April 1983 $2.50

QST

devoted entirely to Amateur Radio

ANNEE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

Phase III takes shape

Page 49

the tempo S-15

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

The S-15 is the kind of hand held most people want. Simple, rugged, reliable, easy to use...it's the hand held for today and tomorrow. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. The S-15 operates from 140 to 150 mHz (and 150 to 160 on export models). Compare that to the others. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry...just one more indication of the kind of quality that goes into the S-15

Consider all of 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)

Available soon!!
The CS-15.. a new version of the S-15.. for commercial use.

- ✶ FCC type accepted
- ✶ Fully synthesized
- ✶ Ultra compact, portable
- ✶ Internally programmable
- ✶ Full 5 watt output
- ✶ 10 MHz receiver coverage

TEMPO M-1
Superb quality VHF marine band hand held. Synthesized for world wide use...all marine channels & 4 weather channels. Ch 16 override. All offsets built in.

TEMPO S-2 Use 220 MHz repeaters nationwide. Synthesized, field tested and dependable.

TEMPO S-4 The first 440 MHz hand held and still a winner.

Available at your local Tempo dealer or from..

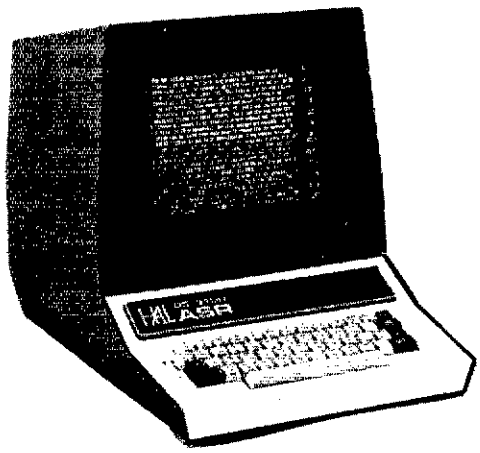
54 YEARS OF SERVICE

Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
Butler, Missouri 64730 (816) 679-3127

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

MESSAGE PROCESSOR TERMINAL



MPT3100

Message processing is now available for radio communications systems. The MPT3100 is a complete up-date of the popular HAL DS3100 RTTY terminal, adding the ability to store RTTY messages, edit them, and retransmit them singly or in preset groups. ALL of the previous features of the DS3100 and MSO3100 are retained and new mailbox commands are included. The editor may be used with any file that is stored. The MPT3100 includes ASR (Auto Send-Receive), MSO (Message Storage Option - "mailbox"), and TRO (Traffic Relay Option) modes. The MPT3100 is a new software package that works in ANY DS3100 with MSO3100 circuit board. Some of the features of the MPT3100 are:

NEW FEATURES OF MPT3100:

- Automatic storage of all received text in files separated by the standard "NNNN" terminator (TRO-REC mode)
- Full editing capability of all files stored by mailbox (MSO) or by TRO storage
- Editor allows insertion or deletion of text in any part of a stored message - 15 keyboard edit commands
- Editor may be used even while receiving, transmitting, or storing messages - even when MSO mailbox is in use
- Files may be renamed, created in the editor, cut into smaller files, and deleted with keyboard commands
- Message files may be transmitted singly or in batches
- Transmitted messages may be serial-numbered automatically
- The full format requirements for NAV MAR COR MARS NTP-8(A) are supported
- New TRO commands include: RXON, RXOFF, DIR, SEND, STOP, RESUME, RESTART, EDIT, CUT, CREATE, QUIT, RENAME, DELETE
- On-screen status indicators show: TRO mode; bytes of memory remaining; file names being recorded, transmitted, and edited
- MSO mailbox .SDIR directory command revised to shorten time required for transmission
- New .DIR [filematch] and .SDIR [filematch] mailbox commands give listing of only file names that include [filematch]
- Programmable "header ID" for each mailbox transmission

MSO Mailbox Features:

- Programmable MSO call-up command
- Mailbox may be controlled by external station to store message files, read files, delete files, and list the file directory
- DS3100 operator may perform all MSO operations on the keyboard without transmitting
- Mailbox transmissions include user-prompting and automatic CW and RTTY indentification
- HELP messages are provided to assist the new user in operation of the mailbox
- All mailbox messages stored may also be edited, renamed, and transmitted using TRO commands
- MSO commands are: .DELETE, .DIR, .DIR [filematch], .ENDFILE, .FILEHELP, .HELP, .KY1ON/OFF, .KY2ON/OFF, .PRINTON/OFF, .QBF, .READ, .RYS, .SDIR, .SDIR [filematch], .WRITE

DS3100ASR Terminal Features:

- Send and receive ASCII, Baudot, Morse codes
- ASCII or Baudot at 45, 50, 57, 74, 100, 110, 134, 150, 300, 600, 1200, 2400, 4800, and 9600 baud; full or half duplex
- Morse code at 1 to 175 wpm
- Full length 72 character line / 24 line screen display.
- 50 line pre-type on-screen transmit buffer
- True "ASR" operation - pretype transmit text while receiving
- 150 line receive display buffer
- MSO 3100 adds 32K bytes of additional storage
- 12 inch, P31 green display built-in
- Control functions are clearly marked on keytop
- On-screen status indicators with real-time indication
- Upper-lower case ASCII with ALL control codes
- Current loop or RS232 RTTY input/output
- Positive and negative Morse key outputs
- ASCII printer output prints Baudot, Morse, or ASCII text
- Operates on 105-130 / 210-250 VAC 50-400 Hz power

WHEN OUR CUSTOMERS TALK, WE LISTEN – and we have been listening. Rather than making a proven product obsolete – a product that is well known and respected for its reliability and capabilities – HAL has completely rewritten the software of the DS3100 to offer the features that our communications customers have been asking for. A full year in the preparation, these are features that could only be designed by people who know and operate RTTY. Best of all, ANY DS3100 can be modified at the factory to include the MPT3100! In marked comparison to other radio equipment that is made obsolete by new models every 6 to 12 months, the DS3100 lives on – a full 4 years after its announcement.

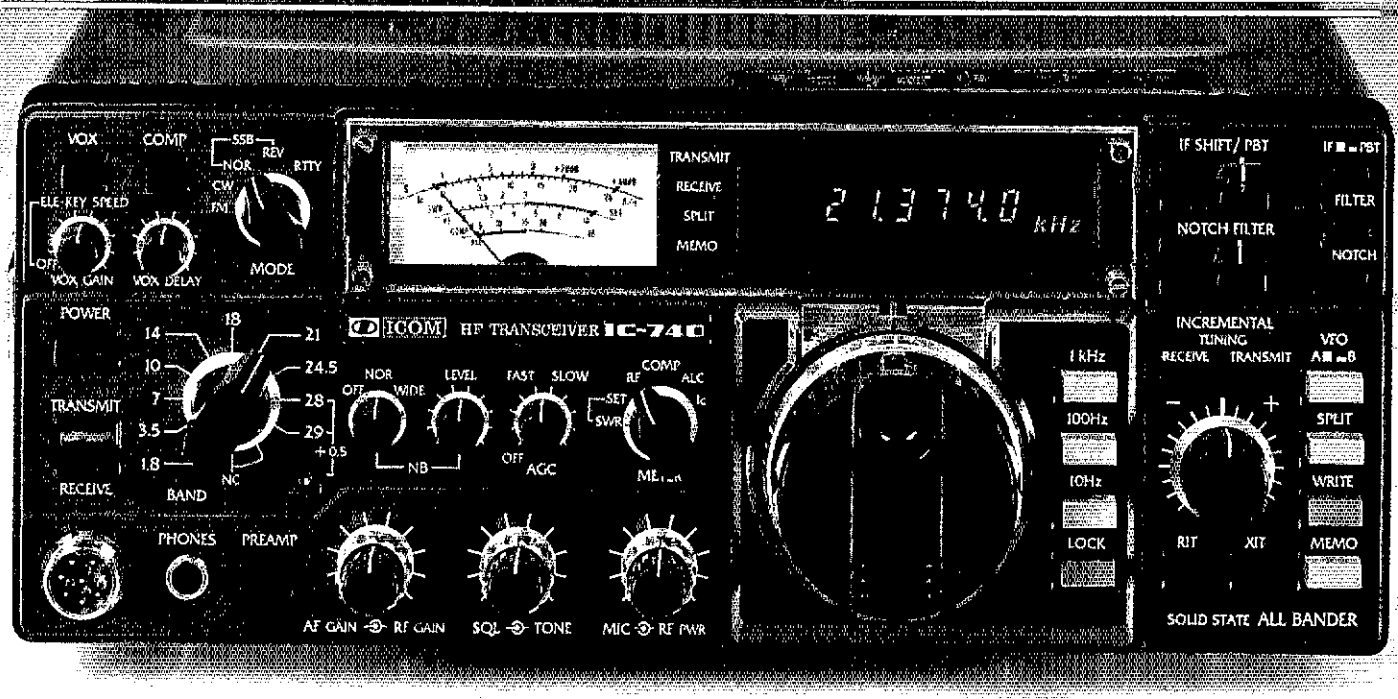
HAL COMMUNICATIONS CORP.
BOX 365
URBANA, ILLINOIS 61801

If you are really serious about your RTTY, look to HAL, your REAL RTTY company.

Please write for even more details about the *MPT3100 Message Processor Terminal*. Call your dealer or HAL for prices and how to get a new MPT3100 or to arrange for modification of your present DS3100.

IC-740

Extensive Versatility for the Serious Operator



The ICOM IC-740 offers features found only on the best amateur equipment and performance second to none.

Dynamic Range. The IC-740 is built to withstand strong adjacent signals and still maintain sensitivity and distortion-free output of the desired signal in its passband. With a dynamic range of over **100 dB** and an intercept point of **+18dBm,** the IC-740 receiver is a true performer. The IC-740 receiver is also **crunch proof,** and unlike many receivers that have good receiver specifications, it does not collapse under the presence of an RF field.

Other outstanding features that are a must for a modern, high-performance amateur receiver are included in the IC-740:

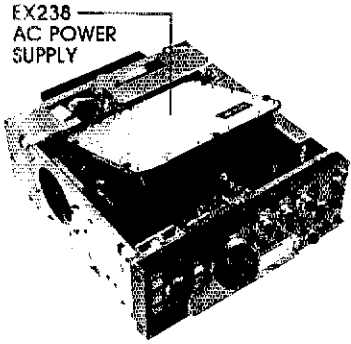
Passband Tuning, adding an additional filtering element to the receiver passband plus giving control of the actual width of the IF stages of the receiver... variable from 2.4 kHz to 700 Hz in SSB, CW or RTTY.

Variable AGC, a two speed AGC with an OFF position allows proper selection of AGC speed **regardless** of mode, VOX or CW breakin. The OFF position makes the IC-740 easily adaptable to frequency converters.

A **Noise Blanker** that really works with both wide and narrow pulse widths and a threshold control to give the optimum blanking with minimum of signal distortion.

And...the IC-740 has an optional **Internal Power Supply** giving 160-10 meter transceive coverage in **one** package.

EX238 AC POWER SUPPLY



These and other fine receiver features plus ICOM's renowned transmitter audio make the IC-740 the **finest amateur transceiver** around today.

$50 Cash Rebate

$50.00 for the purchase of an IC-740.

Begins Dec. 15, 1982
Expires April 30, 1983

OFFER EXTENDED!

ICOM
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 (206)454-8155 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 (214)620-2780

April 1983 *Volume LXVII Number 4*

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

Offices

225 Main St., Newington, CT 06111 USA
Telephone: 203-666-1541.
Telex: 643958 AMRAD NEWI

Member of the Audit Bureau of Circulations

Subscription rate: $25 per year postpaid in the U.S. and Possessions, $30 in Canada, and $33 elsewhere. All payments must be in U.S. funds. Foreign remittances should be by International postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds. Individuals may apply for membership at the rates shown. Licensed Amateur Radio operators under 18 or over 65 — $20 U.S., $25 Canada, $28 elsewhere, plus proof of age. Membership and *QST* cannot be separated. Fifty per cent of dues is allocated to *QST*, the balance for membership. Single copies $2.50.

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

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. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

CONTENTS

OUR COVER

Ulrich Mueller, DK4VW (left), and Gordon Hardman, ZS1FE/KE3D, work on the Phase IIIB satellite during spacecraft integration activities at AMSAT DL, Marburg, West Germany, October 1982. *(photo courtesy AMSAT DL)*

TECHNICAL

BEGINNER'S BENCH

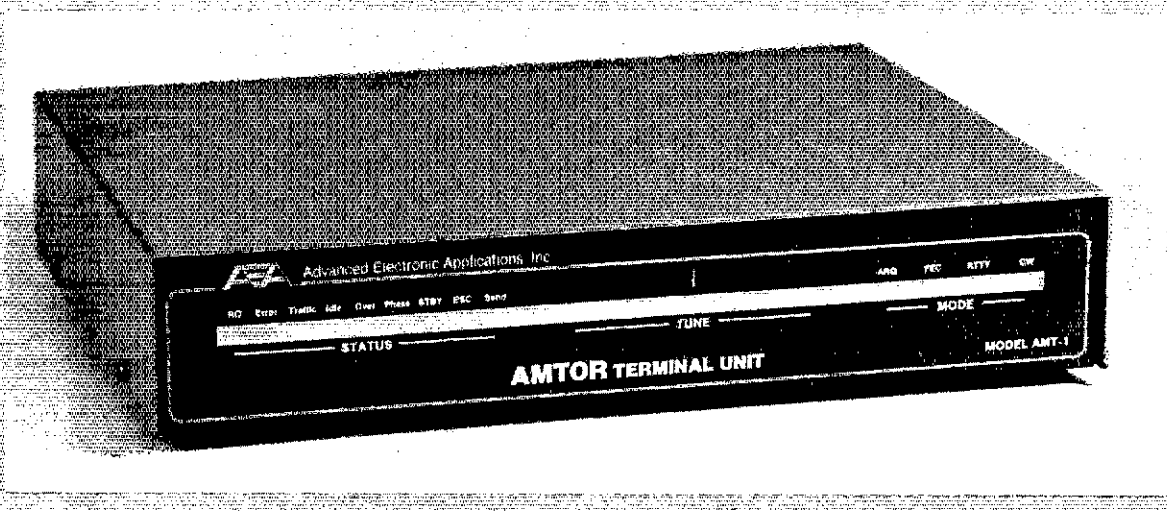
NEWS AND FEATURES

OPERATING

DEPARTMENTS

STOP PRESS
AMTOR NOW OFFICIALLY APPROVED IN U.S.A.

AMT-1
The Definitive AMTOR Terminal Unit



$499.95 Introductory Price

AMTOR is the system of error correcting RTTY which has been rapidly overtaking conventional RTTY in Europe, just as its marine equivalent, SITOR, has been taking over in ship to shore communications.

It was originated by Peter Martinez, G3PLX (see June 1981 QST, p. 25). He first interpreted the international marine CCIR 476-1 specification for amateur use. Virtually all of the 400+ stations presently on AMTOR world wide are using software/hardware designs originated by Peter. The AMT-1 is a proven product which represents his latest and most highly refined design. It represents the culmination of over three years of development and on the air testing, and sets the standard against which all future AMTOR implementations will be judged.

Not only does it incorporate the latest AMTOR specification, but it gives superlative performance on normal RTTY, ASCII and CW (transmit only). As well as some fairly incredible real time microprocessor software, the AMT-1 boasts a four pole active receive filter, a discriminator type demodulator, a crystal controlled transmit tone generator, and a 16 LED frequency analyzer type tuning indicator, which is very easy to use.

Driven from a 12 volt supply, the AMT-1 connects to the speaker, microphone and PTT lines of an HF transceiver and to the RS-232 serial interface of a personal computer or ASCII terminal. All mode control is via ESCAPE and CONTROL codes from the keyboard (or computer program).

It used to be that C.W. was the ultimate mode for "getting through" when QRM and fading were at their worst. That's no longer true — AMTOR will get through with perfect error-free copy when all other conventional transmission modes become useless.

So join the swing to AMTOR now and the large number of satisfied AMT-1 users already on the air outside of the U.S.A. Choose the definitive product. You'll wonder why anyone uses normal RTTY! Send for details. Better yet, see your favorite AEA dealer.

See the AMT-1 and hear Peter Martinez speak at the Dayton Hamfest (Booth #64)

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C-2160, Lynnwood, Wa. 98036
206/775-7373 Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

CUSHCRAFT HF MULTIBAND

CONTEST WINNING ANTENNAS

AV-3
3 BAND VERTICAL
10-15-20 METERS
Only 13 ft., 4.26 m. height
Low priced
Easy to use

AV-5
5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
23 ft., 7.4 m. height
Capacitive X-hat

WITH ADD-ON KIT
4 BAND YAGI
10-15-20-30/40 METERS
NEW 30 METER
WARC BAND WITH
A3 OR A4

A3
3 BAND YAGI
10-15-20 METERS

R3
3 BAND VERTICAL
10-15-20 METERS
No radials
Remote tuning
Better than average
performance
22 ft., 6.7 m. height

ARRL DX CONTEST
MAURITIUS
INDIAN OCEAN

THE CHOICE, A FAVORITE FOR DX-PEDITIONS

The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.
For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3
Broadband, excellent gain and f/b ratio, 2 kw power rating direct 50 Ω feed, Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m, weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1¼ in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

A4
Broadband, excellent gain and f/b ratio, 2 kw power rating, direct 50 Ω feed, boom 18 ft., 5.48 m., longest element 32 ft., 9.7m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1¼" to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.

cushcraft
CORPORATION

THE ANTENNA COMPANY
P.O. Box 4680
Manchester, NH 03108 USA
TELEX 953050

TS-930S

"DX-traordinary"... superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

A superlative, high-performance, all solid-state HF transceiver, that covers all Amateur HF bands, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.

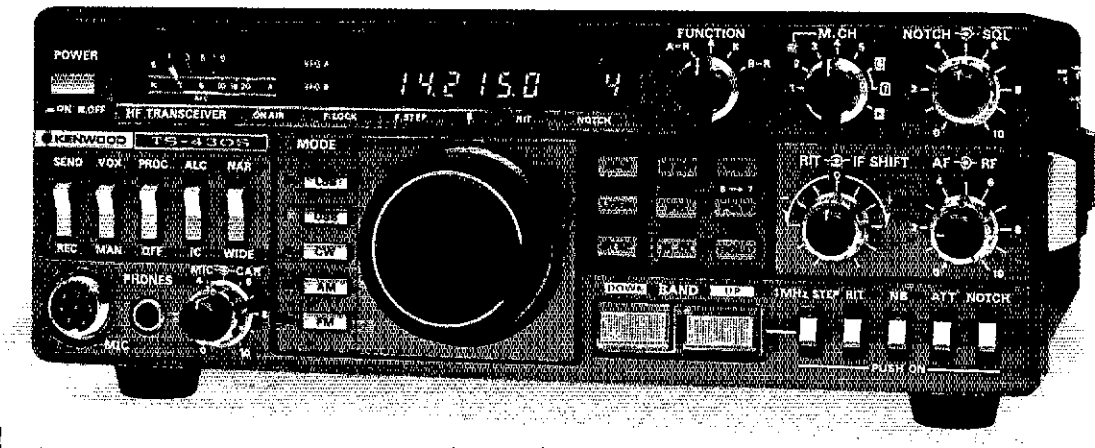
TS-930S FEATURES:

- 160-10 Meters, with 150 kHz-30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC, on SSB, CW, FSK, and AM. UP conversion digital PLL circuit.
- Excellent receiver dynamic range. Typical two-tone dynamic range, 100 dB (20 meters, 50-kHz spacing, 500 Hz CW bandwidth).
- All solid-state 28 volt operated final amplifier. Lowest IM distortion. Power input 250 W on SSB/CW/FSK, 80 W on AM. SWR/ Power meter.
- Available with AT-930 automatic antenna tuner built-in, or as an option. Covers 80-10 meters, including WARC bands.
- CW full break-in. CMOS logic IC, plus reed relay. Switchable to semi break-in.
- Dual digital VFO's, 10-Hz steps, includes band information.
- Eight memory channels. Stores frequency and band data. Internal battery memory back-up, est. 1 yr. life. (Battery not Kenwood supplied.)
- Dual mode noise blanker. NB-1, with threshold control, for "pulse" noise. NB-2 for "woodpecker."
- SSB IF slope tuning, allows independent adjustment of the low and/or high frequency slopes of the IF passband.
- CW VBT and pitch control. VBT tunes out interfering signals. CW pitch control shifts IF pass-band and beat frequency. "Narrow-Wide" filter switch.
- Tuneable, peak-type audio filter for CW.
- AC power supply built-in.
- Fluorescent tube digital display (100 Hz resolution, modifiable to 10 Hz) with digitalized sub-scale, in 20-kHz steps.
- RF speech processor.
- One year limited warranty.
- SSB monitor circuit.

Optional Accessories:

- AT-930 Auto. antenna tuner.
- SP-930 External speaker with selectable audio filters.
- YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455 kHz IF.
- YK-88C-1 (500 Hz) CW plug-in filter for 8.83 MHz IF.
- YK-88A-1 (6 kHz) AM plug-in filter for 8.83 MHz IF.
- SO-1 commercial grade TCXO.
- MC-60A deluxe desk microphone, 8-pin, with pre-amplifier, UP/DOWN switches.

NEW



TS-430S

"Digital DX-terity"... General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch, COMPACT!

Combines compact styling with state-of-the-art circuit design and performance.

TS-430S FEATURES:

- 160-10 meters, with 150 kHz-30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC. UP-conversion digital PLL circuit.
- USB, LSB, CW, AM, and FM (optional) all mode.
- Compact lightweight design. Only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm); only 14.3 lbs. (6.5 kg.).
- Superior receiver dynamic range with Dyna-Mix high sensitivity direct mixing system.
- 10-Hz step dual digital VFO's. Operate independently, include band and mode information. Dial torque adjustable. Step switch for 10-Hz or 100-Hz steps. A=B switch shifts "B" VFO to "A" VFO frequency and mode, or vice versa. VFO LOCK switch. RIT for VFO or memory. UP/DOWN manual scan with optional UP/DOWN microphone.
- Eight memories store frequency, mode, and band data. 8th memory stores RX/TX frequencies independently.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- Memory Scan.
- Programmable automatic band scan width.
- IF shift circuit for minimum QRM.
- Tuneable notch filter, built-in.
- Narrow wide filter selection on SSB, CW, AM (filter optional).
- Speech processor, built-in.
- All solid state. Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Operates on 12 VDC or on 120 VAC, or 220/240 VAC with optional PS-430 AC power supply.
- Fluorescent tube digital display indicates frequency to 100 Hz (10 Hz modifiable).
- All-mode squelch circuit, built-in.
- Built-in noise blanker.
- RF attenuator (20 dB).
- VOX circuit, plus semi break-in with side-tone.

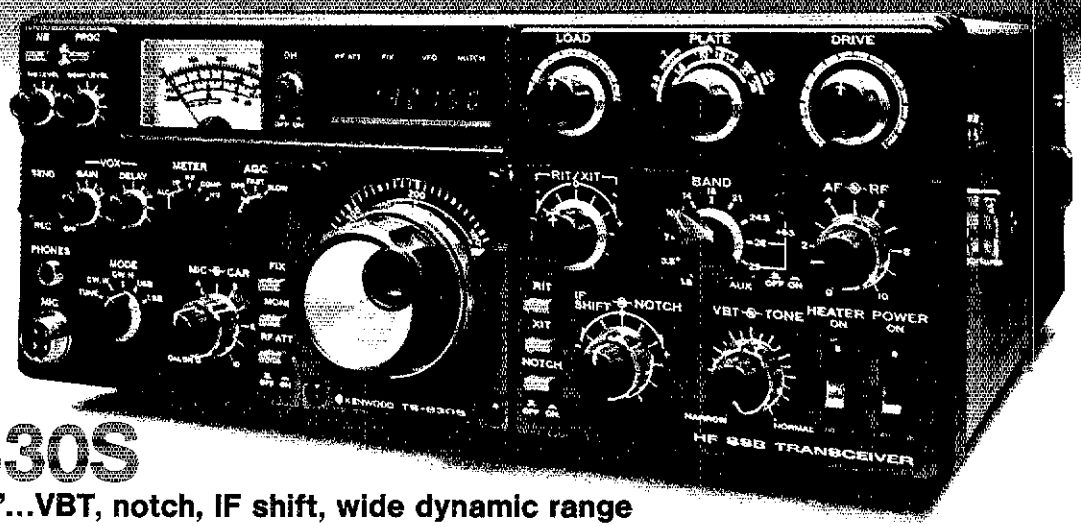
Optional accessories.

- PS-430 compact AC power supply.
- PS-30 or KPS-21 AC supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket
- AT-130 compact antenna tuner, 80-10 m, incl. WARC.
- AT-230 base antenna tuner, 160-10 m, incl. WARC.
- FM-430 FM unit.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand microphone.
- MC-60A deluxe desk microphone, UP/DOWN switch.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220



TS-830S

"Top-notch"...VBT, notch, IF shift, wide dynamic range

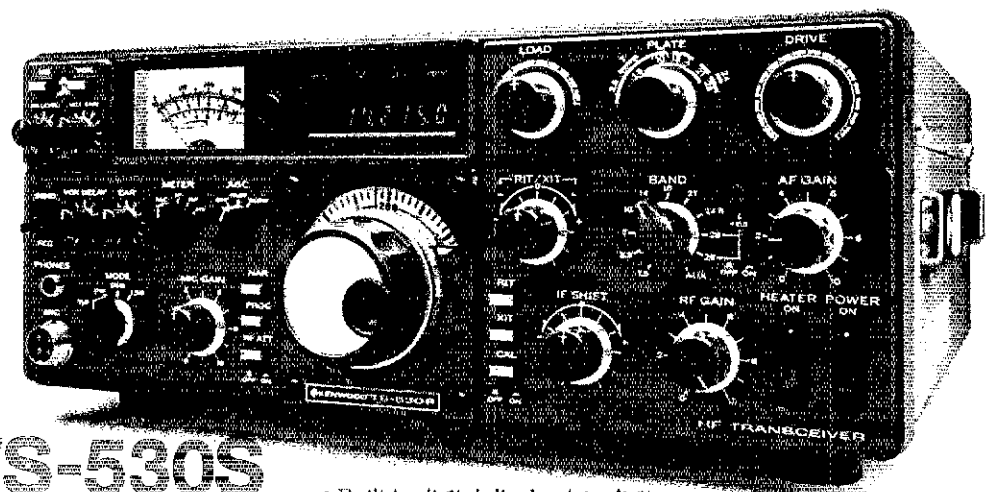
The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF.

TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- 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.
- IF shift (passband tuning).
- Noise-blanker threshold level control.
- Built-in digital display, (fluorescent tube), with analog dial.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- SP-230 external speaker.
- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner.
- 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-530S

"Cents-ational"...IF shift, digital display, narrow-wide filter switch

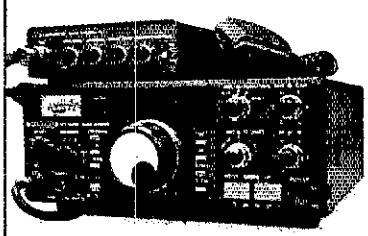
The TS-530S SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530S FEATURES:

- 160-10 meters, LSB, USB, CW, all amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- IF shift tunes out interfering signals.
- 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.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220W 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.



TS-660

The TS-660 "QUAD BANDER" covers 6, 10, 12, 15 meters.

- FM, SSB (USB), CW, and AM
- Dual digital VFO's
- Digital display
- IF shift built-in
- 5 memories with memory scan
- UP/DOWN microphone
- All-mode squelch
- Noise blanker
- CW semi break-in/sidetone
- 10 W on SSB, CW, FM; 4 W on AM.

Optional accessories:

- PS-20 power supply
- VOX-4 speech processor/VOX
- SP-120 External speaker
- MB-100 Mobile mount
- YK-88C, YK-88CN CW filters
- YK-88A AM filter.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

Directors

Canada

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

Vice Director: Harry MacLean, VE3GRO,
163 Meridene Cr. West, London, ON N5X 1G3
(519-433-1198)

Atlantic Division

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

Vice Director: George W. Hippisley, K2KIR,
7932 Irish Rd., Colden, NY 14033 (716-941-5287)

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

TOD OLSON, K∅TO
292 Heather La., Long Lake, MN 55356 (612-473-6478)

Vice Director: Howard Mark, W∅OZC, 11702 River
Hills Dr., Burnsville, MN 55337 (612-890-6302)

Delta Division

CLYDE O. HURLBERT, W5CH, P.O. Box 541,
Biloxi, MS 39533 (601-863-5709)

Vice Director: Edward W. Dunn, W4NZW, Rte. 1,
Box 37, Andersonville, TN 37705

Great Lakes Division

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

Vice Director: George S. Wilson, III, W4OYI,
1649 Griffith Ave., Owensboro, KY 42301

Hudson Division

GEORGE A. DIEHL, W2IHA, 20 Wilson Ave.,
Chatham, NJ 07928 (201-635-8703)

Vice Director: Stephen A. Mendelsohn, WA2DHF,
64 Malden La., Little Ferry, NJ 07643 (201-641-6061)

Midwest Division

PAUL GRAUER,* W∅FIR, Box 190, Wilson, KS
67490 (913-658-2155)

Vice Director: Claire Richard Dyas, W∅JCP,
1826 Tilden St., Holdrege, NE 68949 (308-995-6454)

New England Division

JOHN C. SULLIVAN, W1HHR, Whitney Rd.,
Columbia, CT 06237 (203-228-9111)

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

Northwestern Division

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

Vice Director: M. L. Gibson, W7JIE, 1215 N. 28 Pl.,
Renton, WA 98056 (206-226-4222)

Pacific Division

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

Vice Director: Jettie B. Hill, W6RFF,
22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

Roanoke Division

GAY E. MILIUS, JR., W4UG,
1416 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, K∅PGM, 13495 West Center Dr.,
Lakewood, CO 80228 (303-986-5420)

Vice Director: Marshall Quiat, AG∅X, 1624 Market St.,
Suite 200, Denver, CO 80202 (303-333-0819)

Southeastern Division

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

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

Southwestern Division

JAY A. HOLLADAY,* W6EJJ, 5128 Jessen Dr.,
La Canada, CA 91011 (213-790-1725)

Vice Director: Fred Heyn, WA6WZO, 962 Cheyenne
St., Costa Mesa, CA 92626 (714-549-8516)

West Gulf Division

RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr.,
San Antonio, TX 78213 (512-733-9632 home,
512-684-5111 business)

Vice Director: Thomas W. Comstock, N5TC,
1700 Dominik, College Station, TX 77840 (713-693-1181)

*Executive Committee Member

Section Communications Managers/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 Communications Manager or Section Manager. Your SCM/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 SCM/SM has an appointment available. Check with your SCM/SM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

Canadian Division

Alberta — E. Roy Ellis, VE6XC, P. O. Box 2, RR 1, Fort Saskatchewan T8L 2N7
British Columbia — H. E. Savage, VE7FB, 4563 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba — Peter Guenther, VE4PG, Box 178, Morris R0G 1K0 (204-746-6502)
Maritime-Nfld — Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot J∅H 1Y∅ (514-798-2173)
Saskatchewan — W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

Atlantic Division

Delaware — Harold K. Low, WA3WIY, Rte. 6, Box 66, Millsboro 19966 (302-945-2871)
Eastern Pennsylvania — Karl W. Pfeil, W3VA, 211 Schuylkill Ave., Tamaqua 18252 (717-668-3533)
Maryland-D.C. — Karl R. Medrow, W3FA, 702 W. Central Ave., Davidsonville, MD 21035 (301-261-4008)
Southern New Jersey — Edward E. Wood, N2CER, RD 2 Box 186, Mays Landing 08330 (609-625-0317)
Western New York — William Thompson, W2MTA, RD 1 Rock Rd., Newark Valley, 13811 (607-642-8930)
Western Pennsylvania — Otto Schuler, K3SMB, 3732 Colby St., Pittsburgh 15214 (412-231-6890)

Central Division

Illinois — David E. Lattan, WD9EBQ, RR 1, Box 45E, Makanda 62958 (618-529-1578)
Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin — Roy Pedersen, K9FHI, 510 Park St., Juneau 53039 (414-386-4666)

Dakota Division

Minnesota — Helen Haynes, WB∅HOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota — Dean R. Summers, KQ∅C, 304 4th Ave. NW, Mandan 58554 (701-663-0130)
South Dakota — Fredric Stephan, KC∅OO, Box 772 - Wind Cave Ranch, Hot Springs 57747 (605-745-6006)

Delta Division

Arkansas — Joel M. Harrison, Sr., WB5IGF, 1403 Forrest Dr., Searcy 72143
Louisiana — John J. Meyer, N5JM, 112 Sherwood Forest, New Orleans 70119 (504-482-3493)
Mississippi — Thomas Hammack, W4WLF, 9 Cardinal Cove, Long Beach, 39560 (601-864-4452)
Tennessee — John C. Brown, NO4Q, P. O. Box 37, Eva 38333 (901-584-7531)

Great Lakes Division

Kentucky — Anna R. Sloan, KA4GFU, 3570 Lovelaceville Rd., Paducah 42001
Michigan — James R. Seeley, WB8MTD, 14630 Clinton Rd., Springport 49284 (517-569-2411)
Ohio — Allan L. Severson, AB8P, 1275 Ethel Ave., Lakewood 44107 (216-521-1565)

Hudson Division

Eastern New York — Paul S. Vydareny, WB2VUK, 259 N. Washington, North Tarrytown 10591 (914-631-7424)
N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4635)
Northern New Jersey — Curtis R. Williams, W5DTR/2, RD 3, Box 175, Fox Run Rd., Califon 07830 (201-832-2821)

Midwest Division

Iowa — Bob McCaffrey, K∅CY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas — Robert M. Summers, K∅BXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Benton C. Smith, K∅PCK, RFD 1, Prairie Home 65068 (816-427-5319)
Nebraska — Reynolds B. Davis, K∅GND, 1922 Pawnee, Lincoln 68502

New England Division

Connecticut — Peter Kemp, KA1KD, 5 Greenwood Ave., Bethel 06801
Eastern Massachusetts — Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire — Robert Mitchell, W1NH, RFD 4, Blueberry Hill, Raymond 03077
Rhode Island — Gordon F. Fox, W1YNE, 13 York Dr., Coventry 02816 (401-828-6045)
Vermont — Reed A. Garfield, WB1ABQ, P.O. Box 571, Lyndonville 05851 (802-626-9430)
Western Massachusetts — William Hall, W1JP, Prospect Hill Rd., Brimfield 01010 (413-245-7140)

Northwestern Division

Alaska — Richard Henry, AL7O, P.O. Box 451, Tok 99780 (907-883-5507)
Idaho — Dennis L. Hall, KK7X, 1614 Montana Ave., Coeur D'Alene, 83814 (208-667-3591)
Montana — L. C. "Les" Belyea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington — Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406 (206-759-9857)

Pacific Division

East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada — William J. Marshall-Gratrix, KA7Q, 304 Bret Harte Ave., Reno 89509 (702-322-3554)
Pacific — R. A. "Army" Curtis, AH6P, P.O. Box 4271, Hilo, HI 96720 (808-959-8985)
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Robert Odell Smith, NA6T, 320 Park St-P.O. Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Ross W. Forbes, WB6GFJ, P.O. Box 1, Los Altos, CA 94022 (415-948-5193)

Roanoke Division

North Carolina — Ian C. Black, WD4CNR, Rte. 5, Box 79, Murphy 28906 (704-837-5684)
South Carolina — James G. Walker, WD4HLZ, Rte. 2, Box 432, Marion 29571 (803-423-3645)
Virginia — Phil Sager, WB4FDT, 1829 Stanley Pl., Falls Church 22043 (703-734-2987)
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Leonard M. Norman, W7PBV, 933 South Cedar Knolls, Cedar City 84720 (801-586-9859)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)

Southeastern Division

Alabama — Hubert H. Wheeler, W4IBU, 2100 Buckingham, Huntsville 35803 (205-881-9168)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, P.O. Box 9673, Jacksonville 32208 (904-744-9501)
Southern Florida — Richard D. Hill, WA4PFK, 3800 S.W. 11th St., Ft. Lauderdale 33312 (305-583-6932)
West Indies — Gregorio Nieves, KP4EW, 1390 San Bernardo St., Altamesa-San Juan, PR 00921

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles — Stanley S. Broki, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Sandra Mae Heyn, WA6WZN, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Arthur E. Roberts, W1GOM, 2941 N.W. 44 St., Oklahoma City 73112 (405-947-5347)
Southern Texas — Arthur R. Ross, W5KR, 132 Sally La., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

DX, Pileups and Common Sense

A couple of recent DXpeditions have generated more than the usual amount of mail. The common thread in the letters is that we have a real problem, and something needs to be done about it. The problem, as defined by most of the correspondents, is that individual DXpeditions are taking up altogether too much of the bands as they spread out calling stations so as to make it easier to pick out call signs from the pile. The problem usually is associated with split-frequency ssb operation, particularly on 20 meters, but the cw band has seen its abuses as well.

The reason this is a problem, of course, is that not everyone on the band shares the single-minded goal of contacting that particular DX station at that particular moment. Nets, ragchews and a host of other worthwhile activities are going on at the same time, and these operators are understandably miffed when they are set upon by a horde of people shouting their call signs ad infinitum, sometimes apparently without listening on their transmitting frequency. It's not deliberate or malicious interference, but it's certainly thoughtless, and much of it is unnecessary. From there tempers flare, there's retaliation, things escalate — and we have another incident that wreaks havoc on Amateur Radio's image and does nothing good for our collective blood pressure.

The one individual in the best position to do something about the problem is, of course, the DXpedition operator. He or she specifies the range of listening frequencies and the stations (divided by call sign numerically, alphabetically or geographically) whose calls will be answered, and otherwise manages the pileup. A talented operator can keep hundreds, even thousands, of stations in line while making contacts at the rate of four or more per minute, without taking up more than a few kilohertz of the band. It takes a rare combination of good nature, fairness and operating skill, but it can be done — and the result is a well-ordered pileup that is a joy to behold, fun to be in and doesn't get in anyone else's way.

Is it too much to hope for that operators on rare DXpeditions will all measure up to that ideal? Probably it is, since the people with the time and money for such ventures aren't automatically the best operators (though there are a number who do mighty well). For the rest of us who may find ourselves on the other end of a massive pileup, though, a little common sense will go a long way. Nearly everyone in a pileup will follow instructions and not get out of line if things are being handled fairly and if contacts are being made at a reasonable rate. Nearly everyone *not* in a pileup will take pains to avoid causing interference as long as it's not "polluting" too much of the band.

How much is too much? Reasonable people will differ, but 10 kHz strikes us as being sufficient for nearly any situation, and over the years we've been on both ends a few times. Clearly, there's no justification for "listening 200 to 350," sending cw stations into RTTY territory, or being so nonspecific with instructions that the whole band gets clobbered. An expedition to a rare spot is a signficant event in Amateur Radio, but everything else that goes on in our bands can't be expected to stop for it.

Those of us who stay at home aren't completely helpless, either. Expeditions to rare spots generally require financial backing, and the talent and temperament of operators being sent certainly deserves more than a passing thought when sponsorship is considered. DX organizations ought to be especially sensitive to this.

Will things get better? We certainly hope so. If not, the non-DX part of the amateur community is going to press the League, if not the FCC, for measures that will protect its interests. A little self-restraint by DXers will go a long way toward avoiding restraints designed by others. The members of the League's DX Advisory Committee are wrestling with the problem. They're appointed by your elected Directors to represent you in DX matters; let them know how you feel. — *David Sumner, K1ZZ*

FCC Filings: Quality vs. Quantity

In planning your response to the FCC codeless license proposal (March *QST*, p. 49) for filing by the April 29 deadline, you may wish to bear in mind what the Commission had to say last summer about quality vs. quantity of comments in its proceedings. In a memorandum opinion and order" in Docket 20817, in which the Radiotelephone First Class Operator License was eliminated, FCC said:

> Several petitions set about counting the number of commenters in favor of or opposed to the rule changes we proposed, arguing that the number of commenters on one side of an issue or another accurately reflects the public sentiment on the question and that this number dictates the required outcome of the Commission's deliberations. This premise is faulty for two reasons. First, in proceedings such as this one, where proposed rule changes significantly affect one particular segment of an industry, the affected group always provides the largest number of comments. Although the comments of parties so directly affected are invaluable, simple head counting is not an adequate or acceptable basis for reaching a public interest determination. Rather, the Administrative Procedure Act requires the Commission to analyze all arguments presented, weighing appropriately the comments of each party. Sometimes one documented, well justified position will be more enlightening than many unsupported opinions advocating the opposite outcome. In short, our decision-making process must weigh the merits on each side of an issue.

The moral of the story? We leave that to you. — *David Sumner, K1ZZ*

League Lines...

We deeply regret having to report that ARRL Northwestern Division Vice Director Mel C. Ellis, K7AOZ, passed away on February 22. Mel suffered a massive heart attack after surgery to correct an aneurysm. ARRL President Vic Clark, W4KFC, has appointed M. L. Gibson, W7JIE, as Vice Director to fill out Mel's unexpired term.

The lawsuit brought by George Goumas, N6AWF and others against the City of Cerritos, California has not been dismissed after all! The federal judge in the case is permitting the amateurs to amend their original complaint so as to challenge a new ordinance recently adopted by the City. The ARRL Executive Committee, meeting in San Francisco in February, passed a resolution to "entertain a request for League support in the form of funds to match contributions to the Cerritos Antenna Trust Fund by the local amateur community to overturn any ordinance adopted in Cerritos which is substantially more restrictive than that originally adopted by the City Council on December 2, 1981."

A violation of Citizens Band radio rules is justification for license revocation and/or suspension of a license held by the same individual in the Amateur Radio Service. In three Citizens Band/Amateur Radio license revocation cases, the Commission agreed with its Private Radio Bureau that violation of rules in either service warranted revocation in either service. This ruling results from an appeal by the PRB of FCC Review Board decisions which have held to the contrary.

The FCC has granted A. Prose Walker, W4BW, of Tallahassee, Florida permission to conduct research on propagation effects and the potential of vertical incidence transmission and ionospheric echoes on the bands 18.068-18.168 and 24.890-24.990 MHz.

Cable television interference is the subject of a formal ARRL statement to the U.S. Senate. The Senate Committee on Commerce, Science and Transportation is considering S.66, a bill sponsored by Senator Barry Goldwater, to amend the Communications Act to address cable television service to the public. The League stated that incidents of radio frequency interference continue to be caused by cable television signal leakage, and that existing rules are ineffective in dealing with cable television interference. ARRL urged the committee to acknowledge the existence of the problem in its report of this legislation so that the message that this is a serious problem is driven home to the FCC and the industry. See "Happenings" in next month's issue.

W1AW goes AMTOR! On February 9, the Headquarters station began experimental transmissions on AMTOR, forward error correction (FEC) mode, operating under special temporary authority (STA). See the W1AW schedule (page 83 of this issue) or listen to RTTY/ASCII bulletins for details. W1AW's first AMTOR two-way was completed on February 3, with G3PLX, who authored an article on AMTOR in June 1981 QST. Incidentally, AMTOR is permitted without need of an STA, as of February 22. See "Happenings" this month for details.

A bill to prevent restrictive or prohibitive zoning ordinances for Amateur Radio antennas and towers has been reintroduced in the Pennsylvania legislature by Rep. Benjamin Wilson, WA3ACB. H.B. 49 would allow some amateur tower regulation, but "only to the extent as necessary to protect life or property." Pennsylvania amateurs should register their support of H.B. 49 with their state representatives.

Canadian and U.S. amateurs! Remember, it is no longer necessary to obtain prior permission to operate your amateur station while a guest of your neighboring country. There are automatic reciprocal operating privileges for Canadian amateurs visiting the U.S. and U.S.amateurs visiting Canada. The frequency privileges granted are limited by one's own class of license, except that in addition the frequency and mode limitations of the host country must also be observed.

The International Amateur Radio Union (IARU), the international federation comprised of Amateur Radio societies in 117 countries around the world, hosted a reception at International Telecommunication Union (ITU) Hq. in Geneva on March 8. The reception for delegates attending the World Administrative Radio Conference on the Mobile Services served to introduce Amateur Radio to high-ranking communications officials. David Sumner, K1ZZ, ARRL General Manager and IARU Secretary, attended.

Long Life for Your Transmitting Tubes

Here are some "housekeeping" rules that will help you achieve maximum tube life.

By William I. Orr,* W6SAI

Transmitting tubes represent a significant proportion of the money a radio amateur spends for his or her station, so it's prudent to reduce the cost-per-hour of operation by getting longer life from the tubes. Abuse of the power tube can be costly. Common sense tells the user to operate the tube in the manner recommended by the manufacturer. This article provides some insight into tube operation and provides information that will allow the operator to gain the maximum life from power tubes.

A data sheet covering operation of a specific tube type is available from the manufacturer.[1] It outlines the maximum ratings and provides typical operating conditions for the tube. Maximum ratings must never be exceeded, but some latitude exists in the typical operating conditions. The data sheet is a good starting point in the search for long tube life.

What is the Life of a Power Tube?

If a large number of power tubes of a given type are run in a life test, tube "death" will follow the same mortality curve as that used by insurance companies to determine policy rates. Thus, while it is impossible to determine when a particular tube will fail, it *is* possible to ascertain the *average* life of a number of tubes, which can be extended by proper care. The situation is akin to the Old-Timer who, after taking a physical examination, told the doctor, "If I knew I was going to live this long, I would have taken better care of myself!"

All things being equal, the better care an operator takes of a power tube, the longer it will last. It is possible to extend the life expectancy of an individual tube, just as clean living will help to extend *my* life expectancy (or so I have been told!).

Well-designed power tubes are very forgiving of abuse — more forgiving, for example, than TV type "sweep tubes" or rf power transistors. Nevertheless, the ultimate life of a particular power tube in a given piece of equipment depends on the care and expertise of the operator. Even in the best equipment, tube life can be shortened by the operator who believes in "all knobs to the right!" Tube life can be curtailed by the operator who does not read the instruction manual and doesn't know how to operate equipment properly. Heat is the enemy of long tube life, and an amplifier operated in an off-tune or overloaded condition can quickly damage the power tubes therein.

Filament-Voltage Management of Thoriated-Tungsten Tubes

Certain tubes, such as the 3-500Z, 4-1000A and others have a thoriated-tungsten filament. The filament is processed and heated in the presence of a hydrocarbon to produce ditungsten carbide on the surface of the wire. Life is proportional to the degree of carburization and the filament operating tempera-

[1]Information on most EIMAC tubes and other products may be obtained by writing: Application Engineering Department, Varian/EIMAC, 301 Industrial Way, San Carlos, CA 94070. Data sheets for the 3-400Z, 3-500Z, 3-1000Z and 8877 tubes may be obtained from Varian/EIMAC, 1678 South Pioneer Rd., Salt Lake City, UT 84104.

* c/o Varian/EIMAC, San Carlos, CA 94070

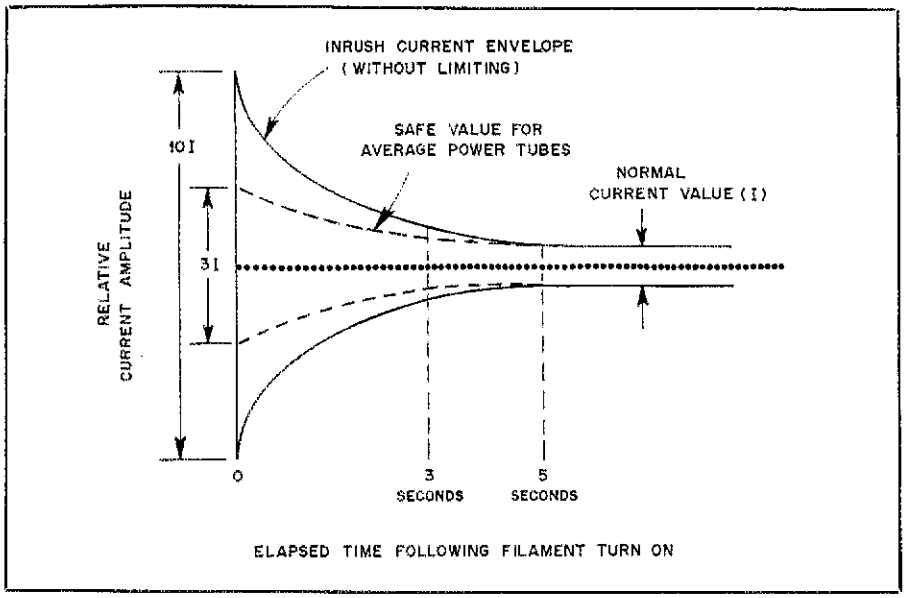


Fig. 1 — Graphic representation of filament inrush current. With no protection, filament inrush current may be as high as 10 times the normal value, for up to 5-seconds' duration (with tubes of the amateur power level). Most tubes are easily capable of withstanding three times the normal filament current; this is a good limiting value. Amateur type tubes can be run at 60% of nominal filament voltage for two to three seconds, after which the voltage is raised to nominal value. Filament voltage may also be brought up to nominal value by means of a variable-voltage transformer.

Table 1

Suggested Primary-Circuit Resistor for Limiting Filament Inrush Current

Tube Type	*Time Delay (Sec.)*	*Resistor*
3-500Z, 4-400A	2	50 Ω,50 W
2 × 3-400Z, 2 × 3-500Z, 4-1000A	2	25 Ω, 50 W
8873/4/5, 4CX250B	4	150 Ω, 50 W
2 × 8873/4/5, 2 × 4CX250B	4	75 Ω, 50 W
8877, 4CX1000A	4	75 Ω, 50 W

ture. As the tube is used, the filament slowly decarburizes and finally is no longer an effective electron emitter.

The key to extending the life of a thoriated-tungsten filament is temperature control, which is a function of filament voltage. For most power tubes a nominal value is given on the data sheet, plus recommended variation limits (usually ±5% of the nominal voltage). The danger of operating the filament in excess of the high limit is that when electron emission is accelerated, the filament decarburizes more rapidly and life is shortened. The danger of operating beyond the lower limit is that a "cool" filament is in danger of being "poisoned" by gas ions in the tube (no vacuum is perfect), or by contaminants forced out of the other tube elements. These can be released during a period of high-temperature operation brought on by an overload.

Operation of the filament within the ±5% voltage range cannot be done without an accurate filament voltmeter. If your amplifier has such an instrument, its accuracy should be checked. If no internal meter is present, the filament voltage can be checked with an external instrument, and a correlation made between line voltage and filament voltage. Once this is done, it is only necessary to check the line voltage to know the filament voltage. Holding the filament voltage within the recommended range will pay big dividends in extended tube life!

Filament Voltage Management of Oxide-Cathode Tubes

Some smaller transmitting tubes, such as those in the 4CX250 family, the 8873/4/5 and the 8877 employ an indirectly heated cathode emitter instead of a thoriated-tungsten filament. The cathode is coated with a barium-strontium emitter that is brought up to temperature by a heater located within the cathode can. These tubes require a period of time for the cathode to reach operating temperature, and potential should never be applied to the tube until the cathode temperature is stabilized. Warm-up time is noted on the data sheet for each tube type.

As with the filament type tube, it is important to hold the heater of the oxide-cathode tube within the voltage limits set by the manufacturer. In the majority of cases, it is ±5%. Exceeding the recommended heater voltage in these tubes will tend to reduce tube life, and falling short of it will severely restrict electron emission.

Filament Inrush Current Protection

As in the case of the common light bulb, the filament or heater of a cold power tube has about one-tenth the resistance of a hot filament. Thus, at the instant of turn-on, inrush current can be up to 10 times the normal amount, until filament temperature rises to the proper value (Fig. 1). This large current surge overloads the filament structure and also creates a strong magnetic field. This field *can warp the filament and grid structures* in a very large power tube! Filament inrush current can be limited to some extent by the filament transformer, which should never be larger than necessary to do the job.

Simple inrush current protection circuits are shown in Fig. 2. Any of these may be retrofitted into an amplifier. A variable-voltage transformer (Fig. 2A) in the primary circuit is a practical solution. Before the amplifier is turned on, the transformer is set at zero volts. Next, the amplifier is turned on and the filament voltage is brought up to normal. This simple operation need only take two to four seconds. With practice, the operation will almost become automatic.

Another effective inrush current protector is shown in Fig. 2B. A series-connected current limiting resistor is placed in the primary circuit of the filament transformer, or in the ac line. Once the power switch is thrown, the resistor is shorted out after two to four seconds. A time-delay relay or simple shorting switch may be used. The resistor should limit the filament voltage to about 70% of the nominal value (Table 1).

Simpler yet is a shorting type (make-before-break) rotary switch, connected as shown in Fig. 2C. In switch position 1, filament voltage is off. In position 2, voltage is applied through the limiting resistor. In position 3, full voltage is applied to the filament transformer. Passing through all the switch positions takes only a few seconds.

Line Voltage Regulation

A vexing problem to many radio amateurs is primary line voltage regulation. Line voltage can wander about during a 24-hour period, and may drop abruptly when a moderate load comes on the line. Unless the line is "stiff" and can withstand the full amplifier load, filament voltage will drop under peak input power conditions. This places a strain on the power tube filament, as voltage is lowest

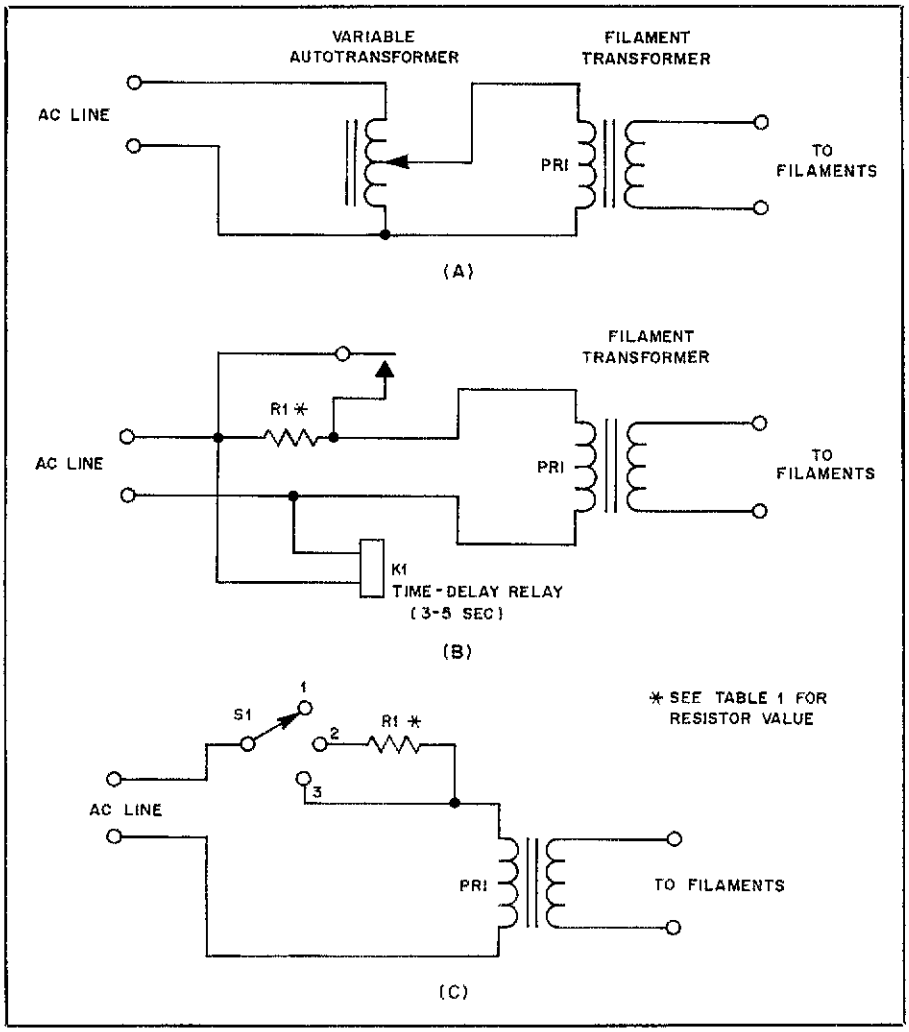


Fig. 2 — A variable-voltage transformer is used to bring the filament voltage up to nominal value over a period of two to three seconds (A). At B, series-connected resistor R1 is shorted out by time-delay relay K1 or a hand-operated switch. In circuit C, make-before-break rotary switch S1 is used to turn on the filament transformer. Switch position 2 introduces the current-limiting resistor.

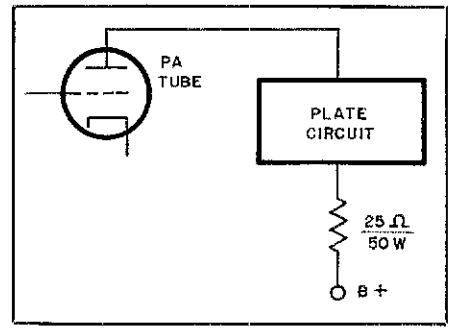


Fig. 3 — A series resistor in the B+ lead protects the tube and related components in the event of a flashover.

when electron demand is highest.

On the other hand, filament voltage can rise during periods of low primary power utilization. Line-voltage fluctuations of 10 V or more are common; this is equivalent to a 0.4-V variation on a 5-V filament line powered from a 117-V primary transformer.

When voltage regulation is a problem, it is wise to set nominal filament voltage in the key-up (standby) condition, and permit less than a 5% drop in voltage at maximum power output. This can best be achieved by operating the amplifier on a 234-V line, as opposed to a 117-V line. When long-term voltage variations are pronounced, the only practical solution is to utilize a primary voltage control device, such as a rheostat or variable-voltage transformer, and maintain an "eyeball" check on the filament voltmeter.

Cooling

A high-power amplifier generates plenty of heat. Sources of this are the tube filament, plate and ohmic losses in the amplifier circuitry. Most amateur amplifiers of the 2-kW-PEP class incorporate a ventilation system to move the hot air out of the cabinet. The operator should make sure this system is in proper order and that air intake and exhaust vents are clear to allow free passage of air. Don't place books or pieces of equipment atop an amplifier if the air passes through this part of the cabinet. And don't push the amplifier back against the wall if the air intake is on the rear of the cabinet. Always allow free circulation of air around the amplifier. While manufacturers have been able to miniaturize equipment, nobody has been able to miniaturize the watt. The smaller the cabinet for a given size power amplifier, the more important it is to extract the heat from it. Make sure your equipment runs cool by providing the tubes with an unimpeded flow of cooling air. In a hot climate, or at an elevated altitude (Denver, for example), an additional cooling fan that forces air *into* the amplifier cabinet may help.

Arc Protection

It is possible for a power tube to internally flash over after a period of disuse. Similarly, other components in the plate circuit of an amplifier can flash over on occasion. Since the power supplies in many modern amplifiers use a large filter capacitor, a tremendous amount of energy can pass through a flashover, damaging the tube and associated equipment. A series resistor will dissipate a large portion of this energy, and can be placed in the plate lead to the power tube (Fig. 3). For retrofitting existing equipment, a 25-Ω, 50-W resistor in the B+ lead, *after* the power supply filter capacitor and before the plate rf choke and bypass capacitor, should do the job.

Finally, make sure that the socket contacts for your power tube are clean and make good contact with the tube pins. Also, check that the cooling system is clear of dust and lint. These simple "housekeeping" rules will help you achieve maximum tube life!

Acknowledgments

Thanks to William Barkley, Dick Rasor, W6EDE, William Sain, Bob Tornoe and Bob Sutherland, W6PO (all of Varian/EIMAC) for their help. Also thanks to Robert Artigo, KN6J, formerly of Varian/EIMAC, who prepared a paper on extended tube life for *Broadcast Management/Engineering Magazine* (April 1982). Some of this material has been extracted from that article.

Bibliography

Ayer, R. "Use of Thoriated-Tungsten Filaments in High Power Transmitting Tubes," *Proc. I.R.E.*, May 1952, p. 591.

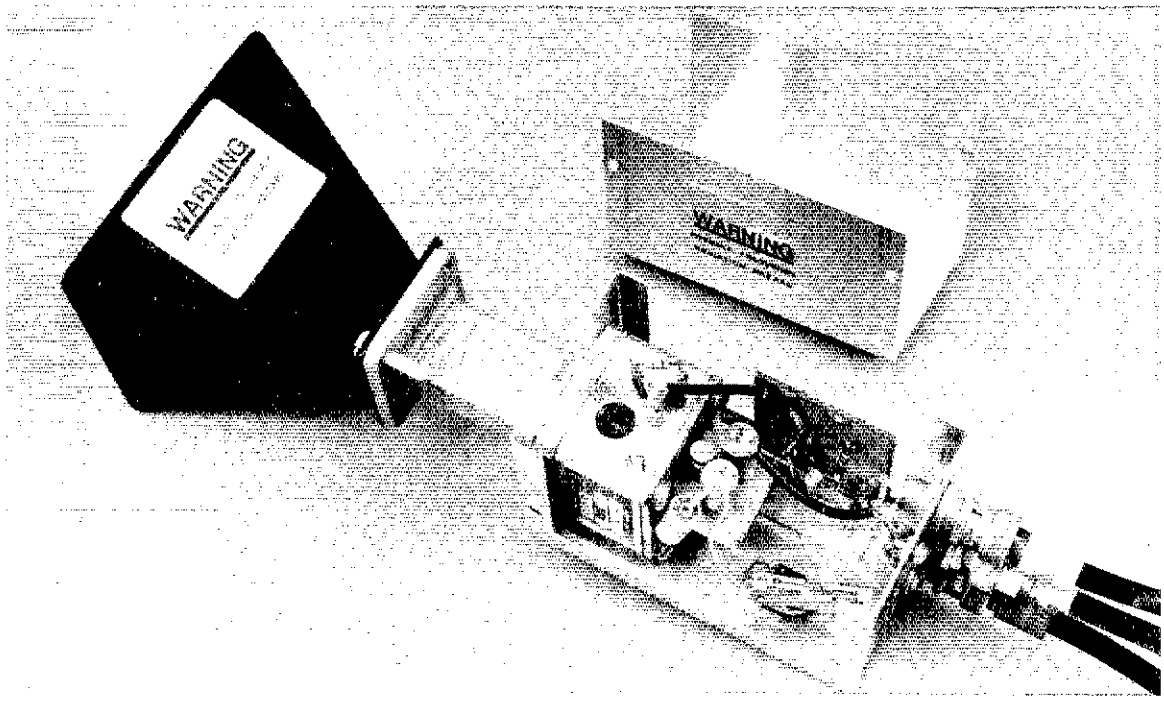
Horsting, C. "Carbide Structures in Carburized Thoriated-Tungsten Filaments," *Journal of Applied Physics*, Vol. 18, January 1947.

Kohl, W. "*Materials and Techniques for Electron Tubes*," New York: Reinhold Publishing Corp., 1960.

Langmuir, I. "The Electron Emission from Thoriated-Tungsten Filaments," *Physical Review*, 1923, p. 357.

Walker, H. "High Power Transmitting Valves with Thoriated Filaments for Use in Broadcasting," *The Institution of Electrical Engineers Paper No. 3200E*, March 1960.

The Care and Feeding of Gunnplexers



Microwaves too difficult? Not so! We'll show you just how easy 10-GHz fm can be.

By Daniel N. Petersen,* WA6OIL

Do you have an adventurous spirit? Do visions of dish antennas pop into your head when you look at your portable barbecue? If so, you should consider "playing microwaves" with a Gunnplexer.[1] The Gunnplexer is a simple, effective way to jump on the 10-GHz bandwagon. In this article, I'll point out some of the pleasures and pitfalls of Gunnplexer operation.

What Is It?

The Gunnplexer, manufactured by Microwave Associates, is a solid-state microwave transmitter and receive converter. It consists of three sections: A Gunn source, a circulator/mixer and an antenna. The Gunn source contains the heart of the system — a Gunn diode. This diode, when placed in a waveguide cavity and subjected to a forward bias, will oscillate at a frequency dictated by the dimensions of the waveguide cavity and by the diode parameters. To put it simply, you apply 10 V dc to the Gunn diode and about 15 mW of 10-GHz "goo" will come out of that rectangular hole at the other end, see?

Also contained in the Gunn source section is a varactor diode. It is used to electrically change the frequency and to frequency-modulate the Gunn source. There is also a mechanical tuning slug that can be used for coarse frequency changes. I do not recommend "fiddling" with that control unless you have had some experience with microwave gear.

The center section is the circulator/mixer. It contains a ferrite circulator and a Schottky mixer diode. The circulator diverts a small portion of the transmit energy to the mixer diode, thus providing a local-oscillator signal for the mixer. A received signal mixes with the local oscillator and appears at the output port, which extends above the circulator/mixer section. The antenna is a 17-dB horn. This type of antenna provides a good amount of gain in a small package. Other types of antennas can be substituted, but for most experimentation the horn is more than adequate.

How Do You Use It?

The Gunnplexer requires very little in terms of operating voltages. A 10-V, 150- to 200-mA dc supply is required for the Gunn diode. This voltage goes directly to the diode with no series resistor. The diode provides the necessary current limiting. Gunn sources are not pillars of efficiency, usually being less than one percent efficient at these power levels. The important thing is that they work well without requiring special support equipment. The varactor tuning diode requires from 1 to 20 V for proper operation. Being reverse biased, the varactor draws virtually no current. You can use a potentiometer as a voltage divider, with a dial on the shaft calibrated in frequency. You can also use a dc voltmeter to indicate your frequency.

[1]Notes appear on page 18.

*Rte. 1, Box 11AA, La Center, WA 98629

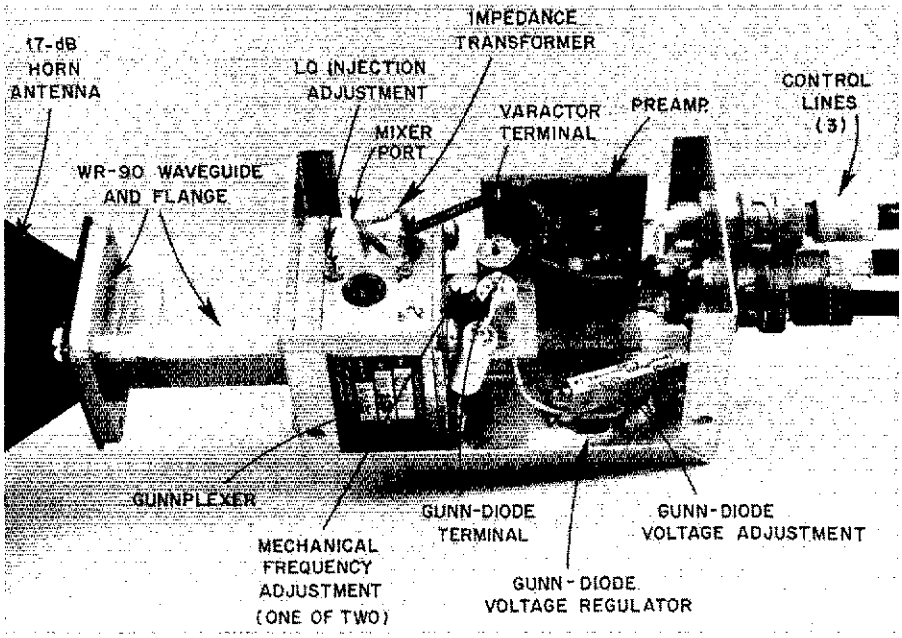


Fig. 1 — This Gunnplexer is housed in a small Minibox. Coaxial cables connect the unit to the i-f receiver and the control circuits. If you mount the horn antenna directly to the Gunnplexer enclosure, the waveguide section can be eliminated.

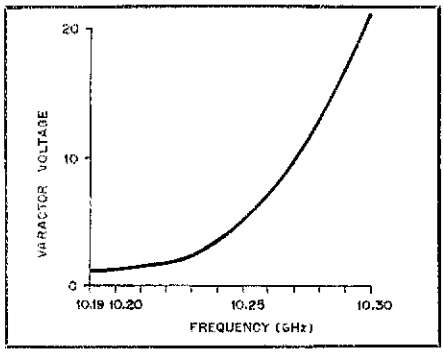


Fig. 2 — Gunnplexer frequency versus varactor-diode voltage. This graph is for a Gunnplexer that is factory tuned to 10.250 GHz at a varactor potential of 5 V.

Table 1

Mixer Port Impedances

Freq. (MHz)	*Z (ohms)*
10	355 – j 102 = 370 Ω
20	286 – j 165 = 330 Ω
30	214 – j 180 = 280 Ω
40	147 – j 164 = 220 Ω
50	123 – j 176 = 215 Ω
60	98 – j 157 = 185 Ω
70	75 – j 141 = 160 Ω
80	61 – j 126 = 140 Ω
90	56 – j 106 = 120 Ω
100	43 – j 106 = 115 Ω

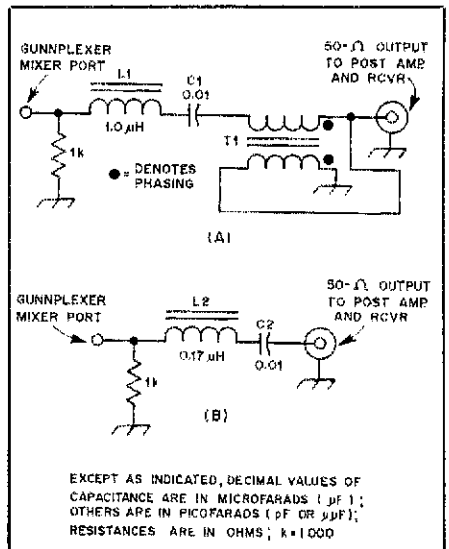


Fig. 3 — Gunnplexer i-f port matching circuits. The circuit at A is used to match the i-f port to 50 Ω at 30 MHz. Circuit B can be used to provide a 50-Ω output impedance in the 90-MHz range. T1 consists of 7 bifilar turns wound on an Amidon FT23-75 core.

I have been speaking "pleasure" so far, so here are some precautions. Treat that mixer port with a great deal of respect! The mixer diode is subject to damage from static electricity. Walk across a carpeted floor and touch the mixer port, and you could have a dead diode. Microwave Associates places a protection diode on the mixer port before shipment. Since this diode is removed before the Gunnplexer is placed in operation, you can't be too careful about avoiding static discharge. A good plan is to attach a clip lead to the mixer port and the Gunnplexer body while it is not being used, or when you are soldering to the mixer port.

Watch the Gunn- and varactor-diode power-supply polarities. I have inadvertently connected the Gunn diode backwards with no apparent damage to the diode (I hope), but I would not recommend doing it. Not only does it give you gray hair when you notice it's hooked up backwards, but having the Gunn diode changed is not cheap! As long as you have positive voltages on the Gunn and varactor ports, you'll be okay.

Mechanical Mounting

For better utilization, the Gunnplexer should be mounted in an enclosure. A 2-1/4 × 2-1/4 × 4-inch Minibox makes an ideal housing (Fig. 1). It provides plenty of room for the Gunnplexer, the Gunn-diode voltage regulator, an i-f preamplifier and connectors for signal and control lines. Because of the small size, the unit can be mounted on a tripod or at the focus of a parabolic dish, with cables going to the i-f and control circuits.

Another reason for mounting the Gunnplexer in a separate housing is that Gunnplexers tend to be somewhat microphonic. I discovered this while on an outing. I was making some adjustments in the Gunnplexer housing and as usual, I was talking to myself. My friend, at the receiving end, told me he could hear me just fine, even though the modulator was turned off. Tapping the case produced a healthy "bonging" noise at the receiving end. I would be interested to know if others observe this phenomenon.

Just When You Thought It Was Safe

Now that the preliminaries are out of the way, things get a bit more complex. As I said before, the varactor requires from 1 to 20-V dc. Before the Gunnplexer is shipped from the factory, a frequency is stamped on the body. This is the transmit frequency at a varactor voltage of 5 V. A change in this voltage produces a nonlinear change in frequency. The shift is much greater at low varactor voltages than it is at high voltages (Fig. 2). The output power also fluctuates with changes in frequency. I have measured a maximum variation of 0.6 dB. This variation should not cause a great deal of concern.

The next subject to be dealt with is the mixer port. Microwave Associates implies that it has an impedance of approximately 200 Ω. Since this declaration is somewhat vague, I connected the mixer port to an impedance analyzer. I found that the complex impedance varies quite a bit with frequency and that the mixer port is capacitive (Table 1). At 30 MHz, which is pretty much a standard Gunnplexer i-f, the transformation to 50 Ω is fairly simple. A matching network is shown in Fig. 3A: L1 cancels the capacitive reactance at the mixer port and dc blocking is provided by C1. T1 produces the required 4 to 1 impedance transformation. I tested the network with a Gunnplexer and came up with the results shown in Table 2. This network appears to work well with both of my Gunnplexers.

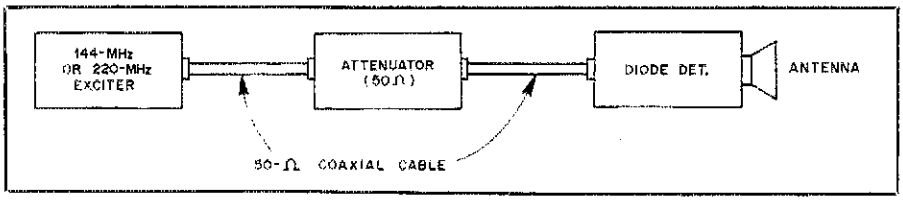


Fig. 4 — Frequency calibration setup. The attenuator should reduce the power applied to the detector diode to approximately 250 mW or less.

Table 2

Fig. 3A Matching Circuit Output Impedances

Freq. (MHz)	*Z (ohms)*
20	69.1 − j 11.0 = 70 Ω
25	60.7 − j 6.4 = 61 Ω
30	54.0 − j 0.94 = 54 Ω
35	48.4 + j 7.7 = 49 Ω
40	42.7 + j 17.2 = 46 Ω

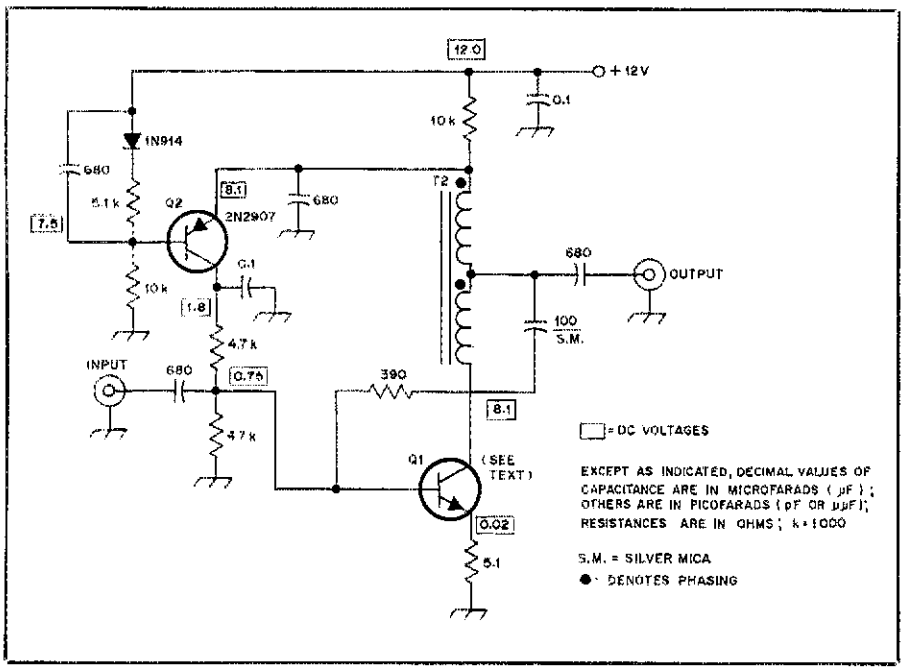


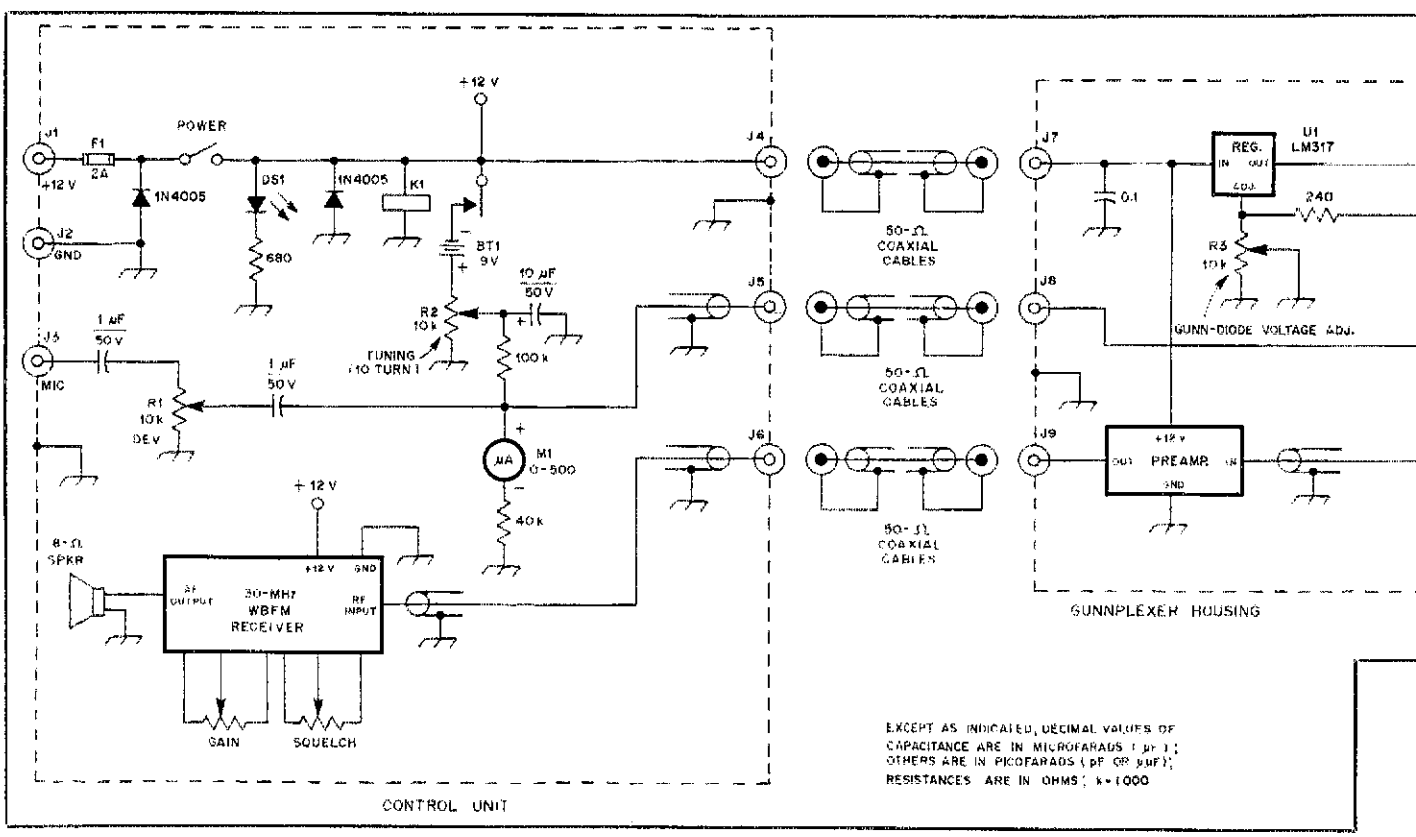
Fig. 5 — I-f preamplifier. All resistors are 5%, 1/4-W carbon types. Unless indicated otherwise, capacitors are disc ceramics. T2 consists of 7 bifilar turns wound on an Amidon FT23-75 core.

Tuning Considerations

The amateur X-band allocation is 10.0 to 10.5 GHz. Any modulation mode, with the exception of pulse modulation, is allowed. Gunnplexers can be ordered for operation anywhere in the band, but most hams prefer operating near 10.25 GHz. There are two reasons for this. First, sitting at the center of the band gives you lots of room to roam before you run into a band edge. The second reason is that calibrators, used to help you find your receive frequency, are simple to make for frequencies near 10.25 GHz.

So Where Are You?

The simplest calibrator is a waveguide type of diode detector (Fig. 4).[2] If you apply enough rf power to the diode, causing it to conduct, it will act as a multiplier. With a careful choice of frequencies you can place a harmonic at a favorable spot in the 10.25 GHz area. For example, the 70th harmonic of 146.52 MHz falls at 10.2564 GHz. A 220-MHz source can also



be used for harmonic generation. The 46th harmonic of 223.5 MHz provides a calibration signal at 10.281 GHz. I have used both a 144- and a 220-MHz rig for calibration sources. A word of caution, however: Please pad your excitation source. The idea is to turn the diode on and off with a volt or so of rf potential. Applying 10 W to a microwave detector diode will launch the diode into the "Twilight Zone" in a cloud of gaseous silicon. You should be able to detect the calibrator signal at a distance of several feet.

I-F Receivers

It has been generally accepted that a 30-MHz i-f is the standard for amateur 10-GHz work. If it is just you and someone else who are "X-banding," however, you can bend convention a bit. For your first experiments you can use a standard fm-broadcast receiver. Since Gunnplexers are easily modulated to produce wide-band fm, it seems only natural to use an fm broadcast set as a ready-made i-f receiver. The circuit shown in Fig. 3B can be used to approximately match the Gunnplexer mixer port to a 50-Ω line at frequencies within the fm broadcast band.

Commercial i-f receivers are available or you can "roll your own" receiver by designing it from scratch (a pain) or by P and M engineering (P and M, by the way, stands for Plagiarism and Modification). The ARRL *Handbook* contains an fm receiver circuit that can be modified for 30-MHz wide-band operation.

The primary concern is the 10.7-MHz filter. For this mode, the filter has to be wide — in excess of 100 kHz or more is ideal. As luck would have it, Radio Shack has in their parts trove a 10.7-MHz ceramic filter that has a 280-kHz bandwidth for a low price. Why use such a wide filter? For tuning considerations mostly. If you had a narrow-bandwidth receiver, say 5 kHz, and were trying to tune in a modulated oscillator that drifts a bit, all you would hear is an occasional "pop" as you tuned across it or it drifted past your frequency. Also, you'll be impressed by the fidelity of wide-band fm. Your partner will sound exactly like your partner and not Donald Duck at the bottom of a well. [Later editions of the ARRL *Handbook* contain a 30-MHz wide-band fm receiver circuit designed specifically for use with Gunnplexers. — Ed.[3]]

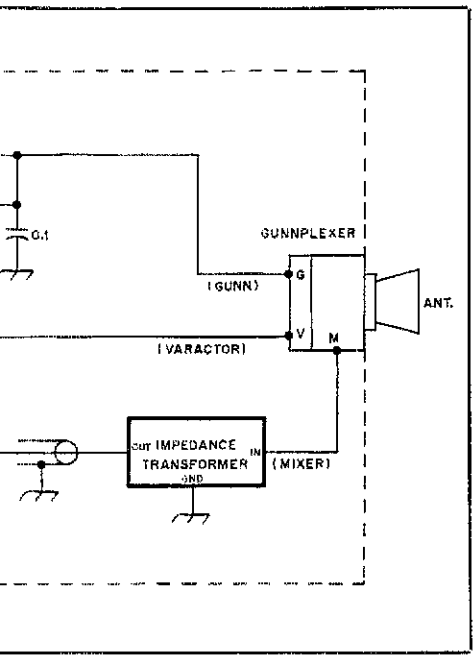


Fig. 6 — Gunnplexer control circuit. An interior view of the Gunnplexer housing unit is shown in Fig. 1. Any wide-band 30-MHz fm receiver can be used as the i-f receiver (see text). The remainder of the control-unit circuit supplies the varactor tuning voltage, Gunn-diode voltage and the modulation audio to the Gunnplexer.

Frequency Stability, or Do You Catch My Drift?

In the last section, I made mention of the Gunnplexer being "a modulated oscillator that likes to drift a bit." This can be construed as an understatement, for the Gunnplexer is an unstabilized oscillator. For example, the VFO in an hf rig should maintain a stability of one part in a million, resulting in a drift of 7 Hz in the 40-m band. The Gunnplexer, on the other hand, has a stability of one part in ten thousand (or 100 parts per million). This results in a drift of 1 MHz at 10,000 MHz. It may not sound like much, but an hf VFO with the same drift at 40-m would move 700 Hz, and that would be unacceptable. Don't despair, for we are not trying to receive cw or ssb with the unit — just wide-band fm.

Some people think that a Gunnplexer cannot be used without automatic frequency control (afc). It is my contention that, for experimentation over short distances, afc is not required. If you and your "partner" want to go hilltopping you should have no problem finding and tracking one another's signals without afc. I agree that for long-term reliability, afc or some sort of phase-lock system should be used.

The Gunnplexer drifts, but don't get the idea that it goes helter-skelter all over the band. When first fired up the Gunnplexer will drift at a terrific rate, slowing down after a minute or two. After five minutes of operation it will have settled down to a very slow drift, caused mostly by temperature changes. If both units are turned on at the same time they will both drift in the same direction at about the same rate. This will minimize the need to chase one another's signals. Some useful advice when operating without afc: Only one of you should tune. It's like hide and seek. One operator "hides" in one spot while the other one "seeks." The "hunter" shouldn't have any trouble finding his "prey." If you are only a few miles apart, tuning in your partner's signal will be as easy as tuning in a commercial fm broadcast station. It's easier, in fact, because there's only one station on the band.

Add an Afterburner

In this section we deal with an i-f preamplifier for your Gunnplexer. The circuit (Fig. 5) is essentially foolproof. It's easy to build and contains fairly common components. Q1 is the amplifier transistor while Q2 is part of the dc biasing circuit. A feedback network, extending from the base of Q1 to the output coupling capacitor, keeps the amplifier gain constant from below 10 MHz to over 90 MHz. The input and output impedances are near 50 Ω.

This circuit can be used in many applications. I find it to be unconditionally stable. If a low-noise transistor is used for Q1, the circuit should work very well. My preamplifiers, using N.E.C. (Nippon Electric) devices, have noise figures (NF) of about 3.5 dB.[4] That isn't great, but, with the Gunnplexer noise figure at about 12 dB or so, a 3.5-dB NF preamplifier will surely aid the system noise figure.

Controlling Your Gunnplexer

The Gunnplexer is simple to control. Fig. 6 contains a schematic diagram of the control system I use on my Gunnplexers. It's in two boxes: the control/receiver unit and the Gunnplexer housing. The control/receiver unit includes the main power control, varactor tuning circuit, modulator and receiver.

When the main switch is turned on, power is supplied to the Gunn diode, the modulator and the receiver. K1 is also energized, enabling the tuning circuit. The 9-V battery "rides" on top of the 12-V line to provide 21 V for varactor tuning. The modulator is a crystal microphone and gain control, with the output connected to the varactor control line. This impresses a small audio-modulation voltage on the varactor. I set the audio level by listening to the signal, adjusting R2 until over-deviation occurs. I then back off the setting of R2. It doesn't take much audio to *really* fm the Gunnplexer. [Some crystal microphones will require the use of an amplifier as shown in note 3 — Ed.]

I have left the receiver question open. You may use a bona fide 30-MHz receiver or a commercial fm-broadcast receiver. I have been using a homemade 30-MHz receiver that is still in the development stage. I hope to treat this receiver in a future article.

The second unit is the Gunnplexer housing. It contains the Gunnplexer, a regulator for the Gunn-diode voltage and an impedance-matching/preamplifier circuit. I have used an LM317 as the Gunn-

diode voltage regulator with good success. It provides precise control of the diode voltage — an important parameter for good oscillator stability. Another reason for a local regulator is that it allows you to operate the preamplifier at 12 V. The preamplifier, although not necessary, is an advantage. I would not compromise the impedance-matching circuit. Without it, you would see, at 30 MHz anyway, a 4 to 1 mismatch to your 50-Ω system. The varactor line simply conveys the varactor dc and modulator audio to the varactor diode. In my units I use BNC connectors and coaxial cable for all three connecting lines. You should use coax for the i-f line, but shielded cable can be used for the dc lines. In fact, Fig. 6 is meant only as a guide. It is one ham's attempt to "ride herd" on the Gunnplexer.

Where are They Sold?

A few phone calls to the New England area revealed the following information: Microwave Associates does not sell Gunnplexers directly or disseminate technical information about them. They sell the Gunnplexer through a single distributor, Advanced Receiver Research.[5] The 10-mW unit is type MA 87141-1 and is in the $250 per pair price class. Advanced Receiver Research also sells support equipment for the Gunnplexer.

If you have trouble locating parts to build this project (or others), you might give the folks at Circuit Specialists, Inc. and Jameco Electronics a try.[6,7] I have done business with Circuit Specialists for years. They have been prompt in replying and are usually well stocked. Jameco Electronics has a complete catalog with a wide variety of parts.

I have found that local Radio Shack stores have some surprising items. For instance, they sell 10.7-MHz wide-band filters (200 kHz wide) that can be used in wide-band fm receivers. Two filters cost $1.99. Consulting the various Amateur Radio publications will net you some other sources, but those I've mentioned are my favorites.

I have found the Gunnplexer to be very satisfying to experiment with. The system and information presented here is meant to stimulate interest in Gunnplexer operation. Don't worry about afc or phase locking yet; get on the air first! Once you have the ship launched and your feet wet, you can add the bells and whistles. Happy Gunnplexing!

An FM Pocket Radio I-F Receiver

For casual Gunnplexer experimentation, a low-cost fm-broadcast receiver can be modified easily for use as an i-f unit. One such receiver is the Realistic Model 12-714 sold by Radio Shack.

The first step in converting this broadcast set into an i-f receiver is to provide for a 50-Ω input. This will allow the i-f receiver to be connected to the Gunnplexer mixer through 50-Ω coaxial cable. Shown in the accompanying diagram is the input circuit of the Model 12-714. The fm antenna is connected to the input tuned circuit (C2 and L1) through a 10-pF capacitor. All you need to do to modify this circuit for use with 50-Ω cable is to remove the wire going to the fm antenna and replace the 10-pF capacitor with an 18-pF unit. The 50-Ω cable can then be attached to the two terminal lugs at the lower right-hand corner of the receiver circuit board. After the receiver has been attached to the Gunnplexer, this circuit can be adjusted for maximum sensitivity by spreading or compressing the turns of L1. The tuning is broad and the adjustment is not critical.

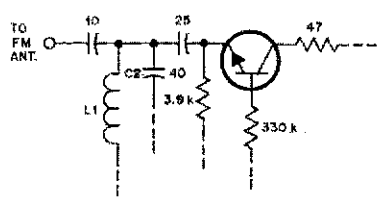
To reduce i-f feedthrough, the receiver should be enclosed in a metal box and all leads entering the enclosure should be filtered. A ferrite bead (Amidon FB101-43) and a 0.001-μF disc-ceramic capacitor on each lead will provide the needed filtering.

Note that this receiver is designed for use with a positive ground. That is, the positive battery terminal is the common circuit point. Because of this, it is difficult to power the receiver from the 12-V supply used to power the Gunnplexer. Using a separate battery (with the positive terminal connected to ground) to power the receiver avoids this problem.

To complete the Gunnplexer transceiver, an audio stage, to modulate the varactor voltage, is required. The simple circuit shown in note 3 will serve this purpose well.

Those wishing to experiment with afc will find a suitable voltage at the junction of C27 and R28 (refer to the schematic diagram that accompanies the Model 12-714). The afc voltage at this point swings approximately 0.4 V either side of the +9-V receiver reference level (the *transceiver* ground point). A simple op-amp circuit, powered from the Gunnplexer supply ($+V_{CC}$) and the receiver battery ($-V_{CC}$), can be used to provide the required amplification and level shifting.

Remember that while the exact i-f used is not critical, it is necessary that the transmitting and receiving units use the *same* i-f. The i-f receiver should be set to an agreed-upon frequency and the varactor-voltage control used for tuning. While the use of 30 MHz as the i-f is highly recommended for general Gunnplexer operation, this simple broadcast set modification will provide experimenters with a low-cost way to "try their hand" on the 10-GHz band. — *KC1V*



Notes

[1]Gunnplexer is a registered trademark of Microwave Associates, Inc., Burlington, MA 01803.

[2]S. J. Noll, "X-band Calibrator," *Ham Radio*, April 1981, pp. 44-50. [This article gives construction details for a waveguide-type calibrator using a 1N23 diode — Ed.]

[3]G. Woodward, ed., *The Radio Amateur's Handbook*, 60th ed. (Newington, CT: ARRL, Inc., 1983), pp. 14-24 to 14-26.

[4][An NE41632E-2 or a similar device is suitable — Ed.]

[5]Advanced Receiver Research, Box 1242, Burlington, CT 06013, tel. 203-582-9409.

[6]Circuit Specialists, Inc., Box 3047, Scottsdale, AZ 85257.

[7]Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002.

Strays

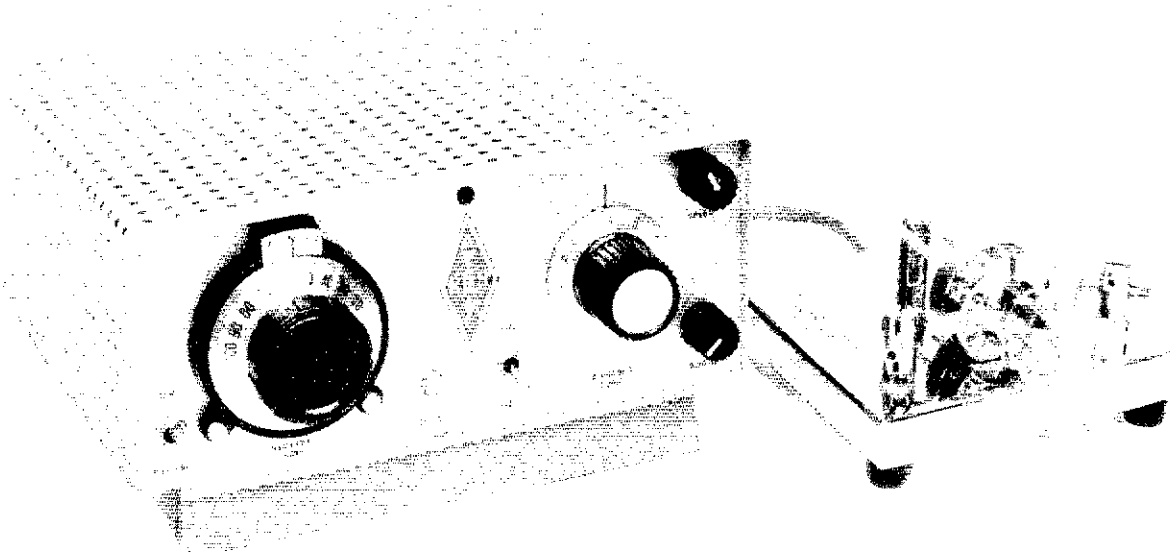
Terry A. Ketron, WA4RJN, of Boone, North Carolina, used a crude but effective means to dispose of a CB linear amplifier he tried to sell at the Shelby Hamfest. The Norfolk, Virginia, FCC office sent WA4RJN a citation warning him of the penalties and prohibitions regarding the sale of such devices, and ordered him to show proof the equipment was destroyed. This photo served as part of the proof. (*photo courtesy FCC*)

Next Month in QST

Those who read May *QST* will learn about

- Vic Clark, W4KFC, and Dave Sumner, K1ZZ, who speak out on a wide range of issues facing the Amateur Radio Service and ARRL.
- digital logic, and how it relates to electronics — a timely Beginner's Bench article.
- the weather conditions that can cause a routine 2-meter contact to make the pages of "The World Above 50 MHz" in *QST* and 10 new states.
- the rules governing Field Day 1983.

Putting the "8P6 Special Hamcation Rig" on 10 MHz



No gear for 30 meters? Here's your chance to get on the new WARC band with an inexpensive homemade trans-receiver.

By Doug DeMaw,* W1FB

I've been "hounded" for conversion information ever since the 20-meter "Hamcation Special" appeared in November 1982 *QST*. Amateurs have been asking how they might convert the 20-meter trans-receiver for use at 10 MHz. The changes are simple, and a kit of parts is available by mail.[1]

Transmitter Modification

Owing to the broadband circuits in the transmitter section of the portable station, there is little to do in order to convert the rf strip from 14- to 10.1-MHz operation. The crystal for the VXO is selected for the upper or lower segment of the band (remember that 10.109 to 10.115 MHz is an amateur "no man's land"; we can't operate there!). The VXO provides approximately 10 kHz of frequency swing when using a 10.1-MHz crystal. L1, the toroidal inductor that connects between Y1 and tuning capacitor C1 of Fig. 1, is made larger. The new inductance value is 12 μH.[2]

The capacitors and inductors of the PA output filter must also be changed in value. Pertinent data are given in Fig. 1. No other changes are required in the transmitter section of the rig. Power output from the MRF476s is the same as for 14-MHz operation — 7 to 8 watts into a 50-ohm load while using a 13.5-volt dc power supply.

Receiver Circuit Changes

T4, L7, C2 and C3 of Fig. 2 (preamplifier module) need to be changed to new values. No additional modifications are necessary for this subassembly.

Two areas require attention in the "Bare Bones CW Superhet" receiver.[3] The VXO crystal (Y4 of Fig. 3) is ground for operation at approximately 13.6 MHz (depending on the band segment desired). The VXO inductor (L1) is increased in value to 10 μH (see note 2).

The remaining receiver-circuit change involves rewinding T1 at the mixer input and adjusting C1 to provide resonance at 10.1 MHz. There are no other changes to the receiver circuit. Simple, eh?

Some Band Aids

Some versions of the original circuit from November 1982 *QST* developed minor "bugs." One condition became manifest as a short-term howl in the earphones as the break-in-delay circuit dropped out of the transmit mode. This was traced to momentary self-oscillation of the receiver mixer during the transfer period of the T-R relay. At that time the receiver remains activated, but there is no load connected to the mixer input. Oscillation occurs at the intermediate frequency (3.579 MHz) because of the high Q reflected to the mixer by the crystal filter. The simple cure is to add a 270-ohm, 1/4-watt resistor (R1) from the high side of the T1 link winding to ground (Fig. 3). This maintains an adequate load at all times, but is high enough in value to prevent degradation of the receiver sensitivity.

Another problem reported by some operators is a missing first dot or dash when the keyer is actuated. This can result

[1]Notes appear on page 21.
*QST Senior Technical Editor

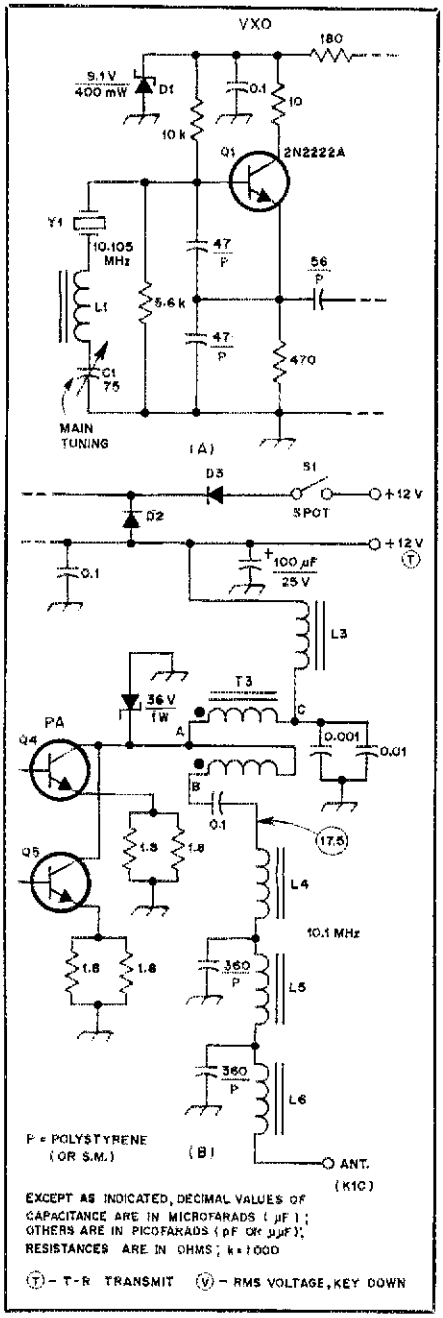


Fig. 1 — The diagram at A shows the transmitter VXO. Y1 is changed to 10.105 MHz for approximate coverage from 10.100 to 10.110 MHz, the lower segment of the 30-meter band. Y1 is an International Crystal Mfg. Co. no. 434110 fundamental crystal. The new L1 value is 12 µH (50 turns of no. 28 enam. wire on an Amidon or Palomar T50-2 toroid core). At B is the PA section of the transmitter. The new cutoff frequency for the harmonic filter is 11.67 MHz. L4 and L6 are rewound to provide an inductance of 0.5 µH (11 turns of no. 24 enam. wire on a T50-6 toroid core). L5 is 1.0 µH (16 turns of no. 24 enam. wire on a T50-6 core).

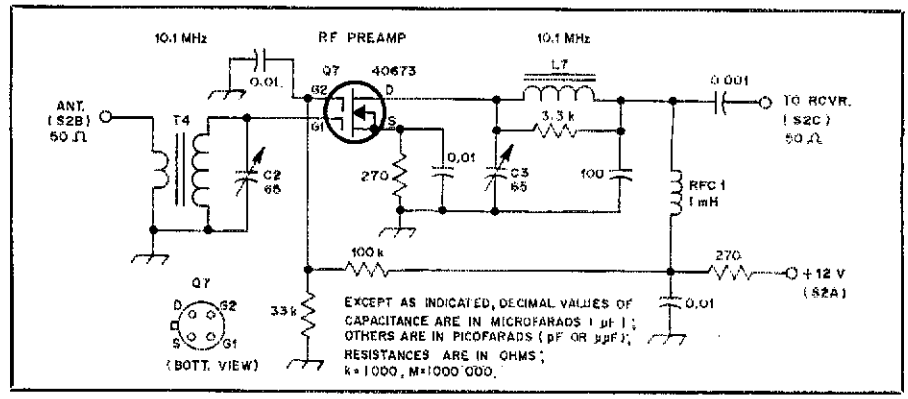


Fig. 2 — Circuit of the modified preamplifier. C2 and C3 are changed to 65 pF, or the existing ones can be shunted by fixed-value capacitors to provide resonance at 10.1 MHz. T4 is rewound to contain 34 turns of no. 28 enam. wire on a T37-2 toroid core. The link has 3 turns. L7 has 36 turns of no. 28 enam. wire on a T37-2 core.

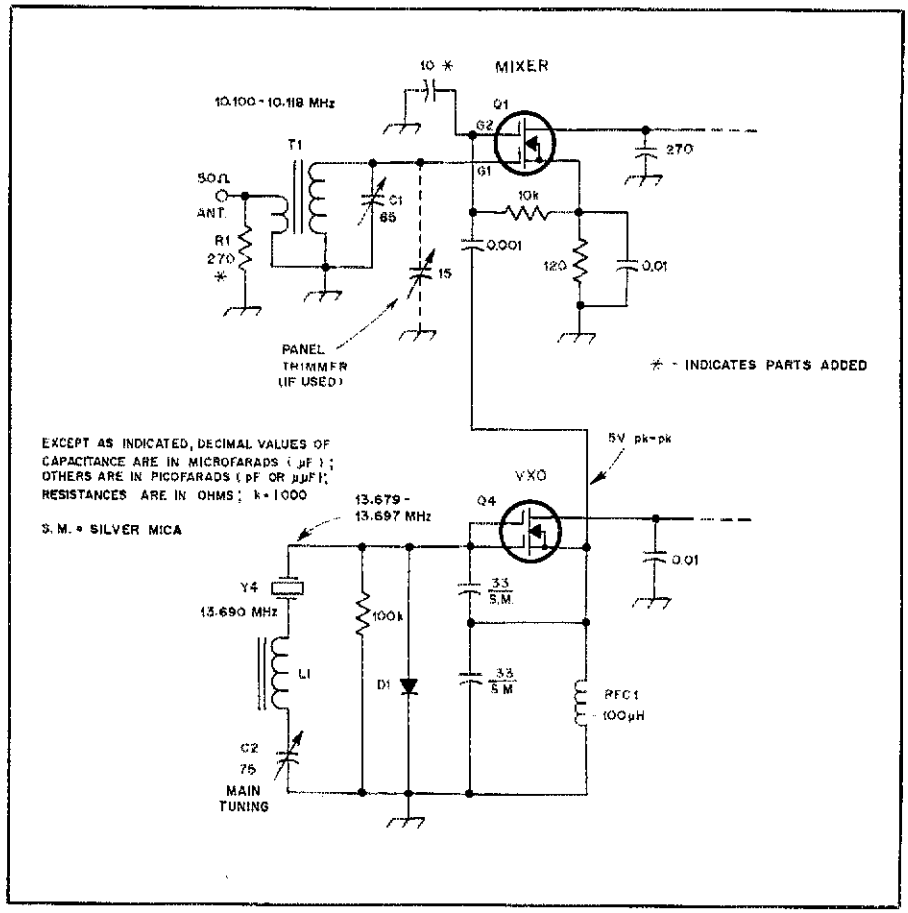


Fig. 3 — The mixer and VXO sections of the 10.1-MHz receiver. R1 is added (see text) to cure a momentary instability problem in the mixer. A 10-pF capacitor has been added at gate no. 2 of Q1 to drop the LO injection from 10 volts pk-pk to 5 volts pk-pk. Y1 is changed to a 13.690-MHz unit for coverage from 10.100 to 10.118 MHz (the low segment of 30 meters). It is an International Crystal Mfg. Co. type 434110, fundamental cut. L1 is changed to a value of 10 µH (50 turns of no. 30 enam. wire on a T50-6 core). T1 is modified to contain 35 turns of no. 26 enam. wire (5 µH) on a T50-2 core. The link has 4 turns of no. 26 wire.

from 2.2-µF blocking capacitor between the gain control and pin 2 of the TL081 op amp holding a charge, which locks out the sidetone signal on the first dit. Substitution of a 0.1-µF capacitor cured the malady.

If instability is noted in the 40673 i-f amplifier of the kit version of this transceiver, put a 0.1-µF bypass capacitor directly at gate 2 of the amplifier (foil side of board). No other unwanted "frigglies" have been reported.[4]

Kit Version

Circuit Board Specialists has developed the kit version of this trans-receiver, which is shown in the accompanying photographs. A single circuit board is used to contain all of the sections that were formerly on individual pc boards. They have also added a Curtis keyer to the new board. The assembled unit (less power supply) measures (HWD) 2-3/4 × 6-3/4 × 6 inches (70 × 171 × 152 mm).

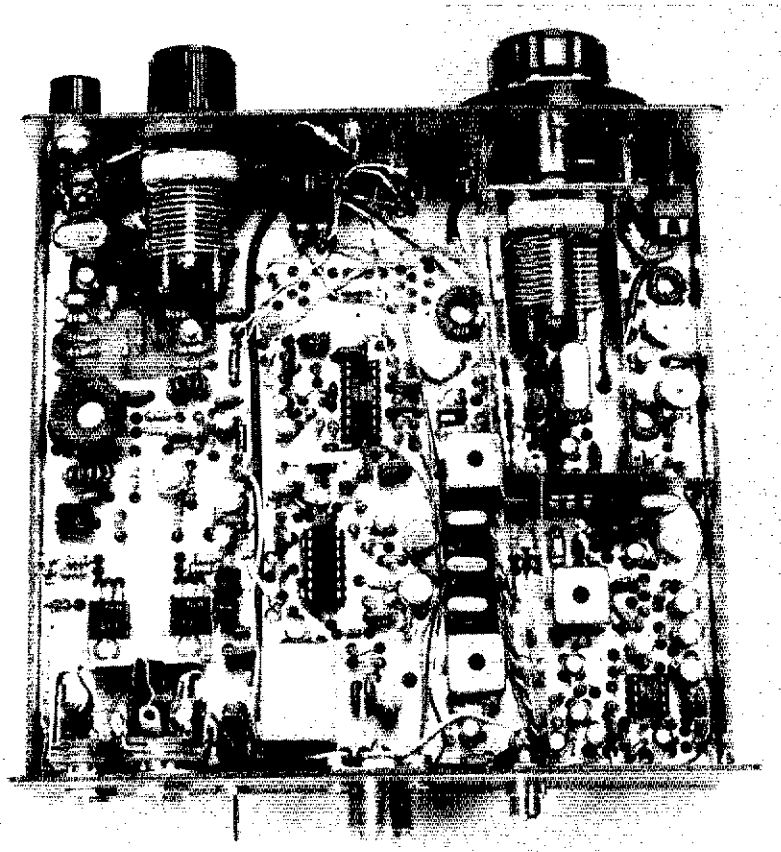


Fig. 4 — Interior view of the CBS kit version of the 30-meter trans-receiver. This lightweight package is ideal for the traveling ham.

This unit is available for 20 or 30 meters (note 1).

Summary Comments

I have enjoyed hopping into the 10.1-MHz activity with low power. With just a sloping dipole and 8 watts I have worked DX easily, and have had a lot of fun chewing the rag with other 30-meter enthusiasts. This new band is ideal for portable operation, since it is open most of the time. Furthermore, a large antenna is not required for the travel pack. I consider 10.1 MHz a great mix of the good qualities of 40 and 20 meters — perfect for the briefcase rig I like to carry afield!

Notes

[1]Circuit Board Specialists (WAØUZO), P.O. Box 969, Pueblo, CO 81002. Negatives, pc boards or full kits available.

[2]The inductance value in both VXOs may have to be increased to more than the amount specified in order to obtain the desired lower limits of the tuning ranges. This will depend upon the crystal used. Use only the amount of inductance that provides the desired range.

[3]D. DeMaw, "Build a Bare Bones CW Superhet," *QST*, June 1982.

[4]Op amps may break into audio self-oscillation when using 8-ohm hi-fi headphones. If this problem occurs, insert a 100-ohm resistor in series with the audio-output at the phone jack. High-impedance phones will give the best results, and are recommended with this circuit.

Strays

QEX: THE EXPERIMENTERS' EXCHANGE

Wonder what you've been missing by not subscribing to *QEX*, the ARRL newsletter for experimenters? Among the features in the March issue were:

- More on the Second ARRL Packet Conference
- "Packet Radio and Radio Communication Requirement," by Karl Meinzer, DJ4ZC
- "A Bibliography on Minimum-Shift Keying," by Den Connors, KD2S
- "ZX81 RTTY Receive Program," by Brian Davis, W9HLQ
- "Data Communications — Digital Phase Lock Loops," by David Borden, K8MMO
- "Components," by Mark Forbes, KC9C

QEX is edited by Paul Rinaldo, W4RI, 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 U.S.; write Headquarters for details.

No, the FCC is not in the auto parts business, as this sign on Guam seems to indicate to ARRL President Vic Clark, W4KFC, who visited the island last year. *(tnx AH2A)*

CALL FOR PAPERS

☐ The 1983 ARRL National Convention, to be held in Houston, Texas, on October 7-9, will have a new wrinkle for DXers and contesters. The Texas DX Society is inviting leading DXers and contesters worldwide to participate in the First International DX and Contest Symposium. Blue-ribbon panelists will debate pertinent issues of interest to ham radio in the '80s, such as contest ethics and the pros and cons of list operation. A resolution will then be made. The proceedings of each debate will be submitted for publication after the Convention.

The TDX is issuing a call for papers to be submitted from the DX and contesting community on topics of interest to each individual. The TDX will then choose the papers that best represent each side of the most popular issues. These papers will be read and credited to the amateurs who submit them. All contributors whose papers are chosen for presentation will be notified in advance. The papers, one typewritten page on any DX or contest topic, should be submitted by June 1, 1983 to Bob Evans, N5DU, Symposium Coordinator, 13719 E. Cypress Forest, Houston, TX 77070.

I would like to get in touch with . . .

☐ any hams who were members of the 40th Mobile Communications Squadron or the 21st Weather Squadron during WW II. Irvin J. Kirch, W9YFG, 34 Hoss Rd., Indianapolis, IN 46217.

The Search for a Simple, Broadband 80-Meter Dipole

What amateur has not dreamed of finding a broadband antenna for 80 meters? Feed it with coax and work with a 2:1 SWR across the band!

By Jerry Hall,* K1TD

Like many amateurs who operate in the 3.5-MHz band, you may use a simple, single-wire dipole (or inverted V) antenna fed with either 50- or 75-ohm coaxial line. And like every one of those amateurs, you are inconvenienced when you want to operate from band edge to band edge with that antenna. Since most of today's transmitters require an SWR no greater than 2:1, you probably find yourself restricted to operating within a 200- or 250-kHz segment of the 80/75-meter band.

Common practice with a coax-fed antenna is to cut the length to favor either the cw or the phone end of the band. Amateurs who want to operate both modes often cut the antenna for resonance near the center of the band. In this way they can operate in the upper frequency end of the cw portion of the band and the lower frequency end of the phone portion.

But try to operate with such an antenna over the entire 80/75-meter band. No way! Even if the antenna is cut for the center of the band, the SWR will be greater than 4 to 1 at the band edges, as curve A in Fig. 1 shows. Oh, yes, you can always use a Transmatch or other arrangement to transform the line input impedance to something near 50 ohms, but this invariably requires additional controls to tune when you shift from one end of the band to the other. Wouldn't it be fabulous if you could cover the entire band without the inconvenience of adjusting controls outside the transmitter? Curve B of Fig. 1 shows the SWR response of just such an antenna.

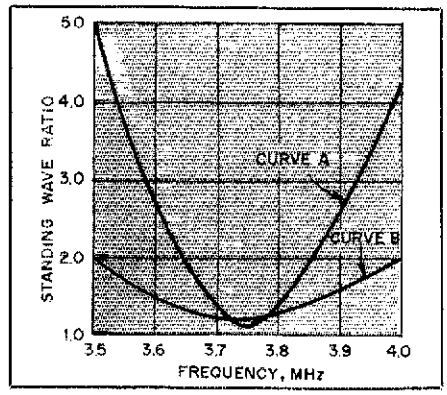


Fig. 1 — Curve A shows the SWR vs. frequency as derived from computer calculations for a no.-12-wire, center-fed, dipole antenna with 75-ohm feeder. The antenna is 125 ft long and is assumed to be in free space with the feed line totally decoupled. This curve correlates very well with that from measured performance of an antenna of this type at a modest height. Curve B shows the SWR response of a broadband dipole discovered in the computerized search described in the text. This antenna has yet to be constructed and tested. See text for details.

The Search for the Ultimate Antenna

Over my years as an amateur I have done considerable experimenting with wire antennas. I tried one kind, then another, then yet another, always looking for that ultimate 80/75-meter radiator. For years I used a center-fed length of wire with an open-wire feeder. At the input end of the line I used a Transmatch. This arrangement gives quite respectable operation over the 80/75-meter band (and our mf band and other hf bands as well!). I've used lengths from 60 ft total to 170 ft total,[1] and each length gave very good results. (Of course, the longer wires excelled somewhat on the lower frequency bands.) I also tried the double bazooka antenna,[2,3] the miscalled Windom antenna,[4] and several others that as far as I know have no names. Uncounted hours upon hours were spent in assembling and installing these antennas, measuring and plotting SWR values across the band, lowering the antennas to make slight changes, and raising the antennas again, only to repeat the whole process.

Not long ago I realized that rather than devoting so much time to constructing and testing, there was a much better way to continue my search for the ultimate antenna. Why not use a personal computer to perform a preliminary analysis of my ideas? If the computer results looked promising, *then* I could construct and try that type of antenna. In this way I could "test" an antenna in a few minutes, rather than taking a week or more of spare time to check out one or two ideas.

The computerized search proved to be a very worthwhile approach. Over the period of a few weeks I checked out more than 200 different antenna and feed-line combinations. Of all the time spent, a good portion was used in researching the appropriate equations. And of course after that it was necessary to program the computer. But from there things went very quickly. Did I discover anything promising for that ultimate antenna? Well, perhaps. The SWR plot of one of my ideas is that shown in Fig. 1, curve B. But I'm not sure you would classify the antenna as being a "simple" one. More on that later. First, let me tell you how I proceeded with the study.

There are various theories described in the literature for calculating the resistance and reactance of a cylindrical antenna. A wire dipole is a long but, to be sure, a very thin cylindrical antenna. Once the resistance and reactance are known, it is a simple matter to calculate the standing-wave ratio for whatever impedance of transmission line is chosen as the feeder. Thus, with specific physical information to start from, the computer will produce results in terms of resistance (R), reactance (X) and SWR. Details on the math are given in the appendix to this article.

To check the accuracy of the computer program that evolved, I calculated data for several commonly used antennas. Correlation between the computer results and test data I had taken, sometimes years earlier, was excellent. I was more than pleased with the procedure and the results. Changing from 50- to 75-ohm line, for example, was as simple as

*Associate Technical Editor

[1]Notes appear on page 27.

entering a different number at the keyboard. And it was just as simple to change the antenna length, or its diameter. The computer could print out results faster than I could develop new ideas.

Before getting into the results, I should emphasize that the main equation on which these calculations are based applies to an antenna in free space. In the presence of the earth, that impedance will be modified. In general, the impedance will be lower when the antenna is less than 1/4 wavelength above ground. Translated to practical terms, this means that most of my calculations showed a better overall match to 75-ohm line than to 50, and these results are what I'll be presenting primarily. However, a 50-ohm line will likely provide lower SWR values in practice at the usual heights for an 80/75-meter antenna, i.e., below 65 feet. But remember, I wanted only a preliminary evaluation on a comparative basis from the computer. I did not feel it necessary to include earth effects in my calculations.

And here's another important point. The calculations take no feed-line currents into account. It is assumed that the feeder, whether it be balanced or coaxial, does no radiating.

A Simple Dipole

We've already looked into a simple dipole antenna of no. 12 wire. Curve A of Fig. 1 shows the SWR response of this antenna, and Table 1 shows R and X values as well as SWR values. The bandwidth between the frequencies exhibiting a 2-to-1 SWR is 208 kHz. With 50-ohm feed line the computed 2:1-SWR bandwidth is only 152 kHz, but keep in mind the remarks of the paragraphs above.

In Table 1, R represents the radiation resistance. This value goes higher with increased electrical antenna length (or higher with increased frequency for an antenna of fixed physical length). Note that the antenna is being fed with 75-ohm line. Note also that the radiation resistance is 75 ohms at about 3.875 MHz, yet the SWR value is still greater than 2:1. How come? The inductive reactance that is part of the feed-point impedance is to blame. (Positive values in the table indicate inductive reactance; negative values indicate capacitive.) While the reactance does not accept any power, it does prevent some of the power from being transferred to the resistance, creating the mismatch. The higher the reactance, the greater the mismatch, and therefore the higher the SWR.

Antenna resonance exists when the reactance goes through zero. Interpolating from Table 1, we see that this occurs at approximately 3746 kHz. Antenna resonance may not always coincide exactly with the frequency of lowest SWR, although with dipole-type antennas and

Table 1

Impedance of a Single-Wire Antenna

Antenna length = 125 ft
Antenna diameter = 0.08 inch
Feed-line impedance = 75 ohms

Freq.	*R, Ohms*	*X, Ohms*	*SWR*
3.500	57.2	−118.6	5.16
3.525	58.2	−106.5	4.43
3.550	59.4	−94.3	3.79
3.575	60.5	−82.2	3.23
3.600	61.6	−70.2	2.74
3.625	62.7	−58.1	2.32
3.650	63.9	−46.1	1.96
3.675	65.1	−34.0	1.65
3.700	66.3	−22.0	1.40
3.725	67.5	−10.0	1.19
3.750	68.7	2.0	1.10
3.775	69.9	14.0	1.23
3.800	71.1	26.0	1.43
3.825	72.4	38.0	1.67
3.850	73.7	50.1	1.94
3.875	74.9	62.1	2.24
3.900	76.2	74.1	2.57
3.925	77.5	86.1	2.94
3.950	78.9	98.2	3.33
3.975	80.2	110.3	3.76
4.000	81.6	122.3	4.22

The 2:1-SWR frequencies are 3.647 and 3.855 MHz and the bandwidth is 208 kHz.
Resonance occurs at 3.746 MHz.

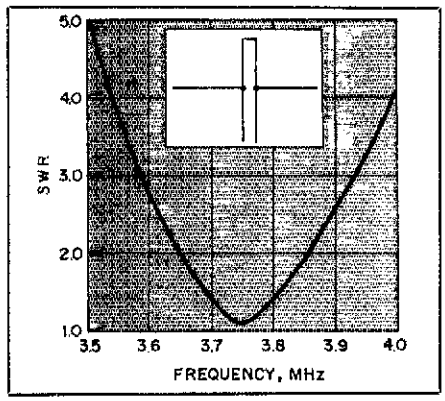


Fig. 2 — SWR curve for antenna with 1/4-wavelength hairpin, as shown in the inset. The antenna is of no. 12 wire, 125 ft long, and fed with 75-ohm line. The hairpin is 52.5 ft of 300-ohm TV ribbon with a 0.8 velocity factor.

coaxial feeders the two frequencies would never be more than 1, perhaps 2 kHz apart. It would be impossible to detect the difference with practical measuring equipment.

Thicker conductors for a single-wire dipole will broaden the SWR response. For example, a dipole made of half-inch-dia wire (such as using the shield of RG-8/U as the radiator) with a 75-ohm feeder exhibits a 2:1-SWR bandwidth of 252 kHz, 44 kHz broader than the antenna of no. 12 wire. In order to maintain resonance at the same frequency as the no.-12-wire antenna, however, its total length must be shortened by about 8 inches.

A Hairpin Match

Now look at the antenna system illustrated in Fig. 2. This antenna is identical to the dipole for curve A, Fig. 1, except that a hairpin of an electrical quarter wavelength at 3.75 MHz has been added. The hairpin will introduce reactance at the antenna feed point as we move away from its quarter-wave-resonant frequency. Below 3.75 MHz this reactance is inductive; above, it is capacitive.

By happy coincidence this is just the opposite of what the antenna itself does, so the hairpin should cancel some of the reactance at the band edges, right? And because the reactance is primarily responsible for the high SWR, then we would think the bandwidth should be significantly broader. But comparison of the SWR plots reveals that there is negligible bandwidth improvement over the dipole alone. The 2:1-SWR bandwidth is 211 kHz, as opposed to 208 kHz without the hairpin. So what went wrong when we added the hairpin?

Most of us amateurs are not accustomed to thinking in terms of paralleling resistances and reactances, and the results often surprise us. For example, assume we have an antenna impedance of 50 ohms resistance and 100 ohms equivalent series reactance at some particular frequency. A shorthand way of writing this impedance is 50 + j100 ohms, where the j indicates that the number behind it represents a reactance, and the values cannot be added directly. The SWR in 50-ohm feed line for this antenna will be 5.8:1. (See what that nasty reactance does to us!)

Now assume we carefully design a hairpin that presents a pure reactance of −j100 ohms at the feed point for this frequency. The actual feed-point impedance will then be the result of the 50 + j100 ohms in parallel with −j100 ohms. We might think the combination will be near 50 ohms with no reactance, but we would be very wrong. The actual feedpoint impedance turns out to be 200 − j100 ohms. The SWR has dropped only from 5.8:1 to 5.1:1.

If we take the extra trouble to completely cancel the feed-point reactance in this example, we will need a shunt reactance of −j125 ohms. The resulting feed-point impedance then will be 250 + j0. With all this care, we've succeeded in bringing the SWR down only to 5:1.

We tend to forget that shunting an impedance with a reactance to obtain a pure resistance gives us an accompanying transformation of the resistance value. As a matter of fact, this is the very principle involved in matching with an L network. So in this example, the very best we can hope to obtain with hairpin matching is a 5:1 SWR.

Different hairpin lengths of 300-ohm line did not yield significant change in the 2:1-SWR bandwidth. The frequency of resonance for the radiator *system* (no reactance at the feed point) changed slightly, however. Making the hairpin

length 26 ft instead of 52.5 ft lowered system resonance from 3.746 to 3.712 MHz. With the hairpin lengthened to 75 ft, system resonance occurred at 3.775 MHz. The length of the radiator wire was held at 125 feet for each case here.

The broadest practical system discovered with a hairpin was 254 kHz in bandwidth, as opposed to 208 kHz without the hairpin. This result was obtained with a hairpin of 25 ohms characteristic impedance, 43.5 ft long. The antenna was 125 ft of no. 12 wire, fed with 75-ohm line. A 25-ohm hairpin can be constructed with two lengths of 50-ohm line connected in parallel (i.e., shield connected to shield and center conductor to center conductor). The velocity factor for the hairpin line was taken as 0.66.

Folded Dipoles

It is commonly stated that a folded dipole has improved SWR-bandwidth performance over a single-wire dipole. (Of course, neither has gain over the other.) Computer calculations verified this statement. I "tested" a folded dipole made of 300-ohm TV ribbon. For these calculations I took the antenna as having a 0.5-inch dia, ignoring the fact that it was not truly cylindrical. The antenna was 125 ft long, and a velocity factor of 0.8 was used to determine the shorted-transmission-line effect of the two halves. (This effect is explained in the appendix.) The 2:1-SWR bandwidth in the 300-ohm feeder came out to be 265 kHz, compared with 208 kHz for the single wire with 75-ohm feeder. System resonance occurred at 3.752 MHz.

But wait a minute! We overlooked something that may be important. With a folded dipole the approximate antenna length for resonance can be determined by the old familiar equation, $l = 468/f$. But half of this length is *not* an electrical quarter wavelength as far as the shorted-transmission-line effect goes. To obtain quarter-wave resonance, we must take the velocity factor into account and place the shorting terminations 80% of a free-space half wavelength apart. This is shown in the inset in Fig. 3, and works out to be a distance of 105 ft for 3.75 MHz. The resulting SWR plot is also shown in Fig. 3. The bandwidth is 262 kHz, 3 kHz less than with the shorting terminations at the antenna ends. In addition, system resonance moved from 3.752 to 3.725 MHz (although 3.726 is the natural resonant frequency of a 125-ft single-wire dipole that is 1/2 inch in dia). Thus, it appears to make little difference in bandwidth whether or not the velocity factor is taken into account when placing the shorting terminations.

Some years ago the use of capacitors at the ends of a 300-ohm-ribbon folded dipole was advocated to compensate for the velocity factor. This idea is shown in the inset of Fig. 4. A capacitor value of 5.9 pF per meter of frequency-band operation is used at each end of the antenna. This suggestion seems to have gone unheeded by amateurs, however; I am unaware of any current publications that carry the information. With the computer, I tried this idea with various values of capacitance. The optimum practical value for 3.75 MHz, determined from the Smith Chart, was 470 pF. This was confirmed by the computer, although values as low as 390 pF or as high as 1000 pF provided the same bandwidth results — 266 kHz. Placing the capacitors at the ends essentially does not improve the bandwidth over that with the shorts at the ends, but the results are slightly better than when taking the velocity factor into account for the shorts. Changing capacitor values did change the system resonant frequency slightly, from 3.721 MHz with 390 pF to 3.726 with 470 pF to 3.738 with 1000 pF. The length was held at 125 ft all the while.

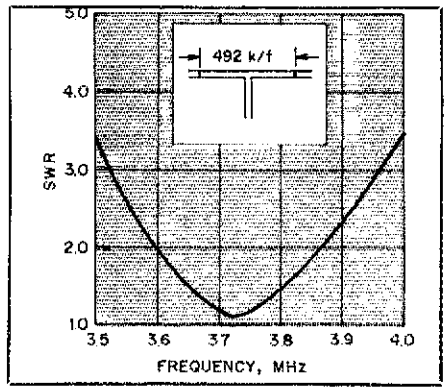


Fig. 3 — SWR curve for a folded dipole as shown in the inset. The antenna and feeder are of 300-ohm TV ribbon. The radiator is 125 ft long, with the shorting connections placed 105 ft apart (k = 0.8). For simplicity in calculations, the radiator was assumed to be cylindrical, with a diameter of 1/2 inch.

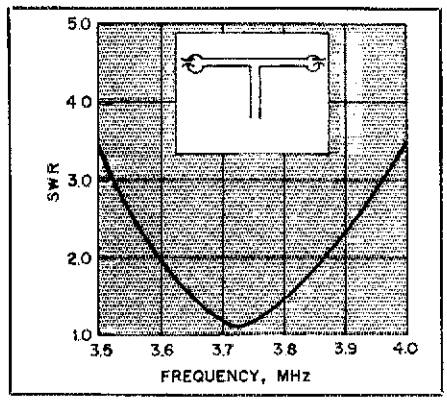


Fig. 4 — A type of folded dipole. The capacitors at the ends compensate for the velocity factor of the 300-ohm TV ribbon for the terminated-transmission-line effect it presents at the feed point. Capacitor values for this plot were 470 pF; the antenna length was 125 feet.

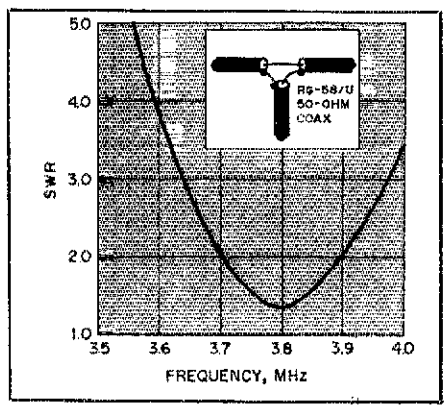


Fig. 5 — The feed-point arrangement of a double bazooka antenna is shown in the inset, and the curve shows the SWR response. The total coax length is 86.67 ft, while the total antenna length is 122.67 ft. The length outside the coax is of 300-ohm open-wire feeder.

The Double Bazooka

The double bazooka antenna is favored by many amateurs because of its "broad bandwidth characteristics." The center portion of this antenna is shown in the inset of Fig. 5. The coaxial line on each side of center is an electrical quarter wavelength of 50-ohm RG-58/U, and is shorted at the outside ends. Because the total coax line length is only 66% of a free-space half wavelength, the antenna is too short for resonance as a radiator. Resonance is obtained by adding a section of 300-ohm open-wire line at each end. Both conductors of each 300-ohm section are tied together, at the connection to the coaxial sections and at the outside ends of the antenna. The antenna is fed with 50-ohm line. The SWR plot of this antenna is shown in Fig. 5. Even though the antenna was "cut" for 3.75 MHz from the double bazooka equations, resonance occurred at 3.803.

Based on computer calculations, the bandwidth of the double bazooka was 190 kHz, compared with 152 kHz for a simple, single-wire antenna fed with 50-ohm line. The improvement is 38 kHz. These computer results agree closely with tests that I conducted in the ARRL lab in 1974, using a General Radio 1606-A rf impedance bridge. From the measured impedances, the 2:1-SWR bandwidth of a double bazooka was 184 kHz, and that measured for a single-wire dipole at the same height and fed with 50-ohm line was 153 kHz. The measured improvement was 31 kHz.

Several variations on the design of the double bazooka yielded some differences in bandwidth. These variations included using 50-ohm line for the radiator and 75-ohm line for the feeder, reversing these arrangements, 75-ohm line for both, and so on. The greatest bandwidth obtained was 268 kHz, using RG-8/U line for the radiator (1/2-in. dia) and a 75-ohm feeder. With a 125-ft antenna and a coax-portion length of 86.5 ft, resonance occurred at 3.725 MHz.

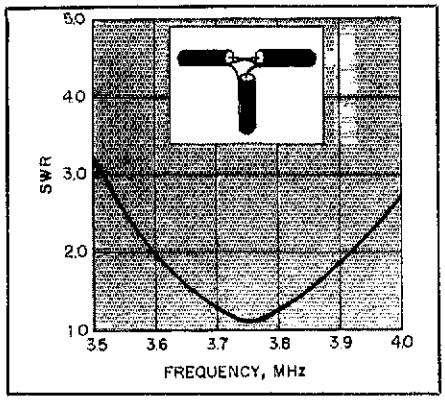


Fig. 6 — SWR plot of an antenna like the double bazooka but with crossed connections at the feed point inset. RG-8/U is used for the coax portion of the antenna (1/2 inch dia), and the feeder is 75-ohm line. The antenna is 124.2 ft long, with 86.5 ft of this length in coax.

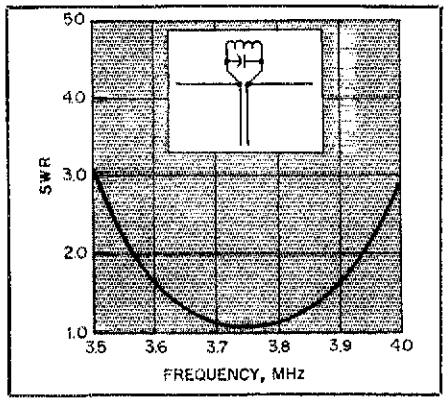


Fig. 7 — A 125-ft 1/2-in.-dia dipole with fixed components at the feed point. The inductor value is 0.5305 μH and the capacitor is 3395 pF. The system is fed with 75-ohm coax. This 124.2-ft antenna has the broadest response of all the practical antennas investigated during the study.

Table 2

Summary of Computer-Study Results for Various Antennas

These calculations assume the antenna is in free space. In actual installations at moderate heights, the bandwidth for 50-ohm feeders will likely be greater than that indicated here.

Antenna Type	*Radiator Dia.,In.*	*Feeder Imped.*	*Bandwidth*
Single-wire dipole	0.08	50	152
Double bazooka	0.38	50	190
Single-wire dipole	0.08	75	208
Single-wire dipole with 52.5-ft hairpin of 300 ohms	0.08	75	211
Single-wire dipole	0.5	75	252
Single-wire dipole with 43.5-ft hairpin of 25 ohms	0.08	75	254
Folded dipole of 300-ohm ribbon, shorts 100 ft apart†	0.5	300	261
Folded dipole of 300-ohm ribbon, shorts 105 ft apart	0.5	300	262
Folded dipole of 300-ohm ribbon, shorts at ends	0.5	300	265
Folded dipole of 300-ohm ribbon, 470-pF capacitors at ends	0.5	300	266
Double bazooka, 75-ohm feeder	0.5	75	268
Double bazooka type of antenna, crossed wires at feed point	0.5	75	324
Single wire with coil and capacitor at feed point	0.5	75	375
Cage dipole	36	75	500

†Dimensions from Fig. 61, p. 2-29, *The ARRL Antenna Book*, 14th ed., 1982.

Other Antenna Types

Next I tried a double-bazooka style of antenna with crossed connections at the feed point. This arrangement is shown in the inset of Fig. 6. I found that a greater bandwidth could be obtained than with the double bazooka, as the SWR plot of Fig. 6 indicates. The bandwidth of this antenna is 324 kHz.

W1RN, one of my colleagues at ARRL Hq., suggested using a fixed coil and capacitor in parallel at the feed point (Fig. 7 inset). The effect should be somewhat the same as with a simple hairpin, because the reactance of an L-C parallel combination goes capacitive with increasing frequency. This is just the opposite of what the antenna does by itself.

The results with various L/C ratios were both interesting and surprising. They were interesting because a quite large bandwidth could be obtained — 375 kHz. (The 2:1-SWR frequencies are 3564 and 3939 kHz.) And they were surprising because, with the arrangement plotted in Fig. 7, there really is no frequency that can be defined as system resonance. The reactance swings across zero at three different frequencies in the band — 3563, 3750 and 3904 kHz, being inductive at the low end and capacitive at the high end. For this antenna arrangement, various L/C ratios were tested by assigning different reactance values at resonance. The reactance for optimum bandwidth was found to be 12.5 ohms at L-C resonance.

Although the calculations were for a radiator of 1/2-in. dia, 300-ohm flat TV ribbon or open-wire line with the conductors tied together should work as well. This antenna looks promising. If constructed for transmitting, the capacitor should be a transmitting type, and the coil should be of low loss. There will be high circulating currents in the L-C components. I have not constructed the antenna.

The Search Continues

Table 2 is a summary of the results of all the various antenna types discussed in this article. The antennas are listed in order of increasing bandwidth, and the results are revealing. I hope this information will dispel many rumors that persist about the bandwidths of various antenna types, and perhaps encourage experimentation among you readers.

What about that ideal-looking curve in Fig. 1? Well, there *was* one other idea I tried in my computer search for the ultimate — a cage antenna. A cage is made with several parallel conductors in a circular arrangement. The assembly resembles a round bird cage. Various materials — either conducting or insulating — can be used as spreaders for making a cage. A spreader would have to be placed every several feet along the antenna. If the antenna conductor wires are spaced close enough together, these conductors will have the effect of being a solid wire for the rf current.

It is a cage antenna that yielded curve B in Fig. 1. The 2:1-SWR bandwidth is 500 kHz, while the radiator is 121.5 ft long and is center fed with 75-ohm coax. The cage diameter is, would you believe, 36 inches! The only problem is that I'm not sure what the maximum spacing between adjacent conductors is for a cage to act as a solid conductor at 3.75 MHz. (I've found nothing definitive in the references, although 0.2 λ is a rule-of-thumb value for wire spacing for a "solid" reflector.) Assuming 4 wires would be satisfactory, a little arithmetic indicates that you would need 486 feet of wire and probably two dozen spreaders to build this dipole antenna. I'm still searching for a *simple* way to obtain the same results.

APPENDIX

If you're a computer buff or if you'd like to know about a mathematical method of simulating a near-resonant dipole antenna, you'll be interested in this appendix. Even if the math doesn't interest you, you may pick up a bit of antenna theory.

Of the material researched, a text by Jasik contains information that seemed well suited to use with a personal computer.[1] The technique Jasik presents uses the induced emf method, based upon a sinusoidal distribution. His equation, in simplified form, is

$$Z = R + j\left[Y - 120\left(\ln\frac{24\ell}{d} - 1\right)\cot m\right] \qquad \text{(Eq. 1)}$$

where

Z = feed-point impedance at the center of the antenna, in the form R + jX. R and X are in ohms.

R = radiation resistance, a function of m (see Eq. 2)

j = complex number notation, indicating rectangular coordinates; the entire j term represents the reactance at the feed point

Y = function of length m (see Eq. 3)

ln = natural logarithm

ℓ = total length of antenna, feet

d = diameter of antenna, inches

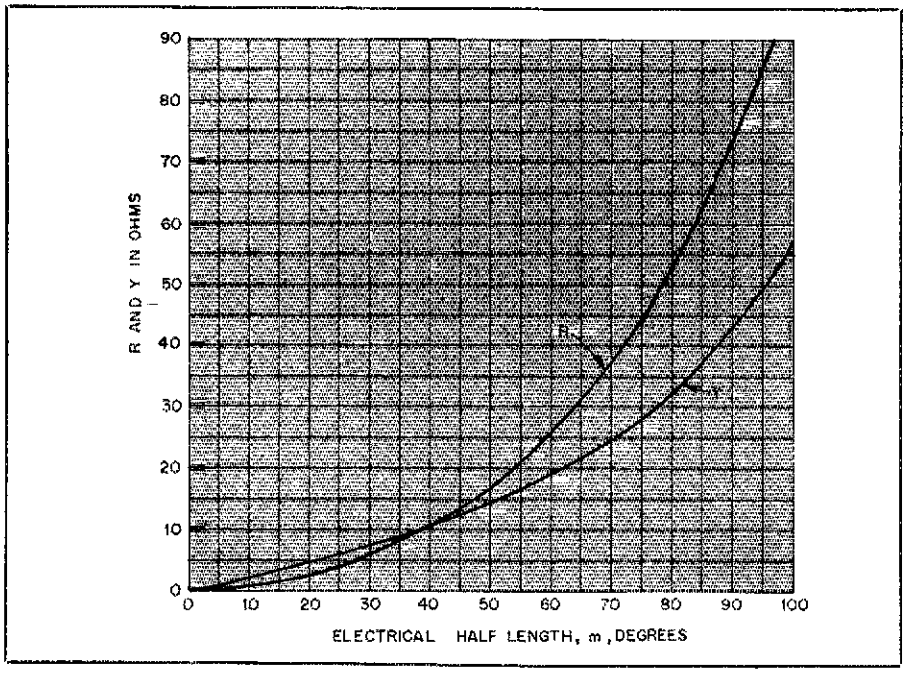


Fig. 8 — Values of R and Y (ohms) vs. m, electrical half length of the antenna, in degrees. (After Jasik; see note 5.)

m = electrical length of half the antenna = 180 (fl/984 + 0.013) degrees. (Note that m is not constant across the band.)
f = frequency in megahertz

Jasik states that Eq. 1 is valid only when the half length of the antenna is not much longer than a quarter wavelength, meaning near half-wave antenna resonance. This was no limitation for this study, but be aware that Eq. 1 is invalid for, say, center-fed long wires or harmonic antennas. For short dipoles the equation may be simplified, but Eq. 1 still applies here since we're working near resonance in all cases.

R and Y are complex functions of the electrical half length of the antenna, m. Jasik merely presents a table of values, and also a graph showing the values of R and Y for various values of m in radians. The graph is presented in Fig. 8, with m converted to electrical degrees.

For the computer analysis, it was necessary to arrive at R and Y values from equations, rather than from Jasik's table or graph. Further research indicated that taking sine and cosine integrals was required to compute R and Y.[6] Rather than tackle what I felt would be a monumental task in programming such a procedure, I chose to derive more simple equations that approximate the values Jasik shows. These equations are

$$R = \frac{m^{2.736}}{3048} \quad \text{(m is in degrees)} \qquad \text{(Eq. 2)}$$

$$Y = \frac{m^{2.234}}{549.7} \quad \text{(m is in degrees)} \qquad \text{(Eq. 3)}$$

In these equations, R and Y are in ohms.

Although these equations are only approximations for Jasik's data, they were optimized for the range from 80 to 100 degrees. The maximum variance from Jasik across the 80/75-meter band is less than 0.5 ohm, assuming resonance within the band. The variance increases significantly for short dipoles.

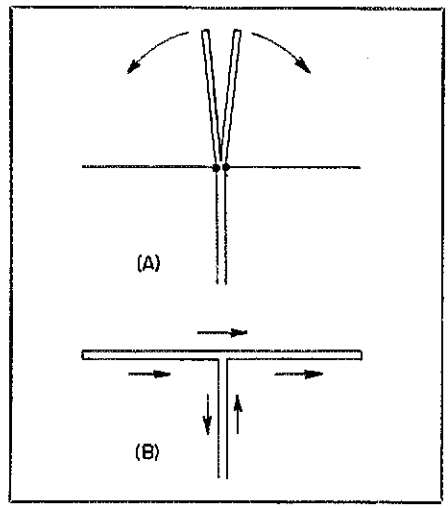


Fig. 9 — At A, a single-wire antenna with two quarter-wave stubs connected in series across the feed point, illustrating the "transmission-line effect" of a folded-dipole antenna. At B, the stubs are brought down to replace the single wire as a radiator, resulting in a folded dipole. Arrows show the direction of current flow in the feeder and the antenna conductors.

Remember that m is designated in electrical degrees in the above equations. If your computer calculates in radians (and most do), substitute the value of pi for the factor 180 in the definition of m in Eq. 1, and use Eqs. 4 and 5 for finding R and Y.

$$R = 21.17\, m^{2.736} \quad \text{(m is in radians)} \qquad \text{(Eq. 4)}$$

$$Y = 15.39\, m^{2.234} \quad \text{(m is in radians)} \qquad \text{(Eq. 5)}$$

Let's say we wish to determine the SWR plot of a single-wire antenna like that resulting in curve A of Fig. 1. The length is 125 feet and the wire diameter may be taken as 0.08 inch for no. 12 wire. For each frequency of interest in the band we may determine the feed-point impedance, $Z = R + jX$, from the above equations. The resulting SWR value for that impedance is then

$$SWR = \frac{A + B}{A - B} \qquad \text{(Eq. 6)}$$

where

$A = \sqrt{(R + Z_o)^2 + X^2}$

$B = \sqrt{(R - Z_o)^2 + X^2}$

Z_o = characteristic impedance of feed line

With these equations you now have all the basic information you need to calculate and plot SWR curves for single-wire cylindrical antennas. I'll leave the computer programming details up to you, as the operation involves only entering data, straightforward mathematics and displaying the results.[7] The results of my computer calculations across the 80/75-meter band for this antenna are those appearing in Table 1.

Folded Dipoles, Stubs, Hairpins, and All That

In more complex antennas, or those with some type of matching arrangement incorporated at the antenna feed point, the net impedance result is equivalent in placing an additional impedance in parallel with the R + jX impedance of the antenna alone. Let's add a hairpin in shunt with the 125-ft antenna we've been talking about, as shown in the inset of Fig. 2, in hopes of broadening the SWR response. For simplicity, let's use 300-ohm TV ribbon as the material for the hairpin. The ribbon has a velocity factor of 0.8. So as not to introduce reactance across the entire band, let's make the hairpin length equal to quarter-wave resonance at the center of the band, 3.75 MHz. (At this frequency, the shorted quarter-wave line will represent an "open," or at least a very high impedance at the feed point of the antenna.) The physical length of the hairpin will be 52.5 ft.

As we depart from hairpin resonance and move in frequency toward either band edge, the hairpin will introduce reactance at the antenna feed point. In one frequency direction the reactance will be inductive, and in the other, capacitive, as mentioned earlier. How much and what kind of reactance may be determined from

$$X_H = j\, Z_H \tan h \qquad \text{(Eq. 7)}$$

where

X_H = reactance of hairpin at antenna end
Z_H = characteristic impedance of the transmission line used for the hairpin
h = electrical length of the hairpin

Eq. 7 assumes a lossless hairpin. The resultant impedance at the antenna feed point is R + jX of the antenna in parallel with X_H. Calculations of this nature are simplest when the resistance and reactance terms are converted to either admittance and susceptance or else to polar notation. These procedures have been discussed in detail in earlier *QST* articles.[4,5]

Instead of a hairpin of balanced transmission line, coaxial line might be used. In this case the matching arrangement might be more properly termed a stub. Hairpins or stubs need not be limited to resonant quarter wavelengths.

In the case of a folded dipole, a combination of factors affect the feed-point impedance. One factor is the "shorted-transmission-line" effect of the two halves of the antenna. The

result of this factor is the same as placing the reactances of two hairpins in series, and connecting the series combination in parallel with the R + jX of the antenna. This is illustrated in Fig. 9A. With two identical hairpins in series, the total reactance is twice that obtained from Eq. 7.

In Fig. 9B the two hairpins are brought down to become the radiator as well. In so doing, antenna currents are caused to flow in both conductors, as indicated by the arrows. The total antenna current divides equally between the upper and lower conductors, and the direction of current flow will be the same in both, as shown. However, the feed line is connected to only one of the two conductors. With the same amount of power being delivered to the antenna but only half the feeder current flowing when compared with a single-wire antenna, it stands to reason that the feed-point impedance must be four times greater. This comes from the power equation, $P = I^2Z$, where Z is a complex quantity, R + jX. The impedance of the antenna as a pure radiator is therefore four times that obtained from Eq. 1. Thus, the actual feed-point impedance of the folded dipole is

$$Z = 4\,(R + jX) \text{ in parallel with } 2\,(j\,Z_H \tan h) \qquad \text{(Eq. 8)}$$

In a folded dipole type of antenna, the "transmission-line shorts" need not be placed at the extreme ends of the antenna. They may be placed nearer the antenna center, perhaps for better bandwidth. This idea is that shown in Fig. 3. Neither must the line be made of ribbon. Coaxial sections may be used, as is done in the double bazooka antenna.

The preceding paragraphs give the mathematic equations for computing feed-point impedances and then determining the standing-wave ratios for the feeder of your choice. Whatever type of cylindrical antenna might come to your mind can be simulated by applying the equations and reasoning out the configurations, as was done above, to determine the shunt or modifying impedances. Antenna lengths, feed-line impedances, hairpin-line impedances, hairpin lengths and other factors may each be assigned independently. The results may be calculated in terms of R, X and SWR. You can test a whole farm of antennas without ever having to go outside.

Notes

[1] meters = feet × 0.3048; inches = ft × 12.

[2] C. C. Whysall, "The 'Double Bazooka' Antenna," *QST*, July 1968, pp. 38-39. This antenna also appears in each edition of *The Radio Amateur's Handbook* from 1969 through 1977.

[3] W. Maxwell, "A Revealing Analysis of the Coaxial Dipole Antenna," *Ham Radio*, Aug. 1976. This excellent reference provides insight into some of the theory underlying the procedure presented in the appendix of this article.

[4] *The ARRL Antenna Book*, 13th (1974) and earlier editions.

[5] H. Jasik, *Antenna Engineering Handbook* (New York: McGraw-Hill Book Company, 1961), pp. 3-1 through 3-3.

[6] P. S. Carter, "Circuit Relations in Radiating Systems and Applications to Antenna Problems," *Proceedings of the IRE*, Vol. 20, June 1932, pp. 1004-1041.

[7] A photocopy of the program the author used with an IBM personal computer is available upon request, as is the same program written for the TRS-80 model 1 Level II. Send $2 to cover copy fee, postage and handling to Dept. TD, ARRL Hq., 225 Main St., Newington, CT 06111. Request BASIC program ANTRXSWR/BAS, and be sure to state which computer program listing you desire.

[8] J. Hall, "A Simple Approach to Complex Circuits," *QST*, July 1977, p. 35. Also see Feedback, Aug. 1977 *QST*, p. 41.

[9] J. Bartlett, "Learning to Use Rectangular and Polar Notation," *QST*, November 1979.

Strays

Senator Barry Goldwater, K7UGA (left), and Major General Robert F. McCarthy, commander of Air Force Communications Command, ceremoniously "pull the switch" to terminate operation of MARS station AFC6BG. Since the 1960s, the station has provided a link to home for many armed forces personnel stationed in Southeast Asia and the Pacific.

MARS STATION AFC6BG IS QRT

☐ An amateur station that was a "link with home" for many Vietnam-era military personnel and their families has ceased operations. Military Affiliate Radio System (MARS) station AFC6BG in Paradise Valley, Arizona, went off the air on January 15.

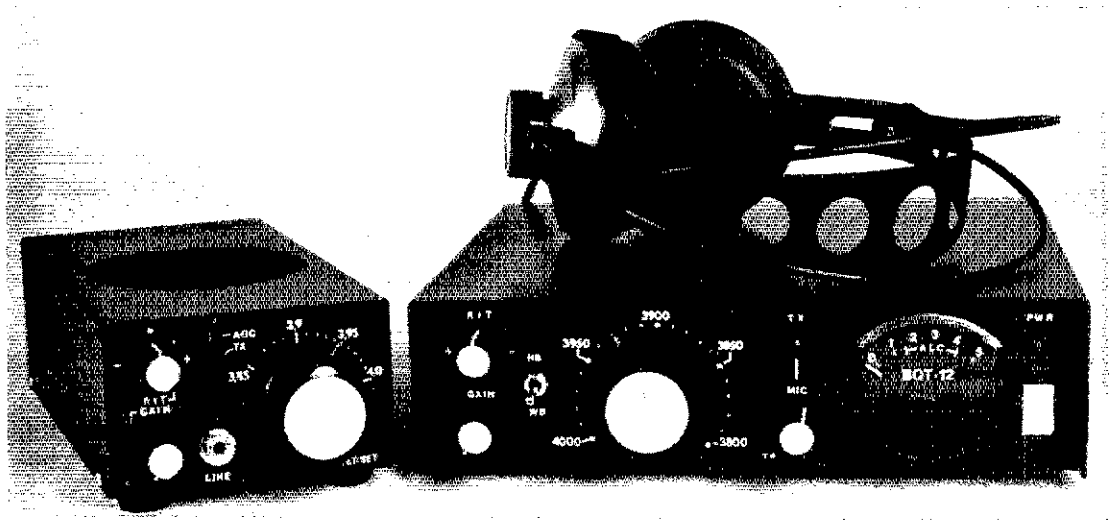
Owned by U.S. Senator Barry Goldwater, K7UGA, AFC6BG served in the 1960s as a phonepatch relay point for those stationed in Southeast Asia to talk to family and friends in the U.S. With the reduction of phonepatch traffic in the 1970s, the station became a radioteletype "gateway" station for the Pacific. The decision to close the station was based on a combination of declining mission activity and the anticipated cost of modernizing the station's aging equipment.

In recognition of the station's years of service, Secretary of the Air Force Verne Orr, WA6IOG, sent the following MARS message to K7UGA: "Operated exclusively by your dedicated volunteers, and at considerable personal expense to you, AFC6BG has provided the Department of Defense and the nation, in times of emergency, a service unparalleled in military communications. We all owe you and your people a tremendous debt of gratitude that can never be adequately repaid." In closing ceremonies at the station, Major General Robert F. McCarthy, commander of Air Force Communications Command, described the volunteers' service as that "which will stand the test of time and will display to others a sense of commitment and dedication." He presented plaques of appreciation to K7UGA, W7FCQ, a long-time station manager, station manager AFA6PU and a dozen volunteers who helped the station in recent years. — *U.S. Air Force News Release*

ATTENTION QRO OPS

☐ The 1983 Dayton (Ohio) Hamvention, scheduled for April 29-May 1, will offer cw operators the opportunity to challenge the world record for copying Morse code. As documented in the *Guiness Book of World Records*, the record of 75.2 wpm was set in 1939 by Ted McElroy. In addition, Cw Proficiency Certificates will again be awarded. For more information, write to Frank J. Schwab, W8OK, Cw Proficiency Chmn., Dayton Hamvention, Box 44, Dayton, OH 45401.

Construct an Audio Amplifier with Agc for Your Simple Receiver



Tired of using headphones with that bare-bones receiver? This module is an inexpensive way to make your little homemade project sound grown up!

By Rick Littlefield,* K1BQT

Many excellent articles describing simple receivers have appeared in amateur magazines. In many respects these receivers perform as well as their commercial counterparts. Most of the designs lack an automatic gain control circuit, however, and this can mean a lot of annoyance and knob twisting while monitoring nets or tuning the band. Some designs do not have the capability of operating with a speaker. In this article I offer one approach to making your next home-built receiver act like a store-bought radio. The module could also be retrofitted to an existing receiver in need of improved audio characteristics.

There are several ICs on the market that satisfy amateur receiver audio requirements. The LM-386, available at Radio Shack stores for about a dollar, is well suited for amateur use. This chip features low distortion, plenty of gain (up to 200), low current drain and high stability. With a 9-V supply it delivers 200 mW of audio power, more than sufficient to drive a speaker.

Automatic Gain Control

Several agc approaches are possible. The one I prefer rectifies a sample of the i-f signal to control the bias of one or more preceding stages. Deriving a control signal from the i-f stage may not be practical in simple designs in which the i-f signal levels are low and BFO leakage is common. Audio-derived agc is usually a safer choice. But deriving audio from a receiver that employs a single high-gain audio chip can also present a problem. The only voltage-sampling point before the volume control is at the output of the product detector, where the voltage level is very low. Thus, a fully functional agc circuit would require the addition of high-gain circuitry to develop a usable control voltage.

The simplest alternative is to derive the control voltage at the audio-amplifier output, where the signal level is high. The agc circuit then keeps the amplifier from being driven past a predetermined output level. Limiting is set somewhere below the maximum undistorted output level of the audio amplifier at a comfortable "maximum" volume level for the radio. A drawback to this approach is that agc action does not occur at very low gain settings. This should not be a problem in quiet listening environments, however, since the human ear can adapt easily to changes of 20 dB or more in normal conversation. In noisy environments the radio would be operated at a higher volume level, and heavy agc action would keep the output more constant. This is a compromise compared to a 90-dB agc system operating independently of the audio gain control; but it meets my design objective without adding much to the complexity of the receiver circuit.

*Box 114, Barrington, NH 03825

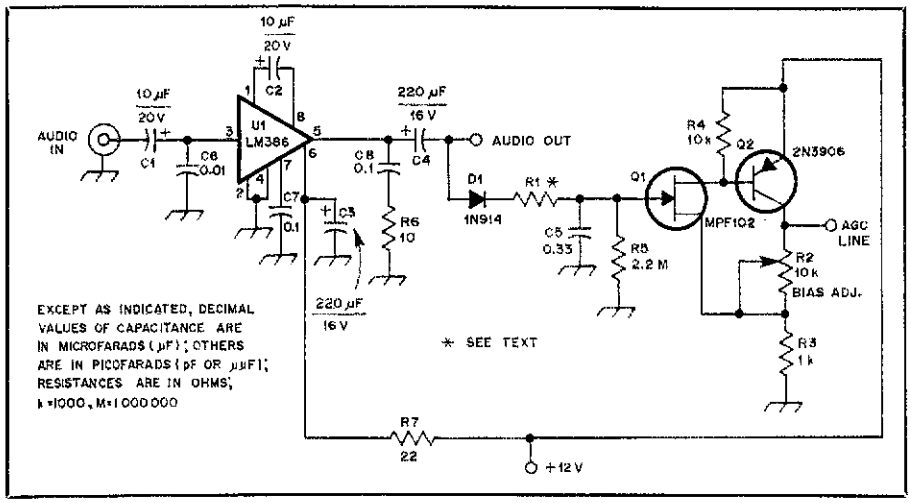


Fig. 1 — Circuit diagram of a simple audio amplifier and agc module for use with homemade receivers.

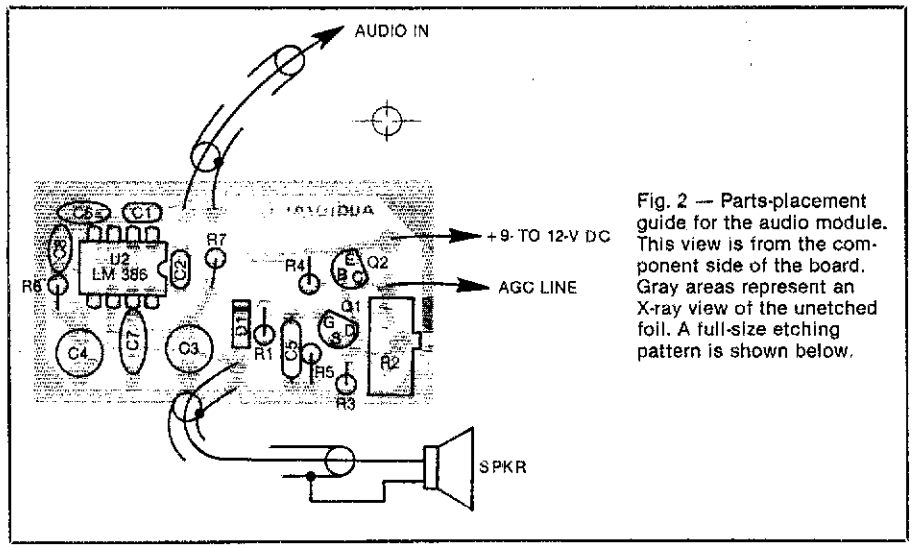
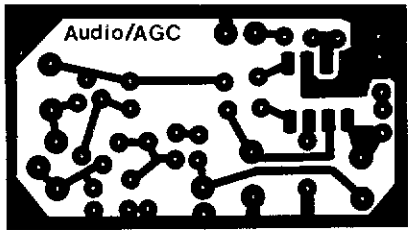


Fig. 2 — Parts-placement guide for the audio module. This view is from the component side of the board. Gray areas represent an X-ray view of the unetched foil. A full-size etching pattern is shown below.



Etching pattern for the audio amplifier and agc module. Black represents unetched copper, viewed from the foil side of the board. Pattern is shown full size. A parts-placement diagram appears in Fig. 2.

Circuit Information

I have used a circuit similar to that shown in Fig. 1 for several small receivers. The LM-386 audio section is compact and stable. Miniature 220-µF, 16-V capacitors (available from Radio Shack) contribute to the small size of the layout (Fig. 2).[1] The circuit is designed to drive an 8-ohm speaker. For the sake of good audio, it should be at least 3 inches in diameter.[2] Operation with headphones is possible by adding a simple attenuator similar to those used in tape recorders and transistor radios. A 10-ohm resistor replaces the speaker, and a 470-ohm series resistor drops the output to a comfortable listening level.

The agc design was borrowed from a more conventional audio-derived configuration and adapted for my application.[3] This circuit has some interesting features that make it universal. First, it samples a wide range of audio levels while remaining virtually "transparent" to the circuit because of the high input impedance. Second, it can be used with either a bipolar or an IC-based i-f section that requires a positive bias-voltage swing, or with MOSFET stages, which employ a negative bias-voltage swing. Since Q1 will respond to either positive or negative voltage, the polarity of D1 determines the direction of the bias-voltage swing. R2 sets the resting-bias level. Adjust this level to the point where agc action begins to lower the receiver background noise on a quiet frequency. R1 is used to adjust the drive. It should be set for smooth response. Overdrive will cause a pronounced overshoot or a cracking sound when strong signals come on. Lack of drive will cause insufficient limiting, and the audio amplifier will be driven into distortion. A substitution box can be used to determine a fixed value for R1 that will work best with your radio. Or, start with a 50-kΩ potentiometer and measure the required resistance.

Receiver Applications

Fig. 3 shows how I used this circuit in conjunction with a receiver that has a 455-kHz i-f and employs a single MOSFET i-f stage. Note that the polarity of D1 is set to provide a negative voltage swing. The agc action is smooth, and the i-f amplifier seems to be resistant to overload when no agc signal is present. Consequently, I did not include an rf or manual i-f gain control.

This receiver was built as a small net monitor for 75 meters. I had doubts about the "audio-derived limiter" approach to agc when I remembered how my old SBE-34 used to snap and crack every time a strong signal appeared. By setting the agc bias at the point of gain reduction and adjusting for the smoothest response, however, I eliminated most of that problem. The scheme worked so well that I decided to try it with a solid-state transceiver, which used an MC-1350P i-f amplifier.

Fig. 4 shows the receiver section of that rig, which uses a 9-MHz i-f stage. The results were good. In practice, I set the gain so that stronger signals activate the agc while weaker ones do not. This provides a reasonable dynamic range while maintaining good audio quality and a low level of background noise.

This receiver does employ a manual i-f gain control, since overload is a problem when signals are strong. Your i-f amplifier is overloading if signals sound distorted at low volume, but seem to clear up at higher levels, when the agc reduces the stage gain. If panel space is not available for the addition of an i-f gain control, a simple attenuator switch using fixed resistors could

[1]Notes appear on page 31.

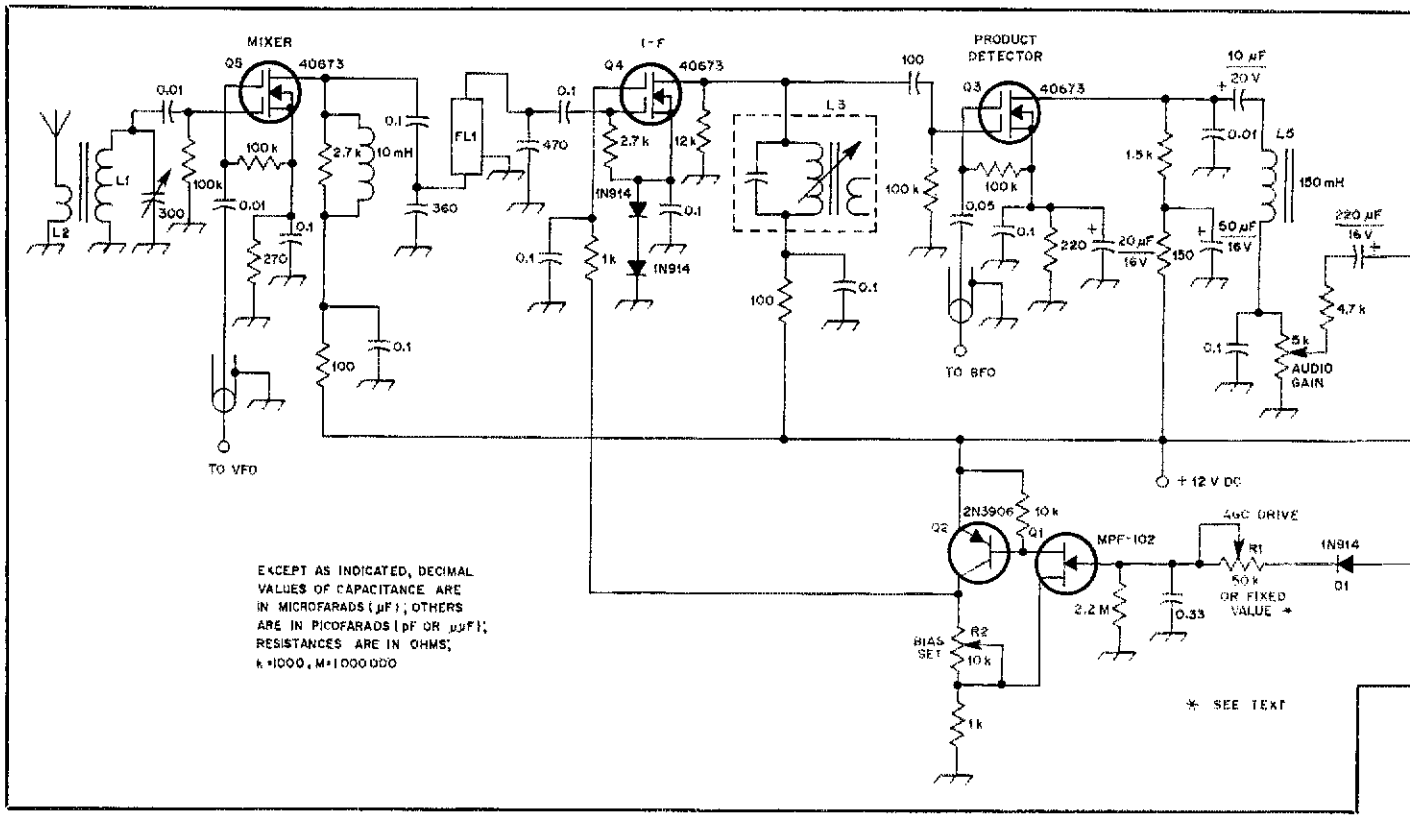


Fig. 3 — Schematic diagram of a 75-meter net-monitor receiver with a MOSFET i-f stage. The audio amplifier/agc module is used as the audio stage in this receiver.

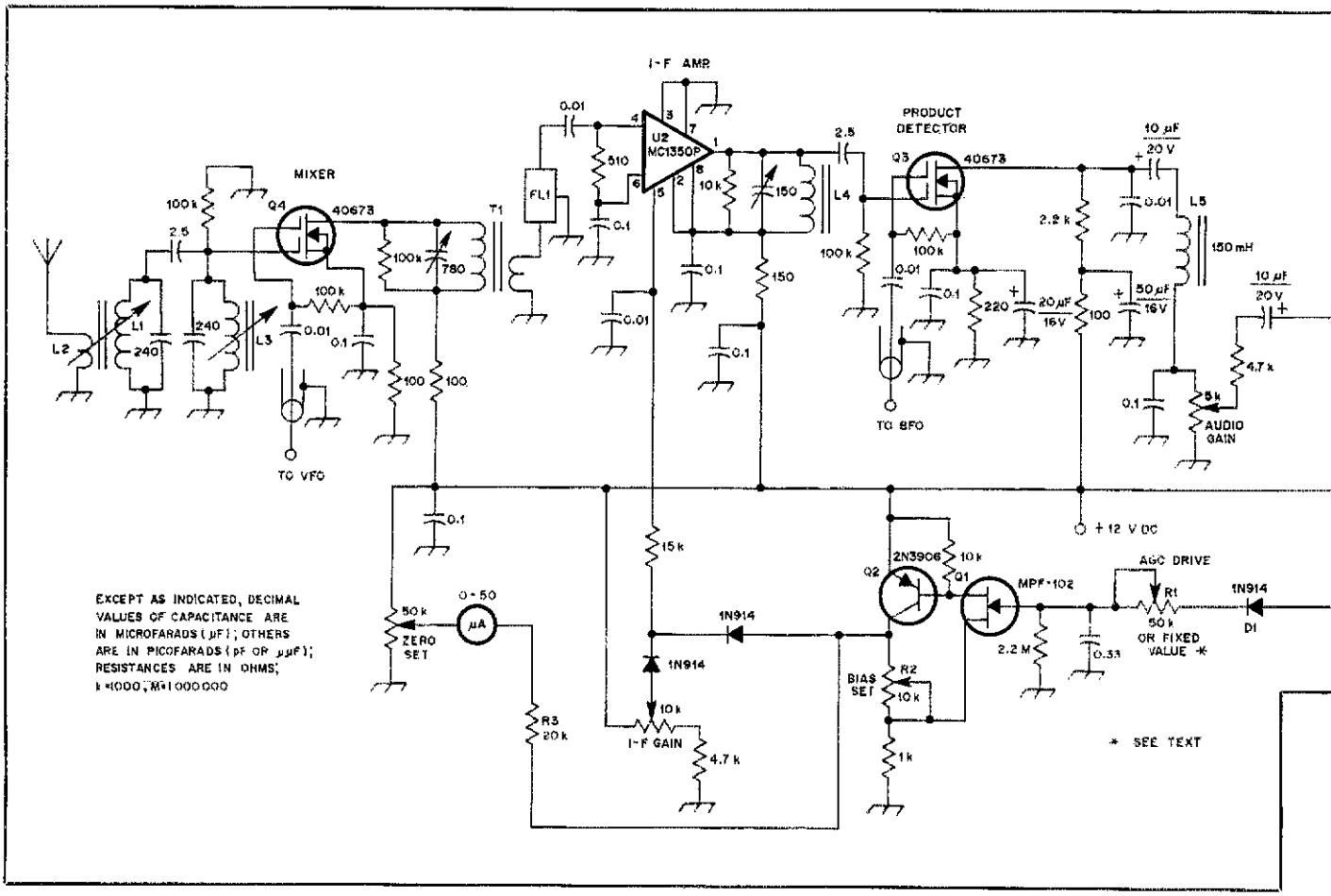
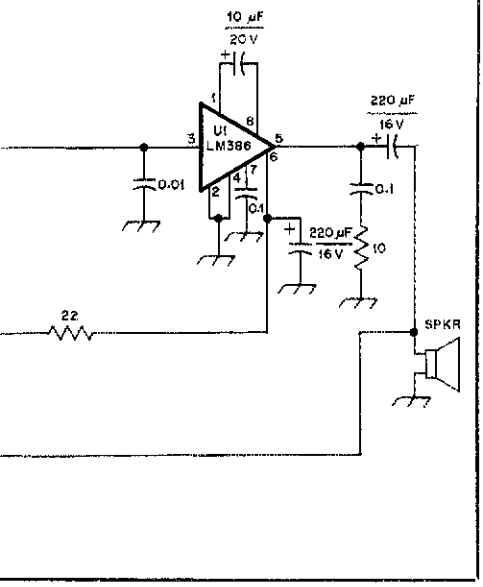
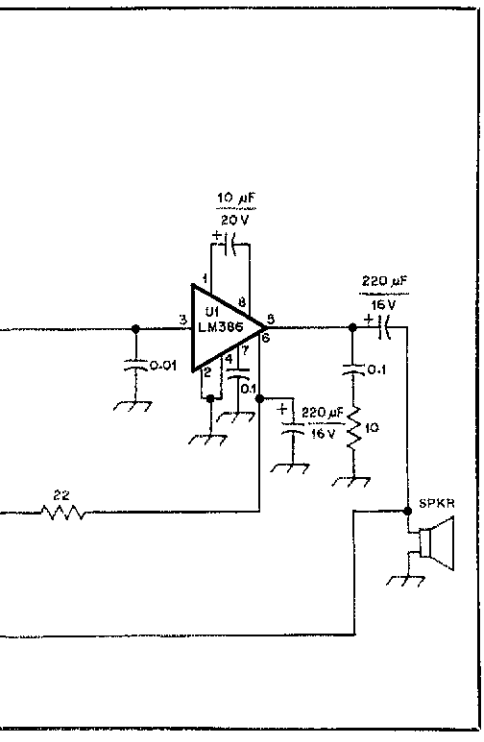


Fig. 4 — Schematic diagram of a simple receiver employing a 9-MHz i-f. The audio amplifier/agc module comprises the audio section of this receiver.



FL1 — 2.1-kHz bandwidth i-f filter. The one used by the author is a Kokusai unit purchased from MHZ Electronics.
L1 — 40 turns no. 24 enam. wire on an Amidon or Palomar T68-6 toroid core.
L2 — Two turns no. 24 enam. wire over ground end of L1.
L3 — Primary of a 455-kHz i-f transformer.



FL1 — Mechanical i-f filter. The author used a McCoy 9-MHz crystal filter.
L1, L3 — Approximately 7 µH, wound on a slug-tuned core.
L2 — Two-turn link wound on ground end of L1.
L4 — 24 turns no. 24 enam. wire on T37-2 toroidal core.
T1 — Primary, 25 turns no. 24 enam. wire on T37-2 core. Secondary, 6 turns no. 24 enam. wire.

be substituted. A 20-dB attenuation level should be about right.

Notice that both receivers employ a single-ended MOSFET product detector. This is a reasonable choice since the circuit is simple and provides some gain. An optional low-pass filter on the detector output reduces high-frequency audio interference. Inductor L5 consists of a 0.6-inch single-bobbin pot core wound to capacity with no. 36 wire. The inductance should be about 150 mH.

My transceiver contained a panel-mounted meter, so I included the meter circuit shown in Fig. 4 for the receiver section. Monitoring the agc voltage does not provide true signal-strength readings, but it does give an indication of agc action. This particular meter has a 50-µA movement, but less sensitive meters can be used with adjustments of R3. The comparative readings obtained with this meter make it a worthwhile addition to the project.

Conclusion

Employing an audio chip that is capable of driving a speaker, and adding a simple agc circuit, can eliminate two drawbacks to building your own "bare bones" receiver. This agc circuit may also adapt to existing projects, including direct-conversion receivers with rf amplifiers. Give it a try. The parts are inexpensive and the results are good.

[Editor's Note: This audio/agc circuit was installed in the W1FB "Bare-Bones CW 'Superhet,' " described in June 1982 *QST*. Few circuit changes were required to replace the original audio circuit. The agc bias voltage was connected directly to Q2 gate 1 through a pair of series-connected 1N914 diodes and a 1-kΩ resistor. The diodes were needed to provide the proper bias voltage range for the i-f amplifier. With no signal present, R2 was adjusted to provide +4 V on gate 1. When the receiver was tuned to a strong signal, agc action reduced this to less than 1 V, decreasing the i-f gain. More or fewer diodes may be needed with other receiver circuits.]

Rick Littlefield received his General class amateur license in 1957, at the age of 13. He holds a BA degree in communications and an MEd in education counseling from the University of New Hampshire. He is employed by the University of New Hampshire in the Department of Media Services. His main duties include writing and producing educational programming and providing consultation for University-affiliated projects, along with some teaching assignments. Rick also owns and operates Lakeshore Media, a small consulting and production company in Barrington, New Hampshire. Rick's other interests include playing several musical instruments and singing. He has stage and recording experience, is a professional narrator, a nationally published cartoonist, illustrator and author, has a Private Pilot rating, and enjoys sailing and cross-country skiing.

Notes

[1]Etched circuit boards, parts and parts kits for the audio amplifier/agc circuit are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002, and from RADIOKIT, Box 411, Greenville, NH 03048.
[2]mm = in. × 25.4.
[3]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977), pp. 103-106.

Strays

TA PROFILES

On November 20, 1981, we had the good fortune of adding David A. Zinder, W7PMD, to our team of ARRL Technical Advisors. Because of his more than 24 years experience in engineering and designing electric power control systems, we named him our expert on power supplies and ac power systems. He has been registered as a professional engineer in Wisconsin and Arizona.

Dave received his first Amateur Radio license in 1951, and currently holds an Advanced class license. He resides in Phoenix, Arizona, and is active on 2 meters. If you are in the area, I'm sure you will hear Dave talking to his son (N7DZF) on 2-meter fm.

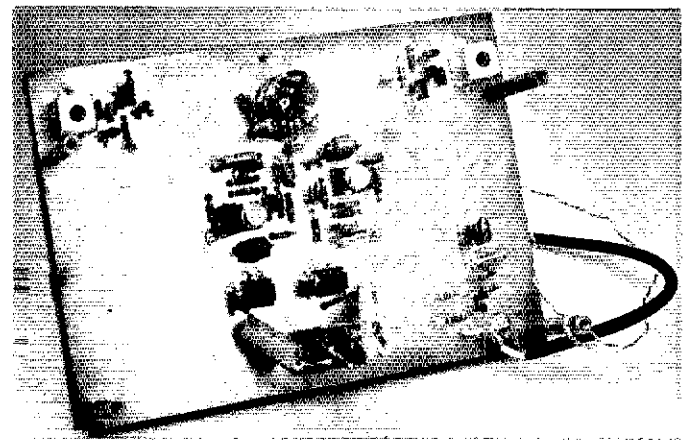
Dave received his BSEE degree from the University of Arizona. He is employed as the principal engineer for Sperry Flight Systems. He is also the power-supply designer and test engineer for the F-16 cockpit CRT display system. Dave has authored more than 22 technical papers, many of which were published in engineering technical magazines. One of his articles, "SCR Power Control Fundamentals," was selected as the best paper of the year in 1968 by *Appliance Engineer Magazine*.

After retiring as Scout Master, following eight years of service, Dave is still active in the local scout council and is the committee chairman. Many of his evenings are devoted to teaching "Intro to Electronics" at Phoenix College. When time allows, he enjoys hiking, camping and fishing. — *Marian Anderson, WB1FSB*

TA Dave Zinder, W7PMD

A Dichotic Detector for CW

Have you ever employed "psychoacoustics" to improve your receiver performance? Try this novel circuit and update your station human engineering.



By Douglas A. Kohl,* WØTHM

In spite of marvelous improvements in receiver performance over the years, the audio output circuitry of modern receivers does not take full advantage of our sense of hearing in rejecting unwanted signals. In a typical receiver we attempt to identify a cw station by adjusting the pitch of the "whistle" (beat note) to match a mental "discriminator." Adjacent unwanted signals produce additional tones that we attempt to ignore. Typical narrow-band (250-Hz) receiver operation eliminates most of the unwanted signals, but others within the passband can mask the desired signal. Furthermore, a strong signal on the i-f filter skirt can be louder than a weak signal in the center of the passband.

A Better Way

The human ear can detect a change in pitch of 3 Hz at 100 Hz, or 9 Hz at 1500 Hz, but *not* when two or more tones impinge upon the eardrum simultaneously. For example, if one tone was at 800 Hz, a second one would have to be 800 ± 125 Hz for the ear to be able to clearly distinguish two separate frequencies.[1] (This points out a fundamental limitation of narrow, crystal-filter techniques.)

Pitch recognition is enhanced greatly when the detection process is changed from single-tone to dichotic pitch comparison.[2] If the conventional audio output of a receiver (usb) is fed to the left side of a stereo headphone, and the audio from a frequency-inverted BFO detector (lsb) is fed to the right phone, there will be no audio "beating" or intertone interference caused by the physiologic functioning of the ear.[3]

If a spectrum of various pitched tones from different stations were presented independently to each ear, and if the same frequency were to appear in both the left and right headphones, two effects would occur. First, a sound "source location" would appear directly in front of the listener, as if he or she were listening to a stereo recording in which one instrument in the center of an orchestra is playing. Second, the perceived intensity of this "localized" tone is increased by three automatically.

To implement the dichotic cw detector, a conventional fixed-tuned BFO and product detector must be duplicated, as shown in Fig. 1. The "left" and "right" BFO frequencies are located at the edges of the receiver i-f bandpass (see Fig. 2). A signal appearing at A will produce a high-pitched tone in the right ear and a low-pitched tone in the left ear. (Refer to Table 1 for specific examples of the detector operation.) Because the same code signal produces tones of different pitches in each ear, the mind can easily ignore them because they are not spatially oriented and have no harmonic relationships. The desired signal, C, at the center frequency, however, produces both a stereo "front and center" location and a noticeable increase in sound intensity. One effect of this sensation is that it masks, or hides, adjacent signals, which are the most troublesome in a conventional receiver.[4]

In practice, there are several other effective modes of operating the detector. Because the dichotic system eliminates audio beats among all signals, the musical sensations of consonance (harmony) and dissonance (discord) of the left and right tones of the desired signal may be used effectively. If the receiver tuning is shifted off-center so the dichotic pitch difference is 100 Hz or less, the right and left tones create a harsh discord sound that clearly identifies the desired code signal in the presence of all others that have a "pure" sound.[5]

For those readers who have a "musical ear," tuning the receiver to create a major or minor third, a fourth or a fifth will form a harmonious tone pair from the desired signal. This will make it easy to distinguish from other background tones.

Circuit Construction and Alignment

The schematic diagram of a prototype dichotic cw detector is shown in Fig. 3. This unit was designed to operate with a receiver using a 9-MHz i-f. Two Colpitts oscillators are used to generate the BFO signals. The oscillators are identical except that one has a vernier tuning capacitor. LM3028 differential-amplifier ICs are employed as product detectors and a JFET source follower isolates the receiver i-f from the detector circuit.

Spurious output from the product detectors is attenuated in low-pass filters, and the detected audio is amplified by a pair of LM386 audio-amplifier ICs. The frequency response of the audio ICs is tailored for good low-frequency operation so true discord sensations can be felt by the user.

Perhaps the most important factor in the construction of this detector is isolation of the BFOs from each other and from the receiver i-f. In the prototype, a double-sided pc board was used, with one side of the board serving as a ground plane. Each BFO circuit should be located as far away as possible from the other. The receiver i-f should not be loaded by the detector circuit, although long lengths of coaxial cable from the receiver to the

[1]Notes appear on page 34.

*SPARSA Products, Inc., 417 Sixth Ave., N.E., Osseo, MN 55369

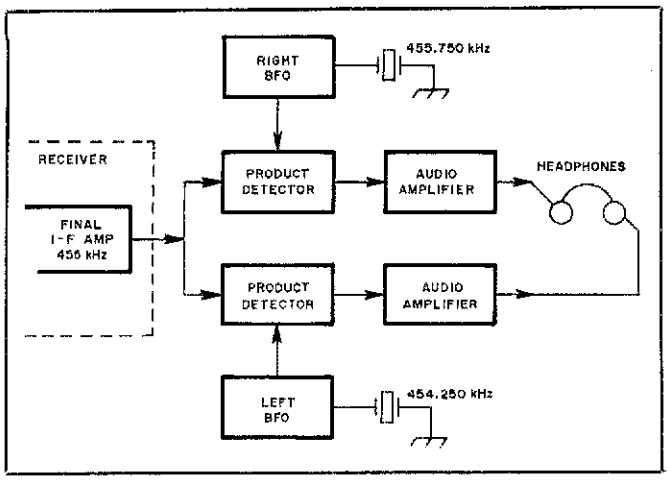


Fig. 1 — Block diagram of a dichotic detector for cw.

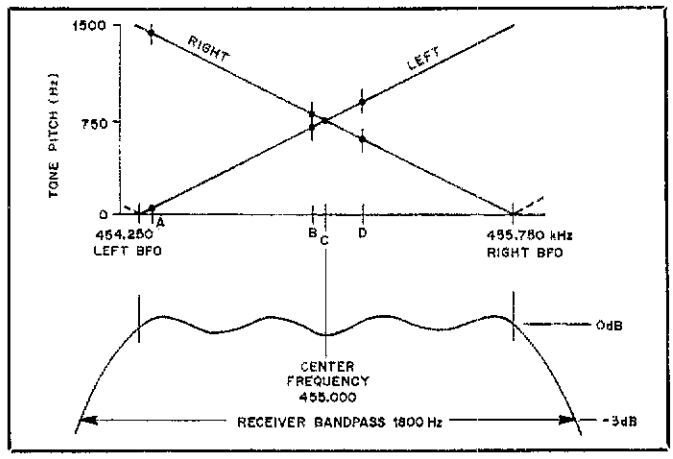


Fig. 2 — Signals present at points A, B and D produce tones of different pitches for the left and right ears.

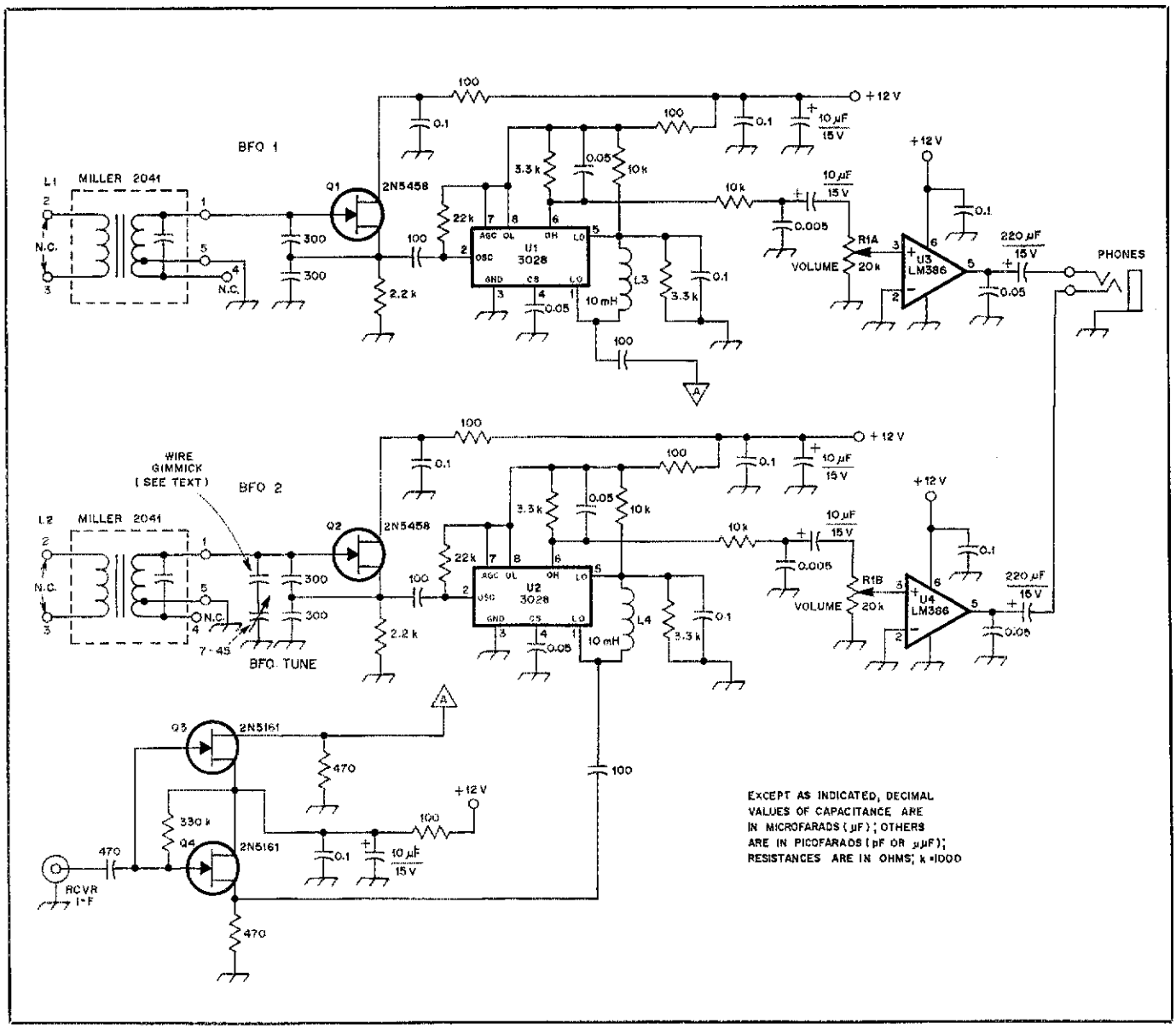


Fig. 3 — Schematic diagram of the dichotic detector. This version is designed to operate with a receiver that uses a 455-kHz i-f. It may be used with receivers having other intermediate frequencies by scaling the BFO-tank components. Fixed-value capacitors are disc ceramic unless otherwise noted. Resistors are 1/4- or 1/2-W carbon composition.

L1, L2 — Miller 2041 i-f transformer or equiv.
L3, L4 — 10-μH miniature rf choke. U1, U2 — LM3028 differential rf/i-f amplifier IC. U3, U4 — LM386 low-power audio amplifier IC.

detector may load the i-f output and require slight receiver retuning. As long as good rf construction techniques are employed the circuit should perform flawlessly.

The two BFOs are tuned (using L1 and L2) until one BFO output falls on the high side of the i-f passband, the other on the low side. During this tuning process C5 should be set to half mesh. With the "gimmick" capacitor adjusted to 7 pF the tuning range of C5 should be ±1 kHz.

Table 1
Typical Detector Frequency Relationships

RF Signal	I-F (kHz)	Audio Tone Pitch (Hz) Left	Right	Dichotic Pitch Difference (Hz)
7.049250 MHz	455.250	0	1500	1500
A 7.049300	455.300	50	1450	1400
B 7.049950	454.950	700	800	100
C 7.050000	455.000	750	750	0
D 7.050150	455.150	900	600	300
7.050750	455.750	1500	0	1500

Operational Technique

With the detector properly aligned and connected, turn on the receiver, select an i-f bandwidth and tune for signals. Remember the headphone volume is now controlled by an external circuit! As the desired signal is located, the two-tone pitches approach each other and merge. When the dichotic pitch difference goes to zero, only one tone centered at 750 Hz, is heard. When centered on the i-f passband, the source of the single tone appears centered directly within the head! All other unwanted signals are pairs of high- and low-pitched tones. Because the high-pitched tone is heard in only one ear and the low-pitched tone in the other, the mind easily rejects them in favor of the localized, intensified tone. Note that the dichotic pitch difference is double the actual difference between the desired signal and the unwanted signal(s) and that exaggerated separation greatly helps in the rejection process.

Atmospheric static comes through the detection system as a localized sound in the center. Under noisy conditions the use of the discord or harmony mode of detection has proven to be an effective way to "tag" the desired signal and copy through the static.

The use of a smaller frequency difference between the two BFOs would shift the center-frequency tone lower in pitch and make the discord or harmony modes easier to use. The effective harmony sensation is a neural processing function within the brain that can create an illusionary but predominate tone sensation that, although derived from two other real tones, has not actually been produced acoustically. Its location also appears to be centered in the head and permits rejection of unwanted left and right ear background signals.[6]

Conclusions

To mentally follow and decode the desired cw signal in the presence of other unwanted signals is a communications challenge. Because of the physical structure of the ear, there are fundamental limitations in recognizing differences in tone pitches that are close together. The dichotic detector takes advantage of the brain's higher-level processing of the auditory neural impulses — psychoacoustics! The result is the same as narrowing the receiver bandwidth to just a few hertz, but without reducing the speed of response, as with a high-Q filter. Furthermore, band searching is accomplished easily because the signals can be tracked readily over ±1.5 kHz.

Notes

[1]Zwicker, Flottrop and Stevens, "Critical Bandwidth in Loudness Summation," *Journal of the Acoustic Society in America*, Vol. 22, 1958, p. 548.

[2]Dichotic — affecting or relating to the two ears differently in regard to a conscious aspect (as pitch or loudness) or a physical aspect (as frequency or energy) — dichotically.

[3]Roederer, "Introduction to the Physics and Psychophysics of Music" (New York: Springer-Verlag Press, 1975), p. 32.

[4]Eagan and Hake, "On the Masking Pattern of a Simple Auditory Stimulus," *Journal of the Acoustic Society of America*, Vol. 22, 1950, p. 622.

[5]Plomp and Levelt, "Tonal Consonance and Critical Bandwidth," *Journal of the Acoustic Society of America*, Vol. 38, 1965, p. 548.

[6]Houtsma and Goldstein, "Perception of Musical Intervals: Evidence for the Central Origin of the Pitch of Complex Tones," *Journal of the Acoustic Society of America*, Vol. 51, 1972, p. 520.

Strays

ROANOKE DIVISION PLANNING SESSION MAY 7-8

☐ This year's Roanoke Division League Planning Meeting, sponsored by the Grand Strand ARC, will be held on May 7-8 at the Holiday Inn in Myrtle Beach, South Carolina. Among the topics to be discussed are the no-code license, ARRL section-level reorganization and the Special Services Club program. ARRL President Vic Clark, W4KFC, is planning to attend. Pre-registration information is available from Dr. I. F. (Jack) Wood, Jr., WA4KGN, 903 Medical Plaza, 82nd Pkwy., Myrtle Beach, SC 29577.

ARRL PRESENTS IEEE PROGRAM

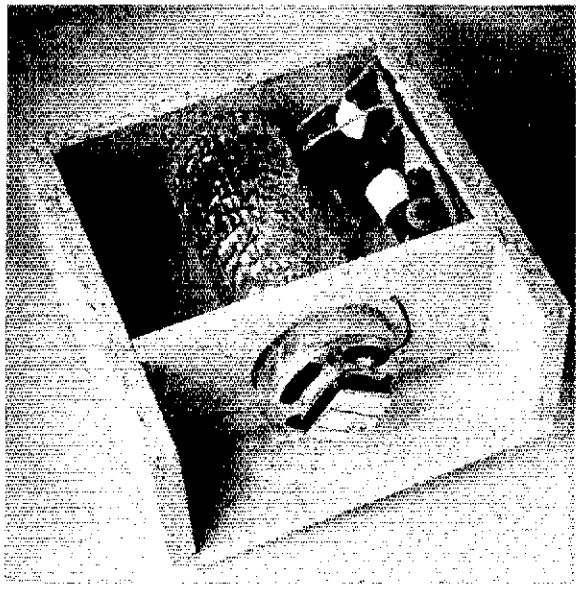
☐ Another ARRL-organized IEEE technical session was presented in December 1982. This time it was MIDCON-82, at Dallas. The theme for ARRL's Session 24 was "Modern Power MOSFETs and Applications — DC through VHF." This was the League's 16th professional IEEE session since 1972, with programs given at Intercon, Electro, MIDCON and SOUTHCON. Jerry Hall, K1TD, of the ARRL Hq. staff, gave a paper in 1982 at another IEEE conference (Globecom-82).

Among the MIDCON-82 IEEE Session 24 attendees were (l-r) ARRL TAs K7QWR, KB6QJ and W5PXH, and WB1FSB, the session chairperson.

Among the attendees at Session 24 were Technical Advisors Roy Hejhall, K7QWR (Motorola), Ed Oxner, KB6QJ (Siliconix, Inc.) and Al Markwardt, W5PXH. Dr. Joseph SooHoo (GE Co.) and ARRL Technical Department Manager Doug DeMaw, W1FB, the primary organizer of Session 24, gave papers. Marian Anderson, WB1FSB, ARRL Technical Department secretary, was the session coorganizer and chairperson.

The ARRL continues to contribute to the IEEE and the professional community in order to help stay abreast of current technology and to provide valuable public relations for Amateur Radio. This regular interface between the amateur and industrial worlds is important in these times of rapid technological advances. — *Doug DeMaw, W1FB*

An Electro-Acoustic CW Filter†



Kind of a fancy name for a simple weekend project. It's a different way to "scrub your ears."

By J. B. Heaton,* G8JFY and R. V. Heaton,* G3JIS

Some experiments we'd performed with hi-fi loudspeaker enclosures of the bass reflex (Helmholtz resonator) type generated a question: Could use be made of a pipe resonator to produce a filter for use with received cw signals? We hoped the resonator would provide good selectivity, greatly attenuate hum and hiss, be low cost and provide easy loudspeaker installation.

Design

The basic resonator principle (see Fig. 1) is similar to that of the organ pipe. An air blast is directed against a sharp edge, creating turbulence that excites the column of air of length *l*. When the column of air is excited sufficiently, an audible tone is produced. The standing wave has a node (high-pressure point) at the sealed end, and an antinode (low-pressure point) at the excited end. When the pressure wave launched at the open end reaches the sealed end, a 180° phase reversal takes place. When this wave returns to the open end, it is in phase with the next wave being launched. This condition is satisfied when the length of the pipe *(l)* is acoustically an odd number of quarters of a wavelength long: $l = n\lambda/4$, where λ = wavelength at the frequency of operation and n = 1, 3, 5, etc.

The relationship between the resonant frequency of the resonator and its physical dimensions is given by

$$f_o = \frac{V_o}{4\,(l + 0.3d)} \sqrt{1 + \frac{\theta}{273}} \quad \text{(Eq. 1)}$$

where

f_o = resonant frequency in Hz
V_o = velocity of sound in meters/second[1]
l = length of resonator in meters
d = diameter of resonator in meters
θ = temperature in kelvins

For typical values of V_o = 330 m/s, θ = 293 K, this equation becomes

$$f_o = \frac{122.4}{(l + 0.3d)} \quad \text{(Eq. 2)}$$

Thus, for l = 0.13 m and d = 0.06 m,

$$f_o = \frac{122.4}{(0.13 + 0.3 \times 0.06)} = 827 \text{ Hz} \quad \text{(Eq. 3)}$$

The resonator will also resonate at odd harmonics. A filter designed for a resonant frequency of 800 Hz will also resonate at frequencies of 2400 and 4000 Hz. It is necessary, therefore, to prevent harmonic frequencies from reaching the resonator.

A Practical Design

Refer to Fig. 2. A 60-mm-diameter speaker is taped to one end of a glass resonator. A tumbler 130 mm long and 60 mm in diameter was used. The loudspeaker and tumbler are mounted in a wooden enclosure as shown in the photograph. Fig. 3 is a schematic diagram of the input filter circuit. L1 through L3 and C1 through C4 form a low-pass filter. L4, L5 and C5 comprise a 700-Hz series-resonant circuit. These components help extend the filter bandwidth above 650 Hz to counter the roll-off of the low-pass sections; C5 attenuates the passage of low frequencies to the speaker. L6, R1 and R2 damp the free-air resonance of the loudspeaker, but have less effect as the resonant frequency of the pipe is approached.

Audio-frequency components designed for cross-over network use are employed in the filter circuit. Low dc resistance inductors and nonpolarized capacitors are used. The inductors should be well spaced or mounted at right angles to each other to minimize unwanted coupling.

Performance

A filter performance (not *overall* performance) plot is shown in Fig. 4. The 6-dB bandwidth points are at 350 and 900 Hz. Ultimate rejection is greater than 50 dB at 2.1 kHz. Low-frequency output is less than the voltage across the speaker would suggest, as there is a 6 dB per octave acoustic roll-off below the loudspeaker free-air resonance. The roll-off is caused by the inability of small speakers to couple effectively with the air at low frequencies.

†Adapted from a similar article that appeared in *Radio Communication* (RSGB), Oct. 1980.

*20 Tewkesbury Ave., Davyhulme, Urmston, Manchester, England M31 1RJ

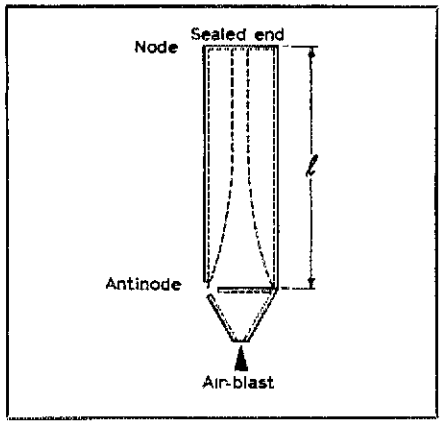


Fig. 1 — Principle of the resonator.

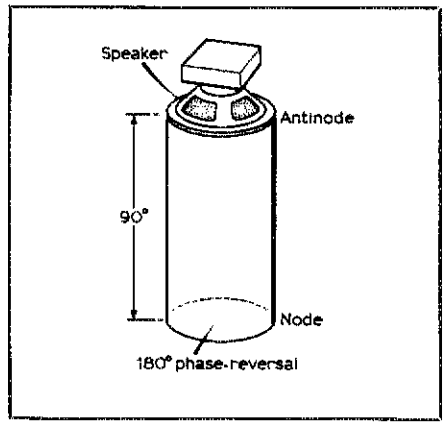


Fig. 2 — Basic form of the acoustic filter.

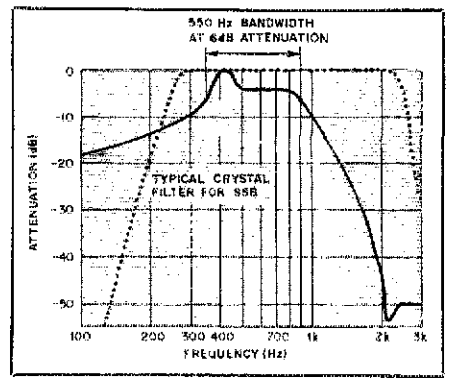


Fig. 4 — Filter performance curve. Note that this is not a curve of overall system performance.

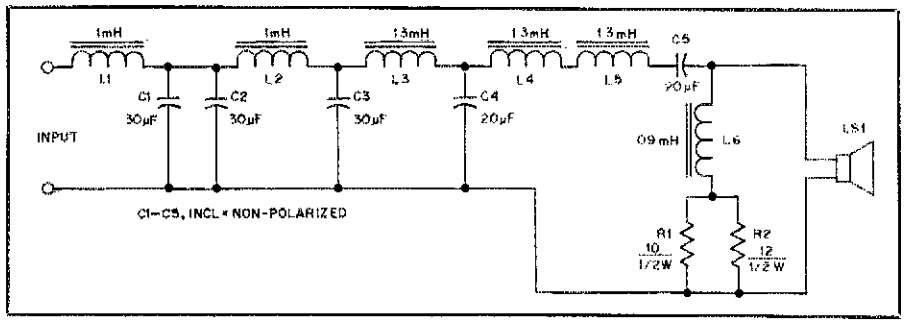


Fig. 3 — Schematic diagram of the harmonic filter.

The unit performs well. When tuning across an S9 + 39-dB marker signal, it is almost uncanny to hear the beat note become virtually inaudible when off system resonance. The steep audio filter roll-off attenuates hiss and hum from all sources. Combined with construction simplicity, don't these features make this acoustic filter an appealing project?

'In = mm × 0.039
ft = m × 3.28

New Products

CHANNEL MASTER HIGH-GAIN TV PREAMPLIFIER

☐ A new generation of outdoor antenna amplifiers — Spartan 2 from Channel Master — features new circuitry for higher gain, wide-range stability and lower noise. The 11-model Spartan 2 line allows uhf, vhf and fm reception in high-input as well as deep-fringe areas. Gain as great as 23 dB is provided at the TV broadcast frequencies. High level vhf signals — up to 200,000 μV (0.2 V) — are accepted without harmonic distortion or cross modulation interference effects.

Weather protection is assured by molded ABS unitized housings that can't corrode, and contain no seams or screw holes. The hinged bottom cover gives access for connection or adjustment. It is secured with a captive screw. A weather boot slips over twin lead or coaxial cable to protect connections. Terminal boards mounted at a 45° angle create a drip loop to prevent water from following lead wires into the housing.

Increased lightning protection results from layout and spacing of circuit boards, conductor channels and components. This prevents static charges from arcing through the circuit. The amplifiers are protected from power surges up to 30 kV in both directions.

Spartan 2 antenna amplifiers are designed to operate in temperatures ranging from −40° F to +140° F. They will deliver oscillation- and hum-free performance regardless of humidity and line voltage fluctuations.

To control fm interference, all the Spartan uhf/vhf/fm amplifiers use a combination of switchable and tunable fm traps. A rotatable plug is used to switch the trap in or out. The trap provides a minimum of 25 dB attenuation across the entire fm band; a screwdriver adjustment sets additional attenuation in a selected portion of the fm broadcast band. Other unwanted radio frequencies, such as marine, aircraft, CB and amateur, are blocked by band-rejection filters.

A model 0064C,7361C was tested in the ARRL lab and at my home. Several months of home testing have shown no reason for dissatisfaction. The test amplifier has been used in conjunction with a large LPDA-type TV antenna. TV and fm reception were enhanced considerably. There were no cases of amateur or CB transmissions causing TVI that could be traced to the amplifier.

Testing in the ARRL lab showed good hf band rejection. Attenuation of 10-meter energy was greater than 30 dB; and greater than 40 dB for lower frequencies. Attenuation at 2 meters is 10 dB, 20 to 30 dB with the fm trap in — depending on frequency adjustment of the trap. At 420 MHz, the test amplifier showed a bit over 8 dB gain. This fell off to −18 at 450 MHz.

In the 220- to 225-MHz range there was a slight amount of gain, about a dB or so. The 6-meter operator will not be as happy. There is plenty of gain at 50 MHz — in excess of 10 dB.

The Spartan 2 line is a considerable improvement over previous products of this sort. Spartan 2 amplifiers are manufactured by Channel Master Division of Avnet, Inc. Ellenville, NY 12428. Price class: model 0064C,7361C, $73. — *Charles L. Hutchinson, K8CH*

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

GROUNDING YOUR MOBILE INSTALLATION

☐ Immediately after purchasing a new 1982 Plymouth Reliant, I set about the task of turning it into a "ham shack" on wheels. The first job was to install the antenna. The bumper on my new car consists of a rather thin steel frame, coated with rubber. To compound the problem, the energy-absorbing system means that the bumper is insulated from the car chassis. Not much here to provide a ground plane for the antenna system. After connecting four heavy, braided ground straps between the bumper and car body, I fabricated a mounting bracket from 1/4-inch-thick steel (Fig. 1).[1] This is fastened to the bumper by means of three bolts, which go through holes drilled in the bumper (Fig. 2). Cylindrical spaces are used to hold the bracket vertical.

My antenna system consists of a Webster Band Spanner for 80 and 40 meters, and a HyGain 270 2-meter collinear antenna. Only one of these is mounted on the car at a time, with the other one stored in the trunk. I also have a magnetic-mount, 5/8-λ, 2-meter antenna for those times during ARES or RACES drills that I need to operate hf and 2 meters at the same time.

The next step in my project was to improve the ground connection between all parts of the car body and frame. Often the ground wires installed by the manufacturer are inadequate; most of the time the paint is not even removed. I use straps made from heavy copper braid, such as the outer conductor stripped from old RG-8 cable. I installed leads between as many individual pieces of the frame and body as possible. Fig. 3 shows a strap between the hood and fire wall, one from the fire wall to the exhaust pipe, and another to the carburetor. I utilize existing screws to fasten the straps, but I use star washers next to the metal to help ensure good electrical contact. Ground straps are installed between all doors and the car body, as shown in Fig. 4. The trunk lid should also be grounded, along with the axles and exhaust system.

Poor ground connections can be especially troublesome on newer cars, which make increased use of computerized control. When an Amateur Radio station is installed, the problem can be compounded when rf finds its way into these circuits. Proper grounding will help minimize the problem.

A technical-service bulletin from Chrysler suggests that low-mileage wheel bearing failure could be caused by an improper ground connection between the battery and the engine.[2] A current flows through the wheel bearing, causing the bearing and race to become pitted and blackened. This problem may occur with any type of car, not just front-wheel-drive vehicles. If you notice "road static" or "wheel static" on your radio, this could be the cause.

This may sound like a lot of work, but the results are worth it. I have almost no static noise, and mobile operation is a real pleasure. I hope to hear you on the air from your "ham shack on wheels." — *Bob Karl, W8HS, Southfield, Michigan*

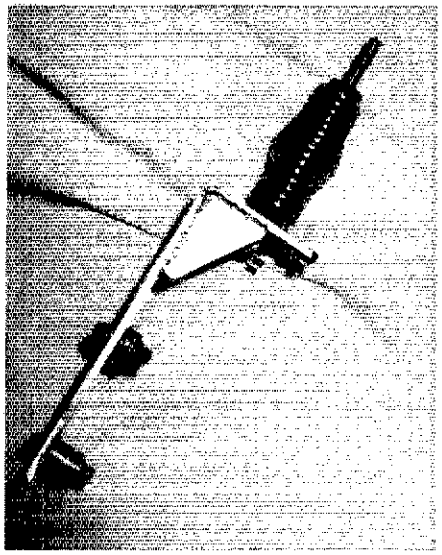


Fig. 1 — Mobile-antenna mounting bracket used by W8HS. Note the spacers used to hold the bracket vertical on the bumper.

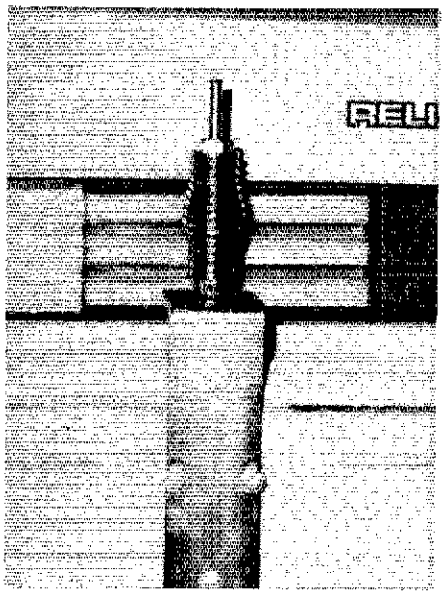


Fig. 2 — Mounting bracket bolted to the bumper of the author's car.

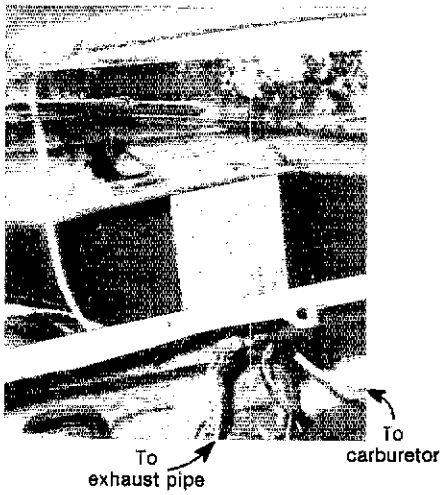


Fig. 3 — Some of the ground straps W8HS installed in the engine compartment of his car.

Fig. 4 — A method of providing a ground connection for car doors. Be sure to scrape off the paint, and use star washers under the screws.

FREEZER-BOX SPEAKERS

☐ My 2-meter hand-held transceiver doubles as a mobile rig. I just lay the rig on the seat beside me and use a speaker mike. I found that the speaker had to be held close to my ear when receiving, but that becomes tiring. Besides, I don't like the idea of driving with one hand.

I found a 4-inch speaker in my junk box. This produced good-quality audio as compared to the speaker mike. Next, I purchased a plastic freezer box at a local store. The one I bought is about 5 inches square and 2-3/4 inches deep. The plastic is approximately 1/16 inch thick and is quite flexible. I drilled a grid of 1/4-inch holes in the bottom of the box, then bolted the speaker in place. A 3-foot length of shielded cable was wired to the speaker and brought out through the side of the box. I snapped the cover in place, and the job was complete. The cable plugs into the external speaker jack, and

[1] mm = in. × 25.4.
[2] Technical Service Bulletin no. 22-01-80, Chrysler Corporation, July 7, 1980.

*Assistant Technical Editor

the rig and speaker lay on the seat beside me. The improvement in audio quality is amazing. — *Stan Goddard, W6FBV, Fremont, California*

☐ I use plastic refrigerator boxes to make enclosures for small speakers. These boxes come in all sizes, so it should be easy to find one to fit most any small speaker. I cut a hole in the lid the size of the speaker cone, and drill holes to fasten the speaker. Next, I cut a piece of window screen or perforated metal to fit inside the lid. This serves as a grille. Small bolts through the lid, grille and speaker hold the assembly together. Drill a hole in the side of the box for the speaker wires, then snap the lid in place.

I glue rubber feet on one side of the box. It stands on my operating table. You could also fasten the box to the wall of your shack, or place it in your car for mobile use. — *Charles "Hub" Gilfert, W3PTM, Tamaqua, Pennsylvania*

CURING DRAKE "SCOTCH" S METERS

☐ The Drake TR4C and TR4CW rigs seem to have a reputation for having "scotch" or stingy S meters. I cured this problem with my TR4CW by removing the no. 12 lamp fuse in the antenna circuit and cleaning the contacts. I used a fine abrasive cloth to polish the two contacts on the bulb. When I replaced it, I noticed an increase in S-meter reading. Frank Walsworth, WB8DBP, tried the idea on his TR4C; the results were the same.

In the TR4C, the lamp fuse is located in the final-amplifier cage, on the top side of the chassis. In the TR4CW, it is under the final-amplifier cage, on the bottom side of the chassis. The lamp is about the size of a flashlight bulb.

In my TR4CW, the fuse is easy to reach and can be removed with two fingers. In the TR4C, it is more difficult to get at. Frank solved this problem by using a spring-type clothespin. He cut off the short end to the hollow part and trimmed the sides so it would fit in the space. This made it easy to remove and replace the fuse. — *Ernie Magnuson, KC4EP, Nalcrest, Florida*

MOBILE CONSOLE

☐ My mobile installation includes an hf transceiver, an external VFO, an antenna matching network and a 2-meter rig. I needed a compact way to mount all of this equipment to provide maximum front-panel visibility in the minimum amount of floor space possible. Stacking the units atop each other seemed reasonable. The console mount shown in Fig. 5 is the result of my effort.

The main elements are the two side panels made from 1/8-inch Masonite. They are laid out carefully, and a hole pattern is drilled to match the mounting holes in the side of the widest unit. The panels are fastened to the hf rig in my installation. Two wooden cross pieces are cut to fit between the Masonite sides. They are shaped to fit over the transmission hump. The cross pieces are glued in place and fastened with wood screws. I cut a corner out of the back of the left side panel to allow access to the power connectors and the coaxial fittings.

My VFO and antenna-matching network are the same width as my hf rig, so they are fastened directly to the sides of the console. My 2-meter rig is a little narrower; I had to use an alternative method of mounting it. I carefully drilled some holes in the bottom of my Transmatch and bolted the mobile mounting bracket for the 2-meter unit to it. Another option would have been to install a horizontal wooden cross member below the larger unit, then attach the mounting bracket for the smaller unit to it.

Fig. 5 — Photo of the mobile console installed in Bruce Carson's car. All the equipment is tilted up from the base to provide maximum operating ease.

When the completed console (with all of the equipment in place) is installed in the vehicle, it is necessary to provide lateral stabilization. I used two small L brackets. One was fastened to the top of my hf rig, and the other was mounted to the dash. When the console is placed in my car, holes in these brackets line up, permitting me to use a no. 8 bolt as a stabilizing pin.

I have made four consoles using this construction technique. I find the materials easy to obtain and to work with. This idea can be adapted to almost any combination of equipment, and the end result is a simple, uncluttered installation. — *E. Bruce Carson, N6AQP, Westminster, California*

SIMPLE STATION CLOCKS

☐ A variety of small stick-on plastic clocks are available at most department stores. These can make a nice addition to your shack. Set the clock to UTC, stick it right on your rig and you will have a ready time reference. These clocks come in a variety of colors, so you should be able to select one that will match the color of your rig. Don't make the mistake that I almost made: The clock may fit nicely on the main tuning knob, but remember: half the time will be upside down! — *Kenneth Trettin, KAØEXG, Rockford, Iowa*

☐ Stick-on LCD clocks are being sold for $3 or less in many department stores. These make a good station clock when set to UTC. In fact, they are so inexpensive that you may want to buy two and set one to local time. Some of these clocks come with a strip of adhesive Velcro® on the back. If you buy some additional Velcro, you can put strips of the mating side at various locations and take the clock with you. The car dashboard is one likely spot. — *Dave Geiser, WA2ANU, New Hartford, New York*

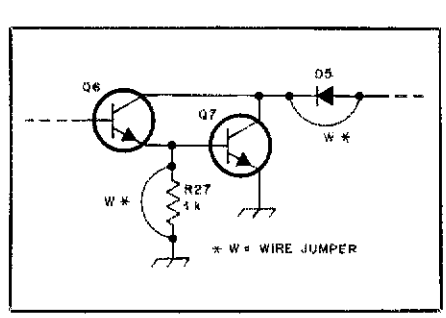


Fig. 6 — Circuit changes for the Heath HD-1410 keyer, to allow it to be used with a solid-state rig.

SOLID-STATE RIGS AND THE HEATH HD-1410 KEYER

☐ When I purchased a new solid-state rig, my Heath HD-1410 electronic keyer would not work with it. The instruction manual for my new rig indicates that the keyer must be able to pull the keyed line down to +0.4 V or less. I measured the key-down voltage with my keyer connected. The potential was +0.6 V. Two simple changes to the keyer circuit cured the problem. D5, at the collector of Q7, and R27, at the base of Q7, must be shorted out of the circuit. I soldered jumper wires around each part (Fig. 6). For those wishing to use the keyer with tube and solid-state types of rigs, a dpst switch can be installed on the back panel. The jumper wires are then connected through the switch. After this modification, the output voltage from my keyer was about +0.2. — *Steve Blomquist, KBØQK, Kansas City, Missouri*

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

CHOOSING WIRE SIZE FOR TOROIDAL INDUCTORS

☐ "What size wire should I use to wind the toroidal inductors with?" is a question frequently asked by people duplicating various circuits and rigs I've designed. The answer is that, in most cases, you can base your choice on availability and convenience, within certain limits. But what are those limits?

Speaking only of toroidal inductors that are found in typical amateur transmitters, receivers and the like, we can describe an inductor by noting its apparent inductance (its inductance modified by stray capacitance) and Q at the frequencies of interest. That is, we could substitute another inductor having the same apparent inductance and Q and get the same performance. There are, of course, some exceptions to this rule, such as VFO tank inductors and others that may be sensitive to very small changes in temperature or physical movement.

To show what effect wire size is likely to have on these two parameters, I wound 22 turns of various sizes of wire on several T-50-6 powdered-iron cores, and measured the inductance and Q of each one at 14 MHz. A homebuilt test fixture having an approximate accuracy of 5% was used for the experiment. No. 21 wire, which would fit precisely on a single layer, was the largest used, and the turns were evenly spaced around the cores wound with smaller wire. The results of my tests are shown in Table 1.

Within the accuracy of the test fixture, and expected core-to-core variation, the inductors wound with wire nos. 21 through 26 are the same. There is a definite drop in Q for inductors wound with no. 28 and smaller wire, but even this drop in Q won't be noticeable unless the inductor is used in a critical application, such as a VFO tank or a high-Q filter. Single-tuned circuits, transmitter interstage and output matching and filtering networks, etc., are generally of low enough loaded Q that the difference in inductor Q is completely inconsequential. Rf transformers, which are generally wound on ferrite instead of powdered-iron cores, are even less sensitive to wire sizes unless extreme bandwidths (e.g., two or three decades) are required.

A rule of thumb that will lead to the highest Q is to use the largest wire size that will fit on a single layer, but which isn't so large that the wire won't conform well to the core. As you can see from the results of this experiment, using wire as much as several sizes smaller than specified will deliver equally good performance. — *Roy Lewallen, W7EL, Beaverton, Oregon*

Table 1
Wire Size Vs. Inductor Value

Wire Size (AWG)	*Apparent L (μH)*	*Q*
21	2.10	252
22	2.17	237
24	2.17	250
26	2.07	248
28	2.15	220
30	2.13	196
32	2.28	182

*Assistant Technical Editor

OTHER BANDS FOR THE JF ARRAY

☐ I've had numerous inquiries concerning my article, "The JF Array" (Nov. 1982 *QST*). Readers wanted additional information about other bands of operation. Because of this response, I've shown applications of my array for other band combinations (Figs. 1, 2 and 3).

I also recommend that expansion of the JF or any other collinear array *not* continue beyond four elements. This is because current diminishes rapidly beyond four elements, and proper phase relationships become difficult to maintain. Also, note that higher gains are possible with the JF concept over conventional perpendicular phasing-stub arrangements because the outer elements are wide-spaced. The "clean" lines of the JF also provide improved multiband performance because little discontinuity is offered at frequencies other than what the antenna was designed for. — *Dick Schellenbach, W1JF, Reading, Massachusetts*

A HALF TWIN-DELTA LOOP ARRAY

☐ By utilizing the apex-driven Delta Loop, you can design a new, 2-element coplanar antenna array, called a Twin-Delta Loop (Fig. 4). This antenna element can be used for practical communication systems from vhf to uhf. In particular, Twin-Delta Loops can be used as

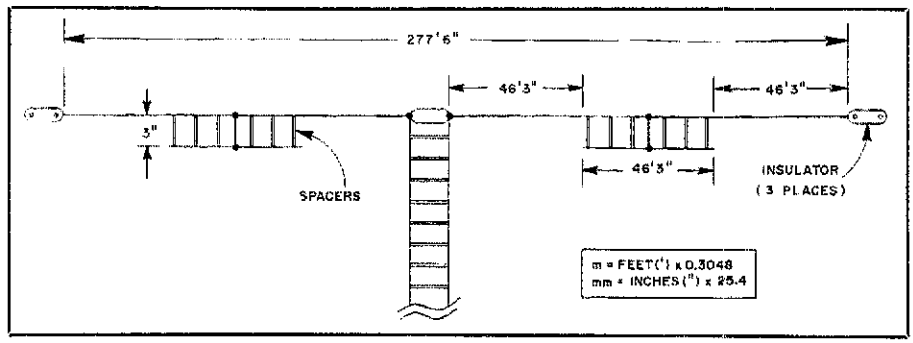


Fig. 1 — JF Array for the following bands and (theoretical gain) configurations: 30 meters — 4-element collinear (5.2 dBd); 80 meters — 2-element collinear (1.9 dBd); 160 meters — 1/2-wave dipole; 40, 20, 15 and 10 meters — extended dipole.

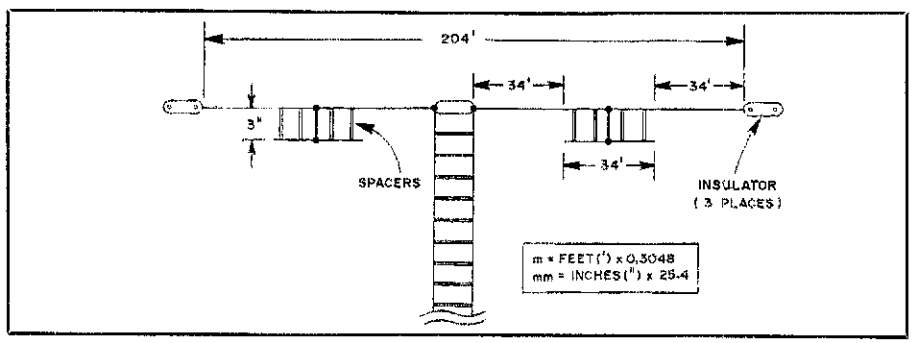


Fig. 2 — JF Array for the following bands and (theoretical gain) configurations: 20 meters — 4-element collinear (5.2 dBd); 80, 40, 30, 15 and 10 meters — extended dipole.

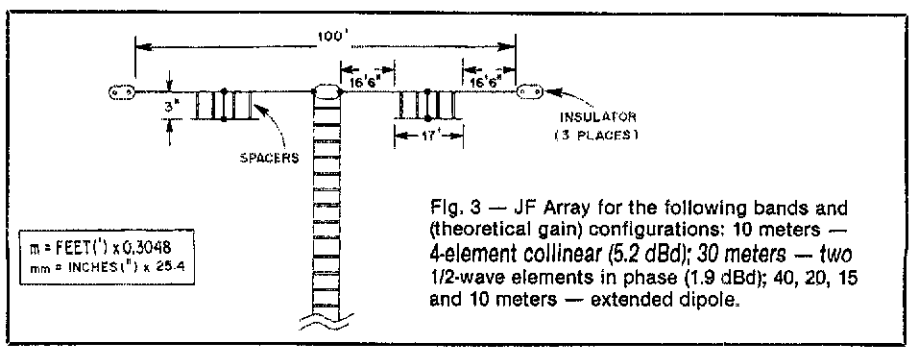


Fig. 3 — JF Array for the following bands and (theoretical gain) configurations: 10 meters — 4-element collinear (5.2 dBd); 30 meters — two 1/2-wave elements in phase (1.9 dBd); 40, 20, 15 and 10 meters — extended dipole.

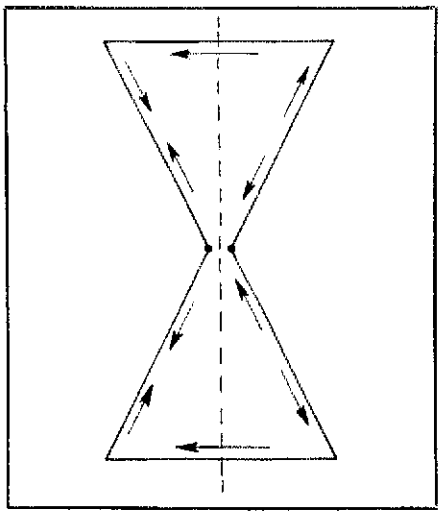


Fig. 4 — Illustration of a Twin-Delta Loop. The total length of the twin loops is approximately 2 wavelengths. Arrows indicate direction of the instantaneous currents on the antenna.

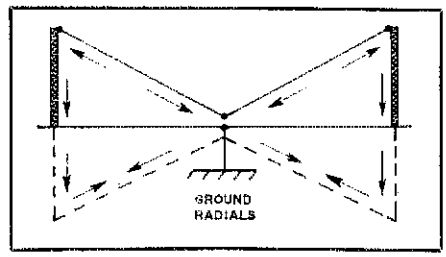


Fig. 5 — The grounded version of the Twin-Delta Loop, with the image in the ground plane.

Table 2

Half Twin-Delta Loop Dimensions

Band	*Tower Height (ft)*	*Length of Sloping Wires (ft)*
160 m†	102.03	204.06
80 m	49.86	99.72
40 m	25.92	51.84

†Optimized for 1.825 MHz.

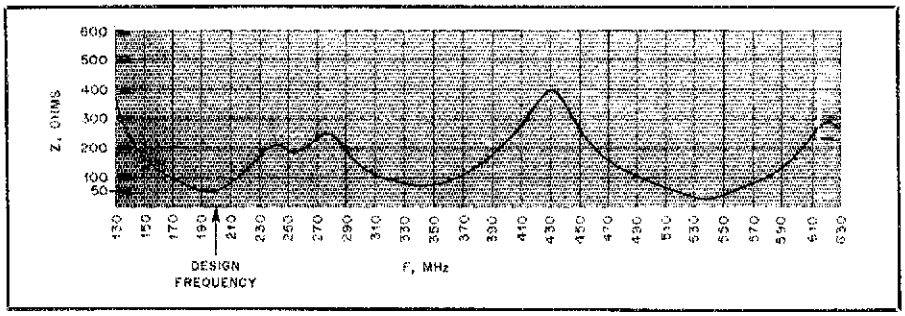


Fig. 6 — Feedpoint impedance of the (grounded) Half Twin-Delta Loop versus operating frequency for the scaled model.

elements of a Yagi-Uda array, providing superior gain and bandwidth characteristics compared to conventional full-wave loop and dipole arrays.[1] If (as with the Half-Delta Loop) this antenna element is rotated 90°, and the lower half is replaced by an image in the ground plane, we now have an M-shaped antenna (Fig. 5) that can be constructed for the hf bands. This antenna offers outstanding performance — even better than the Half-Delta Loop, which in itself is a good hf antenna.[2,3] The new antenna provides a better match to 50-ohm coaxial cable, with greater bandwidth and gain than the Half-Delta Loop.

A Half Twin-Delta Loop was modeled at 200 MHz. That is, *each* Half-Delta Loop and image in the ground plane is 1-wavelength long at 200 MHz. The masts were copper rods of 1/8-in. diameter and 11.12 in. high.[4] The sloping wires (no. 22) were 22.24 in. long. The antenna was mounted on a 98.4-ft-diameter ground screen, which was elevated so that impedance-measuring instruments could be located directly beneath it. A Hewlett-Packard 4191A rf impedance analyzer was used to measure the impedance. Measurements were made through a type-N chassis connector, fed through the ground plane to the measurement instrument located beneath. The electrical length of the feeder cable including the type-N connector was subtracted, so that the measured impedances are referenced to the feed point of the antenna.

The impedance of the Half Twin-Delta Loop was measured over the frequency range of 130-1000 MHz (Fig. 6). Loop resonance (low Z and θ equal to zero) occurred at 201, 346, 540, 755 and 869 MHz, which are close to the resonant frequencies measured for the single Half-Delta Loop over a much smaller ground plane.[5] Notice that at f_o (201 MHz) the feed impedance is 50 ohms.

The gain in the plane of the ground screen was accurately measured, employing a Hewlett-Packard 8505A rf network analyzer. Gain was measured with respect to a carefully constructed and accurately matched (to 50 ohms) 1/4-wave monopole. The azimuthal gain was measured in two orthogonal directions — in the plane and perpendicular to the loops.

[5]See note 3.

At f_o, a maximum gain of 10.2 dBi (5 dB over a 1/4-wave monopole) occurred in the directions perpendicular to the plane of the loops. The gain was 20 dB less in the plane of the loops. The gain and pattern are similar to that for two monopole antennas spaced $\lambda/2$ apart and fed in phase. At $2f_o$, the maximum gain was nearly the same (9.2 dBi), but it occurred in the plane of the loops. A deep null was not found in the perpendicular directions, for which the gain was 6.7 dBi.

The M-shaped, Half Twin-Delta Loop is bidirectional. Low-band DXers who decide to employ this antenna should therefore give consideration to installing two arrays perpendicular to each other, with a switching arrangement so that either antenna can be selected. The Half Twin-Delta Loop offers superior performance over other wire antennas, provides a good match to a 50-ohm coaxial cable and has a wide bandwidth. In a previous article, DeMaw and I stressed the multiband performance of the Half-Delta Loop, and the dimensions given were a compromise to allow this application.[6] The dedicated low-band DXer may wish to optimize this antenna for his or her favorite band. Table 2 provides dimensions for operation on the 160, 80 and 40-meter bands (based on our model antenna measurements). The bandwidth at f_o is 12.8% for an SWR < 2:1; therefore, an 80-meter version would operate well over the entire band, without the need for an antenna-matching unit.

I would like to acknowledge the Communications Research Center and the National Research Center for use of their antenna ranges. Also, thanks to Len Bode, who constructed the antennas and made the measurements. — *John Belrose, VE2CV, ARRL TA, Aylmer, Quebec*

[6]See note 3.

[1]T. Tsuliji and S. Tou, "High-Gain, Broad-Band Yagi-Uda Array Composed of Twin-Delta Loops," IEEE Conference Publication No. 195, *Antennas and Propagation*, Part 1: Antennas, 1981, pp. 438-441.

[2]J. Belrose, "The Half-Delta Loop: A Grounded, Vertically Polarized Antenna," *Ham Radio*, May 1982, pp. 37-39.

[3]J. Belrose and D. DeMaw, "The Half-Delta Loop: A Critical Analysis and Practical Deployment," *QST*, Sept. 1982, pp. 28-32. Also see D. DeMaw and J. Belrose, "Design and Practical Deployment of the Multiband Half-Delta Loop," IEEE Southcon-83 *Preprint*, Session 9, Atlanta, Georgia.

[4]mm = in. × 25.4; m = ft × 0.3048.

Feedback

☐ The following additions and corrections to "The Reality of Reflected Power," Technical Correspondence, Feb. 1983 *QST*, should be made. The text should read: ". . . by a distance of 90°.[5] Line voltage measured across the line is the phasor sum of the forward and reflected voltages; line current measured in series with the line is the phasor sum of the forward and reflected currents. The distance between . . ." Additionally: ". . . phase angle between the *line* voltage and current is exactly 0°. At points . . . "

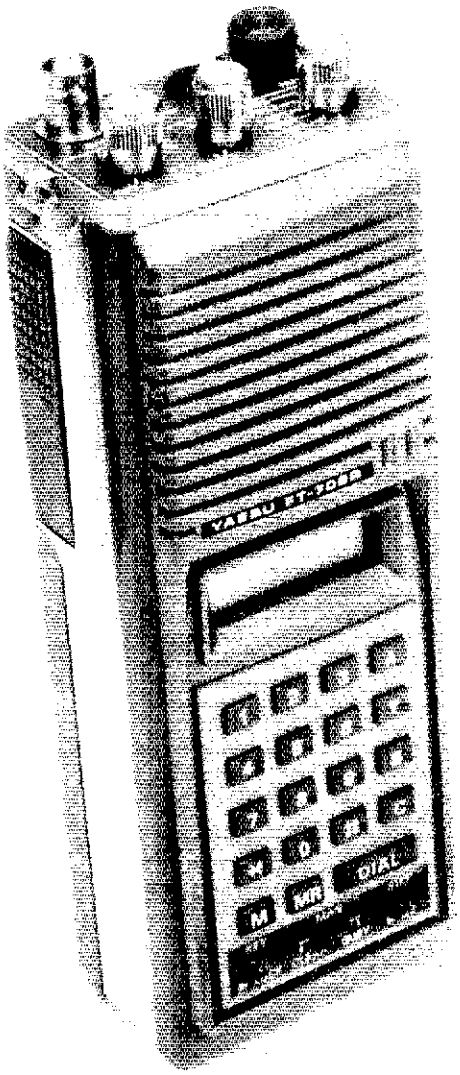
The equation in the last sentence should read $E_{+x} \times H_{\mp y} = P_x$

Author Maxwell also suggests referring to the article by Kramer, "Reflected Waves and Mismatched Loads," June 1978 *CQ*, for more information on the subject.

☐ Readers who enjoyed the article by Webb, "Electrical Antenna Null Steering," Oct. 1982 *QST*, may be interested in a coincidental British approach to the same problem. The Oct. 1982 issue of *Radio Communication* (RSGB) contains an article by Page-Jones, G3JWI, entitled "An Experimental Adjustable Null Receiving Antenna for 14 and 21 MHz."

Product Review

Conducted By Paul K. Pagel,* N1FB



Yaesu FT-708R 450-MHz FM Transceiver

Yaesu FT-708R 450-MHz FM Transceiver Serial No. 2F100398

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 440.000-449.975 MHz with direct programming.	As specified.
Rf output power: 1 W HI; 200 mW LOW.	1.6 W HI; 400 mW LOW.
Spurious emissions: −50 dB or better.	2nd harmonic: −64 dB.
Power requirements: 10.8-V dc battery pack (max. 13 V).	
Current drain:	
tx 150 mA (20 mA squelched);	
tx 500 mA (HI) 300 mA (LOW).	Not measured.
Receiver type: Double-conversion superhet	
1st i-f — 46.255 MHz.	
2nd i-f — 455 kHz.	
Sensitivity: Better than 0.4 μV for 12 dB SINAD. Better than 1 μV for 30 dB S/N.	0.28 μV/20 dB quieting.
Audio power output:	
(8-ohm load): 500 mW at 10% THD.	600 mW.
Size (HWD): 6.6 × 2.4 × 1.9 in. (168 × 61 × 49 mm).	
Weight: Approx. 25 oz (720 g).	
Color: Brushed aluminum, medium gray.	
Price class: $320	

Available from: Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723.

Looking for respite from the madding crowds on 2-meter repeaters? Try the 450-MHz band. I did, and found peace, solitude and a few new friends to boot. During the review period for Yaesu's FT-708R 70-cm fm hand-held, I enjoyed relatively long chats with other 450 denizens free from hustle and bustle. I wxs able to converse without the feeling that countless other users were ready to pounce once I said my final "73." It was a nice feeling!

The 450-MHz band repeaters appear to be more popular in the West, but are also found in numbers throughout the rest of the country. The repeater subbands are from 420.0 to 431.0 MHz, 433.0 to 435 MHz, and from 438.0 to 450.0 MHz. In this country, the most popular repeater channels are in the region 440.0 to 450.0 MHz. The national simplex frequency is 446.0. The repeater band plan includes a transmit/receive offset of 5 MHz, with 50-kHz spacing between repeater channels. With Yaesu's new rig in hand, I felt a welcome breath of fresh air on the 70-cm band.

The FT-708R is a durable, easy-to-use, microprocessor-controlled hand-held rig. It's built around an aluminum frame with a heavy-duty plastic case, and is pleasing to the eye. It features 1 watt of rf output, and provides 10-MHz coverage (440.0 to 449.975 MHz) in 25- or 50-kHz steps. Ten memories allow for storage of your favorite repeater frequencies.

Scanning is a nice feature of the radio. Because the 450-MHz band is generally quiet on the repeater subbands, the user can scan for a busy (or clear) channel — over the entire band, certain segments or just the memory channels. Abnormal splits may also be programmed. Frequency choices are made by the front-panel 16-digit matrix keyboard pad, and the last four digits (9.050, for example) are displayed on the large liquid-crystal display. A lamp is provided for nighttime use. Controls include OFF/VOL, SQL and TONE (for silent monitoring of busy channels), SHIFT (for transmit offset), HI/LOW power switch (200 mW, low; 1 watt, high), KEY-LOCK switch, CLEAR-MAN-BUSY scan switch (to select scanning for a clear, or busy channel) and frequency STEP switch for scanning in increments of 25 or 50 kHz. The antenna is a 1/4-wavelength flexible whip equipped with a BNC connector. The 16-digit pad also offers DTMF capability for autopatch and repeater control functions. Jacks provide for a remote speaker/mike (optional), earphone (supplied), and battery charger. The PTT thumb switch is well placed on the left side. Power is supplied by an internal NiCd battery (10.8 V, 450 mAh). A small switch in the battery compartment allows power to be applied to the microprocessor for retention of the memory channels even when the rig is turned off. Accessories included are a wall charger, and sturdy belt clip.

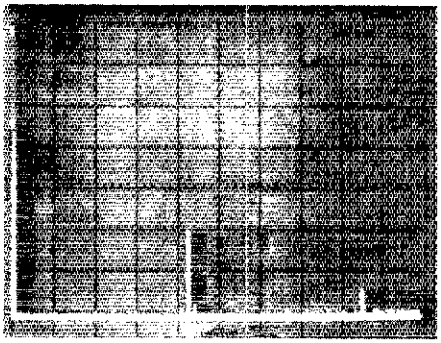


Fig. 1 — Spectral display of the FT-708R. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 1.6 W at a frequency of 452.65 MHz. The fundamental has been reduced in amplitude approximately 50 dB by means of notch cavities; this prevents analyzer overload.

Operation

Using the FT-708R is a pleasure. Frequencies are entered from the keyboard, and must be divisible by 25 kHz. Once the four last digits of the desired frequency are entered, the DIAL key is depressed to put the decimal point in place, and ready the rig for use at that frequency. To store a frequency in one of the 10 memory channels, simply enter the frequency as described, press the desired memory channel number, and finally press M. To recall a memory channel, the memory channel number is depressed, followed by pressing MR. To return to the dial frequency, the DIAL button should be pressed.

For priority channel operation, first enter all desired memory channels for priority use. Then, enter another frequency onto the dial and recall any of the stored memory channels. Hit #. Now, the display will indicate dial frequency and every few seconds will switch to the memory frequency. If checking for a busy signal (with the CLEAR-MAN-BUSY switch in the BUSY position), the rig will lock onto the memory channel if busy. Similarly, if the switch is in the CLEAR position, the rig will lock onto the memory channel if no signal is

present. To use different memory channels, with priority channels, enter the priority frequency and press DIAL, then the number of the desired memory channel and MR. Finally, press # for transceiver search of the memory channel every few seconds from the DIAL frequency.

Repeater operation is simple. Repeater shifts of +5 MHz and −5 MHz are built into the system. Nonstandard splits may be programmed easily.

Scanning is effected with the CLEAR-MAN-BUSY switch and the UP and DOWN buttons on the keyboard. Unconditional scanning is permitted in the MAN (manual) position. To scan for a clear or busy channel, slide the CLEAR-MAN-BUSY switch into the appropriate position. Limited band segments may also be scanned, a nifty feature that saves the operator from having to wade through the entire band. Memory scan is also possible when the UP or DOWN key is pressed with a memory channel on the display. This provides for selectively monitoring one's favorite repeaters.

Performance

I am an avid mountain climber who enjoys lugging varous and sundry fm, ssb and cw vhf rigs up the slopes of mountains in New England. The FT-708R proved itself to be a worthy rig because of its ruggedness and ease-of-operation. It performed well in the cold, and endured bumps and jolts in my backpack. It weighs a little more than some comparable rigs, but the "quality-feel" tips the scale in its favor. The receiver performs well and exhibits no overloading problems. The internal speaker provides full and loud audio even in high ambient noise situations, as in my pick-up truck. The transmitter works well, too. Yaesu's specs are 1 watt for the HI power position, and 200 mW in LOW. In the lab, we observed 1.6 W HI and 400 mW LOW power.

Reports showed the transmitted audio quality to be excellent, although in high-wind situations (on mountain peaks, for example) some wind noise was reported — not altogether unexpectedly! Generally, contacts reported full, deep and crisp audio quality.

The FT-708R flexible whip is small, and a *full* 1/4 wavelength, unlike many 2-meter rubber duckies. Because the band allows the use of inherently small antennas, a 450-MHz fm beam was also easy to pack-in to the mountains.

The battery lasted through many trips, and was easily replaced in the field when it was depleted. A complete battery charge was achieved in about 15 hours by means of the wall charger provided. An optional accessory, the NC-8 ac power supply and quick charger, was a decided advantage, though, allowing the battery to be quick-charged in four hours. The ac power supply allowed constant "home base" use without draining the battery. And with a special adaptor, the spare battery can be charged while the rig uses the primary battery. So whether you're at home or mountain climbing, you can enjoy constant uninterrupted use of the rig.

The manual is complete with information on operating, specifications, accessories and battery operation, and there is a maintenance and alignment section for the more technically minded. (I'm better at mountain climbing than troubleshooting.)

In summary, I would recommend this rig to anyone looking for a state-of-the-art 450-MHz fm transceiver with all of the "bells and whistles." I found no glitches, and will likely purchase one for my own fm arsenal. If you're into mellow fm operation, try 450 MHz. You'll enjoy it. — *Rick Palm, K1CE*

LANCE JOHNSON ENGINEERING D-LAY-5

☐ Before the snow started to fly in the winter of '82-'83 I decided to purchase a new rotator and get it installed. My intent was to get a rugged rotator in place that would easily turn any antenna I'd ever want to install on my tower. After some consideration, I decided on a Telex Hy-Gain T_2X (Tailtwister). Not only is it a rugged "beast," but it's good looking, too. I especially reveled at the appearance of the metered directional indicator — a welcome addition to the shack.

With the T^2X (and some other rotators) the operator must depress the BRAKE switch to retract the brake before energizing the rotator and release the BRAKE switch *a few seconds after* the rotational directional switch is released. It is a precaution that is emphasized in the rotator instruction manual. This allows the rotator/antenna combination to coast to a stop prior to brake insertion and prevents rotator damage. I imagined the awful noise and possibility of rotator damage that might occur should I forget to allow for the delay or if my finger should slip from the BRAKE RELEASE lever. That I could not allow!

Some years ago these circumstances were addressed by other owners of similar rotators. Their solutions to the problem were outlined in past issues of *QST*.[1-4] I recalled seeing a commercially available rotator brake delay unit advertised in *QST*. A letter of request to Lance Johnson Engineering for a D-Lay-5 unit was quickly answered by the delivery of same.

Installation

A glance at the installation instructions promised the job would be quick and easy. This contrasted greatly with the instructions I'd seen for the installation of another commercial rotator delay unit that involved not only rewiring of the rotator control box, but mechanical switch modifications as well!

The D-Lay-5 is neatly constructed on a rugged, single-sided pc board. A 4pdt relay, two electrolytic capacitors and two steering diodes are mounted on the top of the board. Beneath the board are three spacers secured by machine screws. Two of these screws pass through the threaded spacers. They are used to fasten the board to the rotator control box chassis.

No holes need to be drilled in the rotator control box and the existing wiring remains unchanged. Some rotator control boxes may require the physical relocation of an electrolytic capacitor, but this is not required with the T^2X control box. The D-Lay-5 is simply mounted on the underside of the control box chassis using two existing transformer mounting holes, from which the mounting screws have previously been removed. Four color-coded wires are attached to the appropriate switch connections and you're done! Within 15 to 20 minutes after installation has begun, you should have the D-Lay-5 in place and everything up and running in perfect order. You may remove the D-Lay-5 easily should you wish to restore the control box to its original condition at a future date.

It Works!

Control box operation remains unchanged except that now you may release the chosen cw or ccw directional switch and the BRAKE RELEASE simultaneously once the antenna is pointed in the desired direction. You'll note that the BRAKE RELEASE LED remains illuminated for approximately four to five seconds and then extinguishes, accompanied by application of the rotator brake. No more worries about awful noises and rotator damage! Isn't that nice?

The D-Lay-5 is available wired and tested from Lance Johnson Engineering, P.O. Box 7363, Kansas City, MO 64116. Price class: $20. — *Paul K. Pagel, N1FB*

RAK ELECTRONICS "VIC-MORSE" MORSE SOFTWARE

☐ Every month hundreds of pieces of mail, including everything from new-product announcements to reports on the economy, pass through the Hq. offices. One day a new-product release caught my interest. I had just purchased a Commodore VIC-20® personal computer, and had been looking for some Amateur Radio related software.

The new-product release was from a company called RAK Electronics, and the product is a Morse code send/receive program for the VIC-20. I arranged to have a copy sent to Hq. for review.

VIC-Morse is designed to run with the standard 5K VIC-20. The program is written in BASIC, and features a send/receive speed range of 5 to 25 wpm. In the transmit mode, the special characters $\overline{AS}$, $\overline{BK}$ and $\overline{SK}$ are available, along with 4 programmable message memories. Each message may be up to 80 characters long when you're using the 5K version of the VIC-20.

Inside the Program

The program uses BASIC FOR-NEXT loops to set the cw timing sequence. A 1:3:1 dot-dash-space ratio is generated by two loops, one of length X (for dot generation), the other of length 3X (for dash generation), where X is a seed for the speed desired. While transmitting, the program uses the BASIC keyboard-buffer instruction, INKEY$, to get data from the keyboard. This data can be control signals (to set the speed, toggle from transmit to receive, or to run the message memories), or character data. Characters are displayed on the screen *after* the data has been sent. Keyboard data are buffered to 10 characters, after which the program loses data. The receive portion of the program uses an adaptive algorithm to decode the cw. It is also written in BASIC.

Performance of the transmit section of the program can only be described as mediocre at best. The programmer did not include a sidetone function (a simple addition of two POKE statements); therefore, the user must modify the program or hook up an external oscillator or transmitter to test the program. The FOR-NEXT loops used for timing *do not* give the proper 1:3:1 ratio. At 10 wpm, the code sounds somewhat natural, but above that the dashes are much too short. This is because the execution time of a FOR-NEXT loop is not directly proportional to its length (number of loops). Since characters are displayed on the

[1] R. Myers, "Delayed Action Braking for Antenna Rotors," *QST*, May 1971.
[2] "Ham-M Rotator Brake Modification," Hints and Kinks, *QST*, February 1976, p. 45.
[3] "Upgrade Your Ham-M With Delayed Braking," Hints and Kinks, *QST*, September 1976, p. 40.
[4] A. White, "A Delayed Brake Release for the Ham II," *QST*, August 1977.

screen *after* they are sent, the user has no way of knowing if he has made a mistake until the mistake is sent. Because BASIC has a slow execution time (compared to machine-code), the maximum speed, buffer space and versatility of the VIC-Morse program is limited. The receive portion of the program was not tested because the transmit section gave overwhelming evidence of the quality of the software.

Conclusions

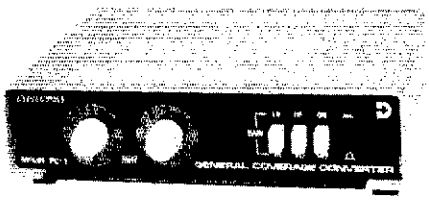
The performance of the RAK program does not justify the price tag. Anyone who has a clear understanding of the BASIC language could write and debug a program as good as VIC-Morse in a few evenings. If you're a ham who is looking for cw software — *caveat emptor!* VIC-Morse is available on cassette tape, and comes with a 9-page instruction manual and an edge connector for TU interface. Receive and transmit signals to and from the VIC-20 are TTL levels. For more information contact RAK Electronics, P.O. Box 1585, Orange Park, FL 32073. Price is $19.95, plus $2 shipping. — *Gerald B. Hull, AK4L*

DATONG PC1

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 30 kHz to 30 MHz.	Confirmed.
Overall gain: −3 dB.	−4.5 dB.
Rejection of 144-145 MHz feedthrough: 60 dB.	56 dB (at 144.525 MHz, converter at 15.525 MHz).
Third-order input intercept point: 10 dBm.	18 dBm at 20 and 50-kHz spacings.
Output impedance: 50 ohms nominal. Input impedance: 50 ohms, but usable with short, high-impedance antennas.	
Power requirements: 10- to 13-V dc at 140 mA.	Confirmed.
Size (HWD): 1.7 × 7.2 × 6.0 inches.†	Confirmed.
Weight: 35 oz (1 kg).	Confirmed.
Finish: Anodized aluminum wrap-around case. Panels printed white on black.	
Digital dials back-illuminated with green LEDs.	Confirmed.

Optional accessories: Model MPU: Mains power unit (ac-to-dc power supply).
Lead D: Coaxial jumper fitted with a PL-259 coaxial plug at each end.
Model 270: Indoor active antenna.
Model 370: Outdoor active antenna.
Available from AR Technical Products Corp., P.O. Box 62, Birmingham, MI 48012, tel. 313-588-2288.

†mm = in. × 25.4



DATONG PC1 GENERAL COVERAGE RECEIVING ADAPTER

☐ The DATONG PC1 is a receiving converter that accepts the frequencies from 30 kHz to 30 MHz and converts them in 1-MHz bands to a receiver that is tunable from 144 to 145 MHz. Without any modification, your 2-meter receiver tuning range can be modified to include coverage of 30 kHz to 30 MHz! If you have only an hf receiver, a conventional 2-meter converter with output at 28 to 29 MHz may be used.

All that is required for hookup to the PC1 is a 12-V 140-mA dc power supply, a short length of coaxial cable with PL-259s at each end for connection between the PC1 and your receiver, and a shortwave antenna. Good signal reception is possible using an indoor antenna, but use of an outdoor antenna is recommended.

Shortwave listening probably captivates more people than anyone could imagine. After a little time searching for signals from all parts of the world, it was easy to see how interesting it was to explore the "other wavelengths." Amateur Radio operating is great, but to enjoy it fully, you have to become a good listener. This is probably why many SWLs (shortwave listeners) become hams. Having a general-coverage converter for a ham receiver provides the listener the "best of both worlds" — Amateur Radio operating and SWLing.

The PC1 is limited in performance only by the equipment you use with it. Most of the present-day 2-meter multi-mode transceivers will suffice. An ICOM 211 and a Yaesu FT-101ZD with an ARR 144VD vhf converter having a 28-MHz output were used with the PC1. The FT-101ZD has an AM position which gives better reception of a-m broadcasts, than the SSB position of the ICOM 211. If you are going to use a multi-mode 2-meter receiver, having a-m mode selection is important.

Circuit

Construction and quality of the PC1 are top rate. Components are mounted on a single fiberglass, double-sided pc board. The PC1 uses nine ICs, six transistors and 27 diodes. The rf input signal passes through one of the seven band-pass filters and on to the mixer. The mixer output is routed through a 144- to 145-MHz band-pass filter to the 2-meter receiver. If overload is caused by strong local signals, a 12-dB attenuator can be switched in. Two additional filters are used below 1 MHz, one covering 30 to 500 kHz and the other 500 kHz to 1 MHz, both switched in from the front panel.

A single crystal oscillator and LSI frequency synthesizer techniques are used to produce the required LO signals. The circuit has an adjustable trimmer that may be used to set the crystal to the exact frequency. The PC1 as shipped from the factory was found to be within a few hertz of exact received-frequency readout.

Operation

The PC1 frequency coverage is divided into 30 separate 1-MHz bands. Two front panel switches with LED-illuminated windows are all that is needed to select the first two digits of the megahertz segment you wish to tune. If you want to listen at 15.016 MHz, you set the two PC1 switches to read 15 and your 2-meter radio to 144.016 MHz. With the PC1 set to 15 MHz, you can tune to 16 MHz, corresponding to a reading of 145 MHz on your 2-meter radio. No PC1 tuning is required: The diode-switched band-pass filters covering 1-30 MHz are selected automatically when the corresponding frequency is selected. Large frequency excursions can be made with a flip of the two front panel switches. Once the favorite listening spots are found, it is easy to return to them with little effort just by dialing the appropriate frequency.

Once the "new world" of shortwave signals has been sampled, it becomes necessary to find a directory that lists information about the stations being heard. One such directory is the *World Radio TV Handbook*, which contains just about everything you would want to know about shortwave listening.[1]

Many hours of listening were devoted to this review and they were enjoyable as well as informative. Tuning the wavelengths not associated with Amateur Radio could cause a scheduling problem with my spare time. I found that using the PC1 for monitoring Amateur Radio signals on other bands (or on the same band while operating and using it as a backup receiver) made the scheduling less difficult.

Being able to use the PC1 as a ham receiver makes it more attractive. The PC1 is manufactured by DATONG Electronics Ltd., Spence Mills, Mill Lane, Bramely, Leeds LS13 3HE, England. Price class: $260. — *Bernie Glassmeyer, W9KDR*

LOGISTICS CORPORATION FIRE-FIST 1000 CW SYSTEM

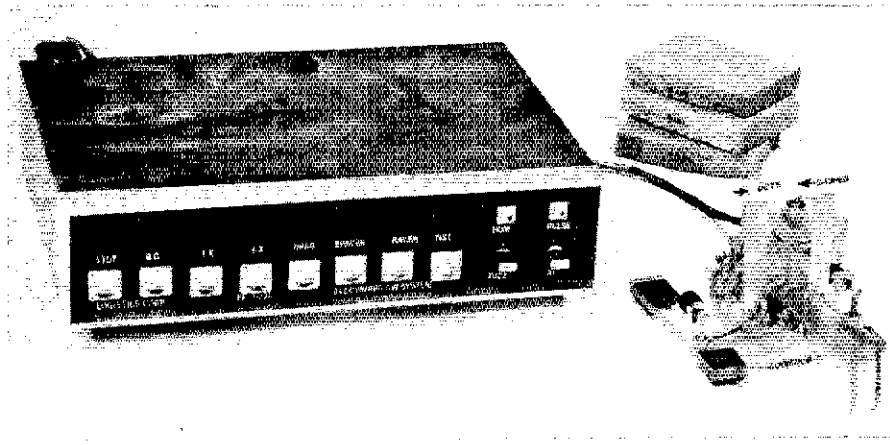
☐ If you've grown weary of the relentless "sameness" of cw signals in our amateur bands, brought on by the emergence of keyboards and other computer-generated and -controlled cw transmissions, take heart. No one is required to have a perfect fist: It can be an adventure to break with tradition and send imperfect code when the mood strikes. No doubt you have become obedient to the pressure of peers who claim "everyone should use a buffered keyboard (KB)." Balderdash! How in the world will your friends know who you are if you don't have a distinctive fist? There's no challenge to copying perfect code. It's much more fun to work a station operator who has a bum fist: It keeps you on your toes!

A new manufacturer, Logistics Corporation, Inc., has recognized the need for nonconformity and free style with its Fire-Fist 1000 cw system. The keyer is computerized, which makes it possible to generate a variety of sending styles. Each cw format is selectable by actuating the appropriate push-button switch on the front panel of the keyer box. Some interesting variations are possible by punching up two or more switches simultaneously, but we don't recommend that until you've mastered the basic operating technique. The '1000 also permits sending conventional, error-free cw at speeds up to 100 wpm.

[1]Available from Watson Guptill, 1515 Broadway, New York, NY 10036. Price: $16.50.

Logistics sells a mating paddle. It contains a layered base made from four sections of iron plate. With all four base plates in position the paddle weighs 10 pounds. In this mode the operator with the legendary "kW fist" should have no problems with the paddle wandering about on the operating desk. The less aggressive operator can remove base plates until the paddle-assembly bulk is reduced to his or her liking. By using only one weight-down plate the paddle will slip about at the slightest provocation. This feature was intended for operators who frequently excuse themselves for their bad cw by saying, "this darned key won't stay put on my table." No need to fib with the Feather-Fist 100 paddle.

The "FF-100" paddle has another unique feature of worth to those who tend to become confused during the heat of a cw QSO. There is a digital display (0.5-inch blue flashing letters) located on each side of the paddle arm. One of the readouts says "dashes," and the other says "dots." The designer realized the difficulty that some cw ops have in telling which way to move the paddle for the sending of dots or dashes. (Mensa members will not need this feature.) An extra set of paddle contacts has been included. This can be used to switch the antenna for full QSK (rubber gloves are required during high-power operation to avoid rf burns). Alternatively, the spare contacts can be used by the "personality operator" who has a ham-shack ON THE AIR light above the rig.[6] This can be especially useful for impressing the visitors: The light blinks on and off in unison with the keying! This kind of razzle-dazzle lends itself nicely to some of the high-power amateur stations.



Programming Features

Switch position no. 1 is for the STUTTERING mode. Normal cw can be sent with the paddle, stored briefly in a memory, then processed and sent by a random-error generator within the keyer. The error rate can be increased or decreased by means of a panel-mounted potentiometer. This mode simulates what many operators call "rf getting into the keyer." It can also be used to create a fist characteristic that is frequently blamed on "a long, hard day at the office," or "I think I had one too many before dinner." We hear a lot of these fists on the bands these days, so this should be a popular feature for the nonconformist.

Position no. 2 is labeled BANANA BOAT. It is not too unlike position no. 3, which is called LAKE ERIE.[7] In either mode CQ comes out as NN MA, NN MA or NN GT. We've all heard this one a great many times while tuning the bands. Some refer to this as a "distinctive fist," and take considerable pride in developing this type of swing.

The tag on mode position 4 reads DXPEDITION. In this mode the station call letters are always erased from the memories, but the RST 599 and operator name remain intact. This will enable the user to confound the pileup operators as they try to learn the call letters of the station they just worked. You can keep them waiting for this vital information for hours! I like to think of position no. 4 as the "fun mode."

Next is no. 5 — the DRAG position. This enables one to send dots at several times the baud rate of the dashes. The resultant CQ sounds something like, "drah-di drah-di drah-drah di drah." Some interesting results can be had by slowing the dashes to 10 wpm and running the dots at, say, 30 wpm. We hear a lot of people doing this with bug keys these days. Trimmer potentiometers are available for changing the baud rates of the dots and dashes.

No. 6 position is called SPACER. Here is where you can duplicate much of the cw you find on the bands. Again, two trimmer potentiometers are available. One controls the gaps between letters and the other puts considerable distance between the words. It is possible to send up to 100 wpm in this mode, but to have 10 to 20 wpm spacing between letters and 5 to 10 wpm spacing between words. This technique gives the operator at the other end of the QSO a chance to fill in his log, file his nails or daydream about some new circuit while you're sending. Of course the coherence of your message may never be realized, but why worry!

No. 7 mode is entitled RACER. Irrespective of what you program into your keyer with the paddle, out comes cw that has no spaces between letters and words. By advancing the potentiometer called "race increase," you can actually start piling one character atop the next one to make things even more interesting. There must be a number of Fire-Fist 1000s in service already, for I've been hearing a lot of this type of cw lately.

Mode no. 8 is labeled NST. In this position the computerized keyer enables the operator to test his rig endlessly without identifying his station. Instead of the conventional word "test" going out over the air, the more common NST NST NST is heard. Although this style of operating is illegal (no call letters included), it does seem to be a popular technique in some circles.

Other Features

The foregoing eight program modes represent the main features of the Logistics Corp. system keyer. However, some additional switches are available. (1) Introducing hum on the cw carrier. This provides notes ranging from T3 to T8, depending upon the setting of the "fuzz" pot. (2) There is a switch that controls chirp (requires a coaxial cable to the local oscillator or synthesizer VCO in your transmitter). A varactor diode in the keyer pulls the transmitter oscillator each time the key is closed. The degree of chirp can be regulated by adjustment of still another internal trimmer potentiometer. Finally, there is a PULSE mode switch that can be used to superimpose pulses on the leading and trailing edges of the cw waveform. This will cause key clicks that are difficult to equal by normal means. This is actually a center-off switch. In its opposite function position it creates the effect of excessive shaping, thereby rendering a bell-like tone to the cw note. This type of soft keying imparts a cw note that sounds as if it were coming from the bottom of a deep well. This is great in a pileup, for no one can figure out what your call is!

Logistics Corporation Fire-Fist 1000 CW System

Manufacturer's Specifications

Dimensions (HWD): Keyer unit, 8 × 12 × 16 inches (203 × 304 × 406 mm).
Weight: 8 pounds.
Color: Two-tone gray and black.
Power requirements: 117-V ac at 35 watts.
Output voltage at key-line jack: 5-V dc (negative).
Price class: $290. Dealer inquiries invited.
Manufacturer: Logistics Corporation, Ltd., 70 Braeburn Rd., Bristol, CT 06010.

Electronics Features

Apart from the usual massive collection of OR gates, AND gates, NAND gates, ROMs, PROMs and what have you, the FF-1000 contains 17 go-no-go ICs. These are essential in generating erratic cw. There are also six kant-read ICs in the system — a totally new concept in the LSI technology. These are used to generate cw that can't be deciphered by the most skilled of high-speed operators. Code readers with visual displays or video terminals can't handle this type of cw either.

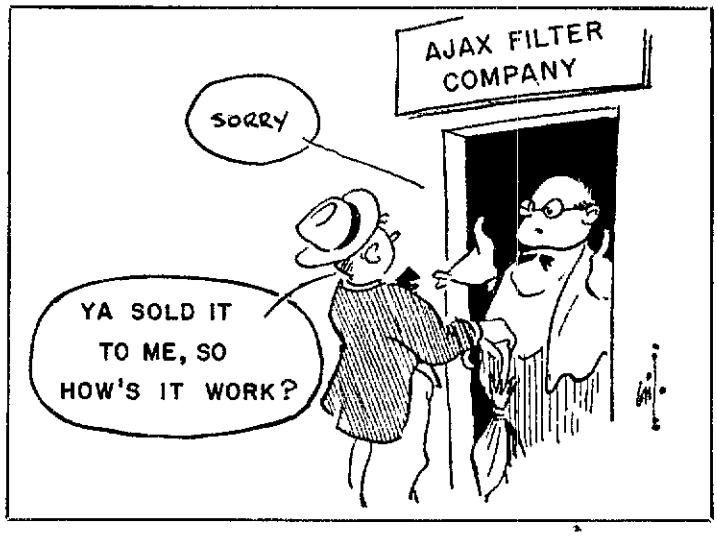
Summary Comments

I highly recommend this system to those who have jaded cw appetites, or wish to do their own thing on the cw bands. The manufacturer is offering a 30% discount for quantities greater than 10 units. This should be especially appealing to the instructors of Amateur Radio classes. The discount deal should be popular also with DXpedition groups. After two months of home use with this system I have finally broken the habit of conforming. No longer do I have that boring fist that puts people to sleep. Now they have to pay attention to what I'm sending, and at last I have a captive audience. — *Zender Bawdrite, YØOP*

[6]See the product review of the Gargler Corp. Profundo 10X Microphone in April 1981 *QST*, p. 49.
[7]a.k.a. "Missouri Valley Swing."

BEGINNER'S BENCH

Understanding and Using Audio Filters



Wondering what an audio filter can do for you? Confused by the plethora of audio filters on the market? This rundown may answer your questions.

By Doug DeMaw,* W1FB

Your friends keep telling you to buy an audio filter to reduce the effects of QRM. But, you've never used one, and you're not sure if such a contraption would really help when the going gets difficult on your favorite cw or phone band. Not only that, you keep hearing about *passive* and *active* filters, and you don't comprehend the difference between them. And, which of the published circuits for home projects would be suitable if you wanted to build your own filter? What about the numerous commercial filters being advertised in the amateur literature? Golly, there sure are a lot of questions that need to be answered, aren't there? An understanding of these filters and how they are best applied should do much toward helping the beginner to make a proper judgment. This article answers some common questions asked of the ARRL staff. I hope it clears up any doubts that may be in your mind.

Types of Audio Filters

I got my introduction to audio filtering back in the 1940s after WW-II surplus radio gear appeared on the market. A popular, low-cost audio filter was available under its military designator, FL-8. It was a passive unit that plugged into the receiver phone jack. A pair of headphones was plugged into the filter box, and away you went with "laundered" audio. The term "passive" simply means there are no devices in the circuit that require an operating voltage. In other words there are no tubes, transistors or ICs that need operating power to make the device work.

An *active* filter, on the other hand, contains electronic devices that require an operating voltage at a specified current. By today's standards the FL-8 aircraft range filter would represent a grave disappointment to the user, but in those days it was definitely better than having no filter at all! It was lossy and it didn't sharpen the receiver output enough to make *anyone* ecstatic. But, it did help to reduce the effects of QRM.

Present-day audio filters offer all manner of high-technology features. The more expensive ones offer various bandwidths and response characteristics. For example we might purchase or build a filter that yielded a low-pass, high-pass or band-pass response, all at the flick of a switch. Other filters are less complex and have only a band-pass response. Such a filter might have up to four bandwidth (selectivity) choices, switch selected. For my cw work I am content with a band-pass audio response.

Perhaps you're wondering how the three filter responses compare. These are depicted in Fig. 1. The curve at A represents how a low-pass audio filter might respond as an audio signal generator was tuned across it. For this example let's assume that the peak (loudest) frequency we want for cw reception is 700 hertz. The filter must then be designed to start rolling off (attenuating) at 700 Hz. As our signal source was moved higher and higher above that frequency, the output from the filter would become lower and lower in level (attenuation). Eventually we would scarcely be able to hear the higher-frequency audio signal. Since our low-pass filter permits all frequencies that lie below 700 Hz to pass without attenuation, the name "low pass" is proper. A low-pass filter will greatly reduce high-pitched QRM energy, but if a signal reaching your receiver creates a tone that is 700 Hz or lower, it will sound just as loud in your earphones as will the desired 700-Hz beat note. Therefore, a low-pass filter will help to reduce some of the QRM, but not all of it. Also, since low-frequency responses will be heard well, static (QRN) will sound as loud as it would with no filter at all. Not much use for QRN reduction, eh? I find a low-pass filter more useful for ssb (single-sideband) reception. If the cutoff frequency (f_{co}) is set for approximately 2000 Hz, the audio from the filter will sound quite acceptable, but the high-pitched "monkey chatter" QRM from stations nearby in frequency will be reduced greatly. Likewise, of course, with high-pitched cw QRM. The sharpness of the rolloff will depend on just how the filter is designed.

Now, let's examine the opposite condition, where the audio filter is built for a high-pass response (Fig. 1B). The same philosophy applies except that the frequency responses below 700 Hz will be attenuated, but those above our chosen frequency will pass unhampered. This type of response characteristic can be useful when a large amount of filtering is not wanted during ssb operation (to preserve

*ARRL Senior Technical Editor

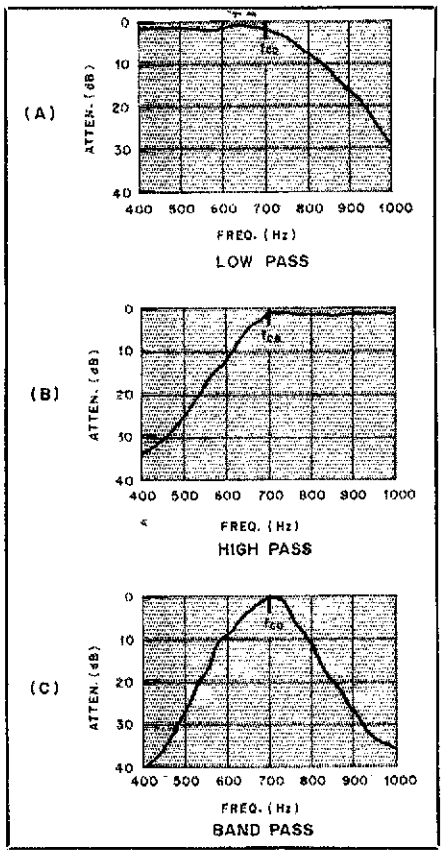


Fig. 1 — Relative response curves for (A) a low-pass filter, (B) a high-pass filter and (C) a band-pass filter.

the fidelity as much as possible), but when we want to reduce any low-frequency (below 700 Hz) rumble (QRM and QRN) that might annoy us or impair readability. I have never found the high-pass audio filter of much use in my shack, but some operators like to use them.

Our remaining filter option is the band-pass type. I find myself "married" exclusively to this kind of filter for cw and ssb work. A typical band-pass response is shown in Fig. 1C. A center frequency (f_c) of 700 Hz would be the choice of many cw operators, since that corresponds to the offset frequency for most of our modern transceivers: An audio filter should have a peak response at or near the same frequency that the receiver BFO (beat-frequency oscillator) provides. This will ensure maximum audio response in the headphones. If you don't know what the offset is for your rig (between the transmit and receive modes) you can tune in a cw signal while using your built-in cw i-f (intermediate-frequency) filter and adjust the tuning dial for peak S-meter response. The pitch you hear will be the approximate frequency to which your audio filter should be set (or designed, if a fixed-frequency filter is used). Most of the better commercial audio filters have a frequency control that permits you to match the audio-filter peak response to that of the receiver offset. Therefore, the correct procedure would be to tune in the cw signal without the filter, then activate the filter and adjust it for maximum response in the speaker or phones.

It is easy to realize the advantage of a band-pass filter over the two other types: QRM and QRN above and below the desired audio frequency are greatly reduced by virtue of the rolloff above and below f_c. This kind of filter generally consists of a low-pass and a high-pass filter connected together electrically. A band-pass response results. It is called a band-pass filter because it will pass only a narrow band of frequencies before attenuation commences. Some electronic filters are designed for an "inverted" band-pass response. They are called "band-reject filters." The approximate response would look like the one in Fig. 1C, except that the curve would be turned upside down. There would be no attenuation above and below the desired frequency range, and that energy within the dip in the curve would be "sucked out." Band-reject filters are used in special applications in which a narrow band of interfering frequencies must be attenuated or removed.

Some commercial and homemade filters have still another function. They are equipped with a "notching" feature. A switch position on the panel is marked "notch." There is also a notch-adjustment control. The function of this circuit is exactly what it is called: It notches out or essentially removes the audio response at a *specific* pitch. Therefore, if you are listening to a cw signal that is peaked at 700 Hz, and there is an annoying QRM beat note at, say, 1000 or 1500 Hz, the notch control can be adjusted to knock down the unwanted pitch without impairing the strength of the tone you are listening to. In my experiences I have applied the notch feature to provide perfect copy, when without it I could not read the station I was in QSO with.

Finally, some filters are equipped with a "Q control." The term "Q" in electronics refers to the relative quality of a circuit or component part. In plain language we can say that a circuit with high Q has low losses. In the filter world we find that the higher the Q the narrower the filter response. Therefore, if we were to increase the Q of the filter that provided the band-pass response of Fig. 1C, the sides (skirts) of the filter response curve would pull in toward the center frequency. This would help to reject unwanted signal energy even closer to the desired signal. An ideal filter response would have skirts that were perpendicular to the base line of the curve, and the top of the curve (nose) would be flat. The resultant response would be rectangular, rather than sloping as it is in Fig. 1.

Filters with Q controls enable the operator to choose the desired amount of bandwidth. Since ssb reception requires a

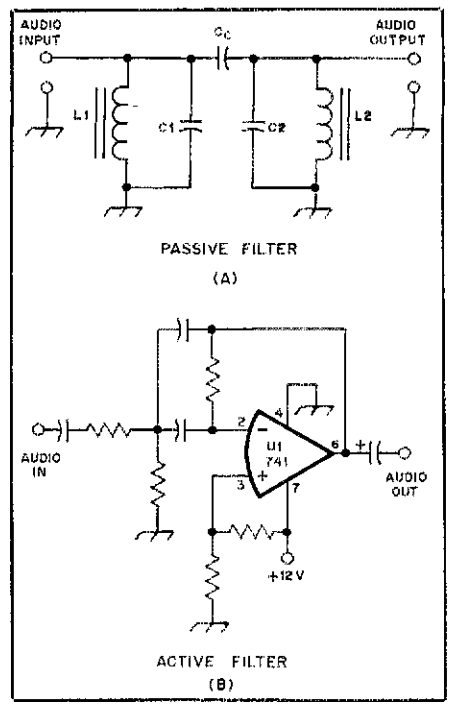


Fig. 2 — Simple examples of (A) an L-C type of passive audio filter and (B) one section of an R-C active filter. The latter requires an operating voltage.

fairly wide bandwidth (300 to 2000 Hz, for example), to ensure reasonable speech reproduction and comprehension the Q control would be set for a low level in order to widen the filter response. Conversely, an ideal cw signal has no appreciable bandwidth, so the Q control would be advanced to narrow the filter response as much as possible.

Fig. 2 shows the essentials of an active and a passive type of audio filter. The circuit at A shows a simple two-section passive filter that employs two resonant circuits (C1/L1 and C2/L2). C_c is the coupling capacitor that joins the filter sections. All passive filters have some loss (insertion loss). On the other hand, active filters can be designed to provide gain. However, most designers set them up for a gain of 1 (unity) so that the gain distribution of the receiver remains the same as before the filter was added. The example at B of Fig. 2 shows one section of an active filter that uses an operational-amplifier IC (op amp). Usually, we will find two to four identical filter sections of this type in a band-pass R-C active filter — R-C meaning resistors and capacitors are used to establish the center or cutoff frequencies rather than elements of inductance (L) and capacitance (C). The latter would be called an "L-C filter." The more filter sections used, up to a practical limit, the steeper the sides (skirts) of the filter curve. A single-section filter of the kind shown at B of Fig. 2 would be of little value by itself, since the skirts of the response curve would be rather wide. They could be narrowed considerably by

designing the simple filter for a high Q, but this would cause design complications. It is more practical to use two or more low-Q filter sections in series to obtain good skirt response.

What Will a Filter Do for You?

We already learned that an audio filter will help to banish unwanted signals and QRM. But what else would prompt an amateur to use one of these gadgets? Well, all receivers put out wide-band noise. This noise is generated after the i-f filter, which usually follows the mixer stage. The i-f amplifiers generate this noise, and sometimes the audio stages in a receiver contribute further to the noise. This energy shows up as a hiss in the speaker or phones. It doesn't cause a problem unless the signal we want to copy is weak enough to be on par with the receiver noise level or slightly above it.

Also, background noise on a readable signal can be annoying (I detest it!). An audio filter will greatly reduce the effective noise bandwidth of the receiver and provide "solid copy" in many instances when partial copy would otherwise result. The received signal, irrespective of its strength, will sound much cleaner after the receiver output has been "sanitized" with an audio filter. The filter can effectively "lift" a weak signal out of the noise much of the time, while at the same instant knocking out QRM from other stations.

I can remember the time I was on a DX-pedition to Montserrat (VP2MFW) and had high hopes of working the world on 160 meters. The QRN level near the equator, especially at 160, 80 and 40 meters, is ferocious. It seems to average between S9 and 10 dB over S9 on 1.8 MHz. The antenna was a closed square loop, 1000 feet on a leg and 60 feet high (m = 0.3048 × feet). Having such a magnificent antenna available (courtesy of VP2MF) was like perishing and awakening in Shangri-la. After warming up the station gear I called "CQ" on 160-meter cw. I could hear people answering me, but nary a call came through in readable fashion. After a few more tries I gave up in despair: The static was just too hard to deal with. Suddenly I recalled packing my active audio filter in one of the suitcases, just in case it would be needed. Shortly thereafter I garnered it, hooked it to the receiver and tried another "CQ." Wonderful! I pulled two stations out of the noise and copied them Q5. The rest of the evening was devoted to working as many stations as possible, even though many of them were still too weak to copy, even with the filter actuated. This is but one example of the value of a good audio filter!

Another receiver malady that can be aided or disguised with an audio filter is output hum. Some receivers — especially when hi-fi phones are used (they respond well to low-frequency audio) — cause weak-signal copy to be difficult because of high levels of 60- or 120-Hz hum in the audio output. The low-frequency rolloff of a band-pass or high-pass audio filter will block the passage of low-frequency hum.

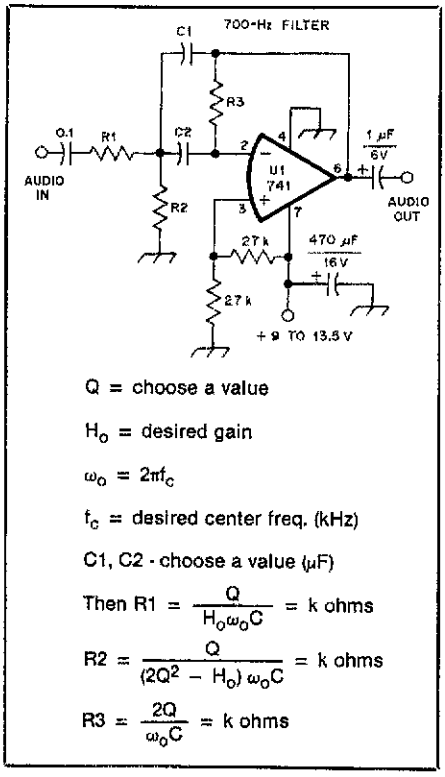


Fig. 3 — Design information for building your own active audio filter. Two, three or four of these circuits are normally connected in series to make the skirts of the filter response steeper.

Building Your Own Active Filter

An earlier *QST* article described an inexpensive, easy-to-build audio filter for cw work.[1] A parts kit is available for that project.[2] But, if you want to start from scratch and try your skill as a designer you can work with the information in Fig. 3. Let's assume that f_c will be 700 Hz (0.7 kHz), Q will equal 5 and the gain (H_o) will be unity (1). We must pick a value for C1 and C2. Let's use 0.01 μF, since that is a value we have on hand. From this data we can work the equation in Fig. 3 and learn the values for the three resistors.

$$R1 = \frac{5}{1 \times (6.28 \times 0.7) \times 0.01} = 113.7\ \text{k}\Omega \qquad \text{(Eq. 1)}$$

$$R2 = \frac{5}{49 \times (6.28 \times 0.7) \times 0.01} = 2.3\ \text{k}\Omega \qquad \text{(Eq. 2)}$$

$$R3 = \frac{10}{4.396 \times 0.01} = 227.479\ \text{k}\Omega \qquad \text{(Eq. 3)}$$

We can see that these are not standard resistor values. Therefore, to ease our design effort we will use resistors of the nearest standard value. R1 will become 110,000 ohms (110 kΩ), R2 = 2200 ohms (2.2 kΩ) and R3 = 220,000 ohms (220 kΩ). These changes in value will not spoil the filter performance appreciably, but will shift the f_c slightly.

One filter section will not be sufficient to help us cope with QRM and noise. A modest filter of amateur value can be formed by placing two sections (from Fig. 3) in series (cascaded). Three sections would be even better, and I would suggest that no more than four filter sections be used. When identical filter circuits are combined it is important that the values of C1, C2, R1, R2 and R3 be closely matched in value throughout the composite filter. Resistors and capacitors of 5% tolerance are usually okay. If the values aren't well matched, the bandwidth of the filter can become too wide, since each filter section will end up with a different f_c. If you have access to a resistance/capacitance bridge, it will help to match your capacitors and resistors as closely as possible before inserting them in the circuit. Composition resistors can be changed in value by filing away some of the carbon inside them. A few passes on the side of a resistor body with a file will increase (raise) the resistance. File and remeasure the resistance until you obtain the desired value. The "wound" on the resistor should then be sealed with glue or epoxy cement. C1 and C2 need to be high-quality (Q) capacitors. Mylar or polystyrene units are recommended.

A Practical Filter Circuit

The filter described in the article of note 1 is shown in Fig. 4. I thought it would be wise to include it in this article in the event your *QST* file doesn't go back far enough. Detailed information and the circuit-board pattern appears in the original article. The circuit contains three active sections and is designed for a center frequency of 750 Hz. You can change the f_c to one of your choice by applying equations 1, 2 and 3.

Radio Shack TL081 op amps can be substituted directly in place of the somewhat generic 741 op amps. The former have FET input circuits and are somewhat less noisy than 741s. But, they cost a bit more!

Hooking the Filter to Your Receiver

Our most convenient installation technique is that of plugging the filter into the receiver phone jack. Headphones are connected to the output of the filter. A 9-volt battery can be used as the filter

[1]Notes appear on page 48.

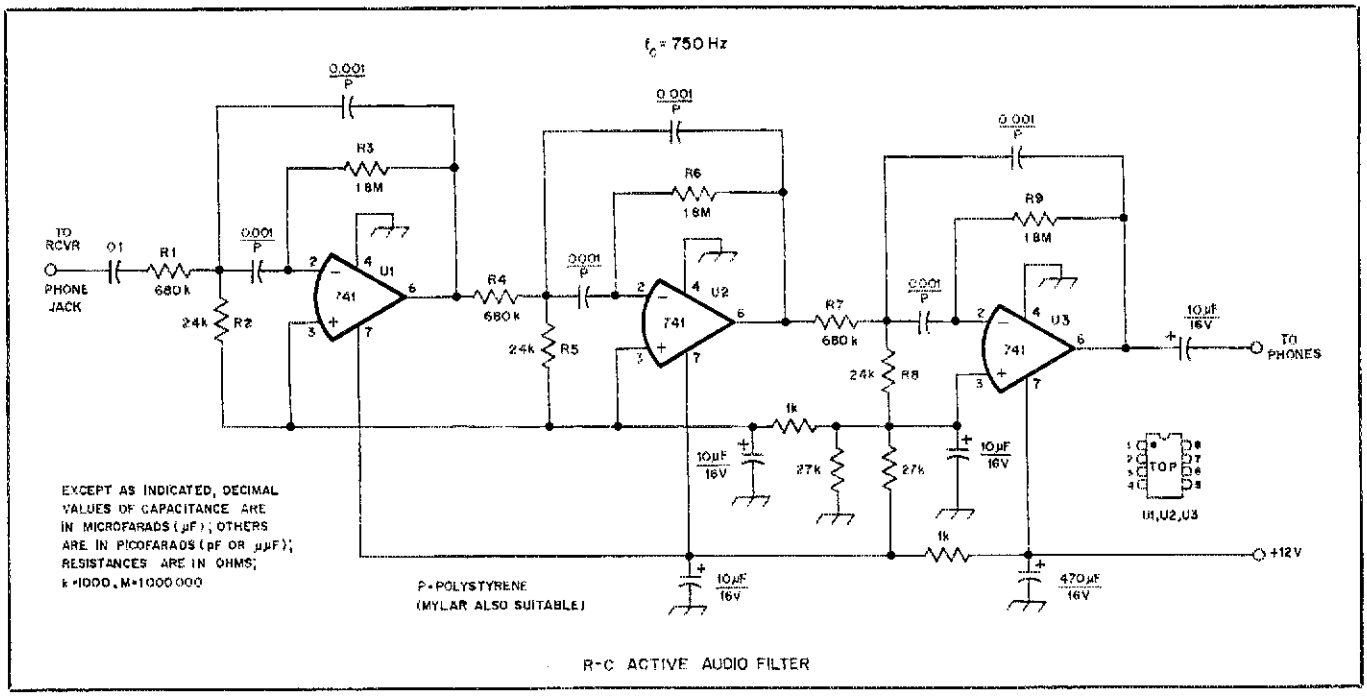


Fig. 4 — A practical three-section R-C active cw filter. Resistors are 1/4- or 1/2-watt carbon types. Capacitors with polarity marks are tantalum or electrolytic.

power supply, and it should last a long time with the circuit of Fig. 4. Alternatively, you can attach a small ac-powered direct-currrent supply. Anything from +9 to +13.5-V dc will work fine.

A switch can be used to turn off the filter and bypass the audio line around the filter when conventional reception is desired. The Circuit Board Specialists kit (note 2) provides that feature.

Care must be taken during use to prevent the filter from being driven too hard by the audio from the receiver. Overdrive can spoil the filter performance and cause objectionable distortion. *Caution:* Use only enough receiver audio output to provide a comfortable listening level in the headphones. You can design your filter for a gain of 2 or 3 if you wish. This will enable you to feed less audio into the filter, while still realizing ample volume in the phones.

A better location for an audio filter would be between the receiver output stage and the low-level audio amplifier that precedes it. But, few of us like to chop into the circuit of our store-bought gear, so we just connect the filter outboard fashion. Many of the commercial active filters contain audio power amplifiers that let us use our loudspeakers. You can learn more about these units by reading *QST* ads and product reviews.

Closing Remarks

I've thumped pretty hard on the subject of filters, so it's time to QRT. I hope you found the answers to some of your questions in this article. Audio filters are easy to build and get operating. If you have not tried your hand at home construction of ham gear, this can be a great first project for you. But more importantly, a good filter can make you king of the weak-signal copiers in your area — assuming that the other ops haven't beat you to the draw in this game! QST

Notes

[1]D. DeMaw, "Beating Rotten QRM — CW Filtering for the Beginner," *QST*, Oct. 1981.

[2]Circuit boards, negatives and parts kits for the circuit of Fig. 4 are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81001.

Strays

ATV/SSTV FORUM AT DAYTON

☐ Amateurs attending this year's Dayton (Ohio) Hamvention (April 29-May 1) are invited to attend an ATV/SSTV forum on April 30 at the Hara Arena. Stanley Brokl, N2YQ, senior engineer for the Jet Propulsion Laboratory in Pasadena, California, will give a talk titled "The Ultimate SSTV DX." Stan is an ARRL section manager for Los Angeles and a member of the JPL ARC, which retransmitted SSTV pictures from the Viking and Voyager space missions on the amateur bands. Stan's talk will be augmented by slides and pictures never before seen.

Also, Jim Chladek, KA2NSJ, and Larry Horne, N2NY, will give a talk and video demonstration on how ATV is used in putting on the cable television show "Network Two New York," which regularly features new innovations in Amateur Radio. Moderator for the forum is Ron Flynn, KB8LU, SSTV editor for *Worldradio*.

The annual SSTV Get-Together will be held on April 29, beginning at 7:30 P.M., at the Holiday Inn North of Dayton. There will be a social hour, followed by demonstrations of homemade SSTV equipment. — *Ron Flynn, KB8LU, ATV/SSTV Chairman, Dayton Hamvention*

I would like to get in touch with . . .

☐ any cab drivers in the U.S. who are interested in joining a net. Lionel Rose, G4KAB, 164 Regal Way, Harrow, Middlesex, England.

☐ amateurs engaged in air-traffic control who are interested in joining a net. International Federation of Air Traffic Controllers Assn., P.O. Box 196, CH-1215 Geneva 15, Switzerland.

☐ any teenagers in North Carolina, South Carolina or Virginia who are General class or higher licensees and are interested in joining a 75-meter phone net. Jim Lea, KA4UBN, 709 Raleigh St., Roanoke Rapids, NC 27870.

AMSAT's Phase III Satellite: What's in it for You?

By Dr. Thomas A. Clark,* W3IWI and Vern "Rip" Riportella,** WA2LQQ

Since 1961, thousands of hams have been transported into the Space Age by hearing signals returned by an unseen solitary sailor: OSCAR! OSCAR I has become the patriarch of an expanding amateur satellite family that now numbers 19 members. OSCARs have been built in eight countries -- the U.S., Canada, Japan, Australia, England, West Germany, Hungary and the USSR. At least seven OSCARs are now active. But for all that have come before, the greatest OSCAR of them all is about to set sail. Later this spring, the AMSAT Phase IIIB satellite (which will be dubbed AMSAT-OSCAR 10 once safely in orbit) will herald a new generation of advanced spacecraft and will bring amateurs a virtual DX cornucopia (see Fig. 1).

What's this new OSCAR about? Who built it? When will it fly? How can I use it? Where will I get the information? What equipment will I need? What DX will be available? These questions and more will be addressed in a series of articles appearing in these pages over the next several months. Written by experts in their fields, they will tell how to get started and how to enjoy the new generation of "birds."

In this article, we introduce Phase III satellites with a description of the overall system: The satellite, the ground station (yours) and *you!* Our approach will emphasize the simplicity of satellite communications. Later, you may want to probe the literature for additional, intriguing detail.

Much of the "mystery" shrouding OSCARs centers on orbits. Thus, a simple explanation of OSCAR orbits seems an appropriate point of departure.

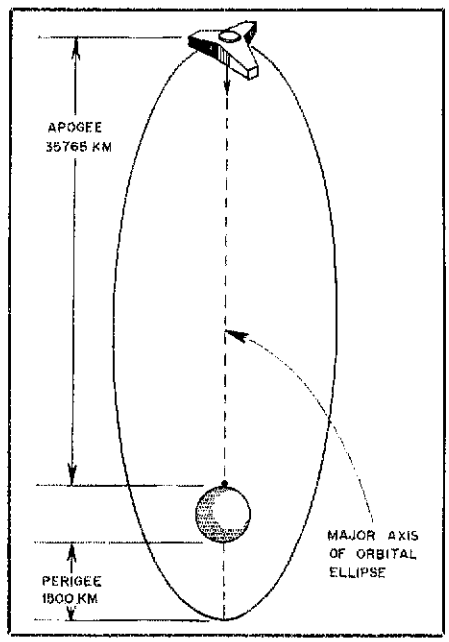


Fig. 1 — Phase IIIB will be placed in a high, elliptical orbit. It will make one revolution in 11 hours, making it accessible for several hours at a time.

Useful Orbits

The orbit that a satellite flies is the major factor that defines how you can use the satellite to meet your communication requirements. Various types of orbits have different features, some more desirable than others. When we watch television transmissions, we occasionally use signals sent through geostationary satellites orbiting 35,000 km (22,300 miles) above the earth. Until now, the OSCARs and the Soviet RS Satellites have been launched into so-called low-polar oribts which, though only moderately useful for communications, have been very important to amateurs. The reason is simple: availability of launch opportunities.

Although amateurs can build satellites, getting then launched into space is a different matter entirely. We continue to be totally dependent on the world's various launch authorities for our "rides" -- if we had to pay for them, the tariff would be several million dollars per launch! OSCAR has consistently been a "hitchhiker" aboard a rocket going to a useful orbit.

All OSCAR and RS satellites (except for the brief-lived OSCAR 4 in early 1966) have been deposited into orbits under 2400-km (1500 miles) altitude. Low-earth orbits (usually called LEO) in this altitude range are typical of earth-resource survey (Landsat) satellites and some types of scientific research and weather satellites. For these altitudes, maximum communications range is about 10,000 km (6000 miles). For LEO satellites, the user sees only a few passes each day. The satellite seems to zip across the sky, being visible for less than 30 minutes during each pass. While the satellite is in range, the user becomes an octopus, pointing antennas at the moving satellite, correcting separate transmitters and receivers for upwards of 6 kHz of Doppler shift, and trying to have a few brief contacts with others who similarly have to "grow" several extra sets of hands.

Despite these complications, nearly 10,000 users around the world have found the LEO satellites an exciting and interesting challenge. Several stations have earned DXCC; nearly 100 have earned WAS, and a few have even earned WAC. These LEO satellites have also been important in demonstrating to the professional space community that amateurs can build and operate satellites that are of considerable utility to mankind. Our successes have earned us the right to make the next step: AMSAT's Phase III satellite.

With the new satellite an exciting precedent will be established. No longer will we be bound by the constraints of LEO satellites. For working long distances, satellites will be placed into much higher orbits. When AMSAT (the Radio Amateur Satellite Corporation) studied the "optimum" orbit for amateur use, we had to ask the question: "Optimum for what purpose?" A geostationary orbit would afford amateurs located over one-third of the earth's surface 24-hour coverage with antennas that need never be moved. But a geostationary satellite must be located above the equator. From such a location, a satellite could serve North and South America, but not Europe, Asia and Africa. A different geostationary satellite could have *its* location chosen to favor Europe and Africa, at the exclusion of the Americas, and so on. A geostationary-satellite system to cover all the earth would require at least three "birds," and AMSAT viewed this as a bit beyond our capabilities now (but just wait for Phase IV!).

Molniya — High, Elliptical Orbit

AMSAT opted for an elliptical-orbit satellite with its 35,000-km apogee (high point) situated as far north as possible. This type of orbit, pioneered by the Soviets, bears the name "Molniya." In many ways, a Molniya orbit can be visualized as a geostationary satellite "hanging" over a point far to the north for about 70% of the 11-hour orbital time. For the remaining 30% of the time, the satellite zips through its 1500-km altitude perigee (low point), located over

*AMSAT President, 6388 Guilford Rd., Clarksville, MD 21029
**AMSAT Executive Vice President, and Editor of *Orbit* and *ASR*, Box 177, Warwick, NY 10990

the Southern Hemisphere, and then reappears for another 11-hour pass.

When the satellite is near apogee, nearly all stations in the Northern Hemisphere will be in view of the satellite simultaneously (see Fig. 2); thus, any and all stations within view of the satellite can work any other within view! During any given day, any station in North America, Europe or Asia would "see" the satellite for at least 15 hours a day. Even stations in the Southern Hemisphere would pick up exciting DX capabilities with significantly more communications "power" than with the present LEO satellites. For example, a station on the East Coast of the U.S. will have over two hours per week to work friends in New Zealand.

Aside from the exciting DX prospects the Molniya orbit will provide, it will bring us other important benefits. Antenna-pointing corrections, to keep the satellite "boresighted," are greatly simplified with the Phase III orbit. This is because of the Phase III satellite's apparent rate of movement across the sky. The new OSCAR will appear to move very slowly near apogee — when it is most distant, 35,000 km away! In fact, on certain occasions Phase IIIB will be in view up to 8 or 9 hours at a time. With this long "communications window," the nature of QSOs on Phase IIIB will likely evolve from contest-like exchanges, which have often been the case on prior OSCARs, to more relaxed, leisurely QSOs. This communications environment may promote more roundtable-type QSOs, since each participating station will hear all others nearly equally well.

Compared with the earlier LEOs, however, the new elliptical orbit is a trifle more complex to work with. Simple plotting boards, such as the ARRL OSCARLOCATOR, won't work because the Phase III satellite altitude is continually changing. Fortunately, many tracking aids, including more sophisticated plotting aids and programs (for nearly every breed of personal computer and programmable calculator), have been developed to help locate and track the new OSCAR. These programs are now available from AMSAT Software Exchange, Box 27, Washington, DC 20044. But even the casual user won't have a difficult job. Since the satellite is visible for such a long period and appears to move slowly, many amateurs will operate with no tracking aids at all. They will simply "peak up" their antennas on the satellite's beacon signals about every half-hour. As an additional aid, the satellite's computer will be sending its current position in Morse and RTTY every few minutes.

Phase IIIB thus offers major benefits compared to the LEOs. These benefits comprise increased geographical coverage (DX range); an extended access window (up to 16 hours per day, 8 to 9 hours continuous); and easier antenna pointing and tracking because of slower movement across the field of view. In one sense, Phase IIIB will be a "global repeater," while in another sense it will constitute a new amateur band with many of the DX characteristics of the 20- or 15-meter bands.

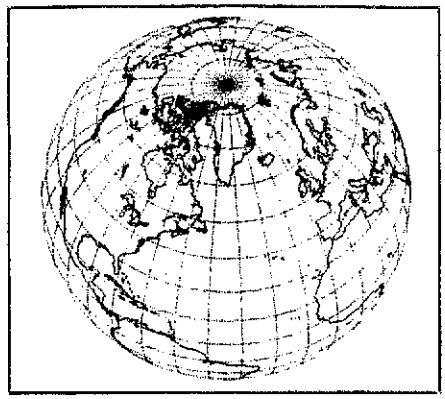


Fig. 2 — A view of the earth as the Phase IIIB spacecraft will "see" it at one of its northernmost orbit points. This view is from apogee at 35,800-km altitude. The sub-satellite point is 45° W. long., 57° N. lat. *(computer graphic by Phil Karn, KA9Q)*

Phase III Communication System

To see why Phase III is like a new amateur band, let us now take a look at the satellite hardware itself. Common sense, combined with a basic understanding of the satellite's operational environment, will give you good insight into the major systems in the new OSCAR.

In essence, the new OSCAR is simply a special type of repeater with a broad bandwidth to support many users simultaneously. It is situated to provide coverage of a large geographical area. In order to function, the satellite requires a communication system (called a *transponder* rather than a repeater), a power system and a control system. Let's see what makes up each of them. (See Fig. 3)

The Transponder

The transponder is made up of a receiver and a transmitter operating simultaneously on different frequencies. As with terrestrial repeaters, the receiver is connected to the transmitter. The big difference is that, for the terrestrial repeater, the signal from a single user is demodulated in the receiver, and then remodulates the transmitter. Thus, only a single 5-kHz fm signal can work through the repeater. On the other hand, satellite transponders are designed to have a moderately wide passband (in the order of several hundred kilohertz for OSCARs) so many stations can share the use of the "bird." The satellite transponders are really just frequency translators with linear power amplifiers.

Another difference between a typical fm repeater and an OSCAR transponder is that stations transmitting through the transponder are obliged to use linear modes such as ssb and cw rather than fm. The reason for this becomes obvious when one realizes electric power is limited to a few dozen watts for the entire spacecraft. It doesn't make much sense to use power-gobbling modes such as fm (F3) and a-m (A3A), since these modes consume power even when there is no modulation. Rather, ssb (A3J) and cw (A1) are the accepted modes since they dissipate power only when there is modulation or keying.

A final difference between a typical terrestrial repeater and an OSCAR transponder is that most terrestrial fm repeaters receive and transmit simultaneously on the same band. To do this, the repeaters must be provided with extraordinary filtering to prevent the strong local transmit signal from overloading the local receiver. Large duplexers and separate sites for transmit and receive antennas are often employed to overcome desensitization problems. Neither of these solutions is suitable on a spacecraft, of course, since weight and space are costly commodities on satellites. Most spacecraft are smaller than a typical automobile, so the transmit and receive antennas cannot be separated by more than a few feet. Therefore, the amateur satellites have adopted the same solution used on commercial satellites: receive and transmit simultaneously on widely separated frequencies (different bands). With the new OSCAR, two transponders will be

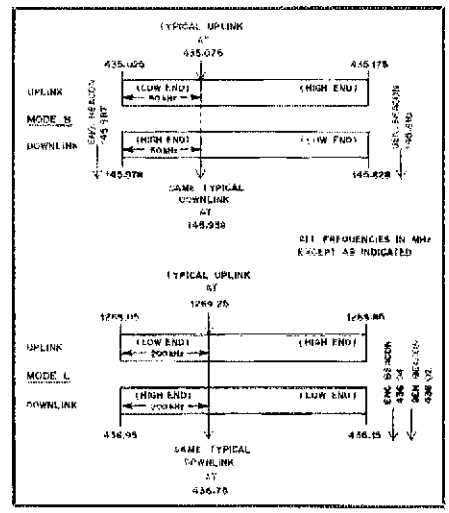


Table 1

AMSAT-Phase III Frequencies (MHz)

Mode B

Uplink (ground to satellite):
435.025-435.175
Downlink (satellite to ground):
145.975-145.825

Mode L

Uplink: 1269.050-1269.850
Downlink: 436.950-436.150

available that offer two distinct uplink-to-downlink combinations. They are listed in Table 1.

As can be deduced, there will be a 150-kHz passband on Mode B and an 800-kHz passband on Mode L. The reason the downlinks are listed in reverse is because the passbands are inverted. That is, a signal entering the transponder receiver on the low edge of the uplink passband will be transmitted by the transponder transmitter on the high end of the downlink passband. Similarly, lower sideband on the uplink will be heard as upper sideband on the downlink. More on this in subsequent articles in this series.

Power System

Next, let's see what's involved in the power system. As is well known, satellites are powered by solar energy, although they do carry small amounts of consumable stores (mostly pressurized gases or stored chemical energy, such as rocket fuel). Silicon solar cells are employed to convert solar radiant flux sunlight to electricity. The Phase IIIB solar panels will produce about 40 W when the satellite is first launched. The power generated is gradually reduced by the damaging effects of solar radiation and micrometeoroids. After five years, the power may be degraded by 20%.

The power from the solar cells is conditioned by a battery-charge regulator that ensures the longevity of the batteries. The nickel-cadmium batteries store the energy for use when the satellite travels through the earth's shadow. The spacecraft will carry two sets of batteries because the battery is the most likely component to fail in orbit. The primary battery is operated until telemetry indicates it has degenerated to a predetermined threshold, whereupon the alternate battery will be switched on-line.

Control System

The control system is probably the most complex of all. It consists of a number of major subsystems that we will describe briefly here, but which will be described in more detail in subsequent articles:

Integrated Housekeeping Unit (IHU): The on-board computer that keeps the entire spacecraft running. It generates and formats telemetry, handles the transmission of bulletins on the beacons, computes and controls attitude, and does a host of other tasks.

Telecommand subsystem: On board, this system receives command messages from ground-based telecommand stations, checks for accuracy and relays the commands to the IHU. The other half of this subsystem consists of the ground-based AMSAT telecommand team (primary stations are in the U.S., West Germany, Canada, New Zealand and South Africa, with supporting stations in Japan, England and Hungary).

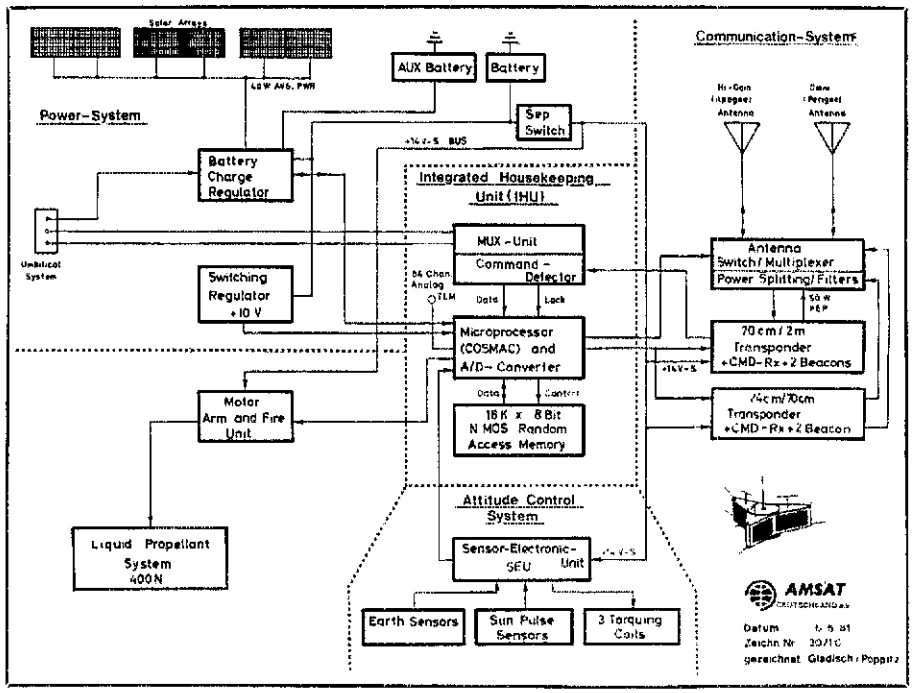


Fig. 3 — The Phase IIIB functional block diagram *(courtesy AMSAT DL)*

Attitude sensors: Earth sensors and sun sensors "look" for the earth and sun, and provide inputs to the IHU, which uses the data to compute the proper attitude (orientation) of the spacecraft so the antennas are directed toward the earth.

Attitude control subsystem: Pulsed electromagnets that create a spacecraft-torque by interacting with the geomagnetic field when the spacecraft is near perigee. In essence, the spacecraft is the rotor of an electric motor and the earth's magnetic field is the stator. Magnet pulse timing is under IHU control.

Kick motor subsystem: Liquid-fueled, two-component propellant (nitrogen tetroxide and hydrazine) rocket engine that is fired to move the satellite from its initial orbit into the elliptical orbit that will be most beneficial to amateurs. The on-board fuel permits the motor to burn for a total of about five minutes shortly after launch and separation. This subsystem also contains the various valves and plumbing that control the propellants.

Antenna subsystem:

2 meters — low-gain monopole or high-gain 6-element phased array ("ZL-special" beam).

70 cm — low-gain monopole or high-gain 3-element phased array.

24 cm — low-gain monopole or high-gain helix.

All antennas are right-hand circularly polarized (RHCP).

The Phase III spacecraft was conceived and developed by the international AMSAT team, with flight hardware and ground support systems developed by amateurs from the U.S., West Germany, Hungary, South Africa, Argentina, Japan, Canada and New Zealand.

"Only 20% Amateur Radio"

We have seen that there is nothing terribly exotic about the satellite, although much of the technology (liquid-fuel kick motors, attitude determination and control, and so on) have very little in common with "conventional" Amateur Radio. Phase III Project Manager W3GEY has been quoted as saying that only 20% of an amateur satellite is Amateur Radio.

Much of the "magic" of building satellites stems from the need for high dependability, and the designers of Phase IIIB built in these characteristics:

1) *High reliability.* No repairmen will be on hand to fix it, should something fail. The spacecraft and all systems must be well designed; only highly reliable components can be used, and rigorous testing must be performed.

2) An OSCAR must work in a harsh environment. Aside from radiation, it must contend with temperature extremes, the effects of high vacuum, micrometeroids and other hazards.

3) OSCAR must survive the mechanical stresses of launch intact.

This, then, is the satellite. We've found it to be moderately complex, built to exacting standards and rigorously tested to banish the prospects of early failure. But we've also found that the satellite is not difficult to understand. And once the satellite is understood conceptually, assembling a suitable ground station for using the new OSCAR is relatively easy!

Your Ground Station

We will discuss three classes of equip-

ment for your ground station: (1) transmitters and receivers, (2) amplifiers and preamplifiers and (3) antennas and rotators. For clarity, we will address each class in terms of general system requirements. Subsequent articles in this series will elaborate on many of these topics.

Your transmitter and receiver must have frequency coverage and operating modes compatible with Phase III if you want to use it. That means for Mode B you must transmit the uplink to the satellite on 70 cm (435 MHz); on ssb or cw, and you must receive the satellite's downlink on 2 meters (145 MHz). For Mode L, you must transmit on 24 cm (1269 MHz) and receive on 70 cm (436 MHz). Most important is the realization that you must be able to operate full duplex — you should be able to transmit and receive simultaneously. No presently available single-box transceiver can do this (although we have seen prototypes of units that can).

Many Phase III users will employ transmit and receive converters. This means of attaining vhf/uhf capability has the notable advantage of allowing you to make use of much of your existing equipment. Converters for both transmit and receive on 2 meters, 70 cm and 24 cm are available; common i-f's are 10 meters, 6 meters and 2 meters.

Other users will employ the "all-mode" transceivers now available from a number of manufacturers. You should note that many of the 70-cm transceivers cover either 430-440 MHz or 440-450 MHz; the latter will not be suitable for use with Phase III. If you opt for a matched pair of these transceivers, you can use the 2-meter receiver as the i-f for 24 cm by using a transmit converter.

Careful planning in the selection of your transmit and receive equipment is essential to ensure maximum station capability for your dollar. So far, we have looked at frequency coverage, full duplex operation and mode of operation. You should keep a few more requirements in mind; rf power output and receive noise figure are two very important station capability specifications. We will cover these requirements next.

For successful Phase III operation, virtually every station will need to use both transmit power amplifiers and low-noise receive preamplifiers. These are necessary to adapt the available equipment originally designed for terrestrial communications to the more exacting requirements of space communications. Let's first discuss the transmitter power requirements.

For consistently good Mode B performance on ssb, you'll want to have about 500- to 1000-W erp (effective radiated power). Calculation of erp includes the transmitter rf output power, feed-line loss and antenna gain — 50-W output to a 15-dB gain antenna with 2-dB feed-line loss yields 1000-W erp. You can juggle these numbers to design your own station, but keep in mind that you should do everything you can to minimize feed-line loss. You will probably want to use an antenna with gain in the 10-16 dB range as a good compromise between requiring too much transmitter power and needing to point the antenna with razor-sharp precision. A number of manufacturers now offer linearized solid-state amplifiers that provide 40- to 100-W output and 10-dB gain. A suitable 4CX250 70-cm tube amplifier was described recently in *QST* by W2GN (Aug. 1982, p. 41). If you plan to use cw, these power requirements will decrease by 5 to 10 dB, easing the burden considerably. A barefoot, all-mode 70-cm rig will probably be adequate.

For Mode L, a bit more transmit power is required because of a number of factors that will be discussed in subsequent articles. AMSAT believes 1- to 2-kW erp is a good target. While this may at first seem prohibitively high, a number of promising developments have made attaining this power level easier. A three-stage linear amplifier (using readily available 900-MHz transistors) with about 20-dB gain and 10-W output has been designed by WB9SNR. W1HDX has used this as a driver for a two-tube 2C39 amplifier commercially built in Sweden. *Voilà* — 100-W output at 24 cm!

You will certainly want to use a receive preamplifier for both Mode B and Mode L. The signals from Phase III will be weak, having traveled over 35,000 km to reach you. This is the system component you cannot afford to skimp on. Build or buy the best preamp you can afford, and mount it close to the antenna. Every decibel of feed-line loss adds a decibel to the noise figure. Since you will be looking at the sky, a noise figure under 1 dB is very desirable. Several manufacturers make excellent preamps. The GaAs FETs are the best, and are probably worth the extra bucks.

Your Phase III antennas may be different than any you've used before, in several ways. First, we strongly recommend that you use right-hand circular polarization (RHCP). If you don't, you'll throw away 3 dB (or more) of hard-earned transmitter and receiver performance. Second, if you try to use linear antennas, you will find that the spinning spacecraft will impart a very objectionable 1.5-Hz "flutter" on signals. A helix wound like a normal right-handed screw produces the proper circular polarization "automatically." A pair of crossed Yagis on a common boom will do the same when the rf to them is phased properly.

Nearly every manufacturer of vhf antennas has such antennas available for both 2 meters and 70 cm. Dozens of articles have been published on suitable OSCAR antennas. They are fun and mostly easy to build. Avoid excessively long Yagis, as they prove difficult to handle and probably are not worth the extra decibel of gain obtainable. For 2 meters, a crossed Yagi with 6 to 8 elements in each plane seems about right. At 70 cm, 8 or 9 elements in each plane is about right for the gain you'll want. Loop Yagis and quagis are difficult to feed for circular polarization, and are probably not a good choice. For 24 cm, a 1-meter-diameter dish seems ideal. Inexpensive commercial uhf TV dishes covered with hardware cloth and using feeds made from ordinary aluminum cans have been tested by W1HDX. Helices or arrays of Yagis also look promising.

Whichever antennas you choose must be accurately pointed toward the satellite. Therefore, you must rotate them in both azimuth and elevation. You can use ordinary TV rotors, you can purchase heavier-duty rotors, or you can use your own ingenuity. Some workable systems are described in the *ARRL Antenna Book*. To know where to point your antennas, you can use a graphical plotting aid, you can use your home computer with software available from AMSAT, or you can just "peak up" on the satellite. AMSAT will soon announce a complete tracking system for the Timex 1000/Sinclair ZX-81 computer.

Perhaps your experience with vhf and uhf is limited. If so, you'll want to brush up by reading the appropriate sections in your ARRL *Handbook*. One area that always challenges the vhf/uhf newcomer is transmission lines. Simply put, use the best you can afford. At 1269 MHz, line loss will "eat you alive" if you aren't wary. Try to obtain some surplus "hardline" for this band. It will save you considerable power loss.

We have discussed a number of general concepts in connection with the new OSCAR. We have seen the essential elements of orbits, the spacecraft and what is necessary for your shack. The depth of our discussion has been limited, of course, by space limitations and the very breadth of the subject. As indicated earlier, a series of feature articles will build on the foundation set forth here. Until then, the following information sources are presented for your use.

Amateur Radio's presence in space began modestly with OSCAR I as the satellite beeped its way across the sky and into the receivers of thousands of hams and SWLs. Phase IIIB, the newest OSCAR, heralds a new age in Amateur Radio communications. After Phase III is launched, an age of unprecedented communications power for amateurs will have opened. Why not join it?

Welcome to the Phase III era!

References

Amateur Satellite Report (ASR), 221 Long Swamp Rd., Wolcott, CT 06716.

Orbit, AMSAT, P.O. Box 27, Washington, DC 20044.

A bibliography of *QST* satellite articles is available from ARRL Hq. for three units of First Class postage.

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 404
February 12, 1983

Agenda

1. Approval of minutes of previous meeting
2. Recognition of new Life Members
3. Affiliation of clubs
4. Approval of conventions
5. Report on local antenna/RFI legal matters
6. Report on FCC matters
7. Discussion of activities aimed at encouraging greater participation by youth in Amateur Radio
8. Report on results of mail ballot ratifying 1983 budget
9. Consideration of IARU Proposals No. 171, 172 and 173
10. Request for transfer of $1066.39 from SCM account to SEC account for 1982
11. Request for deficiency appropriation of $280.65 for CRRL Headquarters for 1982
12. Ratification of Treasurer's action in opening a NOW account at Lynn Five Cent Savings Bank
13. Report of actions taken by General Manager in response to previous Board Meeting actions
14. Report on preparations for Amateur Radio participation in support of the 1984 Olympics

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:30 A.M. PST, Saturday, February 12, 1983, at the AMFAC Hotel, Burlingame, California. Present were First Vice President Carl L. Smith, WØBWJ, in the Chair; Directors Paul Grauer, WØFIR, Jay A. Holladay, W6EJJ, and William J. Stevens, W6ZM; and General Manager David Sumner, K1ZZ. Also present were Counsel Christopher D. Imlay, N3AKD, Vice President Gar Anderson, KØGA, and Vice Directors Thomas W. Comstock, N5TC, and Jettie B. Hill, W6RFF. President Vic Clark, W4KFC, was unable to attend owing to the blizzard conditions which closed the airports in the Washington, DC area.

1) On motion of Mr. Stevens, the Minutes of the previous meeting were accepted in the form in which they were distributed.

2) On motion of Mr. Stevens, the Committee recognized the names of 421 newly elected Life Members, and directed the General Manager to list their names in *QST*.

3) On motion of Mr. Grauer, the affiliation of the following clubs was approved (Category I unless otherwise indicated): Amateur Radio Relay Group, Portland, OR; Ausable Valley ARC, Mio, MI; Clarke County ARS, Grove Hill, AL; Fairplay Middle School ARC, Douglasville, GA (Category III); Fontana Jr. High School ARC, Fontana, CA (Category III); Merrymeeting Amateur Radio Assn., Topsham, ME; Metter Amateur Radio Society, Metter, GA; Mobile ARC of Colorado (MARCCO), Englewood, CO; Neptune Amateur Radio Club, Neptune, NJ; New Mexico Big River Contesters, Albuquerque, NM; North Area Repeater Assn., Hopkins, MN; Peninsula Radio Operators Soc. Inc., Salisbury, MD; Queens College Amateur Radio Club, Flushing, NY (Category III); Santa Rosa Amateur Radio Assn., Milton, FL; Southside ARC, Inc., Grandview, MO; Wapsi Valley Amateur Radio Club, DeWitt, IA; Wareham Amateur Radio Club, Wareham, MA; Western Kentucky DX Assn., Bowling Green, KY.

With this action the League now has the following number of active affiliated clubs: Category I, 1629; Category II, 9; Category III, 181.

4) On motion of Mr. Grauer, approval was granted for the holding of the following ARRL conventions: Oregon State, June 4-5, 1983, Seaside, OR; West Virginia State, July 2-3, 1983, Jackson's Mill, WV; Oklahoma State, July 29-31, 1983, Oklahoma City, OK; Rocky Mountain Divison, August 5-7, 1983, Jackson Hole, WY; Great Lakes Division, September 25, 1983, Cleveland, OH; Missouri State, April 7-8, 1984, Kansas City, MO; Roanoke Division, September 22-23, 1984, Virginia Beach, VA; Missouri State, April 13-14, 1985, Kansas City, MO.

5) Mr. Imlay reviewed the status of local litigation and regulation concerning Amateur Radio as follows:

5.1) *Goumas, et al. v. City of Cerritos, California.* In this case, the plaintiffs, who are radio amateurs, filed suit to overturn a moratorium on new antennas in the community which was imposed while a new, reportedly more restrictive ordinance was being drafted. The suit was dismissed as premature; plaintiffs are considering an appeal. A request for ARRL financial support has been made. After discussion, on motion of Mr. Stevens, the following resolution was adopted:

Whereas, the Executive Committee views with deep concern the recent actions of the City Council of Cerritos, California, which include adoption of a temporary moratorium on the issuance of permits for amateur antenna installations and renunciation of a fair and reasonable ordinance adopted upon the recommendation of the City Planning Commission and endorsed by the amateurs of Cerritos; and

Whereas, the position of the City Council appears to be unlawful in that it unreasonably restricts amateurs from exercising the rights granted to them by their Federal licenses;

Be it resolved, that the Committee would entertain a request for League support in the form of funds to match contributions to the Cerritos Antenna Trust Fund by the local amateur community to overturn any ordinance adopted in Cerritos which is substantially more restrictive than that originally adopted by the City Council on December 2, 1981.

5.2) Guschke, N5SW, case. The Court in this case has accepted our Amicus Curiae brief for filing. The status of financing for the case, particularly with respect to the amount of local support that has been provided, was reviewed without formal action.

5.3) Boudreau, NØCBX, case. This case has had a favorable outcome. Boudreau, of New Brighton, MN, was ordered to take down his 65-foot tower despite the fact that it had been erected prior to enactment of the ordinance under which removal was ordered. The judge ruled that the ordinance was "vague in that it lacks specific standards for its application and subjects itself to arbitrary and capricious enforcement and does not meet Constitutional requirements."

5.4) Bynum, WB2SZK, case. The Supreme Court of New Jersey has refused to hear Bynum's appeal; however, efforts to convince Winslow Township, NJ, to repeal its anti-RFI ordinance in light of enactment of Public Law 97-259 are continuing.

5.5) Ellis, WD8BCM, case. The Court in this case has accepted our Amicus Curiae brief for filing, and the case is scheduled for argument shortly.

5.6) Burbank, Illinois. The City of Burbank has filed a motion to Dismiss the complaint has filed in Federal court on behalf of Burbank's amateurs; an Opposition to the Motion has been filed by counsel for the amateurs. The Motion has been referred to a Federal Magistrate, and a report of his findings and recommendations is expected shortly.

The Committee was in recess for lunch from 11:30 A.M. to 12:45 P.M.

6) Mr. Imlay reviewed FCC matters as follows:

6.1) On January 26, 1983, the FCC Review Board released a decision in the case of David Hildebrand, N6BHU, which overturned a license revocation order issued in October 1982 by an FCC Administrative Law Judge (Dec. 1982 *QST*, p. 69). On motion of Mr. Stevens, it was voted that the Executive Committee is greatly concerned that the position of the FCC Review Board in PR Docket No. 81-302/303 appears to have left FCC with no enforceable rule against the use of indecent or offensive language in the Amateur Service, and directs Counsel to bring to the attention of appropriate Commission personnel the League's concern that the public interest requires continued enforcement of Section 97.119 of the Commission's Rules and Title 18 of the U.S. Code, Section 1464.

6.2) A draft of ARRL comments in PR Docket No. 82-727, concerning procedures for the volunteer administering of Novice examinations, was reviewed. On motion of Mr. Stevens, it was voted that Counsel is authorized to file the comments on behalf of the League.

6.3) On motion of Mr. Holladay, it was voted that staff and Counsel are directed to prepare and distribute by March 16, to the full Board, draft comments in response to the FCC Notice of Proposed Rule Making in PR Docket No. 83-27, the Volunteer Examination Proposal. Board members are requested to submit comments to Counsel by April 6 for incorporation in the League's filing.

6.4) Mr. Anderson rendered a report on behalf of the Ad Hoc Committee on Preparations for Monitoring and Licensing Activities. Particular attention was called to the article in Happenings, *QST*, Jan. 1983, p. 56, as a concise summary of the ARRL volunteer-examination proposal.

6.5) Procedures for arriving at an ARRL position with respect to PR Docket No. 83-28, the codeless-license proposal, were discussed. It was noted that the Board Meeting falls just one week before the deadline for filing comments in this proceeding. It was informally agreed that an options paper setting forth several possible alternative positions (including that of total opposition), with the advantages and disadvantages of each, would be prepared and circulated to the Board sufficiently in advance of the meeting to afford time for study.

7) The status of the Roy Neal film proposal was reviewed. Of the total projected cost of $50,000, half has been identified in the 1983 capital expense budget with the remainder to be funded from other sources. Possible sources of funding support for this innovative project were discussed.

8) Mr. Sumner reported the results of a mail ballot of the Directors ratifying the 1983 budget. There were 14 votes in favor of ratification, with two Directors not voting. Ballots were not received from Directors Lewis and Stevens.

9) The General Manager was directed to cast affirmative votes on behalf of ARRL on IARU proposals as follows:

9.1) On motion of Mr. Stevens, concerning the admission of the Dominica Amateur Radio Club to IARU membership (Proposal No. 171).

9.2) On motion of Mr. Holladay, concerning the admission of the Lesotho Amateur Radio Society to IARU membership (Proposal No. 172).

9.3) On motion of Mr. Grauer, concerning the election of Noel B. Eaton, VE3CJ, as President Emeritus of IARU (Proposal No. 173).

10) On motion of Mr. Grauer, it was voted to transfer $1066.39 from the authorization for travel by Section Communications Managers to the authorization for travel by Section Emergency Coordinators for 1982.

11) On motion of Mr. Holladay, it was voted to authorize an additional $280.65 for the expenses of CRRL Headquarters for 1982.

12) On motion of Mr. Stevens, it was voted to ratify the action of the Treasurer in opening a NOW account at the Lynn Five Cent Savings Bank of Lynn, Massachusetts.

13) Mr. Sumner reported on actions taken by the General Manager in response to Board directives. The report noted that 66 of the 73 Section Communications Managers had elected to assume the title and responsibilites of Section Manager, with three yet to be heard from and four electing to not make the transition at this time.

14) Mr. Holladay reported on preparations being made for Amateur Radio participation in support of the 1984 Olympics in the Los Angeles area. Liaison has been established with the Olympic Committee. Stations at each of the Olympic Villages are envisioned, to handle third-party traffic for participants from as many countries as will agree to the necessary special arrangements. It is anticipated that amateurs will be called upon to provide other communications services, including support of the nationwide Torch Run, which will precede the Games.

There being no further business, the Committee adjourned at 5:30 P.M.

Respectfully submitted,
David Sumner, K1ZZ
Secretary

[The list of Life Member applicants approved at the February 12 Executive Committee meeting will be printed in May *QST*. — Ed.]

Happenings

Conducted By Carol L. Smith,* AJ2I

- *Volunteer Examining — FCC's Version*
- *Obscenity Ruling Overturned*
- *AMTOR on HF*

Volunteer Examining Proposal — Details Out

"This legislation should be implemented at the earliest possible time to assure the integrity and the broadest availability of amateur exams." — FCC

The Commission recently released the full text of PR Docket 83-27, also known as the Volunteer Exam Proposal. There were few surprises (see Feb. 1983 *QST*, p. 62, and March 1983 *QST*, p. 57). The FCC proposal for the future Amateur Radio licensing system (Docket 82-727 proposes changes in the Novice licensing system) would follow this setup.

The Commission would act as a big brother, overseeing the program with minimal cost and involvement. Additionally, the FCC

- *would enter into written agreements with Volunteer Exam Coordinators to interface between Volunteer Examiners and the FCC.*
- *would design exams based on publicly issued lists of approved questions (made up by Commission personnel and the general Amateur Radio population) from the FCC Study Guide.*
- *may continue to administer exams itself.*
- *may refuse to accept the services of any Volunteer Examiner.*

Volunteer Exam Coordinators (VECs) will be entities of a national scope, such as the ARRL, QCWA, IEEE and others, that can give exams regularly. They will handle the bulk of administrative and paperwork duties for the program. VECs would

- *coordinate dates, location and times for scheduling exams.*
- *accredit Volunteer Examiners, without discrimination, based on standards of honesty, competency and efficiency.*
- *assemble, print and distribute exams for the FCC.*
- *keep records of applicants who pass exams and certify successful completion.* These applications must then be forwarded to the Commission.
- *grant interim, 90-day "instant upgrading" operating permits.*
- *grant code-element credit.*

Volunteer Examiners (VEs) would actually administer exams throughout the FCC's jurisdiction. Their services would be voluntary and uncompensated, and they wouldn't be considered to be "employees of the Federal government for any purpose." Volunteer Examiners must be accredited by a Volunteer Exam Coordinator, according to standards set by the VEC. VEs would

- *specify exam times, dates and locations.*
- *be present and watch candidates during exams.*
- *stop exams if improprieties occur.*
- *prepare and administer send-and-receive code tests at prescribed speeds.*
- *be at least 18 and unrelated to applicants.*
- *not be an employee of, nor hold a significant interest in, any enterprise dealing with Amateur Radio equipment or publishing.*

Exams would be given by a team of three accredited Volunteer Examiners. The team chief, who must be an Extra Class licensee, will be required to keep for one year a record of each exam he or she administers (to be made available to the FCC if requested). That record will include: applicant's name, address and call sign (if any); exam location and date administered; exam papers; exam grades; names of other examiners giving the test. The other Volunteer Examiner team members will hold licenses of a higher class than the test they are administering, except that Generals (who have not passed a higher written test element than Technicians) may not give Technician exams. Each VE giving Extra Class tests must hold an Extra Class license.

Examiners would grade tests immediately, with 74% still being the minimum passing grade. If an applicant fails, the examiners would tell him or her and return the candidate's application. If an applicant passes, the examiners will certify the following information on that candidate's application: examiners' names, calls and addresses; examiners' qualifications; examiners' signed statements that the applicant has passed the required exam elements. The applications must be submitted to the Volunteer Exam Coordinator within 10 days.

Although applicants for an Amateur Radio license will continue to study subjects listed in the FCC Study Guide, there would be some obvious differences from the current system. Applicants would

- *be able to review the entire FCC-approved pool of 500-plus exam questions.*
- *submit a properly completed 610 form to examiners before the test.*
- *return all exam papers to VEs.*
- *if successful, keep the VEC-issued interim permit until the new license arrives from the Commission.*
- *use a VEC-issued identifier code when using new privileges.*

This is a nonrestricted notice and comment rule-making proceeding. Comment deadline is April 8, 1983; reply comment deadline is May 9. The Commission notes that *ex parte* contacts (any written or oral communications, other than formal, to the Commission by outside parties) are permitted. A summary of the FCC's procedures governing *ex parte* contacts in informal rule makings is available from the Consumer Assistance Office, FCC, Washington, DC 20554. Full text of RM 83-27 is available from ARRL Hq. for a business-size s.a.s.e., affixed with 54 cents of stamps

League Comments on Novice NPRM

The ARRL supported the FCC's proposed elimination of the mail-back procedure in the Novice licensing program, PR Docket 82-727 (see Jan. 1983 *QST*, p. 57). The League urged, however, that the FCC approve and publish a large bank of Novice questions, written by individuals and organizations, to be used by examiners. This standardization would exclude "subjective interpretation" of tests by individual volunteer examiners and tests that are unintentionally overly simple or excessively difficult.

*Membership Services Assistant, ARRL

FCC Exam Schedule

This schedule tells when, where and what amateur exams are given at FCC Field Offices. *Caution: Call the Field Office to confirm this schedule.* With Volunteer Licensing pending, changes could take place rapidly. An appointment is required if you are blind or are part of a group of 10 or more. No examinations are given on Saturdays, Sundays and legal holidays.

ALASKA, Anchorage — 1011 East Tudor Rd., Rm. 240, Anchorage 99510, tel. 907-563-3899. Exams are given at least twice monthly. Call or write for an appointment at least two weeks in advance.

CALIFORNIA, La Mesa — 7840 El Cajon Blvd., Rm. 405, La Mesa 92041, tel. 619-293-5478. Exams are given at least once monthly. Call or write for an appointment at least one month in advance.

CALIFORNIA, Long Beach — 3711 Long Beach Blvd., Rm 501, Long Beach 90807, tel. 213-426-4451. Exams are given on the 1st and 3rd Wednesday of each month. Requiring code — 8 A.M. and noon; not requiring code — 8 A.M. and 2 P.M.

CALIFORNIA, San Francisco — 423 Customhouse, 555 Battery St., San Francisco 94111, tel. 451-556-7701. Exams are given on the 1st and 3rd Wednesday of each month. Requiring code — 8:30 A.M., 10:30 A.M. and 12:30 P.M.; not requiring code — 1 P.M.

COLORADO, Denver — 12477 West Cedar Dr., Denver 80228, tel. 303-234-6977. Exams are given on the 2nd and 4th Wednesday of each month. Requiring code — 9 A.M.; not requiring code — 10 A.M.

FLORIDA, Miami — 8675 NW 53 St., Suite 203, Miami 33166, tel. 305-350-5542. Exams are given at least once a month. Call or write for an appointment at least two weeks in advance.

FLORIDA, Tampa — Interstate Bldg., Rm. 601, 1211 N. Westshore Blvd., Tampa 33607, tel. 813-228-2872. Call or write for an appointment for amateur exams requiring code. Exams not requiring code are given on the 1st and 3rd Tuesday of each month at 8 A.M. and 10:30 A.M.

GEORGIA, Atlanta — Rm. 440, Masseli Bldg., 1365 Peachtree St., N.E., Atlanta 30309, tel. 404-881-3084. Exams are given at least once a month. Call or write for an appointment at least two weeks in advance.

HAWAII, Honolulu — Prince Kuhio Fed. Bldg., 300 Ala Moana Blvd., Rm. 7304, P.O Box 50023, Honolulu 96850, tel. 808-546-5640. Exams are given on Wednesdays. Requiring code — 8:30 A.M.; not requiring code — 1 P.M.

ILLINOIS, Chicago — 230 S. Dearborn St., Rm 3940, Chicago 60604, tel. 312-353-0195. Exams are given on Tuesdays and Fridays from 9 A.M. to 1 P.M.

LOUISIANA, New Orleans — 1009 F. Edward Hebert Fed. Bldg., 600 South St., New Orleans 70130, tel. 504-589-2095. Exams requiring code tests are given on the 1st and 3rd Tuesday of each month at 8 A.M. Exams not requiring a code test are given on the 1st and 3rd Tuesday of each month at 10 A.M. and on the 1st and 3rd Wednesday of each month at 8 A.M.

MARYLAND, Baltimore — George M. Fallon Fed. Bldg., Rm 1017, 31 Hopkins Plaza, Baltimore 21201, tel. 301-962-2728. Exams are given on the 1st and 3rd Monday of each month from 8:30 A.M. to noon.

MASSACHUSETTS, Boston — 1600 Customhouse, 165 State St., Boston 02109, tel. 617-223-6609. Exams are given on the 1st and 3rd Wednesday of each month by appointment only, which must be made at least one week prior to the desired date of examination.

MICHIGAN, Detroit — 1054 Fed. Bldg. and U.S. Courthouse, 231 W. LaFayette St., Detroit 48226, tel. 313-226-6078. Exams are given on the 1st, 2nd and 3rd Wednesday and Thursday of each month. Requiring code — 9 A.M.; not requiring code — 9 A.M. to 1 P.M.

MINNESOTA, St. Paul — 691 Fed. Bldg., 316 N. Robert St., St. Paul 55101, tel. 612-725-7810. Exams are given at least once a month. Call or write for an appointment.

MISSOURI, Kansas City — Brywood Office Tower, Rm 320, 800 East 63rd St., Kansas City 64133, tel. 816-926-5111. Amateur exams are given on the 1st Tuesday of each month. Requiring code — 20 wpm, 8:15 A.M.; 13 wpm, 9 A.M.; 5 wpm, 10:30 A.M. Not requiring code — 8:15 A.M.

NEW YORK, Buffalo — 1307 Federal Bldg., 111 W. Huron St., Buffalo 14202, tel. 716-846-4511. Exams are given on Fridays. Requiring code — 9 A.M.; not requiring code — 10 A.M.

NEW YORK, New York — 201 Varick St., New York 10014, tel. 212-620-3437. Exams are given on Wednesdays Extra Class — 9 A.M.; General/Advanced class — 10 A.M.; Technician class — noon.

OREGON, Portland — 1782 Fed. Office Bldg., 1220 S.W. 3rd Ave., Portland 97204, tel. 503-221-4114. Exams are given at least twice each month. Call or write for an appointment at least two weeks in advance.

PENNSYLVANIA, Philadelphia — One Oxford Valley Office Bldg., 2300 E. Lincoln Hwy., Rm. 404, Langhorne 19047, tel. 215-752-1324. Exams requiring code are given on Tuesdays at 9 A.M. Those not requiring code are given on Tuesdays and Wednesdays, from 10 A.M. to noon.

PUERTO RICO, San Juan — Fed. Bldg. and Courthouse, Rm 747, Avenida Carlos Chardon, Hato Rey 00918, tel. 809-753-4567. Exams requiring code are given on Wednesdays at 10 A.M. Those not requiring code are given on Wednesdays and Thursdays at 8:30 A.M.

TEXAS, Dallas — Earle Cabell Fed. Bldg., Rm. 13E7, 1100 Commerce St., Dallas 75242, tel. 214-767-0761. Exams are given on the 1st and 3rd Tuesday of each month. Requiring code — 20 wpm, 8:30 A.M.; 13 wpm, 9 A.M.; 5 wpm, 9:30 A.M. Not requiring code — 8:30 A.M. to noon.

TEXAS, Houston — 5636 Fed. Bldg., 515 Rusk Ave., Houston 77002, tel. 713-229-2748. Exams are given on the 2nd and 4th Wednesday of each month. Requiring code — 20 wpm, 8:30 A.M.; 13 wpm, 9 A.M.; 5 wpm, 9:30 A.M. Not requiring code — 10 A.M. to 11:30 A.M.

VIRGINIA, Norfolk — Military Circle, 870 N. Military Hwy., Norfolk 23502, tel. 804-441-6472. Exams requiring code are given on Thursdays at 9 A.M.; not requiring code — 10 A.M.

WASHINGTON, Seattle — 3256 Fed. Bldg., 915 Second Ave., Seattle 98174, tel. 206-442-7653. Exams are given to least twice monthly. Call or write for an appointment at least two weeks in advance.

Examinations at Other Locations

The FCC also travels to designated examination points in cities that do not have a conveniently located FCC office. The following schedule lists the cities by state. The month(s) in which the exam will be given is in parentheses, and the FCC Field Office administering the test is in brackets. It is necessary to make an appointment with the FCC Field Office that gives the examinations. Do this at least one month before the beginning of the month in which the tests will be given. The FCC Field Office will notify you when and where to appear for the examination.

ALABAMA: Birmingham (Feb.) [Atlanta], Mobile (Jan., July) [New Orleans], Montgomery (Aug.) [Atlanta]. ALASKA: Fairbanks (April, Oct.) [Anchorage], Juneau (May) [Anchorage], Ketchikan (May) [Anchorage]. ARIZONA: Phoenix (May, Nov.) [Long Beach], Tucson (May) [Long Beach]. ARKANSAS: Little Rock (March, Oct.) [New Orleans]. CALIFORNIA: Fresno (Oct.) [San Francisco]. CONNECTICUT: Hartford (April, Oct.) [Boston]. FLORIDA: Jacksonville (July) [Atlanta]. GEORGIA: Albany (Sept.) [Atlanta], Savannah (Jan.) [Atlanta]. GUAM: Agana (will advise) [Honolulu]. IDAHO: Boise (April) [Portland], Pocatello (June) [Portland]. ILLINOIS: Rock Island (Nov.) [Chicago]. INDIANA: Fort Wayne (Feb., Aug.) [Chicago], Indianapolis (Jan., May, Sept.) [Chicago]. IOWA: Des Moines (March, Sept.) [Kansas City]. KANSAS: Wichita (April, Nov.) [Kansas City]. KENTUCKY: Louisville (April, Oct.) [Chicago]. MAINE: Bangor (Nov.) [Boston], Portland (May) [Boston]. MICHIGAN: Grand Rapids (April, Aug.) [Detroit], Marquette (June) [St. Paul]. MINNESOTA: Duluth (April) [St. Paul]. MISSISSIPPI: Jackson (June) [New Orleans]. MISSOURI: St. Louis (Feb., June, Oct.) [Kansas City]. MONTANA: Billings (Sept.) [Seattle], Helena (April) [Seattle]. NEBRASKA: Omaha (Jan., July) [Kansas City]. NEVADA: Reno (April) [San Francisco]. NEW MEXICO: Albuquerque (May, Oct.) [Denver]. NEW YORK: Albany (June, Dec.) [New York], Syracuse (March, Sept.) [Buffalo]. NORTH CAROLINA: Charlotte (Aug.) [Norfolk], Greensboro (March, Sept.) [Norfolk], Wilmington (May) [Norfolk]. NORTH DAKOTA: Bismarck (Sept.) [St. Paul], Fargo (March) [St. Paul]. OHIO: Cincinnati (Jan., May, Sept.) [Detroit], Cleveland (Feb., June, Oct.) [Detroit], Columbus (March, July) [Detroit]. OKLAHOMA: Oklahoma City (May, Oct.) [Dallas], Tulsa (Feb., Aug.) [Dallas]. OREGON: Medford (May) [Portland]. PENNSYLVANIA: Pittsburgh (Jan., July) [Philadelphia]. SOUTH CAROLINA: Columbia (May) [Atlanta]. SOUTH DAKOTA: Rapid City (April) [Denver], Sioux Falls (May) [St. Paul]. TEXAS: Austin (Jan.) [Houston], Corpus Christie (June, Dec.) [Houston], El Paso (Sept.) [Dallas], Lubbock (April) [Dallas], San Antonio (March, Sept.) [Houston]. TENNESSEE: Chattanooga (April) [Atlanta], Knoxville (Jan., June) [Atlanta], Memphis (June, Dec.) [Atlanta], Nashville (March, Sept.) [Atlanta]. UTAH: Salt Lake City (July) [San Francisco]. VERMONT: Burlington (Feb.) [Boston]. VIRGINIA: Roanoke (Oct.) [Norfolk]. WASHINGTON: Spokane (May, Nov.) [Seattle], Tri-Cities (March) [Seattle]. WEST VIRGINIA: Charleston (May, Nov.) [Baltimore]. WISCONSIN: Milwaukee (June, Dec.) [Chicago].

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. In accordance with the restructuring of the ARRL Field Organization, the position of Section Manager will supersede the position of Section Communications Manager in each section. Incumbent SCMs 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*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

General Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Manager for this section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .).

An SM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 10, 1983.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, 1983. Returns will be counted August 23, 1983. SMs elected as a result of the above procedure will take office October 1, 1983.

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, 1983.

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 appointment by the General Manager.

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

David Sumner, K1ZZ
General Manager

SECTION MANAGER ELECTION RESULTS

The following elections were conducted for a two-year term of office beginning April 1, 1983:

ARRL Membership Totals, January 1, 1983

Division	Full	Assoc.	Subs	Total	Total 1/1/82
Atlantic	11,717	744	229	12,690	14,305
Central	9603	544	204	10,351	11,811
Dakota	2567	123	64	2754	3123
Delta	4492	257	66	4815	5556
Great Lakes	10,657	534	132	11,323	13,317
Hudson	7547	609	252	8408	9655
Midwest	5721	281	90	6092	7014
New England	7964	515	134	8613	9540
Northwestern	6180	331	118	6629	7457
Pacific	6779	427	143	7349	8360
Roanoke	6837	394	103	7334	8282
Rocky Mountain	3229	186	59	3474	3934
Southeastern	10,000	579	99	10,678	12,119
Southwestern	9890	549	207	10,646	11,879
West Gulf	7829	431	109	8369	9312
Total	111,012	6504	2009	119,525	135,664
Canada	4182	427	171	4780	6389
Totals	115,194	6931	2180	124,305	142,053
Foreign	0	5919	1037	6956	7916
Grand Totals	115.194	12,850	3217	131,261	149,969

General Manager David Sumner, K1ZZ, has expressed concern that membership totals have declined by more than 12% overall during the past year, mainly because of the higher dues rates. In spite of these figures, K1ZZ is optimistic that League membership totals will stabilize soon. "These figures," he said, "underscore the need for all of us to seize every opportunity to promote membership in the League."

Balloting Results: In the Arkansas Section, Joel M. Harrison, Sr., WB5IGF, received 257 votes, and Paul J. Graziani, WD5BIV, received 135 votes. Mr. Harrison is declared elected.

In the Kentucky Section, Anna R. Sloan, WA4GFU, received 319 votes, and Michael C. Wheeler, N4BS, received 186 votes. Ms. Sloan is declared elected.

SM APPOINTMENT

In the Oklahoma Section, Arthur E. Roberts, W1GOM, has been appointed to complete the term (September 30, 1984) of Leonard Hollar, WA5FSN (deceased). In the Southern New Jersey Section, Edward E. Wood, N2CER, has been appointed to complete the term (December 31, 1984) of William Luebkemann, WB2LCC (resigned).

N6BHU REVOCATION OVERTURNED; PRB, ARRL SEEK REVIEW

An FCC Review Board has overturned an administrative law judge's order revoking the license of David Hildebrand, N6BHU, of Hollywood, California (see Dec. 1982 *QST*, p. 69). The judge, Joseph P. Gonzalez, ruled last September that Hildebrand violated Section 97.119 of the Amateur Rules, which prohibits licensed operators or other persons from transmitting communications containing obscene, indecent or profane words, language or meaning.

According to the Review Board, "The material facts are not in dispute. On January 24, 1981, Hildebrand engaged in an exchange over Amateur Radio frequencies in which he used gutter parlance." Nevertheless, the Review Board overturned Judge Gonzalez's decision on the basis that the legal cases defining obscenity are narrowly limited to broadcasting. Since Amateur Radio involves private transmission, the legal principles involving indecent and obscene broadcasts cannot be extended to Hildebrand, the Review Board said.

The case won't end here. The FCC Private Radio Bureau plans to appeal this decision to the full Commission, asking that revocation be reinstated. The League's Executive Committee, at its February 12 meeting, directed the ARRL Counsel to bring the matter up with appropriate FCC personnel (see Moved and Seconded, this issue). The concern is that enforcement of Section 97.119 is vitally important to the Amateur Service, yet will be extremely difficult if this Review Board action is not overturned.

SCHOLARSHIPS: 10 AVAILABLE FROM FAR

The Foundation for Amateur Radio, Inc., a nonprofit organization with headquarters in Washington, DC, plans to award 10 scholarships for the academic year 1983-84. The Foundation, composed of 50 local area Amateur Radio clubs, fully funds two of these scholarships from the proceeds of the Gaithersburg (Maryland) Hamfest. It administers, without cost to the donors, two scholarships for the Quarter Century Wireless Association, and one each for the Richard G. Chichester Memorial, the Radio Club of America, the Young Ladies' Radio League, the Edmund B. Redington Memorial, the Amateur Radio News Service and the Columbia (Maryland) Amateur Radio Association.

Licensed radio amateurs may compete for one or more of these awards if they plan to pursue a full-time course of study beyond high school and are enrolled or have been accepted for enrollment in an accredited university, college or technical school. Most of the scholarships require the applicant to hold at least an FCC General class license or equivalent. The scholarship awards range from $300 to $900, with preference given in some of them to residents of specified geographical areas or the pursuit of certain study programs.

Additional information and an application form may be requested by a letter or QSL/postcard, postmarked prior to May 31, 1983, from the scholarship committee chairman, Hugh A. Turnbull, W3ABC, 6903 Rhode Island Ave., College Park, MD 20740. The Foundation is devoted exclusively to promoting the interests of Amateur Radio and to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service. — *Foundation for Amateur Radio*

POWER PROPOSALS — ARRL APPROVES IN PRINCIPLE

League comments supported the "thrust and intent" of the Commission's proposed power changes in PR Docket 82-624, which would define transmitter power in PEP *output* power. (See Dec. 1982 *QST*, p. 68.) In fact, at its July 1982 meeting, the ARRL Board of Directors adopted a similar policy:

> [We] endorse in principle the changing of FCC rules to permit transmitter power in the Amateur Service to be regulated in terms of output rather than dc input, provided that amateurs operating transmitters incapable of exceeding the legal limit shall not be required to own instruments to measure output power.

The proposed rule changes, authorizing 1500-W maximum PEP output, would actually *increase* allowable power for modes other than a-m. However, amateurs will still be required, above and beyond the proposed power changes, to use the *minimum transmitting power necessary* to carry out the desired communications.

The League's comments urged that

- *a-m dsb "grandfathering" be permanent.* Instead of the five-year period suggested by the Commission, permanent "grandfathering" would reduce the negative impact this rule change would have on a-m operators and experimenters. Furthermore, permanent "grandfathering" would have little effect on spectrum conservation, given the limited use of a-m.
- *applicability of "grandfathering" would run with the a-m equipment life.* This would discourage the manufacture and construction of new amateur a-m equipment while not penalizing amateurs now using such equipment. The League proposed this wording for Section 97.67(e) of the rules:

> Any amateur radio station transmitting A3 emissions using equipment constructed on or before (six months after the effective date of the Order implementing this rule) in accordance with applicable rules, but with a transmitter power exceeding that authorized by paragraph (b) of this section, may continue to do so provided that the power input to the final amplifying stage supplying radio frequency power to the antenna feedline does not exceed 1000 watts, exclusive of power for heating the cathode of vacuum tubes. Limitations of Section 97.61 (authorized frequencies and emissions) still apply.

In response to specific Commission questions, the ARRL proposed that

- *for power measurements requiring a source of modulation*, a two-tone audio input signal should be set at a level that produces a field strength equivalent to the peak field strength measured prior to station inspection and during the suspected violation. Care must be taken to make sure other station parameters are also the same.
- *impedance matching of measuring equipment to amateur transmitters during station inspection* be done by one of two methods: (1) utilizing a vector impedance meter in combination with a high-impedance, peak-reading rf voltmeter or oscilloscope, or (2) using a vector voltmeter with an rf ammeter. In this way, output power can be measured without the necessity of a Transmatch circuit.
- *for pulse emissions*, average output power, instead of PEP output power, be used, with a maximum of 1500 W (as measured over a 1-second interval) allowed. This would encourage amateur experimentation and practical application of pulse emission techniques.

The League noted that amateurs should also be allowed to determine their transmitter output power "via calculation of input power and measurement or estimation of efficiency or by using a wattmeter and measuring forward power minus reflected power." Further, if a good-faith effort is made to stay within power limits, an "insubstantial variance should not result in Commission sanctions."

AMTOR OKAYED ON HF BANDS

Dispensing with the usual prior notice and comment procedures, the FCC granted

RM-4122, the League's petition to allow amateur hf transmission of the digital teleprinter code known as AMTOR. According to the ARRL, AMTOR has the advantage of "providing reliable, error-free copy at the receiving teleprinter and the certainty of the sending operator that the data has been received correctly. The automatic, hand-shaking technique of AMTOR transmissions allows reliable communication even under marginal and fading high-frequency propagation conditions, while the two digital codes currently authorized for use in the hf bands, Baudot and ASCII, do not."

The Commission had concerns that using codes below 50 MHz would violate an international treaty obligation that ". . . transmission between amateur stations of different countries . . . shall be in plain language." As the League pointed out in its petition, AMTOR *is* an internationally recognized code recommendation for the commercial maritime mobile service. Because of that, the FCC clearly characterized AMTOR as "plain language," and authorized its immediate use in the amateur hf bands. The following Rules changes to Part 97 are now in effect:

In Section 97.69, paragraphs (a) and (b) are revised to read as follows:

§97.69 Digital communications.

(a) The use of the digital codes specified in paragraph (b) of this section is permitted on any amateur frequency where F1 emission is permitted, subject to the following requirements:

(1) The sending speed shall not exceed the following:

(i) 300 baud on frequencies below 28 MHz;

(ii) 1200 baud on frequency between 28 and 50 MHz;

(iii) 19.6 kilobaud on frequencies between 50 and 220 MHz;

(iv) 56 kilobaud on frequencies above 220 MHz.

(2) When type A2, F1 or F2 emissions are used, the radio or audio frequency shift (the difference between the frequency for the "mark" signal and that for the "space" signal), as appropriate, shall be less than 900 Hz.

(3) When type A2 or F2 emissions are used, the highest fundamental modulating frequency shall be less than 3000 Hz.

(b) Except as provided for in paragraph (c) of this section, only the following digital codes, as specified, may be used:

(1) The International Telegraph Alphabet Number 2 (commonly known as Baudot); provided that transmission shall consist of a single channel, five unit (start-stop) teleprinter code conforming to the International Telegraph Alphabet Number 2 with respect to all letters and numerals (including the slant sign or fraction bar); however, in the "figures" positions not utilized for numerals, special signals may be employed for the remote control of receiving printers, or for other purposes indicated in this section.

(2) The American Standard Code for Information Interchange (commonly known as ASCII); provided that the code shall conform to the American Standard Code for Information Interchange as defined in American National Standards Institute (ANSI) Standard X3.4-1968.

(3) The International Radio Consultative Committee (CCIR) Recommendation 476-2 (commonly known as AMTOR); provided that the code, baud rate and emission timing shall conform to the specifications of CCIR 476-2 (1978) Mode A or Mode B.

W1AW is transmitting one-way AMTOR presently on an indefinite schedule. Listen particularly after the morning bulletins.

HAMS WIN FAVORABLE CATV AGREEMENT

Monroe, Michigan, amateurs have won some protection from the ravages of CATVI. In July, Monroe County Radio Communications Association President David Smith, W8YZ, and WB8SEZ, the city's representative to the County Communications Committee, addressed the CATVI issue at a City Council hearing on a franchise proposal made by a cable TV company. W8YZ and WB8SEZ cited the possibility of harmful interference to other services, including Amateur. They asked that specific language be incorporated in the cable franchise agreement as a precaution against incidents of interference from the cable system.

In December 1982, the Mayor and Council approved a franchise agreement for cable TV service in the city of Monroe. The agreement contains the following language: "Operational Interference . . . no interference shall result from Grantee's (company's) operation to any type of electronic communications equipment now in use. Any such interference shall be eliminated within a reasonable time after notice thereof."

Monroe amateurs have also made inroads to the cable company to establish a cooperative atmosphere. Interference complaints will first be funneled to the cable company. Only if efforts by the cable operator are made and the interference is not cleared up, will complaints be forwarded to local and federal authorities for enforcement. Mission accomplished. — *V. Olimpio Varsogea, WB8SEZ*

In attendance at a recent fete honoring FCC retiree Vern Wilson, KT4K, chief, Regional Services Division of the Field Operations Bureau, are (l-r) Dick Smith, chief, FCC Field Operations Bureau; Bill Grenfell, W4GF, FCC retiree; the guest of honor, KT4K; Perry Williams, W1UED, ARRL Washington Area Coordinator; and Arlen Von Doorn, deputy chief, FCC Field Operations Bureau. (*photo courtesy Bob Singleton*)

W4RI New ARRL Technical Department Manager

Paul Rinaldo, W4RI, has been appointed to succeed Doug DeMaw, W1FB, as manager of the ARRL Technical Department upon his retirement in May. Rinaldo, who currently edits *QEX* and is president of AMRAD, owns a consulting firm in the Washington, DC area.

General Manager David Sumner praised the work Rinaldo has done with *QEX* and his work as a volunteer in promoting Amateur Radio technical development. (See July 1981 *QST* Profiles, p. 67.) He noted that Rinaldo has been particularly active in the development of packet radio and spread spectrum techniques for use by U.S. amateurs. Sumner also said that Rinaldo has demonstrated leadership qualities that make him the logical choice to lead the League in the new electronic age dominated by computer technology.

FCC NIXES NOVICE 220-MHz PETITION

RM-3314, filed by the ARRL in January 1979 (see March 1979 *QST*, p. 58), was dismissed recently by the Commission. The petition had asked for phone and cw privileges for Novice operators in the 220-225 MHz band. The maximum power input was not to have exceeded 50 W.

A majority of the 33 comments filed to the League petition favored the proposal. The Commission, however, reviewed previous rulings and found this petition to be repetitious. The FCC commented that Docket 20282, which set up the current license-class structure, emphasized the "separateness of the Novice license and its distinctive telegraph mode." Furthermore, the Commission has proposed a no-code license (see March 1983 *QST*, p. 49), which would make this petition redundant. Therefore, the FCC ruled that RM-3314 should be dismissed.

Strays

MOUNT ST. HELENS COMMEMORATIVE OPERATION PLANNED

☐ Three years ago, Mount St. Helens erupted with the force of a 10-megaton bomb, causing widespread damage and killing many people. In memory of two Amateur Radio operators who died in that blast, a group of hams from the Seattle area will be conducting a 24-hour operation from a ridge north of Mount St. Helens beginning at 0001Z May 18, 1983. The two hams who died, Reid Blackburn, KA7AMF, and Gerry Martin, W6TQF, were at forward observation sites north of the volcano and were killed in the initial eruption on May 18, 1980 (see July 1980 *QST*, p. 28, and Aug. 1980 *QST*, p. 47). The group plans to operate on 2-meter fm, ssb and RTTY. On hf, cw and ssb will be the primary modes. — *H. B. Goldis, KC7KR, Bellevue, Washington*

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Volunteer Examination Program?

Early in February, CRRL President Tom Atkins received a letter from DOC that said, in part:

"The subject of amateurs becoming involved in the amateur certificate examination process has been under discussion for some time within our Department as well as with officials of your organization and other members of the amateur fraternity."

What DOC said was quite true, though we must add that discussions with CRRL people have been only informal, few and rather subdued. There is good reason for this. The question of using amateur volunteers in the amateur examination process is very complex. Everyone has a different idea of what it might involve. It could be as simple as a group of local amateurs assisting DOC personnel at a regularly scheduled DOC examination. It could be as extensive as amateurs, through their organizations, assuming complete responsibility for the examination process: certifying volunteer examiners; setting, scheduling, administering and marking the examinations; and even underwriting the costs involved. It appears that DOC is at least entertaining the possibility of extensive involvement. The letter continued:

> The discussion has reached the point where further consideration of the subject would benefit from detailed input from your organization. Of specific interest would be your recommendations under the following headings:
> a) method used to select volunteer examiners;
> b) minimum criteria for examiners; i.e., qualifications, experience, skills;
> c) how to ensure the impartiality of examiners and avoid charges of conflict of interest and favoritism;
> d) quarterly scheduling of exams or an altered frequency-schedule;
> e) how to ensure the availability of examiners and suitable facilities in remote and isolated areas;
> f) maintenance of integrity of examination papers;
> g) how to ensure uniformity on a national basis, awarding marks;
> h) examination paper production and distribution networks;
> i) co-ordination and contact points between DOC inspection staff and volunteer examiners;
> j) provision for service in the official language of the candidate;
> k) desirability of establishing a pilot project in one province or a limited area;
> l) how to ensure that the Department objective of reduced costs with equivalent or better service will be achieved and maintained; and
> m) other relevant matters. . .

Why become involved at all? There are several benefits for the amateur community. Examinations could be offered at times and places convenient for the candidates, and examinations could be offered more often. The major drawback is that a volunteer-examination program could be abused, particularly by those administering or marking the examinations. While DOC has never been accused of offering "customer-convenience service" under the present system, the integrity of that system is beyond question.

At press time, there are still many unknowns. One is the actual extent of DOC enthusiasm for a volunteer-examination program. Another is what CRRL will recommend. Likely it will be some form of limited involvement, with amateurs assisting in the administration and even marking of examinations, but with DOC retaining responsibility for production, distribution and perhaps the scheduling. This would be consistent with the results of the CRRL survey and with comments we have heard around the country. A majority of Canadian amateurs do favour some form of amateur involvement in the examination process, though not likely to the extent that ARRL is going to become involved in the U.S. They realize that ARRL has a well-established headquarters with a paid staff, while all Canadian organizations, including CRRL, must rely on volunteer labour.

We are certain of one thing: A volunteer-examination program is not going to become a political football between amateur organizations. There aren't enough hours in the day for these sorts of games. Besides, DOC would not let this happen. DOC recognizes the existence of *both* national organizations, CRRL and CARF. DOC invited *both* organizations to comment on its questions, and to send representatives to a follow-up meeting in Ottawa on April 15. If a volunteer-examination program becomes reality, it will involve *both* CRRL and CARF. That's fine by us. We're ready to co-operate with anyone for the good of Canadian Amateur Radio.

CRRL would like to hear your views on this important matter. Please send your comments to CRRL, Box 1009, Station E, London, ON N5Y 4J9, before the end of April.

DOC NEWS

☐ To commemorate World Communications Year, DOC will permit Canadian amateurs to use the following special prefixes between May 17 and July 17: in Newfoundland and Labrador, CI1 and CI2; in the Yukon Territory, CK1; and in the remainder of Canada, CY1 to CY8.

☐ DOC will hold Amateur Radio examinations on April 20. Remaining dates for examinations this year are June 15 and October 19. Submit applications to DOC before May 18 and September 21, respectively.

☐ DOC has sent CRRL an advance copy of its new TRC-24, the syllabus for all Amateur Radio examinations. The document should be available for general distribution this month. However, DOC will not be basing Amateur Radio examinations on it until February 1984. Until then, use the old syllabus.

CRRL NEWS

☐ At press time, CRRL had received over 2300 of its survey sheets, about 10% of those sent out. Included with the returned sheets were over 400 new memberships and many, many renewals. Given hard economic times, this is an excellent response. To all members, old and new, thanks for your support.

☐ Early in February, an important case involving Amateur Radio went to court. An amateur in Cote St-Luc, Quebec, challenged a local by-law made under the Quebec Cities and Towns Act that restricted the height of his antenna. Defence for the case was prepared in great depth by CRRL Counsel Bob Benson, VE2VW, with assistance from DOC and experts in constitutional law from McGill Law School. In the past, there have been several cases involving antenna structures. These cases would indicate that amateur antennas are a federal concern and cannot be subject to municipal control. However, the Cote St-Luc case is one of the first to deal with the matter directly, in a court of law. The outcome of this case could set an important precedent for all Canadian amateurs.

Just before press time, the case was postponed to March 9, and possibly to June. It now seems likely that the case will be resolved in a manner satisfactory to both the City of Cote St-Luc and the amateur, who was charged with over 80 counts of contravening the by-law, each count carrying a possible fine of $100 to $500!

☐ Meanwhile, in West Vancouver, the city council wants to pass a by-law to control the height and placement of antenna towers and satellite receiving dishes. The council has gone the Union of British Columbia Municipalities and the Federation of Canadian Municipalities to determine which levels of government can control antennas. As in the Cote St-Luc case, the focal point of the controversy is an Amateur Radio antenna, and CRRL is providing help.

☐ As of December 31, 1982, CRRL had 486 life members.

NOTES FROM ALL OVER

☐ February was the month in which pay-TV came to Canada. It was also the month in which an Edmonton electronics student built a $4 device that would permit him to receive pay-TV for free. Where did he get the circuit? You guessed it! *The Radio Amateur's Handbook!* We now expect *Handbook* sales to soar. . .

☐ It's not too early to plan for Field Day. Entry forms and log and dupe sheets for Field Day and all ARRL contests are available free from CRRL. Send a self-addressed, stamped envelope to CRRL in London, Ontario. In a hurry? Call the CRRL Hot Line at 519-451-3773 and leave a message on the answering machine. Your materials will be mailed out promptly.

☐ Canada's largest annual Amateur Radio gathering, the Radio Society of Ontario Convention, will be held at Inn-on-the-Park, Toronto, on September 23, 24 and 25.

*163 Meridene Crescent West, London, ON N5X 1G3

IARU News

Conducted By Richard L. Baldwin,* W1RU

Don Baptiste New RSGB President

Each year, the Radio Society of Great Britain, as regular as clockwork, elects a new president. Generally, the incoming president is an amateur who has been serving RSGB in a variety of roles, with his increasingly wide range of experience culminating in the RSGB presidency. But occasionally the Society steps outside of its own ranks and selects as its president for a year a gentleman who, although not a licensed radio amateur, has served with distinction in such fields as government, science or telecommunications. The 1983 president of the Radio Society of Great Britain is Mr. Don Baptiste, recently retired from U.K. government service, who was head of the British delegation to WARC-79. He had a long and distinguished career in U.K. government service, and was one of the more forceful of the leaders at WARC-79. He and the IARU became well acquainted at WARC-79, and we were honored to be invited to his installation as RSGB president on January 15 in London. On that occasion, nearly 100 members of RSGB gathered to hear first some introductory remarks by John Allaway, G3FKM, outgoing president, and then a short informal address by Mr. Baptiste. Because of his long experience in telecommunications matters, it is likely that Mr. Baptiste will bring to the RSGB Council a viewpoint that will be most helpful to the Society.

Don Baptiste (l), newly elected president of the Radio Society of Great Britain, receives his "badge of office" from outgoing RSGB President John Allaway, G3FKM. The ceremonies took place in London on January 15. The "badge of office" consists of a handsome medallion plus a ribbon that holds small plaques with the names and call signs of all previous RSGB presidents. It is worn by the president on all ceremonial occasions.

New RSGB Headquarters

RSGB has started off 1983 not only with a new president (which is customary) but also a new headquarters location (which is not so usual). For the last dozen years or so, RSGB headquarters was located in what perhaps can best be described as a town house, at 35 Doughty Street. That is, it was formerly a several-story home that had been converted for office space. It, and the similar building that RSGB had occupied prior to Doughty Street, were convenient in that they were located in central London, but inconvenient in that they were not the most economical use of space and were rapidly outgrown. Now, however, RSGB has taken a giant step by moving outside of Central London, to a proper office building in Potter's Bar. Although when we visited the new location on January 17 there was still a bit of settling in and finish work to be done, most of that was cosmetic, and the staff was obviously enjoying their new working convenience. Our congratulations to the RSGB Council and to RSGB General Manager G3OUF.

FINNISH HAMFEST

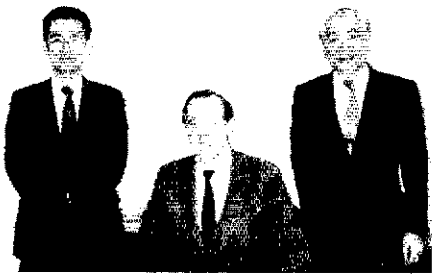
Who's going to be in Finland in July? The Radio Amateur Club of Pieksamaki invites one and all to the Annual Hamfest of the Finnish Amateur Radio League on July 21-24. Pieksamaki is 200 miles northeast of Helsinki. Forums, tech talks, DX, outdoor activities. And the original Finnish sauna. First-class hotel Savon Solmu costs $17 per night per person double room. For hotel reservations (May 20 deadline) and further info, contact Pekka Wahlman, OH4QN, Kaakinmaenkatu 25, SF-76120 Pieksamaki 12, Finland.

IARU REGION 2 CONFERENCE

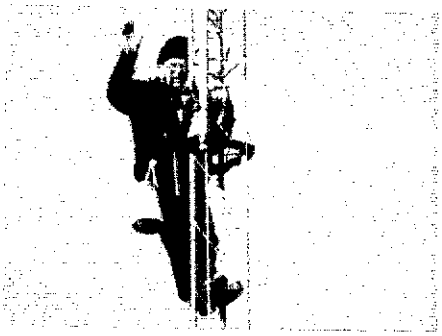
The three regional organizations of IARU each meet on a triennial basis, one each year. The Region 2 triennial conference will be held in Cali, Colombia, between June 6 and 11, 1983, with the host society being the Liga Colombiana de Radioaficionados. The General Assembly of the conference will deal with most important matters of common interest to Amateur Radio throughout the region as well as worldwide, including the implementation of WARC-79, forthcoming ITU conferences that might affect Amateur Radio and the restructuring of IARU. Official IARU attendees should confirm their attendance by writing to the Regional Secretary, Pedro Seidemann, YV5BPG, P.O. Box 2253, Caracas 1010A, Venezuela. We'll have more about this conference in an upcoming column.

THE CARIBBEAN EMERGENCY NET

The main operating frequency of the CEN is 14.185 MHz, and while check-ins from any area are welcome, the main concern of the net is the areas adjacent to the storm routes of the western Atlantic, the Caribbean and the East Coast of the U.S. Although the East Coast of the U.S. is pretty well covered by other nets, U.S. stations can check into the CEN on cw on 14.185 at 1500Z or on a backup frequency of 14.225 MHz. To become a member of the net, it is only necessary to check in regularly and to live in the general areas described previously. After "qualifying" by participation, a copy of the CEN operating manual is mailed to the new net member by Steve Dunkerley, VP9IM, who is manager of the net. CEN is subsidized by IARU Region 2, and has also had a number of donations, all of which helps to some extent to pay for such essentials as the operating manual. The Caribbean Emergency Net is, at the present time, particularly interested in having more Spanish-speaking stations and more stations with RTTY capability. Check in on 14.185, or write to VP9IM at Uppington, 5 Rockville La., Pembroke 5061, Bermuda.



During a December 1982 visit to ITU headquarters in Geneva, we see (left to right) Mr. Y. Kurihara, of Japan, member of the International Frequency Registration Board; Mr. Richard E. Butler, of Australia, newly elected Secretary-General of the ITU; and Mr. Shozo Hara, JA1AN, president of the Japan Amateur Radio League.



W1RU working on his column. *(N1ADV photo)*

HOW TO GET AN AMATEUR LICENSE IN ? ? ?

We're planning to run a series of brief paragraphs in this column on how to obtain an amateur license in various countries of the world. Not how to get a reciprocal operating permit, but how to become a licensed amateur in the country. But, what countries do you want to hear about? A quick and easy poll, please. Send your first, second and third choices on a postcard to W1RU, Star Rte. 4A, Heath Rd., Waldoboro, ME 04572.

*President, IARU

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

The FCC Rule Book

Sure, you know the rules in Part 97 you needed to pass your last license exam. And you know where in the spectrum you can operate to avoid those out-of-band pink slips. Station i-d and power limits are pieces of cake, right? But what of the lesser-known rules and their interpretations? How far does your knowledge of the Rules extend? Take the following test, and find out.

1) Who is eligible to hold a U.S. ham ticket?
a) anyone
b) U.S. citizens only
c) anyone who is not a representative of a foreign government
d) foreign secret agents

2) Worldwide amateur frequencies are allocated by the
a) FCC
b) AFL-CIO
c) International Amateur Radio Union
d) International Telecommunication Union

3) When handling third-party traffic, you must identify the corresponding station's call sign
a) every 10 minutes during the contact in all cases
b) at the end of the exchange *only* if the corresponding station is within a foreign country
c) in no cases
d) in the corresponding operator's native tongue

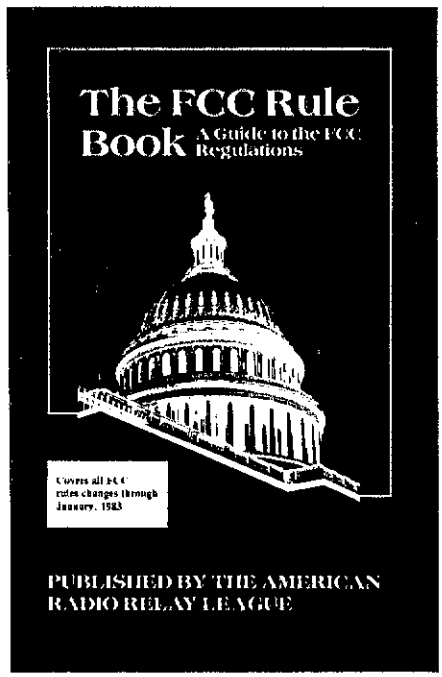
4) If you receive a Notice of Violation from the FCC, you must
a) write a reply to the FCC office that sent the notice within 10 days of receipt
b) write a reply to the originating FCC office within 15 days of receipt
c) write "I will not violate the Rules again" 50 times in your logbook
d) take care of the problem, but no response is required

5) An autopatch made on behalf of a Red Cross official is
a) permitted at any time because the Red Cross is a nonprofit organization and not a business
b) permitted *only* during an emergency situation where there is a threat of immediate safety of life or property
c) *not* third-party traffic
d) a privilege reserved for RACES stations *only*

6) Which of the following one-way communications are NOT permitted in Amateur Radio?
a) general info bulletins to the general public
b) general info bulletins of interest to amateurs only
c) Beacon transmissions
d) remote control of a model *Sopwith Camel*

7) Your station in auxiliary operation serves as a remote receiver for a repeater system. The auxiliary station may use an input (receiving) frequency
a) below 29.5 MHz
b) reserved for auxiliary stations *only*
c) reserved for auxiliary operation, repeater operation, or both
d) in the TV broadcast bands

8) Under the FCC's call sign assignment system,
a) hams may request special 1 × 2 call signs
b) calls are issued based on the licensee's mailing address and class of license
c) calls are issued based on the licensee's hat size
d) calls are assigned to the operator license, *not* to the station license



9) Operation at a fixed location away from the home shack listed on the station license is called
a) mobile operation
b) appendix operation
c) list operation
d) portable operation

10) What is AMTOR?
a) experimental digital code authorized above 50 MHz only
b) a revolutionary "hand-shaking" technique used for RTTY that produces copy less prone to errors
c) *not* allowed in the Amateur Service
d) *Amateur Toroids*

Answers: 1) c 2) d 3) b 4) a 5) b 6) a 7) c 8) b 9) d 10) b

How did you do? If you marked 10 out of 10 correctly, consider applying for the post of FCC Commissioner. Eight of 10: you're a fine, upstanding spectrum citizen. Five or below correct? Consider model railroading as a new hobby.

The point is that all hams should have a good knowledge of the Rules, not only to avoid FCC mail, but to enhance one's ability to have his or her station meet its potential for public service and technical contributions. A good familiarity with the Rules will mean more enjoyment in ham radio, too.

How to learn about the Rules? First, have a *current* copy of Part 97 at your elbow in the shack. Second, read Washington Mailbox in *QST*. And, finally, get yourself a copy of the League's new title, *The FCC Rule Book*.

This guide to the Amateur Radio regulations does three things. First, and foremost, it contains a current, up-to-date copy of Part 97 — The Amateur Service Rules. Secondly, it gives plain language definitions and interpretations of these rules. And, finally, the book contains reference information concerning the FCC — its structure, organization and authority. Lists of third-party-traffic and reciprocal-operating countries, FCC study syllabi, FCC addresses, international and domestic frequency charts, and call sign allocations are included. The Communications Act of 1934 is explained, and amateur extracts are reproduced. The role of WARCs (World Administrative Radio Conference) and the International Telecommunication Union is explored. The rule-making process and how *you* can participate formally in crucial FCC decisions are explained. Sounds like a bunch of legal gobbledygook? Simple explanations are provided to reduce the mumbo jumbo often found in government documents. And some light-hearted humor is interjected to provide for a little entertainment.

All of these features are built-in to *The FCC Rule Book* to eliminate that mire of gobbledygook and make the FCC rules, procedures and policies a breeze to digest.

Coming Attractions

1983 promises to be an exciting year for Amateur Radio as the FCC explores several areas of possible rule making: Volunteer examinations, a no-code license, logging, power limits and phone-band expansion are all topics of discussion on the Commission's agenda. Hundreds of amateurs will participate in these proceedings by telling the Commission what they think of the proposals. Some will meet with controversy, others with approval or disapproval.

To keep up with what the FCC is doing, check the Happenings column — here you will find information on Commission proposals and texts of new rules. An active ham who tempers *The FCC Rule Book* with news from Happenings will remain on top of the dynamic rules arena. And *The FCC Rule Book* is only $3 — a fraction of the cost of an FCC fine!

*Assistant Manager, Membership Services, ARRL

Correspondence

Conducted By Peter R. O'Dell,* KB1N

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.

DE-"COHN" JOB?

☐ Such shame on you! Cohn Job, indeed! (Correspondence, *QST*, Feb. 1983). Perhaps, as your readers were unable to articulate clearly reasoned arguments against the no-code license, they resorted to personal attacks on one of its advocates.

The no-code license? Inevitable! Few vhf operators need the code. The arguments against it are based either on selfishness — learning the code restricts access to the ham bands; bigotry — learning the code keeps the undesirables off the ham bands; or foolishness — learning the code builds character. These are emotional arguments, not logic.

What about Charlie Cohn? It's Dr. Cohn to his colleagues — PhD in physics from the University of Chicago. And, yes, he is as rich as he is smart! No criticism there! His attackers should meet his standards for excellence, then raise their voices.

Mensa? People join Mensa for many of the same reasons people become hams. For some reason, members of both groups are targets of prejudice by outsiders and, according to the letters you printed, victims of prejudice from each other. It is shameful for *QST* to encourage it.

And me? When I was 14 years old, I saved my allowance for three months to buy a Vibroplex "Bug." Now, 26 years later, that key is on my operating desk, plugged into a homebrew QRP transceiver. I love cw and operate it almost exclusively. Let's save the pleasure of learning it for those who will love it, too! — *Wayne R. Openlander, W9NZB, Chicago, Illinois*

☐ In the February Correspondence there was an editor's comment saying that the column is representative of the letters received. In this same column there is a letter from KA5NNG, the whole content of which is an invitation to KB9XV to "take his little yellow Mensa map pin and sit on it." This is in a group of letters supposedly arguing against a no-code license. Is this type of infantile remark really representative of amateur viewpoint? Is this really worthy of printing in *QST*?

Any argument concerning no-code licensing should be based on the relationship of Morse code to the purposes of Amateur Radio. In fact, very few of the letters addressed any of these questions! Instead, they linger more on character assassination and comparisons of KB9XV to a dumb animal, unable to eat without being spoon fed, etc.

I feel that a no-code license does fulfill the highest purposes of the Amateur Service. The reason basically is that cw is an anachronism and therefore an unnecessary burden. Since ARRL membership has been eroding in the last few years, perhaps it is time to think of the future of Amateur Radio. — *James R. Musselman, KO6P, Santa Cruz, California*

RARE DX SECRET

☐ After over 27 years of Amateur Radio activity I have learned a new DXing secret. I had noted that when a DX station shows up on the band he is almost always joined by a carrier or two on his frequency. The more rare the DX, then more and longer carriers appear.

Giving this some serious thought, I concluded that possibly the reverse approach would work. I found a clear frequency on the band, threw on a carrier, and waited to see what DX could be brought up on frequency. I found that a 10- to 20-second carrier would draw a DL, OK or G station to the frequency. I found that longer carrier durations were more effective and would bring more rare DX. Extending the carrier to 30 seconds to one minute, with occasional tuning of the rig, brought up HBØ, 3A, LX and CN8 stations. Now I knew I was on to something, because I had noticed that there *always* seemed to be someone tuning on a rare DX station's frequency. I extended my carrier tuning to 2, then 4, and as much as 10 minutes. Success! The 10-minute carrier garnered HKØ Serrana Bank, Market Reef and VK9 Norfolk Island! I could not wait until I could be home for the weekend and key down for many hours. No telling what DX I would work!

I'm sorry to say that my secret DXing method has been short-lived and has been exposed. As I tune the bands lately, I hear *many* more carriers being tuned, calling out to DX, and some even tuning after they have brought a rare DX station to zero beat. Well, it appeared to be effective while it lasted. Guess that it was too good to be true. — *Whitey Doherty, K1VV, Sandwich, Massachusetts*

MORE SIMPATCH

☐ My personal feeling about the simplex autopatch is that it definitely is a useful device. I have installed one at my station, and offered its use to anyone who wants to use it. All users have been instructed as to its operation, and only those who have agreed to its correct operation have been given the access codes. These users are also identified at the transmitter site. This autopatch is used only for nonbusiness, and is monitored by myself. I have the capability of turning it off immediately should there be any misuse. All of the users either are or have been members of other repeater/autopatch groups in the area, and with very few exceptions, all have expressed the idea that the simplex patch is far superior to the repeater patch. I personally have found there to be absolutely no need for a repeater type of operation in the use of an autopatch. All this does is tie up two frequencies instead of one, and the entire conversation is being broadcast to the full extent of the repeater. When potential users of an autopatch that is integrated with a repeater need to use the patch, frequently they have to wait until rag chewers finish their QSO to be able to use it. I am not against the rag chewers; they have a right to their use of the spectrum just as well as anyone else.

I am currently, and have been for over 15 years, working in public safety. I have dedicated my life's work to the preservation of life and property. I personally carry this communications equipment with me on or off duty and in or out of my assigned jurisdiction. The device has been used to assist at accidents and expedite injured persons to medical facilities. The unit has greatly enhanced the public's view of an Amateur Radio operator and the service he is able to perform for them. — *Kay A. Hargis, WA7GQA, Roy, Utah*

LIGHTNING STRIKES

☐ Recently, I had lightning damage to one of my transceivers. I filed a claim [with the ARRL insurance administrator] about two weeks ago, and in today's mail I had a check covering the repairs. This I consider the ultimate in turnaround time for processing a claim. In addition, they enclosed a note with an s.a.s.e. to determine if I was satisfied. What more could you ask for? — *Richard A. Mahler, W1DQH, Danbury, Connecticut*

NO-CODE COMPROMISE

☐ The time has come for the amateur community to realize that the question is no longer *if* we will have a no-code class license; but *what* effect this action will have on amateur frequencies. The Commission obviously intends to select from one of the two choices, regardless of the League's opposition. It is time to compromise and support the lesser of the two evils.

I think amateurs are threatened less by the digital-class no-code proposal. I suggest that the ARRL Board of Directors support the digital-class concept. The Commission would view this action as a cooperative step, and the League would receive the support of the Office of Science and Technology and others interested in digital communications. The combined support of these groups could turn the tide, forcing the radio-equipment manufacturers into accepting something less than a massive new outlet for selling radios. The result of this compromise, and the alliance with the digital community, could be quite beneficial to all. — *Jim Sanford, N0AIH, Omaha, Nebraska*

75-METER DX WINDOW

☐ When the insert in the January 1983 *QST* showed "The Considerate Operator's Frequency Guide," no mention was made concerning the 75-meter DX window — 3790-3800 kHz. I must presume this was an oversight.

People should know why this segment has evolved as a DX window. The JAs are allowed 3793 kHz to 3802 kHz. The VKs are allowed 3794 kHz to 3800 kHz. The majority of the European, African and Middle East operators find this is the only section free of broadcast and other commercial operation. When it is explained on the air, the majority respect this window. — *Henry L. Luhrman, W4PZV, Lake Clarke Shores, Florida*

[Editor's Note: This 75-meter DX window is different from the 160-meter window in that the former is used transceive with stateside stations.]

*Public Information Officer, ARRL

The New Frontier

The World Above 1 Gig

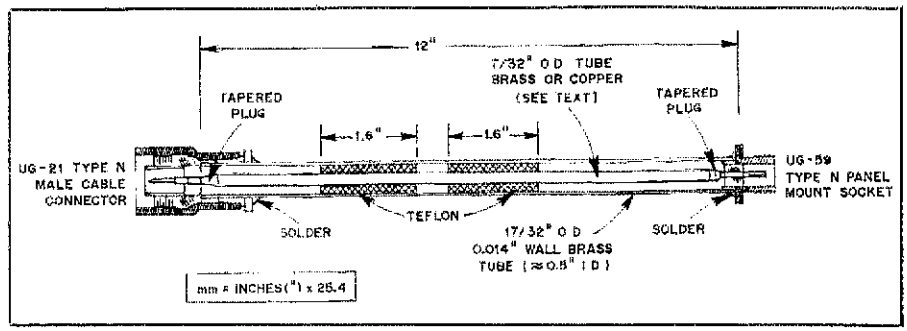
Conducted By Bob Atkins,* KA1GT

1296-MHz Two-Slug Tuner

Sometime ago (April '81), I described in this column the theory of operation of the two-slug tuner. This month, I will describe the construction of such a tuner for 1296 MHz. The construction method described here minimizes the need for machined parts, and all the materials used are readily available. The materials needed to build this tuner are

1 type N plug (UG/21)
1 type N panel mount socket (UG/58)
12-in. × 17/32-in. O.D. brass tube, 0.014-in. wall
12-in × 7/32-in.-O.D. brass tube, 0.014-in. wall.
3.5-in. × 1/2-in.-diameter Teflon rod
1-in. × 3/16-in.-diameter brass rod.

One source for the brass and Teflon parts is Small Parts Inc., 6901 N.E. Third Ave., P.O. Box 381736, Miami, FL 33138.



Schematic diagram of the 1296-MHz slug tuner. See the text for information about the two types of tube.

Construction

1) Remove the nut from the type N plug and enlarge the hole in it (drill or file) to 17/32 in. so that the 17/32-in. brass tube will pass through it with minimum clearance.

2) Remove the ferules and gaskets from the type N plug and screw the nut into the body of the plug two or three turns (i.e., far enough that a couple of threads are still visible between the nut and the body of the plug).

3) Insert the 17/32-in. tube into the type N plug as far as it will go (should be about 3/4 in.) Solder the nut in place on the 17/32-in. tube.

4) Take a 1/2-in. length of 3/16-in. brass rod and file a taper on one end (about 1/4-in. long) such that the unfiled end will fit into the 7/32-in. brass tube and the other end will fit into the center pin of the type N plug.

5) Solder this brass piece into the 7/32-in. brass tube so that the taper starts where the tube ends (see figure).

6) Solder the type N connector center pin to the end of the tapered section. Make sure that the pin and the 7/32-in. tube are coaxial.

7) Take another 1/2-in. piece of 3/16-in. brass rod and drill a hole axially down the center the same diameter as the center pin of the type N socket (measure socket, typically 1/8 in.). Solder the center pin of the socket into this brass piece.

8) File down the type N socket so that the diameter of the section below the flange is 1/2 in. Make sure that it is a snug fit in the 17/32-in. brass tube (see figure).

9) With the type N plug screwed on the end of the 17/32-in. brass tube, insert the 7/32-in. tube coaxially down the center and position it so that the center pin of the type N connector is in its correct position (the tip of the pin level with the inner shield).

10) Determine how much the 7/32-in. tube must be shortened to enable the type N socket to be inserted into the other end of the 17/32-in. tube up to the flange on the socket (depends on the socket, typically 1/4-in.).

11) Shorten the 7/32-in. tube the correct amount and make sure that the whole assembly fits together as it should (pin of the N plug in the correct position, N socket in 17/32-in. tube up to flange).

12) Solder the 3/16-in. extension of the N socket into the end of the 7/32-in. brass tube.

13) Now comes the job of producing a 9-in. long, 1/8-in. wide slot along the 17/32-in. brass tube. If you have a milling machine, now is the time to use it! If you don't, then first of all file a 9-in.-long flat along the tube. As the flat gets wider, the tube wall thickness in the center of the flat gets thinner until it breaks through into the tube. Then take a 1/8-in.-round or square needle file and file a 1/8-in.-wide slot down the tube. With the tube wall already thinned down by the flat, this should be quite a simple and quick job. The tube will probably distort out of round as the slot is filed because of the thin walls. To correct this, carefully bring the tube back into round by squeezing it in a vice.

14) Cut two 1.6-in.-long pieces of 1/2-in.-diameter Teflon rod. Drill a 0.228-in.-diameter hole (no. 2 drill) axially down the center of each. Try to get the hole as axial and as central as possible, using a lathe or drill press if available. Test these pieces for a smooth sliding fit on the 7/32-in. brass tube and inside the 17/32-in. brass tube. If they are tight, sand or file until they loosen up a little.

15) Insert the type N socket and 7/32-in. tube into the 17/32-in. tube. Solder the N socket to the tube as shown in the figure.

16) Take the two Teflon slugs and, on each, drill and tap a 4-40 hole half way along.

17) Insert the Teflon slugs into the 17/32-in. tube. Slide them along and rotate them so that the 4-40 hole is showing through the slot. Screw a 4-40 nylon screw into the hole. This screw may be used to move the slugs back and forth and to lock them in position. Note that this screw *must* be made of insulating material since it will be in contact with the inner conductor of the slug tuner.

18) Screw the body of the N plug on the open end of the tuner. The two-slug tuner is now ready for use.

Using the Tuner

The tuner can be used to match VSWRs of up to 4:1. When the two slugs are touching, the tuner should appear as a section of 50-ohm line. As the slugs are moved apart, they act as quarter-wave-impedance transformers and will thus effect an impedance transform between the input and output of the tuner. In a typical application, the tuner would be connected directly to the output of a 1296 power amplifier. To start with, the slugs are positioned together and the amplifier tuned for maximum output. Assuming that the amplifier itself is incapable of matching to a 50-ohm line (in which case the tuner will not be needed), then more power output should be obtained by adjustment of the slugs. Monitor the power output while varying the position of the slugs. It will probably be necessary to retune the amplifier after each movement of the slugs to maximize power output.

NEWS

Silverstone Electronics Ltd., High St., Whittlebury, Towcester, Northants, NN12 8XJ, England, are producing an interesting line of amateur microwave products, including preamps, power amps and slug tuners for 1296 MHz. Also included in their product line are GaAs FET preamps for the other microwave bands and equipment (including some test gear) for 10 GHz.

Strays

FLASH! NEW 220-MHz WORLD RECORD

A contact between LU7DJZ in Buenos Aires, Argentina, and KP4EOR near San Juan, Puerto Rico, apparently has set a world record for the band. The 3670-mile QSO surpasses the previous record by 1000 miles. See next month's The World Above 50 MHz column for further details. — *W3XO*

*103 Division Ave., Millington, NJ 07946

How's DX?

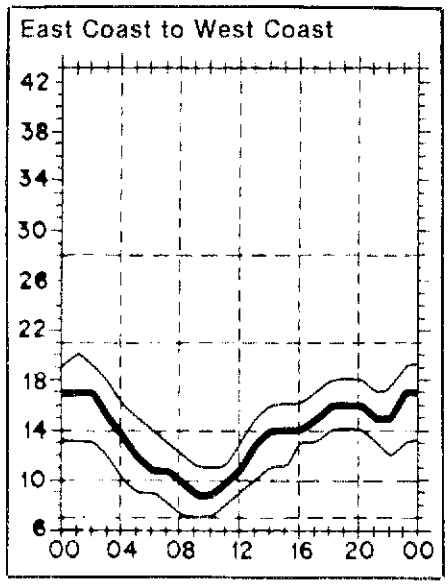
Conducted By Ellen White,* W1YL/4

Those Propagation Charts

For over five years, our monthly journal has carried extensive charted information to aid you in optimizing your precious operating time. Some of us have become quite comfortable in utilization of this material, forgetting that the 30 charts shown each month may appear to be intimidating to all those new hams entering our ranks on a regular basis! Quite a bit of correspondence on the matter indicates that an ongoing educational program is necessary to make this material really relevant to budding contesters, DXers, schedule makers, etc. Not all newcomers to the art and science of propagation know, for example, of that excellent introduction to the use of this material that appeared in the January 1977 issue of *QST* (by the then-K1ZND, now ARRL General Manager K1ZZ!). ARRL's *Operating Manual, Handbook* and *Antenna Book* all contain information that is in itself of great interest, but even more so they are really useful in understanding just what is happening to "conditions" and how ultimately this affects "What Bands We Can Use."

Thirty charts are included each month. This figure is narrowed by inspecting just those pertaining to your own geographic area. If you're in the East, West or Midwest, you'll have charts predicting circuits to South America, Central Asia, South Africa, West Europe, East Europe, Japan, Australia and the South Pacific. There are two charts apiece for Hawaii and Alaska delineating possibilities to the East Coast and to Western Europe. One chart reveals the Puerto Rico to West Coast possibilities, while the remainder covers the popular East Coast to West Coast circuits. The locations of the points on which the curves are based are generalized, with actual locations as follows: South America — Asunción, Paraguay; Central Asia — New Delhi, India; South Africa — Lusaka, Zambia; Western Europe — London, England; Eastern Europe — Kiev, Ukraine; Japan — Tokyo; Australia — Melbourne; South Pacific — Pago Pago, American Samoa; East Coast — Washington, DC; Midwest — Kansas City, MO; and West Coast — San Francisco. Some corrections may be made on the basis of latitude; the general rule is that the higher the latitude, the lower the maximum usable frequency.

*19620 SW 234 St., Homestead, FL 33031



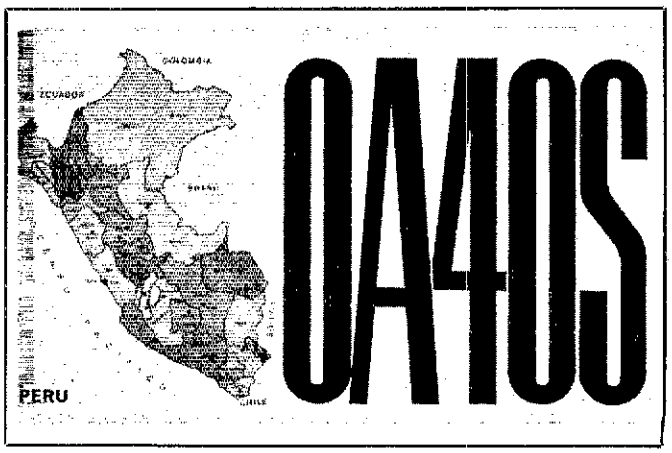
A sample chart showing UTC on the horizontal axis and frequency in megahertz on the vertical axis.

The charts plot the highest possible frequency, the maximum usable frequency (muf) and the optimum traffic frequency. For our introductory purposes we'll just look at muf. The chart predicts one month's propagation conditions for the circuit in question. The solid line represents muf. On 50% of the days in the predicted period, the amateur band that is open will be just below the muf curve. As an example, we'll use a chart that predicts propagation conditions on the East Coast to West Coast circuit during the period between April 15 and May 15, 1983. The rule is to pick the highest frequency you can use that is still below the muf curve. Signals near the maximum usable frequency have definite advantages: They're reflected back at a shallow angle, which gives them a longer skip distance, and they are minimally absorbed, making for stronger signals.

For instance, say you can be on the air from 1200 to 1300 UTC. According to the chart, the best band would be 30 meters for the particular circuit. On the other hand, if you could be on at almost anytime you'd pick the point at which the muf curve approaches or crosses a band you can use. According to our example, the best time to be on 40 for our path would be from 0800 to 1100Z. You could also work that particular circuit on 14 MHz from 1400 to 0400Z. The monthly graphs indicate why ARRL pushed so hard for our new 10-MHz band — a band that effectively fills in our long-haul communications needs between 40 and 20 meters!

The charts become particularly useful in plotting contest strategies and for making schedules to talk with your next-door neighbor's nephew in another part of the country. Used in conjunction with W1AW Propagation Forecasts, the charts can be of great help in planning your operating strategy. Other useful aids certainly include your ears and those of your locals (by means of a DX repeater), the multitude of DX bulletins and the strength of WWV, WWVH and CHU.

W1AW's propagation bulletins are transmitted several times a day, containing information on solar and geomagnetic activity — both of which help to make the interpretation of the monthly chart more precise. The bulletins are normally prepared each Friday, but can be revised at any time to update for current information. To interpret both WWV and W1AW propagation bulletins to make the charts "current," you'll have to understand a bit what the



Active South American OA4OS has a DXCC total of 329/311 and holds 5BWAS, 5BWAC and 5BDXCC. Natan radiates with a dipole on 80, two elements on 40, 5 elements on both 20 and 15, and a TH6DXX for both 10 meters and as a backup. Station gear includes a TS-120S and L4B.

terminology refers to. *Solar flux* is a measure of the sun's radiation at 2800 MHz, and as a trend shows up markedly in conditions. Flux readings of 80 or higher indicate hot conditions on 10 and 15 meters. The *A-Index* is a 24-hour figure for the activity of the geomagnetic field, on a scale of 0-400. A quiet field (10 or lower) is characteristic of the best propagation, with low wave energy absorption. The *K-Index* is more of a real-time figure than the A-Index, given for a six-hour period. The trend is what to look for: A rising trend means poor hf propagation, while values of 4 and up may mean aurora on vhf. *Solar activity* relates to fast-changing conditions, and is of a negative nature relating to the effects on our bands.

The printed literature is extensive and intrinsically so interesting that you may well discover you're spending more time here than in operating your favorite paths and on your favorite bands.

Beacons

Ten-meter beacons can be useful in determining band openings in this now "chancy" frequency range. Some time back, venerable sunspot watcher W1HDQ supplied a brief listing of some likelies: 28.175, VE3TEN Ontario; .205, DLØIGI So. Germany; .207, W4ESY Englewood, FL; .210 3B8MS Mauritius; 215, GB3SX England; .220, 5B4CY Cyprus; .222, HA2BHA Hungary; .227, VE8AA Yukon; .235, VP9BA Bermuda; .237, LA5TEN Oslo, Norway; .238, OA4CK Lima, Peru; .245 A9XC Bahrain Island; .247 EA2HB Spain; .250 VE7TEN Vancouver, BC; .257 DKØTE Germany; .272 ZS6PW South Africa; .276, DFØAAB Germany; .279, YV5AYV Caracas, Venezuela. Ed notes that frequencies are approximate and these represent beacons heard by him in the last few years (and only those in the IARU beacon range of 28.175 to 28.3 MHz). He'd welcome any reports from you on beacons heard in this range that are not on the above list.

The worldwide Northern California DX Foundation Beacon Net on 14,100 kHz is now operational by the following stations on the listed schedule, noting hours, minutes and seconds: 4U1UN/B 00, 00, 00; W6WX/B, 00, 01, 00; KH6O/B 00, 02, 00; JA2IGY 00, 03, 00; 4X6TU 00, 04, 00; OH2B 00, 05, 00; CT3B 00, 06, 00; ZS6DN/B 00, 07, 00. Each station transmits four 9-second dashes, with power levels decreasing from 100 to 0.1 W. For additional information regarding net operation and listener reports, write to Al Lotze, W6RQ, 46 Cragmont, San Francisco, CA 94116.

Publications

Along with the propagation charts, W1AW bulletins and the beacons noted above, you can get a really good feel for what is happening on the bands by subscribing to one of the popular bulletins. The following are available on a sample basis for your s.a.s.e. or s.a.e.: *DX News*, Radio Society of Great Britain, Alma House, Cranborne Rd., Potters Bar, Herts EN6 3JW, England; *The Long Island DX Bulletin*, Box 173, Huntington, NY 17743-0876; *QRZ DX*, 1310A Avenue M, Plano, TX 75074; *The DX Bulletin*, 306 Vernon Ave., Vernon, CT 06066; *DX Report*, 10 Fairington Crescent, St. Catherines, ON L2N 5W3, Canada; *Long Skip*, Box 717, Station Q, Toronto, ON M4T 2N7, Canada.

THE CIRCUIT

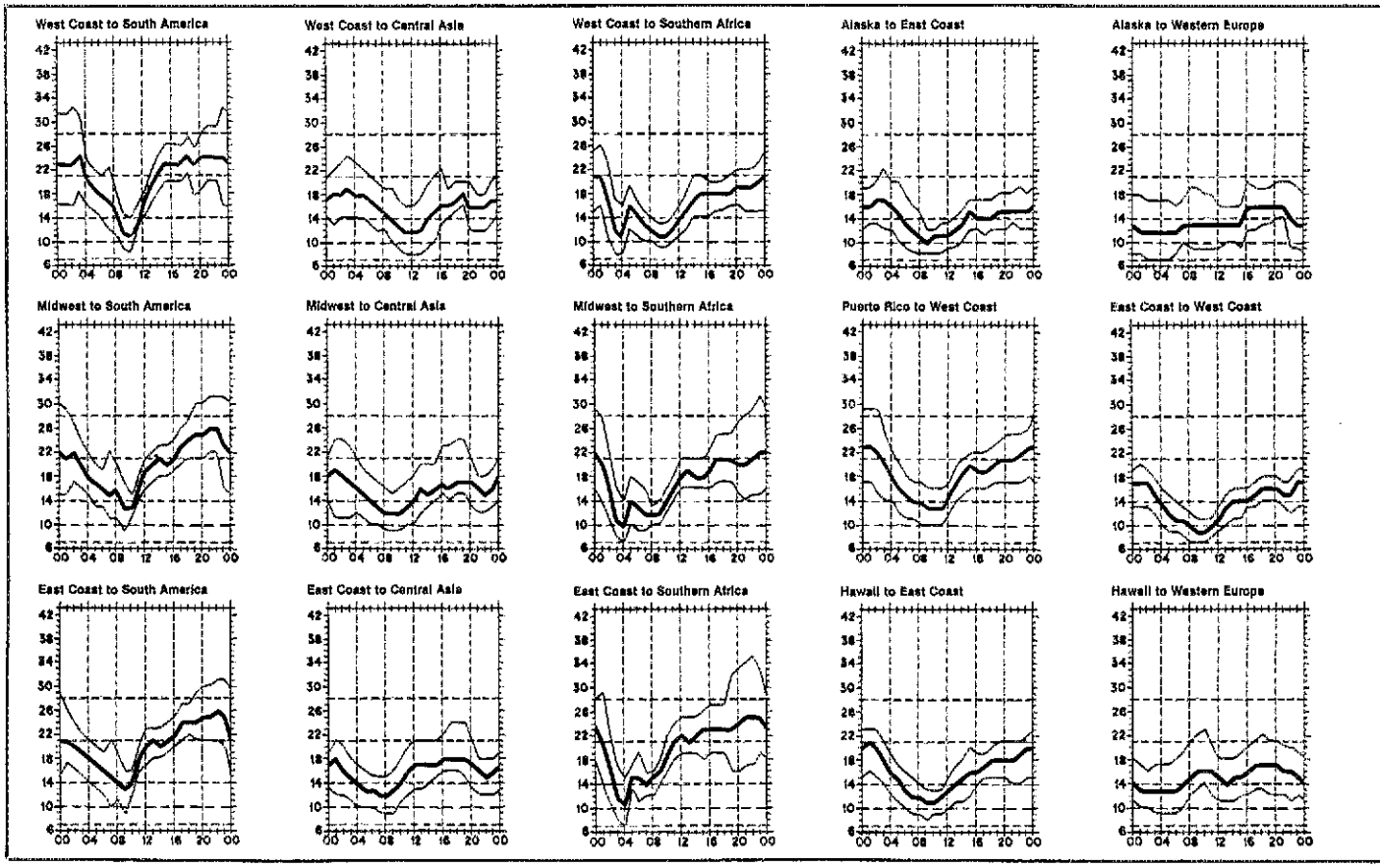
☐ CR9DD: "Veke" still has cards with which to confirm his October 1981 activity. Via OH5VD, Veke Komppa, Siikak, p. 10, SF-48710, Karhula 2, Finland.

☐ KP2: N9DLU/KP2 plans some operating time in early April from St. Croix while honeymooning. Russ will be bringing along an HW-8 and a kite antenna. Cards go to his home QTH: Russ Russell, N9DLU, 7530 W. Lawrence Ave., Harwood Heights, IL 60656.

☐ Antarctica: Beginning about now, Y44YK will be a member of the GDR scientists' group taking part in the 28th Soviet Antarctic Expedition from the GDR base near Novolasarevskaya (12° E, 72° S). He'll be operating Y83ANT for about a year. Loy will respond to cards via the home club Y44ZK, Box 176, 6100 Meiningen, German Democratic Republic.

☐ Fiji: Hams who have held temporary registrations for operation on Fiji still may have cards awaiting them at the bureau, Box 184, Suva, Fiji: 3D2s AB AH AF AJ AL AT BA BH BS CH ET EY FJ FL FC GC GH GL GM HE HG HZ JS JT MD QI RF RM SG TT UP WW XN XR BB GA IS GK AQ. (Bureau Manager 3D2ER notes that the following calls are not registered: 3D2s AG BE BP BZ CR DC DS EE EO FD FP FV IC KU LK MS OF OM RG RT SM TG TU TV YL.)

☐ Haiti: Operating pro W1EOB/N4XR expects to be living and operating in Haiti through the end of this year, as HH2VP, all bands 160-10, concentrating on cw. Vic will be living at the Hotel Ibo Lele in Petionville, which is about 20 minutes by car from the Port-au-Prince Airport. Business or vacation visitors are welcome to drop in and say howdy. During this period, Vic's QSL manager will be Al Rousseau,



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 frequency, or fot).

W1FJ, 180 Den Quarry Rd., Lynn, MA 01904. Cards may also be sent directly to Vic Paounoff at the Hotel Ibo Lele, Petionville, Haiti, or to N4XR via the W/K 4th Call Area QSL Bureau, or to the Radio Club of Haiti, Box 501, Port-au-Prince, Haiti. To date, all cards received for contacts with VP since it was activated in June of 1979 have been answered. If anyone is still in need of a card, please resubmit.

☐ KG4FU: Maine station W1OO is still looking for QSL information for this station for 1976-1977. Larry notes that it was a 160-meter country that he hadn't uncovered until now; ditto for CP1EU in 1974.

☐ Ons Island: From March 27 to April 3, EA1CDF and EA4s KR AXT BPF BPJ BPO and CAI, with the help of the local Madrid Chapter of the URE, will operate 2-160 meters on Ons Island, valid for the Islands on the Air Award (reference no. 80). The call used will be EE1ONS. The island is located in front of the coast of Pontevedra, Galicia, Spain. QSL via the Spanish Society, the URE, at Caballero de Gracia 18, 1.° dcha. B, Madrid 14, Spain.

☐ Central Kentucky DXers have a newly organized club in Lexington to provide a focal point for their activity. The club is based on having fun working DX and contests, and several activities are planned during the year. Interested? Contact Tom Fitzpatrick, WB4FOT, 3701 Niagara Dr., Lexington, KY 40502.

☐ April: Traditional highlights this month include both the International DX Convention, at Visalia, California, sponsored this year by the Northern California DX Club, and the massive Dayton Hamvention. CU! QST

QSL Corner

Administered by Joan Becker, KA1IFO

ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

Send outgoing cards to this address: American Radio Relay League, 225 Main St., Newington, CT USA 06111.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound).

The ARRL-Membership Overseas QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," in December 1982 *QST*, page 77, or send an s.a.s.e. to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

U.S. amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Requirements

1) Presort your DX QSLs alphabetically by call sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive *QST* should indicate that the QSLs are from a "sightless member."

ARRL affiliated club stations may utilize the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash. Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

QSL Information

Here is some information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

A35ZZ (KØCS)
A6XJA (PAØLP)
A9XDO (KA4S)
A9ZNH (KA4S)
CN8EU (KA4S)
EL9B (KD4ZS)
FB8XAB (F6GXB)
FB8ZQ (F6AJN)
HI8LCH (WB2LCH)
HK7UL (N7RO)
HL9TP (N6TP)
LU5ZA (LU2A)
NØZO (KØLST)
PP8ZAT (KC8YW)
SVØCT (N4AXT)
TT8BC (K4PHE)
TT8AC (N4NX)
VK6AHI (K8CW)
VP8AQ (KØJW)
VQ9CI (KE4OC)
V3DX (N6ADI)
ZS5LB (W2LT)
ZS6BCZ (KB7VD)
ZS1XR (N7RO)
Z21EI P.O.B. 2234, Bulawayo, Zimbabwe
5T5RR (F1ANH)
5T5TO (F6BUM)
5V7NW (AK3F)
5W1DZ (WB2LVB)
5W1EA (KØCS)
5W1EE (W6OUL)
6Y5IC (G3XTJ)
7P8CP (WD5JME)
7P8CG (KCØFH)
9Y4IH (WB3AKI)

QSL Manager Volunteers

WA1GNA
KA4EMR
W7NEJ (for Pacific Ocean area stations)

Special Notes

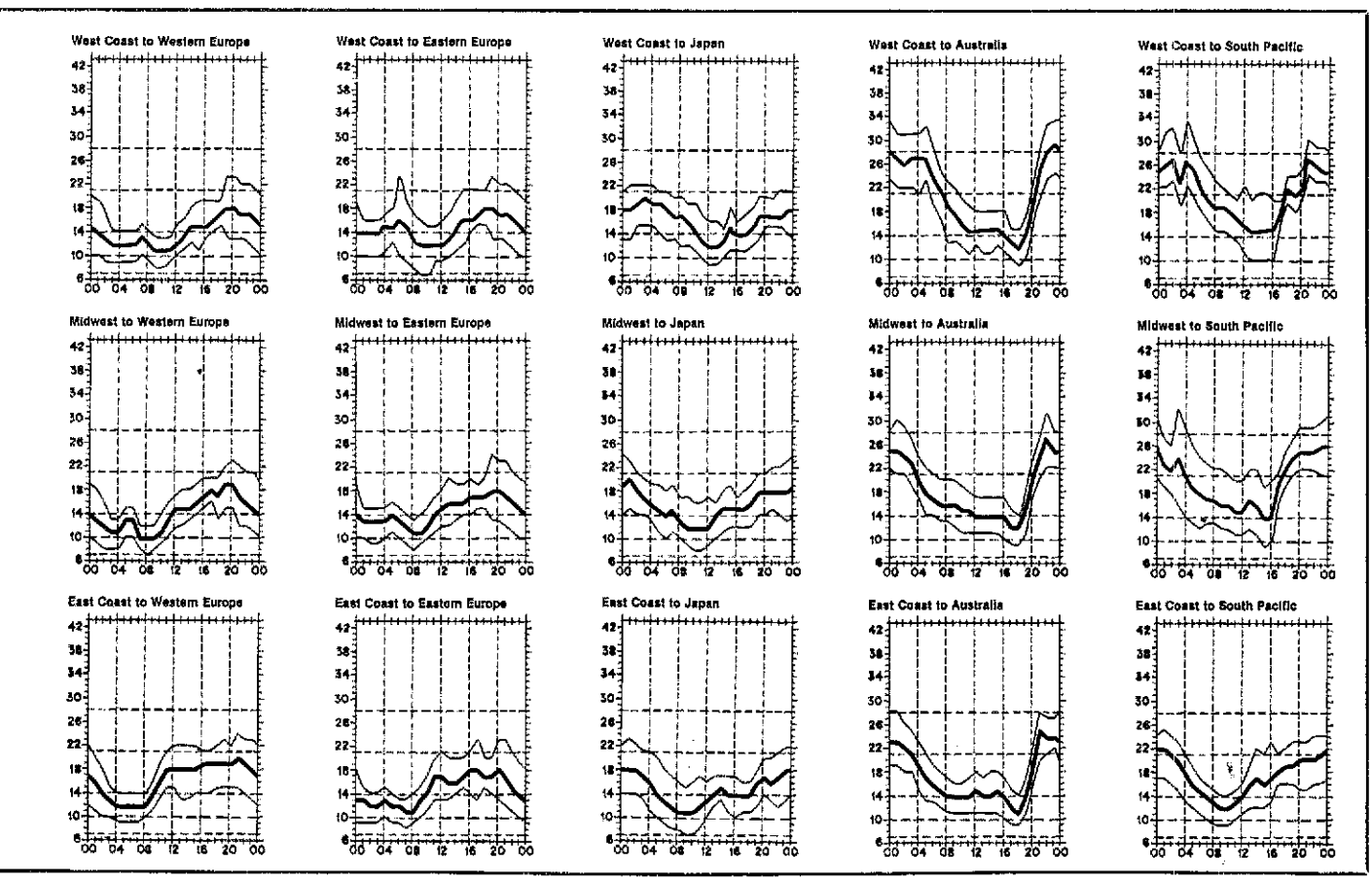
☐ WA1AYS is *not* manager for 5Y8DX or 5P8DX, or any other stations.

☐ WA4PYF is *not* manager for A7XD.

☐ KA4S is *not* manager for 5Z4DE or 5Y4DE.

☐ W6CE is *not* manager for CEØX.

☐ Dec. 1982 QSL Corner, page 77, contains information and addresses for the Incoming Bureaus. For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111. QST



See this issue, 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 megahertz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for April 15 to May 15, 1983, assume a sunspot number of 74, which corresponds to a 2800-MHz solar flux of 123.

DX Century Club Awards

Administered by Don Search, W3AZD

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries 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 January 1, 1983 through January 26, 1983. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DF2JP/154 G3UML/336 SVØAT/109 KA1BPJ/103 WA1LEZ/112 WB2SGS/115 KD5I/134 KG7T/104 KA9CFD/102
DFBVV/107 G4HVR/160 VE3BCC/112 KA1GOL/110 KA2CDE/129 KB3QE/152 KM5J/132 KO7W/102 KA9FCZ/102
DF9ZA/108 HA5KFL/151 VE4AGT/100 KA1NN/104 KA2CJS/100 N3CYI/105 NA5U/104 N7DG/219 N9CTS/123
DJ9EG/182 I4MKN/328 VE7AVU/104 KE1S/102 KE2S/220 W3IS/101 W5CB/304 N7IE/137 W9LYN/123
DJØUY/118 JA2BXV/155 VQ9XX/104 KK1J/123 KX2T/102 WB3JZE/103 W6EMD/100 KC8NU/102 WD9DYR/101
DL8GAE/108 JG2DPZ/180 XE1OD/125 KM1E/182 W2AET/109 W2PQZ/244 K4YYX/103 W6GYM/200 KK8B/106 KØTK/125
F6DKJ/103 JH7RKT/109 YU2CMS/205 N1BRG/102 W2PQZ/244 KA4MBJ/140 WA6IUM/288 KT8F/100 KAØAYN/178
F6EXV/303 OE8LKK/104 3B8FA/100 W1HXO/106 WA2RNB/146 NQ4K/100 K7TDX/100 N8BQI/100 KCØXK/104
F6IPA/121 OH5OZ/210 K1RIF/101 W1IHS/150 WB2NLA/109 KB5PB/104 KA7GXO/100 WB8KTA/105 KKØM/158
FG7BT/142 PY7DY/119

Radiotelephone

AL7S/276 EA1AHY/204 HB9BKH/101 5L7F/104 K4BFJ/154 W6HXW/294 N8BQI/100 N9CPI/111 AKØM/162
CT4RH/223 F8DKJ/100 JG1IMM/102 KM1E/181 KA4MBJ/121 WA6IUM/288 K9DWS/103 W9CTC/109 KKØM/151
DF5BD/296 F6EXV/300 JJ1ASO/143 W1NBE/119 NO4N/140 WB6AFJ/101 KB9QY/124 W9LYN/107 NØCKN/101
DK5BH/294 G4HCQ/106 JF2AXT/132 KA2CDE/129 WA4PMF/100 N7BUP/129 KI9G/115 WD9AYN/100 WØDXY/181
DL2VK/ST3/110 G4HVR/159 JG2DPZ/180 WA2RNB/146 KA5CFY/105 W7AZR/131 N9AUO/101 WD9DYR/100 WØUWP/124
DL4MAK/107 G4MET/100 OK3ZAS/102 W3HWJ/115 W5TKX/175 KB8WC/207 N9CJU/101 WD9IPX/107 WBØZIC/125
DL8RF/107 G4NJW/106 SM6KRE/132 WB3KZF/106 W6FZI/104 KR8X/109

CW

DF2JP/134 JF1RDC/110 ON6YH/133 KK1J/123 K4YYX/102 N6ETK/104 WD8CRY/101 K9VAL/104 WB9NOV/106
DL9WW/110 JA4DHR/106 PY1EWN/107 WB1EXP/110 N4QN/101 W6DN/168 AG9S/102 KK9I/166 AKØP/132
G4IZZ/101 JH7RKT/104 SM6KRE/107 KA2HMJ/124 N5FW/243 KY8Y/101 AK9N/105 N9AXR/106 KØTK/111
HA1TJ/110 OH5OZ/173 KB1W/100 KE2S/183

RTTY

OK1ATP JA3EOP

5BDXCC

K4CXY W5HJA HA9RE AI3Q YU7CB F6FMO UA9OBG K2WT W2WI
N9NGA

Endorsements

Mixed

DF9ZO/250 JA8MS/328 KB1W/151 W3FAF/154 N4AVV/289 KU5L/194 W6CF/340 KB8BS/293 W9IU/342
DJ5KB/153 JA9BAB/248 KM1D/300 W3OVV/132 N4BBB/251 N5AX/303 W6HJ/240 KC8JH/296 W9MMJ/160
DJ9MH/260 KP4V/273 N1AKX/282 W3SOH/290 N4BLX/280 N5DSK/252 W6KPC/330 N8AAT/260 W9MYG/280
DL9VR/264 LA1ND/280 N1ALR/241 W3YMB/150 N4TX/305 N5XR/307 W6LEN/236 N8AXY/272 W9NGA/313
F2GL/309 LA2GV/293 N1AOZ/281 WA3AFS/135 N4XO/344 W5AL/355 W6NGK/153 N8MC/300 W9NUD/278
F6EYS/272 OE1FT/349 N1APA/281 WB3CHS/271 W4BKP/288 W5HTG/149 W6NLG/283 W8GIO/306 W9ON/270
G3XTT/279 OE1WHC/125 W1AM/324 WB3DNA/290 W4JFE/322 W5IJW/322 W6OU/295 W8II/285 W9WB/223
GM4FDM/203 OH2KP/265 W1ECH/307 WB3EFQ/206 W4PGK/199 W5RJC/300 W6SCC/152 W8KR/334 WA9TAH/255
HB9ANY/159 OH2QQ/353 W1ESN/304 AA4MW/281 W4TFB/323 W5TO/337 W6TFO/305 WB8PHO/238 WB9EEE/229
HB9AQW/321 ON6YH/212 W1ETH/224 AA4QZ/177 W4YJ/361 W5VJP/298 W6ZYC/326 WD8CRY/275 WB9POH/275
HB9BKP/177 OZ9PP/314 W1ICF/127 AA4V/310 WA4CXZ/314 W5VSZ/297 WA6GFY/306 WD8IXE/179 WB9TIY/291
HB9BZA/271 PY4OD/341 W1QV/308 AA4Z/309 WA4EMA/127 WA5EZQ/302 WD6ERN/157 AB9V/253 WB9YXY/305
HB9CIR/199 SM6KRE/180 WA1JMP/305 K4ID/343 WA4ICB/225 WA5JVQ/161 K7ABV/338 K9AJ/317 WB9ZJW/151
HBØLL/316 SM7BIP/323 WB1CNM/227 K4LNO/291 WA4QBX/319 WB5IKX/202 K7WF/250 K9BIL/284 WD9IRQ/175
I3EVK/331 VE3LNW/275 WB1EAZ/270 K4MQG/344 WA4VDN/252 WB5YKD/262 W7ALZ/250 K9FD/302 AKØM/231
I7WU/330 VE3NI/275 KA2CFH/199 K4NTS/200 WA4YZF/252 K6ASI/252 W7EDA/309 K9GX/302 KØCF/254
I7ZPB/342 VE4SW/292 KB2RZ/274 K4PT/230 WB4ZNH/305 K6DR/224 W7KHD/253 K9KU/319 KØCVD/266
JA1NTK/217 VE7DX/300 KB2TY/251 K4RZ/315 WC4W/156 K6GXO/286 W7PSO/307 K9QAM/151 KØROF/284
JG1IMM/251 VE7IG/334 KE2M/227 K4SV/284 WD4RAF/141 K6TMB/255 WB7CLU/291 K9TTM/227 KBØTL/169
JH1QOJ/318 YU3TRI/200 KF2G/251 K4YXJ/305 AC5K/129 K6ZOR/260 AA8G/276 K9US/280 KCØD/152
JJ1EEA/125 YU3UAR/204 KJ2R/197 KA4EMR/159 K5GOE/254 KA6CJL/153 K8FF/344 KA9BKW/185 KSØZ/259
JJ1HEY/240 ZL4LZ/305 W2HKE/259 KA4LRM/156 K5JG/300 KB6O/164 K8HHZ/159 KB9M/201 NØZA/282
JA2OZI/228 4X4FQ/343 W2LL/339 KB4UO/228 K5PP/303 KE6FI/192 K8ICE/154 KF9D/239 W9FF/310
JA3ANW/272 K1KTB/281 W2VJN/338 KB4YT/158 KA5FUI/252 N6BB/309 K8KAE/305 KI9T/178 WAØDCO/290
JA3BXF/318 KA1A/248 WA2VUY/288 KM4F/129 KA5W/295 N6CW/337 K8MNG/296 N9BOK/128 WAØOOU/254
JA5BSQ/282 KB1BE/250 KA3R/270 KT4G/300 KB5WQ/271 N6CYL/226 K8OT/236 W9AQ/339 WBØHAI/313
JA6HUG/282 KB1U/252 W3DRD/336 N4AH/310 KC5FQ/247 N6JV/317 K8RSH/128 W9FR/313

Radiotelephone

CE3BBW/131 LA2TO/229 K1KTB/281 WA2VUY/283 KD4WB/127 N5XR/277 N6CYL/226 KB8BS/290 KB9BD/244
CP1FW/282 ON6YH/164 KM1D/286 KC3CO/203 KF4M/254 W5AL/282 N6JV/187 KS8M/219 KC9DS/181
CP6EL/277 ON7TN/162 N1AHN/203 N3CQM/199 N4AVV/287 W5CB/300 W6GYM/200 N8AXY/271 KC9MF/150
CP6IM/140 PAØHBK/270 N1AKX/261 W3AX/175 N4BBB/233 W5GVP/260 W6KPC/328 N8BO/302 W9IU/262
DK3PZ/286 PZ1BK/248 N1ALR/241 W3DRD/297 N4BLX/280 W5RJC/283 W6NLG/280 W8CIH/140 W9ZX/281
EA1QF/300 SV8CS/225 W1ICF/127 W3IJT/125 W4BKP/307 W5RRK/319 W6OU/286 W8GIO/304 WA9TAH/248
EA7VE/226 VE3LNW/254 W1YOU/260 W3JZP/180 W4JFE/300 W5VJP/293 W6TFO/285 W8VHY/331 KØCF/250
F3SG/226 VE3NI/261 WA1LZL/168 W3YHR/274 W4TFB/315 W5VSZ/288 W6TGI/254 W8VSA/231 KØMPR/203
G3CCX/153 VE4AS/315 WB1EAZ/270 W3YMB/150 W4YJ/358 W5VUZ/178 W6ZYC/320 WA8KMK/139 KØSE/284
G3NLY/336 VE4SW/269 K2SGH/280 WA3ZTE/150 WA4CNZ/276 WA5EZQ/295 WA6SGQ/149 WD8CRY/270 NØAFL/280
G3XTT/251 VE7DX/288 KB2RZ/274 WB3CHS/271 WA4CXZ/313 WA5JVQ/160 WA6SJX/175 WD8IXE/153 NØZA/256
I3EVK/319 VP2MBA/126 KC2JY/159 AA4MW/271 WA4QBX/308 K6ASI/250 W7ALZ/232 K9BIL/277 WØFF/285
I5KKW/304 VP2MO/229 KE2M/225 K4ETB/132 WA4RXC/162 K6TMB/248 W7EDA/153 K9GX/300 WBØWAY/282
I8YRK/334 VS6CT/253 KJ2R/181 K4LNO/291 WB4SWI/285 K6VMN/238 W7FJE/224 K9KU/296 WD9AQJ/203
JR3CVJ/181 XE1JFF/138 N2ATT/127 KA4EMR/152 KA5W/270 KD6KF/200 W7KHD/227 K9LUX/263 WD9AWL/280
JA6HUG/218 XE1OD/125 W2YXO/130 KA4GYU/154 KC5GI/285 KE6FI/187 WB7CLU/290 K9PSN/234 WD9FSJ/209
JH8GWW/261 ZL4LZ/305 WA2TNN/163 KB4YT/152 N5DSK/252 KF6AW/133 K8EX/252 K9RR/203

CW

DF9FM/188 JJ1HEY/233 W1YRO/125 AA4MW/131 KA5W/255 N7IE/129 KN8Z/199 K9BIL/181 WB9TIY/189
DF9HE/151 JA2EGM/200 KB2EN/137 K4YXJ/226 W5LVD/272 W7EDA/246 N8MC/275 K9GX/202 AKØM/176
DJØLC/202 LA1ND/206 KB2FS/152 KB4JS/205 W5VSZ/189 W7KHD/167 W8LNO/126 KF9D/228 KØCVD/249
EA3AQS/150 SM3EVR/304 KK2J/130 W4JFE/242 N6JV/290 W7YS/157 W8NPF/200 W9IU/195 KBØTL/145
G3XTT/209 SM6BZE/202 KQ2O/175 WA4QBX/201 W6BJH/249 WA7NXL/151 WB8OZX/161 W9NUD/251 KCØD/130
HB9ALO/279 VE1ANU/225 WA2CNF/150 WA4YZF/202 W6LEN/200 W6TFO/283 KB8BS/201 AB9V/251 W9PEL/127 KSØM/163
JG1IMM/200 XE1VV/135 W3FAF/144 WC4W/151 W6TFO/283 KC8JH/199 K9AJ/299 WB9EEE/123 NØZA/226
JI1FOL/131 KM1D/158 AA4AK/250

On Line

Conducted By Stan Horzepa,* WA1LOU

Duping ReHashed

On Line in December *QST* presented WA1PCJ's hash code algorithm for duping call signs. Many favorable comments were received, and a number of readers used the hash routine as a building block for full-blown contest duping and logging programs.

A handful of readers also wrote that the hash routine was a good idea, but there may be a small problem: All of the hash codes generated by the algorithm fall between 243 (for call sign AAØA) and approximately 500 (for call sign ZZ9ZZZ). After approximately 240 call signs are entered for duping, the hash table is filled and the dupe-search slows down because it becomes a sequential search rather than a random search.

Solution Number 1: W8KOX offered a solution that would distribute the call signs more evenly by expanding the hash code table. Tom accomplished this by adding the following line to the routine:

95 H = (H-240)*4

This line will provide hash codes between 12 (for AAØA) and 968 (for WD9ZZZ), which will fill up the 1024 DIMension of array A$ more evenly and reduce the time for dupe-searching. As the table fills up, line 100 of the routine will take care of any values that exceed the DIMension of A$, as intended.

Solution Number 2: WBØFVK sent in another solution that also addressed the problem. First, Bob suggests changing line 30 to:

30 FOR I = 0 TO MAX-1 : A$(I) = "*" : NEXT

This makes it compatible with lines 100 and 150, which also generate H from 0 to MAX-1. Then, change line 70 to:

70 FOR J = 1 TO LEN(I$)-1

and add the following line:

95 H = H + INT((ASC(RIGHT$(I$,1))-65)/26*MAX

(This line assumes that the last character of the call sign is a letter, not a numeral.)

Solution Number 3: WB4OZN sent in a bare-bones, 111-line logging and duping program that used his improved version of the hash routine. Phil dealt with the problem of filling the hash table, and also addressed another problem: U.S. radio amateur call signs come in a variety of lengths, from three letters plus a number to five letters plus a number, which creates a very large range of numbers for indexing, no matter how one computes the key or subscript value.

In his program (lines 550-660), Phil used only the last four characters of the call sign to narrow the range of possible keys or subscripts. Although this increases the probability of duplicate keys for different call signs, it is worth the trade-off for greater symmetry. (For this application, some limited sequential searching is tolerable.)

Given the last four characters of the call sign, the program finds the ASCII decimal value for each character, then multiplies it by the decimal location of the character. The sum is the initial key value, which is reduced to a value proportionate to the memory allocated to the array. Since the value 27776 would be the result of the fictitious call sign ZZZZZZ, that was used as the base number for a divisor to determine percentage. Also, since few numbers appear in U.S. call signs, each number assumes its natural value.

WB4OZN's program was written in BASIC on a TRS-80® Color Computer and should be easily converted to other versions of BASIC. For a copy of the program, send an s.a.s.e. (preferably no. 10, business size) to ARRL, Dept. PX, 225 Main St., Newington, CT 06111, and request Program Number 13.

Other Solutions: In response to the hash code column, I received a number of other duping (and logging programs) that are now available via Dept. PX at ARRL Hq.

Program Number 14: KA4PZY's conversion of the original hash routine for the Timex 1000 computer with 16K RAM.

Program Number 15: KL7IEH wrote "Super Simple Dupe Search," a BASIC 10-line program for the IBM PC.

Program Number 16: WA4FIB wrote a Sweepstakes logging and duping program in BASIC that uses a binary search algorithm, which Jack claims is much faster than the hash algorithm.

Program Number 17: N2CQ offers his "Duper" for the TRS-80 Color Computer (16K RAM, Extended Color BASIC), which uses a duping algorithm that is based on the standard ARRL dupe sheet.

TRS-80 COLOR AND VIC-20 INTERFACE

A homemade interface for the Radio Shack TRS-80 Color and the Commodore VIC-20 computers has been designed by WD5HRB. Bill's circuit interfaces the computer to terminal units using either a 60-mA loop or an EIA RS-232-C interface. For further information, send an s.a.s.e. to Bill Bodine, WD5HRB, 1305 Everglade, Pasadena, TX 77502.

VU2IJ

VU2IJ has a TRS-80 Model I (Level II with 16K RAM) and is trying to get it on the air from VU-land with as little expense as possible (Jimmy had to pay 325% duty on the TRS-80!). Any help would be appreciated. Write to Jimmy Mistry, VU2IJ, Asavari A 4, 214, Veer Sawarkar Marg, Mahim, Bombay 400016, India.

CW SENDING

Roy Cartier, K4AC, penned a letter decrying the poor sending practices of some cw operators. With the increasing use of computers to receive Morse code, poor cw is all the more evident; the computers' "ears" are not as forgiving as our own. Poor spacing between words and characters often results in garbage when copied by most computers. Roy says that we should try to present a better image to our fellow cw operators, whether they are human or computer.

OSBORNE???

Has anyone interfaced an Osborne 1 computer for ham radio applications? Are there any Osborne 1 user-group nets on the air? If so, please contact W9KB. Also, drop On Line a note so that we can publish that information here.

TI99/4A

A lot of folks must have received TI99/4A computers at Christmastime, because I have received a number of letters since the end of 1982 requesting information about Amateur Radio applications for that computer. At present, the best source of information about the TI is the TI99/4A Users Group Net that is listed in the accompanying table.

K9RH, head honcho of the TI99/4A net, reports that later this year there will be a software cartridge available for the TI99/4A cartridge for RTTY and cw! So, TI-hackers, stand by.

SINCLAIR/TIMEX CW TRANSCEIVING

NU4V has designed an interface and written the software that permits the Sinclair ZX81/Timex 1000 computer to send and receive cw. With split-screen video display, the user may view both sent and received text simultaneously. For more information, send an s.a.s.e. to Cliff Nunnery, NU4V, 313 Vaughn St., Fort Walton Beach, FL 32548.

On-the-Air Computer Nets

Name	Freq.	Days	Time	Mgr.
Apple Computer Nets				
National	14.239	Su	0100Z	
National	14.239	Su	1700Z	
East Coast	7.260	Sa	0900 EST	
Midwest	3.998	Sa?	0200Z	
West Coast	7.230	Sa	0900 PST	
Atari Microcomputer Nets				
National	14.325	Su	1600Z	
East Coast	3.965	W	2000 EST	N2CZW
Midwest	7.235	Su	1830Z	
Pacific NW	7.230	Su	1800Z	KC7DJ
Southeast	7.235	Su	1800Z	
Southwest	7.230	Su	1800Z	
West Coast	7.235	Su	1100 PST	
International	21.400	Th	2330Z	
Dayton, OH	146.445	dy	anytime	
Chicago	147.57	dy	anytime	
Pet/Commodore Nets				
USA	14.240	Su	0500Z	
USA	14.240	Sa	1730Z	
West Coast	7.155 or 7.166	Su	1700 PST	
West Coast	3.825	Th	0400 PST	
East Coast	7.156	Sa	0830 EST	K4HVH
Sinclair/Timex User's Nets				
USA	3.917	dy?	1900 EST	W3YZW
USA	7.225	Su	1900Z	KØOOS
USA	7.228	Sa & Su	1300 EST	K4KER
East Coast	7.240	Su	1100 EST	KQ2F
New York City	146.67	M	2030 EST	W2EWE
Pittsburgh	146.64	W	2200 EST	N3CHT
TI99/4A Users Group Net	3.995	dy	0400Z	K9RH
TRS-80 Color Computer Nets	14.342	Su	2000Z	WB3EBA
	7.270	Su	2200Z	NØDFQ

Sources: N1FB, KQ2F, WA2YNT, WB5RPW, W6HDO, K9RH, Ad Astra, QZX

*72 Stiles St., Waterbury, CT 06706

YL News and Views

Conducted By Jean Peacor,* K1IJV

A Look Behind the Scenes

Back row (l-r): KA1JPA, KA1DYZ, KA1IFO, KA1DTV, WB1FSB, WB1FSN, KA1DTU and W1CKK. Front row (l-r): KB1O, AJ2I and WA1VMC.

Everyone knows Dave Sumner, Dick Baldwin and John Huntoon and their work with ARRL. But, did you know that a look behind the scenes at ARRL Headquarters finds many licensed YLs, all of whom serve the League well in different capacities? They answer your questions when you write or phone, provide members with excellent service and are a most pleasant group. Chances are your inquiries or comments about any awards, QSL cards, help with technical information, club programs, conventions and elections are fielded by the YLs about to be introduced.

Jeannie DeMaw, W1CKK, joined the Hq. staff in September 1965 as a part-time employee when help was needed in the Circulation Department. She became a full-time employee in a few months. Eight years ago, Jeannie transferred to the Communications Department as a branch manager, where she is in charge of all ARRL awards other than DXCC.

She was first licensed as a Novice in 1953 as WN8REI in her native state of Michigan. A year later, she was W8REI with a General class license. When her OM, Doug, W1FB, joined the Hq. staff in 1965, they were both happy to move to Connecticut with their son David, now KA1BUQ. DXpeditions to the West Indies have increased the scope of their radio activities. Jeannie enjoys cooking, skin diving, treasure hunting for relics, home decorating, crafts and fishing in any spare time.

In May 1983, Jeannie and Doug have plans for semi-retirement back to their native state of Michigan, where a 40-acre family farm awaits them. Doug will continue with part-time work with the League. Jeannie will sorely be missed.

Libby Karpiej, KA1DTU, has been at the ARRL for over five years, starting as a secretary in the Circulation Department. She is now Assistant Circulation Manager. Air Mail subscriptions are handled by Libby, as are all special mailings of *QST* by the printer in Kentucky. Her responsibilities also include entering such data into the computer.

Licensed since 1978, Libby now has her Advanced class license. Her OM is David, K1THP. Besides hamming, she enjoys making miniature furniture and baking, mostly with chocolate. In fact, her prizewinning creation of Chocolate Hazelnut Torte was the subject of a recent newpaper article. Originally, she made it for her OM because it combines two favorites of his, chocolate and hazelnuts. Her secret is in the use of chocolate; to use as much as possible without overkilling the fact that it's also sponge cake. For a copy of Libby's recipe, send an s.a.s.e. to Libby or to me.

Joan Merritt, KA1DTV, has worked at Hq. since January 1977. Less than a year later, she had her Amateur Radio license. Starting in the Circulation Department, Joan processed publication orders; later, she was promoted to supervisor of Individual Sales. In July 1980, she became Assistant Circulation-Traffic Manager, where she processes dealer and individual orders for shipping. Her other interests include racquet ball, gourmet cooking, gardening and food tasting in large quantities.

Maureen Thompson, KA1DYZ, joined the Club and Training Department in October 1976. The department was new when she started as secretary. During the next five years, she served as Training Assistant, handling club-affiliation matters and writing for *Radio Club News.* The daily technical questions and heavy public contact in this department sparked her interest to become licensed. She received her Novice call in 1978. Working on her own, one year and three tries later, Maureen passed the Technician class license.

Last year, Maureen transferred to the Technical Department, where she now types *QST* manuscripts using an IBM Personal Computer. She's studying toward an associate degree in electrical engineering at evening school. Her spare time is spent either with text books or with her half-Arabian horses.

Marian Anderson, WB1FSB, began her work with Hq. in 1968 as a receptionist. It wasn't long before she transferred and became the senior technical secretary and editorial assistant to Technical Department Manager W1FB. Her involvement with technical matters led to her call, WB1FSB, in 1977. Her OM is not a ham, but is interested in her radio activities, which include DXpeditions to the West Indies and much cw operation on 15 meters. Marion enjoys camping, knitting and treasure hunting with a metal locater.

Marge Tenney, WB1FSN, came to the League as a Kelly girl in 1964. Her job was to address first-day covers for the U.S. postage stamp honoring the ARRL's 50th anniversary. (Do you still have yours?) She became convention/travel coordinator in the Membership Services Department in 1975. Along the way, she worked with *QST* Managing Editor W1CUT, and was secretary for the general manager's office and Secretarial Department (now Membership Services).

Marge has been licensed since 1977. Her OM is Herb, WB1ETL; their son Rick is WB1ASG. Round or square dancing are favorites of Herb and Marge.

Joan Becker, KA1IFO, is manager of the ARRL-Membership Overseas QSL Bureau. As Joan says, "You might say that I'm the one in the middle between incoming QSLs and radio amateurs experiencing problems in receiving their cards." Questions as to how both the incoming and outgoing bureaus work and many other QSL inquiries are all fielded by Joan; she handles much correspondence. Joan has two YLs working with her — Gail and Denise. They sort approximately 4 million QSL cards (or about 10 tons) in the course of a year. Joan writes QSL Corner for each issue of *QST,* listing manager and DX manager volunteers, as well as QSL bureau information. Originally from Chicago, Illinois, Joan is married, has four children and has been with the League since 1979.

Jodi McMahon, KA1JPA, has the distinction of being the League's most recently licensed YL. Jodi works in the Production Department, where she typesets and does paste-up for *QST.* Formerly WB1EKR, she worked at the League in 1977, left to explore the world, then returned to ARRL in 1981. She is currently checking the market for used equipment and eagerly awaiting making her first Novice band contact as KA1JPA. Jodi is married, and enjoys softball and bicycling.

Sally O'Dell, KB1O, is familiar to all League members as the editor of *QST*'s Club Corner. Sally also writes *Radio Club News,* a newsletter for active affiliated clubs. For the past three

*Country Club Dr., Monson, MA 01057

years, she has served at Hq. as Club Program Manager in the Club and Training Department. She is responsible for all affiliated and Special Service clubs.

First licensed in 1972 as WB8NOK, she upgraded to Advanced in 1977. After a few (about 12) moves around the country, with call sign changes each time, Sally and her husband Peter, KB1N, Hq. Public Information Officer, have settled near Newington with their five-year-old daughter, Anita. When Anita grows up (at age six), she wants to be a ham with her mother's call sign.

Arline Bender, WA1VMC (very Merry Christmas), is in charge of the Field Organization section of the Communications Department. Anyone holding an ARRL appointment knows Arline. She handles SM nominations and elections, appointee records and field expenses. She has been licensed since 1975. Her OM is Chuck, W1WPR, chief operator of W1AW.

Carol Smith, AJ2I, joined the Hq. staff two years ago. As part of the Membership Services Department, Carol describes her job as "varied." She helps members with legal problems, talks to and meets many interesting people, and writes Happenings for *QST* each month.

First licensed in New York in 1977, Carol found Amateur Radio communication possibilities so exciting that she upgraded to Extra in two years. Admitting that she hardly knew how to use a three-pronged plug prior to becoming a ham, Carol now takes pleasure in extolling Amateur Radio's virtues to anyone and everyone, but especially to women. It's her belief that in this age of sophisticated technology, Amateur Radio is a gateway to vocations and avocations in fields not traditionally considered by females.

Carol, whose OM is Wolfgang, KB2FS, is currently interested in 220 MHz, and KB2FS likes DX — a great way to divide frequencies.

The League Never Sleeps

Evenings find two part-time licensed YLs making their contribution to the behind-the-scenes group.

Steffie Nelson, KA1IFB, has been a proofreader of *QST* and League books since 1976. All of this familiarized her with the ins and outs of Amateur Radio long before she decided to get her license. With encouragement from a neighbor, coworkers at the League and at her full-time place of employment, *The Hartford (Connecticut) Courant,* Steffie attended a class sponsored by the Newington Amateur Radio League last year. The result: She earned her Novice license.

Cheryl Sowers-Clift, KA1IXI, works in the evening as a computer operator maintaining back up records of ARRL membership. Though she has held this job for only a few months, her association with the League goes back several years to when she married WA3NLO, deputy manager of the Membership Services Department. Originally from York, Pennsylvania, Cheryl earned her first ham ticket about a year ago. She has since upgraded to Technician and has her eye on the next grade in the near future.

It has been a pleasure to write about the YLs at ARRL Hq. It's exciting to get to know them better, and to be able to put calls and faces together. Without the cooperation of many at League Hq., this would have been impossible. Thanks, too, to my friend Heather Hall, WB1ABF, who one day said: "I'd really like to know more about all the YLs at the League!"

KA1IXI (left) and KA1IFB

SAYLARC'S SPRING MEETING

The second Area YL Amateur Radio Club's spring luncheon will be held at 1 P.M. on April 16, 1983 at Harry's Inn, Somers Point, New Jersey. All YLs are cordially invited to attend. Nonmembers are especially welcome to come and look the club over. Further information may be obtained from Jan Scheuerman, WB2JCE, 616 Revere Ave., Linwood, NJ 08221, tel. 609-927-5873.

Special Events

Conducted By Mark J. Wilson,* AA2Z

Framingham, Massachusetts: Framingham ARA members will operate *throughout 1983* in celebration of its 50th anniversary. Contact three club members, or club station W1FY, for certificate. W1FY is active 1400-1600Z Saturdays around 14.280.

Reading, Pennsylvania: WB3AAL will operate from 1300 to 2330Z *April 1-3* to commemorate the 150th birthday of the Reading Railroad. Frequencies: phone — 7.250 14.300 21.375; Novice — 21.150.

Eufaula, Alabama: Eufaula ARC will operate K4BOE from 1600 to 2300Z *April 8-10* during the 18th Eufaula Pilgrimage. Operation on 14.290 and 21.360.

Camp Pusmataha, Alabama: Boy Scout Troop no. 52 will operate N4FLC/4 from 1700 to 2200Z *April 9* from the site of the surrender of the last organized Confederate forces during the Civil War. Operation 10 kHz up from the lower 40-10 meter General class phone-band edges.

Medford, Oregon: Jackson Co. ARES and Rogue Valley ARC will operate KC7OR from 0000Z *April 9* until 0000Z *April 10* during the 7th Annual Pear Blossom Run. Operation 10 kHz up from low end of General class 80-10 meter phone and cw bands, and 146.52 simplex.

Kingston, New York: Overlook Mountain ARC will operate WA2MJM from 1500 to 2300Z *April 9-10* to commemorate the 300th anniversary of Ulster County, NY. Operation 20 kHz up from lower 40-10 meter General phone band edges and 147.255/.855.

Philadelphia, Pennsylvania: Olympia ARC will operate from the *USS Becuna,* a World War II vintage Guppy class submarine currently on display. Operation 1300 to 2000Z *April 10* on 7.235 14.285 21.360 28.600 144.200.

Shreveport, Louisiana: Area amateurs will operate from 1800 to 2300Z *April 16* during the annual Holiday in Dixie celebration commemorating the Louisiana Purchase. Frequencies: phone — 7.240 14.280 21.380 28.580; cw — 60 kHz up from lower band edges.

Brackettville, Texas: Border ARS and Uvalde RC will operate W5LFG from 1500Z *April 16* until 1500Z *April 17* from Alamo Village, built for the filming of *The Alamo.* Operation on 40-10 meters, phone and cw.

Novice, Texas: North Texas High Frequency Assn. will operate N5NT/5 from 1800 *April 16* until 1800Z *April 17* for Novices. Operation in the 80, 40 and 15-meter Novice bands.

Nashua, Iowa: Great Plains ARC will operate KCØCP from 1400Z *April 16* until 2300Z *April 17* from the Little Brown Church in the Vale. Frequencies: 3.925 7.250 14.290 21.365 28.560.

Worcester, Massachusetts: Central Massachusetts ARA will operate W1BIM from 1700 to 2200Z *April 17* and 1500-2200Z *April 18* from the Worcester Science Center to commemorate Patriot's Day. Operation 20 kHz up from lower 40-10 meter General class phone-band edges.

Nebraska City, Nebraska: Nebraska City ARC will operate KØTIK from 0000Z *April 22* until 0600Z *April 24* during the annual Arbor Day festivities. Operation in the 80-10 meter General class phone and cw bands.

St. Joseph, Missouri: Missouri Valley ARC will operate WØNH from 1400 to 2300Z *April 23* and 1300 to 1600Z *April 24* to commemorate the original Pony Express route between St. Joseph and Sacramento, CA. Frequencies: phone — 10 kHz up from lower General class band edges 40-15 meters and 28.575; cw — 7.125 21.150 28.150.

Wilmington, Delaware: Independent AR Group members will operate from atop the U.S. Geological Survey marker at the point where Delaware, Maryland and Pennsylvania meet. Operation 1500 to 2300Z *April 23-24* in the lower portions of the 40-10 meter General class bands.

Islip, New York: Suffolk Co. RC will operate W2DQ from 1700 to 0100Z daily *April 23-30* in celebration of Islip's 300th birthday. Frequencies: phone — 15 kHz up from lower 40-15 meter General class band edges; Novice — 21.135.

Belleville, Illinois: St. Clair ARC will operate K9GXU from *April 24 to 30* during an antique radio display in commemoration of Marconi's birthday. Operation 10 kHz up from lower 80-10 meter General class phone-band edges and 20 kHz inside Novice bands.

Dayton, Ohio: Dayton ARA will operate W8BI/M from 1700Z *April 29* until 1700Z *May 1* from the Dayton Hamvention. Frequencies: phone — 7.240 14.285 28.575; cw — 7.125 14.030 28.150.

Perry County, Arkansas: Faulkner Co. ARC will operate W5AUU from 1400 to 0000Z *April 30* and *May 1* during the 2nd Annual Toad Suck Daze celebration. Frequencies: 14.300 21.300 28.300.

*Assistant Communications Manager, ARRL

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. For example, your information would have to reach Hq. by May 15 to make the July issue.

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

MBC: We Began It; Why Don't We Use It?

A propagation mode that we amateur vhf types have been exploiting since the early '50s, when W2UK and W4HHK first proved its worth, is finally catching on in commercial and military circles. They refer to it as MBC, for Meteor Burst Communication, but we know it as meteor scatter, or m.s.

Although amateurs were first to use the ionized trails left by meteors as they streak into our atmosphere, the professional developers of MBC systems are getting ahead of us. Taking advantage of modern computer-based technology, they are achieving continuous communications at teleprinter speeds of up to 100 words per minute; whereas, with the techniques we developed 30 years ago and are still using, we consider ourselves fortunate to exchange calls and reports. Despite the fact that we have largely made the switch from cw to ssb, increasing our information rate, our techniques are such as to generally be able to use only the longer lasting overdense trails. Overdense trails are considered to be those with a free electron density of 10^{14} per cubic meter or greater. Being able to utilize the short-duration underdense trails, or "pings," offers a number of advantages. For one thing, they are much more numerous. Several billion tiny pieces of space material enter our atmosphere each day, but the frequency of chunks large enough to produce overdense trails is perhaps in the few-per-hour category. Of course, they are more numerous during meteor showers, which is when we enjoy the most success with the mode.

In addition to their much greater frequency of occurrence, underdense trails also provide propagation over a much more limited geographical area. Many are familiar with the effect that often takes place during showers, when a particularly good burst occurs, allowing reception of a number of widely scattered stations at once. One second there is nothing, and the next there is QRM! Because of the small area covered, such QRM is essentially nonexistent with underdense bursts. Thus, one frequency can be used by many stations simultaneously. By designing their systems to utilize the very numerous underdense bursts, commercial and government operators can essentially function continuously at the teleprinter speeds mentioned.

Can we amateurs adopt similar methods to produce a consistent, reliable meteor-burst communication system of our own? MBC systems do not require super power. Transmitters used in currently operating systems run powers compatible with our amateur rules, and they do not employ huge antennas or super-low-noise receivers. The secret lies in being able to rapidly, and automatically transmit a portion of a stored message whenever the path opens, and stop and hold it when propagation disappears. In concept, it's packet radio with the frequency and length of packets controlled by Mother Nature. Early attempts to build equipment that could accomplish this were made during the mid-'50s by the National Bureau of Standards. They used specially modified tape decks that could be started and stopped quite rapidly. This approach proved the principle, but the equipment was too slow and cumbersome to be really practical.

Not much was heard from professional circles about meteor-burst communication for the next 20 years. Other modes of propagation, such as satellites and tropo scatter, received most of the attention during that period. In the late '70s, articles began to appear in various publications about a "new" method of spanning significant distances with vhf radio signals.

Two recent articles provide more details on how these systems operate. One is in the December 29, 1982 issue of *Electronics Magazine*, while the other appears in *Signal* for January 1983. *Signal* is the journal of the Armed Forces Communications and Electronics Association. Both articles discuss two U.S. Government MBC systems that have been in operation for several years. One, called SNOTEL, was set up by the Department of Agriculture. It employs two master stations, one in Boise, Idaho, and the other in Ogden, Utah, in conjunction with 500 unattended, solar-powered, remote stations spread throughout the western states at distances of up to about 1250 miles. These gather data, such as snow pack thickness, precipitation, temperature and similar slowly changing parameters. The information is stored in a memory ready for transmission when a propagation path opens between the master and the particular remote station. To determine when propagation is present, the master station emits a continuous signal on one frequency while maintaining a listening watch on a second. Whenever a meteor opens a path to one of the remote stations, even if for only a fraction of a second, the remote station, upon hearing the signal from the master, begins dumping data on the second frequency. It does this as long as it hears the signal from the master station.

In addition to the SNOTEL installation, another system operates in a similar fashion, with a single master station located in Anchorage, Alaska, and remotes in various locations in the 49th state. The installation gathers data for several federal agencies, including the Bureau of Land Management, the U.S. Geological Survey and the Corps of Engineers. Like SNOTEL, the Alaskan system has been very successful in proving the concept of using meteor trails in this manner. It is particularly interesting that it has worked so well in the presence of aurora, which can be so destructive to many other types of communication.

I have already noted that high power is not necessary. Generally, master stations put out 500 W and employ moderate size, 5-element Yagis. The remotes run about 300-W output and use dipoles or 2-element beams. Both of these systems operate in the 40- to 50-MHz range.

Development of an amateur version of these MBC systems is certain to provide an interesting challenge, and its successful culmination would add another useful mode in our ability to communicate with one another. The task should be particularly interesting, involving as it does both vhf and computer techniques. Now that 6 meters is returning to its more accustomed characteristics, this would appear to be a good time to see what else we can do with our stations besides working international DX via F_2. Many of us have transmitters and antennas that are capable of exploiting meteor-burst communication. However, this work need not be limited to 6 meters, even though the professionals do employ this part of the spectrum. Certainly, 2 meters can also be used, although the data rate will be reduced. One of the challenges is to develop and obtain general agreement on protocols for an amateur MBC system. I am sure that our computer-oriented vhfers will come through with many good suggestions. Reaching agreement on a standard may be the most difficult part of the job.

Looking for something new to do in Amateur Radio? Participating in the development of a ham version of MBC may be for you!

THE SPRING SPRINTS

In case you missed the announcement on page 85 of March *QST*, there is a new series of vhf/uhf "Sprint" contests beginning this month. Each Sprint lasts just six hours, from 6 P.M. to midnight local time, and each is for a separate band. To encourage the activity nights, which have already taken hold in many parts of the country, the Sprint for each band will be held on the corresponding activity night for that band, from 2 meters up. There is no established activity night for 6 meters, but it will have its own Sprint, nevertheless. It will be last, so as to maximize the probability of E_s. Each Sprint is a separate, single-band contest, so entrants can concentrate on that band without worrying what they might be missing on another band. Scores for each Sprint will be listed separately, so you can concentrate on the band, or bands, of your choice without fear of being beaten by someone who can operate a band on which you are not active.

The 2-meter Sprint will be held on April 18, the 1-1/4 meter Sprint on April 26, the 70-cm Sprint on

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late breaking information.

May 4, the 23-cm Sprint on May 12 and the 6-meter Sprint on May 21. Exchanges will be grid squares, with signal reports optional; grid squares will serve as multipliers. So, the Spring Sprints provide a great opportunity to get started collecting grid squares for the VUCC Awards, announced on page 49 of January *QST*.

EME ANNALS

You have probably already noted that the EME Annals appears in this month's column. This is the first time this box has been published since May 1980. I apologize for this long lapse, and will try not to let it happen again. As I do with the other boxes, I will attempt to run the EME Annals about every six months — at least once per year. However, if it is to be a meaningful representation of the progress of moonbounce, I must have the help of those active on the mode. A few have been submitting regular reports of their stations worked, but many more have not. For this reason, the information that appears this time is certainly not as up-to-date as I would like. Probably, the best way to get people to submit up-to-date information is to go ahead and publish the information available. Thanks to K2UYH for his help in supplying much information on the current status of 70-cm and 23-cm EME stations.

The EME Annals lists the total number of different stations (not QSOs) worked via moonbounce, the number of U.S. states worked off the moon, as well as the number of DXCC countries. This information seems appropriate to convey in a concise manner as an indication of the capability and activity of each station, as well as the general state of EME.

I have been using the same form for this box as that used to update information for the state boxes for the various bands, but I may come up with a special form to help focus on getting the desired information. In the meantime, please submit information for the EME Annals on a separate copy of the form you use to report states worked by a combination of modes.

It would also help if the EME information for each band is submitted on a separate copy of the form. When everything is combined on a single form, it really raises hob with my filing system and sometimes results in my failing to note someone's update, as the sheet must be moved from file to file as I extract the information. Occasionally, I miss doing this. It also helps, if you must use something other than the official form, at least use a standard size sheet of paper. No matter how hard I try to prevent it, little scraps of paper, letters and QSL cards are much more likely to become lost. The proper forms can be obtained by dropping me an s.a.s.e. and requesting the box-update forms. With your help, the EME Annals can be made an interesting indicator of the progress of the moonbounce mode, as well as provide some competition among its practitioners.

EME Annals

Figures are number of different stations worked, number of U.S. states and number of DXCC countries worked via EME. Compiled February 15, 1983.

6 Meters

K5WVX*[1]	2	2	1
WA5HNK*[2]	2	2	1
WB6NMT	2	2	1
W7FN	1	1	1

2 Meters

K1WHS†	417	47	42
VE7BQH†	255	50	32
WA1JXN/7†	225	49	28
W7FN†	161	45	24
SM7BAE	125	50	23
WAØLPK/KL7	119	49	11
W7HAH†	107	44	30
WA3VSJ	88	38	27
KR5F	80	28	18
VE2DFO	71	22	13
W7UBI	67	36	7
W5LUU†	64	30	17
K5GW	63	34	14
WBØQMN	57	18	27
G5CSZ	55	39	11
K4PKV†	54	32	12
W8IDU	49	29	12
WB5LUA†	49	24	17
WA7KYZ	45	29	8
K9XY	41	21	10
WA4MVI†	40	24	12
I2MBC	39	19	11
K7NII	38	24	5
K1FO	38	20	7
K3VGX	38	18	7
W7CI	38	14	4
K5BMG	37	24	9
W7JF	37	18	6
WA7BJU	34	27	2
WA3USC	34	15	11
K2RTH	33	19	6
K9KFR	32	13	10
WØSD	31	21	11
K5UGM	31	20	8
KAØY	30	21	6
K5MB	30	14	4
N2MB (WA2BIT)	29	17	7
W5FF	28	22	6
W4WD	28	18	6
WB9VEM	27	24	3
WA4MVI	27	20	4
W1JR	27	19	8
WB4EXW	25	17	8
K5FF	23	20	5
W4DFK	23	14	6
I4EAT	21	12	7
WØRWH	20	12	10
K6LEW/WV	18	12	4
WB6NMT	16	14	3
K6YNB/KL7	16	13	1
DK1KO	16	7	5
WA9DOT	16	7	3
KØKE	14	9	6
K6LEW/DE	14	9	4
W8WN	14	9	3
WA4GPM	14	8	2
W2AV	13	11	3
K2OS	13	10	3
ZS5ZY	13	7	4
K6QEH	13	7	4
WB5LBT*	13	5	10
K1MNS	12	9	2
K5MB	12	7	2
K1LPS	11	10	1
WØMDL	11	9	1
WB8PAT	11	8	4
VK5MC	11	7	4
K2UYH	10	8	3
W2AZL	10	7	3
K4IXC	10	7	1
KØMQS	10	5	5
AB3D	9	8	3
WØVB	9	7	4
W7RUC	8	8	1
KP4DJN	7	4	4
W5UWB	7	4	3
N6TX	7	2	2
K6MYC	7	1	6
K5VWW	6	5	3
WA1TZV	5	5	1
SM6CKU	5	4	3
WA7BBM	5	4	2
JA9BOH	5	2	3
W3BHG	4	4	1
K3AP	4	3	1
NØJA	4	3	1
W8TN	3	2	2
N6NB/1	2	2	1
W1FZA	2	2	1
WA2PVV	2	2	1
W5JTL	2	2	1
W6DNG*	2	0	1
OH1NL*	1	1	1
W1MX	1	0	1

1-1/4 Meters

K5FF	33	23	4
W5FF	25	21	3
WB5LUA	16	14	3
WØVB	6	5	1
W1JR	4	3	1
WB6NMT*	3	3	1
K7NII	2	1	1
W4WD	2	1	1
W7CNK*	1	1	1
K2CBA	1	1	1
WB2BYP	1	1	1

70 Cm

K2UYH†	207	44	37
I5MSH†	169	8	33
K3NSS†	167	25	20
DL9KR	158	—	—
F9FT†	126	12	40
W1JR†	125	45	27
WB5LUA	121	48	29
W6ABN	117	21	13
DL7YC	109		
YU1AW	107	—	25
HB9AB	100	—	—
G3LTF	98	32	36
VE4MA	90	—	—
SM3AKW	87	—	—
VE7BBG	86	39	21
JA9BOH†	86	19	18
K4QIF	86	19	15
W5FF	79	48	17
W4WD†	75	35	22
F2TU	75	—	—
K5JL	67	*37	27
OK1KIR	64	—	32
SM6CKU	63	—	—
I2COR	61	—	—
K8WWT	57	20	20
KL7WE	52	27	15
K3QCQ	50	—	16
K5FF	48	30	13
ZL3AAD	43	—	—
JA4BLC	43	—	—
W1UHE	41	—	—
DJ9DL	40	—	—
DL7QY	39	—	—
OE9XXI	39	—	—
WB3ESS	36	—	13
WB4IZR	36	—	—
AD1C	35	20	12
N4GJV	34	—	—
WØYZS†	34	18	12
KØKFR	32	13	10
KØTLM	31	21	9
DL6WU	30	—	—
ON4DY	29	13	13
WØRAP	28	15	12
DL7VX	27	—	—
W3CCX†	25	11	12
ZE5JJ†	25	9	13
KH6IHP	23	13	8
WØRRY/5	23	11	8
DK5AI	20	—	—
VK2AMW	18	9	8
PAØSSB	18	—	10
W7JF	15	12	3
ZS6NG	15	—	—
WA8HGX	15	—	—
JH1OFX	15	—	—
FY7AS	13	2	11
K9XY	12	8	2
K5BMG	12	7	5
KØVXM	10	9	1
WØOQI	10	7	3
KA1GT	11	4	6
W4NUS	9	6	2
WA2WVL	6	5	2
K4QF	4	3	2
W4FJ	3	3	1
K1WHS	2	2	1
W5UPR	2	2	1
W1BU*	1	1	1
W2UK/KH6*	1	1	1

23 Cm

K2UYH	28	—	16
SM6CKU	25	—	—
G3LTF	21	—	—
VE7BBG	20	—	—
OK1KIR	20	—	—
WB5LUA	19	4	12
K4QIF	18	—	—
SM4DHN	14	—	—
DL7YC	7	—	—
OE9XXI	7	—	—
I2COR	6	—	—
YU1AW	5	—	5
W1BU*	4	2	4
W2NFA	4	2	3
PAØSSB	4	2	3
WB6IOM	2	2	2
HB9RQ	2	2	1
W6HB*	1	1	1
KH6UK	1	1	1
W1KZJ/KP4	1	1	1

13 Cm

W3GKP*	1	1	1
W4HHK*	1	1	1

†Worked All Continents
— Information not provided
*Participated in first EME QSO on particular band
[1]Combined effort of K5WVX (K5CM) and W5WAX (K5SW)
[2]Combined effort of WA5HNK and W5SXD

UPCOMING VHF PROGRAMS

☐ This year's Dayton Hamvention will feature a series of activities of interest to members of the above-50-MHz fraternity. Chairman for the vhf/uhf events, Jim Stitt, WA8ONQ, says that there will be receiver noise figure and dynamic range tests and an antenna gain measurement, as well as a number of technical forums spread over the three days from April 29 to May 1.

Among the scheduled technical sessions on Friday afternoon, April 29, is an EME forum featuring K1WHS, W4WD, K2UYH and WB5LUA, each describing operation on the band in which they specialize, from 2 meters to 23 cm. Also on the program, AAØL will discuss optimizing receiving systems, and a contesting forum will be presided over by K1KA, N6NB and W3HQT. The new grid-square system and how it got started is to be covered by W1XX and G4ANB. Rounding out the afternoon will be talks by WØPW and KA1GT on uhf equipment. The next day will feature W6JKV describing his famous 6-meter DXpeditions, a talk by K6MYC on antenna design and WA4MVI discussing various types of vhf propagation. The Friday evening receiver-performance measurements will be presided over by WBØTEM, K9KFR, WB5LUA, N4HSN, WD4MBK, W1JR and WA3OJX, while W6HPH and WA8ONQ will handle the Sunday morning antenna measurements. It sounds like an FB program, and should provide a great opportunity for many of the gang to get together.

☐ The 1983 West Coast VHF conference will be held on May 7 and 8 at the Sunnyvale Hilton Hotel in Sunnyvale, California. The program will include noise-figure and antenna measurements, as well as an array of speakers discussing such topics as GaAs FET design and practical designs using the home computer. For details, contact Ken Holladay, K6HCP, 2140 Jeanie La., Gilroy, CA 95020, tel. 408-842-0616.

☐ As of this writing, I have not received any information on the Northeast VHF Conference, but I expect to carry an announcement of that affair in next month's column.

ON THE BANDS

6 Meters — There seems no doubt, as this is being written on a snowbound Sunday in mid-February, that F_2 is a thing of the past for most of us. A few parts of the world are experiencing scattered openings, but the massive long-haul sessions will probably have to wait until Cycle 22. Nevertheless, there is a lot of life left in the old band. E_s is not to be sneezed at as a DX-producing mode. Many double-hop openings of up to 2500 miles occur during the summer season. In recent years, contacts spanning the Pacific and the Atlantic, as well as the gap between the Americas, have taken place. Whether these were caused by multihop E_s or some kind of summer F-layer propagation is not clear. It is one of the more interesting questions to come out of Cycle 21. Only by maintaining a high level of activity in widely scattered parts of the world have we a chance to learn the answer. It is imperative that those who have gotten on the band during the golden days of the peak of Cycle 21 stay with it and remain as active as possible, particularly during times when E_s is likely.

Some of those parts of the world — not surprisingly, those close to the equator — are still receiving some openings. January 29 brought OA8V a contact with FY7AU. Then on February 7, Paul hooked up with 8P6NF, J88AR and KH6IAA between 0130 and 0230Z. Incidentally, Paul and son Curtis, OA8CW, are now on ssb thanks to an FT-680R and a 120-W solid-state amplifier lent by N6BFG.

N6BFG writes that, in addition to supplying the gear to OA8V/OA8CW, he has also been building 4CX250 amplifiers to be sent to various DX stations. Bill has already shipped one to John and Elsa, 9Y4JW and 9Y4LL. He says, however, that he is running short of cabinets and transformers and would appreciate any donations. Address: Bill Carter, N6BFG/7, P.O. Box 99416, Tacoma, WA 98499. He also suggests that those who have old 6-meter equipment they are no longer using might wish to donate it to SMIRK, the Northern California DX Foundation, or some other organization that will make it available to overseas operators who have expressed an interest in giving the band a try.

One of those in a faraway place who intends to remain active on 6 meters is ZL4OY/C Chatham Island. According to a letter from ZL2MQ, he will be there for the next two years. ZL4PO is also active on Chatham.

The morning of February 13 brought a quite strong opening from some of the Southern States to HC2FG and HC1BI. KC2TX/5 San Antonio worked these stations at about 1600Z, and heard a number of U.S. stations via backscatter. KA4ATI Marietta, Georgia, reports a contact with HC1BI the following day at 1410Z. The geomagnetic field was fairly active during the period, with WWV transmitting a K Index of 5 on the 13th.

On February 4, WA5IYX San Antonio reported an opening to the Caribbean with the FY7THF beacon in, and contacts made with 9Y4LL and PJ9EE. It is also understood that PJ9EE worked several 6s that day.

It's aurora season, and W8QOI EN73 took advantage of the February 6 session to pick up 14 new grid squares, bringing his total to 31. That gives Raleigh a good start toward VUCC in only a little over a month.

WA2TPU puts in a plug for QRP on the vhf bands. To prove his point, Don submits a copy of his log for the January SS. Using just 1 W from a National RJX-610, a new self-contained transceiver apparently about to make its debut in this country, to a 7-element quad at 20 feet, he managed 53 contacts in 11 sections. We all remember that conditions during the contest

were not that great! WA2TPU is also a strong believer in quads, and submits several anecdotes in support of his contention.

2 Meters — W5UWB continues to amaze himself and the EME community with what can be done with a single Yagi, in John's case a Junior Boomer. With a preamp at the antenna, and taking advantage of horizon gain, he has now managed to complete two-ways with seven different stations: K1WHS, WA1JXN/7, SM7BAE, SM2GGF, KI7D, VE7BQH and WA6MGZ. The last station uses the smallest antenna of the group, a six-Yagi array. John doesn't intend to stick with a single Yagi setup forever, however. He is building an array of six Junior Boomers himself. But, in the meantime, he's having fun and urges others with high-power capability on 2 meters to give moonbounce a try. He finds the "big guns" only too glad to make the effort if there is any chance whatsoever.

The EME operator who has done more to convince those with single Yagis that they too can make EME contacts is, of course, K1WHS. In a letter updating his EME Annals totals, Dave notes that his huge array of 24 Junior Boomers has now been up for 2-1/2 years, and he always finds new stations to work on every moon perigee. Particularly in Europe, there seems to be a never-ending source of new stations who want to try to work him. During the December and January perigees, Dave contacted 21 new stations, many of them with single Yagis. Some recent QSOs include UD6DFD, UK5EDT, YU1OYK, DFØVK, KG6DX and KIIKN. Also worked was VK5MC with 589/599 signals and a single-Yagi station DJ5MS, with 539 reports both ways. K1WHS is having a great deal of fun with his big array, and is particularly glad to be able to introduce so many new stations to moonbounce.

Another who is having a good time on the band, although he hasn't taken the EME plunge yet, is WE4K Bardstown, Kentucky (EM77). Dave moved down from Michigan a few months ago, where he was WB8TOB and KJ8S. In seven years of operating from his Detroit-area QTH, he had worked 34 states. Beginning New Year's Day, when he put up a Junior Boomer at 30 feet, he has already worked 21 states via a combination of aurora and tropo with the installation coupled with a TS-700A and a 160-W KLM amplifier. And this is supposed to be the dead time of the year!

WAØVJF Wichita, Kansas (EM17), is a good example of what vhfers will do to enjoy their niche in Amateur Radio. Jon lives in an apartment where outside antennas are not allowed, so he erects his 4-element Cushcraft only when he is on the air. It takes fortitude to make the effort when it is 28° and there are 6 inches of snow on the ground. The evening of February 6 it paid off, however, with seven QSOs in Kansas, Oklahoma and into Texas. This made the second evening in a row that Jon had braved the elements. On the previous evening it was for an aurora. On that occasion, he worked five stations, including two new states, WDØCWI South Dakota and K9MRI Indiana. WAØVJF runs a TR-9000, a QSA-5 preamp and a KLM 80-W amplifier.

In an attempt to promote more brass pounding on the band, KF3Y and KA3IRA have been holding a 2-meter cw net since early November. The informal get-together meets at 2000 local time Thursday evenings on 144.095 MHz, and the two take turns as net control. Andy says that all within reach of their east-central Pennsylvania location are welcome to join in.

WBØTEM Akron, Iowa, has been running long-haul skeds with KØWLU/7 Gillette, Wyoming. Although the path is 525 miles and traverses the Black Hills of South Dakota, they make it almost every night, even during the winter. Now WBØTEM would like to try it on 1-1/4 meters if only KØWLU/7 will get on the band. K9KFR is very anxious to attempt 1-1/4 meter skeds as well. What about it, Bill?

According to an article appearing in the Soviet magazine *Radio*, translated by Dexter Anderson, W4KM, of the U.S. State Department, the Soviets are sponsoring a year-long aurora contest that began January 1, 1983 and is open to "all ultrashortwavers." Apparently, that means vhfers/uhfers, but it is not clear whether the competition is open to other than USSR amateurs. The article says points will be awarded in three categories: "Discovering openings, making contacts and carrying out experiments." Those wishing to obtain further information on this interesting-sounding contest might try writing to Box 88 in Moscow, and see what comes back.

1-1/4 Meters — Some belated reports have come in regarding the aurora of January 10. It was apparently very good on this band. WBØTEM Akron, Iowa, got state number 40 out of it by working WA4CBX in Kentucky. VE3DSS reports doing well, also. Using only 10-W output from a modified Microwave Modules Transverter and a 4.5-wavelength Yagi, Dana worked WA1UQC Connecticut, W3HQT and W3GPY Pennsylvania, W1GCI Massachusetts, W9IP Illinois and two Virginia stations, K4LHB and KØR1/4. Reports ran from 55A to 59A. Incidentally, VE3DSS is one who feels that the grid-square program is a fine idea, especially for Canadians. At home, his grid is FN03 and at his summer place it is EN94.

WB2WIK in northern New Jersey is on 1-1/4 meters in a big way. Steve has a modified Microwave Modules transverter feeding a pair of 4CX250s providing a 600-W output to a 17-element Boomer at 65 feet. He is very desirous of a schedule with anyone south of North Carolina and west of the Mississippi. In his first few days on the band, he has already worked all of the closer-in states and has had a lot of reports on the strength of his signal.

70 cm — The *432 and Above News*, published by K2UYH, is always so packed with detailed information that it is often difficult to extract a succinct account of what is being accomplished on moonbounce. However, the January issue contains such an account. In summarizing the accomplishments of DL9KR during November and December, the report mentions that Jan worked several new stations to bring his total to 158, but it was the signal reports noted for some of his contacts that caught this conductor's attention. In a cw contact with Z25JJ, formerly ZE5JJ, 569s were exchanged. Upon switching to ssb, reports were 4 × 5. K9HMB, WBØTEM, I5MSH and W7GBI were also worked, with all reports 559 both ways. Several other stations were contacted, with somewhat lower signal reports ranging down to the "0s" that we are more accustomed to on EME. Reports on 559 and above certainly attest to the maturity of the mode and show that useful information can be transmitted via EME. Another way this fact is being demonstrated is in some of the work being done on 23 cm, where half-hour ssb QSOs have taken place.

According to W3IWI, it now appears that the 70-cm portion of the EME tests from the National Radio Astronomy Observatory at Green Bank, West Virginia, mentioned in February's column, will be held the weekend of May 14 and 15. It appears that lack of time, people and equipment have caused cancellation of the anticipated 2- and 1-1/4-meter tests. QST

Well-known 6-meter and OSCAR operators Paul, OA8V, and his 17-year-old son Curtis, OA8CW. Their QTH is in the Peruvian jungle at the headwaters of the Amazon River.

Strays

Dave Jaksa, WØVX, manager of the General Purpose HF Products Division of Collins-Rockwell, recently visited W1AW and left a brand-new KWM-380 to be used at one of the visitor's operating positions. Bruce Kampe, WA1POI, of the W1AW staff, puts the rig through its paces.

New Books

☐ *Radio Handbook*, Twenty-Second Edition, by William Orr, W6SAI. Published by Howard W. Sams & Co., Indianapolis, IN 46268, book no. 21874. Hard cover, 6-3/4 × 9-1/2 in., 1200 pp., including index, $39.95.

It's unlikely that any amateur with tenure is unaware of what some of us have fondly called the "West Coast Handbook" or the "big Handbook" for many years. The *Radio Handbook*, as it is properly referred to, has been around for a long time, and it has served the interests of active hams and engineers in an admirable manner. Having earned the title of "old coot" in amateur experience and the electronics industry, I have read every edition of Orr's book. I go back even farther to the forerunner of the present publication, with fond recollections of the "Frank Jones Handbook." So, when a review copy of the 22nd edition of *Radio Handbook* arrived at my home, I knew I would have several evenings of "fun reading" to enjoy, and I did!

Having been the senior editor of *The Radio Amateur's Handbook* for a number of years, I was able to appreciate again the great task that handbook editors must face each time a new edition is made ready for the presses. Bill and I had discussed this in person a number of times over the years, shedding a few collective tears in the process. It is not easy to do a "percentage revision" without some penalty to the book continuity, which can ultimately lead to what some may call a "patchwork quilt." I detected no such problems while perusing the 22nd edition.

The strength of the *Radio Handbook* has always been those chapters that deal with power amplifiers. Countless examples of linear power amplifiers for hf, vhf and uhf (vacuum tube and solid state) occupy a large part of the publication. The editor and some of his colleagues are employed by Eimac, a division of Varian, which is a major U.S. source of design and applications data for high-power rf amplifying devices. So, the designs are developed by experts, which should ensure top performance if the circuits are duplicated exactly.

The sections in the book that treat receiver design and construction have been updated to include information on dynamic range and other topics of current import. An in-depth theoretical presentation is given for each stage of a superheterodyne receiver, inclusive of circuit examples for the discrete receiver sections discussed. Numerous practical examples of communications receivers are included for those who wish to "do it from scratch."

Attention is given in the new *Radio Handbook* to specialized amateur modes such as fm/repeaters, OSCAR, moonbounce, RTTY, SSTV, FAX, spread spectrum and even NBVM. The chapter is followed by an excellent one that deals with TVI and RFI.

The balance of the book is pretty much akin to *The Radio Amateur's Handbook* with respect to chapter titles and the topics treated. The notable exception is a 50-page section on electronic mathematics and calculations, which is not found in the League's handbook. This part of the book should be useful to those who are a bit "thin" on the fundamental math needed to pass license exams and to execute design equations.

The paper weight chosen for the *Radio Handbook* is such that there is some show through of printed matter from the opposite side of each page, but it is not unlike the same condition that prevails today with some references, including the professional literature. The opposite-side printed matter and graphics are not prominent enough to detract from the intended print or artwork on the desired pages.

Narration stands out sharply on the off-white paper, making it easy to read (even for us old coots!). Some of the photographs are a trifle "washed out," while others are muddy (dark), but this is also a sign of the times in the printing industry. Heavyweight coated paper is pretty much a thing of yesteryear — unless the consumer is willing to pay, say, $50 for a book that might otherwise cost $20! I doubt that many amateurs are that interested in top-quality paper.

In summary, I think the *Radio Handbook* is a bargain at the asking price, and it deserves a spot in every Amateur Radio library. If you're a professional engineer or technician (broadcasting included), you may want a copy of the volume for use at work, too. — *Doug DeMaw, W1FB*

☐ *Apple® Interfacing*, by Jonathan S. Titus, David G. Larsen and Christopher A. Titus. Published by Howard W. Sams & Co., Inc., Indianapolis, IN. First edition, 1981. Softbound, 5-1/4 × 8-1/2 in., 206 pp. including index, $10.95.

While the title may lead you to believe that this book is strictly for owners of the popular Apple® computer, you'll find this is not so. As with many other such publications, the information presented may be generally useful.

The first four chapters contain a lot of information that can be applied to any computer using a 6502 microprocessor. Some 6502 IC operational basics are presented, along with discussions of memory and I/O addressing and decoding, assembly and BASIC languages, binary and decimal numbering, flags and interrupts, and the use of decoders and comparators.

From Chapter 5 on, the information leans more specifically toward the Apple® computer, but still should be of interest to owners of other computers. It is in Chapter 5 that the breadboard is brought into play and the "hands on" of I/O interfacing begins. The authors developed a pc board containing all of the necessary circuits used in their presentation of interfacing circuits. It may be a bit awkward for many to duplicate such a board because: (1) it is double-sided in construction; (2) although pc patterns and parts overlays are given, the artwork is reduced in size. However, the board may be purchased (no price is given) or wire-wrap techniques and perf-board construction could be used to develop a workable facsimile.

The examples and problems involving interfacing given in the text should provide you with hours of experimenting fun. You'll find there are a lot of interesting and exciting applications for your Apple® computer aside from keeping records and playing games. — *Paul K. Pagel, N1FB*

☐ *An Introduction To Microcomputers: Volume 0 — The Beginner's Book*, by Adam Osborne and David Bunnell. Published by Osborne/Mc-Graw-Hill, 2600 Tenth St., Berkeley, CA 94710. Third edition, 1982. Softbound, 7-3/8 × 9-1/4 inches, 233 pages, $12.50.

Are you at ground level when it comes to understanding microcomputers? Don't know anything about them and anxious to find a well-written text that'll help you learn about 'em? Well, you can't get closer to a beginning than volume zero of a book, can you?

If you've never read an Osborne book before, you'll first note the difference in the way the text is printed. Bold-face type is used to highlight important areas and summarize major subject matter. Text in light-face type expands the information. This format allows you to home in on particular areas of interest and skip areas you already know. If you want the extra detail, dig into the text in light-face type. Key words are offset in the left margin.

Volume 0 begins with a general description of computers, their make-up and how they operate. Those first 43 pages are liberally sprinkled with photographs and drawings to aid in understanding the text.

Choosing A Microcomputer, the topic of Chapter 2, is a must. Don't skip it, especially if you haven't purchased a personal computer. If you've already bought a computer, you may wish you'd read this chapter first! I would take exception to one statement in the chapter: "Video game microcomputers have not sold well . . ." Perhaps they weren't at the time the book was written, but at the time of this review, many such units were selling *very* well.

Software is discussed generally in Chapter 3. Then you're down to the basics of number systems, computer logic and Boolean operations.

You'll really feel like you're getting somewhere by the time you hit Chapter 5. You're now "inside a microcomputer." Interpreters, compilers, assembly language — their advantages and disadvantages are discussed here. You'll also be introduced to instructions and instruction sets, memory locations and addresses, and the CPU itself.

All this information is put together in Chapter 6. This is perhaps the most difficult chapter of the book, and you should take your time studying it. Here you form the foundation for learning how the microprocessor operates. Appendix A provides you with an understanding of how information is stored on floppy disks and cassette tapes.

This book lends itself well to the inclusion of chapter-end quizzes. Unfortunately, there are none. To me, the quizzes would be a welcome addition. Perhaps subsequent editions will include them.

With Volume 0 finished, you're ready to delve into deeper waters. Volume 1 is the next step. Have fun! — *Paul K. Pagel, N1FB*

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,
W9KDR

AMSAT RECEIVES $20,000 GRANT FROM ARRL FOUNDATION

The ARRL Foundation was established by the ARRL and chartered as a nonprofit corporation in the state of Connecticut. It has been granted tax-exempt status by the U.S. Internal Revenue Service. Its affairs are governed by a board of directors of distinguished radio amateurs as a separate entity from the ARRL. None of the directors are paid for their work with the foundation, and administrative expenses are covered by interest on invested funds. Further information on the ARRL Foundation is available on request. If you wish to make a tax-deductible donation to the ARRL Foundation Satellite Fund, send it to ARRL Foundation, 225 Main St., Newington, CT 06111.

AMSAT-OSCAR 8 New Mode Schedule

The OSCAR 8 operating schedule has been changed. Effective until further notice, OSCAR 8 will be available for general use on Sunday, Monday and Tuesday in Mode A. Wednesday will be Mode X, which is for authorized experiments or educational use and battery recharge. Thursday, Friday and Saturday will be Mode J. OSCAR 8's mode schedule is determined primarily from the condition of the spacecraft battery. This is always the main concern, coming even before the needs of the users. Present battery conditions are the result of battery aging and higher operating temperatures. (Batteries aboard both OSCARs 6 and 7 failed from "heat exhaustion," not from discharge or voltage fluctuations.)

OSCAR 8's designers predicted that the maximum sunlight exposure period would be during 1982 and 1983. During the peak sunlight exposure period of January 1982, OSCAR 8 was operated in continuous dual Modes A plus J for nearly six weeks to drain off excess charging currents. This is one of the few "countermeasures" we have to reduce battery temperatures caused by overcharge during these periods. January 1983 did not have the hot period like last year, but it has been on the borderline. In the next few years, the new Mode schedule should help maintain cooler battery operating temperatures.

We are very fortunate to have an excellent team of OSCAR 8 command stations who volunteer their time to keep the battery "healthy." Without these dedicated amateurs making daily checks and sending commands to the spacecraft systems, OSCAR 8 would have been a Silent Key long ago. Many amateurs would like to have every operating day Mode J, and we would like nothing better. Before we think of our personal needs, let's take a good look at the needs of OSCAR. You can help by keeping an eye on the telemetry and sending us your reports so there is enough documentation from around the world to help us make the right decisions. Let's keep OSCAR 8 healthy as long as possible.

VITA-AMSAT-PACSAT

VITA (Volunteers In Technical Assistance), a nonprofit organization providing customized technical assistance for nearly 25 years, has joined forces with AMSAT's PACSAT satellite program. PACSAT will carry twin repeaters, each with separate, switchable uplink and downlink frequencies, and an onboard computer with more than 1 megabyte of solid-state memory. The satellite will be able to communicate in a digital format with ground stations worldwide at least twice a day. The communications protocol will be automated and will support both store-and-forward and instantaneous communications.

Design work on the system has begun, with support from VITA. Additional funding will be obtained from other sources. Design, construction, testing and spacecraft integration will take about 18 months. Launch is projected for late 1984 or early 1985.

The PACSAT satellite system will connect a grid of Amateur Radio ground stations and ground-based networks around the world using packet networking techniques to merge several sets of users at the same time. This channelization will link all users together and make the best possible use of the frequency spectrum.

Construction of a complete spacecraft system is related to a launch possibility from the NASA Space Shuttle, employing the popular and inexpensive GAS (Get Away Special) package. The user is provided with a canister that may be controlled from the shuttle command area. The shuttle launch makes necessary onboard propulsion, which provides the extra energy required to place the satellite in the desired orbit.

The success of the PACSAT satellite system depends on the skills of a large number of volunteers, performing both technical and operational tasks. AMSAT will provide highly qualified designers for the required equipment, programming and general systems design. VITA will coordinate the efforts of the VITA volunteers, staff and others in remote areas being serviced. VITA will be responsible for raising funds, and will be generally responsible for project implementation to donor agencies. While officially a subcontractor, AMSAT will assume a co-managerial role with VITA, with autonomy in administration of technical aspects, coordinating with VITA as necessary and handling the very high level of documentation required for such efforts.

VITA has a worldwide network of more than 4000 expert volunteers, a paid technical staff, document-exchange agreements with more than 200 development agencies and organizations, and over 100 technical publications. Monthly international broadcasts on specific technologies or projects are held on the Voice of America Breakfast Show by VITA staff and volunteers, during which follow-up inquiries by mail are encouraged. VITA's Amateur Radio station participates in a weekly gathering of VITA volunteers and others who are also hams, discussing development issues and technologies, particularly microcomputer applications. (Thanks to Gary Garriott, WA9FMQ, VITA Senior Technical Advisor.)

*OSCAR Program Manager, ARRL

ARRL Foundation President Robert York Chapman, W1QV (left), presents a check to AMSAT Chairman of the Board Col. John W. Browning, W6SP. This Satellite Fund grant was made possible by donations that were matched with the $10,000 authorized by the ARRL Board of Directors at their March 1982 meeting (Minute 106).

Satellite Listening Post

The times and dates (Central North America Time Zone, not UTC) shown below are approximate. During these weekend periods, you can listen to amateur communication on the 10-meter downlinks between 29.300 and 29.500 MHz.

April 2 - 3 — 10:00-11:30 P.M. and 8:30-10:00 A.M.
April 9-10 — 9:50-11:10 P.M. and 7:30- 9:00 A.M.
April 16-17 — 9:30-10:50 P.M. and 6:30- 8:00 A.M.
April 23-24 — 9:10-10:30 P.M. and 5:50- 7:00 A.M.

Monthly Listings

☐ *ASR* (Amateur Satellite Report) is available for $18 ($25 overseas) for 26 issues (1 year) from Amateur Satellite Report, 221 Long Swamp Rd., Wolcott, CT 06716.

☐ Project OSCAR 1983 Annual Orbital Predictions for every orbit of AMSAT-OSCAR 8 and RADIOs 5, 6, 7 and 8 are available for $10 postpaid in Canada, Mexico and the U.S.; $12 elsewhere. Send to Project OSCAR, Inc., P.O. Box 1136, Los Altos, CA 94022.

☐ ARRL members only: Send a 4- × 9-in. self-addressed, stamped envelope with your call sign to ARRL Hq. Club and Training Department for a complete, monthly orbit schedule for all operating amateur satellites. A year's supply of s.a.s.e.'s may be sent at one time; be sure to include 1 unit of postage for each s.a.s.e.

☐ Further information on the Amateur Radio Satellite Program can be obtained free of charge from ARRL Hq. The OSCARlocator package (satellite plotters and details) is now available for $7 U.S., $8 elsewhere.

Strays

THANKS!

☐ When AUTOCODE donated an ATS-4 repeater identifier board to ARRL for use in a construction project involving WIAW/R, we had intended to publish the project. The ATS-4 worked flawlessly; unfortunately, the rest of the project didn't. For that reason, we never published the article, but we'd like to thank AUTOCODE for the generous donation. — *Pete O'Dell, KB1N*

160-METER BULLETIN AVAILABLE

☐ "Top band" operators might be interested to know that the *West Coast 160 Meter Bulletin*, published six times a year, contains DX information, operating hints and construction projects. For more information, write to Dennis Peterson, N7CKD, Editor, West Coast 160 Meter Bulletin, 4248 A St., S.E., Box 609, Auburn, WA 98002.

I would like to get in touch with . . .

☐ members of the Bull Ring net in southern Indiana in the 1950s. Clarence Ridgely, W9GX, 918 N. Main St., Princeton, IN 47670.

☐ any hams who are interested in starting a mobile cw net. Warren Reese, WB6TMY, P.O. Box 4694, Santa Rosa, CA 95402.

☐ anyone who has a power transformer protection circuit that they have used on the Hallicrafters HT-37 transmitter. Paul Kemp, WB0CJB, 1025 E. Loula, Olathe, KS 66061.

QST congratulates . . .

☐ Dr. Harold N. Walgren, K9EDE, of Hinsdale, Illinois, on being promoted to the rank of Colonel, Illinois Air National Guard, and being awarded the aeronautical rating of Chief Flight Surgeon, U.S. Air Force.

Club Corner

Conducted By Sally O'Dell,* KB1O

THE GOLD RUSH OF '83

The fledgling Special Service Club (SSC) Program kicked off on March 1, 1983, only a few short weeks ago. Ever since, the telephones in the Club Branch at Headquarters have been ringing off the hook as the "Goldrush" built up steam. Your response has been heartening and we're all eagerly rushing to accommodate your needs in this renewed spirit of working together in pursuit of our common goals. In what's shaping up to be a mad scramble, however, let's not lose sight of what we're all trying to accomplish.

Rooted in the work of the Long Range Planning Committee, the SSC Program is the second half of ARRL's recent field organization restructuring. As of the first of this year, most of our Section Communications Managers shifted the emphasis in their job responsibilities and became Section Managers. To work with them in accomplishing ARRL's ambitious objectives, a few new field offices were created and are now being staffed (see "New Life for ARRL Sections," June 1982 *QST*, pages 53-55).

Recognizing that (1) a bi-national organization's headquarters is best suited to handle or coordinate work on certain wide-ranging national issues and projects, (2) local groups are best able to handle certain local or regional problems and responsibilities, and (3) ARRL's affiliated clubs are potentially a tremendously valuable resource to the health of the Amateur Radio service, the SSC Program was created as the second phase stemming from the LRPC's work. Those local affiliated clubs who are willing to tackle the responsibilities will, with the assistance of their Affiliated Club Coordinators (ACCs) and Headquarters, develop ongoing programs that will make them more effective locally and create a much stronger local presence for Amateur Radio (see "You and Your Special Service Club," December 1982 *QST*, pages 62-64).

Now, in April, with forms and guidelines in hand, many of you are asking, "Can we do it? Do we want to strengthen our presence locally? Will we be the first? What about the folks across town?" Competition *can* be healthy. Competition can also interfere with achieving mutual goals in the same area. If we're all striving toward the same ends, let's remember that the name of the game is cooperation.

*Club Program Manager, ARRL

Goldfields of New Hampshire

Though many radio club councils (regional federations of clubs) have worked together long and hard in years past, the New Hampshire Section most recently exemplifies the spirit of cooperation that will help Amateur Radio flourish in the years to come. A section-level federation of radio clubs, the New Hampshire Amateur Radio Association (NHARA) has formed under the new section structure. New Hampshire ARRL Affiliated Club Coordinator Peter Cantara, KI1M, with the assistance of other section League Officials, sparked the formation of NHARA. At a recent meeting, representatives of 16 New Hampshire clubs, some affiliated with ARRL and some not, laid the foundation of a cooperative effort of meeting the Amateur Radio needs of the section. (Other sections are developing similar coalitions that will be reported as their work progresses.)

Many of these clubs will undoubtedly become Special Service Clubs. Those who believe that their clubs do not have the resources to pursue SSC status alone are working on ways of accomplishing our mutual objectives cooperatively. Yes, smaller local clubs can band together and apply for the SSC Program jointly — discuss this option with your ACC. Is this an approach that would be attractive to your club?

All of our actively affiliated local-area clubs have been sent the necessary information to apply for SSC status. We urge you to discuss the program at your next club meeting. Invite your ACC to discuss the options with you. The SSC Program is a section-level program — the responsibility for jointly developing suitable projects lies with you and your ACC; approval of your proposed programs lies within the field organization: Your ACC, Section Manager and Director will work closely with you. Approval is *not* a Headquarters matter; we're here to support you in making your newly developed programs a success and in sharing news of your successes with other SSCs and candidates throughout the ARRL and CRRL.

We wish you well in your quest for the "gold" at the end of the SSC rainbow. With a sincere spirit of cooperation, everyone will be a winner!

Satisfactory Programs

What constitutes a satisfactory program under the SSC guidelines? That's a matter to be worked out between you and your ACC. Quite simply, the answer lies in the underlying question: Is the program you propose in any of the areas a sincere effort to improve your effectiveness locally?

For example, under emergency communications, what constitutes satisfactory performance? Your ACC will probably look at whether your club members will all know what to do in case of an emergency situation, know where they fit into the local Amateur Radio emergency communications picture, and know how to behave in a tightly controlled emergency net. Furthermore, your efforts as a club or as individuals who belong to a club should have well-defined responsibilities within your local, section or county emergency preparedness program. Finally, your community should know of your capabilities — long before the emergency happens.

If you already have a strong emergency preparedness capability in your area, don't compete — work with the group in a cooperative effort; increase their resources. If you do not have an effective emergency communications capability, take the bull by the horns and develop one. Again, work together to improve the local situation.

The same rule of thumb applies to other areas under the SSC guidelines. Your ACC is the one to contact. — *Steve Place, WB1EYI*

Strays

The Bureau Radio Amateur Signal Society of the National Bureau of Standards (NBS-BRASS), in Gaithersburg, Maryland, helps Liz Zandonini, W3CDQ, of Washington, DC, celebrate her 84th birthday. Liz has held the same call since 1921 and is still active on the cw end of 10, 15 and 20 meters. Joining in the celebration are (l-r): ARRL President W4KFC, Atlantic Division Director W3ABC and BRASS President K3ZNV.

FREEMAN GOSDEN, EX-W6QUT

☐ Freeman Gosden, who for 32 years was known as "Amos" to listeners of the popular radio show *Amos and Andy*, became a Silent Key on December 10, 1982. Active on the amateur bands in the late 1940s, Gosden was licensed as W6QUT.

I would like to get in touch with . . .

☐ anyone who was a member of R&M Company, 51st Signal Bn. Corps, APO 358, from late 1951 through 1952. John M. Korns, WØUSL, 1101 Vale St., Sandwich, IL 60548.

☐ any amateurs who are Class 8 truck salesmen and are interested in joining a net. Send most convenient times, dates and frequencies to Mike Henderson, WD4HBZ, P.O. Box 4569, Montgomery, AL 36101.

☐ any amateurs who served in the 838th/843rd Signal Service Bn. during WW II. Glenn Markley, W8VLB, P.O. Box 1123, Mansfield, OH 44901.

☐ members of the Chicago Portage Park Radio Club between 1938 and 1941. Lee L. Toman, W3BIM (ex-W9BIM), RD 3, Box 141, Quakertown, PA 18951.

QST congratulates . . .

☐ Terry Ussher, VE3AWE, of Ontario, on receiving the Public Service Medal from NASA and the U.S. Government for his work with the Remote Manipulator System (RMS) developed by Canada for the NASA space shuttle flights.

Hamfest Calendar

By Marjorie C. Tenney,* WB1FSN

California: The 34th annual International DX Convention, jointly sponsored by the Northern California and Southern California DX Clubs, will take place at the Visalia Holiday Inn Hotel, Visalia, on Friday and Saturday, April 22-24. Features include DXpedition reports, technical presentations, awards, contests, dining, hospitality-room congeniality. Slides, movies and videotapes will abound. Open forums will give everyone an opportunity to speak about DXings and contesting. Many overseas visitors are expected to attend. Manufacturers and distributors will show the latest in radio gear. This year's event will be hosted by the Northern California DX Club. For further information, write to Northern California DX Club, P.O. Box 608, Menlo Park, CA 94025.

†**Connecticut:** The annual PVRA (Pioneer Valley Radio Assn.) flea market will be held on Sunday, April 24, at Penney High School, Forbes St., East Hartford, from 10 A.M. to 4 P.M. Admission is $1. Talk-in on 19/79. For info and reservations, contact K1WWI, Plains Rd., Haddam, CT 06438, tel. 203-345-2281.

Georgia: The Kennehoochee ARC will hold its anual spring hamfest at the Cobb County Civic Center, corner of Clay and Fairground Sts. in Marietta, on Sunday, April 17, from 9 A.M. to 4 P.M. Indoor space is available for dealers and flea market, also outdoor flea market space. Concession stand on premises and plenty of parking. Talk-in on 28/88 and 52. For further information, contact John Ellis, W4MRJ, 15 Whispering Way, Atlanta, GA 30328, tel. 404-252-3779.

†**Georgia:** The Albany ARC, Inc., hamfest will be held on May 7 at the U.S. Army National Guard Armory building in Albany. Tickets $1. Table space available. For further information, contact John Crosby, K4XA, 2506 Devon Dr., Albany, GA 31707.

Illinois: The 17th annual Rock River ARC Hamfest will be held on Sunday, April 10, at the Lee County 4-H Center, one mile east of the junction of Rtes. 52 and 30. Camping space available at nominal charge. Tables available (6 ft) at $5. Advance-ticket donation $2, at gate $2.50. Breakfast and dinner will be served. Talk-in on 37/97. Doors open at 6:30 for dealers and 7:30 for general public. For more information and advance tickets, write to Ed Webb, WD9CJB, 618 Orchard St., Dixon, IL 61021, or call 815-284-3811.

†**Illinois:** The Moultrie Amateur Radio Klub (MARK) hamfest will be held at the Moultrie County 4-H Center Fairgrounds, Cadwell Rd., five miles east of Sullivan, on April 17, from 8 A.M. to 3 P.M. Heated indoor and large covered outdoor flea market. No charge to vendors. Space on a first-come, first-served basis. Lunch available. Vendors can set up on Saturday. No overnight hookups. Talk-in on 655/055 and 52. For more information, call or write to Roger Rice, 1520 Harrison, Charleston, IL 61920, tel. 217-345-9501.

Illinois: A hamfest swap and shop will be held on Sunday, May 1, at the Sandwich Fairgrounds, Sandwich. This event is sponsored by the Kishwaukee Radio Club. Tables are $3 each. Overnight camping is available — no hookups. Advance tickets $2.50. Talk-in on 13/73 and 52. For more information, contact Howard Newquist, WA9TXW, P.O. Box 349, Sycamore, IL 60178.

†**Illinois:** The Centralia Wireless Assn., Inc., hamfest will be held in the Kaskaskia College Gymnasium, Centralia, on May 1, from 9 A.M. to 2 P.M. Food and drink available. Doors open at 7 A.M. for flea market and exhibit display set up. No charge for space. Limited number of tables provided on first-come, first-served basis. Tickets are $1 each, or 6 for $5. Mail ticket orders with an s.a.s.e. to Centralia Wireless Assn., Inc., Hamfest Tickets, P.O. Box 1166, Centralia, IL 62801. For further information, contact Bud King, WB9QEG, at 618-532-6606, Lou Hodges, W9IL, at 618-533-4724, or write to CWA, Inc., at the above address.

†**Kentucky:** The Paducah ARA annual swap/hamfest will be held in the Paducah Parks and Recreation Civic Center Bldg., 2701 Park Ave., Paducah, on April 10, from 9 A.M. to 3 P.M. (CST). Doors open to vendors at 8 A.M. Admission is $2, including limited table space. Other tables available. Varied activities planned. ARRL booth. Concessions within building. Talk-in on 66/06. For further information, contact Bill Webb, KS4V, Rte. 2, Box 224, Olivet Church Rd., Paducah, KY 42001, tel. 502-444-6485.

†**Louisiana:** The Baton Rouge ARC will hold its annual hamfest on Saturday, May 7, from 9 A.M. to 5 P.M., and Sunday, May 8, from 9 A.M. to 3 P.M., at Catholic High School, 855 Hearthstone Dr., Baton Rouge. Forums, swap tables, dealers and refreshments. Talk-in on 19/79 and 28/88, and 52. For further information, write to BRARC, P.O. Box 4004, Baton Rouge, LA 70821.

Massachusetts: The Wellesley ARS is conducting its annual auction on Saturday, April 16, at the First Congregational Church of Wellesley Hills, 207 Washington St., (at the intersection of Rtes. 9 and 16). Doors open at 9 A.M.; auction starts at 10 A.M. (15% commission; $1 minimum, $30 maximum.) Talk-in on 04/64 and 63/03, and 52. Contact Kevin P. Kelly, WA1YHV, 7 Lawnwood Pl., Charlestown, MA 02129.

Massachusetts: The Framingham ARA will hold its 8th annual Spring Flea Market on Sunday, April 10, in the Framingham Civic League Bldg., 214 Concord St. (Rte. 126), Framingham. Doors open at 10 A.M.; sellers may set up at 8:30. Admission is $2, and tables are $10; pre-registration is required. Talk-in on 75/15 and 52 direct. Radio equipment, computer gear, bargains galore. Contact Ron Egalka, K1YHM, 3 Driscoll Dr., Framingham, MA 01701.

Massachusetts: To celebrate its 52nd anniversary in Amateur Radio, the South Shore ARC of Braintree will hold an indoor flea market on Sunday, April 17, at the Viking Club, 410 Quincy Ave., Braintree, from 11 A.M. to 4 P.M. There will be 8-ft tables available for $10 each (which includes one free admission), paid for in advance by sending the appropriate amount to Ed Doherty, W1MPT, 236 Wildwood Ave., Braintree, MA 02184. Checks should be made payable to the South Shore Amateur Radio Club. Confirmation of check receipt will be sent. No cancellation refund after April 14. Viking Club will open to vendors at 10 A.M.; doors open to public at 11 A.M. Admission $1. All tables sold out last year — don't be disappointed. Questions? Call Ed, W1MPT, at 617-843-4431 evenings.

Michigan: The Southeastern Michigan ARA (SEMARA) will hold its 25th annual hamfest-swap and shop, April 10, from 8 A.M. to 3 P.M., at Grosse Pointe North High School, Vernier Rd., between Mack and Lakeshore. Admission is $1 in advance, $2 at the door. Talk-in on 75/15. For further information, please send an s.a.s.e. to: SEMARA Swap, P.O. Box 646, St. Clair Shores, MI 48083, or call Ray Ninness, WD8KXN, 313-777-0119.

Minnesota: The Bemidji ARC will hold its hamfest on April 23 at the Holiday Inn Convention Center, Hwy. 2 West, Bemidji. Swap tables available. Talk-in on 13/73. For more info, send an s.a.s.e. to Jerry Pottratz, WBØMSH, Rte. 8, Box 585, Bemidji, MN 56601.

Minnesota: The Arrowhead Radio Amateur Club will hold its annual swapfest on Saturday, May 7 at the Holiday Inn, 207 West Superior St., Duluth. Admission is $2.50 in advance or $3 at the door. Reserved 4-ft tables are $3.50 in advance, $4 at the door. Doors open from 10 A.M. to 3 P.M. Food; free parking in the ramp. Talk-in on 34/94. For more information, advanced reservations, room discount, information and tickets, send an s.a.s.e. to Jerry Frederick, NØBNG, 1127-104th Ave. West, Duluth, MN 55808. Make it a weekend away in Duluth!

Nebraska: The AK-SAR-BEN ARC, Inc., will hold their annual auction on May 8 at the American Legion Post 374, 4760 South 135 St., Omaha. Equipment check-in starts at 8 A.M.; auction starts at 9. For additional information, send an s.a.s.e. to Jim Sanford, NØAIH, 9718 Jaynes St., Omaha, NE 68134.

†**New Jersey:** Annual Flemington Hamfest will be held on Saturday, April 9, from 8 A.M. to 4 P.M., at the Hunterdon Central High School Field House. Gigantic flea market with 20,000 square feet of heated indoor space, 200 tables, major manufacturers and more. Flemington is located at the intersection of Rtes. 202 and 31, just 10 miles south of I-78 between NYC and Philadelphia, and is a tourist area. Talk-in on 52 and 147.375, 147.015, 224.12 and 224.54. Admission is $3 donation. For reservations or information, call 201-788-4080, or write to Cherryville Repeater Association, c/o W2FCW, Box 76, Fairview Dr., Annandale, NJ 08801.

†**New Jersey:** The Bergen ARA is holding a Ham Swap 'n Sell on May 1, 8 A.M. until 4 P.M., at Bergen Community College, 400 Paramus Rd., Paramus. Tailgating only. Bring your own tables. Sellers $3; buyers, free. Thousands of spaces. Talk-in on 79/19 and 52. For more info, contact Jim Greer, KK2U, 444 Berkshire Rd., Ridgewood, NJ 07450, tel. 201-445-2855.

New York: Suffolk County Radio Club all-indoor flea market will be held Sunday, May 1, 8 A.M. to 3 P.M. at Republic Lodge No. 1987, 585 Broadhollow Rd. (Rte. 110), Melville, Long Island. Free parking and refreshments. General admission is $2; wives and children under 12 free. Sellers tables are $7, and includes one admission. Talk-in on 144.61/145.21 and 52. For additional information, contact Richard Tygar, AC2P, tel. 516-643-5956 evenings.

†**New York:** STARC 24, the 24th annual hamfest sponsored by the Southern Tier ARCs, will be held on May 7 at the Treadway Inn, Rte. 17C, Owego. Flea market opens at 8 A.M.; activities close about 9 P.M. Flea market, technical talks, commercial displays. Evening dinner available for $14 with advance registration. Talk-in on 16/76 and 22/82, and 52 simplex. For information and reservations, write to STARC, P.O. Box 112, Endicott, NY 13760, tel. 607-625-3797.

†**North Carolina:** The RARS Hamfest, sponsored by the Raleigh Amateur Radio Society, will be held at the Crabtree Valley Mall, Raleigh, on April 17, from 8 A.M. to 4 P.M. Hospitality room on April 16, from 7 P.M. to 10 P.M. Flea market admission is $4; table rental is $5. Covered flea market, special interest meetings, cw contest, homebrew contest. No charge for flea market space. Talk-in on 04/64 and 28/88. For further information, write to RARS Hamfest, P.O. Box 17124, Raleigh, NC 27619, tel. 919-779-0266.

Ohio: The 14th annual B*A*S*H will be held on Friday night of the Dayton Hamvention, April 29, at the Convention Center, Main and Fifth Sts. Parking is adjacent City Garage. Admission is free to all. Sandwiches, snacks and C.O.D. bar available. Live entertainment for a super social evening. Don't miss it. For further information, contact the Miami Valley FM Association, P.O. Box 263, Dayton, OH 45401.

Ohio: Dayton HAMVENTION — Hara Arena and Exhibition Center, Dayton, April 29-May 1. Technical forums, ARRL and FCC forums, GIANT 2-day flea market on Saturday and Sunday, new products and exhibits, grand banquet, special group meetings and much, much more. Admission: $7.50 in advance, $9 at door (valid for all three days). Banquet $14 in advance, $16 at door. Flea market space $15 in advance (valid for both days). Make checks payable to Dayton HAMVENTION, Box 2205, Dayton, OH 45401. For special motel rates and reservations, write to Hamvention Housing, 1406 Third National Bldg., Dayton, OH 45402. No reservations accepted by telephone. All other inquiries, write to Box 44, Dayton, OH 45401, or tel. 513-849-1720.

Oklahoma: The Lawton Fort Sill ARC annual Founders Day Hamfest and Computer Mart will be held on April 16-17, at Montego Bay Motel, Gore and Pioneer Expy., Lawton. Activities include swap-shop, new and used equipment, ARRL presentations, SSTV and computer demonstrations, food and lots of good fellowship. Talk-in on 28/88. Further information by writing to Lawton Fort Sill ARC, Box 892, Lawton, OK 73502.

Oklahoma: The Green Country Amateur Radio Swapfest (and family "mini vacation"), sponsored by the Broken Arrow ARC, will be held at the Western Hills Lodge, 6 miles east of Wagoner, at Sequoyah State Park (off Hwy. 51), on Saturday, May 14, from 9 A.M. to 5 P.M., and Sunday, May 15, from 9 A.M. to noon. Opens at 7 A.M. Saturday for dealers and swap table set up only. Admission $3 includes both days; Sunday only, $1. Table space $10 at the door (if available, includes one admission) or $7 if pre-registered. Write to Broken Arrow ARC, P.O. Box 552, Broken Arrow, OK 74012, for information. For lodging, write to Western Hills, Box 509, Wagoner, OK 74467. Talk-in on 52.

Oklahoma: The Great Plains ARC 2nd annual Northwest Oklahoma Eyeball QSO and Swapmeet will be held in Moreland on Sunday, May 1, starting at 9 A.M. Admission is $1.50. Dinner at noon; dealers present. Talk-in on 7260, 147.12 and 52. For further information, call 405-994-5453.

Pennsylvania: The Downingtown High School ARC Hamfest will take place April 16 at the Downingtown Senior High School, intersection of Rtes. 30 Bypass

†ARRL Hamfest
*Convention/Travel Coordinator, ARRL

and 322. Open for sellers 7 A.M.; others 8 A.M.-4 P.M. Parking $2. Tables: indoor, $4; outdoor, $3; tailgating, $2. Talk-in on 146.985 and 52. For info and reservations, call Jeff Buller, KA3IAE, tel. 215-269-3042, or Bill Worthington, N3CQU, tel. 215-269-6374.

†**Pennsylvania:** The Horseshoe ARC, Blue Knob Repeater Assn., Bedford County ARS, Mountain ARC and Somerset County ARC will jointly sponsor a hamfest on April 10, at the 4-H Building, Bedford Fairgrounds, Bedford. Admission is $3.

South Carolina: The Greenville Hamfest, sponsored by the Blue Ridge ARS, will be held at the American Legion Fairgrounds, White Horse Rd., 1/2-mile north of I-85 in Greenville, on Saturday, April 30, and Sunday, May 1. Admission will be $3. Talk-in on 01/61 and 223.46/224.06. For further information, write to Hamfest Chairman, Phil Mullins, WD4KTG, P.O. Box 99, Simpsonville, SC 29681. For advance sales, write to Mrs. Sue Chism, Rte. 6, 203 Lanewood Dr., Greenville, SC 29607.

†**Tennessee:** The Oak Ridge Hamfest, sponsored by the Oak Ridge ARC, will be held in the Civic Center, Oak Ridge, on April 16, from 8 A.M. to 5 P.M. (EST). Admission $2; children under 14 free with parent. Large indoor dealer display, electronics flea market, forums, concessions and computers. Within easy walking distance you will find the city flea market, museums, parks, shopping and restaurants. Talk-in on 28/88 (147.72/.12 backup) and 52. For more information, write to Bob Madewell, KA4UOV, Rte. 2, Box 203A, Heiskell, TN 37754, tel. (day) 615-522-5183 or (night) 615-457-5516

Texas: The Tideland ARS (TARS) will hold their Spring-Fest 1983 at the Fairgrounds in League City, on Saturday, April 16. Set up on Friday, April 15. Doors open for set up at 7 A.M.; activities start at 9 A.M. Food available from 7 A.M. to 1 P.M. Swapfest, auction, dealers' displays, demonstrations and good fellowship. Plenty of room and parking. For information, contact T.A.R.S., P.O. Box 73, Texas City, TX 77590.

Virginia: On Sunday, May 1, the Lynchburg ARC will hold its annual swapfest at Brookville High School on Rte. 460 west in Lynchburg. Large covered tailgating area and plenty of food. Talk-in on 01/61. Details via P.O. Box 4242, Lynchburg, VA 24501.

†**Washington:** The annual Skagit Hamfest, sponsored by the Skagit ARC, will be held in the Bryant Grange Hall, Bryant (near Arlington), on April 16. Activities include vendor exhibits, computer displays, Jim Creek Radio Transmitter Tour, bunny hunts, banquet, flea market, country store, technical papers, ARRL meeting. Some camping facilities available. For further information, write to Norman Ray, W7LFA, 14005-132 Ave. N.E., Kirkland, WA 98033, tel. 206-821-2985.

Wisconsin: The 3F ARC Swapfest will be held on May 7, from 8 A.M. to 3 P.M., at the Neenah Labor Temple. Admission is $1.50 in advance and $2 at the door. Tables (4-ft) are $1.50 in advance and $2 at the door. Talk-in on 144.61/145.21. For information and advance reservations, write to Mark Michel, W9OP, 339 Naymut St., Menasha, WI 54952.

Wisconsin: Milwaukee Radio Amateurs Club Annual Spring Dinner Party will be held on Saturday at noon, May 7, at Heidel's Restaurant near Jackson. Advance reservations required. For more details information, send an s.a.s.e. to MRAC, 6415 West Leon Terr., Milwaukee, WI 53218. All interested persons invited.

Wisconsin: The Ozaukee RC will sponsor its 5th annual swapfest on Saturday, May 7, 8 A.M. to 1 P.M., at the Circle B Recreation Center, Hwy. 60, Cedarburg (20 miles north of Milwaukee). Admission is $2 in advance, $3 at the door. All 8-ft tables are $3. Sellers admitted at 7 A.M. for table set up. For tickets, tables, maps and more information, send an s.a.s.e. to 1983 Ozaukee Radio Club Swapfest, P.O. Box 13, Port Washington, WI 53074.

Wisconsin: The Milwaukee RAC annual auction of equipment and parts is Thursday, May 12, at 7:30 P.M., at the Wauwatosa Savings and Loan Bldg., 7500 West State St., Wauwatosa. Open to all hams and protégés. Free admission; no sales charges. No flea market dealers. Please tag all gear to be sold with seller's name and minimum opening bid. Our auctioneer is the inimitable Travis Baird, W9VQD. For further information, write to Milwaukee RAC, N50 W16328 Pin Oak Ct., Menomonee Falls, WI 53051.

Coming Conventions

April 9-10
Missouri State, Kansas City

April 15-16
Michigan State, Muskegon

April 15-17
Midwest Division, So. Sioux City, NE

April 23-24
Mississippi State, Jackson

ARRL NATIONAL CONVENTIONS

October 7-9, 1983
Houston, Texas

July 20-22, 1984
New York, New York

September 27-29, 1985
Louisville, Kentucky

MICHIGAN STATE CONVENTION
April 15-16, Muskegon

The Muskegon Area Amateur Radio Council will sponsor the Michigan State Convention and Hamfest at Muskegon Community College, a facility with free parking for over 2000 vehicles, dining/cafeteria services and clean, modern facilities.

Friday evening, April 15, will feature the Ham Hospitality in the Holiday Inn's Timberline Room (open to all). Also at the Inn, the Wouff Hong initiation will be put on by the MAARC players at midnight.

Saturday, April 16, at Muskegon Community College, doors/registration open at 8 A.M. The event features many technical forums, annual net meetings and commercial exhibits. Special CPR classes will be given during the day. Saturday's tickets are $3 each. No advance or mail ticket sales. Swap-and-shop table space may also be purchased on Saturday. Reservations are required for the evening dinner program. Overnight reservations should be made directly with the Holiday Inn or other motels in the Muskegon area.

For additional information, the Great Lakes Net will be monitored, or write to Joseph R. Sienkiewicz, N8DBP, c/o MAARC, Box 691, Muskegon, MI 49443.

MIDWEST DIVISION CONVENTION
April 15-17, South Sioux City, Nebraska

You are invited to attend the 1983 Midwest Division ARRL Convention, to be held at the Marina Inn, South Sioux City. The 3900 Club is the sponsor. The dates are Friday, April 15; Saturday the 16th, and Sunday the 17th. Talk-in on 2 meters; primary 37/97, standby repeater 31/91. Set-up time: Friday afternoon. Commercial exhibitors, exhibits and flea market will open at 6 P.M. Convention opens Saturday morning at 8 A.M. Some of the dignitaries scheduled to attend: Roy Neal, K6DUE, of NBC News, an expert on aerospace who was present at every major space launch and is now working on involving Amateur Radio in future space flights; ARRL President Vic Clark, W4KFC, on his first visit to Sioux City; Rick Palm, K1CE, a bright young star of the ARRL Hq. staff; Midwest Division Director Paul Grauer, WØFIR; Midwest Division Vice Director Dick Dyas, WØJCP; Dakota Division Director Tod Olson, KØTO; Handi-Ham System Director Bruce Humphrys, KØHR; and Leo Meyerson, WØGFQ, of WRL and QCWA fame.

A full program of convention activities has been planned covering all facets of Amateur Radio. To list a few: "Eyes of the Storm," by Ak-Sar-Ben Club of Omaha; "The Cable TVI Problem," a program designed for Novices; ARRL programs; and the ARRL Forum with all the dignitaries. There will be special programs designed for those not interested in Amateur Radio. All major manufacturers will be represented by their distributors. The flea market will be filled with bargains. Exhibitors include ARRL Zero QSL Bureau, Handi-Hams, QCWA, AMSAT, SM, SEC, Iowa Repeater Council, Sooland Repeater Assn., Midway Radio Club of Kearney, sponsors of 1984 Midwest Convention; Sioux Falls ARC, sponsor of the 1983 Dakota Convention, 3900 Club, ARRL and Air Force MARS. A QCWA Luncheon is scheduled for Saturday. A 3900 Club Breakfast will be held on Sunday morning along with the regular 3900 Club on-the-air meeting originating there. Wouff Hong initiation at midnight Saturday.

Make motel reservations through WØFZO; special rates apply with confirmation. For further information, contact Dick Pitner, WØFZO, 2931 Pierce St., Sioux City, IA 51104, tel. 712-258-1520. For tickets, write to MIDWEST CONVENTION, Jerry Smith, WØDUN, Box 14, Akron, IA 51001. Admission: convention *only*, $6 — good for all three days; banquet (Saturday night) and convention, pre-registration $16; banquet only, at gate $12.

MISSISSIPPI STATE CONVENTION
April 23-24, Jackson

The Jackson ARC will host the ARRL Mississippi State Convention on April 23-24 at the Raymond Road National Guard Armory. Activities include forums, net and special activity group meetings, dealer exhibits and flea market. Food will be available on-site both days.

Admission is free; swap tables are $5 each day. Hours are 10 A.M. to 5 P.M. on Saturday and 8 A.M. to 2 P.M. on Sunday. Headquarters hotel is the Holiday Inn Southwest, where special rates are available to attendees. Reservations should be made directly with the hotel (specify you are attending Jackson Hamfest). A hospitality room will be open at the hotel on Saturday night. Talk-in on 16/76 and 52.

For swap table reservations or further information, contact Butch Magee, KA5MTL, 2120 Belvedere Dr., Jackson, MS 39204, tel. 601-373-4325.

In Training

Conducted By Steve Pink,* KF1Y

EFFECTIVE YOUTH DEMONSTRATIONS

How to deal with young people — a perplexing problem? Amateur Radio's greatest potential for growth lies in the untapped ranks of people under the age of 15. These people can be attracted to our hobby easily, and one of the best ways to do so is through effective and interesting ham radio demonstrations. Cub Scouts, middle and high school groups, 4-H clubs and similar youth groups are always interested in seeing something out of the ordinary. Amateur Radio certainly fills the bill.

There are two types of Amateur Radio demonstrations: the temporary installation, and the at-home demo. Though we'll cover both types, their philosophy is identical.

A significant amount of planning is necessary before an effective demonstration is even begun. You'll have to visit the site. Scope out the antenna situation. Is there an open window near the wall socket? Can whatever trees or backstops that are around support wire antennas? Which bands should you operate on? This usually depends on the time of day of the demonstration, keeping in mind the antenna requirements and space available. At hf, 40 meters is usually the most effective during the day, while 75 meters is a sure bet for interesting contacts in the evening. To operate on 40, you will need a 70-foot spacing between supports; for 75 meters, you'll need about 130 feet. Unless you have an antenna tuner, your band(s) of operation should be decided during your site visit.

Once you know what frequency you want to operate on, you can build the antenna. The important thing to remember here is that the feed line usually has to be *long*. Measure or estimate the feed-line distance during the site visit. Just in case, bring along an extra coil of coax with connecters on each end. Remember: This is not a DXpedition — you can carry whatever you like in the back of your car. Don't worry about loading up. Another important detail to remember is to be generous with the guy wire. Because you will be putting up a temporary installation, long-term strength and reliability are not necessary; go the easy route and use 1/16-in. nylon twine. It's cheap and very easy to use over and over again.

The site visit is also the time to plan the physical setup of the station. Chances are that your demonstration will have been arranged by someone with connections at the place you'll be operating from. Use your contact to make sure that power and whatever desks and chairs you will need are available and plan where you want them during your site tour. Remember the need for adjacent ac socket and coax-cable holes. Always bring a three-conductor extention cord along. When making the site visit, *double-check;* ensure that the station requirements will be met.

More planning might be necessary: Will you be using a familiar rig? With the constant presence of trouble (Murphy) and the way things never seem to go right during a demonstration, eliminate the possible trouble spots early. A Transmatch is always useful in a temporary installation. If you can't get outside and you have to put the antenna within your transmitting room, matching devices are essential. You might consider "cheating" — arranging a contact before the demonstration. This eliminates the often-encountered "dead band condition" that commonly occurs just when you want to impress your audience the most.

On the day of the demo, arrive as early as you can. Putting up dipoles is never as easy as it should be, and you will want to give yourself enough time so that you don't have to rush. Set up all the equipment, check SWR, tune up, and arrange everything for maximum effectiveness.

Your Mind Set

At this point, the two types of demonstration, the portable and the home shack, are on equal par. For an effective demonstration to this very specialized but *very* important audience, a specific state of mind is essential. Unlike demonstrations at fairs, a presentation of Amateur Radio to youngsters should not be focused solely on traffic handling; nor should an in-depth technical explanation of *any* aspect of ham radio be given. (Remember: This is focused toward early and preteenagers.) The most thrilling and the most basic aspect of Amateur Radio is *communication.*

Although perhaps you and many seasoned hams have become somewhat jaded toward the basic act of picking up a microphone and speaking into it (no offense to you cw folks), for someone whose previous communications experience has been limited to speaking on a telephone or talking through paper cups linked with string the mere act of talking into a box and hearing an answering voice tens, hundreds or thousands of miles away is an indescribable feeling. Operating — *that* is the key to the young person's heart! You may think that a definition of sky-wave propagation or a blow-by-blow account of an antenna installation is the be-all and end-all of ham radio, but this is merely confusing verbiage to a young student who is just learning the difference between battery and ac sources of electricity.

Keep It Short, Keep It Sweet

Unless you give a very brief and simple introduction, you will lose your audience. For the introduction, position yourself so that the radio is behind you and the kids are arranged in a semicircle. Move quickly to where the action is. The drama of Amateur Radio lies in making contacts. On 75 meters, if you cannot hear anyone calling "CQ," try it yourself — a nice long call, with the addition of the phrase "for an Amateur Radio demonstration," or something to that effect. This usually results in a response. When you hear your own call sign, take a peek at the youngsters — they'll probably look almost hypnotized!

At your first opportunity, turn the mike over to one of the kids. You'll probably get a fast (*really* fast) "My name is _____. I am _____ years old," but they all want to talk. Gentle encouragement will help a lot here. If you have a speech processor, nowhere else will it be put to such good use. Young voices are high-pitched, and the ham at the other end of the circuit might have a hard time understanding them, particularly at the speeds at which youngsters speak. Make sure they speak directly into the microphone! Kids usually have a visual fascination with the rig itself, and their faces point in the same direction, so make sure the sound from those tiny mouths goes the right way. Ask the other ham how far away he is from your QTH. Play up how far away the station is — the farther the better. If possible, try to make a few more contacts. If need be, break in on a roundtable; 75 meters is full of them, and the old-timers are usually more than happy to preach the fun aspects of the hobby to your audience.

After you make a few contacts, take the opportunity to show off your QSL cards. A brief introduction, such as "but contacts aren't all we do. . .," and then a display of the more colorful and exotic cards from your collection is a real attraction. Many like to use the plastic card display holders; hold a package in one hand and point out specific cards with the other. Cards from the Soviet Union seem to be particularly interesting to young audiences. If you have a call-area map of the U.S., it will aid you in explaining prefixes; the time to explain is when you are asked how you know where a station is located (the question is inevitable). A colorful map of the U.S. suitable for such purposes is available from ARRL Hq. for $3.

Morse code, too, has its place in a demonstration to young audiences. You might first tune to the low end of 40 meters where the high-speed ops hang out. Explain the difference between spelling out every letter of each word (cw operation) and how much more time that takes compared to speaking out loud. Then mention that these skilled ops go a long way toward closing that gap. A commonly asked question at this point is how do people who speak languages other than English understand Morse code phrases? A satisfactory explanation might include an example of transliteration, as well as your telling the group that most hams 'round the world speak English, eliminating the problem altogether. You should also explain the universality of Q signals.

Now you should tune to a ragchew you can copy, and really pique the kids' curiosity. Verbally spell out the conversation as you hear each letter. If you can, write down what you are saying on a blackboard. The fantasy of musical tones (for that is what Morse code really is!) representing letters, words and concepts is an astonishing thing to people — especially youngsters — who have never been exposed to this sort of thing before.

If you have the time, try a few 2-meter contacts, which are especially effective if you have one of the new hand-held radios — the smaller the better — for you can explain that repeaters that retransmit weak signals with great power make such cigarette-sized radios highly effective for portable communications. If possible, make an autopatch.

At the end of the demo, ask for questions; you'll get quite a few! If you can meet the obligation, give a sales pitch. Ask how many kids are interested in getting their own license. You might have to answer a question or two about price. *Talk the cost down.* Ham Radio is not and *does not have to be* expensive. Used ssb gear goes for under $250, with much lower prices possible. Cw rigs can cost under $150 for a receiver and transmitter pair.

There you have it, a complete demonstration from beginning to end. Remember: Ham Radio generates its own excitement! — *Leo D. Kluger, WB2TRN, Recruitment Program Manager, ARRL*

*ARRL Training Program Manager

Strays

STRAY HINTS

☐ "Strays" are those interesting fillers used when space allows in *QST*. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most readers of *QST*. (2) Submit your material before deadline — the 8th of the second month preceding desired publication (i.e. arrive at Hq. before April 8 for June *QST*). (3) Any photographs you send should be good quality, black-and-white glossy prints. Color prints, slides and instant photos do not usually reproduce well.

Items submitted are normally acknowledged, but that doesn't necessarily mean that your Stray will be appearing in *QST*. We receive far more material than we can find room for. If you want your material returned, please include a statement to that effect and an s.a.s.e.

Follow the above hints and maybe your Stray will find a home in *QST*. — *Andrew Tripp, KA1JGG*

I would like to get in touch with . . .

☐ any Novices interested in sewing, knitting and exchanging recipes who would like to join a net. Henrietta M. Seifridsberger, KA2NMP, RD 3, Box 248, Averill Park, NY 12018.

☐ any members or advisors in the scouting Explorers program to exchange information or ideas for ham club activities. Explorer Post 641 ARC, 25 Tulip Ave., Ringwood, NJ 07456.

☐ any amateurs who would like to join an SWL net. James H. Webb, KE4VI, 6209 Sheldon Rd., Apt. 1B, Tampa, FL 33615.

QST congratulates . . .

☐ David Mehnert, NØBEY, of Gretna, Louisiana, on earning perfect scores of 800 on both sections of the 1982 Scholastic Aptitude Test, a feat achieved by only three students of the 1 million nationwide who took the test last school year.

☐ Stan Wisniewski, FO8IW, of Papeete, Tahiti, on being elected as president of the French Oceanic Radio and Astronomy Club.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

N1BFM, Willard E. Morton, Jr., Troy, NH
WA1DRJ, Dominic F. Tuffo, Dorchester, MA
W1EG, David Meirowitz, Pittsfield, MA
WA1FEI, Pasquale S. Magnifico, Westwood, MA
K1FMB, James Gallo, Warren, CT
W1KRJ, Kenneth B. Pratt, Milton, MA
W1POK, John C. Barry, Portsmouth, NH
W1PPD, Colin A. Campbell, Danbury, CT
W1WE, Richard W. Harding, Belfast, ME
K1ZQL, John B. Lyons, Reading, MA
W2BUF, Charles H. Gottwalt, Point Pleasant, NJ
W2DOP, Wilfred J. Higham, Camden, NY
W2DZM, Charles P. Havens, Willingboro, NJ
W2EEU, Michael W. Kozlovsky, Rutherford, NJ
KA2EHS, Ivan M. Rifkin, Jackson, NJ
WB2FIQ, James E. Rubinstein, Spring Valley, NY
W2HNJ, Charles C. Erhardt, Phoenix, AZ
WA2IBN, Glynn E. Lamoy, Morrisonville, NY
K2KOH, Robert G. Stoeber, Douglasville, GA
WA2LDL, Neil J. Lynch, Jr., Bordentown, NJ
K2MEJ, Stanley Miszkowski, Lawrenceville, NJ
WA2OKC, Lewis A. Wendel, Binghamton, NY
W2SJ, Russell M. Huntley, Millville, NJ
WA2TCX, Robert J. LaBelle, Hurley, NY
K3ALL, Lawrence J. Lambert, Stroudsburg, PA
WB3BGR, William Nagurney, Scranton, PA
WB3CLK, John A. Honadle, Temple Hills, MD
W3CTJ, Maurice W. Funk, Red Hill, PA
KB3IA, Eugene E. Gruber, Corry, PA
W3IWZ, Robert J. Beecher, Harrisburg, PA
*WA3QQT, Milton R. Zollickoffer, Westminster, MD
N4AQJ, William C. Fore, Latta, SC
WB4CXZ, Harry L. Wilson, Fort Pierce, FL
W4EIR, Albert H. "Pat" Malone, Kingston, TN
W4HHU, William M. Durham, Madison, AL
WB4MYJ, Lloyd D. Spinks, Moultrie, GA
WA4NFA, Frances I. Adams, St. Petersburg, FL
K4OE, James R. Savage, Nelsonia, VA
W4PJW, Richard C. Adamaitis, Fort Myers, FL
W4UQX, Dan W. Hassler, Prattville, AL
*WA4YPL, Wilfred H. Bauer, Punta Gorda, FL
WA4ZJQ, George R. Lanter, Galax, VA
W5AJZ, James D. "Jack" Guest, Duncan, OK
W5BRM, Perry M. Brown, Jr., Pasadena, TX
K5BXZ, Virginia K. Couffer, Yukon, OK
WD5CHA, Eric D. Coburn, Nederland, TX
N5DGD, Louis A. Korzekwa, San Antonio, TX
W5FFW, Harold E. Davis, Sweetwater, TX
W5FZO, Alton R. Bird, Donna, TX
WA5GLS, Carroll C. Leonard, Jr., England, AR
W5JIB, Bennie Tschoerner, Temple, TX
W5MQF, James W. Talley, Omaha, TX
W5NB, Clyde C. McNichol, El Paso, TX
K5ORC, John C. Jozwik, Las Cruces, NM
W5SHW, John E. Tribby, Roswell, NM
K5WGK, Arthur L. Berk, Magnolia, AR
WB5ZLL, Richard Laurance, Afton, OK
WB6BSA, Thadeus "Ted" M. Lisiecki, Northridge, CA
N6CG, Harry R. Shaw, Bolinas, CA
KA6EPL, Harry G. Bradt, San Clemente, CA
WD6FPL, John E. Greenwood, Glendale, CA
WB6GXO, John M. Barchard, Joshua Tree, CA
KA6HMF, Paul P. Hebert, Montclair, CA
W6NU, Harry E. Redeker, Burlingame, CA
W6SW, D. Cason Mast, Ontario, CA
WA6VUE, Mary E. Hauck, Upland, CA
W7BSN, Truman H. Day, Bainbridge Island, WA
W7CHN, Jack E. Hatmaker, Portland, OR
W7EQM, Albert W. Beck, Valleyford, WA
K7EZP, Warren B. Barnes, Forest Grove, OR
W7JSP, Emmanuel J. Irving, Sun City, AZ
W7KIX, Marvin M. "Mac" McCartney, Richland, WA
W7KLJ, Myron "Mike" Zwoster, Seattle, WA
WA7RGZ, Karl E. Haley, Globe, AZ
*W7UIU, Jay F. Teed, Salem, OR
WA7WHJ, Dyle Linn, Noti, OR
W8BVB, Earl V. Falconer, Lansing, MI
WA8DKM, Milton A. Martin, Cuyahoga Falls, OH
KA8DRQ, Donald S. Avery, Jr., Genoa, OH
WA8HOU, Don Aldridge, Akron, OH
W8JJL, John E. Cunningham, Avon Lake, OH
WB8OMQ, V. Bruce Charlton, Pickerington, OH
W8SMC, John J. "Jack" Erhart, Cincinnati, OH
W8UFA, George M. "Mel" Burke, Cincinnati, OH
WD9ESP, Mark J. Tomlinson, Poynette, WI
WØALX, Robert L. Zell, Phoenix, AZ
WØBCT, Neil B. Coil, St. Paul, MN
WØBOH, Bernard C. Burden, Lincoln, NE
WØDQA, Joe A. Gude, St. Louis, MO
KØFVB, Raymond J. Lauritzen, Neligh, NE
WBØGNL, James C. Ray, Kansas City, MO
WØHUG, Clarence "Buck" Marchbank, Sr., Kirbyville, MO
WAØIXD, Paul L. Hartman, Arnold, NE
WAØKHK, Emery B. Harbert, Benedict, NE
*WØKIC, Frank E. Golder, Sr., Golden, MO
WØKPA, Clinton B. Darnell, Imperial, NE
WØLIO, Caleb Gustafson, Robinsdale, MN
WØOD, Frank M. Thompson, Baudette, MN
WØOGU, Ira H. Johnson, Mankato, MN
WAØPIN, Sunny J. Mitchell, Sparta, WI
WØPL, George Davenport, Ocalala, NE
WØPUB, Benjamin W. Rockey, Leawood, KS
WAØRQC, Arthur M. Bullock, Lincoln, NE
KØTLS, H. Allan Wilkinson, Minneapolis, MN
VE1CBD, George Earl Goddard, Dartmouth, NS
VE6ANF, Ralph Fenning, Calgary, AB
VE6EJ, Howard Cross, Edmonton, AB
VE7ERK, Neil J. McLeod, Creston, BC
VE7FE, Raymond S. Woodford, Toronto, ON
VE7ZR, Roy P. Cable, Mill Bay, BC
HP1GD, George Dawson, Panama City, Panama
OZ5FS, Lennart Christensen, Copenhagen, Denmark
PAØKW, Willem Johnannes Alblas, Krimpen aan de Lek, Holland

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be 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

April 1933

☐ Lots of us who have tuned r.f. regenerative receivers will devour the lead article. Jim Lamb takes W1DF's January *QST* "autodyne" as typical and converts it to a single-signal superhet, with all the improved selectivity resulting therefrom.

☐ Technical Editor Lamb also urges use of a monitor he designed for phone operation, to avoid the overmodulation he says is far too prevalent these days.

☐ The editorial states that as a result of member complaints about inferior merchandise and unethical practices, possibly a result of the depressed economy, *QST* will be even more "choosey" about accepting advertising. This, even though "to refuse advertising when advertising is scarce is heartbreaking." The journal is down to a mere 80 pages, total.

☐ Grammer affirms that a self-excited rig can still produce an excellent signal if good transmitter practices are observed, such as mechanical stability, high *C*-to-*L* ratio, short leads and power supply regulation. He built a 203A Hartley just to prove it.

☐ The editorial crew had a ball preparing a satire on *QST*, official organ of the "American Radiator Delay League." Technical articles, financial statements, station activities and correspondence are among subjects spoofed — even an "idiotorial." But nine pages for this purpose take a heavy toll on a standard fare this month.

☐ W6ZF lauds traffic handling as a real public service, and provides good advice on how to improve the amateur image in that activity.

☐ In the last quarter of 1932, the League had a net gain of $329.63. The Wichita Falls ham club invites one and all to its annual banquet — price, 75 cents. The good old days!

☐ W9USA will operate as a show and traffic station in the Transportation Building at the Chicago World's Fair.

☐ W3DR suggests that observation and reporting of weather conditions, preferably through an organized net, would be a most useful public service by amateurs.

25 Years Ago

April 1958

☐ A world radio conference is coming up in a year or two, and — par for the course — rumors are rampant on the air that we amateurs will lose our shirts. The Editor points out that no country, not even the U.S.A., has yet made formal proposals for frequency allocation changes, and reminds members that the League is deeply involved in official government studies in preparation for the meeting.

☐ W1YOR uses a pair of Delco 2N278 transistors and toroidal transformers, specially made, to obtain 125 watts in a mobile power supply.

☐ By Goodman reviews the new Collins KWM-1 transceiver with considerable praise and a firm prophecy: ". . . more than another piece of ham gear; it could be a way of life. . ."

☐ Particularly for the newer Technician licensee, W1ICP turns his for-the-beginner series to 50 Mc. A simple superregenerative receiver description includes a panel template.

☐ Stacking beams can achieve a few db. gain, as we know, but K2GAL provides an extensive mathematical analysis to show that maximum results will be obtained only if the proper spacing is chosen.

☐ Ah, April! W9LRA proposes an "NSB" method of communication by attenuating not just one of the phone sidebands but both, and then exalting the carrier, preferably signalling with a telegraph key.

☐ Even though it is known that many amateurs and groups take part in the Simulated Emergency Test without bothering to report to Hq., W1NJM feels the 1957 activity was not up to expectations. Red Cross chapter reporting was high, however.

☐ James Harrington, K5BQT, won General Electric's Edison Award. Licensed only three years, he performed heroic emergency communications during the Louisiana hurricane last June.

☐ Cleveland hams formed a "Sohio Moonbeam" group and were among the first to report intercept of the "Explorer" satellite on 108 Mc.

☐ W5VHO's transistorized electronic key has four switch-selected speeds, *10 to 30 w.p.m., and provides* self-completing dots and dashes.

☐ Full Membership in the League reached an all-time high at the end of 1957, a gain of 12% over the previous year. — *W1RW*

Public Service

Conducted By Robert J. Halprin,* K1XA

Combining Emergency Preparedness with Public Relations

Like it or not, we Amateur Radio operators are permitted to enjoy our privileges by the FCC only because our activity is justified as being a benefit to the people of the United States. With the mounting pressures from CATVI, RFI, tower/antenna ordinances, and so forth, it is advantageous for every ham and every radio club to attempt positive public relations activity. If we cannot win public support and demonstrate our value to society (not just government agencies), then it is possible that all of our privileges may be lost. No matter how well a local ARES or RACES group serves an area, almost always the public relations is confused with other radio services. In such cases, positive, long-lasting mass public support is unlikely.

However, it has been found that personal communications services for the general public (as opposed to agencies) are more likely to produce lifetime friends for ham radio. Although certainly more important, the ARES and RACES activities in support of government and service agencies and hospitals usually go on with little public notice. Therefore, it is important, in order to continue these other services, that consideration be given to public communication via radiogram handling, especially in times of communications blackouts. Unfortunately, too many ARES groups are ill-prepared for this, either because of lack of training or manpower, or otherwise misunderstanding their total responsibilities. They often deem public communications to be somewhat "beneath" them and refuse to bother handling such "unimportant" traffic. Such Welfare traffic has always been a difficult subject for overworked and undermanned volunteer disaster workers such as ARES, RACES and Red Cross personnel, and has often been deferred into oblivion. Thus, a valuable public service via Amateur Radio has been wasted.

This article will attempt to show how such Welfare traffic, although of a lower precedence than Priority or Emergency traffic, can be handled without sacrifice to the efficiency of ARES or RACES organizations and at the same time provide valuable lasting friends for Amateur Radio.

How to Do It

Here are some ideas. Every club should have a public relations committee. Each ARES group should have someone to handle public information. (Coordinate these efforts with the section Public Information Officer.) Agencies and organizations served by radio amateurs should be requested to mention Amateur Radio volunteers in their literature and programs. Each ARES group should have an assistant Emergency Coordinator for National Traffic System liaison, with the responsibility of setting up a Welfare traffic plan with the Red Cross, the section Net Managers and the Section Traffic Manager. The Section Traffic Manager, in turn, may be able to provide a cadre of trained traffic handlers to assist the ARES group in getting the traffic out of a disaster shelter site via hf battery operated gear, thus not using up valuable repeater frequencies or ARES personnel who might be overworked. Such preplanning would ensure public service communications during a large-scale earthquake, fire, flood, hurricane and so forth, and will best serve the entire public while providing the lasting public friendship we surely need.

One of the best ways to provide training for such a team is to initiate an Amateur Radio demonstration station with your local radio club or simply set up a booth at a local fair, civic event, shopping mall, etc. Such bulk traffic handling will allow you to better understand your operating inefficiencies, routing and scheduling weaknesses, and to better prepare for large-volume Welfare traffic during emergencies. The demonstration will also be good public relations for Amateur Radio. Furthermore, such fair traffic will supply NTS nets with messages during the slow summer months.

The Demonstration

The ARRL provides a package for clubs and groups planning a demonstration that contains aids and simple ideas. Here are some other tips: Advance publicity on the demonstration station should appear in local newspapers, stating the place, time and brief description of the exhibit. Sometimes, announcements of dates and times of club meetings can be included, and perhaps even a feature article on Amateur Radio. Often, local ad sheets are very thirsty for public interest stories. Most radio stations provide a free public-service-announcement service, too. At shopping malls, set up large signs and support methods well in advance. Arrange in advance equipment, operators, host/hostess, shifts (four hours maximum), tables, chairs, brochures, and so on. Bring plenty of adaptors and connecting cables. Provide adequate lighting, if the event is to be held outdoors at night. Simple signs can be made out of stencils and waterproof felt-tip pens.

Good visual displays are attention getters. Demonstrations of slow-scan TV, fast-scan TV, RTTY, ASCII, satellite operations, Morse decoders and encoders, autopatch, DX QSLs with a world map, and other explanatory visual displays often "bring 'em in." A shortwave receiver is good to let the public paw over, and the excitement of shortwave communications will be entertaining. A code-practice oscillator is often an ear-catcher; recently, clubs have had good success in offering a certificate to anyone who could send his/her name correctly (the code alphabet being written out on the table next to the key). Also, closed-loop RTTY messages can be sent back and forth for entertainment.

Visitors should be given a brief brochure containing an explanation of Amateur Radio, local club meeting times/dates and location, Novice class information, and any other information deemed appropriate.

A few other suggestions to consider! Use quiet battery power over generator power when possible. Arrange permission from local repeater groups for use of repeater and autopatch in advance, and arrange for the use of one alternate repeater in case of breakdown.

The Message Center

The first thing you need is a large sign that advertises the fact that "free messages" can be sent from the exhibit station. Arrange for a greeter/host — separate from the station operators — to help people draft their messages. If bulk traffic is expected, arrange for 2-meter fm liaison stations to handle the traffic (and if possible an hf liaison to handle out-of-state/section traffic). Warn all concerned Net Managers if an overload is expected, so that they will be able to schedule extra liaison stations. Contact your Section Traffic Manager and ask his/her advice on arranging extra liaisons and routing schedules to avoid unnecessary delays. Keep messages under 25 words, and use ARRL numbered radiograms whenever possible. Give visitors easy-to-fill-out radiogram blank forms, and make sure that the addressee's full name, address and telephone number is written clearly. It is also a good idea to get the visitor's name, address and phone number in case of replies or service messages. The text should be read over by the greeter/host before the signee leaves in case of illegible words or other difficulties. Use only the ARRL standard radiogram format. Do not accept messages within easy traveling time or within the local calling area.

For volume trafficking, feed your keyboard or RTTY memory in advance, and establish long-haul schedules through your Section Traffic Manager with NTS Transcontinental Corps stations.

Such experiences with public relations and communications not only provides a valuable service to all of us in the hobby but also provides valuable experience to emergency communicators and traffic handlers in learning procedures, routings and possible difficulties. It's a fun activity for a club or group, and enhances friendly public contact. Good luck. — *Donald Simon, NI6A, ARRL Section Traffic Manager, East Bay*

TENNESSEE SPECIAL OLYMPICS

The Tennessee State Civil Defense Amateur Radio Club, in conjunction with the Nashville ARC (K4CPO), the Davidson County Repeater Association, Vanderbilt University ARC (W4VSV) and the Radio Amateur Transmitting Society will provide communications for the Tennessee Special Olympics to be held May 20 and 21, 1983, at Vanderbilt University in Nashville. Tennessee Special Olympics provides a year-round sports, training, recreation and athletic program for Tennessee children and adults who are mentally retarded. The games include competition in track and field, swimming, gymnastics, bowling, volleyball, soccer and wheelchair events. This past year, over 12,000 participants were involved in the Special Olympics, and the organizations assisting with communications are in need of amateurs who will be able to accept traffic to the families of the athletes throughout the state.

*Deputy Communications Manager, ARRL

There is a critical need for amateurs to receive messages from the participants as they arrive for the games on the 20th and for amateurs to relay the results of the games on the 21st, particularly in the smaller communities of Tennessee. The call signs in use will be K4CPO and W4VSV, and we request Tennessee amateurs to monitor 7.050 MHz on cw and 7.250 MHz ssb on the even hours from 1800Z, and 3.636 MHz cw and 3.980 MHz ssb on the odd hours the 20th and all day on the 21st. On 2 meters, please monitor 146.16/76, 146.28/88 and 146.34/94 MHz. Simplex will be over 146.52.

For additional information please contact Wayne Renardson, NZ4W, 1113 Woodvale Dr., Nashville, TN 37204, tel. 615-292-2153, or Ralph George, W4CJY, 3716 Belmont Blvd., Nashville, TN 37215, tel. 615-298-5892. — *Wayne Renardson, NZ4W*

SCSSBN 25TH ANNIVERSARY

On Monday, April 7, 1958, eight stations checked into the South Carolina Single Sideband Net on 3915 kHz. Ssb was still new to Amateur Radio then; a-m ("ancient modulation") still carried the bulk of our voice communication. But by September of that year, there was enough gear around to have 80 stations listed on the roster. Now, 25 years later, after perhaps 8000 net sessions and nearly a quarter million check-ins, the current roster lists 263 stations and the net still meets daily at 7 P.M. Eastern time.

The purposes of the net, as set forth at a meeting in April 1958, are fellowship, advancement of the radio art and traffic. The net has served as an emergency net on numerous occasions, particularly in connection with hurricanes and severe weather watches, and has been designated a Section Net of the ARRL National Traffic System. Its members look at the past 25 years only as a stimulus to greater achievements in the years ahead. — *Chuck Clark, K4ZN*

Third-Party Traffic Agreements

Here is the latest list of countries with which U.S. and Canadian amateurs may legally handle third-party traffic.

U.S. Agreements

North America: Antigua and Barbuda, Canada, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Lucia, St. Vincent.

South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

Europe: 4U1ITU.

Africa: Ghana, Liberia, The Gambia.

Asia: Israel, Jordan.

Oceania: Australia, Pitcairn Island*.

*Informal agreement. See League Lines, October 1981 *QST*, for details.

Canadian Agreements

North America: Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, United States.

South America: Bolivia, Chile, Colombia, Guyana, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

Europe: 4U1ITU.

Africa: none.

Asia: Israel.

Oceania: Australia.

Keep in mind that during emergency situations special, *temporary* third-party agreements are often established between the countries concerned. W1AW carries information on these temporary authorizations. When in doubt, monitor W1AW.

COMMUNICATIONS SERVICE OF THE MONTH

☐ The week after Thanksgiving, the Clinton, Arkansas, area received various amounts of rain at 6-inch levels. By Thursday night, December 2, many rivers and streams had flooded their banks, and the Army Corps of Engineers and the local law enforcement agencies suspected that the state was in for some heavy flooding. Heavy thunderstorms were numerous throughout the period; three tornadoes set down within five miles of Clinton, wiping out 11 homes and damaging others.

Friday morning, December 3, KA5OVM activated the Clinton White Lightning Net, using the WD5CAA 146.31/91 repeater. It was apparent from the first report from the Clinton and Shirley areas that flooding had begun and that ham radio was in for a workout. It was determined that high water had effectively cut Clinton in two and was burying the town under as much as 12 feet of water.

Both a 2-meter and an hf station were set up at the Clinton ARC clubhouse. Health and Welfare traffic began flowing, with N5EJE manning the vhf station and EC W5TUM operating on 75 meters.

Saturday, December 4, dawned wet and gloomy. WD5CAA and XYL KA5EOY, along with KB4SM, KA5KRE, N5EJE and W5TUM, began handling traffic by the bucket load. A 2-meter link to the Little Rock Red Cross station N5BPU was set up; N5BK acted as a relay station from Mountain Home. By noon, operators from the Faulkner ARC at Conway arrived and set up shop on 2 meters at the command post. Operators were also set up at the Red Cross at the First Baptist Church, and later at the transmitter site of KGFL to provide information to the broadcast crew.

Early Saturday evening the water in town receded enough so that highway travel through Clinton could be resumed. N5EJE and KA5ORM, each with a list of messages, began contacting the people in town.

About noon on Sunday, December 5, word was received from Conway that that town could also be in trouble. The Arkansas River had broken through a dike west of town, near Morrilton, and the river was still rising.

The Faulkner group returned to Conway, and KA5OVM, XYL KA5OVN and W5TUM manned the command post station, with W5WOJ, W5BQC and W5VOG providing relief operations. Communications were maintained at the command post at the high school until Wednesday morning, December 8, when the sheriff's operators moved back to town. The vhf station was moved to the Red Cross Headquarters, and traffic was handled for the Red Cross for the remainder of the day. At about 4:30 that afternoon, operations were closed down and some very tired people went home.

At this time I would like to express my sincerest thanks and appreciation to the hams from the Clinton area, Fairfield Bay, and also to the Faulkner gang, who came in with a carload of equipment and operators. — *Ken Finch, W5TU, EC Van Buren County*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For January, 42 SEC reports were received, denoting a total ARES membership of 22,555. Sections reporting were: AL, AK, AB, AZ, CO, DE, ENY, EPA, IN, IA, KS, LA, ME, MI, MN, MO, MT, NE, NLI, NC, NFL, NTX, OH, OK, ON, OR, PAC, RI, SV, SDG, SJV, SD, SFL, STX, TN, VA, WMA, WNY, WPA, WV, WI and WY.

NATIONAL TRAFFIC SYSTEM

The time was August 1981. The place was Newark Valley, New York, home of Bill Thompson, W2MTA. The occasion was the annual traffic-handlers' picnic.

The NYS meeting had been called to order, and many subjects were being discussed. I was somewhat nervous and was waiting for the right time to bring up my ideas about the possibilities of a cycle one section net.

I had thought carefully about starting a net such as this for about two years. I researched the availability of net control stations plus liaison stations, and listened to both 40 and 80 meters for months trying to find the best place to run it.

I knew the need for this net was there and felt it was my duty to give the reasons why to the leadership officials who were at the meeting. Some of these points were as follows: It seemed that there was always traffic from early morning independent nets; there was possible traffic from TCC skeds that we could handle; traffic held over from the late sessions now could be routed and delivered sooner. Traffic could now be originated in the morning and be on its way.

After some discussion, it was agreed that these were all valid points. I made mention that I thought it would be a good idea to bring the NLI section into the net so they might enjoy the same benefits as we would have. This was also agreed upon.

Being asked to manage the net, I went right to work to get the necessary publicity going. With the help of various newsletters, net bulletins, ragchews and net announcements on all the nets in the second region, I got a very favorable response. On November 9, 1981, NYS/M started its first session.

Since that first day, we in New York State have watched the net grow with enthusiasm. We considered ourselves very fortunate to have many dedicated people who checked into the net; even the horrendous propagation during the "dog days of summer" didn't discourage them, and the net carried on. There are not enough ways to say thank you to these avid traffic handlers for their efforts, but the figures speak for themselves. The net held 295 sessions, had 1789 QNI and passed 1012 pieces of traffic in 1982.

To my knowledge, NYS was the forerunner for a net of this kind, throughout the National Traffic System. And now our 2RN partners and good friends in New Jersey liked the idea so much that they too have started a section net at 10 A.M. on 40 meters. I know that they, as well as any others who might entertain the idea in NTS, might enjoy success.

So, to all of you section Net Managers out there, I say "put your thinking caps on. Try it, you may like it." — *Mark Rappaport, WB2EAG, Net Manager, NYS/M*

January Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	802	25.9	.773	94.1	
CAN	31	647	20.1	.470	100.0	
PAN*	62	722	11.6	.423	100.0	
Region Nets						
1RN	62	347	5.6	.309	93.3	96.8
2RN	62	326	5.2	.340	96.1	100.0
3RN	31	162	5.2	.384	95.2	100.0
4RN	62	488	7.9	.338	79.3	96.8
RN5	62	545	8.8	.336	97.6	100.0
RN6	62	460	7.4	.337	96.0	100.0
RN7	62	572	6.3	.512	85.1	100.0
8RN	62	249	4.0	.337	95.7	100.0
9RN						100.0
TEN	31	371	12.0	.362	93.5	100.0
ECN						71.0
TWN	62	214	3.5	.273	57.4	100.0
TCC						
TCC Eastern	113[1]	534				
TCC Central	88[1]	796				
TCC Pacific	118[1]	424				
Cycle Four						
Area Nets						
EAN	31	1664	53.7	1.471	97.3	
CAN	31	943	30.4	1.214	100.0	
PAN	31	1051	33.9	1.074	98.9	
Region Nets						
1RN	54	653	12.1	.549	96.9	100.0
2RN	93	659	7.1	.529	97.1	100.0
3RN	62	287	4.6	.435	98.4	100.0
4RN	62	672	10.8	.500	91.5	98.8
RN5	62	621	10.0	.568	92.2	100.0
RN6	62	765	12.3	.632	100.0	100.0
RN7	62	507	8.2	.750	97.0	93.4
8RN	58	346	6.0	.380	90.0	93.5
9RN	62	463	7.5	.394	94.3	100.0
TEN	62	345	5.6	.363	76.2	100.0
ECN	62	238	3.8	.413	90.9	100.0
TWN	60	360	6.0	.362	95.0	98.4
TCC						
TCC Eastern	130[1]	701				
TCC Central	57[1]	342				
TCC Pacific	115[1]	765				
Sections[2]	7321	39,098	5.3			
Summary	8885	56,941	6.4			
Record	8347	50,754	19.1			

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (256): APSN ATN (AB), AENB AEND AENH AENJ AENK AENR AENW AENY AENZ ATNM CATN ECAAN (AL), ACN ATEN HARC TECN (AZ), BCEN (BC), NCN NCTN SCN/V SCN/1 (CA), DEPN DTN SEN (DE), FAST FMSN FMTN FPON FPTN GN LCEN MCEN NFPN PBTN PRVAN QFN QFNS SERA SPARC SVTN SWFTN TPTN (FL), CGVHFN GCN GSN GSSBN GTN QN (GA), D1ARES I75MN ITEN PCARES PMN TLCN (IA), ILN ITN (IL), ICN ITN QIN (IN), CSTN KMWN KPN KSBN KWN QKS QKS-SS (KS), 3ARES 4ARES 11ARES BARES CARN CCEN KEN KNTN KRN KSN KTN KYN KYPON MKPN MRN PAEWTN SEKEN TSTMN WTEN (KY), LAN LTN (LA), CTN MEPN MMN MTN WRIN (MB), MDD (MD/DE), CI2MN EM2MN EMRI EMRIPN EMRISS HHTN NEEPN (MA/RI), AEN CMEN MPSN OCRN PTN SGN SPSN (ME), APN (MR/NF), MACS MITN MNN QMN UPN (MI), MNWX MSN MSPN MSSN PICO (MN), ACE CMEN MEOW MON MOSSN NEMOE PHD SARN WCAN (MO), MTN (MS), NSN (NV), CFARS CMN CNCTN JFK M2MEN PCTN RARS THEN (NC), CN CSN (NC/SC), BV2MN CCN EN2MN MARES MN2MN NCHN NCN NMPN NSN N40MN N75MN N160MN PARC PV2MN SBARES WNN (NE), JSARS MCN NJM NJN NJPN NJSN NJVN OBTTN SJVN SOCTN TCETN (NJ), CNYTN EPN HVN NLI NLIPN NYPON NYS OCTEN SCVHFTN SDN STAR WDN (NY), NON OFON OLZ OTWN STN (OK), KYN OLN OPN OSN (ON), BSN MPARES OARES OSN PTTN SOFM WCN (OR), CCAREC D3ARES D5ESN D6ARES EPAEPTN NWPA2MN PFN WARCVTN WPA WPA2MTN WPAPTN (PA), WQVUARES (PQ), A2MN GPD2MN SCNTN SCSSBN YC2MN (SC), SDMN SDWN THIN (SD), TNCW

TNPN TNVN TSRN (TN), BARCN HATN TEX TTN (TX), BUN (UT), STARES SVEN VLN VN VSBN VSN VTN WAARES (VA), VTN (VT), EWTN NTN NWSSB PSTS WARTS WSN (WA), BEN BWN NWTN WCWTN WIN WNN WSBN WSSN (WI), WVARN WVFN WVMDN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

TCC-E/c2 certificates went to K1EIC N1BHH W1QYY W1XX WB1HIH AH2M KB2HM KO2H N2XJ W2ZOJ WB3GZU WA4CCK WB4PNY AF8V W8PMJ WB8YDZ VE3GOL and VE3HTL. TCC-P/c4 certificates were awarded to (years in parentheses): N7AKX W7LCF (1); W7AK WB7NHR KN7B W0OGH WDØAIT KCØD (2); KT6A (3); K7KSA WA7GYQ WØHXB (4); W7LYA W7VSE (5); K7HLR (6) KØBN VE7ZK (8); W7EP (11); W7GHT (14); W6VZT (20); W7DZX (23); W6EOT (28).

1	2	3	4	5
Cycle Two				
TCC Eastern	119	95.0	1071	634
TCC Central	93	94.6	696	348
TCC Pacific	124	95.2	846	423
Summary	336	94.9	2613	1305
Cycle Four				
TCC Eastern	130	90.3	1236	701
TCC Central	62	91.9	715	342
TCC Pacific	124	92.7	1528	765
Summary	316	91.6	3479	1808

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (January) *Cycle Two* — Eastern Area (N2CER, Director) — N3ADU N1BHH N2CER K1EIC WA2FJJ VE3GOL WB3GZU KO2H WA2HEB WB1HIH VE3HTL WA4LJI WD8LRT AH2M W8PMJ WB4PNY W1QYY W2RQ KB3UD AF8V AK1W N2XJ W1XX WB8YDZ. Central Area (W9JUJ, Director) — N5AMK K5BNH N5BT N5CRU W5CTZ N5DFO WØFRC W9JUJ K5KJN KD5KQ KA4MZY W9NXG KA4SAA KB5TC WB9WGD WF4X WB5YDD. Pacific Area (WØHXB, Director) — KT6A NØACW N7AFZ N7CSP NØCXI KU6D KØDJ W7DZX WØEJD KD7EY W7GHT N6GIW K6HAP W5JOV KBØMB WBØMTA WB7NHR K6OWA WA7OYI KF7R W7TGU WB7TQF KV5U WA7WQE KM7Z. *Cycle Four* — Eastern Area (W2CS, Director) — W1AF W3ATQ VE3AWE W3BBN KI3C WA4CCK W2CS VE3CYR W1EFW K1EIR WB2EAG W2FR WD4FTK W2GKZ VE3GOL WB3GZU KO2H N4KB K2KIR KBKQJ AH2M WB8MTD N1NH K8OZ W8PMJ WB4PNY W3PQ W1QYY K3RZR WA2SPL W4UQ VE1WF WB8WKQ KS6X W2XD N2YL K4ZK. Central Area (W5GHP, Director) — WØAM W9CXY KØEZ K5GM WØHI W5LQ W5RB N5TC W5TFB K5TL WB9UYU KB5W KB9X W4ZJY. Pacitic Area (KØDJ, Director) — KT6A WDØAIT W7AK KN7B KØBN KCØD KØDJ W7DZX W6EOT W7EP W7GHT WA7GYQ K7HLR WØHXB K7KSA W7LCF W7LYA WB7NHR WØOGH W7VSE W6VZT VE6ZK.

Public Service Honor Roll
January 1983

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

227
K7VW
207
K5CXP
187
N1BGW
164
KA1GBS
147
KM9B
W1IDK
132
KBØMB
131
W1EOF
130
KVØA
129
KA9BBU
128
WA4QXT
127
WF4X
WD8LRT
126
WA1TBY
122
KCØOO
119
W2ZOJ
116
WØZWL
W2AHV
115
WB1GXZ
114
KA5KRI
WA4PFK
113
WB3GZU
KAØJQG
W6VOM
112
KB3XO
WB2ZCM
KC9CJ
111
WB2MCO
110
W9YCV
W5DTR
K4ZK
109
K4JST
WØOYH
KA3DLY
W9JUJ
108
WA5RVT
107
K2ZVI
W2XD
WA2HEB
106
KA4AMC
105
K2ZM
N4FQD
W2MTA
104
WD4ALY
KA1T
KA4SAA
AG2R
KC2QQ
AF8V
WB2ZJF
N2CER
103
KI1M
WA7LGN
WA4JDH
102
WB1HIH
WA7MEL
KC5NN
N6AWH
W7GHT
W9DM
KZ8Q
WB4WYG
KV5X
101
WD4CNQ
W4CKS
NG4J
WD4AWN
WD9ESZ
100
N8DSW
AD7G
WA3EHD
WD9FRI
N9DIH
99
K7GXZ
KB3UD
WAØTFC
AK1W
KA9HPQ
98
KA5HDT
N2XJ
N7DNG
WB2RBA
WB2PKG
97
KB2HM
NN4I
K9CMO
W2AET
96
K1JHC
KA4GFU
KA4AUR
AG9G
KA9IKR
95
KT6D
VE3HTL
WA3DUM
94
KY2P
K8KQJ
WA4EIC
WA3WIY
93
WØKJZ
W7VSE
92
K2VX
K4VWK
KA1DB
KA3GJT
KB3FW
WB4AID
K4SCL
KB5EK
91
AA4AT
WA4YPQ
WA4CCK
N8EES
NT4U
WD8RHU
90
WB4WII
WA7GQO
N9BYK
89
N2AKZ
W4ANK
KB4OZ
VE3DPO
WA1YNZ
W5CTZ
WB5YDD
N8DTZ
87
K6UYK
W2YJR
KR4V
W6NTN
W1TN
N5TC
KA4GUS
86
KB4WT
W2BIW
KB5UL
KS7I
KAØARP
KD7EY
KM6I
85
KX2L
KA4MTX
KD5FR
W7LG
KF7R
W4GPL
KA4ASZ
84
N6FYV
AC5R
KA7ELI
WB2IDS
N8DSU
WB8MTD
83
KA2NHR
KD4PJ
K4IWW
82
KA4IUM
N1ARI
WA4STO
N4PL
N3CKQ
WB3FKP
N1BJW
81
VE3WM
KA3EJG
W2GJ
WD5GKH
WB2VUB
WB8WKQ
80
KAØCUF
KJ3E
W8GGX
79
NØBDG
AC3N
K9MX
WA4LXP
KA1AVU
NP4D
78
N2BNB
KA2GSX
NI6A
W9NXG
KAØNLI
WA2FJJ
WD8KBW
77
WØKL
W6RNL
WB2GHN
KA4BCM
WB5LAT
VE3BDM
KC2SW
KF8J
76
KD9K
N8AUH
KA6BNW
75
WB7OEX
W1RWG
WD8MIO
KT6A
74
KK1E
N7BGW
KØSI
WA8HGH
KA8GJV
K7LCA
W4SME
73
WA2ARC
WB5LBR
N5DKW
VE3GOL
WA8GMT
KA8CPS
72
K2GCE
W2TZO
K4ZN
KF4HA
N1AJJ
NW4R
K3JL
71
K8AGD
WD4HBD
KY4U
70
WB2VUK
WB2OWO
KL7IJG
K3CR
69
W7EP
K3RZR
WA4EYU
68
WØMZI
WA2KOJ
N2BLX
W5KLV
67
KI1I
W4WXH
K6YD
WB9WGD
KB4LB
N9ATP
66
WB2OHR
KE6NO
KS2G
AE1T
W3VA
WA6QCA
KF4U
KG9B
65
W5KMF
KB4OG
WB7TQF
WB6DOB
WB4TZR
WB8VAZ
64
KA2MBP
W6IPL
WB2QMP
WB4NTW
N6GIW
KC3DW
WB3DUG
63
N2DPN
WA8DHB
62
KC5SF
VE3KK
VE3GT
WA1DXT
WDØAIT
WØMDT
WB6QBZ
KD5GM
61
W4HON
N3ADU
KT5Y
W9TLU
KA8IAF
60
WB9IHH
KA3DTE
WØFRC
WD4BSC
W6CPB
KAØHRP
N4UF
59
KA1GCW/T
56
KA4BBA/T
49
N6EPG/T
47
K1LCQ/T
46
WD8ECM/N
45
KA8GGZ/T
43
KA7AID/T
KA9OBP/N
KA9NOT/N
42
KA9GBG/N
40
KA9NKQ/N
KA4ADF/T

Brass Pounders League
January 1983

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WØACD K8OZ N5DC.

The BPL is open to all amateurs in the United States, Canada and U.S. 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 standard ARRL form.

1	2	3	4	5	6
N4EDO	1888	1209	1888	679	5664
N1BBT/MM	875	660	892	674	3074
KA9CPA	55	1391	157	1105	2708
NØBQP	32	948	260	448	1688
WAØHJZ	28	829	30	511	1398
WØACD	0	796	59	453	1308
WA1TBY	14	544	532	30	1120
KA1GBS	23	522	441	63	1049
W3ATQ	4	499	494	9	1006
KA1DB	6	457	454	20	937
K4JST	27	420	446	9	902
KBØMB	235	208	360	69	872
WØMZI	0	457	0	372	829
W9JUJ	4	380	428	8	820
W1EOF	19	290	469	35	813
WØZWL	0	473	12	323	808
AA4AT	8	365	351	28	752
WB4PNY	11	358	343	0	712
WD4FTK	0	359	326	5	690
W7DZX	12	338	322	4	674
WA4CCK	0	307	340	5	652
KØJZN	0	377	31	242	650
N1BGW	117	207	190	133	647
W1AF	2	278	362	2	644
WD4ALY	0	336	267	17	620
NN4I	15	281	275	22	593
KR4V	15	249	268	55	587
W7VSE	1	301	263	4	569
K6UYK	82	240	223	8	553
KCØAS	4	415	116	9	539
K3RZR	4	260	266	4	534
K8NCV	23	244	262	5	534
KB4WT	3	257	264	8	532
WA4LJI	12	242	270	7	531
WF4X	5	265	250	11	531
N2CER	3	304	205	8	520
WA4JDH	7	267	241	1	516
N6GIW (Dec.)	0	306	315	1	622
WB6QBZ (Dec.)	2	265	286	33	586

BPL for 100 or more originations plus deliveries:

K2GXT	196
KA1BBU	147
K5CXP	132
W1IDK	120
KA4UFI	119
K2GXT (Dec.)	133
K5PE (Dec.)	109
KA5CXW (Dec.)	107
N6AUB (Nov.)	124

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

QST

Independent Nets (January 1983)

1	2	3	4
Amateur Radio Telegraph Society	28	741	212
Central Gulf Coast Hurricane	31	204	2707
Clearing House	30	122	404
Empire Slow Speed	29	71	478
Golden Bear	31	145	2028
Hit and Bounce Slow	31	75	378
IMRA	26	705	1399
Midwest RTTY Net	31	79	310
Mission Trail	31	150	1258
New England Novice	31	78	358
North American SSB Traffic	26	50	259
Vermont SBN	31	120	481
West Coast Slow Speed	31	109	422
20-Meter ISSB	26	1104	623
75-Meter ISSB	31	372	1339
7290 Traffic	48	493	3580

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

QST

Operating News

Conducted By John F. Lindholm,* W1XX

Straight Key Night — SKN XIII

The Days of Spark are Gone

The days of spark are gone, alas
And soon, the glow of vacuumed glass,
Replaced by CRTs and chips,
And the automatic key.
And through the year of '83
That'll be the size of it.
But for old-time hearts . . . again
Somehow it still seems to fit
Once a year to sing the old refrain:
Di-di-dit Dah-di-dah Dah-dit!

— Hunt, KØHT

It's hard to believe that 13 years have passed since K4MD and W1YYM (now W1YL) collaborated to bring us that first SKN on New Year's Eve of 1971. We don't know if a mere 13 consecutive years qualifies the annual SKN event as a tradition, but we don't celebrate SKN as a tradition unto itself; rather, what the event stands for: a time for us as radio amateurs to remember our heritage with a leisurely QSO or two, enjoy a low-key (sorry) operating event and dream of what the future holds for the art and science of Amateur Radio communications. What better reasons could there be to hold an event like Straight Key Night on New Year's Eve?

In the wake of SKN 1983, 99 reports from participants were received here at ARRL Hq. These entries listed 894 QSOs with 629 different stations from all over North America and Europe. Those reports were received from several ops who made no QSOs but admit that they like to listen to the sound of well-sent cw to folks who spent nearly the full 24-hour period and made in excess of 30 QSOs.

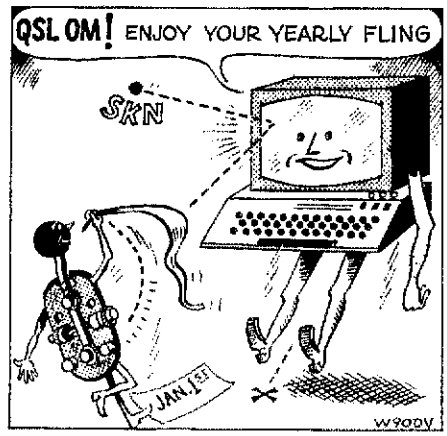
It's interesting to note how some of our brass-pounding peers celebrate SKN. John, K5IMC, pressed into service a key that hadn't seen use in over 50 years. It seems that this particular key was last used by John's uncle, who was a professional telegrapher with the railroad from 1928 through 1931. Jim, N1CC, in making several SKN QSOs, used each of the keys in his collection, which includes an 1874 Bunnell, a 1924 Bunnell J-frame, a 1942 Army J-37 knee key and a 1956 E. F. Johnson Speedkey. WD9BBI helped the Hamfesters Radio Club to celebrate their 50th anniversary by operating club station W9AA for a few hours during SKN.

It seems that the brass-pounding talent was evenly distributed, as 72 different operators were nominated as having the Best Fist. Top vote-getters in this category were K5KPA/3, KQ9E and W9PCF, with three nominations each. Tied for second place honors with two votes each were W1INF (W1RN, opr.), W3OER, W3ADE, N4EL, W4KFC, W5RUH, WA7NXL and WAØVQY. Only two stations received multiple votes in the "most interesting QSO" competition. KV2U and KE6WH each got two nods for their entertaining QSOs. Congratulations to all.

That's about all for this year's SKN. SKN XIV will be held on New Year's Eve of 1984. C U then. — *Bill Jennings, K1WJ*

KEY KLIX

What sweet music all those straight keys did produce. It seems that more and more of the old-timers are



dusting off the old keys and getting into the act. I wouldn't miss it (W9PCF). As a state of the art, SKN rates as the "keystone" of Amateur Radio (W3CEI). Looking forward to next year and, as a few of us do, will be on for the unofficial SKN in July (WB3KJT). Really pleased to hear some good readable keying. Don't believe that *THE OLD MAN* would have much to complain about (W1EWD). Everyone liked my call (WA3*KEY*). A great way to spend New Year's Eve. . . and no aftereffects (W4KFC). As a full-time desk — and part-time disc jockey, my time was limited, but enjoyed running into the quasi-sober troops during the SKN bash. It seems that the Lake Erie swing has become the "Swing de la Sludge" over the years, but there were some darned good fists. . . well, there *were* some . . . (WA4VWV). My most interesting QSO was with W2NZH. He was using all vintage radio equipment plus a key that he bought in 1929 with money he earned from selling Liberty magazines (WB9EIE). I thought it humorous that Shadyside, Ohio (WB8DDE), had a QSO with Sunnyside, New York (W2FYL) (WD8DDE). I worked only six stations in SKN on New Year's Eve and I bet that the first five of them thought that I had never sent any code in my life . . . I quickly found out that sending with a straight key is, or at least in my case a lost art. After sending with the straight key for about an hour and a half, I think I had it down well enough for someone to be able to tell my dits from my dahs (KØTVF). Slowing down the pace with a hand key also seems to enhance our ability to carry on actual conversations. Brings back my Novice memories of QSOs that lasted and the thrill of actually talking with the other operator (KQ9A). Operator here is 72 years old and has been an amateur for 54 years. This was my third SKN and am looking forward to next year's SKN (WØECE). In this day of discussions of a "no code" license it is nice to participate in an event which recognizes the "roots" of Amateur Radio. Heaven forbid that we have a vacuum tube night (Hi!) (KQ9D).

W1AW Schedule

April 24 — October 30, 1983 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000, TTh: 0200, 1300; TThSSn: 2300, S: 0200
	Cw Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	RTTY Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	Cw Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	RTTY Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CDT	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	Cw Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	RTTY Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
PDT	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	Cw Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	RTTY Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice and cw bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

RTTY bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1983 *QST*, pages 9 and 84" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 84.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

Cw bulletins are sent at 18 wpm; Teletype bulletins are sent at 60 wpm with 170-Hz shift, then repeated on 110-baud ASCII.

Experimental transmissions on AMTOR FEC mode, may follow RTTY/ASCII transmissions, with details given at the beginning of the RTTY/ASCII transmissions.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EDT and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on May 30, July 4 and September 5.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Charles Chadwick, K8AXL; Bruce Kampe, WA1POI.

*Communications Manager, ARRL

Results, 13th Annual ARRL 160-Meter Contest

By Mark J. Wilson,* AA2Z and Bill Jennings,** K1WJ

Heavy static . . . lots of QRN . . . local thunderstorms . . . poor conditions . . . rough going. Top Band contesters used these words and others to describe the most recent ARRL 160-Meter Contest, held December 3-5. From what we read on the logs, good ol' Murphy left his mark just about everywhere in the country.

But did Murphy succeed in his efforts to dampen the enthusiasm of the 342 official contest entrants? Nosireebob! Top Banders are a dedicated lot, and it takes more than a little S9-plus-20-dB noise to make them shut their radios down and turn to some other endeavor.

Actually, by most accounts, the first night of the contest was truly the pits. Torrential rains, unseasonably warm weather and widespread thunderstorms conspired to make life on 160 a tad unpleasant. East Coast stations complained of being barely able to hear the WØs, while West Coast stations wondered if there was life east of the Mississippi. Not a pretty picture.

But the second night was a different story. Things returned to quasi-normal, and the band was once again open coast to coast. There was even DX to work. N7DF at ABØI tells of JAs peaking as high as 30 dB over S9, while F8VJ and DL1YD worked stations as far west as Ohio. Certainly not the best of conditions, but not the worst, either.

Scores reflect the less-than-spectacular conditions. AD8I, this year's top-scoring single op, was the only one who would have even made last year's Top Ten. The other top single ops all posted fine scores as well. Among the multiops, the Ohio State University crew at W8LT won yet again. It's interesting to look through the results of past 160 contests and note that the same call signs appear in the Top Ten boxes year after year.

Certificates will be in the mail around April 15. The next ARRL 160-Meter Contest is scheduled for the weekend of December 3-4, 1983. Perhaps Murphy will stay home!

*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL

Top Ten

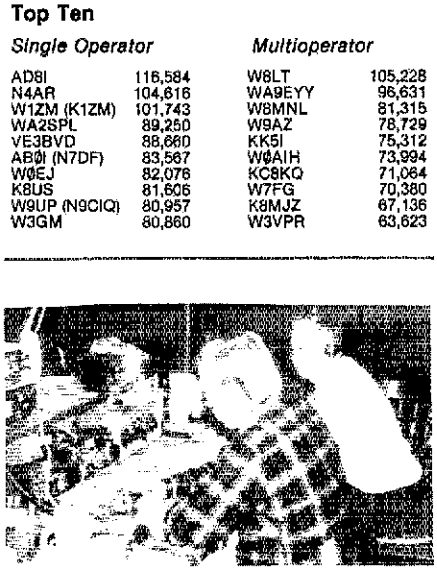
Single Operator		*Multioperator*	
AD8I	116,584	W8LT	105,228
N4AR	104,616	WA9EYY	96,631
W1ZM (K1ZM)	101,743	W8MNL	81,315
WA2SPL	89,250	W9AZ	78,729
VE3BVD	88,660	KK5I	75,312
ABØI (N7DF)	83,567	WØAIH	73,994
WØEJ	82,076	KC8KQ	71,064
K8US	81,606	W7FG	70,380
W9UP (N9CIQ)	80,957	K8MJZ	67,136
W3GM	80,860	W3VPR	63,623

Division Leaders

Single Op	*Division*	*Multiop*
VE3BVD	Canadian	VE3BGA/2
W3GM	Atlantic	W3VPR
W9UP	Central	WA9EYY
KØPK	Dakota	WAØIDK
KK5K	Delta	—
AD8I	Great Lakes	W8LT
WA2SPL	Hudson	—
ABØI	Midwest	WØYBV
W1ZM	New England	K1TZQ
W7EJ	Northwestern	K7IDX
K6MO/6	Pacific	K6RN
N4SU	Roanoke	W3ESU/4
KVØQ	Rocky Mountain	KI7W
KV4FZ	Southeastern	—
K7OX	Southwestern	W6RW
N5JB	West Gulf	KK5I
V3MS	DX	JH1YDT

Antennas Used By Top Stations

Single Op	*Antenna(s)*
AD8I	Half Sloper and Beverages
N4AR	Phased verticals
W1ZM	Inverted-V
WA2SPL	Inverted-V @ 180 feet and 3 Beverages (1100-3300 feet)
VE3BVD	Inverted-V @ 130 feet
Multiop	*Antenna(s)*
W8LT	35-foot vertical and 5 Beverages (500-1500 feet)
WA9EYY	Inverted L and Inverted-V
W8MNL	Inverted-V
W9AZ	260-foot vertical
KK5I	130-foot vertical, Beverages and loops



W7FG (left) and KM5H and W5LFS were part of the W7FG multiop crew, one of the two big Oklahoma multiops active this year. *(WB5KFP photo)*

SOAPBOX

I want to apologize to the many stations who failed to work me; my rotor stuck with my beam pointed straight up (KT5X). Due to the short power cord, station clock was about 150° counterclockwise from operating position. Next year will replace neck brace with sophisticated mirror system, or maybe another clock (K3FD). Blew the cw filter sometime before the test and didn't find it 'til early Sunday morning. The 30-dB loss in the receiver was thought to be poor condx. I'll make you a bet we don't spot everyone 30 dB next year! (KK5I). Where did everyone go? Thought the rig, antenna and operator all needed alignment until I heard another nearby operator ask the same question. I'll be looking forward to next year's contest. Hope Mother Nature doesn't pull the rug out from under the band (W6JEO). A disappointment: less QSOs and sections than last year. I thought I had everything under control this time: better ground, more radials, an open-wire feeder to a higher antenna, a new rig with excellent cw filters, even a new shack, a new console and an FB chair! Everything but QSOs. . . Back to the drawing board (VE2MJ). Had 6 inches of rain and the worst thunderstorm in the history of the weather bureau. On the plus side, I met many old friends who slowed to say hello. My 11th straight 160-Meter test (W5GWD). Wow! QRN was awesome — 20 over the first night and pegging my meter the second. When I turned off the agc, the crashes sounded like cannons exploding in my head. It was a bit embarrassing to ask for repeats when signals were over S9 (V3MS).

FEEDBACK

Please refer to April 1982 *QST*, page 78, for the following corrections to the results of the 1981 ARRL 160-Meter Contest. We found these logs mixed in with the logs from the 10-Meter Contest: In Northern New Jersey, add W2RQ 17,136-204-42-6; in Michigan, add W8GBR 10,984-126-42-11. The U.S. Postal Service apparently lost the following multiop entry from Ohio: KB8AC (+KA8HFO, WA8EUK, WB8YJF, WD8LLR) 99,638-645-77-26. In Washington, KG7A should have been listed as a multiop with KO7G, making them the top Northwestern Division multiop. The single-op winner from Utah should have been N7DF; W7GXC's entry was from the November Sweepstakes.

Scores

Scores list call sign, final score, total QSOs, total multipliers and hours operated. Example: DL1YD's score is 360 points, with 15 QSOs and 12 multipliers. He operated for one hour.

DX

FEDERAL REPUBLIC OF GERMANY

DL1YD 360- 15-12- 1

FRANCE

F8VJ 84- 7- 6- 2

JAPAN

JA7YCQ (JH0CZQ, opr.) 198- 11- 9- 3

JE1SPY (12- 8- 7- 8
JA5DQH 40- 5- 4- 1
JA2YKA (JA9SSY, opr.) 8- 2- 2- 1
JH1YDT (JA0VSH, JE6s CEK, HIC, JF1HBS, JH6UTP, JH0HNI, JK1s CQC, DLQ, FJU, oprs.) 216- 12- 9- 3
JA9YBA (JA9s LJI, LNJ, OTX, JH0CAZ, oprs.) 108- 9- 6- 2

BELIZE

V3MS (W0CP, opr.) 20,670-195-53-13

VENEZUELA

YV1DR 2254- 49-23- 6
YV2IP 1140- 30-19-4Z
YV3BRF (K1CC, opr.) 264- 12-11- 1

W/VE

1

CONNECTICUT

W1ZM (K1ZM, opr.) 101,743-694-71-15
K1CC 75,965-287-45-12

W1XX 14,035-199-35- 8
W1WEB 10,880-160-34-4Z
W1WEF 8588-113-38- 2
AA2Z 6480-100-30- 2
W1SC 5800-100-29- 7
W1QV 3072- 64-24- 4
K1KI 2704- 52-26-4Z
WA1FEN 2496- 52-24-4Z
KM1G 1692- 47-18- 2

EASTERN MASSACHUSETTS

W1AX 9766-127-38- 5
W1AQE 8246-133-31-4Z
K1VV 6864-132-26- 5
KA1CHR 6800-100-34-4Z
K1FWP 3976- 71-28- 4

W1MX (N2ME, opr.) 3168- 75-22-4Z
K1VUT 2596- 59-22- 2
KE1U 702- 27-13- 2
AE1P (+WB1FIA) 17,220-210-41-24

MAINE

K1NBN 7740-129-30- 6

NEW HAMPSHIRE

WA1TZV 40,150-365-55-42
N1ACH 11,210-146-38- 7

N1BEY 80- 8- 5- 1

RHODE ISLAND

K1TZQ (+WA1ABL)
56,050-466-59-20
W1QP (K1DT, N1s AGV, AKO, BBM, WA1s NZR, RKL, TAQ, WB1CVV, oprs.)
38,563-389-49-14
N1RI (+KA1s AIR, EHR, N1s BVY, CED, XW, WB1s DEZ, DXQ)
25,334-261-48-42

VERMONT

WB1CQR (WB2JSJ, opr.)
54,208-481-56-19
K1IK 27,278-295-46-10
WB1GMH 11,808-328-36-19

WESTERN MASSACHUSETTS

W1JP 2714- 59-23-42

3

EASTERN NEW YORK

WA2SPL 89,250-621-70-42
K2GBH 16,412-185-44- 5
KN2Q 12,456-173-36- 8
K2HN 10,780-154-35-10
W2DW 9660-138-35- 6
N2JJ 7920-132-30- 5
WB2PUH 6144- 96-32- 9
W2KHQ 4517- 94-24-17

N.Y.C. & LONG ISLAND

W2KTU 13,572-187-36-13
W2GKZ 9660-138-35-42
W2GP 6588-122-27-42
N6AA/2 3648- 76-24- 6
WB2DLA 3000- 75-20-16

NORTHERN NEW JERSEY

WA2SRQ 62,580-511-60-18
KR2Q 48,450-419-57-42
W2RQ 17,052-203-42- 4
K2OM 16,206-219-37-42

SOUTHERN NEW JERSEY

AE2L 6944-112-31-42
K2FL 6784-106-32-42

WESTERN NEW YORK

K2IGW 54,120-451-60-18
W2MTA 10,268-151-34- 7
KK2D 4368- 84-28- 6
WA2LGZ 800- 25-16-42
K2QR 728- 28-13-42

3

DELAWARE

AA1K 79,356-583-68-32

EASTERN PENNSYLVANIA

W3GM 80,860-614-65-42
W3TS 49,973-422-59-22
W3BUR 32,600-324-50-18
W3AJS 19,272-219-44-42
WA3YON 17,835-216-41-13
WB3FAA 17,328-228-38-14
N3CXB 16,128-224-36-13
W3CNS 14,200-176-40-12
K3OQF 14,130-157-45-10
W3AP 12,300-150-41- 4
WA3KEY 6479-103-31- 4
K4JLD/3 3968- 64-31-42
N3KZ (KB6GP, opr.)
480- 20-12- 2
WB3GAC (+K3WGR, W3UM)
20,496-244-42-13
K3YTL (AD3L, KB3JK, WB3GAI, oprs.) 18,880-236-40-13
WB3FYT (+WB3FKQ)
10,570-151-35-11

MARYLAND — D.C.

K3ZZ 66,002-532-61-10
K2ITG 30,723-309-49-10
K3SA 23,520-242-48-10
W3ICM 12,437-168-37- 6
K3NSS (KA9X, opr.)
2- 1- 1- 1
W3VPR (AE3D, N3s AKP, FN, VP2EEE, WA3KCY, oprs.)
63,623-517-61-32
W3USS (K3ZJ, N3UN, oprs.)
2829- 60-23-42

WESTERN PENNSYLVANIA

W3HDH 24,885-275-45-12
K3FD 21,266-217-49- 4
W3QM 18,090-201-45-15
K3UA 12,062-163-37-42
W3YQ 8024-118-34-42
W3DKL 2800- 56-25- 4
KB3MV 162- 9- 9- 4
W3FS8 50- 5- 5- 2

4

ALABAMA

W8IM 2200- 44-25- 3

GEORGIA

WA4IAR 39,061-364-53-42
N4VZ 21,150-221-47-14
N4RJ 14,523-153-47-42
KA4BAI 12,095-146-41- 9
K4VHC 3537- 64-27- 3
AA4EI 2500- 50-25- 6

KENTUCKY

N4AR 104,616-716-72-22
K4FU 68,244-514-66-20
W4YOK 19,404-219-44- 5
NQ4C 19,200-200-48-16
W4CW (KD4U, KK4Q, N4s TY, XM, NO4R, oprs.)
53,181-465-57-31

NORTH CAROLINA

N4SU 71,890-547-65-42
N4SF 59,458-472-62-42
K4HF 3844- 69-31-42
KE4SU 324- 18- 9- 2
W3ESU/4 (+K4XU)
29,841-300-49-16

NORTHERN FLORIDA

N4WW 23,640-188-60- 8
AA4EH 10,626-125-42-16

SOUTH CAROLINA

K4CNW 49,788-455-54-23
W4MAF 11,726-143-41-42

SOUTHERN FLORIDA

N4IN 40,640-298-64-22
KBUMP 3410- 52-31-42
N4KB 764- 17-11- 2

TENNESSEE

K4OAQ 11,040-138-40- 4
K4OH 8732-118-37-42
K4XO 4950- 75-33- 3
KD4PP 3192- 57-28- 4

VIRGINIA

AA4FF 25,286-268-47-42
W4KU 25,200-261-48-13
K4OD 23,265-257-45-13
KC4W 22,560-235-48-42
KX4V 11,860-154-45-42
N4RA 8806-119-37-42
K4JSI 8448-132-32-12
W4KMS 5412- 82-33-13
KC4HN 3248- 58-28-42
K4TM 1584- 44-18- 4
N4MM 1121- 28-19- 1
W4JVN (+WB4UUE)
17,036-208-41-13
K4AF (KA4NAU, N4KYL, WB/WBO, oprs.)
4698- 87-27- 8

WEST INDIES

KV4FZ (K5NA, opr.)
53,960-362-71-22

5

LOUISIANA

K5KV 16,176-167-48-42
W5QEP 13,568-160-42-22

MISSISSIPPI

KK5K 20,022-213-47-19
N5XA 14,784-151-48-13
W5GWD 928- 29-16-10

NEW MEXICO

KT5X 25,002-230-54-14
KM5S 5440- 80-34-42
K5IC 3534- 57-31-42
KP4X 2000- 50-20-15

NORTHERN TEXAS

N5JR 61,273-412-71-21
KC5DX 23,540-211-55-11
N5UA 10,105-116-43-12
W5QF 9744-116-42-42
W5FLX 7995-101-39-16
KB5UL (+K5SOR)
31,350-272-57-32

OKLAHOMA

NØIN 10,164-121-42- 2
N5AFV 1024- 32-16- 7
KK5I (+K7CW, N5s CG, MF, W5K1)
75,312-502-72-31

W7PG (+AC5B, K5SM, KM5H, NA5B, W5LFS, WD5KFP)
70,380-507-69-32

SOUTHERN TEXAS

K5LZO 14,872-140-52- 6
KB5FU 4321- 73-29- 9
N5AVR 396- 18-11- 7
N5EM (+K5HGB, WA6EWV)
15,615-172-45-42
K5DL (+WN5TEN)
6136-118-26-23

6

EAST BAY

AD6O 9990-135-37-15
K6TS 7336-131-28- 8
K2CMY 600- 25-12- 4
WA6EUZ (+WB6OVV)
13,262-173-38-26

LOS ANGELES

K6SE 42,842-320-62-17
K6ODO 9353- 98-47- 3
W6SGJ 5000-100-25-14
K6EID 2376- 54-22-10
WA6MEM 722- 19-19- 6
W6RW (+K6DDO)
23,600-236-50-42

ORANGE

N4ARO/6 5050-101-25- 8

SANTA BARBARA

WB6DAW 10,920-140-39- 7
W6JTA 6534-121-27- 8
K6MXO 4180- 95-22-42
W6OUL 2016- 56-18- 7
W6JEO 1394- 41-17- 7
WA6RKE (W6s HDO, MSG, WB6DPG, oprs.)
2052- 57-18- 5

SANTA CLARA VALLEY

KD6PY 10,152-141-36-15
W6OKE 2124- 59-18- 3
W6PRI 8- 2- 2- 1

SAN DIEGO

N6ND 20,150-200-50-42
KM6S 986- 29-17-42
AA6EE 408- 17-12- 1

SAN FRANCISCO

WA6T 1836- 51-18- 7
K6RH (+K6SKG, KB6XP, W6SYY)
15,974-163-49-12
WB6EGE (KA6AHK, N6QC, WB6WPD, WB7DEC, oprs.)
5550-111-25-12

SAN JOAQUIN VALLEY

K6MO/6 14,344-157-44-21
W6SX 3792- 79-24-42
N7EU 1330- 35-19- 4

SACRAMENTO VALLEY

WA6BRV 1440- 40-18- 3
AA6DX 1020- 34-15- 2

7

ARIZONA

K7QX 49,698-372-66-21
WB7FDQ 24,948-195-63-42
W7YS 9928-146-34-42
N7AZ 7412-109-34-12

IDAHO

K7RX 30,680-260-59-27
N7BIJ 23,200-200-58-24
K7SU 17,034-167-51-16
W7IWU 1044- 29-18- 6

MONTANA

KØPP/7 10,744-252-61-18
K7VIC 25,482-201-62-30
K7ZT 19,822-187-53-42

NEVADA

KA7BRE 3900- 65-30- 9

OREGON

W7EJ 44,088-331-66-25
W7DGR 14,265-157-45-42

UTAH

WA7ADK 11,521-139-41-10

K7CPC 4930- 85-29-12

WASHINGTON

WA7OFH 30,256-239-61-28
W7TJ 23,108-212-53-27
N7CKD 17,640-177-49-42
W7BYK 9114-107-42-11
K7HU 4032- 72-28- 8
W7IEU 1980- 55-18-20
WA7STA 1470- 35-21- 8
W7KRH 720- 30-12- 2
AK7F 396- 18-11- 2
K7IDX (+W7DZO+ 1 opr.)
20,300-169-58-42

WYOMING

K7EY 10,406-121-43-18
W7IRL 3294- 61-27-42
W7HLA 1518- 33-23- 5
K17W (+N7CYZ)
4690- 67-35-10

8

MICHIGAN

KC8P 30,885-301-51-42
K8CV 8892-117-38- 7
WB8MIL (+K8s FC, JM)
81,315-621-65-39
KC8KQ (+KB8AQM)
71,064-561-63-41
KB8MJZ (+AC8Y, AI8D, K8LF, WD8DSV)
67,136-523-64-42
K18A (+AC8W)
17,876-218-41-42

OHIO

AD8I 116,584-755-76-42
K8US 81,608-600-67-24
KBCCV 67,716-507-66-30
W8SN 55,614-444-62-21
KT8D 50,180-481-52-24
K8AC 49,860-411-60-19
W8IMZ (N8BJQ, opr.)
42,282-363-58-22
W8TJC 37,700-287-65-19
W8CAR 29,468-275-53-42
KC8JR 24,794-250-49-11
K8ES 21,315-216-49-15
KB8VT 21,206-229-46-25
WA8RCN 11,700-150-39- 6
WR8X 9600-117-40-42
K8TH 8610-123-35-17
KB8LM 4662-111-21- 8
K8BL 3360- 70-24- 4
K8HF 2850- 57-25- 3
K8MR 1440- 36-20-42
W8XU 280- 14-10- 1
W8LT (K1LT, K8ND, KU8E, WD8IXE, oprs.)
105,228-702-74-18
W8LNO (+WA8EUK, WB8YVF)
57,600-450-64-23
WB8DIL (+AC8M, AE8J, W8s DSM, VSA, WB8RRR, WD8PZG)
19,712-224-44-29

WEST VIRGINIA

K8OQL 21,560-245-44-12

9

ILLINOIS

KK9A 72,215-551-65-24
K9AB 32,860-310-53-13
WB9GYJ 16,238-175-46-42
W9OA 16,128-192-42-42
K9JU 14,112-147-48-13
WD9COL 9440-118-40- 5
KB8AC/9 9044-119-38-13
KK9C 3900- 78-25-10
KC9N 3000- 60-25- 5
WD9DBC 2944- 64-23-42
KB9KD 2200- 44-25- 4
W9IE 2064- 43-24-42
W9FSB 1152- 32-18-12
W9QWM 962- 37-13- 2
W9LNQ 800- 25-16- 1
WA9EYY (+WB9TIY)
96,631-676-71-42
W9AZ (AK9F, K9NR, KO9I, N9CEJ, W9s HPR, YNI, oprs.)
78,729-566-69-37

INDIANA

W9RE 51,935-398-65-10
W9VP 17,572-191-46- 8
N9NB 11,856-156-38-16
WB9WQV 8970-115-39-21
K92UH (+WB9PXR)
50,508-414-61-19

WISCONSIN

W9UP (N9CIQ, opr.)
80,957-550-73-23
WA2UJU/9 19,264-224-43-42
WA9TZE 16,500-186-44-42
W9WQ 12,480-156-40- 8
KE9A 5642- 91-31-42

W9YCV 750- 25-15-42
WØAIB (KØFVF, KMØO, WAØRBW, oprs.)
73,994-541-68-28

COLORADO

KVØQ 53,399-391-67-42
WØEE 16,432-158-52-13
NØZA 8560-107-40-10
KIØG 3348- 62-27- 9
XØUK 2332- 53-22- 1

IOWA

WØEJ 82,078-602-68-42
WØYBV (+AKØP, KNØO)
55,760-407-68-42
NØSM (+WBØVYV)
34,192-224-54-14

KANSAS

WAØQMU 72,624-531-68-30
KBØC 28,392-252-56-19
KØBLY/Ø 70- 7- 5- 1
KFØM (+WAØVJE)
21,808-188-58- 7

MINNESOTA

KØPK 52,059-384-67-14
WØHW 32,120-292-55-42
WØEXS 10,062-117-43-42
WØTIV 2640- 60-22-42
WAØIDK (+NØBVN)
8352-116-36-17

MISSOURI

ABØI (N7DF, opr.)
83,567-584-71-27
NØTT 48,662-418-58-18
WØXK 21,359-247-49-42
WAØFBQ 10,730-145-37- 6
KØSI 5280- 80-33- 5

NEBRASKA

FØHA 69,756-482-68-42

NORTH DAKOTA

AKØS 14,092-154-49-42
KIØE 2320- 58-20-42

SOUTH DAKOTA

WØJX 37,288-316-59-16

VE

MARITIME — NEWFOUNDLAND

VO1HP 144- 9- 8- 2

QUEBEC

VE2ZP 41,552-389-53-22
VE2HJ 7680-128-30-14
VE2QO 7440-124-30-13
VE2UK 6780-113-30- 9
VE3BCA/2 (VE3s BCA, SC, oprs.)
14,800-200-37-42
VE2CEV (VE2s FBE, FRS, GDH, oprs.)
5104- 88-29-42

ONTARIO

VE3BVD 88,660-677-65-42
VE3ABG 75,712-583-64-23
VE3INQ 49,414-397-62-33
VE3KZ 30,369-285-53-42
VE3GWN 23,594-251-47-42
VE3LSK 16,320-204-40-21
VE3FCU 13,440-160-42-42
VE3JKZ 4260- 71-30-42
VE3NBE 2544- 53-24-42

MANITOBA

VE4FK 3360- 80-21-12

SASKATCHEWAN

VE5XU 13,120-164-40-23

ALBERTA

VE6OU 10,416-124-42-42

BRITISH COLUMBIA

VE7CRU 26,019-219-59-42
VE7FPT 648- 27-12- 3

CHECKLOGS

KA1BSZ, NX4V, VE3MFA, VE7BS, W4DGJ, W4XT, WA8WCU, WB9IOG/Ø, WBØBJP, WBØOEH,

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

APRIL

2-3

VS6 Activity Days, sponsored by the Hong Kong Amateur Radio Transmitting Society, from 0001Z April 2 until 2400Z April 3. VS6 stations send signal report and serial number; others send signal report and *CQ* zone. Suggested frequencies: phone — 3.770 7.070 14.170 14.220 21.270 21.320 28.470 28.520; cw — 3.502 7.002 14.025 21.025 28.025. Contacts good for awards. VS6WCY will be active commemorating World Communications Year. Mail logs to HARTS, P.O. Box 541, Hong Kong.

5

West Coast Qualifying Run, 10-35 wpm, at 0500Z April 6 (9 P.M. PST April 5). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7

W1AW Qualifying Run, 10-35 wpm, at 0300Z April 8 (10 P.M. EST April 7). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See April 5 listing for more details.

9-10

ARRL Midnight Special, from 0500 to 0700Z April 10 (midnight EST Saturday April 9 until 2 A.M. EST April 10; 9 P.M. PST until 11 P.M. PST April 9). First hour, 20 phone; second hour, 40 cw. Work stations once per band. Suggested frequencies: 14.260-14.300 and 7.040-7.075. Exchange grid-square locator (see page 50 of Jan. 1983 *QST*) consisting of four characters (2 letters and 2 numbers). Example: W1AW's grid-square exchange is FN31. Score equals number of 20-meter QSOs, plus number of *different* grid squares worked on 20, plus number of 40-meter QSOs, plus number of *different* grid squares worked on 40. No multiplier. Mail entries by April 20 to ARRL Hq. Include s.a.s.e. for results. Top scores will be listed in *QST*. GL de W1XX (FN31).

23-24

Helvetia Contest, sponsored by the USKA (Switzerland), from 1300Z April 23 until 1300Z April 24. Cw and phone, 160 through 10 meters (no WARC band operation). Work stations once per band, regardless of mode. Exchange signal report and serial number. Swiss stations will also send one of the following abbreviations to indicate their canton: ZH BE LU UR SZ OW NW GL ZG FR SO BS BL SH AR AI SG GR AG TG TI VD VS NE GE JU. Count 3 points per QSO with Swiss (HB) stations. Multiply by number of Swiss cantons worked per band (max. 26 per band). Awards. Mail entry by May 24 to G. Stalder, HB9ZY, Tellenhof, 6045 Meggen, Switzerland.

Scavenger Hunt Contest, sponsored by the Triple States RAC, from 0000Z April 23 until 2359Z April 24. This contest requires flexibility in operating; it is based on old-fashioned scavenger hunts in which the participant must find items on a list. Points are awarded for contacts in the following categories: (1) Ten points for contacting seven of the 10 U.S. call areas. One point for duplicate area contacts and 15 bonus points for contacting all 10 U.S. call areas. (2) Five points for contacting a VE station. One point for each additional VE QSO. (3) Five points for contacting a station with a 2 × 1 or 1 × 2 U.S. call sign. One point for each additional QSO. (4) Five points for contacting a station with a 2 × 2 U.S. call sign. One point for each additional QSO. (5) Five points for contacting a station with a 1 × 3 U.S. call sign. One point for each additional QSO. (6) Five points for contacting a station with a 2 × 3 U.S. call sign. One point for each additional QSO. (7) Ten points for contacting a DX station (non W/VE). Two points for each additional QSO. (8) Five points for contacting a TSRAC member. Two points for each additional QSO. (9) Ten points for making at least one QSO on each band 80, 40, 15 and 10 meters. (10) Fifteen points for contacting a YL station. Three points for each additional QSO. Add 10 bonus points if you score in all 10 categories. Cw and phone only. Look about 20 kHz up from the lower General and Novice class band edges. Awards. Include class of license with entry. Mail by May 25 to David M. Kinney, KC8YR, RD 1, Mingo Jct., OH 43938.

24

W1AW Qualifying Run, 10-35 wpm, at 2300Z (7 P.M. EDT) April 24. See April 7 listing for more details.

MAY

4

West Coast Qualifying Run, 10-35 wpm, at 0400Z May 5 (9 P.M. PDT May 4). See April 5 listing for more details.

7-8

County Hunters SSB Contest, from 0001 to 0800Z May 7, 1200Z May 7 until 0800Z May 8 and 1200-2400Z May 8. Work fixed stations once only. Work mobiles again as they change bands or counties. Mobiles on a county line count as one contact and two multipliers. No net QSOs. Mobile teams count as two contacts if both participate in the exchange. Exchange signal report, county and state (country for DX stations). Suggested frequencies: 3.920-3.940 7.220-7.240 14.275-14.295 21.375-21.395 28.625-28.650. Avoid "mobile windows" from 3.925-3.935 7.225-7.325 and 14.280-14.290. Count 1 point per QSO with fixed W/VE stations; 5 points for DX QSOs; 15 points for QSOs with mobiles; and 30 points for mobile team QSOs. Multiply QSO points by total U.S. counties plus Canadian stations worked for final score. Awards. Entries must be received by June 15. Mail to John W. Ferguson, W0QWS, 3820 Stonewall Ct., Independence, MO 64055.

World Telecommunications Day Contest, phone

9

W1AW Qualifying Run, 10-35 wpm, at 0200Z May 10 (10 P.M. EDT May 9). See April 7 listing for more details.

14-15

CQ-M Contest, sponsored by the Krenkel Central Radio Club of the USSR, from 2100Z May 14 until 2100Z May 15. 3.5 through 30 MHz, cw and phone. 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; multioperator, single transmitter (all bands); SWL. Non-USSR stations send signal report and serial number. USSR stations send signal report and oblast number. Avoid lower 5 kHz of 80/40 meters and lower 10 kHz of 20/15/10 meters. Count one point per QSO within your continent, three 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 July 1 to CQ-M Contest Committee, P.O. Box 88, Moscow, USSR.

Georgia QSO Party

World Telecommunications Day Contest, cw.

21-22

Armed Forces Day. This year marks the 34th anniversary of communications tests between the Amateur Radio fraternity 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.

Crossband Radio Contacts. The military-to-amateur crossband operations will be conducted from 1300Z May 21 until 0245Z May 22. East Coast stations start operations at 1300Z May 21, while West Coast stations start at 1600Z. Military stations will transmit on military frequencies and listen in designated portions of the ham bands. Limit contacts to three minutes. The following stations will be active: *AIR*, 2045th Communications Group, Andrews AFB, Washington, DC: (lsb) transmit 4025 kHz, receive 3800-4000 kHz; (cw) tx 6999.5, rx 7025-7150 kHz; (lsb) tx 7315, rx 7225-7300 kHz; (cw) tx 13,997.5, rx 14,025-14,075 kHz; (usb) tx 14,389, rx 14,275-14,350 kHz. *NAV*, Hq. Navy-Marine Corps MARS Radio Station, Cheltenham, MD: (RTTY) tx 7385, rx 7090-7100 kHz; (SSTV) tx 13,975.5, rx 14,225-14,250 kHz. *NMH*, U.S. Coast Guard Radio Station, Alexandria, VA: (cw) tx 4040, rx 3500-3650 kHz; (lsb) tx 7346.5, rx 7150-7300 kHz; (RTTY) tx 14,440, rx 14,080-14,100 kHz; (usb) tx 20,937.5, rx 21,270-21,450 kHz. *NPG*, U.S. Naval Communications Station, Stockton, CA: (lsb) tx 4008.5, rx 3800-4000 kHz; (cw) tx 4010, rx 3650-3750 kHz; (cw) tx 6970, rx 7025-7150 kHz; (lsb) tx 7301.5, rx 7250-7300 kHz; (cw) tx 7365, rx 7025-7150 kHz; (RTTY) tx 13,827.5, rx 14,080-14,100 kHz; (cw) tx 13,927.5, rx 14,025-14,075 kHz; (usb) tx 14,470, rx 14,200-14,350 kHz; (cw) tx 20,950, rx 21,000-21,200 kHz; (usb) tx 20,998.5, rx 21,360-21,450 kHz. *NPL*, U.S. Naval Communications Station, San Diego, CA: (RTTY) tx 7380, rx 7090-7100 kHz; (SSTV) from 1600 to 2400Z, tx 14,385, rx 14,225-14,250 kHz. *NZJ*, Marine Corps Air Station, El Toro, CA: (RTTY) tx 7375, rx 7090-7100 kHz; (usb) tx 14,480, rx 14,275-14,350 kHz. *WAR*, Hq. U.S. Army MARS Radio Station, Fort Meade, MD: (lsb) tx 4028.5, rx 3775-4000 kHz; (cw) tx 6997.5, rx 7000-7150 kHz; (usb) tx 13,992.5, rx 14,200-14,350 kHz; (RTTY) tx 14,403.3, rx 14,080-14,100 from 1300 to 1500, 1800-2200 and 0100-0300Z; (cw) tx 14,403.5, rx 14,025-14,075 kHz from 1500 to 1800 and 2200-0100Z; (usb) tx 20,995.5, rx 21,270-21,450 kHz.

Cw Receiving Test. Conducted at 25 wpm. The text will be a special Armed Forces Day message from the Secretary of Defense. A 10-minute call-up will start at 0300Z May 22, followed by the text at 0310Z. The following stations will transmit the message on the indicated frequencies: *AIR*, Washington, DC: 6995.5 and 13,997.5 kHz. *NAM*, Norfolk, VA: 4005, 7645 and 14,400 kHz. *NAV*, Cheltenham, MD: 7385 and 13,975.5 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. *AIR* will use 850-Hz shift. All others will use 170-Hz shift. A 10-minute call-up will begin at 0335Z May 22, 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 postmarked by May 28. Stations copying *AIR* send entries to Armed Forces Day Test, 2045th CG/DONJM, Andrews AFB, Washington, DC 20331. *NAM*, *NAV* and *NPG* entries go to Armed Forces Day Test, Hq. Navy-Marine Corps MARS, 4401 Massachusetts Ave., N.W., Washington, DC 20390. *WAR* entries go to Armed Forces Day Test, Commander 7th Signal Command, Attn: CCN-PO-OX, Fort Ritchie, MD 21719.

Michigan QSO Party

26

W1AW Qualifying Run

28-29

CQ Worldwide WPX Contest, cw

*Assistant Communications Manager, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADIAN DIVISION

ALBERTA: SM, E. Roy Ellis, VE6XC — SM/SEC: VE6XC. A/SM: VE6AMM. STM/DEC/NM (APSN & ATN): VE6ABC. EC: VE6AGH VE6AVV VE6FV VE6AMM VE6AHC VE6ABC VE6ASL VE6AFO. Minor hockey week in Canada with over 500,000 registered players kept some Alberta clubs busy supplying communications. VE6AFO advised that a 432 MHz vhf link between Calgary and Edmonton is held daily at 0300Z. Edmonton net time is Sun 0400Z. A temporary 2-meter base stn was installed in the Govt emergency Hqs (ADS) by VE6XC with the call VE6ACD. The Jan NARC meeting proved interesting with 2 lawyers in attendance. One fielded questions on towers and the other on wills. Traffic: VE6CHK 237, VE6ABC 22, VE6SU 9, VE6XC 5.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — BCARPS net, NM VE7QC, reports activity high 216, low 106, total QNIs 4927. The net voted to remain at 0200 GMT. BCEN recorder VE7BNI reports QNI 330, QTC 338. Thanks to VE7s COA CSI BNI ZK and AAG for liaison to RN-7. DRN-7 VE7s EWI QC CDF and FB. VE7BQ is out of hospital and slowly recovering. VE7WO heart surgery doing OK. VE7JO went hiking and has not returned; now reported missing. VE7CP's motorhome and dog stolen in California and not yet recovered. VE7CCJ and VE7ABC made national TV reporting Old Timers' Hockey scores. Microtel ARC: VE7AAL, chairman, VE7SW, vice chairman. Meets 1st Monday of the month; all welcomed. Surrey ARC Dogwood Net Sundays at 1400 GMT on 28.675 runs cw practice after net for up-grading. Traffic: VE7BNI 106, VE7ZK 57, VE7FB 27, VE7CDF 17.

MANITOBA: SM, Peter Guenther, VE4PG — ASM: AJE. SEC: HK. STM: RO. NMs: VJ NM TE ACX HW. Some preparations are being made to have a repeat of last year's SET in March. Sounds like a doozy coming up. All nets busy with pretty good QNI. Warm weather this winter is the cause of a few more mobiles than usual. MMN QNI 408, QTC 31, sess. 31. MTN QNI 227, QTC 63, sess. 31. WRIN QNI 353, QTC Nil, sess. 9. MEPN QNI 1320, QTC 21, sess. 31. CTN QNI 127, QTC 18, sess. 29. Traffic: VE4ACX 79, VE4AJE 49, VE4PG 37, VE4TE 32, VE4RO 31, VE4JA 27, VE4ID 17, VE4AAD 14, VE4FK 12, VE4OO 10, VE4NE 9, VE4TL 5, VE4ADS 4, VE4CF 4, VE4CR 4, VE4DS 4, VE4AAU 3, VE4AGR 3, VE4AGT 2.

MARITIME/NEWFOUNDLAND: SM, D. R. Welling, VE1WF — ASM: VO1FG. NMs: VO1JN VE1WF. SEC: VE1EI. STM: Open. Looking for volunteers to fill the many appointments that are available. Saint John, NB, area amateurs used prefix XL1 Jan 21 to Feb 4. Pileups were fun. CRRL Outgoing QSL Bureau now official and first mailings will be shortly. Congrats to all those who recently passed their DOC exams. VE1SH will be reading CRRL bulletins late in Feb. Many clubs now starting to plan for Field Day which is June 25 & 26. APN needs NCS help; any volunteers? APN: 31 sess., QNI 172, QTC 70, time 306 mins. Traffic: VE1WF 262, VE1XF 93, VE1BXA 19, VE1BKM 11.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3GV. STM: VE3GFN. This month I wil be commencing my fourth term as your SM and I would like to thank all those who have supported and assisted my over the years. I hope I can continue to count on you during this term as well. New appointments: VE3ZR, EC for St. Thomas; VE3NLN, EC for Barrie and also the section's first XYL EC. VE3GFN with 270 countries confirmed managed to snag VK¢CW and LU3ZI in one afternoon while home with a cold. QCWA Southern Ontario Chapter 73 annual breakfast at 10 A.M. at the Mohawk Inn in Campbellville on May 14. SORT's annual flea market the following day May 15 at Arva, near London. VE3FBI is now VE3QB. As this is "World Communications Year," you can look for many special events and special call signs. There is a wall size Canadian rf spectrum allocation poster, based on WARC 79, available from government book stores for $2.50. VE3HCM is the new president of the Lakehead ARC. VE3NZF and VE3NLZ are new members of the Peterborough ARC. The new executives of the Quinte ARC are VE3s HZZ FNP ILD and LGQ. VE3FGU has a full KW on 6 and 2 and is busy looking for those new grid squares in the VUCC awards program. Twenty two members of the London ARES held a two hour exercise followed by a surprise wine and cheese party — that's one way to get them out. Windsor ARC is putting out a fine business monthly bulletin. Field Day is just around the corner — has your club or group appointed a Chairperson to coordinate your activities this year. Happy hunting to all those on their annual pilgrimage to Dayton. Traffic: VE3HTL 266, VE3GOL 225, VE3KK 206, VE3DPO 140, VE3CYR 95, VE3GT 78, VE3KXB 66, VE3GFN 65, VE3AWE 56, VE3JSM 55, VE3AJN 47, VE3BDM 46, VE3WG 34, VE3KCZ 33, VE3EWD 32, VE3WM 28, VE3BVG 22, VE3LNN 22, VE3BZB 16, VE3EHL 16, VE3BAJ 6, VE3KLX 5, VE3IFP 1. (Dec.) VE3WG 85, VE3EST 36.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2EDO VE2FSA. New appointment: VE2ALE is now Bulletin Manager. Tnx to VE2ATW and VE2AUU, the rptr VE2RED is working great, input 147.27 MHz, output 28.44 MHz USB. VE2FSA is now an Advanced Amateur. Congrates to VE2JO (134) and VE2PD (192) countries confirmed. VE2BIN est le nouveau president de VE2CRG (Granby). Prompt retablissement a VE2SN, qui est a l'hopital. A l;assemblee de Janview de 1'UMS, VE2FFE, a donne une tres bonne conference sur le fonctionnement du QSN et des reseaux de ARRL. Avec regret, je dois vous annoncer le deces de VE2BTZ. Traffic: VE2BP 48, VE2EKC 32, VE2GAG 6. (Dec.) VE2FSA 30, VE2GAG 14.

SASKATCHWAN: SCM, W. C. Munday, VE5WM — SEC: VE5II. STM: VE5QY. NMs: VE5HG VE5OI VE5ADZ VE5WM. Activities on the nets have fallen off and may be owing to winter vacations or post Christmas doldrums. Fourteen members of the Saskatoon ARC provided an Amateur Radio display at the Saskatoon Hobby Show. Moose Jaw ARC members were treated to a tour of the new traffic control radar installation at CFB Moose Jaw, thanks to VE5MC. MJARC members assisted with the Southern SK 4H Club Weekend Festival held in Moose Jaw. Traffic: VE5HG 26, VE5AAT 14, VE5WM 12, VE5UX 7.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3DUM WA3WIY K3JL WB3DUG. Kent ARC has changed meeting nights to first Monday of month. SARA has changed meeting night to third Wednesday. Kent ARC presented W3QQV a plaque for "Amateur of the Year." He has been a ham for 58 years. Congrats to son of W3LQE on receiving his Novice, call KA3KHZ. He is 12 yrs old. WA3ZBI is EC for Sussex Co. W3ZOR is new cw instructor AWARE net Sat. night, W3KET NCS phone net after. DTN QNI 354, QTC 36 in 21 sess. DEPN QNI 79, QTC 5 in 5 sess. DEPN (Dec.) QNI 68, QTC 14 in 4 sess. SEN QNI 38, QTC 4 in 4 sess. Traffic: W3PQ 123, WA3WIY 77, WB3DUG 47, WA3DUM 43, W3QQ 36, W3DKX 23, K3JL 18, K3ZXP 9, WA3PWT 8, W3WD 5.

EASTERN PENNSYLVANIA: SM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: KB3LF. DEC: AA3C K3QXC KB3QW KB3UD N3BFL N3CJP W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	551	164	31
EPA	3610	7/10 P.M. Dy	473	270	59
PTTN	3610	6:30 P.M. Dy	260	65	31
PFN	3958	5 P.M. Dy	319	245	31

Local and vhf nets reports: (QNI/QTC/sess.) D3ARES 272/18/5; D5ESN 76/4/4; D6ARES 30/6/4; CCAREC 23/3/3; WARCVTN 29/10/4. OO reports: KB3XO W3FAF W3GOA W3KEK. OBS reports: W3AVJ W3CL W3VA WA3ENE KA3EJG. PSHR: KA3DLY KA3EJG KA3GJT KB3FW KB3UD KB3XO W3GOA W3VA WA3EHD WB3FKP. Officers for 1983: Tamaqua AARA: W3VA, pres.; K3BWE, v.p., WA3OFD, secy., KA3FUL, treas. Anthracite RA: K3PGI, pres., N3CME, v.p., N3CTZ, secy., K3YD, treas. W3AQN now celebrating 60 yrs as a licensed ham op. Penn Wireless Assn, DL-ARC, Murgas ARC and Hazleton ARC made fine showing in recent Pa QSO Party. WB3FKP reports K3YTL now active on 160. DL-ARC station now RTTY equipped. KB3LF now located in Allentown and job hunting at present time. K3IJ reports Anthracite RA planning a Fox Hunt for April and possible commemorative station on the air in June from Eckley miners village (re: The Molly McGuires motion picture). KA3A and WB3FKQ finished 3rd USA multi-op in Nov. SS. W3KEK sends OO reports from sunny Florida. Nice to hear W3HK active in the nets again. N3AKQ now NCS for Midwest RTTY Net on Saturdays. New Novice grads from WARC Novice class are KA3KGN KA3KGO KA3KIU, who are already Techs, KA3KJA KA3KIZ KA3KLX. Congrats. KA3KCA new Novice in S. Williamsport and KA3KMH new Novice in Scranton-WB area. KA3HLT now KC3EH, and N3BIJ to A, now KC3FO. N3BFL, DEC D5, advises Pike Co. (PARES) net meets 1st Wed. of month on the 146.16/76 rptr. Phil-Mont ARC participated in 13 special public service events in 1982, in which their new communications vehicle served in eight. They also sponsor ARS W3TKQ at the Franklin Institute in Phila. This office welcomes all reports from radio clubs, rptr clubs, ARES, AREC and emergency nets in the section. Please keep us informed as to your activities so you can get proper recognition and credit for your efforts. Traffic: KB3UD 199, KB3FW 164, WA3WQP 144, W3IPX 135, AA3B 98, W3VA 85, KA3DLY 82, WB8KPE 81, WA3EHD 79, KB3XO 71, N3CD 65, W3DP 56, KA3GJT 50, WB3KUZ 45, N3COY 25, W3AQN 22, W3CL 22, WB3FKP 22, KA3EJG 18, N3AKQ 16, N3BFL 16, W3ADE 12, W3TWV 12, N3AIW 10, KB3LF 10, W3PTM 8, K3QXC 8, KB3VV 8, W3HK 7, W3FAF 6, N3CMC 3, W3AVJ 2, KC3AK 1, AF3Z 1. (Dec.) W3DP 185.

MARYLAND — DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — WA3ZGY K3OMN and KA3HUT reports were handled by W3FA going to WA3TAI our SEC. Our STM WB3GZU took a deserved rest from the holiday traffic nets. N3QA is back at sea. KJ3E is on a six week vacation. Is W3LDD edging out W3HTB in the DX lane? KB3WL and K3CRW are busy getting their computers on RTTY and cw. W3FZV shifts skeds to accomodate night studies. KC3DW got snow bound in Balto! WB3BFK is a 2 studio man. W3CVE is still on the sending end. N4DR has been fixing radios for his many ham friends. WA3TAI is at 90 feet. Not Tom his tower! KB3NL is a two hatter! You figure that one. W3DQI made a winter trip west. W3YVQ and KC3Y have taken up some much needed slack in our cw net. NC3D is looking forward to the DX contest. KA3R says Heard Island caused quite a stir. KA3T spend his month off from school on antenna repair and operations. W3MSN returned W3CVE's message in person. His first 10 meter contact-the suffix and XYL's name coincidentally the same! W3ZNW and the Calvert ARC have a 2 meter net too. And all this time W3CDQ has been mailing invites to the QCWA Dinner. The Chesapeake Bay Radio Assn send in a change of address. A good idea. The FAR is getting more business like! The AARC Ham Arundel News is in modern Dress. W3OYY has changed his mind about snow! WB3KJT is into computers, but that is his living. KA3CDQ's net the MTN will live on through the new sponsorship of the Anne Arundel Radio Club. The BARC has a successful SET exercise with their callup system working FB. Meanwhile WA3TOY reported a real four alarm fire with his gang providing communications for the Red Cross Team. When ready it goes easy! With the Nets. Net/Manager Sessions/Traffic/QNI average. WC 2 Mtr/KC3DW 4/2/8. MDC PON/W3OYY 4/21/20.3. WR PON/WB3BFK 22/55/16.8. MDD/W3PQ 62/182/9.7. Brass W3FA, WB3GZU and W3PQ. MEPN/WB3GZU 31/142/33. 100% N3AGM. Others WB3BFK, KC3DW, W3LDD, K3ONU and WA2YFM. Traffic: WB3GZU 423, W3CVE 233, W3FA 197, KC3DW 131, KJ3E 124, W3YVQ 53, WB3BFK 29, KB3WL 26, W3LDD 18, N3QA 14, W3ZNW 14, WB3KJT 13, W3FZV 13, W3DQI 11, N4DR 9, KC3D 8, KA3T 4, KB3NL 2. (Dec.) W3YVQ 95.

SOUTHERN NEW JERSEY: SM, Ted Wood, N2CER — SEC: W2HOB. STM: WA2HEB. SGL: W2XQ. BM: WB2BWL. Implementation of the Section Manager structure is underway. Boyd Prestwood, W2HOB, has been reappointed SEC. Rich Baier, WA2HEB, is the new STM; Tom Sundstrom, W2XQ, the State Government Liaison; Sam DeDonatis, WB2BWL, the Bulletin Manager. Four appointments remain to be made: Official Observer/RFI Coordinator, Public Information Officer, Affiliated Club Coordinator and Technical Coordinator. Study June, 1982 *QST*, pg. 53, and Dec. 1982 *QST*, pg. 11. If you are interested in one of the empty appointments and feel qualified, contact me. Emergency preparedness is a high priority issue in South Jersey. Put your operating skills and equipment to use in service to your community. Public service is a very rewarding aspect of Amateur Radio. W2HOB and his team need you. The South Jersey VHF Net has resumed independent operation as an NTS Local Net and meets nightly at 10:30 P.M. on the Vineland rptr, 146.055/655. Traffic: N2CER 520, WB2ZJF 319, WA2HEB 247, WB2PKG 123, WB2UVB 95, KM2E 90, WB2PXD 49, KC2PO 37, KC2PB 31, WB2JCE 29, KY2T 24, WA2GYF 22, KA2CQX 5.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ASM: W2GLH. Affiliated Clubs: Auburn, ARATS, Allegany, Binghamton, Boonville, Carlton Webster, Chautauqua, Champlain Valley, Clarkson College, Cornell, Drumlins, Fort Herkimer, Fulton, GRAM, Genesee RPTR, Gleason, IBM Explorers, Jefferson, Keuka, Kodak, Kodak Park, Lockport, N. Chautauqua, No. Franklin, Niagara, Ogdensburg, Oswegatchie, Otsego, Oneonta, Orleans, Old Timers, RAGS, RARA, RAWNY, Rome, RDXA, Rochester VHF, RIT, Rookies, Salt City, STARS, Skyline, Tioga, Tompkins, Tupper Lake, U of R, Utica, Walton, Yankee Clipper, Yates. If your club isn't listed, why not become League affiliated?

Net	Freq.	Time/Day	NM	QNI	QSP	QND
NARASEN	75/15	0930/Sn	KC2JO	112	2	4
NYS/1*	7077	1000/M-S	WB2EAG	263	96	26
NYSCN	3677	1000/Sn	W2MTA	45	15	5
MFarad	3925	1300/M-S	VE2FMQ	191	43	26
THIN	3913	1600/Sn	WA2KOJ	68	—	5
NYPON*	3913	1700/Dy	KC2SJ	760	340	31
NYSPTEN	3925	1800/Dy	WB2HKU	754	102	31
ESS	3590	1800/Dy	W2WSS	490	72	30
LEWIS	43/03	1815/Sn	WA2OEP	34	0	5
OCTEN*	34/94	1830/Dy	WB2HLY	689	72	31
Q Net	31/91	1830/Dy	KA2CMQ	430	24	31
STAR/E*	99/39	1830/Dy	N2BLX	78	35	26
WDN/E*	04/64	1830/Dy	KC2QQ	685	228	31
Blue Line	93/33	1900/Dy	WA2SEF	261	9	28
NYS/4*	3677	1900/Dy	N2APB	510	211	31
SLVARES	31/91	1930/Sn	WB2NAO	60	1	5
JCARCN	10/70	2000/Dy	WA2WAX	442	13	30
OARCN	25/85	2000/W	K2VTT	76	0	4
WNYECN	3955	2000/3Sn	W2BCH			(ARES)
BRVRSN	055/655	2100/Dy	WB2OFU	431	6	31
CNYTN*	90/30	2115/Dy	WA2PUU	429	91	31
STAR/L*	325/925	2130/Dy	N2BLX	72	23	23
WDN/L*	04/64	2130/Dy	KC2QQ	723	183	31
NYS/5*	3677	2200/Dy	N2APB	412	348	31

*NTS. BPL Dec/Jan to K2GXT. ARES nets: Central 1930 3rd Sun 40/00, Chemung 2100 Sn 10/70, Oneida 1930 Tu 34/94, Onondaga 1930 Mn 90/30, Oswego 1900 Sn 75/15. Appts: (OO) AC2K K2UCO; (ORS) WA2AOG. Comms: 130 SASQUATCH Scouts Cherry Valley Jamboree-WB2HLM WB2PEE WB2PEF. Honors: WB2JQK ARATS Ham-of-Year; Fulton ARC "Key Award" to KA2AON. SKYWARN: SLVARES active; KA2DQP 8 central counties. Officers: RAWNY-WB2OKB W2CUU K2HWF WA2OJV; 1983 Ham-O-Rama WB2OWS KC2CU WA2TOX K2GUG. PSHR: W2AET KA2BHR N2BLX WA2FJJ W2GJ WB2IDS WA2KOJ W2MTA KC2QQ WB2RBA KC2SW W2ZOJ. GB CR. Traffic: K2GXT 403, W2MTA 334, W2AET 238, W2ZOJ 218, WB2IDS 191, WB2OWO 188, WB2QIX 188, WB2RBA 128, W2FR 123, KC2SW 116, KA2BHR 105, KC2QQ 104, KU2N 98, WA2FJJ 96, N2BLX 83, N2DZF 73, KA2BCE 71, WA2SMZ 71, KC2SJ 64, W2GJ 63, WA2KOJ 51, KG2D 50, WB2PEE 39, WB2PID 30, AF2K 29, N2ARD 22, W2HYM 22, WA2AIV 21, KA2DBD 21, WA2RXO 19, WB2NAO 18, K2RN 17, WA2OEP 16, KA2DQA 12, KB2YU 12, KA2LHO 4, K2VR 2. (Dec.) K2GXT 258, KU2N 149.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB — SEC: AB3Q. STM: AC3N. OO/RFI Coord: N3BKU. ACC: N3EE. PIO: WB3CEW. SGL: W3OKN.

Net	QNI	QTC	Sess.	kHz	T/D
WPACW	405	184	31	3585	7:00 P/D
WPAPTN	706	131	31	3983	6:15 P/D
WPA2MTN	532	797	31	146.28/88	8:00 P/D
NWPA2MTN	517	15	28	146.04/64	9:00 P/D

Those listed above are the WPA Section Staff under the new field organization planning. See June 1982 *QST* for details. Applications for appointments should be sent to the staff member in charge of the desired appointment. The SM and the staff member will both consider the application, then make the decision to approve. Silent Keys are W3IBI and KA3DVV; our condolences to their families. New Novices KA3KGY KA3KGK & KA3KEP. Upgrades General KA3KBG, Advanced WN3VAW, Extra N3BKU. Congrats to all. Club officers for 1983 Beaver Valley ARA: WA3ZRM, pres., KG3L, 1st v.p., KF3V, 2nd v.p., KA3DJO, secy., WB3HWB, treas., W3PZC, trust. RA of Erie: KA3CXO, pres., WA3HLN, v.p., KA3CPV, secy., KC3AW, treas. South Hills BP&M: WA3ZNP, pres., K3MPJ, v.p., N3AEV, treas., WA3ZNO, secy., W3MML W3QNI W3LDB, directors. WA3PBD WA3WNT W3IQD, trustees. We still need a Technical Coordinator for the section; I hope we can find some one soon. He or she should have a good grasp of all phases of the technical aspects of our hobby. Traffic: N3ADU 359, AC3N 170, K3CR 166, W3OKN 143, N3CKO 109, W3NEM 100, W3SMV 84, W3EGK 75, WA3QNT 65, K3SMB 63, N3FM 63, K3NPW 58, WA3UNX 50, W3IQD 48, WN3VAW 36,

HAM RADIO OUTLET™

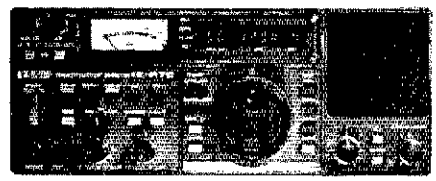
UNQUESTIONED QUALITY. . .
SUPERIOR PERFORMANCE!

ICOM

Important savings to you . . . fast delivery. . . newest and most in-demand ICOM products. Five-store buying strength makes it possible.

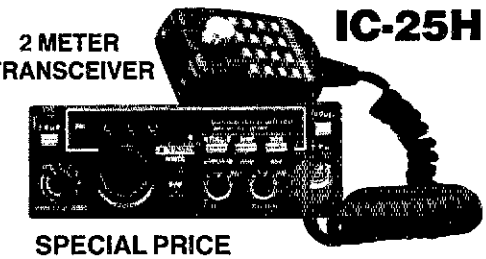
CHECK OUT YOUR VERY SPECIAL PRICES ON THE FULL ICOM LINE

NEW! IC-R70 NEW!
GENERAL COVERAGE RECEIVER



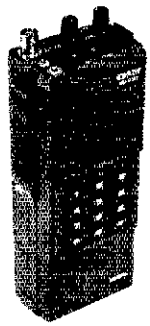
Price represents big value!

NEW 45 WATT VERSION!
2 METER TRANSCEIVER
IC-25H



SPECIAL PRICE
Includes FREE HM-14 Mic.

HAND HELDS



IC-2AT, 2 METER FM
IC-3AT, 220 MHz FM
IC-4AT, 70CM FM
SALE!
CALL FOR PRICES

AND A COMPLETE LINE OF HAND-HELD ACCESSORIES

BC-30, drop-in charger	**$69.00**	**HM-9**, speaker/mic.	**$34.50**
BP-2, 425 ma, 7.2V batt	**$39.50**	**CP-1**, cig' lighter cord . .	**$9.50**
BP-3, 250 ma, 8.4V batt	**$29.50**	**DC-1**, DC op pack	**$17.50**
BP-4, alkaline batt. case	**$12.50**	**Leather case**	**$34.95**
BP-5, 425 ma, 10.8V batt	**$49.50**		

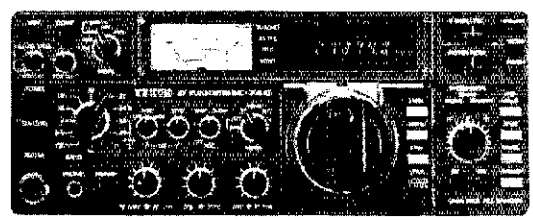
2 METER TRANSCEIVER
IC-25A

NOW!
SPECIAL PRICE
includes FREE HM-14 Mic.

2 METER TRANSCEIVER
FM/SSB/CW
IC-290H

SAVE!
CALL FOR SPECIAL PRICE

HERE!
EX-235 INTERNAL POWER SUPPLY AVAILABLE FOR IC-740



IC-740
Versatility plus! Offering features most requested by hams.
160-10 meters

FREE SHIPMENT ALL ABOVE ITEMS U.P.S. (Brown)

Store addresses/Phone numbers are given on opposite page.

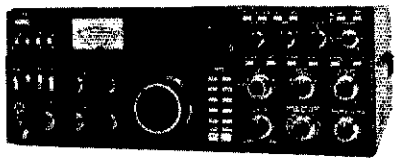
5-STORE BUYING POWER in action!

Some retailers guarantee you'll be satisfied but don't really have the means to back their promises. When Ham Radio Outlet guarantees you satisfaction, it means exactly that. You can count on it!

SAVE $230 KENWOOD SPECIALS!!

on **TS-930S** W/ANTENNA TUNER

PRICE **$1799**

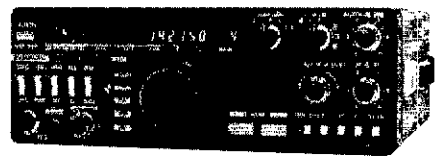


Plus three FREE Bonus Items

1)- SP-930 spkr. 2)- MC-60A mic. 3)- YK-88C-1 filter.

Plus free shipment UPS (Brown)

Substantial savings TS-430S



CHECK OUR LOW PRICES

AND REMEMBER...

FREE SHIPMENT UPS BROWN

ICOM

IC-R70 ***SAVE!!*** **IC-730**

LOW, LOW PRICES *(Plus Free UPS Brown)*

SPECIAL SALE PRICES ALL ETO ALPHA

Example:

76PA

$1699.95

MIRAGE SALE

2 METER AMPLIFIERS

B-3016 30W IN, 160W OUT. REG. $239.95 ***$199.95***

B-1016 10W IN, 160W OUT. REG. $279.95 ***$249.95***

B-108 10W IN, 80W OUT. REG. $179.95 ***$159.95***

B-23 2W IN, 30W OUT. REG. $89.95 ***$79.95***

KLM/Tri-EX

KT-34A ___ **SALE $299**

KT-34XA **SALE $459**

TRI-EX

W36 ___ **SALE $499**

W51 ___ **SALE $799**

LM 470D **SALE $2499**

PRICES ARE FOB CALIF. EXCEPT FOR CERTAIN COMBINATIONS. PLEASE INQUIRE.)

YAESU

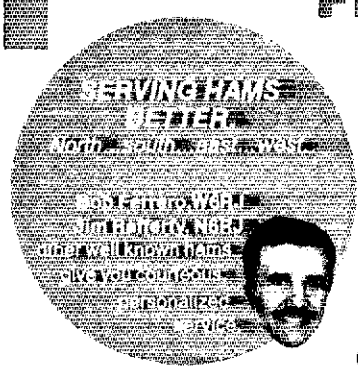
SAVE!

CALL FOR LOW PRICES ON HAND-HELDS and all YAESU items

FT-208R **FT-708R**

FREE SHIPMENT *(U.P.S. Brown)* CONTINENTAL U.S.A.

ON MOST ITEMS THAT CAN BE SHIPPED UPS BROWN.
THERE ARE SOME EXCEPTIONS IN ALPHA, TRI-EX AND KLM



FREE PHONE 800 854-6046

9:30AM to 5:30PM PACIFIC TIME.

OVER-THE-COUNTER, 10AM to 5:30PM.

MONDAY THROUGH SATURDAY

CALIFORNIA CUSTOMERS PLEASE PHONE OR VISIT LISTED STORES.

HAM RADIO OUTLET

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

BURLINGAME, CA 94010
999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport

OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road (619) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd.

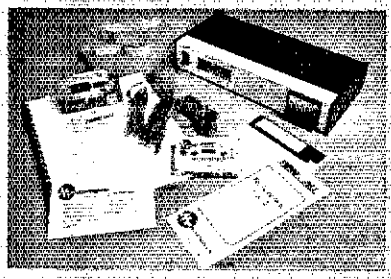
AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON
AVANTI • BELDEN • BENCHER • BERK-TEC • BIRD • B & W
BUTTERNUT • CALLBOOK • CDE • COLLINS • CURTIS • CUSHCRAFT
DAIWA • DRAKE • DX EDGE • DX ENGINEERING • EIMAC
HUSTLER • HY-GAIN • ICOM • J. W. MILLER • KENWOOD • KLM
LARSEN • LUNAR • METZ • MFJ • MICRO-LOG • MINI-PRODUCTS
MIRAGE • NYE • PALOMAR • ROBOT • ROHN • SHURE • TELEX
TEMPO • TEN-TEC • TRISTAO • VOCOM • YAESU and many more!

Prices, specifications, descriptions subject to change without notice *Calif. residents please add sales tax*

TERMINALL

apple TRS-80* ATARI*

MORE FOR YOUR MONEY.



TERMINALL is a hardware and software system that converts your personal computer into a state of the art communications terminal. Terminall features simple connections to your computer and radio plus sophisticated and reliable software.

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse Code or radioteletype (RTTY). Plug into your CW key jack and send Morse Code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software is loaded into your computer from disk or cassette. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse Code, it's fully automatic -and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting in any mode, in minutes. As we said, TERMINALL is simple.

More for your money.

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost.

■ **Fantastic Morse reception.** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Received code speed displayed on status line.

■ **Outstanding documentation.** Professionally written, 90 page user manual contains step-by-step instructions.

■ **Built in, separate, multi-stage, active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 170 and either 425 or 850 Hz shift- keyboard selectable - and uses either the panel meter or scope outputs for easy tuning. Copy the weak ones. Copy the noisy ones. Copy the fading ones.

■ **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF applications. A must on many VHF RTTY repeaters.

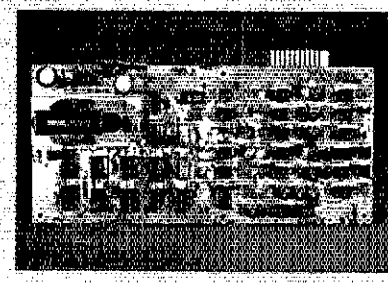
■ **Built in 110 or 220** volt AC power supply.

■ **Built in parallel printer driver software.** Simply attach a parallel ASCII printer (e.g. the EPSON MX-80) to your printer port to obtain hardcopy in all modes.

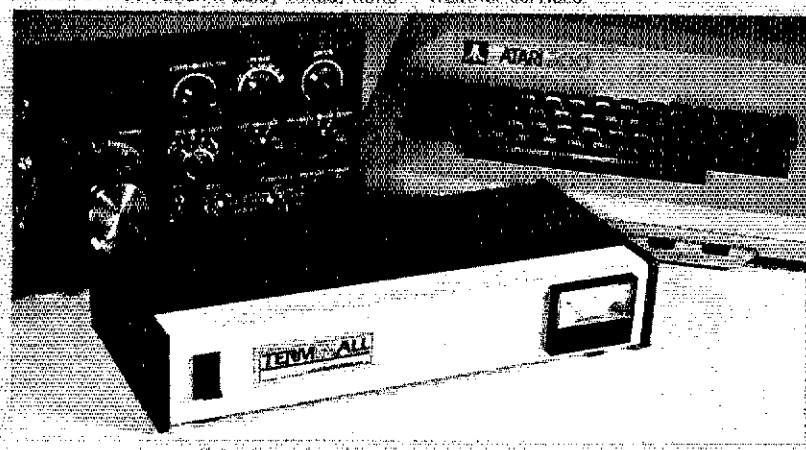
■ **Multi level displays** - allows examining and editing of historical text.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, multiple user-defined WRU, transmit delay fixed, none or auto adaptive), break mode and more!

NO COMPROMISE HARDWARE.



■ **The all-in-one TERMINALL design** makes it great for use on HF or VHF. Ham, Commercial, SWL or MARS! SWL's: TERMINALL may be jumpered for either 425 or 850 Hz reception to copy news and weather services.



15 Day Money Back Trial Period on Factory Direct Orders

System Requirements

TERMINALL T1 Communications terminal for the TRS 80 Model I. Requires a Model I TRS-80, 16K RAM and Level II BASIC. Includes software on cassette and disk, assembled and tested hardware and an extensive instruction manual. **$499.**

TERMINALL T3 Communications terminal for the TRS 80 Model III. Requires a Model III TRS-80, 16K RAM and Model III BASIC. Includes software on cassette and disk, assembled and tested hardware and an extensive instruction manual. **$499.**

TERMINALL T2 Communications terminal for the APPLE II. Requires an APPLE II or APPLE II Plus with 48K RAM and disk. Software is provided on disk in DOS 3.2 format. Use MUFFIN utility to convert to DOS 3.3 format. Includes software on disk, assembled and tested hardware and an extensive instruction manual. **$499.**

Add $4.00 shipping U.P.S. reg. delivery - CA residents add 6% sales tax.

TO ORDER **(209) 634-8888 or 867-2888**

We are experiencing telephone difficulties. Please keep trying.

MACROTRONICS, inc. (R)

1125 N. Golden State Blvd.
Turlock, California 95380

*TRS-80 is a Registered Trademark of Tandy Corp.
*Apple is a Registered Trademark of Apple Computer Inc.
*Atari is a Registered Trademark of Atari Computer Inc.
1 yr. parts & labor limited warranty.

NEW!
TERMINALL
FOR
ATARI 400/800*
NOW AVAILABLE

The communications terminal that does it all!

Barry Electronics Corp.

WE SHIP WORLDWIDE — WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

COMMERCIAL RADIOS stocked & serviced on premises.

We Will Not Be Undersold Call:

212-925-7000

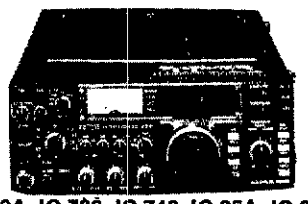
KITTY SAYS: WE ARE NOW OPEN 7 DAYS A WEEK.

Saturday & Sunday 10 to 5 PM

Monday-Friday 9 to 6:30 PM

Come to Barry's for the best buys in town. For Orders Only Please Call: 1-800-221-2683.

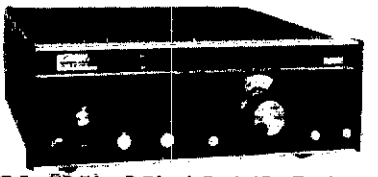
"Don't let April Showers keep you away from the Best Buys in Amateur Radio".



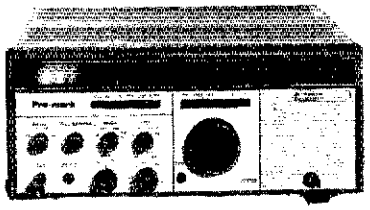
ICOM

IC-R70, IC-720A, IC-730, IC-740, IC-25A, IC-35A
IC-251A, IC-2KL, IC-451A, IC-290H, IC-45A

YAESU



FT-ONE, FT-980R FT-102, FT-101ZD, FT-707, FT-230R, FT-77, FT-726 FT-480R, FT-720RU, FT-290R, FRG-7700, FT-625RD

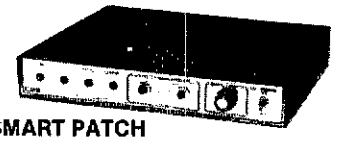


YAESU FT-208R FT-708R

ICOM IC2AT IC3AT IC4AT

Land-Mobile H/T
Wilson Mini-Com II
Yaesu FTC-2203, FT-4703
Icom IC-M12 (Marine)
IC-H12

DRAKE TR-5, TR-7A, R-7A, L-7, L-15, Earth Satellite Receiver ESR-24, THETA 9000E & 500, Digital Multimeter Model #8550-$95.00

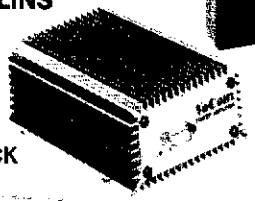


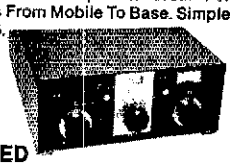
SMART PATCH

CES-Simplex Autopatch 510-SA Will Patch FM Transceiver To Your Telephone. Great For Telephone Calls From Mobile To Base. Simple To Use - $319.95.

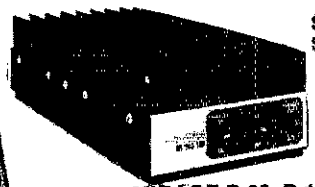
ROCKWELL/COLLINS KWM-380

POWER PACKET
VoCom Power Amplifier & 5/8λHT Gain Antennas IN STOCK



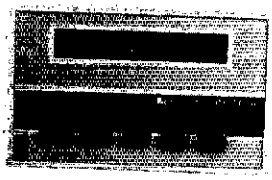


SANTEC
ST-144/UP
ST-440/UP



NEW IMPROVED MURCH Model UT2000B

MFJ
Model 941C, Model 982

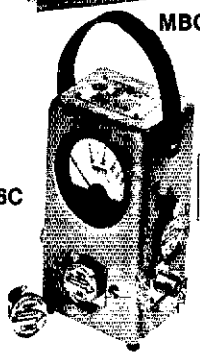


MIRAGE B-23, B-1016, B-108, B-3016, C-22, C-106, D-24, D-1010

DENTRON AMPLIFIERS
GLA-1000C
Clipperton-L-QRO

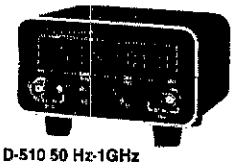
KANTRONICS
Mini-Reader, Interface, Software & Code Tapes

MBO-Reader



Telrex 10, 15, 20 Meter "Tri-Band" Model #TB5EM/4KWP & TB4EC

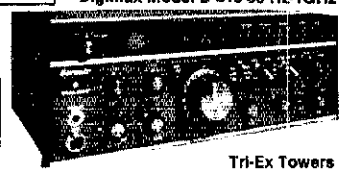
DIGITAL FREQUENCY COUNTER
Trionyx-
Model TR-1000
0-600 MHz
Digimax Model D-510 50 Hz-1GHz



EIMAC
3-500Z
572B, 6JS6C
12BY7A &
4-400A

Communications Specialists Encoders in Stock!

Smallest Wireless Telephone Available
600 ft. range w/encoder $135.00



AEA 144 MHz
AEA 440 MHz
ANTENNAS

BIRD
Wattmeters & Elements
In Stock

BENCHER PADDLES & Vibroplex Keys In Stock!!

Tri-Ex Towers
Hy-Gain Towers & Antennas, and Rotors will be shipped direct to you FREE of shipping cost.

New York City's LARGEST STOCKING HAM DEALER
COMPLETE REPAIR LAB ON PREMISES

New TEN-TEC Corsair In Stock

MAIL ALL ORDERS TO **BARRY ELECTRONICS CORP., 512 BROADWAY, NEW YORK CITY, NY 10012.**

BARRY INTERNATIONAL TELEX 12-7670

TOP TRADES GIVEN ON YOUR USED EQUIPMENT

STORE HOURS: Monday-Friday 9 to 6:30 PM
($1.50 parking across the street)
Saturday & Sunday 10 to 4 PM (Free Parking)

AUTHORIZED DISTS. MCKAY DYMEK FOR SHORTWAVE ANTENNAS & RECEIVERS.

Subways: IRT/LEX-"Spring St. Station"
BMT-"Prince St. Station"
IND-"F" Train-Bwy. Station"

Bus: Broadway #6 to Spring St.

"Aqui Se Habla Espanol"

Clearance on our WW II surplus inventory on Washington's Birthday.

We Stock: AEA, ARRL, Alpha, Ameco, Antenna Specialists, Astatic, Astron, B & K, B & W, Bencher, Bird, Buttemut, CDE, CES, Collins, Communications Spec. Connectors, Covercraft, Cubic (Swan), Cushcraft, Daiwa, Dentron, Digimax, Drake, ETO (Alpha), Eimac, Encomm, Henry, Hustler (Newtronics), Hy-Gain, Icom, KLM, Kantronics, Larsen, MCM (Daiwa), MFJ, J.W. Miller, Mini-Products, Mirage, Newtronics, Nye Viking, Palomar, RF Products, Radio Amateur Callbook, Robot, Rockwell Collins, Saxton, Shure, Swan, Telex, Tempo, Ten-Tec, Tokyo Hi Power, Trionyx TUBES, W2AU, Waber, Wilson, Yaesu Ham and Commercial Radios,Vocom, Vibroplex, Curtis, Tri-Ex, Wacom Duplexers, Repeaters, Phelps Dodge, Fanon Intercoms, Scanners, Crystals.

WE NOW STOCK COMMERCIAL COMMUNICATIONS SYSTEMS

DEALER INQUIRIES INVITED. PHONE IN YOUR ORDER & BE REIMBURSED

Amateur Radio & Computer Courses Given On Our Premises, Call

Export Orders Shipped Immediately. TELEX 12-7670

ege, inc.

Look for us at Dayton
Call for our Special Dayton Prices

Call for Quotes
Dealer Inquiries Invited

VISA MasterCard

APRIL VALUES

Information and Virginia Orders: (703) 643-1063
13646 Jefferson Davis Highway, Woodbridge, Virginia 22191
Store Hours: M-W-F 12 noon—8 p.m.; T-Th-S 10 a.m.—4 p.m.

ICOM

HF TRANCEIVERS
720-A—The Top of the Line
730—A Great Mobile Rig
740—The Newest Model—power supply now available
$50 rebate—expires 4/30/83

MOBILE RIGS
25A & 25H for 2m FM
35A for 220 MHz
45A for 440 MHz
290H for 2m SSB/FM

HANDHELDS
IC 2A/2AT—2m
IC 3AT—220 MHz
IC 4AT—440 MHz

MARINE RADIOS
M2—all-channel Handheld
M80—New 25-watt all-channel

New for **SWL LISTENING**—The R70

A Complete Line of Accessories In Stock—CALL for Quotes

SANTEC

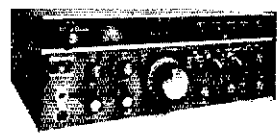
144up 2m Synthesized Hand-held.....277.95
440up MHz Synthesized Hand-held.....CALL

AMPLIFIERS—TOKYO HY-POWER
HL30V 2m Amplifier, 2 in, 30 out, FM only.....59.95
HL32V 2m all-mode Amplifier, 2 in, 30 out.....75.00
HL82V 2m Amp. with Receive Preamp, 10 in, 80 out. 149.95
HL160V 2m Amp. with Receive Preamp, 2/10 in, 160 out. 299.95
HL20U 440-450 MHz Amplifier, 2 in, 20 out.....98.95
HL90U 430-440 MHz Amplifier, 10 in, 90 out.....309.00

TUNERS—TOKYO HY-POWER
HC200 200-watt SWR/Watt Meter/Coax Switch.....86.95
HC2000 2000-watt with Meters and Switch.....289.95

COMPLETE LINE OF ACCESSORIES IN STOCK
—CALL FOR QUOTES—Shipping not included in prices—

TEN-TEC SALE



NEW CORSAIR $999! **ARGOSY $499!**

—All Accessories in Stock—

KANTRONICS INTERFACE FOR MORSE/RTTY

- Hamsoft now available for Commodore 64 and TI 99

—Call for Quotes—

ANTENNA SALE

CUSHCRAFT		HY-GAIN		KLM	
A3	171.95	TH3MK3	215.00	KT34A	299.95
A4	223.95	TH5MK2	307.00	KT34XA	449.95
		TH7DX	375.00		

AMERITRON

HF Amplifiers in Stock.....CALL

WILSON

HF Antennas (by Mako) are now available
—Call for Quotes—

ASTRON POWER SUPPLIES (13.8 VDC)
RS-7A 5 amps continuous, 7 amp ICS.....48.60
RS-12A 9 amps continuous, 12 amps ICS.....68.35
RS-20A 16 amps continuous, 20 amps ICS.....87.20
RS-20M same as RS-20A + meters.....105.50
RS-35A 25 amps continuous, 35 amps ICS.....131.95
RS-35M same as RS-35A + meters.....148.95
VS-35M 25 amp continuous, adjust volt & amp. 171.00
VS-20M 16 amp continuous, adjust volt & amp. 124.00

MFJ PRODUCTS (Call for other MFJ items)
989 New 3-kW Antenna Tuner.....285.95
962 1.5-kW Tuner switch/meter.....186.95
949B 300-watt Deluxe Tuner.....122.00
941C 300-watt Tuner switch/meter.....79.95
940 300-watt Tuner switch/meter.....68.95
104 New Model 24-hour Clock.....29.95
302 Noise Bridge.....48.95
401 Econo Keyer.....41.95
406 Deluxe Keyer.....60.97
408 Deluxe Keyer with Meter.....69.95
412 Pacemaker Keyer with Bencher.....87.95
496 Keyboard II.....279.95
782B Dual Tunable SSB/CW Filter.....79.95

BENCHER PADDLES Black/Chrome....34.95/42.95

AEA KEYERS, READERS, ANTENNAS.....CALL
MM-2, CK-2, KT-2, MBA/RO, MBA/RC, Isopoles
2m Isopole Senior.....34.95
—CALL FOR OUR LOW PRICES—

BENJAMIN MICHAEL CLOCKS
173B 24-hour Crystal Clock.....29.95
173C 24-hour Crystal Clock.....20.95
173DM Dual 12/24-hour Clock.....62.95
973A Analog 24-hour 14-inch Clock.....36.95

DAIWA/MCM/J.W. MILLER
CN-520 SWR/Watt Meter.....59.95
CN-540 SWR/Watt Meter.....69.95
CN-620B 2-kW HF Watt Meter.....106.95
CN-630 VHF-UHF Watt Meter.....126.00
CN-720B 2-kW HF Watt Meter.....149.95
CNW-418 Antenna Tuner.....169.95
CNW-518 Antenna Tuner.....279.95

SUPER SPECIALS

ROTORS
Alliance HD73.....88.95
CD45 II.....101.95
Ham IV.....196.00
Tailtwister T2X.....244.00

AZDEN PCS 300 Hand-held.....279.95
NEW! PCS 4000 2m XCVR.....283.95

KDK FM 2030 25-watt FM XCVR.....269.95

BIG DISCOUNTS

KENWOOD, ICOM
AMERITRON HF AMPLIFIERS
— Call for quotes —

TEN-TEC SPECIALS
516 Argonaut HF XCVR.....399.95
526 Argosy HF XCVR.....499.95
Complete Line of Filters and Accessories.....CALL

MIRAGE VHF/UHF AMPLIFIERS/METERS
B23 2m Amplifier, 2 in, 30 out.....CALL
B108 2m Amplifier, 10 in, 80 out.....CALL
B1016 2m Amplifier, 10 in, 160 out.....235.95
B3016 2m Amplifier, 30 in, 160 out.....199.95

VOCOM ANTENNAS/2m AMPLIFIERS
5/8 wave 2m Hand-held Antenna.....14.95
3 watts in, 25 watts out 2m Amplifier.....56.95
300 mW in, 25 watts out 2m Amplifier.....78.95
2 watts in, 50 watts out 2m Amplifier.....99.95
2 watts in, 100 watts out 2m Amplifier.....157.95
Power Pocket for ICOM 2A/2AT.....179.95
Power Packet for Handhelds.....68.95

CABLE BY SAXTON
RG213 Mil Spec.....26¢/ft
RG8/U Foam 95% Shield.....24¢/ft
8-wire Rotor 2 #18, 6 #22.....16¢/ft
Mini-8.....12¢/ft

TELEX HEADSETS/HEADPHONES
C1210/C1320 Headphones.....38.95/40.95
PRO COM 200 Headset/Dual Imp Mic.....81.95
PRO COM 300 lt/wt Headset/Dual Imp Mic....73.95

ANTENNAS
AVANTI AP 151.3G 2m On-glass Antenna.....28.95
LARSEN LM-150 5/8 Mag Mount.....36.00
MOSLEY HF ANTENNAS.....CALL
MINIQUAD HQ-1.....127.95
SUPER STICK II 5/8 2m Antenna.....15.95
BUTTERNUT HF6V 10-80m Vertical.....109.95
BUTTERNUT 2MCV5 2m Antenna.....37.50
ANTENNA SPECIALISTS.....CALL

HY-GAIN ANTENNAS.....CALL FOR QUOTES
V2S 2m Vertical.....37.50
14AVQ 10-40m Vertical.....51.95
18AVQ 10-80m vertical.....99.50
HY-GAIN ANTENNA/TOWER PACKAGES...CALL

CUSHCRAFT (Other antennas in stock)
AV3 New 10-15-20m Vertical.....44.50
ARX-2B New Ringo Ranger 2m.....33.95
220B 220 MHz "Boomer".....74.95
A147-11 11-element 2m.....37.95
R3 10-15-20m Vertical.....224.00

KLM ANTENNAS (Other antennas in stock)
KT34A 4-element Triband Beam.....299.95
KT34XA 6-element Triband Beam.....Special 449.95
144-148-13LB 2m 13-element with Balun.....77.95
144-148-16C 2m 16-element for Oscar.....93.55
420-450-14 420-450 MHz 14-element Beam.....37.54
420-450-18C 420-450 MHz 18-element for Oscar. 58.70
432-16LB 16-element 430-434 MHz Beam/Balun. 60.70

HUSTLER
6-BTV 10-80m Vertical with 30m.....115.95
5-BTV 10-80m Vertical.....99.95
4-BTV 10-40m Vertical.....79.95

HF MOBILE RESONATORS	Standard	Super
10 and 15 meter	8.25	14.00
20 meters	11.25	16.25
30 and 40 meters	13.00	19.00
75 meters	14.00	29.75

KANTRONICS
RTTY/Morse Interface.....168.00
Hamsoft for VIC 20 (New Release).....44.95
Hamsoft for Atari 400/800.....44.95

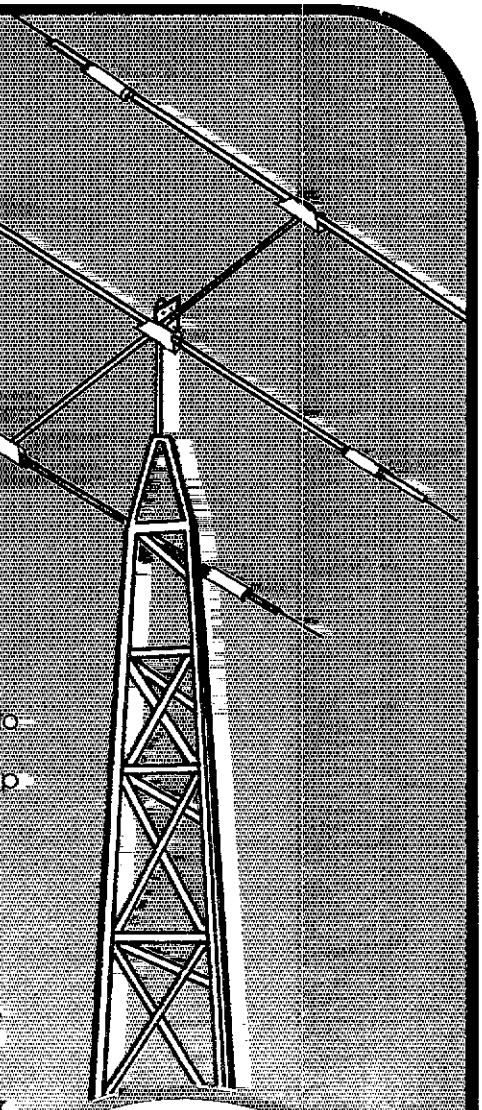
ORDER TOLL FREE 1-800-336-4799

(Orders Only, Please)

Order Hours: M-F 11 a.m. to 7 p.m.; Saturday 10 a.m. to 4 p.m.
Bonus: 2% Discount for Prepaid Mail Orders (Cashiers Check or Money Order)

Send stamp for a flyer. Terms: Prices do not include shipping. VISA and Master Charge accepted. 2% discount for prepaid orders (cashier's check or money order). COD fee $2.00 per order. Prices subject to change without notice or obligation. No personal checks accepted. Returns subject to 10% restocking fee.

Hustler Tribander 3-TBA



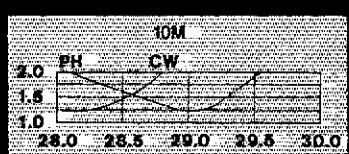
The Rugged, Reliable 10, 15, and 20-Meter Yagi You've Been Waiting for Is Now Available.

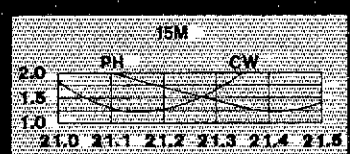
This exciting new tribander sets the pace for dependable performance with its two in one trap design — and the solid construction you've come to expect from Hustler. In fact, its durable design is partially based on concepts used in the time-tested and world-renowned Hustler 4-Band Trap Vertical.

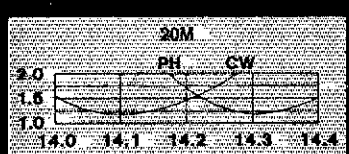
The 3-TBA is the smallest full-featured tribander available today. It offers excellent front to back ratio and SWR at resonance. Plus, it is engineered to provide the widest possible bandwidths with superior power handling capacity.

A special heavy-duty saddle prevents mechanical distortion. Although light enough to ship UPS, and enable use of smaller, less expensive rotors, the 3-TBA can manage windloads up to 100 MPH! Its turning radius is only 14 feet.

All in all, you can't surpass the Hustler 3-TBA for top triband quality: Hustler — still the standard of performance.







For more information on this and other fine Hustler amateur radio products, contact:

HUSTLER®

3275 North "B" Avenue
Kissimmee, Florida 32741

An ARMATRON Company

AEA Isopole

Still only $29.95!!!

Factory Sug. Ret. $49.95
Stock limited.

Add $3.05 for shipping via UPS BROWN in Cont. U.S.

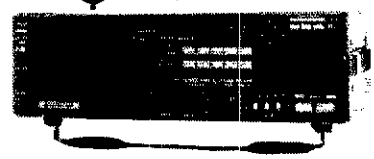
Maximum attainable gain for a twin 5/8 wavelength antenna with greater than 9 MHz bandwidth. Pattern independent of mounting or feed line length. Easy to assemble. Mounts on standard TV Mast. (Not supplied)

KENWOOD

TR 7950

45 Watts! Multi-featured.
Available at Reduced Price!

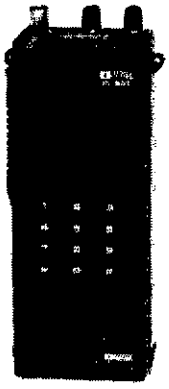
KENWOOD



R 2000

Features never offered before in a gen. cov. rec.
Available at Introductory Price!

ICOM



ICOM HT's

1 EXTRA BP3 AT 50% OFF

with each HT purchased (stock limited)

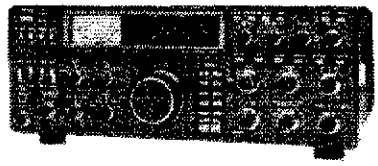
2 Meter Sale $219
220 MHz Sale $239
440 MHz Sale $239

(Limited to stock on hand)

ICOM HT Accessories shipped from stock, UPS Brown Prepaid!

BC-30 Drop-in charger	$69.00
BP-2 425ma 7.2V Batt	39.50
BP-3 250ma 8.4V Batt	29.50
BP-4 Alkaline Batt. Case	12.50
BP-5 425ma 10.8V Batt	49.50
HM-9 Speaker Mic	34.50
CP-1 Cig. lighter cord	9.50
DC-1 DC op Pack	17.50
Leather Case	34.95

KENWOOD



TS 930S

Kenwood's best.
Unparalleled performance for SSB and CW operators.

Our Lowest Price Ever!

Accessories in stock.

KENWOOD

TS 430S

Lowest Price Ever in its Class!

Available from stock.

KENWOOD

TR 2500

Full Featured 2M Handheld

UPS Brown Paid on TR 2500 Accessories

ST-2 Base Stand	$89.95
MS-1 Mobile Stand	42.95
PB-25H Heavy Duty Batt. Pack	39.95
LH-2 Leather Case	37.95
SMC25 Speaker Mic	34.95
TU-1 Sub Audible	34.95


K7LXC Steve


W7GAB Dale


KG7D Bob


K7DS Frank

C-Comm

C-COMM
6115 15th Ave. NW
Seattle, WA 98107
(206) 784-7337

HOURS:
Mon thru Sat
9:00am - 5:30pm

Call TOLL FREE Nationwide — Including Alaska and Hawaii!

800-426-6528

Wash. Residents: Add applicable sales tax. Call 800-562-6818
International Orders: Telex 15-2391 C-Comm

W3MML 30, KB3DT 28, N3BKU 25, W3RUL 22, KI3C 21, K3VQV 18, K3LTV 16, W3NGO 15, KB3NV 14, KA3HDL 13, KB3BG 12, W3KMZ 11, W3SN 11, K3TUA 11, W3KUN 9, K3HCT 7, AB3X 4, N3KB 4, W3TTN 4, KF3V 3, W3LOD 1. (Dec.) KB3DT 194, W3IA 166, WA3HJC 37, WB3GUK 28, KA3ETC 28, N3WS 19.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH. STM: KB9X. OO-RFI: K9MX. BM: K9ZDN. ASM: K9ORP.

Net	Freq.	Times/Day	QNI	QTC	Sess.
ILN	3690	0030/0230 Dy (Z)	483	160	62
IPN	3915	2230 Dy (X Sun, Z)	—	—	—
NCPN	3915	0700 Dy (X Sun, L)	466	64	26
NCPN	7270	1215 Dy (X Sun, L)	154	46	26
IEN	3940	1500 Sun (Z)	146	1	5
ITN	3705	1900 Dy (Z)	321	114	31

CAND IL 100% stations: WB9ODN W9NXG WB9WGD W9HOT. W9VEY/mem reports 58 QNI and 9 QTC. OUR LOSS IS YOUR GAIN! AA9D has moved from Carbondale back to his home town of Elgin. He will be missed in Southern Illinois as a member of both Jackson Co. ARES, where he was asst. EC, and as a member of Carbondale and Williamson Co. ESDA. To his credit while in Southern Illinois at SIU, and later working in the two-way industry, was the establishing of the first AUTOPATCH rptr in the Carbondale area. I'm sure he will be continuing his fine efforts in vhf and emergency activities in Kane Co. As can be seen from the column masthead, we are still in need of an ACC, PIO and TM. There are leads to filling these important appointments, and SGL is hopefully (but unofficially) filled. By the time this hits the newsstand these posts may be filled, but if you are interested please contact any of the folks listed above, as all are certain to be in need of interested assistants. Special thanks to WD9HZF, newly elected president of the JARS, and to the members of JARS for the hospitality extended WD9EBQ and N9CNQ while attending the JARS banquet on Jan. 8th. WD9EED reports the beginning of what may be a tradition in the Moticello area, a Dec. 31st ham breakfast. Amateurs from as far as 60 miles away attended the event which was held at the bowling alley there. He has also been very actively pursuing keeping the ARES alive and well in Piatt Co. as EC there. He has revived relations with the local ESDA, and has remembered to take the time to insure good press coverage of local ARES events, something we should all strive to do. Paul and Marion Hale of Colorado Springs CO would like to hear from any Amateurs who are interested in a DXpedition to China that is now in the planning state. Congrats to all the hams who stayed with the disaster operations in the Southern Illinois and Southeast Missouri areas. Operations were just drawing to a close toward the end of January. Many hams stayed with the effort, helping as needed throughout. Hard to believe that the flooding began two months ago . . . time flies. AFFILIATED CLUBS!! Don't forget about the Special Service Club options which will be so important in establishing your club as a part of the new volunteer examination program. Traffic: K9MX 435, K9CMO 168, W9HOT 152, KB9X 141, W9JJJ 134, W9NXG 116, WB9WGD 99, W9OK 93, KA9NWO 83, KN9BAM 65, KD9K 57, W9HLX 49, W9TLU 48, K9AZS 42, WA9SHE 36, N9DIX 31, KA9NBH 29, N9MX 25, KA9EGW 24, WA9BXB 17, WD9IBH 16, W9KR 10, WD9CJB 7, WA9RUM 7, W9HBI 6, K9WMP 3.

INDIANA: SM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUJ. SOOC: KJ9G. SGLC: WA9BVS. SRC: N9WB. SACC: K9TUS. SCC: W9OBF. STC: WD9ADB. SPRC: K9DIY. SDXC: N9MM. SOBC: KC9TA. NMs: ITN-W9QYY; QIN-KJ9J; ICN-KA9CZD; VHF-W9PMT; IWN-N9BHT; IPN-KO9F; I6SSB-WD9HQJ.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2300	2208	355	1771	62
QIN	3656	1430/0100/0400	943	359	2025	93
ICN	3708	0100	177	49	930	31
IPN	3910	2130	1247	114	947	31
IWN	3910	1310	2842		496	31
6SSB	50150	0100	418	7	2605	31

Hoosier vhf Nets for January-QNI 5042, QTC 245, QTR 8648, bulletins 99 for 25 nets. CAND 647 messages in 31 sess. IN stns W9JUJ W9URQ. Silent Keys N9CI WD9GVP W9QOS. Cancelled EC KC9ED, EC KA9HHQ. NM (1) KK9N, OBS WB9RVN. Appointments: ORS-W5NPM N9HZ KB9HH WD9GET WB9PFZ; NM (L)-KA9LAU; OBS-WD9GET WD9DRM WA9OKK W9JUJ. OO/RFI KA9BSD. WA9VRV W5NPM N9AST W9JWU W9CTC KC9GX W9UL WA9FGT K9FAR. EC: Boone Co.-WB9KLV; Posey Co.-WD9GXG; Rush Co.-K9POP; White Co.-WB9SOY; Green Co.-N9BII; DEC-WD9DVA. You can copy Indiana ARRL Bulletins every Tuesday and Thursday 3630 at 0000Z. The Handicappers Net meets daily on 3910 from 3 to 4 P.M. We have several-WA9OKK W9PMT KA9ECY KO9F KA9FFO. They have a good time. A report from W9JZV about the just completed ham radio classes, sponsored by the Indianapolis Chapter Red Cross ARC, states that seven individuals have obtained Novice ticket. Seven have Technician tickets and two have General tickets. In addition, one of 1981 Novices, KA9LUB/OG, now has his Amateur Extra ticket. N9HZ discusses RTTY. As you know one goal is IN RTTY Net. W9CTC is applying for DXCC 107 countries confirmed. This is the time of bronchial pneumonia and a real struggle to complete the report. Traffic: W9JUJ 820, WB9UYU 205, KJ9J 184, KM9B 162, W9URQ 128, W5NPM 115, W9EI 109, W9QLW 105, W9WKM 101, K9KTB 67, K9DCX 59, WA9QCF 59, W9QYY 95, N9AEI 49, K9WWJ 47, WD9JAA 46, WB9ZQE 46, KA9LAU 40, KA9CZD 39, KB9HH 37, K9FZX 36, KA9FFO 34, W9PMT 34, W9JZV 33, WD9ART 29, KC9TA 28, KK9N 25, WB9JUV 21, WB9MIK 18, N9CQS 17, W9RTH 17, N9DHX 14, WB9PFZ 14, W9BUQ 12, N9HZ 12, KO9F 10, W9CIV 10, W9ZGC 10, WA9JNC 9, KI9R 9, WD9DWD 8, WA9OKK 8, K9FVN 7, WD9GET 7, WB9OZZ 5, W9UPI 5, W9BDP 5, W9DKP 4, WD9IZA 4, K9DIY 3, W8LKU 3, W9YEW 3, W9XD 2, WB9AJY 2, K9SBW 2. (Dec.) KA9DHL 85, N9AST 16, W9UPI 5.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTC. BWN 3984 1215Z QNI 1311, QTC 1436 WB9YPY. BEN 3985 1800Z QNI 754, QTC 181 WB9ESM. WSBN 3985 2300Z QNI 1211, QTC 367 WD9ESZ. WNN 3723 0000Z QNI 254, QTC 68 KA9HPQ. WSSN 3645 0030Z QNI 226, QTC 46 KC9GJ. WIN-E 3662 0100Z QNI 360, QTC 137 W9YCV. WIN-L 3662 0400Z QNI 319, QTC 105 K9LGU. EXPO 3925 1831Z QNI 335, QTC 20 WA9GYF. NWTN .34/.94 0030Z QNI 485, QTC 35 WB9YPY. Gr. Bay .72/.12 Wed. 0245Z QNI 23, QTC 1 WB9NRK. WCWTN 31/91 0030Z QNI 401, QTC 16 N9AUG. WB9POK W9MYG K9LJN & KC9CJ have Extras. KA9FYF has Advanced. KA9NVB & KA9MAT have

NEW! Service and Diagnostic Department

Amp Supply is now offering complete amplifier repair service. For a total charge of **$39.00** we will repair or diagnose the problem on any amateur amplifier. If it takes 10 minutes or 10 hours the Amp Supply service repair charge is **$39.00**. The only additional charge will be parts needed for repair.

Home-brewers; take advantage of this same diagnostic service on your projects. Send us your home-brew amplifier and for **$39.00** we will explicitly instruct you (in writing) about any modification or redesign needed to bring your amp up to specs.

Units must be shipped prepaid to Amp Supply. After receipt, Amp Supply will respond in writing for authorization to proceed with repair.

The ASP Halon Fire Extinguisher

The ASP Halon Fire Extinguisher, safely extinguishes all types of fires without leaving residue, is non-corrosive, 3 times as effective as CO_2, and will not cause damage to sensitive electronic equipment, such as ham gear or computers. Halon 1301 was chosen by N.A.S.A. for its on-board extinguishing system on the Space Shuttle, and is the only extinguisher required by the FAA on every commercial airliner in the U.S. Shouldn't you protect your investment with the safest fire extinguisher available for electronic equipment?

Car or bench size, 1 pound 4 oz.

2 year factory warranty **$29.50**

Building An Amplifier?

Electrolytic Capacitor

EC-125	125uf 500 volt DC	$ 3.95

Diodes

D-3-A	High voltage supply diodes 1 KV, 3A	$ 1.00
DZ-8.5-Z	Zener 8.2 volt 50 watt	$ 5.50

Switches

SB-6	6 position 4 section 2KW PEP ceramic switch with tuned input switching voltage use with 3-500, 4-400, 572B	$21.50
SB-5	5 position 1 section use with 811's or sweep tubes	$ 9.50
BD-6	Planetary Ball Drive for variable caps 6:1 ratio ¼ shaft	$ 4.25

Tuned Input

ATI-6	Complete PC board tuned input board with 6 toroidal coils, 12 trimmer capacitors 6-DPDT relays and coax, fully assembled tuneable 1.8 - 30 mhz matches any amplifier 6¼" x 3¼", 12 VDC	$79.50

Tubes

3-500Z	EIMAC	$94.50
811A		$14.50
572B		$46.50
3-1000Z	EIMAC	$365.00
8877	EIMAC	$455.00
813		$40.00

Coils

TIC-1	Toroidal tuned input coils specify frequency	$ 2.00
FTC-1	Final Tank Coil for 3-500's, 4-400's, 8877, 572B etc. 2KW 160-40 MTR	$16.50
FTC-2	Tank Coil 20-10 MTR	$5.50
B&W 850 A, or 852	Tank Coil and Switch	$72.00
B&W3902-1	Cyclometer Counter — tuning for roller inductor or vacuum variable	$44.50

VARIABLE CAPACITORS

Plate

A-250-75	250pf 3.5-KV	$21.50
A-225-120	225pf 4.5-KV	$23.50
A-232-45	250pf 2.2-KV	$19.25

Loading

A-1100-53	1100pf 3 section 1.2KW	$12.25
A-1000-32	1000pf 2.5KW	$35.50
A-800-32	800pf 2.5KW	$26.00

Plate Chokes

PC-811-1A	Use with 4x811A or Sweep tubes	$ 5.25
PC-500-2A	Use with 3-500, 4-400 etc.	$ 8.25
PC-1000-2A	Use with 3-1000, 4-1000, 8777 etc.	$10.00

Filiment Choke

FC-30-A	30 amp choke on Ferrite Core	$ 8.50

Plate Caps

PC-500-1	Aluminum Heat Sink use with 3-500 etc.	$ 5.50
PC-811-1	Use with 811A, 572B	$ 1.50
PC-8877-1	Aluminum Heat Sink For 8874, 8875, 8877, 3-1000, 572, specify tube	$ 7.50

Sockets

SC-500-1	Johnson 122-0275-001 use with 3-500, 4-400 etc.	$14.50
SC-811-1	Socket for 811A, 572B	$ 1.00
SC-1000-1	Socket 3-1000, 4-1000	$35.00
SAF-500	3-500 air flow socket	$35.00
SC-8877	8877 socket	$14.50
TR-8877	8877 teflon tube ring	$19.50

Antenna change over relay 2KW

RL-2P-1	2PDT 12VDC	$ 5.25
RL-3P-1	3PDT 12VDC	$ 7.50

Meters

M-1000-P	Dual scale 0-3000VDC, 0-1 amp w/shunt & voltage resistors	$17.95
M-2000-W	Dual scale wattmeter 0-200 watt 0-2000 watt	$19.95
M-5000-VDC	5000-VDC Meter	$19.95
M-500	0-500 MA	$17.95
M-1A	0-1 AMP	$17.95
M-2A	0-2 AMP	$18.95
M-3000	0-3000 volt DC	$17.95

Ceramic Loading & Coupling Capacitors

CC-1000	1000pf 5KV	$ 5.95
CC- 500	500pf 5KV	$ 5.95
CC- 200	200pf 5KV	$ 5.95
CC- 100	100pf 5KV	$ 5.95

Roller Inductor

RI-28	28uh ceramic w/siler roller	$39.50

Transformers — Filament

X-5-15	5 VCT @ 15 Amp	$24.50
X-5-30	5 VCT @ 30 Amp	$29.50
X-6-16	6.3 VCT @ 16 Amp	$24.50
X-7.5-21	7.5 VCT @ 21 Amp	$34.50
X-10-15	10 VCT @ 15 Amp	$29.50
X-10-20	10 VCT @ 20 Amp	$39.50
X-20-15	20 VCT @ 15 Amp	$49.50

Combination Plate, Filament, and Relay Control Voltage

X-500	Single 3-500 amplifier XFMR	$69.50
X-500-2	Pair 3-500 amplifier XFMR	$108.00
X-811A	Four 811A amplifier XFMR	$59.50
X-572B	Four 572B amplifier XFMR	$69.50
X-6MJ6	Four Sweep tube amplifier XFMR	$52.50
X-8877	Single 8877 amplifier XFMR	$109.50
XH-4K	Ultimate Hypersil 4KW PEP Plate XFMR	$230.00

Replacement Transformers

	Clipperton L	$87.50
	GLA-1000, 1000B	$57.50

Amplifier Power Supply

APS-1 3000 volt power supply complete 3000 volt DC @ 1 Amp and 12 VDC @ 2 Amps — includes power transformer 117/234 AC 50/60 Hz, electrolytic capacitors, diodes, bleader resistors, PC board. Completely assembled, chassis and cabinet not included — $149.50

Amplifier kits available from Amp Supply:

LK-811A	4 811A 10-80 Meter	$ 277.50
LK-572B	4 572B 10-160 Meter	$ 399.50
LK-500Z-2	2 3-500Z 10-160 Meter	$ 444.50
LK-8877	1 8877 10-160 Meter	$1200.00
LK-30M	4 6MJ6 30 Meter	$ 199.50
LK-1000Z	3 1000Z 10-80 Meter	$1260.00
Econo-Amp	4 6MJ6 any band-mono band specify frequency	$ 200.00

Kits include all necessary parts to build a linear; tuned input, metering, power supply and transformer. Cabinets and chassis sold separately.

- All parts brand new
- We carry just about any amplifier part needed including transformers and cabinets

Check or money orders under $25.00 add $1.75 postage and handling, order direct.

VISA

MasterCard

Amp Supply Co.

2071 Midway Drive P.O. Box 421
Twinsburg, Ohio 44087
Phone # (216) 425-2010

Generals. KA9ARI is now KC9UI. WA9OAK is now KR9S. Effective Feb. 1, BWN will start at 1200Z. New Novice Racine area KA9DOG, mom of KB9NG. New Novice Marshall KA9OSA, XYL of WA9ZTY. New Novices La Crosse area KA9OQR & KA9OQT. Onalaska ARC officers: N9CEY, pres.; N9CIQ, v.p.; N9CDT, secy./treas. pres.; Sheboygan ARC officers: WA9OVU, pres.; WB9GLB, secy./treas.; KO9Q, activities chrmn. CWRA Ltd officers WD9ESX, pres.; WD9JID, v.p.; W9BCC, secy./treas. Eau Claire ARC officers: N9AIX, pres.; W9MEO, v.p.; W9BAR, secy.; KB9BC, treas. Sorry to report W9YKE W9PN WD9ESP & WA9PIN as Silent Keys. KC9CJ is NM of WSSN. New Novice Park Falls area KA9OVS. New Novice and Tech Watertown area, KA9DVH & N9DRH respectively. KA9LLN has Advanced BPL to KA9CPA. Traffic: KA9CPA 2708, WD9ESZ 337, WB9YPY 230, W9CXY 216, K9FHI 185, W9YCV 176, KC9CJ 141, W9DND 124, WA9WYS 123, KA9HPQ 116, W9UCL 98, K9AKG 91, KA9BHL 90, N9BYK 79, KC9KQ 78, K9UTQ 75, AG9G 70, KA9IKR 69, KA9OBP 64, W9CBE 62, KA9KLZ 62, W9LDO 60, KG9B 53, K9SAO 52, N9ATP 50, WB9ICH 48, WD9FRI 48, W9SO 48, K9VSO 46, K9LGU 45, N9BDL 40, N9DIH 40, K9JPS 39, K9VSO 34, KB9NG 33, WB9NRK 32, KB9GO 31, WB9JSW 31, WA9ZTY 31, N9AUG 26, N9DCF 25, W9FDY 25, KA9GYD 25, WA9GYF 24, KA9MFV 24, KC9MX 21, KC9GW 20, WD9IMZ 19, KA9NOT 17, W9SFL 17, W9UW 16, KA9NKQ 8.

DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, WBØHOX — STM: ADØS. SEC: KNØJ. All the EC's have KNØJ's latest mailing, lots of info and THANKS to him for a super job this past year. I must also thank our net managers for a job well done. DON'T forget the Amateur Fair June 4 at the Fairgrounds; it is a big one and lots of fun. WDØBXU is the new Zero rep for 10-10 Int. We regret to report 2 Silent Keys, KØTLS & KAØGDS. Congrats to KAØKHT on his General, and KDØBB on his Advanced. By the time you read this spring should be here. It's been better than last year. KCØYG is a NCS on the IARS DX Net Mon. Hope those that tried got Heard Is. VKØ; lots of good DX this month. I finally got #300.

Net	Mgr.	Time	Freq.	QNI	QTC
MSN-1	WØDM	6:30	3685	327	167
MSN-2	KAØEPY	10:00	3685	---	---
MSSN	WBØWXU	7:00	3710	79	8
MSPN/N	KAØJUX	12:05	3945	595	61
MSPN/E	KCØT	5:30	3929	1200	216
MNWX	WAØONE	8:15	3929	642	500
PICO	WØHZU	Daily	3925	3432	395

Traffic: KBØMB 872, WAØTFC 357, KAØJUX 196, WØHZU 188, KAØEPY 174, KAØHRP 167, WØDM 163, KAØIAQ 149, WØGRW 128, KAØARP 118, NØCLS 110, WØDFX 100, WAØONE 98, KTØR 57, ADØS 56, WDØHDD 51, KØCSE 40, KØOGI 40, WDØAHO 39, KBØRW 18, KDØBB 15, WBØJUL 13, NØDUQ 12, KAØODJ 11, KAØJQO 10, WDØBGS 8, KNØJ 7, KCØYG 3, WAØCEL 2, KAØNRU 2.

NORTH DAKOTA: SCM, Dean R. Summers, KQØC — FCC plans to be in Bismarck Sept. 13 & Sioux Falls May 24. Be sure your Form 610 is in. Forx Club now has patches; see KAØCAF. WØDM recovering from a fall. NØCYT is new OO. WØDM re-appointed OBS. Lots of folks now have computers-KBØRM KB9EK AKØT KBØUK NØGOU WBØFDT WBØGRC . . any others?? Remember, ARRL has many films, slides and other programs for the asking, write for details. Williston RARC meets 2nd Tues. at 18th St. Development Complex. Forx Club meets 4th Tues. at United Hospital. Data Net 29 sess.; 32 QTC, 403 QNI; Goose River 93 QNI, 2 QTC. Start planning now for Field Day, Peace Garden Hamfest, local club picnics and hamfests and don't forget Dakota Division Conv. Traffic: WØCDO 69, KAØFSM 64.

SOUTH DAKOTA: SM, Fredric Stephan, KCØOO — ASM: WØKJZ. Start planning for the Dakota Division Convention in Sept. at Sioux Falls. Hub City ARC gave public radio demonstration and has started Novice classes . . . Instructors are WBØSSC WDØHWL. Minnehaha Co. Civil Defense awarded WØBLZ Outstanding Radio Amateur for 1982. WØDVB and WØKJZ have been honored with life memberships in the Signal Hills ARC for their many years service. EC WØNWR and his Minnehaha Co. ARES members well equipped; taking extensive training. NTS TEN DTEN liaison stations were KØFRE WØKJZ KCØOO WØHOJ WBØKWX and WDØCPI. Join the fun SDTHIN at 1500 UTC on 3960. SD WX net 936 QTC, 1042 QNI; SD Traffic Handlers Info. Net 44 QTC, 173 QNI; SD Emergency net 5 QTC, 142 QNI. PSHR: KCØOO WØKJZ WØZWL. Traffic: WØMZI 829, WØZWL 808, WØHOJ 164, KCØOO 111, KØAIE 106, WAØVRE 82, WØDVB 76, WAØUEN 67, WØKJZ 64, KØFRE 55, WBØSSC 33, WØRWE 30, WBØOMF 28, NØCFS 26, WAØCIP 25, KCØAF 24, WAØBZD 24, WØYMU 24, WBØRXF 23, WBØHTT 20, NØCDX 17, NØEEH 14, KØTVJ 4, WBØYQT 1.

DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU — SEC: WB5IGF. All ECs and hams interested in emergency communications are reminded of the emergency coordinators net on 3.995 at 5:30 local time each Sunday. Reports continue to come in concerning the December storms and floods. N6VC, Faulkner Co. EC, has new emergency plan and it is a good example. Contact him on 146.37/97 in Conway for more info. Net reports: OZK NM W5MYZ, 207 checkins, 17 QTC, 407 min. Ark. Phone Net NM W5QFU, 312 checkins, 17 QTC, 111 min. Mockingbird Net Mgr. WA5ZWZ, 830 check-ins, 26 QTC 8 hours. Ark. Razorback Net Mgr. KC5CE 1275 checkins, 41 QTC, 430 min. Ark. represented 40% on RN5 by AE5L, N6AEN, WB5TDP, W5FDP. Traffic: W5QFU 64, WD5FCE 48, W5TUM 37, W5UAU 16.

LOUISIANA: SM, John Meyer, N5JM — ASM: KC5SF. STM: W5GHP. SEC: AC5R. Lots of work ahead for both KB5YK of BRARC and KD5QS of SARA, each hamfest chairmen of their club's annual big event. K5DPG has compiled a list of rptrs state-wide free for one s.a.s.e.; lots of new ones in this handy reference. W5OVV of LCARA is working on a project to publish a directory of all hams in the state; contact him for details and cost. The Acadiana club has new officers: N5BYM, pres.; KA5DKE, v.p.; KA5JQN, secy.; WD5DHY, treas.; KA5DFE K5ARH, board members; good luck gang! Looks like W5USN, the old Navy station, may fire up again thanks to KB4JI, station trustee and Chaplain at the Base who is heading the effort. Welcome to K5BPA, new EC for Allen Parish to KA5LEB new Asst. EC for E. Baton Rouge, and to WA4ILH new Asst. EC for Calcasieu and Cameron Parishes. Those interested in emergency work should check into the La. Emergency Net on 3910 Mon. at 8 P.M.

Net	Freq.	Time	NM
LAN	3615	Daily 7 & 10 PM	KC5SF

The Interface

Software Available for Six Computers

The versatility of the personal computer gives you a whole new world with the Kantronics Interface™ and Hamsoft™ or Hamtext™. The Interface™ connects to any of six popular computers with Hamsoft™ or Hamtext™ giving you the ability to send and receive CW/RTTY/ASCII. An active filter and ten segment LED bargraph make tuning fast and easy. All programs, except Apple, are on program boards that plug directly into the computer.

Hamtext™, our new program, is available for the VIC-20 and Commodore 64, with all the features of Hamsoft™ plus the ability to save received information to disc or tape, variable buffer sizes, VIC printer compatibility, and much more. Our combination of hardware and software gives you the system you want, with computer versatility, at a reasonable price.

Hamsoft™ Features

Split Screen Display
1026 Character Type Ahead Buffer
10 Message Ports-255 Characters each
Status Display
CW-ID from Keyboard
Centronics Type Printer Compatibility
CW send/receive 5-99 WPM
RTTY send/receive 60, 67, 75, 100 WPM
ASCII send/receive 110, 300 Baud

Hamsoft™ Prices

Apple Diskette	$29.00
Atari Board	$49.95
VIC-20 Board	$49.95
TRS-80C Board	$59.95
TI-99 Board	$99.95

Hamtext™ Prices

VIC-20 Board	$99.95
Commodore 64 Board	$99.95

Suggested Retail $169.95

For more information contact your local Kantronics Dealer or:
Kantronics 1202 E. 23rd Street Lawrence, KS 66044

Introducing a great new line of Viewstar components.

These quality engineered passive components have been designed by engineers who, like you are highly demanding amateur radio operators. Only the best components and state-of-the-art technology have been used to build them.

VS 1500A Transmatch *$489.95
This Transmatch is designed to match virtually any receiver, transmitter or transceiver in the 160 to 10 meter range, (1.8 to 30MHz) with up to 1500 watts RF power to almost any antenna. A 1:4 balun is built in for connection to balanced lines. Circuit uses the series parallel capacitor connection for improved harmonic attenuation. Units use the highest quality ceramic roller inductors and switches.

VS 300A Transmatch $159.95
This unit contains high quality components and is designed for lower power equipment up to 300 watts. It will match any receiver, transmitter or transceiver in the 160 to 10 meter range, (1.8 to 30MHz) with up to 300 watts RF power to almost any antenna. A 1:4 balun is provided for connection to balanced lines.

PT 1000 LP Lowpass filter *$35
This unit eliminates spurious conduction from transmitters operating below 30 MHz. It effectively eliminates 2nd and 3rd harmonics appearing in the TV bands when operating on 10, 15 and 20 meters providing excellent attenuation to TV frequencies above 36 MHz.

PT75 and PT300 Highpass filters. *$14.95
These units suppress spurious conduction from transmitters operating below 30 MHz. They provide low loss in the TV pass band 52-400MHz. PT 75 is designed for cable TV use. PT 300 is designed for off-air antenna use.

*FOB East Syracuse, N.Y.

VIEWSTAR INC.

Distributed by;
Unadilla/Reyco Division
Microwave Filter Co.
6743 Kinne St. East Syracuse, N.Y. 13057
U.S. Toll free 1-800-448-1666
N.Y.S. Collect 1-315-437-3953

LTN	3910	Daily 6:30 PM	N5ANH
LSN	3703	Mon-Fri 7:30 PM	WD5CWK
LRN	3587.5	Sunday 6:30 PM	W5GHP
CCTN	146.01/61	Mon-Fri 6:30 PM	GNOARC

Traffic: W5LQ 161, W5GHP 149, KC5SF 134, KA5DHT 112, K5TL 100, AC5R 68, WB5LBR 57, WD5JFY 52, WA5TQA 42, N5ANH 25, W5TVW 23, W5VMY 12, KA5PLF 10, WA5WJZ 8, K5WOD 8, N5JM 7, WD5IAA 2.

MISSISSIPPI: SCM, Paul Kemp, KW5T — STM: KB5W. SEC: N5DDV. VHF Coord. KB9TN. Spring is upon us once again. Time to check our your emergency capabilities and procedures. Jackson ARC sponsoring MS state convention and hamfest this month. Apr. 23 & 24. Plan to see you all there. Both MTN and MSN need your support. Upgrade KA5POC now Gen. RN5 (KB5W) sess. 62, QTC 621. CAND (W5KLV) sess. 31, QTC 647. DRN5 (WB5YDD) sess. 62, QTC 545. MTN (K5OAF) 31 sess. 31, QNI 156, QTC 66. MSBN (N5DSK) sess. 31, QNI 2693, QTC 66. MSN (N5ERX) sess. 21, QNI 196, QTC 11. CAEN (KA5AGD) sess. 5, QNI 145, QTC 0. GSEN (KB5W) sess. 21, QNI 413, QTC 41. Traffic: KB5W 315, N5AMK 279, K5OAF 181, N5RN 72, KT5Z 70, KD5P 65, N5EZQ 25, W5WZ 18, WA4GVJ 12, W5LSG 9, KT5T 4.

TENNESSEE: SM, John G. Brown, NO4Q — ACC: WA4GLS. SGL: W4WHN. SEC: K4TKQ. STM: K4YOL. The 1983 hamfest season is now beginning it's run and your ARRL officials of the section are looking forward to meeting with you and hearing what you have to say relative to the management of the section under the new concept. Let them know what you have on your mind as to the way things are going. Know many comments are in the back of your mind. If you have a subject matter that is pressing, take time to drop them a letter. I know that writing a letter is a bit of bother, also sometimes talk is also hard to get down in notes when someone is on the soapbox. In other words, take time to write a letter so we are sure to the matter under discussion. The summer storm season is just around the corner and you should begin to get the antenna grounding habit again and be ever ready to assist the people of your community in the event a tornado or other such storms come calling and leave an unwelcomed calling cards. Congrats to the many upgrades and newcomers that are evident on the bands with new calls and/or new amateurs. Keep up the fine work and enjoy the fruits of your efforts and service. Note in the last report or so that there several nets that did not get in reports. Last month six did not respond. Come on net managers and send in reports. Net summaries are: Phone: sess. 103, QNI 3490, QTC 285; VHF sess. 82, QNI 2120, QTC 627; TN - CW, Sessions-47, QNI-272, QTC-180; RTTY-Sessions-30, QNI-158, QTC-11. The last net is still looking for some good RTTY net operators to keep the band hopping. Traffic: NG4J 257, W4WXH 82, W4ZJY 78, K4WWQ 72, WB4TDB 45, W4MRD 37, W4DDK 35, K4WOP 21, W4PFP 18, NM4W 15, WA4UCE 13, W4TYV 11, K4AMC 11, WA4GLS 10, KE4LS 9, W4DTI 9, WD4GYT 8, K4VMO 7, WA4RMP 6, NN4S 5, W4PSN 5, WA4HKU 5, W4PMP 4 and W4EWR 3. That is a 30% drop in activity from last month. Many calls are not among the list. Send them in guys and gals.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: KA4MIC.

Net	QNI	QTC
KRN	565	19
KYN	221	88
MKPN	1290	72
KNTN	420	119
KTN	1486	114
KSN	239	77

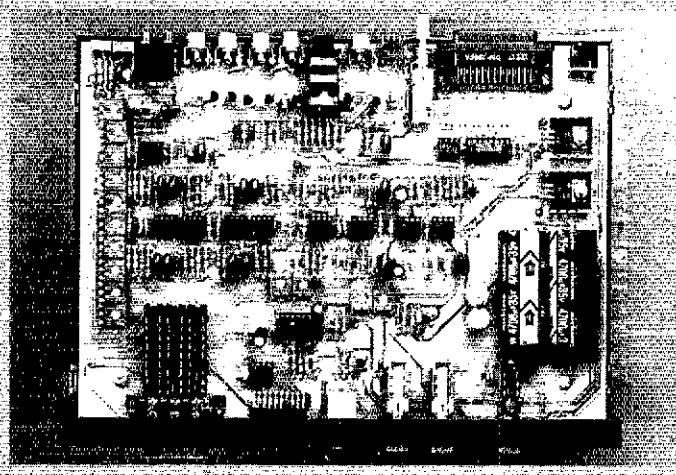
ARES nets reporting 13; Total QNI-1940; QTC-240. HAMFEST: Paducah on April 10. Stns active WD4JDJ KU4A N4GD-OO WA4AGH WA4SWF-OBS W4TPB. SET '82 reports: KTN 475; LCARES 267; 4ARES 265; KNTN 258; TSTMN 211; BARES 142; PAEWTN 115; SEKEN 42; WARES 34. New Section Appts: W4OYI-ACC; N4GD-OO/RFI Coord.; WA4AGH-BM; KTN NM-KA4SKV. TNX & CONGRATS. No more DXCC for WA4SAC-new harmonic. Congrats. PARS New Officers: KA4GYU, pres.; WA4KLN, v.p.; KA4SKV, secy.; WD4INS, treas.; KF4FO, activ. chm. PSHR: KA4ADF KA4BCM WD4BSC KA4GFU KA4MTX KB4OZ KA4SAA WA4YPQ. Traffic: KA4SAA 199, K4YZU 145, KA4GFU 135, WD4IYI 120, KB4OZ 89, WD4RWU 71, KA4BCM 61, KC4WN 61, K4MHL 56, KZ4G 52, KS4V 40, WB4APC 34, WA4AVV 34, WD4BSC 32, WA4EBN 30, WA4GHQ 27, WA4YPQ 25, WD4IXS 22, W4WQV 22, W4PKX 19, KA4SKV 19, WD4COF 18, K4HOE 18, W4OYI 17, WD4CJO 14, KA4MTX 14, WB4AUN 12, WA4NOG 11, WD4IYH 10, N4GD 9, WA4JAV 8, KA4MBF 8, WA4SWF 8, KA4MAP 5, WA4SAC 5, KA4ADF 3. (Dec.) WA4SAC 9, WA4JAV 8.

MICHIGAN: SM, James R. Seeley, WB8MTD — SEC: WA8EFK. STM: WD8RHU. OO/RFI Coor.: K8JH. ACC: K8SB. PIO: WA8PII. SGL: N8CNY. TC: WB8BGY. BM: KZ8V.

Net	Freq.	Time/Day	QNI	QTC	Sess.	Mgr.
QMN*	3683	1800 Dy**	1448	318	31	KV8U
MITN*	3953	1900 Dy	815	265	31	K8KQJ
MNN*	3722	1730 Dy**	447	106	61	N8DSW
GLETN	3932	2100 Dy	1366	106	31	WD8IBY
MACS*	3953	1100 Dy**	584	102	31	K8LNE
UPN*	3722	1700 Dy	726	91	36	WA8DHB
WSSBN	3935	1900 Dy	650	40	31	WB8SUR

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. Vhf nets, 13 rpts, QNI 718, QTC 39, sess. 50, WD8RHU mgr. ARES net Sn, 3932, 1730. Traffic Workshop Sn, 3953, 1600. 3932 is MI hf emer. freq. Please note that your BM, KZ8V, is ex-KC8DN. Other new KZ's: 8H, ex-WA8JNR; 8I, ex-N8DVZ. New club officers: L'Anse Creuse ARC (Mt. Clemens), WA8QAF, pres.; WD8LBJ, pres elect, N8EOA, secy, WB8UCB, treas. KG8F, act. mgr. Cascades ARS (Jackson): KC8SE, pres.; WB8BGY, v.p.; N8CNT, secy.; KA8HDY, treas., KZ8H, act. mgr. Machine Contest Club (Jackson): WB8MTD, pres.; AI8D, v.p.; K8MJZ, secy./treas. Speaking of clubs, which one will be the first to be officially designated as a Special Service Club in MI? Several already are beating on ACC K8SB's door, even though the program has not (at this writing) officially begun. Is yours one of them? Under BM KZ8V, MI's OBS program is being expanded with the addition of special MI bulletins in addition to W1AW's offerings. Listen on section and local nets alike for info pertinent to the MI amateur community. SGL N8CNY reports that (ho hum) the latest attempt to have our callsign license plates put into the "vanity" category was routinely tabled; it never reached the committee level this time. His message, though, is clear: this threat is perennial. About that "MI HF emer. freq." 3932 kHz. As with published net frequencies, this too is *approximate*. Under our state emergency plan, it (or the nearest open

CHAMPAGNE RTTY/CW on a Beer Budget



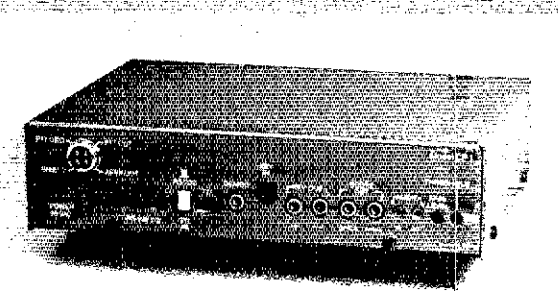
CP-1 Computer Patch™ Interface

The AEA Model CP-1 Computer Patch™ interface will let you discover the fastest growing segment of Amateur Radio: computerized RTTY and CW operation.

When used with the appropriate software package (see your dealer), the CP-1 will patch most of the popular personal computers to your transceiver for a complete full-feature RTTY/CW station. No computer programming skills are necessary. The CP-1 was designed with the RTTY neophyte in mind, but its sophisticated circuitry and features will appeal to the most experienced RTTY operator.

The CP-1 offers variable shift capability in addition to fixed 170 Hz dual channel filtering. Auto threshold plus pre and post limiter filters allow for good copy under fading and weak signal conditions.

Transmitter AFSK tones are generated by a clean, stable function generator. Plus (+) and minus (-) output jacks are also provided for CW keying of your transmitter. An optional low cost RS-232 port is also available. The CP-1 is powered with 16 VAC which is supplied by a 117 VAC wall adaptor included with the CP-1.



Please write AEA for more detailed information on the CP-1 or better yet, see your favorite dealer and compare.

Prices and specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C-2160, Lynnwood, Wa. 98036
206/775-7373 Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

spot to it) becomes a "command" or leadership liaison channel if need for such exists during a state-wide communications emergency. In so designating 3932, the drafters of the plan (including this writer) had no intention of disturbing on-going routine use of this spot by any individual or organization. Can we let it rest? Traffic: AF8V 327, WD8LRT 254, KA8CPS 237, WB8MTD 236, W8QHB 208, N8DSW 190, K8KQJ 115, WD8RHU 111, WA8DHB 106, K8KMQ 94, WB8WKQ 81, N8DTZ 72, N8BNC 69, WD8EIB 58, KA8NCR 58, W8SCW 52, N8EGK 49, WA8EFK 48, W8CUP 37, WD8ECM 35, WB8HPZ 35, W8IHX 34, K8LNE 33, K8UPE 33, W8YIQ 31, WA8WZF 30, WB8SYA 27, KZ8I 24, KI8Q 24, N8CNY 22, WD8MJB 21, K8ZJU 19, W8BEZ 18, WB8TTA 18, W8YZ 17, WA8LKC 16, K8OCP 15, KS8P 15, KZ8V 15, W8VIZ 15, WB8YWA 14, WB8YRY 13, KA8JFM 12, WD8OEP 12, KV8U 11, N8BBY 10, N8EOI 7, WD8BSE 6, N8EBN 6, W8LDS 5, WB8POL 5, W8RNQ 5, KT8G 3, KF8M 3, W8URM 3.

OHIO: SM, Allan L. Severson, AB8P — Asst SM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW WA8DYX W8EK WA8GMT KF8J WD8KFN WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	470	225	62	6:45/10 P.M.	3.577
BNR	133	73	31	6:00 P.M.	3.605
ONN	229	33	27	6:30 P.M.	3.708
OSN	310	121	31	6:10 P.M.	3.577
OSSBN	2976	755	93	10:30 A.M. 4:15 & 6:15 P.M.	3.9725
OSSN	164	82	31	6:45 A.M.	3:577
O6MN	525	190	31	9:00 P.M.	50.160

Hard to believe, but the hamfest season has begun, and as usual, I hope to talk to many of you at the various functions. I'm particularly interested in knowing what you'd like our new Section Organization to do for you. I hope to meet a representative cross-section of Ohio amateurs at the Dayton Hamvention where I'll be available at the ARRL booth, the ARRL Forum, OSSBN Forum, and, certainly the ARES Forum where K8AN will again perform his usual organizational magic. Club elections: East Liverpool ARC-N8DSU, pres.; W3LRE, v.p.; K8JKB, secy./treas.; KC8WO, Trustee. Madison Co. ARC-KA8KHS, pres. KA8ELN, v.p.; WD8QXT, secy./treas. Mt. Vernon ARC-W8WWU, pres.; WD8LTP, v.p.; KC8UR, secy./treas. Upgrades: to Extra-KC8ZX KC8LB.

Local Nets	QNI	QTC	Sess.
ALERT	38	---	4
BARF	151	27	20
BRTN	275	108	30
COARES	103	1	3
LCNWO	382	58	43
MASER	109	5	4
Medina Co.	337	39	31
NCTW	28	15	17
RARA	70	---	4
TSRAC	1149	67	36
VWCEN	67	---	4

Traffic: K8NCV 534, W8PMJ 364, WD8MIO 330, W8GGX 242, WD8KFN 220, WA8GMT 160, K8OZ 156, AB8P 153, K8DL 145, KF8J 128, N8DSU 122, WD8KBW 121, WD8IKC 120, K8YUW 119, W8EK 114, W8OZK 111, W8WEG 84, WB8JGW 81, WB8UBR 78, WA8GMT 73, KA8GJV 63, WB8KKI 63, N8EES 61, N8BQK 60, K8TVG 59, N8AUH 57, W8SKP 57, KA8MEB 53, KA8IAF 49, K8AN 48, K8JDI 47, WA8SSI 47, N8CSL 46, W8TP 46, KA8ICB 43, WB8DMF 42, WD8NEC 41, WD8RGP 41, K8VOY 37, N8CWU 36, WB8HHZ 35, W8MOK 34, N8AEH 33, WA8QYJ 33, K3RC 33, KV8Q 31, W8TXV 31, WB8YTD 31, WD8RZG 29, WB8SIQ 29, N8EMR 28, KA8IUK 26, W8UPD 26, WD8JAJ 25, WB8QHV 23, WD8DOS 21, W8FUP 21, WB8MRL 21, N8AKS 20, WD8AYH 19, KA8DJZ 18, KA8LNA 18, KA8NXV 18, N8CW 17, WA8DYX 17, W8MVE 17, WD8RGS 16, WA8BUW 15, K8NJO 15, K8CKY 14, KA8GGZ 14, WA8HED 14, WB8KWD 14, W8ZM 13, WD8NED 12, KA8GMF 11, WB8YUS 11, N8CJS 10, W8DYF 10, KB8YS 10, W8BHL 9, WB8AWM 8, W8HVA 8, WB8NHV 8, KA8DGO 7, WD8EKI 7, N8JR 7, KA8NFD 7, WB8VOA 7, W8LZE 6, N8AJU 5, WB8QHU 5, K8CMR 4, W8OQL 4, WB8NTR 3, W8RG 2. (Dec.) N8CSL 175, W8SKP 149, N8EHR 50, N8EMR 35, N8AEH 25, WB8YUS 18, KA8NXV 7. (Nov.) K8NCV 868, WD8MIO 504, WD8KFN 403, K8OZ 387, W8PMJ 374, W8GGX 300, WA8HGH 244, N8BQK 239, WB8MZZ 230, WD8RIB 210, N8DSU 166, AB8P 159, WA8GMT 154, WB8UBR 138, WB8DMF 130, W8QZK 116, N8EES 107, K8JDI 104, KA8GJV 95, WD8DYW 92, K8YUW 92, KA8MEB 91, W8EK 90, N8AUH 84, WD8KBW 84, WB8QHU 84, N2NS 82, WB8JGW 80, W8UPD 75, K8DL 68, WD8IKC 66, KA8HUZ 64, WB8QHV 64, W8SKP 64, W8WEG 62, N8JR 61, K8AN 59, WB8SIQ 58, N8CSL 57, KB8YS 55, WA8BUW 52, WA8SSI 52, WD8MLN 51, WD8NEC 51, KF8J 49, N8CWU 46, WA8QYJ 46, WB8YTD 43, K8HJE 41, W8MOK 40, KA8DJZ 39, WD8ODV 36.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL.

Net	Time/Day	Freq.	NM
EPN	2300Z	3.902	AG2X
ESS	2300Z	3.590	W2WSS
NYS	0000/0300Z	3.677	N2APB
NYS/M	1500Z M-S	7.077	WB2FAG
NYPON	2200Z	3.913	KC2SJ
NYSPTEN	2300Z	3.925	KA2Q
NYS RATT	2330Z	3.625	W2ODC
CDN	2330Z	146.34/94	WB2ZCM
HVN	0030Z S-M-T	144.535/135	N2BDW
HVN	0030Z W-S	146.37/97	N2BDW
SDN	0230Z	147.66/06	K2ZVI
SCRN	0100Z	147.735/135	KV2U

CLUB NEWS: Albany ARA had speaker on tracking by radio of wildlife in Feb. Also reports new member KA2PHD. CCNR has new member W2BCE. Orange Co. ARC reports upgrades KA2MSL N2DPP and KA2QIX received licenses; also Silent Key N2CKL. WARA had interesting Feb. program on new equipment out. WECA had program on arson investigation. W2XL reports Ulster busy with SKYWARN training. CDN had impressive totals for '82. W2WSS of ESS-tel. # in msgs could use improvement in accuracy!! Congrats to AK2E new EC for Schenectady. NYPON & NYS/M both busy in Jan. PSHR: WB2ZCM WB2MCO K2ZVI K2ZM W2YJR W2BIW WB2VUK WB2OHR KA2MBP. Traffic: WA2SPL 395, K2ZM 242, WB2MCO 166, K2ZVI 132, WB2VUK 128, WA2JBO 127, WA2JQL 116, WB2ZCM 116, W2BIW 105, W2YJR 78, K2MI 58, KA2MBP 52, W2PKY 49, AG2X 43, KB2KW 40, WB2OHR 39, WA2YBM 34, AA2Y 27, WA2CJY 26, KC2IU 24, WB2SON 14, N2GPX 11, KC2TF 9, N2BFG 7.

NEW YORK CITY-LONG ISLAND: SM, John Smale, K2IZ —

True Romance

An unsolicited response to our recent ad "Why I love my ALPHA 78".

John M. Shinall, K4BYK
P.O. Box 240
Cumming, Georgia 30130
United States of America

December 29, 1982

Dear OMs,

Reading your account of an Alpha 78 love affair in the latest QST prompts this letter from me as one of the first to be smitten.

Since placing S/N 8002 into service on July 22, 1979 with a shakedown QSO and 59 report from 4Z4PG on 15 meters I have worked 293 countries plus two that Don Search doesn't count. Operation has been on all bands on both SSB and CW utilizing 100 watts of drive with dipoles for 40 and 80 and a tri-band Quad. Reliability has been superb overall with a couple of minor problems handled promptly and courteously by mail. (Absolutely no down-time has been experieced and no new ones missed.)

In early 1978 I acquired one of the "no tune-up" rigs and immediately ordered an Alpha 374 but the FCC threw a wrench into the works with the new 10 meter amp restrictions. While waiting for the mess to unravel you guys told me about the three hole 78 with QSK that was in the works so I decided to go for broke and changed my order. The 374A is quite an amplifier itself but my brown bomb was well worth the wait.

Using a pair of solid state transceivers in tandem permits multi-band operation with the single 78 helping snag the multipliers during single-op contesting. (While typing the previous sentence I took a three minute break to work 9N38 on 14.217/SSB and 14.035/CW. I even worked the last Navassa on five bands within 17 minutes with no tune-ups.) Ease of operation is a real plus for me after almost 25 years of twisting ol' tune/plate and load.

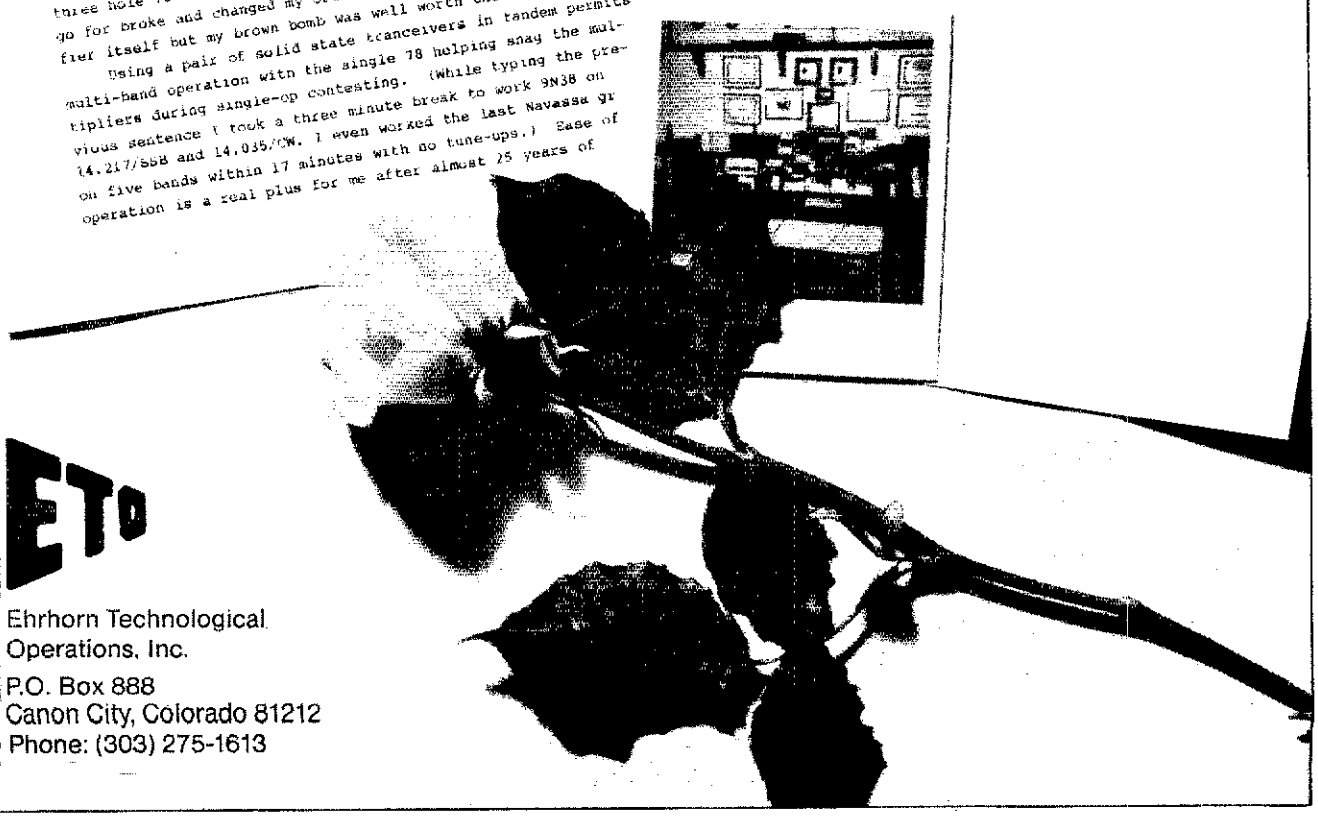
The compact size is nice and in my shack allows for shelf-top rather than desk-top operation. (See enclosed photo.) I also understand that this and the Hypersil transformer facilitate shipping but this really doesn't matter to me as I don't anticipate our ever parting company.

Your ad writer doesn't lie...its all true and more. I defy anyone to put an Alpha 78 in line between a solid state rig and an antenna and not fall in love. And woe be unto the ham with a jealous wife when he brings home this tan little beauty with flashing eyes looking for a little excitement.

Yes, I love my 78 but I'll admit I've never met an Alpha owner who wasn't in love with his 76, 374 or 77 either. You guys have quite a harem of temptresses.

73,

John, K4BYK



ETO

Ehrhorn Technological Operations, Inc.
P.O. Box 888
Canon City, Colorado 81212
Phone: (303) 275-1613

NLI CW*	3630	1900/2200	W2LWB
NLIPN*	3928	1815	KS2G
SCVHF	4.77/5.37	2030 M-F	WA2ARC
BAVHF	6.07/67	2000 M-F	N2BQD
LIMARC	6.25/85	2100 F	N2BZL
ESS	3590	1800	W2WSS
NYS	3677	1900/2200	N2APB
NYS	7077	1000 M-S	WB2EAG

* Denotes section net; all times are local; please try and help out by checking in whenever possible. The Town of Islip will be holding their Tercentennial, and the Suffolk Co. ARC will be operating W2DQ April 23-30. Look for them 15 kHz up from the lower end of the General phone bands on 40, 20 and 15, and look for them on the Novice band around 21.135 kHz. QSL with large SASE to WA2ARC. Congrats to W2PL who celebrated his 50th anniv. as a ham. K2FEA upgraded to Advanced. Stats. for NLI CW are: total QNI 354, total QTC 270 in 62 sess. The 10-10 Int. local chapter-L.I.A.R.S. (Long Island Amateur Radio Society) invites checkins to their net on Thursday nights at 2000 local on 28730 kHz. KS2G has started printing the QNB (Quarterly Net Bulletin) for the NYC-LI section; if you want a copy please contact him. This bulletin contains all the info on the nets in this section. Congratulations to WB2TQC and his XYL on their new harmonic, a girl. N2CRD and K2CMV earned open class WAG awards, K2CMV also collected the 35 QSOs endorsement. New members to Grumman ARC are, KA2OFI W3BH KA2OZQ WA2FNQ N4DXM N3KH. Very interesting article published in the Grumman newsletter about the EX-Long Island Amateur Radio Society (EX-LIARS). It seems there are over 80 members, all formerly from L.I. They have two picnics a year with good attendance at both. If you're planning on moving down to Fla. why not contact one of the members. New members for Suffolk Co. ARC are: KA2EYW KA2PPZ. Anyone knowing of or interested in forming a Commodore VIC-20 Computer Users group please contact KS2G, Mel Granick, 6 Melanie Lane, Syosset 11791. Anyone interested in starting a 2M RTTY traffic net should contact W2LWB or K2LIE. Traffic: N2AKZ 184, W2AHV 176, W2TZO 136, KA2FFC 105, WA2ARC 92, W2GKZ 64, K2MT 34, K2MT 34, K2GCE 30, K2IZ 26, WA2PMW 20, KS2G 11, N1EE 2, K2JFE 2. (Dec.) N2BQD 80.

NORTHERN NEW JERSEY: SM, Curtis R. Williams, W5DTR — SEC: WB2VUF. STM: W2XD. BM: N2BOP. ROC: W2CC. SGL: W2KB. PIO: WB2NQV. TC: AD7I. NMs: W2CC AG2R N2BNB KA2GSX KA2HNQ WB2IQJ KY2D N2XJ W2PSU.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJM	N2XJ	7063	1000 Dy	31	187	102
NJPN	W2CC	3950	1800 Dy 0900 Sn	36	517	209
NJSN	WB2IQJ	3735	1830 Dy	31	301	105
NJN/E	AG2R	3695	1900 Dy	31	438	184
TCETN	KA2GSX	147.255	1930 Dy	31	255	49
OBTTN	KY2D	147.12	2000 Dy	31	675	140
NJN/L	AG2R	3695	2200 Dy	31	311	134
NJVN	KA2HNQ	49/49	2230 Dy	—	—	—
NJRTTY	W2PSU	147.51	Autostart			

Another new Section Leader under the new structure is AD7I, Paul Newland, Technical Coordinator. The position of Affiliated Club Coordinator remains open. The Flemington Hamfest/Indoor Flea Market will be held Saturday, April 9. Congrats to KY2P (N2DWY), KY2T (KA2KTR), and N2EBA (KA2QWK) on their new calls. WD2ABC has retired as Captain from the Union Fire Dept. KA2ERG will organize operators for the Westfield Soccer Tournament. N2XJ reports the New Jersey Morning CW Net got off to a good start in January. More stations are needed and your help would be appreciated when you can check in. Members of Sussex Co. ARC provided communications for NJ Special Olympics winter games. OO W2TPJ has been active sending QO Cards to those with chirpy signals heard on 80 and 40. Your local and state nets need your support. Can you spare a few minutes to be NCS or a liaison once a week? PSHR: W5DTR W2XD AG2R N2XJ KB2HM KY2P K2VX KX2L N2BNB KA2GSX WB2GHN WB2QMP N2DPN. Traffic: N2XJ 195, K2VX 155, KB2HM 147, W2XD 131, AG2R 128, KY2P 86, N2BNB 76, KA2LEB 66, KX2L 63, WB2GHN 53, W5DTR 50, WB2KLF 50, KA2GSX 38, W2ZEP 38, KB2WI 35, N2DPN 34, WB2QMP 20, KC2MM 21, W2UH 17, WA2FZJ 13, N2BC 12, W2CC 12, N2EBA 8. (Dec.) KA2FXB 25.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY — ASM: WØRPK. NMs: WAØAVW WAØAUX WØYLS KQØI. Owing to the section reorganization please note the new leadership appointments: SEC-WA4VWW; STM-KØGP; Bulletin Manager-KØIIR; Technical Coordinator-KØDAS; State Government Liaison-AKØQ; Public Information Officer-KBØZP. Feel free to contact these folks for assistance. I am looking for Public Information Assistants from each area and club to complete this reorganization. If you can handle the PIA job let me know. Still need OBSs in many areas; if you do not hear the bulletins on your repeaters maybe you would like the job. EC year-end reports excellent, over 65% of ECs turned in year-end reports; where are the rest? Traffic total and participation up over previous years. ARRL membership up in this section, thanks to all who have made it a great year. New officers in Muscatine KEØY WBØTSG KAØADF KAØBUT; in DSM WDØCPD WBØUGO WDØDOK WBØOEU. Attend Weather watch Meetings this month!!!!

Net	UTC	Freq.	Dy	QNI	QTC	Sess.
TLGN	0030/0400	3560	Dy	414	201	62
ICN	0100	3713	TThS	78	32	11
75M Phon	1830-2330	3970	M-S	2125	131	52
PM Net	2130	3982	MWF	198	0	21
ITEN	2230	3970	Sn	96	12	5

Traffic: WAØAUX 258, WØSS 177, KØGP 170, WØYLS 124, KAØJQG 84, KØCY 83, WDØFWB 75, WA4VWV 61, KCØSC 58, NØEHV 45, KQØI 44, WDØHND 43, W4JL 40, KAØADF 39, WBØAVW 36, WBØJFF 26, WØBW 25, WDØDCF 20, KBØOZ 15, KA9GBG 14, KEØY 14, WØLFF 8, WBØCPR 3, KØZQ 3.

KANSAS: SCM, Robert M. Summers, KØBXF — Was sorry to hear of another Kansas Silent Key, NØEGY/KAØNTB.

Net	Sess.	QNI	QTC	NM
KSBN	31	1554	167	KAØCUF
KPN	23	401	45	KAØCUF
KWN	31	1091	750	WAØLBB
CSTN	31	2081	161	WAØOMB
QKS	62	307	77	WBØZEN
QKS-SS	13	52	12	NØBDG
KMWN	31	640	542	WAØLBB

There will be a meeting of Section Leadership Officials at the ARRL Midwest Convention April 15-17 in Sioux City. As of this date I am planning to attend and hope to see several KS reps also. Welcome to the new class of

Novice in Leavenworth-KAØs MVJ MVK PIV PIW PIX PIY PIZ PJA PJB and PKA. They all have enrolled in an upgrade class, and word has it that the talent in this group is going to make a new world of Field Days in Leavenworth. Johnson Co. RAC is boasting of having a youngster getting his drivers license again. When it expires he will be 96. Guess it makes him feel real proud also to be able to copy code at 40 wpm. WØBT, ex-KØKED, was recently elected pres. of Kaw Valley ARC. More election results next month. Traffic: WØFRC 344, WBØZEN 144, WØHI 119, WØOYH 98, KAØCUF 77, WØFIR 75, WØKL 70, WØFDJ 66, WØCHJ 35, NØBDG 32, KØBXF 30, ACØE 23, KSØU 20, WØPB 11, KAØE 9, WØRBO 7, KØGSC 6, WØRT 4, WØOAG 2, WAØOWH 1.

MISSOURI: SM, Ben Smith, KØPCK — As of January 1, I started serving as Section Manager of the Missouri section. At that time we started the Section Manager plan. I am very proud to announce the following list of amateurs who will be holding leadership positions: SEC-WBØKUW; STM-KØSI; PIO/ACC-KT5Y; TA/TC-K4CHS; OO/RFI Coord.-WBØRHK; BM-NØBKH; SGL-KA6CSJ. The leadership people and I are eager to serve the amateurs of Missouri, so give us something to do. At their January club meeting, the Indian Foothills ARS honored WØKNF for his fifty years as a licensed amateur. Congrats from all of us. The MO SSB net had a QNI of over a thousand for the first time in years. A great tribute to net manager KT5Y and the rest of the net. The MEOW net has good participation under the leadership of KØDSQ. KØSI surely would like more QNIs on the MO CW Net. By this time, the MO Traffic and Training Net will have been on the air for several weeks. The net is a slow speed net on 3730 kHz at 7:30 P.M. NØDDZ is net manager with WBØSSB KGØL KSØI and NØDDZ acting as NCS. We urge Novices and above to check in. It will be a good place to help get your code speed up and learn cw net procedure. New ORS appointments go to KT5Y AIØO and WA8MAZ, with WBØELJ receiving the very first Public Information Assistant appt in MO. 1983 officers in the Callaway AR League are: WDØCGZ, pres.; WØNUB, v.p.; KSØM, secy./treas. Ozark ARS officials are: NØAGU, pres.; KØLAF, v.p.; KBØE, secy./treas. Rolla Regional AR Society recently elected the following: KBØKD, pres.; WØGS, v.p.; WØPIV, secy./treas. Mid-Mo ARC officers are: KAØBTO, pres.; NØSS, v.p.; KAØDLD, secy./treas. Central Mo. RA officials are: WBØTEG, pres.; WA8MAZ, v.p.; NØBLB, rec. secy.; KSØR, corres. secy.; NØBEF, treas. We hope all clubs will report their activity to me and to KT5Y. This is your "Section News" column, so let me know what you want in it! Traffic: KCØAS 539, KØSI 173, KUØG 121, KØPCK 110, WØBMA 102, AIØO 79, KT5Y 52, WØOUD 41, NØDDZ 40, KØDSQ 35, KCØCL 33, WBØSSB 31, WAØYJX 30, WA8MAZ 11, WØNUB 10, WAØKUH 6.

NEBRASKA: SM, Reynolds Davis, KØGND — Midwest Division Convention Apr 15-17 in S. Sioux City, NE. We are looking forward to see you there. Roy Neal, K5DUE, Science Ed for NBC News is featured spkr. Topic: "What's Up?" Speaking of TV, look for members of Lincoln ARC on Nebraska ETV during their annual auction. Exact time/date will be on all nets. Please add KØGND & KØGNW to your club newsletter mailing lists. Additional appts: OTS-WAØBOK KØDKM WØGEO WAØOQX KØSFA; NMs — KAØAND NØAZF WAØBOK KQØK; New ECs — KAØAEW NØDGB KAØJLH WBØMJZ KØPXY KØTD; ORS — WBØTED. Thank you all for volunteering! Hf NE nets: 0030Z NE Storm 3982 kHz; 0100Z NE CW 3737; 0130Z NE 160 WX 1995; 1330Z NE AM Phone 3982; 1400Z Western NE 3950; 1430Z (Sun) NE ARES 3982; 1830Z Cornhusker 3980; 1900Z NE 40 7282. Plus locals. Traffic: KØGND 43, KAØBCB 22, WØHTA 14, WØNIK 10 WBØGWR 9 WBØGMQ 8, KØJFN 8, WAØBOK 6, WAØOQX 6.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — SEC: K1WGO. STM: K1EIC. OO/RFI: KA1ML. SGL: K1AH. ACC: N1AZF. OBS: WA1DWE. PIO: WB1AIU. TC: W1HAD.

Net	Freq.	Local Time	QTC	QNI	NM
CN	3640	1900/2200	240	394	K1EIR
CPN	3965	1800 Dy/1000 Sn	73	239	W1OD
NVTN	28/88	2130	54	307	WB1ELA
WCN	78/18	2030	104	509	WB1GXZ
RTN	13/73	2100	23	393	WB1ESJ

Upgrades: Extra-KA1FT; Adv-N1AWJ N1CML Gen-KA1JJO KA1HYE. The FCC's NPRM on the so-called codeless license, Docket 83 28, has been released. Your comments have been solicited; the future of Amateur Radio is in your hands. Be sure to voice your opinions. The comment deadline is 29 April. SMAG is making the CARA produced "CQ Ham Radio" Novice class video tapes available to viewers of the local Meriden cable system. K1TGX had fun operating portable J6L. New SARA officers: W1ICH, pres.; N1AWJ, v.p.; KK1J, secy.; KG1M, treas.; KA1FOT, trust. Call changes: WB1DZS/N1CML; KA1GRD/KB1FW; N1BFS/KN1W. Valley Regional HS-WA1FTT back on the air. SARC now conducting upgrade classes. W1AW soon to be operating EME. The World Communications Year has arrived. What is your club doing to publicize Amateur Radio? ICRC recently was treated to a fine presentation by N2OK, who helped design and build the ESPN complex in Bristol. The PVRA Flea Market has been scheduled for April 24th. Murphy's Marauders CC recently held their annual dinner party. Packet Radio transmissions have been receiving a lot of interest lately at both SARA and ECARA meetings. The W1-bureau needs your help. Be sure to maintain a sase with the sorter; it is recommended that no money be sent. If possible, volunteer your time. After all many hands make light work, and this is a volunteer effort. With these simple the W1-bureau should be able to get back on the track and provide the service required. Traffic: W1EFW 332, WB1GXZ 300, WB2PJU 187, K1EIR 88, KA1EGE 74, WB9IHH 72, K1AQE 50, W1YDL 50, WB1ESJ 45, K3ZJJ 28, K1UOE 27, W1BDN 16, K1EIC 16, KA1BHT 14, N2BQA 10, W1QV 7, K1XA 2.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASM: K9HI.

Net	Mgr.	Freq.	Time (loc)/Dy	QNI	QTC
EMRI	WA1LPM	3.658	1900/2200/Dy	582	795
EMRIPN	KA1ON	3.959	1730/Dy	273	346
EM2MN	N1BNI	23/63	2000/Dy	461	392
NEEPN	K1BZD	3.945	0830/Sn	89	19
HHTN	KA1MI	04/64	2230/Dy	509	399
EMRISS	N1BHH	3.715	2030/Dy	140	49
CI2MN	N1BYS	045/645	1930/Dy	200	140

By the time you read this you all will undoubtedly be aware of the Notice of Proposed Rulemaking that the FCC came out with in January regarding the establishment of a no-code amateur license. The facts are that you don't want it and the League doesn't want it, but we will probably have it forced on us anyway. Should we sit

COMMUNICATIONS EQUIPMENT

MIRAGE AMPLIFIER SALE!

B1016 2 Meter Dual Purpose $249
H.T. 1-2W In - 35-90W Out
or Transceiver 10W In - 160W Out

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
B23	2M	No	2W	30W	5A	$ 79
B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
D24	440	No	2W	40W	8A	$179
D1010N	440	No	10W	100W	20A	$289

RC-1 Remote Control for Mirage Amplifiers $24
MP-1 and MP-2 Peak-Reading Wattmeter $99

ASTRON POWER SUPPLIES

Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8 VDC ± .05V
- 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

MODEL RS-50A

SANTEC

ST144μP Handie Talkie
ON SALE! Only $285

- 142-149.995 MHz
- 24 Hour Clock
- 3.5W/1W/.1W Output
- Liquid Crystal Display

IN STOCK FOR IMMEDIATE DELIVERY

OTHER SANTEC ITEMS

ST-440μP 440 MHz H.T. $299
SM-3 Speaker Mic 33
ST-LC Leather Case 29
ST-6BC Base Charger 29

TOKYO HY-POWER LABS
Regular $89.95
SALE $75!

HL-32V 2 Meters, 2W In - 30W Out

OTHER TOKYO HY-POWER ITEMS

HL-82V 2 Mtr, 2-12W In - 35-85W Out $139
HL-160V 2 Mtr, 1-15W In - 160W Out 299
HL-20U 440 MHz 1-3W In - 20W Out 99
HL-90U 440 MHz 10W In - 80W Out w/Preamp . . 339
HC-150 HF Ant Tuner w/Wattmeter 89
HC-2000 Deluxe 2KW HF Antenna Tuner 299

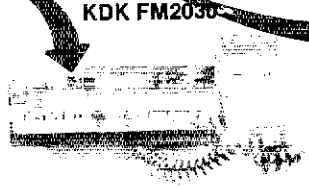
TRIO-KENWOOD TR7950

SALE PRICE $359!

ICOM IC25A

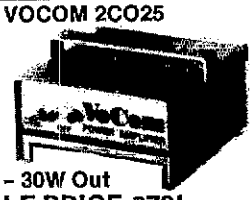
SALE PRICE $309!

KDK FM2030



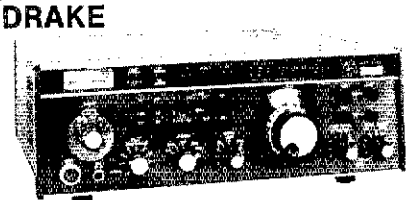
SALE PRICE $269!

VOCOM 2CO25



2M 2W In - 30W Out
SALE PRICE $79!

R.L. DRAKE



TR-7A Transceiver On Sale $1449!
Accessories In Stock - Call!
L7 HF Amplifier Only $969 (Less Tubes)
Eimac 3-500Z Tubes $199/pair

TEN-TEC SUPER SALE!

New Corsair $999! **Omni-C Close Out $799!** **Argosy $499!**

ALL ACCESSORIES IN STOCK—CALL!

HAL Communications Sale!

CWR6850 $849!

CT2100 KB2100 $859!

CWR6700 Receive Only Telereader . . . $439
DS2050KSR RTTY System with Keyboard . . 569
DS3100ASR Deluxe RTTY Terminal . . . 1799
DS3100ASR with MSO3100 Message Unit . 2132
RS2100 1" Scope w/Loop Supply 289
ST5000 RTTY Demodulator 219
ST6000 Deluxe Demodulator/Keyer 649
BMC12AU 12" Green Screen Monitor 111
BMC12EU 12" Hi-Resolution Monitor 169

AEA PRODUCTS

MM-2 MorseMatic® $150 — MM-2 w/Mem. Exp. $189
CK-2 Contest Keyer . . 125 — KT-2 Keyer/Trainer . . 99
BT-1 Morse Trainer . . . 72 — BT-1P w/Nicad . . . 109
MBA-RO Reader . . . 269 — AC-1 12 VDC PS . . . 14
Isopole® 144 . . . . . 39 — Isopole® 144 Jr. 29
WB-1 Moscow Mut®. . 115 — WB-1C for Xcvrs . . . 135

ICOM

720A • 730 • 740 • HF Transceivers • IN STOCK—CALL!
IC251A $579 • IC451A $779 • IC290H $489 • IC2AT $229

TRIO/KENWOOD

TS-130SE • TS-430 • TS-830 • TS-930 • IN STOCK CALL
TR-2500 • TR-9130 • ACCESSORIES IN STOCK—CALL!

RF POWER LABS AMPLIFIERS

A1000 160-15 Mtr. KW w/AC Supply $1329
V76 6 Mtr. 8-15W In - 120W Out w/AC Supply . . 499
V360 6 Mtr. 5-10W In - 450W Out w/AC Supply . . 1189
V70 2 Mtr 10-15W In - 90W Out w/AC Supply . . . 499
V71 2 Mtr. 1-3W In - 90W Out w/AC Supply 519
V180 2 Mtr. 5-15W In - 200W Out w/AC Supply . . 599
V350 2 Mtr. 10-20W In - 400W Out w/AC Supply . 1189
Fan Kits and Rack Adapters Also Available—CALL!

JANEL QSA5 PREAMP $39!

QSA-6 . . . . . $41 — 432PL $53
PB-30 . . . . . $21 — PB144 . . . . . $21
PB-50 . . . . . $21 — PB220 . . . . . $21

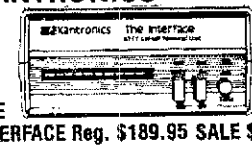
DAIWA CN-620B $111!
160/2 mtrs
20/200/2000 wts

BENCHER PADDLE
BY-1 Blackbase $39
BY-2 Chrome $49

MFJ MODEL 104 On SALE For Only $33!

202B Noise Bridge $54
250 2KW Dummy w/Oil 31
260 300W Dry Load 25
262 2KW Dry Load 59
422 Keyer w/Paddle 89
482 4 MSG Mem Keyer 89
484B 12 MSG Keyer 125
494 Keyboard 249
496 Keyboard 299
525B RF Processor 109
624 Phone Patch 59
901 300W Tuner 54
940B Tuner w/Meter 72
941C Tuner w/Meter 79
949B Deluxe Tuner 129
989 Deluxe 2KW Tuner 289

KANTRONICS



THE INTERFACE Reg. $189.95 SALE $169.00!

OTHER KANTRONICS ITEMS

Mini-Reader . . . $239 — Varifilter $99
Mini-Terminal . . . 259 — Field Day 2 399
Apple Hamsoft . . . 29 — Atari Hamsoft 49
VIC-20 Hamsoft . . . 49 — TRS-80C Hamsoft . . . 59

TEXAS TOWERS

DIV. OF TEXAS RE-DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri.: 8:30 a.m.-5:30 p.m. Sat. 9 a.m.-1 p.m.

TELEPHONE: (214) 422-7306

MasterCard VISA

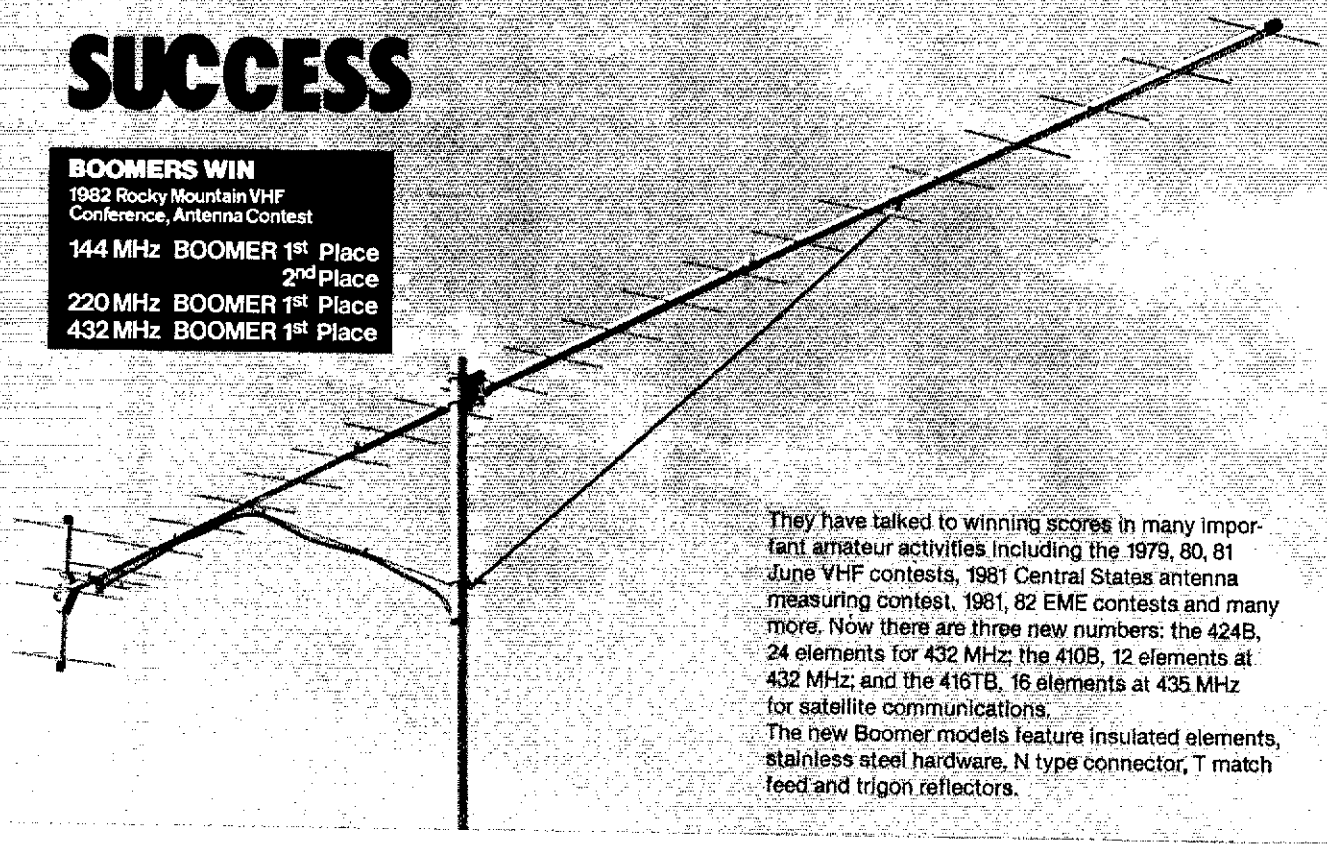
Our numbers talk

424B

SUCCESS

BOOMERS WIN
1982 Rocky Mountain VHF Conference, Antenna Contest

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



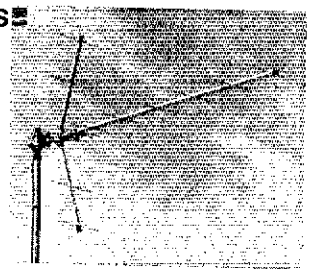
They have talked to winning scores in many important amateur activities including the 1979, 80, 81 June VHF contests, 1981 Central States antenna measuring contest, 1981, 82 EME contests and many more. Now there are three new numbers: the 424B, 24 elements for 432 MHz; the 410B, 12 elements at 432 MHz; 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.

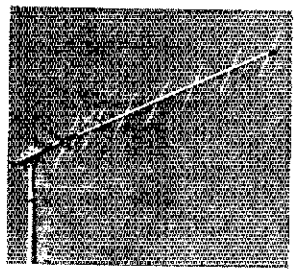
SPECIFICATIONS AND FEATURES

424B:
424-435 MHz, 7.6λ, gain *maximized, F/B ratio *excellent, beamwidth 19°, length 17.42 ft. 5.2 m.

410B:
424-435 MHz, 2.2λ, gain *maximized, F/B ratio *excellent, beamwidth 33°, length 6 ft. 1.83 m.

416TB:
428-438 MHz, Circular Polarization 2.2λ gain *maximized, F/B *excellent, beamwidth 34°, length 6.7 ft. 2.03 m.





MORE BOOMER NUMBERS

32-19	144-146 MHz	19 elements
214B	144-146 MHz	14 elements
214FB	145.5-148 MHz	14 elements
228FB	145.5-148 MHz	28 elements
220B	220-223 MHz	22 elements
617-6B	50-51 MHz	6 elements

Our list of model numbers also includes a full line of Boomer power dividers and stacking kits. See your dealer for all of the numbers, then talk to your friends throughout the world with Boomer antennas.

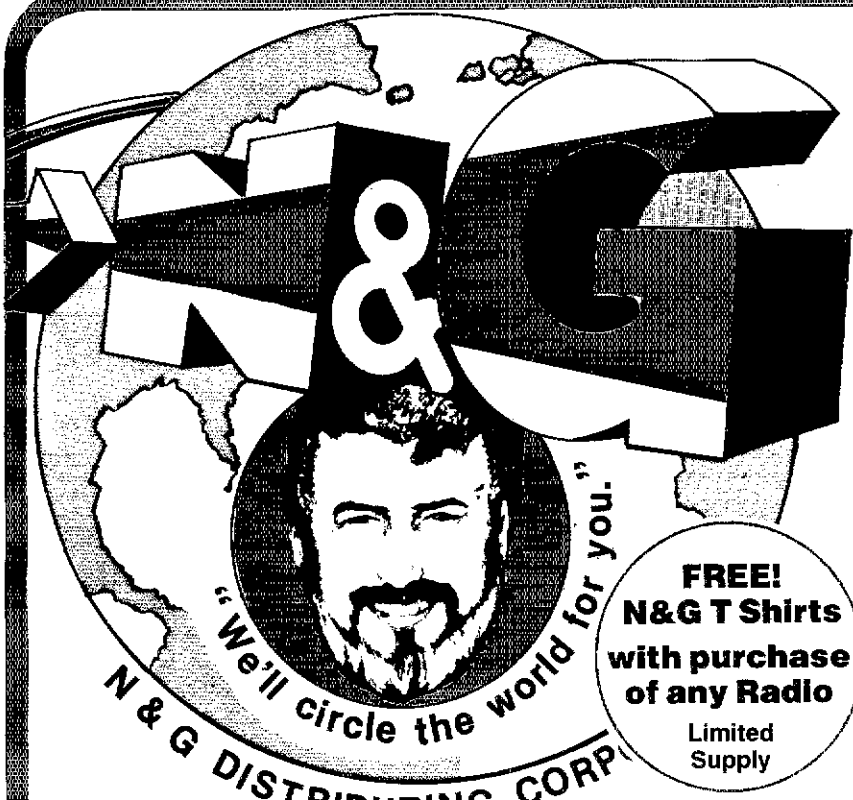
A LEADER FOR OVER 30 YEARS

cushcraft CORPORATION

THE ANTENNA COMPANY
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108 USA

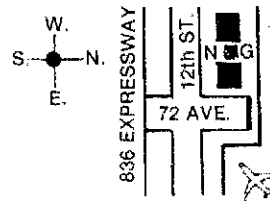
TELEX: 953050
CUSHSIG

*Gain and F/B ratio cannot be published in QST. They are included in Cushcraft specification sheets and other publications.



N & G DISTRIBUTING CORPORATION

Nos especializamos en exportacion a sur America. Los mejores precios, servicio, calidad, y garantia. 2 minutes del Aeropuerto.
Para más información llame gratis.
1-800-327-3364



N & G DISTRIBUTING CORPORATION
7201 N.W. 12 St
Miami, Florida
33126

FREE! N&G T Shirts with purchase of any Radio
Limited Supply

ONE OF THE WORLDS LARGEST DISTRIBUTORS OF ICOM, CUBIC, YAESU

We also stock Marine, Aircraft, Amateur and Commercial Radios. . .

WE ARE A FACTORY DIRECT DEALER

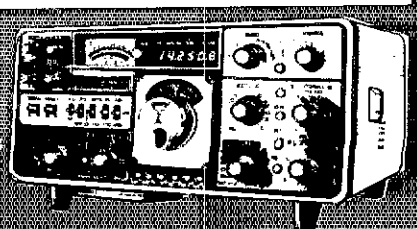
Call us TOLL FREE: for our Low Prices. . .

1-800-327-3364

(Dade) 1-305-592-9685 (Broward) 1-305-763-8170
Prices subject to change without notice.

YAESU
ICOM
CUBIC
LUNAR
cushcraft
MIRAGE
TONNA

Plus MOST other famous Brands.



YAESU FT-902DM. Now $1,535
With: • Electronic Keying • AC and DC Supply • FM • Memory • Microphone
...LESS $500.
for any working FT-101E, EE, or EX

back and insist that "we" don't want it or should we accept the fact and make the best of it? I don't know what the Board of Directors is going to do with this one, but here's my opinion. We should make the best of having a no-code license because I think the FCC is going to have its way. They have been pressing the issue off and on for ten years and it is inevitable if not now later. The worst we can do is to ignore their requests for some direction in terms of how to implement the license and let them make their own specifics. In the NPRM they ask for our help, so let's give it to them! Since they can't support a no-code license below 30 MHz (by ITU regs) the question then is how much of the VHF/UHF band they should have access to. One school of thought is to put them off by themselves so they won't bother "us." The other is that we should bring them into the fold and show them how things are done. I choose the latter approach because putting them off by themselves is just what CB Radio had in the beginning, and we know what happened to that service. So I propose giving them access to the full two-meter band, even with all of its present crowding. If you put them on 220 where (at least in some parts of the country) they would be all by themselves we are setting ourselves up for a repeat of CB which is a disaster. What do you think? As you read this, there is still time to let the FCC and your director (W1HHR) how you feel. Should there be mode or power restrictions? You may not like the outcome, but you can't complain if you don't let somebody know how and what you think. Let's hear from you! Traffic: N1BBT/MM 3074, WA1TBY 1120, KA1GBS 1049, KA1DB 937, N1BGW 647, W1AF 644, KA1BBU 329, W1IDK 280, WA4STO 248, N1BHH 237, N1BYS 221, N1BOG 196, N1AJJ 181, KI1I 148, WA1DXT 134, W1CE 124, KA1MI 114, KA1AE 96, N1CKN 91, KE1U 71, K1BA 62, KA1EMQ 44, K1GN 36, WB3FOC 35, K1BZD 31, WA1FNM 29, W1QLL 27, KA1R 25, K1LCQ 24, KA1ON 21, W1ATX 15.

MAINE: SCM, Clift Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. Congrats to Mid-Coast RC on its new ARRL affiliation and to the selection of KA1HJQ, public relations and Field-Day coordinator. Congrats to Ellsworth AWA new officers: AK1W, pres.; N1BTE, v.p.; KA1BRA, secy./treas.; W1CCN WB1EIS W8HAP, directors. KL7IJG has been presenting ham radio hobby to high schools. PSHR: AK1W N1BJW KA1AVU W1RWG KL7IJG KA1GCW (Tech.).

Net	Sess.	QNI	QTC	Mgr.
PTN	52	544	236	AC1G/N1BJW
SGN	25	1071	199	K1GUP
CMEN	8	131	17	W1WCI
RACES	3	30	10	W1RWG
AEN	5	67	3	WA1YNZ

Traffic: AK1W 311, W1ISO 124, W1RWG 90, KL7IJG 85, N1BJW 82, WB1BYR 77, N1BLZ 52, KA1TJ 48, W1BMX 46, KA1AVU 44, W1JTH 37, W1AHM 33, WA1YNZ 24, WA1ZJL 22, KA1BPJ 20, KA1GCW 18, WB1EIL 18, W1KX 17, WA1JHT 13, W1GCB 13, W1WCI 12, KA1ENL 10, KA1ENM 9, K1PV 8, W1CTR 6, N1BME 5.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — SEC: AK1E. STM: W1TN. NMs: N1NH K1OSM W1VTP. Seen on hyways and byways: W1OOQ W1IPI W1CSM & WA1ZNZ. It is sad to report N1BFM a Silent Key. New appts: N1AIX as State Government Liaison; WB1BRE as Public Information Officer. North Country DXers W1LQQ W1PNR W1HJF N1AHN & WB1GQQ worked the rare VK0, FB8, LU & 5T5. K1POV climbed Mt. Washington on his motorcycle mobile. KA1ZO of Whitefield worked PY1PE. Many NH stations were heard in NH QSO Party. The Hoss Traders will be at Deerfield in April. See you there. Spring is nearly here. Happy Easter. Traffic: N1NH 295, W1QYY 229, KI1M 139, W1TN 130, K1OSM 112, AK1E 100, K1YMH 88, WB1CFP 74, KA1BJ 63, W1MHX 61, KK1E 60, W1VTP 55, KI1R 45, W1ALE 43, W1CUE 38, WA1YZN 35, KA1JMG 30, KA1FKM 25, KB1A 24, KA1CJI 22, WA3BZM 14, N1ALM 10, WA1PEL 9, N1BSM 8, N1AKS 8, K6UXO 7, WA1HOB 6, K1NH 4, K1PQV 1, KA1ZO 1.

RHODE ISLAND: SCM, Gordon F. Fox, W1YNE — SEC: KA1EHR. RIEM2MN. NM: WA1OSL. New appointment W1EOF as Section Traffic Manager (STM). ARES was activated on 1/15 to provide weather reports to Wx Service. Welcome to K1AOS. First time on phone in 25 years. Now on 2M with IC290H. East Bay AWA has members on Bristol Co. Cable TV Advisory Committee. New officers at W1AQ-K1AGA, pres.; K1AMG, v.p.; KM1X, treas.; WA1LAD, secy. Five new Novices licensed from clubs' Novice classes. Newport Co. RC officers-WB1GVH, pres.; W1LO, v.p.; WA1OSL, treas.; K1PTV, secy.; W1JFF, corr. secy. OSARG officers-K1DA, pres.; KA1LA, v.p.; K1VOB, secy./treas. Traffic: W1EOF 813, AE1S 26, KA1EHR 23, WA1CSO, 13, N1RI 11, K1AOS 6.

VERMONT: SM, Reed Garfield, WB1ABQ — STM: N1ARI. BM: AE1T. Greetings to all in my first report as SM and mni tnx ur support. A BIG tnx to W1RNA for his mni yrs of SCM service, a tough act to follow. Welcome to AE1T as our first BM; now looking for OBS to help him out. VTN now at 3539 to escape RTTY QRM, has slow speed nights on Wed. and Fri. W1KOO/R sounds vy FB agn. I know there are more tfc ops in VT, pse get those reports to me. Very 73, keep in touch, cu on the nets.

VTN	31/129/94	VSBN	31/481/120
GMN	26/425/35	VFMN	31/290/62
VCN	26/485/28	VPN	5/102/6
RFD	5/93/25	CVFMN	5/59/4

Traffic: K1BQB 183, N1ARI 160, AE1T 88, W1KRV 71, W1OAK 39, WB1ABQ 38, KA1GID 34, WB1CZE 14.

WESTERN MASSACHUSETTS: SM, William J. Hall, W1JP — STM: W1UD. SEC: WB1HIH. ACC: W1YI. PIO: WA1MJE. The restructuring of the new field organization going well with only four positions left available. The ARES effort is really taking off under the direction of WB1HIH and NM KA1CDC. There are 217 active participants. The WM Emer. Net which meets on 3937 at 0830 Sundays had QNI of 621 in January with the support of 10 vhf rptrs and a Wed. cw net on 3725 at 8:30 P.M. Newest addition is KA1JJM/R on 147.66/06. Now news from the clubs. WB1EMB is new prez of Mt. Tom ARA. Wls KUL KUE & UKR maintaining 10 A.M. skeds dy from FLA to W. Ma. on 21.4 MHz. WB1GSO is now prez for Central Ma ARC. Focal point of club in 1983 is to organize an emergency communications group. The club graduated six novices in 1982 — Good show! KA1CPG is new prez of Provin Mt. ARA. Main concern of club is still the physical relocation of Red Cross which poses logistical problem. Lots more news next month. PSHR: KA1T WB1HIH K1JHC. Traffic: KA1T 311, W1UD 162, WB1HIH 138, K1JHC 83, W1KK 78, W1JP 51, K1IJV 32, WA1YYW 28, W1ZPB 26, WA1OPN 22, W1PUO 16, WA1DNB 7.

NORTHWESTERN DIVISION

ALASKA: SM, Richard Henry, AL7O — SEC: KL7LO.

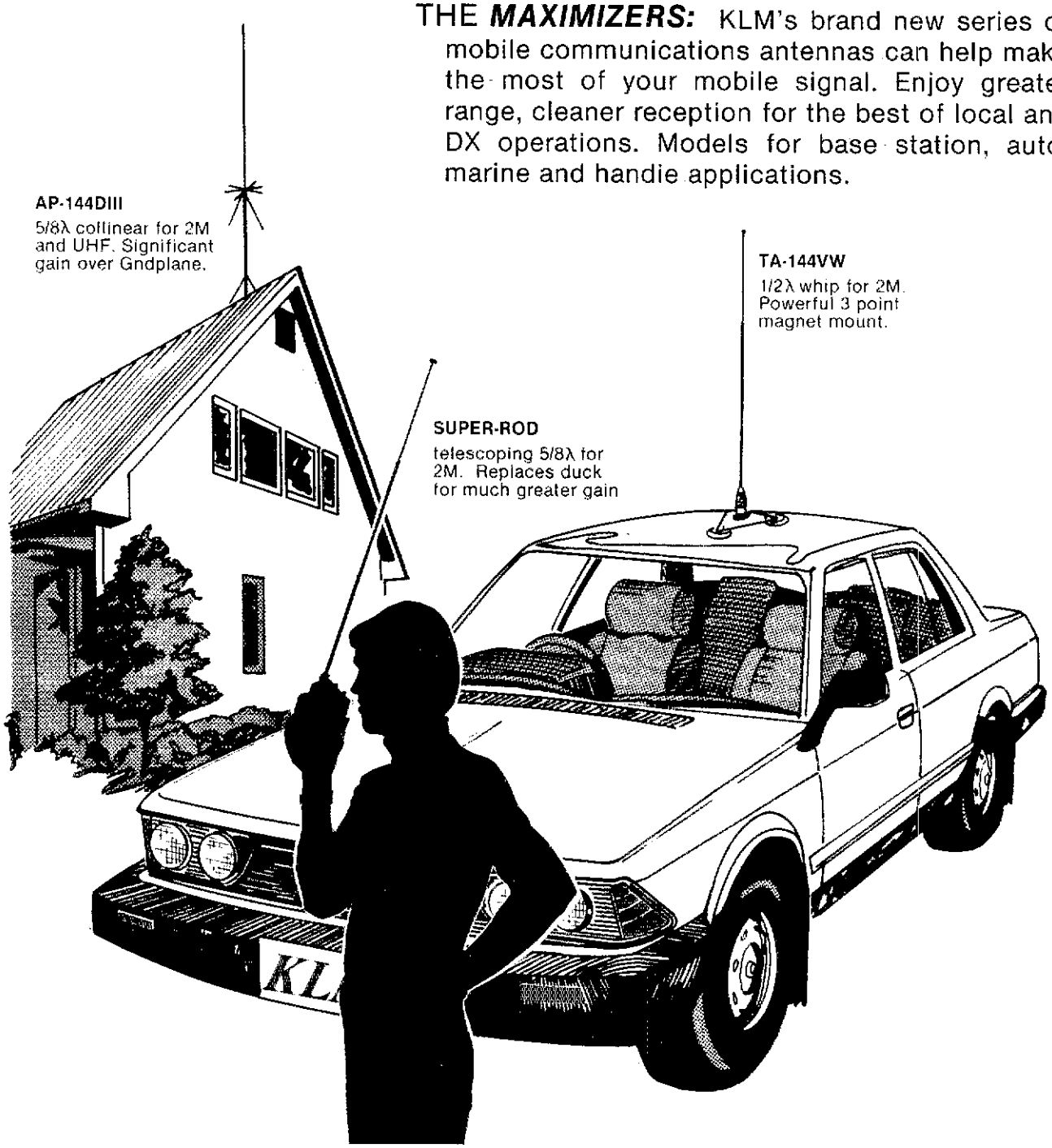
KLM Mobile MAXIMIZERS

THE ***MAXIMIZERS:*** KLM's brand new series of mobile communications antennas can help make the most of your mobile signal. Enjoy greater range, cleaner reception for the best of local and DX operations. Models for base station, auto, marine and handie applications.

AP-144DIII
5/8λ collinear for 2M and UHF. Significant gain over Gndplane.

TA-144VW
1/2λ whip for 2M. Powerful 3 point magnet mount.

SUPER-ROD
telescoping 5/8λ for 2M. Replaces duck for much greater gain



Make yourself heard with a *MAXIMIZER*

- for HF, VHF, and UHF bands
- multiband models, too
- easy assembly and installation
- magnet and bumper/trunk lip mobile mounts
- accessories

WRITE FOR A COMPLETE CATALOG

KLM Electronics, Inc. P.O. Box 816, Morgan Hill, CA 95037 (408) 779-7363

STM: KL7T. ACC: AL7AC. After thirteen months of service WL7H has resigned as STM. Many thanks for a job well done. KL7T has been appointed to the position of STM. Good luck to KL7T as he assumes the traffic managing responsibilities for our section. Other new appointees are: ORS-KL7VY; TC-AL7L. Anchorage's Ham of the Year for 1982 is KL7PQ. The Motley Group has grown into the most popular and active section net. Averaging one thousand check-ins each month this winter, the Motley Group, which meets on 3933 kHz at 0700Z, is continuing to handle more than its share of traffic into and out of Alaska. New NM for the Motley Group is AL7BR. Traffic: KL7VY 46, KL7LO 14.

IDAHO: SCM, Dennis Hall, KK7X — KARS is planning their Hamfest '83 for June 11th in Coeur d'Alene; plan to attend. K7RPB and XYL had their 48th wedding anniv. Feb. 4th; congrats. Both KARS and NIARA are planning new rptrs for the North Idaho area. Am planning a trip through Idaho in late spring; hope to meet with Governor Evans concerning Amateur Radio support in the state. Seems to be a lot of resistance on the part of state and local officials in the state to utilize Amateur Radio in disasters, anyone with ideas or comments please contact me before the end of April. Still in need of news from the south end of the state.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935	6:00 P.M. Dy	31	1875	44
CD	3990	7:10 A.M. M-F	21	599	36
IMN	3635	8:00 P.M. M-F	21	159	72

Traffic: W7GHT 213.

MONTANA: SM, Les Belyea, N7AIK — SEC: W7LR. STM: KF7R. OO/RFI Coord.: KS7U. ACC: WB7TWG. PIO: WA7GQO. SGL: W7JMX. TC: K0PP. BM: KB7SE. The FCC exams will be in Helena April 19-21. Good luck to those of you trying to upgrade. The Anaconda ARC put on a public demo in communications in conjunction with the Deer Lodge Co. search/rescue practice. A large number from Billings and Butte attended the Gallatin ARC February meeting. WA7JDX and WA7ZMC brought along their 440 remote base station, and told of its interworkings. Novice classes are being held in Helena, Bozeman and Billings as club projects. The Capital City ARC surprised W7CT with a birthday party a while back, his 82nd. ATTENTION club newsletter editors, The Sweetwater ARC (Wyoming) will be the host club for the WIMU "83" hamfest. Please send your newsletters to N7COA and get one back in return with early WIMU "83" information.

Net	Sess.	QNI	QTC	Mgr.
MTN	21	970	68	K7TQM
BSN	13	206	8	WB7UTJ
IMN	21	159	72	K7JV
MSN	5	59	0	KB7SE

PSHR: WA7GQO W7LBK KF7R. Traffic: KF7R 52, WA7GQO 40, N7AIK 34, W7LBK 17.

OREGON: SM, William Shrader, W7QMU — STM: V7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. Welcome to the new section Club Coordinator, WB7WTD. Clubs needing assistance or information about Oregon Council of Clubs, contact WB7WTD. Section's positions described in last month's column are still available. UPGRADES: Novice, KA7OXV; KA7OXW KA7OWG KA7OTC; General, KA7AGN N7CMV KA7CSS; Advanced, KD7AD. KA7MDM and W7PNS both celebrating arrival of new sons. KA7KDU newly married. WB7TKY will represent the United States in the International Skill Olympics in Linz, Austria, during August. W7GLU presented with 50-year ARRL membership pin. Actually he has 57 years continuous ARRL membership, presentation was a little late. K7RXV is the newly appointed EC for Washington Co. KC7FI is new EC for Union and Wallowa Cos. PTTN (Prime Time Net) meets on 145.43 daily at 7 P.M.; KA7AID is manager. K7DDI has a solid 24-year record for OEN check-in. PARC operated a Christmas message service at Portland Vet's Hospital; 52 messages processed. KD7AD active on 10-10 International with 500 10-10 nos. Paul KA7CZE teaching electronics at Rogue CC. Josephine/Jackson SWAP Meet/Potluck will be June 18 at Tom Pierce Park, Grants Pass. Traffic: W7VSE 569, KN7B 214, WA7LGN 193, WB7OEX 169, W7ZB 132, KA7ELI 130, KA7AID 47, KI7Y 47, N7BGW 38, AL7W 30, W7DAN 18.

WASHINGTON: SM, Joe Winter, WA7RWK — ASM/BM: KD7G. SEC: K7SH. STM: W7GB.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0245/0545	660	225	62	N7GSP
WARTS	3970	0200	3281	199	31	W7SFT
NTN	3970	2000	961	68	31	W7VL
NWSSB	3945	0230	732	48	31	W7JGM
EWTN	146.64	0130/0530	106	90	59	WA7CBN
PSTS	145.33	0130/0630	121	69	62	W7IEU

In proceeding with the expanded Field Org. I congratulate and thank the newly appointed Section Officials for accepting: Affil'd Club Coord.-Willis Propst, K7RS, 18415-38th Ave. S., Seattle 98188; Technical Coord.-Kurt Heidergott, K7UU, 503-167th NE, Bellevue 98008; Public Info Officer and State Gov't. Liaison-John Brown, W7CKZ. 725-88th Ave. SW, Olympia 98502; Bulletin Mgr. Gene Sprague KD7G, 10716 23rd Dr. SE, Everett 98204; KD7G also remains Ass't. SM: Previously appt'd. Sec. Emerg. Coord. Steve Hart K7SH, 1566 E. SR #4, Cathlamet 98612; Sec. Traffic Mgr.-Don Calbick, W7GB, 447 Knolls Vista Dr., Moses Lake 98837 continues. Official Obsvr/RFI Coord. is not yet named. These volunteers are dedicating their talents and time to help you, the League, its members and the ham community to derive greater benefits and enjoyment from our service. Please refer to this list. Contact them with your ideas and problems or if you would like to help. N7IL is new OBS. Congrats. OBS W7PGY rpts ARRL bulletins by RTTY on 28.100 Tues. & Fri. at 2000 PST. SEC K7SH conducts Red Cross Comms mtg for all hams in Cowlitz Co. & vicinity. Clark Co. ARC welcomes 6 new mbr, 6 upgrds, 3 Novices. Twenty now in Novice and ten in Gen. classes. Clark College picks 5 students to each receive a $200 Reid Blackburn Scholarship sponsored by the club. Vancouver HF May 7-8. K7VNI EC Whatcom Co. rpts 17 ARES mbrs spent 112 hrs & 520 miles patrolling rivers. Yakima ARC HF May 14-15, Cen. WA. St. Fairgrds. More than 80 attend YARC Installation Dinner. WA7ARB traveling over icy & snowy Satus Pass Jan. 2nd ran off the road. He was in contact with W7GZN on 146.25/.85 and asked for help. W7GZN KC7RE & WA7ZMR proceeded to the site but could not pull his 4WD rig out. K7TID & K7NPA were monitoring and were asked to call a wrecker. It all ended at 4:30 A.M. with WA7ARB OK despite minor injuries. Congrats to all! Chehalis Valley ARS elects '83 officers: N7EIK, pres.; KA7JPK, v.p.; KA7ODR, secy.; W7GYB, treas. Congrats to KA7EOV on his Lewis Co. EC appt. Traffic: W7DZX 674, WB7TOF 309, K7GXZ 191, N7DDP 175, W7HNA 129, N7AFZ 117, N7ANE 112, K5TI 108, W7GB 107, N7DNG 102, W7LG 102, W7IEU 71, N7AFY 66, K7CTP 66,

FOR *ANY* OF THE NEWEST AND BEST HAM GEAR...

IT PAYS TO TALK TO "UNCLE BEN"

SEE THE NEW YAESU FT 77 AND FT 980

Earliest delivery...great trades...big discounts... and all with my old-time reliable, friendly service.

NEW!
COMPUTER DIVISION

Call us toll free for lowest discount prices on:
TEXAS INSTRUMENTS
ATARI
COMMODORE
FRANKLIN
KANTRONICS INTERFACE
HAMSOFT ... and more.

CALL ME...

Toll Free 1-(800) 645-9187
New York 1-(516) 293-7995

Toll Free (800) 645-9187
New York (516) 293-7995

SEE ME...

At one of the world's largest Ham Supply Centers!
We ship anywhere!

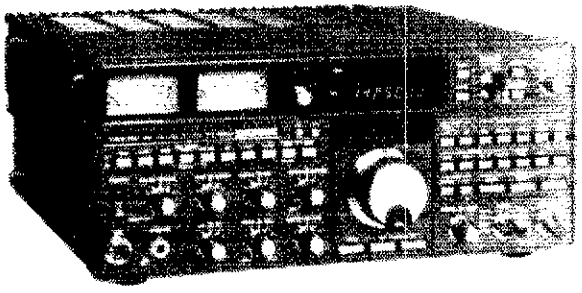
"Uncle Ben" Snyder, W2SOH the head man of

HARRISON RADIO

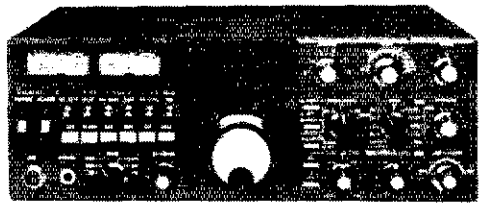
"HAM HEADQUARTERS, USA"
...Since 1925!

YAESU

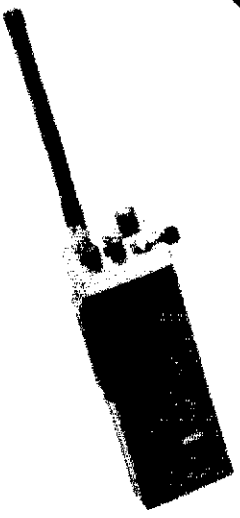
FT-77



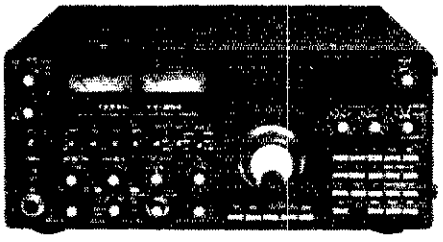
FT-980



FT-102



FT-208R



FT-ONE

WA7BDD 55, KD7G 19, K7AJT 12, W7APS 12, KA7INX 12, W7AIB 2, W7ERH 2. (Dec.) N7EPM 87.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG — ASM: W6ZF N6DHN VE2AQV/W6. SEC: W6LKE. STM: NI6A. HARC brought in new officers: KD6QT, pres.; KB6TQ, v.p.; N6DOE, secy.; N6DOC N6HWJ, sgt-at-arms. Must be wild meetings! They were toasted at their annual inauguration Dinner. N6HWJ, ex-KA6TNV, just upgraded to General. EBARC members WA6ZFV WB6DOB KA6OLK WA6JSO N6DRT N6DIG & NI6A installed a tribander and a two-meter gain antenna on the 50-foot tower at their club station in the Salvation Army building. Their member N6HNU has upgraded to Advanced, and they have welcomed NG6C WB6IBU & KA6WAG as new members. LARK survived a visit from N6DHN & me, and we enjoyed meeting all their members who were in attendance. Their meetings have been changed back to second Saturdays at 9:30 A.M. SBARA 2-meter net is on 145.800, Wed. nights at 8:30 P.M. MDARC's award-winning "The Carrier" featured two full pages of FB pix of their Christmas party. Traffic: NI6A 306, W6VOM 173, WB6DOB 148, K6APW 138, K6AGD 80, WB6UZX 33.

NEVADA: SM, Bill Marshall-Gratrix, KA7Q — STM: W7BS. A quiet month, except for the continual activity of ENARS in Ely which is the busiest and most active club in the state and which has just started a new Novice class of nineteen. Nevada Sagebrush Net meets weeknights at 1930 local time on 3906 KHz. Traffic: W7BS 73, W7BKQ 16.

PACIFIC: SM, Army Curtis, AH6P-Aloha and hafa adai to all of the Pacific. The new rptr is up and working on Haleakala. Thanks to EARC with a little help from their friends, the hub of the statewide 2M rptr system was replaced with new equipment. The improvement is terrific. Your support of this fine group is suggested. KH6H is experimenting with a new tone decoder kit that may have excellent application on the statewide system. Check with KH6H for details. KH6S WH6ANH and KH6B ran a COSMOS-1402 alert net on 40M until the satellite was reported down in the Indian Ocean. And Kauai reports their .31/.91 rptr is back on the air finally after Iwa did a number on the power lines to the area. Aloha. Traffic: KH6B 82, KH6S 46, KH6HIJ 42, KH6H 33, W6ORS 8.

SACRAMENTO VALLEY: SM, Norman Wilson, N6JV — SEC: N6AUB. ASM: KI6T. KE6NO is now the Section Traffic Manager. He reports that the Sacramento Valley Traffic Net meets daily at 2100 on 146.64 and 147.105 on alternating days. New officers for the Oroville ARS are: KE6NL, pres.; N6HQE, v.p.; N6GOV, secy.; WB6YKQ, treas. Congrats to KE6NO and N6EPG on making Public Service Honor Roll. Recent up-grades include KA6STZ Advanced, N6HQC (ex-KA6LCQ) and N6GOV (ex-KA6QOG) General, and KA6QEO Tech. Brand new Novice in Davis is KA6YSC, and KA6UBJ is now N6IBE. WR6AEN is now operating as W6AK/R. Traffic: KE6NO 45, N6EPG 9.

SAN FRANCISCO: SCM, Bob Smith, NA6T — SEC: N6BLN. STM: K6TP. SFRC "Old Timers Nite" is July, 1983. All section members wishing to attend contact NA6T for further information. REDXA will moderate the forums at the Visalia DX Convention. Should be a FB job. TNX to KA6JED, for the FB job on the Portable Vault in Requa; see him for the information on plans for your requirements. Del Norte ARC rptr is up and working, with the need of a timer and auto-ID; any suggestions? FWRA-HARC has the new ARES/RACES Emergency Net working. Look for it on 145.550 MHz. Also the Preliminary Emergency Plan for Humboldt-Del Norte Cos. is in. How are the rest of the clubs doing with theirs? KA6JED has lots of plans for emergency generators developed in his power tech classes. Need a reprint? Contact W6GGR in Eureka. K6LRN is forming the plans for a MARC Annual Flea Market; see him for further information. Traffic: W6IPL 202, W6RNL 111, K6TP 92, K6TWJ 92, N6FYV 62, W6GGR 11, WB6RTE 10.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. SMs: W6TRP K6YK NF6K. New officers of the Stanislaus ARA are W6AFS, pres.; KE6QT, v.p. WA6MIZ, secy.; N6EKV, treas. The club meets the 3rd Thursday in Modesto and operates rptrs on 145.39 and 223.68 MHz. New officers of the Central Cal. DXC are: W6MEL, pres.; W6GR, v.p.; WB6VIN, secy./treas. The club meets quarterly. Contact any officer for more information. New officers of the Sierra ARC of the High Mojave are: WA6IMM, pres.; W6SIY, 1st v.p.; WA6FZX, 2nd v.p.; WA6ARA, secy.; ND6Q, treas. The club meets the 2nd Monday in Ridgecrest. Appt renewed: EC-WA6OYF. New appts: OO-WB6ITM; PIA-KB6CC. W6FIQ is a Silent Key. N6DNE is KF6IX. N6BVI is NQ6H. WB6DPX is KF6GO. WD6GOX is active in Fresno. WD6COT and W6GR have new towers. WD6AFC is on 160 meters. N6BNW has a Drake 4-line. WA6LDJ has a TR7950. W6MND and N6DBH lost towers and beams in recent storms. Their antennas must have been large enough. WA6UOR has another KWM380. WB6ITM has a KWM2 and is collecting radio equipment. KB6DI worked Heard Island on phone. The ARRL Pacific Division Convention is August 19-21, in Reno. The Fresno Hamfest is May 22-24, 1983. Plan to attend. Traffic: N6AWH 182, W6DPD 22, WD6FRS 18, WA6YAB 16, WA6JDB 4, K9YBM 3, W6SX 1.

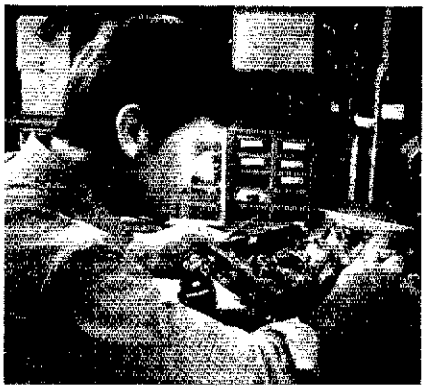
SANTA CLARA VALLEY: SM, Ross Forbes, WB6GFJ — STM: W6ZRJ. SEC: KA6R. Welcome to our two newest members of the section staff! W6MKM will serve as the Affiliated Club Coordinator and WB6BPU will serve as the Public Information Officer. It was wonderful to see all of the volunteers in the section helping out during the winter storm problems. With the many areas that were without commercial power, now is the time to start looking into your own situation and to study how your station can operate on emergency power. New officers of Gabilan ARC are: K6HWR, pres.; K6TEH, v.p.; K6JHK, secy./treas.; WD6EKQ, publicity; K6TEH, activities. Since a number of clubs have some new Novices, don't forget the code practice from W6QIE nightly (ex-Mon) on 3590 at 8 P.M. WB6IZF has a new 250' horizontal quad. ARES activities resulted in a number of positive articles in various newspapers; CONGRATS to everyone! Anytime you see some publicity for Amateur Radio in your local paper, be sure to send a copy to ARRL Hq. There are a number of Amateur Radio flea markets this summer. Contact WB6GFJ for details. New officers for LERC are: WB6WIC, pres.; KE6YW, v.p.; KA6RGE, secy.; KE6LL, treas. SPECS has a nice information flyer for the general public, contact W8RPA or W6ASH for copies. ARRL Executive Committee members were in the section during February for their meeting. Don't forget the SCV Section ARES net on 146.895 or 145.45 at 8 P.M.

NRI will train you at home to be an electronics professional in the growing world of communications.

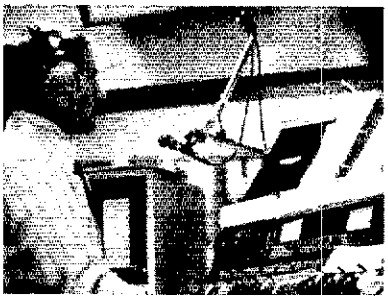
Marine Communications

Microwave

TV Broadcasting



CB Radio



AM & FM Broadcasting

Learn to service, repair, and install everything from microwave antennas to two-way radios...from radar sets to TV transmitters.

No other home-study course gives you such complete, professional training in so many fields of communications. No other gives you such advanced equipment, selected for state-of-the-art design and features. Only NRI gives you the thorough preparation and training you need to achieve professional competence in the wide world of communications.

Learn at Home in Your Spare Time

Learn at your own pace, right in your own home. There's no need to quit your job or tie up your evenings with night classes. No time or gas wasted traveling to school: NRI brings it all to you. You learn with NRI-developed fast-track training methods, a clearly and logically organized program using advanced techniques for learning at home.

Includes Automatic Scanner and 2-Meter Transceiver

Your training is built around high-technology equipment that lets you explore the state-of-the-art. You assemble your own hand-held, two-meter transceiver that operates as both a fixed and mobile station. And you get a fully synthesized, microprocessor-based scanning monitor receiver with programmable features. Five custom-designed chips let you cover all VHF and UHF mobile bands. Using audio cassette training tapes, you learn not only how to operate these units, but study their advanced circuitry in detail.

Also included is a professional liquid crystal display multimeter with 4 functions across 13 scales, a portable frequency counter you build to cover ranges from 50 Hz to 512 Mhz, the NRI Antenna Applications Lab, and the NRI Discovery Lab® where you build and test the "leading edge" circuitry found in your transceiver and scanner. All equipment is yours to keep. To use the transceiver you'll need an amateur license, and we'll give you training to get it.

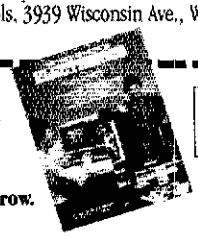
Train with professional instruments and equipment that's yours to keep.

FCC License or Full Refund

In addition to all lessons and equipment, you get special training and the TI-30 engineering calculator to help you pass the exam for the FCC radio-telephone license required to use or work on broadcast equipment. You pass your FCC examination or *your tuition will be refunded in full.* No ifs, ands, or buts...this money-back warranty is valid for six months after completion of your course.

Free Catalog, No Salesman Will Call

NRI's free 100-page catalog shows all the equipment you get, describes each lesson in full, and tells about other electronic training in fields like TV/Audio/Video, Microcomputers, and Industrial Electronics. Mail the coupon and see how we can make you a pro. If coupon has been removed, please write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.



NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016
We'll give you tomorrow.

All career courses approved under GI bill.
☐ Check for details.

NO SALESMAN WILL CALL
Please check for one free catalog only.

- ☐ Communications Electronics • FCC Licenses • Mobile • CB • Aircraft • Marine
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Computer Electronics including Microcomputers
- ☐ Digital Electronics
- ☐ Basic Electronics
- ☐ Industrial Electronics including Robotics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council 19-043

ARRL LETTER

FOR MEMBERS ONLY

We thought you might like to know a little more about the ARRL Letter and how we put it together. Since the last of October, we've been bringing you the very latest in news from the FCC, ARRL Hq. and the world of Amateur Radio. When we say latest—we mean latest!

For instance, we were in the mail with the details the very next day after FCC gave the okay for the use of 10 MHz. We were in the mail the very next day after the FCC adopted their NPRMs on no-code and the volunteer exam program. We brought the information to our subscribers first, we brought it to them in a readable, nonsensational manner and we brought it to them accurately.

There is a reason for that. Let's take a look at the process of putting together an issue. During the two-week period between issues, Peter O'Dell, KB1N, and Wayne Yoshida, KA6KGU, compile the top stories in Amateur Radio. On Tuesday morning of publication week, Pete, Wayne and other key staffers meet to discuss the top stories. We tentatively select a lead story, and the other stories are ranked in importance. The secretaries begin loading the stories into the word processor. Then we double check the facts and their meaning with the experts—people who really know what is going on. After all, one or two people can't be expected to fully understand the implications of all the complex stories making news in Amateur Radio today. With the Letter, it is a team effort.

Wednesday, afternoon, we do a rough layout. Thursday we do the final layout, and at 2 p.m. we turn camera ready copy over to the printer. By noon Friday he delivers the printed copies to our mailer, who has it in the hands of the Post Office by 5 p.m. That means the details are in the mail to our subscribers less than 36 hours after the story happens.

There's only one small hitch—the FCC meets Thursday mornings. We have just enough time to bring you the latest news from the FCC and still meet our deadline *(actually, we planned it that way)*. On days like those when the FCC adopted the order for the 10-MHz allocation or when they adopted the NPRMs on no-code and the volunteer examination program, we went through a "disaster drill" between 10:30 a.m. and 2 p.m. Funny, none of the local hams showed up with HTs to help us out though. It's more work for us, but it keeps our subscribers up-to-date on the very latest happenings.

We invite you to compare our track record with all the other sources of news about Amateur Radio. The ARRL Letter is FAST, READABLE, NONSENSATIONAL and ACCURATE. Subscribe today. *(Actively affiliated ARRL clubs can subscribe, also. You can use our material in your newsletter as long as you give us credit.)*

Name _____ Call _____

Street _____

City _____ Prov/State _____ PC/ZIP _____

Control number (from QST label) _____

License expiration date _____

VISA _____ Expires _____

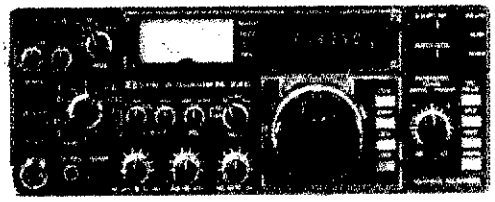
_____ Expires _____

*$19.50 in U.S., Canada and Mexico (U.S. funds)
Elsewhere, airmail, $31 (U.S. funds)

Mail to:
The ARRL LETTER
Desk 10
225 Main St.
Newington, CT 06111

MISSOURI RADIO CENTER

"CALL TOLL FREE" 1-800-821-7323

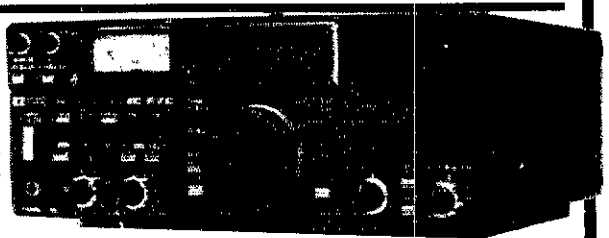


NEW IC-740

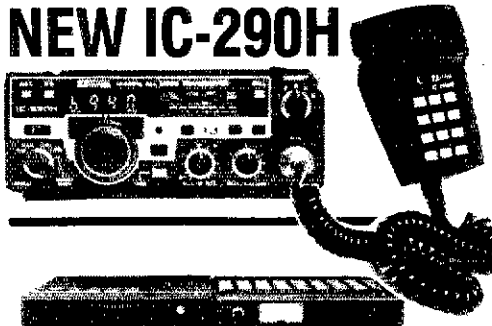
contains all of the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator. Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

NEW IC-R70

Features: squelch on sideband, adjustable width noise blanker, adjustable speed AGC, passband tuning as standard, and adjustable notch filter as standard. Other features are high stability, synthesized tuning and 3 tuning speeds, optional AM/FM mode, variable CW filter widths, dial lock, two VFO's with data transfer, plus many others. Also, the IC-R70 will operate transceive with the IC-720A.



NEW IC-290H



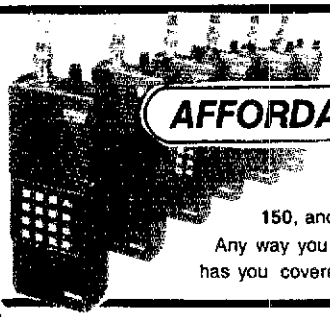
The IC-290H features a powerful 25 watt output and a highly sunlight readable green readout, in the same compact package as the IC-290A. Other features and styling of the IC-290H are the same as the previous model - the IC-290A.

FEATURES

- 5 memories - store your most worked frequencies.
- Call channel - your favorite frequency instantly available.
- 5/KHz FM tuning or 1KHz/100Hz tuning on SSB.
- FM/USB/LSB/CW modes.
- Programmable offsets.
- Priority channel - monitors 2 frequencies.
- Scanning of memories or band.

IC-2KL 160 - 15 meter solid state linear amplifier. For use with the IC-701, IC-720A, or IC-730, 500 watt CW out. Includes matching power supply.

CALL TODAY & SAVE



AFFORDABLE

400, 220, 150, and 146MHz. Any way you go, **ICOM** has you covered.....

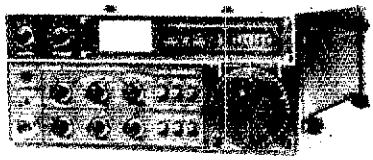
The **IC-730** is truly a superior grade transceiver at an affordable price.

DISTRIBUTORS FOR

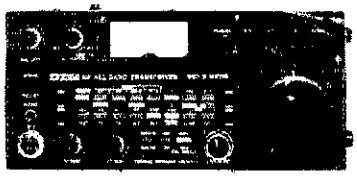
- A E A
- ALLIANCE
- ASTRON
- AVANTI
- AZDEN
- B & W
- BENCHER
- BUTTERNUT
- C E S
- CURTIS
- CUSHCRAFT
- DAIWA
- DENTRON
- HUSTLER
- HY-GAIN
- ICOM
- JANEL
- KANTRONICS
- KDK
- KENWOOD
- M F J
- MIRAGE
- ROBOT
- SHURE
- TENTEC
- VAN GORDON
- VOCOM
- YAESU

MIDWEST'S AUTHORIZED ICOM SERVICE CENTER

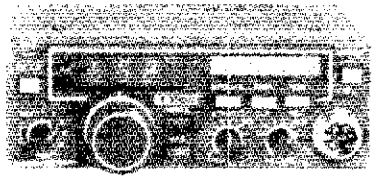
FIRST IN SALES IN SERVICE **!!**



The **IC-251A** has excellent sensitivity and crystal filters having an exceptional shape factor giving good selectivity. Includes AC Power Supply.



ICOM's **IC-720A** is a superior quality HF transceiver. Whether you are a radio amateur, a shortwave listener, or a mariner, you will find the **IC-720A** has features that no other transceiver offers in such a small compact size.



The **IC-25A** is truly a step forward in 2-meter transceivers and its compact size and affordable price makes it the best buy in 2-meter HF mobile.

2900 N.W. VIVION RD. / KANSAS CITY, MISSOURI 64150 / 816-741-8118

every Wednesday. Every EC and DEC who is within range of these rptrs should be checking in on a regular basis. WB6GFJ has been getting on RTTY and Slow Scan TV. Traffic: W6YBV 193, WB6GFJ 30, WD6EKR 14, W6PRI 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR —

Net	Time	QNI	QTC	Sess.	NM
CMN	521	191	771	31	W4EAT
CSN	938	239	55	31	NJ4L
JFKN	1591	1066	181	31	WB4WII
QNE/L	1690	654	262	61	AB4S
THEN	770	1036	186	31	WA4OBR

January was a relatively quiet month in the Section. Everyone taking a quick breath between Christmas and Valentines Day. Although traffic was lighter than Dec., we still had a respectable total for the month. Feb. looks like its gonna be a biggy. Your SCM is now computerized thanks to help from N4UE. All reports are fed into the monster and it spits out all the good stuff listed and collated correctly. It's not that it's such a big help, but it gives me somebody else to blame when you guys catch an error. We'll be in Raleigh on the 21st of Feb. for a dual purpose function. The Governor of N.C. will be issuing a proctamation designating Feb. 21 tru 27 as Amateur Radio Week, and the State Crime Prevention Bureau will kick off its Ham Watch Program. More about Ham Watch next month here. Our DEC KU4W working overtime picking up the reins of our emergency program. If you ECs think he's hard on you, you otta see what he's making me do! Speaking of ECs, NN4P, the DEC Rgn 1, stepped down last mo. for health reasons - we will miss him - replacement Jim Ford, WB4UJH. More new faces -TAR HEEL Emerg. Net elected four new directors: K4NLK W4YBQ WB4MJH KA4KSB. Congrats, fellows. A chance for a very real emergency existed early this month when a ship in the Cape Fear River dragged an anchor and severed phone lines used by, among others, the two hospitals in Brunswick Co. After notifying the hospitals of their preparations, local hams stood by for emergencies 'til Ma Bell got it together. Very fine business, guys. Hat tipped to K4PPD and his fine group. Traffic: WD4CNQ 232, WB4WII 199, KU4W 192, AB4S 183, WD4CNR 162, KD4PJ 132, WD4LRG 124, W4EAT 105, KA4KJI 77, WA4OBR 72, WA4SRD 65, NE4J 65, WA4BFT 61, K4NLK 55, WB4CYN 50, WB4N 44, N4CYG 38, NT4K 37, WD4HTE 33, KZ4A 33, KA4DHP 31, WD4CEB 28, W8JUP 26, N4EHM 23, W4GRO 22, KA4UBN 19, N4UE 17, W2JDB 15, W4EHF 10, KA4ATK 9, W4RVE 2, WB4MJH 1.

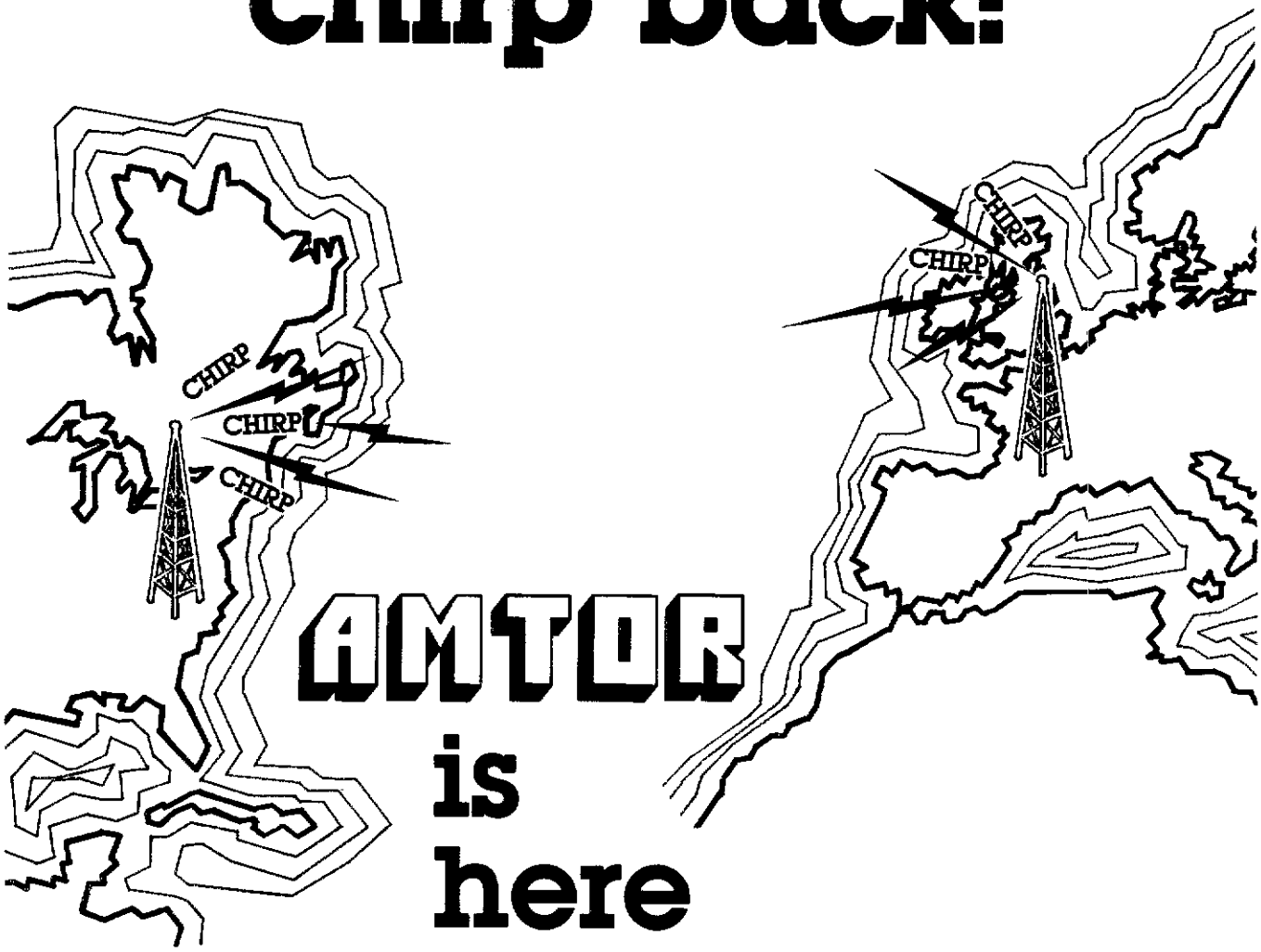
SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ — April 7 marks 25 years of service to the SC section by the South Carolina Single Sideband Net. The net was formally organized at a meeting in Columbia April 1956. First official session was April 7, with formal net rules issued April 19. Over the years some rules and procedures have changed, but as stated in 1958, the basic purpose of the net has remained the same: (1) fellowship, (2) advancement of the radio art and (3) traffic. Also, the net has sponsored Operation 22, supported Amateur Radio Week, participated in Simulated Emergency Tests, and was activated as an emergency net on numerous occasions. Beginning net years 1961-1962, the net established the "South Carolina Sidebander of the Year" award. Each year the person or persons selected best exemplify the ideal net member and Amateur Radio operator. Congrats to all amateurs who have supported the SCSSB net over the years. Belated congrats to W0IKT for BPL in December. Traffic: K4ZN 281, W4NTO 99, K4WJR 81, KA4AUR 76, W4FMZ 67, W4ANK 64, K4FRX 41, WB4UDK 40, WD4FJP 30, KE4WC 26, WA4MIY 25, K4ZB 22, KA4LRM 19, WD4NMF 15, W0IKT 7, W4DRF 4.

VIRGINIA: SCM, Phil Sager, WB4FDT — STM: WD4ALY. SEC: WB4UHC. Chief OO: W4HU. Chief OBS: K3RZR. Club Coordinator: WD4KQJ. State Government Liaison: W4THV. A Virginia House of Delegates bill which would have raised the yearly fee for Amateur Radio call letter license plates from one to ten dollars was withdrawn by its sponsor in a Senate Committee. The bill was originally written to lift the requirement that amateurs who have call letter license plates have an operating Amateur Radio transmitter in their car at all times. The additional nine dollar yearly fee was added in the House of Delegates Committee at the suggestion of the Department of Motor Vehicles. This bill then passed the House of Delegates before Virginia amateurs were aware of its contents. Once the alarm had been given, Virginia amateurs, their ARRL representatives and ARRL Headquarters swung into action. Numerous Virginia amateurs and clubs wrote or contacted their state senator concerning the bill. Our ARRL Roanoke Division Director, W4UG, made dozens of telephone calls to the members of the Senate committee and their legislative aides voicing his opposition and arranging for speakers to oppose the bill. Our newly appointed State Government Liaison, W4THV, had a meeting with the sponsor of the bill. At the end of this meeting, the sponsor agreed to withdraw the bill. A similar bill was introduced in 1972 to raise call letter license plates to $25.00 yearly, and this bill was defeated that year in the House of Delegates on its third reading. This problem does seem to come up every few years in the State Legislature and bares careful watching. Virginia amateurs were very lucky in being able to isolate the bill while it was still in committee. In several other states, similar bills passed thru their state legislature and became law before amateurs were aware of them. Traffic: WB4PNY 366, W3ATQ 260, WD4ALY 238, WA4CCK 233, WA4LJI 210, WD4FTK 161, K4JST 152, K4AET 143, K4KDJ 139, AA4AT 135, WB4FLT 117, KA3DTE 112, NN4I 112, KR4V 105, KA4IUM 100, K4JM 93, K3RZR 80, W4UQ 75, W3BBN 73, NT4U 68, WB4FDT 65, W4NWM 58, N4YQ 57, WD4OCW 53, K4VWK 53, KB4WT k49, KB4OG 40, NT4S 39, WB4KIT 32, WA1VRL 26, W3BBQ 23, KA4JXZ 23, KA4ZTB 19, W4CFV 16, KC4HN 15, N4HYO 14, NW4O 14, W4PVA 13, N4BJX 12, W4HIR 10, WB4MAE 10, K4MLC 9, WB4DQZ 8, N4HAK 8, W4NFA 8, WB4ODZ 8, N4EBU 7, N4FNT 7, WB4OBZ 6, N3RC 6, WA4TVS 6, W4KXE 4, N4LE 4, W4DM 2, WD4KQJ 2, W4LXB 2, W4TZC 2, KI4W.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. Rptr Coord.: WD4KHL. WA8CTO is first ACC in newe WV field org. K8CG is first Tech. Adv. KA8OMM is new WV Novice Net mgr. KA8GHF is now KZ8Q. RTTY rptr is now on the air in St. Albans on 147.36. WV state conv will be July 2 & 3 at Jackson's Mill. My term as SM expires on Oct. 1, 1983, and I do not plan to seek another term.

Net	Time	Freq	Sess.	QTC	QNI	W8LYV
WVN	7:00	3567	29	31	155	W8LYV

Now you can chirp back!



AMTOR is here

Been wondering what those "chirp-chirp" signals were around 14075? They're AMTOR, AMateur Teleprinting Over Radio. European hams have been enjoying the benefits of error free RTTY for sometime. (It's a must for commercial Maritime traffic.) Now, U.S. Amateurs are on the threshold of a new era of RTTY.

Old problems of QRM, QRN, & QSB are gone! If a propagation path exists, AMTOR will get the message thru — with no "hits" — "newspaper" perfect copy!

Two modes are available; AMTOR mode A transmits a three character block specially coded so that the receiving station can recognize an error. The three character block is repeated until the receiving station confirms reception by replying with the proper control code signal. Flawless print is possible with this "hand-shake" style operation.

Mode B, "FEC" or Forward Error Correction, is actually a time diversity mode where text is repeated and intermixed in the transmission. The receiving station unscrambles it and prints the clear text. This "broadcast" mode allows more than two stations to communicate. It's more effective than conventional Baudot or ASCII, but not as reliable as AMTOR mode A.

The actual DATA transfer in either AMTOR mode is nominally equivalent to conventional RTTY at 50 baud, or 66 WPM.

A receive only "Listen" mode is also available for reception of mode A data by a station not directly involved in the "hand-shake" communication.

Start with a new AMTOR ACT-1, ATR-6800, or update your present system.

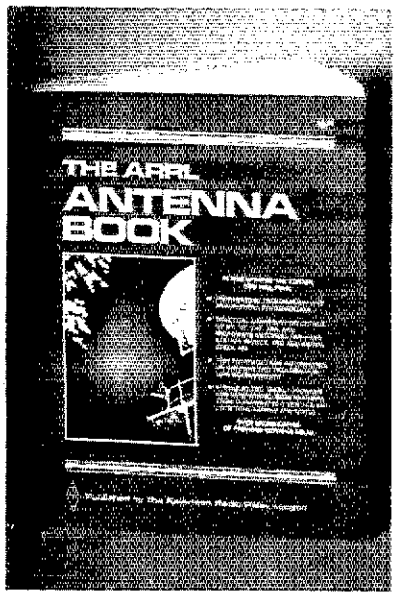
Microlog is ready with AMTOR! Give us a "chirp" at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, MD 20879. TEL (301) 258-8400. TELEX 908153

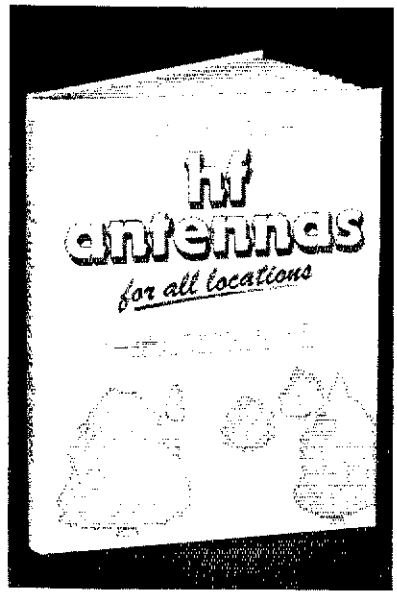
MICROLOG

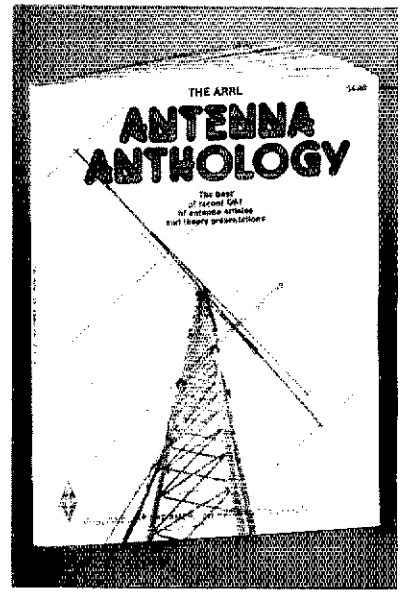
INNOVATORS IN DIGITAL COMMUNICATION

BOOKS

"A STATION IS ONLY AS EFFECTIVE AS ITS ANTENNA SYSTEM"







THE ARRL ANTENNA BOOK The best and most up-to-date antenna information around. The just revised 14th Edition contains in its 328 pages 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. Paperbound. Copyright 1982. **$8.00** in the U.S., **$8.50** 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; Hortizontal Beams; Verticle 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.**

ANTENNA ANTHOLOGY The best *QST* hf antenna articles and theory presentations. Verticals: 2 and 4 band verticals for the novice, Cheapie GP, High Performance system for 20, 40 and 80, other loaded systems. Yagis: Short antennas, and The Log-Yag Array. Quads: Wire quads for 80 and 40, 2-Element Quad for the Novice. Miscellaneous Antennas: Loops, Delta-loops, Antennas for travel trailers and campers, plus matching devices and antenna test accessories. Copyright 1978, 148 pages. **$4.00** U.S., **$4.50** elsewhere.

Enclosed in U.S. funds drawn on a U.S. bank or an international money order is $_____ for the books marked below:

( ) ARRL Antenna Book
$8 U.S. **$8.50** elsewhere

( ) HF Antennas
$12.00

( ) Antenna Anthology
$4 U.S. **$4.50** elsewhere

NAME _____

ADDRESS _____

CITY, STATE OR PROVINCE, ZIP OR POSTAL CODE _____

Charge to my ☐ Master Charge ☐ Visa _____

Account number _____ expires _____ Bank number (MC) _____

A.R.R.L
225 Main Street
Newington, CT 06111

RF POWER

ONE BILLION WATTS IN STOCK

Your One Stop Source for RF Power Tubes and Transistors

TUBE SPECIALS

3-400Z	$100.00	6MJ6 (SYL)	$ 7.28	5894B	$ 59.00	8874	$206.00
3-500Z	95.00	12BY7A	2.55	6146B	7.95	8875	206.00
3-1000Z	368.00	572B	46.00	6146W	15.00	8877	485.00
4CX250B	65.00	811A	11.00	8122	115.00	8908	13.00
6LF6	5.99					8950	13.00

RF TRANSISTORS

SPECIAL — MICROWAVE 1.00 SPECIALS — While they last

MRF901	House Marked 852 4 Lead	1.00	NEC73436	JAP 3 Lead MRF901	1.00
MRF901	House Marked 854 3 Lead	1.00	NEC NEO2136		1.00

2-30 Mhz

RF43,RF33 (Premium Replacements for MRF455 & MRF455A)	(RFG)	70W	12.5V		15.00
CD2545	(CTC)	50W	12.5V	Flange	24.00
CD3424	(CTC)	60W	12.5V	Flange	24.00
SD1451	(SSM)	60W	12.5V	Flange	15.00
SD1076	(SSM)	80W	12.5V	Flange	19.88
RF85	(RFG)	80W	12.5V	Flange	17.50
MRF458	(MOTO)	80W	12.5V	Flange	19.88

VHF
150-175 Mhz

						UHF 450-512MHZ					
B40-12	(CTC)	40W	12.5V	Stud	19.35						
2N5591	(SSM)	25W	12.5V	Stud	9.50						
2N6083	(SSM)	25W	12.5V	Stud	9.95						
2N6097	(SSM)	40WPNP	12.5V	Flange	15.95	2N5946	(SSM)	10W	12.5V	Stud	12.95
SD1416	(SSM)	70W	12.5V	Flange	31.00	MHW710-2	(MOTO)	13W	12.5V	Module 19 db Gain	59.00
987	(MRF559)	5W	12.5V	13db	1.00	CM60-12A	(CTC)	60W	12.5V	Flange	42.95

MINIMUM ORDER $30.00 **Add $3.00 for UPS charges**

CALL TOLL-FREE 800-645-2322

(N.Y. State 516-536-8868)

R F Gain, Ltd.

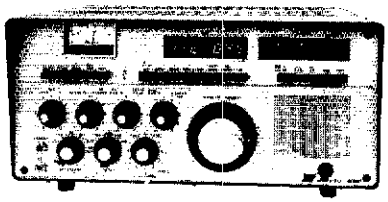
Export And Dealer Inquiries Invited Call for Types Not Listed

100 Merrick Road Rockville Centre, New York 11570

TWX 510-225-7508

---

milspec 1030



By signal/one.

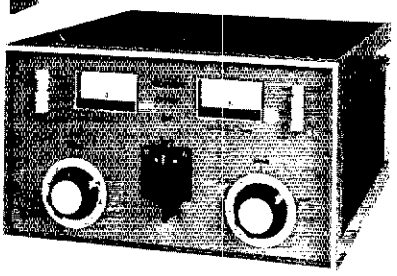
- GENERAL COVERAGE: 10 KHz to 30 MHz, Milspec quality
- POWER OUTPUT: 150 watts CW/PEP output. (200 watts optional)
- RECEIVER INTERFERENCE: Immunity heretofore unattainable
- A-B-C TUNING: Instantaneous frequency and band pre-set by lever wheels. Frequency and memories permanently retained.
- SSB TALK POWER UNEQUALED: processed through both crystal filter at 40 MHZ and two mechanical filters at 455 KHZ
- BUILT-IN: AC/DC, speaker, RF clipping, Pre-IF adjustable noise blanker, synthesized passband tuning, IF Notch filter, seven digit readout. Easy service using transistor and IC sockets.
- QSK CW: Fast break even crossband, vacuum relay
- COMPUTER CONTROLLED: Remotely by optional RS232 interface
- INTRODUCTORY PRICE $4995. Phone Don Payne, K4ID, for brochure ... if you want the finest.

Personal Phone — (615) 384-2224
P.O. Box 100
Springfield, Tenn. 37172

PAYNE RADIO

. . . If you want the finest

ALPHA 77DX



WINTER SALE — ALL ALPHAS

Model	List	Sale
77DX	$5450	**$3795**
78	$3495	**$2495**
374A	$2595	**$1870**
76A	$1985	**$1445**
76PA	$2395	**$1740**
76CA	$2695	**$1940**

Phone Don Payne, K4ID, for Brochure

Personal Phone — (615) 384-2224
P.O. Box 100
Springfield, Tenn. 37172

PAYNE RADIO

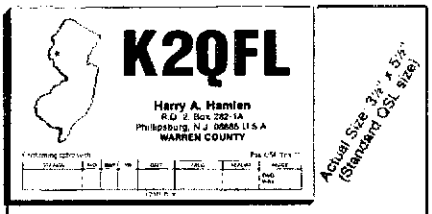
MILITARY SURPLUS

HANDI-TALKIES WANTED

Super high prices. Any quantity, any condition.
RT-976/PRC-75 RT-976A/PRC-75
RT-865D/PRC-66 UHF-225 to 400 MH

SPACE ELECTRONICS

Call Ray, K2BBC, or Jack, WA2KTX
Call collect: 201-440-8787



1,000 nice QSLs - Only $25.00!

Your state outline, other art or large type. Thousand lots only, one side, black ink on 67 lb vellum bristol. This report form only, **post-paid. Please specify blue, yellow, tan or gray stock.** Please give me your **call, name, address & county.** Please specify **state outline, other art** (enclose black & white line art only - for your photo in place of art add **$5.00** - I can resize and crop art or photo to your specs if nec). or **no art** (I'll use larger, centered type). **Satisfaction guaranteed!** Free with each order: 5 band DXCC checklist and a *"World's Best XYL Award"* imprinted with your XYL's full name **(specify).** Checks and MOs payable to: **Harry A. Hamlen, K2QFL,** and send orders to R.D. 2, Box 282-1A, Phillipsburg, NJ 08865. ARRL sym. no cg. Other wording, add **$2.**

WVFN	6:00	3990	31	99	741	N8AJC
WVMD	Noon	7235	31	51	641	W8FZP
WVNN	6:15	3730	12	2	24	KA8OMM
KFC	8:30	47/87	5	4	92	WD4KHL

Traffic: KZ8Q 108, N8AJC 77, K8KT 53, W8FZP 42, KA8HCT 36, K8OEW 30, WA3NUI 26, KC8CR 21, WA8KCJ 17, WB8UDY 14, WB8VAZ 14, WB8ZMX 11, WD8DHC 10, K8JQ 10, WA8YLW 10, W8CAL 8.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WDØAIT. Congrats go to WØDZ for winning the April 82 Cover Plaque Award, given for the best technical article in the *QST* for the month. This award has gone to three other members of our Division in the past years. Two new appointments have been made in the section. The State Government Liaison duties have been assumed by AGØX, and Bulletin Manager duties go to WØMDT. Activities in the section are Super Fest IV on 4 June in Loveland by the NCARC, which has been well attended in the past. KØKU reports a swap-fest on 2 April in Grand Junction. The amateurs have been asked to provide communications for the 9th Health Fair 9 thru 17 April. This being a section-wide project it will require a lot of operators. The 220 MHz activity should be on the increase with the new rptr on 224.74 MHz owned by the Aurora RA. I am sure there are some of the traffic people not turning in their reports. Please people, let's try to show just how busy you the amateurs are. Nets: CWN sess. 31, QNI 259, QTC 141, QNF 863; HNN sess. 31, QNI 1905, QTC 89, Inf 226, QNF 1477. Traffic: NØBQP 1688, WAØHJZ 1398, WØACD 1308, KØJAN 650, WDØAIT 193, WØWYX 129, KBØZ 120, WAØOYI 111, KAØNLI 96, WØMDT 73, WØLAE 64, NØACW 45, KØTIV 45, WØNFW 26.

NEW MEXICO: SM, Joe T. Knight, W5PDY — DEC: KB5XD STM: KV5U. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 163 msgs with 265 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 at 0100 UTC and handled 55 msgs with 1178 stations in. New Mexico Breakfast Club meets daily on 3.939 at 0630 local and handled 88 msgs with 976 checkins. Yucca 2-Mtr net 78/18 & 93/33 handled 2 msgs with 577 checkins. Caravan Club 2 mtr net 66/06 handled 11 msgs with 142 checkins. Vy sorry to report the passing of K5ZCA. K5BN recovering after more surgery. W5IXR & W5IXS are both on the mend. N5SJ & K5XY paid brief visits to ABQ. Bean FEED at Las Cruces April 24th. Traffic: W5DAD 228, W5JOV 143, ND5T 126, W5ENI 63, N5SJ 55, KB5LI 17.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. STM: W7OCX. Start planning now for WIMU-83 at Jackson Hole, WY. QSL to WB7AMP or N7OCA for details. Dixie ARC new officers: N7TJ, pres.; KC7OA, v.p.; K7WG, secy/treas. K7UM active and enjoying 30M. WA7EVA and WB7BZT running a Novice class at Dixie College. WB7UJP now NA7G. KA7FHF now NA7D. WA7HHE running Novice class. Ogden ARC new officers: WØKP/7, pres.; KG7UB, v.p.; KA7INM, secy; K7SDN, treas.; KA7MNK WB7RLW, directors. 38/98 is back on Kessler Peak with 10M FM signal signing KD7BA/R TEN FM. 34/94 back on thanks to WA7UUJ and WA7ARK. KA7JPB in University Hospital owing to motorcycle accident; doing FB. WA7ARK reports N7DPW who was active in CAP was killed in aircraft accident. UARC new officers: KB7HM, pres.; KC7ZD, v.p.; KA7AFG, secy.; KA7NBJ KA7MUU chairpersons; K7HFV, editor; WA7QKE asst. editor of *The MICROVOLT*. K7BYQ Silent Key. Traffic: WA7MEL 88, KN7U 36, K7CKF 32, NA7G 28, WA7JRC 27, W7PBV 15, KO7H 2, WA7HHE 2.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: W7TVK. STM: WØGH. A successful search & rescue in the Big Horn Mt. was due in part to Amateur Radio operators providing the only effective communications from the search area and both the County & State EOCs. Thanks to KD7AN WA7KUE KB7JZ N7EOC K7TFW KB7HS N7BVX WB7RMI K7SLM & W7TVK for their efforts in this SAR. KA7OPQ is a new Novice, & N7CGN upgraded to General. Congrats to all. The Wyo. Hamfest is 3rd weekend in July at Meadow Lark Lake. WIMU Hamfest is Aug. 5-7 at Jackson. WAØPFJ reports the Wyo. Jackalope net held 26 sessions with 696 QNI & 2 QTC. Thanks to all for your cards; they made my hospital stay much brighter. Traffic: KD7EY 442, WØOGH 83.

SOUTHEASTERN DIVISION

ALABAMA: SCM, H. H. Wheeler, W4IBU — ASCMs: WA4RNP KA4WVU. SEC: N4DMA. STM: WA4PIZ. January has seen much improvement in several facets of Amateur Radio. DRN5 now has initiated a new session at 10:30 A.M. local at 7280 kHz. Two new clubs have been started. The cw nets are gaining in participants, but more are needed. A new cw training net for Generals and above is being proposed. (If interested contact the STM.) The ARES is growing in membership with coverage in new counties. There is still a need for coverage in several counties. How about YOU? Can YOU lend a hand? The HAMFEST days are close at hand. Support the dealers for they are what make them successful. The Special Services Club program is in full swing. Get your order in early!! New club officers: W.A.A.R.S.-W4WYP, prez., KE4TN, v.p.; WD4DAT, secy./treas. HAYLARC-WB4QOS, prez., KD4JD, v.p.; KA4SHI, secy.; WA4DJW, treas., Montgomery ARC-W4CNQ, prez.; KA4ZWD, v.p., K4BTB, treas.; KE4FO secy. AMTOR digital teleprinter code now legal on the ht bands. See March *QST* for details on codeless license proposal. Comment deadline is April 29. The Docket is 83-28. Third party tfc with St. Vincent, prefix J8, is now permitted. Atabama represented 100% on CAND by W4CKS & N4FQD. DRN5 represented 95% by WA4JDH WB4IXA W4IBU W4WJF W4CKS N4FQD KC4GS NW4X KD4KT WA4PIZ KD8GT & WA4RLQ. Traffic: WA4JDH 516, W4CKS 122, N4FQD 84, WA4LXP 53, W4IBU 49, NW4X 34, WB4IXA 21, WD4DHI 20, WA4JPK 18, KB8GT 10, WB4TVY 10, K4AOZ 8, W4DGH 4.

GEORGIA: SM, Eddy Kosobucki, K4JNL — Well spring finally has arrived after a very unusual winter. Tnx to all who helped during all the emergencies. Dixie DXers elected: NQ4I, pres.; K4JTD, v.p.; KA4JMH, secy/treas.; K4VHC, contest chmn; W5VUX mbr. The rptr coordinator for the Georgia section is: C.A. Strawn, WB4JEH, 1841 Covington Hwy. (SE), Conyers 30208. If you're planning on constructing a machine contact him and he'll be glad to help in any way he can. There are 40 ARRL affiliated clubs in the section. WA4ABY is the (ACC) or Affiliated Club Coordinator & will be contacting you to see in what areas he can help. Under the new LRPC program there are many ways that each club can benefit. KA4HHE is the new ARC of Savannah club pres. Serving with her are: W4HYU, v.p.; K4AZM, secy.; KA4COY, treas.;

ARRL Publications/Supply Order

☐ THE 1983 RADIO AMATEUR'S HANDBOOK The standard manual of Amateur Radio Communications.

SOFT COVER	CLOTHBOUND
$12.00 U.S.	$17.75 U.S.
$13.00 Canada	$20.00 Elsewhere
$14.50 Elsewhere	

☐ TUNE IN THE WORLD WITH HAM RADIO All the beginner needs to know to obtain the Novice license. Package includes text and code practice cassette. $8.50

☐ ARRL ANTENNA ANTHOLOGY The best from QST. $4.00 US, $4.50 Elsewhere

☐ ARRL ANTENNA BOOK Contains theory and construction of all types of antennas. $8.00 US, $8.50 Elsewhere

☐ ARRL CODE KIT Two 60 min. cassettes and booklet to get you from 5 to 13 wpm quickly! $8.00

☐ ARRL ELECTRONICS DATA BOOK reference guide of charts, tables, & circuits. $4.00 US, $4.50 Elsewhere

☐ THE FCC RULE BOOK A guide to the regulations. $3.00 U.S., $3.50 Elsewhere

☐ FIFTY YEARS OF ARRL A history of ARRL up through the early '60's. Reprint from 1964 QST. $4.00

☐ FM AND REPEATERS FOR THE RADIO AMATEUR $5.00 US, $5.50 Elsewhere

☐ HINTS AND KINKS Vol XI The best from QST. $4.00 U.S., $4.50 Elsewhere

☐ HIRAM PERCY MAXIM $4.95

☐ LICENSE MANUAL Complete text of amateur regulations, FCC exam syllabus, radio theory for Technician through Extra. $4.00 US, $4.50 Elsewhere

☐ ARRL OPERATING MANUAL Definitive source of good operating practices applied to over a dozen most popular Amateur Radio activities. $5.00 US, $5.50 Elsewhere

☐ OSCARLOCATOR PACKAGE - locators for Oscars 7 and 8, tops on using ham satellites, full color $7.00 U.S. $8.00 elsewhere

Q&A BOOKS Give sample questions and answer to FCC amateur exams.

☐ NOVICE $2.00 US, $2.50 Elsewhere

☐ TECH. & GENERAL $2.50 US, $3.00 Elsewhere

☐ ADV. & EXTRA $3.00 US, $3.50 Elsewhere

☐ RADIO FREQUENCY INTERFERENCE $3.00 US, $3.50 Elsewhere

☐ REPEATER DIRECTORY 1982 edition. $2.00 US, 5 or more $1.75 each

☐ SOLID STATE DESIGN FOR THE RADIO AMATEUR Practical circuits and theory. $7.00 US, $8.00 Elsewhere

☐ 200 METERS & DOWN History of Amateur Radio up through the mid-'30's. $4.00

☐ UNDERSTANDING AMATEUR RADIO Written for the beginner. Contains theory and how-to-build-it info. $5.00 US, $5.50 Elsewhere

☐ WEEKEND PROJECTS FOR THE RADIO AMATEUR Easy to build projects from QST. $3.00 US, $3.50 Elsewhere

RSGB PUBLICATIONS

☐ RSGB RADIO COMMUNICATIONS HANDBOOK 5th Ed. in one paperback volume, 778 pages $22.00

☐ VHF - UHF MANUAL $12.50

☐ AMATEUR RADIO TECHNIQUES $12.50

☐ TEST EQUIPMENT $11.00

☐ HF ANTENNAS for all LOCATIONS $12.00

☐ AMATEUR RADIO OPERATING MANUAL $10.00

THE ARRL FLAG

☐ 3'x5' cloth flag $21.00

☐ Pin $2.50

☐ License Plate $5.00

☐ Cloth Patch $5.00

BINDERS

☐ 6½ x 9½ (US and Canada only) $6.00

☐ 8½ x 11 (US and Canada only) $7.00

☐ L/C/F CALCULATOR Slide-rule type for problems on inductance, capacitance and frequency $3.00

BUMPER STICKERS $2.00 each

☐ "Amateur Radio - A National Resource"

☐ "Amateur Radio - One World, One Language"

CODE PRACTICE TAPES each $5.00

☐ 30 minutes of 5 wpm and 30 minutes of 7.5 wpm on one standard cassette.*

☐ 30 minutes of 10 wpm and 30 minutes of 13 wpm on one standard cassette.*

☐ 30 minutes of 15 wpm and 30 minutes of 20 wpm on one standard cassette.

*Same as the tapes provided in the CODE KIT.

☐ HOLA CQ Learn to communicate with Spanish-speaking amateurs. Cassette and 16 page text. $7.00

DECALS

☐ Amateur Radio Emergency Service 2/$0.50

☐ Amateur Radio Emergency Service 5/$1.00

☐ Member or Life Member, each 2/$0.50

CLOTH PATCHES (washable)

☐ Amateur Radio Emergency Service 3½ inch diameter $2.50

☐ 3" League Diamond $1.00

☐ 5" League Diamond $2.00

☐ Life Membership chevron for 3" League Diamond Patch $1.00

☐ Life Membership chevron for 5" League Diamond Patch $1.25

☐ Rubber Stamp $2.00

MEMBERSHIP PINS

☐ Membership $2.50

☐ League Official _____ $2.50
Title

LEAGUE EMBLEM CHARM

☐ Membership $2.50

☐ League Official _____ $2.50
Title

☐ 14" x 16" LEAGUE EMBLEM BANNER $7.50

☐ 6" EMBLEM BUMPER PLATE $5.00

☐ Replacement for Life Members $2.50

☐ LIFE MEMBERSHIP PLAQUE (for replacement-allow 8 wks. delivery) $25.00

LOG BOOKS

☐ 8½ x 11 Spiral $1.75 US, $2.50 Elsewhere

☐ Mini Log 4 x 6 $1.00 US $1.50 Elsewhere

☐ 3-hole Loose Leaf 96 8½ x 11 sheets $3.00

MAPS

☐ US Call Area: $3.00

☐ World Map, 1980 edition Great Circle map with country prefix list, ITU region boundaries, time zones and much more $4.50

☐ MESSAGE DELIVERY CARDS 10 for $0.50

☐ RADIOGRAM PADS 70 sheets $0.75

SMITH CHARTS®

☐ Standard (set of 5 sheets) $1.00

☐ Expanded (set of 5 sheets) $1.00

☐ ANTENNA PATTERN WORKSHEETS 100 8½x11 sheets $3.00

☐ MEMBER'S STATIONERY 100 8½ x 11 sheets $3.00

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALLOW 3-4 WEEKS FOR DELIVERY.

PAYMENT MUST BE IN U.S. FUNDS
$1.00 PER TITLE FOR POSTAGE AND HANDLING

Ship postpaid to:

NAME _____ CALL _____

STREET _____

CITY _____ STATE/PROV. _____ ZIP/PC _____

Total Enclosed (or charge to MC, VISA or Chargex) $ _____

VISA or Chargex No. _____ Expires _____

Mastercard _____ Expires _____

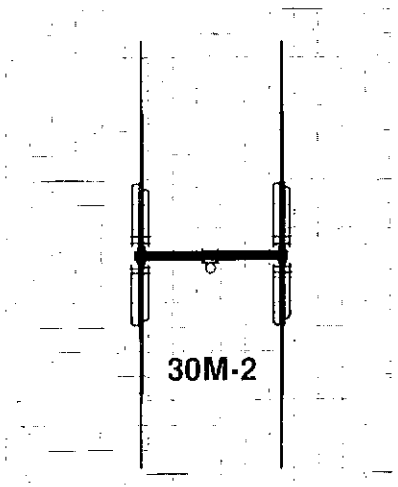
Bank No. _____ Signature _____

Have you fully completed your order form? Is your check (which must be drawn on a U.S. bank) signed or charge number indicated?

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST., NEWINGTON, CT 06111

QST383

KLM 30 Meter Monoband Yagis



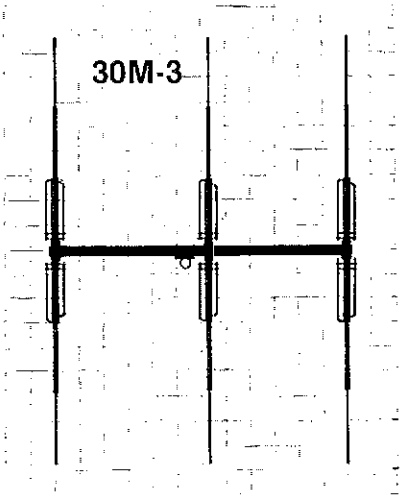
KLM is proud to announce two new high performance monobanders for 30 meters. The KLM 30M-2 and 30M-3 are carefully designed to combine moderate size with superior performance. Either of these compact powerhouses can be a valuable addition to your antenna system without overloading the tower or rotator.

- Construction materials feature strong 6063-T832 alloy aluminum element and boom tubing, massive Lexan insulators, and stainless steel hardware for years of reliable service.

- A DC grounded Beta match and KLM's proven 4:1 DC grounded Balun make the 30M-2 and 30M-3 as lightning/static proof as possible. The unique linear loading system keeps element lengths manageable without sacrificing performance.

- The adventure of a new band awaits you. Double your pleasure with the great gain and broadband response of the KLM 30M-2 or 30M-3. See your KLM dealer now!

KLM Electronics, Inc.
P.O. Box 816,
Morgan Hill, CA 95037
(408) 779-7363



30M-2: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain:
VSWR: **less than 1.5:1**
F/B:
Feed Impedance: **50 ohms**
Element length: **35'3"**
Boom: **3"O.D. x 12'**
Turn Radius: **18'6"**
Weight: **35 lbs**
Windload: **4 sq ft**

30M-3: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain:
VSWR: **less than 1.5:1**
F/B:
Feed Impedance: **50 ohms**
Element length:**35'3"**
Boom: **3"O.D. x 24'**
Turn Radius: **21'5"**
Weight: **50 lbs**
Windload: **7 sq ft**

KA4KOE, act. dir. The Atlanta RC is making more efforts than ever to make the "Ham-festival" the largest & best ever. One new item will be "reserved spaces in the flea market." After you read this you still have time to contact them for full details. The Albany ARC's 1st annual hamfest will take place on Sunday, May 7th. K4XA informs me that they are working like mad to make this a huge success. Their 1983 newly elected officers are: K4PGY, pres.; K4GCR, v.p.; KA4YBA secy.; K4XA, treas. Gud luk in the new endeavors. WB4SLZ & the gang in the Conyers area need to be congratulated for all the efforts they have made during the past year. For being one of the smaller clubs, their programs & activities are outstanding. Lanierland ARC 1983 slate is: N4FCL, pres.; N4DMZ, pres.; N4FJF, secy.; N4BYX treas.; KC4UC, act. mgr. They meet in Gainesville at the Red Corss bldg on the last Tues. of each month. Remember 3975 is the gathering place for the best hams in the land. Won't you come & join us on the nets or just stop by for a casual ragchew. Traffic: W4WXA 222, N4BIM 71, WB4NTW 53, K4JNL 42, W4FIZ 40, WB4RUJ 36, K4NM 35, KA4ATM 24, N4DOM 21, W4HON 20, K4EV 15, K4BAI 12, K4PIK 5, N4UZ 2. (Dec.) KL7FX 166, W4NKL 23, AA4EI 4.

NORTHERN FLORIDA: SM: Billy Williams, N4UF — SEC: W4UFA. STM: WF4X. ACC: N4ADI. Several ARES groups activated for tornados/severe wx on Feb. 1st. Clay Co. ARES, Marion Co. Emer. Net among those responding. Also Alachua Co. group assisted. Very good response by all involved. LSTTN (Lake-Sumter) net having good activity. NCSs include NS4C WB4AWG WB4HMT VE1RU NQ4P KF4GY NA4F W4OQF K3AQY WD4HUZ KA4RWB. KB4LB names RACES officer for Seminole Co. KC4SS recovering after surgery. NQ4P appointed to Lake Co. Emergency Board. HCARA FD site will be at McKethan Lake Rec. Area. KB9LT is chmn. WB4EXA and N4EBH are offering HCARA Novice class. New rptr Orange Park on 147.93/.33 operated by KD4XP. WB3DBE is new hamfest liaison for OPARC. KB4CXR upgraded to Tech. K4AQQ busy on 160 meters. Most clubs active with spring public service event communications among them are NOFARS, RANGE, OARC, GCARC TARS and HCARA. BARS held homebrew contest. BARS gave awards to W4BSO NE4Z KF4IG and WD4MSR. LMARS Comm. Chmn are: NS4J, rptr.; KB4LB, education; AJ4L, custodial; NE4I, newsletter. WD4AKL, scrapbook. ARRL affiliated clubs wishing to apply for Special Service status (SSC) should contact ACC N4ADI for information. The new classification went into effect this month. WD4BEF and AB6I warn of using WD-40 type lubricant in electronic circuits. Seems the residue and some circuits don't mix. Gainesville ARS officers for 1983 aare WA4JXI, pres.; KA4WNU, v.p.; N4CUF, secy.; KC4UF treas.; WA4HFR, rptr. trustee. KA4DVH & KC4UF cites as GARS Hams of the year. K4DPZ rptr antenna now up 500 ft. on WUFT-TV tower. All hams are urged to register their comments on the code-free license concept. Write FCC and send copies to Sen. Chiles & Hawkins as well as your district House of Rep. member. Traffic: N4EDO 5664, N4PL 444, NY4E 364, WA4QXT 357, WA4EYU 201, WD4IIO 148, WB4ADL 134, W4MGO 134, K64LB 129, KF4U 105, W4KIX 99, WB4TZR 98, KF4HA 97, WD4HBP 81, KD4KK 75, N4ADI 70, KA4VXT 65, WD4RIO 57, WD4MLQ 56, KB4T 54, AA4FG 50, N4GDT 47, N4GMU 45, NQ4P 40, WB4DTS 40, W3IDO 27, K3AQY 26, KA4ETX 26, KF4EU 26, KB9LT 26, NF4O 23, N3BRT 22, WA4STZ 22, N4UF 21, KD4QZ 19, WB4YQP 16, NS4C 15, WB4AWG 13, KA4DCD 13, W4GUJ 13, WD4ORO 8, WA4PUP 8, W4LUW 7, KA4RBY 6, KA4RMH 6, KF4GY 5, WD4HUZ 5, N4ESM 3. (Dec.) W4KIX 201, N4GMU 109, WA4OPA 4.

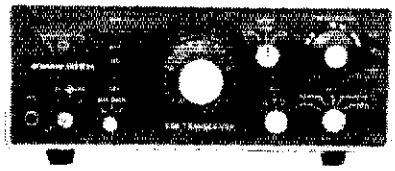
SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS. STM: K4ZK. It was with regret that I received the resignation of Jim Townsend, KB4OW, SEC. He did an outstanding job as SEC, and we wish him well in his new position in California. Manny Papandraes W4SS, has been appointed SEC. He is very active in emergency communications and is president and administrative director of the Palm Beach ARC, Inc. The SM/STM/SEC meeting at the Sarasota Hamfest was very well attended; the number of participants has increased steadily over the past three years. It was especially nice to renew a friendship of almost fifty years, WD4NXF, who was my Boy Scout leader and college zoology instructor many years ago. W4JM is very proud of his fifty-year ARRL plaque presented to him by W4RH at the Sarasota Hamfest. WA4LQO and XYL KB4ATW report their first harmonic, Elizabeth Ann, born January 20th. K9VTU, assistant EC Polk Co., is recovering well from heart surgery. K4VSN is NM of the Peace River Valley Amateur Net as of February 1st. WB4NOZ reported that as St. Lucie Co. EC, he activated a nuclear power plant emergency drill January 19 and 20, with 20 operators participating. WD4CRR has been conducting sessions on instruction in traffic handling for the Florida Midday Traffic net. WB4CDQ has updated the traffic handlers list originally prepared by K4ZK, and also listed them by city. Thanks to both of you for a job well done. Congrats on new calls to: WK4F ex KC4OT, NM of Southwest Florida Traffic Net; KF4RL, ex-WB4MPJ who is an NCS on both the Florida Phone Traffic Net and the Southeast Florida Traffic Net; WK4H, ex-KE4TM. W4SME is an active Official Observer. Special thanks to WA4TWD and KA4GUS who helped me via two meters, to locate veterinary assistance for my cat, Scotch, when he suffered an extremely bad cut on his leg. 73 de WA4PFK. Traffic: WA4PFK 388, VE3BSY 358, WA4EIC 343, K4ZK 252, WD4AWN 248, K4IA 180, WB4AID 161, WB4WYG 142, KA4GUS 138, W1NJM 123, W4NFK 119, KA4AMC 116, WD4CHO 114, K4SCI 112, KA4ASZ 108, WA4HXU 102, K4EUK 101, W8BZY 100, KC4FL 89, WA4TWD 88, W4SME 76, W4GPL 74, N4KB 72, W4PKP 72, KY4U 71, KM4Y 69, W4ESH 68, KE4DA 62, W4DL 62, WD9AEP 58, WK4F 57, KA4FZI 52, KF4RI 49, KA4NXF 38, WA4GYR 37, W4OUU 36, WA4RLV 36, K5IHH 33, K7LCA 33, WB4GCK 32, W3TLV 30, K4IEK 27, KA4YHS 26, W4ROA 22, KA4BBA 21, NW4R 21, NJ4O 20, W4YCL 17, AA4BN 16, W4IRA 16, W4SMK 16, WB4OUK 15, W4UIO 13, W4WYR 13, WA8MFC 12, KD4SF 12, W4LVA 11, W4MPV 10, N4CMW 9, WD4KPG 9, K4FOU 8, KA4GDU 8, K4JLL 8, W4MFD 8, KA4RWV, KA8CXO 6, N4FL 6, KA4VAW 6, W3IJR 5, KB4KB 5, K9EHP 4, WB4GJH 4, W4JM 4, WD4MCC 4, W3IJC 3, KA4JST 3, K3NMR 3, WB2SDA 3, K4IRT 2, WB8SNT 2, KB4CYF 1, N8EL 1, N4FNY 1, WA4GIE 1, N4GQR 1, K4KKP 1, WB4LQO 1, WD9NHV 1, K4OVC 1, WA4PIL 1, W8VNJ 1, NX4X 1, KA4YHE 1, KA4YHF 1.

WEST INDIES: SCM, Julion Negroni KP4CV — NP4CF is the new Section Emergency Coordinator. He is actively reorganizing ARES and will organize RACES. NP4D successfully completed a 2-week microwave course in San Juan. WP4BSV is new assistant net manager of WINC. KP4FFW is new 4RN representative for WIN. NP4D

CLOSE-OUT

HI-POWER MOBILE 235 WATTS INPUT

SWAN 100 MXA



- All solid state.
- 80, 40, 20, 15 & 10 (28.5-29.0).
- With Mobile Mounting Bracket.
- 1 Khz dial Calibration.
- Direct 12 VDC operation.
- VOX, NB & Calib. built-in.

A.C. Pwr. Supply
(21 amp max) $99.00
Add $5.00 Shipping and Handling Continental U.S.A.

Hand Held Mobile Mike $19.95

$399.00

Add $5.00 Shipping and Handling Continental U.S.A.

HAM RADIO CENTER
8340-42 Olive Boulevard
P.O. Box 28271
St. Louis, Missouri 63132

Call toll-free

1-800-325-3636

MasterCard

NATIONAL TOWER COMPANY

P.O.Bx. 12286 * Shawnee Mission,Ks. * 66212
Hours 8:30-5:00 M-F 913-888-8864

VISA

CUSHCRAFT ANTENNAS

A-3	3 Element Triband Beam	$172.00
A3219	19 Element 2 mtr. "Boomer"	$79.00
A4	4 Element Triband Beam	$225.00
AV-4	40-10 mtr Vertical	$79.00
AV-5	80-10 mtr Vertical	$86.00
ARX2B	2 mtr. "Ringo Ranger"	$34.00
ARX450B	450 mhz "Ringo Ranger"	$34.00
A147-11	11 Element 146-148 mhz Beam	$37.00
A147-22	22 Element "Power Pack"	$105.00
A144-10T	10 Element 2 mtr "Oscar"	$44.00
A144-20T	20 Element 2 mtr "Oscar"	$68.00
214B	14 Element 2 mtr. "Boomer"	$68.00
214FB	14 Element 2 mtr. FM "Boomer"	$68.00
228FB	28 Element 2 mtr "Boomer"	$182.00
R-3	20-15-10 mtr. Vertical	$225.00
10-4CD	4 Element 10 mtr "Skywalker"	$87.00
15-4CD	4 Element 15 mtr "Skywalker"	$99.00

HYGAIN ANTENNAS

V-2S	New 2 mtr Vertical	$37.00
18AVT/WBS	80-10 mtr Trap Vertical	$87.00
TH5MK2S	5 Element Thunderbird	$309.00
TH7DX	7 Element Triband Beam	$379.00
TH6DXX	Conversion kit to TH7DX	$139.00
TH3MK3S	3 Element Triband Beam	$215.00
TH3JRS	3 Element Triband Beam	$155.00
18HTS	Hy-Tower 80-10 mtr. Vertical	$329.00
105BAS	5 Element 10 mtr. "Long John"	$115.00
155BAS	5 Element 15 mtr "Long John"	$175.00
2BDQ	40 & 80 mtr Trap Doublet	$47.00
204BAS	4 Element, 20 mtr	$229.00
205BAS	5 Element, 20mtr, "Long John"	$289.00
402BAS	2 Element 40 mtr Beam	$189.00
HQ2S	2 Element, Hy-Quad	$259.00

HUSTLER ANTENNAS

4BTV	40-10 mtr. Vertical	$79.00
5BTV	80-10 mtr Vertical	$99.00

ROHN STEEL TOWER ACCESSORIES

5/16	EHS guy wire (3990 lbs.)- 1000'	$130.00
1/4	EHS guy wire (6650 lbs)-1000'	$155.00
5/32	Cable - 100'	$36.00

ROTORS

Alliance HD-73 (10.7 sq.ft.)		$89.00
Alliance U-100		$38.00
CDE-CD45-2 (8.5 sq.ft.)		$105.00
CDE Ham 4 (15 sq.ft.)		$195.00
CDE Tailtwister (20 sq.ft.)		$239.00
Hygain HDR300 (25 sq.ft.)		$419.00

ROTOR CABLE- 8 COND.

(2-18 & 6-22) 4080 per ft		$0.18
(2-16 & 6-20) 4090 per ft		$0.35
RG8X	Belden mini 8 low loss foam per ft	$0.17
	500' roll	$79.00
RG8U	Columbia Super Flex-$26/100' - 450'	$120.00
	Complete line of Rohn access. available	

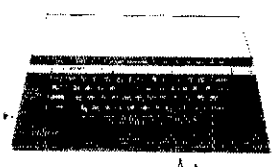
ROHN TOWERS

25G	10' section	$39.90
25AG	3 or 4 top section	$52.00
45G	10' section	$94.00
TB-3	Thrust bearing	$48.00
M200	10'mast, 2"o.d.	$19.50
BX-40	40' self supporting (6 sq ft)	$159.00
BX-48	48' self supporting (6 sq.ft.)	$199.00
BX-56	56' self supporting (6 sq ft)	$269.00
HBX-48	48' self supporting (10 sq.ft.)	$259.00
HBX-56	56' self supporting (10 sq ft)	$339.00
HDBX-40	40' self supporting (18 sq.ft.)	$249.00
HDBX-48	48' self supporting (18 sq.ft.)	$309.00
FK-2548	48' 25G foldover (Freight Paid)	$795.00*

* Prices 10% higher west of Rockies
SHIPPING NOT INCLUDED.

HOME COMPUTERS

ATARI



$649.00 NEW 1200xl

64K MEMORY

INNOVATIVE HELP KEY PROVIDED TO CALL UP ASSISTANCE WITHIN A PROGRAM.

The ultimate consumer computer with greater computing power with its 64K RAM capacity. The high quality, full stroke keyboard of the 1200xl locks and unlocks electronically to protect work in progress. Its diagnostics system allows the user to test ROM and RAM audio-visual circuitry and keyboard functionality. All of the over 2,000 popular entertainment, educational and home management programs available for ATARI Home Computers will run on the 1200xl. All ATARI computer peripherals are also compatible with the 1200xl, an important benefit.

CX483 Programmer Kit $59.95
ATARI 800 Home Computer $499.00

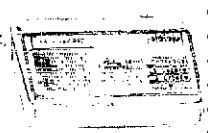
Bearcat

$219.00

BC210XL- 18 ch,6 band, programmable

BC350-7 band, aircraft,prog	$369
BC300-7 band,aircraft,prog	$339
BC20/20-40 ch, aircraft,7 band,prog	$279
BC250-50 ch, 6 band, programable	$279
BC100-programmable Hand Held	$299
BC200-16 ch, 8 band, prog	$179
BC150-10 ch, 5 band, programable	$159

Regency

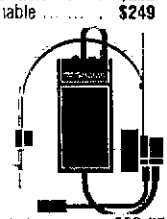


$159

D300- 30 ch, 6 band programable

R1040- 6 band,10 ch,programable	$129
K100- 5 band,10 ch,programable	$139
D100- 6 band,10 ch,programable	$159
M100- 6 band, 10 ch, programable	$209
D810- 50 ch,aircraft,programable	$249

MAXON



49 mhz, FM
2-WAY RADIO
with hands free operation, voice activated transmit range up to ½ mile

MODEL 49S batteries not included $39.95

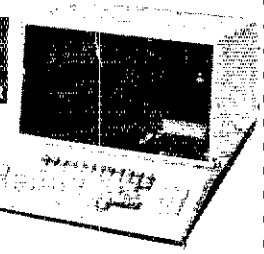
RADAR DETECTORS

FOX WHISTLER

DASH MOUNTS		SUPER HETS	
Whistler Z-70	$69	Whistler Spectrum	$279
Fox XK	$89	Whistler Q2000	$199
Fox XKRW remote	$119	Q1000 Remote	$219
Bel 820 Micro Eye	$79	Fuzzbuster Super 2	$179
Bel 835 remote	$219	Fox Vixen	$179
		Bel 830 Executive	$169

SANYO BUSINESS COMPUTERS

FREE
WORD STAR, MAIL MERGE, SPELL STAR, CALC STAR, INFO STAR



$1,499
MCB1000

WITh BUILT IN 5¼" FLOPPY DISK DRIVE

MCB 1000 desk-top computer supplied with CP/M®, SBASIC II. Check program, various uhlities, it features Business Graphics capability, detachable keyboard,number pad, cursor control keys.

Centronics parallel printer port, RS-232C serial port, and built in floppy disk drive with file copy procedure can be expanded to incorporate up to three 5¼" floppy disk drives.

Z-80A CPU has high-speed processing & no-wait mode.

System memory - CPU RAM 64K bytes.

12" non-glare green phosphor screen shows up to 256 characters.

PR5500 SANYO PRINTER $799

recently acquired an HRO500. KP4CA has a new 50 ft. top loaded vertical and is experimenting on 190 kHz. WP4BCV is anxiously waiting the return of Infotech. A new rdioteletype club for PR has been formed. It is hoped that RTTY will soon be heard on the 145.35 rptr. PRARC mini-hamfest at Gurabo was a successful reunion for the club regulars. PSHR: (Dec.) KD4PJ. PSHR NP4D. Traffic: NP4D 91, KP4DJ 66, KP4ABK 33, WP4ADG 2.

SOUTHWESTERN DIVISION

ARIZONA: SM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. The ARA *Squelch Tail* reports the following helped with communications for the Fiesta Bowl Parade: WB7NKH WA7PNY W7EX WA7WVP K7GH KA7DTS WA7ZZT N7AFM KA7DTT WB7BLF WB7BNI WB7DUN W7IOA WB7CHQ WA7VIE W7LIP WA7CPA WB7DQN W1OQ WA7KRV WB7OZR K7QWR WA7ZCZ WA7WCF WA7VDZ K7HGZ W7RT WB7OWD N7BYA WB7TPY N7RK. The intertied rptr system known as the "ZIA" connection has been given quite a bit of publicity in several ARC newsletters. The following provided comm. for Payson area Christmas Food and Toy project: N7CVT N7EDO WB7WAW WB7BXN WB7UUL and K7RZU. New officers for TARA: WB7WAW, pres.; N7EAQ, v.p.; KA7CNJ, secy.; N7XA, treas. New officers for ARA are: WB7BVS, pres.; K7COE, v.p., KA7DTT, secy., N7DFH, treas. While on the subject, CCARC's 83 officers are: KA7MGO, pres., WB7EUY, v.p.; and WB7OPT, secy/treas. The TRA reports they will soon have a 450 MHz rptr on the air. N6BVZ has stepped down as DEC for Apache Co. and will be returning to 6-land. Anyone in Apache Co. interested in this vacancy should contact me. W7UQQ has reported he will be relocating to 4-land. WA7NXL reports receiving his 150 DXCC endorsement. PSHR: W7EP W5KMF. New appointee: N7CQY-ORS. ATEN QNI 1128, QTC 187. Traffic: W7EP 158, W7AMM 140, W5KMF 108, KB7FE 103, W7LVB 75, WA7KQE 28, N7CQY 19, K7NMQ 19, KA7HEV 10, N7CVT 12, N7EH 12, W7DQS 5, K7POF 3, WA7NXL 2, (Dec.) K7UXB 188, WA7YUL 11.

LOS ANGELES: SM, Stan Brokl, N2YQ — SEC: N6UK. STM: W6INH. ACC: NF6D. January started off with a bang as I was asked to install the new officers of the Associated Radio Amateurs of Long Beach on Jan. 15. The new officers are: AK6Y, pres.; WA6MED, v.p.; WA6UBU, secy.; W6UPL, treas. K6DDO has been handling lots of traffic around the world BOC Solo Sail Boat Race. K6ZT has done an outstanding job getting to the right people in the Olympic Committee. Amateur Radio will be used by the Olympic organizers in many ways. Thanks to K6ZT's hard work. He was appointed by the LA Council of Amateur Radio Clubs. Many local Radio groups will be contacted within the next year to get involved. OO report: K6KA 80. Traffic: K6DDO 100, WA6OCM 64, K6INK 22, N6DZO 12.

ORANGE: SM, Fried Heyn, WA6WZO — SEC: W6UBQ. DEC: (by counties) WB6JBI (Orange); W6LKN (Riverside); K6GGS (San Bernardino); WB6YZY (Inyo). NMs: WA6QCA (FM); K6XI (CW); W6CPB (SSB); K6JT (RTTY), WA6WZO (ASCII). New section level position appointments Feb. 1: Affiliated Club Coordinator (ACC) KA6NLY; Bulletin Manager (BM) W6DXL; Official Observer/RFI Coordinator N6PE; Public Information Office (PIO) KA6HNY; State Gov't Liaison (SGL) N6HIQ; Technical Coordinator (TC) AA6DD. Because of the disaster from rain and high tides OC ARES was activated by Red Cross and OC RACES was activated by OC Fire Dept, for which over 50 hams participated. New club officers for 1983 — Morongo Basin ARC: N6DOU, pres.; W6IF, v.p.; WD6FMP, secy.; WD6FKD, treas.; Lake Elsinore Valley ARC: KA6IXY, pres.; W6WPP, v.p.; W6WPP (XYL), secy/treas. Anaheim ARA: KD6DA, pres.; WD6RQT, v.p.; WA6UOO, rec. secy.; NM6X, corr. secy.; WA6WVJ; treas. 220 SMA: W6ABW, pres.; N6BVU, v.p.; K6KH, secy.; WB6YIZ, treas. Mt. Wilson RA: KA6OTX, pres.; WA6HBR, v.p.; KA6TAS, secy.; WB6WSE treas. ARA Long Beach: AK6Y, pres.; WA6MED, v.p.; WA6UBU, secy.; W6UPL, treas. N6AWF (with KK6V N6GDE N6ECA) is filing a law suit against Cerritos in Federal Court alleging, among other things, that its restrictive antenna ordinance violates his rights. He would like to hear from hams that could give support; their attorney is K6JAN. Local instructors interested in developing new licensing test questions for ARRL are asked to contact W6DDB. W6DFG and WA6DXJ operate a swap net on 7265 kHz at noon Sat & Sun. WestCoast ARC is now sponsoring a T-hunt the 1st Sunday of the month at 1 P.M. starting at Mile Sq Park (recreation center) in Fountain Valley beginning May 1st at their annual picnic. Traffic: W6NTN 278, WB6OBZ 176, AI6E 134, N6GIW 110, N6GOT 101, WA6QCA 75, K6XI 65, KA6BNW 61, KA6HJK 25, W6RE 24, W6CPB 16, W6PNS 16, K6ZCE 13, WA6WZO 6, KA6WSI 5, WB6LQL 1. (Dec.) N6GIW 622, WB6QBZ 586, WA6QCA 219, N6GDT 135, W6TKV 17, W6DXL 14, WB6LAR 4.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. ARC of El Cajon presented N6CQW with "Ham of the Year" award. Club officers for 1983: QCWA - K6ACY pres.; K6UV, v.p.; W6OSD, secy; N6LY, treas. ARC El Cajon - WB6VSL, pres., W6RHV, v.p.; KA6YIB, secy.; WA6MHZ, treas. Palomar ARC - N6DYO, pres.; N6GZI, v.p.; WB6TBQ, secy.; W6OLQ treas. No Shores ARC - N6ART, pres.; WB6HPJ, v.p.; WA6FOJ, secy.; KA6UCD, treas. Escondido ARS - N6CLO, pres.; W6OLQ, v.p.; N6HSZ, secy.; WB6BTM, treas. Regular traffic handlers are eligible for Official Relay Stn appointment. Contact STM N6GW (222-5575) for application. Upgrades: KA6QOQ to Gen (now N6HHU); KA6IDX to Adv (now KF6KE). New ARES members: N6BLQ N6FHP KF6KE W6NFG WB6NVE. City of San Diego and Red Cross were supported by 33 ARES members during storm/flooding in late Jan and early Feb. Public service: March of Dimes 10k run (Convair Club), Spl Olympics Floor Hockey (2-mtr and 70-cm ARES nets - a first for the 70-cm operators.) Recruiting underway for Red Flag Patrol (Calif. Dept of Forestry). Contact W6INI, 273-1120, if interested. Note: reports needed by 5th of each month. Traffic: KT6A 428, KM6I 290, K6HAP 165, KU6D 133, KB6AI 94, N6AT 22, WA6IIK 10. (Dec.) N6NR 178.

SANTA BARBARA: SM, Robert N. Dyruff, W6POU — New Special Service Club status being considered by Satellite and Conejo Valley clubs. Calif. quake disaster planning sees need for wide-area ham comms. Statewide strike teams proposed to join medical, SAR units on callup. Calif. ARES/RACES planning will week input from all sctns. Focus: AE6N (SW Div), N6DRT (Pac. Div.). Heaviest rains in quarter century hit SBar Sctn. Ventura, SBar Cos. declared disaster areas from heavy surf, wind, fallen trees, long power outages. 15 Vent. Co. ARES ops provided shelter, damage assmnt comms over 3 days. SLO Co. EC W6MSG lost 7 vhf/uhf ants & 2 towers. Schedules 2 SETs. Simi Valley XMAS parade comms led by WD6EBY plus 6 ops; SBar Milpas Xmas parade comms by N6CJL plus 8 ops. SBar So. Co. ARES added S&R pager for mutual aid callup. N7DKV recd blood from Paso Robles hams for surgery. SBAR No. Co. EC named Ham of 1982 by Satellite ARC. Five wpm on 10 mtrs Mon nites 2000PT via K6QYL & SBARC Boys Club stn K6TZ/6. S.W. Div. 160M ARES net in 5th year Suns. 1100PDT 1945 kHz - W6TET-NM San Diego. Reg. SBar sctn ops incl: W6WBY W6JEO W6GAW K6MXO W6POU. Contest rules issued by WB6DNN for SBARC inter-club. N6DHU sparked Conejo ARC sweepstakes competition. Condor RA 220 rptr adding sub-audible grunge limiter. Paso Robles ARC W6LKF/R on 2 mtrs. Estero Bay ARC begins upgrade classes. Traffic: K6YD 67, W6RIC 13. (Dec.) W6RIC 85.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC — ASM: WA5QFD. SEC: W5GPO. STM: W5VMP. NMs: K5UPN KA5LLT AA5J WD5JYI AE5I. Stormcom '83, the greatest public service seminar ever produced in our section, is now history. If you are involved in public service work in the ARES, RACES, NTS, Stormcom '84 is an event you will not want to miss! Assembled in one room were representatives from State, County, and City Government, the National Weather Service, the news media, and public safety officials, in full two-way dialogue with our ARES and RACES Leadership Officials from all over the State. Most impressive was the large turn-out of non-amateur local government officials seeking knowledge and expressing interest in our services. This meeting was truly a milestone in our effort of establishing our credibility, professionalism, and dedication in emergency preparedness with our served agencies. Our thanks to Dallas Co. ARES for their hard work on this most successful meeting. New officers for the Sabine Valley ARA (Greenville): K2SCU pres., WB5IZL, v.p.; WB5TVD, secy.; WD5FMP, treas. The club meets third Thurs. of each mo. The wx season is here — DECs and ECs should contact W5GPO or K5PC ASAP after a disaster in your area so the proper response of equipment and personnel can be made, and to avoid over-reaction. Our section emergency freqs. are 7290 (day) 3961 (night) and 3770 (cw). Traffic: KA5AZK 85, KD5FR 48, KC5NN 47, W9OYL 40, N5DKW 36, WB4HML 31, KB5UL 29, WB5LAT 15, K5HGX 13, K5PC 7, AJ5F 1.

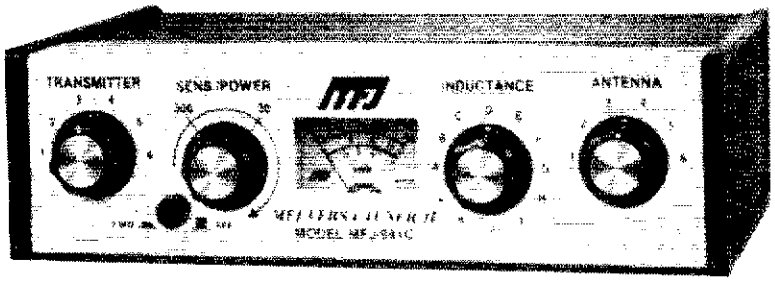
OKLAHOMA: A/SCM, Ray Miller, W5REC — ORS appts: KF5A W5ADC K5CAY K5OXP W5DRZ K5EA WB5EAY KB5EK WB5ELG W5FW W5HXL WD5IFB N9IN WA5JGU W5JJ WB5LSW WA5OUV WB5PVL W5RB W5REC W5SUG W5UYH W5VOR W5VXU KV5X WA5ZOO W5ZTN. New Asst. Directors are: WA5KBJ WA5OUV AD1S W5CCV and W5BLW. Congrats to W1GOM becoming the new OK Section Manager. NB5N working to get the TARC affiliated. I urge all to take his lead because no other single action will help the OK section more. KY5J and WB5ZQX announce the Osage Co. ARS will hold its swaptest in Pawhusa on 2 April. WB5AOH says RTTY Muskogee rptr on 146.145 with much activity. I wish there were better words, but — a heartfelt thanks to each of you for your support as I leave the office of Asst. SCM of OK. Traffic: KD5OE 371, K5CXP 287, W5AS 227, KA5CXW 168, W5RB 153, KV5X 135, KB5EK 127, W5REC 126, W5VXU 105, WA5OUV 65, WB5ELG 63, KB5XI 57, WD5IFB 45, WD5EAA 40, W5SUG 39, WA5ZOO 36, WB5EAY 27, WA5OGC 26, W5VLW 26,W5VOR 24, KD5GB 22, WD5JCE 22, N9IN 18, KC5OU 15, N5EO 13, K5CAY 12, W1GOM 6, WB5LSW 1. (Dec.) KA5CXW 214, W5FW 31.

SOUTHERN TEXAS: SM, Art Ross, W5KR — ASM/STM. N5TC. SEC: WA5RVT. K5PE also made 8PL for December 82, making a total of 10 for that month. ORS K5RG overhauled the Atlas 350 of the University of Houston ARC. ORS N5AF added LU3ZJ to his DX list. CAND Mgr W5KLV reports Southern Texas represented 100% by WB5YDD W5KLV N5AMH W5URN W5SHN N5DFO N5CRU and KD5KQ. ORS K5RVF says large crowd greeted new officers of Port Arthur ARC: KB5S7, pres; N5CFB, v.p.; KA5MEQ, secy/treas. DRN5 Mgr WB5YDD reports Southern Texas represented 100% by ND5C (ex-N5DAA), K5KJN W5TOP W5URN W5KLV W5SHN W5CTZ N5AMH WA5RVT KD5JX WB5MMI K5WOB WB5ATP KD5KQ N5CRU N5DFO W5VLT KD5DX and WB5YDD. OM/XYL team upgraded to Extra Class: EC KA5MEN new call is NE5H; XYL's old call, KA5MME, became NE5G. CONGRATULATIONS! The Brownsville rptr, WA5YXS/R, has autopatch working just great. EC N5AMH reports much work and good results working in Handi-Hams and Courage Hams; two-wheel chair Hams and one paraplegic among those helped by N5EFG. KA5IRU KC5CN W5ETA KZ5V and others; KA5IRU has prepared program tapes which are quite effective. EC N5AMH also reports much ARES activity; new county judge favors Amateur Radio, and has KY5G as Number 1 assistant in Civil Defense. Traffic: W5SHN 466, WB5YDD 390, W5CTZ 366, N5DFO 210, W5KLV 200, N5TC 106 N5AMH 60, N5CRU 56, ND5C 49, W5KR 41, K5OWK 40, KA5KRI 39, WA5RVT 36, W5BGE 24, WD5GKH 20, KD5GM 18, K5HZR 11, K5RG 10. (Dec.) K5PE 238, K5GM 230, N5AF 64.

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

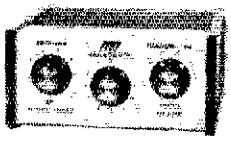
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-951, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

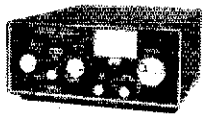
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf 6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al cabinet. Tilt bail.

To order or for your nearest dealer

master charge | CALL TOLL FREE 800-647-1800 | VISA

For tech. info., order or repair status, or calls outside continental U.S. and inside Miss., call 601-323-5869.

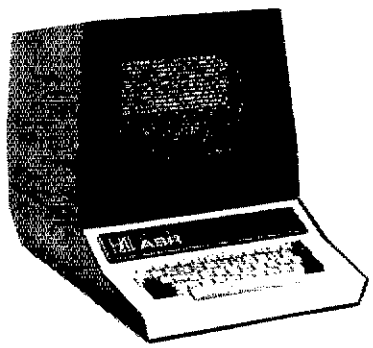
- **All MFJ products unconditionally guaranteed for one year (except as noted).**
- **Products ordered from MFJ are returnable within 30 days for full refund (less shipping).**
- **Add shipping & handling charges in amounts shown in parentheses.**

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED

Box 494, Mississippi State, MS 39762

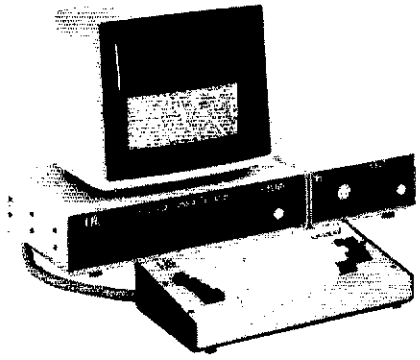
HAL - Check our Prices!



DSR-3100 ASR Communications terminal for reception and transmission of Baudot, ASCII & Morse. 15¼"h × 13½"w × 20½"d, 45 lbs. (Reg. $2195).. **Sale $1795**

DSR-3100 ASR/MPT-3100 Message processor terminal with message storage. (Reg. $2790).... **Sale $2290**

ST-6000 RTTY Demodulator/Keyer. Connects between transceiver and HAL DS-3100 ASR terminal or other radio teleprinter systems. Receives 170, 425, and 850 Hz shifts, oscilloscope tuning indicator, auto-start. Available with "High" or "low" tone sets. 3½"h × 17"w × 9"d, 12 lbs. (Regular $749)..... **Sale $659.95**

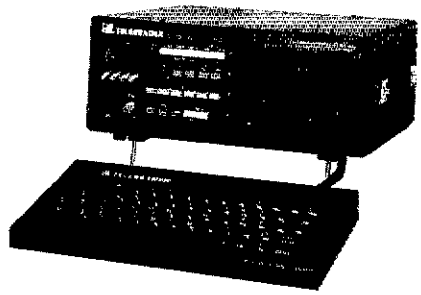


CT-2100 Receive-only Communications Terminal for Baudot, ASCII & Morse; or functions as a complete transmit & receive terminal w/optional keyboard & video monitor. Selectable high/low tones. 16¼"h × 3⅜"w × 10¼"d, 16 lbs. (Regular $845)..... **Sale $689.95**

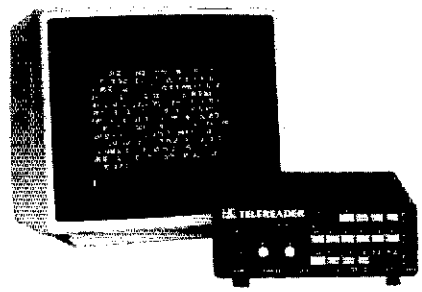
KB-2100 Dedicated keyboard for the CT-2100. 14"h × 2½"w × 7⅛"d, 4½ lbs. (Regular $175) .. **Sale $149.95**

RS-2100 1" RTTY tuning scope and loop supply. Shows standard crossed-ellipse tuning pattern. 3½"h × 8¼"w × 10⅛"d, wt. 9 lbs. (Regular $329)..... **Sale $289.95**

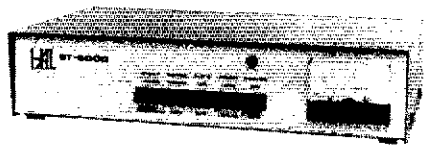
KG-12NU 12" monitor. P-31 Green phosphor CRT with removable smoked plastic screen cover. 11⅛"h × 12¼"w × 12"d, wt. 19 lbs. (Regular $200)..... **$169.95**



CWR-6850 Portable Telereader KSR Terminal for the reception & transmission of Baudot, ASCII & Morse. Selectable "High" or "Low" tones, built-in 5" green CRT; includes separate keyboard. 12-14.5V dc operation. 11¾"h × 12¾"w × 5"d, 16 lbs. (Keyboard) 7¾"h × 13¾"w × 7¼"d, 9 lbs. (Regular $995)..... **Sale $849.95**



CWR-6700 Compact Telereader RO Terminal for the reception of Baudot, ASCII & Morse. 12-14.5V dc operation. Shown with optional KG-12NU monitor. 2¼"h × 8"w × 12½"d, 5½ lbs. (Regular $495).. **Sale $429.95**



ST-5000 RTTY demodulator/keyer. Connects between transceiver and radio teleprinter systems. Receives 170 and 850 Hz shifts, auto-start, front panel tuning meter. Available with "High" or "low" tone sets. 2¼"h × 12"w × 8"d. 12 lbs. (Regular $249) ..... **Sale $224.95**

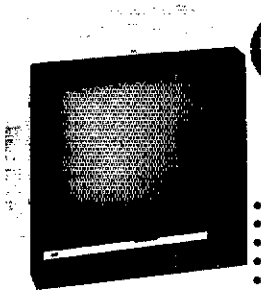
Not pictured:

DS-2050*KSR terminal (Reg. $649)..... Sale $569.95
MR-2000 CW rec. opt. (Reg. $159).... Sale 139.95
DS-2050* w/MR-2000 (Reg. $808) ..... Sale 699.95
* Specify "High" or "Low" tones.

Misc. accessories:

MSG-2100* Msg. storage ROM (CT-2100).... $25.00
RM-2100 Rack mounting kit (CT-2100)..... 25.00
*Special order
C-1* Cable set; DS-3100, ST-6000 to xcvr ... $50.00
C-2* Cable set; CT-2100, DS-2050, CWR-6850 25.00
*Special order - specify transceiver.

Call Paul Sirbinski at AES Milwaukee Headquarters for all of your HAL needs.



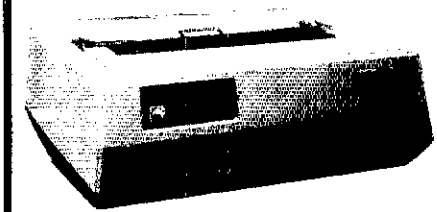
USI Computer Products

Pi-Series Video Monitors

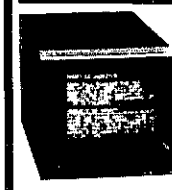
- 9" or 12" Diagonal
- Green or Amber Screen
- 80 Characters × 24 Lines
- 1000 Line Resolution
- 20MHz Horizontal B/W

The **Pi-Series** is design and plug compatible with most Amateur RTTY/CW Communication Terminals and small Business or Personal Computers. Easy-on-the eyes green or amber screen displays reduce eye strain - even after long periods of use. Clean, crisp character generation. 100-hour factory burn-in. **Metal cabinet.** 9" models are 8⅝"w × 8⅛"h × 9¼"d, 14.6 lbs; 12" models are 12⅝"w × 11⅞"h × 12"d, 23.3 lbs. 115vac-60Hz. The amber screen models have a video-invert switch.

Pi-1 9" Green Screen. (List $149)..... **Sale $119.95**
Pi-4 9" Amber Screen (List $215)..... **Sale $149.95**
Pi-2 12" Green Screen (List $210)..... **Sale $149.95**
Pi-3 12" Amber Screen (List $249)..... **Sale $179.95**



OKIDATA 82A Dot matrix printer. Hard-copy from DSR-3100, CT-2100, CWR-6850, CWR-6700. 14⅛"w × 5⅛"h × 12¾"d, 19¼ lbs. (Reg. $549) .. **Sale $459.95**
256 Buffer..... 130.00
2K Buffer 150.00
Parallel or serial interface cable (specify) 40.00
Fan-fold paper ..... case 34.95
Replacement ribbon..... 3.95



PANASONIC TR-930
Black & White TV Monitor for RTTY, SSTV, CCTV, computers, etc. 9" screen, 700 lines resolution. Video input 1.0V p-p, Hi-Z or 75 ohms. 9"h × 8¾"w × 9¾"d, 11¼ lbs. 120vac/60Hz. **Sale 159.95**

AES STORE HOURS

Mon. thru Fri. 9-5:30; Sat. 9-3

E-X-P-A-N-D-E-D WATS HOURS

Milwaukee **WATS** line **1-800-558-0411** answered evenings until 8:00 pm, Monday thru Thursday.

Please use WATS line for Placing Orders.
For other information, etc. please use Regular line.

MasterCard VISA

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

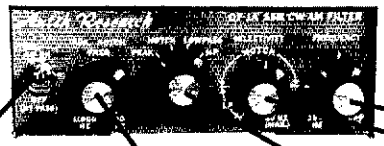
ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33515
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

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

THE AUTEK "QRM ELIMINATOR"



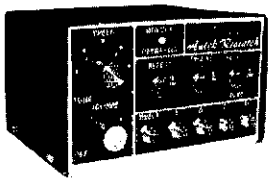
Model QF-1A For SSB & CW
$73.00 (Includes AC supply)

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 due to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp. Built-in 115 VAC supply. 6½x5x2½. 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!

WORLDS RECORD KEYER. OVER 4000 DX QSO'S IN 2 DAYS!



Model MK-1 Keyer $104.50

Probably the most popular "professional" contest keyer in use, yet most owners are casual CW operators or novices. After a few minutes, you'll see how memory revolutionizes your CW operation! Just start sending and record your CQ, name, QTH, etc. in seconds. 1024 bits stores about 100 characters (letters, numbers). Playback at any speed. Dot/dash memories, triggered clock, repeat, combine, 5 to 50+ WPM, built-in monitor and 115 VAC supply. Works with any paddle. Sit back and relax while your MK-1 calls CQ and handles standard exchanges!

Optional memory expander (ME-1) expands any MK-1 to 400 characters. ME-1 factory installed $35. Owner installed, only $25. Add more memory now or later!

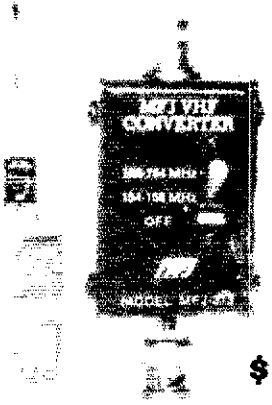
Autek Research
BOX 302 DEPT J
ODESSA, FLORIDA 33556 • (813) 920-4349

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.)

Hear Police/Fire Weather

on 2 Meter Handhelds with this MFJ VHF Converter.



Scanning Handhelds become Police/Fire Scanners

MFJ-313
$39.95

New MFJ VHF converter turns your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner.

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA weather, maritime coastal plus more on 160-164 MHz.

Mounts between handheld and rubber ducky.

Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls.

Highpass input filter and 2.5 GHz transistor gives excellent uniform sensitivity over both bands. Crystal controlled.

Bypass/OFF switch allows transmitting. Won't burn out if you transmit (up to 5 watts) with converter on. Low insertion SWR. Uses AAA battery. 2¼x1½x1½ in. BNC connectors.

Enjoy scanning, memory, digital readout, etc. as provided by your handheld on Police/Fire band.

220 MHz Converter for 2 M Handheld

MFJ-314 **$59.95**

MFJ-314, like MFJ-313 but lets you receive 221-225 MHz on your 2 meter handheld.

Police/Fire/Weather Band Converter for 2 Meter Mobile Rigs.

MFJ-312
$59.95

MFJ-312, like MFJ-313 but for mobile 2 meter rigs. Transmit up to 40 watts thru converter without damage. SO-239 connectors. Mobile mounting brackets. Rugged. "ON" LED. Use 12 VDC or AAA battery. 3x4x1 in.

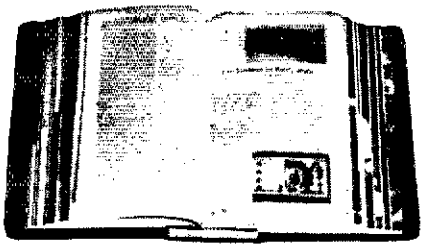
Order from MFJ and try it-no obligation. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for amount indicated plus $4.00 each shipping.

Hear police/fire/weather. Order now.

CALL TOLL FREE ... 800-647-1800
Call 601-323-5869 in Miss., outside continental USA, tech/order/repair info. Telex 53-4590.

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762



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: $6.00. Binder for QST beginning with the January, 1976 issue: $7.00. Available in the U.S. Possessions and Canada.

AMERICAN RADIO RELAY LEAGUE
225 Main Street
Newington, CT 06111

FM and REPEATERS

Whatever your interest in fm — repeaters, amplifiers, transmitters, receivers, mobile and portable gear, antennas or accessories — you'll find it covered in detail in the 2nd Edition of this popular book. Includes repeater design, operation, control, and troubleshooting. Also has tips on buying gear as well as projects you can build yourself. Copyright 1978, 175 pages. **$5.00** U.S., **$5.50** elsewhere. In U.S. funds.

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST.
NEWINGTON, CT 06111

TEN-TEC, ICOM, YAESU
Special Pricing
Delaware Amateur Supply
800-441-7008

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. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(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" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*. If the 20th falls on a Sunday, the Ham-ad deadline is the previous Friday.

(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 permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and 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 character of their products and services. Individual advertisers are not subject to scrutiny.

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.

CQ and QST 1950-1982 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues, all other 30 cents each including USA shipping. Send SASE, chronological order and payment to W6LS, 2814 Empire Avenue, Burbank, CA 91504. Available issues and refund sent within one month.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a nonprofit 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 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. Box AA, Mamaroneck, NY 10543 for details.

FOX-TANGO Club Newsletters for Yaesu Owners. Back issue (1980/1981) looseleaf sets $6 each, both for $10 while they last. Fox Tango Club, Box 15744, W. Palm Beach, FL 33416.

YAESU Owners — Join your International Fox-Tango Club — now in its twelfth year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out — get top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325 MHz), more. 1982 or 1983 sets $8 each; both $15. Send dues to FT Club, Box 15944, W. Palm Beach, FL 33416.

W.A.R.A. Warren, Ohio Hamfest has been set for August 21, 1983.

ROCHESTER Hamfest - Atlantic Division/New York State Convention Saturday, May 21, Monroe County Fairgrounds. Hotel headquarters, Rochester Marriott Thruway. More info? Write or call Rochester Hamfest, 300 White Spruce Blvd., Rochester, NY 14623 716-424-7184.

ARRL ILLINOIS State Convention and Starved Rock Radio Club Hamfest, June 5, Princeton, IL. Help us celebrate 50 years in Ham Radio. SASE for information. Write W9MKS, R.R. #1, Oglesby, IL 61348. Fone 815-667-4614.

ANNUAL Evansville TARS Hamfest May 15, 1983, Vanderburgh County 4H Fairgrounds. Open at 6 AM CDT. All indoor-inside and outside flea market. Admission $2, indoor tables $5, outdoor flea market $1.50. Talk-in on 147.75/.15 and 146.19/.79. For table reservations and information, contact Hal Wilson, WB9FNN, R.R. 8, box 427B, Evansville, IN 47711.

THE WABASH County Amateur Radio Club will hold its 15th annual Hamfest at the Wabash County 4-H Fairgrounds, Wabash, IN on May 15, 1983. Doors will open at 5 AM, and close at 3PM. Free overnight camping. For more info send SASE to Dave Spangler 45 Grant St., Wabash, IN 46992. N9ADO.

DENISON ARC will sponsor its annual Flea Market in Deloit, IA May 22, 1983. For more information contact NØDQS 712-263-4782.

ILLINOIS: The 22nd annual Moultrie MARK Hamtest will be held April 17, at the Moultrie County 4-H Center Fairgrounds, on Cadwell Rd., 5 miles east of Sullivan. Heated indoor and large covered outdoor flea market. No charge to vendors. Space on a first-come, first-served basis. Talk-in on 146.520 and 146.655/055. For more information, write Roger Rice, WA9OWY, 617 W. State, Charleston, IL 61920, or call 217-345-9501.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cars, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill, NY 12198.

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.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

QSLs with class! Unbeatable quality, reasonable price. Samples $1 refundable. QSLs Unlimited, P.O. Box 27553, Atlanta, Georgia 30327.

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.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

QSL samples — 25¢ Samcards - 48 Monte Carlo Dr., Pittsburgh, PA 15239.

QSL ECONOMY: 1000 for $13. s.a.s.e. for samples. W4TG, Drawer F, Gray, GA 31032.

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.

CADILLAC of QSLs — Completely different! Samples $1 (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs — We feature: (a) The KØAAB collection. (b) Custom designs for railroad employees and railfans. (c) Front side report styles. Specify which samples you want. Please send a self-addressed business size envelope with 37¢ postage attached. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From $240. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, NY 11778 516-744-6260.

QSLS. Quality and fast service for 23 years. Include call for free decal. Samples 50¢. Ray, K7HLR, Box 331, Clearfield, UT 84015.

3-D QSLs - Increased returns assure users' satisfaction. Samples 25¢. 3-D QSL Co. P.O. Box D, Bondsville, MA 01009.

QSLs - Variety, value, quality, custom. Samples & catalog 60¢. Alkanprint, Box 3494, Scottsdale, AZ 85257.

COLORFUL QSL's including Day-Glows and Woodgrains. Samples 50¢. (Refundable with order.) Specialty Printing, Box 361, Duquesne, PA 15110.

QSLs, Catalog 50¢ N&S Print, 2523 West Orangewood Avenue, Phoenix, AZ 85021.

QSL Cards by reliable company with 17 years experience. Amateur QSL Cards (Standard Designs and Design-your-own). Also available are our own-designed State Cards. Top quality, reasonable prices. Free catalog and samples. Write: Mail Order Expess, Inc. P.O. Box 703, Lexington, NC 27292.

QSLs by W6BA "customized" $19.75 per 1000. Star Route 2, Box 241, 29 Palms, CA 92277.

LOW COST QSLs samples s.a.s.e. Koepke, 6 Katherine Road, Albany, NY 12205.

NEW KID on block — for QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing, instructions included. Stamp appreciated.

PICTURE QSL cards of your shack etc. from your photograph or black ink art work. 500 $21, 1000 $29.50. Send stamp for illustrated literature. Generous sample pack $1; half pound of samples $2. Custom printed cards, send specifications for estimate. Raum's 4154 Fifth Street, Philadelphia, PA 19140. Phone; 1-215-228-5460.

QUALITY QSLs from $19.95/1000 ppd 48 states. All types. Discounts 5K or more. See ad-page 203-Nov. QST. Legal 40¢ SASE or 50c brings samples. DX-Print, N5CMI, Box 272, Plano, TX 75074.

Introducing The SRT-3000 A High Performance RTTY Communications Send-Receive Terminal

SRT-3000
List Price $ 995.00

• Built-in demodulator & AFSK modulator for 170,425,850 Hz shifts, high and low tone pairs • 60,66,75,100,132 WPM Baudot, 110,300 Baud ASCII, 5-99 WPM Morse • 1000 character text buffer with BREAK feature • Ten 80 character message memories with battery backup • Selectable display formats, 24 lines x 72 characters (2 pages), 24 lines x 36 characters (4 pages), 16 lines x 36 characters (6 pages) • Split screen operation • On screen status line displays a tuning bar, mode, speed, shift, tone pair, normal/reverse, USOS, WRU, SELCAL, buffer mode and buffer count • Cassette interface for long "Brag Tapes" or unattended message storage • Baudot and ASCII printer outputs • Built-in audio monitor • Built-in 110 VAC power supply • Other features—PTT control, WRU, SELCAL, sync idle, CW ID, USOS, autostart, full or half duplex, scope outputs, weight control, intercharacter spacing, reverse video, RS-232, word wrap around • Compact size only 13.3 x 10.3 x 4 inches • Made in USA.

Send For Free Information

DGM ELECTRONICS, INC.

Optional 9" video monitor shown $149.00

787 BRIAR LANE, BELOIT, WISCONSIN 53511 (608) 362-0410

FAST SCAN ATV

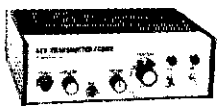
VISA

P.C. ELECTRONICS
Maryann WB6YSS
2522 PAXSON
ARCADIA, CA 91006
Tom W6ORG

master charge

WHY GET ON FAST SCAN ATV?

- You can send live action broadcast quality color pictures from cameras, video tapes, computers, etc. at a cost less than slowscan.
- Video really improves public service communications for parades, RACES, CAP, weather watch, etc.
- DX is about the same as 2 meter simplex. 15 to 100 miles.



ALL IN ONE BOX!

TC-1 Transmitter/Converter
Plug in camera, ant, mic, tv set, and you are on the air ..... **$399ppd.**

For more info call **(213) 447-4565**

PUT YOUR OWN SYSTEM TOGETHER!

TVC-2 DOWNCONVERTER tunes 420-450 mHz to ch 2 or 3 ..... **$55ppd.**
TXA5 EXCITER/MODULATOR ..... **$89ppd.**
PA5 10 WATT LINEAR ..... **$89ppd.**
FMA5 Audio Subcarrier ..... **$29ppd.**
ALL FOUR SPECIAL ..... **$249ppd.**

SEND S.A.S.E. FOR OUR CATALOG, WE HAVE IT ALL!

We are a full line supplier of ATV gear. Over 20 years in ATV. We have modules for the builder, complete units for the operators, antennas, repeaters, cameras, linears, and special affects.
SEE CH. 14 1982 ARRL HANDBOOK.

EIMAC 3-500Z's

• Very limited quantity •

$170 PAIR
CASH, MO, COD
Add $5 shipping/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

ALL BAND TRAP ANTENNAS!

PRETUNED - 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!

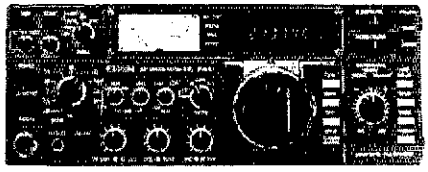
COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6"- you just switch to band desired for excellent worldwide 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!

80-40-20-15-10-6 meter - 2 trap --- 104 ft. with 90 ft. RG58U - connector - Model 998BUC . . . $89.95
40-20-15-10 meter --- 2 trap --- 54 ft. with 90 ft. RG58U - connector - Model 1001BUC $88.95
20-15-10 meter --- 2 trap --- 26ft. with 90 ft. RG58U - connector - Model 1007BUC. $87.95

SEND FULL PRICE FOR POSTPAID INSURED. DEL. IN USA. (Canada is $5.00 extra for postage - clerical - customs etc) or order using VISA - MASTER CARD - AMER. EXPRESS. Give number and ex. date. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ALL PRICES MAY INCREASE . . SAVE - ORDER NOW! 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-4 Kearney, Nebraska, 68847

ICOM - Check the Big Savings at AES!

HF Transceivers:	Regular	SALE
IC-730 8-band 200w PEP Xcvr w/mic	$829.00	649.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
HM-10 Mobile scan microphone	39.50	



$50 FACTORY REBATE

on IC-740 extended until April 30, 1983

	Regular	SALE
IC-740 9-band 200w PEP Xcvr	$1099.00	949.95
PS-740 Internal power supply	159.00	149.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 9 MHz 500 Hz CW filter	59.50	
FL-54 9 MHz 270 Hz CW filter	47.50	
FL-52 455 KHz 500 Hz CW filter	96.50	89.95
FL-53 455 KHz 250 Hz CW filter	96.50	89.95
MB-12 Mobile mount	19.50	
HM-10 Mobile scan microphone	39.50	
IC-720A 9-band Xcvr/.1-30 MHz Rcvr	$1349.00	1099
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 KHz AM filter	49.50	
MB-5 Mobile mount	19.50	
IC-7072 transceiver unit, 720A/R-70	112.50	
Common accessories; 720/730/740	**Regular**	**SALE**
PS-15 External 20A power supply	$149.00	134.95
EX-144 Adaptor; CF-1/PS-15	6.50	
CF-1 Cooling fan for PS-15	45.00	
PS-20 20A switching ps w/speaker	229.00	199.95
CC-1 Adaptor; HF radio to PS-20	10.00	
CF-1 Cooling fan for PS-20	45.00	
SM-5 8-pin electret desk mic	39.00	
SP-3 External speaker	49.50	
Speaker/phone patch (specify radio)	139.00	129.95
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile ant w/tuner	289.00	259.95
HF Linear Amplifier	**Regular**	**SALE**
IC-2KL 160-15m/WARC solid state linear	1795.00	1299

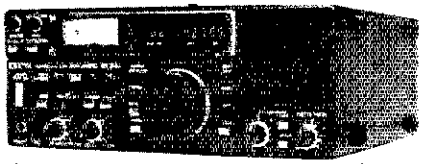
Please use WATS line for Placing Orders.
For other information, etc. please use Regular line.

IC-251A • $50 REBATE

Low AES Price + $$ back from ICOM

Hurry! - offer ends May 31st, 1983

VHF/UHF Multi-modes:	Regular	SALE
IC-251A 2m FM/SSB/CW Xcvr/AC ps	$749.00	599.95
IC-551D 80w 6m Xcvr	699.00	599.95
PS-20 20A switching ps/spkr	229.00	199.95
CF-1 Cooling fan for PS-20	45.00	
EX-106 FM adaptor	125.00	112.95
IC-451A 430-440 SSB/FM/CW Xcvr/ps	899.00	769.95
IC-451A/High440-450 MHz Xcvr/ps	899.00	769.95
AG-1 .15 db preamp for IC-451A	89.00	79.95
IC-290H 25w 2m SSB/FM Xcvr, TTP mic	549.00	489.95
IC-560 10w 6m SSB/FM/CW Xcvr	489.00	439.95
IC-490A 10w 430-440 SSB/FM/CW Xcvr	649.00	579.95
VHF/UHF FM:	**Regular**	**SALE**
IC-25A 2m, 25w, up-dn-ttp mic, grn leds	$359.00	319.95
IC-25H as above, but 45 watts	389.00	349.95
IC-25A '82 model; 25w, ttp mic, red leds	349.00	289.95
IC-45A 440 FM xcvr, 10w, TTP mic	399.00	359.95
IC-22U 10w 2m FM non-digital Xcvr	299.00	249.95
EX-199 Remote frequency selector	35.00	
VHF/UHF Portables:	**Regular**	**SALE**
IC-202S 2m port. SSB Xcvr, 3w PEP	$279.00	249.95
IC-505 3/10w 6m port. SSB/CW Xcvr	449.00	399.95
BP-10 Internal nicad battery pack	79.50	
BC-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
IC-402 432 port. SSB Xcvr, 3w PEP	389.00	299.95
IC-3PS Power supply	95.00	89.95
IC-20L 2m amp, 10w PEP or FM	98.00	89.95
IC-30L 432 amp, 10w PEP/FM	105.00	94.95



Shortwave receiver:	Regular	SALE
R-70 100KHz-30MHz digital receiver	$749.00	649.95
EX-257 FM unit	38.00	
FL-44 455 KHz SSB filter	159.00	129.95
FL-63 9 MHz 250 Hz CW filter	48.50	
SP-3 External speaker	49.50	
EX-299 (CK-70) 12V option	9.95	

AES STORE HOURS

Mon. thru Fri. 9-5:30; Sat. 9-3

E-X-P-A-N-D-E-D WATS HOURS

Milwaukee **WATS** line 1-800-558-0411 answered evenings until 8:00 pm, Monday thru Thursday.

ICOM Handhelds

The Transceivers. The IC-2A features full coverage of the 2 meter ham band. The IC-3A covers 220 to 224.99 Mhz, and the IC-4A, 440 to 449.995 Mhz. Each comes with BP-3 rechargable battery, AC wall charger, flex antenna, earphone, wrist strap, and belt clip. Accessories are interchangable. Slide on, removable battery pack allows quick change and may be charged while removed from transceiver.

2 meters:	Regular	SALE
IC-2A .15/1.5w 2m HT/batt/wall cgr	$ 239.50	214.95
IC-2AT .15/1.5w 2m HT/batt/cgr/TTP	269.50	219.95
220 MHz:		
IC-3A 220 HT/batt/wall cgr	269.95	229.95
IC-3AT .15/1.5w 220 HT/batt/cgr/TTP	299.95	239.95
440 MHz:		
IC-4A .15/1.5w 440 HT/batt/wall cgr	269.95	229.95
IC-4AT .15/1.5w 440 HT/batt/cgr/TTP	299.95	239.95

Hand-held Accessories:	Regular
BC-25U Extra 15-hour wall charger	$10.00
BC-30 1/15-hour drop-in charger for BP-2/3/5	69.00
BP-2* 450 ma, 7.2v 1w extended time battery	39.50
BP-3 Extra standard 250ma 8.4v 1.5w battery	29.50
BP-4 Alkaline battery case	12.50
BP-5* 450 ma, 10.8v 2.3w high power battery	49.50
**BC-30 required to charge BP-2 & BP-5*	
FA-2 Extra 2m flexible antenna	10.00
CA-2 Telescoping ¼-wave 2m antenna	10.00
CA-5 ⅝-wave telescoping 2m antenna	18.95
CA-3 Extra 220 flexible antenna	9.12
CA-4 Extra 440 flexible antenna	9.12
CP-1 Cigarette lighter receptacle charger for BP-3	9.50
DC-1 DC operation module	17.50
HM-9 Speaker/microphone	34.50
LC-2A Leather case without TTP cutout	34.95
LC-2AT Leather case with TTP cutout	34.95
ML-1 2m 2.3/10w HT amplifier (Reg. $89)	SALE 79.95
ML-25 2m 20w HT amplifier (Reg. $199.50)	SALE 179.95
Marine band:	
IC-M12 12 ch Marine hand-held	SPECIAL $199.95

Misc. accessories:	
24-PP 24-pin accessory plug	$ 4.00
BC-10 Memory back-up; 551/720/730/740	8.50
BC-20 Nicads & DC-DC charger for portables	57.50
BU-1 Memory back-up; 25A/290A/490A	38.50
EX-2 Relay box w/marker; 720A/730/701	34.00
HM-3 Deluxe mobile microphone (specify radio)	17.50
HM-5 Noise canx mobile microphone, 4 pin	34.50
HM-7 Amplified mobile microphone, 8 pin	29.00
HM-8 Touch-tone mic; 255A/260A, 8 pin	49.50
HM-10 Scan mic.; 255A/260A/290A/25A	39.50
HM-11 Scan mic.; 490/25A/290A	39.50
HM-14 Scanning/TTP mic; IC-25A/45A	38.50
SM-2 4-pin electret desk microphone; 551D	39.00
SM-5 pin electret desk mic.; 251A/451A	39.00
HP-1 Headphones	34.50
Mobile mount (specify radio)	19.50

MasterCard VISA

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 - Phone (414) 442-4200

AES BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

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

WANTED — old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

MIRROR -in-the-lid, spinning disc, and other pre-1946 T.V. sets, parts, literature wanted for substantial cash. Finder's fee paid. Arnold Chase, WA1RYZ, 9 Rushleigh Road, West Hartford, CT 06117 203-521-5280 (collect o.k.).

MANUALS for most ham gear made 1937/70. Sorry no individual quotes given. Our current, 18 page, 'Manual Catalog' requied to order, $1 postpaid. HI-Manuals, Box C-802, Council Bluffs, IA 51502-0802.

KNOW FIRST! Ham radio fanatics. You need The W5YI Report,- twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts! Quoted coast-to-coast! We print what you don't get elsewhere! $18. annually w/money back guarantee! Free sample - S.A.S.E. (two stamps) W5YI; Box #10101-Q, Dallas, TX 75207.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

BUY AMERICAN — New - Drake TR7-$1195 R7 - $1295. Limited quantities. Accessory IF filters - $45. each installed. Organs and Electronics, Box 117, Lockport, IL 60441 815-838-1580.

ANTIQUE Marconi and other radio and wireless sets and parts wanted. Immedite cash. Weingarten, 67-61 Alderton St., Flushing, NY 11374. 212-896-3545.

ATLAS RADIO Repair Service — specializing in the 180, 210,* & 215-Ninety-day Written Guarantee — parts & labor. A.R.R.S.,, 1320 Grand, San Marcos, CA 92069. 619-744-0720.

THE DX Bulletin weekly newsletter; large SASE for samples. P.O. Box 873, Vernon, CT 06066.

ELECTRON tubes; Current and hard to find types. Special purpose, transmitting, receiving and cathode ray tubes. Send addressed stamped envelope for our free list. Rutan Electronic Sales Co., 166 5th Ave., New York NY 10010.

TRANSCEIVE with your scanner! 2m-70cm. Low cost add-on! Free info, SASE to W6GVC Apt. "O", 720 County Center Drive, Visalia, CA 93277.

TRS-80 Amateur Radio Software for Model I/III. Free color catalog. SASE to Micro-80, 2665 Busby, Oak Harbor, WA 98277.

WANTED: Callbooks, Handbooks before WW2. State condition and year. Write for my offer. Joe, WB6DQJ, Box 5333, Walnut Creek, CA 94596.

WANTED: Drake R7, pre-1950 TV sets and old TV Guides. W3CRM, Box 90-Q, Rockville, MD 20850. 301-654-1876.

CONTESTERS - Superior TRS-80 logging/duping/scoring package. $69.95/contest. SASE W1RM, Box 1188, Burlington, CT 06013.

RTTY program for Superboard II microcomputer $65. Free Details KH6AKW, 99-060 Lohea, Aiea, HI 96701.

"CW IS EASY" — our cassettes combine FCC style QSO's and tests with tough random code. "System Extra" - $6.50, "System General - $12.25, "System Novice" — $6.50 postpaid. Lance Johnson Engineering, Box 7363, K.C., MO 64116.

TENNATEST - Antenna noise bridge - outperforms others - accurate - costs less - $41 - Send stamp for details. W8URR, 1025 Wildwood Road, Quincy, MI 49082.

FAST professional ham repair. N.Y.C. area. All major brands. Commercial FCC Lic. #P2-2-33167. Amateur Extra. In business 7 years, on the air since 1965. Rich Tashner N2EO 212-352-1397.

FREE ad with subscription. Buy-Sell-Trade. One year $4, two years $7. WA4OSR's Rigs + Stuff, Box 973-Q, Mobile, AL 36601.

QUADS *dB QUADS* 2, 3 & 4 elements, complete kits, fibreglass spreaders, components, wire. 3 First Class stamps for complete brochure. db + Enterprises, Box 24, Pine Valley, NY 14872.

BUGS and keys wanted. Looking for Morse and CW items for collection. Any landline, wireless, shipboard or misc. Morse code items wanted. K7EA Bill Bradford, 3891 Seagull Drive, Salt Lake City, UT 84120.

BUY-SELL-TRADE - 6 issues $2. WA4OSR's Rigs + Stuff, Box 973-Q, Mobile, AL 36601.

CONTESTS? Work them from Costa Rica. Details W4ZD.

DXPEDITION? Costa Rica. Home, antennas all bands. Write W4ZD.

NEW solar electric panels, batteries, components. Send for information. Non-profit. Specs Inc., Box 155 Montrose CA 91020.

WANTED: old glass antenna insulators for collection. Also history, info. What say oldtimers? Jim Singleton, K2IRO, 77 Cochrane St., Melrose, MA 02176. 617-662-2128.

AMATEUR RADIO Today, A mini-Magazine offering timely material on a professional basis for all active Radio Amateurs. A.R.T. is six pages produced bi-weekly on premium sotck using magazine techniques. Money back guarantee for your $26/yr subscription or a quarterly trial (six issues) for $5. Product reviews, contests, propagation, technical topics and much more! Send to Amateur Radio Today, 221 Long Swamp Road, Wolcott, CT 06716.

WANTED Collins parts for 30S1, also 8877 & 4CX1000 tube K4NBN "No Bad News".

WANTED: Drake T-4XC, AC-4 MS-4.W3CRH, Box 90, Rockville, MD 20850. 301-654-1876.

MUST sacrifice to highest bidder all my ham gear: New Yaesu FT100, Bandit 2000C, HW100, Tentec Triton II, Yaesu FL2100 linear, H2170, SB102, 6, 600V 3kW xformers etc. W6BPL, Jerry Lorentz, 2120 Green Meadows Way, Ashland, OR 97520.

HYGAIN towers: HG-54HD, $1395. HG-70HD, $2169. Others, antenna/tower/rotor packages — write! Tower base and shipping included! Lowest prices! K4VUD/5, Harpole's Tall Towers, 6005 Rainier, Plano, TX 75023.

FOR SALE: Ohio Scientific CIP computer, cassette player, monitor, CW, RTTY software. $350 or will trade for general coverage receiver KI8L 419-325-2757 after 5:30 P EST.

CLIPPERTON-L with 10 meters, extra set of new finals $499 plus shipping K5XI, 713-266-4719.

COLLINS, 75-S 3-B round $450, 32-S-3 winged with 516F-2 $550, 312 B-4 $175, Crystal Pack $175. 30 L-1 $525, DD1C $75, Hal ST-6000, DS-3000 $850, Kenwood TS-700 $400, TS-600 $450 Cushcraft 2M + 432 Twist on Rohn short top with 2 rotors $175, Model 33 KSR $125 MN-2000 $175 - all mint. K1KHE 617-698-0263.

HW-8 Mods: Reprints of the HW-8 series from CQ: Test Report and two-part modifications series, plus miscellaneous improvements. Proceeds support Milliwatt DXCC QRP trophy program. $7. Ade Weiss, W0RSP, 83 Suburban Estates, Vermillion, SD 57069.

COMPLETE Rig For Sale: TS520 (CW filter & Panadaptor), SM-220 Station Monitor, SB-221 2 kW linear, Tempo K6FZ mini-tribander, C-D rotator, HD-15 phonepatch, Shure 444 — cables and manuals $1250 for all. WV6QJW 213-973-0255 Bill Carson.

WANTED: FT-225RD or TS-700SP clean good working condition. Cash details and phone number first letter W7HZJ Charles Gray, Box 611 Route 1, Sierra Vista AZ 85635.

SELL TS-700-A mic and cables like new $350 plus UPS SB-110A HP-23 clean good working condition, spare tubes $250 plus UPS write W7HZJ Charles Gray Box 611 Route 1 Sierra Vista AZ 85635.

'83 CALLBOOKS US $19 DX $18 Both $35 ppd W9JVF 1147 N. Emerson Indianapolis, IN 46219.

WANTED: aluminum tower sections K4XS, 813-842-7315.

HAM RADIO Repair: Collins, Drake, Galaxy, Swan specialists. "Grid", W4GJO, Route 2, Box 138-B, Rising Fawn, GA 30738.

WANTED — E.F. Johnson equipment in mint and unmodified condition. Such as Five Hundred, 6N2 Thunderbolt, Courier and others. Also speaker 270G-3 for Collins 75A4. K4VUQ 191 Kentucky Ave. Lexington, KY 40502.

DRAKE, T4X, R4C, AC-4, $550; DSR-2 continuous coverage commercial receiver, $1100. K2KGF - will ship.

FOR SALE: Kenwood VFO-520, $100. Kantronics FD-2 CW, RTTY, ASCII reader, $250. MFJ 496 Super Keyboard with AFSK, $200. N6EGY 805-964-8340.

WANTED: HyGain HDR300, TH6DXX to TH7DX conversion kit. Heath SA5010 kever, Yaesu YO301 scope W2UGM, 66 Columbus Ave., Closter, NJ 07624 201-767-0123.

KEYER kits, lambic, dot/dash memory, CMOS, $15 up. SASE for information. MSC, 1304 Toney Drive, Huntsville, AL 35802.

THANKS to the 75 who replied to my ad for 800 series tubes for living room display. Special thanks to those who sent free tubes. You've made this rewarding and challenging. Now have 42 types. Will I get all 100? Still need 804, 806, 817-825, 827, 828, 831, 833-835, 839-841, 844-859, 862-865, 867-871, 873, 875, 878, 880-883, 886-899. Also need sockets, especially for 833, 849, 861, etc. John Clements, 7310 Ensign, Sun Valley, CA 91352.

MULTI-BAND antenna — KT5B — 160M thru 10M (WARC) only $59.95 details Kilo-Tec PO Box 1001 - Oak View, CA 93022, call 805-646-9645.

MORTTY is an astounding Heath H8/H89/Z89 communications program — RTTY, telephone, ASCII or Baudot at any speed. Morse ID, split screen, type ahead, key-string detect, autoanswer, adaptability, many options $100. MORTTY, 3707 Blanche, Cleveland, OH 44118.

HUSTLER Antennas - special offer - request catalogue. Action Supply Inc. Dept. Q, 1122 East Hays, Boise, ID 83702.

WANTED-Hammarlund HQ-160, Layfayette HA-230 or HA-225 KB@W, 916-272-7203 days.

COMPUTER OWNERS: At Last! CW/RTTY send/receive software by RAK Electronics for VIC 20. CW send/receive for Atari 400/800, Commodore 64, PET 2000/4000. Complete with schematic for simple homebrew interfaces, instructions and I/O connector. Will work with popular commercial interfaces, also. CW $19.95, RTTY (VIC 20) $24.95, both $39.95. Check, Visa/MC, C.O.D. SASE for information on these and many other cassette programs for games, education, home, Ham Radio! Amateur Accessories, 6 Harvest Ct. RD7, Dept. Q, Flemington, NJ 08822 201-782-1551 best after 6 P.M. EST.

YAESU FT-One general coverage, every option, scanner microphone. List $3700 asking $2250. Yaesu FL2100Z 80-10 meter linear $350. Dentron MT2000A 3kW tuner $200. N6ABE Will 415-881-5429 anytime.

LARSEN ANTENNAS TRAVEL IN THE FAST LANE.

Race car communications demand the best from an antenna under some of the worst conditions. Split second decisions require reliable signals at exceptionally high speeds. That's why Larsen Antennas are used on race cars at the Indy 500. Because Larsen Antennas are designed to take high speed with minimal signal distortion. Proving they can travel in the fast lane without putting a drag on their performance. Larsen's precision tapered stainless steel whip provides maximum flexibility while minimizing radiation pattern distortion, giving you a clear consistent signal. And Larsen's exclusive Külrod® plating, gives your antenna high conductivity to assure that maximum power goes into communicating — not heat.

That full measure of performance goes into our product integrity too. With a no nonsense warranty that won't slow you down.

So, whether you're following the racing circuit or a local rescue effort, you'll find Larsen Antennas will keep you ahead of the situation with dependable performance. Ask your favorite Amateur dealer to demonstrate how you can hear the difference with Larsen Antennas. Write for our free Amateur catalog.

Larsen Antennas

IN USA: Larsen Electronics, Inc.
11611 N.E. 50th Avenue P.O. Box 1799 Vancouver, WA 98668 Phone: 206-573-2722

IN CANADA: Canadian Larsen Electronics, Ltd.
283 E. 11th Avenue, Unit 101
Vancouver, B.C. V5T 2C4 Phone 604-872-8517

Külrod® is a registered trademark of Larsen Electronics, Inc. in U.S.A. and Canada.

WEATHER facsimile recorder RJ4 $250 plus shipping Chuck, KA8CKB 513-426-0984.

IC-701, PS, SM2, EXT-1, MT-3000A tuner, Kantronics Signal Enforcer audio filter. All excellent $950 firm. 517-832-7446 after 2000Z WA8NSS.

ANTENNAS, Towers — Let authorized dealer quote your Hy-Gain or Cushcraft system. RF Enterprises, Route 7, St. Cloud, MN 56301.

TOWER Wanted - LM470 or equivalent. State condition, make, and price in first letter. KC2PX, 52 Stonewyck Drive, Belle Mead, N.J. 08502.

RISK-FREE buy and sell service. Details $1 S.A.S.E. Selltronix (WB2AVE/7) P.O. Box 388, Cortaro AZ 85230.

DRAKE R7A receiver in new condition for sale. Asking $1250. Bill WA2TDR 201-482-6629.

WANTED: Motorola "Minitors", anykind of lowband FM equipment, NLS Miniscope, sell my Drake T4XB, R4B, AC4 $400 U-ship, SASE for my big list of equipment, let's trade; N8COQ Fred Slaughter, Davison Rt Box 9, Gassaway, WV 26624 no phone.

THRUST Bearings: plans changed, no longer needed. 2 1/2", 2 3/16" and 1 3/4" available. $65, $45 and $40 ppd. Nick G. Lash, 458 W. 900 S., Hebron, IN 46341.

QUALITY STAINLESS fasteners! Nuts-hex and more "U", bolts! Screws-lock-flat washers! Also fine fastener "handi-pacs"! Lists 25¢ or sase! Walt - W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

WANTED - early telegraph instruments: keys, sounders, relays, switchboards, registers, etc. Also want related items, including pre-1910 paper. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

DRAKE TR7 display model PS7-NB7-AUX7-FA7-3 filters-MS7-RV7-MN2700-Shure mic-service manual-all $1495. MN7 $110. Dentron tuner 3000A $250-2000A $150. MLA 2500 160 thru 10 meters $675. Kaisumi keyer MK1024 $125. KE Electronics 4096 keyer $100. Phone HD15 or Nye $25. Send for list of Ten Tec Accessories. KB7HN 1-208-344-2844.

MADISON Repair: Collins - KWM, S-Line, KWM 380; Drake, Icom, Kenwood, Yaesu. Soon-warranty station ETO/Alpha. Reasonable rates. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268, 1-800-231-3057.

HALLICRAFTERS HT-32B and SX-115. Completely original, no modifications. $475. Will help on shipping. KA9LTR 815-398-1648.

MUST SELL: Atlas 210X with noise blanker, RIT, Astatic amplified mic (mobile version of D-104), mobile mount and manual. Excellent condition with recent checkup by Specialty Communications. $350. Want to buy Kenwood TS-130S with CW filter and PS-130, perhaps VFO-130? Sell also: KDK FM-2015A 2-meter FM with TT mic and manual. Mint, $200; Telex headfones with boom mic $40. Want: Collins 353C-31 plug-in mechanical filter for 75A-1. Anyone have one of these?? AC1Y, c/o ARRL Hq.

STANCOR 25-W modulation xfmr A3845, $5. Four spdt relays, mercury-wetted contacts, octal base, $5 each. Two transformers 117-V primary, 880-V/260 mA secondary, $5 each. Hamtronics FET 10-M preamp, mint, $10. HW-8, some mods, $50. AN/PRM-10 GDO, $25. Two Johnson 153-32-3 transmitting variable capacitors 1000 pF, .065-.070 plate spacing, new $20 each. N1FB.

WANTED: Heath SBA-104-1 noise-blanker, K4RV, Rt. 7, Box 168, Lexington, S.C. 29072 803-359-3418.

HF TRANSCEIVER: Sell Yaesu FT-101ZD with 10 MHz. Mint condition. With FV-101Z VFO 600 Hz filter and fan. Will ship in original cartons. $700 Lee Aurick, W1SE. Mon. and evenings 203-666-8048 Tues. through Fri., 7:30 to 5:30, 203-667-2494.

WANTED: highest prices paid for Harris RF-301 & associated equipment. Call Liberty Electronics collect 212-925-6048.

REPAIR and Service of ham equipment. WAØVQF. 913-845-9034 evenings.

FOR SALE: FT-101E w/cw filter $375. FV-101B VFO, $125. SP-101 spkr, $15. DD-1 digital display $120. WB2LOU, 814-237-9509.

HAL ST-6000 wanted, any condition. AD7I, POB 205, Holmdel, NJ 07733.

SPRING Clean that shack, castoffs will be welcomed at Junior High School 22 in New York City. Contact WB2JKJ via Callbook for details.

DESPERATELY need owner's manual for Hallicrafter HT-19 transmitter. KA8PJN Clarence Smith, 17845-144th Avenue, Spring Lake, MI 49456 linephone 1-616-842-8517.

ATLAS 210X. No p/s. Like new condition with Shure mobile mike. Will demonstrate mobile 40/20 or from home 80/75 40/20 SSB or CW. $300. Bob Norloff W4GEX/1 598 Millstone, Brewster (Cape Cod) MA 02631. 617-896-6482.

SALE - TR4CW/RIT, 4PNB, RV-4C, AC-4 little use latest production; 32S-3, 75-S1 (winged); KWM-2, 512B-5 (round), 516F2-All equipment purchased new + absolutely mint. Telephone evenings 615-794-5380 W4XS.

HEATHKIT HW101 transceiver with CW filter and PS23 power supply excellent condx $350. Jim W8UAB 216-626-3352.

WANTED: Hallicrafters R-46B or R-47 speaker (matches SX-100). For sale: MFJ (Curtis) keyer, $30. Heath (EV) mike w. grip-to-talk stand $30. W7BER, Tempe, AZ. 602-820-9111.

SLEP specials. HP-608FR late model signal generator, 10 MHz thru 455 MHz, 19" panel with blue/gray cabinet, excellent for precision laboratory work $375; URM-25 signal generator 10 kHz thru 50 MHz $285; URM-26 signal generator 4 MHz thru 405 MHz $245; Marconi Instruments model TF-1066B AM/FM signal generator, 10 MHz thru 470 MHz $550; Radio Specialty Mfg Company model 1163-1-3, FM Deviation Meter with built-in oscilloscope, range 25-55 MHz, 145-175 MHz, 405-470 MHz $345; USM-140 oscilloscope DC-25 MHz, dual trace, triggered sweep $295.00; all excellent condition, lab tested, add shipping, M/C, VISA or check accepted. Phone 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

DRAKE: TR-7, 0-30 MHz TX/RX; filters 1.8 kHz, 500 Hz, 6 kHz. Two SP-7, two FA-7, PS-7, service manual, service kit. Also MN-7 tuner, RV-7 VFO. All for $1800. Evenings 315-476-0334, Geoffrey, KA2HWT.

MINT TS-120S plus mobile mount $485 postpaid. W8TN 304-273-4680.

HUSTLER 5BTV $75. Write/telephone W6RQZ.

SELL: Heath HA-10 linear. DC output 600 watts 811A's; 1000 watts 572B. Spare 811A's, new panel. $300. Heath SB-221 linear. 10 meters, surge protection finals, rectifiers, $550. Hammarlund SP600, $75. Hallicrafters 1938 receiver, $75. Ed, K7KER. 406-587-3762. 1924 Sourdough, Bozeman, MT 59715.

WANTED: Drake NB7, MN7, RV75, CW, AM filters. Sell or trade mint RV7, KB1BX 617-274-6260.

FOR SALE: Yaesu FT-102, with SSB & CW filters, and FV-102DM scanning & 12 memory VFO; used only 3 hrs; original cost $1,388; My price $1,000; W2VNA 202-362-6113.

KWM-2 winged s/n 12441, 516F-2, $500; 75S-3B round s/n 30459, $550; Century-21 with calibrator, keyer, $265. John, NI4M, 615-847-4865.

FOR SALE: Icom 2-KL linear and AT500 ant. tuner; both no-tune & band-switching from Icom xcvrs; add zip to your signal; used only 10 hrs; original cost $1,795; my price $1,295 or b/o; W2VNA, 202-362-6113.

FOR SALE: Ten-Tec 580 Delta, Ten-Tec mic, Ham-Keyer, Bencher paddle, Dentron Jr. transmatch, Dentron W-2 wattmeter, Alliance CD-73 rotator, power supply 12Vdc-25 Amp, T.E.T. 4-element tri-band antenna, Drake L-P filter. First $875 takes it all! T. Hutzel WD8RPP, Oxford, OH phone 513-523-7643.

HALLICRAFTERS: SX-100 and SX-96. Both well cared for. Best offer. Olsen, KE6OY, 916-343-3187, 24 Marydith Ln. Chico, CA 95926.

YAESU 901DM, FV901DM, YO901, FC901, speaker/patch package $1400. Collins 30S1 with 2 extra tubes. Compol80 with North* Drive, LA36RO Decrwriter II, ASR33, various S100 boards. N6CFO 805-682-5693.

GOOD clean Collins 32S-3 transmitter and 516F-2 power supply, 1400. W6PN, 805-969-5152, or 1141 Summit Road, Santa Barbara, CA 93108.

WANTED: Kenwood TV-506 transverter, good condition Harry, WA3BIE 215-828-5896.

HARDLINE - 1000ft 50Ω 3/8" Spirafil (SLA38-50J) + 2 N-male + 4 N-female connectors. $1000 takes all. W8MV 216-494-5395.

OLDE tyme Collins Radio enthusiast wishes to purchase at least one 2.0" or 2-1/2" ILLUMINATED meter, similar to the type used on the Collins KWS/75A32V series equipment. The meter scale isn't important, but a 0-1mA. movement would be desirable. The reasnn for wanting this meter (or these meters) is to allow a homebrew project to match some existing equipment. John - W4MRJ 404-252-3779 15 Whispering Way, Atlanta, GA 30328.

WANTED: Old bugs for my key collection. I am trying to find each make and model manufactured before 1950. Vibroplex, Martin, McElroy, Bunnell, etc. Also looking for spark keys and keys of historical significance. K5RW Neal McEwen, 1128 Midway, Richardson, TX 75081.

2 TELREX Bertha Poles & antennas, Henry amplifier 8-K, $4200 firm, Henry 2-K $600. Phone 919-983-9340 919-722-3059 D. Reynolds.

SALE: CES 510-SA simplex auto patch, new $289. 20 amp. regulated power supply, $50 new. Plane, 42 Pennsylvania Ave, Niantic, CT 06357.

SELL: Alpha 76 PA amplifier. Three 8874 tubes. Absolutely mint. $1400 WBØWLI 2810 Gray St., Denver, CO, 80214. 303-232-0620.

SB630 console - tubes-parts-xtals W2FW.

RUNS of QST $5 yr. CQ, $3, extras, books, parts, xceivers. Needs SASE W3MSN.

YAESU FTV-250 2M xverter w/ARR preamp mint - $135 Heath HW-8 QRP CW trans. Mint-$85 WB6TOW 916-527-0780.

GENERAL coverage receiver, Yaesu FRG-7 excellent shape, $175 will ship UPS. Byron Looney, K6FI, 805-927-8733, 6540 Buckley Drive, Cambria, CA 93428.

TEN-TEC Argonaut #515, SSB/CW, notch/CW filter, mike, power supply. Like new, works perfectly. A wonderful QRP rig. $335 bargain. Buying Ten-Tec Argosy. Stu Cowan, W2LX, Box 596, Rye, NY 10580.

THRUST Bearings: Plans changed, no longer needed. 2-3/16" and 1-3/4" available. $45 and $40 ppd. Nick G. Lash, 458 W. 900 S., Hebron, IN 46341.

WIFE says clean out shack. Twenty years collection of parts, books, equipment. SASE for list. WB6CGZ 3103 E. Ave. Q-15 Palmdale, CA 93550.

WANTED: Yaesu antenna tuner FC-107. Must be in excellent condx. Larry, W6LSG, 1650 Stanley Way, Escondido, CA 92027. 619-743-7093.

DRAKE R-4B, T-4XB, AC-4, MS-4 Kenwood MC-50 $525 will ship. KB5XG, 918-762-2088.

COPPER WIRE, solid, enamel, bare, tinned. Cut to any length. No minimum. #12, 20¢ per foot; #14, 16¢ per foot; #16, 12¢ per foot; #18,9¢ per foot; #20, 8¢ per foot; #22, 7¢ per foot; #24, 6¢ per foot; #26, 5¢ per foot; #28, 4¢ per foot; #30, 3¢ per foot; Guy Wire, solid nylon, 200 pound test #14, 6¢ per foot; Porcelain Insulators, 2 1/2 inches long by 1 inch thick, 7/32 inch holes, $1.20 each. Shipping and 10% to 48 states. 15% elsewhere. New Yorkers add sales tax. Jug Wire Company, 2234-36th Street, Woolsey, NY 11105.

WANTED: Kenwood transceiver 820S, 180S, 120S, or 530S, Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

DRAKE R4B, T4XB, MS4, AC3 $525 Walter Wooten, W1LW 203-464-9956.

IC-2A , perfect. $149. WB7VOO, 602-298-4820.

COAXIAL switch - manual SP4T BNC - surplus - silver with gold contacts - 1 dB insertion 80 dB isolation 1000 MHz - panel mount with knob and plate - $29.95 ppd. W3ZD 520 Centennial Road, Warminster, PA 18974.

TOWER for sale. Tri-X LM354 crank-up tilt-over heavy duty. 54' extended. Includes TA-33 tri-band beam, Ham-M rotor, Ringo two meter antenna, coax and control cables, all in good condition. $1000. Located in Benton Harbor, Michigan. Robby, W8TOM 1-704-274-5152.

COLLINS 75A-4 excellent condition. All 3 filters, vernier tuning knob, speaker, and original manual. $325 plus shipping. Dave Schoepf WØOZG 418 Lake Forest, Vicksburg, MS 39180.

NOISE generator, using 5722, non automatic, wanted. W4PMG 2902 Concord Street, Sarasota, FL 33581.

WANTED: Drake MN-2000. NG6W. 714-631-6686.

MINT FT-101ZD, Mk II, WARC, CW filter, mic, fan. Used very little, $595. MFJ-949 ant. tuner, $65. MFJ-484, paddle, $75. Bud, N7BFN 206-939-6899.

MADISON Goodies: HyGain TH7DX $369; V2S $38; HD73 $99; Ham4 $169; 3219 $79; TriEx W51 $799 (FOB California); TS530S $599; TS130S $599; Butternut HF6V $125; 2MCV5 5/2 collinear $39; AlphaDelta-stock; Curtis K5/K5B $29.95 ea, Drake TR7A $1450; R7A $1400; DowKey 60 series $99; Tokyo HiPower HL160V $299; Hc2000 $299; Santec ST144uP $279; ST440uP $299; ST7T $230. Sams, Rider, Tab, Gilfer-stock; ProSearch-call; Signal/One Milspec - stock; Vibroplex, Sherwood, Curtis, Dielectric-10%; Valor 80-10M mobile whips $20 ea; Surplus meters $9.95; Antique tubes; Belden 8210 72ohm kW twinlead 40¢/ft; FOB Houston, items guaranteed. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268. 1-800-231-3057 (orders). Mastercard/Visa.

FOR SALE: 2 EIMAC sockets, SK-700 $50. W2YSM.

TRADE NCX-3 with NCXD dc supply for HW-8 or other QRP xcvr suitable for my Novices-to-be kids. Carl Greene. WBØIUS, POB 13, Nixa, MO 65714.

APPLE Owners — key transmitter, practice code, or make tapes. No external hardware needed for code practice — uses Apple speaker. Tape $10, disk $12.50. SASE for full info. Hart, 7720 Bogart, Ft. Worth TX 76118. 817-498-1899.

SELL: QST, 140 excess issues, to 1928. Other electronic magazines. List SASE. K6WM, 850 Groff, Pomona, CA 91768.

SELLING QST's 1966/1981 best offer W9AYL 2003 Newton, Park Ridge, IL 60068.

HEATH SB200 linear amp with 10M, like new $305. Astatic D104 base mic $40. Ron, WA1JMP, 203-537-1521.

COLLINS S-line, round emblem, good condition 75S-3B, 32S-3, 516F-2, w/500Hz CW filter, no mods. N3CCW Larry Carraciolo, 1515 Lakeview Drive, Germansville, PA 18053.

SELL: Icom 701 w/p.s. $550; Icom 211 $250; Bearcat scanner 250 $150; all mint condition prices firm, KB4XU 803-766-2831.

GALAXY V Mk-2 transceiver and power supply. $150 Hart, W5HZF, 7720 Bogart, Ft. Worth, TX 76118. 817-498-1899.

STOP LOOKING for a good deal on Amateur Radio equipment — you've found it here — at your Amateur Radio headquarters in the heart of the Midwest. Now more than ever where you buy is as important as what you buy! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Wilson, Ten-Tec, Icom, Dentron, Hewlett-Packard calculators, MFJ, Tempo, Regency, Hy-Gain, CushCraft and many more. Write or call us today for your low quote and try our personal and friendly Hoosier Service. Hoosier Electronics, P.O. Box 3300, #9 Meadows Center, Terre Haute, IN 47803. 812-238-1456.

INTERACT computer Morse T/R program (N4BE) and interface, $50. SBE-144, $85. New relays, $15@. Yaesu ERB, B&W 377. K1LEC 802-886-8121.

WANTED: Swan VFO Model 508. State price and condition. KBØTG Box 2012, Olathe KS 66061.

NEW 51-J4 Dial Drum Assembly, complete with installed tension spring. $55 Bob W4JNN 703-560-7161.

NEW Cushcraft A-3 with 743 40 Meter Kit, A3SK stainless hardware. Dan Zdanowicz, K1YPB, 8626 Hedgeway, Utica, MI 48087, 313-739-0125.

COMPUTERSHACK for sale. Wide assortment of OSI computers and spare boards, accessories at ridiculous prices. SASE for complete list. Tom Badgett, K8AO, 508 Woodland Drive, Bluefield, WV 27401.

SOME adhesive copperfoil left, 24 inches wide, 2.50/foot, Manfred Ramin, DL2UD/W5 713-879-7714.

DRAKE TR7, PS7, MS7 and 7077. Mint $1,100. Pickup preferred. KB1BX 617-274-6260.

KENWOOD TS-700A, $325; IC-245 with SSB, $225; Drake ML xtal 2 meter 12 ch., $65; SB-1LA amplifier 1200 PEP, $185; Heath Apache and Mohawk, $60 each, $100 pair; Prototype Lafayette HA-146 with special factory audio section, $80; 4CX1000 tube socket, $ name it. S. D. Smith, WA4VWV, RR #2, St. Charles, IA 50240. 515-283-4936 work.

FOR SALE: Ham Operator's Retirement Paradise: three or four bedroom home in beautiful Thousand Islands; 30', 4-element Cushcraft mast and beam with rotator; 11-element 2-meter beam with rotator; wired radio room with superb view of St. Lawrence River; wall-to-wall carpeting; lovely yard with garage. Low 50's. Contact: WA2FAN Box 24 Fisher's Landing, NY 13641.

WANTED: Schematic for Hallicrafters S-53. KA4LDD.

YAESU-101E for sale - like new - with spare tubes best offer 1-401-789-1817. O. W. Greene, 40 Benefit Rd., Wakefield, RI 02879.

HIPOTRONICS 100kV laboratory kilovoltmeter, in mint condition. Sell or trade for ham gear. N4HUL 516 Ardmore, Albany, GA 31707.

COLLINS 75S3-B, winged emblem, mint cond. with all filters including 200 and 500 Hz CW, $600. FT-101 with 160 meters and all factory mods, $450. Kirk helical 3 element 40 meter beam, never erected, $325. K2YY, John Hill, 130 W. Central Ave., Moorestown, NJ 08057 609-235-5270.

NATIONAL LF-10 preselector and HRO-500TS speaker wanted. Dick Cook N7ETO 6326 N.E. Barrett Dr., Poulsbo, WA 98370.

YAESU FT101ZD. Mint condition in original box. With speaker/patch - $700. Steven Udwin - N2CFC Business hours: 201-871-3710.

FOR SALE: JRC NRD-515 receiver, NSD-515 transmitter plus all the accessories made for this equip. Less than two hours use, as new $2800. Icom IC211 all mode 2 meter rig mint, also RM-2 (which needs a little work) $375 Heath phone patch $30. All items FOB N.Y. S. Slonim, W2PD 516-541-2342.

DRAKE TR3 remote VFO, perfect $200. DC $75, AC $75. TR3 $200, all $400. KM5Y 214-475-1341.

WANTED RCA 44 or RCA 77 mike, Vibroplex Blue Racer. John White 55 Walden, Burnsville, MN 55337.

HEATHKIT: SB-100 with HP23 power supply; $250. SB-230 conduction cooled linear; $500. Murch UT-2000 transmatch; $100. L. D. Gilley, Box 877, Harlan, KY 40831 606-573-1103 evenings.

"FANTASTIC Discounts" Sony-2001 $209.95 Icom-R70 $679.95 FRG-7700 $439.95 Kenwood R-1000 $419.95 R-2000 $579.95 Panasonic RF-3100 $266.95 Bearcat-100 $288.49. Much more, fast service and free UPS shipping to 48 states. Stamp brings picture catalog, Galaxy Electronics, Box-1202, Akron, OH 44309 216-376-2402.

IC730, filters, scan. $650 214-475-1341, KM5Y.

WANTED: Heath's SBA-301-2 400Hz CW filter KA3FOK 717-934-2252.

HEATH H8, 32K, serial & parallel I/O, cassette & disk intfc., ext. config. option (for CP/M), wirewrap card, extender card, H9 video terminal, ASR33 hardcopy terminal, $1100; Wavetek 164 Function Geerator, .003 Hz to 30 MHz, $895; Tektronix RM35 oscilloscope, $250; Singer FM7/DM3 Frequency & Deviation Meter, 20MHz to 1000 MHz, $250; Dave Marshall, 1803 Scenic Dr., Alamogordo, NM 88310 505-437-6374.

TI99/4-4A Basic & Extended Basic programs. CW Practice CW Transmit, SSTV keyboard, Children's CW, Children's Math, Amateur Call Locator. Write Sam Moore, Sr., AC5D Box 368 Stigler OK 74462.

COLLINS S-Line 32S1, 75S3B, Console & Power Supply. Hustler 4BTV ant., Millen 92200 ant. tuner. Automatic keyer, Wire tuner, misc. parts. Would like to sell as a lot. Dick Gallo 922 Highland View, Atlanta, GA Days 404-577-7600 eves 404-872-8922.

DRAKE TR-4C, RV3 VFO, AC4 ps excellent $500 Karl KB2AS, 925 7th North St., Liverpool NY 13088 315-451-6472.

FOR SALE: Icom IC-720A with PS-15 and mobile mounting bracket. In excellent condition, asking $950. Will ship UPS COD. Mark, KB2IF, 609-426-2626.

COLLINS 51S-1, mint condition, with manual, $1200 Millard Oscherwitz, W9FSV, 2140 Sandy Lane, Wilmette, IL 60091, 1-312-256-3020.

AMATEUR ACCESSORIES: Our name says it all! Frozen prices - New Azden PCS-4000, call!; Larsen 2m 5/8 wave mobile magnet or trunk lip mount antenna $38; W2AU balun $13; ham radio VIC-20 software information SASE; MFJ-816 HF watt/SWR meter $27; Mini-Quad HQ-1 $129.95. Free shipping. Check, m.o., Visa/MC. Amateur accessories, 6 Harvest Court RD 7, Flemington, NJ 08822. 201-782-1551.

COLLINS Filter: Need mint F455-FA-05-0840 pay $50. W5EZ 406 BayouView, Seabrook TX 77586.

TEN-TEC Omni-D Series B noise blanker, CW filter, $575. WØLS 303-449-2500 3770 22nd St., Boulder, CO 80302.

WANTED - Swan 270 Cygnet plate transformer. Eddie W. Scott, W3CSX Rt 1, Fairplay, MD 21733.

FOR SALE: Dentron linear amplifier GLA-1000 $250. Audio filter SL-55, Electronics Research $25. WB2LOU, 814-237-9509.

SELL: Heath HA-202A two-meter FM amplifier, like new $40; homebrew 13.8 Volt regulated 4 Amp power supply with meter $25. AA1U 203-379-1729.

FOR SALE: Galaxy V transceiver with matching remote VFO, station console, audio filter, and power supply. Station console includes a speaker, SWR bridge, phone patch, and digital clock. Also included is an Astatic D-104 microphone. All in good condition. $375. Call Phil WB5PVL evenings 405-721-3315.

WANTED: CW keyboard. WDØBVD, RR 1, Box 212C, Willard, MO 65781.

OSCILLOSCOPE Wanted: Good used Heathkit 10-4550 KK8Q. 328 Buchanan, Kalamazoo, MI 49001 616-349-1905.

WANTED: Collins 32S-3 207-635-2846 RR 1- Box 2930, N. Anson, ME 04958 Jerry Sass.

WANTED: Heathkit HW-20. W8QKU, 2748 Meade, Detroit, MI 48212.

RTTY Headquarters: All your RTTY needs. Dealers for "HAL" and "info-Tech" products. You can't beat our prices! Call or write Dick, KØVKH, Dialta Amateur Radio Supply. 212-48th Street, Rapid City, SD 57701 605-343-6127.

FOR SALE: S-100 board set with 64K RAM, disk controller, CPU and I/O. Expandoram 64K RAM. Integrand mainframe. Two mini floppy drives with case and power. $1200 for everything or will sell pieces separately. Will trade for ham gear plus cash. KA1PB 617-494-0047 or 253-2469.

WANTED: Ten-Tec 405 linear amplifier. David Dunville, N4GUA, 804-264-8824.

DRAKE T4X-B, R4-B, AC-4, MS-4. Xtals for 160, WWV, 29Mc. Input for monitorscope. Plugs, cables, manuals. Spare finals. Excellent condition. Certified check for $545 includes shipping. W4NXH, 1800 Neva Drive, Largo, FL 33540.

DRAKE TR4 transceiver, AC4 pwr. supply $299 W4NTS Southern Pines, NC 28387 call 919-692-3331.

SWAN 350 with speaker/pwr supply factory aligned in Jan. $275 Jeff P. Woodward, Rt. 2 Box 419, Denton, TX 76201 817-382-6156.

CUSTOM handknit amateur sweater jackets. Details SASE. WB9NCT, Box 541, Marinette, WI 54143.

HEATH IO-4550 oscilloscope with PKW-105 probe, excellent, $360 postpaid. KD7AP, 1436 E. Enid Ave., Mesa, AZ 85204. 602-835-7254.

EIGHTEEN 813s, fils tested, $5; sockets $1.50; 10 Volt 10 Amp xfmrs $6; R-175A chokes $7. Eimac HR-8 caps $3; 250 Hz R4C filter $24; Air-Dux 195-1 $12; Squires Saunders Blanker $28; Henry MS-2 4 ch. VHF pocket scanner $65; Teac A-20 deck $38. 75A3 $95; Want Johnson Thunderbolt, 3-1000Z, 4CX350As. G. Grant, 2200 Oscar Dr., Gilroy, CA 95020.

HANDHELDS - Temp S2T 220 MHz synthesized w/TT pad and charger $175/bo. Temp S4T 440 MHz synthesized w/TT pad. No charger. $175/bo. Phil Marquis, 415-591-8411 x396 8AM-4PM.

MUST SELL: HW101 w/CW filter, fixed and mobile power supplies $400. HR1680 receiver $140. Both in mint condition W2EZ 9 Whitney Farms Circle, Fairport, NY 14450.

WANTED: Hallicrafters HT-44 and SX-117. WA7KOG Barry Schmidt 253 D St. N.E. - Ephrata, WA 98823.

SELL: JSR Engineering antenna tuner. Has backlighted SWR and power meter, 30 and 300 watts. Like new! $55 was $89.95 new. WB2MJQ Box 490, Chester, NY 10918. 914-783-4988 after 7 PM.

TEN-TEC 544 digital with 262G p/s. Both mint, $500. Certified check and I pay shipping. Also Regency HR-212, Heath Micoder, Genave GTX-1 handheld. All in very good shape. Make offer. NØOF, 701-282-7594, before 5 PM CST.

YOUR NAME in print! - You've probably modified one of your rigs to do something better or different, right? If your mod is good enough, we'll tell the world. Send details to Portland Radio Supply, 1234 SW Stark St., Portland, OR 97205.

DRAKE TR4C, RV4C, AC-4, Shure 444 $500 MN 2000 $150 SB200 w/10 mtrs $300 HAMII, TA33, 35ft twr $150 713-497-0773 N5BR, Box 218789, Houston, TX 77218.

ICOM IC-730 with IC-PS15 power supply and FL-45 filter, $650. Also MM-2 keyer, $110. All absolutely mint. Slavin, 9 Winfield Drive, Northfield, IL 60093, 312-441-5953.

SELL: ATV, SE-1 b/o $225, SSTV keyboard b/o $50 W2WHK 210 Utica St., Tonawanda, NY 14150 716-692-5451.

SELL: Yaesu FT-301S 160 to 10, 40W PEP, CW filter. In like new cond. $325 + shipping. WB2MJQ, Box 490, Chester, NY 10918 914-783-4988 after 7 PM.

MAGNIFICENT Telrex ruggedized beams; never used or used one year: 10M636X, 15M32X, 20M646X, 40M329X. Rotator BT599RIS with indicator system and 6 position coax switch system; 185' RG17A/U; 24'-2" diamond steel mast; 77' Vesto tower (incomplete). Must sell. Best offer. Norman Gordon, 27933 Briones Way, Los Altos Hills, CA 94022.

WANTED: Rohn 25G or 45G fold - over tower or conversion parts. KV5I Eddie Hatcher 840 Wixom, Dallas, TX 75217.

DRAKE R4-C extra clean, late model, with Sartori mods $275. Kenwood TR-7730 w/TT mike $225. Prepaid K9LWT 414-554-9170.

IMMACULATE Kenwood TS-180S with manual. Will ship. $525. Call daily before Noon Pacific time. George WB6NNU. 916-622-3055.

COLLINS filters: F455FA21 $50, F455Y21 $50, F455FA08. $85. W9ZR, 1-414-434-2938.

TEN-TEC 580 Delta $600, 515 Argonaut $300, 283 VFO $150, 280 PS $120, 255 PS $145; most keyers and accessories. IC2AT $180 All equipment like new. Roland Lussier, 25 Valley Dr., Flagstaff, AZ 86001 602-526-8314.

$110 EACH, your choice, all in excellent condition - Kenwood VFO-520, TV-502 transverter, Clegg Venus transceiver, or Microwave Module MMT 432/28 call John KC5GB, 713-376-1616, Callbook address.

ICOM 701, IC701PS, IC-SM2, manuals, cartons, mint, uship $675, WBØTEY, 319-367-5493.

HW-100, microphone, complete. Factory updated-aligned. Mint. Terrific buy $200. Steven Kocik, 11271 Riveredge, Parma, OH 44130.

KENWOOD TS-820 with digital display, 2.1 kHz filter, operating and service manuals, original carton. $525. David Talley, W2PF. 10275 Collins Ave., Bal Harbour, FL 33154. 305-868-4131.

KENWOOD TR-2400, leather case, charger, manual, and VoCom 5/8 wave antenna, mint condition. $200. Also AEA M B A reader, new condition $225., W7BYG Box 1503 Chelan, WA 98816 509-682-2440.

WANTED: 10-meter solid state mobile xcvr. KZ5B 532 Gardenia Ave., Orange, TX 77630.

SIGNALONE CX7. All improvements, one year service warranty, $3200. Mandelkern, 505-523-2897.

KENWOOD VFO-120, $95. John W1FV, 993 Massachusetts Ave., #305, Arlington, MA 02174, 617-646-4142.

TS-830S, VFO-230, SP-230 like new all in original cartons, $895 all. KFØP 612-451-6188.

DRAKE TR7/DR7, all filters, RV7 VFO, PS7 supply like new $1295 KB9UX 312-398-0875.

WANTED: h.b. CW xmtr. 300-500 watt input (no comm. gear) Frank Lewis, K8GKR, RR 5 Box 800, Lima, OH 45801.

WANTED: National HRO-50, HRO-60, wkg, condx W8PEN, 9108 New Delaware Rd., Mt. Vernon, OH 43050 614-392-0841.

H-P 205AG audio generator, good but some attenuator sections inoperable, $25. Vibroplex bug, $15. Panasonic RQ-102S reel ac/portable recorder, $20. HW-8 with some modifications, $50. NLS 3.5A DMM, $40. OSI C4P computer, 8K, color, sound, $275. Purchaser pays shipping. SASE inquiries. Paul K. Pagel, 4 Roberts Rd., Enfield, CT 06082.

HEATH station, excellent condition, SB-104A transceiver, SB-604/HP-1144 speaker/power supply. SB-644A remote VFO, NB/CW filter, hand mike, all manuals, sale by original owner, pkg only $550. Kirk quad, 3 band 4 element boom 3" x 24', fiberglass spreaders, cast aluminum spiders, single coax feed, $200. 919-791-0484. KB4IL

PANEL METERS: Cleaning out shack. Limited quantity of new Jewel 4" 100μAmp calibrated 0-5, 0-100, 0-500 watts, with or without standard SWR scale. Perfect for any HB watt meter or SWR bridge: $14. Also 3" 0-50 Vdc jewel 100 μAmp, same case style. Scale and range can be changed with rubons and new shunt: $9. Shunt instructions included. KD6NE, 639 Pomona, Coronado, CA 92118.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 481, 230 Woods Lane, Somerdale, NJ 08083.

HAM CONTESTERS. Fast machine language dupe program for the TRS-80 color computer. Dupes by call and band, deletes, prints, searches, reviews, sorts, saves to tape, 14 page manual. DUPE3400/UTILITY-3400 calls (32K) $15. DUPE1400/UTILITY-1400 calls (16K) $15.00. New Super Contester I has all the above features plus real time clock, automatic logger, and more. Super Contester I-2900 calls (32K only) $24.95. For info. or program write J.C. Software, Jeff, 214 South 20th St., Battle Creek, MI 49015.

WANTED: VOX/semi break-in module and digital display for Atlas 210X transceiver having 5520 kHz if, and/or schematics thereof. Art, N4HZK, 649 SE 34 Terrace, Ocala, FL 32671.

LPF (75A4) $65, F455J-05 $85, F455J-15 $65. F455J-60 $35. F455FA-05 $75. F455FA-31 (new) $45. F455FA-40 $35. F455B-12 (75A3) $35. R/E: 75S3B, 32S3, 516F2, 312B4 $1450; 312B4 $250. W/E: 75S3B, 32S3, 516F2, 312B4 $1050; 312B4 $200; 75S1 (CWF) $235. Want: Late KWM2-A. James Craig, 32 Birchwood Drive, Rye, NH 03870. 603-964-6658.

HEATH HW101 w/CW filt, HP23C ps, HS-1661 spkr, GH-12A mic, HN-31 Cantenna. All exc cond. $300 Foley, WA9VLE 312-422-4466 aft 7PM CST. No collect.

RETIRING to Florida - must sell 30-year accumulation of ham gear, parts, and technical books immediately -sacrifice prices. Send SASE for list. Dino Mastrojohn, 10 Madeleine Pl. Parsippany, NJ 07054 W2UII.

WANTED Dentron40m MINIxceiver. MLX20. J. Ball, W6BFO, 7112 Deveron, Canoga Park, CA 91307, 213-340-4411.

SELL R4C w/3 filters, NB, 15 xtals (WARC, SWL), MS4-$375. T4XC extra finals, WARC xtals, AC4, DC4 W4 $375. Shipping Extra. All excellent W1GAJ David Schwartz 1183 Southeast St., Amherst, MA 01002.

LIGHTNING arrestors, simalar to "Blitz-Bug"; $3; American-Made PL-259, 75¢; add $1.50 postage and handling on all orders; catalogue 50¢ WB5OHH-BNC Communications 6602 Fairway Drive, Houston, TX 77087.

Doc's Communications

702 Chickamauga Avenue
Rossville, GA 30741
404/866-2302

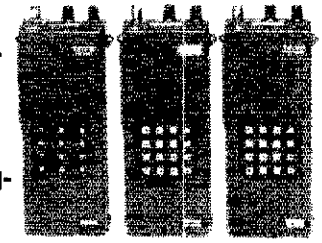
Presents...

ICOM DAY!

Saturday, April 9, 1983
9:00am til 5:00pm

WIN!!

- ★ Telephone buyers will receive a surprise gift in their package.
- ★ In-store drawings each hour. Come and register to win!!
- ★ Grand prize for in-store drawing. Win your choice of:



IC-2AT IC-3AT IC-4AT

- ★ No purchase necessary to register for grand prize.
- ★ Special in-store pricing.
- ★ ICOM Personnel to demonstrate new equipment.
- ★ Refreshments will be served.

Doc's Communications
702 Chickamauga Avenue
Rossville, GA 30741
404/866-2302

NEW TS830S for $150?

Yes indeed! Just add a Matched Pair of top-quality 2.1KHz BW (bandwidth) Fox Tango Filters. Here are a few quotes from users:

"... Makes a new rig out of my old TS830S!..."
"...VBT now works the way I dreamed it should..."
"...Spectacular improvement in SSB selectivity..."
"...Completely eliminates my need for a CW filter..."
"...Simple installation - excellent instructions..."

The Fox Tango filters are notably superior to both original 2.7KHz BW units but especially the modest ceramic 2nd IF; our substitutes are 8-pole discrete-crystal construction. The comparative FT vs Kenwood results? VBT OFF — RX BW: 2.0 vs 2.4; Shape Factor: 1.19 vs 1.34; 80dB BW: 2.48 vs 3.41; Ultimate Rejection: 110dB vs 80. VBT SET FOR CW at 300Hz BW — SF 2.9 vs 3.33; Insertion Loss: 1dB vs 10dB.

AND NOW A *NEW* TS-930S.

Tests prove that the same filters improve the '930 even more than the '830. Don't buy CW filters—not even ours. Your probably won't need them.

INTRODUCTORY PRICE: (Complete Kit)...$150
Includes Matched Pair of Fox Tango Filters, All needed cables, parts, detailed instructions. Specify kit desired: FTK-830 or FTK-930. Shipping $3 (Air $5). FL Sale Tax 5%

ONE YEAR WARRANTY
GO FOX-TANGO – TO BE *SURE!*
Order by Mail or Telephone.
AUTHORIZED EUROPEAN AGENTS
Scandinavia MICROTEC (Norway)
Other: INGOIMPEX (West Germany)

FOX TANGO CORPORATION
Box 15944T, W Palm Beach, FL 33406
Phone. (305) 683-9587

DUPERMAN

REAL TIME MACHINE LANGUAGE DUPER FOR TRS-80 MODEL III

DUPECHECKS 800 QSOS/SECOND DURING CONTEST. PRINTS CHECKSHEETS AFTERWARDS. STORES UP TO 2750 QSOS PER BAND. CONTAINS ITS OWN TINY VERSION OF DOSPLUS OPERATING SYSTEM. PROGRAM FURNISHES AUDIO OUTPUT IF DESIRED. REQUIRES MODEL III WITH 48K AND 1 OR 2 DRIVES. 1 DISK VERS. $29.95. 2 DISK VERS. $39.95. WE PAY POSTAGE. FL. RESIDENTS ADD 5% STATE SALES TAX.

TIM COTTON, N4UM
5680 SW 16 ST., PLANTATION, FL. 33317

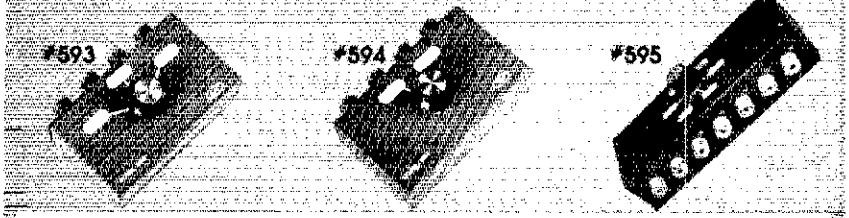
FREE CATALOG

QSL CARDS

MAIL ORDER EXPRESS
BOX 703
LEXINGTON, N. C. 27293

coaxial R. F. antenna switches

Heavy Duty switch for true 1 Kw POWER - 2 Kw P.E.P.



Single Pole, 3 Position. Desk or wall mount. All unused positions grounded
#593 - UHF connectors / **$27.25***
#596 - BNC connectors / **$36.50***

2 Pole, 2 Position, bypasses, linears, reflectometers, antenna tuners, etc.
#594 - UHF connectors / **$34.25***

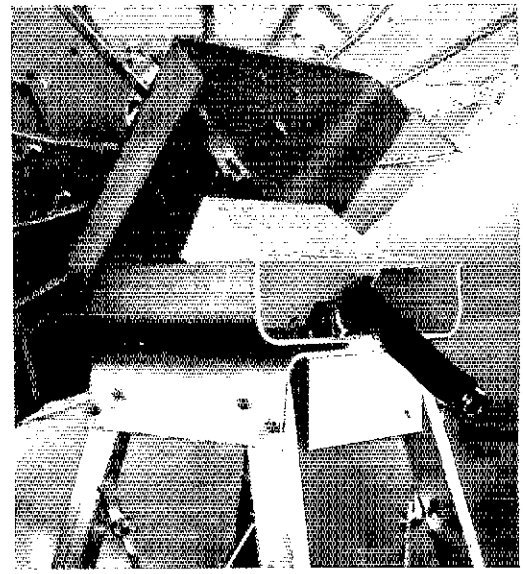
Single Pole, 5 Position, all unused positions grounded
#595 - UHF connectors / **$32.00***
#597 - BNC connectors / **$46.50***

* Shipping and handling for any item add $2 each.

ALL OUR PRODUCTS MADE IN USA

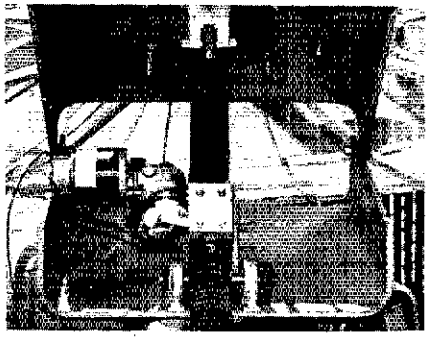
BARKER & WILLIAMSON
Quality Communication Products Since 1932
At your Distributors write or call
10 Canal Street, Bristol PA 19007
(215) 788-5581

AZ-EL MOUNT CLOSEOUT!



These massive commercial AZ-EL mounts were designed for KLM's 4 GHz satellite antenna systems. A contract cancellation now forces us to clear out the last 50 units at way below their original cost. These brutes will raise and rotate up to 450 lbs without a counterbalance (the equivalent of a commercial 10-12' dish) or just about any size moonbounce array you can think of. Look at all the features:

- Massive 1/2" steel construction
- Two reduction gearmotors
- Tubular steel legs / 1/2" rod braces
- Gold-Zinc plated
- Stainless steel hardware
- 360 AZ / 90 EL capable

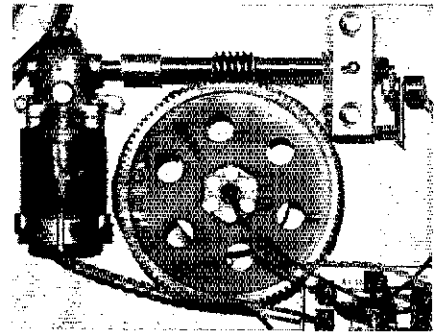


This is a powerful mount at an unbelievable price! Its first come, first served, so contact KLM now!

original price: $1995

Closeout Special!

$650

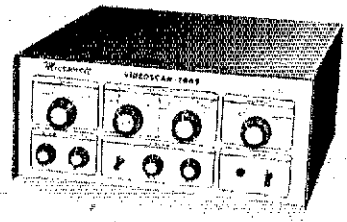


KLM electronics, Inc.
P.O. Box 816,
Morgan Hill, CA 95037
(408) 779-7363

Limited Sale--SAVE $100 Until April 1, 1983 On

HIGH RESOLUTION SLOW SCAN TV

Once you see our picture, you won't settle for anything less!



New generation amateur-standard scan converter sends and receives sharp pictures with up to 16 times better resolution than earlier units. Interfaces easily to home TV camera and CCTV monitor. VIDEOSCAN 1000 ™ employs a custom microprocessor and other LSI ICs that provide advanced capabilities such as multiple picture storage, 64 levels of gray, split screen, call sign option, on-screen cursor and much more. Call or write for brochures on VIDEOSCAN and *"Getting Started In SSTV"*. This unit is so advanced, it costs you less, especially at these special introductory prices — *Deduct $100 from prices listed below until April 1st, 1983* —

VIDEOSCAN 1000 Kit (For advanced builders)	VS1000-K	$595.00
VIDEOSCAN 1000 Wired & Tested	VS1000-F	$795.00
CALL SIGN OPTION (Specify up to six letters)	VSC	$ 50.00

Send check or money order. Use your VISA or MasterCard. Add $8.00 for shipping and handling for continental U.S. Wisconsin residents add 5% Wisconsin State Sales Tax.

Microcraft Corporation
P. O. Box 513Q, Thiensville, Wisconsin 53092
Telephone: (414) 241-8144

ICOM IC-402 Closeout

432MHz SSB/CW Portable

ICOM IC-402 Portable 432 MHz SSB/CW Xcvr. VFO tunes 430-435.2 MHz in (4) 200 KHz ranges. 3w out; Blanker; RIT; S/RF meter; CW monitor; Built-in ant. Uses 9 "C" cells or 13.8vdc/1A. Includes mic., strap, DC cord and batteries. 7¼"h × 2¼"w × 6⅝"d, 4⅛ lbs.

Regular $389 - ***Closeout $299.95***

Accessories:	Regular	NOW
IC-3PS AC power supply	$ 95.00	$89.95
BC-20 Nicads & DC-DC charger	57.50	
IC-30L 10w linear amplifier	105.00	94.95

Quantity limited, send Check or Money Order. Call TOLL FREE 1-800-558-0411, use MASTERCARD/VISA; or for CASH COD. Prices do not include shipping charges.

MasterCard VISA

AMATEUR ELECTRONIC SUPPLY®

4828 W. Fond du Lac Avenue
Milwaukee, Wisconsin 53216
Phone: (414) 442-4200
Wisconsin WATS: 1-800-242-5195
Nationwide WATS: 1-800-558-0411
AES Branch Stores in: Clearwater, FL • Orlando, FL • Wickliffe, OH • Las Vegas, NV

RDC

New ICOM IC-25AG Under $320.00
—Call—

April special Kantronics 2 M. ¼ wave trunk lip mount $12.95. For all your ham needs and more good prices phone

ROSS DISTRIBUTING COMPANY
78 South State Street, Preston, Idaho 83263
Telephone (208) 852-0830 Closed Monday at 2:00

COMPUTERIZED BEAM HEADINGS
USA GREAT CIRCLE MAP

3 Giant listings - Customized on your EXACT QTH
A must for efficient beam use

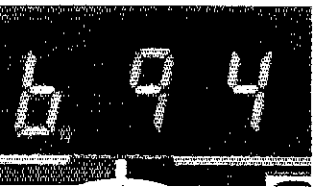
1st List: All ARRL countries & more, over 860 DX locations, distances in kilometers. Hear call, immediately know heading. Listed by call sign prefix, map centered on USA. ***2nd List:*** Over 450 USA/CANADA cities. Listed alphabetically by city, distances in miles. ***3rd List:*** Like 2nd list, but alphabetic by state. Send name, call QTH, latitude & longitude if known, $9.95 for everything to.

Ted Herrman, AE8G
901 S. Buckingham Ct., Sterling, VA 22170

ICOM IC-25A/

More Features Per Square Inch!

The smallest 2 meter FM obile on the market is now en easier to read and use h a green LED readout and a mpact touchtone™/scanning crophone and gives you the tion of 25 or 45 watts.



New Green LED. Easier to ad in bright sunlight, and not aring at night, the IC-25A(H)'s w readout provides good bility under all conditions.

5 Memories. Instant access most used frequencies. VFO A ormation is transferred to the ected memory by pushing the te button.

Priority Channel. Any emory channel may be onitored for activity on a mple basis, every 5 seconds, hout disruption of a QSO nducted on a VFO frequency.

New HM14 Microphone. Smaller and lighter . . . the HM14 microphone provides a 16 button touchtone™ pad as well as up and down scan buttons adding easy frequency control of the radio and additional tones for repeater control.

NOR/REV Capability. Use of this button in the duplex mode allows one touch monitoring of the repeater input frequency. If simplex operation is possible you will know instantly.

Scanning. Pushing the S/S button initiates the scan circuitry. With the mode switch in a memory position the unit will scan all 5 memories plus the 2 VFO frequencies. With the mode switch in a VFO position, the unit will scan the entire band or the portion of the band defined by memories 1 and 2. Full band scan or program band scan is selected from the front panel and internally switched scanning choices of adjustable delay period after a carrier is received then resume scan, or resume on carrier drop, are standard.

The New 45 Watt IC-25H. Only slightly longer than its companion IC-25A, the IC-25H packs a powerful 45 watt punch. This 45 watts of power eliminates the need for an external power amplifier in fringe areas and gives a savings of space and wiring.

The IC-25H has all of the standard features of the IC-25A that have made it the most popular 2 meter mobile ever, plus the new green LED readout, new HM14 microphone and extra power. These new features make the IC-25H the best 2 meter mobile value on the market.

ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

IC-471A NEW!

The New Deluxe 430-450 MHz Base Transceiver from ICOM

WRITE OFFSET INTO MEMORY

NEW DISPLAY

32 CHANNEL MEMORY

1 MHz UP/DOWN FOR FAST QSY

32 full function memories / subaudible tones / PLL locked to 10 Hz / two color florescent display / RIT readout / scanning / new size.

32 Memories. Each memory holds frequency, mode, offset direction, offset frequency and subaudible tone for easy return to an oft used frequency or for remembering a new repeater or simplex frequency.

Subaudible Tones. Subaudible tones are selected by rotating the main tuning knob. These tones may then be stored into memory along with the frequency, offering ease of operation.

Phase Lock Loop. Extremely low noise and good signal to noise ratio PLL design allows the IC-471A to lock to 10 Hz for extreme accuracy.

New Display. ICOM's new easy-to-read two color florescent transceiver situation display shows frequency, mode, offset direction, VFO in use, memory channel, and RIT offset direction and amount.

Scanning. Scanning of memories, programmable band scan, and mode scanning are available and easy to use.

New Size. Only 11¼"W x 4⅜"H x 10¾"D the IC-471A is styled to look good and engineered for ease of operation.

NEW 440 MHz Repeater

IC-RP3010 FM Repeater

Now a 10 watt 440 MHz FM repeater from the leader in VHF communications. The IC-RP3010 features high stability crystal controlled channels, CTCSS system, ID'er, remote control through a DTMF decoder and microprocessor controlled circuitry.

ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

1.2 GHz! NEW!

Explore the world of 1200 MHz FM with ICOM's new IC-120 Mobile!

Now you can move out of e crowded 144 and 440 MHz ands into the wide spectrum of 200 MHz because ICOM gives ou the opportunity to explore e spectrum from 1260 to 1300 Hz . . . 40 MHz . . . with all the atures found on popular 2 eter and 440 MHz rigs plus me:

Memories. Six memory annels plus 2 VFO's provide orage of most used quencies in this wide band. ch memory allows memory of quency, offset direction, offset quency, and tone encoder quency. (Internal memory ckup available.

Scanning. Scan the emories, scan all 40 MHz or ogram a segment to be anned. All scanning has the tion of scanning for a busy or en channel.

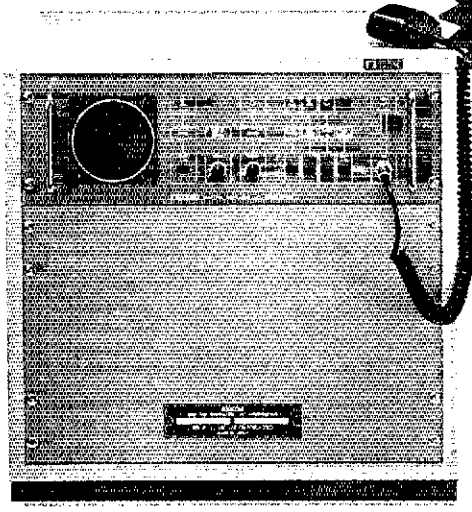
Duplex. Be able to work different repeater offsets, with ICOM's programmable offset system, as they become available.

3 Tuning Rates. Tuning increments of 10 KHz, 20 KHz or 1 MHz are available for rapid or slow tuning of the band.

RIT. RIT on FM? Yes, ±5 KHz on either side of the transmit frequency allows you to tune signals offset from yours.

Readout. Four digit green LED readout for easy visibility day or night.

The ICOM IC-120 gives you all of this plus a very quiet PLL circuit, with excellent signal to noise ratio, high sensitivity and a stabilized power amplifier to provide full power over its temperature and voltage ranges, and the IC-120 is small, only 2"H x 5½"W x 8⅛"D.



NEW 1.2 GHz Repeater

Complete your system with the IC-RP1210 repeater.
• PLL frequency selection (198 channel, 10 KHz steps, DIP switch) • High stability PLL (0.5PPM/-30° to +60°C) • Repeater access via CTCSS • DTMF control functions • Selectable hang time • ID'er.

ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

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

In 2 Meters Today...
ICOM Leads the Way!

ICOM IC-251A

ICOM has always been the amateur communications equipment industry's leader in 2 meter solid state digital technology. ICOM continues its established leadership with the all new IC-251A 2 meter multi-mode base transceiver. ICOM's advanced engineering incorporated a multi-memory system, 2 programmable scanning systems, 2 internal VFOs, and built in repeater offsets.

The New ICOM 251A is the most advanced, flexible 2 meter system on the market, incorporating features customers ask for most:

- ☐ Memory access to automatically stop on [illegible]
- ☐ 3 memories built in (quick access to your favorite frequencies)
- ☐ Programmable band scan — scan the whole band, or any portion of it you desire (adjustable scanning speed). Automatically resumes scanning after 16 seconds if desired.
- ☐ Squelch on SSB! The 251A will automatically and silently scan the SSB portion of the band seeking out the SSB activity on 2.
- ☐ Multi-mode operation — USB, LSB, CW, FM. Great for getting into Oscar, plus enjoying SSB rag chewing as well as repeater operation (including the new subband).
- ☐ 600kc Repeater offset built in. Easy repeater operation on the FM portion of the band.
- ☐ Variable repeater split — with the 2 built in VFO's, it's possible to work the odd splits plus accommodate future repeater band plan changes.

The RF amplifier and first mixer circuits using MOS FET's, and other circuits provide excellent Cross Modulation and Intermodulation characteristics. The IC-251A has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having the high shape factors, exceptional selectivity.

$50 Cash Rebate

$50.00 for the purchase of an IC-251A.

Begins Mar. 1, 1983
Expires May 30, 1983

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

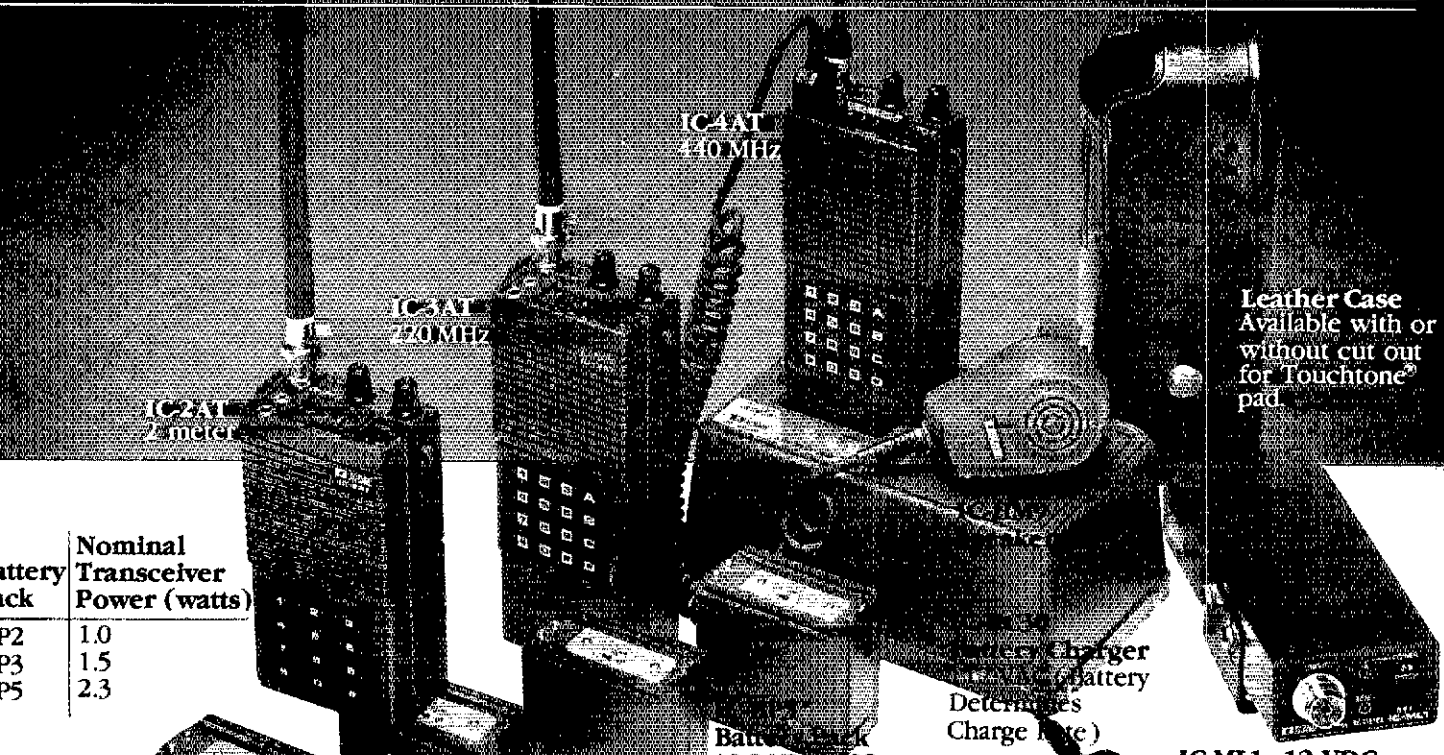
ICOM

2112 116th NE, Bellevue, WA 98004
3331 Towerwood Drive, Dallas, TX 75234

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

ICOM Handhelds

2 Meter, 220 or 440 MHz



ttery ck	Nominal Transceiver Power (watts)
P2	1.0
P3	1.5
P5	2.3

C-DC1
DC Regulator
2 VDC in/9.6 out
comes with DC
cord—will not get
power from BC30)

IC-BP2*
Battery Pack
7.2 VDC 425 mAH
1.5 hr charge

IC-BP3†
Battery Pack
8.4VDC 250 mAH
15 hr. charge

IC-BP4*
Battery Case

Battery Pack
10.8 VDC, 425mAH
1.5 hr charge

IC-BC25U
AC Wall Charger
117 VAC in
(for charging
BP3 only)

IC-CP1
Cigarette Lighter
Cord w/Fuse
(charges BP3/powers DC1)

IC-ML1 12 VDC
144 MHz Booster
10W out/12 VDC
(comes with 5ft
coax,BNC to PL-259)

*Requires BC30 Charger
†Will charge from BC30, BC25U, CP1, or 12 VDC Direct (pack is internally regulated)
††Accept 6 AA size batteries - Alkaline or NiCd (Do not attempt to charge Alkaline batteries)

COM's reliable, field proven, andhelds have been the ost popular handheld on e market. Here's a few easons why:

he Transceivers. The IC-2AT atures full coverage of the 2 eter ham band. The IC-3AT overs 220 to 224.99 MHz, and the IC-4AT has 440 to 449.995 MHz. Each radio is only 2.6in x 1.4in x 6.5in in size. Excellent audio quality is provided by a quality speaker and an electret condenser microphone. All have 1.5 watt output and battery saving 0.15 watt low power. Touch Tone® pad is included (on "T" models).

Standard Equipment. Each transceiver comes complete — ready to use — with BP3 rechargeable battery, AC wall charger, flexible antenna, earphone, wrist strap, and belt clip...all standard.

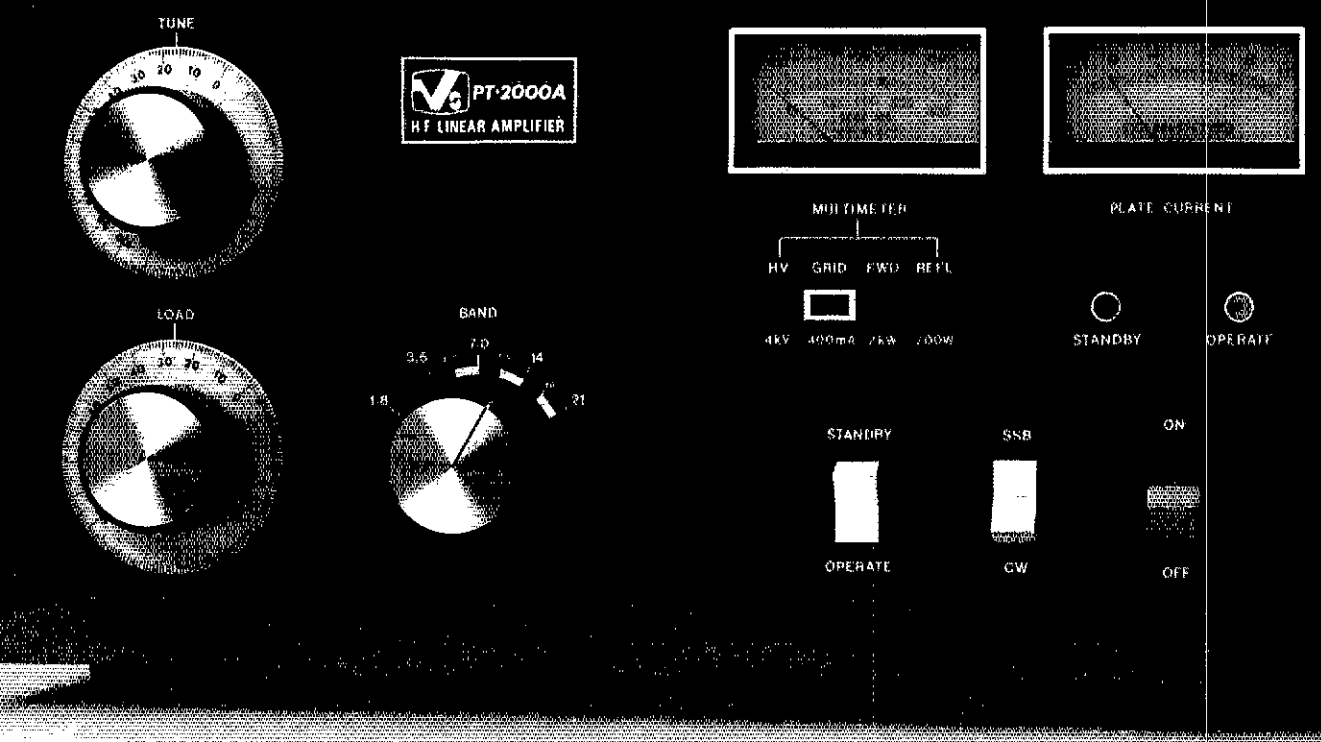
The System. Accessories for the handheld series are interchangeable between transceivers. Slide in removable battery packs allow quick changing of batteries. Batteries may be charged when removed from the transceiver.

ICOM
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155**/3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780.**

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

Quality. For Less!



HF linear amplifier

PT—2000A

$1495

FOB Buffalo, N.Y. Price includes all accessories, cables, tubes and chimneys.

he PT — 2000A Linear Amplifier is a one age, class AB2 Linear Amplifier using two ass envelope, high performance Eimac 500Z power tubes. It is a completely self- ntained table top unit capable of 2300 watts EP input, designed to provide reliable, stable, gh RF output power. It is equipped with a essurized plenum cooling system to ensure timum operation for extended periods of ntinuous use. The circuit and components e conservatively designed and selected for ortless operation under all conditions.

EATURES

signed for SSB, CW, RTTY, AM or ATV eration on the amateur bands between 1.8 Hz and 21 MHz.* (Including WARC bands d MARS operation.) May be customer odified to cover the 28 MHz band. Please nsult the factory.

n be modified for frequencies outside the ateur bands for commerical or military use. ease consult the factory.

anadian and other non-U.S.A. models pplied with 10 meter band.

st heating high performance 3-500Z triodes sure rapid turn-on time.

ntinuous duty squirrel cage blower plus tional muffin fan for extreme extended use.

e Pi-L circuit features;

Heavy duty, 7KV rotary switch with silver plated contacts.

b) A high quality, dual section 6KV plate tuning capacitor which maintains constant Q from 1.8 to 30 MHz*

* Above 21.450 MHz non U.S.A. only

Pi network input for each band.

The power supply features a special heavy duty (30 lb.) continuous rated 1100 VA power transformer, a separate filament transformer and computer grade filter capacitors for maximum realiability.

Power transformer transient protected.

By-Pass standby switch on front panel.

Adjustable ALC Control (up to -30V)

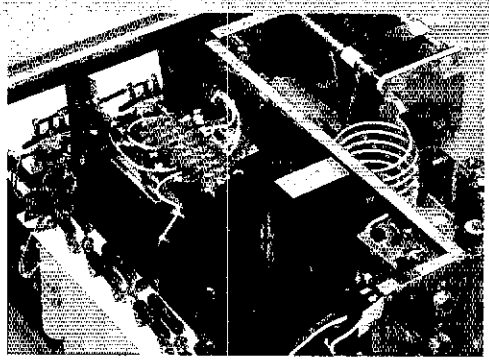
Dual back-lit meter system to monitor all critical voltages and currents.

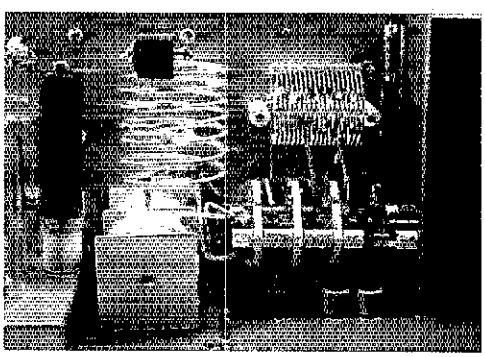
SSB/CW switch for optimum efficiency in all modes of operation.

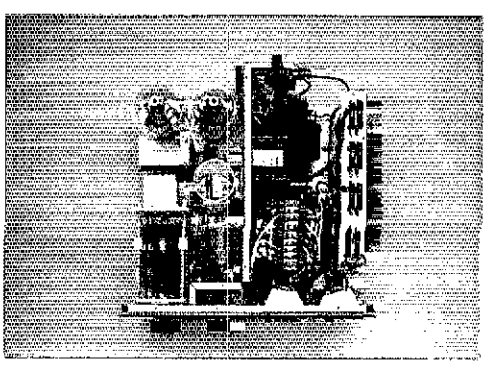
Vernier tuning for smooth and accurate settings on all bands.

Safety interlock disconnects AC line voltage when the top cover is removed.

Major credit cards accepted
Free Brochure available on request.





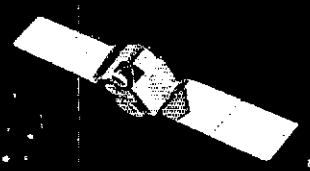


VIEWSTAR INC.

Distributed by: Hammond Mfg. Co.
1690 Walden Ave. Buffalo, N.Y. 14255

4 Edinburgh Rd., Guelph, Ontario N1H 1E5
one: (519) 822-2960 Telex: 06-956523

RCA is a Leader in Communications Command and Control Systems



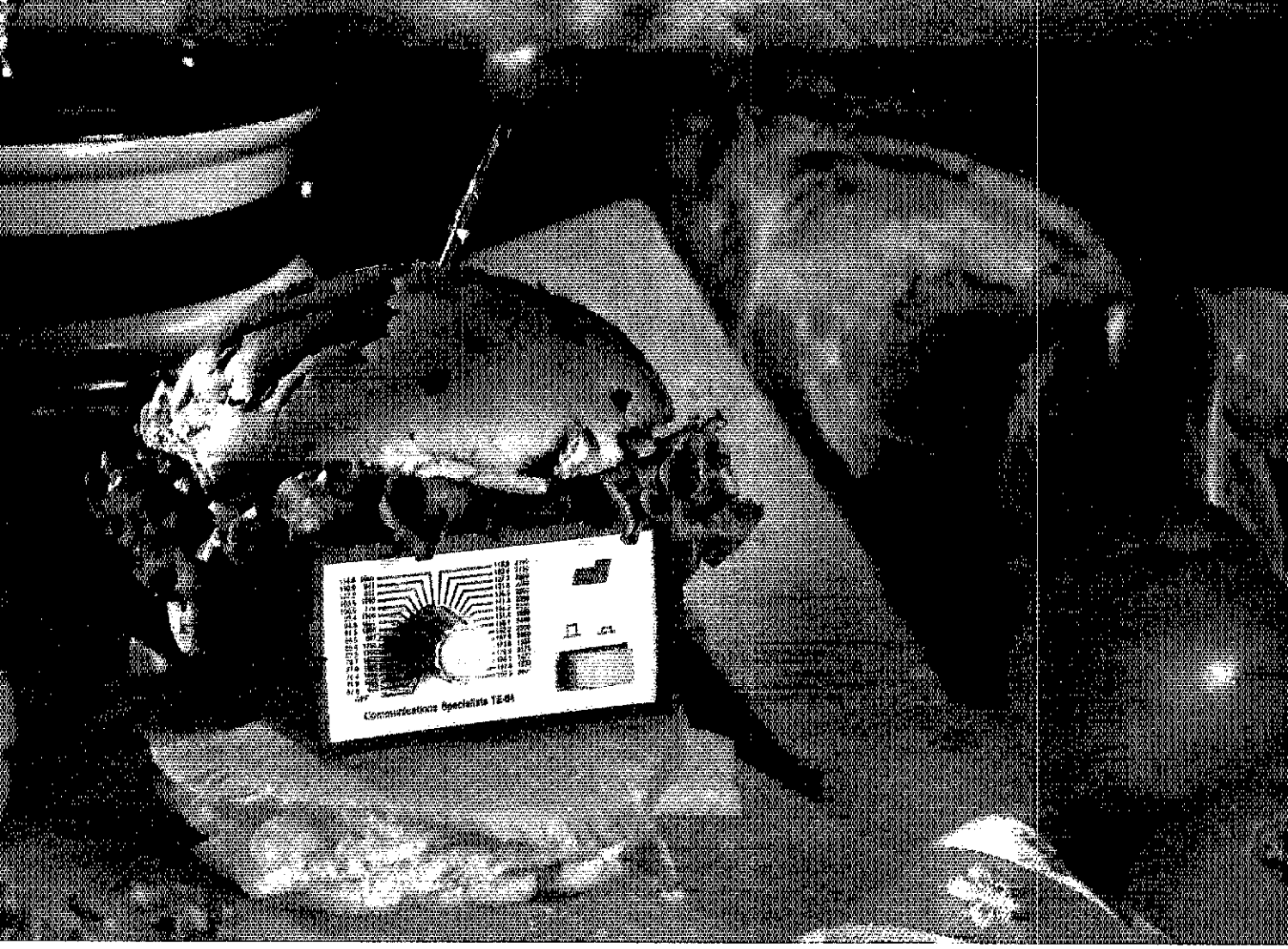
RCA Engineers Explore the Leading Edge of Technology in:

- Frequency agile HF antenna couplers
- Very fast VLSI frequency synthesizers
- HF-VHF-UHF spread spectrum Communications radio design

If you share our commitment to HF long range communications and want to contribute to circuit and system designs of the future, contact:

Dr. U. L. Rohde (DJ2LR)
RCA Corporation
Government Communications Systems
Mail Stop 13-4
Camden, NJ 08102

RCA



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, ± .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

MasterCard VISA

The ultimate team...the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

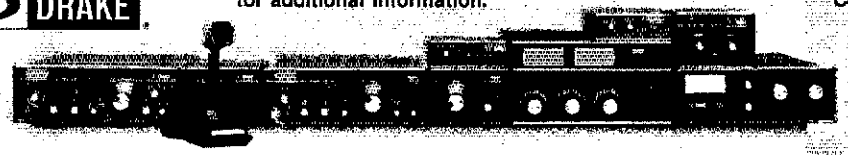
• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

DRAKE

See your Drake dealer or write for additional information.



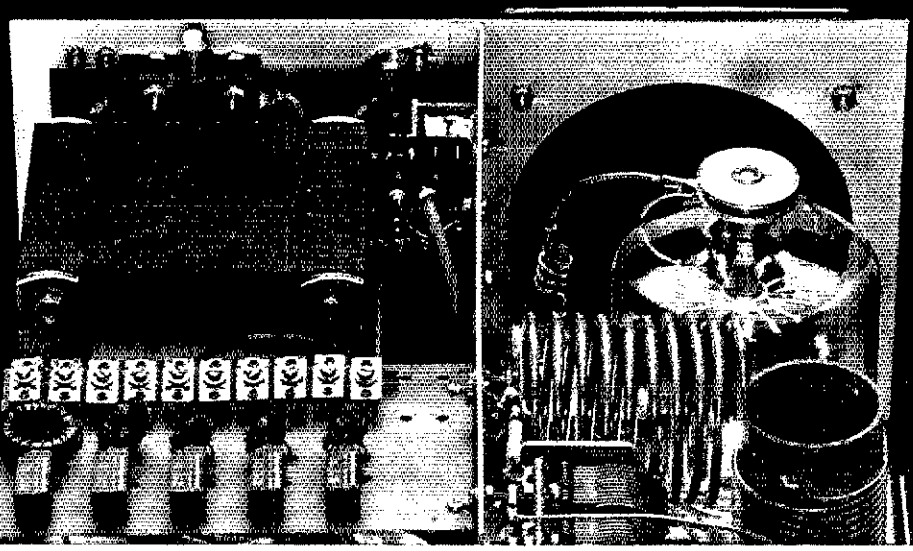
COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive** operation with main transceiver PTO or RV75

R. L. DRAKE COMPANY • 540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

* Patent pending

Ameritron's AL-80 is so Affordable it's Indispensable!



Performance is what an amplifier is all about, and at less than 60¢ per watt, how can you afford *not* to own an AL-80? The AL-80 delivers 1200 + watts PEP, 1000 watts, CW, RTTY and SSTV input and includes FULL BREAK-IN on 160 - 10 meters.*

There is no other 1200 watt linear on the market today selling for $699.50 to offer full break-in and all WARC bands and a one (1) year limited warranty.

We destroyed the AL-80 around a single 8877.

because of its durability, power output and years of proven reliability. It's a workhorse, and we know whether you are competing in a contest or rag chewing, your station's dependability is essential.

At Ameritron we build reliability into all our products. The SPR-8 Studio Processor gives you studio-quality sound in a natural way. The RCS-8 Remote Coax Switch allows you to *instantly* switch up to 5 different antennas, using a single coax, without leaving the comfort of your shack.

Shouldn't your equipment give you performance and economy? Shouldn't it be built by Ameritron?

Buy the Ameritron Line from Dealers across the country, write us for a catalog.

*10 meters included on export models, or may be modified by licensed amateurs.

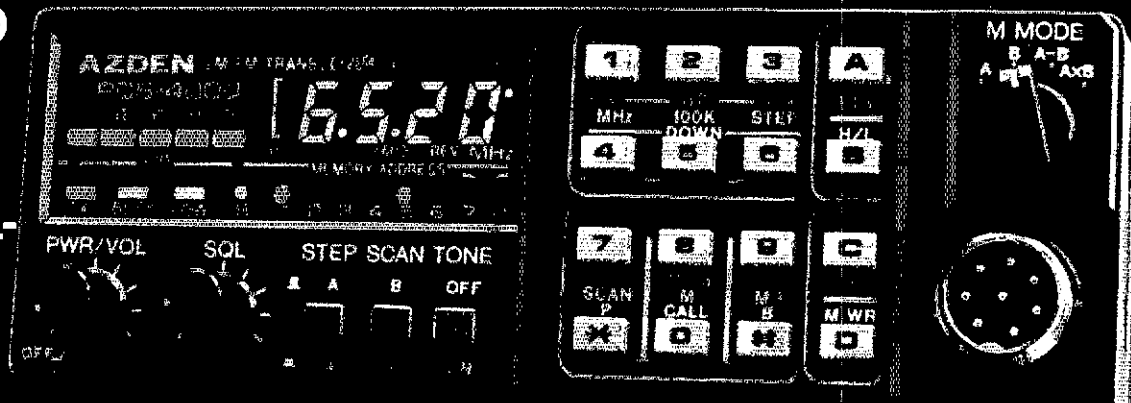
AMERITRON INC.
2071 Midway Drive
Twinsburg, Ohio 44087
(216) 425-3999

New!

AZDEN® PCS-4000

Small-yet so Sophisticated.... so Advanced-there is No Comparison.

SHOWN ACTUAL SIZE



FEATURES SO UNIQUE AND OF SUCH SUPERIOR COMMERCIAL-GRADE QUALITY, THAT...

IT CARRIES A 1 YEAR LIMITED WARRANTY!

- **8 MHZ COVERAGE, CAP/MARS BUILT IN:** 142.000-149.995 MHz in selectable steps of 5 or 10 kHz. **COMPARE!**
- **TINY SIZE:** Only 2" H x 5.5" W x 6.8" D! **COMPARE!**
- **MICROCOMPUTER CONTROL:** At the forefront of technology!
- **UP TO 8 NON-STANDARD SPLITS:** Ultimate versatility for CAP/MARS. **COMPARE!**
- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard offset.
- **DUAL MEMORY SCAN:** Scan memory banks either separately or together. **COMPARE!**
- **TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan the two segments either separately or together. **COMPARE!**
- **FREE AND VACANT SCAN MODES:** Free scanning stops 5 seconds on a busy channel. Vacant scanning stops on unoccupied frequencies.
- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency.
- **TWO PRIORITY MEMORIES:** Either may be instantly recalled at any time. **COMPARE!**
- **NICAD MEMORY BACKUP:** Never lose the programmed channels!
- **FREQUENCY REVERSE:** The touch of a single button inverts the transmit and receive frequencies, no matter what the offset.
- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.
- **BRIGHT GREEN LED FREQUENCY DISPLAY:** Easily visible, even in direct sunlight.
- **DIGITAL S/RF METER:** Shows incoming signal strength and relative output.
- **BUSY-CHANNEL AND TRANSMIT INDICATORS:** Bright LEDs show when a channel is busy and when you are transmitting.
- **FULL 16-KEY TOUCHTONE* PAD:** Keyboard functions as autopatch when transmitting.
- **PL TONE:** Optional PL tone unit allows access to PL repeaters. Deviation and tone frequency are fully adjustable.
- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and fidelity.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-range communication and battery conservation. (Transmitter power is fully adjustable)
- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV for 20-dB quieting. Audio circuits are designed to rigorous specifications for exceptional performance, second to none. **COMPARE!**
- **REMOTE-CONTROL MICROPHONE:** Memory A-1 call, up/down manual scan, and memory address functions may be performed without touching the front panel! **COMPARE!**
- **OTHER FEATURES:** Dynamic microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.
- **ACCESSORIES:** CS-6R 6-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.
- **ONE-YEAR LIMITED WARRANTY!**

EXCLUSIVE DISTRIBUTOR:

AMATEUR-WHOLESALE ELECTRONICS **TOLL FREE...800-327-3102**

8817 S.W. 129th Terrace, Miami, Florida 33176 Telephone (305) 233-3631 Telex: 80-3356

VISA MasterCard

MANUFACTURER:

AZDEN **JAPAN PIEZO CO., LTD.**

1-12-17 Kamiereiaku, Mitaka, Tokyo, 181 Japan. Telex: 781-2822452

The inside story on TEN-TEC's CORSAIR.

All solid-state broadband design.

All 9 HF bands—160-10M. All bands ready to go.

Full output at 100% duty cycle, *all* bands, *any* mode, even RTTY and SSTV. 200 W. input.

Triple Conversion Receiver with switchable RF Preamp. for sensitivity of 0.25 μV on all bands with dynamic range of 90 dB or better. 3rd order intercept +15 dBm.

Variable Bandwidth *plus* Passband Tuning. Narrow the bandwidth or move the passband anywhere in 2.4 kHz bandwidth. Standard 12 pole filter; optional filter converts to 16 pole performance.

Dual-range, triple-mode, Offset Tuning receiver, transmitter, or both—±1 kHz or ±4 kHz.

Variable Notch Filter—adjustable frequency, better than 50 dB depth.

Speech Processor clipper/compressor design with up to 10 dB processing.

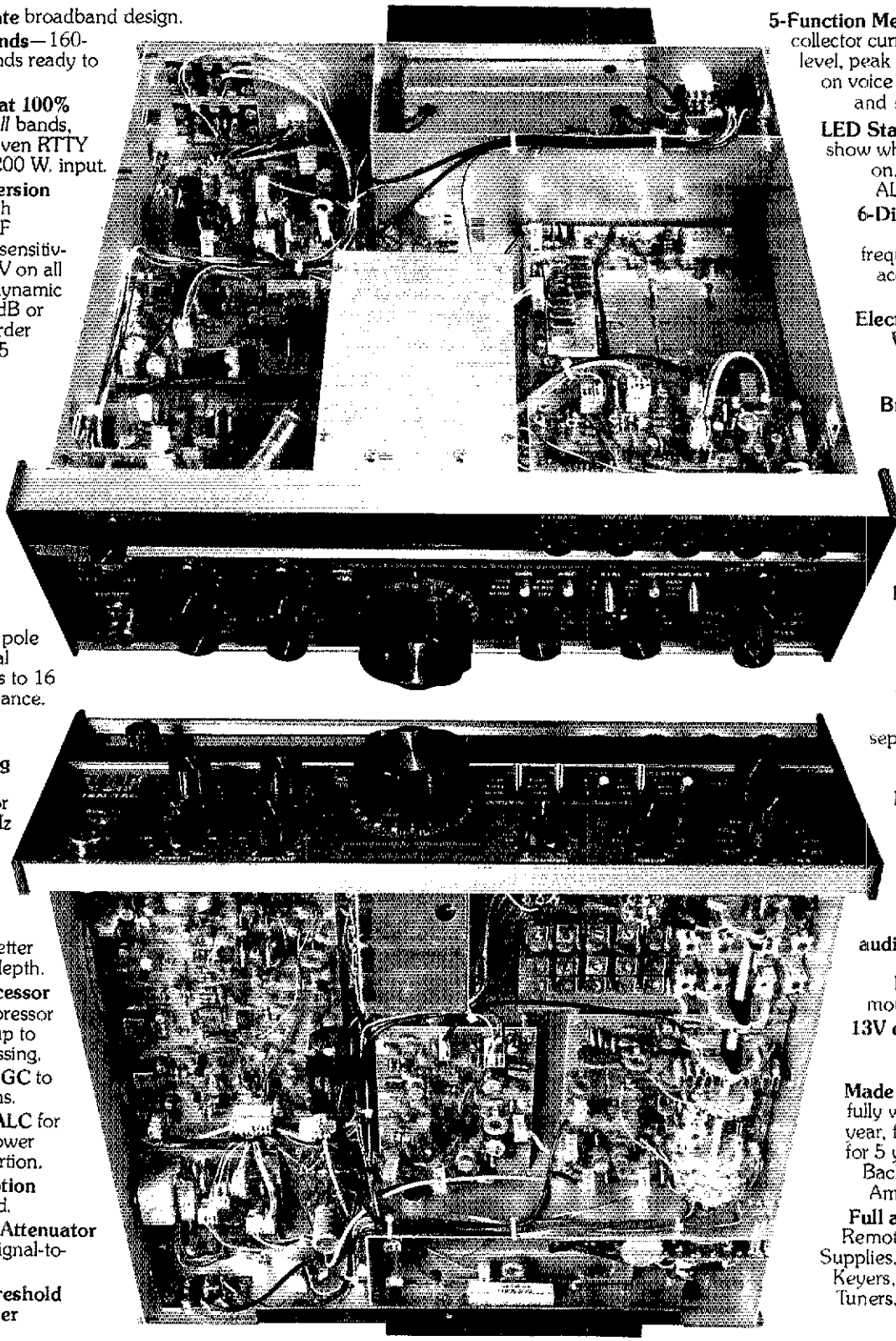
Fast/Slow AGC to suit conditions.

Adjustable ALC for maximum power without distortion.

WWV Reception 10 MHz band.

Headphone Attenuator to enhance signal-to-noise ratio.

Variable Threshold Noise Blanker



5-Function Meter—monitors collector current, processor level, peak forward power on voice and cw, SWR, and signal strength.

LED Status Indicators show when RF amp. is on, Processor on, ALC, and Offset.

6-Digit Readout—with LSI true frequency counter, accurate on both sidebands.

Electret Polarizing Voltage at Mic. Jack.

Full or Semi Break-in for cw.

CW Signal Spotter—easier to use, just match tones instead of zerobeat.

High Articulation Keying—3.5 msec rise-decay time.

Complete Interfacing for accessories—separate rec. ant., QSK linear, separate VFO, keyer, speaker, ant. relay, RTTY, Phone Patch, remote band switching.

Less than 2% audio distortion—compression loaded bottom mounted speaker.

13V dc design—for easy mobile operation.

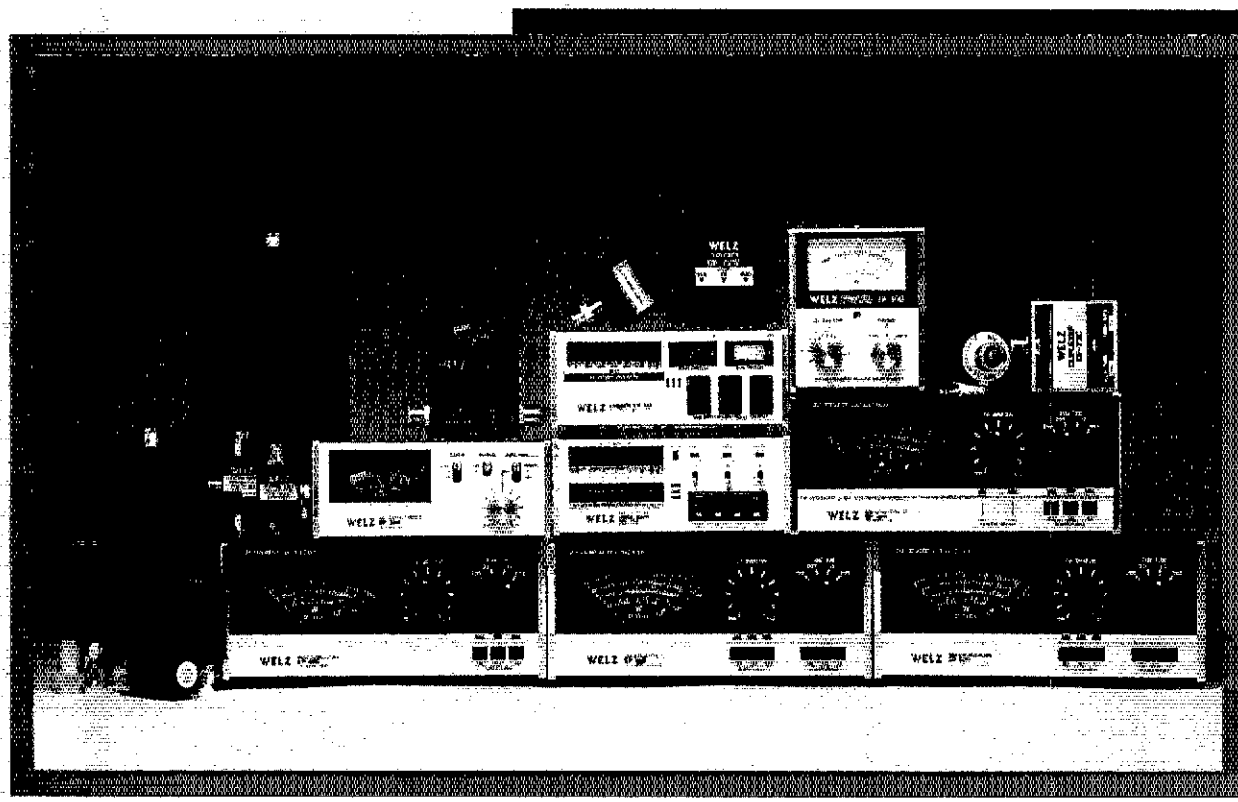
Made in the USA—fully warranted for 1 year, final transistors for 5 years, pro rata. Backed by reliable American service.

Full accessory line: Remote VFO, Power Supplies, Microphones, Keyers, Antennas and Tuners, SSB and CW Filters.

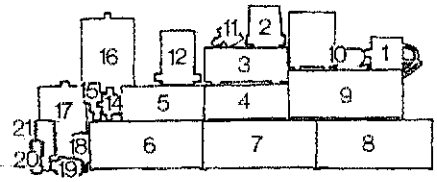
CORSAIR—a new level of achievement in amateur radio design, with every feature for effortless, effective operation. Try CORSAIR at your TEN-TEC dealer—you'll discover what easy operating is all about. And what a remarkable value CORSAIR represents.

See your TEN-TEC dealer or write for full information.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862



INTRODUCING



The WELZ Family of Communications Accessories

Come to the WELZ for Station Accessories. WELZ Co., Ltd., is the source for top quality, superior performing, affordable products to compliment the mainstay radio equipment in your station. Increase the versatility of your station with WELZ Wide-Z Sensor™ power and V.S.W.R. meters, precision 50 ohm terminations with bandwidth to 1300MHz, EMP surge protectors, termination wattmeters and more. The unique features and solid performance of WELZ products make you more comfortable getting maximum performance from your station. The products in the photo and listed below are just some of the WELZ family of products. Send QSL for full catalog and **see us at the Dayton Hamvention, 1983.**

1 & 2 — Duplexers (**DF-72C & DF-72W** shown) WELZ produces a series of these "little black boxes" to permit operation on any two of several bands from HF thru 449MHz. $23-50.00 depending on model. **3** — **LX-10F** AC Power Meter, line filter and switch box for organizing your shack and taking the trash off of the AC Mains. $82.00. **4** — **RS-120** Non Interruptable Power Supply with battery charger terminals and 10 amp capacity, when used with auxiliary battery. $210.00. **5** — **SP-250** most economical 1.8-50MHz, 2KW Wattmeter & V.S.W.R. Meter is perfect for your hamshack. Has <0.06db insertion and 3 watt sensitivity. $75.00 **6** — **SP-400** VHF-UHF 130-500MHz Inline type Wattmeter. Very good accuracy (10%) has 5/20/150 watt scales. Has "N" type connectors. $108.00. **7** — **SP-300** HF-VHF/UHF Three Sensor Wattmeter up to 1KW HF- 200W VHF/UHF. Three power levels, 10% accuracy and excellent sensitivity. $150.00. **8** — **SP-600** our best Three "Wide-Z" Sensor 2KW Power Meter for HF-VHF-UHF sensor 1 is 1.6-60MHz at 2KW, sensor 2 is 1.6-150MHz at 200W, sensor 3 is 130-500MHz at 200 watts. These three sensors allow monitoring of exciter drive and amplifier input V.S.W.R., amplifier output and antenna V.S.W.R. and power and V.S.W.R. on the VHF/UHF station at the touch of a finger without changing cables or "slugs." $157.00 **9** — **SP-200** the single element 1KW but 2 antennas for HF operation 1.8-160MHz Wide-Z Sensor great performance, style for the hamshack. $107.00. **10** — **TP-20G** 50MHz to 1300MHz Termination Power Meter compact fast acting 5-7% wattmeter is ideal for up to 15 watt units. $210.00 **11** — **TP-05X** 50-500MHz Handheld performance meter. Built in BNC connector fits on most handhelds. Tells if TX is up to specs. $21.00. **12** — **SP-10X** 1.8-150MHz Pocket Size unit for convenient field or shack use. Handles up to 200 watts, 10% accuracy. $37.00 **14 & 15** — **CA-35A & CA-23N** Coaxial EMP Surge Protectors contain the latest changable chip technology for surge protection. Handle 300 watts up to 500MHz with low insertion loss. 35A-$22.00, 23N-$26.00. **16** — **CT-300** 1KW Wide Band Oil less Aircooled Dummy DC-250MHz handles 1KW for 3 min. and 300 watts continuous. $68.00. **17** — **CT-150** 400W Wide Bank Oil less Aircooled Dummy DC-250MHz has gold plated SO-239. Less than 1.1:1 up to 250MHz. $46.00. **18** — **CT-15N** 15 Watt DC-500 MHz Dummy Load gold plated type "N" connector, 50 watt peak power (3 min). V.S.W.R. <1.1:1. $21.00 **19** — **CT-15A** 15 Watt DC-500MHz Dummy Load, the work horse around any shack. 50 watts peak (3 min). V.S.W.R. <1.2:1. $12.00. **20 & 21** — **CT-03N & CT-20G** DC-1300MHz Dummy Loads CT-03N 3 watts, low V.S.W.R. <1.1:1 at 1.3GHz. (03N) — $47.00 (20G) — $123.00.

WELZ

Communications Accessories

Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

FOR SALE: Kenwood RM-76 microprocessor unit for TR-7600. Like new. $40. Dave Wells KD6TO P.O. Box 27373, Oakland, CA 94602 415-531-2800.

DRAKE L-4B, MN-2000, both mint, little use, $950 or best offer. No shipping, K1CM, 617-331-5555.

FOR SALE: TenTec Argonaut 515 mint, $280; Kenwood TR-7800, exc., $235; Icom R-70 receiver, mint, $630; R-392, exc., extras, $145; add. UPS. Ham mags: S.A.S.E. for list, details. WA7ZYQ, 208-245-2070.

ATLAS 210X, AC console and mobile mount-mint $300 Hustler mobile antenna, RM 10 thru 80 meter coils, s/steel body mount, quick disconnect $85. Dentron Jr. Monitor $50 Kenwood 700SP $425 SB-200 linear $300 mint Kenwood MC 45 mic $15. Tele 814-724-2497 KC3DX.

TUBES - Huge inventory of new and used tubes including industrial electron tubes. No list available. Reasonable, guaranteed. Send list of tubes needed and SASE to: N1BGL 16 Hillcrest Avenue, Dedham, MA 02026.

MICROLOG/AVR-1 and A-Tronix cw keyboard excellent condition. $275, manuals Tony KA2KCE 914-965-4773.

SALE: Tektronic storage scope Type 564 with Type 3A6 dual amp & Type 3B3 time base, including manuals. Needs minor work $125 plus shipping. K1KON, 203-838-1335.

DRAKE Twins for sale - R-4C, T-4XC, AC4, MS4, all filters, 4NB blanker, all cables, manuals, factory cartons. Absolutely mint condition - very late serial no's. -$900 or best offer. Must sell. J. McMorran, 1092 Orlo NW, Warren, OH 44485 216-393-8289.

SLEP Specials, new factory boxed Ten-Tec 560 Corsair $995; 280 P/S $149; 260 P/S $179; 263 remote VFO $179; DRake TR-7A $1,389; TR-5 $669; PS-7 P/S $269; PS-75 $179; RV-7 remote VFO $169; RV-75 synthesized VFO $259; 9000E new model RTTY/CW communications terminal $824; ICOM 720A $1,139, IC-740 $949, ICR70 receiver $649; Collins KWM-380 with 4 filters, N/B, control interface, with latest December 1982 Collins factory installed updates, 1 year customer warranty, last chance at old prices $2,850. Add shipping. Phone 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

GIVING it up - must sell FT901DM with CW filter, SP901 speaker/patch, FC901 tuner - $725; FT707 with CW filter, FP707 power supply/speaker, FC707 tuner, mobile mount - $650; FL2100B linear - $375. All equipment immaculate, unmodified, in factory cartons, with all manuals. Norm Newman, WAØBSN, 314-441-1443 after 6 PM CST.

IBM-PC software. Logger/Duper, user programmable any log format $39.95. QSLer for automatic QSL card into $19.95. Ham Data Base, DXCC bearings and records, $39.95. Micro Electronic Systems, 19 Annette Park Drive, Bozeman, MT 59715.

WANTED: Oscilliscope. Low priced. 0 to 5 MHz or 10 MHz. W2GCN, John Davis, 415 Mountainview Ave. S.I N.Y. 10314 212-698-3690.

VIC20 SOFTWARE with expansion makes Vic a full featured CW keyboard. Runs on bare Vic as a memory keyboard. Excellent value at $20 SASE for details. Jim Grubbs PO Box 3042 Springfield, IL 62708.

COLLINS 200 Hz filter, for 75S-3B/C, new, $95 postpaid or b/o. John Werner 26316 Falmouth, Warren, MI 48089.

ATLAS 210XNB and 215XNB each $290; Atlas 10X MARS xtals $50. WA6ERB/Ø 309-986-0189(e).

HEATH SB-101 transceiver, SB-600 speaker with HP-23 AC supply, HM-15 RPM, $225 or best offer. WB2DFK, 20 White Birch Drive, Guilford, CT 06437.

WANTED - RME 4301 Sideband Selector. Jay Luster W6QHD 10028 Park, Bellflower, CA 90706.

MICROWAVE Modules: Call for our unbeatable price on MMT144-28, MMT432/435-28s, MMT 1296-144. Lunar amplifiers with preamps - 50MHz; 120 watt $238; 144 MHz; 40 watt HT $109, 100 watt $238, 150 watt $260, 200 watt $315, 220 MHz; 80 watt $186, vhf/uhf GaAsFet preamps by Lunar $112.45, mastmounted GaAsFets $249.95, other preamp models available call Astron: VS35M $167.50, RS35M $148.50 RS35A $129, other models available from 7-50 amps. KLM 140-150 MHz verticals $25, Mirage D1010N 100 watt 430-450 MHz $280 VHF Shop Box 349 RD 4 Mountaintop, Pennsylvania 18707 info/orders M-F after 6:00 PM, weekends anytime! 717-868-6565. Two stamps for catalog.

1269-1296 EQUIPMENT - Call on UHF units: 1269-144MHz. transmit upconverters, 1296-144/28MHz. transverters, 1269-1296MHz. 50-120 watt linear amplifiers, 1296 MHz MGF1402 GaAsFET preamps, dish feeds etc. Announcing: Lunar kits: Low noise DBM converter kits from 50-450MHz including ATV models, Lunar/ARCOS 1kw amplifier kits from 50-450MHz. Santec St-144up 279.00, Tokyo Hy-power amplifiers call! Belden 8214 $.39/ft VHF Shop K3MKZ 717-868-6565.

WANTED: CRT for Tektronic Type 422 scope PN 154-0466-05. K1KON 203-838-1335.

ICOM IC-730 $550; FL-30 and FL-45 each $40; HM-10 $25; SM-5 $25; IC-402 70cm $290, IC3PS/IC30L $130, both $390; ICPS-15 $95; WA6ERB/Ø 303-986-0189(e).

IF YOU HAVE SUFFERED A HEART ATTACK...A unique opportunity is available to eligible persons nationwide to participate in a program supported by the National Institutes of Health.
The Hyperlipidemia-Atherosclerosis Study is designed to explore the possibility of reversing the disease (atherosclerosis) which cause life threatening heart attacks. You or someone you know may be eligible.
Participants must: *be age 29 through 64 *have had only *one* heart attack in their lifetime (suffered within the past 4 1/2 years) *be free of stroke *be free of diabetes *not have had heart surgery.
Transportation and lodging for participants and an interested family member are *free of cost.* The study works closely with each person's private physician.
Please contact the Hyperlipidemia Study Center *nearest* you.
EASTERN - Philadelphia, PA 1-800-345-1057 toll-free 1-800 -362-5244 Pennsylvania only MIDWEST - Minneapolis, MN 612-376-4494 collect.

COMPUTERS-TRS-80's-Big discount price. Monthly specials-call for current prices. Hancock Techtronics, Hancock, MD 21750 301-678-6000.

4-1000A, EIMAC chimney, EIMAC airflow socket $100, HV transformer 3000-0-3000 large 11 x 16 x 11. $125, 3-872's plus sockets $27.50. 2 MFd 8000V filter condensers, filament transformer for 4-1000 $10 Telrex — 320M26 $125 All FOB Don W6MRE, 6803 Amestoy Ave., Van Nuys, CA 91406 213-344-6309.

HOMEBREWERS: Incredible Semiconductor Bargains: Hi-Voltage rectifiers 14,000V, 1Amp. $6. 4/$20. Bridge rectifiers 35 Amp. 1000V. $2. 1N4004: 20/$1. 1N4007 10/$1. S.A.S.E. list Semiconductors/test equipment. K2AW's "Silicon Alley" Frank Fix, 175 Friends Lane Westbury, NY 11590 516-334-7024.

Jobs for Hams

HAM RADIO Specialists - Coed camps located in Milford, PA., approximately 80 miles from New York City. Excellent salary and working conditions. June 17-August 19. Contact Steve Brownstein, NJ YMHA Camps, 21 Plymouth Street, Fairfield, NJ 07006, 201-575-3333.

WANTED for Summer of 1983: Instructors in electronics, computers, and ham radio. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, P.O. Box 356, Paupack, PA 18451.

COUNSELORS...Maine Boys' camp ham radio, Electronics, code, General License, may bring own equipment. Write: Richard Krasker, 95 Woodchester Dr., Chestnut Hill, MA 02167.

COUNSELORS: Connecticut brother-sister camp. Completely equipped with ham radio station. Program includes electronics, kit building, code and communications. June 25 - August 22. Send resume: Lloyd Albin (N2DMQ) Ken-Mont and Ken-Wood Camps, 2 Spencer Place, Scarsdale, NY 10583.

COUNSELORS: Ham Radio. Also specialists in land sports, water and cultural activities. Camp Wayne children's camp, Northeast Pennsylvania. 18-1/2 + years. 570 Broadway, Lynbrook, NY 11563 516-599-4562. (Include telephone number)

HAM RADIO, broadcasting counselor, 21 years or older, for summer sleepaway camp near Pittsfield, Massachusetts. Camp Emerson, 5 Brassie Road, Eastchester, NY 10707 914-779-9406.

HAM Counselor wanted. New Hampshire Boy's Camp. June 21-August 22. Write: John Klein, 28349 Chagrin, Cleveland, OH 44122. 216-831-4330.

hy-gain®

V Series Antennas

More ERP* for your Repeater

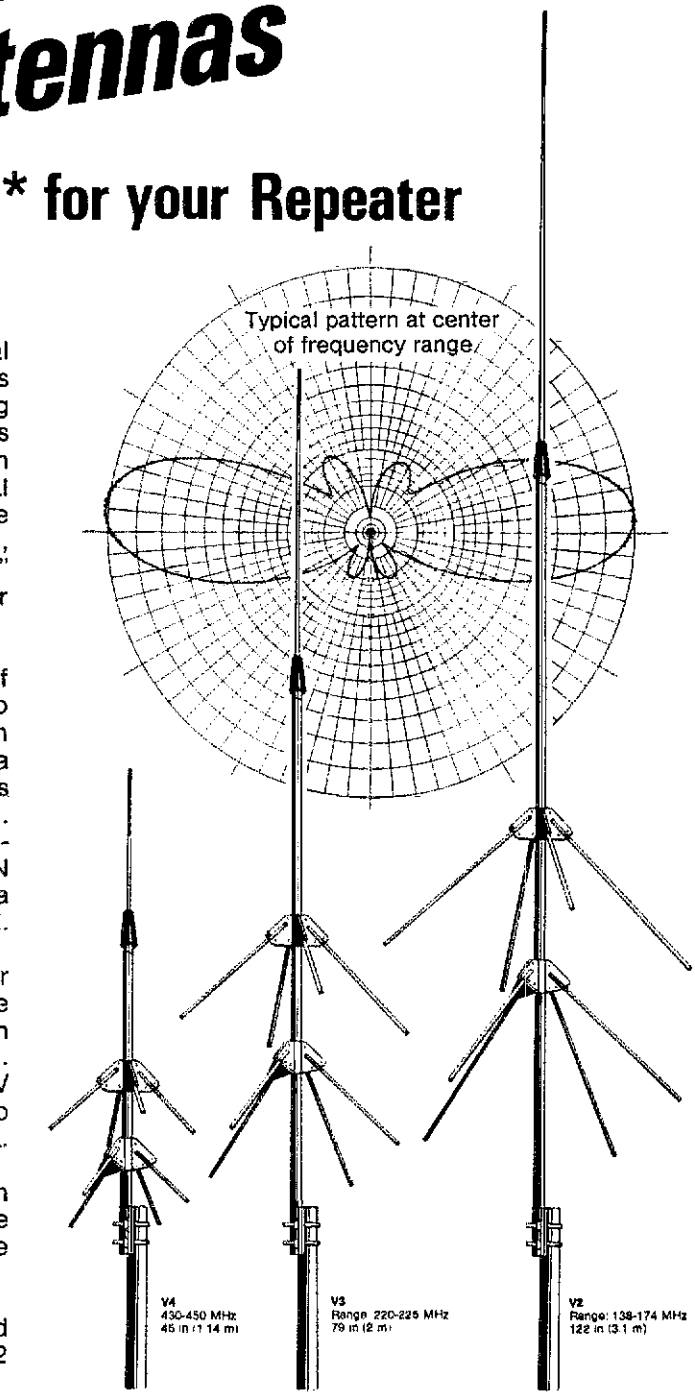
Hy-Gain V Series antennas focus the omnidirectional pattern evenly at the horizon, without high angle lobes or horizontally polarized content. By concentrating the power at the horizon you get cleaner transmissions over longer distances, improved communications in valleys and reduced picket fencing of the signal between tall structures. A Hy-Gain V antenna is like adding an amplifier and receiver pre amp. And, because antennas which "talk" louder, also "hear" better, a V Series antenna is also ideal for your home QTH.

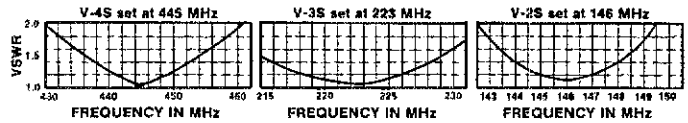
Extended double zepp V Series antennas consist of two stacked .64 wave vertical sections in phase. Two sets of 1/4 wave radials decouple the antenna from the mast and feed line so all RF goes into the antenna and is not radiated by the coax. The feed line connects through the lower section to the center matching coil. This not only provides weather protection for the connector (SO-239 connectors for V2, V3. Type N connector for V4) but also places the entire antenna at dc ground to reduce lightning hazard and QRN.

V Series antennas are easily assembled in one hour or less. Rugged and maintenance free, they're made of seamless, corrosion resistant 6063-T832 aluminum and all critical hardware is of passivated stainless steel. They'll withstand winds of 100 mph (160 km/h). V models accept mast diameters up to 2" (50 mm) so you can readily mount a V above your HF antenna.

Since a Hy-Gain V Series antenna costs only a fraction of a re-tuned landmobile antenna, you can now realize the *full* potential of your communications with the repeater or your home station, economically.

For unbiased information ask any of several thousand V2 users or read the product review in QST May '82 or Amateur Radio Profiles Vol. 2, No. 3.





V Series antennas cover the entire band with VSWR below 1.5:1. Broadband characteristics insure optimum repeater performance on both input and output frequencies.

*Effective Radiated Power (ERP)

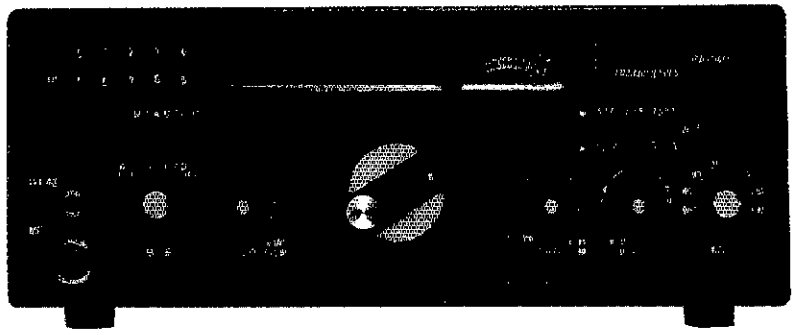
TELEX hy-gain

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte - Office 711, Centre Affaires Paris-Nord 93153 Le Blanc-Mesnil, France

More kit quality

A triumph of price and performance — Heath's new HW-5400 Synthesized HF SSB Transceiver kit makes high technology affordable. With more versatile, far-reaching capabilities, it puts the original skill and adventure back into Amateur Radio...



HW-5400 Transceiver

Heath breaks the price barrier on sophisticated transceivers, offering the highest value for your hamshack dollar. The slim, new HW-5400 is a marvel of kit-form engineering that performs like a dream on 80-10 meters.

MORE ADVANCED IDEAS

Solid state and broadbanded, the HW-5400 incorporates more performance-improving features at a lower price than any comparable transceiver. It's fully synthesized for crystal stability and accuracy. Operating in USB, LSB and CW with automatic sideband selection, it has full break-in (QSK) for proficient keyers, two memories per band, power supply activation at the Transceiver, defeatable amplifier relay, reverse and over voltage protection as well as high VSWR forward power cut-back circuitry for the finals.

A custom microprocessor yields flexible, fingertip control over all phases of T/R operation.

MORE CONVENIENCE

This perfection-packed kit has many benefits. A unique dual-speed tuning system can extract new QSOs or fly through a band in 1 kHz increments with 50 Hz resolution! *Split-Memory Access* lets you review and change the transmit frequency while in receive, without missing a single word or fragment of code. With it, you can beat the QRM every time. Essential vox and sidetone controls are located behind the front panel nameplate. Seven mode and function symbols confirm transceiver status at a glance.

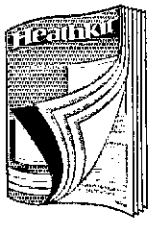
The HW-5400's Frequency Entry Keypad option allows directly-synthesized QSY to any point in the band, and permits fast DX control when used with the Split Memory function. The matching HWA-5400-1 Power Supply/ Speaker & Digital Clock (not shown) provides a double-fused source of 13.8 VDC from 120 or 240 VAC.

MORE ENJOYMENT

Novice or active pro, the HW-5400 is perfect for operators who want a Transceiver that's second to none, plus the pride, knowledge and satisfaction that come from building it yourself with our world famous step-by-step manuals. You may find it to be the first microprocessor-controlled rig with enough potential to match the level of professionalism in every radio amateur!

MORE DETAILS IN CATALOG

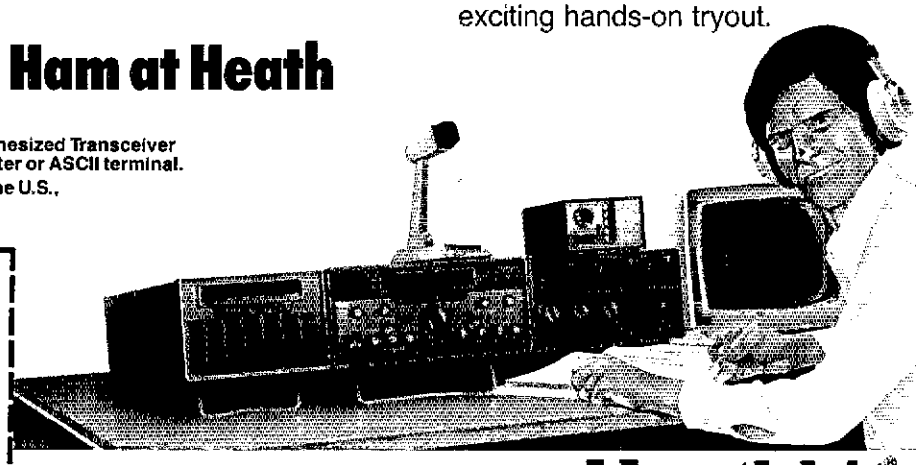
FREE! For complete details and specs, get a copy of the latest Heathkit catalog. Remove and mail the coupon today or write: Heath Company, Dept. 009-014, Benton Harbor, MI 49022. Visit your local Heathkit Electronic Center* for an exciting hands-on tryout.



There's more for the Ham at Heath

Also see our state-of-the-art SS-9000 Deluxe HF Synthesized Transceiver (pictured below), which can be controlled by a computer or ASCII terminal.

***Units of Veritechnology Electronics Corporation in the U.S., a subsidiary of Zenith Radio Corp.**



☐ Please send me a FREE Heathkit catalog.

Mail to:
Heath Company, Dept. 009-014
Benton Harbor, MI 49022

Name _____

Address _____

City _____

State _____ Zip _____

AM-436

Heathkit®

MIRAGE

American made RF Amplifiers and Watt/SWR Meters of exceptional value and performance.

•5 year warranty • prompt U.S. service and assistance

RF AMPLIFIERS

2 METERS-ALL MODE

B23 2W in=30W out $89.95
(useable in: 100 mW-5W)

B108 10W in=80W out $179.95
(1W=15W, 2W=30W) RX preamp

B1016 10W in=160W out $279.95
(1W=35W, 2W=90W) RX preamp

B3016 30W in=160W out $239.95
(useable in: 15-45W) RX preamp
(10W=100W)

220 MHz ALL MODE

C106 10W in=60W out $199.95
(1W=15W, 2W=30W) RX preamp

C1012 10W in=120W out $289.95
(2W=45W, 5W=90W) RX preamp

C22 2W in=20W out $89.95
(useable in: 200mW-5W)

RC-1 AMPLIFIER
REMOTE CONTROL $24.95
Duplicates all switches, 18' cable

WATT/SWR METERS

- peak or average reading
- direct SWR reading

MP-1 (HF) 1.8-30 MHz
MP-2 (VHF) 50-200 MHz
$119.95

430-450 MHz ALL MODE

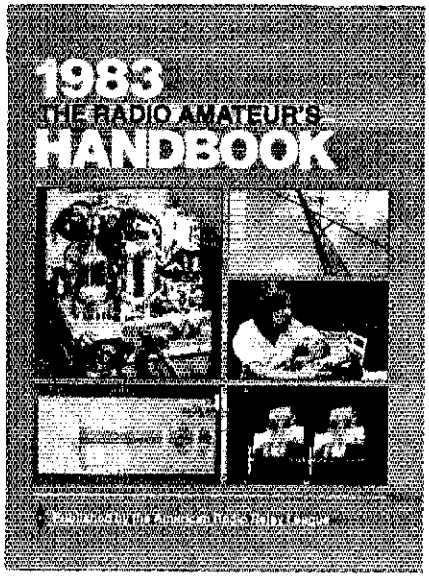
D24 2W in=40W out $199.95
(1W=25W)

D1010 10W in=100W out
(1W=25W, 2W=50W) $319.95

Available at local dealers throughout the world.

MIRAGE
COMMUNICATIONS EQUIPMENT, INC.

P.O. Box 1393, Gilroy, CA 95020 (408) 847-1857



The 1983 Edition of the *RADIO AMATEUR'S HANDBOOK* continues the tradition of presenting the most up-to-date concepts in radio frequency communications. The previous 58 editions can be found in the libraries of engineers, technicians, students and radio amateurs around the world.

Expanded emphasis is given to the use of Amateur Radio satellites including tracking programs. The builder will find a wealth of new construction projects. The following three pages show some of the material added to the new edition and a breakdown of the contents of each chapter.

Chapters included in this big 640-page edition are:

- Amateur Radio
- Electrical Laws and Circuits
- Radio Design Technique and Language
- Solid State Fundamentals
- AC-Operated Power Supplies
- HF Transmitting
- VHF and UHF Transmitting
- Receiving Systems
- VHF and UHF Receiving Techniques
- Mobile, Portable and Emergency Equipment
- Code Transmission
- Single Sideband
- Frequency Modulation and Repeaters
- Specialized Communications Systems
- Interference with Other Services
- Test Equipment and Measurements
- Construction Practices and Data Tables
- Wave Propagation
- Transmission Lines
- Antennas for High Frequency

Projects and topics added to the new Handbook include:

- Code Practice Oscillator
- QSK kW HF Linear Amplifier
- 250-Watt Linear Amplifier Covering 30-m Band
- Two-Tone Generator
- High-Performance ssb Speech Processor
- Simple Switching Regulator
- General-Purpose RTTY Demodulator
- 50-MHz Transmitting Converter
- 8-Band Communications Receiver
- Frequency Spectrum Chart
- Introduction to Packet Radio and Spread Spectrum
- New RFI Chart showing Frequency Relationships Between Amateur Bands (including WARC) and Other Services (including CATV)
- 10 GHz Gunnplexer, Communications
- New Antennas for vhf fm
- Updated Parts Supplier List

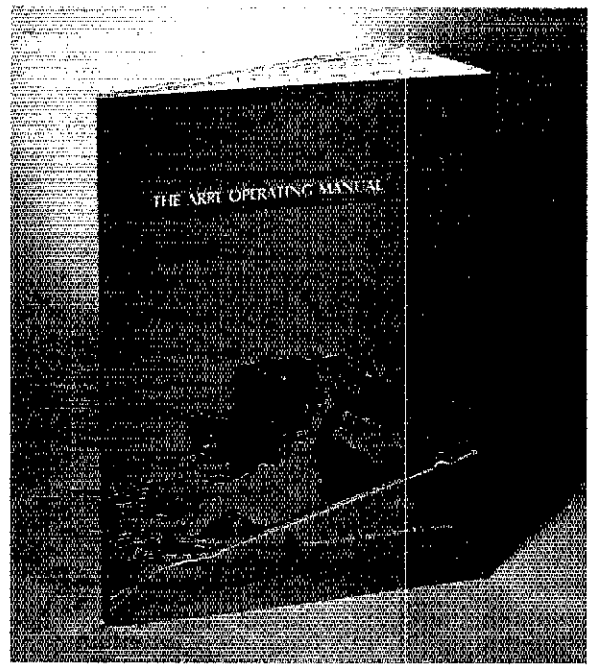
Paper Edition: $12 in the U.S., $13 in Canada, $14.50 elsewhere. Cloth Edition: $17.75 in the U.S., $20.00 elsewhere.

THE ARRL OPERATING MANUAL

We think that this is the finest book on Amateur Radio operating ever written, and the 1980 Edition is well on its way to becoming one of the ARRL's best sellers! Each chapter was written by an expert with extensive on-the-air experience in his or her field. You'll find dozens of useful charts and tables. All facets of operating are covered in a style which shows how fun and rewarding the Amateur Radio experience can be.

Chapters include: Basic Amateur Radio, Rules and Regs, Traffic Handling, Emergency Communications, DX and DXing, Contests, Awards Chasing, FM and Repeaters, VHF/UHF Operating, Satellites, Visual Communications, Microcomputers, and Shortwave Listening.

Contains these important references: 5BDXCC country check-off list with continents, ITU and CQ zones of each country, ARRL Numbered Radiograms, International Call Sign Allocations, Q Signals, CW Abbreviations, RST System, Beacon Frequencies, DX Operating Code, Spanish Phonetics plus much more!



The 1980 Edition is the first in the large (8-1/2 × 11) format and replaces the *Operating Guide* and the three previous editions of the old *Operating Manual. 154 Pages, $5.00in the U.S., $5.50 elsewhere*

ADVERTISING DEPARTMENT STAFF

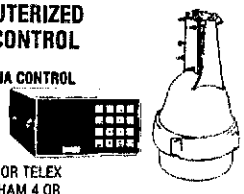
Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Jean Marhefka, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

Index of Advertisers

ANTENNA/TOWER SALE!

PRO-SEARCH COMPUTERIZED ANTENNA SYSTEM CONTROL



THE MOST ADVANCED ANTENNA CONTROL SYSTEM AVAILABLE— Computerized—Talks—Scans Programmable—Auto Brakes Order Your Pro-Search Today!

AVAILABLE FOR EXISTING CDE OR TELEX ROTORS OR WITH NEW TELEX HAM 4 OR TAILTWISTER MOTOR UNITS! **TELEX hy-gain**

Pro-Search Talking Controller List $551.91 - Now Only $489!
Pro-Search Non Talking Controller List $415.91 - Only $369!
Pro-Search Talking Controller With Telex Ham 4 Motor $599!
Pro-Search Non Talking Controller W/Ham 4 Motor Only $479!
Pro-Search Talking Controller With T2X Motor - Only $649!
Pro-Search Non Talking Controller W/T2X Motor - Only $529!

POLAR RESEARCH LI'L SLIPPER

- Mount and Rotate Additional Antennas at any Elevation **On Your Existing Tower!**
- Use with H Frame to Stack & Rotate VHF/UHF Antennas **On Your Existing Tower!**
- Add a Second Tribander and up to Four VHF Antennas **On Your Existing Tower**—Great for Contesting!
- Will Safely Support and Rotate full 360 degrees up to 11 sq ft and 200 lb. Antenna Load.
- Complete with Rotor/Control and all Mounting Hardware
- Fits all Towers—Guyed—Free Standing—Crankup

Suggested List Price $695—Introductory Special $599!
ORDER YOURS TODAY—IN STOCK FOR IMMEDIATE SHIPMENT!

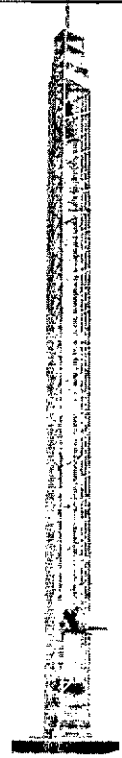
UNARCO-ROHN Self Supporting Towers — On Sale!

Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! How's that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	251	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429



Tri-Ex®

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

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
W-36	36 ft.	9 sq. ft., 50 mph	$ 499
W-51	51 ft.	9 sq. ft., 50 mph	$ 799
LM-354	54 ft.	16 sq. ft., 60 mph	$1449
LM-470D (Motorized)	70 ft.	16 sq. ft., 60 mph	$2499

Masts—Thrust Bearings—Other Accessories Available at Sale Prices—Call!

RG-213U

$.29/ft $279/1000 ft
Up to 400 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss Foam Dielectric
- Non-contaminating Vinyl Jacket

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
⅛" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket ..... $.79/ft
½" LDF4-50 Andrew Heliax™ $1.49/ft
⅞" LDF5-50 Andrew Heliax™ $3.99/ft
select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$22	$22	$22	$22
⅞" Heliax™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 .... $1.25 Nickle PL259 .... $.90
UG21B N Male .. $2.95 UG23D N Female .. $2.95

ANTENNA WIRE & ACCESSORIES

12 Ga. Copperweld .. $.12/ft 14 Ga. Copperweld .. $.10/ft
14 Ga. Stranded .. $.10/ft 18 Ga. Copperweld 1/4mi $30
450 Ohm H.D. Line .. $.18/ft H.D. End Insulators .. $2/ea
Van Gorden 1:1 Balun $11
Van Gorden Center Insulator $6

HUSTLER

4BTV 40-10 mtr Vert $79 5BTV 80-10 mtr Vert $99
G5-144B 2-mtr Base .. $79 G7-144 2-mtr Base .. $109

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$10	$10	$12	$15	$19
2KW Super	$14	$15	$19	$24	$33

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT

HF6V 80-10 mtr Vertical $129
RMK-II Roof Mount Kit w/radials $39
STR-II Stub Tuned Radial Kit $20
TBR-160HD 160-mtr Coil Kit $49
2MCV-5 2-mtr Base Vertical $39
Free Shipping in Continental U.S. on HF6V Antennas!!

CUSHCRAFT

A3 3-el Tribander	$179	A4 4-el Tribander	$229		
R3 20/15/10mtr Vert	$229	A743/A744 40mtr Kit	$69		
10-3CD	$76	10-4CD	$89	15-3CD	$99	15-4CD	$109
20-3CD	$179	20-4CD	$239	40-2CD	$279	AV5	$99
A50-5	$65	A50-6	$89	A147-4	$25	A147-11	$39
214B	$69	214FB	$69	3219	$79	2208	$75
226FB	$189	416TB	$59	4248	$63	617B	$179
147-20T	$63	144-10T	$45	144-20T	$69	432-20T	$49
14TMB	$25	ARX2B	$39	AMS147	$29	PD-2	$25

Many other Cushcraft models in Stock—CALL!

HY-GAIN

V2S 2-mtr Base Vertical $39
TH5MK2S Broad Band 5-el Triband Beam $319
TH7DXS 7-el Triband Beam $379
TH3MK3S 3-el Triband Beam $219
TH3JRS 3-el Triband Beam $159
TH2MK3S 2-el Triband Beam $139
HY-QUAD 2-el Triband Quad $279
402BAS 2-el 40-mtr Beam $199
205BAS 5-el 20-mtr Beam $299
155BAS 5-el 15-mtr Beam $179
105BAS 5-el 10-mtr Beam $119
204BAS 4-el 20-mtr Beam $229
203BAS 3-el 20-mtr Beam $139
153BAS 3-el 15-mtr Beam $79
103BAS 3-el 10-mtr Beam $59
DB1015BAS 3-el 10/15 mtr Beam $159
64BS 4-el 6-mtr Beam $55
66BS 6-el 6-mtr Beam $109
18HTS 80-10 mtr Hy-Tower Vertical $339
LC-160 160-mtr Coil Kit for 18HTS $39
214 14-el 2-mtr Beam $35
2BDQ 80/40 mtr Trap Dipole $49
5BDQ 80-10 mtr Trap Dipole $99
BN86 80-10 mtr KW Balun W/Coax Seal $19

MACO (WILSON) ANTENNAS

SY-33 3-el Triband Beam $199
SY-36 6-el Triband Beam $269

MOSLEY

CL-33 3-el Triband Beam $229
TA-33 3-el Triband Beam $199
TA-33JR 3-el Triband Beam $149
S-402 2-el 40-mtr Beam $279

HYGAIN/TELEX CRANKUPS

ON SALE! FREIGHT PAID! SPECIAL PRICES! SAVE$$!

Model	Height Up	Down	Wind Load	List	Sale
HG-37SS	37.0 ft	20.5 ft	9.0 sq ft	$777	$669
HG-52SS	52.0 ft	20.5 ft	9.0 sq ft	$1095	$949
HG-54HD	54.0 ft	21.0 ft	16 sq ft	$1818	$1499
HG-70HD	70.0 ft	23.0 ft	16 sq ft	$2850	$2399
HG-33MT2	33.0 ft	11.5 ft	8.5 sq ft	$898	$779

ALPHA DELTA COMMUNICATIONS

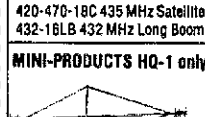
Transi-Trap™ Surge Protectors—In Stock Now!

Model LT 200W UHF Type .. $19
Model HT 2KW UHF Type .. $29
Model LT/N 200W N Type .. $39
Model HT/N 2KW N Type .. $44
Model R-T 200W Deluxe .. $29
Model HV 2KW Deluxe $32

KLM

KT34A 4-el Broad Band Triband Beam $309
KT34XA 6-el Broad Band Triband Beam $469
3.8-1 80-mtr Rotatable Dipole $429
7.2-1 40-mtr Rotatable Dipole $159
7.2-2 2-el 40-mtr Beam $289
7.2-3 3-el 40-mtr Beam $439
7.2-4A 4-el 40-mtr Beam $599
6el-20mtr Big Stick Monoband Beam $599
6el-15mtr Big Stick Monoband Beam $389
6el-10mtr Big Stick Monoband Beam $229
10-30-7LP Log Periodic Broad Band Beam $599
144-148-13LBA 13-el 2-mtr Beam $79
143-150-14C 14-el 2-mtr Satellite Antenna $79
420-470-18C 435 MHz Satellite Antenna $59
432-16LB 432 MHz Long Boom Antenna $59

MINI-PRODUCTS HQ-1 only $139!



Wing Span - 11 ft
Boom - 54 in. long
Wind Area - 1.5 sq ft
1200W P.E.P. Input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating) $99
Alliance U100 (for small beams & elevation) $49
Telex HAM 4 (15 sq ft rating) $199
Telex Tailtwister (20 sq ft rating) $249
Telex HDR300 Heavy Duty (25 sq ft rating) $439

Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

UNR-ROHN GUYED TOWERS

10 ft Sections 20G $32.50 25G $41.50 45G $93.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$789
FK2558	58 ft	13.3 sq ft	$879
FK2568	68 ft	11.7 sq ft	$959
FK4544	44 ft	34.8 sq ft	$1099
FK4554	54 ft	29.1 sq ft	$1219
FK4564	64 ft	28.4 sq ft	$1329
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

All Foldover Towers Shipped Freight Pre-Paid!
Foldover prices 10% higher west of Rockies.
All Rohn 25G & 45G Accessories in stock - Call!

TOWER/GUY HARDWARE

3/16" EHS Guywire (3900 lb rating) ..... $.12/ft
1/4" EHS Guywire (6000 lb rating) ..... $.15/ft
5/32" 7 x 7 Aircraft Cable (2700 lb rating) ..... $.12/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable) ..... $.35
1/4" CCM Cable Clamp (1/4" Cable) ..... $.45
1/4" TH Thimble (fits all sizes) ..... $.30
3/8EE (3/8" Eye & Eye Turnbuckle) $5.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle) $6.95
1/2" EE (1/2" Eye & Eye Turnbuckle) $8.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle) $9.95
3/16" Preformed Guy Grip $1.79
1/4" Preformed Guy Grip $1.99
6" Diam - 4 ft Long Earth Screw Anchor $12.95
500D Guy Insulator (5/32" or 3/16" Cable) ..... $.95
502 Guy Insulator (1/4" Cable) $1.95
5/8" Diam - 8 ft Copper Clad Ground Rod $11

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating) ..... $.29/ft
HPTG4000 Guy Cable (4000 lb rating) ..... $.43/ft
HPTG6700 Guy Cable (6700 lb rating) ..... $.59/ft
9901LD Cable End (for 2100/4000 cable) $4.95
9902LD Cable End (for 6700 cable) $5.45
Socketfast Potting Compound (does 6-8 ends) $8.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$25	$39	$59	$79
.18 in Wall	$39	$69	$99	$109
.25 in Wall	$69	$129	$189	$249

SOUTH RIVER ROOF TRIPODS

HDT-3 3 ft Tripod .... $19 HDT-5 5 ft Tripod $29
HDT-10 10 ft Tripod .. $49 HDT-15 15 ft Tripod .. $69
Heavy Duty Tripods include mtg hdw-UPS Shippable

TEXAS TOWERS

DIV. OF TEXAS RE-DISTRIBUTORS INC.

MasterCard VISA

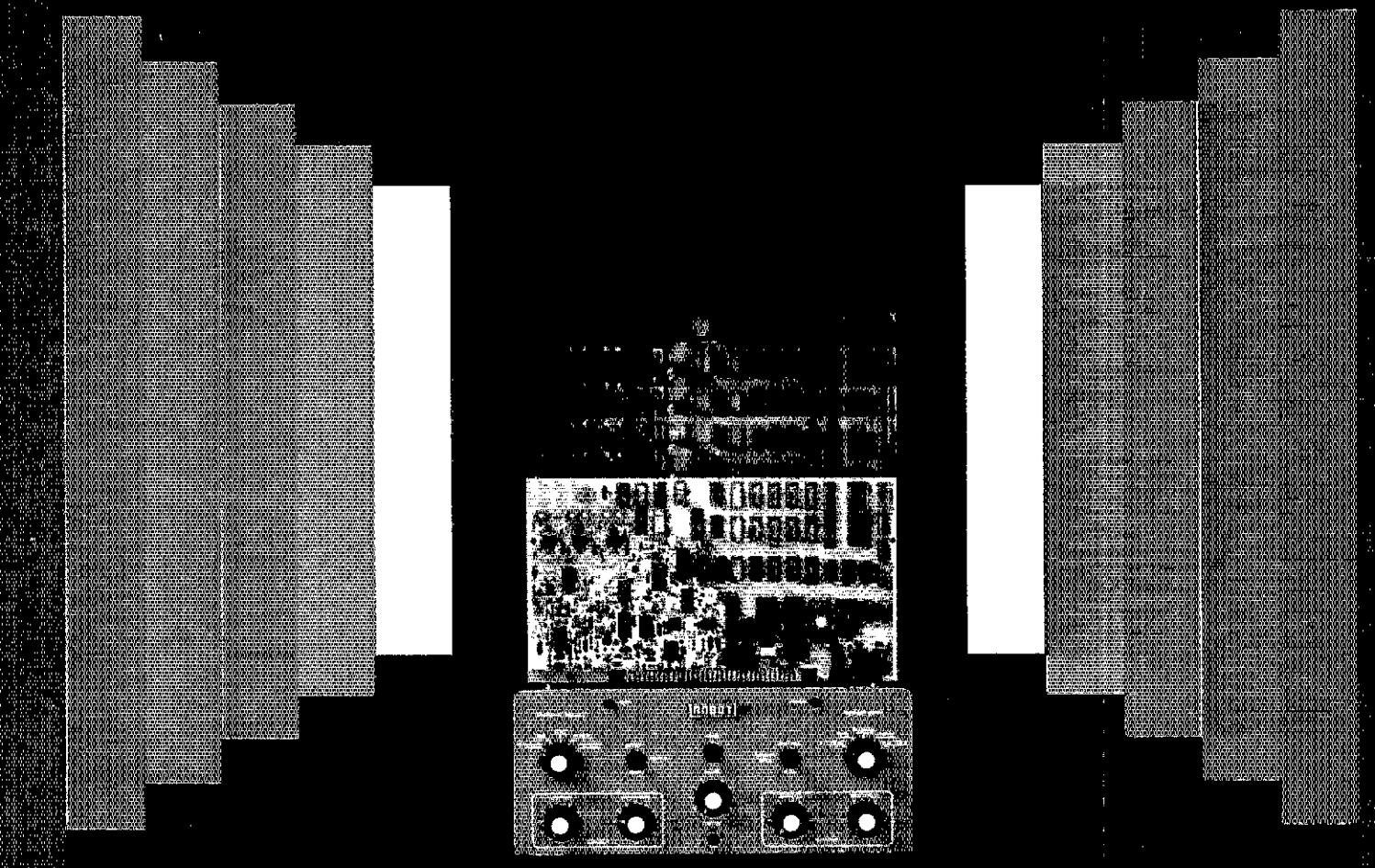
1108 Summit Ave., Suite 4 / Plano, Texas 75074

ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri. - 8:30 a.m. - 5:30 p.m. Sat. - 9 a.m. - 1 p.m.

TELEPHONE: (214) 422-7306

ROBOT BREAKTHROUGH

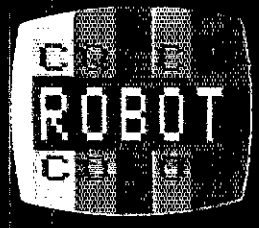


Robot Single Frame Color Slow Scan TV

Robot's color slow scan TV provides you with a whole new dimension of Amateur Radio activity. Now you can exchange color pictures of your latest DX QSL card, the best stamp in your collection, or even that terrific sunset scene you shot last summer.

Robot's new microprocessor controlled, color SSTV equipment, available now in retrofit board to convert Model 400's to full color, provides 12 second single frame transmission of color images. It is black and white compatible, and offers sharp, clear color picture quality never before possible.

See your dealer today or write for details.



See the complete display of Robot's new color SSTV system at the Dayton Hamvention.

ROBOT

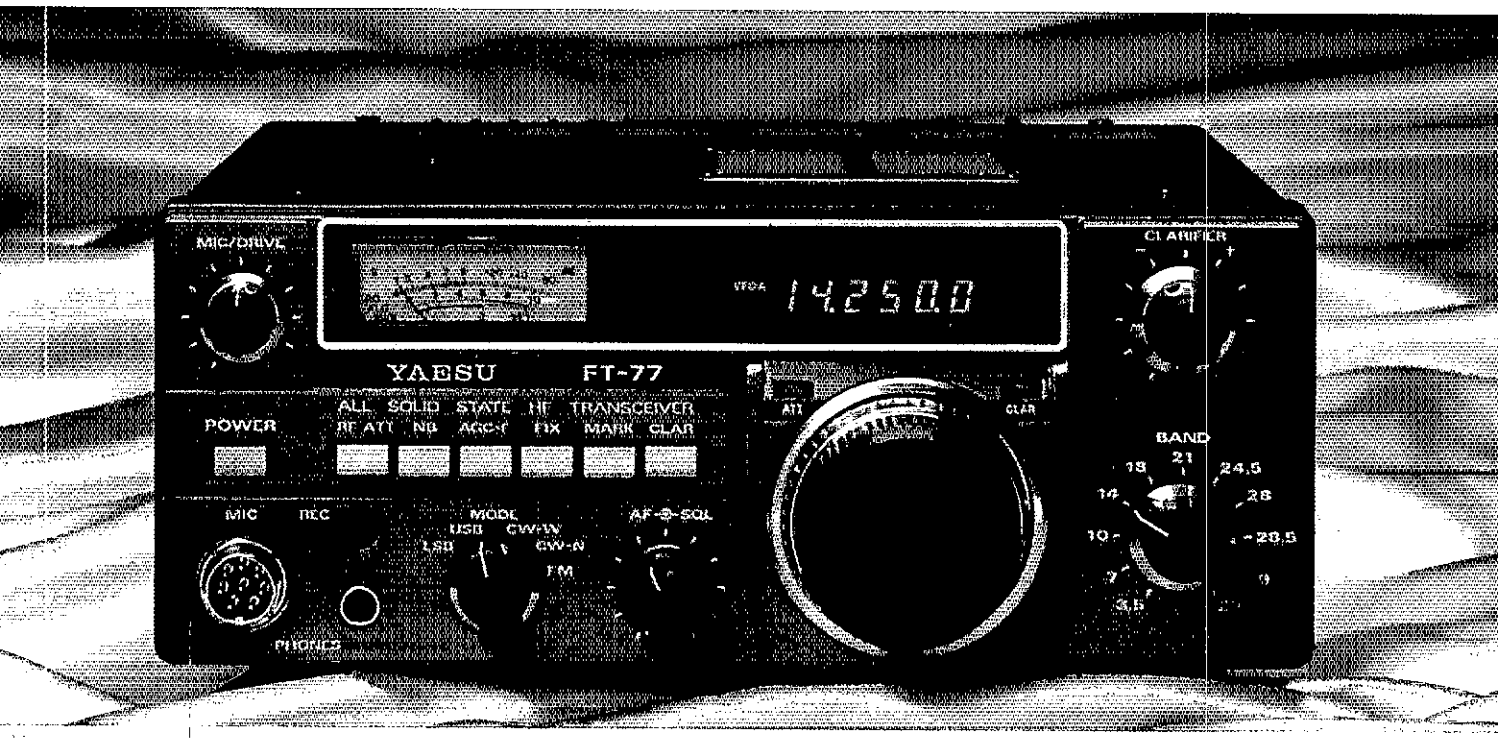
Also introducing our new Super Terminal with color graphics capability when used with the new Robot color scan converter. Also has expanded memory, printer interface, and non-volatile message memories for RTTY and Morse.

ROBOT RESEARCH, INC.
7591 Convoy Court, San Diego, CA 92111 • (619) 279-9430

World Leaders in Slow Scan TV, Phone Line TV and Image Processing Systems.

FT-77 The Rig for All Seasons!

Answering the call for an HF rig that goes everywhere, sounds great, and is cost-effective, Yaesu proudly introduces the FT-77 Compact HF Transceiver System.



Computerized Design and Manufacture

The FT-77 design engineers utilized the latest computerized circuit board layout methods, resulting in a compact, reliable transceiver with maximum utilization of available space. Automated insertion techniques are used in assembly, providing improved reliability and quality control over earlier designs.

Operating Versatility

The FT-77 is equipped for operation on all amateur bands between 3.5 and 29.7 MHz, including the three new WARC bands. Fully operational on SSB and CW, the FT-77 includes a dual width noise blanker (designed to minimize the "Woodpecker" or ignition noise), full SWR metering, R.I.T., and optional CW filter with wide/narrow selection. The optional FM-77 permits operation on the FM mode, with front panel squelch sensitivity control.

Expandable Station Concept

Ideal for mobile operation because of its compact size and light weight, the FT-77 forms the nucleus of a versatile base station. Available as options for the FT-77 are the FP-700 AC Power Supply, FV-700DM Synthesized External VFO and Memory System, FTV-707 VHF/UHF Transverter, and FC-700 Antenna Coupler, providing top performance at an extraordinarily low price.

Best of All, It's a Yaesu!

With most experience in transceiver design and manufacture, the Yaesu trademark is your guarantee of quality and durability. We've got all-new technology and an all-new warranty policy to back it up.

See the FT-77 and the all new line of Yaesu HF, VHF, and UHF transceivers, receivers and accessories at your Yaesu Dealer today! *It's time you tried a Yaesu!*

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

0283

YAESU ELECTRONICS CORPORATION, 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45146 ● (513) 874-3100

"Comm-packed."

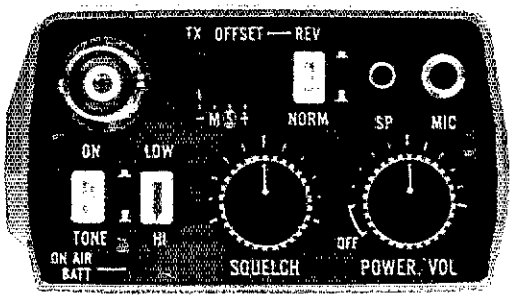
BIG performance... small size... smaller price!!!

TR-2500

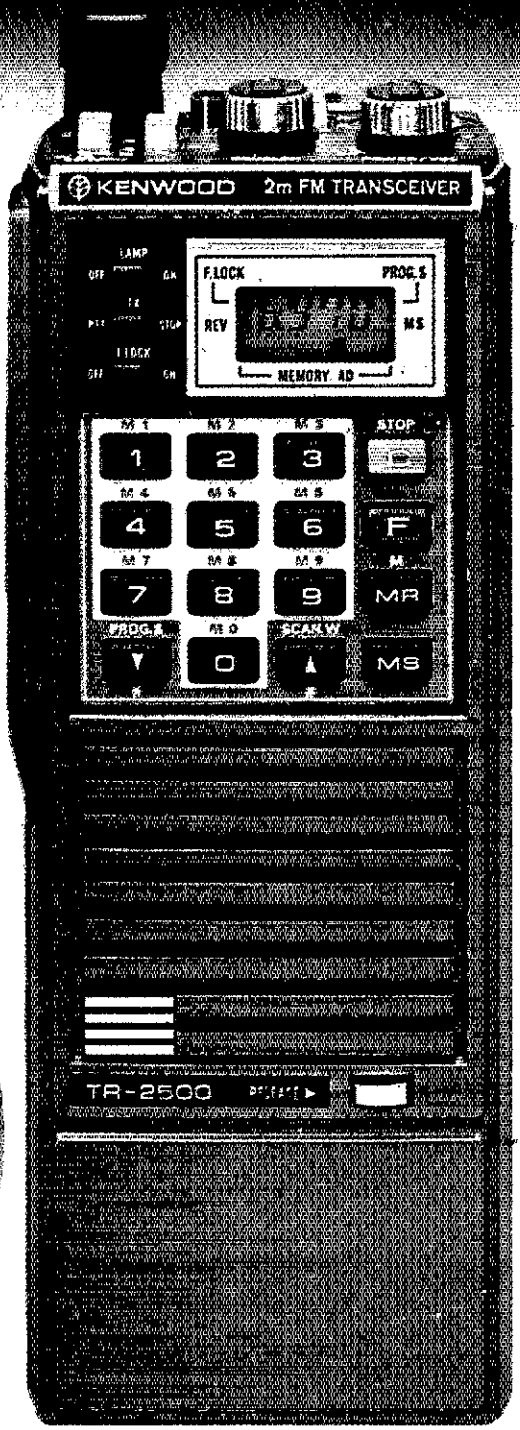
The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

TR-2500 FEATURES:

- **Extremely compact size and light weight**
  Measures 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches). Weighs 540 grams (1.2 lbs) with Ni-Cd pack.
- **LCD digital frequency readout**
  Shows frequencies and memory channels, four "Arrow" indicators.
- **Ten channel memory**
  Nine memories for simplex or ±600 kHz offset. "M0" memory for non-standard split frequency repeaters.
- **Lithium battery memory back-up**
  (Estimated 5 year life.) Maintains memory when Ni-Cd pack is fully discharged or removed.



- **HI/LOW power selection**
  2.5 watts or 300 mw.
- **Memory scan**
  Scans only channels in which frequency data is stored.
- **Programmable automatic band scan**
  Upper and lower frequency limits and scan steps of 5-kHz and larger.
- **UP/DOWN manual scan**
- **Built-in tuneable sub-tone encoder**
  Tuneable (variable resistor) to desired CTCSS tone.
- **Built-in 16-key autopatch encoder**
- **"SLIDE-LOC" battery pack**
- **Repeater reverse switch**
- **Keyboard frequency selection**
- **Extended frequency coverage**
  Covers 143.900 to 148.995 MHz in 5-kHz steps.
- **Optional power source**
  Using optional MS-1 mobile or ST-2 AC charger/power supply, radio may be operated while charging. (Automatic drop-in connections.)



Actual size

- **High impact plastic case**
- **Battery status indicator**
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.

Standard accessories include:

- Flexible antenna with BNC connector
- 400 mAH Ni-Cd battery pack
- AC charger

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply

TR-3500

70 CM FM Handheld

- 440-449.995 MHz in 5-kHz steps
- TX OFFSET switch keyboard programmable ±5 kHz to ±9.995 MHz
- 1.5 W/300 mW HI/LOW power switch
- Auto. squelch position on squelch control
- Tone switch for TU-35B optional programmable CTCSS encoder
- Other features include 10 memories, lithium battery memory back-up, programmable automatic band scan, memory scan, UP/DOWN manual scan, repeater reverse, 16-key autopatch, keyboard frequency selection, slide-lock battery.

- VB-2530 2-M 25 W RF power amp., w/cables, mtg. brkt. (TR-2500 only)
- TU-1 Programmable CTCSS encoder (TR-2500 only)
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only)
- PB-25 Extra 400 mAH Ni-Cd battery
- PB-25H Heavy-duty 490 mAH Ni-Cd battery
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for manganese/alkaline AA cells
- SMC-25 Speaker-microphone
- LH-2 Deluxe leather case
- BH-2A Belt hook
- RA-3 m 3/8λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap
- EP-1 Earphone

More information on the TR-2500 and TR-3500 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD

pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.