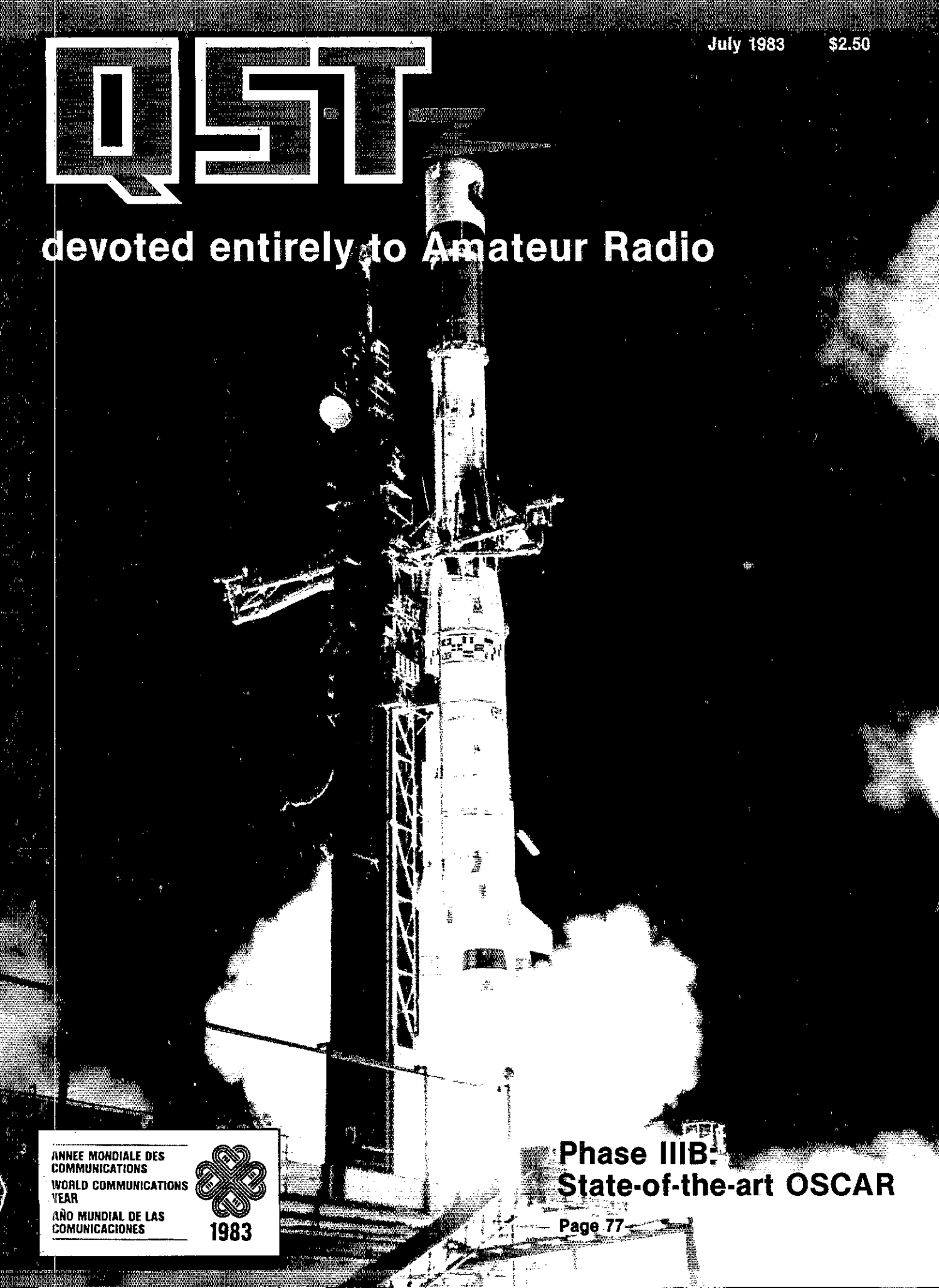
July 1983 $2.50

QST

devoted entirely to Amateur Radio



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

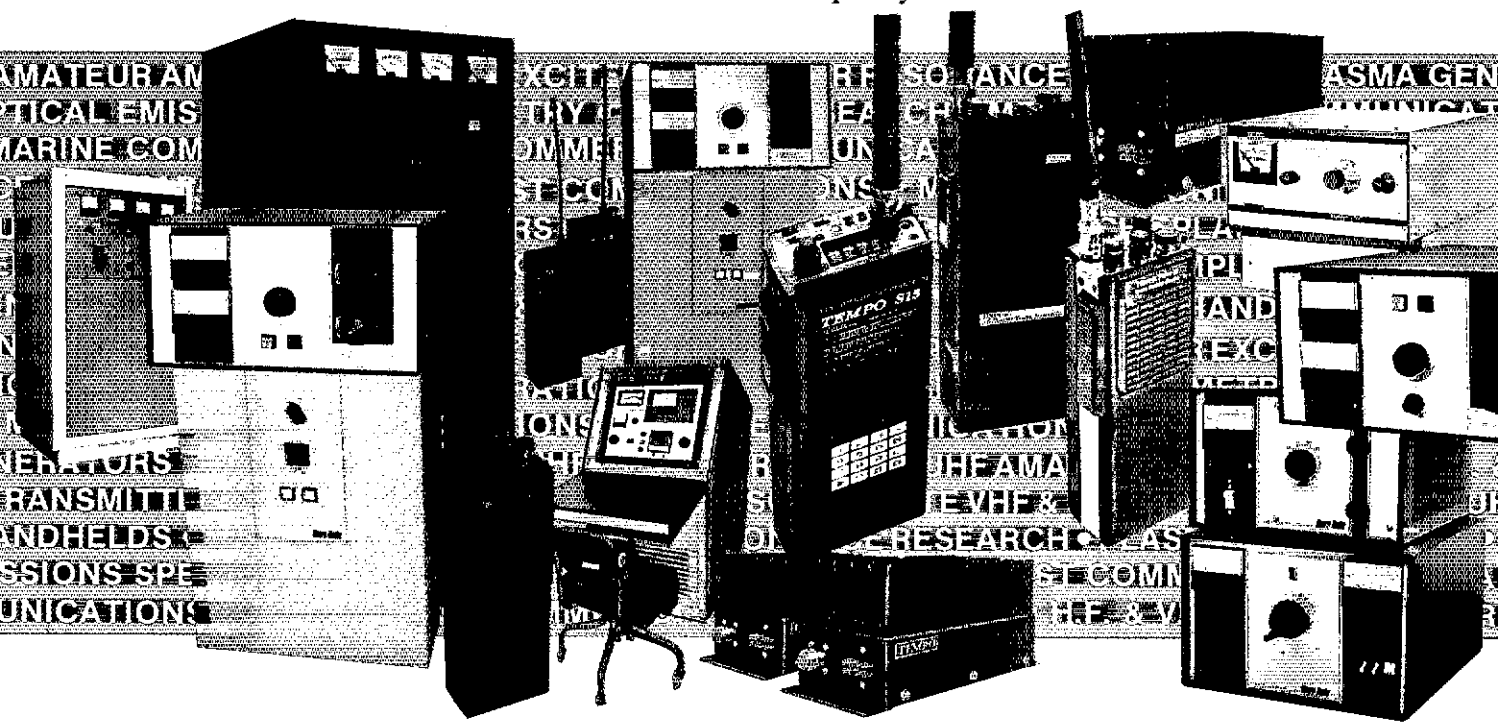
Phase IIIB: State-of-the-art OSCAR

Page 77

Henry Radio has

RF POWER FOR SALE

No, we don't sell RF by the watt but we do offer a broad line of power RF devices for many different services... communications, HF-VHF-UHF (both vacuum tube and solid state), plasma generation for sputtering, etching, laser excitation, optical emissions spectrometry, cancer research, nuclear magnetic resonance, NMR imaging, meteor burst communications and many others. Frequencies from 1.5 to 500 MHz and power levels from 10 watts to 10,000 watts. Possibly no other single company offers such a wide range of standard and special RF power amplifiers
It all started many years ago with superb amateur linear amplifiers and today as always Henry amplifiers are famous throughout the Amateur world of HF, VHF and UHF communications.
Today the range of choice is truly "mind boggling".
Consider these examples:
Plasma excitation for sputtering or etching... frequencies at 13.56, 27.12 or 40.68. Powers from 500 watts to 10,000 watts.
Marine communications... 5,000 and 10,000 watts HF shore or shipboard CW, RTTY, SSB for 4, 6, 8, 12, 16, 22 MHz.
Commercial two-way FM... solid state to 130 watts, frequencies from 30 MHz to 500 MHz. Vacuum tubes to 500 watts.
Nuclear magnetic resonance pulse amplifiers... powers from 500 to 10,000 watts on the resonance frequency of choice.

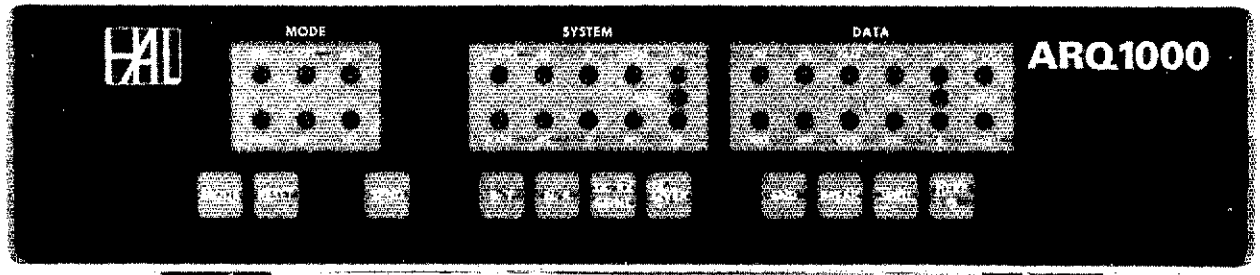


For more than half a century Henry Radio has provided the world's most diverse source of Amateur radio equipment. Now we offer the same expert personalized assistance for commercial, industrial, scientific, medical and research applications either communications or process engineering. Tell us how we can help you. Call or write Ted Henry, Ted Shannon or Mary Silva (Los Angeles office).

Henry Radio

2050 S. BUNDY DR., LOS ANGELES, CA 90025 (213) 820-1234 • 931 N. EUCLID, ANAHEIM, CA 92801 (714) 772-9200 • BUTLER, MO 64730 (816) 679-312

AMTOR RTTY

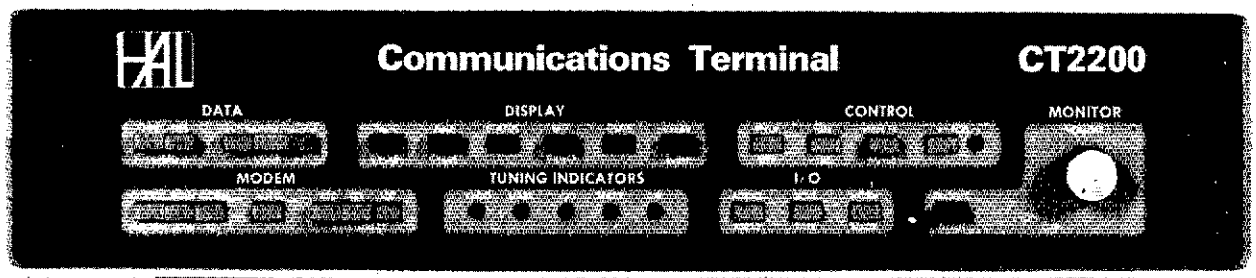


HAL is proud to announce the ARQ1000 code converter. This terminal not only supports the AMTOR amateur codes, but meets ALL of the commercial requirements of CCIR Recommendation 476-2. The ARQ1000 can be used with present and previous generation HAL RTTY products. In fact, any Baudot or ASCII full duplex terminal at data rates from 45 to 300 baud may be used with the ARQ1000. Some of the outstanding features of the ARQ1000 are:

- Send/receive error-free ARQ, FEC, and SEL-FEC modes
- Automatic listen mode for ARQ, FEC, and SEL-FEC
- Meets commercial requirements of CCIR 476-2
- By-pass mode for normal RTTY without changing cables
- Programmable ARQ access code, SEL-CAL code and WRU
- Programmable codes stored in non-volatile EEPROM
- Keyboard control of normal send/receive functions
- 30 Front panel indicators and 11 control switches
- Interfacing for loop, RS232, or TTL I/O
- "Handshaking" control for printer and keyboard or tape
- Self-contained with 120/240V, 50/60 Hz power supply
- Cabinet matches style and size of CT2200 and CT2100
- Table or rack mounting
- Built-in DM170 modem option available
- Encryption option available for commercial users
- 8½" × 17" × 10½"

The ARQ1000 is commercial-quality equipment that will give you the outstanding performance you expect from a HAL product. Write for full details and specifications of the ARQ1000.

BY POPULAR REQUEST

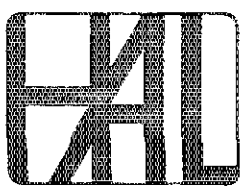


By popular request – the new CT2200. Our slogan is "When Our Customers Talk, We Listen" – and we have been listening. The CT2200 includes these often requested features:

- New AMTOR connections for use with ARQ1000
- Keyboard programming of all 8 "brag-tape" messages
- Programmable selective call code
- Expanded HERE IS storage for a total of 88 characters
- Non-volatile storage of HERE IS, "brag-tape," and SEL-CAL code
- 3⅝" × 17" × 10½"

All of the proven CT2100 features are retained. Some of these features are:
• Tuning scope outputs (a MUST for AMTOR) • Built-in demodulator for high tones, low tones, "103", or "202" modem tones • 36 or 72 character display lines • 2 pages of 72 character lines or 4 pages of 36 character lines • Split screen or full screen display • Baudot or ASCII, 45 to 1200 baud • Full or half duplex • Morse code send/receive at 5 to 99 wpm • Send/receive loop connection • Automatic transmit/receive control (KOS) • Audio, RS232C, or Loop I/O • On-screen tuning and status indicators • Clearly labeled front panel switches, not obscure keyboard key combinations • Separate convenient lap-size keyboard • Internal 120/240, 50/60 Hz power supply • Attractive shielded metal cabinet

In addition, an update kit is available so that all CT2100 owners can update their CT2100's to include CT2200 features. The kit even includes a new CT2200 front panel! Rather than making a proven product obsolete, HAL put even more behind the buttons. Pick up a CT2200 at your favorite HAL dealer and join the RTTY fun. Write for our full RTTY catalog.

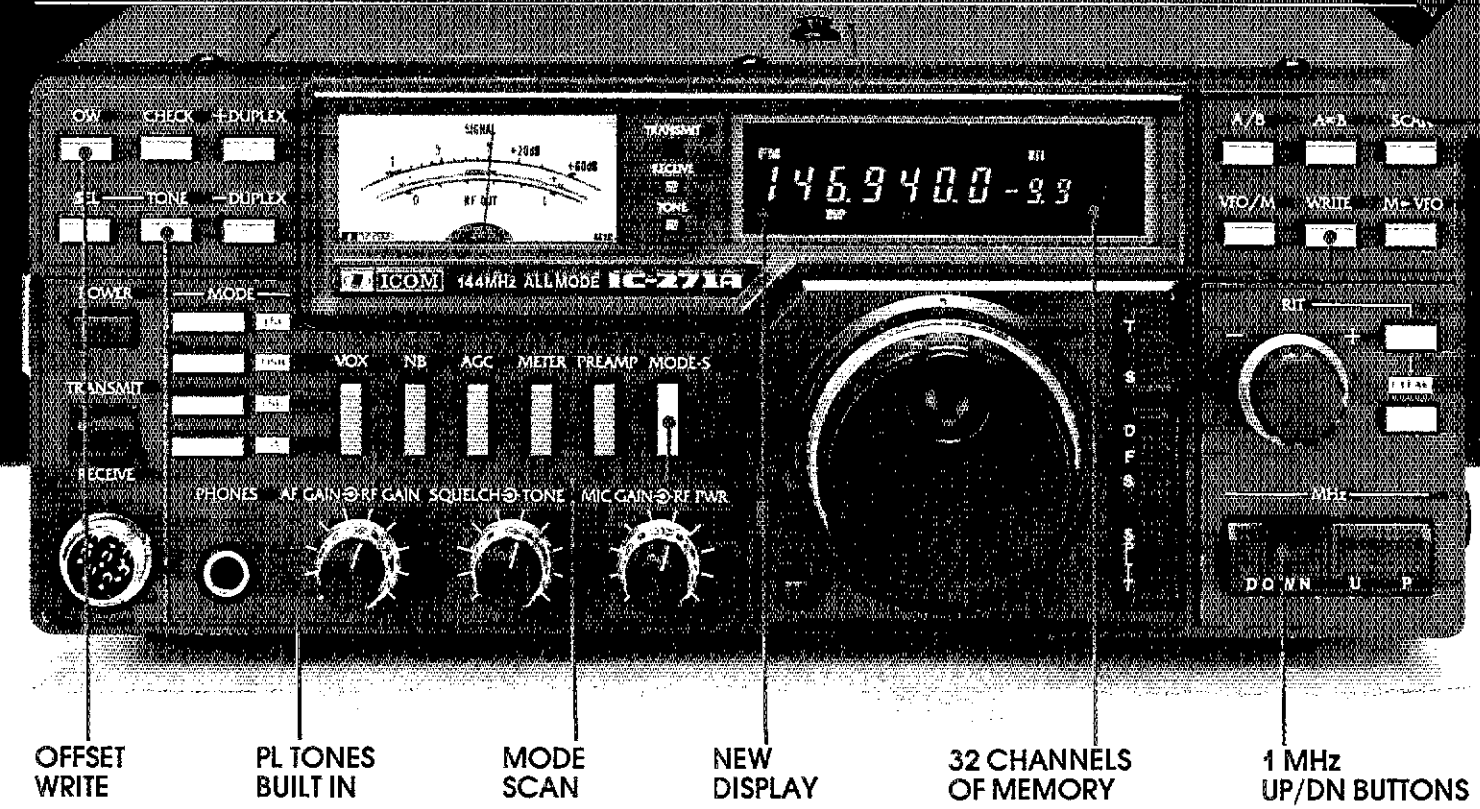


HAL COMMUNICATIONS CORP.
Box 365
Urbana, IL 61801 (217) 367-7373

IC-271A

NEW!

25 Watts of FM, SSB, CW for 2 Meters



ICOM presents the most advanced all mode, two meter base station available today... the IC-271A.

25 watts of power from 12 VDC or from 117 VAC with the optional internal power supply/32 full function memories/multimodes/subaudible tones/PLL locked to 10Hz/high visibility, multi-color flourescent display/RIT readout/scanning/dual VFO's/new size.

25 watts. Now a 2 meter base station with 25 watts of power and an optional internal power supply. The IC-271A is a complete station.

32 full function memories. Each memory holds frequency, offset, offset direction, mode, and subaudible tone. Frequency, tones and offset are selected by rotating the main tuning knob.

Subaudible tones. Subaudible tones are selected by rotating the main tuning knob and may be stored into memory.

PLL locked to 10Hz. Extremely low noise and a good signal-to-noise ratio PLL allow synthesizer lock to 10Hz.

High visibility display. ICOM's new high visibility, multi-color display gives easy to read at-a-glance display of frequency, mode, offset, VFO in use, memory channel, and RIT offset direction and amount.

Scanning. The IC-271A can scan memories, programmable sections of the band, or modes. Mode-S scan is a mode scan and can be used to scan memories with a particular mode or to lock out frequencies continuously busy so that the receiver will not stop at that memory channel each time.

Dual VFOs. ICOM's dual VFO system is now even more versatile with the ability to transfer from memory to VFO. This allows frequencies from the tunable memories to transfer directly into another memory without moving a VFO to the new frequency first.

New size. Only 11¼"W x 4⅜"H x 10¾"D the IC-271A is styled to look good and engineered for ease of operation.

Other features. To make the IC-271A functional and easy to use, ICOM has incorporated many asked for features: UP/DN buttons, dial lock, switchable preamplifier, duplex check, all mode squelch, receive audio tone control, S meter, center meter, computer interface, and 7 year lithium battery memory backup.

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**

July 1983 *Volume LXVII Number 7*

QST (SSN: 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

OUR COVER

Far more than just a pretty launch, AMSAT-OSCAR Phase IIIB represents a prodigious accomplishment. Hams around the world should now have a spanking-new spacecraft to use, thanks to the volunteers and contributors who have made it possible. *(photo courtesy European Space Agency)*

CONTENTS

TECHNICAL

BEGINNER'S BENCH

NEWS AND FEATURES

OPERATING

DEPARTMENTS

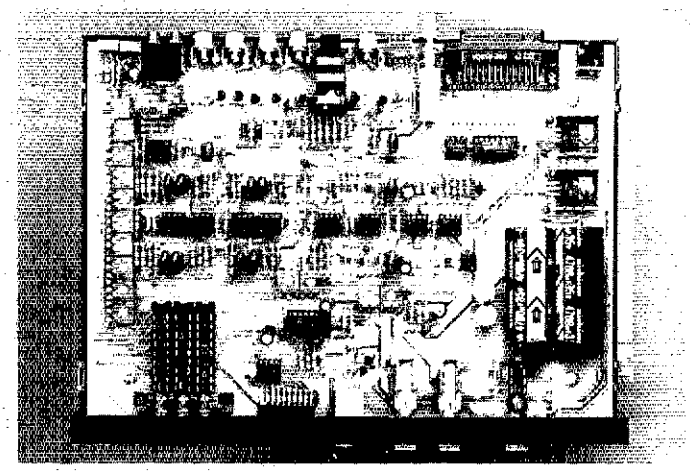
Subscription rate: $25 per year postpaid in the U.S. and Possessions, $30 in Canada, and $33 elsewhere. All payments must be in U.S. funds. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds. Individuals 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.

CHAMPAGNE RTTY/CW on a Beer Budget



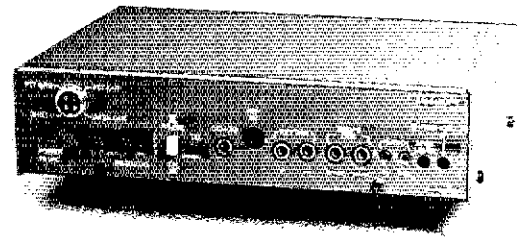
CP-1 Computer Patch™ Interface

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.



HAMTRONICS

4033 Brownsville Road
Trevose, Pennsylvania 19047
(215) 357-1400

AEA
Brings you the Breakthrough!

CUSHCRAFT
HF MULTIBAND
CONTEST WINNING ANTENNAS

AV-3
3 BAND VERTICAL
10-15-20 METERS
Only 14 ft., 4.26 m. height
Low priced
Easy to use

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

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

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

A3
3 BAND YAGI
10-15-20 METERS

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.

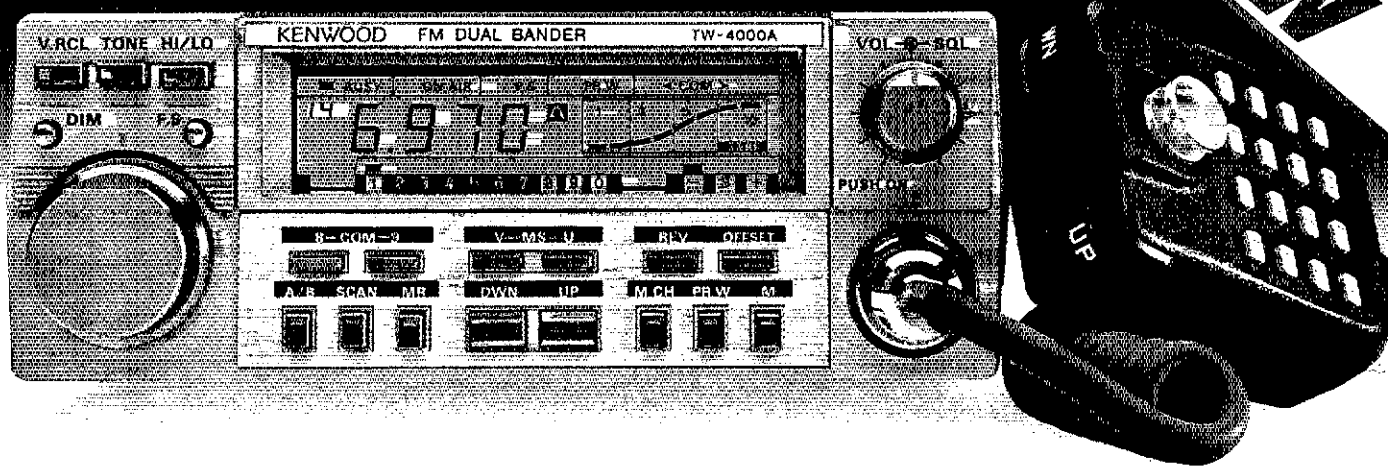
THE CHOICE, A FAVORITE FOR DX-PEDITIONS

cushcraft
CORPORATION

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

FM "Dual-Bander."

NEW



2 m & 70 cm in single compact package, LCD, 25 W, optional voice synthesizer.

TW-4000A

KENWOOD's TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2 m and 70 cm FM functions in a single compact package.

TW-4000A FEATURES:

- **2 m and 70 cm FM in a Compact Package** Covers the 2 m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Large, Easy-to-Read LCD Display** A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, "S" or "RF" level, VFO A/B, scan, busy, and "ON AIR." Dimmer switch.
- **25 Watts RF Power on 2 m/70 cm.** Hi/Lo power switch.
- **Optional "Voice Synthesizer Unit"** Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Front Panel Illumination**
- **10 Memories with Offset Recall and Lithium Battery Backup** Stores frequency, band, and repeater offset. Memory 0 stores receive and transmit frequencies independently for odd repeater offsets, or cross-band operation.
- **Programmable Memory Scan** Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.
- **Band Scan in Selected 1-MHz Segments** Scans within the chosen 1-MHz segment (ie., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction may be reversed by pressing either the "UP" or "DOWN" buttons on the microphone.
- **Priority Watch Function** Unit switches to memory 1 for 1 second each 10 seconds, to monitor the activity on the priority channel.
- **Common Channel Scan** Memory 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.
- **Dual Digital VFO's** Selectable 5-kHz or 10-kHz for 2 m, and 5-kHz or 25-kHz for 70 cm. Depress "UP" or "DOWN" key on the front panel for band change in 1-MHz steps.
- **16-Key Autopatch UP/DOWN Microphone (Supplied)**
- **Repeater Reverse Switch**
- **High Performance Receiver/Transmitter** GaAs FET RF amplifiers on both 2 m and 70 cm, high performance MCF's in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Rugged Die-cast Chassis**
- **Optional Two-Frequency CTCSS Encoder** Easily mounted inside the radio, allows DIP switch programming of two different tone frequencies, for 2 m and 70 cm.
- **"BEEPER" sounds through speaker.**
- **Easy-to-Install mobile mount**

TW-4000A accessories:

- **VS-1 Voice Synthesizer**
- **TU-4C Two-Frequency Programmable CTCSS Encoder**
- **KPS-7A Fixed station power supply**
- **SP-40 Compact mobile speaker**

More information on the TW-4000A and TS-780 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

All mode "Dual-Bander"

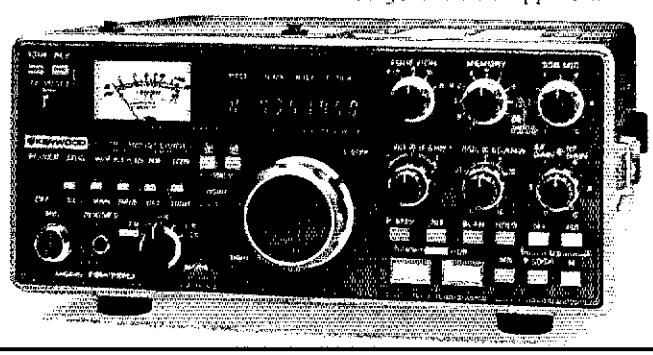
TS-780

2 m & 70 cm all mode, dual digital VFO's, 10 memories, scan, IF shift...

TS-780 FEATURES:

- USB, LSB, CW, FM all mode, covering the 2 m band (144.000-148.000 MHz) and the middle 70 cm band (430.000-440.000 MHz). UP/DOWN band switch.
- Dual digital VFO's with normal/tight drag switch. VFO steps in 20-Hz, 200-Hz, 5-kHz, or 12.5-kHz, plus "FM CH" channelized tuning. Split (cross) frequency operation possible. F. LOCK switch provided.
- 10 memories include band and frequency data, backed up by internal batteries (not supplied). Battery life exceeds one year. Memories 9 and 10 for priority instant recall.
- Band scan, with selectable 0.5, 1, 3, 5, and 10-MHz scan bandwidth.
- Memory scan selectable for all memories, or 2 m or 70 cm only.
- IF shift circuit rejects adjacent interference.
- High sensitivity and wide dynamic range • 7-digit fluorescent tube digital display • 10 watt RF output • 2 m ±600-kHz TX offset switch with reverse switch • Tone switch for optional TU-4C two frequency tone encoder unit • VOX and semi break-in CW built-in • FM center-tune meter • Noise blanker for SSB, CW.

Subject to FCC approval



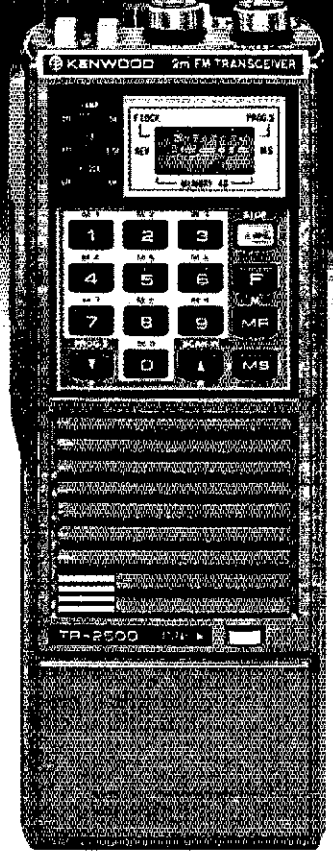
TR-2500

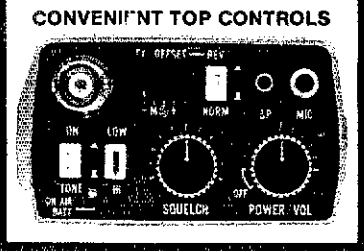
size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs), 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.





- AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack.
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.

TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW.
- TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- RA-3 2 m 3/8 λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7950/7930

Big LCD, Big 45 W, Big 21 memories, Compact.

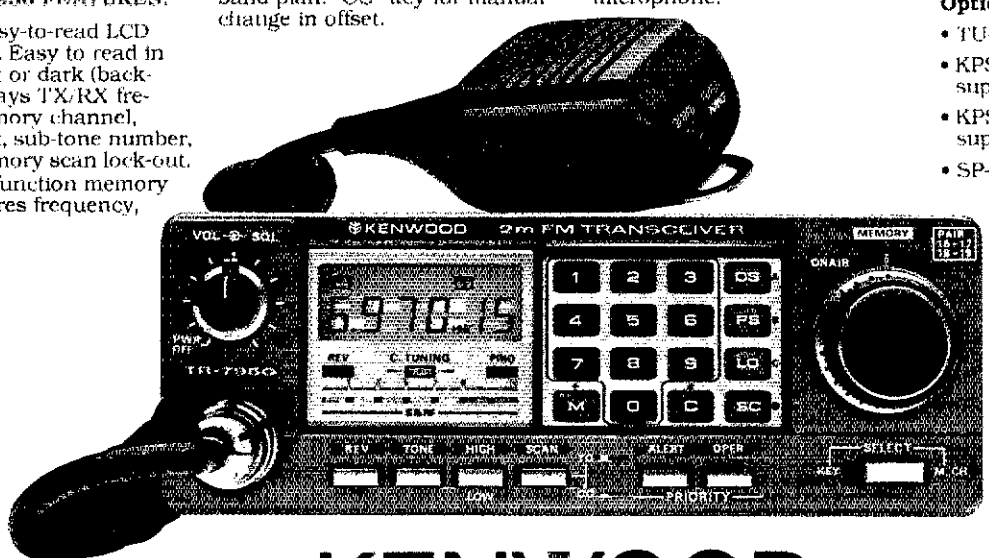
Outstanding features providing maximum ease of operation include a large, easy-to-read LCD display, 21 multi-function memories, a choice of 45 watts (TR-7950) or 25 watts (TR-7930), and the use of microprocessor technology throughout.

TR-7950/TR-7930 FEATURES:

- New, large, easy-to-read LCD digital display. Easy to read in direct sunlight or dark (back-lighted). Displays TX/RX frequencies, memory channel, repeater offset, sub-tone number, scan, and memory scan lock-out.
- 21 new multi-function memory channels. Stores frequency, repeater offset, and optional sub-tone channels. Memory pairs for non-standard splits. "A" and "B" set band scan limits. Lighted memory selector knob. Audible "beep" indicates channel 1 position.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- 45 watts or 25 watts output. HI/LOW power switch for reduction to 5 watts.
- Automatic offset. Pre-programmed for simplex or ±600 kHz offset, in accordance with the 2 meter band plan. "OS" key for manual change in offset.
- Programmable priority alert. May be programmed in any memory.
- Programmable memory scan lock-out. Skips selected memory channels during scan.
- Programmable band scan width.
- Center stop circuit for band scan, with indicator.
- Scan resume selectable. Selectable automatic time resume-scan, or carrier operated resume-scan.
- Scan start/stop from up/down microphone.
- Programmable three sub-tone channels with optional TU-79 unit (encoder).
- Built-in 16-key autopatch encoder, with monitor (Audible tones).
- Front panel keyboard control.
- Covers 142.000-148.995 MHz in 5-kHz steps.
- Repeater reverse switch. (Locking)
- "Beeper" amplified through speaker.
- Compact lightweight design.

Optional accessories:

- TU-79 three frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.



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, KØTO
292 Heather La., Long Lake, MN 55356 (612-473-6478)

Vice Director: Howard Mark, WØOZC, 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,* WØFIR, Box 190, Wilson, KS
67490 (913-658-2155)

Vice Director: Claire Richard Dyas, WØJCP,
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, KØPGM, 13495 West Center Dr.,
Lakewood, CO 80228 (303-986-5420)

Vice Director: Marshall Quiat, AGØX, 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, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba	Peter Guenther, VE4PG, Box 149, Landmark
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 JØH 1YØ (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 46E, 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, WBØHOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota	Dean R. Summers, KQØC, 304 4th Ave. NW, Mandan 58554 (701-663-0130)
South Dakota	Fredric Stephan, KCØOO, Box 772 - Wind Cave Ranch, Hot Springs 57747 (605-745-6006)

Delta Division

Arkansas	Joel M. Harrison, Sr., WB5IGF, 1403 Forrest Dr., Searcy 72143 (501-268-9540)
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 (502-554-3391)
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 (516-226-4835)
Northern New Jersey	Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa	Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas	Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri	Benton C. Smith, KØPCK, RFD 1, Prairie Home 65068 (816-427-5319)
Nebraska	Reynolds B. Davis, KØGND, 1922 Pawnee, Lincoln 68502 (402-421-2415)

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	Clavis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire	Robert Mitchell, W1NH, RFD 4, Blueberry Hill, Raymond 03077 (603-895-3456)
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	Will Darcy, AL7AC, SR Box 80660, Fairbanks 99701
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	Leonard M. Norman, W7PBV, 1310 Hazelwood St., Boulder City 89005
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	William "Bill" Sheffield, KQØJ, 1444 Roslyn St., Denver 80220 (303-355-2488)
New Mexico	Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah	Ronald C. Todd, K3FR, 2112 W. 12060 S., Riverton 84065 (801-254-6051)
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 (809-782-4375

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..."

20 Years at 225 Main

July 1 marks the 20th anniversary of the opening of what is still described by many visitors as the "new" ARRL Headquarters building at 225 Main St., Newington, Connecticut. The significance of that move in 1963, from seriously overcrowded facilities in downtown West Hartford to spacious quarters in the suburbs, probably cannot be fully appreciated by those of us who came on the scene later, and who tend to take the present building and grounds for granted.

Financed primarily by members' contributions to a Building Fund, the new structure was air-conditioned, adjoined a sizable parking area, and had nearly twice the floor space of the old. It was built on land originally purchased in the '30s as the site for the Maxim Memorial Station, W1AW, housed then, as now, in a separate building at the front of the property. The 1963 ARRL staff was genuinely grateful to the more than 11,000 members and clubs who contributed to the Building Fund, and staff and members alike took great pride in their new Headquarters.

August 1963 *QST* had this to say: "Not a pretentious structure, the new headquarters is more aptly described as neat, pleasant or handsome than as plush or ornate. Within its red-brick walls are 24,000 square feet of usable floor space, enough to handle today's and tomorrow's needs without crowding." The first statement is as true today as it was 20 years ago; the second remained true until the late '70s, when rapid increases in membership and in League programs necessitated staff expansion and a consequent addition to the building. The ARRL of 1963 had 100,000 members and a Hq. staff of 77; today's is an organization of 130,000 members, and its staff of 120 offers a level of service undreamed of two decades ago.

A 1963 visitor returning to 225 Main St. today will note many changes, both inside and out. The W1AW antenna farm has been expanded considerably, including a 120-foot tower; three flagpoles, for the U.S., Canadian and ARRL flags, now adorn the grounds; the parking area has been expanded; the building itself is half again as deep as it was, though its frontal appearance is unchanged.

Much greater progress is evident within. A Honeywell computer provides instant access to membership and accounting records through more than a dozen terminals in various parts of the building, and produces the labels for monthly *QST* and other mailings. Sophisticated typesetting and graphics equipment permits us to do publishing work in-house for which we previously had to rely on outside vendors. The laboratory is well equipped with modern test equipment. Word processors crank out articles, documents and letters; other microcomputers are kept busy from morning to night generating satellite orbital data, checking contest entries, controlling W1AW code practice and bulletins, and performing a host of other functions. One thing that has not changed is that the building and grounds are well kept and carefully maintained, reflecting the pride of the staff in its quarters and our desire for visiting members always to think of it as "the new building."

Another thing hasn't changed since 1963, or, indeed, since the founding of the League in 1914: ARRL Headquarters is not the center of the Amateur Radio universe. We who work on your behalf in Newington are not the League; proud as we are of our headquarters facilities, this fine building is not the League. *You, the members, are the League.* We are here to support your volunteer efforts as you work for the protection, promotion and advancement of Amateur Radio in your communities. We provide services that will cause you to want to be members. We perform some functions, particularly at the national and international levels, for which "volunteer power" is unavailable or insufficient. We are here to do your bidding, as expressed through your elected representatives on the Board of Directors. What the League is, and what it does, is as dependent upon what *you* do as upon what happens in Newington.

If your travels take you to New England this summer, please plan a visit to ARRL Headquarters. We're just a few minutes from Interstate 84 or Interstate 91, about five miles southwest of the Connecticut State Capitol dome and a mile north of Newington Center. Directions generally are available on W1AW/R, 145.45 MHz, or we'll be glad to send you a map of the local area in advance of your trip. Tours are given on the hour, Monday through Friday, during normal business hours. If you can't visit in person, a new slide show with a 30-minute cassette tape narration by ARRL President Vic Clark, W4KFC, is available on loan to affiliated clubs; ask the Club and Training Department for slide collection SC-25. Either way, we hope you will share our pride in your League's headquarters facilities! — *David Sumner, K1ZZ*

League Lines...

Effective June 15, 1983, U.S. radio amateurs using radio teleprinter codes or fast-scan TV will no longer be required to identify in international Morse Code or plain language voice. If using Baudot, ASCII or AMTOR, stations may identify using the particular digital code being used for the communication. If using other digital codes above 50 MHz, stations may identify using Baudot, ASCII or AMTOR. Fast-scan TV transmissions may be identified in video using the U.S. 525 scan-line standard described in Part 73 of the FCC rules. The cw or plain language voice i-d requirement will still apply to facsimile and SSTV transmissions. Amateurs will have the option to continue using cw or voice i-d as at present for radioteleprinter or fast-scan TV. Also, the maximum frequency shift for digital communication will be raised from 900 to 1000 Hz in the hf bands. Above 50 MHz the maximum shift will depend on the signaling rate used. According to the Commission, the prior notice and public procedure requirements were not necessary because of the non-controversial nature of the rule changes.

In keeping with a general trend toward deregulation, the FCC has voted to eliminate routine station logging in the Amateur Radio Service. U.S. radio amateurs, in general, will no longer be required to keep station logs. For example, elimination of the third-party traffic logging requirement means that repeater stations will no longer need to tape-record autopatch and other third-party messages. FCC engineers-in-charge, however, have been given the authority to require a station licensee to maintain such operating and maintenance records as may be necessary to resolve conditions of interference or deficient technical operation. Amateur licensees may, of course, voluntarily keep station logs of routine operations after the effective date of this action in PR Docket 82-726. Information about non-routine operations will still be required as part of the station records. Examples of non-routine information include repeater data when certain power restrictions are exceeded, auxiliary and remote control operations, and the names and callsigns of the control operators other than the station licensee. The new rule becomes effective upon its publication in the Federal Register.

The FCC has proposed to make additional Amateur Radio Service frequencies available to the Radio Amateur Civil Emergency Service (RACES). One of the major factors in the Commission's action was the Department of Defense's observation that in the event of a declared national emergency it would be most valuable for RACES stations to have access to amateur repeater stations. The Notice of Proposed Rulemaking in PR Docket 83-524 has a comment deadline of August 2, with replies to comments due September 1. Details in next month's "Happenings."

There are two full-time immediate openings in the Technical Department at ARRL Hq. Applicants must have experience as a radio amateur, hold a current Amateur Radio license, possess a solid technical background and have writing and editing skills. Recent design experience is desired in one of the following areas: (1) rf analog circuitry, (2) digital circuitry, and (3) software development, including assembly and machine levels. These are entry-level positions with opportunity for advancement. Salary is dependent upon academic background and experience. Contact Paul Rinaldo, W4RI, Manager, Technical Dept., ARRL Hq., 225 Main St., Newington, CT 06111, telephone 203-666-1541.

The new address for the Virgin Islands ARRL Incoming QSL Bureau is: Virgin Islands ARC, GPO Box 11360, Charlotte Amalie, St. Thomas, VI 00801.

To keep track of those grid squares worked for the VHF/UHF Century Club Award, the ARRL Grid Locator map is a must. It's available for only $1 from Hq. See June QST, p. 146, for particulars.

Two Oregon state senators, Tony Meeker and Steve Starkovich, have introduced Oregon Senate Bill 623, which would prohibit the operation of any "nonionizing electromagnetic radiation source without a permit." There is a provision, however, which exempts among other things "an amateur intermittent sole source emitter having an average output of less than one kilowatt." According to local hams, the bill was prompted by a citizens' group called People Against the Tower (PAT) based in Silverton, Oregon. The credit for the amateur exemption is due in large part to local hams who turned out en mass to oppose a similar proposal in Multnoma County, Oregon.

The Massachusetts Department of Public Health has circulated another draft of its proposal to regulate "fixed facilities which generate electromagnetic fields." While this proposal does not generally exempt amateur operators from its limits on rf emissions, amateur intermittent single source emitters of less than 1 kW average output rf power are exempted from having to obtain prior permission from the director of the Department of Public Health. ARRL is on record as being completely opposed to state involvement in this area.

An Introduction to AMTOR

This mode adds space age excitement to RTTY!

By Paul Newland,* AD7I

On January 27, 1983, the FCC approved the error-correcting teleprinter protocol known as AMTOR for use by American radio amateurs. What is AMTOR, anyway?

AMTOR (*Am*ateur *T*eletype *O*ver *R*adio) is an exciting new mode of radioteletype (RTTY). It offers all the utility and enjoyment of conventional RTTY plus one great advantage: AMTOR removes virtually all errors caused by interference, fading or other disruptions. It also has built-in capability for selective calling. If your station is configured for AMTOR, it has the option of not responding to ASCII, Baudot or cw; only AMTOR signals will print on your teleprinter. This new system should prove useful for avid RTTY operators and traffic handlers as well.

I will provide an overview of how AMTOR operates and how amateurs can make use of it. Those interested in more of the technical details of AMTOR are encouraged to read the excellent *QST* article by Peter Martinez, G3PLX.[1]

AMTOR is a derivation of the commercial teleprinter system, SITOR, which stands for *Si*mplex *T*eletype *O*ver *R*adio.[2] SITOR is a commercial hf RTTY error-correction system used by many ships and coastal marine radio stations. SITOR allows a shipboard teleprinter to be connected to the international Telex network via hf radio so ship owners can send messages directly to their ships in real time. In addition to having error-correction capability, SITOR also includes selective calling. With this feature, coastal stations can call any ship that is monitoring, and forward a message to it without error or operator intervention.

AMTOR, in most respects, is the same as SITOR. With an AMTOR code converter, however, it is possible to monitor other stations using either AMTOR or SITOR operating in Mode A. This feature is important for radio amateurs so they can continue to self-police their bands. Most SITOR code converters do not have this capability.

Modes of Operation

AMTOR features four modes of operation.[3] They are: A — Automatic Request for Retransmission (or fills), B — Broadcast, L — Listen, and S — Selective Broadcast. Before discussing the modes in detail, it is useful to define some terms:

Master Station (MS) is the station that starts the communications. It does not show who is sending data at any one time, but only who began the contact. All stations synchronize their transmissions to those of the master station.

Slave Station (SS) is the station that is called by the MS.

Information Sending Station (ISS) is the station that is generating or sending data. I will sometimes use the term *sending station* when I mean, more correctly, ISS.

Information Receiving Station (IRS) is the station that is receiving and printing data. I will sometimes use the term *receiving station* when I mean, more correctly, IRS.

Of all the modes, Mode A is the most immune to errors, but is also the most complex. In Mode A, both the ISS and IRS send bursts of data to each other. This requires both stations to operate in a VOX-like manner. The ISS sends three AMTOR characters in a burst, and the IRS sends one AMTOR character in a burst. After each station sends a burst, it switches to receive so it can detect and decode bursts from the other station. This requires radios capable of switching from transmit to receive or receive to transmit in 10 to 20 ms. Most modern ssb radios meet this requirement.

To begin a QSO in Mode A, the operator tells the AMTOR code converter the selective calling characters of the station to be called.[4] The MS code converter begins to send the selective call characters, using bursts of three characters and switching to receive between the bursts. The gaps between the bursts provide time to listen for the receiving station. The receiving station, when correctly decoding its own selective call characters, will respond with a special AMTOR signal that says, "I hear you and I am ready." When the MS code converter hears that signal, the MS becomes the ISS, and it will alert the operator (usually through the use of LEDs on the code converter) that the IRS is ready to copy. The ISS may now send data to the IRS. During communications, the ISS (either the MS or SS) transmits characters in groups of three and the IRS replies with a one-character AMTOR signal that says either, "I received the last group of three correctly; send the next three," or "I missed that last group; send it again." Because AMTOR enables the ISS to repeat characters until they are received without error, the number of errors actually printed on the teleprinter is reduced drastically in comparison to conventional RTTY.

When the ISS wants to let the other stations send data, it sends the three characters, FIGS Z B.[5] This sequence of three characters is the AMTOR "over" signal for Mode A. Now, the IRS becomes the ISS, and vice-versa. Similarly, when the

[1]Notes appear on page 13.
*P.O. Box 205, Holmdel, NJ 07733

new ISS wants to convert back to an IRS, the operator types in the characters FIGS Z B. In addition, the IRS station is able to break into the ISS transmission at any time. To do this, the IRS operator presses the OVER button on the code converter. Instead of the IRS sending the usual "send it again" or "give me the next block of data" bursts, it responds with another special one-character message that says, "I want to send you some data; let's exchange places." When the ISS receives this message, the exchange is made and the ISS may begin sending data.

When the ISS wants to close the QSO, the operator presses the QRT button on the code converter, causing both converters to "handshake" and go off the air. If the IRS wants to close the contact before the ISS is finished, the IRS can "break" into the ISS and exchange places. The operator may then press the QRT button to close the contact.

Mode B

Mode B is useful for broadcasts when the sending station wants to reach more than one station simultaneously, or when the IRS cannot send acknowledgements to the ISS. Examples of this type operation are W1AW bulletins or net operations.

In Mode B, the transmitter is on continuously, unlike Mode A, in which the data is sent in bursts. The sending station AMTOR converter sends each teleprinter character twice, with the second transmission of a character delayed from the first by 280 ms. These transmissions are made synchronously, as opposed to conventional RTTY, which uses start and stop signals before and after each character. In synchronous communications, all data characters are sent one after the other, without start and stop signals, and at a rate that is controlled by an accurate time base, such as a crystal oscillator. When there are no characters from the teleprinter to send, the code converter fills this "dead time" with AMTOR idle characters. These characters are used to fill the periods of time when the sending teleprinter is not generating data, but they do not print on the receiving teleprinter; they are like a conventional RTTY "diddle."

The advantage of Mode B, compared with conventional RTTY, is that the teleprinter only receives data from the code converter when there are valid AMTOR signals present. Because the characters are transmitted in pairs, AMTOR B stores the first character in memory and waits for the second. When it receives the second character, it checks both in the pair for errors. If one of the two characters has been received correctly, it is printed. If both are in error, a space will be printed to mark the error. This space is easy for the operator to spot and provides a place on the hard copy for a manual fill to be made.

Listen for AMTOR over W1AW

If you can receive AMTOR, try listening for W1AW AMTOR transmissions, Mode B, following the 11 A.M. EST/EDST (presently 1500 UTC) RTTY/ASCII transmissions Monday through Thursday on 14.095 MHz. W1AW has been transmitting AMTOR bulletins since February 8, first under an STA (Special Temporary Authority granted by the FCC) and continuing after the Commission authorized AMTOR for general use in the Amateur Radio Service. The W1AW AMTOR schedule will soon expand; watch the W1AW schedule, published in alternate issues of *QST*, for full details.

W1AW has also made several two-way contacts using Mode A, mostly with stations in Europe, where AMTOR has been popular for some time. It's still a thrill to have a DX station say, "Please QSL — you're my first U.S. QSO on AMTOR!" — *Chuck Bender, W1WPR, Chief Operator, W1AW*

Mode S

Mode S is just like Mode B, except that it includes selective calling. It is rarely used today, although it probably will be used often in the future. Mode S is useful if you are unable to operate in Mode A and only want to receive messages that are specifically intended for you. Teleprinter paper can be used up at a fast pace if you are on a channel that is active with Mode B traffic!

Mode L

Mode L is useful for monitoring two stations that are using Mode A to communicate. Of course, since the sending station is not getting acknowledgments from the Mode L station, but instead from the other Mode A station, the Mode L station will not obtain the benefits of error correction. This is hardly a problem, because the only purpose of this mode is to allow for monitoring, not error-free communications.

Which Mode?

It is important to understand that for all modes except L an AMTOR controller that is monitoring a channel will automatically switch to the proper mode when it is called by an MS. When someone calls your station, you don't have to be concerned with which mode is being used. The AMTOR controller will determine whether the call is in Mode A, B or S, and will adapt to that mode immediately. Only when a station *places* a call does the operator choose what mode to use.

Error Detection

AMTOR is able to process data without error because it rejects data that it believes is incorrect. How does AMTOR know when the data is wrong? It converts each five-unit Baudot character to a seven-unit character that always has four 1s and three 0s before transmission. At the receiving station, AMTOR checks each received character to see if it meets the 4/3 criterion. If it does, the code converter assumes that the data is correct.[6] If it does not, the character is assumed to be in error.

Even though this method of error detection may appear to be overly simplistic, it provides adequate performance for "outwitting" the error-causing phenomena found on hf radio circuits.

How to Hook It All Up

AMTOR equipment is available for moderate cost and is *simple* to hook up. Those totally unfamiliar with RTTY might want to review the information on this mode found in the ARRL *Handbook*. The basic equipment used for AMTOR is the same as that used for normal RTTY, with the addition of an AMTOR code converter between the terminal unit (modem) and the teleprinter. As an added plus, with AMTOR you don't need a terminal unit with auto-start, mark hold, and so on. The AMTOR code converter provides all those features for you.

Where and When

Most AMTOR operation is centered around 14,075 and 3637.5 kHz. These two frequencies are typically used for calling. After contact is established, and if both operators are present(!), they will usually move the QSO to another frequency.

Some stations have their radios configured for scanner operation. They will tell other AMTOR operators the frequencies they scan and what their hours of operation are. When someone wants to contact them, they locate a frequency that the other station is known to scan, make sure it is inactive, and then begin a Mode A call. Usually, if the "receiving" station is not in a QSO on another channel, it will respond to the Mode A call within 40 seconds and the QSO can proceed. If stations are using scanners, there is no need to move off channel because the QSO can begin on a *working* channel, instead of a calling channel.

Some stations, such as G3PLX and HB9AK, monitor 14,075 kHz continuously and have computers attached to their AMTOR systems. The computers can be used to store or retrieve messages intended for their station or others. Some AMTOR computer systems can also act as store-and-forward repeaters. When you call these systems, you can request that your message be relayed to another station on completion of your QSO.

As an example of this capability, G3PLX and I were trying to pass some information on 20 meters, and the path between us was just not there; we found that by relaying messages from G3PLX to A4XFW in Oman, to HB9AK, to AD7I near New York City and back again, we could communicate. It is noteworthy that there were *no* operators at HB9AK or A4XFW during these relays. [This type of unattended

transmitting is not presently allowed under FCC rules without special authorization. — Ed.] Everything at these two stations was under computer control. Now *that* has to be a new form of long path!

Simple, But Robust

I have been involved with AMTOR for some time now and I continue to be impressed with its robust capabilities, while maintaining simplicity. It has proved to be a simple and inexpensive addition to any amateur RTTY station. Finally, the most compelling reason I can offer for becoming active with AMTOR is that RTTY is more fun without errors!

Readers' comments and suggestions are always welcome. I would like to hear from anyone interested in getting involved with AMTOR. Please include an s.a.s.e. with your correspondence.

Notes

[1]J. Martinez, "AMTOR, an Improved Error-Free RTTY System," *QST*, June 1981, pp. 25-27.

[2]The exact specifications of SITOR are outlined in CCIR (International Radio Consultative Committee) Recommendation 476-2.

[3]Not all controllers include all modes. If you consider building or purchasing a code converter, you should know which capabilities you want. In addition, if you purchase a commercial AMTOR code converter, make certain the unit meets or exceeds all specifications outlined in CCIR Recommendation 476-2 for the modes you want to use.

[4]AMTOR uses four-letter combinations for selective calling. With a 26-letter alphabet, this provides for 456,976 unique calls. Although it might be desirable to have more calls available, this is all the internationally agreed upon standard allows. Most amateur stations use the first letter and last three letters of their call sign for the selective calling characters. Using this algorithm, the calling characters for W1AW would be WWAW.

[5]On CCITT no. 2 coded terminals, FIGS Z B will print as ±?. On terminals commonly used by American radio amateurs FIGS Z B will print as :?.

[6]This leads us to why I must say that AMTOR provides *virtually*, rather than *absolutely*, error-free communication. There is a chance, although small under normal conditions, that some "hits" during transmission will result in a data error that will pass the 4/3 test at the receiving station.

Bibliography

Azimullah, R. and R. Deraemaeker, "Simplex TOR STB 750 for World-Wide Radio Telegraph Communications." *Philips Telecommunications Review*, Vol. 35, No. 4, Dec. 1977.

Daley, A., "Hf Radio Marine Telex." *Transactions on Vehicular Technology*, VT-25, No. 4, Aug. 1977, pp. 199-202.

Da Silva, H., E. Goldstern and J. Kok, "Simplex TOR STB 75." *Philips Telecommunications Review*, Vol. 30, No. 1, Dec. 1971, pp. 1-14.

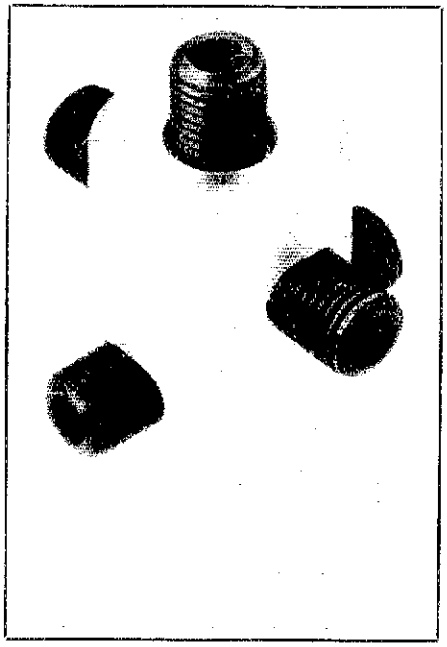
Holliday, A., "MICROTOR." *Electrical Communication*, Vol. 51, No. 1, 1979, pp. 75-79.

Martinez, J., "AMTOR, An Improved RTTY System Using a Microprocessor." *Radio Communication*, Aug. 1979.

Martinez, J., "AMTOR, The Easy Way." *Radio Communication*, June/July 1980.

Paul Newland, AD7I, was first licensed in 1971 and is currently active on hf and vhf with new modes such as AMTOR and packet radio. He is presently focusing his Amateur Radio activities on development of hardware and firmware for AMTOR code converters and modems. Professionally, Paul is employed by a major research and development company where he designs microprocessor-based communications interfaces for computers. He received a BSEL degree from California Polytechnic State University in 1979 and a MSEECE from the University of Michigan in 1980. Paul is a member of the ARRL and IEEE.

New Products



In addition to the two basic switches, MEC offers a 10-color variety of keycaps and bezels. Bezels illuminated by LEDs are available, too.

MEC also provides a matrix mounting system (UNIMEC/VARIO-SUPPORT) for their switches. This enables a designer to realize a custom keyboard or switch panel almost instantly. The desired layout and switch functions are determined simply by inserting the appropriate switches into the matrix. According to the manufacturer, this makes panel mounting easy and stops over-pressure as well as flexing of the pc board.

Switches and pricing information are available from Forsbert Sales, Inc., 646 Summer St., Brockton, MA 02402, tel. 617-522-6300, and Switches, Inc., 949 Stierlin Rd., P.O. Box 4248, Mountain View, CA 94040, tel 415-962-8649. — *Paul K. Pagel, N1FB*

X-PANDA-FIVE

☐ A new accessory for the hf mobile enthusiast is available from JL Industries. The X-PANDA-FIVE is an adaptor that permits the installation of up to five resonators on one mobile mast.

The manufacturer claims ease of installation and convenience of operation. The mobile operator no longer needs to stop to change resonators — a distinct advantage, especially during bad weather. In addition, hams who own motor homes or RVs, or who live in modular homes, apartments or condominiums, might find the X-PANDA-FIVE a useful accessory for erecting a multiband hf antenna where limited space is available.

Complete installation and resonator tuning instructions are furnished with the X-PANDA-FIVE. The adaptor is machined from solid aluminum stock and incorporates resonator mounting studs of high-tensile carbide steel. All threads are 3/8" × 24 to accept either Hustler or HyGain resonators and masts. The suggested retail price is $14.95, and the unit is available direct from the manufacturer, JL Industries, P.O. Box 030413, Fort Lauderdale, FL 33303 — *Sandy Gerli, AC1Y*

UNIMEC SWITCHES

☐ A/S MEC-75 of Copenhagen, Denmark, offers a unique modular switch available in two forms: momentary contact and push-push action. Both types provide five different contact configurations. These are determined by selecting the appropriate switch terminals with pc-board traces or hard wiring. Essentially, each switch is a programmable 4pdt type.

Strays

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

☐ The June issue of *QEX* featured:

- "Many Modifications to the Ten-Tec Omni," by Robert E. Helms, AF5Z.
- "Lowpass Speech Filter Using Surplus Inductors," by Ed Wetherhold, W3NQN.

It also reviewed the Ninth Annual Eastern VHF/UHF Conference and carried a request from Hank Magnuski, KA6M, for information from potential users of the AMSAT OSCAR Phase IIIB AMICON Special Service Channel, which has been designated for packet-radio operations.

This issue, the 16th, was the first one produced at ARRL Hq. Please send all subscription requests, manuscripts and correspondence for *QEX* to ARRL Hq. The domestic subscription rate for ARRL members is $6 for 12 issues; $12 for nonmembers. There are additional postage charges for mailing outside the U.S.; write to Hq for details.

DX SERVICE AVAILABLE TO BLIND OPS

☐ The Braille DX Service promotes DXing among blind hams by providing a monthly cassette recording of current DX activity, including QSL information, propagation reports and DXpeditions. For more information, contact Phil Scovell, AFØH, 8347 West 6th Ave., Lakewood, CO 80215, tel. 303-233-4335.

Spread-Spectrum Applications in Amateur Radio

Through the properties of their coded modulation, spread-spectrum systems can provide multiple-access, low-interference communications to radio amateurs.

By William E. Sabin,* W0IYH

Traditionally, the emphasis in Amateur Radio has been to make a transmitted signal as narrow in bandwidth as possible. Also, receivers are made as narrow and as interference-immune as possible. In this way, many signals can occupy a ham band successfully. This approach has been successful, to a point. But if a group of stations is on one frequency (the pileup!), the system does tend to break down, with disastrous results.

A new approach is being advanced that amateurs should take a look at. Military and commercial organizations are developing spread-sprectrum systems. Such systems deliberately occupy a wide band of frequencies, as part of a strategy to make communications more reliable and more secure, or private. (The word "privacy," as used here, has a special meaning in Amateur Radio, which will be considered later.)

To be more exact, a transmitter sends its message in such a way that a wide spectrum is used, according to a very carefully designed plan. The receiver has the ability to use this same plan in reverse, to convert the signal back to narrow-band form. By performing these actions in the right way, privacy and interference immunity are improved. Fig. 1A shows a conventional transmitter output of, say, 1 kW. With spread-spectrum operation, this same power is spread out as shown in Fig. 1B. There is no strong carrier at any one frequency. Within a 3-kHz band, the amount of signal is greatly reduced. In fact, it may be less than the noise level. But after "despreading," the signal once again looks like the signal at A.

This scheme is different from wide-band fm in that the message itself does not produce the spread spectrum. Instead, another agent is employed to spread the signal. Also, there is no carrier, as in an fm system.

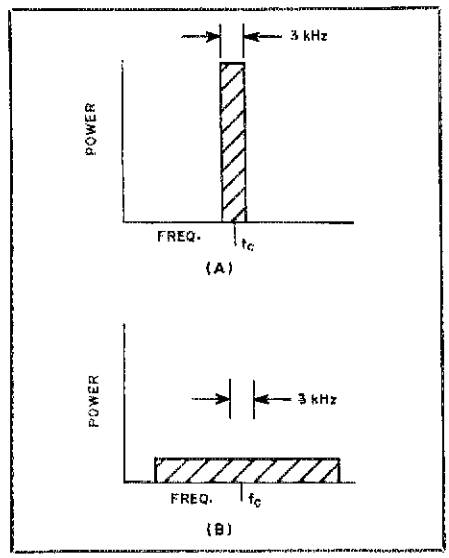


Fig. 1 — The power distribution of a conventional communications signal (A) versus a spread-spectrum signal (B). The same total power is contained in both signals.

Why Amateur Spread Spectrum?

Consider the network shown in Fig. 2. Using spread spectrum, stations A and B can communicate privately, while C and D do the same. Or, A can address all stations. Also, a member of this net can address an entirely different net or a single member of the other net. Or, B could address all nets simultaneously. In a particularly large region, these nets all use the same frequency band, and no equipment retuning is needed for any of the above operations.

In any of these operations, a degree of "privacy" is achieved, in the sense that communications are programmed according to the requirements of the moment. This "selective calling" is achieved by using the microcomputer-based "protocol," or message-routing procedures. The use of spread spectrum is an enhancement of the "packet radio" techniques that advanced amateurs are now experimenting with. By adding to this packet system a carefully managed spread-spectrum protocol, it should be possible to greatly reduce "collisions," avoid interference and add significantly to the repertoire of the packet system.

This extra element of spread-spectrum management, in addition to time management, makes it possible to reduce the guesswork with respect to frequency selection, which is a major problem in Amateur Radio. The difficulty is that a clear frequency at my station may not be clear at

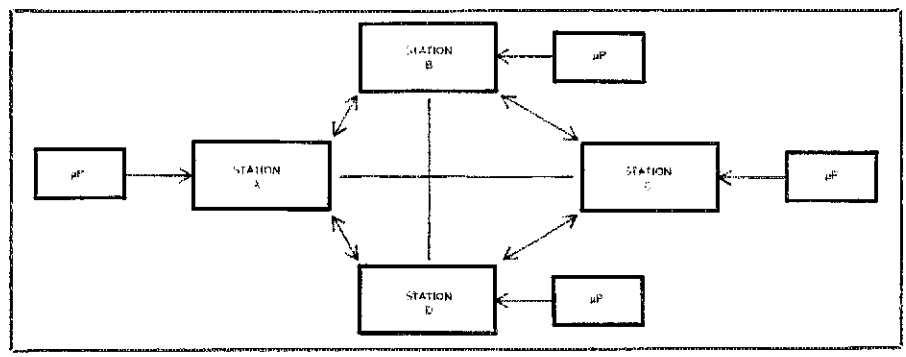


Fig. 2 — A network of stations using μP or microprocessor-based protocols. Network and internetwork communication may be obtained without equipment retuning.

*Rockwell-Collins, Telecommunication Products Div., Cedar Rapids, IA 52498

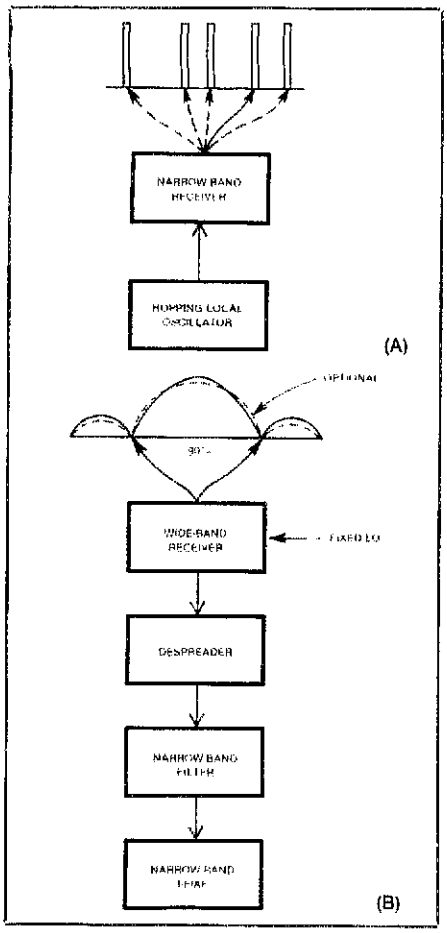


Fig. 3 — The two major types of spread-spectrum operation. At A, the frequency-hopping mode is illustrated; at B is the direct-sequence mode. The spreading is caused by applying a coded modulating signal at the transmitter that is independent of the intelligence modulation. The same predetermined code is applied in reverse at the receiver to despread the signal, and the intelligence is then demodulated in conventional fashion. If different spreading codes are appropriately chosen, interference-free operation may be obtained with different stations sharing the same frequency spectrum.

your station. We need a way to improve this situation. The communication is not restricted to data. Digitized voice messages can be sent, stored at the receiving station and converted back to speech at the completion of the message.

The information below summarizes the possible advantages of combining spread spectrum with packet-network protocols. There is no particular argument in favor of using spread spectrum by itself.

- Voice or data
- Simultaneous net combinations
- Network privacy
- Reduced collisions between
  A) spread and nonspread systems
  B) other spread systems
- Combines well with packet protocols
- Enhances packet repertoire

The important extra element is the voluntary "discipline" to which the various players can subscribe. The discipline is handled by the various personal computers involved, leaving the operator with a great deal of freedom.

Fig. 3 illustrates the two major types of spread-spectrum reception that amateurs might consider: frequency hop and direct sequence. At A, a narrow-band receiver is rapidly tuned through a predetermined set of frequencies. The desired signal is available at each of these frequencies when the receiver tunes there, according to a predetermined plan. Other signals are programmed so that they are seldom on the frequency to which the receiver happens to be tuned at one particular moment, although they may share this frequency at different times.

At B, a wide-band receiver, tuned to a fixed frequency, listens to a signal that has been carefully spread out in the manner shown, according to a predetermined plan. The receiver possesses the key by which to despread this signal and put it through a narrow filter. All other signals using the same frequency band are essentially ignored. A different spread-spectrum signal fails to despread. A conventional signal is likewise unable to penetrate the narrow filter, because it is converted to a wide-band signal by the receiver.

On the hf bands, frequency hopping would be better because of its narrow-band nature. At uhf, direct sequence offers advantages. By carefully selecting the kind of modulation in direct sequence, the spectrum is improved as shown in the dashed line in Fig. 3B. This could be msk (minimum-shift keying) modulation.

Direct-Sequence Spreading

Fig. 4A shows a conventional phase-shift-keyed data signal and the transmitted spectrum it produces. The width of the main lobe is twice the data rate, and in an amateur RTTY system would be less than 1.5 kHz wide. In Fig. 4B, each data bit is modulated by a PN code, where PN means pseudo-noise. There may be thousands of PN code bits for each data bit. The data bit has the effect of inverting, or not inverting, a group of PN bits, depending on a data 1 or 0. After combining these code streams, a mixer with a fixed-frequency local oscillator produces the spread-spectrum rf signal. The width of the main lobe is twice the PN code rate.

The design of the PN code is critical to the performance of the spread-spectrum system, and will be covered in the next section. The spectrum in Fig. 4B shows that, when listened to by a conventional receiver, a weak, hissing, noise-like signal is heard. It is not truly random noise, because of the nonflat nature of the spectrum, and because the PN code does repeat itself after some long time interval. The expression "pseudo" noise is therefore appropriate.

Fig. 5A shows a PN code generator. A shift register with N stages, initially loaded with all 1s, generates an output that is

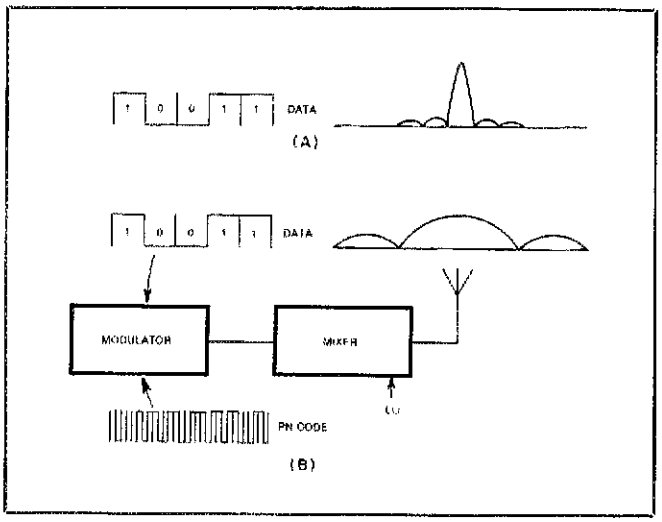


Fig. 4 — At A, a conventional phase-shift-keyed (psk) data signal and the transmitter spectrum that it produces. At B, the same data signal and a pseudo-noise (PN) code are combined to produce a direct-sequence psk signal with its much broader spectrum.

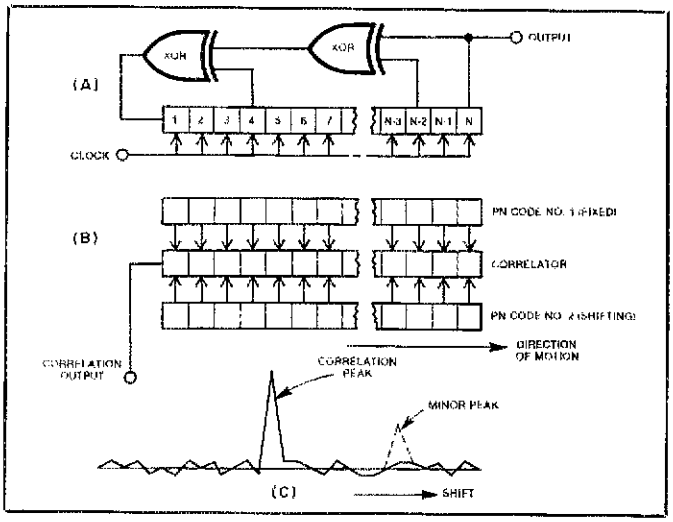


Fig. 5 — A PN code generator, A, and a correlator, B. The strings of blocks represent shift registers. At C is shown the correlation output with shifts of data in the lower shift register. This output peaks when synchronization is obtained.

influenced by the XOR feedback gates. After as many as $2^N - 1$ pulses, the code repeats itself. Code length can be from, say, 10 bits, to 10 million or more. If my transmitter and your receiver use the same PN generator circuit, we can communicate.

Fig. 5B shows a correlator. One input is a fixed (or static) PN code that has been stored. The other input is the received signal, which ripples through the bottom section. The output of the correlator, Fig. 5C, is very small (± 1 or 0) except when the two codes exactly coincide, at which time the output equals N. When this peak occurs, the two codes are "synchronized," or correlated.

A well-designed code has only one of these sharp peaks. Other codes will have other minor peaks that can produce "false" synchronization. Also, a short segment of a good code may not be so good in this respect. Therefore, the register length should be as long as the code, or at least as long as possible. A good possibility for amateur use is to combine two short Gold codes.[1] The resultant codes have good correlation properties and are easy to generate.

Fig. 6 shows two types of direct-sequence receivers. In Fig. 6A, the despreading is done at i-f. A narrow-band crystal filter lets only the despread signal get into the data or voice detector. In B, a double conversion takes place, and the correlator, operating at baseband, performs the despreading. A low-pass filter then passes the desired signal only, which can be derived from the correlator output. Some receivers use both methods, that at A for data detection, and that at B for synchronization.

Direct-Sequence Synchronization

Fig. 7 shows, in a very general way, how synchronization is achieved and maintained. One way is to slow down or speed up the PN code generator in such a way that it can search backward and forward in time to "acquire" the incoming code. Once the code has been acquired, a tracking operation takes place, so that the PN code stays closely aligned with the desired signal. Acquisition is greatly aided by the use of very stable clocks and by prealignment of the codes, so that only a small amount of searching is needed. For example, using WWV, all code generators could be initialized each hour.

Another method uses a special, short preamble that the receiver quickly recognizes. This recognition starts the tracking operation. In an amateur application, this would be easier and cheaper to implement. In this case, the prealignment

[1][Editor's Note: Gold codes are a family of codes named after the developer, R. Gold. The significance of the family is that a large number of codes may be obtained with relatively short shift registers in the code generator.]

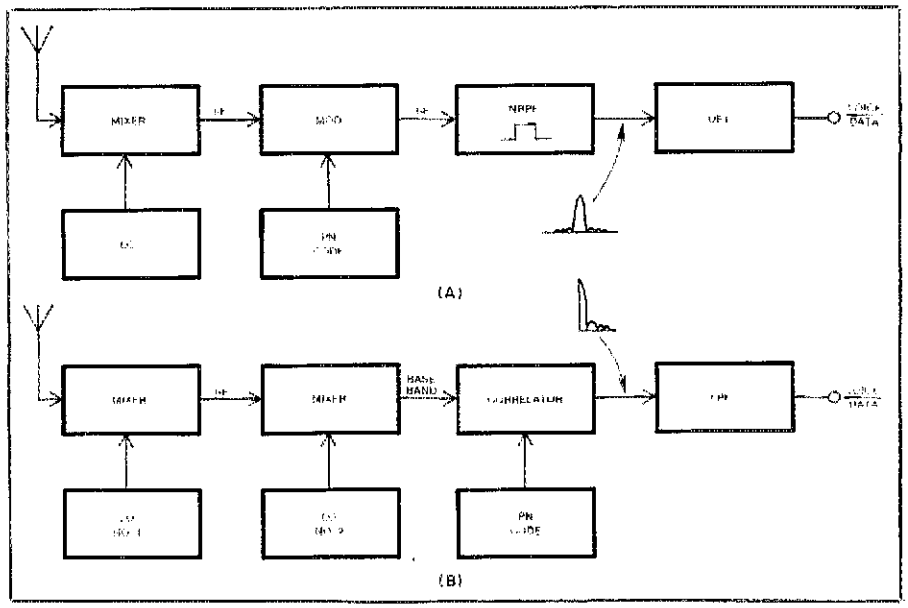


Fig. 6 — Block diagrams of two types of direct-sequence receivers. See text.

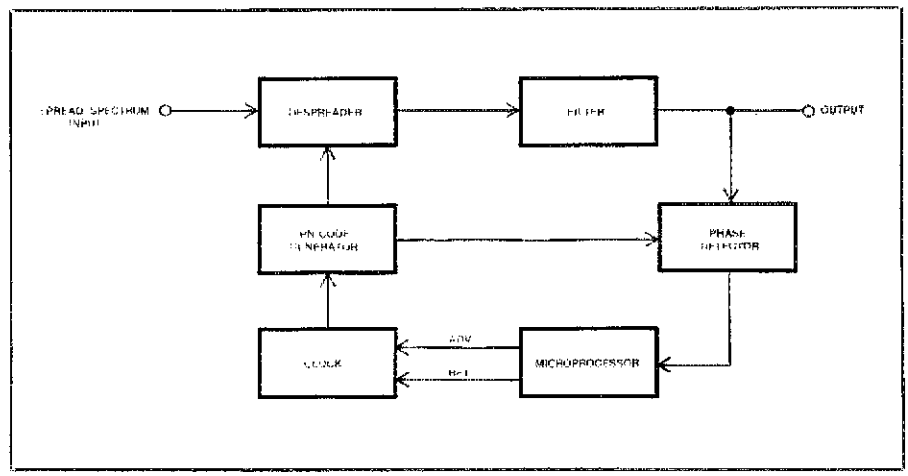


Fig. 7 — A system for synchronizing and tracking with direct sequence.

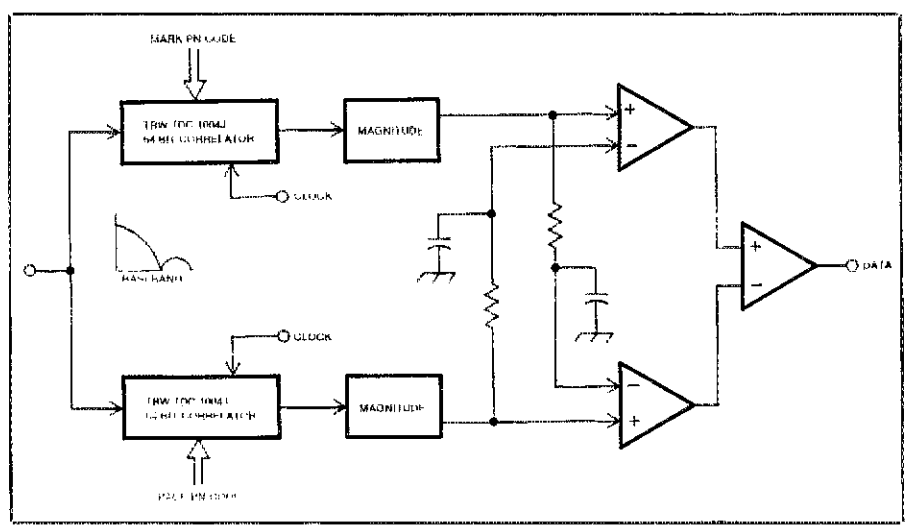


Fig. 8 — A correlator that operates at baseband with direct sequence.

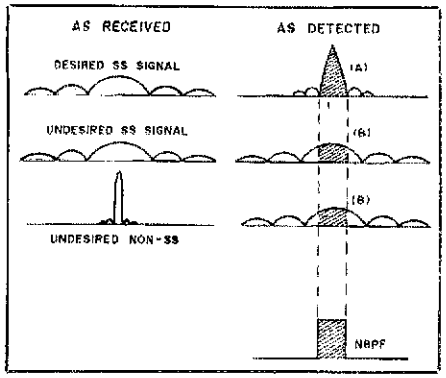


Fig. 9 — Illustrating interference rejection in direct sequence. Processing gain is obtained with despreading, and in decibels is equal to 20 log (A)/(B), where (A) and (B) are the amplitudes depicted in the shaded areas at the right.

of codes and time-of-day clocks would not be needed. When the preamble is sent, it is immediately followed by the start position of the long PN code. The receiver performs the identical operation. Sometimes, the preamble is sent as a frequency-hopping signal rather than direct sequence.

The circuit of Fig. 8 uses two TRW 64-bit correlators. One recognizes a PN sequence that identifies a mark, and the other recognizes an unrelated sequence that signifies a space, using bi-phase modulation. The correlator outputs can be positive or negative, so a full-wave rectifier (using op amps and diodes) is needed.

Each comparator looks at the instantaneous output of its correlator and the average output of the opposite correlator. This circuit, with very little modification, can detect marks and spaces in a frequency-hop radio, in which up to 64 bits of information would signify the message bit.

Fig. 9 shows how a desired spread spectrum and an undesired signal, either spread or narrow-band, are interpreted by a spread-spectrum receiver. The narrow-band signal is "smeared" by the receiver so that little energy is passed by the receiver so that little energy is passed by the narrow band-pass filters. If the undesired local signals are strong enough, however, they can still override the desired distant signal, even after it has been despread, as shown. This "near-far" problem in direct sequence is an important limitation. Frequency hop seems to be more immune.

Frequency-Hop Spreading

Fig. 10 is a block diagram of a frequency-hop transmitter. A fast-frequency-change local oscillator is needed. The time that it takes to settle on the next frequency should be less than 10% of the dwell time on that frequency. Hop rates of 10 to several thousand per second are feasible with today's technology, and amateurs should experiment with speeds over the entire range. For example, a real opportunity exists for innovation in a low-cost, fast-hopping synthesizer design.

Shortly before changing frequency, the signal is smoothly attenuated, as shown. After the hop, the signal is brought up again, smoothly. This is necessary to reduce the transmitted spectrum (key clicks) as much as possible and to allow the LO time to make its frequency change. The hopping pattern is all under microprocessor control and determines which station or network will be addressed.

The analog voice or fsk data is filtered by the narrow band-pass filter. In other words, frequency hop is basically a narrow-band mode at any one frequency. Following the mixer, wide-band amplifiers and a wide-band antenna are needed so that equal power output occurs at each frequency.

For voice, a-m (with carrier) is preferred to single sideband because ssb causes phase jumps between hops, which produce excessive noise and distortion. Analog voice is not a preferred mode, in general, in frequency hop. At very low hop speeds, however, ssb should be considered as a possibility.

Fig. 11A shows the transmitted signal, smoothly attenuated between hops. The dashed lines show possible amplitude variations with a-m operation. Fig. 11B shows the spectrum. The tapered Christmas-tree shape at each frequency is caused by the turning on and off (Fig. 11A), and also by

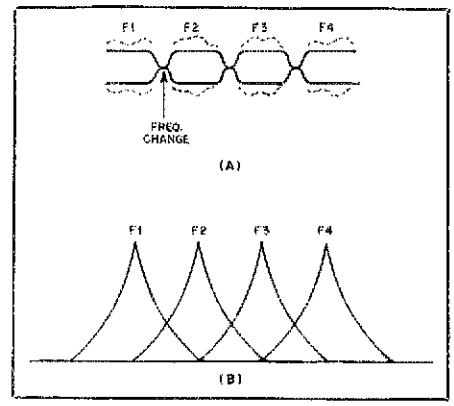


Fig. 11 — At A, an amplitude-versus-time representation of a frequency-hopping signal. The broken lines indicate possible variations arising from amplitude modulation of the signal. At B, an amplitude-versus-frequency representation of the same signal; any predetermined arrangement of frequency hopping may be used.

the mark/space information or a-m sidebands. To minimize interference, the drop-off in the spectrum should be as fast as possible, consistent with good communication. We can also visualize that the receiver bandwidth should be only wide enough to receive, say, 90% of the total signal energy at each frequency.

A frequency-hop receiver is shown in Fig. 12. An antenna input switch controls the turn-on at each frequency in a way that reduces intermodulation with strong, undesired signals on nearby frequencies. After mixing, a narrow filter leads to the signal detectors. The outputs of these detectors provide signal information to the microprocessor to control the synchronization algorithm and to determine that sync has occurred. When synchronization is achieved, a tracking operation is started in which the hop clock rate is adjusted momentarily. Later paragraphs cover this topic more thoroughly.

Instead of a single filter plus discriminator, consider two narrow filters, one for mark and one for space. The outputs are rectified and compared to determine the

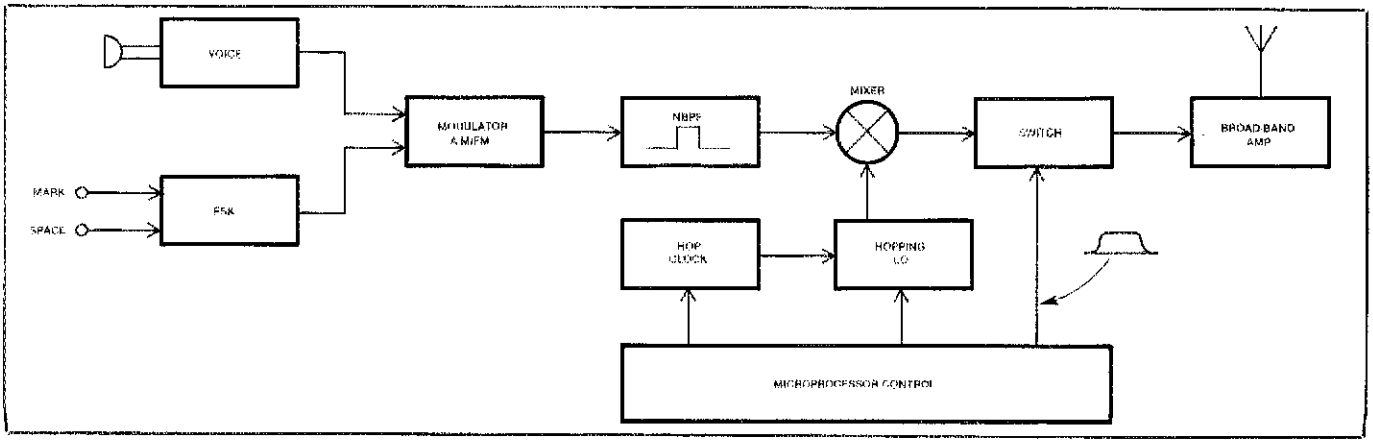


Fig. 10 — A frequency-hop transmitter. The hopping LO must be capable of making fast frequency changes with short settling times.

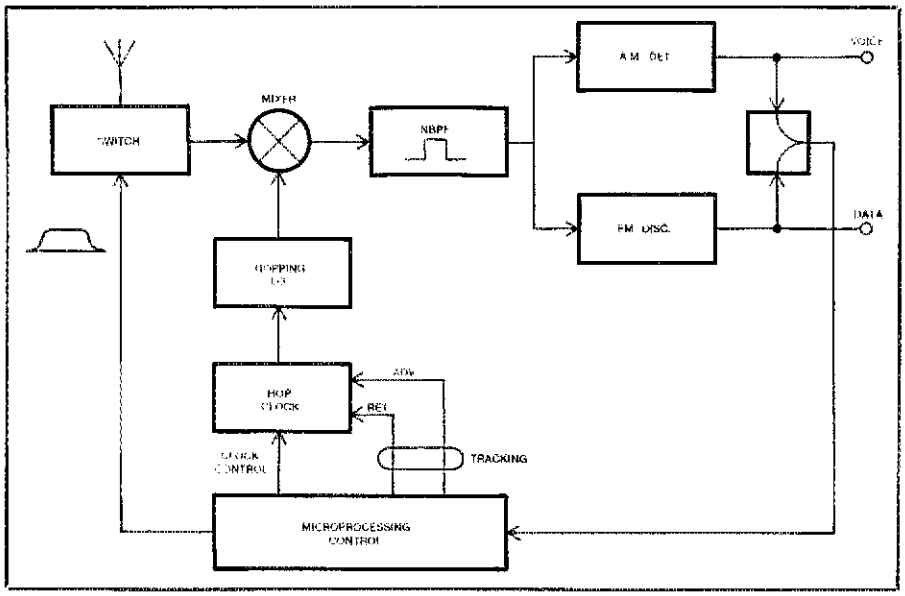


Fig. 12 — A frequency-hop receiver. The antenna switching reduces intermodulation from strong adjacent-frequency signals.

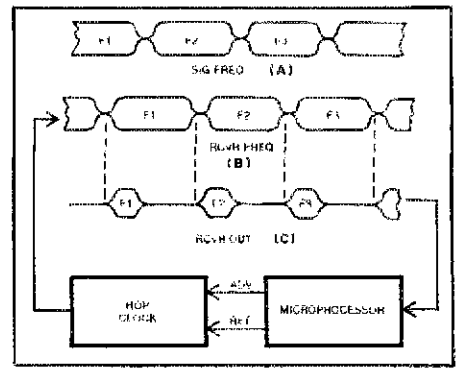


Fig. 13 — Illustrating frequency-hop sync searching or tracking.

mark or space condition. For data reception, each filter has a 3-dB bandwidth that in hertz is about 1.25 times the number of hops per second. Linear-phase filters, called "matched" filters, are needed.

Frequency-Hop Synchronization

One way to synchronize is to use very stable hop-clock oscillators. The hopping code patterns are then all initialized at some time, say each hour, using WWV as a time reference. Then, only a slight amount of searching back and forth in time is needed to align the receiver with the signal.

At the start of each reception time, a small sync adjustment is made. A block of data would be preceded by a special segment that sets up the receiver to copy data. A latecomer in a net would also need opportunities to get fully synchronized.

Sync searching is illustrated in Fig. 13. We see that the incoming signal, at A, does not completely coincide in time with the receiver tuning, at B. The signal switches to frequency f2 before the receiver is ready to switch to f2. The result is that the receiver output has a signal only during the interval shown at Fig. 13C. The receiver uses this information to advance or retard the hop clock slightly until the overlap has improved sufficiently. In the example shown, the receiver hop clock would be speeded up.

In another synchronization method that is somewhat more complicated, the receiver slow hops until the computer recognizes that sync has occurred. Then, the receiver fast hops in sync with the signal. The advantages of this method are that very stable hop-clock oscillators are not needed, and no prealignment of hopping codes is needed.

An additional method is to reserve certain frequencies as "start" or "stop" frequencies. When the start frequency is detected, hopping automatically begins according to the hop pattern plan. A stop frequency advises that the net control is available.

Interference Rejection

In Fig. 14, two kinds of interference are shown. In one case, a steady signal appears on one of the frequencies. In the second case, another hopping signal occasionally occupies the same frequency at the same time. Also shown in Fig. 14 is a common occurrence, signal fading from time to time on various channels.

Ways to combat these conditions are (1) make the receiver bandwidth narrow, to reduce interference; (2) design the hop codes to minimize "collisions" between nets and between net members; (3) use a fast-responding agc; (4) use a lot of message redundancy, i.e., repeat everything on several frequencies; (5) use error-correction codes; and (6) delete occupied frequencies and insert clear frequencies. Possibly certain frequencies would be reserved for backup use only.

Network Protocol

How could frequency hop be used to enhance an amateur packet network? Consider the format in Fig. 15.

Block 1: The net control has a hop code that addresses the net. The stations in the net are using this hop code to monitor the net control station and synchronize to it.

Blocks 2 and 3: The net control also sends data that contains the information in blocks 2 and 3.

Block 4: Having acquired frequency-hop sync, the net members acknowledge.

Block 5: The net control listens for my message using my frequency-hop code. Other stations in the net communicate with each other at the same time, using predetermined hop patterns that do not interfere with other members.

Block 6: The stations use two kinds of code simultaneously: frequency-hop pattern and mark/space code. This makes it possible, for example, to address a particular station and to identify the caller at the same time, or to inform the recipient how to respond to the call. Once the net members become synchronized, it should be possible to maintain sync for a long period of time, with tracking adjustments as required. If a member requires sync, he can send a sync-request message to which the recipient responds.

These ideas are offered for illustrative purposes and do not represent any known system in use. The important thing is that

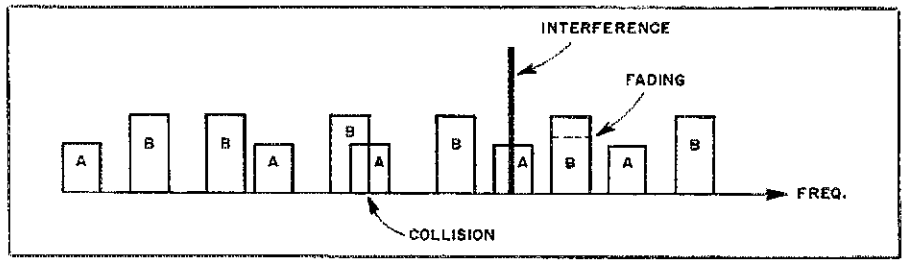


Fig. 14 — This drawing depicts interfering signals and fading in a frequency-hop system. The letters A and B identify emissions from two different transmitters sharing the spectrum, but with different hopping codes. The two frequency sets are almost orthogonal. The coding system is designed to reject interference, fading and collision. The same hop frequencies may be used by both stations, A and B, but at different times.

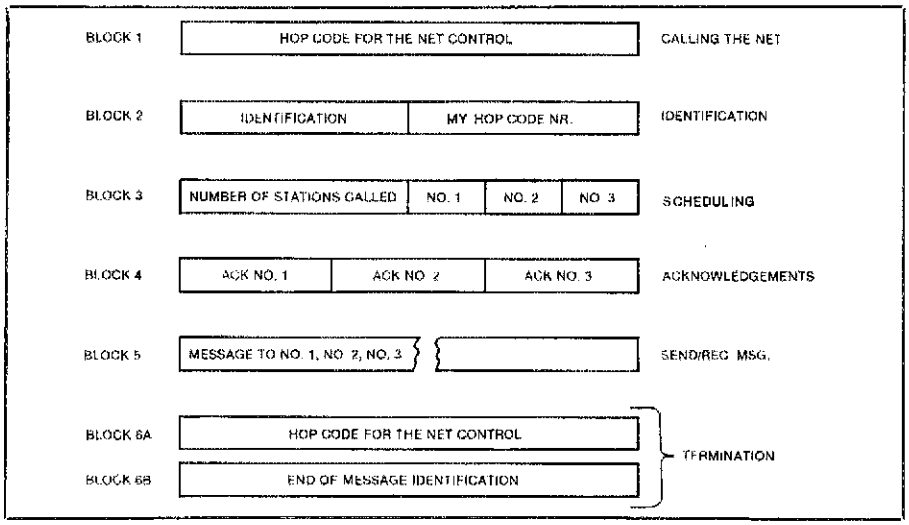


Fig. 15 — Possibilities for network protocol.

amateurs are free to devise schemes that are right for them.

The key to success in frequency hop is to repeat the message often and to provide error correction. This means the message rate must be reduced to improve reliability. In frequency hop, the possibilities of interference are strong. This means that any part of the message must be repeated on several different frequencies. In a slow-hop system, a block of data is sent on each frequency and then the frequency is changed. A typical dwell time on each frequency might be 0.1 second.

It is important to have some way of detecting "bad" frequencies and moving away from them. The network protocol should include an avoidance strategy. The key is to find out if excessive errors occur on certain frequencies. This frequency management is under computer control. My computer tells your computer what action is needed to improve the message reliability.

In a fast-hop system, the dwell time on each frequency might be 1 ms. The message rate is the same as with slow hop, but now each data bit is repeated on several different frequencies. After each bit is received, a vote is taken and the majority decides whether the bit is a 1 or 0. The addition of error correction adds to the reliability. The fast-hop method should be a better scheme for amateur use because, with good design of hopping code patterns, collisions and loss of data should be less.

The Amateur Radio Research and Development Corporation (AMRAD) is a group of amateurs who are dedicated to advanced technology in Amateur Radio. Within this group are subgroups interested in spread spectrum and packet networks. The *AMRAD Newletter* is helpful to anyone wanting to learn more, or to get in touch with others having similar interests. (Another interesting newsletter, *QEX*, an experimenter's exchange, is published by the ARRL.) AMRAD is also in touch with the FCC and has obtained special permits to do various kinds of experimental work. The address is AMRAD, P.O. Drawer 6148, McLean, VA 22106. Terry Fox, WB4JFI, is president of AMRAD. Hal Feinstein, WB3KDU, heads the spread-spectrum subgroup, and Dave Borden, K8MMO, heads the packet-protocol group.

New Books

MICROPROCESSORS AND MICROCOMPUTERS

by Ronald J. Tocci and Lester P. Laskowski. Published by Prentice-Hall, Inc., Englewood Cliffs, NJ 07632. Second edition, 1982. Hardbound, 7-1/4 × 9-1/2 inches, 404 pages including index. $20.95.

This comprehensive book does exactly what the authors intend it to do. It addresses a broad spectrum of readers, providing a practical introduction to the world of microprocessors and microcomputers. Concentrating on the fundamentals of microprocessor-based systems, it leans specifically toward the 6502.

The authors' writing style is about the nearest you can come to having a personal tutor without actually employing one. If you can't find the time (or money) to attend classes on this subject, you can bring the class into your home for a small cash outlay. And should you attend a formal class, you'll still find this book to be a valuable reference.

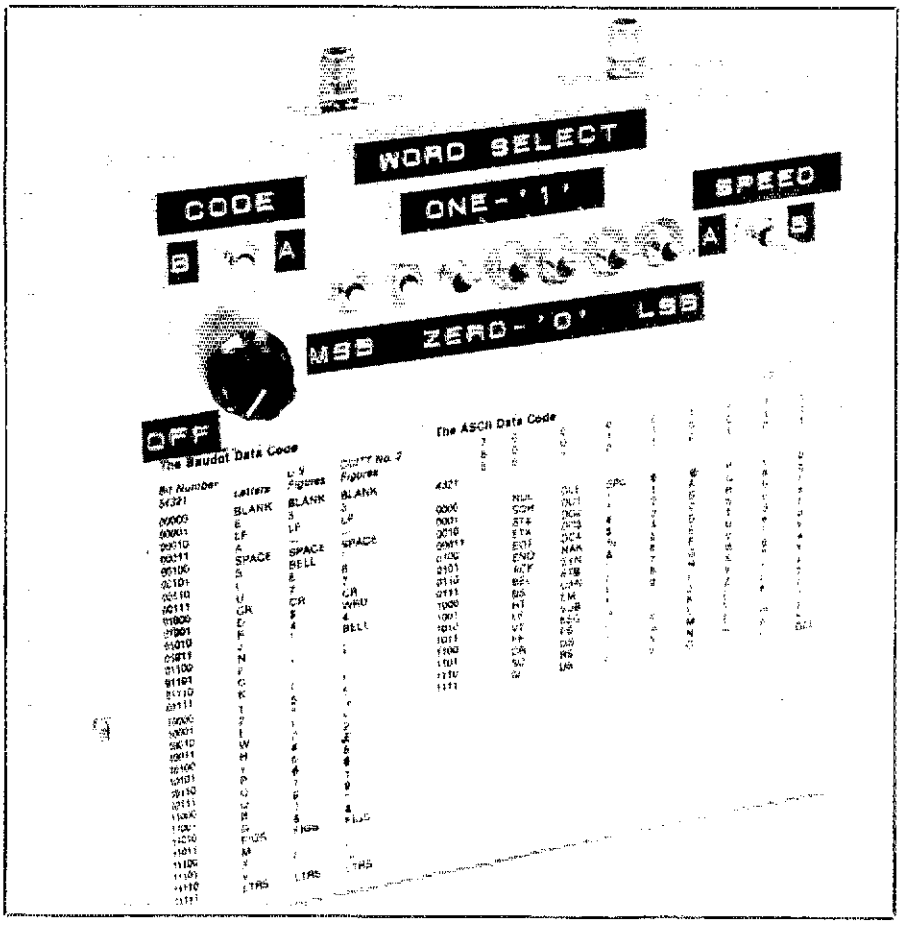
From number systems and codes used in the world of computers, you're stepped through digital circuits, an introduction to computers and then into microcomputer hardware. After voyaging through the inner workings of the microprocessor itself, you're led to the ports of I and O — input/output interfacing. These are important ports of call, as this interfacing allows you to communicate with the computer, and the computer to respond to you. The many facets of microcomputer software are covered in the last section, and the appendix contains the 6502 instruction set and op codes. Budding assembly-language programmers will find some helpful examples.

Each chapter has a number of questions, plus problems for the reader to solve. This helps you to discover gaps in your understanding of the material. More than likely you're not going to remember *everything* you've read the first time around, but it's a simple matter to turn back a few pages and refresh your memory — sort of a dynamic RAM operation!

Weak points? My only gripe is that there is no answer section. It would be nice to have absolute verification of the answers you've provided for the example questions and problems.

If by now you haven't gathered that I recommend the book, let me state emphatically that I do! I wish all my schoolbook texts had been written this clearly. This is one volume that shouldn't collect dust on your bookshelf. — *Paul K. Pagel, N1FB*

A Serial ASCII/Baudot Character Generator You Can Build



Looking for a simple way to test your printer or video terminal? This "weekend" project may be just what you need.

By J. Robert Witmer,* W3RW

Wouldn't it be nice to be able to *easily* generate serial Baudot or ASCII characters for test purposes? I constructed a simple, low-cost device to do just that. It provides Baudot or ASCII characters at the most frequently used speeds, has a variable character rate and can be battery powered. Easy-to-add modifications include 8-bit ASCII operation, selectable parity generation and additional speeds. The unit is based on a UART (Universal Asynchronous Receiver Transmitter), an LSI (large-scale integration) IC widely used in data communications applications.

Brief UART Theory of Operation

At first glance the UART appears complicated, but it's really very easy to use. Several articles have described its operation in detail, so we'll cover just enough of the theory to understand how to put the UART to work.[1,2] A UART is a circuit subsystem (many functions in one package) that can receive and transmit binary information of varying word lengths. In doing this, it incorporates the start, stop, control and error-detecting information necessary for asynchronous communications with many standard data terminals and computers.

This may be easier to understand by first looking at the transmission time sequence of the Baudot (Murray) and the ASCII character codes (Figs. 1 and 2). Circuitry within the UART allows you to concentrate on the binary code for the Baudot or ASCII character and to forget about the generation of the start, stop and optional parity bits. You don't have to worry about the timing, the spacing or the sequencing, either, as the UART handles all of that, too! Most UARTs have control pins that are used to select the format and size of the Baudot or the ASCII word (or any 4- to 7-bit code) you wish to use. A description of the function of each UART pin is given in Table 1.

How the Character Generator Works

The schematic diagram of the character generator is shown in Fig. 3. The heart of the circuit is the UART, U2. S2 through S8 control the UART data inputs and are used to enter the binary code for the Baudot (see Table 2) or ASCII (see Table 3) character you wish to send. S9 enables you to send 5-bit (Baudot) or 7-bit (ASCII) characters. If you wish to be able to send 8-bit ASCII characters, a switch can be added to connect UART pin 38 to the positive supply (8-bit) or to ground (5- and 7-bit). I hard

*79 Blaine Ave., Leola, PA 17540

[1]Notes appear on page 23.

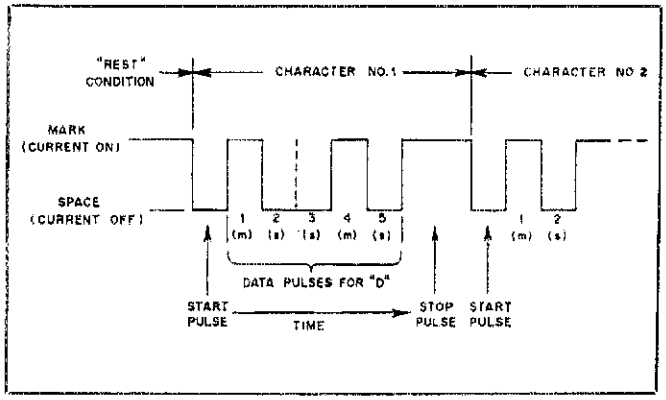


Fig. 1 — Time sequence of a typical Baudot character, the letter D.

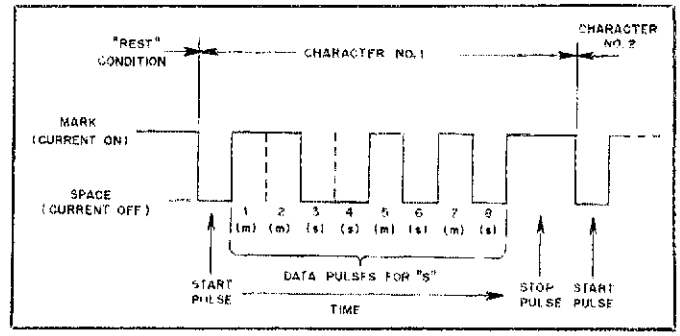


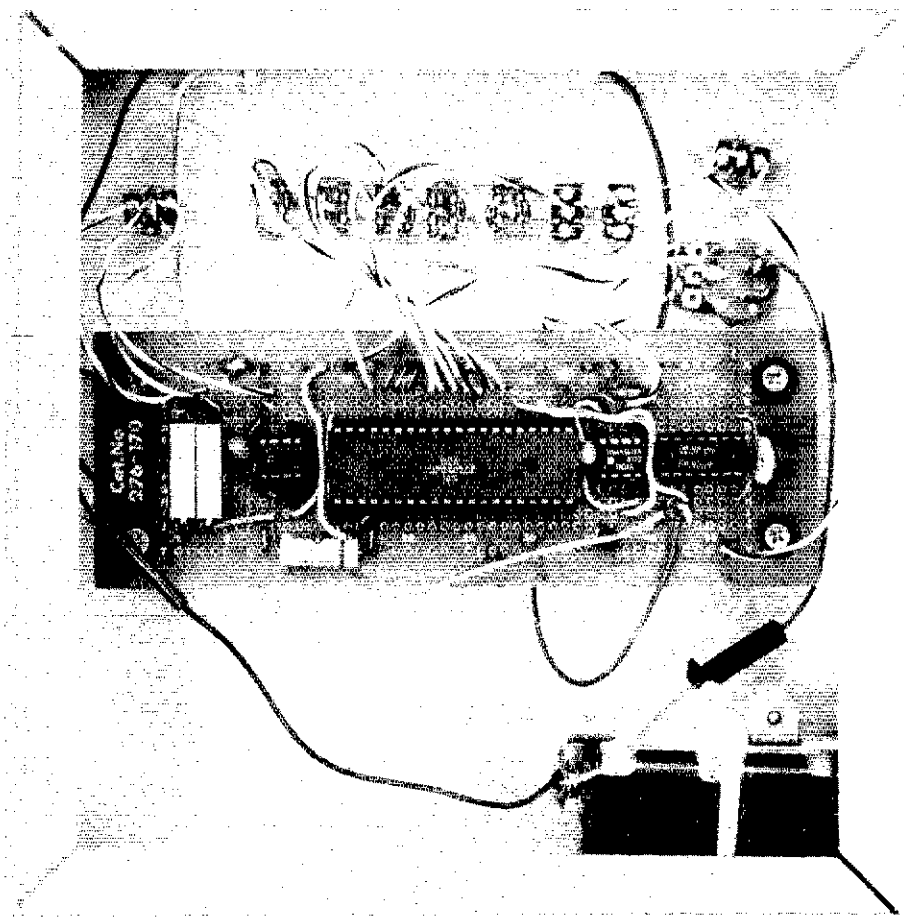
Fig. 2 — Time sequence of a typical ASCII character, the letter S. The eighth, or parity, bit (when used) may be set to one of four possible conditions: (1) always mark, (2) always space, (3) odd parity or (4) even parity.

Table 1
UART Pin Descriptions

Pin no.	*Function*
1	Positive supply: Usually +5 V (4 to 6 V used in this circuit).
2	Some UARTs require −12 V on this pin (not used).
3	Ground.
4	Receive data output enable: Parallel data outputs are enabled when this pin is low (not used).
5-12	Receive data outputs (not used).
13-16, 18, 19	Receive status outputs (not used).
17	Receive clock input (not used).
20	Receive serial input (not used).
21	Reset: Operational status of the UART is reset when this pin is pulsed high.
22, 24	Transmit status outputs (not used).
23	Transmit strobe: Data transmission is initiated when this pin is pulsed high.
25	Transmit serial output.
26-33	Transmit parallel inputs.
34	Control strobe: Control inputs are entered into the UART when this pin is high.
35	Parity enable: Parity generation is enabled when this pin is low.
36	Number of stop bits: Two stop bits are generated when this pin is high. One stop bit is generated when this pin is low and the select-data word length is greater than 5 bits. One and one-half stop bits are generated when this pin is high and the data word length is 5 bits.
37, 38	Data word length: This pin selects the number of data bits per word:

pin 37	*pin 38*	*bits/word*
0	0	5
0	1	6
1	0	7
1	1	8

39	Parity select: If parity is enabled (pin 35), this pin is used to select even or odd parity.
40	Transmit clock input.



A look at the interior of the ASCII/Baudot character generator. The CHARACTER RATE control is above and to the right-hand side of the circuit board. At the bottom right-hand side of the chassis is a NiCd battery pack used to power the unit.

wired pin 38 to ground for 5- and 7-bit-only operation.

A similar situation exists for pin 35: If you wish to be able to send parity-encoded ASCII characters, a switch can be connected to this pin to allow parity to be selected. I chose to disable parity by hard wiring pin 35 to the positive supply. If you do elect to utilize parity, another switch should be connected to UART pin 39 to enable you to select even or odd parity.

An R-C circuit (R2 and C2) connected to the UART RESET input (pin 21), ground and the positive supply provides a reset pulse to the UART when power is first applied. U3 provides the data-strobe signal to the UART. Each strobe pulse causes the selected binary code to be loaded into the UART and transmitted. By varying the data-strobe pulse rate with R1, you can adjust the rate at which characters are sent. R1 does *not* affect the words-per-minute speed or baud rate of the individual characters, but simply controls the time interval between characters. The circuit shown in Fig. 3 provides a rate of approximately 1/2 to 60 characters per second. You could eliminate U3 and use a momentary-contact push-button switch to

Table 2
The Baudot Data Code

Bit Number 54321	*Letters*	*U.S. Figures*	*CCITT No. 2 Figures*
00000	BLANK	BLANK	BLANK
00001	E	3	3
00010	LF	LF	LF
00011	A	—	—
00100	SPACE	SPACE	SPACE
00101	S	BELL	'
00110	I	8	8
00111	U	7	7
01000	CR	CR	CR
01001	D	$	WRU
01010	R	4	4
01011	J	'	BELL
01100	N	,	,
01101	F	!	!
01110	C	:	:
01111	K	(	(
10000	T	5	5
10001	Z	"	+
10010	L	)	)
10011	W	2	2
10100	H	#	£
10101	Y	6	6
10110	P	0	0
10111	Q	1	1
11000	O	9	9
11001	B	?	?
11010	G	&	&
11011	FIGS	FIGS	FIGS
11100	M	.	.
11101	X	/	/
11110	V	;	=
11111	LTRS	LTRS	LTRS

Note: FIGS-H (10100) may also be used for MOTOR STOP function. "1" = mark = hole in punched tape

Table 3
The ASCII Data Code

Bit Number								
7	0	0	0	0	1	1	1	1
6	0	0	1	1	0	0	1	1
5	0	1	0	1	0	1	0	1
4321								
0000	NUL	DLE	SPC	Ø	@	P	\	p
0001	SOH	DC1	!	1	A	Q	a	q
0010	STX	DC2	"	2	B	R	b	r
0011	ETX	DC3	#	3	C	S	c	s
0100	EOT	DC4	$	4	D	T	d	t
0101	ENQ	NAK	%	5	E	U	e	u
0110	ACK	SYN	&	6	F	V	f	v
0111	BEL	ETB	'	7	G	W	g	w
1000	BS	CAN	(	8	H	X	h	x
1001	HT	EM	)	9	I	Y	i	y
1010	LF	SUB	*	:	J	Z	j	z
1011	VT	ESC	+	;	K	[	k	{
1100	FF	FS	,	<	L	\	l	/
1101	CR	GS	-	=	M	]	m	}
1110	SO	RS	.	>	N	^	n	~
1111	SI	US	/	?	O	—	o	DEL

ACK = acknowledge
BEL = signal bell
BS = backspace (←)
CAN = cancel
CR = carriage return
DC1 = device control 1
DC2 = device control 2
DC3 = device control 3
DC4 = device control 4
DEL = (delete)
DLE = data link escape
ENQ = enquiry (WRU)
EM = end of medium
EOT = end of trans.
ESC = escape
ETB = end of block
ETX = end of text

FF = form feed (home)
FS = file separator
GS = group separator
HT = horizontal tab (→)
LF = line feed (↓)
NAK = not acknowledge
NUL = null
RS = record separator
SI = shift in
SO = shift out
SOH = start of heading
SPC = space
STX = start of text
SUB = substitute
SYN = synchronous idle
US = unit separator
VT = vertical tab (↑)

Note: "1" = mark = hole in punched tape

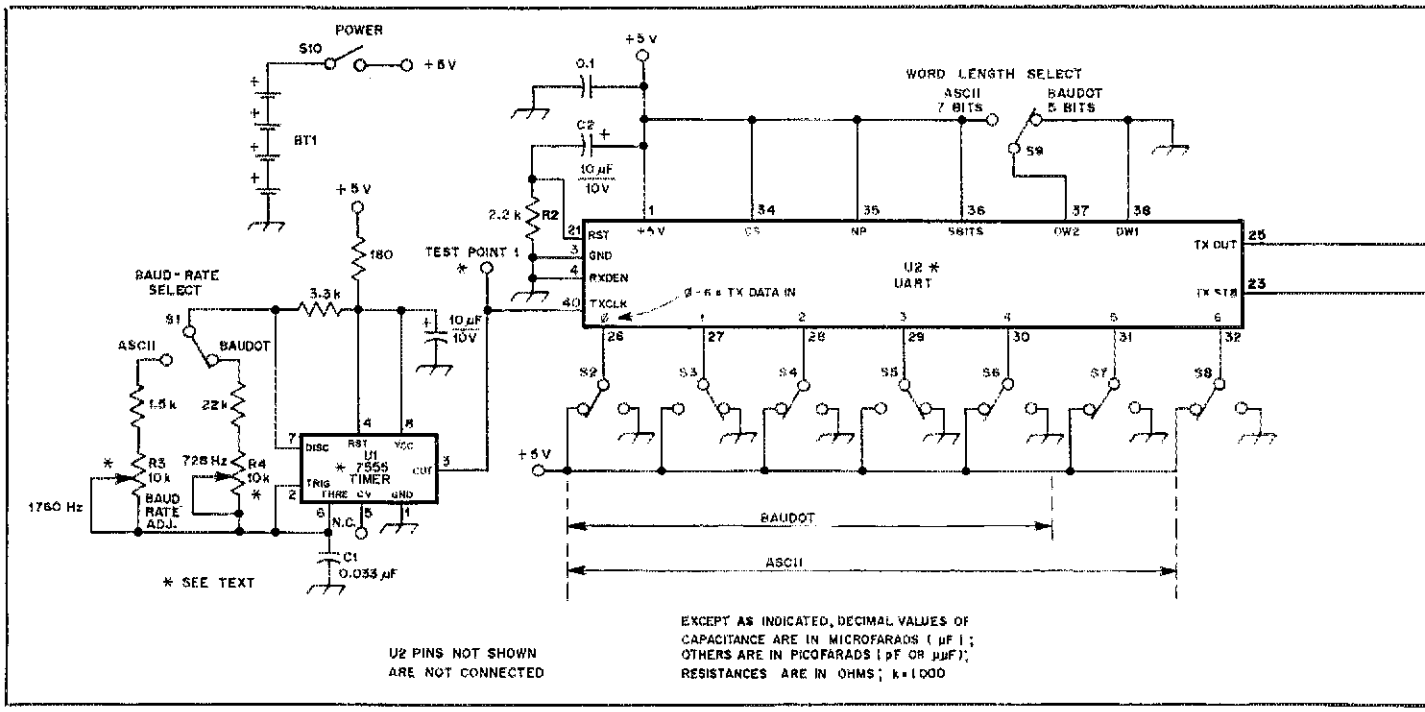


Fig. 3 — Character generator schematic diagram. All resistors are 1/4-W, 5%-tolerance carbon types. Except as indicated, capacitors are disc ceramics. Polarized capacitors are electrolytic or tantalum types.

BT1 — Four AA-size NiCd or alkaline cells in series.
C1 — 0.033-µF Mylar or polystyrene capacitor.
R1 — 100-kΩ panel-mount control.
R3, R4 — 10-kΩ pc-mount multi-turn control.
S1-S9, incl. — Spdt toggle switch.

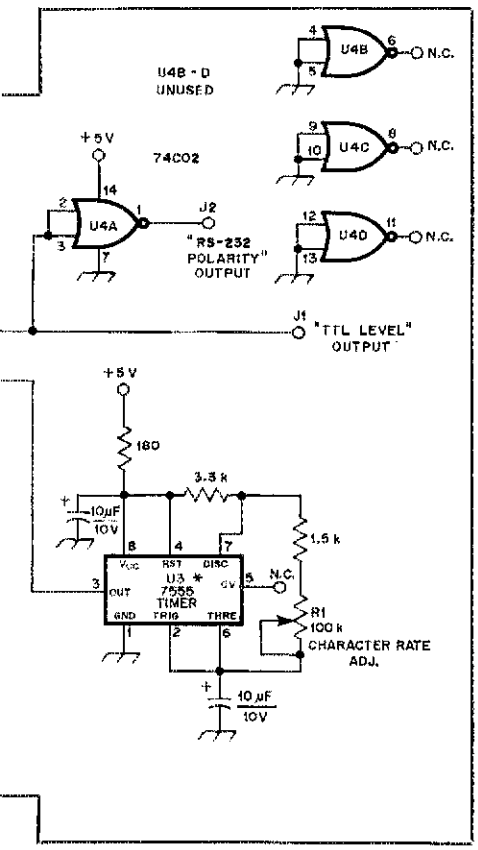
Table 4
Part Comparison

	CMOS	*Standard*
U2	CDP6402 IM6402	AY-3-1015 AMI S 1602
U1, U3	7555	555
U4	74C02	74LS02
Current drain	3.5 mA at 5 V	60 mA at 5 V
Approximate total IC cost	$13	$9

pulse pin 23 high when you want a character to be transmitted. Unused sections of U4 could be used to debounce the switch.

U1 provides the transmit-clock signal to the UART (pin 40). It is the frequency of this signal that determines the words-per-minute speed or baud rate at which each character is sent. S1 allows you to select between two preset operating speeds. I have one set for 60-wpm Baudot operation and the other set for 110-baud ASCII.

Four "AA" NiCd or alkaline batteries provide the power to operate my unit. The total current drain with the parts I use is less than 4 mA. The current requirements and voltage ratings of various component alternatives are given in Table 4. Once you've selected the parts, choose the battery type and capacity necessary for the length of service you desire. I've operated my unit at supply voltages from 4 to 6 V without trouble. Be sure that the circuit



S10 — Spst toggle switch.
U1-U4, incl. — See text and Table 4.

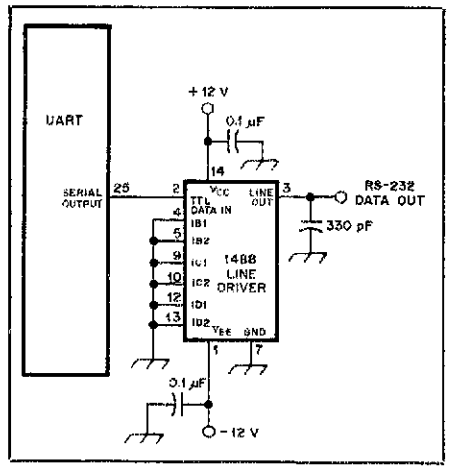


Fig. 4 — RS-232 interface circuit.

being driven can handle the maximum voltage of the battery pack you plan to use. Be careful not to exceed the maximum voltage ratings of the parts you use.

Construction and Alignment

The construction technique you use when building the character generator is not critical. I used a Radio Shack experimenter's board (cat. no. 276-170) and provided sockets for all ICs. I mounted the board in a 7 × 7 × 2-inch aluminum chassis with all the switches and controls mounted along the top edge.[3] This arrangement permitted sufficient room to attach copies of the ASCII and Baudot code tables below the switches for easy reference.

I am presently using the low-power CMOS parts listed in Table 4. The UART is an RCA CDP6402. The IM6402, available from JDR Microdevices, should be an exact replacement for the RCA part.[4] The 74CO2 is also available from JDR Microdevices, and the ICM7555 CMOS timers are available from Radio Shack. I also tried non-CMOS parts in the circuit, with no change in performance except for a large increase in battery drain and a higher supply-line noise level. The non-CMOS UART I tested was the AMI S1602, which is an exact replacement for the GI AY-3-1015D (available from Radio Shack). A Mylar or polystyrene capacitor should be used for C1 to ensure frequency stability under varying temperature conditions.

Alignment is simple: Connect a frequency counter to the output of U1 (TEST POINT 1, Fig. 3) and adjust the trimmers (R3 and R4) for a clock frequency equal to 16 times the desired baud rate. For 60-wpm Baudot (45.45 baud) and 110-baud ASCII, the frequencies are 728 Hz and 1760 Hz, respectively. If you wish to operate 100-wpm Baudot (74 baud) or 300-baud ASCII, the frequencies are 1187 Hz and 4800 Hz.

Using the Character Generator

I use the output of U2 (J1) to drive (through an appropriate bias resistor) the keying transistor in my Model 15 printer loop system. The output from U4A (J2) will drive the RS-232 input of my ADM3A CRT terminal. Although this output does not meet the RS-232 standard specifications, I have used it successfully with several RS-232 printers and terminals.[5] The circuit shown in Fig. 4 can be used to ensure full compliance with the RS-232 standard if you desire. Notice, however, the need for additional power-supply voltages. You could probably use 9-V batteries to supply these voltages, but I would try single-supply operation first.

To operate the character generator, you simply connect your equipment to J1 for transistor keying or to J2 for "RS-232 polarity" (mark = 0 V). Set the switches to the desired mode and character code, turn on the power and adjust the character rate by means of R1. That's all there is to it! You now have a simple way to test your Baudot or ASCII terminal or printer.

Notes

[1] J. A. Titus, "The UAR/T and How it Works," *Ham Radio*, Feb. 1976, p. 58.
[2] S. Leibson, "Input/Output Primer, Part 4: The BCD and Serial Interfaces," *BYTE*, May 1982, p. 202.
[3] mm = in. × 25.4.
[4] JDR Microdevices, Inc., 1224 S. Bascom Ave., San Jose, CA 95128.
[5] G. Woodward, ed., *The Radio Amateur's Handbook*, 60th ed. (Newington: ARRL, 1982), p. 14-46.

References

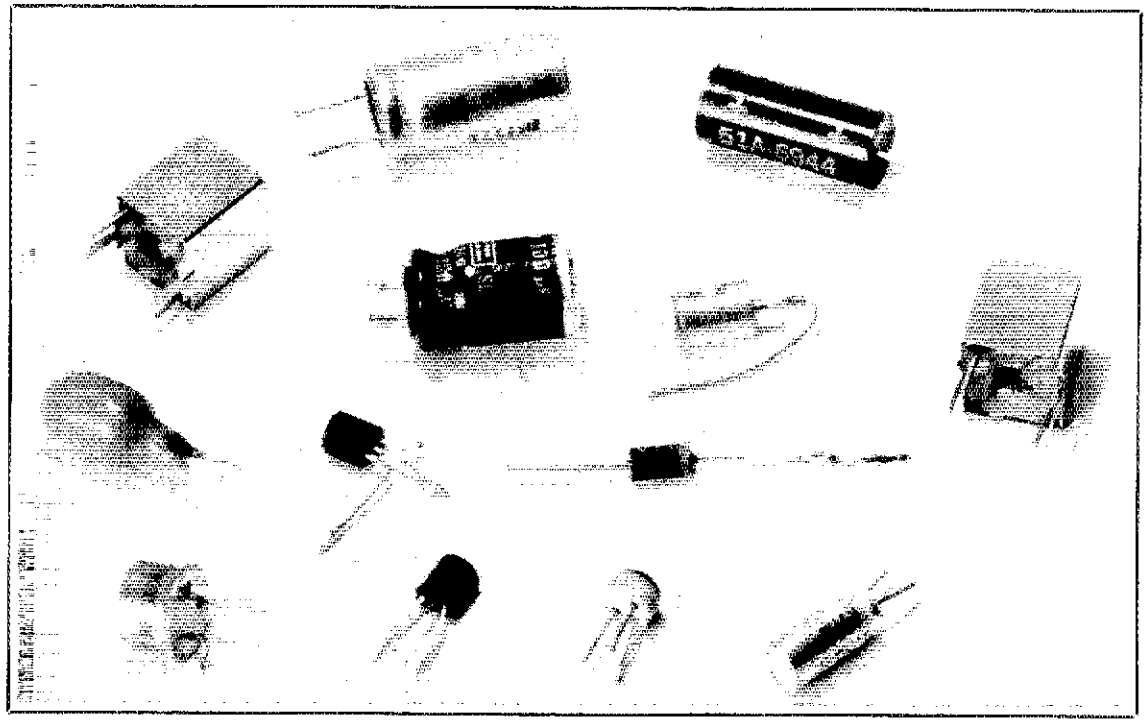
Barden, W. Jr. "Using the Model I/III RS-232 Port." *BYTE*, July 1982.
Derynck, R. R. "Bit Rate Clocks for Your Serial Interface." *Microcomputing*, Oct. 1979.
Kalin, E. B. "A Programmable Serial-Communication Interface." *QST*, Sept. 1982.
Kirchner, E. "Serial Converter for 8-Level Teleprinters." *Ham Radio*, Aug. 1977.

Next Month in QST

It's being called the "Amateur Radio Event of the Decade" — Astronaut Owen Garriott's upcoming operation aboard the Space Shuttle *Columbia*. How can you take part? Check out August *QST*, which will provide details on when and where to listen, and how to have the best chance to complete a QSO with W5LFL while he conducts the first Amateur Radio activity from space.

On the more mundane side, the August issue will feature several top-notch technical articles. One will describe a means of approaching fast-scan TV quality using slow-scan methods. Another, aimed at beginners, will delve into rf power measurements — including how to use an rf ammeter, an rf probe and a scope. Finally, "A Boom-Excited Antenna" will tell you how to put an existing Yagi on 10 MHz and below by gamma-matching the boom.

Salvaged Parts: A Gold Mine for the Radio Amateur



Parts procurement a problem? If you're a builder, you're a "scrounger." Here's a map to another treasure trove of parts and a sample of what can be done with salvaged parts.

By Clint Bowman,* W9GLW

After my retirement in 1976, I engaged in part-time work that involved me with a-m/fm digital clock-radio circuits. This work had two results. It triggered a desire to put together some gear and get back into Amateur Radio activities using current technology. (From 1931 to 1945 I had done a considerable amount of experimenting, building and constructing on the 160- through the old 2½-meter bands.) I also realized that understanding the intricacies and eccentricities of the clock-radio circuits could be extremely useful to amateurs whether they build anything or not. Also, there is a gold mine of salvageable parts in defunct clock-radios. These parts may be retrieved easily using a solder sucker or wicking material and a 25- to 45-W soldering iron. Bypass and electrolytic capacitors, transistors, diodes, fixed resistors and some useful miniature a-m/fm i-f transformers are there for the taking.

Discovering the I-F Transformers

The i-f transformers are housed in bright metal solderable containers coded with paint dots on the container or on the end of the adjustable core. Typically, those with yellow or black dots are used for a-m i-f circuits at a nominal frequency of 455 kHz. The red-dot units provide inductance for the a-m local oscillator/mixer tuning circuit at 455 kHz, and have an output coupling loop. The ferrite-core material employed is suitable for use at frequencies from somewhat less than 455 kHz to at least 2500 kHz.

Transformers with orange, green, blue or lavender dots are used in 10.7-MHz fm circuits. The green and blue transformers have collector-matching taps and are therefore preferred for general amplifier service. These coils will generally be satisfactory in applications requiring tuned circuits at frequencies from about 14 MHz to less than 7 MHz, depending on the amount of lumped circuit capacitance present. These coils may also have an integral fixed capacitor across the input winding that should be removed to increase the upper resonance range. This capacitor may be located within the shield can or externally just below the plastic base.

The external capacitor can be removed easily by breaking it with long-nosed pliers. The shield will have to be removed to accomplish the job if the capacitor is mounted internally. For frequencies below 10.7 MHz, this capacitor may be left as is and additional capacitance can be added to resonate the inductor at a frequency as low as 7 MHz without an excessively dominant C to L ratio. For lower frequencies, it is

*P.O. Box 282, Prospect Heights, IL 60070

desirable to rewind the transformer. This can be done with a little patience.

Rewinding the Transformers

A supply of no. 40 enameled copper wire should be on hand. Be certain it is of the self-stripping variety that strips the insulation from the wire during soldering. A small vise, good illumination, a low-wattage soldering iron with a clean tip, a penknife and long-nosed pliers should also be available.

Usually, the shield can is crimped to the plastic base. This crimping can be undone by passing a knife blade around the base several times between the shield and the base. Then, one at a time, grasp each corner solder pin with your pliers and, while holding the shield can with your other hand, gently work the can loose. Inside the can you will find a threaded plastic insert with a threaded ferrite cup core. Up and down movement of the cup changes the flux density of the coil and the coil inductance. The unique design of the cup core completely shields the coil from outside influences.

Secure the coil base in a small vise by catching opposite edges in the vise jaws. The coil is wound on a dumbbell-shaped ferrite core and will probably be surrounded by a thin plastic protective membrane that should be removed with the aid of a knife blade. The core is usually held in place with wax in a seat provided in the plastic base. The coil also will be wax-impregnated and will have to be heated briefly with the soldering iron to remove the existing wire turns. During this procedure, the core probably will loosen from the base. It can be reseated by reheating the assembly with the tip of the iron. Or, the bottom end of the core and the mounting space on the base can be cleaned of wax and a drop of epoxy cement used to make a solid assembly.

Coil winding is best accomplished with the core in place. Leave enough slack in the wire terminations to the solder pins so these leads may be dressed closely to the winding area, because the cup core must clear these fragile leads. A 3:1 winding ratio between input and output windings will work for usual common-emitter amplifiers. The same ratio applies for determining the input tap for the driving-stage collector. Ensure that certain windings are polarized properly. Make a drawing of the pin arrangement showing the winding connections, because after the shield can is replaced this information may prove invaluable!

The ferrite material used in the 10.7-MHz transformers is probably useful up to at least 150 MHz. The cup core arrangement limits use of practical coils to something less than 40 MHz, however, because of the high flux density and correspondingly few turns of wire. At least one of these dumbbell-core coils is found in the emitter circuit of the high-frequency, common-base fm mixer/oscillator of these clock-radios as a tuned choke for a dc return.

These ferrite-core transformers exhibit a lower Q than air-wound coils. For use as rf/i-f stage transformers for the bands from 160 through 20 meters, however, they exhibit flatter loaded-Q characteristics and far better shielding.

Other Components

The front-end rf transistors in these sets will oscillate and amplify beyond 150 MHz. They are suitable for noncritical circuits at 2 meters, but leave something to be desired as low-noise, high-gain amplifiers at the higher frequencies. These devices are quite suitable for 9-MHz i-f service, as are transistors found in the radio i-f circuits.

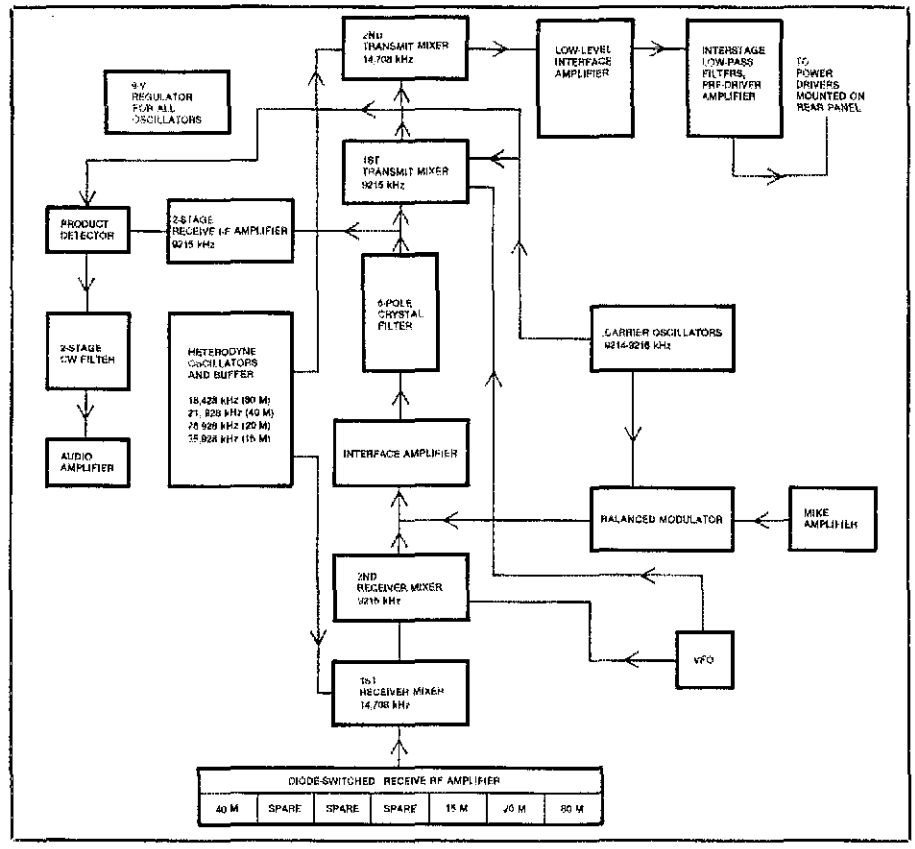


Fig. 1 — A block diagram of the author's homemade transceiver.

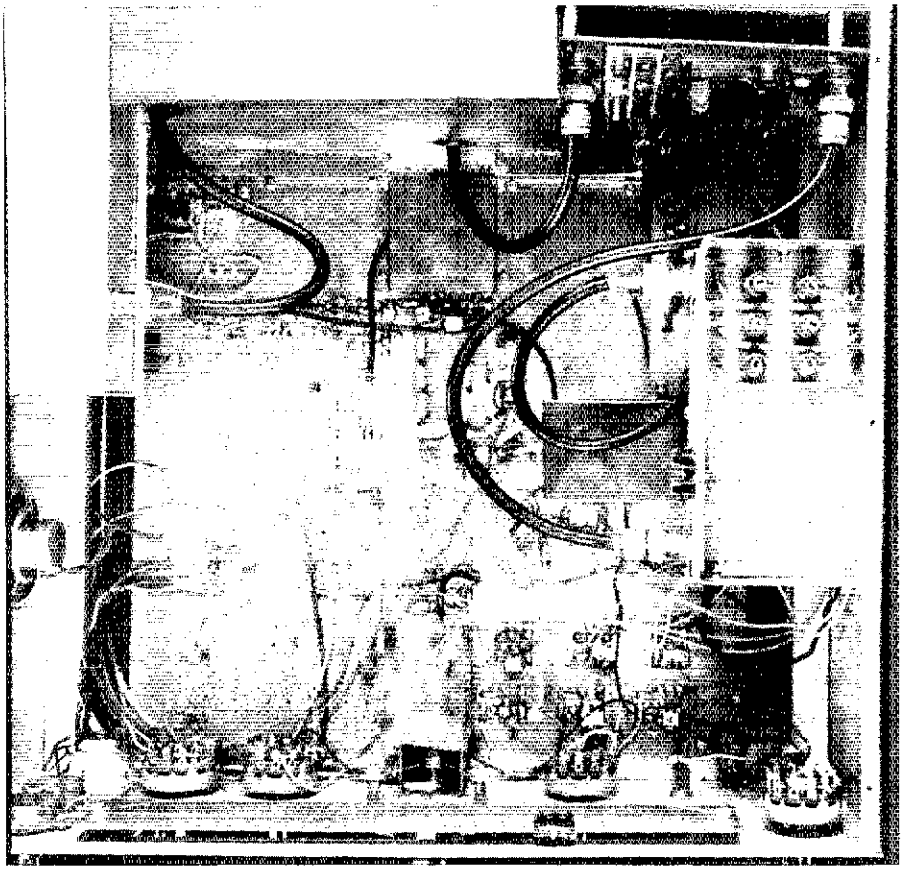
Front and rear views of the homemade transceiver. *(photos by Russ Planck, W9RGH)*

Generally, high-frequency germanium diodes of the 1N60 variety can be retrieved from these sets. One such diode is located in the fm mixer collector circuit, and others in the ratio detector. These diodes exhibit low-threshold, low-capacitance characteristics and are suitable for use in rf probes at frequencies up to at least 1000 MHz.

Other devices include npn and pnp transistors suitable for use in low-frequency service, rectifiers of the 1N4000 type and electrolytic capacitors ranging in value from 1 to 1000 μF usually with 16-V dc ratings. Fixed resistors with values ranging from a fraction of an ohm to perhaps 1 megohm are abundant.

A Transceiver is Born

As mentioned earlier, the part-time work triggered a desire to put together some gear



transistors for the final amplifier. These transistors have a 250-W dissipation rating and a maximum continuous collector current rating of 20 A. At 13-V dc, this amplifier functions satisfactorily at better than 200-W cw input without forced-air cooling. Bias is set for about 800 mA of collector current for satisfactory linear operation.

The power amplifier driver is a two-stage affair consisting of an input stage using push-pull MRF237 transistors and an output pair of MRF475s. This amplifier operates at a lower power level, supplying from 1 to 5 W of driving power. Both amplifiers are broadband types, and no tune-up is necessary.

The high-current power-supply output is fed directly to the driver and final amplifiers continuously, even during receiving periods. A 30-A meter provides for current monitoring.

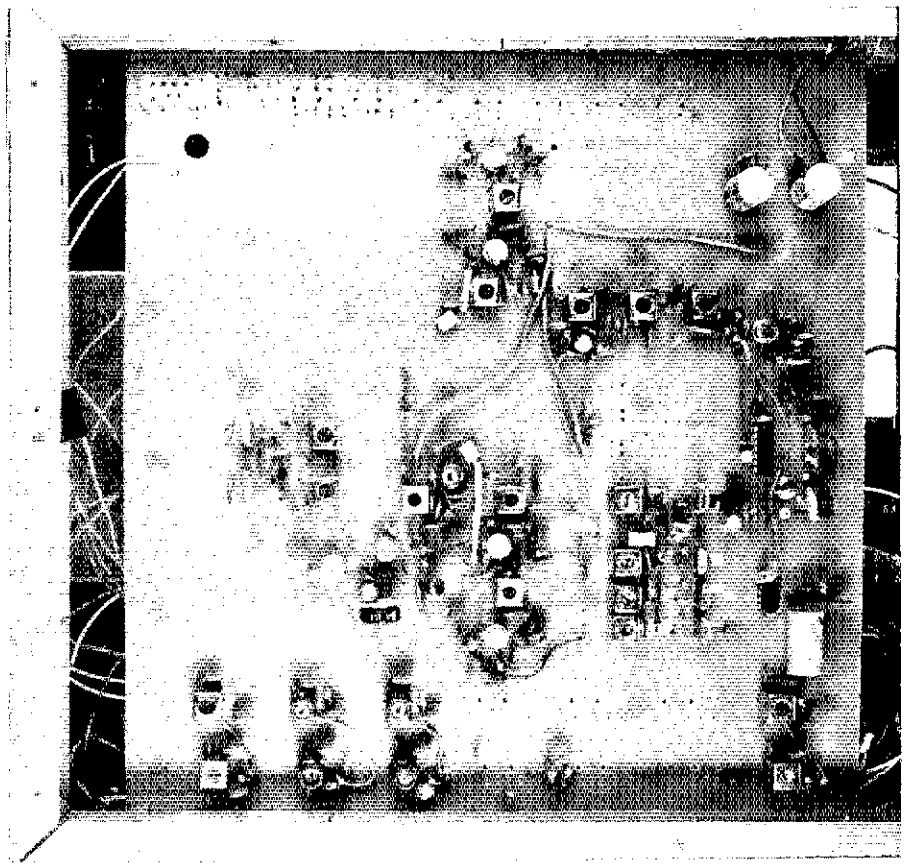
Driver and final-amplifier modules are mounted vertically on the rear panel of the transceiver. This panel may be removed for servicing without unsoldering a connection. I found it imperative that the final amplifier be completely shielded; otherwise, massive regeneration resulted from coupling between the output and the transmitter second mixer circuits. Little shielding is required for the driver module. Cables equipped with BNC connectors are used for

and get back into Amateur Radio activities using current-technology equipment. A transceiver with multiband switching capability and enough power to permit operating during prime times was an absolute requirement. It had to be all solid-state (with a minimum of direct, mechanical switching), be self-contained (with the exception of the power supply), incorporate an antenna-matching network and SWR indicator, and be definitely more than a novelty since it would have to serve as the only hf equipment at W9GLW.

Several goals were established: (1) tuning must be consistent from band to band and progress from left to right (using a slide-rule dial), with the lower-frequency end on the left; (2) all tuned circuits must present negligible levels of unwanted signals, especially in the mixer; (3) remote-diode or transistor switching would be employed for all low-level, multiple-frequency or multiple-function circuits. A block diagram of the transceiver is shown in Fig. 1.

A regulated power supply provides a 12-V dc source for all low-level transmitter and receiver circuits, a 20-A high-current source adjustable from 6- to 13-V dc for the power stage drivers and final amplifier, and a source of 117-V ac. The latter is switched from a hand-held microphone through a low-current dc circuit and is used to operate an external coaxial antenna T-R switch.

I selected a pair of Motorola MRF454



Top (left) and bottom (right) views of the author's homemade transceiver. A number of salvaged parts were used in its construction and the pc boards are handmade. *(photos by Russ Planck, W9RGH)*

interconnections. Separate antenna connections for transmit and receive are used, and an external coaxial switch allows for antenna switching.

The consistent tuning goal dictated a double-conversion scheme for transmit and receive. Cascaded balanced mixers satisfy this requirement. The interstage transformers were salvaged and modified as outlined previously, and no interstage amplification is required.

To a great extent, the antenna interface circuit treatment determines the overall effectiveness of any receiving system. This transceiver uses a single rf amplifier stage with diode-switched, individually tuned input and output transformers for all bands.

The two-stage i-f amplifier is patterned after circuits found in a-m/fm radio sets, and the cw filter and audio amplifier are similar to circuits found in *QST* and semiconductor manufacturers' applications notes. A three-position panel switch selects cw sharp, cw medium and ssb bandwidths. The transistors and transformers used are salvaged items. Occasionally, an LM386 will be found in imported radios. I used one for the audio amplifier. A small salvaged speaker provides adequate audio for communications-quality sound.

The inclusion of a receiver agc circuit is, in the final analysis, one of personal preference. An agc loop is included in this circuit. It is without dc amplification, excludes the rf amplifier, and is inoperative except on extremely strong signals. Separate rf and af gain controls are provided. This arrangement is entirely satisfactory for digging out weak DX signals and working through full-power neighboring-station signals. An S meter wasn't feasible with this circuit, so that device was omitted...and hasn't been missed!

The VFO uses inductive tuning and has a nominal range of 5700 to 5200 kHz, providing for 500-kHz-wide bands. The rather unusual oscillator end-points were dictated as a convenience to the manufacturer of the carrier oscillator and filter crystals; they enabled the use of on-hand blanks. John Holmbeck, W9KZO, was of help in this area.

The heterodyning oscillator circuits are diode-switched. A set of steering diodes, energized by the microphone PTT switch or cw setup switch, diverts the buffered oscillator signal to the transmit or receive mixer. All oscillators are supplied with 9-V dc from an inboard regulator and filter system. This approach isolates these critical circuits for emergency operation from an unknown power source. Rear-panel jacks are included to permit operation from a single power source.

Seven-band operation has been provided. At the present, only the 80, 40, and 20-meter bands have been activated for transceive, and 15 meters for receive only. Seven low-pass transmitter output filters are mounted in a shield box on the left side panel of the transceiver. Filter selection is made by means of a two-section rotary switch. A relay, activated by the microphone PTT switch or the cw setup switch, controls distribution of low-current supplies to both transmitter and receiver circuits.

The cabinet is made of individual pieces of aluminum for the sides, front and back panels, and top and bottom covers. A length of U-shaped 1-inch-wide aluminum countertop stock was formed into a rectangle.[1] To this is attached the main circuit board, the four cabinet sides and the bottom cover. The top cover attaches to a lip formed along the top edge of each side panel. Top and bottom covers are removable for transceiver alignment or examination purposes without affecting the mechanical integrity of the vertical members of the assembly.

PC-Board Construction

All pc boards are handmade, including the 12-inch-square main circuit board. I use a high-speed rotary hobby tool and dental burr.[2] Component-mounting holes are drilled using a drill press. I have used this method of circuit-board construction for many years with excellent results.

Should you wish to try this method of pc-board construction, here's an outline of the procedure from circuit conception to finished board: (1) a schematic diagram is drawn; (2) rough artwork is sketched disregarding dimensions, but placing components and electrical runs to eliminate as much as possible the need for jumpers; (3) final artwork is drawn to scale on 0.1-inch-ruled graph paper; (4) the artwork is taped to the copper-clad board and all component and mounting holes are drilled; (5) the artwork is removed and all connecting runs and other features are drawn free hand on the board using the drilled holes as guides; (6) the board is then screwed to 1-inch lumber stock for ease of handling, and only the lines encompassing the electrical runs and pads are routed. Most of the copper remains on the board for ground plane use or the later addition of other circuits; (7) the board is then sanded to a smooth finish, and all circuits are checked with an ohmmeter for shorts and continuity.

Complicated single- and double-sided boards filled with 6- to 40-pin ICs have been prepared in this manner. To the uninitiated, they look like etched boards with more copper remaining than usual. After you've had a little practice, an audio amplifier or oscillator project can progress from an idea to a finished board in a couple of hours.

Try your hand at a salvaged-parts project. You'll save money and gain some valuable experience!

Notes

[1] mm = in. × 25.4

[2] Router burrs supplied by the tool manufacturer have never been found to be suitable for this service; the shanks are too long, and control of the tool is lost. In addition, the burrs lose sharpness quickly and must be replaced often. Your friendly dentist might give you a package of used burrs or tell you where to purchase them. Dental burrs have short shanks and retain their sharpness for a long time.

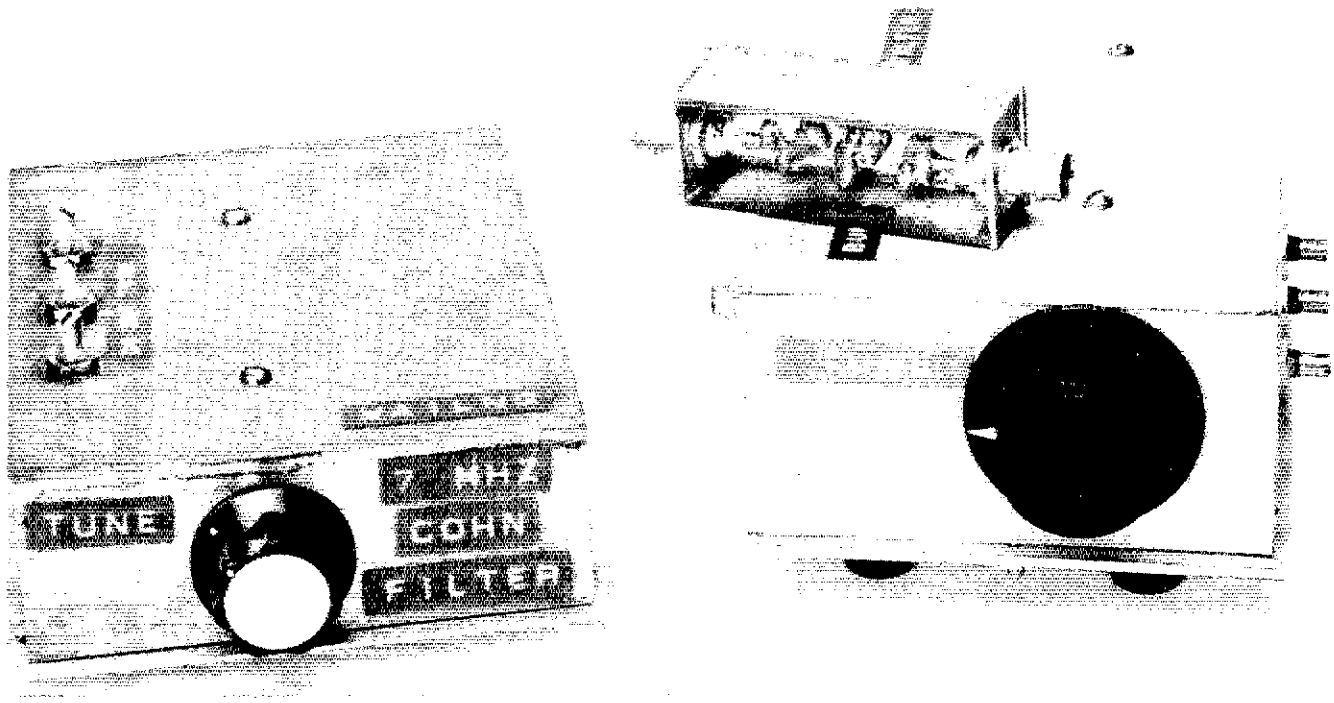
Strays

NARL, ARRL SIGN PUBLIC-SERVICE PACT

☐ In April, officials of the Newington Amateur Radio League (NARL) and the American Radio Relay League put their signatures on an agreement that formalized the club's assistance to local police, particularly during emergencies. In a cermony at W1AW attended by the local news media, NARL President Tom Namnoum, KM1O, and W1AW trustee John Lindholm, W1XX, signed a Memorandum of Understanding between the club and W1AW/R. Under the terms of the agreement, NARL will provide operators to the Newington Police Department for public service events and during emergencies. NARL members will also give information over W1AW to visitors requesting directions to ARRL Hq. ARRL is responsible for supplying and maintaining the equipment.

With the signing of the pact, the issuing of photo identification and the completion of mock disaster drills, NARL is now the official backup communications group to the Newington Police Department. Police Chief Thomas Ganley said that NARL members and their equipment will be put to use during major disasters, such as floods and blizzards, and if the Police Department's communication system should fail. The amateurs will also help police during parades and on holidays. The NARL volunteers have been incorporated in the town's civil preparedness division to further formalize the assistance program.

Filter Systems for Multi-transmitter Amateur Stations



Have you ever operated from a station that has had two or more transmitters on simultaneously? The intrastation interference can drive you crazy! Here's how to cure the "multi-multi" syndrome.

By Gerald B. Hull,* AK4L/VE1CER

Modern hf receivers are designed to tolerate very large input signals; after all, the bands *are* crowded with QRO signals. But there are situations in which receivers will "fall apart" when they are most needed. Multi-multi contest stations, emergency communications centers and Field Day sites are prime examples. In each case, fundamental and harmonic energy from close-by transmitters can overload a receiver front end, causing intermodulation distortion (IMD) and other spurious products to appear at the output.

Just how bad can this problem be? To illustrate by way of a mathematical example: Imagine a transmitter delivering 600 W (+58 dBm) at 3505 kHz to a dipole antenna.[1] The second harmonic is 40 dB below the fundamental, or +18 dBm. If we neglect antenna system loss and/or gain, the free-space attenuation between two antennas placed 200 feet apart would be 25 dB on 7 MHz.[2] This means a 7-MHz receiver would be subjected to a signal of −7 dBm (+58 − 40 dB − 25 dB = −7 dBm), or 100,000 μV, at its input! Signal levels of this magnitude can raise havoc within a receiver.

Another cause for intrastation interference, although not as prevalent, is rf leakage into the ac power lines. This can be caused by improper bypassing at the equipment supply, or leakage from cabinet openings.

The Solution

A sure-fire cure to the above problems is simple — external filter networks. Stand-alone low/high-pass filters can reduce harmonic energy to a near-zero level. Fixed-frequency or tunable band-pass filters can be used as narrow preselectors to reduce "crud" in a receiver front end. "Brute-force" ac-line filters can reduce rf energy on power lines drastically.

Which filter should you use? Each type has its particular advantages and disadvantages, and each application must be chosen

*Assistant Technical Editor

[1]Notes appear on page 31.

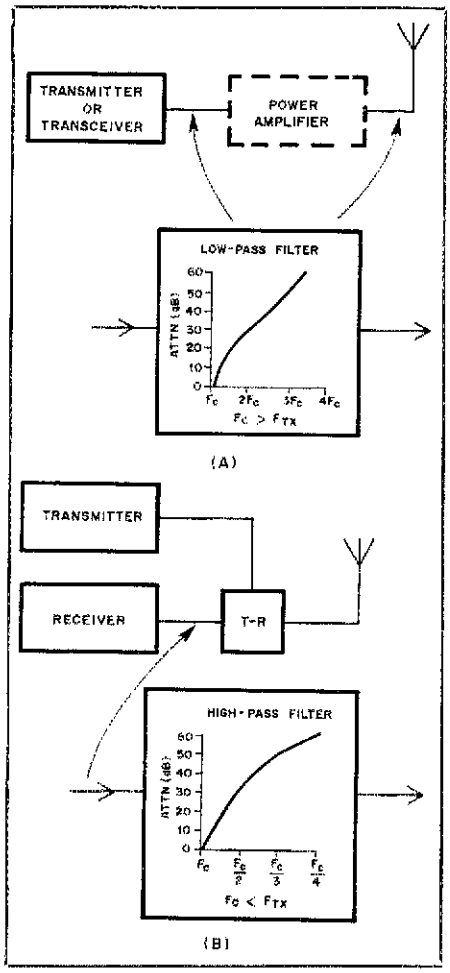


Fig. 1 — Block diagram of a high/low-pass filter system. When an external power amplifier is used, low-pass units should be located at the *output* of the amplifier.

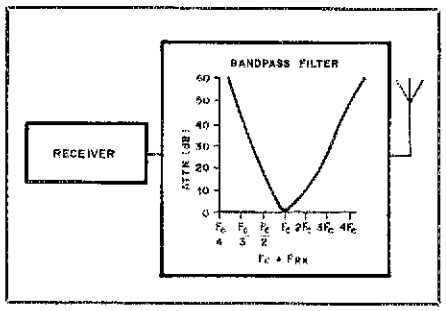


Fig. 2 — Band-pass filter system diagram. When these filters are used with a transceiver, the equipment must be modified to prevent transmitter energy from entering the filter.

carefully. An improper choice can result in minimal interference reduction or an unnecessary expense.

Low-Pass/High-Pass

External low-pass filters can be used when transmitter harmonic signals are causing receiver overload. Simple 3- to 7-pole filters can reduce harmonics to a noninterference level. The principal disadvantage of discrete low-pass filters is the requirement for filter components that will withstand high power levels. High-voltage capacitors for a 1-kW filter are expensive and almost impossible to locate. Low-pass filters are installed at the transmitter or final-amplifier output (see Fig. 1).

An alternative to the reduction of transmitter harmonics, although not as effective, is the addition of a quarter-wave coaxial stub at the transmitter output. The coaxial line should be 1/4-λ at the *harmonic* frequency. One end of the line is open-circuited and the other end connects to the transmitter output through a coaxial "T" connector.

A high-pass filter mounted at the receiver input will prevent overload from strong transmitter fundamental signals. Since relative signal levels at the receiver input are low, standard-size components may be used.

Fixed/Tuned Band-pass

Band-pass filters are useful for eliminating interfering signals that may be present in a receiver front-end passband but outside the i-f system passband (see Fig. 2). Typical fixed-tuned band-pass filters for 1.8 to 30 MHz have bandwidths of 50 to 200 kHz. This type of filter can be used to attenuate energy that falls outside the filter passband, e.g., to lower the effective level of broadcast carriers present in the upper portion of the 7-MHz band. The disadvantage of fixed-tuned band-pass filters is the need for several units to cover a single band. Tunable bottom-coupled, minimum-loss band-pass filters have been described in amateur literature.[3,4,5] Commonly called "Cohn filters," these units have the advantage of tuning over an entire band and, depending on the design center frequency, *very* narrow bandwidths. Cohn filters work well up to 14 MHz, after which the bandwidth and loss increase dramatically. The alignment of Cohn filters is tricky, but despite this fact they remain one of the most popular external interference-rejection filters.

AC Line

When interference exists between stations that have proper input/output filtering, there is a good chance that rf energy is being coupled into the receiver via the ac power line. To confirm this, transmit into a dummy load and monitor the second-station receiver. If the interference persists, the path is probably the ac line. A "brute-force" ac line filter should clear up this type of interference.

Table 1

Chebyshev High-Pass and Low-Pass Filter-Attenuation (dB)

No. Poles, Ripple	*VSWR*	*$2f_c$*	*$3f_c$*	*$4f_c$*	*$5f_c$*	*$6f_c$*	*$7f_c$*
3 pole, 0.1 dB	1.36	12.24	23.60	31.42	37.39	42.22	46.29
5 pole, 0.1 dB	1.36	34.85	54.21	67.27	77.21	85.26	92.04
7 pole, 0.1 dB	1.36	57.72	84.83	103.11	117.03	128.31	137.80
9 pole, 0.1 dB	1.36	80.60	115.45	138.96	156.86	171.36	183.55

Note: For high-pass filter configuration $2f_c$ becomes $f_c/2$, etc.

Table 2

Chebyshev Low-Pass Filter — Pi Configuration

No. Poles, Ripple	*C1*	*C2*	*C3*	*C4*	*C5*	*L1*	*L2*	*L3*	*L4*
3 pole, 0.1 dB	3283.6	3283.6				9.131			
5 pole, 0.1 dB	3650.4	6286.6	3650.4			10.91	10.91		
7 pole, 0.1 dB	3759.8	6673.9	6673.9	3759.8		11.32	12.52	11.32	
9 pole, 0.1 dB	3805.9	6794.5	7019.9	6794.5	3805.9	11.48	12.87	12.87	11.48

Component values normalized to 1 MHz and 50 ohms. L in μH; and C in pF.

Chebyshev Low-Pass Filter — T Configuration

No. Poles, Ripple	*L1*	*L2*	*L3*	*L4*	*L5*	*C1*	*C2*	*C3*	*C4*
3 pole, 0.1 dB	8.209	8.209				3652.3			
5 pole, 0.1 dB	9.126	15.72	9.126			4364.7	4364.7		
7 pole, 0.1 dB	9.400	16.68	16.68	9.400		4528.9	5008.3	4528.9	
9 pole, 0.1 dB	9.515	16.99	17.55	16.99	9.515	4591.9	5146.2	5146.2	4591.9

Component values normalized to 1 MHz and 50 ohms. L in μH; C in pF.

Construction Data

Tables 1, 2, 3 and 4 are used in conjunction with Figs. 3 and 4 to design each of the above mentioned filters for a specific frequency or band. The high-pass and low-pass filter component values in Tables 1 and 2 are normalized to 1 MHz.[6,7] To find a component value for the frequency of interest, divide the normalized value by the frequency in megahertz. For example, to calculate values for a low-pass filter that has a cut-off frequency of 8 MHz, you would divide the table values by 8. A practical 7-pole low-pass filter is shown in Fig.

Table 3

Band-pass Filter Component Values

BW_L(3 dB)	$L1,L2$ (μH)	C_o (pF)	$C1,C5$ (pF)	$C3$ (pF)	BW_L(3 dB)	$L1,L2$ (μH)	C_o (pF)	$C1,C5$ (pF)	$C3$ (pF)
1.8-1.9 MHz	5.12	1446	291	55.3	7.0-7.2 MHz	2.05	245	42.4	4.88
1.8-1.85 MHz	5.12	1485	192	28.8	7.0-7.3 MHz	2.05	242	53.2	7.17
1.8-1.9 MHz	8.74	847	221	32.4	7.0-7.2 MHz	8.74	57.5	19.1	1.14
1.8-1.85 MHz	8.74	870	148	16.8	14.0-14.2 MHz	0.8	158.7	14.4	1.59
3.5-3.6 MHz	5.12	393	75.1	7.8	14.0-14.2 MHz	2.08	61	9.2	0.61
3.5-3.6 MHz	8.74	230	56.6	4.58	14.0-14.4 MHz	2.08	61	14.7	1.2
3.5-3.7 MHz	5.12	352	110	15	21.0-21.3 MHz	0.49	115	9.2	1.15
3.5-3.7 MHz	8.74	224	83.4	8.8	21.0-21.5 MHz	0.49	114	14.1	1.9
3.8-4.0 MHz	5.12	325	93.2	11.8	21.0-21.5 MHz	0.82	68.4	11.4	1.14
3.8-4.0 MHz	8.74	191	70.7	6.9	28.0-28.5 MHz	0.48	65.3	7.2	0.82
7.0-7.1 MHz	2.05	248	26.6	2.5	28.0-29.0 MHz	0.48	64	11.8	1.6

$C2 = C_o - C1 - C3$
$C4 = C_o - C3 - C5$

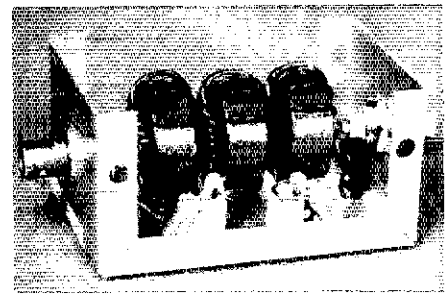


Fig. 5 — A practical 7-pole low-pass filter built around the information given in Table 2. The unit is housed in a small aluminum box.

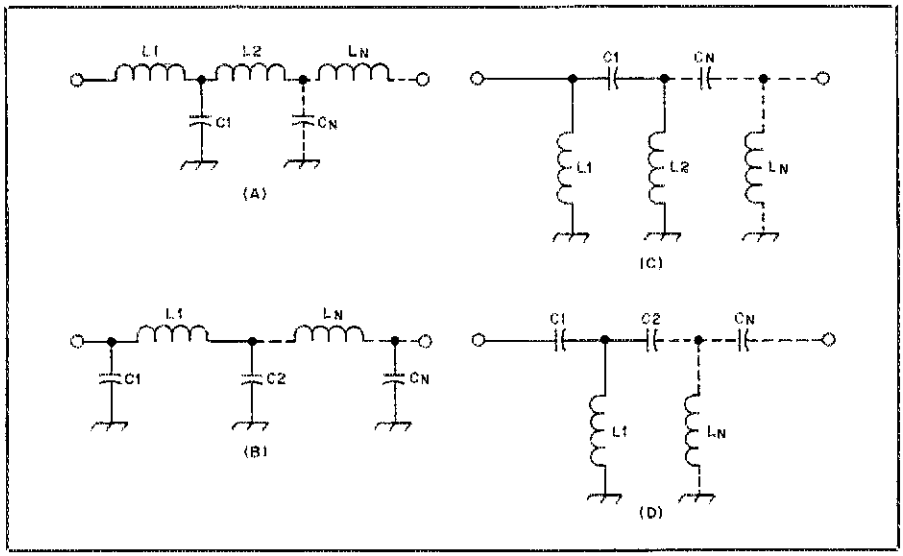


Fig. 3 — Schematic diagrams for low- and high-pass networks. The choice of a "T" or "pi" configuration will depend on the components on hand.

5. Toroid cores are used for the inductors. They are self-shielding, which will decrease the internal coupling in the filter, improving the ultimate attenuation. The filter is mounted in a small aluminum box to prevent leakage.

Table 3 shows the component values for a fixed-pole band-pass filter for 1.8 through 30 MHz. The construction techniques described in the previous section can be used for the band-pass design.

An important factor to consider when constructing band-pass filters is insertion loss. This loss is directly proportional to the Q of the inductors used. For optimum performance, always choose the highest-Q core material for the frequency range desired, keeping in mind the trade-off between highest Q (maximum selectivity) and insertion loss.

Variable Passband

Tunable Cohn filters are perhaps the most complex to construct and align. The schematic diagram of a three-resonator bottom-coupled Cohn filter is shown in

Table 4

Cohn Filter Parts Values

Band	L1	L2*	L3	L4	L5*	L6	C2	C3	C4**	C5	C6	C7	C8	CX†	CY†	CZ†
80	29	0.8	60	60	0.8	29	150	33	2-14	2-14	2-14	33	150	5	33	5
40	14.5	0.38	29	29	0.38	14.5	68	18	1-20	1-20	1-20	18	68	—	15	—
20	2.37	50 nH	3.0	3.0	50 nH	2.37	240	20	1-20	1-20	1-20	20	240	—	—	—

Inductance values are in μH; capacitance is in pF unless otherwise noted.
On 80 and 40 meters, L1, L3, L4 and L5 are wound on 2-mix ferrite cores (μ = 10, $Q_u \geq 250$).
On 20, 6-mix cores are used (μ = 8, $Q_u \geq 250$).
*L2 and L5 are air core inductors, except on 40 meters, where a T37-2 core is used.
**C4, C5 and C6 2-14 pF units are Johnson 193-6-1; others are Cardwell 160-107. See note 4 for availability.
†May not be required.

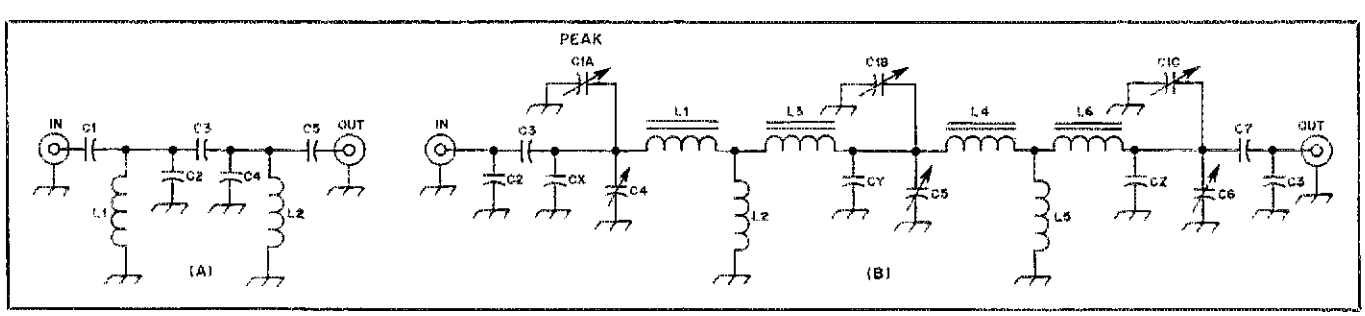


Fig. 4 — Fixed and tuneable band-pass filter schematic diagrams. Component values are in Tables 3 and 4.

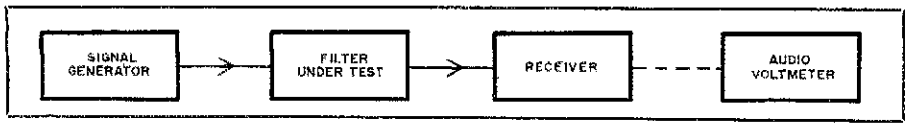
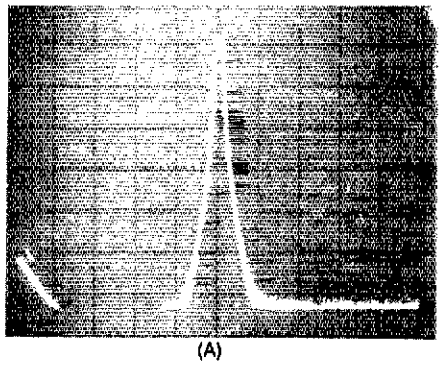
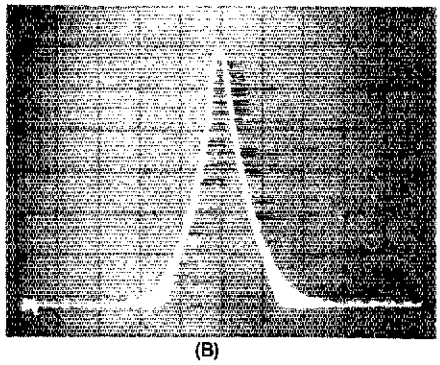


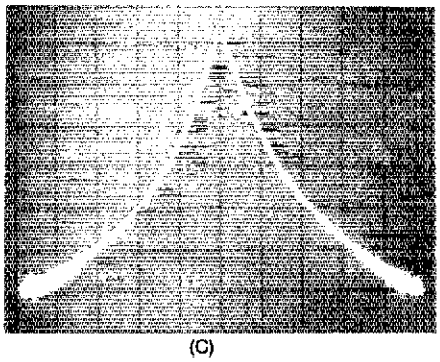
Fig. 6 — Cohn filter alignment setup. See text for details.



(A)



(B)



(C)

Fig. 7 — Response curves of three Cohn filters for 3.5 (A), 7 (B) and 14 (C) MHz. Top of the picture represents 0-dB loss. Vertical divisions are each 10 dB; horizontal divisions are each 500 kHz.

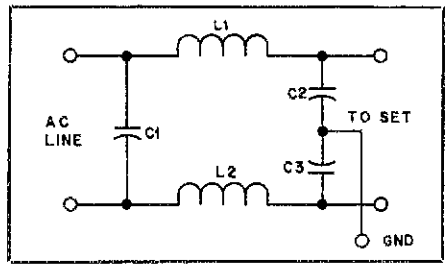


Fig. 8 — "Brute-force" low-pass ac line filter schematic diagram. All capacitors are 0.005-μF disc-ceramic units. L1 and L2 are 15 μH, with wire size depending on current demand.

Fig. 4B. The parts values for 3.5- through 14-MHz filters are given in Table 4. Inductance values in the table must be adhered to *strictly*, or the filter will be impossible to align! The three-gang tuning capacitor, C1, is a Miller 1460 (23 pF per section), which is available from Radio Kit.[5] Substitutes for this capacitor can be used, but be sure the three gangs track properly and that the capacitance value for each section is the same.

Two pieces of test equipment will be required to align the filter — an hf receiver and a signal generator, both of which cover the filter frequency. Hook up the test gear and filter as shown in Fig. 6. The receiver S meter or an external audio voltmeter can be used to measure the receiver output. Set the generator and receiver to the filter center frequency. Apply a signal to the filter and adjust C1 for maximum output. Next, adjust C4, C5 and C6 for maximum output level. These three capacitors will interact, so they will have to be adjusted and readjusted to ensure minimum insertion loss. L4 and L5 determine the mutual coupling between filter sections. The coil turns may have to be compressed or expanded to find the coupling that will give a single-hump response. Over-coupling will cause a three-hump response, and under-coupling will severely restrict the bandwidth and increase insertion loss.

Fig. 7 shows the response curves of three Cohn filters built by Jay Rusgrove, W1VD. The loss in these filters varies from 7 to 10 dB. By carefully adjusting the coupling inductors and trimmer capacitors, these filters can be adjusted for minimum loss or minimum bandwidth, whichever is more important to the builder.

AC Line

A "brute-force" ac line filter is shown in Fig. 8. The inductors should be air core, and wound with enamel-coated wire of sufficient cross-sectional area to handle the current of the equipment involved. The unit should be enclosed in a metal box with a ground lug connected directly to an earth ground.

Conclusions

These filters should enable the multioperator-oriented amateur to design a station in which intrastation interference does not exist. These filter methods are not meant to take the place of proper station engineering, i.e., proper placement of antennas, use of high-dynamic-range receivers, and so on.

I have operated both multi-single and multi-multi contest stations that incorporate these filters, and have met with great success. Thanks to ARRL Hq. Lab Supervisor Phil Accardi, AJ1N, for his assistance in testing and confirming the Cohn filter designs.

Notes

[1]The unit "dBm" is used to express power in reference to 1 mW, or 0 dBm. A level of +58 dBm is 58 dB above this reference.
[2]m = ft × 0.3048.
[3]D. DeMaw, "His Eminence — the Receiver, Part 1" *QST*, June 1976.
[4]W. Sabin, "Solid-State Receivers," *QST*, July 1970.
[5]Cohn, "Dissipation Loss in Coupled Resonator Filters," *Proc. IRE*, Aug. 1959, pp. 1342-1348.
[6]G. Woodward, ed., *The Radio Amateur's Handbook* (Newington: ARRL, 1982), pp. 6-11 and 6-12.
[7]D. DeMaw, ed., *ARRL Electronics Data Book* (Newington: ARRL, 1976), pp. 55-56.
[8]Trimmers and three-gang tuning capacitors are available from Radio Kit, Box 411, Greenville, NH 03048.

Strays

QRP MOVEMENT IN EUROPE

☐ Enthusiasm for QRP (low power) in Great Britain and other parts of the world has heightened considerably in recent years. According to a U.S. spokesman for the American QRP movement, some 40,000 amateurs around the world are now actively engaged in QRP activities in the high-frequency spectrum. This seems due in part to the appeal of building inexpensive, simple homemade projects. Another reason for the keen interest in low-power operation is the challenge offered by using less than 10 W of transmitter output power to span the globe with cw and ssb signals.

The Rev. George Dobbs, G3RJV, who founded the G QRP Club in the UK some time ago, publishes *SPRAT*, the club's quarterly QRP bulletin. He reported on April 1, 1983 that the club has gained more than 450 new members since Christmas of 1982. This remarkable surge in affiliation is indicative of the interest being shown in QRP activities. Membership in the G QRP Club is available to any amateur, irrespective of nationality. The club also offers an interesting QRP type of booklet (100 pages) called *Circuit Handbook*. RSGB will soon reprint and distribute this publication for the G QRP Club. Those interested in the club may contact G3RJV, 17 Aspen Dr., Chelmsley Wood, Birmingham B37 7QX, England. — *Doug DeMaw, W1FB*

I would like to get in touch with...

☐ anyone with information or a schematic diagram for an amplifier using an 833A or 8122 tube. Nick Ferro, KU2A, Box 167, Lake Placid, NY 12946.

A Simple Computer Model for VHF/UHF Propagation

Understanding propagation basics will help you predict vhf/uhf coverage. A BASIC program makes the calculations easy.

By Jack Priedigkeit,* W6ZGN

Wouldn't you like to be able to predict how far beyond the horizon your vhf or uhf signals will travel? By using the simple propagation model presented in this article, you can estimate terrain clearance and line-of-sight (los) coverage from, for example, a repeater site. You'll also learn how to account for the effect of varying meteorological conditions. To ease the job of making the necessary calculations, a simple BASIC computer program has been included.

Basic Concepts

The idea that the velocity of propagation along an rf transmission line depends on the dielectric constant of the material separating the conductors is familiar to most amateurs. However, it is not generally appreciated that this concept also applies to the bending of a radio wave as it propagates through the atmosphere. The velocity of propagation depends on the refractive index — the square root of the dielectric constant. The dielectric constant of air is a function of pressure, temperature and humidity and it generally decreases with altitude. It is this decrease with altitude that is important.

A radio signal at a slightly higher altitude, h + △h, travels just a little faster than the same signal traveling at the reference altitude, h. The effect is to tilt the radio wave front ever so slightly, so as to bend the ray path toward the earth. This is illustrated in Fig. 1. If a curve with a radius greater than the radius of the earth is used to draw the ray path, it can be seen that the refracted, or bent, ray will intercept the earth beyond the geometric tangent point.

The distance to the geometric horizon (the tangent point for the straight ray path) is calculated easily because the tangent to a circle is perpendicular to the radius of the circle. This distance is

$$d(ft) = \sqrt{(a + h)^2 - a^2} \qquad \text{(Eq. 1)}$$

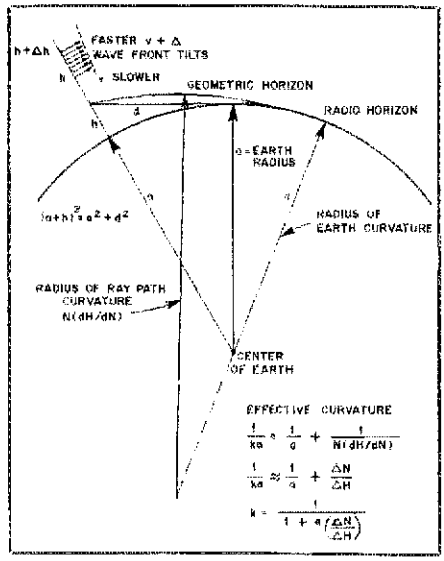


Fig. 1 — The geometry used to calculate the geometric and the radio horizons.

where

a = radius of the earth in feet (3690 mi × 5280 ft/mi)

h = antenna height in feet[1]

Neglecting the h^2 term, which is small compared with 2ah, the distance in miles to the geometric horizon is very closely approximated by the expression

$$d(mi) = \sqrt{1.5h} \qquad \text{(Eq. 2)}$$

where h = antenna height in feet.

Meteorological Considerations

The typical long-term average refractive index of the air at the surface of the earth is 1.000300. This normally decreases with altitude at an average rate of 12 parts per million per 1000 feet of elevation (39 parts per million per km). It is the custom to describe the refractive index in terms of N-units. The N-unit being defined as (1 − the refractive index) × 10^6. With this definition, the surface refractive index is 300 N-units, and the gradient, △N/△H, is −12 N-units per 1000 feet, or −39 N-units per km.[2,3,4]

The effective earth-radius factor, k, which determines the distance to the radio horizon, is related to the refractive-index gradient by the expression

$$k = \frac{1}{1 + a(\triangle N/\triangle H)} \qquad \text{(Eq. 3)}$$

where a = the true earth radius

△N/△H = the refractive index gradient in the same units as the earth radius (i.e., both in feet or in meters).

The distance to the radio horizon in miles is

$$d(mi) = \sqrt{1.5\ kh} \qquad \text{(Eq. 4)}$$

where h = antenna height in feet.

The refractive-index gradient is determined by the changes in air pressure, temperature and humidity with altitude along the propagation path. Temperature inversions and sudden changes in humidity, as occur at the interface between fog and clear air, can cause rapid changes, or discontinuities, in the rate of change of N with altitude. Since it is difficult, if not impossible, to measure the detailed micrometeorology of the propagation path, it is necessary to use an average k value for the path. Over a period of many years, the average value of k is 4/3. This results in the familiar expression

$$d(mi) = \sqrt{2h} \qquad \text{(Eq. 5)}$$

where h = antenna height in feet.

The propagation model to be described allows the user to specify a value for k. The computer uses this value to calculate the

*441 Sherwood Way, Menlo Park, CA 94025

[1]Notes appear on page 33.

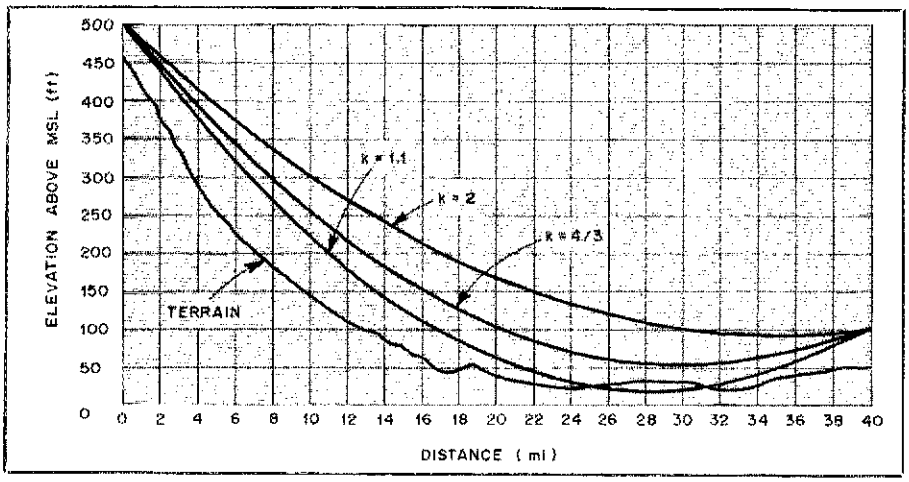


Fig. 2 — Shown here are the ray-path-versus-distance plots for the example described in the text. Three values of k are used to illustrate the effect of varying atmospheric conditions.

height of the ray path above a smooth earth as a function of the distance between the two antennas. Different meteorological conditions can be simulated by using different values of k.

Computer Results

Fig. 2 is a plot of the computer-calculated ray-path height between two antennas, 40 miles apart, located at 500 and 100 feet above mean sea level. This might be a propagation path between a repeater site and a fixed station. A terrain profile was sketched in using elevation data taken from a topographic map. From Fig. 2 it can be seen that under average propagation conditions (k = 4/3) the ray path clears the terrain by 50 feet. For meteorological conditions where k = 1.1, however, the ray path is blocked by the terrain, and a reduction in signal level would be expected. It can also be seen that when conditions are such that k = 2 the ray path clears the terrain by 100 feet. These curves illustrate nicely the effect of short-term meteorological conditions on this propagation path.

For other combinations of antenna height, separation distance and terrain, the ray path may be blocked for the average (k = 4/3) conditions. In this case, the path will open up when meteorological conditions increase the effective earth radius. This partly explains the extended repeater coverage and the interference between repeaters sometimes observed.

The Computer Program

The vhf/uhf ray-path computer program (Table 1) is written in BASIC and should run on most home computers with little or no modification. For simplicity, extensive operator directions and input prompts have been omitted from the program. These features can be added, if desired, by anyone familiar with BASIC programming.

The operator enters, by means of the keyboard, the altitude of the antennas, H1 and H2, in feet above mean sea level, the separation distance, D0, in miles, and the earth radius factor, K0. The computer output is a listing of the distance in miles from the antenna at H1 and the height of the ray path in feet above mean sea level.

Table 1
Program Listing

```
10 INPUT H1
20 INPUT H2
30 INPUT D0
40 INPUT K0
50 DH=H1-H2
60 K1=1.5*K0
70 K2=(D0^2)/K1
80 IF ABS(DH)>K2 THEN 170
90 D1=0.75*K0*DH/D0+D0/2
100 H0=H1-D1^2/K1
110 IF H0<0 THEN PRINT "LOS NOT POSSIBLE"
120 FOR N=0 TO 20:  D3=N*D0/20
130 H3=H0+(D3-D1)^2/K1
140 PRINT D3, H3
150 NEXT N
160 END
170 K3=DH/D0+D0/K1
180 FOR N=0 TO 20:  D3=N*D0/20
190 H3=H1-K3*D3+D3^2/K1
200 PRINT D3, H3
210 NEXT N
220 END
```

If the antenna heights are too low for the separation distance, the ray path will be blocked by the curvature of the earth and the computer will print "LOS NOT POSSIBLE." The computer will then print negative altitudes where the ray path falls below mean sea level. This is useful information, as it can be used to estimate the increase in antenna height required for a line-of-sight path.

The ray-path height is calculated at 20 equally spaced points along the propagation path. Twenty points were chosen because it is a convenient number of lines to display on the computer terminal. By changing the number 20 in program lines 120 and 180, the number of points and lines printed can be changed.

The ray-path height calculations use either of two programs: lines 120 through 140, or lines 180 through 200. If the absolute difference in the antenna height, ABS(DH), is less than the difference in height needed for line of sight at the separation distance, D0, the path height is calculated by lines 120 and 130. In this case, it is necessary to first calculate the distance, D1, to the point of minimum path height, H0. This is done in lines 90 and 100. If the absolute difference in antenna height is greater than that needed for line of sight, the ray path is calculated by lines 180 and 190. In this case, the distance D1 and the height H0 are not used, as the minimum height will be either H1 or H2. However, it is now necessary to include the height change caused by the slope of a straight line connecting H1 and H2. Line 170 calculates the slope, and line 190 calculates the ray-path height with distance, including the height changes resulting from the curvature of the earth.

Final Comments

No mention has been made of Fresnel zone clearance criteria used in selecting sites for microwave relay stations where highly reliable paths are required to minimize circuit outage.[5] These have been omitted because the midpath first Fresnel zone clearance for a 40-mile path at 146 MHz requires a 600-foot terrain clearance. Since there are few, if any, amateur repeater sites that can meet this criterion for the majority of the users, first Fresnel zone clearance is, in this case, academic. We amateurs are conditioned to accept varying signal strengths and an occasional path outage. Since Fresnel zone clearance decreases as the square root of the signal frequency, in the gigahertz frequency range it is considerably less than the 600 feet required for 2-meter operation.

It has been assumed, for this simple model, that the refractive-index gradient is constant with altitude and that it extends over the entire propagation path. Discontinuities caused by a temperature inversion or a sudden change in humidity, as occurs at the interface between fog and clear air, have not been considered. Since it is these discontinuities that produce "ducting," or "trapping," of the ray paths, extended propagation coverage resulting from these effects is not predicted by this simple model. Nevertheless, this simple computer model is a useful tool for estimating terrain clearance and potential coverage of a repeater site. It should also help you to better understand vhf/uhf propagation.

Notes

[1] m = ft × 0.3048; km = mi × 1.609.

[2] B. R. Bean and E. J. Dutton, "Radio Meteorology," *National Bureau of Standards, Monograph 92* (Washington, DC: NBS, 1966).

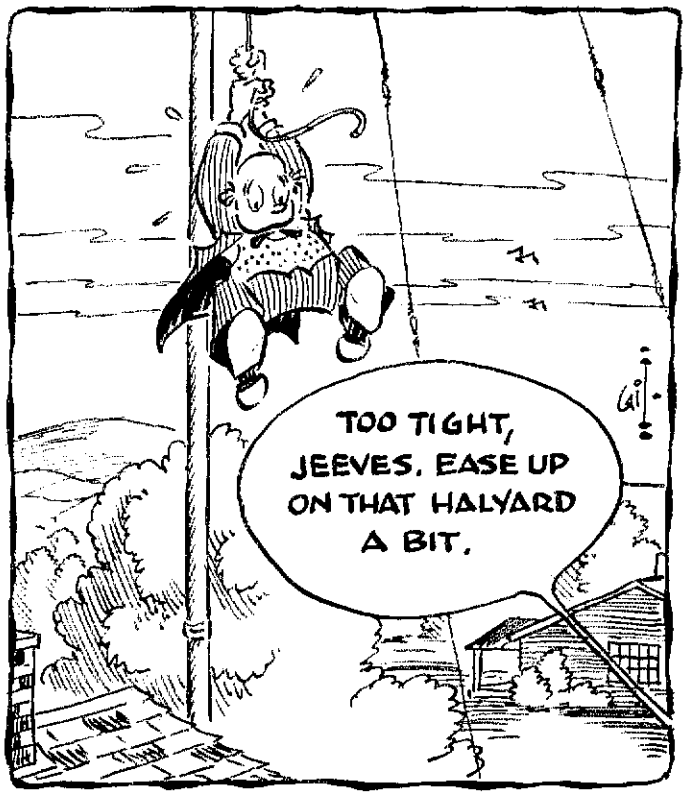
[3] B. R. Bean, J. D. Horn and A. M. Ozanich, Jr., "Climatic Charts and Data of Refractive Index for the United States and the World," *National Bureau of Standards, Monograph 22* (Washington: NBS, 1960).

[4] D. L. Haarsager, "Microwave Path Evaluation," *Ham Radio*, January 1978, pp. 40-42.

[5] *Reference Data for Radio Engineers*, 5th ed. (New York: Howard W. Sams and Co., Inc., 1969) p. 26-14.

Getting the Most out of Your Antenna

BEGINNER'S BENCH



All dipoles are created equal, but some work better than others. Is your antenna doing the best it can for you?

By C. L. "Chuck" Hutchinson,* K8CH

Asking which is the best antenna is about like asking which is the best automobile. Almost everyone has a different opinion. Personal operating habits have a lot to do with one's choice. But more important, consider *where* and *how* your antenna can be installed!

For the amateur who wants a simple, effective and low-cost antenna for hf, a 40-meter dipole is a great way to get started. The cost is minimal, it will fit on most housing lots, and you get the bonus of 15-meter coverage. That's right, two bands for the price of one and no Transmatch (tuner) is needed. If casual contacts are what you seek, this antenna may be all you'll ever need. Should the "DX bug" bite, you will not be "uncompetitive" on 40 meters; on 15 meters, it is unlikely that yours will be "the loudest signal on the band."

How well your dipole performs depends on a number of factors, not the least of which is where you install it. It is easier to contact China using a dipole installed in Japan than with one in Vermont, but that is not what I mean! For a dipole to work best, it should be erected high and in the clear. To understand why requires a knowledge of how horizontally polarized antennas act when installed over the earth. Furthermore, one should grasp the concept of how radio waves get from one place to another.

Dipole Radiation Patterns

Consider a dipole in "free space." That means completely removed from the vicinity of all other objects, including the earth! A dipole in those circumstances will exhibit the familiar radiation pattern shown in Fig. 1. You may have seen the figure-8 pattern before, but be aware that this is only a partial representation. A more complete picture is shown in Fig. 1B. The doughnut shape represents the three-dimensional dipole radiation pattern.

All antenna patterns are three dimensional. They are seldom represented that way in books and magazines because there is no easy way to represent three-dimensional-pattern intensities accurately on a flat surface. Most of the time you can get a good idea of pattern shape by looking at pattern plots taken in horizontal and vertical planes. Fig. 1A illustrates the pattern of a dipole in a plane that contains the antenna. Let's call it horizontal, even though that means nothing in space. The pattern in a perpendicular or "vertical" plane would be a circle. Combining the two patterns results in the one shown in Fig. 1B.

Getting Down to Earth

What happens when the dipole is moved from free space to your backyard? As you have probably guessed, the presence of earth will modify the dipole radiation pattern. Energy striking the earth will be reflected from it. This reflected energy will combine with the directly radiated energy causing reinforcements and cancellations (lobes and nulls) at various angles.

There is a major difference in the way horizontally and vertically polarized radio waves reflect off the earth. In Fig. 2 you can see this difference represented graphically.

A radio wave has two components — magnetic and electric; by definition the two exist at right angles to each other and at right angles to the direction of travel. All

*Assistant Technical Editor

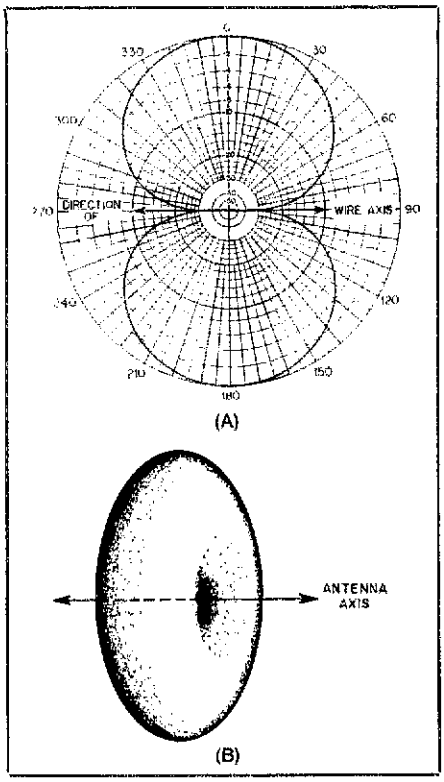


Fig. 1 — At A, radiation pattern of a half-wave antenna in the plane containing the wire axis. At B, the solid pattern of the same antenna.

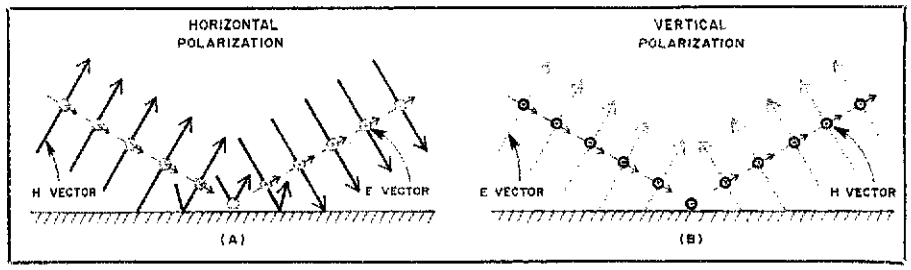


Fig. 2 — Horizontally polarized waves are shifted 180° in phase upon reflection, as shown at A. Vertically polarized waves, as shown at B, are not shifted. Circles with an X in the center are vectors (arrows) pointing into the page; those with dots in the center are pointing out of the page.

three can be thought of as vectors, or arrows, all mutually perpendicular. To visualize how this works, think of the seams in the corner of a room — where the two walls meet and where each wall meets the floor. These three seams are all at right angles to each other.

The electric field of a horizontally polarized antenna is horizontal, and the magnetic field is vertical. With a vertically polarized antenna the relationship is reversed; the electric field is vertical, and the magnetic is horizontal.

Alignment of the magnetic component (H vector) of the radio wave determines the nature of the reflection. In the case of horizontally polarized radio waves, the H vector is coming to the ground at an angle. You can visualize what happens during reflection by thinking of that H vector as an arrow that is made up of thousands of short pieces. Each piece reflects from the earth as it hits. The result, as seen in Fig. 2A, is that the vector is turned over. The electric field (E vector) must retain the "right sense" to the magnetic field. Therefore, the E vector (shown going into the page before the reflection) is shown coming out of the page afterward. This change in direction represents a 180° phase shift.

In the case of vertical polarization, the magnetic vector comes down parallel to the earth. This time there is a simple reflection with no phase shift or reversal. This assumes that the earth is a perfect conductor.

The effect of the ground reflection is the same as if a second "image" antenna were placed as far below the earth as the "real" antenna is above the earth. The image antenna acts as if it were fed the same amount of energy as the real antenna. For horizontally polarized antennas, the two are 180° out of phase. That means that when a point on the real antenna is at a positive peak the corresponding point on the image is at a negative peak (Fig. 3). For vertical polarization, the antenna and image are in phase.

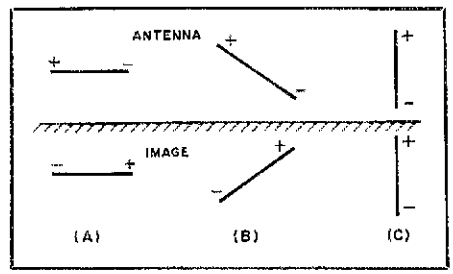


Fig. 3 — Antenna and image phase relationships are shown at A, B and C.

Let's assume that a dipole is installed 1/4 wavelength above ground. We could also say the dipole is 90 (electrical) degrees above ground. (One wavelength represents a full cycle or 360°.) Can you imagine the pattern that exists in a plane perpendicular to the antenna? In free space it would be a circle. What will it be here?

Fig. 4 shows two antennas spaced $\lambda/2$ apart and fed 180° out of phase. The drawing "freezes" an instant in time. The heavy solid lines can be thought of as positive peaks and the lighter, dashed lines as negative peaks. Where solid lines (or dashed lines) touch, the energy from the two antennas is in phase and they combine by adding. Where solid and dashed lines touch each other, there is a cancellation or nulling of energy.

The situation depicted in Fig. 4 is like placing a horizontal dipole $\lambda/4$ above the ground. There is one difference, however. We can ignore the bottom half of the figure — radiation exists only above the ground. You can see that there is maximum radiation straight up. Also notice that there is a complete cancellation, or null, along the horizontal center line. That line corresponds to the earth's surface.

Let's review the situation as we now understand it in the case where we have a horizontal dipole $\lambda/4$ above the ground. First, the doughnut-shaped pattern of free space is altered by the presence of the earth. Second, the resulting pattern is the same as if another dipole antenna were placed $\lambda/4$ below the ground and fed an equal amount of power, 180° out of phase with the real antenna. The radiation pattern will have a maximum straight up and a minimum along the ground.

How can we determine the pattern intensity of our dipole at angles between the horizontal and the vertical? The method is illustrated graphically in Fig. 5.

At the angle of interest two rays contribute to the radiation, one direct and one reflected. The reflected ray will travel farther than the direct ray (refer to Fig. 5). We see that the difference would be zero (wavelengths or degrees) if the antennas were located at A and C. Line AD (the distance from A to D) is equal to BD. The reflected ray travels a distance equal to BC farther than the direct ray. This effect creates a delay or phase difference at a receiving antenna. Even if the rays were to travel 100 or even 1000 miles, the reflected wave would still have to travel that relatively short distance farther.

It is not enough to know how long in feet or meters the distance BC is. That distance must be converted to electrical degrees.[1] The result is the phase difference, or phase angle, between the two rays. With that information, the two can be combined mathematically. This sounds involved and difficult, and it can be. However, through the use of trigonometry the calculations turn out to be straightforward.

Vertical radiation patterns for horizontal dipoles at various heights can be seen

[1]Notes appear on page 37.

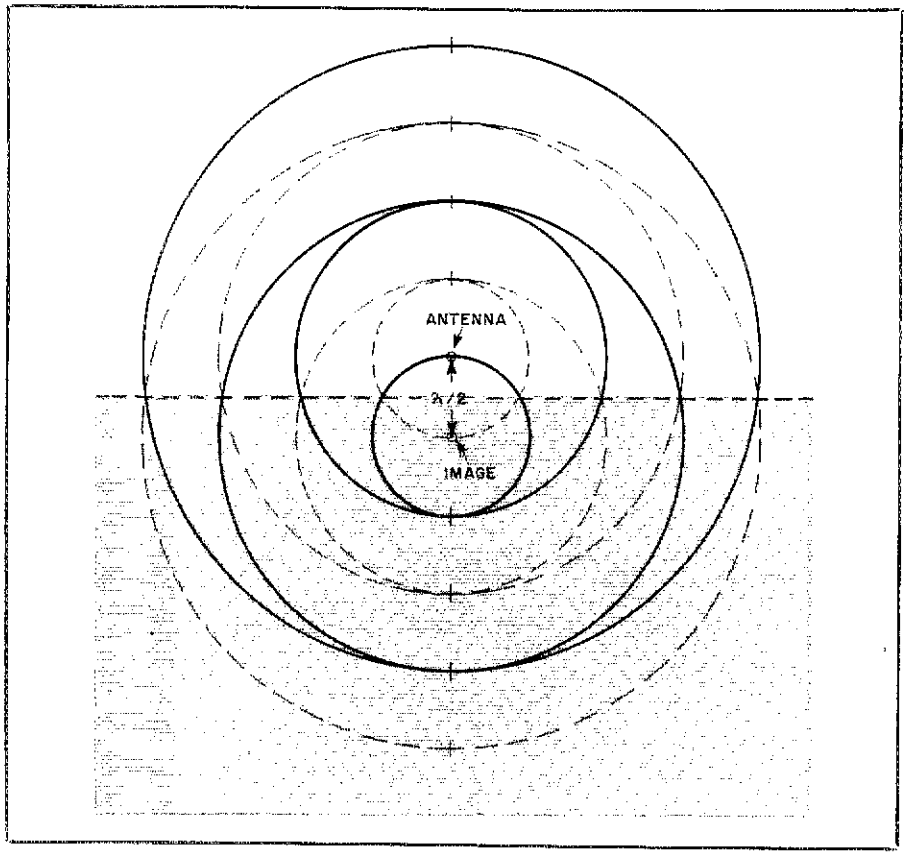


Fig. 4 — Interference between waves causes directional effects. See text.

in Fig. 6. When the antenna is placed at odd multiples of 1/4 wavelength above ground, there is maximum radiation vertically; at even 1/4-wavelength spacings (multiples of 1/2 wavelength) there is a vertical null. The higher the antenna is raised, the lower the angle of the first lobe.

Why the Vertical Radiation Pattern is Important

Radio communication is possible at hf because, depending on conditions, the ionosphere refracts radio signals, returning them to earth. Fig. 7 shows an ionized layer above the earth. When radio signals enter that layer at an angle, they are bent or refracted; when conditions are right they return to earth. Lower-angle radiation returns to earth at a greater distance; higher angles yield shorter distances. Actual conditions are much more complicated than this. A future article in the Beginner's Bench series will cover radio propagation in more detail. We will be concerned only with a few general principles for now.

Our first rule of thumb is that lower radiation angles yield greater distances. The second is that lower frequencies tend to use higher angles of radiation. It is useful for you to capture those two concepts. Let's look at some numbers.

Table 1 is taken from *The ARRL Antenna Book*. Observe that the angle of arriving signals varies with frequency. A close examination reveals three numerical

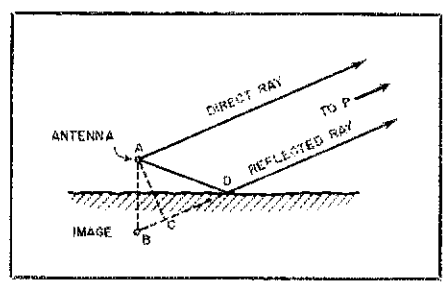


Fig. 5 — At any distant point, P, the field strength will be the resultant of two rays, one direct from the antenna, the other reflected from the ground. The reflected ray travels farther than the direct ray by the distance BC, where the reflected ray is considered to originate at the "image" antenna.

values and relationships for each band on the England-to-New Jersey path. First, useful radiation angles will be below the "upper angle." The upper angle is determined by merely changing the meter-band designation to degrees. For example, on the 40-meter (7-MHz) band, the upper angle is 40°. Second, the most useful angle will be about half the upper angle. Third, at times you may use angles at or less than one quarter the upper angle.

The numbers in Table 1 apply to the path across the North Atlantic; they don't apply to all situations. As you can see, there is no single angle that is best for a given path or band. There is, however, a preferred range of angles. Let's look at a practical example.

Earlier, I stated my preference for a 40-meter dipole as a first antenna. Let's suppose you have two supports 69 ft high (λ/2) and properly situated to support a dipole.[2] Fig. 6C shows the vertical radiation pattern off the sides of the antenna. (There will be little useful radiation off the ends.) Comparing with Table 1, we see that the radiation from our dipole is concentrated in angles a bit higher than optimum for the North Atlantic path. To center dipole radiation on the angles indicated in the table would require that the dipole be raised to 100 ft or more! Few of us have trees, or other supports, that are anywhere near that high. (Perhaps I can find some 30-ft-high planters for the 70-foot oak trees in my front yard.) Most of us will be content if we get our dipoles close to 69 ft high.

Our friendly 40-meter dipole also works on 15 meters, but the pattern is a bit more complicated. The horizontal "free space" pattern is shown in Fig. 8. A 15-meter dipole 69 ft above the earth would have the pattern of Fig. 6F off the sides. Our (3/2-wavelength) dipole will have a pattern that is the sum of these two patterns. As with the 40-meter band, radiated energy is concentrated in angles a bit higher than optimum. Nevertheless, this also represents a reasonable compromise.

What happens if we erect an 80-meter dipole at 69 ft (λ/4)? The broadside, vertical pattern will be that of Fig. 6B. This is not a very good DX antenna; most of the radiated energy goes straight up. This conbination should work well for local contacts and for communication out to several hundred miles, however.

Most experienced hams agree that it is best to get your antenna up at least 1/2-wavelength if you want to work DX. But there is nothing magical about 69 ft for the 40-meter (or any other ham) band. Think of it as a desirable height, not as an absolute minimum height.

Getting your antenna up high will not only give you a lower radiation angle, it will help minimize losses. Trees, shrubs, buildings and the like will tend to scatter and absorb radio waves. This phenomenon increases with frequency, becoming critical in the uhf and microwave ranges. Whenever possible, you should try to get your antenna above such objects.

But I Can't Get It up That High!

Not all, perhaps not many, of you have a pair of well-spaced, tall supports for a dipole. In fact, you don't need two tall supports. Maximum antenna radiation takes place at the high current points. In a half-wavelength dipole, the high current point is at the center. For that reason, you may choose to put up your dipole as an "inverted V."

For best radiation, the angle between the two sides of an inverted V should be as

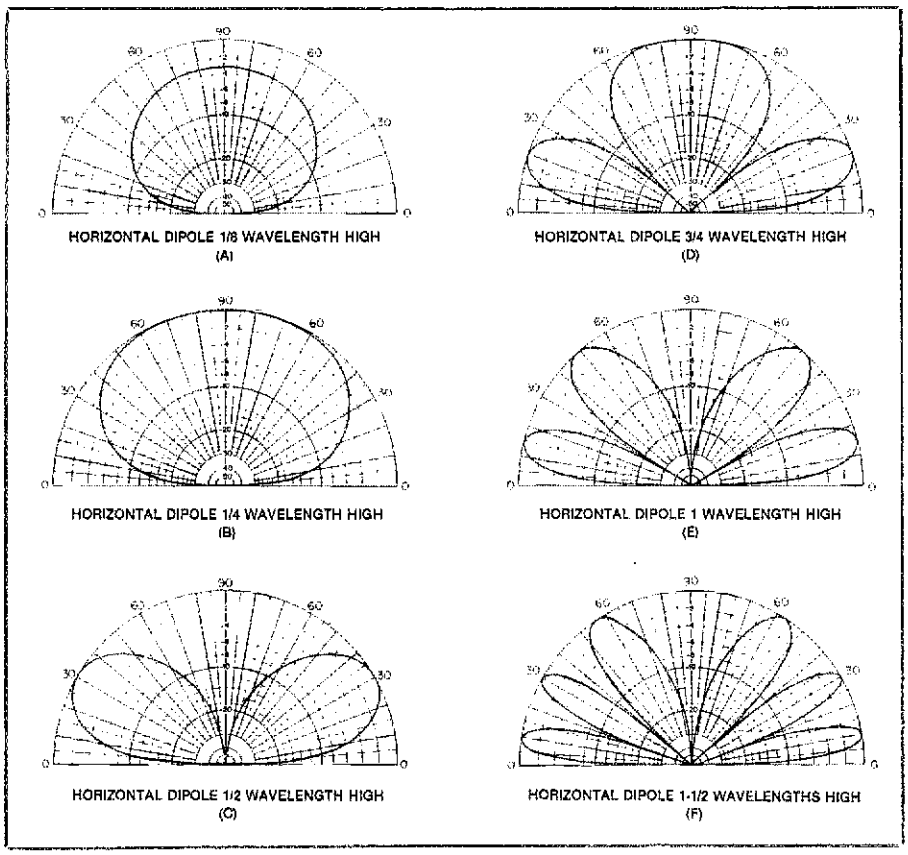


Fig. 6 — Vertical radiation patterns for horizontal dipoles at various heights above ground. The free-space pattern would be a circle at −6 dB on the scale. For directional antennas, these are factors to which the free-space radiation pattern should be added to include the effect of reflection from perfectly conducting ground. These patterns are only for the vertical angle of radiation of horizontal antennas.

Table 1

Measured Vertical Angles of Arrival of Signals from England at Receiving Location in New Jersey

Freq. (MHz)	*Angle below which signals arrived 99% of the time*	*Angle above which signals arrived 50% of the time*	*Angle above which signals arrived 99% of the time*
7	35°	22°	10°
14	17°	11°	6°
21	12°	7°	4°
28	9°	5°	3°

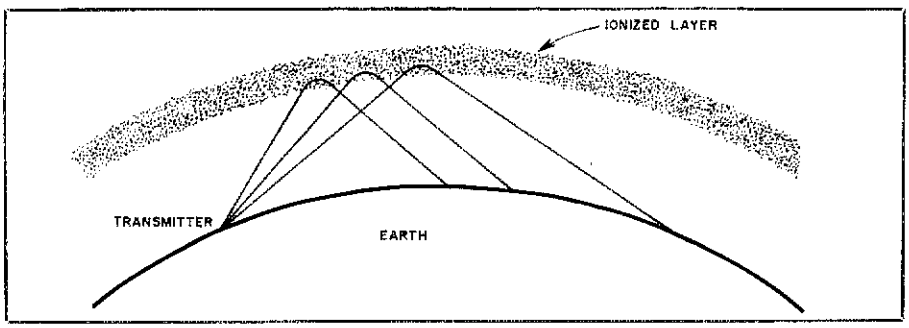


Fig. 7 — Simplified model of the ionosphere showing how hf radio signals are propagated over long distances.

great as possible. If the sides were parallel (zero-degree angle), the results would be the same as from a feed line: There would be no appreciable radiation. With a 120° angle between sides, losses in effectiveness should not be noticeable; at 90°, they will be. Try to avoid angles of less than 90° between sides of an inverted V. My 40-meter inverted V has its center at about 60 ft; the angle between sides is between 120° and 90°. I have had good DX and domestic performance from that antenna.

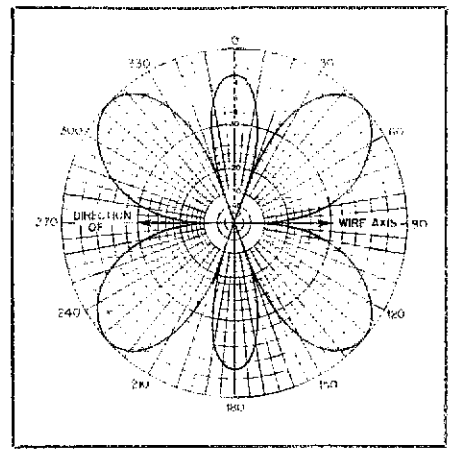


Fig. 8 — Radiation pattern of a 3/2-λ dipole in the plane containing the wire axis.

Vertical antennas can be good DX performers, particularly on frequencies below 14 MHz. But they depend on ground conductivity and certain installation factors for good low-angle radiation. While vertical antenna DX performance can be very good, the same cannot be said for performance at a range of more than a few miles to a few hundred miles. Much more could and should be said about vertical antennas, but that must await another time.

For a low-cost, versatile antenna it is hard to beat the horizontal, center-fed dipole. For best results, get your dipole up as high and in the clear as you can. Good luck.

Notes

[1]The distance, in feet, divided into 984 gives the number of wavelengths. Wavelengths times 360 equals degrees. To change meters to wavelengths, divide into 300. To change wavelengths to radians, multiply by 2 times π (3.1415927...). Most computers use radians in making calculations.

[2]m = ft × 0.3048.

Strays

I would like to get in touch with...

☐ former members of the Lawrence Institute of Technology ARC, W8QOA, of Southfield, Michigan. Eric Janle, KA8OBP, 3032 Golfhill Dr., Pontiac, MI 48055.

☐ anyone having a parts list or schematic drawing for a Side Band Engineering Del Mar Model 225 12-channel vhf marine radio transceiver. Francis E. Erdle, N3AJ, 21930 New Hampshire Ave., Brookeville, MD 20833.

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

A 400-Hz POWER SUPPLY FOR A RADIO COMPASS

☐ I needed a 400-Hz supply that could power two surplus radio compass units, one for azimuth and one for elevation with my EME antenna system. After many unsuccessful attempts to wind a 400-Hz transformer for a previous design, I decided to try a 555 timer and a flip-flop to switch a pair of transistors.[1] Fig. 1 shows the schematic diagram for my circuit. Most of the parts were ones I found in my junk box, but the parts list gives Radio Shack part numbers for anyone who wishes to buy all new components. I tried a variety of transformers at T1, and they all seemed to work well.

As an additional use of this circuit, I discovered that it is ideal for finding the operating frequency of transformers. The oscillating frequency of the timer can be adjusted over a wide frequency range, and the transformer under test connected as T1. Find the frequency of maximum output voltage and current, with minimum current drawn from the dc supply. This will be the optimum operating frequency of the transformer. — *Gene Wasson, KØUDZ, Rapid City, South Dakota*

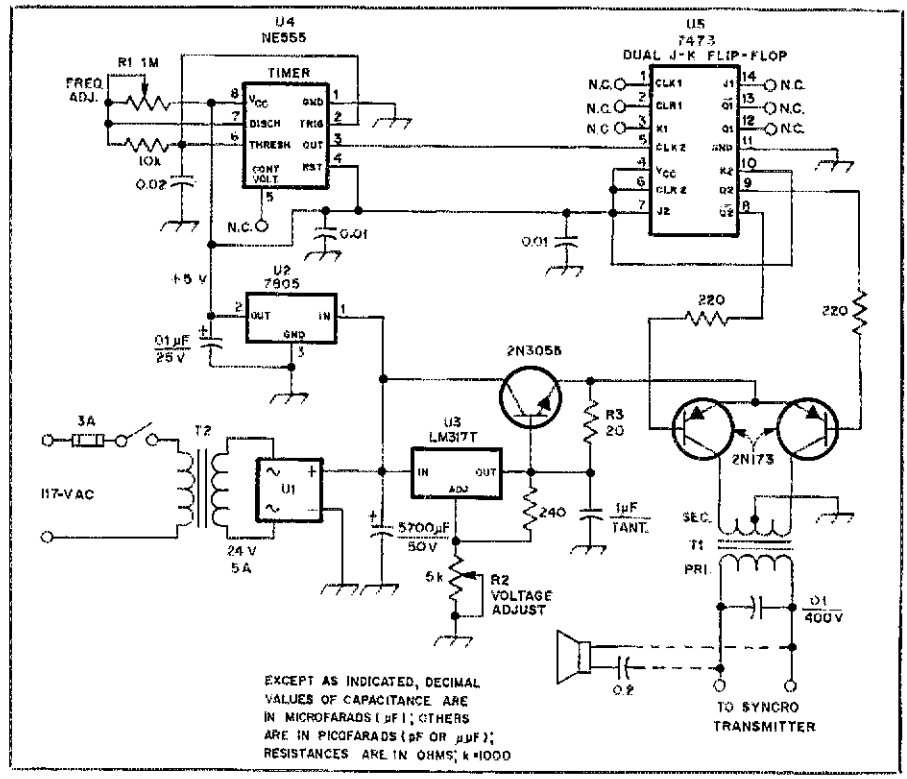


Fig. 1 — Schematic diagram of a 400-Hz power supply that can be used with a radio compass for antenna-direction readout (part numbers in parentheses are Radio Shack).
T1 — 117-V primary, 25-V secondary, used as a step-up transformer (273-1512).
T2 — 117-V primary, 12- to 18-V secondary, at least 4-A rating.
U1 — 6-A, 50-PIV full-wave bridge rectifier (276-1180).
U2 — LM 7805 5-V regulator (276-1770).
U3 — LM 317T adjustable voltage regulator (276-1778).
Q1 — 2N3055 or equiv. (276-2041).
Q2, Q3 — 2N173 or equiv. (276-2006).

RETUNING MOBILE ANTENNA, FAST AND EASY

☐ I use a Hustler mobile antenna mounted on the rear bumper of my car. During extended trips from home, I keep cw and ssb schedules on several bands. Peak performance of this antenna requires resetting the adjustable whip to resonance when changing from the cw to the ssb portions of a band. Hustler provides a collar on the adjustable tip. It acts as a preset guide for the correct length at the higher frequency, but resetting for a preferred lower frequency requires some other method of measuring tip length. The method I devised involves placing strips of electrical tape on the rear bumper. These are spaced a distance equal to the resonant length of the tip at my preferred frequency. I simply lay the entire resonator along the bumper, adjust the tip to match the spacing of the tapes and tighten the jamb nut. Of course, a pair of tape strips is required for the resonator of each band. — *Victor Woodling, W9JNH, East Peoria, Illinois*

MULTI-BAND HF MOBILE ANTENNA

☐ My mobile station consists of a Kenwood TS-120S and four Anixter-Mark Heliwhip antennas. These antennas are helically loaded. A separate fiberglass rod is used for each band. Stopping along the highway to change the antenna for each band change became a nuisance.

I fabricated a three-band adapter. Later, I made a four-band adapter, using 1/8-inch hard aluminum plate.[2] For the four-band version, I used a T-shaped piece of aluminum. The three end portions of the bracket were bent down at an approximate 30° angle. I drilled four holes in the bracket to clear the standard 3/8-inch × 24 antenna-mounting stud. To assemble the antenna, I mounted the longest whip through the top of the T and into the base. The remaining three coils were then secured to the adapter by means of lock washers and nuts.

I have experienced no problems with this system. Band hopping is now effortless, and my mobile operating is more enjoyable. This principle should be useful with other types of mobile antennas, such as those that employ interchangeable loading coils. — *Merritt Scarff, W4FAH, Lakeland, Florida*

COLLINS EQUIPMENT 40-METER COVERAGE CHANGE

☐ While changing the 8.9775-MHz crystal in position 3C of my Collins equipment to provide coverage of the 30-meter band, I decided to make another crystal change. By removing the 10.355-MHz crystal in position 2B and replacing it with a 10.255-MHz unit, I shifted the coverage on this 40-meter segment from 7.2-7.4 MHz to 7.1-7.3 MHz. This enables me to tune the entire 40-meter phone band in one segment. I believe this was a worthwhile change. — *John Wasmuth, W8BP, Marquette, Michigan*

TOWER THRUST BEARING PROTECTION

☐ I have a 65-foot tower with a 5-element tri-band beam antenna. To make the rotator easier to service, I have it mounted at the 20-foot level. I use a 50-foot mast pipe (1-11/16 inch OD) from the rotator through a heavy-duty thrust bearing mounted on the top plate of the tower. The thrust bearing supports the entire weight of the mast and antenna.

I was concerned about what would happen to my investment if water were allowed to find its way into the bearings over a period of time. A protective cover will prolong the useful life of the bearing and minimize the need to replace this expensive piece of hardware at frequent intervals.

My solution was to use a "plumber's helper" to form a cover. Carefully enlarge the hole that the handle threaded into until it is about 1/4-inch smaller in diameter than your mast. Slide it down the mast until the cover is against the bearing

[1] E. L. Campbell, "Antenna Rotators and Indicators," *QST*, April and May 1967.
[2] mm = in. × 25.4; m = feet × 0.3048.
*Assistant Technical Editor

plate. A small bead of silicone sealer around the top of the helper completes the job. Fig. 2 illustrates the final arrangement. I inspected the bearing after six months of exposure to our inclement Michigan weather, but found no traces of rust. — *Dick Carter, N8DMO, Jenison, Michigan*

(NOT) STORING IC CHIPS IN STYROFOAM®

☐ When I opened my copy of the new *Hints and Kinks* book I was shocked to see the suggestion about using foam-plastic meat trays to store ICs.[3] The trays I have seen are completely nonconductive and are capable of holding large static charges. Static-sensitive ICs would be destroyed instantly! That's why commercial foam for storing IC chips is conductive, and will not hold a static charge. You can easily verify this with an ohmmeter. — *Kjeld Hvatum, N1BSP, Cambridge, Massachusetts*

☐ A word of caution is in order about the use of foam-plastic trays to store IC chips. As integrated circuits become more compact, and operate on less and less power, they become even more sensitive to the ravages of static electricity. How sensitive? This was the subject of a videotape shown recently to the employees of NCR Corporation, a computer-systems manufacturer.

You don't have to walk across a carpet in a dry room to build up enough charge to damage or destroy an integrated circuit. With the right combination of synthetic fibers in your clothes, you can ruin an IC through mishandling it while sitting at a workbench. But the most dramatic demonstration on the videotape was a perfectly good commercial-grade IC destroyed by the static electricity in a foam-plastic cup waved once over the chip! No spark, no sound, just one defective IC.

Most amateurs don't deal with such high-performance, large-scale integrated circuits — yet. But we can all save ourselves some trouble and expense by keeping our IC chips away from nonconductors capable of holding even a small electrostatic charge. This would include cellophane tape, foam-plastic and ordinary plastic bags. Computer manufacturers use specially treated plastic bags with conducting surfaces. Only then can the components be safely shipped in a box of foam-plastic "peanuts." — *Ken Nollet, KØEN, St. Paul, Minnesota*

TOWER THRUST BUSHING PROTECTION

☐ For several years, I have been using a rubber boot to keep the thrust bushing on my tower clean and dry. The boot was fashioned from a rubber toilet-tank ball. [This is the part that fits in the drain hole at the bottom of the tank. — Ed.] Cut the top of the ball to fit snugly around the mast, and cut the bottom so it will stretch fit over the thrust bushing. Slide the boot down the mast until the bottom can be stretched over the bushing. A stainless-steel hose clamp placed over the boot just above the thrust bushing holds it it place (Fig. 3). Be sure to pack the bushing with grease before installing the protective cover. — *Thomas Kruszon, WB2PXL, Riverhead, New York*

[3]*Hints and Kinks for the Radio Amateur*, 11th ed. (Newington: ARRL, 1982), p. 1-2.

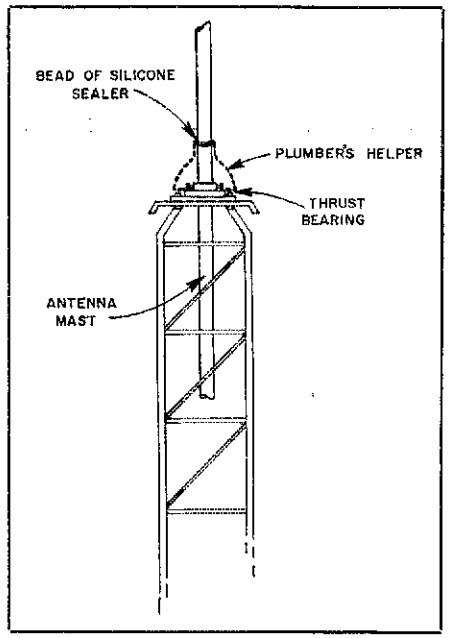


Fig. 2 — A "plumber's helper" can be used to protect a thrust bearing from the weather.

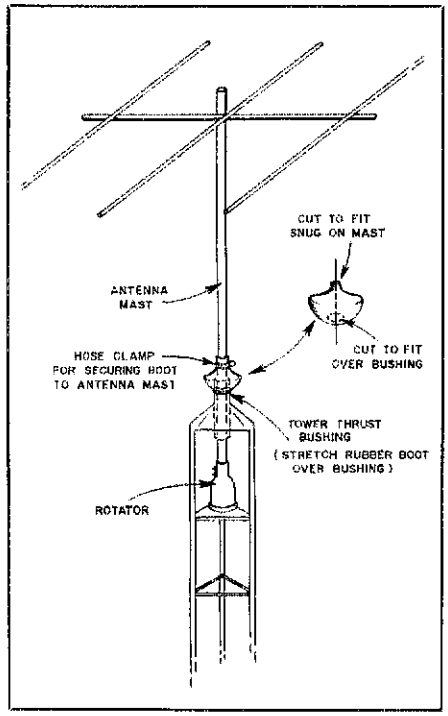


Fig. 3 — WB2PXL uses a rubber toilet-tank ball to form a protective boot for the thrust bushing on his tower.

☐ I use a piece of rubber-impregnated material, such as the cuff from an old rubber glove, to make a weatherproof cover for the thrust bushing on my tower. Fig. 4 shows this technique. The cuff is secured with a stainless-steel hose clamp, just above the top of the bushing. Be sure to apply a good coat of bearing grease between the mast pipe and the bushing. — *Ed Lynch, WB2YKX, Latham, New York*

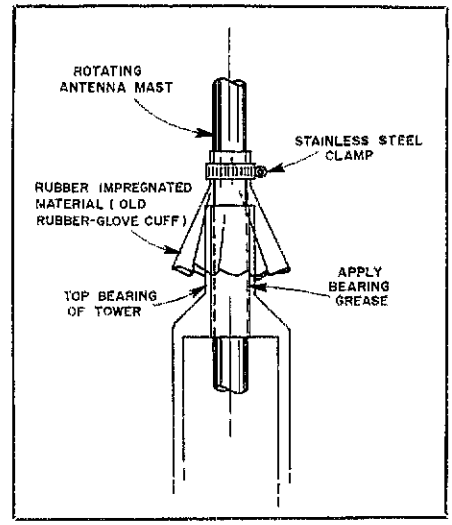


Fig. 4 — Illustration of the protective cover used by WB2YKX to weatherproof the thrust bushing on his tower.

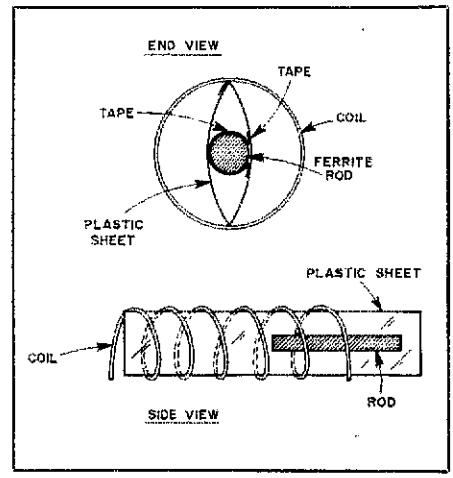


Fig. 5 — A piece of stiff plastic and a ferrite rod can be used to make a homemade variable inductor.

FERRITE-ROD SLIDER FOR VARIABLE INDUCTOR

☐ Here is an idea that I have employed to make a homemade variable inductor for use in a Transmatch or other piece of equipment. I mount a ferrite rod inside the coil, and slide the rod through the coil to change the inductance. To mount the slider inside the coil, I use a piece of stiff plastic (the type used for covers on greeting-card boxes works fine) that is twice as long as the coil. Next, I cut the plastic to a width of 2.75 times the inside diameter of the coil. Tape the ferrite rod to the sheet as shown in Fig. 5 and fold the sheet in half. The assembly will fit into the coil with just a slight compression. This arrangement will minimize any dielectric loss and provide an easy way to slide the rod back and forth through the coil. You could fasten a wood or plastic handle to the end of the assembly and add a scale for setting the inductance. — *Glenn Morrison, KO9L, Evanston, Illinois*

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

OPERATING WITH AMTOR

☐ [Editor's Note: The following is taken from a report outlining on-the-air experiments with AMTOR. The report was submitted to the FCC on November 12, 1982 in accordance with the terms of STA 7130. This STA allowed K4PA to experiment with AMTOR prior to legalization of this mode on hf for all duly licensed American amateurs.]

A Report on Experiments With the CCIR 476 ARQ Teleprinter Code:

1.0 INTRODUCTION

AMTOR (MODE A) is a teleprinter system that is described in CCIR Recommendation 476 and uses a fast-break simplex radio channel to automatically request repeats (ARQ) of garbled data.[1,2] This "handshaking" process is a significant improvement over traditional RTTY operation and provides nearly error-free copy over marginal hf circuits.

Beginning in January 1982, I (K4PA) commenced two-way communication with other AMTOR stations around the world, in an effort to field test microprocessor equipment used to generate and detect CCIR 476 signals, and to determine whether the AMTOR system was suitable for use by amateur RTTY stations. From January through October, 22 AMTOR stations in 11 countries were contacted, with a total operating time of 80 hours. All contacts were made on 14,075 kHz.

2.0 AMTOR PERFORMANCE

Is It Really Error-Free? Yes, almost perfectly so! AMTOR performance is so near to its promise that a meaningful error-rate estimate is difficult to make. Typing errors are the most significant source of garbled copy.

AMTOR is much like wideband fm communication in that, as propagation conditions vary, a sharp threshold marks the boundary between perfect copy and an unusable circuit. That boundary, however, is substantially below the signal/noise ratio usually necessary for hf RTTY work. When signals fade, AMTOR automatically reduces the "throughput rate," maintaining perfect copy until finally giving up at what seems to be the last possible moment. If signals fade and return repeatedly, AMTOR operators communicate with ease while conventional RTTY operators try to fill in the garbled portions of their messages.

What is the Data Rate? The block timing specifed in CCIR 476 permits a maximum rate of 66 wpm. This "throughput" is realized if no repeats are requested. Band conditions determine how often repeats are needed. On the average, circuits seem to run at 30 to 60 wpm, probably a result of the operators using AMTOR in conditions that are otherwise unacceptable. Speeds of less than 10 wpm may be accompanied by significant errors and are not generally used.

Unfortunately, CCIR 476 ARQ timing is somewhat complicated and adapting it to faster rates is not a simple clock-frequency change. In most stations, changes to the microprocessor code in ROMs would be required. To my knowledge, no amateur experiments along these lines have been conducted.

3.0 THE AMTOR OPERATING ENVIRONMENT

AMTOR has several unique characteristics related to the basic ARQ process:

Message Receipt Confirmation. By virtue of the ARQ handshaking technique, operators using AMTOR are certain that all transmitted data blocks have been received correctly. They can monitor the transmission process at any time to learn exactly how much of a message has been sent.

Full Break-In Operation. CCIR 476 allows the changeover between sending and receiving data to be initiated from either end of a circuit. Information-receiving stations may interrupt incoming messages by pushing a control key.

Transmitter Look-Thru. With AMTOR, the radio equipment at both ends of a link is continually cycling between transmit and receive at a 0.45-second rate. Activity on the channel is noticed easily during the listening periods.

Effective Power Adjustment. When propagation is good, the AMTOR operator can reduce power and immediately observe the effect on channel speed. He or she can do this while either sending or receiving data, and can experiment without affecting reception quality. It is quite dramatic to observe how superfluous a "full gallon" is on good circuits — and how helpful a 10-dB power increase is with marginal conditions.

Reduced Interference Potential. An interesting feature of AMTOR is that both ends of a link are "always" transmitting. This precludes the common situation in which a frequency is erroneously thought to be clear due to inability to hear one side of a contact. No QRL? transmissions are needed.

4.0 EQUIPMENT REQUIREMENTS

Almost all AMTOR equipment takes the form of a hardware interface between conventional data terminals (ASCII or Baudot) and the RTTY station modem. The signaling rate is 100 baud, within the 45 to 110 range commonly employed. The transmitter shift may be anything the operators agree upon, and has been exclusively 170 Hz in my experience.

AMTOR operation requires radio equipment capable of relatively fast break-in operation. A nominal requirement is that the transmitter achieve nearly full output within 20 ms after changeover is signaled. AMTOR equipment generally provides a delay adjustment to withhold transmission until receive/transmit changeover is completed. Tardiness at this point limits the maximum range at which other stations may be contacted. CCIR 476 block timing allows 170 ms for the round-trip delay, but receive/transmit changeover time must be subtracted from this value for range calculations. I have learned that a 30-ms delay prohibits ARQ communication between Virginia and Australia!

Most amateur equipment uses mechanical relays as part of the transmit-receive changeover process, most often in antenna-switching circuits. A subtle difficulty arises when other transmitter circuits can switch faster. In this case, we find that an antenna relay will "hot-switch" the transmitter output and generate a click over considerable portions of the band. The problem, of course, has been solved with most modern rigs operating in the cw mode. Yet, this does not guarantee a particular transmitter will be clean when running RTTY or when speeded up for AMTOR. One solution, employed by KB6BT and me, uses a gated afsk generator that is delayed and shaped to provide a clickless turn-on after all relays have settled.

A second timing requirement with AMTOR is that the transmit-to-receive changeover be made as quickly as possible. That is, when the transmitter is turned off, the receiver age must allow full sensitivity in 20 ms or less. Interestingly, this delay affects the *minimum* range over which AMTOR stations may communicate. If a nearby slave station begins control signal transmission 20 ms after changeover, the master station must be ready to receive at that time. When the two stations are distant, signal propagation delay mitigates this constraint.

5.0 TYPICAL AMTOR EQUIPMENT

Most stations are using the Mark 2 AMTOR kit from G.P.W. Electronics, Ltd.[3] This is a single circuit board designed by G3PLX that translates CCIR 476 to and from Baudot code at 45 or 50 baud. A 1023-character typing buffer is also provided. Input/Output are at TTL levels.

A few stations are reportedly using software-only modifications to popular hobby computers and single-board microprocessor systems. I use a machine-language program for AMTOR Mode A in a Kim-1 microcomputer dedicated to RTTY operations.

6.0 AMTOR SIGNAL CHARACTERISTICS

Compatibility with Other Signals. The frequency shift and signaling rate used with AMTOR are commensurate with present amateur RTTY equipment. Only the characteristic "chirp-chirp" of the simplex ARQ process distinguishes these transmissions from other amateur RTTY. I believe that most RTTY operators are now familiar with AMTOR signals as a result of experiments conducted by U.S. stations and the considerable activity in other parts of the world. It is estimated that at least 80 stations in 20 countries are now active with AMTOR.

An interesting aspect of AMTOR operation is that it is fully compatible with commercial TOR equipment now gaining acceptance in maritime use. AMTOR stations have adopted the practice of using the alphabetic portions of their call signs to determine a four-letter selcode unique to each station. Commercial apparatus uses a five-digit sequence assigned to each sta-

[1]J. Martinez, "AMTOR, an Improved Error-Free RTTY System," *QST*, June 1981, p. 25.
[2]J. Martinez, "AMTOR, an Improved Radioteleprinter System Using a Microprocessor," *Radio Communication*, Aug. 1979, p. 714.

*Assistant Technical Editor

[3]55 Cobham Rd., Ferndown Industrial Estate, Ferndown, Wimborne, Dorset BH21 7RA, England.

tion, which is converted internally to four characters, in accordance with CCIR Recommendation 491. Nevertheless, amateur and commercial stations may communicate easily with one another once the appropriate selcode is determined.

Is the AMTOR Block Design Appropriate? Recognizing that AMTOR achieves nearly perfect elimination of transmission error, one may ask what can be done to improve transmission speed. CCIR 476 yields a communications efficiency of 50%, in the sense that a 100-baud radio channel (with ARQ handshaking) produces a 50-baud teleprinter output. To increase the AMTOR data rate one may adjust either the signaling speed or the ARQ efficiency.

The question of efficiency recalls a most striking feature of AMTOR — the relatively few characters (three per block) transmitted at a time. One may ask if increasing the block length will substantially reduce handshaking overhead. In my opinion, the block length cannot be increased usefully beyond a factor of 5 or 10. The problem is that with marginal hf circuits the probability of a "hit" in an interval of several seconds is very high. Using a block length of 80 characters (one line of text) seems foolhardy if communication is to be attempted during poor conditions. Perhaps an adaptive system that matches block length to channel statistics, or a method of correcting individual errors within a long block, would yield useful improvement in ARQ efficiency.

7.0 PREDICTIONS FOR AMTOR USE

AMTOR performance is such a significant improvement over conventional RTTY that enthusiasts are given to forecasting its exclusive use within a few short years. Comparison with the history of ssb telephony is unavoidable. Yet AMTOR, as is, suffers from the 50-baud limitation on transmission rate. This is adequte for any link involving a typist, but how soon will the amateur's need for computer-to-computer communication grow beyond this modest speed? Stations may already be heard lamenting that more than 40 minutes is required to send an 8-K program over the air.

Thus, the future of AMTOR involves an estimate of amateur data transmission needs and our progress with the proposed wideband vhf data networks. If the need does not materialize quickly, or if the networks still require years of development, AMTOR may well establish itself as the dominant mode of amateur data communications.

Another factor affecting my prediction of exclusive AMTOR use on hf is my preoccupation with long-haul circuits that are reliable 24 hours per day. These considerations are not typical of the great bulk of amateur RTTY communication. 100 wpm (or, possibly, 300 wpm) Baudot and ASCII codes work well on continental U.S. paths during good band conditions. Nevertheless, I find that, when a station has the option, AMTOR is invariably selected. It extends our communication range, increases the time "window" during which a circuit is open, and provides that wonderful certainty of perfect print on the other end. — *William C. Meyn, K4PA, Reston, Virginia*

AID FOR PROGRAMMERS

☐ First, congratulations on publishing the fine article by Rose, K6GKU, on the MINIMUF Program (Dec. 1982 *QST*). I was, however, somewhat disappointed when I read the editor's note on page 38. There is, and has been for some time, a book addressing the problem of using a program on a computer for which it has not been written. The book is David Lien's (W6OVP) *BASIC Handbook*, available from CompuSoft Publishing, 535 Broadway, El Cajon, CA 92021, for $19.95 + $1.65 postage and handling.

With the *BASIC Handbook*, anyone can translate the many different BASIC language "dialects" to their own computer syntax. The book is really a "must have" for any serious microcomputer owner. — *Leslie S. Smith, KA6AXX, San Diego, California*

LINE LOSS AND SWR

☐ While it is true that moderately high SWRs on transmission lines of average length at the lower frequency bands are of minor importance, things *can* get out of hand. When the 10-MHz band legally opened, my friend W7IR was anxious to give it a try, since his new rig includes that band. He has an inverted V cut for 3.6 MHz, and reasoned that since the third harmonic of that band is not too far from 10 MHz, it might work on the new band. The SWR at 10 MHz was about 5:1; this was overcome easily with a matching network. Signal reports were disappointing, however, even allowing for the 100-W output of the transceiver.

He then realized that his transmission line (milspec RG-8A/U) is 350 feet long, and perhaps the attenuation was causing the SWR to look much better than it really was. (At 10 MHz, RG-8A/U has an attenuation of 0.55 dB per 100 feet, or about 2.0 dB for the whole line.)

This attenuation figure means that, even if there is no antenna connected to the end of the line, the return loss measured at the shack end can be no greater than 4.0 dB; *the SWR can never look higher than 4.4:1!*

Actually, the antenna (there really *was* an antenna at the end of the line!) was radiating a small amount of power, but W7IR had not intended to operate QRP! W7IR is now looking for a place to hang a 10-MHz antenna, preferably closer to the shack. — *Harry R. Hyder, W7IV, Tempe, Arizona*

Feedback

☐ W2HXF correctly points out that the pictorial drawing of T1 in Fig. 4 of "Go Class B or C with Power MOSFETs," March 1983 *QST*, p. 27, has an error. Leads D and E should be joined, rather than leads C and D. The schematic diagram for T1 is correct, however. Also, T2 should have been described as a bifilar choke.

☐ There is a typographical error in "More MINIMUF Program Mods" (Technical Correspondence, May 1983). The following line should read:

2010 B1 = (remainder per May issue)

Author Bramwell is credited with the correction.

☐ VE2CV has pointed out that in Fig. 7 of "The Effect of Supporting Structures on Simple Wire Antennas," Dec. 1982 *QST*, p. 34, the angles in the small insert have been reversed. The angle θ is the angle of elevation for launch of skywaves; ϕ is the azimuthal angle (ϕ = 90° is the plane orthogonal to the plane containing the antenna).

☐ In "SOLAR FLUX/SUNSPOT NUMBER CONVERSION FOR MINIMUF" (Technical Correspondence, May 1983), there are errors in Eq. 3. It should read

S9 = 625*(SQR((0.73)↑ 2-0.0032*(65-SF)) – 0.73) (Eq. 3)

Thanks to K4JW for picking this up.

☐ Author Belrose points out that there are several errors in the Appendix of his January 1983 *QST* article entitled, "Beverage Antennas for Amateur Communications." Eq. 1 should read: Z_0 equals 60 times the natural logarithm of 2h/a. While the symbol n is defined correctly, this definition should have appeared in the text after the list of definitions following Eq. 6. Eq. 5 should read

$$G = \frac{377\pi\sin^2\delta}{Z_0\lambda^2}\left|\frac{1-e^{-\ell\Gamma}}{\Gamma}\right|^2 \quad \text{(Eq. 5)}$$

Eq. 4 was converted incorrectly from metric to English units. It should have read

$$Z_0 = 60 \ln \frac{2(3.7)(12)}{0.0404} = 462 \text{ ohms (Eq. 4)}$$

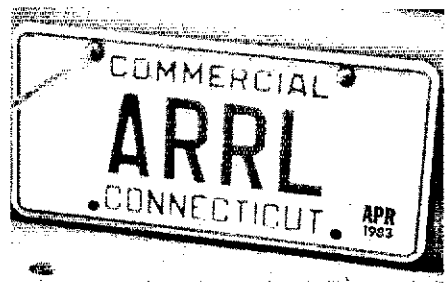
where

h = 3.7 feet (1.13 m)

a = 0.0404 inches (0.1026 cm)

☐ *QST* has received a virtual landslide of information from various sources telling us that the June Stray entitled "Contact-Lens Wearers Beware!" (page 22) is erroneous. Apparently, we (along with several other publications) were the victims of a hoax: The incident described in the Stray, according to the information we've received since the Stray appeared in print, did not occur. The underlying message is this, according to the National Society to Prevent Blindness: "Contact lenses, of themselves, do not provide eye protection in the industrial sense. For occupational use, contact lenses should be worn only in conjunction with appropriate industrial eye protection."

Strays



The League's 1979 GMC pickup truck, used mainly for hauling mail to and from the Post Office, is sporting a new license plate, compliments of the family of the late Francis E. Handy, W1BDI. The family graciously transferred ownership of the license plate to the League in memory of Handy's 42 years of service to the ARRL and Amateur Radio. Known affectionately as "Mr. Amateur Radio," Handy is best known for creating *The Radio Amateur's Handbook* ("Handy's Handy Handbook") and for founding the ARRL section-level organization and Field Day, which, by the way, celebrates its 50th anniversary this year.

Product Review

Conducted By Paul K. Pagel,* N1FB

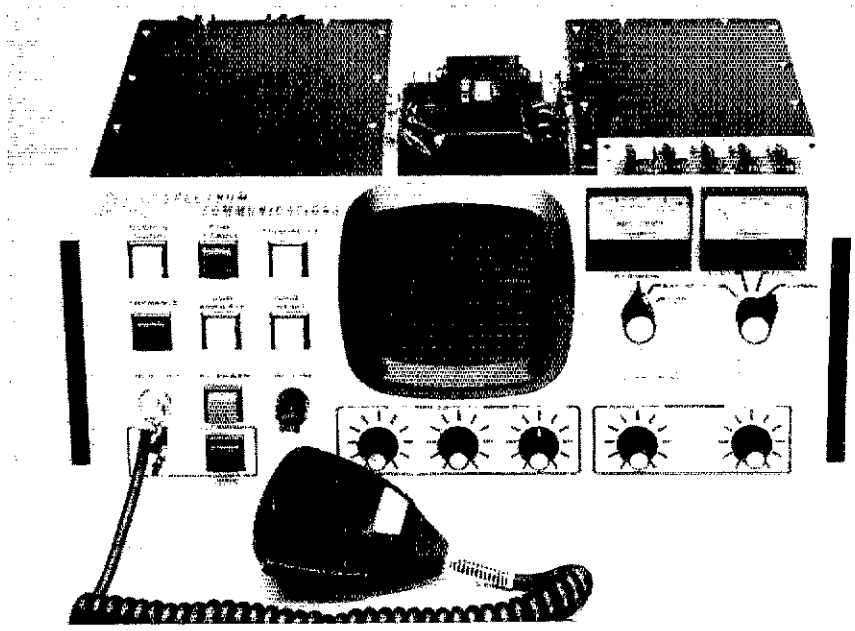
Spectrum Communications SCR 1000 2-Meter FM Repeater

Reliable, trouble-free, solid-as-a-rock — those are the words that first come to mind when I think of the Spectrum Communications SCR 1000 2-meter repeater. Spectrum has relied heavily on time-proven circuits and components to put together a package that should be a good performer for any group that doesn't want to "roll their own."

The review unit was in use daily at W1AW/R during a period that stretched from mid-July through the following January. After overcoming some initial difficulties, we experienced no significant problems with the unit. W1AW/R is located in an elevator penthouse in a large public building in Newington. The penthouse is neither heated nor air conditioned, which means the temperature extremes are *not quite* as severe as would be experienced if the unit were housed in a metal box hanging on the side of a tower.

During the first couple of weeks of the review, the unit twice failed to transmit. On both occasions, we pulled it from service and returned it to the ARRL lab for testing. The first time we found nothing wrong with it back at the lab, so we returned it to service. After a few days it again failed to transmit. This time we sent it back to the factory. Although there was some minor damage in shipping, the factory could find nothing basically wrong with it. They returned it to us after a few days, and we put it back into service. Craig Baker, one of Spectrum's engineers, suggested that the problem might have been falsing in a remote inhibit circuit.

The inhibit circuit can be activated or deactivated by remote means. On a few occasions after that, the transmitter failed to operate. The first time, one of the technical crew made the trip to the site and found the INHIBIT indicator light on, indicating that the inhibit circuit had been set. (Because we were unfamiliar with the unit and were not testing it at the site, we neglected to notice if the light had been on during the first two "failures.") The transmitter also failed to transmit on three other occasions. Each time, we were able to deactivate the inhibit function remotely and return the repeater to service without "making a house call." Because the repeater could be inhibited remotely, we were never really certain whether the incidents had been true "falses" or were the acts of some whimsical jester. Also, we could not make it "false" in the lab. Those were the only difficulties experienced with the unit during the entire review period.



Spectrum Communication SCR 1000 2-Meter Repeater, Serial No. 1844

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 136 to 174 MHz.	
Sensitivity: 0.3 μV for 12-dB SINAD.	0.42 μV for 20-dB quieting.
Squelch/COR threshold: 0.1 to 0.2 μV typical, 0.25-μV maximum.	0.13 μV.
Hang time: 0.1 to 6 seconds.	Less than 0.5 second (minimum) to approx. 10 seconds (max.).
Time out range: 0.5 to 4 minutes typical.	Approximately 12 seconds (min.) to approx. 5 minutes (max.).
Power output: 30 W at 13.8-V dc, 25-W minimum.	28 W.
Modulation: True fm, 7-kHz maximum.	Not measured.
Preemphasis: 6 dB per octave.	Not measured.
Spurious emissions: −75 dB typical, −70 dB minimum.	See Fig. 1.
Size (HWD): 7 × 19 × 13 in.†	
Weight: 21 lb.	

†mm = in. × 25.4; kg = lb × 0.454.

On-the-Air Reports

The repeated audio fidelity is excellent. Frequently, I tried listening to the input and output of the repeater. Except for the obvious variations in signal strength, there was little, if any, difference between the tonal qualities of the two. The audio is handled the "right way." Audio from the fm detector in the receiver is deemphasized at 6 dB per octave rolloff according to EIA specifications. In the transmitter, the audio is preemphasized, again according EIA specifications, before being applied to the modulator, a modified Clapp oscillator configured to produce true fm. The acid test for such a unit is the application of a human voice having a deep "gravelly" quality. We are blessed with two such test cases on W1AW/R, and I am happy to report that the SCR 1000 passed both voices with flying colors.

The SCR 1000 replaced a real "clunker." Users were ecstatic with the increased range of the new machine. The output power seemed well-balanced with the sensitivity of the receiver. Transmit and receive ranges appeared to be nearly equal for a typically equipped 10-W mobile station with a 5/8-λ antenna. Our unit came outfitted with a CTCSS decoder built in. Being located near the coast, we are subject to periods of tropospheric ducting. For hours at a time, the repeater may key up on weak distant signals. Experiments with the CTCSS decoder indicated it is an effective means of keeping the distant weak signals from activating the repeater without decreasing the range. If your repeater suffers from this sort of "interference," it may be worthwhile considering adding a CTCSS decoder for use at such a time, if not all the time. Modern encoders are inexpensive and easily installed in most transceivers, including hand-held portables.

The receiver front end consists of eight high-Q resonators with an amplifier following the first two and another amplifier following the next three resonators. A doubly balanced mixer converts the 2-meter output of the front end to the first i-f at 21.4 MHz. Two monolithic crystal filters follow the mixer and deliver the i-f signal to a single-stage amplifier. The output from the amplifier is then filtered by an additional set of monolithic crystal filters. From there, the signal is processed by a MP5071, which provides the functions of second mixer, amplifier, limiter, fm detector and squelch noise amplifier. The squelch

*Assistant Technical Editor

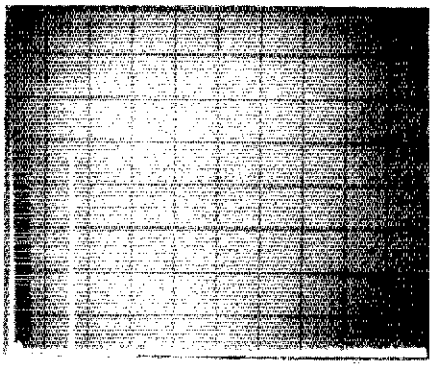


Fig. 1 — Spectral display of the SCR 1000. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 28 W at a frequency of 145.45 MHz. The fundamental has been reduced in amplitude approximately 33 dB by means of notch cavities; this prevents analyzer overload. All spurious emissions are about 78 dB below peak fundamental output. The SCR 1000 complies with current FCC specifications for spectral purity.

circuit detects noise above 35 kHz, which makes it immune to many of the shortcomings found in some simpler squelch circuits.

Audio from the receiver, local microphone and i-d generator is applied to a varactor diode supplying load capacitance to the 18-MHz crystal. From the modulator, the signal is multiplied, filtered and amplified to provide approximately 2-3 W of 144-MHz energy at the exciter output. From there, the signal is fed to the power amplifier that boosts the level to the 30-W range. Spectrum currently uses a 2N6082 in this stage. A 75-W PA is also available as an option.

Control circuitry consists of TTL-compatible CMOS logic. Relays are not used; current consumption for the circuitry is quite low, a critical parameter when operating from emergency backup power sources. Squelch range, hang time and time-out functions are all adjustable, as would be expected.

One observation about the squelch is in order. Aside from operating on 35-kHz noise, the squelch circuit has hysteresis. That is, it takes a stronger signal to open the circuit than it does to keep it open. Without this provision, a weak, fading signal is apt to be "chopped" up by the squelch opening and closing as the signal crosses back and forth over the critical point that opens the squelch. We did not notice such chopping with this circuit, but we have with our "clunker." The hysteresis is a true blessing for the operator attempting to talk with another station having a weak, fading signal.

Besides the circuits necessary for the functioning of the repeater, the SCR 1000 comes with a number of goodies that make life a lot easier for the repeater technical crew. Two meters on the front panel provide means for making a quick check of the entire system without the need to remove a single screw. The first meter can be switched between EXCITER RF, FINAL RF and RECEIVED SIGNAL STRENGTH. The second permits reading of the 5-V SUPPLY VOLTAGE, 12-V SUPPLY VOLTAGE, EXCITER CURRENT and FINAL AMPLIFIER CURRENT. MONITOR VOLUME, SQUELCH, REPEATED AUDIO, HANG TIME and TIME OUT can all be adjusted with controls located on the front panel. An ac line fuse holder is also found on the front panel. A push-button switch turns the ac power on and off (as with the other switches on the panel, this one is illuminated when activated). The control operator can either inhibit the COR or simulate it with another pair of push-button switches. Another switch provides for manually keying the i-d circuitry. A final push-button switch will inhibit the transmitter when activated (illuminated). The switch will also light when the transmitter has been inhibited remotely. The switch (local control) can override the remote inhibit, but a remote reset will not override a local inhibit. Another indicator illuminates with an incoming signal.

The owner's manual for the SCR 1000 is a pleasure to read. Aside from explaining the functioning of the repeater circuitry in detail, the manual provides general information on repeater operation and general troubleshooting of the system — not just the repeater itself. Solutions are suggested for several commonly encountered problems. Complete technical specifications, schematic diagrams and alignment data are provided.

Although the unit came with a built-in (optional) autopatch circuit, we were unable to give it a test at the repeater site. (Because of conditions beyond our control, we were unable to get a telephone line installed at the repeater site.)

Users have found the SCR 1000 delightful. It was a sad day when we boxed the SCR 1000 up to ship back to the factory and brought the "clunker" out of storage. Price class for the SCR 1000 is $1600; for the CTCSS option, $120; for the autopatch, $600. Additional information can be obtained from Spectrum Communications Corp., 1055 W. Germantown Pike, Norristown, PA 19401. — *Peter O'Dell, KB1N*

CUSHCRAFT CORPORATION 40-2CD 40-METER SKYWALKER YAGI

☐ Most amateurs who take their contesting seriously eventually ask themselves the following question: "What can I do about 40 meters?" Why 40 in particular? Well, it's on this band that the Sweepstakes is won and lost, and it's on this band that the outcome of most cw DX contests is decided. Forty is the one band where nine times out of 10 the average dipole or inverted V just doesn't "cut the mustard." Most successful contest stations have gain antennas on 40 for two reasons: The added signal strength puts them a cut above the rest in the pileups, and the front-to-back and front-to-side ratios help get rid of some of the trash that makes hearing the weak ones so difficult.

What kind of gain antenna to use depends on several factors. A vertical array is nice, but an extensive ground system is essential if it's going to be effective. And often the radiation angle is so low that a vertical system isn't optimum. Fixed wire beams and quads are popular too, but they're only good in one or two directions. Eventually, the choice becomes clear: Some sort of rotatable horizontal antenna is the solution.

Again, the would-be 40-meter "big gun" is faced with a bewildering number of options. Currently on the market are full-sized 2- and 3-element Yagis, 2-element quads and shortened 2, 3, 4 and 5-element Yagis. The full-sized antennas offer good bandwidth and gain. They are also large and heavy, often requiring use of spacial towers, masts and rotators. The shortened beams are lighter and somewhat smaller, but many are a compromise in terms of performance and SWR characteristics.

Enter Cushcraft Corporation's most recent addition to its line of hf "Skywalker" antennas. Designated the 40-2CD, this 2-element beam

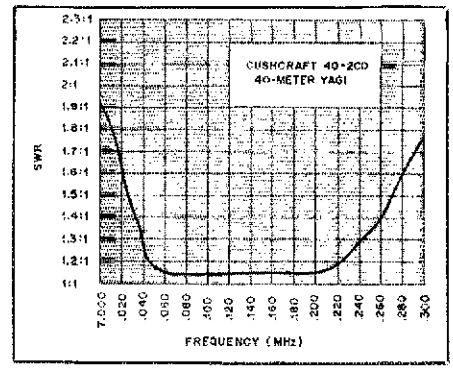


Fig. 2 — SWR curve of the Cushcraft 40-2CD 40-meter Yagi.

offers good performance in a practical package. The antenna consists of a driven dipole element and a reflector element mounted on a 22-foot boom.[1] Each element is shortened to approximately 43 feet through the use of loading coils and small capacitance hats. A 3-element 40-meter beam of similar design has been described in the ARRL *Handbook* for the past several years.

The antenna is made from high quality, polished-aluminum stock. The boom consists of four separate pieces. The center section is made from two 2-1/8 inch OD pieces joined by a coupler at the boom-to-mast plate. A 56-inch-long piece of 2-inch-OD stock is inserted into each end of the center section to complete the boom. The larger-diameter tubing is slotted at each junction, and a steel worm gear-type hose clamp holds the sections together securely.

Each element is made from telescoping sections of tubing. Reflector halves are joined at the boom by a 3-foot length of 1-3/8 inch OD tubing. Driven element halves are joined at the boom by a black plastic insulator tube that is 8 inches long. Element tubing decreases from 1-1/4 inches OD at the center to 1/2-inch OD at the tip.

The elements are secured to the boom by 1/4-inch-thick aluminum plates and U bolts. These plates have grooves machined in them to help prevent element twisting. The 1/4-inch-thick boom-to-mast plate and associated U bolts and saddles provided by Cushcraft will accommodate masts up to 2-1/8 inches OD. A boom brace made from aluminum tubing runs from the mast to the ends of the boom to provide support.

The hardware provided with the beam is all first-rate. What isn't stainless steel or aluminum is well-plated and should hold up without rusting for a long time. In addition to the construction steps outlined in the owner's manual, I coated the telescoping tubing sections with conductive grease at each junction to prevent aluminum-oxide buildup, which can cause antenna performance to deteriorate over the years. I also coated the threads of every screw with noncorrosive silicon sealant to prevent any vibration from loosening the nuts. Plastic end caps for the boom and elements completed the installation.

The antenna went together in about three hours. The instruction manual is fine. Cushcraft seems to subscribe to the theory that a picture is worth a thousand words; the clearly labeled detailed drawings left no questions in my mind as to which bolt went where. My only complaint is that four of the hose clamps were missing from

[1]m = ft × 0.3048; mm = in. × 25.4; km = miles × 1.609.

Cushcraft Corporation 40-2CD 40-Meter Yagi

Manufacturer's Claimed Specifications	*Measured by ARRL*
Boom length: 22.3 feet.	As specified.
Longest element: 43 feet.	As specified.
Turning radius: 24 feet.	As specified.
Assembled weight: 44 pounds (20 kg).	As specified.
Wind surface area: 6.38 ft.^{2}	Not measured.
Frequency coverage: 7.0-7.3 MHz.	As specified.
Bandwidth (2:1 VSWR): 200 kHz.	See Fig. 2.
Material: 6063-T832 seamless tubing.	

the parts package. Although Cushcraft is very good about sending replacements for missing or damaged pieces, I decided to purchase replacements at a local hardware store to save time.

It took Gary Hitchner, WA2OMY, and me about half an hour to install the completed antenna atop 100 feet of Rohn 25. We installed the antenna in one piece. Gary pulled a rope rigged through a pulley on the mast while I followed the antenna up and fished it around guy wires. The relatively light weight and small size of the antenna made it an easy job. Caution should be taken, however, to watch the capacitance hats at the element tips. They do tend to get caught on guy wires, and too much bending and twisting could detach them.

The completed antenna is mounted on a no. 4130 seamless steel tubing mast about 5 feet below a 3-element 20-meter monobander. It is fed through a 12-turn decoupling choke made from RG-8/U cable, as suggested in the manual. The feed line is 165 feet of RG-8/U. Physically, the antenna is about the same size as the 20-meter beam. The elements do droop some, caused in part by the weight of the loading coil assemblies, but this hasn't caused any problem.

In the construction manual, Cushcraft gives three options for the resonant antenna frequency: 7.025 (cw), 7.140 (middle) and 7.220 (phone). I assembled mine for the middle of the band. The resultant SWR curve (Fig. 2) was obtained using a Bird Thruline wattmeter connected at the antenna end of the feed line. As the curve shows, my transmitter is extremely happy on both cw and phone! This type of SWR curve is not characteristic of some of the other shortened 40-meter beams on the market, but other 40-2CD owners have had similar results.

On-the-air performance of the antenna is excellent. Transmitted signal reports confirm that the antenna works significantly better than a dipole at 70 feet. Observations on receive indicate significant nulls off the side and back of the antenna. Perhaps the biggest thrill is being able to hear the many weak signals that are inaudible on the dipole.

During the three-month evaluation period (October through December 1982), more than 110 different countries were worked with the antenna. It acquitted itself well during the CQ Worldwide DX Contests and the ARRL CW Sweepstakes. Although we have had no ice yet at the time this is written, the antenna has weathered several storms with winds in excess of 50 mph with no apparent problems. The antenna still works as well as it did when first installed.

I would highly recommend this antenna to anyone looking for that added "something" on 40, but who doesn't have the desire or resources to install a full-sized antenna. The 40-2CD lists for $380. Manufacturer: Cushcraft Corporation, P.O. Box 4680, Manchester, NH 03108. — *Mark Wilson, AA2Z*

VIBROPLEX "BRASS RACER" AND EK-1 PADDLES

☐ Many electronic-keyer-paddle designs have appeared in the past 10 years or so. Each manufacturer tries a new approach to certain aspects of paddle construction: base material, paddle shape and material, type (single lever or iambic), tensioning method and overall weight. The Vibroplex Co.'s latest entries, the Brass Racer and the EK-1, are fashioned after the former HAMCO "Scotia" design.[2] The two models discussed here are constructed of hardwood, polished brass, steel and molded plastic.

Triangular paddles are used in the 'Racer — similar to the Bencher and HAL "FYO" designs. Fig. 3 is a close-up of the pivoting system; it is similar to that of the Bencher and incorporates locking screws to prevent the paddles from flying apart (remember that malady, "FYO" owners?). Paddle tension is adjusted by two permanent magnets mounted just behind the paddle arms. (Ten-Tec uses a similar tensioning scheme in one of their designs, although it uses electromagnets.) One word of caution when adjusting the tension: *Do not* pull the magnets out of their holes. There is a tiny spring and a small plastic ball that keep tension on the magnet. These parts will fly out of the paddle, and may be impossible to locate. The paddles come with a 2-foot, three-conductor cord and an unattached 1/4-inch phone plug.[3]

The EK-1 has a Curtis 8044 IC keyer built into the base. A pc-mount potentiometer is used as the SPEED control, and it protrudes through the right-hand side of the keyer base. The keyer is powered by an internal 7.5-V battery (EP-175) that the manufacturer claims should have a lifetime of up to 12 months under average use. To gain access to the battery or keyer, two recessed, bottom-mounted screws must be removed.

The keyer is constructed on a single-sided, glass-epoxy pc board. No battery polarity markings were on the board of the review unit, but the manufacturer has stated that later production models do have such identification. The instruction sheet does caution that the positive terminal be placed toward the SPEED control potentiometer.

Adjusting sending speed is a bit awkward, especially when sending with your right hand. Also, the potentiometer movement is stiff, and precise speed control settings are made difficult. Employing a centrally mounted miniature rotary control might be preferred.

The EK-1 is wired as a "right-handed" keyer. The dot and dash contact posts are connected to foils on the pc board, and no provisions have been made to swap the dot/dash keyer inputs to the opposite posts.

Initially, the review EK-1 wouldn't send over 20 wpm. A 150-kΩ board-mounted fixed-value resistor in series with the SPEED control had to be changed to 47 kΩ to reach the higher sending speeds. This, too, is a production-line change incorporated in later models.

Output line keying is accomplished by means of an MJE-350 high-voltage pnp transistor. The collector and emitter are "floating," enabling the single transistor to be used to key both positive and negative key-line voltages by correctly connecting the shield and center conductor of the two-conductor output line to the transmitter. A diode placed across the output line serves to protect the transistor in case the wrong polarity is inadvertently used. The transistor has a V_{CEO} rating of 300 V and should handle key-line voltages found in most amateur equipment. The presence of a 50-V disc-ceramic capacitor across the output line surprised us, but no problems occurred when keying a TS-820S with a key-line voltage of −65.

Although the Curtis IC has provisions for weighting control and sidetone output, these functions are not used with the EK-1. Weighting could be changed, however, by altering the value of a fixed-value resistor across pins 15 and 16 of the IC.

The paddles have a different feel, but we found them easy to adjust, and soon became confortable with the light touch required to operate them. The heavy weight of the paddle prevents it from "walking" across the operating desk. Wood, brass and black metal are combined to make an attractive addition to any ham shack. For those with a crowded operating position, the EK-1 will free up a little extra desk space.

The Brass Racer and EK-1 are available from The Vibroplex Co., Inc., P.O. Box 7230, 476 Fore St., Portland, ME 04112. Price class: Brass Racer, $75; EK-1, $110. — *Paul K. Pagel, N1FB and Gerry Hull, AK4L*

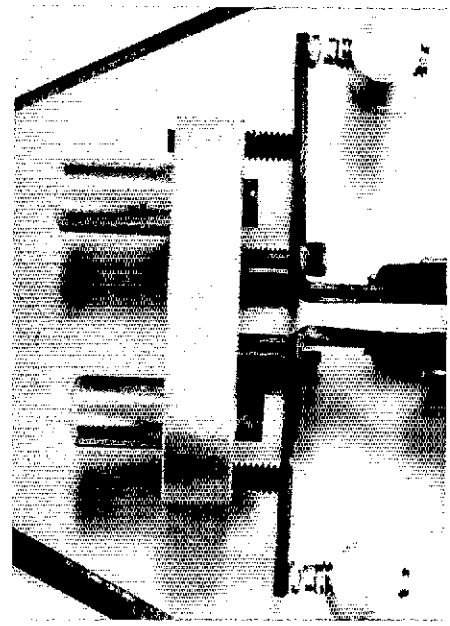


Fig. 3 — A close-up of the Vibroplex paddle.

MICROCRAFT CODE*STAR READER KIT

☐ In the last few years, it has become common practice for many hams to abandon the quiet murmur of clanging gears and the sweet

[2]Product Review, Dec. 1978 *QST*.
[3]mm = in. × 25.4

fragrance of stale machine oil associated with mechanical RTTY equipment in favor of the ubiquitous home computer with an RTTY or cw send/receive program. As the price of microprocessor chips dropped, it became conceivable to build a dedicated "reader" around these chips. Such is the Microcraft Code*Star.

The amazingly compact unit (7-3/4 × 5-3/4 × 3-3/8 inches) houses a dedicated microprocessor chip, eight multisegment LED readout chips and all the circuitry needed for filtering audio signals and translating them into logic levels the microprocessor can understand.[1] Only about half of the circuit board is used; the rest is reserved for adding an optional ASCII output port — and there is plenty of room inside for building in an ac-operated supply or installing the otherwise necessary 12-V battery.

The obvious question, then, is: "If it is so small and has so few parts, does it work?" The answer is yes, it does work — and I think it works well, considering the cost. There are a few drawbacks to using the unit, though. Several other staffers used the Code*Star briefly during the review period. The most often heard complaint was that at the higher speed settings (110-baud ASCII and 100-wpm Baudot), the user found it difficult to read the display as the letters shifted left from one display unit to the next. I did not find this to be a problem, but I am a speed reader and found it easy to follow the characters on the display as long as I used a soft focus. That is simply a matter of training and conditioning.

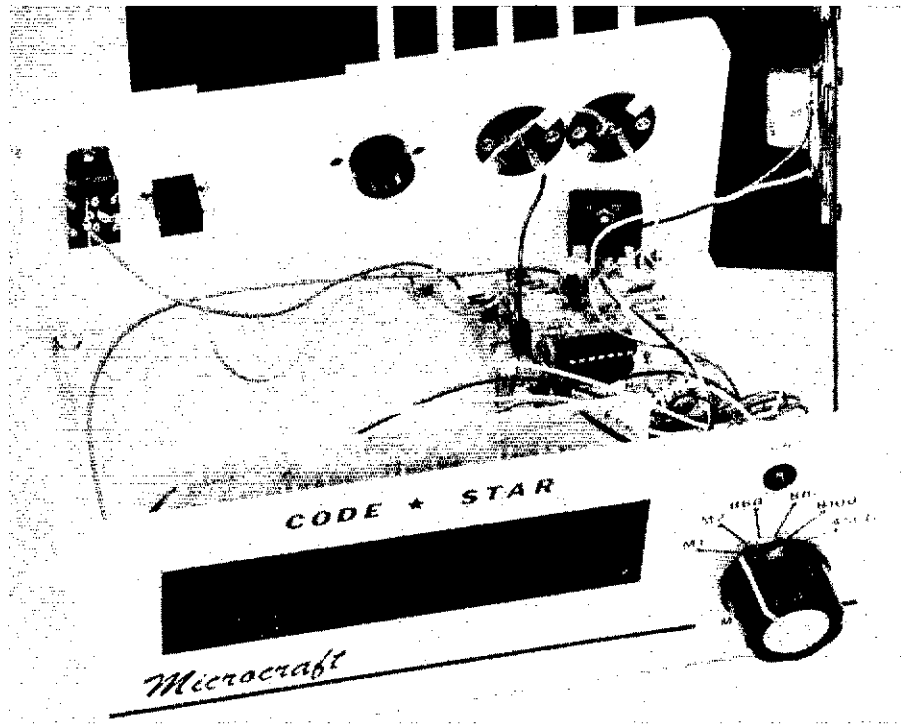
A somewhat more serious complaint is that the unit tends to "false" on sloppy code and on good code if another signal is in the passbands of the internal filters or the receiver filters. Careful tuning, additional filtering, lowering the receiver volume-control setting and similar measures can be used to minimize the effects of other signals in the passband, but nothing short of the vengeance of T.O.M. can abolish sloppy code. Fading band conditions also tend to disrupt the functioning of the Code*Star.

Provisions are made for connecting a key (or keyer) to a special input of the Code*Star for sending practice. It is a truly humbling experience to watch the machine display what you are *actually* sending!

Six modes of operation are available to the Code*Star user. M1 and M2 copy cw; M1 utilizes "heavy filtering" and has a speed range of 3 to 33 wpm, while M2 has light filtering and a speed range of from 3 to 70 wpm. Using my (memory) keyer directly into the Code*Star, I found that it copied accurately up to about 85 wpm in the M2 range. Modes M1 and M2 both auto-track, which means they automatically adjust to the speed being received within a few characters. Speed adjustments (but not mode adjustments) are handled by the microprocessor, and there are no manual means for adjusting the speed, save the MODE switch on the front panel.

Baudot (five-level RTTY code) can be copied at three speeds — no need to change those oily gears, just flip the switch. Speeds of 60, 67 and 100 wpm are available. Since amateurs tend to use either 60 or 100 wpm, I spent very little time using the 67 wpm code. It is on hand for those who like to listen to RTTY stations found outside the amateur bands.

[1]mm = in. × 25.4.



As with the Baudot mode, I found it rather tricky to tune in an ASCII station (despite the tuning indicator LED on the front panel). I understand from friends who are RTTY addicts that this is one of the curses of the mode. Once I found the proper receiver dial setting, the Code*Star functioned beautifully. After some practice, it did seem to become considerably easier to tune stations in. With these modes, the only glitches occurred during deep signal fades or when interfering signals were in the passbands. (The perfection of mere machines will never conquer the human tendency to err. Some RTTY operators compensate for their mechanically flawless sending and receiving equipment with terrible spelling and atrocious grammar.)

The Code*Star kit is intended for intermediate to advanced builders. Microcraft offers to refund the purchase price minus a handling charge for any unassembled kit within 10 days of the original shipping date if the purchaser feels he or she is not able to construct the kit. The Code*Star is available in assembled form at a slightly higher price.

The kit instructions are straightforward, and there are only 3-1/2 pages of them. That is a little misleading, though. The second instruction is, "Install all fixed resistors and solder. Save scrap leads." There are nearly 60 resistors. An average kit builder could expect to complete the kit over a weekend.

The microprocessor, three support ICs and six transistors are installed on the main board. A second board, mounted perpendicular to the main board, holds the displays and drivers. The two boards are attached with several jumpers made from the scrap leads saved in step 2. Both boards have parts-placement guides silk-screened onto the front sides to aid construction.

All parts except the custom microprocessor are covered by a 90-day warranty. According to the manual, the custom microprocessor is "100% tested and burned-in. However, it can be damaged by mishandling and incorrect voltages and therefore is not included in the warranty."

Initially, the Code*Star did not function correctly. I returned it to the factory, and they found I had installed a transistor backward. Afterward, it *usually* functioned okay, but there were times I couldn't get it to copy anything. My initial assumption was that rf was affecting it (I was using it in the ARRL lab while W1AW was on the air). That assumption proved incorrect. Finally, after a few months of sporadic failure, it "died." Back to the factory, where the technicians found a faulty capacitor in the input circuit. Apparently, it had intermittently failed. They replaced the capacitor, and I have experienced no more problems with the unit. Microcraft reports that this was a highly unusual failure.

In my opinion, the unit has a lot of value per dollar. It does a reasonably good job of copying cw, Baudot and ASCII. It is small, lightweight and convenient to use, having no external controls other than the MODE switch and the ON/OFF switch. To connect it to the receiver, one merely plugs a jumper into the headphone output of the receiver. A tuning LED indicates when you are "in the ballpark" while tuning in a station.

When the unit is in use, receiver audio is passed to a 2-inch speaker in the Code*Star. At times, I would have preferred having the ability to use headphones and the Code*Star. The volume control is a pc-mounted trimmer potentiometer that is accessible only by removing the cover. Both of these shortcomings could be remedied with a couple of minor circuit modifications. (Gee, I've got 20 minutes, a 25-k Ω volume control and a phone jack. Think I'll go turn the soldering iron on!)

Price class of the Code*Star kit is $160; wired, $220. The optional ASCII output port kit has a price class of $60; wired, $80. Additional information can be obtained from Microcraft Corporation, P.O. Box 513Q, Thiensville, WI 53092, tel. 414-241-8144. — *Peter O'Dell, KB1N*

W5LFL: First Ham in Space

Ever work an Astronaut aboard an orbiting spacecraft? Not likely! Here's your chance.

By Roy Neal,* K6DUE

"W5LFL, from the flight deck of the Space Shuttle *Columbia.*" Those exciting words came a step closer to reality when ARRL President Vic Clark, W4KFC, and other ARRL officials, accompanied by Vern Riportella, WA2LQQ, President-Elect of AMSAT, went to Houston on May 17 for a meeting with Dr. Owen Garriott, W5LFL, and a team of NASA officials and engineers.

NASA has granted permission for Garriott, an Advanced class amateur and electrical engineer, to carry a 2-meter transceiver on the flight of STS-9. The Space Shuttle is now scheduled for a nine-day mission to be launched on September 30. He will operate up to an hour a day with the understanding that his hamming will not interfere with his work as an astronaut.

The *Columbia* is now at the Kennedy Space Center, being modified to carry the European Spacelab 1. The flight path, at an inclination of 59°, will carry it over most of the heavily populated areas on earth.

It was agreed that W5LFL will operate on the low end of the 2-meter band, between 144 and 146 MHz. Many foreign amateurs are restricted to those frequencies.

Garriott will transmit on several preannounced frequencies and listen for replies on perhaps a dozen others. He will probably transmit for one minute, identifying himself and the stations he has been able to copy. Then he will listen for a minute, logging calls received. Exact transmit and receive frequencies and format will be announced once they are determined.

He will fly at an altitude of around 155 miles, with a speed of some 17,000 miles an hour. This will permit line-of-sight communication up to 8 minutes over most locations on the flight path. Orbital tracks and times also will be made available and disseminated widely.

NASA engineers estimate that small gain antennas will be needed to ensure good reception. Designs will be suggested for simple, inexpensive construction. Garriott, by the way, will probably use a special helical type of antenna on a printed-circuit board, built by NASA and constructed to mount in one of the windows at the rear of the flight deck. He will probably use 5 W on fm and may even try to pound brass for a few cw contacts.

He will use his astronaut's mini-cassette recorder to tape all activity, including the signals received. This will constitute the log of amateur space station W5LFL. The League will act as his QSL manager, and cards will acknowledge listener reports as well as QSOs.

There are many details still to be worked out, but the teams are now at work to coordinate the effort to write some pioneering history into the annals of Amateur Radio with the first ham in space, Dr. Owen Garriott, W5LFL, this fall. Stay tuned for the "how to" details. They'll be released soon by NASA, AMSAT and the ARRL.

The STS-9 NASA Space Shuttle-Amateur Radio project is one step closer to reality. Meeting recently at Johnson Space Center in Houston to work out the details were (l to r): AMSAT Executive Vice President WA2LQQ, NBC Science Editor K6DUE, ARRL Satellite Program Manager W9KDR, ARRL President W4KFC, ARRL Public Information Coordinator KB1N, and NASA Astronaut W5LFL. *(NASA photo)*

During a tour of the Shuttle trainer, Astronaut W5LFL shows ARRL Public Information Coordinator KB1N the window where the antenna will be mounted in the *Columbia. (NASA photo)*

*c/o NBC News, 3000 West Alameda Ave., Burbank, CA 91523

International Youths Delight in Amateur Radio

Think of the possibilities Amateur Radio offers for international goodwill! Here is a program that combines the two, and does so in the best of environments — summer camp.

By Clayton Jones,* N4GZY

With my trusty transceiver packed carefully away in my old VW van and an antenna mast tied to the roof rack, I arrived last July at the Legacy International Youth Program near Bedford, Virginia. I was greeted enthusiastically by friends there, both staff members and children from previous summer sessions, who escorted me to a room near the swimming pool. This was to be the radio shack for the next two weeks, headquarters for DXing and classroom sessions, and the hub of excitement for the entire Legacy community.

The Legacy Program was founded by J. E. Rash, KB4DWV, and is sponsored by the Institute for Practical Idealism. It is a unique summer experience for young people ages 9-18. The program is designed to bring youths from widely varying cultural, racial and social backgrounds into one community where they can work together at learning how to understand each other and how to live in harmony with people very different from themselves.

During those two weeks last year, 31 children from 10 countries and five continents experienced Amateur Radio for the first time. Excitement ran high as we made our first DX contact, with Austria. Red pins went into the U.S. and world maps on the wall. Small faces pored over the atlas day and night. A globe and string were used for azimuth bearings, and a compass for hand-turning the mast and beam. Code-practice oscillators were built, and the blackboard became filled with component symbols, dipole formulas and other such Novice fare.

The shack became a stopping off place to and from the pool. Bright, eager faces would peer in through the screen door to see what was going on. "Russia! They contacted Russia!" By dinner time every evening, word would get around the entire community about our latest QSOs.

One of the 31 young people from five continents and 10 countries who participated in the Legacy Youth International Summer Camp Amateur Radio program last year. The author is in the background.

Communication is an important factor in the entire Legacy Program. Activities are geared to awaken youthful potential for exciting, creative personal growth. For example, in addition to Amateur Radio, participants explore computer and video technologies.

The official purposes of the Amateur Radio Service harmonize beautifully with Legacy concepts and ideals. Our hopes for the Amateur Radio program at Legacy were expressed perfectly by Richard Baldwin, W1RU, President of the International Amateur Radio Union, in his address to the Japan Amateur Radio League in Tokyo last October: "I would like to see the DX capability of Amateur Radio be used for more than just obtaining a QSL card from rare countries. Just think what a wonderful influence 1 million or 5 million radio amateurs can have toward international friendship and understanding ... I think that we are not yet making full use of that capability."[1]

Amateur Radio is at a turning point, and youth involvement is the axis of rotation. The hobby is the only pastime that not only reaches deep into the most modern technologies, but does so to expand communication and understanding among people, and develop goodwill between nations. It is the ideal medium through which international boundaries may be transcended. During the Legacy camp, these ideals are realized to the benefit of both the participants and the hobby.

Special-Event Station

This summer, in keeping with the 1983 World Communications Year, the foundation will be laid for a Legacy International Youth Amateur Radio and computer network. Its purpose is to allow Legacy participants to promote dialogue among world youth on important issues, and to bring these young people into contact with scientists, experts in various fields and world leaders, as well as their peers.

Listen for us on the bands this summer as a special-event station, transmitting from the Legacy International Youth Program. We will probably spend a good bit of time on 20-meter phone and on the Novice bands. We'll be on the air during the day, some evenings and, of course, late at night, DXing after the campfire burns low.

Anyone who would like more information should contact Dr. Ira Kaufman, Executive Director, 1141 N. Glebe Rd., Arlington, VA 22201, tel. 703-522-1407.

Clayton Jones, N4GZY, is a professional musician who owns and operates Southcoast Music in West Palm Beach, Florida. He has been on the Legacy International Youth Program staff for three years.

*Legacy Youth Programs, 822 South Taylor St., Arlington, VA 22204

[1]International News, Dec. 1982 *QST*, p. 71

Disaster Strikes Amateur Operation in Texas

By Arthur Kay,* W5APX

"The airport terminal roof is caving in. We are moving out," a voice crackled over the 2-meter repeater. The warning fell on anxious ears as radio amateurs stationed inside the Jackson County Airport terminal scurried for safety. Moments later, the roof came crashing down. One amateur didn't make it out alive.

No one could have predicted this tragic turn of events. After all, for the past three years, members of the Port Arthur (Texas) ARC have provided communications, without any major problems, during the Bum Phillips Celebrity Golf Tournament (named for the head coach of the National Football League New Orleans Saints). And the forecast for the weekend, although it included rain, never even hinted at the violent weather ahead. Set up some portable stations, scout around with some hand-helds, pass some traffic; just a routine operation, for a good cause — some of the Tournament proceeds go to the Thomas W. Hughen Center, a nonprofit organization in Port Arthur that has been providing services to physically disabled children and adults since 1939.

Things went smoothly Friday morning, May 20, as the volunteer drivers were kept busy chauffering celebrities from the airport to their motels. During the afternoon, one of the drivers, Arthur "Pete" Vela, K5YLU, arrived at the airport with Darrell Holland, WD5GJP. They checked in with Virginia Nutt, KA5MEQ, the airport liaison for the event, and waited for arriving Tournament celebrities.

At about 2:30 P.M., our local weather bureau became concerned about the weather conditions. About 15 minutes later, the bureau issued a tornado watch and SKYWARN was activated on the 147.90/30 repeater. As most of our amateurs were involved in the celebrity operation using the 146.625/025 repeater, it fell to Barnette Singleton, KB5SY, our Emergency Coordinator, and me to function as a net. KB5SY was net control and I was his observer.

The weather bureau called again at 3 P.M., stating that a violent-looking cell was developing 30 miles away. They told us to find an observation point from which to watch the approaching storm. A few minutes after I arrived at the observation point, the cell found me. All hell broke loose with winds of up to 125 mph, hail the size of golf balls and total darkness that was broken only by the flashing of fallen power lines. No funnel was sighted. The weather bureau was notified, and they notified the state police and the power companies.

Rescue workers rummage through the debris of the collapsed Jackson County (Texas) Airport terminal, where radio amateur Arthur "Pete" Vela, K5YLU, lost his life. *(Port Arthur News* photo)

Communication lines to various ambulance and other public services were damaged. Also, the weather bureau and our net control lost power temporarily, so I switched over to the 146.625/025 repeater just in time to hear WD5GJP on his hand-held radio saying that the airport terminal roof was caving in. A few moments later, he came on again saying, "The roof has fallen in. We got Virginia [KA5MEQ] and Brenda [a nonham] out, but we can't find Pete." The women had run for the back exit and were safe. It is thought that Pete had hesitated in his run to safety and looked to see where the women were; in that instant, the roof came crashing down, killing him.

The emergency power at the weather bureau and the net on 147.90/30 were restored, and the celebrity operation resumed. As word spread as to what had happened, more hams came aboard. KB5SY and Ron Crowe, KB5SZ, our club president and net control for the 146.625 repeater, started coordinating the operations to provide the best balance of services.

Our group and all of hamdom have lost a devoted amateur and friend. It seems that in all our training to try to save the lives and property of others we somehow lost one of our own. We will now try to study more effective ways to ensure our own safety as well as the success of future operations.

Bum Phillips, shocked and saddened by Pete's death, started a fund with a personal donation of $1000 to purchase, in Pete's name, a special communications room at the Hughen Center as a memorial. Also, we have received word that the New Orleans Saints football team has donated $3000 to the fund. The goal is $40,000, to be used to equip the room with the technology needed to teach those who can't converse verbally to communicate with others using Morse code and Amateur Radio as well as computers. Those wishing to contribute to the Pete Vela, K5YLU, fund should make their donations, which are tax-deductible, payable to "Fund for Benefit of Hughen Center," c/o First National Bank, P.O. Box 651, Port Arthur, TX 77640.

*3836 Avalon Ave., Port Arthur, TX 77640

Happenings

Conducted by Carol L. Smith,* AJ2I

- *Nominations Open for Board Representatives*
- *Scholarship News — Goldwater, Hadlock*
- *More 10-M Repeater Frequencies Proposed*

League Members To Choose Board Representatives

"Newington" doesn't dictate what the League will and will not do — you do! As a Full member, your voice determines the direction of ARRL policy. This fall, members of the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions will choose directors and vice directors to represent their interests on the ARRL Board of Directors for two-year terms beginning January 1, 1984.

ARRL Divisions

The policies of the League are established by 16 directors, who are elected on a geographical basis to represent their divisions and constituents on the Board (see page 8 of any *QST* for a list of the divisions, directors and vice directors). These directors serve for two-year terms, with half standing for election in alternate years. Just as in national, state or provincial politics, the voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection, or to decide that other representatives could do a better job and work for the election of those persons. At the same time directors are elected, vice directors, who can fill in when the director is unable to serve, are also chosen.

Call for Nominations

Nominations are now open for director and vice director in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions for the two-year term beginning January 1, 1984. From now until August 20 at noon, League headquarters will accept nominating petitions signed by 10 or more Full members of a division, naming a Full member of that division as a candidate for director or vice director.

The candidate must submit information (on a form provided by Headquarters) that will allow the Executive Committee to determine the eligibility of the candidate in accordance with the provisions of the Articles of Association and By-Laws, and a statement of not more than 300 words setting forth the candidate's qualifications. The statement will be included with the ballot mailed to members and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee.

The nominee must hold at least a General class amateur license or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

"The future of the League is in your hands. Come election time, vote!"

Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that division who were in good standing on September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1, and to be valid, must be received at Hq. by noon on Monday, November 21. A group of nominators can name a candidate for director or vice director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand, and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Since all the powers of director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from headquarters upon request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1984-1985 term.

(Signature . . . . Call . . . .
City . . . . ZIP . . . . Date . . . .)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

Absentee Ballots

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the U.S., Full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the secretary prior to September 10 giving their current *QST* address and the reason that another divison is considered home. If your home division is in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Divisions, but your *QST* goes elsewhere, please let the ARRL secretary know, as soon as possible, but no later than September 10, so you can receive a ballot for your home division.

The Incumbents

These persons presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year: Atlantic —Hugh A. Turnbull, W3ABC, and George

*Membership Services Assistant

W. Hippisley, K2KIR; Canadian — Thomas B. J. Atkins, VE3CDM and Harry MacLean, VE3GRO; Dakota — Tod Olson, KØTO, and Howard Mark, WØOZC; Delta — Clyde O. Hurlbert, W5CH and Edward W. Dunn, W4NZW; Great Lakes — Leonard M. Nathanson, W8RC and George S. Wilson, III, W4OYI; Midwest — Paul Grauer, WØFIR and Claire Richard Dyas, WØJCP; Pacific — William J. Stevens, W6ZM and Jettie B. Hill, W6RFF; Southeastern — Frank M. Butler, Jr., W4RH and Evelyn Gauzens, W4WYR.

Petitions need 10 or more signatures of Full members, and are due at Headquarters by noon, August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon, November 21. The new term will begin at noon, January 1, 1984.

For the Board of Directors:
June 1, 1983
David Sumner, K1ZZ
Secretary

NEW 10-M REPEATER FREQUENCIES PROPOSED

The Commission has adopted an NPRM in PR Docket 83-485, which would make additional 10-meter frequencies available for amateur repeater operation. The current 29.5-29.7 MHz segment authorized for repeater use would be expanded to include 29.0-29.5 MHz, increasing the number of "channels" from approximately 4 to 17.

The FCC noted that the Further NPRM in Docket 82-83 would expand the 10-m telephony segment to 28.3 MHz, offsetting most of the loss of frequencies to nonrepeater operation caused by this proposal. Further, it specifically requested comments weighing the

- *need for the proposed repeater subband expansion;*
- *impact of the proposed expansion on existing and future repeater and nonrepeater operation;*
- *acceptability of that impact to the amateur community.*

Part 97.16(c) of the Rules would be changed by this proposal to read:

> (c) All amateur frequency bands above 29.0 MHz are available for repeater operation, except 50.0-52.0 MHz, 144.0-144.5 MHz, 145.5-146.0 MHz, 220.0-220.5 MHz, 431.0-433.0 MHz, and 435.0-438.0 MHz. Both the input (receiving) and output (transmitting) frequencies of a station in repeater operation shall be frequencies available for repeater operation.

Comments are due on or before July 25, 1983; reply comments on or before August 24, 1983. Formal participants must file an original and five copies of their comments. Participants who wish each Commissioner to have a personal copy of their comments should file an original and 11 copies. Members of the public who wish to express their interest by participating informally may submit one copy. All comments are considered. Each set of comments must state on its face "PR Docket No. 83-485" and be addressed to The Secretary, FCC, Washington, DC 20554.

CB, R/C LICENSING ELIMINATED

Stations in the Radio Control and Citizens Band Radio Services no longer need individual licenses. (See February 1983 *QST*, p. 63, and March 1983, p. 58, for background information.) Also, CB stations may now operate legally without station identification (R/C rules permitting such operation are continued), and there are no longer any minimum age requirements.

In a 42-page Report and Order, the FCC emphasized that the Rules must still be followed. (For example, manufacturers are required to pack a copy of CB regulations with each transmitter.) The Commission said that "elimination of individual station licenses in these services would result in no lessening of the operating privileges or responsibilities of R/C and CB users. An operator of an R/C or CB radio station would still be required to comply with the Communications Act and with the rules of each service." All pending R/C and CB applications and any others received by the Commission in the future will not be acted upon.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page eight of this issue.

A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* 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 Street, Newington, CT 06111

We, the undersigned full members of the...ARRL Section of the ...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office.

(Signature...Call...City...ZIP...).

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, September 9, 1983.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters September 30, 1983. Returns will be counted November 22, 1983. SMs elected as a result of the above procedure will take office January 1, 1984.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1984.

If no petitions are received for a section by the specified closing date such section will be resolicited in January *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

SM APPOINTMENT

In the Alaska Section, Will Darsey, AL7AC, has been appointed to complete the term (December 31, 1983) of Richard Henry, AL7O (resigned).

In the Colorado Section, Bill Sheffield, KQØJ, has been appointed to complete the term (September 30, 1983) of Larry Steimel, WØACD (deceased).

PERRY F. HADLOCK SCHOLARSHIP FUND

The ARRL Foundation is pleased to announce the establishment of the Perry F. Hadlock Memorial Scholarship Fund, a $500 annual award, for electrical engineering students/hams. Hadlock, K2IK, was a pioneer in the amateur and commercial communications communities.

He installed one of the first dipole antennas on Admiral Byrd's sea plane, which was used to explore the North Pole. Perry was also a personal acquaintance of Marconi and later worked for David Sarnoff, heading up RCA's Brazilian manufacturing facility for 26 years. Much of the communications equipment used during World War II was manufactured at this facility.

Perry was a member of the ARRL, the Old Old Timers Club, QCWA and, recently, the Magnificent Group Net. Donations to the Scholarship Fund in memory of Perry F. Hadlock may be sent to the ARRL Foundation, 225 Main St., Newington, CT 06111.

Perry F. Hadlock, K2IK

JESSE BIEBERMAN MEMORIAL MERITORIOUS MEMBERSHIP FUND

Thanks to contributions to the ARRL Foundation's Jesse Bieberman Memorial Fund, memberships in the League are available to disabled or elderly individuals (with long-standing ARRL membership records) who cannot afford to renew on their own accord. Jesse Bieberman, W3KT, past-Director of the Atlantic Division, held a special empathy for the disabled and elderly amateur communities; he often brought this sensitivity to meetings of the ARRL Board. Mrs. Bieberman and the League felt that the Jesse Bieberman Memorial Fund was a particularly fine way to perpetuate his memory.

If you, or someone you know, has accumulated 25 or more years of League member-

ship, is over 65 and/or disabled, and cannot afford membership renewal, please write the ARRL Foundation. All applications will be given every consideration.

MAXIM AWARD AND GOLDWATER SCHOLARSHIP KEYNOTES OF ARRL FOUNDATION BOARD MEETING

An exciting and vital year is in store for the ARRL Foundation thanks to measures taken by its Board of Directors on April 22, 1983. Heading the slate is the announcement of the Foundation's participation in fund raising for the ARRL in its Scholarship Endowment Fund honoring Senator Barry Goldwater. An annual $5000 award is the target, commencing September 1984.

A revitalized Hiram Percy Maxim Award, to be awarded annually, will honor young people who make outstanding contributions to Amateur Radio. The Foundation has transferred $1000 to the ARRL in support of the Hiram Percy Maxim Award.

The success story of the Twentieth Anniversary Satellite Fund Drive unfolded: $100,828 in total donations from 1449 contributors. And, contributions continue to roll in at a steady rate indicating the spirit and enthusiasm for "hams in space."

The Foundation will participate with funding for the new League educational film on the W5LFL Space Shuttle Mission. The aim is youth, with an emphasis on showing connections between Amateur Radio and computer/space science. A $5000 grant was approved by the Board in support of the project and of the goal of attracting bright, young people to the pursuit of Amateur Radio.

The Board also considered a request for funding from the Courage HANDI-HAM System — the national organization specializing in Amateur Radio services and Radio Camps for the handicapped amateur community. The HANDI-HAMs are looking toward establishing an East Coast Radio Camp (see June 1983 *QST*) and to expand its library of materials for Amateur Radio study. The System is hoping to reach more hams and interested persons with their special resources and skills. The request was referred to a committee for further study and recommendations.

Got a question concerning the ARRL Foundation and its programs? For answers and an attractive information pamphlet, write ARRL Foundation, 225 Main St., Newington, CT 06111. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

MORE ON CUBAN INTERFERENCE

In this column in March 1983 we told you about harmful interference from a beacon-like signal occupying several discrete frequencies in the 1800-1825 kHz amateur band. Amateurs in Florida were particularly affected; in fact, amateur communications in that part of the band were completely disrupted. The FCC sent a telegram of complaint to the Cuban telecommunications authorities. The offending signals abated for a while, but have returned and are causing harmful interference anew to Florida hams.

The FCC has come to our assistance again. This time, since there was no response from Cuba in this matter, it sent a telegram to the International Frequency Registration Board in Geneva, Switzerland. The IFRB serves as the "appeal" agency in such matters. FCC's cable uses the language, "Please be advised this harmful interference has occurred in the past and a notification was sent to Cuba on 3 January 1983..."

We'll keep you posted on developments. In the meantime, let *us* know if the interference persists.

COMPLAINTS BRING RESULTS

Claypoole, ex-N6BII

Saying that it "views malicious interference as a very serious matter," the Commission revoked the station license and affirmed the suspension of the operator license of Harold R. Claypoole, N6BII, of San Diego, California. This action came about as a result of several complaints the FCC had received about Claypoole's operation.

Claypoole has a history of Amateur Radio Service rules violations. His 1961 amateur application was at first denied on the basis of violations. After promising compliance, however, Claypoole was subsequently relicensed.

The current revocation and suspension result from 1982 breaches of Amateur Radio rules. Commission engineers monitored Claypoole "maliciously causing interference to the communications of other operators by making transmissions, including unmodulated carriers, directly on top of the ongoing transmissions of the other operators, broadcasting recorded material including music, and identifying with a false call sign."

During the monitored transmissions, Claypoole repeatedly stated that his purpose was to "cause the Commission to issue him a citation." FCC engineers did then inspect his station. According to the Commission, "Following the inspection Claypoole telephoned the FBI and stated that, if a certain Commission engineer returned to his house, he (Claypoole) would shoot the engineer with a .45 caliber pistol and then hit him over the head with a beer bottle."

Claypoole claimed that he was not at home to make the transmissions. However, the Commission determined that his claims couldn't be believed because the transmissions had been traced to Claypoole's residence and his voice was the same as that recorded on the dates in question. Furthermore, Claypoole mentioned facts in his transmissions that undercut his claims of innocence.

The Commission concluded that Claypoole "willfully and repeatedly violated Sections 97.125, 97.121 and 97.115 of the Rules. His malicious interference, together with his other violations, clearly disqualifies him from holding an amateur license and warrants license revocation and affirmation of suspension." — *FCC Order*

BURBANK UPDATE

The lawsuit being brought by radio amateurs against the City of Burbank, Illinois (a suburb of Chicago) passed an important procedural hurdle on May 20. Federal Magistrate Carl B. Sussman recommended to the U.S. District Court Judge in charge of the case that the case go forward. The City of Burbank earlier had filed a motion to dismiss the case for lack of jurisdiction, but Magistrate Sussman disagreed.

According to Sussman, the radio amateurs and CBers who are plaintiffs in the case "allege that the ordinance and its enforcement violate their rights under the First Amendment, the Equal Protection Clause and the Due Process Clause. These allegations present a direct and essential element of their federal claim. Thus, the Plaintiffs state a claim 'arising under' the Constitution of the United States."

Attorney Jim O'Connell, W9WU, who is representing several named radio amateurs and CBers in a class action suit against the City, is very encouraged. The Magistrate's recommendation means that the City is not going to get off the hook simply by saying that there is no federal jurisdiction of the radio operators' claims.

Persons wishing to help with financial support are invited to send their contributions to The Burbank Tower Fund, c/o Roger Borowski, WA9EKA, Chairman, 6107 West 80th Pl., Burbank, IL 60459. — *W. Dale Clift, WA3NLO*

VOLUNTEER EXAMINER PROPOSAL — ARRL FILES REPLY COMMENTS

On May 19, the League filed its reply comments to clear up some errors and misconceptions that had developed in comments filed by other parties. The ARRL specifically addressed four main issues:

- *League participation as Volunteer Examiner Coordinator.* Some commercial publishers felt that the ARRL is not allowed to participate in the Volunteer Examiner Program because of the "conflict of interest" provisions of PL 97-259. The League pointed out that the law, passed last year, prohibits ARRL Headquarters employees from directly administering tests, but that the legislation actually encourages organizations such as the League to be involved in coordinating the activities of examiners.
- *The availability of sufficient Volunteer Examiners.* Some commenters said that very few radio amateurs are likely to participate in the Volunteer Examiner Program, ignoring the outstanding public record of amateurs who have volunteered considerable time and resources in Novice examining, Amateur Radio class instruction and countless instances of public service communications. The League noted that Extra Class licensees particularly are well aware that much is at stake in running a smooth and honorable examining program, and that their participation is vital. The alternative, drastically reduced test opportunities, is one that radio amateurs definitely do not want.
- *Any examination program costs money.* The League's directors determined at the April 1983 Board meeting (see June 1983 *QST*, p. 60) that the ARRL will participate as the Volunteer Exam Coordinator only if mandatory nominal examination fees are allowed. A nominal fee could cover the costs of printing and distributing the tests, and cover the costs of administering the program. Many individuals who filed comments on this docket also supported the reinstatement of fees.
- *Bureaucratic delays in processing results.* The League, and others, want the present "instant upgrading" procedure continued under the proposed Volunteer Examiner Program, and set forth simple procedures in support of that position. The ARRL also feels that the FCC will need a Volunteer Examiner Coordinator to process the vast quantities of test activity information. The FCC Licensing Branch in Gettysburg is not equipped to have direct contact with hundreds or thousands of individual examiners, thus making the VEC necessary.

The Commission has made it plain that budgetary restrictions in the next fiscal year will result in further drastic cuts in the examination schedules. Therefore, the ARRL urged the Commission to reach a swift decision in establishing the Volunteer Examiner Program. — *Curt Holsopple, K9CH, Manager, ARRL Volunteer Examiner Program*

Moved and Seconded...

LIFE MEMBER APPLICANTS
APRIL 20, 1983

List No. 1: Theodore P. Albrecht, W9IFJ; Ricardo J. Alfaro, II, W6FWX; Joe W. Alvis, SVØCN; Alan S. Ambrose, N8DHF; Satoshi Aoki, KG2X; Ralph A. Asplan, K8DEX; Eric M. Atkins, VE3HMG; Joel Bahr, N9BON; Julian R. Bankston, W5EDQ; Charles D. Barton, KBØYK; Richard C. Bean, WA1KDL; David A. Beltz, WD8AYE; David Benua, WB2PJU; Robert A. Blakemore, Sr., N5DGQ; Allen H. Boardman, WB4CLJ; John Allen Bonck, N3JB; Gerald G. Boyd, WB6NJY; Richard D. Breining, WB9BTZ; Alan C. Brennglass, WB2DZW; Thomas W. Brooks, KE1R; George S. Brown, N1ATT; Leonard E. Brown, Jr., WØFDD; Ernest M. Bryant, WD4JMC; Parvez A. Bukhari, KA2JZX; David W. Burnham, WA1MXN; Edward J. Burns, WA3EST; Edgar Herbert Callaway, Jr., WB4AWH; Arthur G. Chase, WL7FS; Floyd I. Chowning, K5LA; Albert C. Christl, WA3CHC; Robert H. Clark, WAØFAL; Jeff Clarke, KU8E; Robert M. Clarke, N1RC; Richard J. Cloak, Jr., KA6HAB; John F. Clowe, Jr., W4ZPG; George J. Collins, ADØW; Ralph Compton, WA5JVQ; D. Carlton Cooper, W4MOG; William M. Coopman, Jr., K9CHZ; Joseph H. Cowen, WA5TUM; William J. Cox, WD8CZA; Ralph B. Crossman, K6HAV; Delbert D. Crowell, W6PGR; Harry E. Davidson, W6JTY; M. P. De Francesco, KA1RG; L. J. Delaney, Jr., WA4MIY; Saul B. Dinman, K1PDX; James W. Doggett, Jr., W5URD; Terry L. Donahue, KA6EOT; Dennis Dzierzawski, K9EIS; Philip F. Eckley, WB8FIW; Jim L. Elliott, K5KSY; Eric N. Ellison, W2IBB; Robert R. Ellison, KA2FEO; Greg L. Englert, WB4ECB; John G. Eykelhoff, WA1YWG; James H. Ferry, Jr., W9KXR; Richard L. Freudberg, WA1JSN; John R. Fridenstine, WB8PAT; Thomas R. Fry, WB1CPF; Godfrey A. Gale; Michael A. Gale, WA3HCN; A. P. Gandy, W5OYI; George C. Garbett, KCØKO; Barry W. Gardner, W3FV; James L. Gatlin, N4YB; Robert C. Gauthier, VE2DEW; G. Paul Gerbracht, W3QPP; Chauncey McClean Gilbert, III, N3CAU; Ricky C. Gilbert, WB5AMI; Robert A. Granica, KA2AIO; Jessie J. Granier, Jr., WB5YAK; Paul J. Gregis, WB2LQZ; Aubrey L. Gibson, KB5IM; Richard W. Glover, KBØYR; Lawrence R. Gonia, WA9IIS; Martin J. Green, Jr., K2PLF; Marvin R. Groh, WB8FKC; Richard R. Hale, N8AKF; David R. Hall, WB4EIN; Dennis L. Hall, KK7X; Conrad L. Harteloo, WB7VHB; Donald E. Hattrem, K9AVP; Oliver R. Hayes, KA1GEO; Jessie J. Hewett, WB4HJJ; William Keith Hibbert, KA1YE; Hideaki Hirose; William H. Holliday, W4DKL; Gerald A. Holmes, WA1UVI; Raymond M. Holt, KL7IFN; Charles M. Howell, WA4VRH; Donald H. Hunt, W1NKZ; Henry H. Hunt, W1ORI; Earl H. Hunter; John W. Hutchins, WB4NNY; Earl Russell Hutchison, W5UYH; Stephen R. James, KA9NPT; George W. Jolly, ND5E; Randall T. Jones, KA9HAO; Kenneth B. Katzman, WB2HJQ; Peter Kean, K2AXI; Harry A. Kennedy, WB4SKU; Stephen W. Kercel, AA4AK; Daryl H. Kiebler, WB8EUN; John C. Klimek, W2KHQ; Iwao Kobayashi, N2ATF; Arthur E. Kreymer, WB9SJB; George L. Krickovich, W2YJ; H. Ross Lambert, AK3M; Thomas W. Lamons, WB4BLJ; William Langston, WB2OXU; David Scott Lawrence, WB8QYN; Michael S. Leibovitz, WA9EVF; Michael D. Lemieux, N1BAO; William J. Lewis, Sr., W4ZDP; John E. Lindell, WØYCY; Michael J. Love, WB8OAZ; Robert O. Lowery, W5KGX; Frederick A. Lucas, Jr., K1EFI; Grady C. Lunsford, WA4WRJ; Wally Maistryk, WAØUJO; David R. Malley, K1NYK; John L. Manna, WA2MTR; Mark Markam; Robert L. Mast, W1AXR; Michael J. Masterson, KA2HZA; Vladimir Matsukevich; Charles D. McCarthy, W1BK; Jack B. McClain, AE4Q; Dennis A. McClure, KB8XE; J. C. McDonald, WB1BUM; Ronald A. Medykiewicz, WA3VEE; Gordon S. Meekins, WD8RNC; Lee Michaud, N8LT; Robert W. Middleton, KA1GQU; Jack O. Miller, W9WYN; Gregory Montllor, WD5JMV; Alton B. Morgan, WB5NTI; Arlen E. Morrill, Jr., WA7YSH; Charles Roy Morris, Jr., W4WFB; Richard S. Moseson, N2BFG; William G. Nadzam, K8WN; Donald W. Nelson, N2COT; Lawrence Ngou, AC6Q; Don Nichols, WB4GAQ; Peter L. Norris, N1BCE; Pete C. Noyes, WB1EOC; Robert N. Obert, W1UWU; Ronald A. Ohm, WBØIDU; Robert A. Orr, WA4BPZ; Donald C. Osmund, W9PO; James R. Owens, WA2MKD; F. Joseph Palladino, W3FP; William D. Palmer, KB7SG; Malcolm G. Parks, W6NBD; Darrell F. Pennisson, WB5QEM; Donald D. Peterson, WAØLPZ; Ralph A. Peterson, Jr., N5DOI; Gary O. Phillips, N4CTY; Alvin Denney Pistole, WA6FPX; Carl H. Podlesny, Jr., KCØHN; William J. Porter, K1YPE; Harold S. Post, AK2E; William A. Quigley, K1VJH; John N. Ramsey, N1AKB; Richard N. Reimer, W6ET; Arthur L. Robertson, WØIWV; William H. Rogers, W3FPO; Donald E. Rublee; Jack T. Running, N7DDI; Charles D. Russell, WB4LKX; Kathryn L. St. Gil, KA5LIS; Martin D. Schaffer, WA7REJ; Albert C. Schauer, K8ICE; Phyllis J. Schauer, KA8RPU; Thomas A. Scott, WAØTOS; Frank J. Serra, K1ICD; Ernest R. Seymour, N4BPF; Donald E. Shaffer, W4PZ; Ronald D. Shannon, KD6BD; Thomas A. Siegel, AFØN; John R. Silva, N3AM; Douglas C. Simpson, WB3KES; Giles W. Simpson, N5CMI; A. Jeffrey Slack, KA3DYO; Joseph M. Sloss, K7MKS; Louis C. Sortman; Marc A. Stancy, WB9MAI; Nathaniel Stein, KA1IKA; W. Steve Stevens, KD6BS; Billie M. Stevenson, KA5IKY; Vernon F. Stilwell, WA4YJX; James R. Sullivan, KU5E; Edward J. Swiatlowski, WA2URK; Donn R. Taylor, KØQC; Donald W. Thomas, WØPEA; Llewellyn P. Thomas, K3VDY; Robert M. Tippett, WA1VAH; Clifford A. Toth, KA3FWU; F. J. Toussaint, KC7UZ; Kenneth Paul Tovay, KW4E; Arthur G. Townsend, Jr., WA1TZY; Joey L. Trantham, WB4BPP; David B. Tucker, KA6BIM; Robert E. Tucker, WØKYI; Steve Twiggs, KM7U; Edward A. Urbanik, KQ8W; Wallace A. Utley, W2CB; Charles M. Vaughan, K4UWH; Roger H. Volk, KØGOB; Lawrence W. Volker, KL7IWF; Robert L. Wade, W4KCT; Robert C. Wang, KQ4M; Thomas E. Wagman, WL7AMG; Charles T. Watkins, WB6WQA; Walter W. Weber, WA9FXG; Richard H. Webster, WA6OJT; David E. Weinreich, WA2VUJ; David A. Welker, WB3AMO; Charles A. White, III; Robert A. Wilson, N6TV; Ronald D. Wilson, K4POZ; Marvin C. Witt, W6WKN; Leland Wong, WB6GVB; Brian M. Wood, WØDZ; Jeanne A. Wood, KA1BGT; Philip W. Wood, KA1GOG; Benjamin D. Wright, NØBW; Charles D. Wright, WB4KPE; O. Leslie Wright, W5GIL; Richard G. Wunder, WA7WFC; Bruce D. Wyman, K4OP; Akira Yamaguchi, WB2ZTB; Michael Young, K6MBV; Bradford K. Zuehlke, WA9ZZV.

List No. 2: Flavio J. Acosta; Raymond K. Adams, N4BAQ; William M. Adkisson, WØWQK; Richard C. Ague, WB3AVF; Jim Alderson, WB6SQK; Dennis J. Alexander, K2UA; George A. Allan, KA6GJW; W. G. Allen, W7US; Jeffrey S. Alper, WB9PZD; David Alston, Jr., KC5KB; Roger W. Amidon, K2SMN; John A. Anastas, KA4SZF; David B. Anderson, K6YZR; Frederick H. Anthony, WØRKN; Carlos A. Archilla, KP4ENS; James S. Armstrong, AK5J; Jerald C. Armstrong, WØPHI; James A. Arnett, W8NVJ; Richard C. Arzadon, WA8RXI; Charles Stephen Ashby, WB3LCE; William L. Atkinson, WB8WHK; William A. Bailey, WB4ENN; William T. Bailey, WB4LKU; Barry A. Baines, WD4ASW; Dave J. Baldridge, N9BMS; Elden Baldwin, KA4RDQ; Wellsford V. Barlow, Jr., WBØUKN; John R. Barmore, WB7VHC; Patsy R. Barmore, KA7MZZ; Harry E. Barnett, W8SWD; Roger L. Barron, W4EI; Malvern S. Barrow, III, K4WHN; John L. Bartholomew, WB6SAN; Leonard E. Bartz, KØKRB; Albert H. Bates, Jr., W1XH; Darrel O. Baxter, WD8ANZ; John C. Beakley, II, KC5PP; Stephan V. Bechtolsheim, DF4CK; Andrew R. Becker, WØNVM; Tyssen W. Becker, KB8FJ; Paul J. Bellocchio, K2RN; James H. Bennett, Jr., WB4WRK; David M. Benoit, KA1ID; Elyse M. Benoit, KA1RW; Donald G. Bergmark, W9NGA; Stephen F. Biddle, K6EWL; Robert C. Biggs, WA8CBA; Shelton M. Binstock, N3AZN; William Kindal Birch, KA1DKM, Gerald F. Birnbaum, N7BPM; William A. Birtcher, WA1RFM; Milo Blair, WA7PMW; Neil C. Blakestad, WDØFGJ; Angus A. Blench, N6DLG; John Blitch, Jr., WB6QGN; Anders Bocker, N6DJC; Steven W. Bockman, K2FW; Cornell C. Bodensteiner, WD5GJB; June A. Bodensteiner, KA5JQN; Harvey S. Bonser, WB8WXG; J. L. Boockholdt, AA5F; Douglas Booth, WDØCWQ; Larry R. Boreen, WBØUYU; Walter E. Bortree, WA3SWH; Glen Joe Bourek; Frank J. Bowers, KB6RV; Duane Braford, WB7ROZ; William C. Brandburger, WB3LGO; A. Eric Brindley, WØXG; Perry G. Brittain, W5STI; Billy C. Brock, WB5RSP; Michael C. Brooker, WD9IFC; C. Thomas Brooks, WDØGBO; Gerald E. Brophy, KD5GP; Robert S. Brownstein, K2UMU; R. E. Bruninga, WB4APR; Ben A. Burch, III, N4FHL; Dennis Burgess, KA7FAH; Leonard J. Burke, WA4NTG; Thomas J. Burns, AK8J; Allen D. Burrell, KA7AAU; Vaughn P. Cable, K6ZTA; James Cadorette, KB1GG; A. B. Caldwell, KA4PYV; Larry Calvert, KA7DOI; Angelo J. Campanella, W8EDR; Paul Caravano, WD8CPS; Philip L. Carter, WD8QWR; Wayne G. Case, WA4YSX; Richard Casey, AB1U; Michael D. Castleman; Gregorio M. Catuncan, KG9I; John F. Cazahous, Jr., WB6WLF; H. Dale Chaney, WB8DTN; Loren F. Chase, AIØM; Terry Chau, KA5CFG; Atwood C. Cherry, KA4STM; Carroll Chiasson, N5ANW; Fred B. Childs, WØWQ; Michael G. Cizek, KO7V; George L. Clute, W7LFD; Ronald A. Cole, K4OND; Thomas H. Cooke, KAØFGF; Charles R. Collier, WA4YTL; Wendell W. Collins, K4VPK; Charles O. Colpitts, KA7IRF; Fred H. Conner, KB8HB; Jerry W. Cooney, KA4TBC; Eric J. Coons, KA1BJP; Charles F. Corder, KA5BJY; Arthur H. Corey, K4SHJ; Paul S. Cornett, KB2VD; Donald J. Coudert, Jr., KA1CFE; Peggy Coulter, W9JUJ; David H. Cowdin, III, WDØHHU; M. Stanley Cox, N6CBK; Thomas M. Cox, KA9GXL; Joseph A. Crawford, AE8T; Scott Cronin, KA4LXZ; William T. Crowell, NØCFK; Jose R. Cruz, KA2KCR; William E. Cunningham, KB8UO; Louis L. D'Antuono, WA2CBZ; Alan P. Davenport, KB7CW; Maurice H. Davidson, K8SJD; Bill Davis, KC7UW; McDonald Davis, III, K4ZDB; Michael D. Davis, WA1UJV; Roger Davis, N7BNC; William D. Dean, WØWDW; Steven R. Decho, KE6FX; James H. Decker,

ARRL Foundation President Bob Chapman, W1QV (left) and ARRL General Manager Dave Sumner, K1ZZ, take a coffee break during a lull in the Board meeting. *(photos courtesy WØOZC)*

Directors Carey and Sullivan seem absorbed with something or someone out of range of the camera. The complete Minutes of the April Board meeting appear in June *QST*.

WB9UQT; Miguel A. Del Toro; Frank Dellechaie, KBØW; Robert W. Denman, WA2JGC; Robert J. Dill, KC2OW; Arthur L. Dillard, W9CTC; Veon R. Dillon, WH6AKZ; Donald M. Dishinger, W6RKT; John J. Diskon, KA6NVN; David D. Doty, N5ALU; J. S. Douglass, K2SD; Myron T. Doürado, WA1WDZ; James C. Dover, Jr., N4DNR; Larry Downing, WA9LQT; Joseph H. Doyle, WA3OHI; Leonard H. Drayton, WA6LAU; Donald D. Dugger, NØANO; Malcolm Dunford, WA7YWK; Richard A. Dunipace; Brandon W. Durden, KA5KES; William H. Durkin, WD4OBG; Barry C. Dutcher, KA1CLV; David O. Dyer, Sr., K4VHT; Richard L. Eastman, KA7HEA; David R. Eddy, WD8LSF; Richard F. Eichacker, WB1ATK; Suzanne S. Eichacker, WB1ATJ; Franklin J. Elam, K6QJD; Edwin H. Epperson, W6PIO; David B. Epstein, KL7LO; David H. Erbeck, W7KJI; William E. Evans, KB9H; Joseph J. Fairclough, WB2JKJ; Robert F. Falkenthal, WB9FPX; Brian Farleigh, WDØCKF; Norman D. Fast, KA4AEF; A. Eugene Fawcett, III, WA5CYI; John Robert Fiers; Henry F. Ferguson, WB2RAH; David Fischer, WB7WUS; Henry F. Fisher, IV, KC4I; David V. Fitterman, KØKRL; James M. Fitzgerald, WB2NLD; Edwin J. Fleischer, K2JRE; Ulis Fleming, WB3LUI; Gerry Ford, NC5C; Calvin Foreman, Jr., KB5OI; Charles W. Foreman, K5EUH; Thomas C. Fowler, Jr., WL7AFA; Keith C. France, W7OGT; David G. Fraser, W6DZN; Scott M. Freeberg, WA9WFA; George J. Freed, WA3RQK; George A. Gadbois, Sr., N3BCW; Paul W. Gallier, WØGBR; Roland A. Gann, W5TLY; Robert H. Garwood, NØBG; Randall R. Gawtry, KØCBH; June Geiger, N9BAE; E. Hughes Gemmill, Jr., K2DIM; Rodney M. George, WB8YDV; Leonard R. Geraldi, K6ANP; F. Clark Gesswein, N4CG; John R. Gibiser, Jr., WBØRYU; John J. Gielniak, WA9FGC; Charles T. Gill, NØARF; Gary D. Gill, WB4ZPF; John L. Gill, WDØFNE; Clifford B. Gillman, KA9KTV; Joseph Gilmaker, W6HGU; John H. Gindlesberger, WA8FNJ; John F. Glaeser, WB9ESM; Herschel M. Glasgow, KO5K; Steve Goggans, K7LZJ; Howard Goldstein, N2WX; Peter A. Goolsby, KY4Y; J. G. Gorrell, WØCLR; Robert M. Gosline, AE6S; Danny Graham, WB8YSM; Arthur Curtis Grafing, KC5NC; Mark S. Graham, K9OAJ; G. Michael Gratti, N9AYI; Thomas M. Greenway, K4PI; Roger J. Grose, KA8BPW; Daniel H. Grossoehme, N8AFL; Ross L. Guarino, WB2WJF; Michael M. Guess, KB9AS; Michael Gulla, WA1VTW; Jerry W. Gullick, WA5EYJ; Mike F. Gullo, WB2RVX; James Wayne Gunter, WB4DNG; Jean F. Hagemann, KC2KQ; Kenwood H. Hall, WA8LRW; Scott E. Hamilton; Don F. Hanenberger, Jr., WAØRUF; J. Richard Hanna, K3VYY; August R. Hansen, KBØYH; Gary L. Hansen, NØASA; Peter Harcy, N4CNA; Robert T. Harding, W3JEE; Charles R. Harmon, KJ5L; Charles H. Harpole, K4VUD; Arthur N. Harris, N6GAT; Bernard Harris, Jr., K4PRT; Thomas Kevin Harris, WA3RXE; W. C. Harris, Jr., N5BRL; Curtis P. Hartwig, KB2EJ; Thomas R. Harvey, WBØTXP; Marc Hasson, NM6N; Dwight R. Hayes, W5THM; E. C. Havard, KA6PSR; Mickey Heimlich, N5AJW; Eugene M. Henson, A1JD; George E. Henzler, WB8HHZ; Edward J. Herman, KA7NKX; Fred J. Hermann, K3AI; John H. Hess, KA2GKR; Robert Jeffrey Hicks, KA5BLB; Charles R. Hill, Jr., KI4G; Mike Hill, N8BHO; Gary K. Hills, KA4KJI; Roy O. Hinger, KA6NFL; Richard E. Hix, WB1EFV; La Verne L. Hoag, KB2UI; Harry D. Hoffman, WØQIY; John Searcy Hollis, Jr., WA4QLL; Leslie D. Hooe, WA7LUU; Roger S. Horie, KH6UA; Sherman Jan Hornbeck, NØCS; R. C. Horton, WB5NFB; Joseph J. Horvath, WB2QQC; Stanley J. Horzepa, Jr., WA1LOU; Kenneth D. Houser, WB2MPC; David L. Howard, N4BFZ; Ronald Charles Howard, N4DLE; Faris Howat, N2FH; Robin D. Huckaby, WB4GKI; Douglas L. Hulse, WDØACC; Charles C. Hunt, K9FXW; Lawrence H. Hunt, KA5HZN; Joachim W. Hupe, AE6A; Charles A. Hutcheson, KA4SXY; Danny R. Hutchison, KA9IXA; John A. Iannetta, WA8GMT; Torsten E. Isaacson, KØHQW; Myra Itchkow, K2YL; Arima Iwase, K2VZ; Kenneth Van Jackman, WA2DPM; Stephen S. Jackson, KA2EIA; David Jagerman, KC2FR; George R. James, WB7NVA; David R. Jeheber, WA6EKR; Douglas Jenkins, NQ4E; Lubbie A. Jenkins, WD5GEW; Bruce L. Johnson, N6EXQ; Dale E. Johnson, WB9NRK, Glenn B. Johnson, WDØEFE; Larry Johnson, WDØDVJ; Robert F. Johnson, WA2KUT; Don D. Jones, K5UKP; Donald W. Jones, KC8KY; Kenneth A. Jones, WA2GIW; Chris Jorgensen, WB6YUM; Robert Judd, KB5KU; Gerald Juntunen, WD5JFL; Johnny R. Justice, WD4NEH; Robert Lee Justice, KD5HX; Lannie E. Kane, W6ONT; Vahan Kapagian, N8AWH; Wayne A. Kaplan, N3AXQ; Richard K. Karlquist, N6RK; Raymond J. Kato, WA7TSI; Warner Keesler, KA2GHR; David Carl Keiser, WB3EFH; John C. Keith, WDØDJU; Edward F. Keller; Lewey Kennedy, N6EBD; H. Chalmers Kerr, Jr., K6DQI; Leonard J. Kersheskey, K7YW; George F. Kick, KA8HZB; Mark Kieffer, NØCKV; James R. King, AE9M; Leonard C. King, W6KNR; Robert E. King; WBØLRV; Charles R. Kirkpatrick, KF7C; Walter Leroy Klein, WA6FPR; Allan C. Koch, KA8JJN; John P. Koempel, WB8PEY; Francis V. Koempel, WB2JKU; Dennis R. Kolodziej, N8CWM; John K. Koontz, KC4HQ; Thomas J. Koska, K6UKX; D. A. Kowalski, WD6HCF; Bruce M. Krawetz, N6AOZ; Charles W. Kuhn, WD9EGW; Harry Kundrat, Jr., W2YEZ; Donald Kunz; David Kuraner, K2DK; Joseph M. Kurz, N5ELJ; Larry Kushner, WA6BKC; Richard Lafleur, KB5SK; Joseph P. Lameiras, WA2WJL; William W. Lana, N4COY; Richard E. Landers, WDØGZA; Clay Langston, Jr., WB8ZMV; John R. Larrabee, WB1ADO; I. Lavitz, WD4JSN; Michael A. Lawn, K2PSQ; Elihu Lebow, W5PPD; Gregory Lee, KC8JH; Richard H. Lee, K5CVH; William A. Lee, II, WA5LTA; James W. Lehnberg, WA4TCR; James Matthews Lehrer, N6ACV; Mario Leiderman, YV1LF/W4; Richard E. Lellinger, N4FBW; Angelo Licata, KA2HWF; Ira Linderman, WB2RXR; Richard F. Lindmeier, WB2INP; Phyllis A. Linehan, KA7CXP; Steven J. Litwins, WA4HII; John E. Lloyd, KA2KFV; John Locke, KA4FLP; Mark W. Lohr, WB7OOD; James Longnecker, WD8EGO; George P. Lord, KB9XQ; Joseph S. Lord, W1PNH; Kenneth Lorkowski, WB8HIW; Douglas E. Losty, WA1TUT; Lawrence Loughran, K6SGD; Harry N. Lucas, Jr., WA2KGM; Paul Lukas, N6DMV; Dickson Lum, NH6E; L. L. Lyman, K8IXZ; Robert C. Lynn, NØATL; John M. Lyons, WA6WCZ; Dickerson W. MacLeod, WBØYNS; Henry J. Maciog, Jr., WA1ASU; Ronald W. Magnus, WA7GFE; Jerry Maher, KBØVT; Norman P. Maine; Richard H. Maitland, KA2BSR; Alice S. Malone, KA4JPR; Michael D. Maltsberger, KD5BK; Lawrence Joseph Mangan, NØATC; Larry D. Manning, N9AFI; Wayne E. Manning, WØFI; Myles M. Marcus, W2IRW; Charles J. Marek, N8CMG; David D. Marshall, K5TJ; Dennis W. Martens, WB9TCJ; Philip J. Martin, WA2WSK; Robert G. Martin, AG6V; Robert C. Mate, WB8MIP; Richard P. Mathison, KG6Y; John Mayfield, WBØKUL; Thomas Mefford, WB8YLI; John F. Megee, KB9VK; Charles A. Melton, KA6EUB; Kenneth Mendenhall; Allan T. Mense, W4PRB; David E. Meye, KL7QW; Philip R. Meyers, WB7QLM; Joseph L. Michaud, WA7OEM; Donald Richard Miller, Jr., A1IV; James Albert Miller, KA4DGL; Richard S. Miller, N5CNC; Stephen C. Miller, KA2AGD; Michael Don Minkoff, NK6A; Herbert Mitschan, KA6JAH; Kenneth L. Moan, N2BCH; Dean L. Molen, N7CYQ; Wade L. Moler, WD4EQN; Ted R. Moneypenny, KB8VN; Dorothy R. Montgomery, KA9ODB; Stanley N. Montz, WB2AYF; Allan W. Moore, N3ABO; Thomas O. Moore, II, W7KMA; Richard A. Moran, WD8CRY; Theodore A. Morange; Juan A. Moreira, KA6OFC; Harry E. Morgan, III, WB2YET; John R. Morgan, WB5ROR; Peter E. Morin, WA9KWS; Roy E. Morrow, N4ARA; Walter L. Moss, Jr., W5AYZ; Jack T. Moy, WB2ALI; Fred Muller, WA6LQL; Mathias A. Muller, KB6RF; Robert J. Mulrooney, KB3RI; Mark E. Musick, WB9CIF; Robert E. Myers, K3HWL; Russell P. Myers, WD4JHD; Thomas R. Mylott, III, KA5GQP; Fred W. McAdoo, W7VQM; Robert McArthur, K5LTJ; Gerald E. McAtee, KAØITA; John B. McComb, III, WA7LWQ; Robert L. McConnell, KB5VO; William M. McCrary, K4EXB; Harold W. McDonald, WD4FVJ; Thom B. McDonald, KV5B; Roy L. McFadden, Jr., WA4EFG; Larry R. McGee, KF9E; Stephen McHaney, WD4LIM; F. Ellen McKay, K1VCK; Richard Lee McKelvey, KMØJ; Ronald W. McKinney, WA3QDS; Jack B. McKirgan, II, WD8BNG; Michael F. McLaughlin, WB3JHX; Russell T. McLaughlin, K8LM; Donald L. McMillin, N6DXA; Larry J. McMurry, N3BQK; Michael C. Nagel, WD8LLN; Gary G. Nelson; KBØYN; Leo Nepote, K6AYL; Wilbert W. Nichols, N7ECP; Phillip R. Nickols, WBØUIE; Leroy C. Noddin, W1BEO; Thomas F. Nolan, KO2G; Wilford R. Noorda, KA7AML; John J. Nugent, WB8TKL; Walter G. Obenhofer, KA2MRP; James L. O'Brien, Jr., K5NV; Thomas R. O'Hara, W6ORG; Joseph L. Odom, Jr., KD4MJ; Eugene E. Oleson, KB4JI; Lois K. Oliver, KA9GYE; Dale J. Onderisin, KA9KHX; William D. Osborn, KH6KV; Thomas L. Otte, WB8ZHU; James H. Paffenbarger, WA1ABU; Alan H. Page, KE4WO; Sarjit Singh Paintal, WB2YFN; Donald D. Paolino, WB6VSK; Albert W. Parker, W8UT; William A. Parr, KA5ENJ; Robert A. Pautsch, WB9PFM; Sanford A. Peabody, II, WD6EYV; James E. Pearson, KA4GMG; Dick Pelletier, N1OM; Oliver H. Perry, III, WA4UPV; Leonard E. Peterson, W3HFI; Robert H. Petitpas, WB4UZC; Jack E. Phillips, Jr., KD3C; Russell M. Pickelmann, W8JIU; Gary Pierson, WA7GVM; Martin Pih, WA4AVB; Larry K. Pittman, WD9EME; Pedro J. Piza, Jr., NP4A; Terry L. Plummer, WB6SEJ; Robert Pohanka, WD4BYF; Francis A. Polaski, WA3BLG; T. Earl Poulson, K9CPT; Robert L. Powell, W3QHF; Thomas E. Powell, KA5ILS; William T. Price, WD6GCR; Nathan B. Priddy, K5VIP; Peter Putnam, W9DHK; Edward W. Quade, WBØILI; Howard W. Radke, N7TI; Francis Avery Ragan, Jr., WD4EKQ; Maurice Rankin, WB3LAK; Ronald L. Rausch, K5HZ; Charles La Mar Ray, W9LT; Frank B. Ray, KA7CRU; John S. Reckley, N3BLE; Lawrence A. Reece, WB9LUG; Douglas J. Reed, N3AIA; Joe T. Reeves, WD4EEA; Wayne Revelle, N7CET; J. Albert Reynolds, N4AGG; Thomas M. Reynolds, KA5DOS; James B. Rice, KA7GJU; Marvin H. Richards, WA6TGX; E. Dean Roberts, K8GXV; Edward H. Roberts, WA3IHR; Vernon L. Roberts, WD6CHL; Darryl L. Rohwer, KI7X; Laurence A. Root, KB6CO; Ralph B. Roseberry, K3UX; Mark W. Rosneck, KBØUS; Thomas R. Ross, N8CBN; Kenneth W. Roth; Richard C. Roth, K1OME; Elwood B. Rough, KB3GX; Roland J. Roy, WB5MPB; David Roznar, W6TGE; Abraham Rubin, KH6HSC; Donald A. Rudhe, WB7CRP; W. Philip Ruemmler, WB7OUL; Mark S. Russell, KB2MG; Martin E. Rymarz, KA9HZO; Dick J. Sander, K5QY; Irvin M. Sanders, K3IUY; David G. Sarault, WA1DWE; Herbert A. Scaroni, AI6D; Norman Schmansky, KB8PY; Carl F. Schroeder, N2CS; Gilbert R. Schugart, KA2CHN; Glenn E. Schultz, WØIJR; Karen K. Schultz, KAØCDN; Gene B. Schur, W7WDL; Darren L. Schwarzlose, WD5GQT; Ali N. Schwayri, N2BFV; Peter Scialli, KC2UJ; Bradford E. Scott, WD9HDZ; Anthony F. Scrudato, N4BXX; Brian J. Scully, KA1DGN; William L. Seal, KA3BHP; Richard J. Sedlak, N2CHR; Michael S. Sewell, KØCRX; Arnold F. Sexe, WBØOPZ; Harry G. Seyfert, WD9FYF; William F. Shaughnessy, KB1DY; Richard Carl Shearer, KA2EFG; John A. Sheffield, KA4JXC; James W. Shelton, Sr., WD5JNV; Jesse E. Sherwood, K4DLQ; Francis S. Shields, WAØZCR; Keith C. Shilhavy, KA9GYD; L. Stephen Shrader, WA4GOX; Hyman L. Siegel, K9CCN; Jorge A. Silveira, WB4PEA: Raymond W. Simpson, WA2PYX; Carl A. Sims, Jr., KA4GSY; Porter A. Skinner, W7UZA; William Slapin, K2VHV; Adlo T. Smith, KC5WL; Beresford Smith, KM2E; Clayton B. Smith, WA4QEU; Eldred M. Smith, W6EQJ; Mark Smith, N2MR; Robert W. Smith, KC8NV; Walter L. Smith, KA3AGM; David E. Snavely, KA5B; Neil K. Sorenson, WA6KLE; Lee G. Spears, K7KJH; Jerry C. Spencer, K8OZ; Herbert C. Spierling, N6BC; Michael H. Staats, KB7NR; Paul A. Staby, WØEZN; Gary W. Staerkel, WBØVYR; Fred A. Steele, Jr., K4PUE; Ronald Steiner, K6KEO; Robert W. Stephanak, Jr., WB8CYW; John F. Stewart, WD8BFA; Kent B. Stewart, KA7GKW; Kevin Michael Stickle, WN2CVP; Frederick W. Stowell, N3AZ; Floyd Styer, WA8WFX; Steven L. Styer, WB8CXL; Jeffrey E. Sudeith, KØJS; Jeff M. Sullivan, KG6N; Paul J. Sumberg, WB4YIV; Martin E. Sutton, WDØALO; Robert E. Swarts, KA9BFK; Michael Leland Switzer, K8ZE; Christopher R. Tarlini, WD9AZK; Mark Teloh, KB9RK; Howard A. Terhune, K5BWO; G. Robert Thacker, K3GT; David C. Thackston, WB1GZC; Gwynn E. Thomas, W8JHL; Ron M. Thomas, N4RT; Gary C. Thostenson, WA9JFM; Edward David Tobatto, Jr., KA4RZM; James N. Tobey, WD9GCZ; Max T. Treinen, KB7XU; David W. Trewin, KR4U; Raoul S. Trudell, WB4JLT; Lake Edward Trump, AL7N; Stanley L. Trybus, W8DBL; Warren A. Tucker, KL7CL; Arlen T. Turriff, K6VNX; William M. Tyler, Jr., K4SLQ; Mack Tyner, N4FFK; Paul R. Valko, WB8ZJL; Ron Vick, WA5NYA; David Vierling, KA1TZ; Philip L. Viger, KA1FGK; N. Vijayan, WD6BSW; Joe Voelkelt, KL7LF; Wesleyan K. Voigt, K8JWG; Randy A. Vold, KAØEWQ; William P. Volm, WD9HDY; Carl Volz, Jr., W3SMV; Robert J. Voronovitch, KB1DU; Thomas C. Wagstaff, KB4JA; Joe H. Waldrop, WB5TDJ; Bruce Walek, WD4GOR; Cornelius N. Walker, W6KXN; George E. Walker, Jr., KQ5W; James J. Walker, N6FCN; Roland L. Walker, KB2TT; Thomas J. Wall, K2TW; Charles M. Ward, WB4LAB; Cedric M. Warren, WD8IKK; John J. Washcalus, WB3FYT; Benedict L. Wasilauskas, K4GHS; Bill Weaver, WA6FSP; Thomas D. Weese, K6AJG; Herbert N. Weisman, KØDUQ; Buren Earl Wells, Jr., KZ4W; Darrell B. West, W7DMA; David W. Wester, KØIEA; C. W. Westwood, W2YGU; Richard R. Wetherald, WB8UCW; Cynthia M. Whanger, N3DDQ; Dexter R. Wheeler, W1TUM; J. F. Wheeler, W6FVZ; Warren Whelan, WB2ONA; Richard Earl Whittan, WAØAHQ; Robert D. Whitworth, N4BPT; James E. Wickell, NC4H; Richard P. Wightman, WB7BZR; David L. Williams, WBØZJP; Harold E. Williams, KB6ZH; Ivan D. Williams, KA9IHM; Lionel C. Williams, K5LW; Walter C. Williams; Robert L. Willison, WD8MOD; James L. Wilson, KD3T; Philip R. Wilson, WA1DAH; Robert B. Winn, W5KNE; Bruce D. Wood, WAØRIM; Richard C. Wood, II, N4FAF; Robert S. Wood, KA1GNG; Richard H. Woodlee, N4FAT; Robert A. Woods, KB9HI; David W. Wright, WB2VZD; Frank R. Wyatt, III, KC5M; John M. Yarbrough, III; Walter Yatzook, Jr., NICJB; Richard A. Yearger, Jr., WB7VNY; Leonard John Zinck, Jr., KB3DK; A. Jackson Zipperer, Jr., WB4LIT.

List No. 3: Norman A. Adams, KA2JRK; Augusto Aguirre, NN4Z; Dennis J. Aita, KA3GHP; Merrill C. Allschwager; Fred Anderson, KAØLHN; John B. Arkenberg, KA7GKI; James W. Arlidge, WB6QXN; William E. Ash, WA2OPG; George R. Atkins, WB1FXI; Lloyd J. Aubert, Jr., WBØRZK; James B. Austin, N8AQV; John Austin, WA6RLV; Blaine G. Auville, Jr., WA8IOE; David C. Azpell, WB9CZC; David C. Bailey, KA8DJN; Gary L. Baker, N6ARV; Kenneth J. Baker, KOØW; Michael A. Ballenger, KU5H; Clayton Bartholow, KDØBY; John P. Bayne, KK9A; Donald R. Beach, WB4ZWO; Jeffrey J. Beals, WB2OUK; Walter A. Bearden, KA4MVJ; Richard C. Beil, KB9BA; Martin E. Belden, KA7CYO; Clark Bell, K6MSK; Ernest C. Bennett, Jr., KB7RS; Jerry D. Bennett, W4BGK; Alexander E. Benton, W5UCC; Francis E. Bernhardt, WD8DOS; Barry Bettman, WB6UTY; William Beyer, Jr., WD4GDZ; William B. Bliss, WB3HVS; Charles J. Bock, N7DZA; John J. Bohnovic, Jr., K8RXG; Stephen E. Boller, NØNO; Thomas H. Bond, N4ENE; Ronald C. Borkgren, KCØBQ; Bruce T. Bracker, WD4GSG; Lawrence W. Bradford, KM5Y; Jim E. Bradley, WA4AOO; Joseph J. Brantlecht, KD4IC; Jerry D. Brantley, N5ADJ; Wallace Braun, KB7AO; Richard A. Brethold, WAØKWI; Glen A. Brewington; James A. Britch, WD5DHY; Allan J. Broadbent, KA5CLZ; Kenneth E. Broshofske, KDØCI; Dale G. Brown, KC2PZ; Robert Buchanan, KA7CCC; James R. Bull, KCØXI; Gregory A. Burnett, KB8NU; Robert J. Bush, N6BFQ; Shirley J. Bush, N6DLR; Glen F. Buswell, KA8JCI; Delbert Callen, KBØMH; Thomas J. Calomiris, K3TC; Grady Campbell, WD5JMY; Joseph L. Campbell, KD6DY; Michael L. Capizzi, WB9WQC; Jose A. Carrion, KP4E; David P. Carson, WA7BTZ; Eugene F. Carter, W5OLN; Ernest Cascio, N3AJE; Linda Cereghino, N7CZY; James A. Chandler, N5COT; Lawrence Cherner, WB1FAW; Robert S. Cheskes, K2UDT; Louise Chevalier, KA8OWN; E. Tom Child, KA8JPI; Mark Chitjian, WA2NYY; Gerald K. Chong, KH6EUM; William E. Chord, Jr., KA7FWQ; Charles E. Christmann, Jr., WB5YAZ; Frederick W. Clark, KE4FC; Gerald W. Clusen, N9AYN; Don Cochran, KC8CK; Eric R. Cochrane, WD4FTA; Ronnie Colcord, KF4ST; C. L. Coleman, WA4PKQ; Harold G. Collins, W6JES; John Collins, KA5AOL; P. R. Coltrin, Jr., WD9HYY; J. H. Comer, III; Joanne P. Compton, KA5LYC; Robert J. Connelly, WD4MRT; Lauren E. Cook, KA9BQI; Lloyd H. Cooper, WA6YEV; Robert W. Cornett, WA4RUW, Roland L. Cote, KA1JUG; Garrett J. Cotter, N8CXI; John C. Cox, WD4PKZ; Albert Crespo, WB6FCR; William D. Crowl, KL7FNX; Margaret Ann Curran, KA4IIZ; Dirk Dana, WA3MRQ; Wilbur A. Darsey, AL7AC; D. R. Dascenzi, N6AHP; Edward J. Davis, K2PHK; Joseph W. Davis, KV9I; Ronald B. DePew, KCØDW; Darl E. Deeds, NA8W; Frank Delfine, WB2UJS; Frank W. Denk, Jr., KA9J; Joseph J. Desher, KB2CO; Dennis H. Diehl, WB3EFI; Len A. Dobry, AE7U; Charles C. Doggett, WA3EEE; Francis J. Donovan, Jr., W3LPL; Thomas A. Dover, WD4FFN; Gregory F. Drezdzon, WD9FTZ; Rick Dubbs, WD9EPI; B. J. Dunlevy-Wilson, N3DAK; Dale W. Dycus, W5VZN; Thomas W. Easterly, KF2S; Wade T. Eilers, WN5TEN; Bruce W. Ellis, WØBF; Keith R. Erickson, KØGNW; Richard A. Erlichman, ND4G; Dwight A. Ernest, KA2CNN; Val L. Erwin, W5PUT; Diego D. Esquibel, WD8MIS; Frederick H. Essig, K4TDT; Richard Esterline, WB9EOA; Terry L. Evans, WD9HQH; Joseph E. Feldman, WB7FIY; Leland L. Fellows, Jr., N5DGH; Nicholas J. Ferro, Jr., KU2A; Jeffrey Fields, N8CKO; Arthur C. Fingerle, WB6NYH; Thomas F. Fisher, WB7PSY; James R. Fitzjarrell, WØRFZ; Eugene M. Flynn, WA8ZSK; Sandra M. Foley, N9DNX; David M. Foster, KA6KPX; Joe Freeman, KA6ABA; Wallace Larry Freeman, WD4HOZ; Gerald L. Fuller, WA8EQP; Rick Fultz, KC5EJ; David V. Furman, KA3FCD; David K. Garcea, WB6ZBE; F. Jason Gaskell, WA6RJG; Robert H. Geiger, WD9ITQ; Samuel H. George; WA2IFU; Richard Gerlach, KA6BES; Larry M. Gibson, KA9T; C. Wayne Gilbert, KA9R; Fred Glenn, K9SO; Jack M. Goetz, WA7PKA; Emory L. Gordy, Jr., W4WRO; Brian L. Grass, KL7KT; Keith A. Graves, KA6LAC; William Grebenchinko; James M. Green, WB3DJU; Virgle W. Griffith, NI4H; Robert Grissom, WA6RYG; Sam D. Gross, Jr., WA4JPK; Lyndon Haddock, KC8I; Bruce A. Hammerschmidt, KA9NNH; Liston R. Harley, KA1BTF; Stanley L. Harper, WD8LNB; Willis B. Harper, Jr., K4TWW; James A. Harrass, N8BCS; Robert J. Harris, WB7BWZ; Kermit L. Harrison, KD6XM; William G. Harrison, WD4HQB; Thomas M. Hart, AD1B; George J. Hartmann, WB1AAG; Donald G. Haskins; Charles A. Hasty, WD9IQV; Charles B. Hawes, N9CWE; Bobbi L. Hawks, WD4OVO; Mervyn L. Hecht, KO6E; Dewey L. Hee, WB7OEV; Timothy J. Heger, KBØG; Julian R. Hendricks, KF4KS; Jack W. Hendrickson, KA7CHY; Richard Herndon, K5FNI; John J. Herr, WA6OWG; Harvey D. D. Hetland, WA6KZI; Albert H. Heusmann, KJ2F; William P. Hill, Sr., K3INT; Hervey M. Hiller, KD6QK; Vernon W. Hockenberry, KA2JCR; Herbert Hofland, VE3MCY; Edward H. Hofmann, WDØHBY; Jack P. Holland, WA6HIW; Robert L. Hollister, N2BCY; Dennis M. Holt, N4IGX; Frederick Horanic, KA3EET; Thomas M. Hoyne, N6NI; Richard A. Hudgins, KB6JK; Jewett E. Huff, WA5ICS; Mark William Huff, WA4DHY; James R. Hughes, Jr., K4WYN; Gordon W. Hullin, K2ZBU; Sharon G. Ibaugh, N3CXY; Edward J. Ireland, W8HZF; James H. Isom, WB9LQX; Gordon R. Jackson, KE6Y; Lynn Jackson, AC5T; Stewart K. Jackson, K1YET; David C. Jaeger, KCØCR; Teresa L. Jaworski, KA9IFQ; Michael J. Jessop, WB3JVD; George W. Johannsen, WBØZQN; A. W. Johnson, Jr., WB5CII; Arleigh R. Johnson; Bruce K. Johnson, WA7DVD; David M. Johnson, KL7DJ; Edward T. Johnson, KØHFT; Lawrence R. Johnson, WA2FSU; David P. Jones, KA8DCW; R. L. Jones, Jr., WD4KWR; Charles N. Kaeff, Sr., N4FFP; Stephen Kalt, N8CPF; Bruce Robert Kampe, WA1POI; William W. Kane, WM4L; Keith J. Kauffman, KC5YH; David C. Keese, KD4SX; Charles Keeton, K8OBW; John D. Kelley, KD3U; George F. Kelly, WA1YXS; Jack P. Kennedy, III, KA4HWW; Norman L. Kibby, WA6VWJ; Robert L. Kinville, KA2BAT; Sunny Kirsten, KA6PPP; Donald Klesick, WA2VVW; Barry L. Knouse, WA3YTW; Stefan Koczo, KA9GGF; Frank R. Kollatt, Jr., W5BPT; Robert L. Krachmalnick, NØCYT; Allan O. Kragh, KA6FBQ; Stephen Kronbert, WB7QAL; John B. Kruk, K3KR; Richard J. Kuepper, WA6RWS; Peter Jay Kuhn, KQ8J; Patrick A. Kuykendall, WB4SFY; Yee Hin Kwong; Rolland David LaDue, KA9U; Michael James La Frieda; R. Larry Laffon, N3CAM; Barbara L. Lake, N4EUI; David O. Lallas, WDØCXG; Richard L. Landau, W1IBN; Melvyn E. Larson, KCØP; David Holly Latchaw, WB5UPT; Louis W. Latimer, WB7PJW; Paul Le Clair, N6ATH; James A. Lee, WBØPMT; Zack W. Lee, K4RND; Jerry L. Lemon; Joseph B. Leonard, WA4HWT; Robin Kay Lewis, WA7YOQ; Forrest M. Liljedahl, W5HHS; Harley D. Lindquist, KA8IHF; Paul A. Little, K1FIR; Everett L. Lively, WB7REY; Jerry L. Lloyd, WA1TCA; Jim Lommen, KC7QY; James F. Longley, N2AZM; Antonio Lopez, WB5YQT; Vincent A. Loschiavo, N2AIE; Julian R. Lutes, WBØTXH; Joseph J. Lyddon, WB6UFX; Timothy J. Lydston, KB4IO; James D. Lytthans, K6VRY; Mark MacKinnon, KA1CVS; Richard D. Machacek, WBØNCR; Robert F. Magee, WB7TXQ; Donald Mallison, NØAPC; John R. Mangerson, KC9GW; David E. Mann, N4CVX; Steven Marsden, VE3KQU; Thomas F. Martin, KF6EV; Thomas I. Mathewson, KA2MYD; Carl J. Mattes, Jr., KA1AVD; Philip A. Medeiros, N1AJS; M. R. Melhem, WB3JON; Robert W. Melown, KA3ARK; Joe D. Melton, KB5MM; Judith S. Merrill, KA5PQD; Anthony R. Micci, KC2NL; Ulrich F. Michael, WB7UMC; John MacMillan, VE4AHT; Carl L. Miller, KF8Y; George C. Miller, KA8KBW; Leonard V. Miller, WDØDIT; Bruce W. Mills, KL7JDR; Charles E. Mink, KF2U; Robert B. Minor, WØNFE; Theodore A. Mirgliotta, KB8NW; Ernie Mitchell, KA4TZA; Grant Mitchell, KA2DIV; Paul M. Mitchell, Jr., WB6BCK; Thomas G. Mitchell, KD6EM; Norman Moak, WA2BDW; Ronald L. Monahan, K8IOS; James L. Moody, Jr., NL7C; Robert W. Moody, Sr., WD8OOE; Kenneth W. Moordigian, WD6BMZ; Dennis F. Moore, K7UMH; Alan D. Morgan, KA4ADF; Anthony R. Morgan, KN7E; David D. Morgan, WB7CLU; George A. Morris, Jr., W6ABW; Steve Morris, K7LXC; Frank W. Mortimer, WB2TOV; Glenn Mulligan, N6AFZ; James L. Murch, WA6OEY; James R. Murdock, WD6EEY; Jay Musikar, AF2C; Hubert R. McClain, K6SPK; Peter R. McDonald, K6DYP; G. Michael McGrath, KC2TD; Guy B. McInerny, K6VNQ; G. Scott McIntyre, KA6IOO; Wallace A. McIntyre, N9AUN; John E. McKeen, W1TN; Daniel C. McKenzie, AI9D; William E. McLean, KE4CA; Gerald L. McLendon, WA6MXD, Scott A. McMullen, WB5RMQ; David A. McPhie, WA7YCA; Paul W. Nance, WB7PWM; David Nicely, KB8UG; Juli K. Noble, WB7SCV; Daniel D. Nolan, WA2FRY; Robert S. Norris, W5KI; William Mark Northcutt, WD5DYI; Lawrence R. O'Hearn, K1DGY; Jonathan B. Oakley, WB2WCD; Harry A. Ober, WB6CGZ, Forrest Oden, N6ENV; George Oliva, Jr., K2UO; Bruce I. Olson, N9BLU; Ronald Eugene Ostman, KAØAYN; Douglas K. Over, KA9HDZ; Harold G. Page, WB1ADY; James E. Page, WA6OFB; Francis R. Pallo, WA2STX; Mike Parker, WB5WDS; Samuel Franklin Patterson, N4DRV; John L. Payne, N4COT; Cecil E. Pearson, Jr., KA4JKA; Mark J. Pearson, WB4WVV; Sam Pennise, KA2CGH; Jim Pepides, KA1DJE; W. M. Perkins, Jr., N4EZQ; Dennis R. Peters, N5UA; Michael J. Petz, KA9HNT; William Curtis Phillips, KD4YU; Harold Pickett, N9CHM; Solomon M. Pikarsky, N4EVB; Anthony W. Piper, Jr.; Jimmy G. Piper, W4HON; Philip J. Pishney, KA3FKL; Gordon Plyler, KD4UC; J. E. Portwood, KH6OU; Marvin J. Postema, WB4TDW; Robert L. Powell, Jr.; S. Blaine Price, KA7GHY; Jack Prince, WA6QWP; Timothy Prosser, WD8JFC; Kenneth M. Prow, WD5ELT; James B. Puchta, WA2CDK; Jack D. Queen, KA4ITE; Jerry John Raimondo, WB2KZX; George E. Ransford, W9VMT; Paul W. Rapp, KD6EY; Frank A. Razinha, WA1TJR; *Eileen Razinha*, KA1FBC; Gary D. Reece, WB9UYT; L. Darlene Reece, NØCBG; Marshall P. Reece, NØBLD; William E. Reese, WB8ZRN; Ernest C. Reid, K1TGB; Robert R. Reid, NØBHC; Barry L. Reitnauer, K3KOZ; H. L. Rinker, KI2D; Douglass L. Risdon, KM8P; Nathan C. Roach, WA4TMW; Bruce A. Robbins, WDØGNA; John E. Roberts, W2EWK; Steven W. Robillard, WAØVQX; Roger A. Robinson, WD8JNK; Edward J. Roche, Jr., K4YEX; Robert J. Roehrig, K9EUI; Joseph E. Rogers, AJ1Y; William P. Rohde, K3XA; Jeffrey D. Ronner, WB2AEQ; William A. Rose, WDØFLX; William W. Rose, III, KA6HMS; John K. Rosenstock, KA4EVH; Bruce P. Rossanese, KB3RE; Raymond J. Roy, WB5WEM; Kenneth R. Ruffner, KU5Q; George L. Ruptier, N6AVY; Larry G. Russell, K5ZCJ; Roland A. St. Louis, Jr., K2LKH; John B. Sanders, Jr., KB5ZP; Greg Sanker, KA7CJA; William F. Santiff, KB4P; Francis T. Santry, WA4UYE; Michael A. Savin, AI1Y; Charles G. Savoie, WD5KBB; Steven D. Schaarschmidt, KØCI; Craig M. Schettler, KA2JKD; William A. Schlegel, W7PRR; Michael Schmitt, KN7O; O. P. Schreiber, W2UH; Ronald L. Schreiber, KA9JDU; Susan E. G. Scott, N8CGM; William A. Scott, KA3CHB; James A. Seager, KA2CDE; Robert Sebonia, AK9Y; J. Sebring, N7BLW; Mark Seelbinder, WD9ATV; Robert Seely, WAØVLC; W. Russell Seibert, N5WS; Gary R. Senesac, KC9UM; Mark Seyffer, KB9S; David E. Shaffer, KA6DLJ; Gary J. Shane, WB5WOW; Matt W. Shank, N6CUQ; John Shannon, N8AVA; Larry D.. Sharp, WB4DMW; Marilyn J. Sheedy, KA2NNK; Ray M. Shell, WA4BNZ; Archie Shetler, WN3DHI; Joseph P. Shinners, W7VIH; John Simonton, WD8BVR; David J. Smith, KA6EBA; Larry Smith, WD5FOG; Monte E. Smith, WA4F; Robert G. Smith KØFYJ; Roger A. Smith; Terry Smith, WDØGFQ; John C. Solley, W6GQH; Stephen H. Southerland, KD4CS; Gerald E. Spear, Jr., K9KWD; Gerald L. Spearman, K9BIR; Richard W. Spencer, WD5PUF; Gary Spicer, WB5JCT; Randall W. Spriggle, KJ3F; Wayne Starnes, Jr., KU4V; Mark A. Steffka, WB8WTF; Jan W. Steinman, WB8RRB; Joseph O. Stenger, WAØVSW; Thomas W. Stevens, N5ADP; Sara Elaine Stewart, KCØHU; John M. Stillman, N9ANO; Lou Stine; Joseph M. Stotler, K9LJP; Charlotte G. Strawser, KA3JUR; James R. Streible, K4DLI; M. H. Strickland, Jr., W7FCH; William P. Suffa, KC2DA; Paul A. Sunada, KH6LD; Richard H. Sweet, WB6MYF; Donald M. Sykes, KG3M; Roger Taksar, WB1BXS; Thomas Taormina, K5RC; Allan K. Taylor, VE3WV; Donald P. Taylor, KA3APT; La Fonne J. Taylor, N7AKM; Larry Taylor, WB1CIV; Ted D. Taylor, WA6LBS; David E. Teich, KA2QCP; A. Stephen Tepper, WA3HIL; James T. Thiewes, WBØRZZ; P. E. Thomas, KA2FBV; Thomas M. Thompson, WA2FZJ; William T. Thornton, N6ATB; Lowell Tieszen, WDØALH; Stephen R. Tillett, K7KOT; John A. Tobias, N6BBR; Gary C. Todd, KB2DM; Hollis D. Tolley, KB4PH; William H. Tomison, K7YIC; Gary Trentham, KCØFL; Don Triplett, K4UVV; Thomas N. Trischan, N6AVB; Ted A. Trower, N8DHG; Roy Kenneth Trussell, N4CGV; William L. Turini, KA4GAV; Dan W. Turner, WA4BRO; Duane Two, WB7TYT; Al Vacek, KN5A; Ottar R. Valvik; Brian M. Van Norman, NØAXU; Frank N. Van Zant, Jr., KL7IBA; Weldon Vantreese, WD5FDL; Dante H. Ventriere, Jr., KA4JRE; Dennis E. Von Cannon, WB4RPO; Michael C. Wagner, WB1DJC; Thelma Jo Waldrop, WB5WJY; Danny V. Walker, N4BEX; J. C. Waller, Jr., NO4U; Gregory S. Warner, KAØECQ; Jeffrey Paul Warnke, KB9UI; W. T. Warren, W4PG; Harvey Wasserman, K2BOG; Judy Watford, WB5ETG; William J. Watkins, NI6U; Norman J. Webb, K2PPO; Mark J. Weber, WA1GOO; Neal C. Weckworth, WBØVTD; Thomas J. Weigel, NØDBQ; James M. Weitzman, K3JW; Lambert F. West, KA6HTC; Robert L. West, KV4C; Haven R. Whanger, W3BIS; Richard W. Wheat, WB5CCO; Steven M. Wheatley, KU9C; Jacob J. Wicks, KI2M; Douglas R. Wiese, WBØYDD; Hiram W. Wilder, NE4X; Don Wilke, WB8BKC; T. Michael Willett, WD5GFW; Donald L. Williams, Jr., WA4K; Roger A. Williams, KA5AAL; Jerry D. Wilson, K4KQK; Robert A. Wirth, KA6AMT; James B. Wolf, KR9U; McFarland W. Wood, Jr., W4PVT; Michael N. Wood, WA4CXA; Michael W. Woolverton, WBØZPW; Herman W. Worley, WA4VMS; James A. Worsham, WA4KXY; D. E. Wright, KQ9T; Dennis J. Wroblewski, K9DTK; Warren J. Young, WB7NYV; Roy A. Zeigler, KA4EWX; Fred J. Zendarski, NØDDP; David L. Zeph, W9ZRX.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Band Edges

"How close can I set my dial to the band edge?" is a question asked not only by the beginner, but by experienced amateurs as well. This month, we'll tell you how close you can go to get that rare DX QSL card — and avoid that rare FCC "QSL" card.

Q. I'm an active hf phone DXer. How close to the band edges can I set my VFO?

A. Many factors are involved. A-m double-sideband signals occupy about 6 to 7 kHz of band space, or *bandwidth* — 3 kHz on each side of the carrier (center) frequency. Most amateurs, though, use single-sideband emissions on the popular DX phone bands. Properly generated single-sideband signals have only one discernible sideband and no audible carrier because of strong suppression of the carrier and the unwanted sideband. Thus, to determine where you may set your VFO in relation to the band edge, you must consider (1) which band edge you're near (upper or lower) and (2) which sideband is suppressed. For example, if you're an Extra Class licensee working near the bottom edge of the 20-meter phone band (14.150 MHz) and using the upper sideband, your VFO can be set just inside the band edge if the unwanted lower sidebands are suppressed by at least 40 dB (97.73[a]). The carrier frequency should be located inside the band edge regardless of the level of suppression. The carrier frequency is the frequency of operation and is required to be within the authorized frequency band (97.63[a]). Always allow a margin of safety for possible inaccuracy of your frequency readout.

If you're operating near the top edge (14.350 MHz) with the upper sideband, you must set your VFO dial at least 3 kHz away to accommodate your sideband. Remember, all of your sidebands must be confined within the amateur bands and subbands as applicable (97.63[b]).

Morse Code

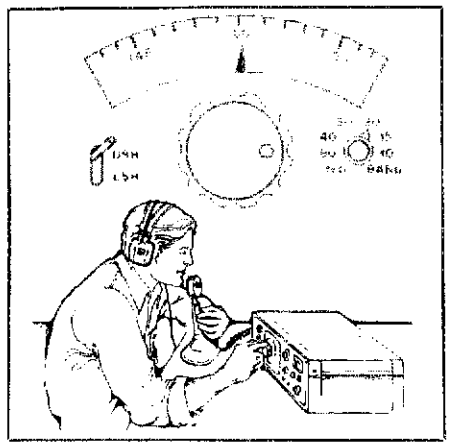
Q. When operating cw, how close to the band edge can I go?

A. The answer depends upon how fast you send your code. The bandwidth of a cw signal in hertz is approximately four times the sending speed in words per minute. For example, if you're honking along at 25 wpm, the signal occupies about 100 Hz of spectrum. So, keep your VFO at least half of the bandwidth away from the band edge: 50 Hz or more. Also, most rigs offset the transmit signal from the receive by 600 to 800 Hz, so this factor should be considered in your final frequency determination. Remember, the faster your fist, the greater space you're taking up on the band!

Bandwidth Limitations

Q. How wide can my voice signal be?

A. For a-m double sideband voice, bandwidth



should not be greater than 7 kHz to be consistent with good engineering and amateur practice. You should take precautions to avoid overmodulating your transmitter so you don't "splatter" and make your signal wider than necessary. Single-sideband signal bandwidth should normally be confined to 3 kHz per good engineering practice (97.78, 2.202). Incidentally, the Commission defines *bandwidth* as the width of the frequency band outside of which the mean power of any emission is at least 26 dB below the average power level of the total emission (97.65[e][3]).

Q. How about my fm voice signal?

A. The bandwidth of an fm voice signal is determined by the audio frequency employed and its amplitude. The only FCC restrictions on fm voice signals apply to operation below 29 MHz, where their bandwidths may not exceed that of an A3 double-sideband emission with the same audio characteristics: about 6 to 7 kHz. Wider fm bandwidths are permitted above 29 MHz. Common fm repeater and repeater-user signals occupy 15 to 25 kHz (16 kHz is the norm) of spectrum, usually depending on the attenuation character of the filter preceding the modulated stage. That is, the carrier frequency deviates off center by 5 kHz on either side, with the rest of the bandwidth occurring from sidebands of the input signal based on the Bessel function distribution. This type of fm operation is generally referred to as 16F3 narrow-band fm and is used almost exclusively by gentlemen's agreement below 450 MHz on the popular repeater areas.

Some repeater transmitters use 7 or 8 kHz of deviation from the center frequency. But, such operation is generally frowned upon by the fm community because more space than necessary is used to carry out the desired communications. The FCC 29-MHz cutoff rule for fm voice bandwidth is found in Section 97.65(c).

TV and Facsimile

Q. Why is fast-scan television not found on the hf bands?

A. Fast-scan television, a mode in which images appear in the same manner as a home broadcast TV, is not found at hf because of the bandwidth limitations. To get across all the information necessary for a fast-moving TV picture, much spectrum is required; so much, in fact, that on the relatively small hf bands other modes of communication would be precluded. Thus, bandwidth limits restrict hf TV operation to the slow-scan variety, whereby images appear as a photograph, or "stop-action," and do not require oodles of band space.

When using a-m or fm TV and facsimile (fax is a method of sending pictures and words for permanent display on paper) below 50 MHz, signals must not be wider than a single-sideband voice emission, about 3 kHz (97.65[d]).

Between 50 and 225 MHz, a-m fax and TV *single-sideband* signals may not be wider than a voice ssb signal, about 3 kHz. A-m fax and TV *double-sideband* signals may not be wider than an a-m double-sideband voice signal, about 6 to 7 kHz, when operating between 50 and 225 MHz. On fm at this segment, 20 kHz is the limit for fax and TV (97.65[e]).

No special bandwidth limits apply above 420 MHz, so you'll find wider bandwidth modes, such as fast-scan television, there. But, remember that in all cases not specifically covered by the rules, the various signals must be used in accordance with good engineering practice. Use state-of-the-art equipment that is properly adjusted. Conserve spectrum!

Digital Codes

Q. What are the bandwidth limits for RTTY modes?

A. Bandwidth limits for digital transmissions are indirectly provided by FCC restrictions on sending speeds. The amount of spectrum employed depends largely upon the speed at which data is transmitted and the frequency shift. The slower the sending speed, the less band space used.

Sending speeds are specified by FCC in terms of baud. Baud rate is the reciprocal of the time of one data pulse in a digital character, e.g., 1/0.022 seconds = 45 baud. At hf, where the bands are narrower than their vhf counterparts, sending speeds are more restrictive: 300 baud between 3.5 and 28.0 MHz. Spectrum conservation is the name of the game at hf, as we've seen from our discussion of slow- versus fast-scan television.

The limit for digital transmission between 28 and 50 MHz is 1200 baud; 19.6 kilobaud between 50 and 220 MHz; and 56 kilobaud above 220 MHz, where there is much greater space to play.

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been reviewed by the FCC's Personal Radio Branch for agreement with current FCC interpretations and policy. Numbers in parentheses refer to specific sections of the FCC rules.]

*Assistant Manager, Membership Services, ARRL

ARRL Membership Referral Program

What better way to get the newcomer (or any other non-member) on the right track than to recommend joining the League? Where else can a ham get that kind of value for the money?

Over the years we've noticed that many of our new members join because some other ham (a member) tells them it is the best way to stay in the mainstream of ham radio—and it's the best deal going, too. We've always appreciated these referrals. Use this new referral form enclosed with *QST* this month, and we will be able to show you our appreciation.

If you refer a friend to us who joins ARRL (regular membership including *QST* subscription), we will send you a certificate good for a book from List A. Refer two friends, receive two certificates and use those for a book from List B. If you are really persuasive, for 3 certificates you can have your choice of any book from List C. You can collect the certificates and hold them until you have enough for the book of your choice. (The certificates will expire six months from the date issued, though.)

We've included one referral card, but you may want more. Use the card on this page to make photocopies (or any reasonable facsimile)—it doesn't really matter. All we need to know is that it is a referral from you when the new member sends in his membership application and payment or credit card number. (Sorry, we cannot bill.) The only requirement is that the "new member" may not have been a member of ARRL in the six-month period immediately prior to the date of joining.

List A
50 Years of ARRL
200 Meters and Down
Weekend Projects
FM & Repeaters
Call Area Map
Understanding Amateur Radio
FCC Rule Book
Radio Frequency Interference

List B
Antenna Book (Paper)
Code Kit
License Manual
Hints and Kinks
Tune in the World with Ham Radio
QST Binder

List C
Handbook
Cloth Antenna Book
RSGB Operating Manual
HF Antennas
Amateur Radio Techniques (RSGB)

After you receive your certificate(s) for referring a new member, you may choose one book from List A for each certificate. You may choose one book from List B for two certificates (or two from List A). Each book from List C requires three certificates.

TAKE US TO YOUR FRIENDS

ARRL/CRRL MEMBERSHIP REFERRAL FORM

NEW MEMBER JOINING NOW

Name _____ Call _____

Address _____

City _____ State or Province _____ Zip or Postal Code _____

Membership with QST: $25 US, $30 Canada, $33 Elsewhere in US funds via ARRL Membership Referral Plan, Desk 22, 225 Main St., Newington, CT 06111. Canadians may join at $36 Canadian via CRRL, Desk 22, POB 7009 Stn E, London, ON N5Y 4J9.

SEE OTHER SIDE FOR IMPORTANT INFORMATION

[ ] Regular rate [ ] 65 or older/17 or younger — See over
[ ] Payment enclosed [ ] VISA [ ] Mastercard [ ] Am. Express

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

Signature _____

CURRENT MEMBER MAKING REFERRAL

Name _____ Call _____

Address _____

City _____ State or Province _____ Zip or Postal Code _____

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.

W1AW ON AMTOR

☐ There is no doubt: More than 30 years of amateur activity were packed with lots of excitement. It must have been just the long-time experience which caused the doubts on what happened the eve (local) of April 11 — a day I surely will not forget.

For quite some time I had not logged any RTTY DX contacts. While some European stations tried to satisfy themselves with local "chats," I suddenly heard an AMTOR station calling CQ in mode B and, to my greatest surprise, I clearly copied W1AW, being well aware who is "hidden" behind the call. As fast as this call had appeared, it faded out.

Despite my anger on the missed contact, I remained alerted and my waiting for another half hour paid off for a real exciting event: my first ARQ [Automatic ReQuest] contact with the U.S. since the FCC had "sacrificed" AMTOR on February 22, but also another first with ARRL's W1AW with "Chuck" at the keyboard. He must have been astonished on certain questions I had put to make sure he really was the genuine W1AW. I was rewarded with an excellent QSO with faultless copy until the band faded out again for the rest of that exceptional night.

Another "special" followed the nice contact. I know it would have been easy to deposit the QSL in the bunch of all the thousands in transit from ARRL. No, when I started to bring this story to paper, the postman brought the rare W1AW card. It obviously had been forwarded the fastest possible way. — *Max Suss, HB9JV, Switzerland*

A POSITIVE APPROACH

☐ Thank you for including the annual financial statement in May *QST*. I hope that this practice will continue. While the data has always been there for the asking, making it available to everyone through *QST* is the more appropriate and positive approach. — *J. W. Dreher, W2TKG, Baldwinsville, New York*

SAY WHAT?

☐ The comments attached to membership totals listed on page 56 of the April 1983 *QST* lead me to believe that some ARRL bureaucrat has realized that many amateurs have been priced out of League membership in the quest to promulgate bureaucracy and establishment of the League as a branch of the Federal Government.

Maybe you money-hungry rascals will soon get the message that all amateurs are not rich and the League cannot afford to be all things to all people. — *R. Alton Simpson, WA5TJB, Forrest City, Arkansas*

*Public Information Coordinator, ARRL

AH, THE HAM SPIRIT . . .

☐ During the night of the recent California earthquake (May 2-3), several people in our newsroom monitored the special "nets" on 40 and 75 meters.

The manager of KOMO walked into the newsroom to listen to the shortwave monitor. He was duly impressed with how ham operators had coordinated the effort. Just as I was telling him my own call letters, an operator in California came on and said, "Get your f-----g emergency network off my g----n radio." For the first time since becoming an amateur, I was embarrassed with the association. I listened more that night . . . and heard more of the same. — *Glenn H. Lambertz, NØDED/7, Seattle, Washington*

LIDS AND KIDS

☐ Either a new operating procedure has just made the scene or maybe I've just not noticed. I refer to the use of KN where it isn't called for.

You often hear two novices in QSO using it. Who but a friend of theirs would want to break in? Whenever I hear it, I wonder just who they think they are. When I was operating from the Greenland Ice Cap I never used it.

What prompted this note was a WB2 who was calling CQ this evening and signing KN. No one answered him. — *David L. Wiesen, K2VX, Newark, New Jersey*

LIDS AND OLDER KIDS

☐ I have been listening to many cw operators calling CQ in the Extra Class bands and, in many instances, they have called CQ for at least 20 times and without signing their calls. Then they call CQ again for another 20 times or more, also without signing their calls. Then, when they do, they sign their calls at least six to 10 times with DX. I have listened many times, and then found out they are local stations that sound like DX. I would suggest that any ham calling CQ on cw and also ssb, would call three times and sign twice and repeat the same procedure the same way for a few more times. I bet they will get more results if they do it this way. — *Raymond Van Handle, W2BAI, Passaic, New Jersey*

READ THE SPECS

☐ I have been interested in RTTY for some time now and one recurring dissatisfaction among RTTY users bears mention — the frequency stability among the crop of transceivers usually used on the bands by hams is marginal for RTTY. This is especially true with the advent of the MSO, where it is desirable to "listen in" for long unattended periods. A frequency drift of about 100 cycles (or less in many cases) will cause garbled copy or no copy. A check of the specs will immediately show that few modern transceivers have this kind of stability. Many will drift more than this even after a lengthy warm-up, and little can be done to improve the situation in most cases except keep your hand on the tuning knob!

The moral of the story is to look carefully at the frequency-stability specification before you buy that new rig for RTTY. If the rig has good stability, the manufacturer will show it prominently in his specifications. If it isn't so good, he will probably leave it out or express it as "parts per million," which is technically more exact but more difficult for the average ham to interpret. For reference, a drift of one part in 1 million will result in 14 cycles of drift at 20 meters. Many current rigs quote specifications of 20 parts per million or more. — *J. H. Mehaffey, K4IHP, Atlanta, Georgia*

TO LIST OR NOT TO LIST

☐ When I first read "DX Lists — Pros and Cons" (Sept. 1982 *QST*), I was absolutely against all DX nets. My views were completely final — DX nets are garbage in the hobby of cleanliness. (You may quote me on that!) Well, not long ago, I pulled out this issue of *QST*, turned to the article and began reading. I have changed indeed! The only statement I found reasonable was W4PTT's: "If a DX station does not want to have a list taken for him or to get on a net, all he has to do is refuse. If one does not want to participate in lists/nets, that's your prerogative." Think about it for a second: The people who are not interested in DX nets won't use them. The people who are interested will use them. It's all very uncontroversial, realistic and simple when you come right down to it. — *Andrew Rieser, KA2MZQ, Bedford, New York*

30 METERS

☐ I have just returned from our local ham club meeting where this month's program was entitled "Characteristics of the New 30-Meter Band." This made a very interesting topic, and the ARRL is indeed to be commended for its key role in getting us on this fine new band. Of course, we discussed equipment and the excellent propagation characteristics of 10 MHz, but I was surprised that so much of the discussion centered on the operating traits of the new 30-meter users. One of our elder and most respected members commented, "You had better get on 30 meters now before someone louses it up, because this is the closest thing I have ever seen to real hamming the way it was 30 years ago." At least three other members spoke up to emphasize the real and unexpected joys of working the fine, relaxed operators they are encountering on 10 MHz. There is indeed a noticeable difference!

Since we are constantly lamenting the boorish behavior on our other bands, I wonder if we might learn something constructive here? What makes the operators on 30 meters different and more pleasing? Well, how is 30 different from its adjacent neighbors, 20 and 40 meters? Let's see — no phone operation, 250-W power limitation, generally simple antennas, no contests. That's about it, except that we have encountered very few homebrew rigs, but that is true of all bands nowadays. — *Dave Christie, WB5KFP, Bartlesville, Oklahoma*

QST Profiles

Conducted By Andrew Tripp,* KA1JGG

This Ham Takes to the Wild Blue Yonder

Once a department store management trainee, Verne Orr, WA6IOG, has spent much of his working life as a public servant, rising to the position of Secretary of the Air Force, a post he has held since February of 1981. Born and raised in the Midwest, Verne moved with his family from his native Iowa to California at about the time he entered high school. There, he was graduated from Pomona College with a BA degree, and from Stanford University Graduate School of Business with an MBA in 1939. During WW II, he was an ensign in the Supply Corps of the U.S. Naval Reserve, serving in both the American and Pacific theaters. He was released from active duty as a lieutenant in 1945, and six years later was honorably discharged from the Naval Reserve as a lieutenant commander. Following his release from active duty, Verne spent the next 15 years as a partner in his father's new car dealership in Pasadena, and the next three years as president of a savings and loan association. Then-governor of California Ronald Reagan invited Verne to serve as the state's director of motor vehicles, a position he held from 1966 to 1969. He served for a brief time as the state's director of general services, and in January 1970 began a five-year term as California's director of finance. From 1975 to 1980, Verne taught government finance courses at the University of Southern California Graduate School of Public Administration. He achieved national prominence when he served on the Reagan Presidential Campaign Committee and was deputy director of the Office of the President-Elect during the transition.

Holding a model of an F-15A Eagle fighter aircraft, Air Force Secretary Verne Orr, WA6IOG, relaxes for a moment in his Pentagon office. Although his busy work schedule has him QRT, Secretary Orr looks forward to having "the leisurely ragchew" once he returns to the private sector. *(U.S. Air Force photo)*

QST: How and when did you first become interested in Amateur Radio? What in particular attracted you?

Orr: I became interested in 1959. Our daughter Carolyn was 12, and I thought if she had an Amateur Radio license it would give her an easy way to talk with boys. So, she and I studied together for our Novice licenses. Our son Robert, 10, also became interested, and we all three got our licenses together. Robert and I went on to get our General class licenses, although Carolyn stopped with Novice.

QST: What are your present amateur-related interests and activities? Do you ever get involved with Field Day or contesting, for example?

Orr: Although I am a member of the Pentagon Radio Club and was recently invited to cut the ribbon on the opening of their refurbished shack, my schedule has not permitted participation since assuming my present position. Before coming to Washington, the two activities from which I got the greatest pleasure were contacting stations the night before Field Day, when they were setting up their new remote locations and there wasn't the jam up or intense hurry to establish contact and move on, and the annual YL-OM contest.

QST: Are there any facets of the hobby you might delve into in the future?

Orr: When I return to a more normal life, my interest in the hobby will be exactly that which I had before coming to work for the Federal government. I have no urge to get into the pileup that accompanies chasing a rare DX station nor to move into satellite communications. I enjoy the leisurely ragchew and the checking out of equipment with other amateurs who have just bought new transmitters or put up new antennas and are anxious to get reports. General Curtis LeMay (W6EZV), known to many amateurs as one of the most outstanding Air Force officers, has a net of friends with whom he communicates regularly, and I very much look forward to joining that net when I can be home in midmorning, the hour in which he goes on the air.

QST: Do you remember your first on-the-air contact?

Orr: Definitely I do. Our daughter had been given the privilege of keying out the first contact and was exhilarated at holding an intelligible code exchange. I took over the transmitter next, using my call sign, and was immediately called down by her contact who reported to me that he had just talked to someone at that address and, since it was her station, I should be using her call sign and not my own. For the entire year she was a Novice, she delighted in insisting that I was illegally using my own call sign instead of hers.

QST: What are some other of your most memorable on-the-air experiences?

Orr: The experience I remember best happened to our son Robert. He had just built a Heath 2-meter rig and, when we finally got it working properly, his first contact was only a few blocks away, but it was Herbert Hoover, Jr. Mr. Hoover learned of Bob's age and his interest in Amateur Radio, and invited him to the Hoover residence. Mr. Hoover was extremely generous to Bob and helped him grind some crystals to get added frequencies, and I felt very grateful that a man of his prominence would take that much time to assist a young boy just getting started.

QST: Has Amateur Radio helped you, either with your career or in other ways?

Orr: In my present position as Secretary of the Air Force, I find my knowledge of Amateur Radio exceedingly beneficial. So much of the Air Force involves communications, satellites and radar, that my knowledge is helpful. In addition, it serves as a common introduction when I go into our avionic shops and talk with our technicians.

QST: In the early '60s, the Air Force literally helped launch the amateur satellite program by providing space aboard their rockets for OSCARs 1 through 4. How would you compare the growth of the OSCAR program over the past 20 or so years with commercial efforts in this area? Are launch opportunities in general going to become more difficult to obtain in the future?

Orr: The growth of the OSCAR program has closely paralleled the growth of commercial COMSAT programs, but at a lower level. The satellites have increased tremendously in capability and complexity over the last 20 years, and will make a major jump with the upcoming Phase IIIB satellite launch. This new satellite is computer-controlled, has an apogee kick motor, a peak rf power of 50 W/channel and 128 telemetry channels, and weighs 250 pounds — all in all, a very impressive satellite.

The launch opportunities are decreasing and will probably become more difficult in the future. As the satellites have grown in capability, they have grown in size and weight. They are no longer a small satellite to be "tossed over the side"; they are system drivers, as complex as the potential host. The best opportunity for launch is the Space Shuttle, where weight and size are relatively unconstrained for small, "important" secondary payloads. In this case, "important" is defined as in our interest because of the positive international goodwill created by supporting worldwide Amateur Radio operators.

*QST Features Editor

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

The CRRL Survey

At last, the results of the CRRL Survey! But first a few words on the background. Last December, we were busy preparing a mailing, to twist some arms a bit and get a few more of you to join the League. That mailing was going to every amateur in Canada. It was about then that President Tom Atkins called and said, "Why don't we spend a few dollars and take advantage of the mailing to ask a few questions?" Thus, the CRRL Survey was born.

No, it wasn't a professional survey like the Florida State University Survey done by the League a few years ago. If we had to do it again, we'd likely indulge in some rewording, throw out a question or two and add in others. But the survey did meet our basic objective: to find out about Canadian amateurs — their operating preferences, the organizations they support, the services they use or find useful and their opinions on a number of issues that will likely require decisions in the future.

Were there any surprises? Speaking personally, I expected more amateurs who were younger, and more amateurs interested in fm and repeaters or DX. I was surprised by the number of amateurs who had their Digital licence or were involved in packet radio or OSCAR. Sometimes you do lose touch — and that's what these surveys are for.

Special thanks to Ray, VE3ZJ, Audrey, VE3KGS, and all the members of the Staines family who spent hours entering data from over 3000 survey sheets into their computer. Thanks also to Dave Toth, VE3GYQ, who found time between delivering babies and removing appendixes to write the computer programs that resulted in many pages of interesting figures, including the Canada-wide totals below. [Note: Figures in parentheses after each question indicate the number of amateurs responding to the question. The figure after each answer indicates the number of amateurs choosing the answer, followed by the calculated percentage (in parentheses).]

1) *In what call area do you live?* (3016)
VO—45 (1%), VE1—230 (8%), VE2—353 (12%), VE3—1269 (42%), VE4—152 (5%), VE5—140 (5%), VE6—266 (9%), VE7—548 (18%), VE8—8 (<1%), VY—5 (<1%)

2) *When did you first become a radio amateur?* (3016)
before 1920—82 (3%), 1920-29—60 (2%), 1930-39—332 (11%), 1940-49—242 (8%), 1950-59—376 (12%), 1960-69—545 (18%), 1970-79—962(32%), after 1979—417 (14%)

3) *What class of licence do you presently hold?* (3016)
Amateur—878 (29%), Advanced—2085 (69%), Digital—4 (<1%), Amateur and Digital—8 (<1%), Advanced and Digital—41 (1%)

4) *What is your present age?* (3016)
under 20—69 (2%), 20-29—213 (7%), 30-39—555 (18%), 40-49—620 (20%), 50-59—608 (20%), 60-69—698 (23%), over 69—253 (8%)

5) *As an amateur, how active do you consider yourself to be?* (3016)
very active—478 (16%), moderately active—2189 (72%), inactive—349 (11%)

6) *If you are active, indicate your major areas of interest.* (3016)
160 metres—199 (6%), 80-10 metres—2360 (78%), fm and repeaters—1506 (50%), other vhf-uhf—243 (8%), cw—1484 (49%), ssb—1745 (58%), RTTY—365 (12%), SSTV—65 (2%), FSTV—52 (2%), packet—76 (2%), OSCAR—131 (4%), ragchewing—1357 (45%), traffic—410 (13%), emergency—466 (15%), DX—891 (29%), contests—294 (10%), awards—155 (5%), building and experimenting—1023 (34%), other—348 (11%)

7) *To what Amateur Radio organizations do you belong?* (3016)
CRRL—1519 (50%), CARF—1297 (43%), provincial—909 (30%), local club—1783 (59%), special interest—308 (10%) [Note: Of the survey group, 692 (23%) were members of both CRRL and CARF.]

8) *How much* weekly *are you prepared to pay to protect your privileges and receive an Amateur Radio magazine and other services that national Amateur Radio organizations provide?* (2290)
$0.50—611 (27%), $0.75—526 (23%), $1.00—738 (32%), $1.25—72 (3%), $1.50—83 (4%), $1.75—17 (1%), $2.00—243 (11%)

9) *As in Canada, some countries have two national Amateur Radio organizations. Do you think this is a good idea?* (2888)
yes—855 (30%), no—1388 (48%), not sure—645 (22%)

10) *Which organization do you feel has the experience and resources, and should represent Canadian amateurs nationally and internationally?* (2726)
CRRL—954 (35%), CARF—487 (18%), both CRRL and CARF—1022 (37%), a new organization—263 (10%)

11) *Do you listen to the CRRL "QST" news bulletins read regularly on stations and nets across Canada?* (2909)
yes, often—301 (10%), yes, occasionally—1008 (35%), no—1600 (55%)

12) *Do you use the CRRL-ARRL Incoming QSL Bureau in your province or territory?* (2879)
yes, often—373 (13%), yes, occasionally—770 (27%), no—1736 (60%)

13) *Do you plan to use the new CRRL Outgoing QSL Bureau?* (2777)
yes, often—307 (11%), yes, occasionally—1041 (37%), no—1429 (51%)

14) *Should amateurs and Amateur Radio organizations be prepared to help DOC administer Amateur Radio examinations?* (2900)
yes—1971 (68%), no—542 (19%), not sure—387 (13%)

15) *If yes, what kind of Amateur Radio organization should do this?* (2039)
national—983 (48%), provincial—349 (17%), local clubs and groups—707 (35%)

16) *Some amateurs have suggested that when the 160-metre band is deregulated, DOC should designate a 160-metre phone subband as is now done on 80-10 metres. Do you think this is a good idea?* (2849)
yes—1442 (51%), no—438 (15%), not sure—969 (34%)

17) *Other amateurs have suggested that DOC should not designate phone subbands on* any *amateur bands. They say phone operation should be regulated only by gentlemen's agreement as is now done on 160 metres. Do you think this is a good idea?* (2854)
yes—390 (14%), no—1914 (67%), not sure—550 (19%)

18) *A few amateurs have suggested that DOC should designate subbands according to bandwidth of mode in use, rather than according to mode (e.g., subbands for modes up to 300-Hz bandwidth, other subbands for "wider" modes). Do you think this is a good idea?* (2764)
yes—476 (17%), no—980 (35%), not sure—1308 (47%)

19) *Finally, what do you feel are the most pressing needs, issues or problems facing Canadian Amateur Radio today? Please add any general comments at the end.* Here's a selection from our "soapbox": Malicious interference...Intruders...cable TV operators and Amateur Radio equipment should have RFI standards imposed on them by the government...Amateur towers, antennas and dishes should be under jurisdiction of DOC...Clean it up; cut power to 500 W...Get rid of all damn contests...Stop American infringement of our Canadian-international phone bands...Stop telling Americans where they can and cannot operate phone...Maintain a high standard for obtaining a licence...Back off on difficulty of exams...Increase exams to once a month...Clear delineation of knowledge required to write DOC exams...I was a ZS before coming to Canada; now I must sit for exams...Have one strong body, namely CRRL...Get rid of CRRL; we have CARF...CRRL and CARF should continue to co-exist and give individuals a choice...CRRL and CARF should co-operate...CRRL and CARF should form one strong organization...More Canadian content in *QST*...Speed delivery of *QST*...No problems as far as I'm concerned...How to tell your wife you need a new rig!

CRRL NOTES

☐ DOC has announced a new reciprocal-operating agreement with Yugoslavia.

☐ Under the CRRL Constitution, the CRRL President and the ARRL Canadian Director are one and the same, and the CRRL Vice President and the ARRL Canadian Vice Director are one and the same. Elections for these offices will be held this fall. For details, consult the Happenings column in this *QST*.

☐ Nominations for CRRL Amateur of the Year are now open. Send names and supporting material to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

*163 Meridene Crescent West, London, ON N5X 1G3, Tel. 519-433-1198

IARU News

Conducted By Richard L. Baldwin,* W1RU

How to Become a Licensed Amateur in Japan

Just about all hams, wherever in the world they may live, are interested in Amateur Radio in Japan. First, Japan has a so-called "no-code hf license," and as a result sports the highest number of licensed amateurs of any nation. Then, much of the amateur equipment in use around the world was designed and manufactured in Japan, whose passion for electronics is widely known and admired.

There are four license classes in Japan: First Class, Second Class (limited to 100-W output), Telegraphy Class (all modes, but limited to 10 W and excluded from 14 MHz) and Telephony Class (all modes except telegraphy, limited to 10 W and excluded from 1.8 and 14 MHz).

State examinations are held twice a year, in April and October, in the capital cities of the 10 call districts (JA1-Ø) and of Okinawa Prefecture (JR6). In addition, examinations for the Telephony Class license are conducted about eight times a month in Tokyo. All examinations for First Class, Second Class and Telegraphy Class licenses are essay-type exams, and are given only in Japanese. The technical level of the exams is similar to those in the U.S., but the language barrier would be considerable even though there is no citizenship requirement.

For a Telephony Class license, one may take a 36-hour course given by the Japan Amateur Radio League — the completion of this course is considered equal to having passed the state exam. Last year, 710 courses were conducted by the 11 district offices of JARL, both in the evenings and on holidays. Candidates for the other exams usually self-study, although local clubs sometimes give courses.

The code-speed requirements are 12 wpm for First Class, 9 wpm for Second Class, 5 wpm for the Telegraphy Class and none for Telephony. In addition, applicants for the First Class license must also pass a Japanese-code test at 10 wpm (there are a number of additional characters). As of September 30, 1982, Japan had 532,349 amateur operators, 90% of which were Telephony Class licensees.

For overseas visitors, there is good news on the horizon. Negotiations are right now in progress for a reciprocal-operating agreement between the U.S. and Japan. More on that in a subsequent column.

IARU TO ATTEND HF BROADCASTING CONFERENCE

The International Telecommunication Union (ITU) holds both General World Administrative Radio Conferences (WARCs) and specialized WARCs dealing with a single service or area of the spectrum. WARC-79 was an example of a General WARC, one that comes only every 20 years or so and which revises the Radio Regulations and the Table of Allocations from stem to stern. General WARCs, as you might suspect, are the *most* critical to the Amateur Radio Service. Depending on the agenda, some of the specialized WARCs can also influence (for better or worse) the Amateur Radio Service.

For five weeks during January and February of 1984, there will be a High-Frequency Broadcasting WARC in Geneva, to deal with the "planning" of hf broadcasting. Because of the large number of hf broadcasting stations, and because of the widely variable propagation conditions, broadcasters try to coordinate their operations to minimize mutual interference. An entire Article of the ITU Radio Regulations, Article 17, is devoted to the procedure for working out seasonal schedules. The smaller countries feel this procedure doesn't protect their interests adequately, and would prefer a system of assigned channels; countries such as the U.S. say the bands aren't wide enough for such a system to work. Further, as our Intruder Watchers well know, hf broadcasters habitually operate "out-of-band" (that is, outside the bands allocated to broadcasting in the ITU Table of Allocations) when they feel that their broadcasting needs are not adequately served otherwise.

Because of the appetite of hf broadcasting for additional spectrum space, and because out-of-band broadcasters are often found on amateur frequencies, it is essential that Amateur Radio closely monitor what is happening in the world of hf broadcasting. Therefore, at its March meeting in Tokyo, the IARU Administrative Council determined that IARU would participate in the 1984 HF Broadcasting WARC. Application has already been made to ITU for IARU to have a team of observers on hand, in accordance with the provisions of the ITU regulations. It is expected that the members of the team will include representatives from each region.

*President, IARU

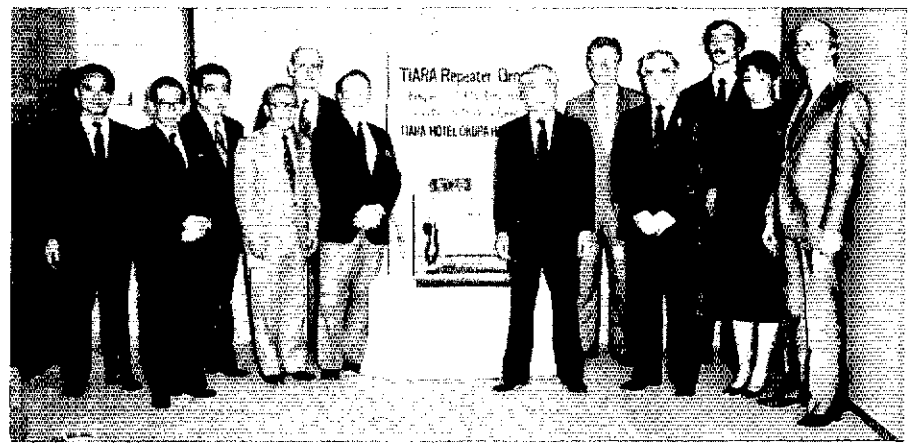
FOREIGN AMATEUR REPEATER IN TOKYO

In April 1983, the Tokyo International Amateur Radio Association (TIARA) celebrated the approval, thanks to support from the Japan Amateur Radio League, of its application for a foreign amateur repeater in Tokyo. The repeater operates on 434.78 (in) and 439.78 (out), and is located on the new wing of the Okura Hotel in Akasaka, Tokyo, with the antenna about 75 meters above ground. An 88.5-Hz subaudible tone is required for access. The location is central to the business area and is convenient for the Foreign community living in or just visiting Tokyo. The Okura Hotel is also the meeting place for TIARA. (It just happens that the managing director of the Okura Hotel is an amateur!)

TIARA is a group of 80 foreign amateurs from 14 countries living in Japan. First organized in 1970, it has grown steadily and over the years has assisted many foreign amateurs in getting on the air in Japan. Visitors are welcomed at meetings, which are usually held on the last Friday of the month. TIARA's mailing address is P.O. Box 119, Akasaka, Minato-ku, Tokyo 107. — *AHØA*

GOOD NEWS FROM TURKEY

After years and years of effort comes this word from Turkey that in early April the Turkish government accepted a new set of wireless rules that provide for radio amateurs. At the end of six months (in October), Turkish amateurs will become legal and licensed. Our congratulations to all those whose persistence made this achievement possible.



Present at the TIARA ceremonies at the Okura Hotel were (l-r) JN1WLE (Okura Hotel ARC), JG1SIY (president, Okura Hotel ARC), JI1TUY (Okura Hotel ARC), JA1CLN (manager, External Affairs, JARL), AHØA (president, TIARA), W1RU (president, IARU), JA1AN (president, JARL), W2ZWA (vice president, TIARA), G4JFM (TIARA), WA4PRF (TIARA), I1RYS (TIARA) and SM6CPI (secretary, TIARA).

Public Service

Conducted By Robert J. Halprin,* K1XA

Board Adopts Alert Frequency Concept

At their Annual Meeting in April, the ARRL Board of Directors accepted an Emergency Communications Advisory Committee recommendation concerning the AB1Z Eastern Massachusetts emergency alerting plan, directing the General Manager to implement this recommendation. New England Division Vice Director K1PAD summed up the essence of the unique alerting plan:

"The method is infinitely simple and requires no modification for anyone with a 2-meter fm rig. The idea is this. Set aside a simplex frequency and, when you aren't using your rig for anything else, monitor this frequency. There will be no two-way communication on the frequency. In the event of an emergency during odd hours, people would be alerted by an alert transmit station and told which repeater to go to for more information. A group of alert transmit stations have been trained and would retransmit the alert right on the simplex frequency to spread the message over an increasingly large geographical area.

"The beauty of this system is that absolutely no hardware modfications or additions are necessary and people can participate immediately. The only requirement is the discipline to dial up the alert frequency instead of turning the rig off. Not having two-way communications on the frequency keeps it quiet and also puts into action the only proven way to cure any malicious interference that might occur — and that is 'dead silence.' This technique has been used a number of times in Eastern Massachusetts, most notably during a huge fire in Lynn, Massachusetts (see Feb. 1982 *QST*, pp. 83-84). I know the system works."

Readers of the Lynn fire article will remember that the Eastern Massachusetts ARRL leadership decided to use 145.695 MHz as their alerting frequency (for reasons explained below). However, the League's Emergency Communications Advisory Committee chose not to designate an official frequency for this emergency alerting plan, preferring to let the decision be made at the local level. The ECAC recommendation (as submitted by chairman W5GHP) which the Board adopted, is as follows:

> The committee agrees with the AB1Z emergency alerting plan. This plan is very easy to implement and can be used in its present form, even though more advanced systems may be in the planning stage or even the hardware stage. No special equipment is required. Concerning the recommendation of a specific frequency, it is felt that this should be a consideration of the local ARRL Emergency Coordinator in cooperation with the ARRL Section Emergency Coordinator. The ECAC therefore recommends that as much publicity as possible be given to this plan, and that information on it be published in all manuals concerned with emergency communication.

AB1Z, the originator of this idea, has generated an extensive amount of documentation on the concept. Here's a portion of his explanation:

> The alert frequency is a new kind of OFF position for any 2-meter transceiver or scanner. The designated simplex frequency is the place to leave the knobs when you want silence. This frequency is reserved for an emergency announcement when hams are urgently needed to provide communication. The emphasis is on speed; it will bring you the word hours sooner. The alert frequency can also be used to transmit a warning when a major emergency is imminent; that could give you just the time you need to protect yourself and your family.
>
> Like tone signal systems, the alert frequency is a selective alert system. The receiver stays silent except when there is an alert. Unlike tone systems, the alert frequency doesn't require any hardware. No black boxes need to be built or hooked up. The frequency itself is the selective feature. This means that any ham with a synthesized rig or scanner can "install" it immediately just by punching it in. That's what this concept is all about.
>
> The alert frequency idea grows out of the Eastern Massachusetts Plan's philosophy of reliability through redundancy. No single person or piece of equipment is essential for its success.
>
> The alert frequency isn't intended to be the only method of getting hams in an emergency. Many other methods may be appropriate. The alert frequency fills in the gaps left by the limitations of other methods. Its virtue is that it can reach many hams outside the hours when repeaters are active, without requiring any special hardware.
>
> It's *not* a distress frequency. The addressee for a distress call is not the ham community but a public safety agency. To reach them, we have autopatches... Metropolitan areas usually have many repeaters within range; most times it's possible to raise someone on at least one of them. Remember, a call on the alert frequency may wake hundreds of people, so using it should be a last-ditch response to a truly desperate situation.
>
> It's *not* an emergency operating frequency. The actual operation takes place on one of the many available repeaters, standard simplex frequencies or RACES frequencies.
>
> It's *not* an emergency check-in frequency. The alert announcement specifies the frequency to check in on. The alert frequency goes silent again as soon as the alert announcement is finished, in case a further alert might be needed later.
>
> Obviously, it's *not* a routine calling frequency. Yes, your friend might be listening. But if you use the alert frequency to call, you'll be discouraging other hams from using it as a way to shut the rig off. That's what we all want to avoid.
>
> To avoid confusion about any of these points, it's *not* called an "emergency frequency." Its only name is "the alert frequency."
>
> We have many operating frequencies, many methods of calling for help and many frequencies that can be used for calling; but we have only one recognized and reserved alert frequency. Therefore, its usefulness should be protected by using it only for its recognized purpose.
>
> Basically, just treat the designated simplex frequency as the receiver's OFF position. No changes in operating habits are needed, except to discontinue the practice of shutting off the power. Leaving the offset switch wherever it was for the last repeater used will make sure that any accidental transmission isn't on the alert frequency.

Shirley, KAØBCB, and Christine Law, chairman of the "Business and Professional Women's Fun Run," discuss the progress of the marathon held in Gering, Nebraska. The Scotts Bluff County Amateur Radio Emergency Service provided communications for the event over the WDØBQM repeater. *(Jeanne Weber photo)*

The ECAC and the Board, in adopting this concept in principle for nationwide implementation, did not name any specific 2-meter frequency, therefore leaving that decision to the local emergency communications leadership. However, it may be useful to readers to understand why Eastern Massachusetts amateurs adopted 145.695 MHz. AB1Z addressed this point:

> The basic criterion for a frequency that hundreds of hams will be listening to around the clock is that it should be completely free of anything except high-priority alerts. A channel is needed that has nothing already on it.
>
> Obviously, repeater channels and fm simplex frequencies can't be used. That leaves out everything above 146 MHz and the inputs and the outputs of the 145 MHz group. We don't want to come into conflict with the active cw and ssb segment at the bottom of the band or its logical expansion space. Scratch 144.9 MHz and below. Satellite frequencies are out. So everything above 145.8 MHz is eliminated. 144.9-145.1 MHz is assigned to fm weak signal work; however, it's also used for simplex operation sometimes. So is 145.52 MHz, which is a simple click down from 52/52 on a lot of rigs. Better rule out everything below 145.6 MHz.
>
> We also wanted the channel chosen to be a RACES frequency so that it could legally be used in case of a presidentially declared emergency, which might shut down the rest of 2 meters. [The FCC is presently exploring the idea of bringing the 2-meter RACES allocations in harmony with established 2-meter amateur usage — Ed.]. At this writing, the lower RACES segment extends up to 145.71 MHz...that leaves exactly *one* RACES frequency meeting all the specifications — 145.695 MHz.
>
> As for possible conflicts with the regular band plan, 145.5-145.8 MHz is listed as "miscellaneous and experimental modes" in the band plan in the latest *Repeater Directory*. There isn't a lot of that, and we're out in the middle, away from the frequencies most likley to be used. This type of activity is likely to involve weak signals, which would not ordinarily be detected by typical fm receivers with average antennas and locations. As for interfering with these activities, alert transmissions (including test transmissions) will be extremely rare. Thus, the time taken away from other possible uses is insignificant.
>
> As a cross-check, several stations, including one at a well-known repeater site, monitored the frequency for a couple of months without detecting any carriers. So we really do have the channel we need. The wide publicity being given to the alert function should also reduce the chance for casual use.

It should be reemphasized that the ECAC and the Board, in adopting this concept, decided to make the specific frequency choice a local option. If such an alerting plan will enhance the emergency response of your local radio amateur organization, then serious consideration should be given to implementing a simplex alert frequency in your area. Further details on this innovative approach to emergency alerting can be obtained by sending a business-sized s.a.s.e. to John A. Carroll, AB1Z, 25 Evergreen Ave., Bedford, MA 01730.

THE COALINGA QUAKE

The quake was quite strong in Los Altos and surrounding cities; consequently, over a dozen local Amateur Radio operators reported in on the local repeater, W6ASH/R, within a minute. All local reports were about the same, so operators were assigned to

*Deputy Communications Manager, ARRL

monitor other repeaters and networks. W6ASH put out a general call on the Mt. Diablo repeater, WA6EUZ/R, and in seconds had reports of approximate strength of the shake from 20 cities stretching from Shasta to Fresno. It appeared that the strongest shake was in the Fresno area. After returning to the local repeater and within 15 minutes of the shake, reports from Coalinga were picked up, stating "downtown in ruins and burning." Immediately, KGO-TV was called with the report. Later, KGO-TV called back and got up-to-the-minute reports from WB6OML, our PR man, and put him on the air on the 6 P.M. newscast.

Meanwhile, N6IIU was monitoring our network. He passed the information to the Red Cross Division Headquarters in San Francisco. His information updated theirs, and since Coalinga is in our division, they decided to immediately send the Palo Alto radio-equipped van down with a damage-assessment crew. N6IIU came back on W6ASH/R and called for volunteers. W6ASH, KT6W and WA6ZBX responded. I (W6ASH) loaded my car with hf, vhf, scanner and antennas; KT6W loaded his car with a gasoline generator and antennas; and N6IIU got the Palo Alto van loaded with cots and vital disaster kits. Through coordination on the repeater, we were on the road in a convoy by 7 P.M.

The repeater mentioned above, W6ASH/R, is owned by the Southern Peninsula Emergency Communication System (SPECS). It is located on the El Camino Hospital in Mountain View, and is dedicated to public service. Some other frequencies used en route and at the disaster scene were 3902 kHz and 147.33 MHz.

N6IIU is the Disaster Chairman for Palo Alto Red Cross. Representing the Division, he was in contact by Amateur Radio with San Francisco and Coalinga during the trip. He obtained clearance through the CHP roadblocks, got directions to the temporary Red Cross shelter and, among other things, arranged for feeding the victims!

We arrived at the Red Cross shelter in the West Hills Community College gymnasium, about five hours after the quake. Power to this area was intermittent, so we started KT6W's generator and had hf and vhf radios in operation in 20 minutes. We checked into a network already in operation in the area.

The local hams had responded immediately after the shock and had coverage of the Emergency Operation Center (EOC), the airport, the police station, the church temporary shelter and the Fresno Red Cross. KV6W was the acting emergency coordinator for the local hams. Since we had established a semipermanent, portable station on emergency power at the Red Cross shelter, he asked us to take control of the network. WA6ZBX became chief operator for the next 72 hours. He was assisted by many volunteers from the Kings County ARC and the Visalia Radio Club. KV6W assumed control on Thursday, changing from a 24-hour day to an 8 A.M.-8 P.M. schedule.

The *Hanford Sentinel* gave Amateur Radio many accolades for their operation, particularly to the local operators who were on the scene when it happened. The Fresno Radio Club kept their radio-equipped van at CHP headquarters overnight Monday.

Although the four men from Palo Alto/San Francisco were amateurs, their primary mission was to spearhead the damage assessment which must be done before the Federal Emergency Management Agency (FEMA) could declare it a disaster area. Our leader, N6IIU, had trained thirty five members of SPECS in Red Cross Damage Assessment. They had previous experience when they assessed the Alviso flood area in March where 400 homes were under one to four feet of water for several weeks.

At 9 A.M. Tuesday, the day after the quake, N6IIU conducted a crash course covering the fine points of assessment. Twenty teams consisting of amateurs as leaders, County Health people and Building Inspectors set out to evaluate the damage. By midnight Wednesday, the survey was complete and the data was tabulated. National Red Cross personnel rushed the data to Washington, and President Reagan declared Coalinga a disaster area, which qualified the victims for low-interest loans to rebuild. When the assessment work was finished, N6IIU assumed an official Red Cross staff duty in charge of Supply and Transportation at the Red Cross Field Headquarters.

Everything possible was done to coordinate Health and Welfare traffic incoming and outgoing. When the SPECS gang left on Saturday, KT6W and his crew from the Kings County Amateur Radio Club were still busy sending out amateurs to locate victims. Welfare Traffic — or Disaster Welfare Inquiries (DWI), as the Red Cross prefers to call it — was lighter than expected. A large amount of it would probably have been generated in the shelter, but of the 7000 victims, less than 50 used the shelter. Most of the victims stayed near their homes and slept in trailers or tents. About 5000 per day were fed by the Red Cross and the National Guard. Blank message forms and signs were posted, but response was low.

A large portion of the phone service was restored in a day or two. The Red Cross was so busy with disaster-related work that they banned incoming DWI for three days. When it was accepted, it came in batches by radio and landline. Those messages that could not be phoned were delivered, mostly by the local amateurs in their personal vehicles. The Red Cross policy on DWI requires that all DWI traffic be routed to and from the local Red Cross chapters throughout the country to the Red Cross chapter nearest to the disaster scene.

During our stay down in Coalinga, we kept in contact with home and San Francisco Headquarters by skeds on hf with WA6LIJ, WB6OML, N6FW, KE6PQ and WA6LDW.

We in the San Francisco Bay area have gone years without a disaster; however, this is our third emergency this year. We were lucky they were all on a rather small scale. It has gradually built up our experience and training and we feel that now we are better prepared for "the big one," when it comes. Of course, SPECS has many drills annually, but this year has been a real workout! — *Walter Read, W6ASH, DEC-at-Large, Santa Clara County*

REPEATER LOG LIVES!

Yes, the Repeater Log, formerly a monthly feature of this column, is alive and well, and living in the FM/RPT column. This change of QTH will provide even more recognition for the important public service communications activities handled on repeaters. The Communications Department staff *(and not* FM/RPT Conductor WA1LOU) will continue to compile the Repeater Log, so please send your reports (preferably on form CD-258) to ARRL Hq. as before.

NWA AWARDS

The National Weather Association has announced its Award Program for 1983, and as was the case last year, organizatons and members of the Amateur Radio community may well qualify for recognition under two of the award categories. Those two categories are:

1) The greatest contribution to meteorological operations by an organization that is not directly a part of the professional meteorological community. This category could include organizations such as clubs, the Amateur Radio Emergency Service, or Radio Amateur Civil Emergency Service groups or nets that are distributing vital forecast information that results in prompt evacuation of people from an area where severe weather has been forecast.

2) The greatest contribution to meteorological operations by an individual who is not a member of the professional meteorological community. This could be a radio ham operator who transmits observations to the National Weather Service during a hurricane or heavy rain from an area where there is a scarcity of data or distributes warnings of severe weather to an area where normal communications are limited or have been disrupted.

Narrative nominations, with comments or endorsements as might be applicable, should be forwarded to: Mr. Edward J. Maree, Chairman, NWA Awards Committee, 25 Hillcrest Dr., Pembroke, MA 02359.

Nominations should be received by the NWA committee prior to September 30, 1983. The presentation of award plaques and possible honorable mention certificates will be made at the National Weather Association's annual banquet. If you need any additional information, feel free to contact me by mail or phone. My office number is 617-861-2552. — *Darell R. Whitehead, 11 Patterson Rd., Bedford, MA 01730*

PUBLIC SERVICE DIARY

☐ Near Bozeman, Montanta — February 19-20. A cross-county skier lost his life in an avalanche near Bozeman. Local amateurs WB7AZJ and WA7GHW helped in the accident area in the search of the skier's body and in providing back-up communications. Primary communications were provided by the sheriff's radio system between the site and Bozeman. Amateur communications were contributed by on-site portables and by portables which were used along with the Bozeman WR7ANC repeater. W7JMX, N7AIK and KB7Q supplied off-site contacts. (N7AIK, SM Montana)

☐ Dallas, Texas — April 5-6. A 120-block area of the Oak Cliff section of Dallas lost its telephone service when a man cut the telephone trunk line with an axe. At 6 P.M., the city's Office of Emergency Preparedness contacted Dallas RACES officials to request Amateur Radio assistance. Within minutes, over 40 local amateurs and the Dallas County ARC communications van were enroute to both the city EOC and the place where the phone line had been severed. Within an hour, the van had been set up at a nursing home in the affected area, and a vhf station had been established onboard the fire department's command van to conduct the emergency net. Amateurs were dispatched to provide additional mobile support. Since a hospital was located in the same area, a second station was set up at the hospital and was operated throughout the night.

By 11 P.M., the amateur operation was running so successfully that the fire department companies pulled out, leaving only the amateur operators on patrol until the next morning. The ham operation was secured about 7 A.M. While no fires or major incidents were reported by amateurs, several pieces of *third-party traffic* were handled on behalf of the hospital. City officials were pleased with the Amateur Radio operation, and expressed their thanks to the participants. (N5FDL, PIO Northern Texas)

☐ Saugus, Massachusetts — April 19. The North Shore Repeater Association issued a call for Amateur Radio operators to help search for a 13-year-old boy who had been missing all night. NSRA control operators W1HOO, W1MCX and K1VLK from the 19-79 Repeater Association coordinated volunteer efforts with the Saugus Police. Hams cooperated with the Boy Scout troops and other volunteers searching the marshy area and nearby woods until 11 A.M., when the Saugus Police notified the searchers that the boy had been found safe in a friend's treehouse. (KA1HVC, public relations director, North Shore RA)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Warren, Ohio — December 25, 1982. An early Christmas morning fire in a 148-unit apartment complex forced the evacuation of between 150 and 200 tenants. Once fire departments had been notified and were at the scene, EC KC8GI was contacted by the Red Cross for communications help by the local ARES. Red Cross officials set up emergency facilities for the evacuees at a nearby school in Niles, and ARES members from both Mahoning and Trumbull Counties conducted relay communications over W8VTD/R and on MARS frequencies for fire and Red Cross officials. (KC8GI, EC Trumbull County)

☐ Riverside County, California — February 21. SEC W6UBQ issued a general call over W6TJ/R for radio operators to go to the Riverside County General Hospital, which had just lost its telephone service. Once the ten operators who responded to the call arrived at the hospital, they were each assigned to critical points within the building. During the five-hour outage, they used simplex frequencies for paging hospital officials and relaying time-valued advisories and consultations. (W6UBQ, SEC Orange)

☐ Ventura County, California — February 28-March 5. Heavy rainstorms resulted in all county reservoirs being filled to maximum capacity, and caused flooding and mudslides in the area. When the Sinalda Dam face moved about 5 feet and threatened to break, between 1400 and 2000 Simi Valley residents were forced to evacuate the area. During the three-day crisis, ARES members conducted emergency communications over WA6ZTT/R between the four established evacuation shelters and the disaster officials. WB6RVA ran the amateur portion of the operation, while WD6EVT coordinated the efforts of the Simi Valley ARES members. (W6RIC, DEC Ventura County)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For April, 41 SEC reports were received, denoting a total ARES membership of 23,596. Sections reporting were: AL, AB, AZ, AR, CO, IL, IN, IA, KS, KY, ME, MI, MN, MO, NE, NH, NLI, NC, NFL, NTX, OH, OK, ON, ORG, PAC, RI, SV, SDG, SJV, SC, SD, SFL, STX, TN, VA, WA, WV, WMA, WNY, WPA and WI.

NATIONAL TRAFFIC SYSTEM

Effective May 22, PAN Cyles One and Two changed its meeting frequency to 14,247 kHz. Congratulations to WB2ZJF, who has become an assistant net manager for 2RN/c2. Thanks go out to N2CER for his help in that slot. An 8RN/c4 certificate went to KZ8Q.

April Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	30	1050	35.0	.894	98.3	
CAN	30	858	28.6	.548	100.0	
PAN*	30	685	13.4	.398	83.3	
Region Nets						
1RN	57	324	5.7	.329	86.7	100.0
2RN	60	392	6.5	.382	96.0	100.0
3RN	30	236	7.9	.466	96.7	100.0
4RN	60	548	9.1	.359	74.7	100.0
RN5	60	591	9.8	.340	98.8	100.0

RN6	60	484	8.1	.386	95.0	83.3
RN7	90	596	6.6	.450	80.6	100.0
8RN	58	322	5.5	.338	90.6	100.0
9RN	60	437	7.3	.319	100.0	100.0
TEN	30	400	13.3	.367	93.7	100.0
ECN						90.0
TWN	60	242	4.0	.307	74.0	83.3
TCC						
TCC Eastern	99[1]	499				
TCC Central	78[1]	374				
TCC Pacific	111[1]	490				
Cycle Four						
Area Nets						
EAN	30	1812	60.4	1.570	98.3	
CAN	30	941	31.4	.934	99.4	
PAN	30	1107	36.9	1.212	99.4	
Region Nets						
1RN	60	736	12.3	.591	96.7	96.7
2RN	89	720	8.1	.550	95.2	93.3
3RN	61	331	5.4	.512	97.8	100.0
4RN						100.0
RN5	60	639	10.6	.653	95.0	100.0
RN6	60	757	12.6	.644	100.0	100.0
RN7	60	542	9.0	.737	98.9	100.0
8RN	53	336	6.3	.355	84.0	100.0
9RN	60	454	7.6	.415	99.2	100.0
TEN	60	380	6.3	.374	84.8	98.3
ECN	60	365	6.1	.529	94.0	100.0
TWN	58	437	7.5	.397	84.6	98.3
TCC						
TCC Eastern	112[1]	696				
TCC Central	54[1]	350				
TCC Pacific	109[1]	810				
Sections[2]	6753	26,163	3.9			
Summary	8179	45,689	5.6			
Record	9642	56,155	19.1			

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (241): APSN ATN (AB), AENB AEND AENH AENJ AENK AENR AENY AENZ ATNM ECAARESN MCENS (AL), ACN ATEN HARC (AZ), NCTN SCN/1 SCN/2 SCN/V SVTN (CA), CN CPN NVTN RSN WCN (CT), DEPN DTN SEN (DE), BEN DEN ENMC FAST FMSN FMTN FPON FPTN GN LCEN NFPN PBTN PEN PRVAN QFN QFNS SEFTN SPARC SWFTN SVTN TPTN (FL), CIARES IGLARES ISBN ITEN PCARES PMN TLCN (IA), ILN ITN (IL), ICN ITN QIN (IN), CSTN KMWN KPN KSBN KWN QKS QKS-SS 3ARES 4ARES 5ARES 6ARES 11ARES 13ARES BARES KEN KNTN KRN KSN KTN KYN KPON LCARES MKPN PAEWTN SEKEN TSTMN WTEN (KY), CI2MN EM2MN EMRI EMRIPN EMRISS HHTN NEEPN (MA/RI), MPSN OXRACES PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MNAMWXN MSN MSPN MSSN PAW (MN), CMEN JCARES MOSSB MTTN SLARES (MO), MTN (MS), CEN CFARS CMN CNCTN JFK M2MEN PCTN RARS THEN (NC), CN CSN (NC/SC), BVARESN CCN DFW EN2MARES MNARES NCHN NCN NE40 NE75 NMPN PV2MN PVTN SBARES WNN (NE), GSFM GSPN NHN (NH), JSARS MCN NJM OBTTN SJVN TCETN (NJ), NSN (NV), CDN CNYTN EPN HVN NCVHFTN NLI NLIPN NYPON NYS NYS/S OCTEN SCVHFTN SDN STAR WDN (NY), ALERT BN BRTN COARES LCTN MCTN O6MN RARA VWN (OH), NWOSN OLZ ONON OPEN OTN OTWN STN (OK), KTN OLN OPN OSN OSN2 OSND TIN (ON), BSN ORARES OSN PDXARES PTTN (OR), CCESN D3ARES D5ESN EPA EPAEPTN NWPA2MTN WPA WPA2MTN WPAPTN (PA), PTN (PAC), QSN WQVUARESN (PQ), A2MN GPD2MN LC2MN SCNTN SCSSBN (SC), SDN SDSMEN SDTIN SDWN (SD), TNCW TNPN TNVHFN TSRN (TN), TEX TSN TTN (TX), BUN DCN UCN (UT), VTN (VT), STARES SVEN VLN VN VSBN VSN (VA), EWTN NTN PSTS WARTS WSN (WA), WVARES WVFN WVMDN WVN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	103	96.1	989	499
TCC Central	90	86.7	748	374
TCC Pacific	120	92.5	980	490
Summary	313	91.8	2717	1363
Cycle Four				
TCC Eastern	138	81.2	1390	696
TCC Central	60	90.0	661	350
TCC Pacific	120	90.8	1601	810
Summary	318	87.3	3652	1856

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (April) *Cycle Two* — Eastern Area (N2CER, Director) — AA4AT N3ADU N1BHH N2CER K1EIC WA2FJJ VE3GOL WB3GZU KO2H WA2HEB WB1HIH VE3HTL KB3LF WA4LJI WD8LRT AH2M W8PMJ WB4PNY W1QYY W2RQ KB3UD AF8V AK1W WB8WKQ N2XJ W1XX WB8YDZ. Central Area (W9JUJ, Director) — N5AMH N5AMK K5BNH N5BT N5CRU W5CTZ N5DFO W0FRC W4JL W9JUJ K5KJN W5KLV KD5KQ KA4MZY W9NXG KA4SAA KB5TC WB9WGD WF4X WB5YDD. Pacific Area (W0HXB, Director) — NI6A KT6A N0ACW N7AFZ N6ANL VE6CHK N7CSP N0CXI KU6D W7DZX W0EJD KB7FE W7GHT N6GIW K6HAD W0HXB KM6I W5JOV KB0MB WB0MTA K6OWA WA7OYI KF7R ND5T W7TGU WB7TQF KV5U K6UYK W7VSE WB7WOW KM7Z. *Cycle Four* — Eastern Area (W2CS, Director) — W3ATQ VE3AWE W3BBN KI3C WA4CCK W2CS VE3CYR WB2EAG W1EFW K1EIR W2FR WD4FTK W2GKZ VE3GOL WB3GZU KO2H KN1K N4KB K2KIR K8KQJ AH2M WB8MTD N1NH K8OZ W8PMJ WB4PNY W3PQ W1QYY K3RZR WA2SPL KA1T W4UQ VE1WF WB8WKQ W2XD N8XX N2YL K4ZK. Central Area (W5GHP, Director) — W0AM W9CXY K0EZ K5GM W0HI W5LQ W5RB N5TC W5TFB K5TL WB9UYU KB5W KB9X W4ZJY. Pacific Area (K0DJ, Director) — AD0A WD0AIT KN7B K0BN KC0D K0DJ W7DZX N2EC W6EOT W7EP W7GHT WA7GYQ W0HXB WA7KHE K7KSA W7LCF W7LG W7LYA KA0NLI ND5T WA7TEH W7VSE W6VZT VE6ZK.

Public Service Honor Roll
April 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.

623
W0ZWL
211
K7VW
210
K5CXP
204
WB7TQF
184
WB7WOW
180
K4SCL
164
WD4COL
140
WF4Y
WF4X
137
KA1GBS
134
W2AHV
KM9B
133
KU0G
128
WB2UVB
KA1T
127
WB5YDD
124
WA4QXT
122
W1EOF
KC9CJ
KC0OO
118
WB1GXZ
N2XJ
KA3DLY
117
WA4PFK
WA1TBY
116
WD8LRT
115
N4FQD
114
K4JST
W9YCV
113
K2ZM
WB3GZU
WA4EIC
112
WB2IQJ
KA4SAA
K4ZK
111
W7VSE
N7DNG
110
WB4WYG
108
WB2MCO
107
WA4YPQ
106
W4ANK
WA4CCK
KC2QQ
AF8V
105
WA4JDH
W0OYH
NI6A
NG4J
KB3UD
104
WA5RVT
W1TN
W0KJZ
VE3HTL
103
VE3BDM
N6AWH
KA8GJV
102
WA3WIY
W9JUJ
W3YVQ
KZ8Q
101
WA2HEB
W4CKS
K8KQJ
K7GXZ
100
WD8RHU
WB2ZJF
KV5X
99
WA7GQO
WD4ALY
KY2P
AL7W
AK1W
98
W5DTR
WD4CNQ
N8EES
N1BGW
KA5HDT
KU4W
KA4GFU
97
WB2RBA
W7GHT
W6VOM
96
WD9ESZ
WD8MIO
WB8WKQ
WB2OWO
WA7LGN
WA2FJJ
WA0TFC
W6NTN
WB2VUK
W2AET
KS7I
KD5FR
95
KB5EK
94
KF8J
KA8CPS
K9CMO
K6UYK
K2VX
93
WD4AWN
W1PUO
N2AKZ
KA4GUS
92
WB3KUZ
N1BJW
KK1E
KR4V
KA3GJT
KA1EPO
91
WA1YNZ
VE3DPO
N8DSU
N1ARI
90
W9DM
W5CTZ
N5TC
KI1M
KC2TF
KB4OZ
89
W2MTA
N3COY
KT6A
AK1E
AG9G
88
NP4D
N2CER
W2BIW
K5UPN
87
WA8GMT
VE3GT
N3CKQ
N2DPN
86
W2YJR
KB4WT
KA3EJG
84
N6GIW
N5EFG
KY4U
KB5UL
KB2WI
KA8IAF
83
WB7NHR
WA2ARC
K7LCA
KA1AVU
KG9B
82
WB2IDS
W6INH
W1RWG
KA4BCM
81
AK2E
WA2KOJ
W2ZOJ
KD4PJ
KA4AUR
80
WD9FRI
WA2CUW
VE3KK
NF5T
79
WD5GKH
WB1ABQ
KT6D
KE6NO
78
W6RNL
WB4AID
WA4LXP
K2ZVI
K4VWK
KD9K
76
WB5LBR
N7BGW
N4GDT
KA0BCB
K0SI
75
WB5MMI
WB2GHN
WA5QFD
W9NXG
W7LNE
W3VA
K3CR
74
WB4TZR
W7EP
N1AJJ
KS5V
KJ3E
KA2BHR
KA1BHT
73
N0CFS
W0LAE
KD4TY
72
WA3UNX
W2GJ
KT5Y
W6IPL
KA0BWM
K3ZJJ
71
WB3FKW
WB2KLF
W5KMF
W5KLV
KB3FW
KA1TJ
70
WB1HIH
W4ZJY
W1YOL
KC2SW
KA9HPQ
W4LKB
K1JHC
AC3N
69
WB8MTD
KA4IUM
W3DKX
VE2EDO
KA3DTE
K8JDI
68
WD4HBP
N9BYK
N5FDL
KA0NLI
KE1U
67
WA3EHD
W4HON
N3CJP
W2PKY
KT0U
K4ZN
66
WB6QBZ
WB4GHU
WA4EYU
N9ATP
N1CLV
KC4WN
KA7AID
65
WA8DHB
WD4OCW
NW4R
WA4LJI
KA5AZK
64
WB4NTW
WB2QMP
WA6ZUD
WA4JTE
W0OUD
KA2MBP
N4UF
KS2G
K4WJR
63
WD8KBW
W4SME
N0EEH
NN4I
KC3DW
KA0ARP
AG2R
62
WD9IBH
W8EK
W0KK
K6TWJ
W0FRC
N5BT
N2BLX
KP4DJ
KB7FE
KA7ELI
61
WA6QCA
KA8MEB
AI6E
60
WD4BSC
WB0HOX
KD5GM
WA0SCP
W4FMZ
N3ADU
KB3LF
KA4BBA
56
KA1BBU/T
53
N6EPG/T
45
KA9OBP/N
KA2DQA/T
43
KA8GGZ/T
40
WD8ECM/N

Brass Pounders League
April 1983

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: KA1GBS K3RZR WD4ALY NN4I KB4WT K5CXP KA5CXW KB5EK N0BQP.

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
K3NSN	2118	1196	196	100	3610
W3CUL	645	996	1384	52	3077
KA9CPA	32	1439	211	1037	2719
W9JUJ	1	508	428	3	940
W3VR	197	289	378	31	895
W1EOF	0	289	482	26	797
WB7TQF	283	126	185	125	719
K8NCV	24	334	353	5	716
WA2SPL	20	285	338	48	691
W7VSE	0	328	314	12	654
KT6A	5	353	272	6	636
W7DZX	15	312	300	5	632
VE3HTL	7	287	297	15	606
WB7WOW	23	257	243	63	586
KC0AS	157	222	132	19	530
WB5YDD	5	267	220	18	510
WD8MIO	26	240	216	22	504

BPL for 100 or more originations plus deliveries:

K5CXP	130
W0FIR	123
N1CLV	110
WA4PFK	104
NI6A	102

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

Independent Nets (April 1983)

1	2	3	4
Amateur Radio Telegraph Society	29	441	282
Central Gulf Coast Hurricane	31	407	2429
Clearing House	30	85	333
Empire Slow Speed	30	45	459
Golden Bear	30	190	1762
Hit and Bounce Slow	30	70	372
IMRA	25	622	1285
Mission Trail	30	189	1098
New England Novice	30	84	367
North American Single Sideband	26	68	250
Vermont Sideband	30	152	534
20-Meter ISSB	26	863	467
75-Meter ISSB	30	378	1122
7290 Traffic	47	533	4230

1 — NET NAME
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Coming Conventions

By Marjorie C. Tenney,* WB1FSN

July 2-3
West Virginia State, Weston

July 8-10
Northwestern Division, Spokane, WA

July 10
Indiana State, Indianapolis

July 29-31
Oklahoma State, Oklahoma City

August 5-7
Rocky Mountain Division, Jackson, WY

August 6-7
North Florida Section, Orange Park

August 13-14
Delta Divison, Shreveport, LA

August 19-21
Pacific Division, Reno

August 20-21
Alabama State, Huntsville

September 2-4
Southwestern Division, Anaheim, CA

September 23-25
Dakota Division, Sioux Falls, SD

September 25
Great Lakes Division, Cleveland, OH

October 22-23
Tennessee State, Chattanooga

November 26-27
Florida State, Clearwater

ARRL NATIONAL CONVENTIONS

October 7-9, 1983
Houston, Texas

July 20-22, 1984
New York, New York

September 27-29, 1985
Louisville, Kentucky

INDIANA STATE CONVENTION
July 10, Indianapolis

The ARRL Indiana State Convention, in conjunction with the Indianapolis Hamfest and Computer Show, will be held on Sunday, July 10, at the Marion County Fairgrounds at the southeast intersection of I-74 and I-465. There will be inside and outside flea markets, a separate computer show and flea market, and commercial vendor display area. Technical forums all day. Club activities. (We invite your participation.) Women's activities and professional food services.

Setup after noon on Saturday, July 9. Camper hookup facilities available on the grounds; motels close by. Security provided Saturday night and Sunday. Your gate ticket of $4 entitles you to all activities. For further information, contact Indianapolis Hamfest, Box 11086, Indianapolis, IN 46201.

OKLAHOMA STATE CONVENTION
July 29-31, Oklahoma City

This is Ham Holiday no. 10, folks! Sponsored by Central Oklahoma Radio Amateurs, Inc. (CORA), this year's event again combines the specialty interests of a "computerfest" with the annual state ARRL convention. We have so outgrown our humble beginnings in 1974 that we again require the spacious, all-air-conditioned facilities in the "incomparable" Myriad in downtown Oklahoma City. Talk-in on 34/94.

During QLF contests, computer seminars, QRM party, antennas, ARRL forums, dealers' displays, inside flea market, etc., nonhams have the options of a style show, jazzercise, microwave cooking, tours of downtown and shopping centers, a luncheon and games.

Saturday evening dining in the buff (we'd call it a buffet but E.T. went home) and dance will be held at the Quality Inn, Reno at Eastern. Tickets are $11/person for both events; $3/person or $5/couple for the dance only. Music by "The Midnight Express," but please wear clothes for both. QCWA breakfast Sunday morning will be at the Holiday Inn Downtown.

Pre-registration is $6 by July 17, $7 at the door. First pre-registered flea-market tables are $1 each; additional tables are $4 each in advance, $5 each at the door if available. Mail checks or money orders (no cash) to CORA, P.O. Box 14268, Oklahoma City, OK 73113. Sorry, *no* confirmations available.

ROCKY MOUNTAIN DIVISION CONVENTION
August 5-7, Jackson, WY

The 1983 Rocky Mountain Division Convention combined with the 51st WIMU Hamfest will be held August 5-7 at the Virginian Motel, Jackson.

Registration begins Friday, from 4 P.M. to 9 P.M. Hamfest and registration are on Saturday, from 8 A.M. to 9 P.M., and Sunday, from 8 A.M. to noon. There will be programs for all hams and nonhams on Saturday. Sunday morning there will be a breakfast and a business meeting.

Pre-registration is $8; $10 at the door. Pre-registration cutoff date is July 15. Exhibit space for dealers, and space for flea market is free. Plenty of motels and camping facilities are available in the area, but reserve early, for Jackson is a busy place. For more information, write to Pete Stull, WB7AMP, 1314 Kimberly, Rock Springs, WY 82901.

NORTH FLORIDA SECTION CONVENTION
August 6-7, Orange Park

The Greater Jacksonville Hamfest Assn. is pleased to announce the ARRL North Florida Section Convention and 10th Annual Jacksonville Hamfest, to be held August 6-7 at the Orange Park Kennel Club. This facility is conveniently located near the intersection of I-295 and U.S. 17, just south of Jacksonville, and offers over 30,000 sq. feet of indoor display space.

Swap tables, exhibitor booths, MARS, computer clubs and many other activities. Special motel rates available. Admission is $4, and the hours are 8 A.M. to 5 P.M. on Saturday and 9 A.M. to 3 P.M. on Sunday. For further information, contact Wayne Oehlman, WB3DBE, P.O. Box 23134, Jacksonville, FL 32241, tel. 904-268-3981.

DELTA DIVISION CONVENTION
August 13-14, Shreveport, LA

The Shreveport Amateur Radio Association (SARA) will host the ARRL Delta Division Convention at the Shreveport Convention Center, on the riverfront, August 13 and 14, 1983. Hams and their spouses from several states are in for a super convention with Louisiana flair. Top guest speakers, exhibitors, forums and diverse entertainment will be presented.

The lineup will include sessions on both Saturday and Sunday with Delta Division Director Clyde Hurlbert, W5CH, hosting the ARRL forum. Guest panelist will be ARRL President Vic Clark, W4KFC. President Clark will also be the speaker at the Saturday Night barbecue. His topic will be "ARRL '83 and Beyond," and will cover happenings this year and what's ahead for Amateur Radio. ARRL Assistant Communications Manager Don Search, W3AZD, will head the DXCC forum and will verify QSL cards. Don will talk about the DXCC program and what's happening with DX. The technical forums will be presented by ARRL TA Al Markwardt, W5PXH. Al will discuss antenna tuners, hf quad antennas and RFI. The IBM Personal Computer Division will present a basic and an advanced program on home computers. Ernest Ethridge of the National Weather Service will lead the SKYWARN presentation. Other forums on tap include a MARS forum and a Satellite TV demo and discussion. After attending a special program on handicapping the horses, you can board a chartered bus to visit Louisiana Downs for a few hours of racing. Nonhams are invited to our free arts and crafts flea market, so bring your goodies for the swap meet. Other activities include a bus tour of Libbey Glass Outlet, Shreveport's largest shopping mall, and the Norton Art Gallery, which features some of finest western art in this part of the country. Free video entertainment will be provided both days of the convention, and the kiddies will have their very own area. And, of course, everyone will want to drag out all those old "boat anchors" and participate in our indoor or outdoor flea markets.

A heavy turnout is expected (the convention will be held during the racing season at Louisiana Downs) so hotel and motel reservations should be made as early as possible. For more information, contact John Harris, KD5QS, Convention Chairman, 129 Herndon St., Shreveport, LA 71101, tel. 318-222-5886.

PACIFIC DIVISION CONVENTION
August 19-21, Reno, NV

Resting as a sparkling jewel midst the snow-capped grandeur of the Sierra Nevada range is Reno, site of the 1983 Pacific Division Convention, August 19-21. The MGM Grand Hotel, with its spacious, newly converted Tennis Pavilion, has been reserved, and 199 exhibitor booths await commercial and club exhibits.

The Wide Area Data Group has put together a program that allows for plenty of time to roam through the Convention hall, while enabling visitors to attend all forums. You are invited to stop by the official "Welcome Booth" for a chat, maps of the Convention floor and Reno-area sites and other tidbits of interest to our guests. In addition to scheduled forums, there will be plenty of on-site meeting rooms for special gettogethers with VIPS and executives.

The banquet will feature roast of prime rib with all of the trimmings, and a special after-dinner speech by Roy Neal, K6DUE, of NBC News. Also present will be Vic Clark, W4KFC, Dave Sumner, K1ZZ, and the Honorable Richard L. Bryan, Governor of the Silver State. K7UGA has also been invited.

Special tours have been arranged to the world-famous Harrah's Automobile Museum, and a dinner journey across beautiful Lake Tahoe aboard the *M.S. Dixie* awaits the romantic at heart. A night out on the town, embraced in the brilliance of Reno at night, is scheduled.

The Convention hall will open at 6 P.M. on Friday and will continue until 3 P.M. Sunday. An indoor swap meet has tables at $5 each. The MGM RV park has 500 spaces reserved on a first-come, first-served basis. For room/RV reservations, call MGM direct at 800-648-5080. Advance tickets are $7.50 (admission) or $35 (includes banquet, etc.). The Communications Command Center will provide talk-in on 147.63/03 (high-level), 147.90/30 (MGM Grand, low-level) and 222.86/224.46. Simplex talk-in is on 52. For more information, write to P.O. Box 3132, Sparks, NV 89431. You will want to attend this convention in Reno, "The Biggest Little City in the World."

*Convention/Travel Coordinator, ARRL

Hamfest Calendar

[Attention those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

Alberta: The 49th Glacier-Waterton International Hamfest will be held July 15-17 at Waterton Homestead Campground, just north of Waterton National Park entrance on Hwy. 6, Alberta. Bunny hunt, technical sessions, entertainment, swap tables. For information and pre-registration write to P.O. Box 148, Milk River, AB T0K 1M0, Canada.

†**Arizona:** Fort Tuthill Hamfest 1983, sponsored by the Amateur Radio Council of Arizona, will be held at Fort Tuthill County Park, airport exit off I-17, Flagstaff, July 29-31, from 1 P.M. Friday to 3 P.M. Sunday. Swapfest, dealers, food, cw contest. Speakers will include ARRL President Vic Clark, W4KFC, ARRL Hq. representative Dale Clift, WA3NLO, and Lew McCoy, W1ICP. Talk-in on 22/82 and 60/00. Further information from Graham Lloyd, AJ7I, 1023 N. 62nd Ave.,

Phoenix, AZ 85043, tel. 602-233-9676.

British Columbia: The Penticton ARC is sponsoring the 1983 Okanagan International Hamfest July 30-31 at Oliver Centennial Park, Oliver. Registration on Saturday, July 30, 9 A.M. PDT; activities from 1 P.M. Saturday to 2:30 P.M. Sunday. Nonhams: Bring your hobbies, crafts and flea market items for display or sale. Entertainment, bunny hunts and pot luck luncheon at 11:30 A.M. Sunday. Talk-in on 34/94 and 76/76. First-come, first-serve basis; no reservations at Centennial Park. For information, write to John Juul-Anderson, VE7DTX, 8802 Lakeview Dr., Vernon, BC V1B 1W3, or Lota Harvey, VE7DKL, 584 Heather Rd., Penticton, BC V2A 1W8.

Colorado: The Ski Country ARC will hold its second annual swapfest on July 23 at Colorado Mountain College, 1402 Blake Ave., Glenwood Springs. No admission charge; tables are $5 each. Talk-in on 07/67. For further information, contact Frank, WAØBBI, Box 280, El Jebel, CO 81628.

Illinois: The DuPage ARC Hamfest/Computerfest will be held at the Downers Grover American Legion Post grounds on Sunday, July 10, from 9 A.M. to 4 P.M. Large outdoor flea market. Tickets $2, available at the gate only. Plenty of parking space. Food and drink available. Talk-in on 144.89/145.49. For more information, send an s.a.s.e. to W9DUP, P.O. Box 71, Clarendon Hills, IL 60514, or call 312-971-1156.

Illinois: The Quad-Co. ARC will sponsor the 26th annual hamfest of the "Breakfast Club" on July 16-17 at Terry Park, 3/4 mile east of Palmyra. All other groups are invited to meet at the hamfest, giving prior notice to the Hamfest Committee. Dancing and movies Saturday night. Bring your own basket lunch. Sandwiches and soft drinks available on the grounds. Talk-in on 3973 kHz from noon Saturday to 11 A.M. Sunday. Games, contests, golfing and fishing. Bring your swap gear. Camping facilities open from Friday afternoon until Monday morning. Pre-registration until July 7 is $1.50; at the gate $2. Write to "Hamfest," c/o Quad-Co. ARC, 602-D East Walnut, Chatham, IL 62629.

†**Illinois:** The Belvidere hamfest sponsored by the Big Thunder ARC will be held on July 31 in Belvidere. Camping available on Saturday, July 30, beginning at 6 P.M.; small fee. Sunday hours from 6 A.M. to 3 P.M. Advance admission is $2; at the gate $2.50. Acres of flea market space (free); tables at $2 available. Indoor facilities, in the event of rain. Talk-in on 52 simplex. For further information, contact Bob Anderson, 910 W. Locust St., Belvidere, IL 61008, tel. 815-544-3215.

†**Illinois:** Illinois's oldest hamfest — established in 1929 by The Fox River Radio League — will be held on Sunday, Aug. 21, at the Kane County Fairgrounds in St. Charles. Located midway between Elgin and Aurora in the Fox River Valley, the FRRL Hamfest can be reached easily from either the Northwest or the East-West Tollways via the SR 31 exits and driving south or north, respectively. Talk-in on 94 simplex or 21/81. All commercial exhibits, contests, demonstrations and part of the flea market will be indoors. Additional flea market outside, adjacent to main hall. Overnight parking for campers and motorhomes on Saturday, August 20, available by prior arrangement for fee of $3. Campers, commercial exhibitors and flea marketers contact George R. Isely, WD9GIG, 736 Fellows St., St. Charles, IL 60174. Advance tickets $2; send business-size s.a.s.e. to Gerald Frieders, W9ZGP, 1501 Molitor Rd., Aurora, IL 60505. Tickets at gate are $3.

Indiana: The combined LaPort-Michigan City ARCs will sponsor their Summer Hamfest on Sunday, July 17, at the LaPorte County Fairgrounds, on State Road 2, west of LaPorte, 8 A.M. to 2 P.M. Paved outdoor parking; indoor tables by reservation, 40¢ per ft. Write to P.O. Box 30, LaPorte, IN 46350. Good food, cold drinks. Donation $3 at the gate.

Indiana: The Steuben County Radio Amateurs present the 25th Annual FM Picnic and Hamfest at Crooked Lake, Angola, on Sunday, Aug. 7. Picnic-style barbecue chicken, inside tables for exhibitors and vendors, overnight camping (fee charged by County Park). Talk-in on 81/21 and 52. Admission is $2.50.

†**Kansas:** The Central States VHF Society will sponsor the Central States VHF Conference at Doubletree Hotel, Overland Park, July 28-31. Varied hours each day; banquet at 7:30 P.M. July 30. Admission for all sessions is $12. Barbeque on Thursday evening. Technical sessions on Friday and Saturday, 9 A.M. to 5 P.M., including antenna measuring. For further information, contact Tom Bishop, KØTLM, tel. 816-452-6953.

Louisiana: The Central Louisiana ARC will sponsor a hamfest July 30-31 at the Bolton Avenue Community Center, Alexandria. Swap tables will be available.

†**Maine:** The second annual Greater New England Hamfest, sponsored by the Blackstrap Repeater Assn., will be held on Saturday, July 30, from 8 A.M. to 5 P.M., at the Cumberland Fairgrounds, Cumberland. Forums, lectures, giant flea market, exhibits, dealers, food, free camping. Advance tickets $1, at the gate $2, under 16 free. Talk-in on 69/09, 13/73, 52 and 3.940. For more info, call Ed Williams, KA1FZD, tel. 207-846-3509, or write to P.O. Box 321, Cumberland, ME 04021.

Maryland: The Baltimore Radio Amateur Television Society again presents the famous BRATS MARYLAND HAMFEST on Sunday, July 31, at the Howard County Fairgrounds, Rte. 144 at Rte. 32, adjacent to I-70 in West Friendship, about 15 miles west of Baltimore. Fairgounds available for setup on Saturday, July 30, at 2 P.M.; overnight security provided. Facilities for RVs overnight available. Talk-in on 63/03, 16/76, 52 and 29.54/64. For table reservations and information, call Mayer Zimmerman, W3GXK, at 301-655-7812.

Michigan: The Straits Area ARC will host its annual Swap'n Shop on Sunday, July 17, from 9 A.M. to 4 P.M., at the Harbor Springs High School gym. Go 8 miles north of the State Police post (in Petoskey) on M119 and follow signs. Talk-in on 31/91 and 52. Free parking Saturday night provided at site for self-contained RVs. Refreshments available Sunday. Donation at the door is $2.50; plenty of table space available for $2.50. For more information and/or tickets, write to Straits Area ARC, W8GQN, P.O. Box 444, Conway, MI 49722.

Michigan: The Hiawatha ARA of Marquette County is celebrating their 50th Anniversary as a club and its affiliation with ARRL by sponsoring the Annual Upper Peninsula Hamfest on July 30 at the Michigan National Guard Armory in Ishpeming. Doors open at 9 A.M.; registration is $1. Tables will be available for displays, sales, etc., at the rate of $3 per table. Computer demonstrations, net meetings and other activities. Talk-in on 16/76. Come help us celebrate this Golden Anniversary. For further information, contact Stu Sihtala, KO8U, Hamfest Chairman, 1836 Prairie Ave., Ishpeming, MI 49849, tel. 906-485-5720.

Michigan: The Amateur Radio Public Service Assn. of St. Joseph County will hold its 5th annual Swap and Shop on Sunday, July 31, at the St. Joseph County Fairgrounds, Centreville. Doors open at 8 A.M. Tickets are $2 in advance, $3 at the gate. Indoor tables $3; trunk sales are free. Camping available Saturday night for $6. Talk-in on 52. For more information, contact Warren Harder, N8EOX, 14820 Broadway Rd., Three Rivers, MI 49093.

Minnesota: Faribault ARC will have its 2nd Annual Swapfest on Saturday, July 9, at the Rice County Fairgrounds, north edge of Faribault, from 9 A.M. to 3 P.M. Talk-in on 19/79. Lunch available; close to parks, fishing, tourist spots. Amateur Radio gear, computer gear, miscellaneous electronic equipment. General admission $1.50; selling space and admission $3 (indoor or outdoor). Tables available by pre-registration only at $3 each (7-ft tables). Contact Donal Klier, 1118 N.W. 8th St., Faribault, MN 55021, for further information.

Minnesota: The Iron Range ARCs will be holding their Range-Wide Hamfest on July 10, from 10 A.M. to 4 P.M., at the Clinton Community Center on Hwy. 37, 13 miles east of Hibbing, 6 miles west of Hwy. 53. Tickets are $1; tables $2 each. Talk-in on 25/85. Food, picnic area, playground and tennis courts. For more info, send an s.a.s.e. to Teresa Dall, KAØCDO, Rte. 1, Box 284, Iron, MN 55751, tel. 218-744-5212.

†**Missouri:** The Zero-Beaters ARC Hamfest will be held at the Washington Fairgrounds on July 17, from 9 A.M. to 3 P.M. No admission charge. Cake walk, candy scramble, traders row, sandwiches, dinners, refreshments available. Talk-in on 52. For further info, write to Zero-Beaters ARC, Box 24, Dutzow, MO 63342.

†**Missouri:** The 5th Annual North Missouri Hamfest will be held Sunday, Aug. 7, at the Moberly Municipal Auditorium, Moberly. The auditorium has 12,000 sq. ft of air-conditioned space available. Flea market inside with limited number of free tables. Forums and films during the day. Doors open for flea market and distributors at 8 A.M., and for hamfest from 9 A.M. until 3 P.M. Tickets are $2 at the door or $1.50 in advance. Sponsored by the NEMO ARC, Kirksville, and the Tri-County ARC, Moberly. For information and/or tickets, contact Sam Fischer, KAØILO, P.O. Box 341, Moberly, MO 65270. Talk-in on 69/09.

New Hampshire: Fly into New Hampshire's third largest electronic flea market, Saturday, July 16, at 9 A.M., at the Manchester Airport. Rain date is Sunday, July 17 — monitor 52. Sponsored by the New Hampshire FM Assn. General admission $1; seller's $5 per lot. Seller's lot = 2 parking spaces (16 ft); includes one admission. Bring your umbrella and table or tailgate.

†**New Jersey:** Sussex County ARC will sponsor "SCARC '81" at the Sussex County Fairgrounds, Plains Rd., off of Rte. 206, Augusta on Saturday, July 16. Doors open at 8 A.M. Admission $2; indoor tables $5 in advance, $6 at door; Tailgate space $4 in advance, $5 at gate. Food and refreshments, plenty of free parking. Talk-in on 90/30 and 52 simplex. For further information, write to Lloyd A. Buchholtz, WA2LHX, 10 Black Oak Dr., RD 1, Vernon, NJ 07462, tel. 201-827-6062.

†**New Jersey:** The 5th annual hamfest sponsored by the West Jersey Radio Amateurs will be held at the Super 130 Drive-In, Rte. 130, Edgewater Park, on Sunday, July 17, from 9 A.M. to 3 P.M. Setup for vendors at 7 A.M. Admission $3. Flea market, QLF contest, refreshments, ARRL info table. Bring your own table. Hamfest to be held rain or shine. Talk-in on 75/15 and 52 simplex. For further information, contact Mary Lou Shontz, N2CLX, 107 Spruce La., Mt. Holly, NJ 08060, tel. 609-267-3063.

†**New York:** The Genesee Radio Amateurs, Inc. (GRAM), Batavia Hamfest will be held at the Firemen's Grounds in Alexander on Sunday, July 10, 7 A.M. to 5 P.M. Admission is $2 in advance, $3 at the door. Cw contest, flea market, boat anchor auction, exhibitors, indoor display area, free camping (electricity $2), radio clinic. Commercial vendors open at 9 A.M. Talk-in on 144.71/145.31 and 52. For further information, write to GRAM, P.O. Box 572, Batavia, NY 14020, or call Dave at 716-343-6770.

New York: The Mt. Beacon ARC hamfest will be held on Saturday, July 23, at the Arlington Senior High School, Poughkeepsie/Lagrange. Tickets are $2; women and children free. Tailgating space is $3 (1 free admission). Tables $4 (1 free table and admission). Doors open at 8 A.M. Talk-in on 37/97 and 52. For more info, call or write to Art Holmes, WA2TIF, 2 Straub Dr., Pleasant Valley, NY 12569, tel. 914-635-2614.

North Carolina: The Cary ARC will sponsor its 11th annual Mid-Summer Swapfest on Saturday, July 16, at the Lion's Club Shelter (next to Cary Senior High School) in Cary, from 9 A.M. to 3 P.M. Buying, selling, trading, haggling, bartering and visiting. Open auction — we sell all. Never an admission or commission at the Mid-Summer. Talk-in on 28/88, 75/15 and 52. Rain or shine. Bring tables and chairs.

†**North Carolina:** WCARS Hamfest and Computer Fair of 1983, sponsored by the Western Carolina ARS, Inc., will be held an Buncombe County Firemen's Training Center, Asheville, July 30-31. Doors open at 9 A.M. Admission is $4, good for both days. McElroy Memorial CW Competition (home of cw record), computer talks, ARRL booth, camping and RV parking — no charge. Free flea market area outside; $5 per table inside per day. Free RV overnight parking. Talk-in on 16/76, 31/91 and 52. For further information, contact Garland Lance, 845 Sand Hill Rd., Asheville, NC 28806, tel. 704-667-3758.

North Dakota: The 20th Annual International Hamfest is scheduled for July 9-10, at the International Peace Garden between Dunseith, North Dakota, and Boissevain, Manitoba. Contests, transmitter hunts, mobile judging contest. Excellent camping facilities. Talk-in on 147.33. For more info and advanced reservations, contact Mike Manky, WBØTEE, 518 East Columbia Dr., Bismark, ND 58501, tel. 701-258-5114.

†**Ohio:** The Wood County ARC's 19th annual "Ham-A-Rama" will be held at the Wood County Fairgrounds, Bowling Green, on July 17, starting at 8 A.M. Free admission. Talk-in on 78/18 and 52. Advance table rentals ($5) to dealers only. Saturday setup available until 8 P.M. For more information or dealer rentals, send an s.a.s.e. to Wood Co. ARC, c/o Craig Henderson, Box 366, Luckey, OH 43443, or Chuck Dicken, WD8ICP, 1002 Revere, Bowling Green, OH 43402.

†**Ohio:** On Sunday, July 17, The Canton ARC, W8AL, and the Tusco ARC, W8ZX, will present the 9th Annual Hall of Fame Hamfest. It will be held at the Nimishillen Grange, 6461 Easton St., Louisville. Tickets are $2.50 in advance and $3 at the gate. Flea market opens at 9 A.M.; space is $2. AMSAT Forum, ARRL Forum, dealers, food and much more. Talk-in on 71/12 and 52; call W8ZX or W8AL. Children under 16 free. Tables available on reserved basis for $3.50 each; check must accompany reservations. For information or reservations, contact Butch Lebold, WA8SHP, 19877 Hazelview Ave., Alliance, OH 44601, tel. 216-821-8794.

†**Ohio:** The Northern Ohio ARS is pleased to announce its 6th Annual NOARSFEST. Saturday, July 23 is the date; the Lorain County Fairgrounds, Wellington, is the place. Flea market setup from 6 to 8 A.M.; gates open from 8 A.M. to 5 P.M. Donation is $2.50 in advance, $3.50 at the gate; children under 12 free. To order admission tickets, write to

NOARSFEST, P.O. Box 354, Lorain, OH 44052. Huge blacktopped flea market area. Flea market $1 per car space. Large indoor exhibit hall. Campers may park overnight Friday at no charge; no hookups. Talk-in on 144.55/145.15 and 52. Dealers: Indoor exhibit space with 8-ft tables ($8 each). Send check for advance registration to Don Winner, WD8RZG, 8927 Torrance Ave., Brooklyn, OH 44144, tel. 216-749-6594.

†**Ohio:** Warren ARA presents the Warren Hamfest on August 21 at Kent State University-Trumbull Branch, Warren. Flea market opens at 6 A.M. Main building with dealers opens at 8 A.M. Tickets are $2.50 in advance, $3 at gate. For tickets or information, write to WARA, P.O. Box 809, Warren, OH 44482, c/o Frank Fitzhugh, KA8GGD.

Oregon: The 8th annual Lane County Ham Fair will be held at the Oregon National Guard Armory, 2515 Centennial, Eugene, on July 16-17. Doors open at 8 A.M. both days. Major ham equipment suppliers, computer demos, technical seminars, swap tables. Free parking for RVs; no hookups. Talk-in on 28/88, 86/26 and 52. Registration is $4. Swap tables (2 max.) are $5 each. Checks payable to Lane County Ham Fair should be sent to Tom Temby, Treas., WB7WPU, 3227 Crocker Rd., Eugene, OR 97404, tel. 503-689-1761.

†**Pennsylvania:** The 46th annual South Hills Brasspounders and Modulators hamfest will be held on Aug. 7, from 9 A.M. to 4 P.M., at the South Campus of the Community College of Allegheny County, Pittsburgh. Tickets are $3 each or 2/$5. Computers, OSCAR, ATV demo and flea market. Talk-in on 13/73 and 52 simplex. Further information from Andrew L. Pato, 1433 Schauffler Dr., W. Homestead, PA 15120.

South Carolina: The Charleston Hamfest, sponsored by the Charleston ARS, Inc., will be held July 23-24 in Charleston. Hours are 8:30 A.M. to 4 P.M. Saturday and 9 A.M. to 4 P.M. Sunday. Admission is $5. QCWA and MARS meeting. Talk-in on 16/76. For further information, contact the Charleston Hamfest Committee, tel. 803-747-2324 or 795-1737.

Tennessee: The Plateau ARC will again sponsor the Crossville Hamfest at the Cumberland County Community Complex, Hwy. 70 North, Crossville, July 9-10. Admission at the gate is $1 for adults. Exhibit and flea market space available on a first-come basis. Talk-in on 93/33. Dutch-treat dinner Saturday night. For further information, contact Plateau ARC, P.O. Box 2621, Crossville, TN 38555.

†**Tennessee:** The Radio Amateur Transmitting Society of Nashville will hold its annual hamfest at downtown Municipal Auditorium on Sunday, July 31, from 9 A.M. until 5 P.M. Admission is free; hotels and motels, ample parking and the Grand Ole Opry nearby. Tables will be $10 for the center aisle and $5 for all others. The hamfest will feature amateur and computer activities, a cw proficiency test, HANDI-HAMS, booths and exhibits, Region 2 Air Force MARS, flea markets and swapfests, and food and refreshments, along with other activities for everyone. Talk-in on 34/94 and 52. For additional information, contact Willie Porter, KB4BLL, 4907 Idaho Ave., Nashville, TN 37209, tel. 615-269-9757.

Texas: The 18th annual Northwest Texas Emergency NET Picnic and Swapfest will be held on Sunday, Aug. 7, at 8 A.M. in the City Park in Levelland. Cosponsored by the Northwest Texas Emergency NET and Hockley County ARC. Talk-in on 28/88. A family event; bring your own picnic basket. Swapping all day, with tables provided. A $3 registration fee is requested, but not required.

†**Virginia:** The 33rd annual hamfest sponsored by the Shenandoah Valley ARC, Inc., will be held at the Raritan Fairgounds, Berryville, on Sunday, Aug. 7, from 7 A.M. to 3 P.M. Admission at the gate is $3; women and children free. Many activities, arts and crafts (noncommercial), Raritan chicken barbeque. Talk-in on 22/82 and 52 simplex. For further information, contact Carl Horner, K4BRK, Siler Route, Box 154, Winchester, VA 22601, tel. 703-662-4934.

Washington: The Western Washington DX Club, W7FR, hosts the 31st annual Northwest DX Convention on July 29-31, at the Double Tree Plaza Hotel, located near the South Center Shopping Mall and the Seattle-Tacoma Airport. For futher information, call or write to "Registration," Ruth Bennett, WA7RVA, 6729 Beach Drive, S.W., Seattle, WA 98116, tel. 206-932-1335, or Roy Foote, N7AIF, *Chairman, 3029 - 48th Ave., S.W., Seattle, WA 98116, tel. 206-935-8041.* Also use the WWDX club repeater. Call Frank, W7FR, on 146.40/147.00.

West Virginia: The Triple States RAC will present its 5th annual Wheeling WV Hamfest at Wheeling Park on Sunday July 24, from 9 A.M. to 4 P.M. Dealers, flea market and auction, free parking, refreshments, ARRL, SWOT booths. Admission $2; children under 12 free. Indoor display; tables available (with price of admission), but reserve space. Contact TSRAC, Box 240, RD 2, Adena, OH 43901, tel. 614-546-3930.

Wisconsin: The Sheboygan County ARC, Inc., will sponsor the annual Lake Shore Swap Fest and Public Brat Fry on Saturday, July 16, from 10 A.M. to 4 P.M., at Wilson Town Hall, Sheboygan. Adults $3, advance $2.50, children under 12 with family free. Advance deadline is June 30. Free tables. Camping available. Public auction, swap-buy-sell. Bring your odds and ends. See ham video tapes. Talk-in on 66/06 and 52. For information, write to P.O. Box 895, Sheboygan, WI 53081, tel. 414-457-3203.

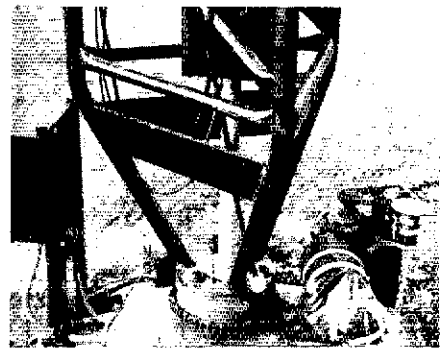
†ARRL Hamfest

[Note: Sponsors of large gatherings should check with the League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Strays

Hudson Division Vice Director Stephen Mendelsohn, WA2DHF, says hello to President Reagan in the office of Costa Rica President Monge prior to Reagan's radio speech to that nation last December. An engineer with CBS Radio in New York, Steve was part of the broadcast team that covered the President's tour of South and Central America. *(photo courtesy WA2DHF)*

John G. C. Miller, W2ORI (center), of Lockport, New York, receives an ARRL 60-year membership plaque from Atlantic Division Vice Director Bud Hippisley, K2KIR (right), at a meeting of the Niagara Frontier Chapter of the QCWA. Helping with the presentation is chapter President Ray Griswold, W2SD.



Shown is the base of a 138-ft, 2500-lb rotatable tower completely hand constructed by Dennis Homerick, KN8COQ, of Mansfield, Ohio. The tower, erected in one piece with the aid of a crane, telescopes with the help of a 2/3-hp winch that was designed using two gear motors and a drum placed in the center. An identical gear motor rotates the tower.

SAFETY FIRST

☐ There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious — sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot in a transmitter when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household how to turn the power off, and how to apply artificial respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office).

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a severe rf burn, he or she could run into the antenna and be injured.

11) Do not operate high-power uhf or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

Take time to be careful. Death is permanent.

How's DX?

Conducted By Ellen White,* W1YL/4

Have You Heard?

What may have been one of the most noteworthy events in the annals of Amateur Radio DXing took place on remote Heard Island in January and February of this year. It had been almost three years since VKØRM had activated this part of the Australian External Territory in the South Indian Ocean, and Heard was very much on the "want" list for many of the DX persuasion.

The ground was set back in April of 1982, when a representative of the Wireless Institute of Australia rocked the faithful at the Visalia DX Convention with news that an expedition would go to Heard Island, and that a group of mountain climbers eager to assault the famous 6000-ft mountain dominating that forbidding part of the world would accompany them. This group ultimately would put VKØCW and VKØHI on the air, with VK3DHF and K8CW operating.

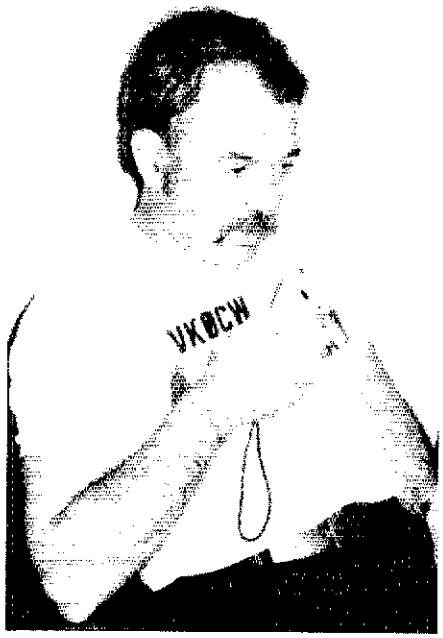
It wasn't long after the above announcement that Jim Smith, VK9JS, of Norfolk Island fame, announced that the Heard Island DX Association (HIDXA) would also go to Heard. The bands and periodicals blazed with the news for the better part of the remainder of 1982.

Amid many trials and tribulations and attempts to get financial support, both groups did indeed accomplish the incredible goal of getting to Heard (and back) safely, activating Amateur Radio in a substantial manner and accompanying important scientific projects.

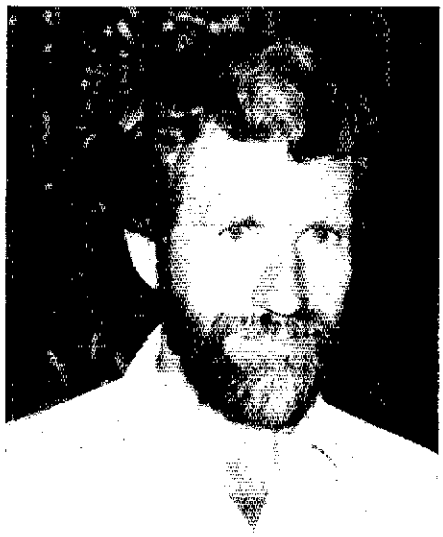
Your column editor had the privilege of talking with both K8CW and VK9JS at this year's Visalia DX Convention (April 1983). Here are some comments by both principals.

K8CW: "I first learned of the planned Heard Island DXpedition at Dayton in 1982, when VK5QX presented the fact that an Australian expedition was being planned, which would include mountain climbers and scientific people. In Australia, VK6XI and VK6NE were already working with expedition leader William Blunt about taking Amateur Radio along. It ended up that there were two of us hams who actually went. We sailed from Freemantle, Western Australia, on New Year's Eve, arriving on Heard on January 20. Enroute, we stopped at Kerguelen and then the MacDonald Islands. Our first QSO was at 1257Z on January 22, with VK6FS. The mountain climbers and scientists were 25 miles away, on the other end of the island. They made their base camp at Skewer Beach, which was completely flattened later on when hit by a hurricane.

"Personally, I was very pleased to have gone. I was in the right spot at the right time, being associated with IDXF. The boat trip was a fantastic experience, and the Anaconda was superb. This is an 84-ft sailing vessel with a 100-ft mast. The weather was such that we blew 25 sails, which had to be sewn together. The seas were overwhelming (40 ft). Our supplies were substantial (we had seven man-years of food on the boat), and we did leave some on Heard for emergency provisions.



VKØCW/K8CW *(W1YL photo)*



VKØJS/VK9JS *(W4WJ photo)*

"I was part of an expedition that included the scientific fields of medicine, biology and glaciology. Even pollution experiments took place to see if there was any evidence of pollution at this remote place.

"We had worldwide support; even King Hussein helped! Ultimately, we worked JY3ZH, but the king was out of the country! We had technical support worldwide, and information and input from thousands. We brought back many pages of information on Heard Island.

"The best QSO? There wasn't a best in particular. *Every one* of them was the best."

VK9JS: "I started the road to Heard in 1980, when, in those days, I was quite influential working for the Australian Government in Papua/New Guinea. I pulled every string I could to get the Amateur Radio VKØRM operation going. Australia wanted to restate their claim on Heard at that time. In 1951, they had abandoned Heard for the slightly easier climate of the Antarctic Continent.

"Eventually guidelines for private expeditions to Heard Island were generated, and I obtained permission in principle to go to Heard and to use the buildings which was a tremendous gesture on behalf of the Australian government.

"When I heard that IDXF, WIA, the Northern California DX Foundation, and others were going to sponsor the Amateur Radio portion of the WIA expedition, I realized there would be no need for me to back out of my plans. The VKØCW/HI operation was quite a different thing than the aims and goals of the HIDXA. 762 donations were received to help the HIDXA goal of getting Amateur Radio on Heard. We put on a 17-member team, with intentions of steaming the southern route to Heard. I was responsible for all the organizational details of the entire operation.

"We solicited expert advice on the capabilities of the Cheynes II charter vessel and whether a special survey certificate would be required, etc. In December, we received authorization from Canberra to undertake the proposed private Amateur Radio project."

The VKØJS QSL notes: "Sincere thanks to the hundreds of individual radio amateurs and small radio clubs around the world who contributed to our funds and continued to believe, despite adverse publicity. Special thanks to Sojo and Kirsti, coorganizers of the Amateur Radio and Scientific Expedition, for their faith in the impossible..."

Impossible it was. But the impossible became possible early this year, with sincere and dedicated hams, operating under the most trying conditions, furnishing treasured VKØ contacts for the rest of us.

SPRATLY

This group of small reefs is located in the central part of the South China Sea, about 280 miles southeast of Camranh Bay and about 775 miles northeast of Singapore. The "islands" were seized by Japan in June of 1940 and became a submarine base. The rights to the islands were renounced by Japan in 1951. Spratly was added to the ARRL DXCC list of "entities" in early

*19620 SW 234 St., Homestead, FL 33031

1966. The first operation from Spratly took place almost a couple of decades ago (W9WNV), and the second 1S1A (by K7ZZ). XV5AC, N5TP and possibly others have operated from this precarious area of the world. The last major operation (April 1979) was manned by VK2BJL, K4SMX and K1MM. At that time, they attempted to land on Amboyna Cay, but were fired upon. They wound up operating on an unoccupied bit of land, Barque Canada Reef, for several days.

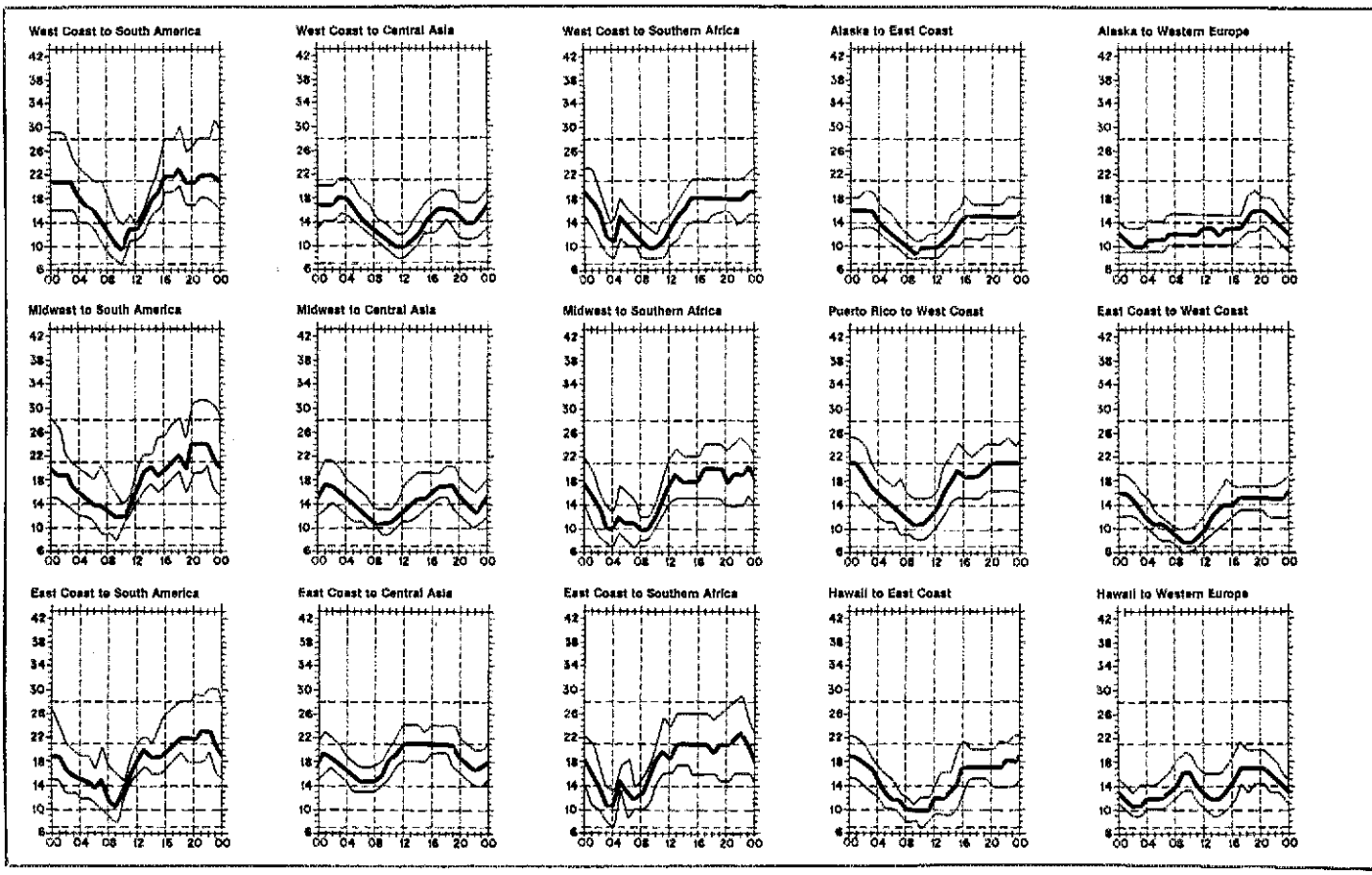
PY1APS took time out from a recent KH6-type trip and other trips to North America to work BY1PK for country no. 337. Gerson notes that it took him 17 years to get to no. 337. He still has logs of his PY7APS/Ø 1967 operation, as well as records for his 1968 and 1969 PYØAPS ventures.

On the left is K8TCR, an electrician for the City of Hamilton, Ohio, followed by retired firefighter N8BCV, and DL8OL and KB8YK. K8TCR met DL8OL on the air and discovered that he wished to meet other U.S. firefighters. Several years later, Klaus got his wish on a visit to the U.S. Out of that meeting, and with L.A. Fire Department retiree N6AXQ, a net was formed that now includes over 200 firefighters from ZL DU VE JA DL OZ VK XE W and the Marianas. Interested? Contact KB8YK. *(Jim Denney photo)*

In early April 1983, an eagerly awaited expedition by four German amateurs approached Amboyna Cay in the Spratlys. The German amateurs, DJ3NG, DJ6SI, DJ4EI and DF6FK, were accompanied by the boat owner and his wife. On April 10, at 0652Z, their ship was fired upon and sank, apparently *while attempting to* use the Cay as a navigation aid to find a nearby reef. Search operations combed the area by air and sea, but were suspended on April 18. At that point in time, prospects for finding *any* survivors from the 51-foot yacht Siddharta were very dim. On April 20, official word surfaced that both DJ3NG and DJ4EI lost their lives and that others had sustained some injury — this news released following their discovery by the Freighter Linden on April 19. DJ6SI and DF6FK returned to Germany as rapidly as was possible, and their story still awaits telling. All Amateur Radio mourns the loss of DJ3NG and DJ4EI, and thoughtfully rethinks the dangers inherent in any operation of this kind. Some talk was heard at once that Spratly should be eliminated from the DXCC List. Careful observation certainly points up the dangers of many, many areas, however. The DXCC Criteria (on the ARRL DXCC List) indicates the points that are in question for country determination.

THE CIRCUIT

☐ VK2DIK left on Stage 3 of his around-the-world helicopter flight in May. His itinerary: departing Prince Rupert, Alaska, July 7; Seattle, July 18; Amarillo, July 21; Fort Worth, July 22 (exactly 50 years from the date



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. Once 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

that Wiley Post arrived back in the USA after his first-ever solo flight around the world in a fixed-wing aircraft!). Dick planned 15-meter operation (21.385/21.185). QSL via Dick Smith, Box 321, North Ryde, NSW 2113, Australia.

☐ W1BWS will be operating July 19-28 from Lajes Air Force Base, in the Azores, in between classes of a course he will be teaching. 10-80, ssb/cw will be used. QSL via his home QTH.

☐ HC7: In 1981/82, W5VFO operated as W5VFO/HC7 and HC7CM. If you still need Buck's card, QSL via C. M. Brecheisen, Jr., W5VFO, 919 Waterview Circle, Richardson, TX 75080.

☐ Turkey. TA1UA informs IARU/ARRL Headquarters of the happy news of the new rules accepted and published by the Turkish government. By about October, Turkey will license radio amateurs. Special congratulations to the Turkish Radio Amateur Society for their years of effort that will soon bear fruit.

☐ French Polynesia: All FO8s and FOØ will again be on the air this year, July 10-17, for the annual Tiurai Celebration. Participants will announce certificate details. Your requests go to Tiurai Special Certificate, Radio Club of French Polynesia, B.P. 5006, Pirae, Tahiti, French Polynesia, South Pacific.

☐ Northwest DX Convention: A DX-cellent extravaganza is being planned by the Western Washington DX Club, at the 31st annual Northwest DX Convention, July 29-31. The Double Tree Plaza Hotel, located near the Seattle-Tacoma Airport, will provide easy access. For further information, call Ruth Bennett, WA7RVA, at 206-932-1335.

☐ Malpelo: The 50th anniversary of the Colombian Society, the LCRA, will provide for HKØTU/Malpelo, during 5 days in October. Multiband and multimode operation details will appear in a future issue. HK3DDD will manage the avalanche of cards!

☐ W3HNK gets special kudos from KA1JOC. Meddy notes that, after sending out various duplicate cards and awaiting 11 years, he received a confirmation of his QSO with UJ5ØA, while operating as CP1FW — thanks to W3HNK, who furnished him various leads. Still need Meddy's CP1FW card (including his slow-scan "first")? Send *your* card with an s.a.s.e. to Meddy Landry, KA1JOC, 10 Oak Ridge Dr., Somersworth, NH 03878.

☐ WCY Award: Commemorating World Communications Year 1983, the DARC is sponsoring an attractive award for two-ways with special WCY stations. A minimum of 25 on hf or five on vhf are required (same conditions for SWLs). All modes/frequencies permitted. The award may be applied for until the end of 1984. Your verified list with 20 reply coupons or $3 (U.S.) goes to Award Manager Hans-Peter Gunther, DL9XW, Am Strampel 22, D-4460 Nordhorn, Federal Republic of Germany.

☐ 5A5TH: KØJS has repeatedly tried (and failed) to pry a card out of this station (June 1970). Any tips go to Jeff Sudeith, 545 W. Sandhurst Dr., Roseville, MN 55113.

☐ ZD9BR: Manager ZS2RM still has the old logs. Remember, though, Buck can't use IRCs, but some U.S. Commemoratives would be appreciated. (thanks W6LFB)

☐ IARU: Special congratulations to two new member societies of IARU, The Dominica Amateur Radio Club and the Lesotho Amateur Radio Society, unanimously elected late April.

☐ NØEEN had hoped for extensive European operation in June. If you worked John, QSL via manager KAØGOA, 2 Monticello Ct., Davenport, IA 52806.

☐ Gabon: Bill Harrison, WD4HQB, ex-TL8WH, worked a year for it, but finally has obtained TR8HWG. Confirmations via N4AXR.

☐ 10-Meter Beacons: KA1YE/B is on 28.287 MHz with 3 W into a vertical (soon to be a turnstile). Keith notes that WA1IOB/B is at 28.208 and W3VD/B is on 28.295 MHz. (thanks KU7G of the ARRL Technical Information Service!)

☐ Shortly after the German Spratly attempt, the DU1CK DXpedition to Spratly operated from Thitu as 1S1CK. Limited numbers of contacts were made.

QSL Corner

Administered By Joan Becker, KA1IFO

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.

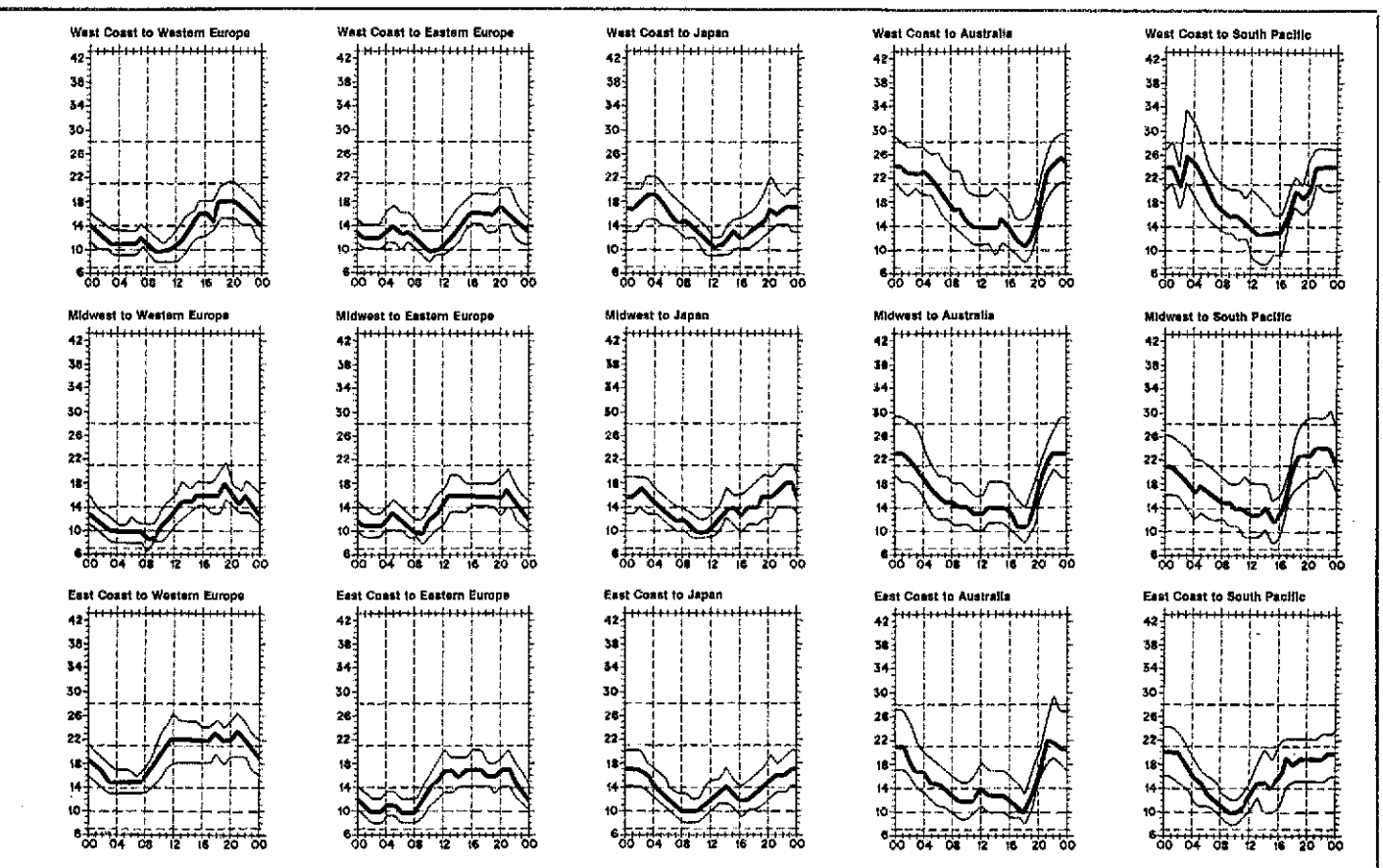
CR9T (WA4IKZ)
CR9Z (JA1ELY)
CRØUA (CT1UA)
HH2VP (W1FJ)
J37XC (W2BJI)
J87LTA (K4LTA)
P29JM P.O. 9205, Rawa, Papau
P42J (W1RM)
TR8JD (F6AJA)
TT8AD (HB9CLA)
TU2LS (K3GYD)
VP2EH (KC5EA)
VP5FUX (KB9AW)
VP5LDX (WB8LDH)
VP5SSX (KB9AW)
VQ9TO (KC4OK)
VR6KY (NE5C)
V3CH (WBØMIV)
V3HE (DL1JW)
V3WTM (WD5CKF)
YB4AEP (N5COP)
ZD7CW (N4CID)
ZD9BZ (KA1DE)
7P8CL (SM5GOJ)
9Q5JE (DJ5TY)
TR8JD (F6AJA)
T7ØA P.O.B. 1, Rep. of San Marino, 47031
ZS1OU (KA3FIB)
ZY1JF (PY1DOQ)

QSL Manager Volunteer

DL1HBT

Special Notes

☐ WA2CDE is not manager for C53AL.
☐ K4ON is not manager for 3D6AR.
☐ WB8SSR is not manager for V2AW.
☐ June 1983 QSL Corner contains information and addresses for the Incoming Bureaus. April 1983 QSL Corner contains information on the operation of the ARRL-Membership Outgoing Overseas QSL Service. For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for July 15 to August 15, 1983, assume a sunspot number of 67, which corresponds to a 280-MHz solar flux of 118.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 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

AL7DN/124 G3YJI/305 JF2GYH/208 YU1OXW/137 W1SSX/105 KD4QP/102 KB5IM/214 WB6ZHT/211 WA8OXS/100
CE3GN/290 GM3PPE/202 JH3UBF/105 9J2GJ/200 K2VX/114 KE4JO/100 KD5RO/202 AC8W/255 K9GPN/110
DJ6TK/324 HA8KVK/123 LX1DA/129 9M2AX/106 KC2NX/211 KF4FP/102 KM5A/149 AD8T/101 KA9AGT/110
DJ0AJ/104 HB9CJX/117 OE3WWB/326 KA1AQD/105 KK2A/110 N4EDX/101 W5HK/116 K8ZTT/274 KS9M/108
DK1HH/102 I2QEA/154 ON6HE/307 KA1KF/100 W2NKC/125 WA4MOJ/116 W5VUF/141 KC8QT/221 WA9CYG/100
DL4FAX/108 JG1FVZ/212 PS7ER/141 N1BRT/128 KA3GJK/132 WB4JRL/125 WN5ZAH/100 KC8WG/102 KD0Z/153
DL5GT/124 JA2ELA/134 SM3KIF/102 N1BZG/103 WA3ZPW/103 WD4JFF/105 KJ6Z/116 N8DEQ/107 N0DGE/102
DL9GAU/107 JA2GPR/285 SM4AXL/105 W1FOV/109 WB3IPE/114 WM4Z/101 KU6T/102 W8MEX/114 WA0QIT/161
F6HMJ/103 JA2GXY/125 YU1GTU/261 W1HHV/118 KA4SPL/201 K5ND/102 NH6H/103

Phone

CT1AJY/100 JG1FVZ/164 LX1DA/129 N1BZG/100 K4KYO/100 KD5SU/100 WB6ZHT/177 KX8Q/105 KS9M/103
DJ6TK/147 JA2GPR/272 LX1KH/129 KC2NX/202 KE4YD/102 W5HK/108 KD7CU/203 N8BSB/106 N9ER/281
DJ9EM/127 JE2SPW/108 OE6EUG/116 N2BHS/131 N4AVR/195 W5VVV/100 KN7F/105 N8DEQ/104 WA9OVU/136
EA3OCN/159 JF2GYH/202 PT2PPP/129 W2DSE/157 WA4GZA/109 KJ6Z/103 W7JBS/241 W8WYK/100 KA0NNF/109
EA3CSK/121 JH2IJC/139 VE3LCZ/101 WB2PXA/100 WA4MOJ/105 N6EVZ/100 K8ZTT/265 WA8LXW/109 KD0Z/152
G3NDC/125 JA7UVI/104 VK2VMX/111 KA3EMQ/107 WB4JRL/125 W6CBA/157 KC8KE/144 WD8QJD/111 WD0BMM/106
GM4CUX/101 JH7JDB/110 KA1ERN/104 KD3A/103 KB5IM/214 W6SWE/215 KC8QT/215 KC9PX/100 WD0CCW/183
HB9CJX/113 LA5LT/109 KA1YO/101 AG4M/100

CW

G2GM/201 JA1GZV/101 OH1FS/111 PA3ALV/115 K1PV/100 W2CKR/101 KA4IFF/103 K6UD/207 KO7W/104
G3DKO/102 JG1FVZ/115 OZ1GHQ/100 PY2FK/181 KF1K/104 W2TQC/244 N4DEK/102 N6DAZ/100 AC8W/207
GM3PPE/199 JF2BBF/103 OZ1HET/122 VE7DX/108 W1KX/104 KA3CTO/100 W5MUG/107 W8SWE/114 K8ZTT/118

RTTY

I0ZSG K4VDM DK4KK WB3HAZ

160 Meters

W6RW

5BDXCC

EA1ABT KK1X NN4Q LA4HW W3ICM W6SQP JH7BRG W4YE UA6APP
W4DZZ I2PKF I2JSB JA4IKD W1BBJ EA8LD K9QVB N6HR OE3ALW
DJ6DU KE3A SV8CS

Endorsements

Mixed

A71AD/279 IT9TAI/357 OH2BC/342 9V1TL/251 WB2BNJ/310 AC4B/305 K5IID/251 W6SWE/254 K9RX/304
DF4RD/287 IT9TGO/275 OH2FQ/280 AK1N/236 WB2CJL/258 K4CXY/300 K5KT/196 W6TTK/160 K9UA/302
DF7VO/193 IT9ZGY/356 OH2SX/160 K1EM/301 WB2RME/126 K4DY/336 KC5CZ/251 WA6TOO/301 K9WWW/201
DF9RW/260 JA1ATF/271 OK2BBJ/280 K1OXD/227 AF3E/316 K4IR/327 N5TC/301 WA6WZO/313 KB9EZ/319
DJ5AI/332 JA1CZI/261 OZ1FAO/224 K1SS/329 K3AV/342 K4KG/340 N5UR/318 AI7P/211 KF9U/151
DF8SG/130 JA1HGY/322 PY2BBO/262 K1WJB/247 K3HPG/329 K4NV/270 W5GEL/345 K7AA/326 KR9U/250
DK2BI/322 JA1VN/308 PY2BCQ/250 KA1ML/204 K3ND/317 K4RPK/349 W5KNE/210 K7RLS/310 N9CLM/160
DK7XX/234 JA1WSA/259 PY5EG/289 KA1CDC/202 K3RS/330 K4RZ/317 W5LVD/323 W7EDA/315 N9CTS/153
DL1DA/310 JE1CYH/201 SK4BX/219 KA1HQ/263 K3RT/303 K4TXJ/280 W5SP/325 W7HZL/196 N9ER/293
DL3NBL/136 JE1GBI/171 SM3BIU/309 KB1BE/271 K3TUP/326 KD4VN/125 W5ZPA/308 W7IYW/317 W9CBE/150
DL5KAT/189 JH1AGU/271 SM5AKT/275 W1ELR/342 K3ZR/328 KU4N/263 WA5QCH/262 W7JBS/246 W9EIZ/250
EA5AMR/208 JA2DOU/265 SM7QY/349 W1GME/341 KA3CTY/155 N4AH/315 WA5TOD/184 W7JFO/332 W9HIK/345
EA6DE/273 JA2JZT/211 TI2BEV/175 W1NH/251 KA3R/280 N4PB/303 WB5MJK/125 W7KS/319 W9JBR/125
EA9GZ/207 JA3AQ/328 VE2CU/200 W1ODY/319 KB3YX/129 NF4A/320 WD5GJB/285 K8RLQ/150 W9NNE/300
EI7CC/264 JA3BAG/143 VE2PD/202 KB2G/172 KC3X/271 NI4Y/269 K6JR/328 KC8YW/127 W9NUD/287
F6FHO/263 JA3GIY/128 VE2QV/269 KB2HZ/290 KE3A/293 NW4L/160 K6NL/289 N8AFR/291 WA9BXB/125
F8RU/334 JA3PXH/288 VE3JKZ/252 K2OPJ/242 KI3L/280 NX4B/150 K6UD/316 N8II/299 WA9EKA/294
F9YZ/326 JI3AUD/130 VE3MZ/280 KF2G/261 N3ARK/285 W4ORT/333 KG6S/271 N8LP/176 WD9BEG/189
G3AAE/360 JA6CM/208 VE4IU/249 KJ2B/219 N3ST/205 W4OVU/291 KM6N/261 W9EY/179 AI0O/250
G3DOG/325 JA8DNZ/315 VK4QM/363 KM2V/318 W3NF/308 W4RA/285 N6FL/197 W8MFW/286 K0AL/250
G3GIQ/333 JA8EAT/320 VO1CA/270 N2AP/322 W3NJL/176 W4TFB/325 N6VO/261 W8NPF/314 K0QTU/125
G3ZAY/320 KL7IF/212 YU2BOP/271 N2CGB/250 W3TV/337 WA4CXZ/316 N6VR/316 W8QFR/330 K6SW/254
G3ZRH/152 KP4FO/126 YU2OB/310 W2CUC/304 W3YQ/225 WA4JXI/266 NO6H/212 W8SYR/298 KC0Q/283
G4GIR/249 LA1K/342 YU4HA/333 W2GA/321 WA3WIP/298 WA4QBX/323 W6DH/263 W8TQY/245 KY0A/261
GM3ITN/349 LA2KD/227 YU7DX/262 W2JB/323 WA3YLN/183 WA4UCU/200 W6GMF/346 WA8MOA/288 N0EL/314
GW4BLE/285 LA5NM/259 Z23JO/273 W2MJ/346 WB3CQN/290 WB4AGT/251 W6GYM/225 K9AWK/335 W0BWJ/233
HB9AIJ/322 OE3ALW/281 ZB2GR/172 W2QL/307 WB3HAZ/301 WD4RAF/151 W6KH/352 K9KK/260 W0DEI/350
HB9BLQ/276 OH1AA/300 ZL1AV/340 W2UP/232 WB3HTK/237 AG5X/294 W6KPC/331 K9MFY/305 W0LWG/352
HB9CIP/282 OH1FS/250 4Z4OL/211 WA2OVG/176 WB3KAM/275 AK5B/284 W6MEL/261 K9QVB/309 W0PT/337
I8WY/264

Phone

A71AD/279 G4FJT/203 OH1AA/279 KA1YN/127 K3PPI/200 WA4OPW/317 N6BAK/250 KC8AV/183 W9BVX/343
CE3GN/290 G4GED/153 OH1FS/248 KB1BE/271 K3RT/272 WA4QBX/312 N6BLN/226 N8II/289 W9CRN/284
CP1FQ/241 G4GIR/220 PY5EG/287 W1HJF/184 KE3A/288 K5FM/304 N6VO/224 N8AFR/291 W9IFJ/202
DH5BAE/166 HB9BLQ/257 VE2JO/152 W1KSZ/300 KI3L/263 K5KT/188 W6DH/249 N8BIB/251 W9NNE/259
DK2BI/320 HB9CIP/254 VE2PD/201 WA1JKK/255 W3DYT/153 K5OVC/328 W6GYM/225 W8JQJ/310 WA9EKA/285
DL4GAD/211 I5ICY/250 VE2QV/226 AG2K/200 W3FZE/297 KA5DNP/176 W6JOT/202 W8MAW/310 WA9IVU/224
EA3AOE/252 I5ZGQ/295 VK4QM/347 K2OPJ/203 AC4B/302 KC5CZ/230 W6KPC/330 W8PCA/306 WD9FOE/260
EA3CFW/174 IT9TAI/321 XE1LCH/275. KB2HZ/284 K4ETB/157 KD5GB/168 W6MEL/198 WA8MOA/271 WD9HAW/290
EA5AMR/174 IT9ZGY/339 YV5EF/152 KM2V/317 KF4M/265 KQ5A/125 W6TTK/158 WA8NDE/150 K0QTU/125
EA6DE/273 JE1GBI/165 ZB2GR/166 N2CGB/250 KW4V/203 W5JJA/338 WA6IVO/162 WA8SAE/162 KC0BN/151
EA9GZ/207 JH1AGU/253 ZL1AV/322 W2GA/313 N4DIT/180 W5LQN/300 WA6WZO/313 K9KK/255 KQ0J/176
EI7CC/261 JA2JZT/211 ZP5JAL/132 W2QL/296 N4JA/307 W5MQV/205 WB6PSY/290 K9MD/305 KY0A/216
F5JA/320 JA3AQ/313 ZP5MJY/132 WA2MTR/251 N4PB/301 W5OSH/278 K7RLS/292 K9MFY/298 N0CXE/180
F6AXP/301 JA3PXH/260 6D5LM/127 WA2SRM/280 NI4Y/250 W5RRK/320 W7EDA/204 K9QVB/297 W0BWJ/233
F6FFA/263 LA5NM/219 AK1N/233 WA2SSU/175 W4BLB/175 W5SP/309 W7GYZ/179 K9RX/255 W0PT/290
F6FHO/263 NP4CC/250 K1EM/264 WA2VEG/325 W4EPT/335 K6JR/326 W7JFO/332 K9UA/283 WA0GUD/223
F6FWW/250 OA4BS/314 KA1AWH/208 WB2BNJ/309 W4JHE/286 K6XJ/321 WA7BPO/271 KR9U/235 WB0CGJ/267
G3DOG/307 OE3ALW/280 KA1CDC/200 WB2CJL/225 W4NYN/332 KB6V/272 K8VIR/296 N9JK/280 WD0FNZ/136
G3ZAY/316 OE3WWB/325 KA1HQ/263 K3EW/229 W4RA/279 KE6AL/151

CW

DF5XF/201 JA3BAG/137 VE2CU/200 K2JF/180 N3AKD/139 K4NV/270 WA5TOD/147 W7HZL/136 KB9KB/289
DK7XX/228 JA3PXH/262 4Z4OL/189 K2OPJ/174 K3EW/158 NI4Y/202 K6TS/200 K8WW/300 N9ER/161
G3GHY/152 JA8EAT/296 9V1TL/198 K2TQC/310 K3KA/292 W4NZR/127 N6VO/126 N8II/269 W9NUD/259
G4GIR/170 LA2AD/177 K1EM/162 K2UFM/260 KC3X/184 W4OYI/174 N6VR/232 W8CEU/259 WA9EKA/275
I8WY/250 OH1AA/209 KA1CB/225 KB2G/170 N3ST/165 AK5B/161 NO6H/200 WA8SAE/270 AI0O/230
JA1CZI/235 OZ1FAO/215 W1JR/290 KJ2B/159 W3GG/226 K5YY/204 W6SWM/161 K9AJ/303 KC0Q/267
JA1NTK/152 PY2BBO/177 W1KSZ/255 W2GA/175 AA2QZ/178 W5SP/193 N7RO/224 K9QVB/302 KJ0U/252
JA3AQ/277 SM5AKT/270 AA2Q/150 W2QL/240 K4CXY/270 W5ZPA/283 W7EDA/259 K9ZO/249 W0PT/228

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

A-Bomb Proof Repeater

The first Amateur Radio repeater in the United States to be housed in a federally funded "atomic bunker" is W4HBB/R, a 2-meter repeater located in Savannah, Georgia. The repeater is owned and operated by the Amateur Radio Club of Savannah (ARCS) on 146.37/146.97 MHz and is housed in a bunker specifically designed to protect commercial radio broadcast stations in the event of an emergency.

The primary purpose of the bunker is to protect WJCL-FM, which has been designated the Emergency Broadcast Station for the Savannah area. In the event of a nuclear disaster, the radio station transmitter and its operators would be protected from the nuclear blast and its resulting fallout. And if a hurricane or other kind of weather emergency struck, equal protection would be provided. In either case, information and instructions from Civil Defense would be broadcast from the station to the Savannah area.

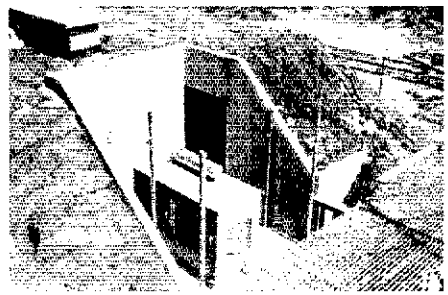
The bunker has some very impressive features. The walls of the bunker are constructed of reinforced concrete and are more than 1 foot thick. The walls are also banked with 8 feet of earth for additional protection. The structure can withstand extreme over-pressure, such as that produced by a nearby nuclear blast. If commercial power fails, the site is equipped with a diesel generator and two weeks' supply of fuel, which can power all of the equipment located in the bunker. The electrical system also has electromagnetic pulse (EMP) protection to counteract voltage spikes. A special design permits air ventilation while providing protection against fallout debris. There are enough food and provisions to supply two occupants in the bunker for two weeks.

The broadcast tower is 1500 feet high and is heavy-duty in design (it was originally designed to accommodate several television and/or fm radio broadcast antennas). The tower can probably withstand extreme over-pressure produced by a nearby nuclear blast or high winds produced by killer hurricanes.

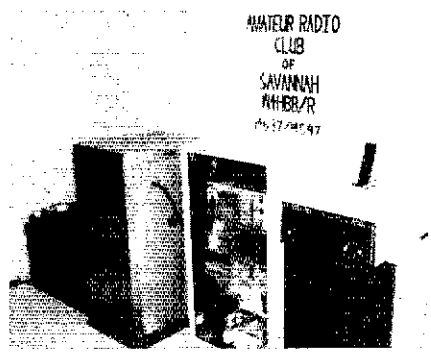
An installation such as this is costly. Through the assistance of the Federal Emergency Management Agency (FEMA), funding was obtained to build the bunker at a cost of about $55,000 (the generator cost an additional $25,000).

Repeater History

The ARCS 37/97 repeater also has some features concerning its history and design that are worth mentioning. The first repeater was a 1964-vintage Motorola 60-W vacuum-tube machine that was donated to the club in December 1976. In early 1977, the repeater was installed at the WJCL transmitter site, with an antenna height of 350 feet. It soon became well known throughout southeast Georgia and South Carolina as the "hot bucket of bolts," nicknamed from the suffix of its call sign, W4HBB.



An atomic bunker houses the Amateur Radio Club of Savannah's 2-meter repeater as well as a commercial fm broadcast station.



The W4HBB/R installation inside the atomic bunker features a Motorola Micor repeater with a backup Motorola tube-type machine.

The vacuum-tube repeater provided reliable service for three and one-half years, but after Hurricane David, the club realized it was not prepared for all emergencies. For example, the old repeater was not easily adaptable for emergency power. The membership agreed to purchase a more modern and efficient machine that could be operated from 12-V batteries.

After selling many bales of paper, aluminum cans and raffle tickets, the bright, shiny, new solid-state Motorola Micor repeater arrived for installation in 1980. The Micor produces an output power of 100 W with a continuous duty-cycle rating. To keep modifications to a minimum, the identifier, control circuit, autopatch and other accessories are housed in a separate cabinet. Interconnect cables with mating plugs connect the accessory cabinet with either the Micor or the old vacuum-tube repeater. If the new Micor fails or needs servicing, it takes very little time to get the old Motorola repeater back on the air.

The Micor repeater is equipped with a heavy-duty power supply that serves a dual purpose. The power supply powers the repeater and charges a bank of 12-V batteries. If there is a power failure, the repeater can operate from the batteries for nearly a week at full-rated output power under normal use.

Move Down Under

In early 1982, the club was offered the opportunity to install the repeater in the WJCL-FM radio "atomic bunker." The club accepted the offer and, in September 1982, the repeater was transferred from the old transmitter building to the adjacent bunker. To date, the ARCS 37/97 repeater has operated with very little downtime.

ARCS is grateful to the Lewis Broadcasting Co. for allowing their equipment to share the protection of the bunker. This protection has made the Amateur Radio operators in the Savannah area more confident of their capabilities to provide public service if an emergency situation of the worst kind arises. — *Andy Blackburn, WD4AFY*

*72 Stiles St., Waterbury, CT 06706

TWO-METER SPLINTER BAND PLAN

After several studies, the ARRL Board of Directors adopted the position of the VHF Repeater Advisory Committee (VRAC) on the issue of 15-kHz "splinter" channels in the 146-148 MHz repeater subband. West of the Continental Divide, there is no particular problem, so the resolution leaves good enough alone.

East of the Divide, two conflicting coordination plans are in effect — the "upright" and the "inverted" plans. Either system works, but mixing the two does not. Since there are more upright splinter repeaters east of the Divide, the Board adopted a five-year phase-in of a policy of all upright repeaters east of the Divide to minimize inconvenience. That is, all Eastern repeaters in the 146-147 subband will be low in/high out, and all in the 147-148 subband will be high in/low out.

PAYING YOUR DUES

This suggestion comes from an 8-land reader: "How about encouraging repeater-owning Amateur Radio clubs to establish nonvoting associate or sustaining memberships at lower dues for hams who would like to help with the financial burden of repeaters they use but do not want to or cannot become active members of the club. I belong to one club, which owns the repeater I use most, but I would contribute $5 or so to at least two other machines I use regularly."

REPEATER LOG

☐ According to reports received between March 10 and May 9 repeaters were involved in the following public service events: 36 weather emergencies, 11 crimes, 14 medical emergencies, 443 vehicular emergencies, 14 fires, 7 search and rescues, 8 public safety events, 97 drills/alerts and 7 power failures.

The following repeaters were involved (followed by the number of events): K1FFK 5, W1XJ 10, K1ZZN 5, WB2IWT 1, N2MD 2, W2ODV 5, WA2PAV 14, K2QIJ 11, W2VL 72, WB2ZII 7, WA2ZWP 2, W3ACH 3, N3AIA 5, N3BFL 11, K3HKI 1, WB3JVX 35, K3PSP 1, VE3RPT 3, W3UER 4, WR4AMJ 3, W4ATD 2, W4BEJ 1, KA4CLL 2, N4DMA 2, W4DPH 2, K4DXZ 1, KF4EV 1, WA4GIC 5, K4GSO 2, K4HY 2, K4IJY 2, W4JNB 1, WB4LHO 1, WA4QBG 1, WB4QES 19, K4SCL 1, WA4SWF 2, VE4UMR 1, VE4WPG 1, W5FC 1, W5GIX 12, WA5LHL 2, WA5LVT 1, KB5NO 1, VE5RRG 1, W5RVT 3, W5VLY 1, W5WX 1, KH6AH 1, WD6AWP 13, WB6CAN 4, WD6FGX 11, WB6FMC 2, KH6H 3, KH6HHG 2, WB6HUK 1, WB6IIY 3, KC6K 1, N6ME 1, K6TZ 23, WC7AAT 10, K7CC 10, W7EX 242, W7HSG 14, W7OMR 6, K8DDG 8, WD8IEL 10, W8VA 2, WB8VAZ 2, K8VXH 1, WR9ACD 1, WB9DGO 2, K9HGX 1, W9JMH 1, W9KXQ 3, W9NSS 1, WB9VLV 1, W9WDD 1, WRØACD 1, WRØAEV 2, WØAFG 1, WRØAMJ 1, WDØBQM 2, WØEBE 11, WØEQU 1, WØGKP 1, WBØHAC 1, KØKKV 1, KØKRB 1, WØKUJ 3, KØSCM 2.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

KA1CBE, James S. Hutchins, Sanford, ME
KA1CWR, Burton K. Still, Winthrop, ME
W1OLG, Leigh C. Tryon, Meriden, CT
*W1SJ, Valentine J. Morris, New Haven, CT
WA1TJB, C. Barton Smith, Torrington, CT
W1ZS, Glenn C. Sabin, Northampton, MA
W2DFV, Harold W. DeRusha, Edison, NJ
WA2DVL, Willard W. Davis, Port Kent, NY
W2ELN, Norwood V. Bradshaw, Woodhaven, NY
W2HVC, Maurice Grossman, Jamaica, NY
K2IS, Morris L. Rosenfield, New Paltz, NY
W2OG, Alfred B. O'Hara, Hawthorne, NJ
WA2PRW, Ralph L. Marks, Holiday, FL
W2QHL, Robert L. Clute, Oneonta, NY
K2QOS, Michael F. Fekete, Sr., Trenton, NJ
W2RUT, Roger E. "Kernie" Curran, Hannibal, NY
K2SWL, Horace D. "Mike" Runey, Horseheads, NY
WA2YXB, Peter A. Metroka, Liverpool, NY
N3CEN, George E. Jones, Clear Spring, MD
KA3DHH, Robert M. McClain, Lake City, PA
W3DQJ, Fernley A. Gartrell, Westminster, MD
W3DZL, Harold E. Stoneback, Quakertown, PA
W3IWD, Carmine Pastella, Monessen, PA
WB3JIE, John C. Barch, McKeesport, PA
*W3KVZ, Paul Damanskis, Glen Mills, PA
W3MRK, Jack E. Phillips, Sr., Hyattsville, MD
W3NRY, David L. McConaughy, North East, PA
W3QKW, Damon D. Holton, Norristown, PA
WB4BLI, Leonard K. Davenport, Kingsport, TN
*W4BSB, Hugh Y. Meetze, Manassas, VA
WA4ENE, Ervin Stockinger, Palm Beach Gardens, FL
WD4EUX, Abraham B. Sutker, Columbia, SC
WA4FYZ, Gary H. Toncre, Miami, FL
K4GMA, Paul E. Hillard, Mt. Dora, FL
WA4HJA, Fred B. Colvin, Bradenton, FL
K4JVX, Royal C. Dickson, Greenville, SC
K4KMG, Harold R. Champion, Sr., Centerville, AL
WB4KYG, Edgar "Ed" Reichelderfer, New Port Richey, FL
W4LXL, Ernest S. Allman, Athens, GA
WD4OTC, Vincent J. Slomka, Columbus, GA
K4UD, Henry F. Priebe, Jr., Dunwoody, GA
W4ULX, Giles Tuck, Greensboro, NC
KY4X, Ferenc Pankotay, Raleigh, NC
WB4YTA, Frank Baque, Jr., Miami, FL
KA5CCA, Edward Wilson, Deer Park, TX
N5DAU, George W. Starns, Rhome, TX
K5JZR, Marmaduke Corbyn, Jr., San Antonio, TX
KA5LDL, Robert E. Van Winkle, Corpus Christi TX
W5LVQ, Rolland M. Sifers, Guthrie, OK
WB5TFX, Ben Gard, Hollenville, OK
W5UGJ, Carroll P. Mulliniks, Lake Charles, LA
WA5VVV, Irvin D. Collins, Denham Springs, LA
K5YLU, Arthur B. "Pete" Vela, Groves, TX
W6DUC, Victor H. Peterson, Needles, CA
W6FRH, Taubner G. Hamma, Stockton, CA
K6GRS, Richard K. Brown, Gardena, CA
WD6GTZ, Raymond D. Barnes, Winter Haven, FL
W6HYZ, John C. "Jack" Burke, Fresno, CA
W6KBD, Herbert Gordon, San Diego, CA
KA6LJK, Harold E. Palmer, San Jose, CA
WB6LYD, Lee O. Smith, LaHonda, CA
WA6MJT, Garland D. Moorehead, Fortuna, CA
W6NHP, George T. Savage, Redondo Beach, CA
W6NUI, Thomas L. Rutherford, Rancho Palos Verdes, CA
W6OSY, Dunstan S. Gross, Oakland, CA
W6PKH, Howard G. Young, Mountain View, CA
WA6QVH, James J. Murphy, San Diego, CA
K6QXN, Louis D. Rush, Spring Valley, CA
W6STV, Morris Holmen, West Point, CA
K6UX, William H. Phillips, Vallejo, CA
W6WPV, Sherman F. Desper, Turlock, CA
W6ZCT, Arthur P. Lorenz, Oxnard, CA
N7AXB, B. John Prestini, Clayton, WA
W7DXL, Thomas G. Schuele, King City, OR
WA7EPT, James Pendlebury, Henderson, NV
W7GPJ, William E. "Steve" Stevenson, Portland, OR
W7HN, Charles A. McDonald, Spokane, WA
W7JQO, Robert E. Foltz, Sedona, AZ
KB7RO, Winfred M. Harvey, Everett, WA
W7SO, Howard B. Truax, Albany, OR
*KB7UC, Joseph J. Ireland, Cheyenne, WY
W7WVD, Charles B. Heap, Emmett, ID
N8CIM, George E. McGuiggan, Sr., Tallmadge, OH
W8EFI, Robert D. Binting, Sandusky, OH
W8KEU, Jesse E. Antwright, Jr., Largo, FL
WB8LHV, Harold A. Flesch, Sr., Springfield, OH
K8ODY, Richard R. Brege, Rogers City, MI
KB8UJ, Kyle J. Kinder, Salem, OH
N9BPP, Herb J. Lieski, Juneau, WI
WD9EKR, Roby H. Parker, Muncie, IN
W9GGX, John F. Gerety, Madison, WI
W9GX, Clarence "Ed" Ridgely, Princeton, IN
KC9IJ, Dale R. Harner, Egan, IL
K9LQB, Gareth H. Bundy, Mascoutah, IL
K9MXX, Bernard Isaacson, Delray Beach, FL
W9ZII, George P. Entrekin, Greenfield, IL
KØATK, Francis L. Smalley, Fessenden, ND
KØAWK, Lyman P. Culp, Charleston, MO
WØEUR, Rubin J. Overson, Donnelly, MN
WBØFVT, Charles F. Best, Harvey, ND
WØIDD, Norris S. Preston, Marceline, MO
WAØKOE, Chester A. Dill, Lincoln, NE
KAØNSP, Eugene B. Wagner, Hastings, NE
KAØORF, Ercil A. Hoke, Jr., Manhattan, KS
WAØPSN, Marie Gorr, Chadron, NE
WØQNP, Allan T. Smith, Culbertson, NE
KØVDT, Samuel A. George, Princeton, MO
WBØZCB, George L. Potter, Wilcox, NE
VE3ACA, Anthony R. Clinchy, London, ON
VE3AT, Hugh Gill, Woodstock, ON
VE3DJJ, Ashton W. Johnston, Islington, ON
VE7AXH, Willem A. Broeksma, Prince George, BC

*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

July 1933

☐ Governors from 35 states sent messages via amateur radio channels to President F. D. Roosevelt on his inauguration, a relay project organized by the Washington Radio Club.

☐ Swinging Zepp feed lines produce frequency wobble from self-excited rigs, but George Grammer found that using twisted pair cord is not the answer, since high capacity results in heavy losses (heat). Such a feed line works okay, though, on center-fed wires.

☐ The Editor looks forward to the Cairo radio conference set for 1938, saying that with large increases in the amateur population we're going to need more space. However, some of us are turning out rather poor quality signals, which is no way to win the support of authorities.

☐ W8ALK laments the "loss" of 3.5 kc., which results from using a frequency meter at 3.5 Mc. with "only" 0.1% accuracy, so he uses a micrometer for the dial of his tuning condenser.

☐ A new "A-1 Operator Club" is sponsored by the League, with criteria for membership being good keying (or voice techniques), proper procedure, copying ability and courtesy.

☐ W1DBM started with a used Model T Ford axle and completed a "shack on wheels" with galley, sleeping quarters, and 160, 80 and 5-meter capabilities.

☐ Meters are expensive, and hams usually employ shunts and rectifiers on one milliameter for additional measurements. W9BLK goes it one better with a homemade thermocouple to permit antenna current measurements.

☐ The League has gone d.c.! The Board of Directors decided to ask the Federal Radio Commission to require direct current for *all* transmitter stages and thus eliminate tone modulation and a.c. applied to amplifier stages.

☐ To save space (and power) in his portable 5-meter superregenerative receiver, W3ACD used a self-quenching circuit rather than a separate tube.

☐ Prof. Dan Noble of the University of Connecticut, concerned about our poor phone signals, explains the fundamentals of impedance vs. turns ratios in audio transformers, and what happens when we ignore those principles.

☐ OA4U operates at 11,000 feet on a mountain in Peru, using a Ford engine-driven generator and a 325-foot Hertz antenna.

☐ W3CXL is consistently at the top of the Brass Pounders' League listings, with traffic totals around or over 2000.

25 Years Ago

July 1958

☐ Progress in improvement of receiving techniques continues with W6STA's tuner for 3500-4000 kc. The stability and tuning rate remain optimum even on higher bands with the use of crystal converters.

☐ W9LIJ suggests that Technicians interested only in 6 meters should build a receiver for optimum performance on that band, rather than an "all-band" job with converters.

☐ Smaller than the two D cells powering it, W9KRU's multivibrator standard produces 50-kc. spots through 30 Mc.

☐ Using any old capacitor in the junk box may be the wrong approach, as W1ZEO points out that factors such as frequency (audio or r.f.), component reactance, stability requirements and losses may dictate specific types.

☐ The frequency of W1PLJ's rig can be controlled by the receiver v.f.o. for spot frequency operation, or by a separate one for split frequency QSOs.

☐ An absorption-type wavemeter may be old hat but is still a most useful adjunct to a ham station, particularly Novices, W1ICP points out.

☐ The Editor recites the history of one of our most sacred traditions — the Wouff Hong, and the elite society of the Royal Order of the Wouff Hong.

☐ W1JLN, a traveling salesman, built a 25-watt portable unit covering 80 and 40 meters for his trips. Back-to-back chassis make a nifty cabinet enclosure.

☐ If you'd like to be a top scorer in the CD Party, K2KIR has lots of good tips on techniques and operating procedures.

☐ To facilitate DX work on 2 meters, the League will ask F.C.C. to restrict the lowest 100 kc. for c.w. telegraphy work only.

☐ WØBP finally did it — a WAS on radioteletype, two-way.

☐ Aimed especially at the nonengineering ham who is still deeply interested in antenna performance, W6DOB provides some basics on beam design and construction.

☐ K6PYB avoided expensive filters in his teletype terminal unit by use of a pulse-counting detector which responds to the frequency difference in the f.s.k. signals.

☐ Unusual reception of the Sputniks when halfway around the world from the receiving point has piqued scientific interest, and Stanford Professor W6QYT requests reports from amateurs to add to other data being collected.

☐ Early reports indicate that KH6IJ and W3LOE are top scorers in the League's 1958 DX contest.

☐ For the 2-meter enthusiast, W8WXV has some useful hints on building and operating converters. — *W1RW*

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Power Indicator for a 1296-MHz Slug Tuner

Recently (April 1983), a two-slug tuner for 1296 MHz was described in this column. This month's column describes a simple directional power coupler that can be added to this tuner to produce a low-cost power-output indicator.

The power indicator is, in reality, a short (much less than 1 wavelength) section of transmission line that is placed in close proximity to the center conductor of the two-slug tuner, which is itself a section of air-dielectric 50-ohm transmission line. When two sections of transmission line are in close proximity, power will couple from one to the other, and the coupling is directional (for more on this topic, see a recent edition of the ARRL *Handbook*, p. 3-10). The power transferred into the coupled line can then be rectified and displayed on a meter.

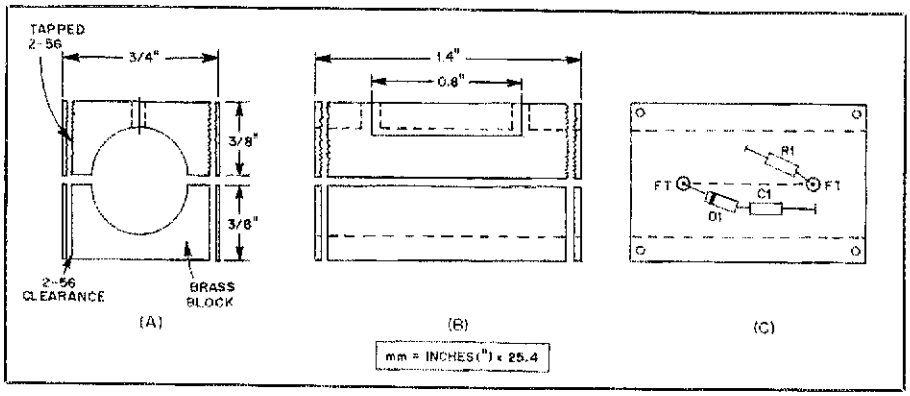


Fig. 1 — Power sampler for the two-slug tuner described in April 1983 *QST*, page 62. FT — Insulated feedthrough capacitors.

Construction

Brass bar of the size used in this project may be obtained from Small Parts, Inc., 6901 N.E. Third Ave., P.O. Box 381736, Miami, FL 33138.

1) Take two brass pieces 1.4 in. long, 3/4 in. wide and 3/8 in. thick, and tightly clamp them together with the 3/4-in. sides in contact so as to make a block 1.4 in. long and 3/4 in. square (see Fig. 1).

2) Drill a 17/32-in. hole axially through the center of the block, as shown in Fig. 1. Do not remove the clamp yet.

3) At the four corners of the block, drill a no. 50 (0.07-in.) hole through both halves of the block. Now remove the clamp.

4) Take one of the two brass pieces and enlarge the four corner holes to 2-56 clearance (no. 43, 0.089 in.) size. Take the other brass piece and tap the holes with a 2-56 thread. The two pieces of the block can now be secured together with four 1/2-in. × 2-56 screws. Alternatively, the holes could all be drilled with a no. 43 drill and long 2-56 screws and nuts used to hold the pieces together.

5) The two brass pieces when bolted around the body of the two-slug tuner should be a tight fit. If they are not, file the mating faces down a little until a tight fit is obtained.

6) Take either one of the brass pieces and drill two holes 0.8 in. apart on the center line of the broad face (see Fig. 1B and 1C). The size of these holes depends on the size of the insulated feedthroughs available. If feedthroughs are not available, the coupling loop can just be passed through the holes, with care being taken to fasten it securely to the components at either end. In this case, the diameter of the holes should be such that they preserve the 50-ohm impedance of the coupling loop. Using no. 22 swg wire 0.0253-in. diameter) for the coupling loop, the holes should be drilled with a no. 51 (0.069-in.) drill.

7) The coupling loop itself is designed to have a 50-ohm impedance. Using no. 22 gauge wire, it should be installed (see Fig. 1B) with approximately 0.06 in. between the center of the wire and the body of the brass block.

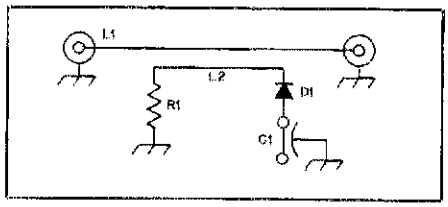


Fig. 2 — Schematic diagram of the power sampler.
C1 — 1000-pF feedthrough capacitor.
D1 — Hot-carrier diode, HP 5082-2900 or equiv.
L1 — Center conductor of 50-ohm air line (tuner).
L2 — Coupling loop.

8) The components shown in Fig. 2 can now be installed as shown in Fig. 1C. If a 1000-pF feedthrough capacitor is not available, a small disc-ceramic capacitor with minimum lead length may be substituted.

Use of the Power Indicator

The power indicator should be clamped around the output end of the two-slug tuner, with the 50-ohm resistor nearest the output connector and the coupling loop positioned in the center of the slot. Make sure that the coupling loop does not short against the body of the two-slug tuner or the body of the power indicator. A meter and a series resistor should then be connected between the output of the diode on the power indicator and the body of the block. To start with, try a 500-microamp meter and a 10-kΩ variable resistor. The power indicator is very useful in tuning up power amplifiers and drivers for maximum output. In addition, if the power indicator is reversed (i.e., with diode closest to the output socket), the meter should give a measure of reflected power, but be warned that the indicated reflected power may be influenced by the real forward power unless the directivity of the directional coupling loop is high. In a simple design such as this, it is probable that directivity will be low.

Directivity is a measure of the degree to which the observed output from the power indicator is proportional to the true forward or reflected power. It may be defined as the ratio of the voltage measured when reading reflected power to the voltage measured when reading forward power when the transmission line is terminated correctly (i.e., no real reflected power). If the coupling loop is not terminated in its characteristic impedance, then standing waves will be set up on it, resulting in an output not directly proportional to the forward or reverse power sampled. In the case of this power indicator, since the terminating resistor is 50 ohms if the coupling loop does not present a 50-ohm impedance all the way along its length, then a loss of directivity will result. Lack of directivity isn't much of a problem when the power indicator is being used simply to indicate when an amplifier is tuned for maximum output. It does become a problem, however, when trying to accurately measure reflected power, since a small reflected power usually is measured in the presence of a relatively large forward power. If the directivity was 10 dB, then for 100 W of forward power, even if the line were perfectly matched, 10 W of reflected power would be indicated.

The sensitivity of the power meter is a function of the degree of coupling between the center conductor of the two-slug tuner and the coupling loop, and will therefore depend on the exact size and positioning of the coupling loop. If an accurate determination of power is required, then calibration against a known power meter should be carried out.

For more information on power indicators, reflectometers and directivity, interested readers are referred to the RSGB *VHF/UHF Manual*, 3rd edition, pp. 10.1 to 10.10. QST

*103 Division Ave., Millington, NJ 07946

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

Updated Terrestrial DX Records

The July 1982 column featured a discussion of the then-known terrestrial DX records for the various bands above 50 MHz. Many questions were raised, prompted by a lack of detailed information regarding potential record-breaking QSOs. Particularly emphasized was the need for specific details such as time, date, signal strenth, propagation mode (if known) and, most important, the geographical coordinates of both stations. Since that column appeared, additional information has been received concerning apparent record-breaking contacts on 6 meters, 2 meters and 70 cm. In addition, new records have been established on 1-1/4 meters, 3 cm and 1.24 cm.

After recomputing information furnished by JA5HTP, I conclude that his contact from a portable location with PY5BAB, also operating portable, comes the closest to the antipodes, or half way around the world. Several others, such as HL9TG and HL9WI with their LU contacts, have worked almost as far, but not quite. KH6IAA's QSO with ZS3E also approaches the mark. Since I have already said that only geographical distance will count, not the length of the propagation path, I believe that JA5HTP and PY5BAB have the 50-MHz record.

In the case of the 2-meter record, there is conflicting information as to whether a two-way contact actually took place between I4EAT and ZS3B. Part of the controversy apparently involves the use of a 10-meter liaison frequency. One piece of correspondence is from I4SN, a physicist specializing in radio-wave propagation. It attests to the legitimacy of the contact and encloses a photocopy of a confirming QSL from ZS3B. Unless other more convincing evidence is forthcoming, I must conclude that a two-way 2-meter contact did take place between these two stations and accord them the current 2-meter terrestrial record.

Terrestrial DX Records†

6 Meters	JA5HTP/6 and PY5BAB/5 March 11, 1982	12,433 miles (20,008 km)
2 Meters	I4EAT and ZS3B March 31, 1979	4803 miles (7690 km)
1-1/4 Meters	KP4EOR and LU7DJZ March 9, 1983	3670 miles (5906 km)
70 Cm	KH6IAA/KH6 and KD6R July 28, 1980	2552 miles (4106 km)
23 Cm	VK7KZ/P and VK5MC/P Jan. 23, 1980	1422 miles (2288 km)
13 Cm	VK6WG and VK5QR Jan. 17, 1978	1170 miles (1883 km)
9 Cm	ZL2THW and ZL2TSM Feb. 1975	238 miles (383 km)
5 Cm	K5FUD and K5PJR Sept. 20, 1977	267 miles (430 km)
3 Cm	IØSNY/EA5 and IWØBFZ/Ø Aug. 10, 1982	726 miles (1168 km)
1.24 Cm	DJ2UH/P and DJ4YJ/P Feb. 21, 1982	152 miles (244 km)

†as of April 15, 1983

Like the 2-meter record, the new 1-1/4 meter record was established via Transequatorial Propagation or, as some prefer to call it, FAI. The contact was between KP4EOR and LU7DJZ, and surpasses, by more than 1000 miles, the previous record held for many years by W6NLZ and KH6UK. I have received sufficient information concerning the various 70-cm contacts from Southern California to Hawaii in July 1980 to accord the record for this band to KD6R and KH6IAA/KH6. A new 23-cm record was missed across the same path last summer only because no one was available at the KH6 end to put the station on the air for a two-way QSO. But, the KH6HME beacon from up on Mauna Loa was heard in Southern California for several hours one evening last July. Surely, it's only a matter of time before the record for this band is captured by stations using this tropo path, one of the world's best. No information has reached me regarding new records for the 13, 9 and 5-cm bands.

The Italians once again showed the rest of the world that they know how it's done on 3 cm. To set the new record, IØSNY journeyed to the east coast of Spain and, as in previous record-breaking contacts, took advantage of sea ducting and optimum terrain at both ends to work IWØBFZ operating portable near Rome and set a record that will be hard to top. SM5AGM, who keeps the Region 1 records, lists on his latest sheet a new 1.24-cm (24-GHz) record set by DJ2UH and DJ4YJ. I have received no information on work on the higher bands, so I will continue to leave them blank until I do.

The accompanying table lists the terrestrial world records as I presently know them. I feel that this information is far more authoritative than that published last July, but, as noted, there are still some missing data, particularly with respect to all important geographical coordinates. I continue to solicit all the help I can get in making published records correct and keeping them up to date.

DAYTON POSTLOGUE

Once again, Dayton was interesting and fun, despite the rain. This year's affair was especially worthwhile to vhfers because of the fine program put together by WA8ONQ and his crew of helpers. Such well-known practitioners of the radio art as it applies to the bands above 50 MHz as W1JR, K1WHS, K2UYH, WB5LUA, K6MYC and W6JKV, to mention only a few, provided the lowdown on subjects from antenna design to conducting successful 6-meter DXpeditions. The Friday evening get-together and noise-figure-measuring fest was a hit and afforded a fine opportunity to talk things over with those one does not meet very often. It was too bad that the antenna gain tests were rained out. Better luck next year.

The vhf operating and contest forum produced several lively discussions, and it was especially nice to witness the presentation, to W1JR, of the first VUCC Award. Joe earned it on 70 cm, taking advantage of moonbounce to collect the required grids. The Ad Hoc Committee for VHF/UHF Contesting held a spirited meeting and came up with a number of suggestions for future changes to these League-sponsored events. W1XX will have more to say on this subject in upcoming issues of *QST*.

It was great to have the opportunity to meet many vhfers from around the U.S. and Canada as well as a number of overseas countries.

1983 CENTRAL STATES VHF CONFERENCE

This year's meeting of the Central States VHF Society, the 17th since these conferences were begun, will be held during the weekend of July 29-31 at the Doubletree Inn, Overland Park, Kansas, near Kansas City. Speakers scheduled for this year include WØPW, KØRZ, W4WD, W3IWI and others. WBØTEM will preside over the antenna-gain tests and, of course, noise-figure measuring is also planned. In addition to the fine technical presentations, the Central States Conference always affords one of the best opportunities available to renew old friendships and make new ones. For details, send an s.a.s.e. to Ted Mathewson, W4FJ, 1525 Sunset La., Richmond, VA 23221.

CU there!

The new 28-foot 0.43 f/d dish at K5JL.

ON THE BANDS

6 Meters — As this is being written, May 15, the 1983 summer E_s season is just getting under way. If the opening we were treated to yesterday is a reasonable sample of what is in store, the months to come will be interesting indeed. It started as a fairly routine early-season opening to Florida from our part of the country. But then the word was passed from the south that Caribbean stations such as HH2PR, J88AR, VP2MO and J6LOV were being worked. Listening intently, a number of us in the mid-Atlantic states began to hear not these Caribbean stations, but LU8YYO. In only a few minutes, Victor's signal built up to well over S9 and remained there for about 20 minutes. It was the first real DX for this part of the country since March 12. Also worked by this conductor was LU2WM. I did not hear the Caribbean stations, but I understand that W4UWH/KP2 and several KP4s were worked in this area. HH2PR was also worked well into the U.S. K8EFS in Michigan is one known to have made the grade with him for country number 55. Also active, and worked in south Florida, was Guantanamo station KG4GN. PJ9EE was also on and working Florida stations. The only sour note was the fact that a few U.S. stations were working other U.S. stations in the 50.1 to 50.125 DX window. This is one factor that may have prevented some of us in this part of the country from hearing the weaker DX signals. Most, I am sure, would be glad to cooperate and move out of this part of the band when working Ws and VEs, when the band is open for DX. But if it's not, most reason with some justification, why bother. The trouble is, 6 meters can open rather suddenly and, if one is involved in a long-winded contact with S9-plus signals both ways, a weak DX station may not be heard by either participant in

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

1-1/4 Meter Standings

Listing is call, state, U.S. states worked and call areas worked. Call areas are the 10 U.S. call areas plus KH6 and KL7, each VE and XE call area and DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Those not showing some indication of activity or interest in remaining in the standings over the last two years have been deleted. Compiled May 15, 1983.

W1JR*	MA	31	20
K1FO	CT	22	7
K1PXE	CT	18	6
W1YTW	ME	14	8
W1GXT	MA	14	8
W1HDQ	CT	13	5
W1QXX	MA	13	5
K1JIX	MA	13	4
W1AZK	NH	10	3
K1BFA	MA	10	3
W2CRS	NY	21	—
K2CBA*	NY	19	7
W2PGC	NY	16	10

*Indicates some contacts via EME.

W2DWJ	NJ	15	6
K2DNR	NY	15	6
K2YCO	NY	14	7
WA2FGK	NJ	14	6
WA2FUZ	NY	14	5
W2SEU	NY	13	5
WA2YWP	NY	6	2
W3GPY*	PA	40	12
K3HZO	MD	20	10
W3UJG	MD	15	8
W3RUE	PA	14	7
W3IP	MD	13	6
W3HMU	PA	13	4
WA3JUF	PA	12	5
K3IUV	PA	12	4
W3XO	MD	9	4
W3IY/4	VA	23	10
WA4CQG	AL	20	—

K4LHB	VA	18	9
WD4IIS	GA	18	7
K4GL	SC	14	6
WA4SBC	VA	14	5
N4CD	VA	13	5
KC4P	AL	9	2
K4IXC	FL	5	3
WB5LUA*	TX	33	12
K5FF*	NM	31	13
W5RCI	MS	24	6
K5CM	OK	22	—
W5HN	TX	20	6
W5FF*	NM	18	10
N4JS/5	MS	13	7
K5SW	OK	11	5
W5RCI	MS	10	5
K5JL	OK	7	4
W5NZS	OK	4	2
WA5VJB	TX	3	2

WB6NMT*		10	6
W6WSQ		6	4
K7NII*	AZ	16	11
W7JF	MT	8	5
W7CNK	WA	6	3
K7ICW	NV	4	2
WB8BKC*	MI	28	9
WA8TXT	OH	20	10
W8IDU	MI	15	7
K8AXU	OH	12	7
K8HWW	MI	11	7
WB8PAT	OH	8	6
K9MRI*	IN	34	9
K9HMB*	IL	23	10
WB9SNR	IL	22	9
K9XY*	WI	19	10
K9KFR	IN	11	6

KB9NM	WI	5	4
WBØTEM*	IA	39	—
WØVB*	MN	34	12
KØDAS	IA	16	7
WØPW*	CO	14	6
WØSD	SD	9	5
WAØQLP	SD	4	2
WAØNOK	MO	4	2
KCØW	ND	3	1
VE1UT		4	1
VE2YU		8	3
VE2DFO		7	8
VE2HW		5	2
VE3EMS		37	13
VE3DSS		13	7
VE3AIB		10	12
XE1BC*		2	3

the QSO. There is no reason we can't move above about 50.130 at all times to work U.S. and Canadian stations. Better still, if we use the 50.2-MHz domestic calling frequency for CQs and spread out from there, the bottom end of the band will be entirely free for those looking for DX. If a few start this ball rolling, most of the rest will follow. I do most of my CQing at 50.2 if I think that the band is open only for U.S. stations. However, if I believe that there is DX about, I am in there looking for it like many others. If conditions give us a break, there should be lots of DX to chase this summer. Last month's column carried a listing of a number of DXpeditions and other opportunities. In addition to those mentioned, a group including K8EFS should be on from St. Kitts beginning about June 18 until July 1.

The May 14 opening was not the first of the season. There have been several affecting limited areas prior to that. On May 2, W5DZF/4 south Florida reported a good Caribbean opening. The following day, VE1YX and KA1PE caught one to the Midwest with VE1YX reporting working a dozen 8s and 9s. KA5LVP Hattiesburg, Mississippi, reports working 2s on the 11th. For some southern areas, F_2 to South America is still in almost every day. W5UWB Kingsville, Texas, is one of the most frequent reporters of these openings. John has even worked one mobile, LU2WM.

K1MNS passes along word from G5KW that the first 6-meter two-way with a station outside the British Isles took place on May 6, when Ken worked ZB2BL at 0625Z.

2 Meters — The 2-meter news this month consists mostly of reports of those poised and ready for the action of the coming months. N7ARE Salt Lake City, Utah, is one of these. Gary has 90 W to a KLM 13-element Yagi at 40 and is already up to nine states — no mean accomplishment from his QTH! He is looking for DX of the aurora, m.s. or E, variety, and can be reached for skeds at 801-968-4208 or on the CSVHF 75-meter net. Another getting ready should be familiar to many. It's WAØDXZ, now /5. Bob had 36 states from Iowa and is starting anew from his present QTH in northeast Mississippi. The current rig is 90 W to a 19-element Boomer at 70 feet. Evening phone number is 601-324-0262.

From the other side of the world, JA1VOK reports TE contacts with VK4ZSH on April 23 and 24. The second-day signals ran up to S8 and S9. Then, on April 29 and May 1, he worked VK4BFO, about a 3900-mile path. This makes four VKs on 2 meters for Hatsuo.

In beacon news, N6CA writes that the KH6HME is now on 144.052 with 35 W to a 16-element collinear. Other beacons at the same site on Mauna Loa are on 432.075 and 1296.0 MHz.

K9RII, the new *SWOT Bulletin* editor, reminds all to remember the *SWOT* contest coming up in August. For details and membership information, contact George Bretz, KB5SV, 3530 Livingston, Fort Worth, TX 76110.

In recent weeks, a number of Washington, DC-area 2-meter enthusiasts have been giving ssb mobile a try. Regularly heard around 144.2 during morning and evening drive times are N3FL, WA2YRG and W3XO. All are using horizontal antennas. If you haven't tried 2-meter ssb in the vehicle yet, you should. It's lots of fun and very surprising as to what it can do. The secret, however, is the use of a horizontal antenna and reasonable power. Good contacts can be made with 10 W, but it's better to have five to 10 times that much.

1-1/4 Meters — KP4EOR provides additional information on the events leading up to and immediately following his record-breaking contact with LU7DJZ. The two worked many evenings on 144.150 and used that frequency to coordinate attempts on this band. David first heard Ramon's 220-MHz signals on November 26, 1982. Signals were 559, but David's 220-MHz transmitter was not completed at the time, so no two-way resulted. LU7DJZ was heard again, with somewhat weaker signals, on December 1, 2 and 13. Then, there was a dry spell until February 13, when LU7DJZ was copied at 419. Again, there was nothing heard until March 3, when LU7DJZ reported KP4EOR's ssb signals at 5 × 4. Four evenings later, David's signals were heard again, this time at only 519 on cw. The record-breaking two-way contact came on the 9th on cw, when 2-meter signals were well over S 9. Propagation on 1-1/4 meters was present again the following two evenings, weakly on the 10th but with 5 × 7 signals on ssb and 589 on cw on the 11th. Unfortunately, KP4EOR was having amplifier problems, so he was reduced to SWL status on those occasions.

All of the 220-MHz propagation took place within a half hour of 0000Z, except in one instance. On December 13, LU7DJZ's signals were heard at 0225Z. Equipment at LU7DJZ consists of a 70-W-output cw/ssb transmitter feeding two 10-element Yagis through 1/2-inch hardline. KP4EOR uses a 4CX250B, producing about 200 W to a single Boomer at 35 feet. David uses 3/4-inch hardline and a mast-mounted preamp.

Ramon informs David that two other LUs are preparing equipment for 220 MHz. KP4EOR is building a high-power amplifier for 432 MHz, and LU7DJZ already has 400 W going on that band. They will be attempting to break the 70-cm record beginning this fall.

The Higher Bands — The big 70-cm news this month is the EME operation from the 140-foot dish at the National Radio Astronomy Observatory in Green Bank, West Virginia. Using a 100-W solid-state amplifier mounted at the feed of the huge dish, W3IWI and crew, operating under the call K8HUH, worked well over 150 stations in 20 countries during the weekend of May 14 and 15. The occasion was the celebration of the identification by Dr. Carl Jansky, 50 years ago, of radio emissions emanating from the center of our Milky Way galaxy. This discovery is generally credited as being the beginning of the science of radio astronomy.

W3IWI says that the combination of the amplifier and a low-noise preamp right at the feed point was a real winner. Their own echos were S9. They had 30 dB of sun noise and 3 dB of moon noise, and were even able to detect the Crab Nebula. Fully one third of their QSOs were on ssb, including a 20-minute ragchew with VE7BBG.

On the negative side, Tom notes that the U.S. stations did not seem to be as capable as those in other countries, particularly in their ability to receive the signals from K8HUH. He identified many that did not seem to be hearing them. It seems very important for this type of work to have a good preamp located at the antenna, or to use a short length of very good feed line. Maybe next time many of us will be better prepared.

In 23-cm news, N6CA (DMØ3UT) says that he is now up to seven grids, his most distant coming from a contact with W6KGS (CM98), a distance of 402 miles. He comments that more activity is in the offing for the Southern California/Arizona area with WB5TCO now residing in Mesa and K7GNV having just moved to Tempe, where he expects to be on soon. Chip also notes that he is now in a position to offer a 7289 cavity amplifier capable of 100-W output with forced-air cooling and up to 250 W with water cooling. For info, drop an s.a.s.e. to Box 35, Lomita, CA 90717.

Strays

NOSTALGIA TIME

☐ You know you've been in Amateur Radio for quite some time if you remember

- when Herbert Hoover's name was on your blue-green license
- when the radio inspector came to your home to inspect your station
- "Baldwin Phones"
- when 20 meters was 14,000 to 16,000 kc.
- when the covers of *QST* were drawn by Clyde Darr, 8ZZ
- when there were only nine U.S. call districts
- winding 1/4-in. copper tubing for your 50-W rig
- connecting a mike to a loop for phone operation
- receiving a QSL card that said "spark forever." — *Harry Neff, W3JN, King of Prussia, Pennsylvania*

NATIONAL YOUTH GROUP LEADERS:

☐ Would you like to see Amateur Radio as a thriving, integral part of your group? An exciting new program is underway that will help you do just that. It's called Ham Radio on the Road, and we need your help to get things going. If you have ideas or suggestions, or if you are a leader in a group such as 4-H, Girl Scouts or Campfire Girls, Boys Clubs or Boy Scouts, please contact Recruitment Program Manager Leo Kluger, WB2TRN, at ARRL Hq.

A SIGN OF THE TIMES

☐ Amateur Radio will be prohibited in five years unless amateurs organize for beneficial protection! Will amateurs be organized body able to protect themselves from this impending calamity? Write us for absolutely latest particulars concerning this latest question. Future amateur radio depends on you — the loyal amateur! Only a slacker will hesitate. You write immediately! American Institute of Radio Engineering. Omaha. — *an ad that appeared in the* Electrical Experimenter, *April 1919; tnx W6ZZN*

YL News and Views

Conducted By Jean Peacor,* K1IJV

Opinion Time

"There are as many opinions as there are people; each has his own correct way." — Terrance c. 190-159 B.C.

Today, it's reader opinions that are being sought. Why? News of YLs generally stems from the OMs and is very much appreciated. Time was when YLs would reply by return mail when news about them was requested. Times have changed. Not only are replies not in the next mail, many are never forthcoming. Why?

At my request, two YLs have expressed their views concerning YL News and Views in letters that follow. In keeping with the Views segment of the column's title, it seems appropriate and healthy that different opinions be expressed from time to time. It is hoped that this will be a catalyst for others to take pen in hand and write.

"Dear Jean:

Thank you for your letter inquiring about my opinion of YL News and Views. I suppose most YLs are too modest about their accomplishments to inform you when they have done anything outstanding. Personally, when my *QST* arrives, I always turn first to the YL column to see what they are doing and who is featured. There is always a certain amount of excitement and satisfaction in finding someone there I know or have worked.

"I don't feel that the YL column is discriminatory in the least. The DXers have their page; those interested in vhf find a particular interest in that column; the traffic handlers have a section; so why not the YLs? I'm definitely in favor of keeping YL News and Views as long as there is news to print. Hope you get a good response to inquiries and a good cross-section of opinions.

33,

Jan Scheuerman, WB2JCE"

"Dear Jean:

I have thought for quite a while that the YL column in *QST* was an anachronism and that the time has long since past to relegate it to the shelf with the antiques in the ARRL museum. The face of the world has changed enormously since the column was first begun. Women now have an equal place in ham radio and the column does not reflect that fact.

"When I read your column, I often see featured some perfectly ordinary ham, just like thousands of others, whose only claim to the limelight is that she happens to be female. This is demeaning for all of the other women who number among the top DXers, traffic handlers and contesters in ham radio.

"It is an accident of birth that I was born female. I take no credit for that. My accomplishments in ham radio I have worked for, and I am proud of them. If I were to be singled out for any recognition, I would certainly ask that it be for what I have done, not merely for what I am.

"Ham radio is one of the few places where I have never been subject to any kind of prejudice because I am a woman. Hams are very willing to allow people to prove their own worth. It is not at all fitting that a magazine which attempts to reflect the thoughts and feelings of these hams be the very place to shelter the vestiges of this kind of chauvinistic attitude. For this reason, I feel the column should be discontinued.

Very sincerely,

Linda Ferdinand, N2YL"

RESULTS, 1983 YLRL YL/OM CONTEST

Phone

YL			*OM*	
KG1F†	89,770	Gold Cup	DL1RA	779
OK3CRX†	74,297	Second Place	OK3CWA†	962
KA4FVU†	73,287	Third Place	PA3BLA†	657

YL PHONE

KG1F† 89,770; WA2NFY† 1237; K2RUE/4† 1351; KA3DTE/4† 1680; KA4FVU† 73,287; WA4SRD† 6525; KM7E 50,988; WB7FDE† 10,057; N9ALC† 11,562; KCØGM† 3925; KØEPE 56,072; DF3TE 9940; DF9YY† 51,884; DJØEU 10,368; DK9ZL† 8062; DL7AFJ 3712; DL7AGJ† 3660; DL3SAR 16,578; G4EZI 1706; OH8MA 43,648; ISØSFZ† 620; IK1AIF 8136; IT9JLA† 51,810; OK3KFO 583; OK3CRX† 74,297; OK3YK† 242; OZ1AW† 1258; PA3ADR 902; SP2FF 8; TO5RC/F5RC.83† 3285; 5Z4CM† 11,124; VK3KS† 962; YU1EXY 3000; YU1YL 5250; YU4DLJ 640; YU7SF 20; YU7ADJ 84.

OM PHONE

W1HOZ† 80; K2LFG† 123; W3ARK† 195; WA3EXX† 100; W6ZT 143; W7ULC† 308; KB8GH† 100; K9FFC 60; W9LNQ† 37; DL1RA 779; F6HNL† 251; IK3VU 85; IKØAUO 10; I8HZT† 191; IK1BAE† 270; I8ZLW† 288; JA9SSY† 1; JH3DPB 212; OK1AGN† 438; OK1DKS† 288; OK1KZ† 190; OK3CWA† 962; PA3BLA† 657; VK3XB 5.

Vermont's Joan Gibson, KG1F, is the Gold Cup winner for Phone in the YL/OM Contest.

CW

YL			*OM*	
I2RLX†	15,782	Gold Cup	LU1EWL†	1125
W8YL†	12,127	Second Place	VE3KUC	393
5Z4CM†	6,873	Third Place	EA3LA	270

YL CW

W2NFY† 1377; K2RUE/4† 4950; WA2WHE† 6162; WA4SRO† 2668; K8ONV/4† 4235; KA8PSA† 2250; W8YL† 12,127; N9AIB† 2351; WL7AZB† 96; OZ7YL† 1296; IT9KFQ† 1330; CT1YH† 3325; DF6UI† 1187; DK6EH† 232; DL2SAP† 3258; DL3SAR† 373; DL5BAG† 2328; DJØEK† 2925; GM4LUS† 280; I1MQ 25; I2RLX† 15,782; I5AZX† 330; VK3KS† 1976; 5Z4CM† 6873.

OM CW

W1HOZ† 220; W1OPJ† 151; W2AAU† 204; K2LFG† 123; W2UAP† 137; W3ARK† 135; WA3EXX† 88; W6ZT 160; W7RD† 67; W7ULC 292; W9LNQ 270; VE3KUC 393; OZ6XR 79; DK3OI 140; EA3LA 270; LU1EWL† 1125; YU7SF 110; VK3XB 20.

†Low-power multiplier

*Country Club Dr., Monson, MA 01057

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 July 8 for September *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*

CALL FOR PAPERS

☐ Papers are invited for the 1983 Annual VHF Conference sponsored by the Electrical Engineering Department of Western Michigan University, Kalamazoo, to be held on October 29, 1983. Authors wishing to present papers on the design, construction or testing of vhf equipment should send a synopsis or abstract (typically two pages with diagrams) of your paper by August 15 to Dr. Cassius Hesselberth, W8FLH, Chmn., Dept. of Electrical Engineering, Western Michigan University, Kalamazoo, MI 49008. Speakers will be notified of acceptance by August 20.

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,*
W9KDR

PHASE IIIB IS ASSIGNED A LAUNCH DATE

In late May, just as this issue of *QST* was being wrapped up, the European Space Agency (ESA) announced the new launch date for its Ariane L6 mission aboard which AMSAT-OSCAR Phase IIIB will ride. If all proceeded according to schedule, Phase IIIB was launched on Thursday, June 16, sometime between 1200 and 1345 UTC. If weather or other delays held the launch beyond this "window," a further delay of two weeks, or more, ensued. Therefore, as you read this, Phase IIIB has either just been launched or its launch is imminent.

Why go to all of this trouble to let you know that one of the major events in Amateur Radio in the '80s may have occurred a week or two ago? Simply because you have the chance to share in this history in the making. First, determine the current status of the Phase IIIB mission by listening to ARRL bulletins on W1AW or by tuning into the AMSAT Nets (Wednesdays on 3.850 MHz; E Coast 0100Z, Mid Continent 0200Z, W Coast 0300Z. Note that these are Tuesday night local times. The AMSAT International Net occurs on Sundays at 1800Z on 21.280 MHz and at 1900Z on 14.282 MHz).

If the launch has been delayed, you may still have the chance to listen in on the actual countdown on the AMSAT Launch Information Network Service (ALINS). W1AW will transmit the launch information *live* on all scheduled voice frequencies for the duration of the launch sequence and insertion into transfer orbit — dates and times of the ALINS are announced routinely on ARRL Bulletins. Worldwide coverage will be provided by several other stations operating in the 14.270 to 14.300 MHz window. If the launch took place as scheduled, you still have the chance to monitor the first signals from the OSCAR 10 General Beacon. (Note: AMSAT-OSCAR Phase IIIB will be assigned a numerical designator, OSCAR 10, its being the 10th in the OSCAR series, upon achieving a successful orbit.)

Phase IIIB — General Beacon During Early Orbits

You'll find the General Beacon at about 145.812 MHz when the satellite is in range; signals will be either cw or RTTY (170-Hz shift FSK at 50 baud). The Beacon format for early orbits will be approximately as follows (information provided by K1HTV of AMSAT; data frames, under software control, may differ slightly from what is presented here):

HI HI AMSAT OSCAR 10 AT XX:XX:XX UTC[1]
ORBIT XXX[2] MA XXX/256[3] UBAT XX.X VOLTS[4]
TBATT XX.X C[5] IARRAY X.X A[6] SA ± XX DG[7] SPIN XX RPM[8]
SATELLITE STATUS: FIRST MOTOR FIRING AND ORBIT CHANGE EXPECTED DURING ORBIT 3[9]
TRANSPONDER IS OFF UNTIL ABOUT ORBIT 10
LISTEN DAILY TO THIS BULLETIN FOR LATEST OPERATING NEWS AT THE HOURS AND + 30[10]
AMSAT OSCAR 10 HI HI

*OSCAR Program Manager, ARRL

Space Shuttle Astronaut Owen Garriott, W5LFL, and ARRL President Vic Clark, W4KFC, discuss some logistics of Owen's upcoming 2-m fm Amateur Radio project. They are aboard the Space Shuttle Trainer at Johnson Space Flight Center, Houston. *(NASA photo)*

Notes

[1]Universal Coordinated Time in HH:MM:SS as computed by the onboard flight computer.
[2]Orbit number, which will change at each *perigee*.
[3]MA = Mean Anomaly expressed as a number from 0 to 256, with perigee = 0 and apogee = 128.
[4]Primary battery voltage in volts.
[5]Primary battery temperature in °C.
[6]Solar array current in amperes.
[7]Sun Angle, referencing the spacecraft's Z axis to the sun.
[8]Spin rate of the spacecraft about its spin (Z) axis in revolutions per minute.
[9]Note that the orbit 0 perigee occurs just before third-stage shutdown; apogee 0 occurs over the Indian Ocean; orbit number will increment at each perigee — perigee 1 over the Pacific, apogee 1 over South America.
[10]The typical early-orbit General Bulletin operating schedule, as measured from the hour, is 00-05 min. cw/RTTY bulletin, 05-15 min. PSK General Beacon (telemetry), 15-25 min. possible ranging or telemetry, 25-30 min. PSK telemetry. The second half hour will repeat this format.

Therefore, the best time to listen to the beacon frequency to determine the early status of the satellite will be the five minutes beginning on the hour and the five minutes beginning on the half hour each hour. Once again, the information presented here, relayed from AMSAT just before our deadline, is at best a good approximation of what will transpire. Tune into W1AW for ARRL Bulletins, monitor the AMSAT Net frequency (3.850 MHz) for updates, and refer to the biweekly ARRL Letter and Amateur Satellite Report for the latest information available.

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 OSCAR locator package (satellite plotters and details) is now available for $7 U.S., $8 elsewhere.

Strays

A RUBBER DUCK AT 16,000 FEET

☐ I had the opportunity recently to operate a mode that very few radio amateurs ever get to try — aeronautical mobile. As indicated in AC6M's article in December 1982 *QST* ("Captain, May I . . .?"), operation aboard a commercial aircraft is just not in the cards. If you ever get the opportunity during a noncommercial flight, however, jump at the chance to be "aero mobile."

My opportunity came on a noncommercial flight from Mt. Vernon, Ohio, to Grove City, Pennsylvania — a 40-minute trip. I had obtained the pilot's okay before we took off, and received permission to operate *after* we gained altitude. As we approached 16,000 feet, I apprehensively turned on my hand-held radio with rubber duck antenna. I listened on various repeater frequencies, and recognized many of the usual repeaters around Ohio. I gave out a call on 146.52 simplex and announced I was "W8UMH/aeronautical mobile listening," and had continuous QSOs with amateurs in Ohio and Pennsylvania during the trip. The greatest distance worked was 120 miles. Not bad for 1 W and a rubber duck antenna!

On the return trip that afternoon, 146.52 was busy and I had trouble hearing some stations. Thus, I invited those listening on 146.52 to QSY to 146.55, which was clear. Most stations met me on .55, and I had continuous QSOs there as well. My one call on a repeater frequency was done on 146.79 direct to call a friend rather than on the .19 repeater input frequency. In this way, I did not access other 19-79 repeaters. All in all, it was quite interesting hearing all the repeater and simplex activity from 16,000 feet — and being pursued like a "DX" station! — *Donald T. Blizzard, W8UMH, Mercer, Pennsylvania*

In Training

IN SEARCH OF ACCURACY

☐ Part of the Club and Training Department's function at ARRL Headquarters is to refer prospective Amateur Radio operators in your area to you, an ARRL registered-instructor. As the March 1983 "In Training" column reported (March *QST* p. 80), the Training Branch staff this year is updating the registered-instructor file. A two-part mailing campaign is underway to help us chart an accurate file of registered Amateur Radio teachers. Your attention to our appeal for updated information will assist us in running an effective instructor and Elmer referral service.

Periodic but small revisions have occurred during this past year. Through letters and phone calls, you have helped a great deal in supplying corrected information. More action is needed, however. With over 6600 instructors, it's hard to keep track of all current addresses, call signs and teaching schedules.

Those who contact Headquarters seeking information about Amateur Radio are sometimes referred to instructors who no longer live at their listed addresses or to radio amateurs who no longer teach. These outdated referrals may undermine a person's determination to get a license. Therefore, it's only good public relations for Amateur Radio and your Training Program to have a reliable referral list.

The *Instructor's Newsletter* mailing in May has helped us gauge the accuracy of our instructor list. If you're an ARRL-registered instructor, please take part in the second step of our accuracy campaign. A request for current information is being mailed to you. An enclosed business-reply card will make it easy to respond — and at no cost to you. Your answers to a few pertinent questions on the card will help us get the referral listings back up to snuff.

Are your name and call sign correct? Because of upgrading we've found that call signs change frequently. Does your current address and ZIP code appear? Please make the necessary changes or spelling corrections. Our instructor-referral list is organized by state and then by ZIP code. ZIP codes help us to zero in on the closest registered instructor to a prospective student.

Are your training classes associated with an Amateur Radio club? If so, which one? We need to know these instructor-club connections, because this will help direct future ham radio operators to an active support group.

What levels of class do you teach? Some teachers write that they have learned more from their classes than their students have. Soon, the instructor may upgrade his or her license and, in turn, teaching level. We would appreciate knowing where your current teaching interests lie. A better student-instructor match is our aim.

The reply card is not intended to replace class registrations. We urge you to register each class with Headquarters. The benefits of class registration were discussed in the March 1983 "In Training" column. If you're involved or getting started in Amateur Radio training and are not an ARRL registered instructor, then you're welcome to join the training corps. *Instructor registration* is a painless matter that requires answers to the above questions. *Class registration* requires only the starting and ending dates of your class, the number of students and class level (e.g., Novice or General).

Thank you for your active support of a high-quality Amateur Radio Service and the time spent in your Training Program. With your continued help, a revised list of program participants will be ready for the new training season and for whatever new responsibilities a Volunteer Examiner Program may bring. — *Steve Ewald, WA4CMS, Training Assistant*

Special Events

Conducted By Mark J. Wilson,* AA2Z

Cleveland, Ohio: Northern Ohio ARS will operate K8KRG *until Sept. 5* from the vintage submarine *U.S.S. Cod.* Operations in the lower portions of the hf General class bands.

Cedar Rapids, Iowa: The amateurs at Rockwell Collins will operate ADØC *beginning July 1* to commemorate Collins's 50th anniversary. Suggested frequencies: phone—3.950 7.190 7.275 14.210 14.280 21.300 21.355 28.600; cw—30 kHz up from lower band edges.

Calgary, Alberta: Calgary ARA will operate VE6WSJ from *July 1 to 16* from the XV World Jamboree Mondial. Operation on all bands and modes, with concentration on 7.030 on the half-hour and 14.190 on the hour.

Emington, Illinois: Livingston Co. ARC will operate K9ENM from 1600 to 2400Z *July 2 and 3* to commemorate the town's 100th anniversary. Frequencies: phone—3.960 7.290 14.330 21.430; cw—20 kHz inside Novice bands.

Hannibal, Missouri: Hannibal ARC will operate WØKEM from Mark Twain's boyhood home from 1500 to 2100Z *July 3 and 4* during the Tom Sawyer Days celebration. Frequencies: phone—7.245 14.290 21.400 28.770; cw—7.125 21.125.

Fort Laramie, Wyoming: High Plains ARC will operate K7YPT from the historic fort from 0000Z *July 4* until 0000Z *July 5*. Frequencies: phone—up from 3.850 7.250 14.250 21.300.

Baton Rouge, Louisiana: Baton Rouge ARC will operate KD5SL *July 5 to 18* from Louisiana State University during the 1983 International Special Olympics. Operation around 3.900 7.250 14.300 21.360 28.600.

Monroe, Michigan: Monroe Co. Comm. Assn. will operate WA8MTX from 1200 to 2400Z *July 8 and 9* from the Floral City Festival. Operation 10 kHz above lower General class hf phone and cw band edges.

Bethlehem, New York: W1FHP and the Hen House Gang will operate *July 9* during Christmas-in-July. Operation on 40, 15 and 10 meters.

Waterville, New York: Waterville Central School ARC will operate WD2ALL from 1300 to 2000Z *July 9* to commemorate the birth of photography pioneer George Eastman. Operation in lower portions of hf General class phone and Novice class cw bands.

Jackson, Michigan: Cascades ARC and Michigan Space Center will operate WB8CSQ during Space Day activities from 0000Z *July 9* until 1700Z *July 10*. Frequencies: 3.900 7.235 14.285 21.360 28.510.

Paris, Texas: Red River Valley ARC will operate WB5RDD/5 on *July 15* to commemorate the storming of the Bastille. Operation 10 kHz up from lower hf General class phone-band edges.

Country Club Hills, Illinois: Tri-Town RAC will operate W9VT from 2300Z *July 15* until 0300Z *July 17* in commemoration of Silverfest, the town's 25th birthday. Operation in the 40, 20 and 15-meter General class bands.

Wheeling, West Virginia: Northern Panhandle RC will operate W8ZQ *July 15 to 17* during the Jamboree-in-the-Hills. Frequencies: 7.280 and 14.280.

Port Huron, Michigan: Eastern Michigan ARC will operate K8EPV from 1500 to 0300Z *July 16 and 17* during the annual Port Huron-to-Mackinac Island Yacht Race. Frequencies: phone—3.910 7.235 14.285; cw—3.710 7.110 21.110.

Wapakoneta, Ohio: Reservoir ARA will operate K8QYL from 1400Z *July 16* to 0400Z *July 17* and 1400 to 1900Z *July 17* from the home town of astronaut Neil Armstrong. Operation around 7.260 and 14.285.

Racine, Wisconsin: Racine Megacycle Club will operate W9UDU *July 16 to 24* during the annual Salmon-a-rama on the shores of Lake Michigan. Operation during the afternoon and evening hours in the General class hf phone bands.

Essex, Ontario: Amateurs in Essex will be active using the prefix CH3 (instead of VE3) from *July 16 to 31* to mark the town's 100th anniversary.

Peru, Indiana: Miami County ARC will operate K9ZEV from 1400 to 2300 *July 23* during the 24th annual Peru Circus City Festival. Operation primarily in the 40-meter General class phone band, with occasional operation on 20, 15 and 10.

Bend, Oregon: Central Oregon RA will operate during the Brothers and Sisters QSO Party from 0800Z *July 23* until 1400Z *July 24*. WN7ODD will operate from Brothers, Oregon, and N7CSH will operate from Sisters. Operation 10 kHz up from lower General class phone-band edges and 15 kHz inside the Novice bands.

Port Colborne, Ontario: Welland Co. ARC will operate XJ3PTC from 1200 to 2400Z *July 24* to celebrate the town's 150th anniversary. Frequencies: phone—7.280 14.280; cw—up from 7.100 and 21.100.

Berne, Indiana: Adams Co. ARC will operate KC9TZ from 1300Z *July 29* until 0200Z *July 30* during Berne Swiss Days. Frequencies: phone—7.240 14.285; cw—21.115.

Warren, Michigan: Tank-Automotive Command ARC will operate W8JPW from 1300 to 2000Z *July 30* to celebrate Detroit Arsenal's 42nd year. Frequencies: phone—7.250 21.400 146.49; cw—7.055 (1500-1700Z).

Academia, Pennsylvania: Tuscarora ARA will operate KI3D from 1200 to 2400Z *July 30* from the Tuscarora Academy. Operation 10 kHz up from lower General class phone-band edges.

Celina, Ohio: Reservoir ARA will operate KR8M from 1330 to 1900Z *July 30* during the Celina Lake Festival. Operation around 7.260.

Canton, Ohio: Canton ARC will operate W8AL from 1700 to 2100Z *July 30 and 31* during the annual Professional Football Hall of Fame Inductee Enshrining ceremonies. Operation July 30 on 7.068 14.068 21.068 and July 31 on 7.277 14.277 21.377.

Indianola, Iowa: Warren Co. ARC and Des Moines RAA will operate WØAK during the U.S. Hot Air Balloon Championships from 2300 to 0200Z and 1130 to 1400Z daily *July 30 to Aug. 6*. Frequencies: phone—30 kHz up from lower General class band edges on 80, 40 and 20 meters; cw—7.030 14.060.

Lincoln City, Indiana: Pike Co. ARC will operate W9CZH from the Lincoln Boyhood Memorial from 1700Z *July 30* until 1700Z *July 31*. Frequencies: phone—3.925 7.265 14.305 21.395; cw—7.133; RTTY—14.090.

Davenport, Iowa: Davenport ARC will operate WØBXR from 1600Z *July 30* until 0300Z *July 31* and 1600 to 2300Z *July 31* during the Bix Biederbeck Memorial Jazz Festival. Operation about 10 kHz up from lower General class phone and cw band edges.

Greenville, Ohio: Treaty City ARA will operate W8UMD from 1400Z *July 30* to 0100Z *July 31* and 1400 to 2200Z *July 31* from the Garst Museum, which houses Annie Oakley memorabilia. Operation about 20 kHz inside 40- and 20-meter General class bands; some 40- and 15-meter Novice band operation.

Huntington, Indiana: Huntington Co. ARS will operate KC9GS from 2100 to 0300Z *Aug. 1 to 3* from the Huntington Co. 4-H Fair. Frequencies: up from 3.900 7.230 14.280 21.350 28.600.

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 August 15 to make the October issue.

*Assistant Communications Manager, ARRL

Club Corner

Conducted By Sally O'Dell,* KB1O

CLUBS AND COMPUTERS: A SIMPLE INTERFACE

One of the most significant technological advances to take place in the past decade was the introduction of the microprocessor. A process known as large-scale circuit integration has made it possible to incorporate enormous computing power and mass-memory in an affordable desk-top package. Typically, in the past, only large institutions had access to this type of computing power, usually found in main-frame computers, but recent technology has brought these electronic marvels into our homes and, in some cases, into our radio shacks.

Perhaps we can draw a parallel between the early days of radio and the personal computer. Both, of course, have had a tremendous impact on society, and both have been viewed in their infancies with some skepticism. If we take a closer look at the beginning of radio, it becomes evident that organized groups were responsible, at least in part, for many of the innovations and advances that took place in those early years.

A definite comparison can be seen between the first radio clubs and today's computer users groups. These organizations may have given the emerging personal computer industry the proverbial "shot in the arm," generating public support and acceptance while helping many beginners over the initial hurdles. Although some of these groups are large, complex organizations, many are loose-knit, local clubs lacking formal structure. On the opposite side of the coin, perhaps, are today's highly organized and well-established Amateur Radio clubs, some of which have successfully incorporated their expertise in Amateur Radio with an interest in computers. Reading the hundreds of newsletters that come across the club desk every month, we are struck by the number of radio clubs that have groups of individuals who are actively using computers, either as a hobby or with Amateur Radio.

Let's take a closer look at how some of these clubs have linked the two areas of technology. A typical radio club has a wide cross section of individuals within its ranks and, therefore, has several varied areas of expertise available to it. Some clubs have taken advantage of this and are consulting their members who are proficient in digital electronics or software development in much the same way early repeater groups, for example, relied on members who were familiar with commercial repeater systems. Members who are experienced in computer operation are most certainly an asset and should be called upon whenever possible. Often, these individuals are already performing some task for the club such as writing, editing or printing the newsletter on a computer. It should be remembered that many of these splendid people would be happy to share their knowledge if asked.

Incidentally, a recent spot check of club newsletters received at Headquarters revealed that close to 25% of them are now computer-generated. Clubs, especially those with large memberships, are finding it advantageous to use computer-generated lists for mailing purposes. Admittedly, these are small tasks for a computer. But, in many cases, they have successfully aroused the curiosity of the members. Other clubs are offering "hands-on" experience for those wishing to learn computer applications. This can be especially helpful if one is thinking of taking the plunge into computer-mania.

If your organization is having difficulty finding someone to speak about computing, a trip to the local computer store could produce interesting results, as many shop owners jump at the chance to promote their products. The ARRL film library, by the way, has among its new additions two video-tapes on microprocessors: (1) *The History of Microprocessors* and (2) *Microprocessors;* they can be borrowed by contacting Karl Townsend at ARRL Hq.

With computer users groups springing up all over the country, contacting one of these groups could indeed prove worthwhile. Your club may want to consider a reciprocal agreement with your new-found friends. It may well be that computer enthusiasts are as interested in Amateur Radio as you are in computers. Along similar lines, a handful of radio clubs have branched off into smaller, special-interest groups, much like the users groups mentioned earlier. These groups do quite well, as the number of computer-related articles in recent newsletters indicates. It's common to find whole portions of club newsletters dedicated to computer science. A typical newsletter may include everything from product reviews to BASIC programs, while also explaining the various ways microprocessors can be used in the shack. The *QST* column On Line, conducted by Stan Horzepa, WA1LOU, is another informative source linking computers and Amateur Radio.

It is safe to say the number of computer applications suited for Amateur Radio are wide and varied, restricted only by the imagination. It would seem that radio clubs are well on their way to becoming pioneers in this emerging field, and we will be looking to them for advances and innovations in the near future. — *Ed Raso, WA2FTC, Assistant Club Program Manager, ARRL*

*Club Program Manager, ARRL

The Shy-Wy ARC of Cheyenne, Wyoming, celebrated 50 years of club affiliation recently. In honor of this golden anniversary, Rocky Mountain Division Director Lys Carey, KØPGM (r), presented a special affiliation certificate to club officials.

SSC Kudos and Contacts

Congratulations to the League's newest Special Service Clubs. These clubs are recognized for extended efforts on behalf of Amateur Radio and service to their communities. For further information on these clubs, contact them at these addresses:

Delta Amateur Radio Club, W4BS
c/o P.O. Box 16343
Memphis, TN 38116
Club membership — 28

Fort Wayne Radio Club, W9TE
c/o P.O. Box 15127
Fort Wayne, IN 46885
Club membership — 195

Owensboro Amateur Radio Club, K4HY
c/o 1611 Chapel La.
Owensboro, KY 42301
Club membership — 71

Penn Wireless Association, W3SK
c/o P.O. Box 734
Langhorne, PA 19047
Club membership — 76

Rochester Amateur Radio Association, K2JD
c/o P.O. Box 1388
Rochester, NY 14603
Club membership — 824

SSC UPDATE

Special Service Club applicants were originally asked to supply the membership control number for each ARRL member in their clubs. Good news! In response to your cries for help, we are now asking only for the current call signs of your club's ARRL members. All members know their call sign; most don't know their membership control number. We hear you! Please include a roster of your club's ARRL members including name, address, and *call sign* when applying through your section Affiliated Club Coordinator to become an SSC. Thanks for your cooperation.

NEW LIBRARY VIDEOTAPES

Several new videotapes are available from the ARRL film library through the courtesy of the Wireless Institute of Australia and Image Transform of Hollywood, California. The following tapes may be scheduled for club programs: VT-16, *Loaded Antennas* (50 min., color); VT-17, *Low Definition Television* (30 min., color); VT-18, *History of Microprocessors* (60 min., color); VT-19, *Microprocessors* (60 min., color); VT-20, *Wire Antennas* (30 min., b&w); VT-21, *ATV in Great Britain* (30 min., color); VT-22, *ATV in Australia, 1980-81* (60 min., color); VT-23, *Signal to Noise Story* (30 min., color); and VT-24, *Apollo 13 Disaster* (30 min., color).

All tapes come in 3/4-in. U-Matic and VHS formats and may be borrowed by contacting Karl Townsend, ARRL Club and Training Dept., 225 Main St., Newington, CT 06111.

Strays

I would like to get in touch with...

☐ any hams who are high school or college-level basketball officials. Brad Fox, KA3R, 8881 Spiral Cut, Columbia, MD 21045.

☐ other amateurs who collect sports memorabilia. Will Wiehe, WB2FEL, 154 Martling Ave., Bldg. 1, Apt. 6B, Tarrytown, NY 10591.

QST congratulates...

☐ Josephine Jackson, W3LJF, of Erie, Pennsylvania, on receiving the MS Person of the Year Award from the National Multiple Sclerosis Society.

☐ Tom Bishop, KØTLM, of Kansas City, Missouri, on receiving the 1983 Missouri Kansas Amateur of the Year Award.

☐ Orrie E. Thompson, WØDFC, of Elma, Iowa, on being named Midwest Amateur of the Year at the Midwest Convention in Sioux City.

☐ Southern Texas SEC Allen R. Guy, WA5RVT, on being appointed the ARRL representative to the Texas State Volunteer Organizations Active in Disasters (VOAD) Advisory Board.

Results, 10th Annual ARRL 10-Meter Contest

By Bill Jennings,* K1WJ and Mark Wilson,** AA2Z

If you find your call listed herein, you were an important part of the largest and best of the 10 Annual ARRL 10-Meter Contests. Through these 10 years, we have run the gamut of propagation conditions from the "pits" of the early 1970s to a "hint of better things to come" in the mid-70s and the increasing activity of the present solar cycle to the "peak" of the present solar cycle in the late 1970s to the "middlin' " conditions of the past couple of years as the solar cycle winds down.

The best part of the 10-Meter Contest is that it isn't entirely dependent on good conditions to make for a good contest. This is a contest in which the operator can make of his/her operating time exactly what he/she puts into it. When there are no "monster" transcontinental openings, we can work locals on ground wave or take advantage of limited e/w E skip or a little N/S transequatorial propagation. We can also play the vhfer's game and work some scatter as time and band conditions permit. In other words, just explore the vagaries and variations of propagation possibilities that 10 meters has to offer.

In the 10-Meter Contest we can enjoy the best or worst of band conditions that would simulate a domestic contest like the November Sweepstakes, or permit us the thrill of a large-scale DX competition like the February/March ARRL DX Contest. And, of course, the operator can choose his/her favorite mode — cw or phone, or a combination of both — or the fun and camaraderie of joining some friends in a multioperator effort. The 10-Meter Contest is truly an operator's event.

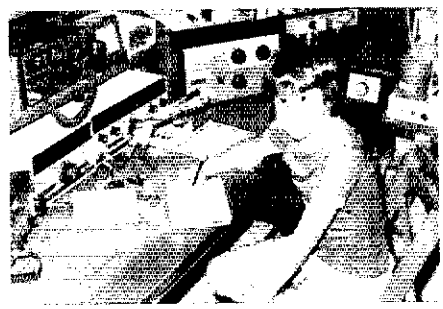
It was the individual operators who made this the largest 10-Meter Contest ever — 1678 or so (give or take a few for multiop stations) of them. There were 944 logs received from W/VE stations, while 734 entries came into ARRL Hq. for the December 11-12, 1982 event from overseas.

If you've thought of searching the world for the ideal spot from which to operate and win the 10-Meter Contest, a glance at the top DX scores table will show that it's a mixed bag of continental operators who appear in each of the four categories.

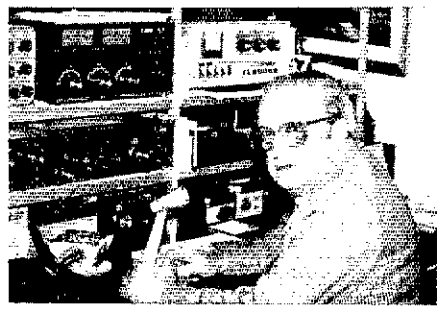
You'd find pretty much the same thing in searching for the "best spot" in the U.S. or Canada from which to make the W/VE Top Ten table. It does not seem that there is one "sacred" geographical area that would ensure a determined operator a sure-fire position in the Top Ten listings. It appears that if you were on either coast, in the north or south or from somewhere in between, your chances for success were equal to those of all other participants. It just depends on how much effort you were willing to invest in building and operating your station and, of course, on your level of operating skill. And that's precisely how a contest should be decided.

But for the fact that the average Top Ten W/VE as well as the average Top DX Scores are down slightly from last year's levels, the 1982 10-Meter Contest was a mirror image of its predecessor in 1981. A lot of the '81 "Top Tenners" repeat in '82. WØYK is again at the top of the W/VE mixed-mode heap, K5RC repeats as the code champ, and VE1YX nudged out N7DD and KØRF to take the top W/VE phone honors for 1982. Good work there through some heavy competition.

As any 10-meter operator knows, when you deal with this band you do the best with what it gives you in the way of propagation conditions. But that is half the fun — doing the best with what you've got. Perhaps that's the lure of 10 meters and what makes the ARRL 10-Meter Contest so popular. We make no promises as to what to expect from the band for the 1983 contest, but we do promise that it will be held on the weekend of December 10-11. Drop on in and join the fun.



Twelve-year-old Stuart, KA4UDD, operated Mixed Mode from Virginia to the tune of 50,400 points.



EA2OB posted the number two phone entry from Spain.

N4RJ and crew took the number eight multiop spot for W/VE stations. Hugh also stood on his head to work multipliers, but we didn't have room for that photo.

Top Ten — W/VE

Mixed Mode

Call	Score
WØYK	700,344
WB7FDQ	675,480
N8II	625,084
W5XZ	601,660
AD8I (KU8E)	492,048
N5DDO	484,080
KG1E	467,614
WB5VZL	441,496
WB4BVY	414,256
VE1BPY	405,976

Cw

Call	Score
K5RC	405,288
N4AR	332,232
K6LL/7	329,184
N6CW	320,144
K8NZ	306,614
K4VX	300,440
WØUA	293,160
N7CW	261,186
W5JW	252,420
K5NW	247,752

Phone

Call	Score
VE1YX	978,930
N7DD	830,850
KØRF	776,456
N5RZ	583,470
AI6V	573,844
K6HNZ	562,500
KØUK	525,572
K1NG (KI1G)	508,370
N6ND	493,680
WB1GQR	475,236

Multiop

Call	Score
N5AU	859,270
ABØI	770,336
W5RRR	763,968
N4WW	708,300
W5VX	655,158
KFØM	577,752
K2RF	544,000
N4RJ	514,744
KD5SP	497,658
K5LZO	496,250

Top Five — DX

Mixed Mode

Call	Score
VP2KBU (KCØFW)	574,250
I4VEQ	548,352
G5CMX	497,166
JI1QPU	334,412
UB5ILD	260,126

Cw

Call	Score
K9LA/V2A	340,684
YU1AWW (YU1RL)	262,386
DL1VJ	204,370
UB5ZAL	187,506
LZ1KAB	184,044

Phone

Call	Score
V2ARO	1,011,488
KB7IJ/KH2	583,440
L2M (LU1BR)	579,020
NP4CC	566,680
F6KBF (F6BKR)	471,724

Multiop

Call	Score
LU1E	713,880
YV3BRF	678,132
G4MBV	556,284
LU4DQ	509,520
XE1MDX	493,554

SOAPBOX

This is my 10th consecutive ARRL 10-Meter Contest; I have been in it since the beginning. I wonder how many other "veterans" have also been in all of

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

DX Continental Leaders

Continent	Mixed Mode	Cw	Phone	Multiop
Africa	CN8CO	CN8CY	EA8ZI	5Z4CL
Asia	JI1QPU	JI1ACI	JH7DNO	JA3YQP
Europe	I4VEQ	YU1AWW	F6KBF	G4MBV
North America	VP2KBU	K9LA/V2A	V2ARO	XE1MDX
Oceania	ZL2AH	VK4XA	KB7IJ/KH2	—
South America	YV2IF	LU1EWL	L2M	LU1E

Division Leaders

Division	Mixed Mode	Cw	Phone	Multiop
Atlantic	K3UA	N3BJ	K3GM	KJ2Q
Central	W9OP	N9HH	W9LT	WØAIH
Dakota	KNØV	WAØLKL	WBØMWJ	KØSR
Delta	W5XZ	K4OAQ	N5DSK	W5EA
Great Lakes	AD8I	N4AR	K8ZE	K8III
Hudson	K2EK	KR2Q	N2BJ	K2RF
Midwest	WAØQMU	K4VX	WØXK	ABØI
New England	KG1E	W1IHN	K1NG	WB1EYI
Northwestern	NL7P	KQ7I	AG7M	KT7G
Pacific	N6NF	N6CW	AI6V	WA7KNK
Roanoke	N8II	WB5TMS	WB4TLX	NA4L
Rocky Mountain	WØYK	WØUA	KØRF	W5GB
Southeastern	N4SA	K4BAI	KD4TT	N4WW
Southwestern	WB7FDQ	K6LL/7	N7DD	AB6R
West Gulf	N5DDO	K5RC	N5RZ	N5AU
Canadian	VE1BPY	VE3MRN	VE1YX	VE3CVX

them...(WB2AMU). Our QTH was in the eastern Atlantic, just having departed a port in southern Spain on our way back from a six-month Mediterranean cruise. Wish I could have been on longer, but had plenty of phonepatch and radiogram traffic for the states and had to leave after about six hours of "testing" (WB8RFB/MM! — *USS Independence*). The contest was a family affair this year — the operators were Dad, Mom and three children! (KC7KI). I am a new amateur, and this was my first contest (SV1RP). I don't think those running 2 kW realize how poor their audio is on the band. Really creates a lot of splatter and distortion (KB1CV). I'm only running 60 W, but I've got a new antenna, so maybe better results next time (EA8ZI). Used a ground-plane antenna, but my elevation of 2400 ft helped (HL9SM). If I had walls built around my shack, I could knock out the interference from ham friends who know I'm home and drop in because they see the beam turning, and from my son who wanted to show me that he finally figured out how to work a yo-yo (how can you turn away a four-year-old who is so proud of himself) (KC3BB). Found I could work the East Coast with the beam south, but could not hear them with the beam east (KA9JDW). Great openings to the West Coast and Europe. My ears are still ringing from those big Texas signals (WA3UNX). Best JA opening came at 0001Z Monday morning. If that doesn't tell you Murphy is looking over your shoulder, I don't know what does (KI1G). Working the 7th call area from California was the best thrill of all, but where was Idaho on cw? (KT6M). The bad thing is that I was competing against the two best ops in the world — WØCP, who won the ARRL DX cw contest as V3MS, and WØUA, who wins everything! (NØCGA). This was my first 10-Meter Contest, and I can only say, "No doubt about it, I've got to get a softer chair!"(KA2BIX). I was very impressed with the professionalism and courtesy displayed the whole weekend (N6GRM). Still can't understand why I would get a 59 signal report and have to repeat my call four or five times (VE6CCL). Picked up an amplifier halfway through the contest and started working my neighbors — my favorite contest (WB7CFL). The very best cooperation was always present during the contest. It was a pleasant experience to see the pileups let the QRP stations through when I asked for QRP only (HI8GB). Strong rf on 10 meters didn't open the neighbor's automatic garage door this time. What luck! (KA1YQ). I did 10% better than last year, even with my two-year-old boy on my lap (I hope he doesn't count as a second op!). Is there really such a thing as a VE8? (KA6BIM). My wife strongly recommends that the contest date be any other time but December (W9ODO). Imagine the thrill when my wife Donna's first QSO on cw with her new Technician call N6HTH was with K4KQ, who started me in ham radio almost 20 years ago to the day. Hmmmmm (N6HE). I played "search and pounce" in this one and went after the multipliers. Delaware eluded me until the last five minutes of the contest, at which point I had written it off as impossible. I was very pleased to work all 50 states in this one (K1LPS). Having two Yagis in different directions really helped (AF1T). I learned the true definition of two words: (1) ecstasy — when a snowstorm gives you the excuse to stay in all weekend; and (2) frustration — when the power goes off! (WB4PIQ). I would like to see more listening for weak signals, but then maybe it wouldn't be a contest (WB9KVI). [Hint: The good ops with the big scores *do* listen for weak signals — Ed.]. Less activity this year. Sunspot cycle to blame? (AA6EE). I've been trying to work JA on 15 all year, and during the contest I worked seven JA stations in one hour! (N5EZA).

FEEDBACK

Please refer to July 1982 *QST*, page 74, for the following corrections to the results of the 1981 ARRL 10-Meter Contest. In the New York-Long Island section, WB2AMU's multiplier count should read 89, not 81. In Illinois, the call sign of the fourth place Mixed Mode entrant should be KA9GFJ, not 'GJF. In Wisconsin, KE9A's entry was Mixed Mode, not Phone-Only as indicated. This makes him the top WI Mixed-Mode scorer. In Iowa, we left out K9AYK's score of 36,288-279-63-B. This makes him the number five Cw-Only entrant. In the Division Leader box, KM5R, not K5JA, should be shown as the West Gulf Division leader.

Scores

DX scores are listed by continent/country according to the ARRL DXCC list. U.S. and Canadian scores are listed by call area and ARRL section. Single-operator scores are listed first, followed by multioperator. Each line score lists call sign, score, QSOs, multipliers and entry class (A = Mixed Mode; B = Cw Only; C = Phone Only; D = Multioperator).

DX

AFRICA

CN8CO 238,754-1159-103- A
CN8CY 176,400- 978- 90- B
CT3CL 60,188- 367- 82- C
EA8ZZ 23,600- 200- 59- A
EA8ZI 97,416- 492- 99- C
EA8ADY 36,680- 262- 70- C
EA8JE 4350- 75- 29- C
ZS6WB 68,868- 331-104- C
5Z4CL (K5a AVX, PAW, opra) 118,180- 622- 95- D

ASIA

HL9SM (KA1BWK, opr.) 50,680- 362- 70- C
JI1QPU 334,412-1413-118- A
JH1RNZ 229,086- 979-117- A
JH1AGU 198,880- 880-113- A
JK1HAM 96,960- 497- 96- A
JA6GGD 95,200- 595- 80- A
JA9JFO 80,410- 473- 85- A
JA4DMV 43,950- 293- 75- A
JA4JNR 38,304- 252- 76- A
JR3BOT 15,390- 169- 45- A
JR1MTR 14,798- 148- 49- A
JA6LDD 12,516- 149- 42- A
JA1OHP 12,096- 142- 42- A
JJ1SOK 8664- 114- 38- A
JA7ARW/1 3936- 81- 24- A
JA1AAT 1160- 29- 20- A
JH3CON 540- 18- 15- A
JA1AAV 240- 15- 8- A
JH7UJU/7 200- 20- 5- A
JI1ACI 180,180- 910- 99- B
JH7UJW 50,920- 380- 67- B
JA7JWF 50,808- 348- 73- B
JA9CGJ 45,724- 318- 71- B
JA1NTK 43,680- 308- 70- B
JR3XEX 40,664- 298- 68- B
JA2PXV 38,940- 295- 66- B
JA7BMZ 38,870- 299- 65- B
JA9RYL 37,820- 305- 62- B
JE1SPY 35,380- 305- 59- B
JA1OP 32,332- 274- 59- B
JA1DFQ 30,744- 244- 63- B
JR2NTC 27,690- 211- 65- B
JA8AQ 18,792- 174- 54- B
JA8CAQ 18,000- 148- 60- B
JG1WRN 13,248- 133- 48- B
JA1BSU 12,508- 117- 53- B
JA5JCV 12,502- 134- 47- B
JA6JNG 12,432- 147- 42- B
JR6ISK 11,954- 139- 43- B
JH7RZW 6072- 92- 33- B
JR4IQI 2340- 45- 26- B
JR1FVW 2160- 54- 20- B
JH7RKT 2052- 53- 19- B
JR2AQP 1764- 42- 21- B
JA1OYB 1536- 49- 16- B
JJ2XTV 1160- 29- 20- B
JR1AMH 256- 16- 8- B
JE7BNZ/2 28- 7- 2- B
JH7DNO 376,380-1530-123- C
JF1EEK 63,342- 391- 81- C
JF3XNQ 43,608- 316- 69- C
JA2BHN 41,730- 321- 65- C
JA1FKY 39,192- 276- 71- C
JA6EOR 35,028- 278- 63- C
JA6EFT 28,700- 205- 70- C
JA1CQT 26,800- 200- 67- C
JI3BFG 25,440- 240- 53- C
JA7VSO 24,054- 211- 57- C
JR2CFD 22,788- 211- 54- C
JA#TPE 22,260- 210- 53- C
JA1ALX 21,114- 153- 69- C
JH1UUT 18,400- 184- 50- C
JG1ZPJ 13,104- 168- 39- C
JA1JCP 11,610- 129- 45- C
JA1FO 9900- 99- 50- C
KA2JP 9800- 100- 49- C
JA7WFA 9120- 95- 48- C
JA6QDU 8968- 118- 38- C
JH7XCN 8282- 101- 41- C
JJ1HAK 7840- 112- 35- C
JE1PJR 6868- 101- 34- C
JH4QJT 6650- 95- 35- C
JA1LOM 4810- 65- 37- C
JA3BBC 4466- 77- 29- C
JG1HZR 4104- 76- 27- C
JA0ASG 4080- 85- 24- C
JH8RGO 4060- 70- 29- C
JA1YCL 3082- 67- 23- C
JA7GYR 2800- 56- 25- C
JJ3BZS 2684- 61- 22- C
JA1BUI 2208- 69- 16- C
JH0WCN 2160- 54- 20- C
JA4JBL 2000- 50- 20- C
JL1EJO 1722- 41- 21- C
JA1BCW 1600- 50- 16- C
JR1FJK 936- 26- 18- C
JH9JJD 936- 26- 18- C
JO1CEW 840- 35- 12- C
JN1DX1 360- 12- 10- C
JE4ICX 72- 9- 4- C
JH1CRN 8- 2- 2- C
JA3YQP (JE3a CYV,EPK, JF3PJF, JG1VRW, JH3OPB, oprs.) 477,512-1712-138- D
JA2YKA (JA4UDP, JA9s NEO, SSY, XXS, JE2s JCV, RQT, VYH, JF2DQJ, JH2QXG, JH4VBQ, JJ1BTC, JR2CMC, oprs.) 459,352-1714-134- D
JA9YBA (JA9s LJI, LNJ, OTX, QCK, VBW, JH0CAB oprs.) 448,800-1700-132- D
JA7YAA (JE7s CUO, GFO, HWR, WPC, JH8SME, JJ1MVV, JR7SEI, oprs.) 402,340-1705-118- D
JA1ZLO (JA7RHJ, JA6-9330 oprs.) 402,192-1512-133- D
JA1YXP (JE1NJR, JF6IGH, JH0NPR, JJ1OHJ, JL1ROT oprs) 194,112-1011- 96- D
JA6YAI (JE6s MQW, UWI, JR6EZE, oprs.) 184,044- 927- 98- D
JA7YAB (JH7s AJV, CUU, IHR, MAJ, SSJ, JR7CBI, oprs.) 166,896- 917- 91- D
JH7YFR (JA7CXV, JR7s BPH, LVA oprs.) 81,978- 542- 77- D
JA6YDH (JE6s PSL, VRJ, JG1TAW, JR6s GHN, KYA, PKJ, QHK, oprs.) 62,900- 365- 85- D
JA7YFH (JH7SER, JR7s EGK, EUV, UOL, YQT, oprs.) 61,727- 381- 81- D
JA7YWD (JE7s FFT, LMF, TPC, TMO, JH7DHX, JR8NQE, oprs) 6996- 106- 33- D
JA7YDX (JE7s FOP, NLA, SEP, JR7s GDU, RPU, RZM, UHG, oprs.) 1584- 44- 18- D
JT1BG 3360- 60- 28- C
HA9AKM 62,352- 433- 72- A
OA#QCA 19,140- 290- 33- A
UA9YHD 13,332- 202- 33- A
UA#SAU 78,812- 646- 61- B
UA9QBT 64,904- 532- 61- B
UA9CBR 26,320- 280- 47- B
UA9CHQ 6840- 114- 30- B
UA9OBS 5888- 128- 23- B
KA9UAD 93,148- 803- 58- C
UA#QEP 28,946- 353- 41- C
UA9ANC 19,926- 243- 41- C
UK#AAM (UA9LAS, OA#AKA, oprs.) 241,542-1491- 81- D
UK9HTT (4oprs.) 42,944- 488- 44- D
UK9UAC (UA9UUM + 1 opr.) 34,632- 481- 36- D
UK9PGV (multiop) 1554- 37- 21- D
UK#FAD (UA#s FAY, FER, FEV, FEX, oprs.) 8928- 186- 24- D
UD6DJH 60,600- 404- 75- A
UD6DKW 39,260- 302- 65- B
UD6DLL 2760- 60- 23- C
UF6FER 34,720- 280- 62- C
RF6QAH 10,872- 151- 36- C
UK6FGD (UF6s AW, FBX, FFH, oprs.) 15,080- 145- 52- D
GL7QAA 15,010- 167- 45- C
UK7PAL (UL7s PAE, PBY, PCZ oprs.) 208,342-1427- 73- D
UH#MDX 48,672- 432- 48- A
YK1AO 18,124- 197- 46- C
4Z4TR 14,400- 144- 50- C
9K2GE (G4HZP, G6BQU, oprs.) 7904- 76- 52- D

EUROPE

CT4GD 188,870- 935-101- C
CU#UA 104,310- 549- 95- C
CT1AV 89,956- 523- 86- C
CT1AHG 40,004- 274- 73- C
DL7MAE 212,986- 977-109- A
DF4ZL 88,004- 490- 98- A
DL8MBS 78,936- 429- 92- A
DK1LX 54,386- 383- 71- A
DF2RG 44,398- 281- 79- A
DK5OS 1650- 33- 25- A
DL1VJ 204,370- 955-107- B
DF3LZ 88,332- 433-102- B
DL6RAI 71,552- 411- 86- B
DL1BB 52,788- 318- 83- B
DF1TH 44,660- 287- 77- B
DL6HAU 18,688- 146- 64- B
DL1AM 13,268- 90- 72- B
DL9CE 13,200- 179- 50- B
DL3ME 11,136- 96- 58- B
DK7QB 8484- 101- 42- B
DK7HA 5320- 70- 38- B
DL#TS 768- 24- 16- B
DL8PC 363,888-1368-133- C
DL#BSA (DK2MN) 216,474- 993-109- C
DA2ER 216,354-1011-107- C
DL#NT (DH2SA1, DJ4AK, DL8SAB, oprs.) 49,968- 344- 72- D

KA2CR 16,680- 139- 60- A
EA1BOW 4984- 71- 42- A
KA5TK 79,296- 472- 84- B
EA3CRX 69,119- 458- 74- B
EA5EV 17,024- 152- 56- B
EA3BHA 11,868- 138- 43- B
EA3GF 4756- 58- 41- B
EA4BV 260- 13- 10- B
EA3CUQ 179,270-1214-115- C
EA3DB 150,000- 625-120- C
EA3CCN 133,272- 617-108- C
EA5CXS 115,920- 504-115- C
EA2QU 77,778- 449- 86- C
EA5CBT 45,560- 268- 85- C
EA1CDF 26,600- 175- 76- C
EA7OJ 22,496- 148- 76- C
EA4BPJ 21,452- 173- 62- C
EA3BOX 9804- 86- 57- C
EA7BYM 8640- 80- 54- C
EA7ARK 8268- 78- 53- C
EA3ARX 6760- 65- 52- C
EA1BWD 4320- 80- 27- C
EA7CEP 3996- 54- 37- C
EA3DNC 2072- 37- 28- C
EA4CAI 1600- 32- 25- C
EA3AUV (+EA3AIR) 106,528-1235-124- D
EA3MM (EA3s AEF, AYK, BBA, BEN, CBR, CGK, oprs.) 114,816- 617- 92- D

EA6LA 23,628- 179- 66- A
EA6CL 29,240- 214- 68- B
EA6GP 66,096- 408- 81- C
EA6BZ 5940- 66- 45- C
EA6MP (+EA6ID, EG6IP)
49,760- 311- 80- D
EI4DW 56,604- 318- 89- C
F9KP 108,274- 608- 89- B
F6DXV 71,400- 425- 84- B
F6EWB 42,924- 292- 73- B
F3BC 37,654- 281- 67- B
F9BB 23,578- 170- 68- B
F6GVT 21,824- 175- 62- B
F6KQV 14,720- 160- 46- B
F6CXJ 10,464- 107- 48- B
F8CCI 6290- 85- 37- B
F3AT 5644- 83- 34- B
F1DA 4524- 78- 29- B
F6EPO/M 3300- 66- 25- B
F6KBF (F6BKR,opr.)
471,724-1661-142- C
F6HOY 63,888- 363- 88- C
F8WE 62,192- 338- 92- C
F6HRI 41,120- 257- 80- C
F6EXQ 27,880- 205- 68- C
F6BTS/M 14,560- 130- 56- C
F6HQK 9676- 118- 41- C
F5HZ 7632- 72- 53- C
F6EVI 2548- 49- 26- C
F6FJE (+F6EGI)
384,210-1423-135- D
F6FRH (F6s GDF, EBA, KSO, GDQ, HOK, HVF, oprs.)
93,917- 541- 86- ?
G5CHX 497,166-1761-141- A
G4OKN 71,240- 177- 60- A
G3SXW 59,684- 344- 86- B
G3HBY 42,194- 289- 73- B
G2AJR 10,320- 120- 43- B
G4MBO (G4s BWP, GBS, GIK, JQL, oprs.)
556,284-1841-151- D
GM3RAD 137,496- 674-102- A
GM4ELV 17,880- 149- 60- C
GW4BKG 251,564-1031-122- C
HG7UG 155,656- 694-112- A
HA6NF/P 85,332- 547- 78- A
HA3NU 67,716- 300- 79- A
HA5LZ 65,766- 335- 97- B
HA3BZ 65,736- 390- 83- B
HA3NX 34,452- 261- 66- B
HA3IU 28,336- 253- 56- B
HA5KBC (HA5s KP, LV, MA, MD, MO, VM, oprs.)
251,940-1105-114- D
HA3KNA (3oprs.)
92,450- 485- 85- D
HA5KFZ (3oprs.)
41,588- 281- 74- D
HB9BGW 7200- 100- 36- B
HB9ASJ 4007- 63- 29- A
HB9DX 3840- 60- 32- B
HB9RPP 3768- 61- 38- B
HB9KC 1886- 41- 23- B
HB9QA 174- 6- 7- B
HB9ADS 33,930- 261- 65- C
T4VEQ 548,352-1904-144- A
K2VXJ 145,344- 752- 96- B
W9NXX 369,400-1575-116- C
K1POR 362,052-1602-113- C
K2JSB 176,748- 858-103- C
K1HAC 144,480- 645-112- C
KA4BHO (27,116- 642- 99- C
LA9FY 3864- 78- 23- A
LA1VL 12,576- 131- 48- B
LA7S1 9400- 100- 47- B
LA5DW/P 6030- 67- 45- B
LA1S (LA5DW, oprs.)
5832- 81- 36- B
LA5DW 1944- 36- 27- B
LA7YW 260- 13- 10- F
LA2TO 52,816- 357- 74- C
LA2TY 39,232- 232- 63- C
LA1VCA 25,376- 208- 61- C
LA4HH 23,100- 150- 77- C
LA9DI 21,666- 137- 79- C
LA5JX 8910- 99- 45- C
LA1EQ 6600- 75- 44- C
LA3JT 3500- 50- 35- C
LA2AD 696- 29- 12- C
LA4O (LA4DCA, LA9HW, oprs.)
143,754- 728- 97- D
LX1YZ 9800- 100- 49- B
LX1KW 59,796- 302- 99- C
LZ2BE 13,750- 175- 55- A
LZ1KAB 184,044- 939- 98- B
LZ1DQ 57,600- 400- 77- B
LY2KF 170,100- 810-105- C
LZ1CW 65,016- 378- 86- C
LZ1KDP (LZ1 JY, MS, ZF, LZ2s IF, UU, oprs.)
370,504-1593-116- D
LZ2KAD (LZ2RS + 2 oprs.)
78,186- 471- 83- D
4U1VIC (WIHUE, opr.)
760- 20- 19- A
OE5JDL 7396- 86- 43- B
OH5TS 254,380-1106-115- A
OH5MQ 8592- 179- 24- A
OH2BJG 1456- 56- 13- A
OH/MW 528- 22- 12- A
OH3FM 46,560- 485- 48- B
OH5UO 39,888- 277- 72- B
OH1ES 29,346- 219- 67- B
OH6AM 12,852- 189- 34- B
OH6RC 9984- 192- 26- B
OH9TO 4176- 87- 24- B
OH2DN 660- 22- 15- B
OH/KU 10,100- 101- 50- C
OH6AC (OH6s CS, WZ, oprs.)
65,184- 776- 42- D
OH6QU (+OH6DU)
26,352- 551- 24- D
OK1ARI 205,212-1047- 98- A
OK1KZ 34,526- 283- 61- A
OK1PM 26,800- 200- 67- A
OK1AVD 158,496- 762-104- B
OK2BGV 156,420- 711-110- B
OK2BWH 65,886- 417- 79- B
OK3IF 31,390- 215- 73- B
OK3BA 16,280- 148- 55- B
OK1AWC 9576- 126- 38- B
OK1EV 6552- 117- 28- B
OK1DVR 4554- 69- 33- B
OK1DLF 4224- 64- 33- B
OK2SBJ 1596- 38- 21- B
OK3CFA 260,134-1093-119- C
OK1TN 202,860- 805-126- C
OK2BQZ 8000- 100- 40- C
OK1DKS 6400- 80- 40- C
OK2BHQ 5688- 79- 36- C
OK1DMA 336- 14- 12- C
OK2KJU (Multiop)
76,074- 409- 93- D
OK1KZD (Multiop)
13,112- 149- 44- D
OK1KRQ (2oprs.)
4736- 64- 37- D
ON4XG 93,984- 528- 89- A
ON4ABW 157,320- 828- 95- B
ON7EX 22,072- 178- 62- B
ON4JJ 11,500- 115- 50- C
OZ7JZ 29,800- 200- 57- A
OZ1BUR 14,208- 111- 64- A
OZ1ADX 83,936- 446- 86- B
OZ5KU 60,650- 271- 75- B
OZ1DKG 39,040- 317- 61- B
OZ6KS 10,388- 96- 53- B
OZ8E 4756- 82- 29- B
OZ5EV 122,850- 525-117- C
OZ8ME 26,624- 208- 64- C
OZ1CLG 22,082- 181- 61- C
OZ6XR 20,748- 182- 57- C
OZ3FC 18,176- 142- 64- C
OZ1DAF 6080- 95- 32- C
OZ1APA 5452- 58- 47- C
OZ1DYC 1040- 26- 20- C
OZ1GRS (+OZ1BWF)
7790- 95- 41- D
PA0XPQ 194,040- 924-105- A
PA0VDV 176,832- 913- 96- B
PA0VLA 17,446- 142- 61- B
PA3ABA 15,776- 136- 58- B
PA3BWQ 14,520- 119- 60- B
PA3AMA 7752- 101- 38- B
PA3BLU 5694- 73- 39- B
PA0DIN 672- 21- 16- B
PA3TMS 450,616-1426-158- C
PA3AIR 202,230- 965-107- C
PA0CAN 74,036- 466- 83- C
PI1GOE 45,000- 250- 90- C
PA0BUD 32,800- 205- 80- C
PA0LIE 21,216- 156- 68- C
PB0AAL 8000- 100- 40- C
PA0KDM 6636- 79- 42- C
PA0YN 2160- 40- 27- C
PA3BVT 1248- 39- 16- C
PA0TUR/P (PA2FAS, PA3s ATA, AWW, BZY, PA0s AAS, ABE, BOE, LEG, TUK, oprs.)
254,018-1187-107- D
SM0TW 53,404- 330- 79- A
SM0BOS 27,048- 192- 69- A
SM5BDV 18,000- 125- 72- A
SM4CMG 3068- 59- 26- A
SM6INC 102,780- 567- 90- B
SL0AS 82,270- 421- 95- B
SM5CAK 76,558- 479-101- B
SM5DAC 42,432- 272- 78- B
SM6BZE 31,552- 225- 68- B
SM0EEJ 10,820- 130- 67- B
SM6LWB 24,966- 219- 57- B
SM7CRA 18,460- 142- 65- B
SM7IAZ 15,300- 170- 45- B
SM5FAV 5382- 65- 39- B
SM0MML 4154- 67- 31- B
SM5XX 2000- 50- 20- B
SM7CZC 288- 18- 8- B
SM4KL 242- 11- 11- B
SM5GNU 371,078-1262-147- C
SM2KWQ 87,680- 548- 80- C
SM2NTU 21,744- 224- 53- C
SM6MYP 15,184- 144- 52- C
SM6LIF 13,312- 104- 64- C
SM0RNY 9588- 94- 51- C
SM5CZD 8004- 87- 46- C
SM7AIO 8000- 100- 40- C
SM4BTF 7776- 81- 48- C
SM0CHA 3476- 79- 22- C
SM0FN 1102- 29- 20- C
SK2OG (SM2s IIR, NNX, oprs.)
31,284- 237- 66- D
SL7AZ (SM6JWR, SM0LHO oprs.)
24,790- 185- 67- D
SV1JG 47,212- 407- 58- A
SV1RP 11,780- 190- 31- B
UA1TDX 203,086- 949-107- A
UA4CH 40,484- 349- 58- A
UA3AGW 37,872- 263- 77- A
UA3TAM 11,680- 146- 40- A
UA3TES 10,812- 159- 34- A
UA4AGP 9310- 133- 35- A
UA3TAG 7130- 115- 31- A
UA4PCI 6448- 104- 31- A
UA4AHT 33,072- 312- 53- B
UA4WWA 101,636- 642- 79- C
UA3AGN 54,492- 478- 57- C
UA3TKP 54,362- 353- 77- C
UA3TN 41,470- 319- 65- C
UA6ABH 36,064- 322- 56- C
UA6LHC 25,800- 215- 60- C
UA3AGG 24,910- 265- 47- C
UA6AJF 13,950- 155- 45- C
RA3TET 13,520- 169- 40- C
UA3DRB 10,440- 87- 60- C
RA3DKE 9430- 115- 41- C
UA6AZW 8784- 122- 36- C
UK3ABO (UA3APF + 2 oprs.)
212,976-1044-102- D
UK4WAB (3 oprs.)
87,616- 592- 74- D
UK6LDN (UA6LTA, UW6OE, oprs)
63,616- 448- 71- D
UK4NAA (UA4s NBA, NC1, NEN, oprs.)
14,288- 188- 38- D
UA2KC 37,350- 225- 83- A
UA2FFC 11,468- 122- 47- C
UA2FDX 6666- 101- 33- C
UK2FAA (RA2FDE,UA2s FCZ, FDK,FEW, FFD, oprs.)
270,280-1165-116- D
UB5ILD 260,126-1151-113- A
UB5IUB 76,912- 437- 88- A
UY5TE 43,310- 355- 61- A
UB5HEJ 18,656- 212- 44- A
UB5PBA 810- 27- 15- A
UB5ZAL 187,504- 947- 99- B
UB5QDU 39,884- 338- 59- B
UB5UBJ 15,900- 150- 53- B
UB5WAR (1,328- 118- 48- B
UB5UKJ 9944- 113- 44- B
UB5DW 5976- 83- 36- B
UB5ITW 51,188- 382- 67- C
UB5FCY 39,902- 281- 71- C
UK5UDX (UB5XCM +1 opr.)
412,320-1718-120- D
UK5MBG 261,612-1014-129- D
UR5QBE (3oprs.)
180,726- 993- 91- D
UC2AFF 17,568- 144- 61- C
UK2AAW (UC2s ACF, ACU, CFG, oprs.)
134,600- 673-100- D
UO5DEK 80,388- 519- 77- A
UO5UWC 55,296- 432- 64- B
UP2BAO 174,720- 832-105- A
UP2BAS 41,814- 303- 69- A
UP2BBF 6660- 83- 60- A
UP2PBZ 22,100- 169- 65- A
UP2BLF 16,218- 159- 51- B
UP2DM 11,770- 481- 85- C
UP2TDW 8400- 100- 42- C
UP2BPC 8280- 115- 36- C
UK2BCR (Multiop)
114,072- 582- 98- D
UQ2GFN 156,416- 752-104- A
UQ2GLW 32,856- 222- 74- A
UQ2CKM 15,390- 135- 57- A
UQ2PQ 57,800- 340- 85- B
UQ2CZZ 24,522- 200- 61- B
UQ2GBJ 12,126- 141- 43- B
UQ2CGP 4136- 53- 39- C
UK2GAB (3oprs.)
183,080- 796-115- D
UK2GJL (UQ2GEJ+ 1 opr.)
62,118- 357- 87- D
UR2RMJ 49,392- 252- 98- A
UR2QI 41,706- 330- 63- A
UR2RKS 100,810- 590- 85- B
UR2ROA 28,372- 173- 82- C
UR2RMZ 8624- 98- 44- C
UR2RBK 50- 5- 5- C
UK2RBT (UR2s ER, DU, JL, oprs.)
36,984- 268- 69- D
UK2RAB (UR2s RFS, RHK, REV oprs.)
2784- 48- 29- D
YZ60L 207,920- 920-113- A
YZ3VB 59,680- 373- 80- A
YZ4YG 42,588- 273- 78- A
YZ6DO 32,536- 196- 83- A
YS1YJ 26,412- 213- 62- A
YS1VE 24,056- 194- 62- A
YX6XG 22,800- 200- 57- A
YS7ZL 22,570- 185- 61- A
YZ8YE 16,768- 131- 64- A
YZ1SM 16,560- 138- 60- A
YZ4SE 16,330- 115- 71- A
YZ1IL 15,930- 135- 59- A
YZ2EK/P 15,390- 134- 57- A
YZ1ZL 8710- 93- 45- A
YZ2ZB 7344- 102- 36- A
YZ2HF 6624- 72- 46- A
YS8ZA 4988- 86- 29- A
YZ1JR 4752- 66- 36- A
YZ3YE 4056- 52- 39- A
YS6ZYC 1920- 40- 24- A
YS6ZZG 1334- 29- 23- A
YS2ZI (YZ4MI)
500- 25- 10- A
YZ3MM 12,656- 111- 56- B
YZ4TF/P 9310- 93- 49- B
YS7VL 7728- 82- 46- B
YA1ZL 6586- 89- 37- B
YS3RA 4896- 68- 36- B
YZ1GB 3600- 59- 30- B
YZ2YJ 2760- 60- 23- B
YZ3HN 2550- 51- 25- B
YZ4EA 1836- 34- 27- B
YS4YD 520- 20- 13- B
YS2WG 520- 20- 13- B
YZ3LM 336- 14- 12- B
YS2ZB 252- 14- 11- B
YZ1TL 20- 5- 2- B
YZ1DK/A 218,610-1041-105- C
YZ2TO 132,664- 644-103- C
YZ7EN 123,600- 618-100- C
YZ8XL 104,208- 501-104- C
YS4RD 42,456- 244- 87- C
YZ6WN 24,852- 218- 57- C
YS4VA 24,696- 196- 63- C
YZ3ZE/A 23,616- 164- 72- C
YZ6HO/P 20,770- 155- 67- C
YS7WG 14,522- 137- 53- C
YS3WL 12,348- 126- 49- C
YA9LO 9828- 91- 54- C
YZ4NM/A 8084- 86- 47- C
YZ3SF/A 8004- 87- 46- C
YZ3XG/YA3YG 6992- 92- 38- C
YS5XL 4352- 64- 34- C
YZ4NC 3968- 64- 31- C
YZ4XE 3328- 52- 32- C
YZ7QJ 1584- 33- 24- C
YZ1IC 1188- 33- 18- C
YA4WA 910- 35- 13- C
YS1YF 160- 10- 8- C
YZ2YI 126- 9- 7- C
YO6VZ 158,598- 801- 99- A
YO5ALI 63,900- 355- 90- A
YO2BCT 8148- 97- 42- A
YO6EX 5394- 93- 29- A
YO4BXE 2832- 59- 24- A
YO8BSE 1840- 40- 23- A
YO9HP 5016- 115- 22- B
YO9DT 20,424- 138- 74- C
YO2BEH 4272- 89- 24- C
YO2BV 2950- 59- 25- C
YO7CGS 2058- 49- 21- C
YO5BBZ 1008- 36- 14- C
YO3KWJ (YO3s ABL, QK, JU, IW,oprs.)
193,980- 913-106- D
YO4KRF (YO4s ATW, CEM, oprs)
110,888- 668- 83- D
YO8KOD (YO8s CAR,CRL,oprs)
27,840- 232- 60- D
YU2SD 253,690-1303-115- A
YU2QG 239,560-1060-113- A
YU7AF 67,200- 420- 80- A
YU7SF 15,504- 136- 57- A
YU1AWW (YU1RL,opr.)
262,386-1157-113- B
YU3EKU 96,760-1180- 82- B
YU4WN 61,308- 393- 78- B
YU1WZW 39,072- 264- 74- B
YU4VFA 26,934- 201- 67- B
YU3JS 9360- 104- 45- B
YU7ORQ 7560- 90- 42- B
YU7QCV 5810- 75- 35- B
YU2RDE 261,360-1089-120- C
YU3TLA 149,984- 688-109- C
4N9OLY (YU1PJQ, YU4WFT,oprs)
349,408-1432-122- D
YU3DKR (4oprs.)
120,240- 664- 90- D
YU7ACN (Multiop)
82,782- 511- 81- D

NORTH AMERICA

C6ADV (+K2CBU)
448,818-1767-127- D
HI8LL 22,400- 200- 56- A
HL8GS 356,952-1668-107- C
HP1AC 31,968- 214- 72- B
J3AAS 216,300-1030-105- C
NP4P 216,480- 980-110- A
KP4CC 566,680-2285-124- C
KI1WY/KP4 (+WB9AHQ)
304,632-1436-106- D
OX3ZM 53,720- 340- 79- C
VP2KBU (KC9PW,opr.)
574,250-2297-125- A
K9LA/VZA 340,684-1598-106- B
V2ARO (WB6SHD,opr.)
1,011,488-3464-146- C
V31TV (85,640- 910-102- C
XE1MDX (+XE1s FAO,MMD,OX, V1C)
493,554-1913-129- D
ZF2AG (N8AG,opr.)
271,508-1318-103- C

OCEANIA

FK8CL 50,344- 406- 62- B
FO8TW 14,352- 156- 46- C
H44SB 3840- 48- 40- C
KB7II/KH2 583,440-2210-132- C
VK4XA 65,846- 451- 73- B
VK8XE 1102- 29- 19- B
VK2WU 402,480-1592- 95- C
VK6NCW 13,392- 108- 62- C
YB8ACL 39,000- 375- 52- C
YB2CR 2760- 92- 15- C
ZL2AK 6600- 100- 33- A
ZL2RY 25,812- 239- 54- B

SOUTH AMERICA

CE3BFZ 27,738- 207- 67- C
CE5CJA (CE5s BYY,CFR,CNT, DRD,DVS,EHZ,XQSCIE,oprs.)
331,344-1416-117- D
HK8BVN 186,440- 790-118- C
HK3MAW 22,344- 147- 76- C
LU6AKG 67,680- 356- 94- A
LO1EWL 52,002- 319- 81- B
LZM (LU1BR,opr)
579,020-2227-130- C
LO1VK 88,200- 441-100- C
LU8EDZ 18,816- 147- 64- C
LO1S (LU1CLA,LU2a,AB, DSL, LU3AJW,LU6DWA,oprs.)
713,880-2644-135- D
LU4DQ (LU1DFO, LU4DCK,LU6s KF,ETB,LU8s,DLK,DQ,oprs.)
509,520-1930-132- D
OA8CW 38,688- 248- 78- C
PY2DRP 40,836- 249- 82- B
PY1DFF 7452- 81- 46- B
PP2ZDD 308,216-1106-118- C
PT7KW 149,200- 746-100- C
PY8ZRJ 122,010- 581-105- C
PP8ZAT 63,640- 370- 86- C
ZY3ATN 6968- 136- 26- C
YV2TW (I2,096- 496-113- A
YV3BRV (+YV3AZC)
678,132-2457-138- D
ZP5LOB 3008- 47- 32- C

MARITIME MOBILE REGION 1

WB8RFB/MM 20,060- 170- 59- C

W/VE

(

Connecticut

N1CC 205,428- 900-114- A
K1YRP 174,240- 788-110- A

KM1P 56,560- 404- 70- A
K1K1 54,720- 304- 90- A
K1PLR 52,160- 376- 79- A
K1NCD 41,192- 270- 76- A
KM1G 21,344- 181- 58- A
KA1YE 12,690- 135- 45- A
KA1EBI 6016- 89- 37- A
W1GNR 134,844- 657-102- B
WA1FCN 39,852- 236- 82- B
W1CNU 11,356- 228- 67- B
K1BV 20,544- 214- 48- B
W1WY 8450- 65- 65- B
WA2SVR 2240- 53- 20- B
K1NG (K1IG,opr.)
508,370-1753-145- C
N1API 387,684-1602-121- C
KA1FSO 70,122- 377- 93- C
N1ABY 45,920- 287- 80- C
KA1EHK 43,460- 265- 82- C
K1SSO 31,524- 213- 74- C
W1VH 30,240- 210- 72- C
WB1EYI (+AA2Z)
448,404-1738-129- D
K1WNT (+KA1YR)
174,146- 627- 99- D

EASTERN MASSACHUSETTS

KG1E 467,614-1841-127- A
KE1U 86,664- 468- 92- A
WA1UOH 83,980- 432- 94- A
W1VM 62,694- 367- 81- A
AI1E 17,584- 157- 56- A
K1ZZJ 8118- 122- 33- A
W1TUM 3936- 68- 26- A
WT1HH 199,716- 979-102- B
K1VUT 147,790- 709-103- B
K1VV 103,208- 673- 76- B
KA1CLV 59,428- 449- 81- B
WA8AXH/1 43,680- 269- 78- B
W1DA 23,700- 237- 50- B
KA1EHQ 2184- 39- 28- B
KA1EG 405,654-1649-123- C
KA1CFC 182,756- 781-117- C
W1VDR 146,740- 638-115- C
WB1FWS 118,116- 579-102- C
KA1AMR 60,648- 361- 84- C
WB2UMF 55,440- 385- 72- C
KA1R 43,542- 369- 59- C
KA1EKR 27,676- 187- 74- C
K1RB 26,386- 167- 79- C
KA1FAP 16,960- 160- 53- C
KI1CRB 12,190- 115- 53- C
W1BUG 3360- 80- 28- C
W1CLK 2850- 57- 25- C
KA1YQ (+KA1EM)
338,496-1374-123- D
AE1P (+KA1G, WB1FLA)
181,608- 965- 94- D
KA1MY (+KE2ZJ,KA1s ERC,UX, KP1G,KG1K,WB2FJ)
49,980- 353- 70- D

MAINE

KA1GV 107,536- 570- 94- A
KB1U 75,276- 460-102- A
KA1QQ 55,692- 352- 78- A
WB1GLH 24,892- 470- 79- B
W1KX 17,930- 158- 55- B
N1APC 8562- 115- 37- B
K1SA 5320- 76- 35- B
N1ATO 184,224- 912-101- C
K1NAN (KK1A, opr.)
12,284- 166- 37- C
KA1QR (+WB1AEK)
81,840- 440- 93- D

NEW HAMPSHIRE

N1BKV 96,768- 498- 96- A
K1IH 9280- 113- 40- A
W1PB 166,208- 778-106- B
N1BOM 45,408- 268- 88- B
W1END 39,032- 236- 82- B
N1BQD 21,232- 112- 48- B
K1NB 10,700- 103- 50- B
AF1T 258,892-1097-118- C
KB1Z 262,000- 968-125- C
K1TR 42,408- 279- 76- C
K1GW 10,742- 131- 41- C
N1OM 8844- 134- 33- C
K1WW (+KA1VQ)
331,530-1285-129- D

RHODE ISLAND

KM1X 101,136- 573- 88- B
KA1TS 166,530- 793-105- C
K1VSJ 75,078- 387- 97- C
K1GNO 64,500- 375- 86- C
KA1AWS 13,160- 140- 47- C

VERMONT

WB1GQR 675,936-1842-129- C
K1LPS 78,408- 363-108- C
WB1GMG (+WB1GMH)
43,688- 254- 86- D

WESTERN MASSACHUSETTS

N1BZG 31,744- 496- 64- A
AC1T 97,278- 523- 94- B
N1TZ 382,284-1517-126- C
K1JJU 1120- 28- 20- C
K1GDH (+KA1HVF,WA1ZRB, WB1DZK)
777,980-1230-113- D
WB1EQS (+K1ZQD,KA1CKX, W1PWK, WB1s DLK,FTS,FIJ)
127,664- 612-101- D

2

EASTERN NEW YORK

K2EK	308,864-1215-127-	A
KC2QF	226,920- 930-122-	A
WA2JQK	201,500- 769-130-	A
KN2Q	107,514- 540- 99-	A
N2BJG	87,174- 499- 87-	B
N2JJ	65,472- 372- 88-	B
W2KHQ	41,666- 250- 83-	B
N2BJ	313,224-1263-124-	C
KK2A	57,984- 302- 96-	C
WB2KEX	33,228- 234- 71-	C
N2FS	29,962- 211- 71-	C
KA2GFE	27,512- 181- 76-	C
KA2BLX	26,934- 201- 67-	C
KR2Z	20,768- 176- 59-	C
WB2OFV	16,748- 158- 53-	C
W2AZO (+KA2HYM)	211,640- 962-110-	D
KA2DXX (+KG2H)	40,320- 252- 80-	D

N.Y.C. & LONG ISLAND

KA2AEV	163,084- 739-109-	A
KC2SU	91,524- 526- 87-	A
W2GKZ	64,400- 350- 92-	A
K2QVS	20,000- 100-100-	A
K2SX	82,450- 418- 97-	B
WA2NDA	43,350- 288- 75-	B
WB2AKU	42,330- 248- 83-	B
WB2DLA	4216- 68- 31-	B
WA2HSQ	1632- 48- 17-	B
WB2PWR	176,762- 571-111-	C
KS2G	79,794- 429- 93-	C
KR2E (N2CMD,opr.)	48,114- 297- 81-	C
WA2SUH	18,080- 160-119-	C
WA2SVT	37,444- 253- 74-	C
W2KZE	15,774- 229- 78-	C
KA2EYR	18,602- 131- 71-	C
K2HTO	7520- 94- 40-	C
K2RTT	4366- 59- 37-	C
WB2HTW	3050- 61- 25-	C

NORTHERN NEW JERSEY

WA2SSH	33,580- 230- 73-	A
KT2D	1596- 38- 21-	A
KB2Q	274,180-1010-110-	B
K2TW	207,236- 998-103-	B
KD2I	180,402- 834-107-	B
W2RQ	13,112- 149- 44-	B
KA2MKD/M	10,416- 97- 42-	B
KC2DE	6888- 81- 41-	B
W1GD	115,460- 502-115-	C
W2FCR	102,184- 482-106-	C
KC2CS	27,324- 198- 69-	C
K2RF (+KT2R, W2HWG, WA2s JHT,PIO,VUN, WB2s BHC, ECI,LHD,TSY,WIK)	544,000-1997-136-	D
KS2M (+KA2LGL)	30,494- 193- 79-	D

SOUTHERN NEW JERSEY

KA2LNM	21,122- 179- 59-	A
N2AWC	8892- 113- 39-	A
K2HPV	16,352- 145- 56-	B
KA2RGD/M	1350- 38- 15-	B
KC2ME	303,660-1205-126-	C
WA2WJL	48,800- 305- 80-	C
KA2ETR	42,300- 282- 75-	C
WA2BNG	26,624- 208- 64-	C
K2MK	2652- 51- 26-	C

WESTERN NEW YORK

W2HC	58,140- 300- 95-	A
W2FUI	48,972- 332- 77-	A
KM2L	36,494- 257- 71-	A
N2CSY	20,720- 147- 70-	A
W2TZ	137,158- 704- 97-	B
KQ2K	123,394- 599-103-	B
W2PTY	81,800- 409-100-	B
KW2J	17,584- 153- 56-	B
KA2OMX/T	1620- 30- 18-	B
WA2MNM	247,500- 990-125-	C
WB2YQO	108,498- 507-107-	C
KC2B	62,560- 340- 92-	C
WA2POW	60,160- 310- 97-	C
KB2SE	42,476- 259- 82-	C
WA2FBE	30,076- 206- 73-	C
KC2OW	27,056- 178- 76-	C
WB2FBP	25,427- 223- 57-	C
WB2TKD	22,464- 144- 78-	C
WA2RKO	20,636- 154- 67-	C
WA2LEZ	14,800- 148- 50-	C
K2QR	1056- 33- 16-	C
KJ2Q (+KA2CFH,WB2WVF, WB2SZY)	153,600- 640-120-	D
WA2AAZ (AB2F,N2COJ,WB2TGU, oprs.)	21,230- 190- 55-	D

3

DELAWARE

KJ4BP	73,610- 433- 85-	B
AC3T	22,050- 225- 49-	C
KC3AH	15,500- 155- 50-	C

EASTERN PENNSYLVANIA

KB3YY	163,460- 743-110-	A
N3CXB	87,970- 459- 95-	A
W3ARK	87,220- 490- 89-	A
K3FN	74,302- 383- 97-	A
W3BGN	62,080- 388- 80-	A
KC3M	52,828- 363- 79-	A
WA3TQJ	50,160- 314- 76-	A
K3ND	43,500- 250- 87-	A
W3KV	18,060- 129- 70-	A
KK3V	12,896- 124- 52-	A
K3YD	2040- 51- 20-	A
KB6GP/3	1360- 38- 17-	A
N3AOT	107,184- 616- 87-	B
WA3YON	22,692- 178- 61-	B
WB3FYT	22,440- 178- 60-	B
K3VTA	14,310- 132- 53-	B
WA3JKW	12,800- 128- 50-	B
W3ADE	11,342- 101- 53-	B
W3JPW	9676- 118- 41-	B
K3GM	347,980-1370-127-	C
WA3ZTE	140,634- 601-117-	C
N3AZS	124,200- 540-115-	C
KC3EE	117,024- 552-106-	C
W3ZAA	60,606- 333- 91-	C
WB3CIW	60,140- 310- 97-	C
KC3AD	33,004- 223- 74-	C
KA3TIC	30,976- 242- 64-	C
KB3NQ	26,260- 207- 65-	C
KC3DJ	18,768- 138- 68-	C
K3EBZ	18,100- 181- 50-	C
N3DAU	17,664- 138- 64-	C
N3BCZ	8652- 103- 42-	C
KC3CB	8084- 94- 43-	C
W3MXN	7098- 91- 39-	C
W3DCG	6708- 86- 39-	C
W3CPR	4216- 62- 34-	C
WA3YTI	3300- 50- 33-	C
N3CFE (+KA3EAQ,N3s AOG,DCR, WB3EPU)	94,940- 465-101-	D
K3YTL (AD3L,KB3JK,oprs.)	4968- 69- 36-	D

MARYLAND D.C.

W3ICM	113,290- 546-105-	A
K3SA	31,600- 200- 79-	A
W3GN	25,894- 417- 91-	B
WA3YPL	5976- 83- 36-	B
W4KM	4176- 77- 24-	B
KA9X	2- 1- 1-	B
W3USS (K3ZJ,opr.)	221,030- 961-115-	C
KC3DF	125,892- 548-117-	C
WA4CYR	113,344- 506-112-	C
N3AOE	63,552- 331- 96-	C
N3GB	47,278- 307- 77-	C
K4CGY	44,070- 339- 65-	C
KC3KE	15,000- 150- 50-	C
WB3KFG	7000- 100- 35-	C
WB3JVD	1216- 38- 16-	C

WESTERN PENNSYLVANIA

K3UA	252,648-1036-121-	A
WA3CQU	10,430- 147- 35-	A
K3DE	10,010- 91- 55-	A
W3BJ	151,620- 722-105-	B
N2MA/3	47,208- 279- 84-	B
WA3UNX	14,410- 130- 55-	B
WB3CMZ	8600- 99- 43-	B
W3HDH	7052- 86- 41-	B
K3LMM	314,146-1181-133-	C
AD8J/3	156,656- 716-108-	C
WA3ESH	65,088- 339- 96-	C
KA3CRC	54,008- 314- 86-	C
KB3WU	44,544- 256- 87-	C
KC3BB	35,856- 249- 72-	C
KC3CL	30,806- 211- 73-	C
WB3HPE	29,700- 200- 73-	C
KA3ABK	23,424- 192- 61-	C
W3DKL	19,964- 161- 62-	C
K3MRT	13,566- 133- 51-	C
KA3AUX	6408- 89- 36-	C
WA3PGX	140- 10- 7-	C

4

ALABAMA

KA4ILP/N	34,648- 259- 61-	B
KD4TT	125,532- 634- 99-	C
KA4AJA	55,096- 388- 71-	C
N4AQA	27,528- 186- 74-	C
KF4ID	9900- 99- 50-	C

GEORGIA

KX4R	274,560-1056-130-	A
K4EZ	107,568- 498-108-	A
W4MCX	41,652- 267- 78-	A
AA4E1	3500- 50- 35-	A
K4BAI	139,668- 678-103-	B
WA4JFL	34,804- 222- 77-	B
W5VDX	86,528- 416-104-	C
KE4XW	63,112- 343- 92-	C
W4WWS	60,916- 314- 97-	C
K4KG	37,440- 234- 80-	C
W4NW8	9570- 87- 55-	C
N4RJ (+AA4GA, WB4NMA)	514,744-1738-148-	D
N4WQ (+N4GIM)	281,970-1200-117-	D

KENTUCKY

WA4QMQ	92,352- 446-104-	A
ND4Y	56,588- 300- 94-	A
N4AB	132,237-1298-121-	B
KA4JMZ	26,052- 166- 78-	B
KB4CGX/N	9720- 98- 45-	B
KA4TAY	40,716- 261- 78-	C
WD4KIT	5684- 98- 29-	C
N4TY (+NO4R)	220,688-1060-104-	D
W4GN (K4TXJ,KD4U,N4XM,oprs)	174,944- 781-112-	D
WD4CRG (+N4DIT)	130,320- 543-120-	D
WB4VFW (KA4s BYA,KJG,TPE, KE4NS,NN4H,W4HLQ,WA4DPC, WB4OJM,WD4GDA,WA8YMH)	44,092- 302- 73-	D

NORTH CAROLINA

WB5YMS	64,296- 336- 94-	B
N4AA	32,128- 249- 64-	B
KB4CMG/M	9760- 107- 40-	B
WD4OBD	9546- 109- 43-	B
WB4KJJ	28,392- 182- 78-	C
WB4WRL	11,800- 118- 50-	C
KA4VLP	6992- 92- 38-	C
WA4NOT	3780- 70- 27-	C
KF4HK (+KS4S,WA4VCC, WB4QNP)	262,010- 985-133-	D
N84J (+AB4S,AB4V,KA4s WDX, WWX,N4ELM)	169,680- 808-105-	D

NORTHERN FLORIDA

N4SA	365,684-1603-114-	A
WB4MUK	11,808- 117- 48-	A
WC4E	135,168- 752- 88-	B
KA4VNS/N	91,348- 517- 82-	B
WA4MOJ	107,730- 567- 95-	C
W4WKQ	129,540- 635-102-	C
W4LLR	86,464- 386-112-	C
WB5YLT	22,968- 174- 66-	C
N4WW (+NX4N,WB3GCI)	708,300-2361-150-	D
KF4W (+KB4s BF,SW,KC4UF, N4LS,WA4AXJ)	425,148-1497-142-	D

SOUTH CAROLINA

K4CNW	61,656- 363- 84-	B
KJ4X	13,624- 131- 52-	B
WB2GJD	1480- 59- 29-	B
WB4TLX	341,504-1334-128-	C

SOUTHERN FLORIDA

WA4FYZ	54,808- 398- 68-	A
K8UNP	45,240- 260- 87-	A
N4DMI	31,328- 178- 88-	A
WD4ANZ	102,808- 567- 88-	B
N4BF	75,402- 531- 71-	B
N4KB	2184- 42- 26-	B
W4JM	13,356- 126- 53-	C
W4HVU	9118- 97- 47-	C
W4LX (KA8CXQ,WD8ABP,oprs.)	133,224- 732- 91-	D

TENNESSEE

WB4SFX	107,000- 499-107-	A
KB4SL	93,840- 456-102-	A
K4XO	39,424- 224- 88-	A
KD4PP	37,500- 250- 75-	A
K4OAQ	144,840- 708-102-	B
K4AMC	143,400- 714-100-	B
W4PHW	3300- 58- 25-	B
KE4HX	186,660- 765-122-	C
N4FZM	56,052- 346- 81-	C
KD4XX	37,324- 217- 86-	C
NY4N	36,720- 255- 72-	C
N4DJY	7030- 95- 37-	C
W4VSV	1628- 37- 22-	C
NR4S (+KI4Q,KY4L)	78,772- 417- 94-	D

VIRGINIA

WB4BVY	414,256-1523-136-	A
WB4J	100,672- 482-104-	A
K4OD	65,520- 364- 90-	A
K4FFF	60,636- 326- 93-	A
W4YE	57,494- 323- 89-	A
K4JM	50,568- 294- 86-	A
KA4UDD	50,400- 350- 72-	A
KA4RLJ	36,520- 220- 83-	A
N4MM	17,400- 145- 60-	A
W4LMW	6732- 102- 33-	A
N3OS	53,210- 308- 85-	B
KC4HN	35,600- 198- 89-	B
K4TM	16,080- 134- 60-	B
K4JST	504- 20- 12-	B
W4MV	198- 10- 9-	B
KB4G/4	90,420- 411-110-	C
K4VT	54,000- 270-100-	C
WB4PIQ	30,368- 208- 73-	C
K4QAX	8034- 103- 39-	C
WB4UBD	1536- 32- 24-	C
NA4L (+N4s BDM,VL,WD4s BTF, BTC)	319,332-1157-138-	D
W4IY (AF2T,KB4ADS, KC4WI, KD4IC, WB4s,CZX,RDV,oprs.)	140,682- 554- 99-	D

WEST INDIES

NP4EE	55,242- 297- 93-	C

5

ARKANSAS

W5FDP	113,226- 501-113-	C
KA5EZK	45,588- 262- 87-	C
W5EIJ	14,080- 128- 55-	C

LOUISIANA

W5RZ	601,660-2245-134-	A
W5WG	46,508- 288- 77-	B
AC5R	13,536- 144- 47-	B
W5QEP	131,036- 697- 94-	C
N5BGX	12,000- 120- 50-	C
W5EA (AE5V,KA5OGM,KC5CZ, KU5B,oprs.)	414,556-1699-122-	D
W5USN (KB4JI; WA8MYE,oprs.)	148,672- 736-101-	D

MISSISSIPPI

N5CFU	68,040- 374- 84-	A
N5FG	65,728- 415- 79-	A
N5CW	102,170- 599- 85-	B
WD5DSK	228,032-1018-112-	C
W5NCB	9540- 106- 45-	C
KN8J (+N1GLS,KC8IS)	120,870- 707- 85-	D

NEW MEXICO

WA5DJJ	18,928- 165- 56-	A
KC5DV	18,666- 176- 51-	A
W5JW	252,420-1192-105-	B
N5EZA/T	4644- 61- 27-	B
KA5OKR/T	1848- 34- 22-	B
N5ACP	23,600- 200- 59-	C
W5GE (N2JB,KA5ECS,KB5EZ, KC5BH,oprs.)	65,650- 502- 65-	D

NORTHERN TEXAS

WB5VZL	441,496-1903-116-	A
K5FUV	368,250-1473-125-	A
K5NW	247,752-1137-108-	B
KA5GFJ	60,060- 379- 78-	B
KB5UL	44,020- 310- 71-	B
K5SOR	17,520- 332- 56-	B
W5QF	28,704- 200- 69-	B
AD5F	7992- 101- 36-	B
N5RZ	583,470-2161-135-	C
KV5B	244,528-1054-116-	C
W5PLN	120,540- 615- 98-	C
W5IU	70,798- 389- 91-	C
KX5U	6076- 98- 31-	C
N5AU (+K5ZD,KM5X)	859,770-2962-145-	D
KY5P (+KY5N)	368,520-1658-111-	D
ST5M (+KC5DE)	120,120- 699- 84-	D
N5FDQ (+WD5CUW)	105,120- 584- 90-	D

OKLAHOMA

N5CG	301,990-1313-115-	A
KM5H	218,000- 998-109-	A
N9IN/5	13,500- 150- 45-	B
WD5IRR	6840- 111- 30-	B
WA5PFJ	73,650- 491- 75-	C
KD5BJ	61,104- 402- 76-	C
WD5HZK	10,824- 132- 41-	C
W5PAM	7280- 104- 35-	C
KC4WQ	6336- 99- 32-	C

SOUTHERN TEXAS

N5DDO	484,080-2017-120-	A
AD5Q	359,190-1533-117-	A
W5ASP	168,072- 894- 94-	A
N5CMF	3050- 53- 25-	A
K5RC	405,288-1706-117-	B
N5AVR	13,376- 150- 44-	B
K5ZC	8092- 119- 34-	B
WA5IMS	472,384-1952-121-	C
KC5CP	312,736-1348-116-	C
KB5FU	175,800- 879-100-	C
K5UCV	139,048- 764- 91-	C
WA5IYX	74,074- 481- 77-	C
N5CUY	39,468- 299- 66-	C
AK5G	36,530- 281- 65-	C
WA5RNV	32,816- 293- 56-	C
KA5LDH	22,632- 246- 46-	C
WB4YKA	17,280- 180- 48-	C
WD5BEP	7728- 84- 46-	C
WD8DKJ/5	2450- 35- 35-	C
W5OP	1800- 45- 20-	C
K5HIM	330- 52- 3-	C
WSRRR (K5CN,KC5U, KN5H, NA5R,oprs.)	763,968-2767-138-	D
W5VX (+K5s JX,TSQ,NA5G, W5MYA)	655,158-2463-133-	D
KD5SP (+KY5A,N5s,EA,JJ)	497,658-2087-119-	D
K5LZO (+WB5RUS,WB8NFY)	496,250-1985-125-	D

6

EAST BAY

WB6FGR	276,360-1410- 98-	A
K6CSL	30,800- 276- 55-	A
N6CRM	21,840- 210- 52-	A
KS6H	99,864- 676- 73-	B
K6ATV	64,448- 418- 76-	B
K6ARE	9360- 107- 40-	B
W6DNY	4312- 77- 28-	B
N6HJY/T	4140- 54- 30-	B
K2GMY	253,248-1319- 96-	C
KS6Q	13,992- 159- 44-	C

LOS ANGELES

K6EID	246,788-1172-103-	A
AI6Z	195,444-1097- 89-	A
N6RC	153,552- 914- 84-	A
KT6M	97,500- 603- 78-	B
WB9ERO/6	34,210- 310- 55-	B
N6HE	17,712- 151- 54-	B
WB6VYS	5220- 90- 29-	B
N6ITH/T	3402- 50- 27-	B
WA6OTU	2184- 42- 26-	B
W6UK	75,680- 440- 86-	C
W6NXB	7958- 91- 29-	C
WB6JHC (AJ6O, KB6A, KC6W, NM6Q, WA6s,CWQ, YSC, WB6GWT, oprs.)	146,804- 746- 98-	D
KA6RAI (+KA6UDZ)	50,050- 325- 77-	D

ORANGE

W6UK	234,968-1277- 92-	A
WA6JAH	163,760- 892- 89-	B
K6GBK	68,226- 411- 83-	C
WA6IYN	34,160- 280- 61-	C
WA6GER	2226- 53- 21-	C

PACIFIC

KH6IJ	4860- 81- 30-	A
KH6UN/T	17,370- 167- 45-	B
KH6JWR	14,688- 153- 48-	B
KH6CDO	62,436- 473- 66-	C
AH6EK (Multiop)	4158- 76- 27-	D

SACRAMENTO VALLEY

W6AMW	83,328- 496- 84-	A
AA6DX	55,480- 375- 73-	A
WA6BRV	6666- 100- 33-	A
WD6CQH	2112- 40- 22-	B
A16V	573,644-2351-122-	C
N6JM	49,420- 353- 70-	C

SAN DIEGO

N6BFE	94,224- 589- 78-	A
N6RLK	6090- 85- 35-	A
W6ZT	48,984- 308- 78-	B
AA6EE	2254- 49- 23-	B
N6ND	493,680-2040-121-	C
W6KBD	18,676- 161- 58-	C
AB6R (+WB6OKE)	442,888-1909-116-	D

SAN JOAQUIN VALLEY

W6SX	34,128- 316- 54-	B
WA6YKW/N	16,380- 162- 45-	B
KA6BIN	12,716- 606- 93-	C
WB6LBR	109,890- 555- 99-	C
KE6RN	25,520- 220- 58-	C
W6REX	17,000- 170- 50-	C
WA6SLF	8692- 106- 41-	C

SAN FRANCISCO

WA6AUE	124,244- 698- 89-	C
K6LVD	37,814- 259- 73-	C

SANTA BARBARA

W6TKP	66,722- 457- 73-	A
N6CAU	38,988- 359- 54-	A
WB6DNN	9040- 103- 40-	A
KA6GKU	8880- 120- 37-	A
KA6VRW/N	570- 17- 15-	B
W6DAL	111,720- 588- 95-	C

SANTA CLARA VALLEY

N6NF	401,664-2092- 96-	A
WD6CKT	93,440- 640- 73-	A
W6OKK	44,042- 361- 61-	A
N6UW	37,004- 312- 58-	A
W6SZN	15,316- 326- 56-	A
K2UMU	33,516- 291- 57-	A
N6CW	320,144-1475-107-	B
N6MG	226,644-1101-101-	B
W6QBL	58,112- 437- 64-	B
N6YE	13,376- 148- 44-	B
KA6ING/T	5100- 68- 34-	B
WD6DXR/N	1440- 30- 20-	B
K6HMZ	562,500-2250-125-	C
K6LTL	126,176- 693- 91-	C
KA6HTC	12,274- 188- 34-	C
KF6AB	47,840- 368- 65-	C
KF6EC	34,840- 268- 65-	C
W6YVK	11,968- 136- 44-	C
K6YA (AG6D,K6MA,KE6PQ, N6s AUV,DOK,WB6RPA,WB6YZI,oprs)	370,400-1852-100-	D

7

ALASKA

NL7P	285,096-1696- 84-	A
AL7CQ	172,848-1108- 78-	A
WB4WXE/KL7	36,828- 341- 54-	A
KL7AF	23,344- 572- 64-	B
KL7Y	68,340- 510- 67-	B
KA7FUE/KL7	34,080- 355- 48-	C
KL7SK	2450- 49- 25-	C
KL7CQ (+KL7s HFQ,LO)	219,184-1442- 76-	D
KL7KE (+KL/KD)	8844- 130- 33-	D

ARIZONA

WB7FDQ	675,480-2587-130-	A

KC7V 13,056- 136- 48- A
K6LL// 329,184-1493-108- B
W7CW 261,186-1279-101- B
WB7QHM 114,880- 674- 90- A
W7ZMD 84,456- 612- 69- B
W7YS 44,144- 335- 62- B
WA7NXL 16,024- 170- 47- B
WJ7UY 2320- 51- 20- B
WA7NWL 960- 25- 16- B

N7DD 830,850-2865-143- C
W7EGT 349,392-1506-116- C
WA7RLK 278,480-1170-102- C
EY7F 110,712- 659- 84- C
K7KOH 98,400- 600- 82- C
WB2WEO 38,744- 334- 58- C
KL7WL 10,812- 102- 53- C
W7RAJ 10,080- 112- 45- C

(DAHO)

KJ7EIJ 86,184- 561- 76- A
N7SU 62,424- 459- 68- B
KN7K 53,550- 516- 51- B
KU7Y 20,832- 247- 42- B
N7DYS/T 14,878- 147- 46- B
WA6DYD 58,136- 559- 52- C
KB7CQ (+KB7CR)
249,744-1452- 86- D

MONTANA

KN7T 754,644-1526- 83- A
KE7X 119,922- 759- 79- B
KL7FDQ/7 30,080- 176- 36- B
WA7GVT 9768- 128- 57- B
N7CFC 60,984- 484- 63- C
KA7INW (+K7CQI)
24,960- 208- 60- D

NEVADA

WA7UEC 366,102-1838- 99- A
WA7CWM 258,344-1302- 86- A
WB7VVH 39,050- 275- 71- C
WA7ENK (+K7SPN)
195,932-1922-103- D
KA7BKB (+KA7BKP)
137,020- 806- 85- D

OREGON

W7GUR 62,624- 411- 76- A
WB7SRU 46,434- 327- 71- A
KA7FTS 35,404- 333- 53- A
AD7T 15,264- 106- 72- A
W7YAQ 6200- 100- 31- A
K7QT 129,150- 856- 75- B
W7TC 98,540- 754- 65- B
KA7KDU/T 28,560- 248- 51- B
K17M 295,926-1591- 93- C
W7YRD 258,258-1419- 91- C
K7UH 232,744-1238- 94- C
WB7HEI 132,276- 906- 73- C
WB4IOJ 103,220- 794- 65- C
KA7GPC 30,160- 290- 52- C
WA7WBE 12,388- 163- 38- C
KA7FMC 7072- 104- 34- C
EJ4A 2940- 42- 35- C
W7VW (K7TDX,KA7A ARC,JDZ,
KD7s AA,AB,KU7E)
144,840-1065- 68- D
WB7UFJ (+KA7KMQ)
58,842- 467- 63- D

UTAH

K7CPC 50,960- 452- 56- B
KA7KMP 3630- 52- 33- B
WA7HQD 111,600- 775- 72- C

WASHINGTON

N7TT 141,080- 980- 73- A
W7KMO 124,150- 948- 65- A
KR7L 15,170- 180- 41- A
WF1ED 33,186- 783- 61- B
AG/M 459,244-2146-107- C
N7CKD 104,168- 526- 99- C
KB7TW 63,042- 399- 79- C
W7ERB 11,904- 124- 48- C
K7IDX 8188- 178- 23- C
KY7G (+K37G)
464,000-2000- 91- D
KC/K1 (+KA/s CVT,CZV,OIW)
24,530- 218- 55- D

WYOMING

WB7CFI 174,968- 757- 82- A
W7IRL 18,914- 187- 49- A
KB7M 196,712-1031- 76- C
KC7TH 148,200-1140- 65- C

8

MICHIGAN

8O8T 305,838-1307-117- A
WB8GDO 136,974- 615-111- A
K8CV 35,076- 237- 74- A
N8CQA 26,332- 223- 58- A
KA8IIN 24,300- 223- 54- A
W8UA 194,876- 939-103- B
KB8WG 16,640- 151- 52- B
KA8MSU/M 7400- 87- 37- B
WB8RUQ 2112- 44- 24- B
W8WVU 2000- 40- 25- B
W8YL 1370- 40- 22- B
K8XE 392,616-1558-126- C
N8DEQ 264,740-1085-122- C
WD8RBW 71,340- 410- 87- C
WB8VPQ 60,822- 327- 93- C
N8CXX 54,240- 339- 80- C
KA8PAH 51,660- 315- 82- C
K8ICK 31,920- 190- 84- C
WA8WMF 29,600- 196- 75- C
WB8SFF 29,088- 202- 72- C
K8SS 21,358- 181- 59- C
N8ABY 13,888- 124- 56- C
KA8HJC 10,728- 149- 36- C
EW8G 9800- 100- 49- C

KC8EM 1482- 39- 19- C
WA8TBQ (+AD8R,K8LX,N8BKQ)
387,072-1536-126- D
N8BKO (+AC8W,K8AJ,DD,JLB,
KA8s APL,KCN,KJ8A,N8s,
CJA,DBL,WA8s,BSF,MEC)
270,844-1138-119- D
KG8V (+AB8Y,K8MPF,KR8W,
WB8EY,WB8IOR)
203,668- 847-118- D
WB8BDQ (KB8BPY,WD8CIN,
WK8PEE)
194,940- 855-114- D
KC8U (+KG1E)
64,672- 344- 94- D
K8BTI (+WA8ZCO)
36,272- 252- 68- D
KK8DV (K8NKB,KC8CE,N8EUZ,
WA8RNB,oprs.)
19,824- 177- 56- D
WD8AYV (Multiop)
9996- 119- 42- D

OHIO

AD8I (KD8E,opr.)
492,048-1833-134- A
K8CX 376,164-1456-129- A
WB8UFH 74,646- 422- 87- A
K8MNG 63,592- 331- 96- A
KC8YW 20,234- 151- 67- A
KA8DUT 19,836- 171- 58- A
N8DDE 16,080- 134- 60- A
WB8CAR 14,800- 148- 50- A
K8MR 8188- 89- 46- A
K8BL 7474- 100- 37- A
AC8J 5874- 89- 33- A
K8NR 306,614-1257-121- B
W8EN 168,272- 809-104- B
WA8SBC (WB8PHI,opr.)
140,650- 722- 97- B
N8BJQ 122,176- 696- 99- B
WB8QID 103,356- 519- 99- B
KW8J 87,380- 514- 85- B
KA8EIK 52,836- 352- 74- B
W8LNO 49,896- 296- 84- B
N8EJC 16,218- 148- 53- B
W8LCY 8692- 104- 41- B
KV8Q 7956- 99- 39- B
WB1DM 4836- 78- 31- B
WB8KQ/T 1092- 26- 21- B
K8HF 736- 23- 16- B
8J8V 282,500-1130-125- C
N8ATR 206,340- 905-114- C
KC8JH 161,500- 750-109- C
W8KKF 125,370- 597-105- C
WA8BIN 70,666- 497- 89- C
WB8VPA 47,850- 275- 87- C
WD8KOR 45,598- 235- 97- C
KC8UZ 36,176- 238- 76- C
W8RMRF 33,880- 220- 77- C
WB8MIP 32,004- 256- 63- C
EB8MS 25,920- 180- 72- C
W8VUL 25,220- 194- 65- C
WB8PAT 15,504- 114- 68- C
W8NPF 14,652- 99- 74- C
W8KR 14,080- 110- 64- C
W8NF (N8ATZ,opr.)
7680- 120- 32- C
WB1LC 6586- 89- 37- C
WB8VJP 6072- 92- 33- C
WB8YEW 3970- 70- 28- C
WD8RTM 1800- 50- 18- C
KI8O 1344- 32- 21- C
N8CUK 810- 27- 15- C
KB1II (+KC8AB,WB8KRY)
455,820-1605-142- D
WD8AUB (+WB8KKI,WD8s BIA,
L,D)
332,100-1347-123- D
WD8IXE (+KC8WE)
144,928- 644-112- D
KO8P (KB8LH,N8s BGJ,DZA,
W8s HEC,ZZS,WA8WHF)
119,028- 546-109- D
WA3EKH/8 (+KA8KPP, WA3ZBU,
W8BYGR)
95,970- 447-105- D
WB8CCL (+N8DGZ)
65,436- 395- 82- D

WEST VIRGINIA

N8II 625,084-2201-142- A
WA8YTH 33,604- 271- 62- A
K8OQL 31,244- 210- 73- B
N8CDD 59,432- 323- 97- C
W8VEN 26,520- 204- 65- C
N8APA (+N8ABW)
101,970- 495-103- D

9

ILLINOIS

W9WJ 128,544- 623-103- A
K9BQL 50,706- 311- 81- A
WD9EKD 37,422- 239- 77- A
KA9GFJ 36,960- 220- 84- A
W9QWM 34,000- 248- 68- A
WD9DCE 28,884- 240- 58- A
W9LRQ 14,356- 97- 74- A
WA9MKU 14,280- 139- 51- A
AD9H 6336- 99- 32- A
KK9C 9400- 89- 30- A
K9QQN 5360- 89- 30- A
K9EFC 300- 25- 10- A
N9KH 142,596- 688-102- B
WD9DSC 94,860- 526- 90- B
W9PNE 82,984- 449- 92- B
KC9N 54,600- 321- 84- B
N9TI 48,500- 250- 77- B
W9OA 21,200- 200- 53- B
KK9A 4030- 65- 31- B
W9FSD 2970- 49- 27- B
KB9QZ (2U,744- 559-108- C
KB9AW 84,164- 397-106- C
K9LUX 64,574- 389- 83- C
KR9A 27,917- 381- 78- C
N9CQX 57,630- 339- 85- C
KA9JDW 46,228- 254- 91- C
K9IKP 30,932- 209- 74- C
AD9R 28,810- 215- 67- C

KC9E 14,112- 144- 49- C
W9REC 8040- 67- 60- C
K9VMI 4176- 58- 36- C
WB9TDR 1302- 31- 21- C
AB9M (+AC9E)
216,200- 940-115- D
K9EAX (+ WD9DVW)
57,768- 348- 83- D
W9CA (+N9AIB)
45,568- 256- 89- D
N9BZB (KA9s DVY,BHC,WA9RSO,
WD9COL)
41,238- 261- 79- D

INDIANA

W9RE 107,642- 503-107- A
W9XD 94,248- 473- 99- A
KC9FC 77,018- 393- 97- A
WD9EME 60,912- 322- 94- A
N9NB 3968- 64- 31- A
K9TUS 99,696- 516- 93- B
W9VP 28,268- 190- 76- B
WB9ZGY 17,714- 151- 57- B
W9JGR 4896- 63- 36- B
W9LT 405,768-1537-132- C
N4PF 235,638-1007-117- C
WB9RDL 101,008- 472-107- C
W9NZW 64,288- 328- 98- C
KC9OP 60,864- 317- 96- C
KB9CO 51,504- 296- 87- C
WD9IPX 42,432- 208-102- C
KC9IT 29,876- 194- 77- C
K9VQE 18,358- 137- 67- C
WB9IWM 15,260- 109- 70- C
N9DPJ 10,486- 107- 49- C
K89PW 5848- 86- 34- C
N4FKF 2352- 49- 24- C
KC9CC (+AK9V,KB9MO,N9BSO)
314,592-1352-116- D
N9SF (+KA9OKR,N9s ACD,CRW,
WB9s AMI,CIF,IIV,WD9IKL,
oprs.)
85,002- 457- 93- D
KC9HI (+KC9MJ,N9DNV)
22,000- 200- 55- D

WISCONSIN

W9UP 221,100-1004-110- A
KE9A 216,508- 958-113- A
KA9DSR 73,346- 400- 91- A
K9CDF 10,296- 131- 39- A
W9YCV 7950- 75- 53- A
W9VZR 5460- 70- 39- A
W9WAQ 118,584- 549-108- B
W9NA (14,624- 597- 96- B
KE9S 101,904- 568- 88- B
KA9IKM 17,710- 145- 55- B
KQ9L 260,397-1076-121- C
W9UP 151,340- 658-115- C
K9EC (WB9YUH,opr.)
98,808- 537- 92- C
W9QBD 37,696- 248- 76- C
KC9GG 25,480- 182- 70- C
K9DWS 19,344- 156- 62- C
WB9AZH 9680- 110- 44- C
N9KS 8600- 100- 43- C
KA9KKU 4480- 70- 32- C
KB9DZ 2420- 55- 22- C
WB9AIR (+KW8VF,W8UC,WA8RBW
oprs)
372,060-1378-135- D
W9XT (+WB9GZZ)
294,372-1258-117- D
WA9BZW (+KA9LWN)
92,150- 478- 95- D

#

COLORADO

W@YK 200,344-2556-137- A
N@ST (N@EBH,opr.)
249,660-1294- 95- A
WBETT 163,930- 839- 97- A
N@ZA 121,660- 758- 79- A
KR@U 10,584- 141- 36- A
W@UA 293,160-1374-105- B
N@CGA 209,856-1088- 96- B
W@CP 194,388-1001- 97- B
KI@J 32,656- 299- 52- B
K@OST 4032- 52- 32- B
WS@OCJ 2688- 48- 24- B
KA@OZN/N 234- 10- 9- B
K@RF 276,456-2734-142- C
K@UK 525,572-2727-118- C
W@COR 288,496-1387-104- C
N@AEN 117,888- 814- 96- C
W@LZV 44,380- 317- 70- C
K@TIV 16,128- 168- 48- C
KA@FXH 14,520- 165- 44- C
KA@OJT 10,944- 152- 36- C
WA@DYZ 8924- 97- 46- C
N@DQY 1444- 38- 19- C

IOWA

W@TO (WA3PWL,opr)
257,004-1076-118- A
AK@P (39,920- 660-106- A
KF@Z 34,408- 250- 68- A
NW1R 107,322- 567- 93- B
K@LCI 72,210- 392- 87- B
N@BS 65,520- 362- 90- B
W@YBV 42,778- 278- 73- B
WB@NZ 8536- 96- 44- B
KB@QE 7920- 92- 40- B
KB@PR 303,952-1756-121- C
N@COL 151,312- 772- 98- C
W@PPF 48,200- 300- 77- C
N@KFG 38,288- 252- 72- C
KA@D 33,264- 252- 66- C
KC@GH 26,000- 200- 65- C
K@EVC 16,268- 166- 49- C
W@PUR 12,768- 131- 48- C
K@SRL 10,710- 105- 51- C

WB@KVT 4478- 82- 27- C
AC@M 1520- 45- 17- C
KJ@I (+KM@Q, N@DYP)
268,660- 996-133- D
N@EEN (+KA@NUC)
45,140- 305- 74- D

KANSAS

WA@QMU 359,600-1449-124- A
N@BLD 21,094- 192- 53- A
WB@WZX 15,990- 188- 41- A
N@CBC 8246- 128- 31- A
KS@U 54,400- 332- 80- B
W@IYR 22,572- 209- 54- B
KB@WJ 126,464- 608-104- C
WB@YJT 83,312- 508- 82- C
WD@FHK 49,404- 358- 69- C
WN@CKG 33,600- 240- 70- C
K@TEN 31,388- 266- 59- C
K@VUA 9792- 102- 48- C
KF@M (+KBCC,WA@VJF,
WB@UXP)
577,752-2172-133- D

MINNESOTA

KN@V 282,480-1174-120- A
N@BSH 148,824- 684-108- A
K@MPB 49,248- 324- 76- A
WAZHFI 43,070- 365- 59- A
WA@LKL 159,250- 875- 91- B
K@PK 82,378- 502- 82- B
WB@YCR 79,740- 443- 90- B
N@HUI 51,878- 341- 79- B
WA@WWW 25,010- 199- 61- B
KF@T 21,200- 206- 50- B
K@@AX 9238- 142- 31- B
KS@T 3584- 64- 28- B
AC@W 44,352- 336- 66- C
WB@YUC 38,170- 347- 55- C
WB@ZEZ 37,207- 209- 89- C
WA@VHX 29,784- 219- 68- C
WB@GGM 28,914- 237- 61- C
KA@MZJ 27,560- 233- 48- C
W@EKS 11,832- 116- 51- C
WA@VQR 4092- 62- 33- C
K@SR (+KF@P,WB@HCH)
246,598-1019-121- D
WB5W (AI@E,KA@MZJ,KC@HR,
W@OJE,WA@NOX,WB@VYC,WD@s
DTD,GUW,GUX,HXW,oprs.)
128,250- 675- 95- D
KB@XV (+WA@TVB)
71,200- 445- 80- D

MISSOURI

R4VX 300,440-1297-116- B
KF1M 108,240- 613- 88- B
K9HF 9768- 111- 44- B
WA9FWO 2600- 94- 26- B
WD@RDB/M 2088- 50- 18- B
W@XK 467,480-1612-145- C
K3IGA 199,068- 939-106- C
WA@NOK 102,396- 483-106- C
W@FES 75,994- 417- 91- C
N@ALC 44,850- 325- 69- C
W@SPF/@ 8436- 111- 38- C
KA@ILO 3640- 70- 26- C
AB@I (+KQ@AA,KB@WD,N7DE)
770,336-2529-152- D
N@AQC (+K9PA,KB@ME,KE@W,
N@s AOF,AQZ,EAC,WB@s CQV,
SQY)
424,668-1648-129- D

NEBRASKA

KV@I 203,600-1018-100- A
AK@G 37,792- 349- 46- A
KB@YE 12,312- 171- 36- A
N@BNY 42,210- 306- 67- B
WB@GOB 19,720- 170- 58- B
W@SSC 206,568- 906-114- C
W@AJU 50,250- 335- 75- C
KA@KCM 32,592- 388- 42- C
KA@CON 2160- 54- 20- C

NORTH DAKOTA

KC@CU 74,184- 562- 66- A
KC@W 1404- 39- 18- C
KF@A (+KM@W)
133,446- 967- 69- D

SOUTH DAKOTA

N@EAL 9672- 149- 31- A
K@JV 11,088- 149- 33- B
WB@NWJ 241,680-1272- 95- C
W@WUU 8904- 106- 42- C

VE

NEWFOUNDLAND

VO1AN 59,446- 379- 77- B
VO1QU 295,320-1380-107- C

LABRADOR

VO2CW 425,920-1760-121- C

MARITIMES

VE1BPY 405,976-1634-124- A
VE1BSL 10,640- 140- 38- B
VE1YX 978,930-3285-149- C

VE1DX 81,090- 477- 85- C
VE1OC 30,618- 189- 81- C

QUEBEC

VE2DPO 49,856- 322- 76- B
VE2FTU 27,720- 462- 60- B
VE2FFE 3248- 50- 29- B
VE2DTI 52,316- 319- 82- C
VE2XL 16,758- 147- 57- C
VE2PD 6960- 87- 40- C
VE2KW 4340- 70- 31- C
VE2FSU 4104- 54- 38- C
VE2JO 3840- 60- 32- C
VE2FSM (+VE2GFN)
50,348- 307- 82- D

ONTARIO

VE3KZ 239,268- 941-127- A
VE3GP 146,370- 690-105- A
WA4TWI/VE3 28,920- 236- 60- A
VE3MRM 132,916- 658-101- B
VE3MBE 48,356- 411- 77- B
VE3LUQ 15,120- 139- 54- B
VE3LQJ 2080- 40- 26- B
VE3CYX 333,322-1199-139- C
VE3FBQ 228,760- 860-133- C
VE3MBM 180,600- 700-129- C
VE3GCO 124,020- 585-106- C
VE3CDS 32,400- 225- 72- C
VE2AEJ/3 27,492- 170- 79- C
VE3LDW 18,468- 171- 54- C
VE3MKJ 18,816- 168- 56- C
VE3KQI 14,950- 115- 65- C
VE3ESM 3060- 51- 30- C
VE3CVX (+VE3FIB)
774,512-1064-129- D

MANITOBA

VE4QST (VE4MG,opr.)
28,240- 353- 40- A
VE4YY 56,772- 473- 57- B
VE4AEX 29,280- 162- 60- B
VE4AM 120,032- 968- 62- C
VE4ZN 23,880- 199- 60- C
VE4RP 22,378- 167- 67- C
VE4ADQ (+VE4ADG)
123,668- 719- 86- D

SASKATCHEWAN

VE5AAD 39,474- 452- 43- B
VE5RA 362,232-1677-108- C
VE5GF 248,724-1269- 98- C
VE5AKG 66,920- 478- 70- C
VE5AE 40,200- 300- 67- C
VE5JQ (+VK5s AG, BBQ,BCO,RG,
ZU)
88,196- 653- 66- D

ALBERTA

VE6CCL 47,424- 484- 48- A
VE6GHS 24,804- 233- 53- A
VE6AGV 75,638- 641- 59- C

BRITISH COLUMBIA

VE7DVV 11,016- 102- 51- B
VE7CTD 30,250- 275- 55- C
VE7EOC 17,836- 182- 49- C
VE7BRU 13,536- 144- 47- C
VE7FG (VE7s CMT,EON,EOQ,
oprs.)
206,338- 902-113- D
VE7ZZZ (VE7s EMX,ENF,ENI,
EPN,oprs.)
177,970-1369- 85- D

YUKON

VY1AU 7120- 89- 40- C

CHECKLOGS

KA7IA,KA7BSE,KA7LM,GW4BLE,
HA1XO,HA3GJ,HA3HL,HA4XX,
HG1@HKZC,K@MIA,KA1YS,
KA5OJV,KA6HQW,LA1DBA,LA1WCA,
LA2EG,LA2KD,LA3DB,LA5BB,
LA7ZN,LA8DX,LA9LO,LA9ZV,
LU3DVP,LZ1DB,LZ1VJ,N1BIZ,
N2RS,N5ECM,OH1PY,OH3BU,
OH7YC,OK1AD,OK1US,OK2BJU,
OK3CQB,ON5FV,OZ1EDE,
OZ1FGS,OZ4UR,OZ4ZU,OZ9HL,
PA@RWS,PA@TV,PA@YKZ,
PA3AIK,PA3BDK,PA3BQY,PY2AC,
RA3DPD,RB5GCJ,SM2COR,SM4ASI,
SM4DLS,SM5FBL,SM6AYH,
SM6JWA,SM7DNG,SM7DQH,TI2LO,
UA@LF1,UA1AUA,UA1AWO,
UA1QRU,UA1ZCP,UA3DAT,UA3DGI,
UA3DNK,UA3DUA,UA3MDX,UA3PAZ,
UA3QLC,UA3TBK,UA3TDD,UA3TEW,
UA6APP,UA6LFQ,UA6PCR,UA9PDW,
UA9OEC,UA9XED,UA9XE,UA9YFD,
UB5AEZ,UB5LIE,UB5MDV,UB5QEL,
UB5UGD,UB5UKE,UB5UKO,UB5ZCW,
UC2ACL,UC2LBE,UH8HCM,UK3ABT,
UK4FAX,UK5HAB,UR5ICX,UK5QCI,
UK8HAF,UK8HZZ,UK9UBM,UN0HAZ,
UN8HDE,UP2BZT,UQ2GFU,UR2RSO,
UV3DN,UV3MM,UW3HV,UW4KB,
VK2DID,W1WEF,WB8FFB,WB3JZE,
WB6ZLQ,WB8LZR,WD8EOL,
WP4BXP/2,YZ1DH,YZ2JC,YZ4GF,
YZ4SK,YZ4VF,YZ5BL,YZ6NL,
YZ1PA,YZ1ZE,YZ7ZC,YZ8ZM,
Z41QK,Y64TH,Y64XI,Y65XE,Y48TJ,
Y51WO,Y56YP,Y77VL,YO2CHT

Rules, 1983 ARRL UHF Contest

With the success of the VUCC awards program and the 2° × 1° grid squares in the ARRL VHF/UHF Spring Sprints, the Ad Hoc Committee for VHF/UHF Contesting has elected to exchange Maidenhead grid squares in the UHF Contest. This year's exchange is the four-character grid-square locator (see January 1983 *QST*, page 49), and the multiplier is the number of different grid squares worked per band. Signal reports are optional. See rules 4 and 5 for details.

This year's rules also allow for single-band entry categories and awards, much like the VHF QSO Parties. Rules 3 and 9 contain the new wording. All vhf/uhf contests now have a common local starting time, so this contest starts an hour earlier at 1800 UTC.

Revised summary sheets are available for an s.a.s.e. from ARRL Hq. Send early to get yours.

Rules

1) **Object:** To work as many amateur stations in as many 2° × 1° grid squares as possible using authorized amateur frequencies above 220 MHz and all authorized modes of emission.

2) **Contest period:** Begins 1800 UTC Saturday, Aug. 6 and ends at 1800 UTC, Sunday, Aug. 7. Entrants may use as much of this time as they wish.

3) **Categories:**

(A) Single operator: One person performs all operating and logging functions, as well as equipment and antenna adjustments.

(1) *Multiband.*

(2) *Single band:* Single-band entries on 220, 432, 1296 and 2.3 GHz and up categories will be recognized both in *QST* score listings and awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. See also Rule 8, Awards.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters.

4) **Exchange:** Grid-square locator (see Jan. 1983 *QST*, page 49). Example: W1AW in Newington, CT would send FN31. Exchange of signal reports is optional.

5) **Scoring:**

(A) *QSO points:* Count three points for each complete 220- or 432-MHz QSO. Count six points for each complete 1296-MHz QSO. Count 12 points for each 2.3-GHz or higher QSO.

(B) *Multiplier:* The total number of different grid squares worked *per band.* Each 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) *Final score:* Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: W1AW works W3CCX in FN20 on 220, 432 and 1296 MHz. This gives W1AW 12 QSO points (3 + 3 + 6) and also three grid-square multipliers. Final score is 12 QSO points × 3 multipliers, or 36.

6) **Miscellaneous:**

(A) Stations may be worked only once per band for credit, regardless of mode. Crossband QSOs do not count.

(B) Partial QSOs do not count. Both calls, the full exchange, and acknowledgment must be sent and received.

(C) Fixed, portable or mobile operation under one call is permitted. Contacts with aeronautical stations do not count. A portable or mobile station may not be counted for more than one QSO per band, even if the station is moving. However, a station that changes locations may be contacted for additional grid square multipliers, but not for QSO points.

(D) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently during the contest period under any other call sign (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC). The intent of this rule is to accommodate family members who share a rig, not to manufacture artificial contacts.

(E) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, inelgible for awards.

(F) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (i.e., able to communicate over a distance of at least 1 km).

(G) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work, even if the repeater is turned off.

(H) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(I) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (e.g. laser) and employing at least one stage of electronic detection on receive.

7) **Reporting:** Entries must be postmarked no later than September 7, 1983. Official forms are available for an s.a.s.e. from ARRL Hq., and all entrants are strongly urged to send early for a set.

8) **Awards:**

(A) Single operator

(1) Top single operator score in each ARRL Division.

(2) Top single operator on each band (220, 432, 1296, and 2304-and-up categories) in each ARRL Division where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if W3HQT has the highest single-operator multiband score in the Atlantic Division and his 432-MHz score is higher than any other Atlantic Division single op's, he will earn both a certificate for being the single-operator Division leader *and* an endorsement sticker for 432 MHz.

(B) Top multioperator score in each ARRL Division where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

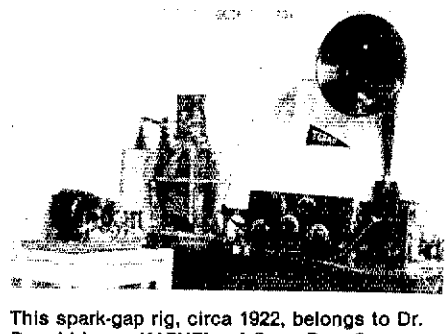
(C) Additional certificates may be awarded where significant effort or competition is evidenced.

9) **Disqualification:** See January 1983 *QST*, page 85. QST

Strays

Harris Robinson, W3LW (left), of Palmyra, New Jersey, receives his ARRL 60-year membership plaque from Atlantic Division Director Hugh Turnbull, W3ABC. In the 1930s, Roby was a frequent contributor of technical articles for *QST*, giving readers some ideas on modulating screen-grid rf amplifiers, improving the signal-to-noise ratio in receivers and using gaseous voltage regulators for power supplies.

Like the Phoenix, the bird of mythology rising out of the ashes, what appears to be a Wouff Hong looms above the remains of a house. Art Mueller, WA3BKD, of McDonald, Pennsylvania, took this photo while traveling through the town of Slovan.



This spark-gap rig, circa 1922, belongs to Dr. Donald Long, KA7NZL, of Coos Bay, Oregon. Among the items used to construct this rig are a discarded 50-kV ac transformer, a Motorola horn and a 24-point rotary spark gap that operated at 3850 rpm.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

JULY

2-3

A. Volta RTTY Contest, June *QST*, page 82.

Six Meter Invitational Net Activity Day, June *QST*, page 82.

Venezuelan World Wide Contest, phone, June *QST*, page 82.

6

West Coast Qualifying Run, 10-35 wpm, at 0400Z July 7 (9 P.M. PDT July 6). 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 include your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

9-10

IARU Radiosport Championship, May *QST*, page 88.

13

W1AW Qualifying Run, 35-10 wpm, at 0200Z July 14 (10 P.M. EDT July 13). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See July 6 listing for more details.

16-17

SSTV DX Contest, June *QST*, page 82.

20

W1AW Qualifying Run, 10-35 wpm, at 2300Z (7 P.M. EDT) July 20. See July 13 listing for more details.

23-24

ARRL Midnight Special, from 0300 to 0500Z July 24 (11 P.M. EDT July 23 until 1 A.M. EDT July 24). First hour, 40 cw; second hour, 80 phone. Work stations once per band. Suggested frequencies: 7.040-7.075 and 3.890-3.930. Exchange signal report and state. Score equals number of QSOs; no multiplier. Mail entries by Aug. 10 to ARRL Hq. Include s.a.s.e. for results; top scores will be listed in *QST*.

30-31

Venezuelan World Wide Contest, cw, June *QST*, page 82.

CW County Hunters Contest, sponsored by the Cw County Hunters Net, from 0000Z July 30 until 0200Z Aug. 1. Work stations once per band. Work portables/mobiles again as they change county. Stations on county lines count as one QSO, but multiple multipliers. Exchange serial number, category (P for portables, M for mobiles), signal report, county (for U.S. stations) and state, province or country. Suggested frequencies: 3.575 7.055 14.065 21.065 28.065. Portables and mobiles call CQ below 7.055 and 14.065; others spread out above those frequencies. Count 1 point for QSOs with fixed stations, 3 points for portables or mobiles. Multiply QSO points by total U.S. counties worked for final score. Mobiles and portables calculate their scores both on a state-by-state basis and overall for awards. Mail logs by Sept. 3 (include a large s.a.s.e. for results) to Jerry Burkhead, N6QA, 7525 Baltic St., San Diego, CA 92111.

Armadillo Run, sponsored by the Texas DX Society, from 0001Z July 30 until 0200Z Aug. 1. Runs concurrent with the Cw County Hunters Contest. TDXS members will activate all 256 Texas counties, and the object is to work as many TX counties as possible during the contest period. Final score equals number of TX counties worked. Ties will be broken by TX QSO count. Only non-Texas single operator entrants operating from their own stations are eligible to compete. Exchange is the same as for the Cw County Hunters Contest. Operation by the TDXS mobiles will be generally restricted to between 14.055 and 14.075. Certificates for entrants working at least 50 TX counties. A plaque will be awarded to the entrant working the most TX counties. If the winner works more than 175 TX counties, this plaque will be presented at the 1983 ARRL National Convention in Houston. Mail entry by Aug. 31 to Dennis Motschenbacher, KZ5M, P.O. Box 82, Thompsons, TX 77481.

AUGUST

2

West Coast Qualifying Run, 10-35 wpm, at 0400Z Aug. 3 (9 P.M. PDT Aug. 2). See July 6 listing for more details.

6-7

ARRL UHF Contest, this issue, page 85.

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Club, from 1800Z Aug. 6 until 2300Z Aug. 7, with a rest period from 0500 to 1200Z Aug. 7. Work stations once per band and mode. No repeater QSOs. Exchange signal report and QTH (county for IL stations; state, province or country for others). Suggested frequencies: cw—40 kHz up from low end; phone—3.890 7.230 14.280 21.375 28.675; Novice—25 kHz up from low end (especially on the hour and half hour). Count 1 point per QSO (except 2 points for Novices/Techs worked in Novice bands). IL stations multiply by sum of states (max. 50), VE call areas (max. 10) and DXCC countries (max. 5) worked. Maximum multiplier is 65. Others multiply by total IL counties worked. IL portables and mobiles add 200 bonus points to final score for each county from which 10 or more contacts were made. All stations may take one bonus multiplier for each group of eight QSOs with the same county. Mail logs by Sept. 1 (include large s.a.s.e. for results) to RAMS/K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634.

SWOT Open QSO Party, sponsored by Side Winders on Two, from 0000Z Aug. 6 until 2400Z Aug. 14. No time limitations. 144 MHz only. No fm or repeater QSOs. Entry classes: (A) single operator; (B) mobile or portable or multioperator. Exchange call signs, YES or NO indicating SWOT membership, and Maidenhead grid square locator (see Jan. 1983 *QST*, page 49). Count 1 point per QSO with non-SWOT members, 2 points for SWOT members. Multiply QSO points by number of different grid squares for final score. Include ARRL section on summary sheet. Stations may send their QTH if they do not know their grid square. Mobile or portable operators may be reworked as they change square. Mobiles/portables combine logs for all operations and submit total of scores. Mail logs by Sept. 1 to Jerome Doerrie, K5IS, Rte. 2, Box 72, Booker, TX 79005.

13-14

European DX Contest, cw, sponsored by the Deutscher ARC, from 0000Z Aug. 13 to 2400Z Aug. 14. (Phone contest Sept. 10-11; RTTY contest Nov. 12-13.) Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry classes: single op, all band and multiop, single transmitter. Multi-single stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single ops may operate a maximum of 36 hours. The 12 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained later). Multiply by number of EU countries worked per band (DXCC list, plus GM-Shetland, IT and UN1). The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (e.g., 1300/DJ1QQ/134). A QSO may be reported once, and not back to the originating station. A maximum of 10 QTCs to the same station are permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets *must* be submitted for bands with more than 200 QSOs. Deadlines: cw—Sept. 15; phone—Oct. 15; RTTY—Dec. 15. Mail to WAEDC Committee, Postbox 1328, D-895 Kaufbeuren, Fed. Republic of Germany.

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug. 13 until 0700Z Aug. 14 and 1300Z Aug. 14 until 0200Z Aug. 15. Work stations once per band and mode. Cw QSOs in the cw subbands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH (county for NJ stations; ARRL section or country for others). Suggested frequencies: cw—1.810 3.535 7.035 7.135 14.035 21.100 28.100; phone—3.900 7.235 14.280 21.355 28.610 50.100 144-146. Suggested activity schedule: phone on the even hours; 15 meters on the odd hours 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/VE QSO and 3 points for DX. Multiply by number of ARRL sections (including NNJ and SNJ, max. 74) worked. Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max. 21) worked. Awards. Mail logs in time to be received by Sept. 10 to EARA, P.O. Box 528, Englewood, NJ 07631.

20-21

KCJ Single Operator CW Contest

New Mexico QSO Party

North American ATV DX Contest

SARTG World-Wide RTTY Contest

21

W1AW Qualifying Run

27-28

Alabama QSO Party

All Asian DX Contest

Occupation Contest

SEPTEMBER

10-11

ARRL VHF QSO Party

Strays

I would like to get in touch with...

☐ anyone who has a schematic for an SBE Touch-Com 40. Lisle T. Hines, K2QLA, 4 Ellwood Ave., Cortland, NY 13045.

☐ anyone who has successfully interfaced an Ohio Scientific Model C4P-MF computer with an amateur station for RTTY and cw operation. Bob Forsee, WA4IGS, Rte. 13, Box 228, Bowling Green, KY 42101.

☐ any amateurs interested in forming a net to discuss the problems of chemical dependency (drugs and alcohol). Friend of Bill and Bob, P.O. Box 541, Biloxi, MS 39533.

☐ other amateurs who are interested in the use of early photographic processes. Tracy Diers, W2OQK, 58-14-84th St., Elmhurst, NY 11373.

☐ anyone who has an operating manual for the RTTY telephone modem Phonics TV Phone, manufactured by AMF Electronic Products Development Division, Alexandria, Virginia. Gustavo Diaz, WA4MCJ, 240 S.W. 10th St., No. 2, Miami, FL 33130.

*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. ASM: VE6AMM. STM/DEC/NM (ASPN & ATN): VE6ABC. EC: VE6AGH VE6AVV VE6FV VE6AMM VE6AHC VE6ABC VE6ASL VE6AFO. VE6AMM & VE6ABC visited the Three Hills ARC and showed a film and gave a talk on message handling. VE6CFQ supplied them with supper and directions to club. VE6ABC and yours truly held a meeting with govt officials on establishing a govt ham station and sought their backing on a prov. ham network. We were well received, but permission is required from higher levels and it has been requested. VE6CAA established a 2 M rptr net during a snow storm which knocked out power and tel for most of a day. Many rptrs down at same time. Net activities down owing to poor signals. Traffic: VE6CHK 265, VE6ABC 20, VE6EO 6, VE6CAA 5, VE6BLQ 2.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — British Columbia Emergency Net, 3650 kHz 0300 reports QNI 314, QTC 493. A/NM wishes to send congratulations to VE7FPM, age 15, who has held his license for two months, and who checks into net nightly. Who says cw is dead? BC Phone Net NM VE7QC reports the net has changed frequency to 3758. Commercial RTTY covers 3754 to 3757 past year. VE7BAK is taking permanent residence in VK-land. VE7LL and VE7CB are home from wintering in the south. Sixty one years ago VE7CT fired up his 5-watter of raw AC, and still active. Traffic: VE7BNI 126, VE7EDN 114, VE7ZK 91, VE7FB 65, VE7CDF 54, VE7ARR 6.

MANITOBA: SM, Peter Guenther, VE4PG — A/SM: AEJ. SEC: HK. STM: RO. NMs: VJ NM TE ACX HW. VE4MG reports his father VE4TT is expected to be back home after a stay in the hospital. VE4TL and VE4YE are doing a FB job on swap and shop Wed and Sun and evenings. We were recently contacted on the federal level regarding a Canada-wide weather watch. A meeting is slated in the near future. Yours truly is recovering nicely after a hip injury and is almost back to normal again. MTN QNI 209, QTC 50, sess. 30. MMN QNI 517, QTC 32, sess. 30. MEPN QNI 894, QTC 15, sess. 30. Thanks a lot, fellows, for the many chores you helped out with when I was laid up. Traffic: VE4RO 41, VE4PG 38, VE4ACX 37, VE4TE 32, VE4JA 21, VE4AAD 14, VE4FK 12, VE4ADS 10, VE4NE 6, VE4CR 4, VE4DT 4, VE4LB 4, VE4MG 3, VE4CF 2, VE4TK 1.

ONTARIO: SM, Larry Thivierge, VE3GT — SEC: VE3GV. STM: VE3HTL. DECs: VE3GOL VE3JJA. VE3GFN has retired as the Section Traffic Manager. Taking over will be VE3HTL. Thanks for all your help and welcome to HTL who is active on all levels of the NTS. In addition I am pleased to announce the appointment of VE3AR as the section's PGL. A very successful Red Cross ARES test exercise, under the direction of SEC VE3GV, was held province-wide on the alternate OPN net frequency, 7055 kHz. A complete report will follow shortly. In the meantime, thanks to all those who participated and listened, with special thanks to the RSO's ONTARS 40 net manager, VE3EFX. XN3GT will be a special events station operating all bands Aug. 1 thru 14 during the 125th anniversary of the Town of Renfrew. A special certificate will be available for contacting this station. Regretfully I announce that ex-VE3GP, who was one of the founding fathers of rptr, VE3STP and VE3HDA have become Silent Keys. Lambton Co. RC has completed two years as an unorganized-organized radio, electronics, computer, RTTY, SSTV, non-competitive fun club — sounds like there's something there for everyone. VE3CO, representing the CNIB Amateur Radio program was a recent guest speaker at the Dunnville ARC. There are now about 415 blind operators in Canada. St. Mary's Hospital amateur station VE3KFZ is changing its call sign to VE3SMH. VE3BZT is now VE3MB, while VE1AYE is now VE3NPU. Niagara Peninsula ARC, a public service oriented club, has received the "People Helping People Award" from radio station CHSC. VE3OHR is the club rptr of the Oxford Co. ARC. Congrats to Amateur of the Year award winners VE3BZB, Peterbourgh ARC and K8GMU/VE3, Welland Co. ARC. VE3MPF has his Advanced, and welcome to newcomers VE3OAF and VE3OBB. Toronto VHF Society ARC has become a League affiliated club. Traffic: VE3HTL 606, VE3KK 301, VE3CYR 179, VE3HGJ 166, VE3GT 150, VE3DPO 124, VE3BDM 123, VE3GFN 95, VE3FGU 69, VE3AWE 49, VE3KCZ 49, VE3AJN 47, VE3WG 38, VE3WV 27, VE3GOL 21, VE3EWD 17, VE3EHL 14, VE3MCO 10, VE3KLX 6, VE3WM 6. (Mar.) VE3DZH 15, VE3KLX 7.

QUEBEC: SM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2EDO. NMs: VE2EDO VE2FSA. Congrats to VE2YW, our Public Information Officer. The Happy Gang Net was ten years old on June 24th, a FB job by all these whitecaners. VE2ALE is doing a FB job retransmitting W1AW bulletins on local nets and rptrs. With regret I have to report VE2PJ, Silent Key. VE2ZG a ete reelue presidente de VE2MO. Traffic: VE2ALE 276, VE2EDO 103, VE2BP 50, VE2EKC 38, VE2EC 36, VE2FSA 29, VE2FFE 7.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3WIY W3DKX. Very soon nominations will have to be made for the next SM. Term starts January 1, 1984. Please give thought to the matter, and send in nominations to Hq. I do not intend to run for the next term. We now have a EC in Kent Co. in the person of KA3BDR. The Delmarva Hamfest will be Aug. 21. Please give it your support. AWARE upgrades KA3AUJ KA3KHZ to Tech, KA3KHX KA3AAD to General and KA3AFC W3LQE to Advanced. Congrats. DARC has had computers as programs. SARA also been having very interesting meetings. DTN: QNI 350, QTC 44 in 21 sess. SEN: QNI 28, QTC 1 in 4 sess. Traffic: W3QQ 70, WB3DUG 63, WA3WIY 51, W3DKX 47, W2AGR 14, WA3PWT 11, K3ZXP 8, W3WD 5.

EASTERN PENNSYLVANIA: SM, Karl W. Pfeil, W3VA — ACC: KB3NE. SEC: WA3PZO. SGL: N3CJP. STM: KB3LF. DEC: AA3C K3QXC KB3QW KB3UD N3BFL N3CJP W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.	Mgr.
EPAEPTN	3917	6 P.M. Dy	495	216	30	WA3EHD
EPA	3610	7/10 P.M. Dy	463	281	61	AA3B
PTTN	3610	6:30 P.M. Dy	—	—	—	WB3EPU
PFN	3950	5 P.M. Dy	254	281	30	WA3WQP

Local and vhf nets reporting (QNI/QTC/sess.): D3ARES 168/14/4; D5ESN 65/11/4; D6ARES 40/3/3; CCAESN 31/2/4. BPL: K3NSN. OBS reports: K3EBZ KA3EJG W3AVJ W3VA. OO reports: W3FAF W3GOA W3KEK. PSHR: AA3C KA3DLY KA3EJG KA3GJT KB3FW KB3LF KB3UD N3CJP N3COY W3VA WB3FKP WB3KUZ. Congrats to Penn Wireless Assn. on becoming first EPA Special Service Club. W3ABC, Atlantic Div. Director, gave most interesting talk at "Social Nite," sponsored by the Schuylkill Rptr Club and Tamaqua Area ARC. EC N3BAY reports Pike Co. ARES participated in Indian Point Nuclear Evacuation Test. WB3FKP sez half of EPA entries in recent SS were members of Murgas ARC. WB3FAA was #1 in fone SS. Nice to hear N3BHF active in the nets again. New calls: KN3H (N3BCD), KN3V (KB3ZZ). Lehigh Univ., W3AEQ, now active in both fone & cw nets. K3NSN high tic totals this month were all made on cw. W3ADE was presented ARRL 60-year certificate by W3ABC at recent HRAC meeting. Upgrades: KA3APT "E;" KA3KGT KA3ANM WB3KXM "A." N3AIA and W3AQN report approximately 20 area hams were on standby to provide communications for York Co. EMA RACES when a truck loaded with toxic analy alcohol was involved in a head on collision with an auto. New gear: WB3FAA, IC251 & IC551D; WB3FKQ, FT680; AD3L, 520TS; K5JLD & WB3LQM, IC2ATs. KA3DLY now getting into chess via ham radio. KB3LF had best month in a while. DEC 2 AA3C reports 29 hams officiated at the American Cancer Society Amish Country Half Marathon. WA3CKA on hf & vhf RTTY and on a system for the Vic20. KB3LF announces EPA section basket picnic will be held Sat. July 23 at Tuscorora State Park, 5 miles west of Tamaqua. All hams are invited to attend. Traffic: K3NSN 3610, KB3UD 259, WA3WQP 176, W3IPX 164, KA3DLY 137, KB3FW 112, WB3KUZ 110, N3COY 103, W3VA 95, KA3GJT 86, KB3LF 85, W3DP 78, AA3B 77, N3CD 71, N3CJP 48, WA3EHD 48, KA3EJG 48, WB3FKP 47, WB8KPE 43, KE3U 33, N3BHF 31, N3AIW 20, KA3IME 20, W3AON 18, W3TWV 18, W3ADE 16, N3BFL 16, K3QXC 12, N3BAY 10. W3FAF 7, N3AKO 6, W3AVJ 6, N3AIA 5, AA3C 3, N3CMC 3, W3HK 3, K3EBZ 2, AF3Z 2. (Mar.) W3HK 3.

MARYLAND — DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — N3CRA, now in Germany, sends a special thanks to N3CBX and KR8C for the many phone patches when he was on TDY in Okla. K3STM and WA3GQT (now N3DHB) were in the "net" too. Upgrades: N3CRA to Extra, and KA3HMM to Advanced. Congrats. FAR's new slate of officers: WB3DJU, pres.; N3AKD, 1st v.p.; W2GHK, 2nd v.p.; N3CKD, 3rd v.p.; K4LMB, rec. secy.; W3RXJ, corres. secy.; K3AO, treas. News and bulletins received and appreciated from FAR, Chesapeake Bay RA, Columbia ARA, Annearundel RC, and the So. Maryland ARC. OO reports from W3IK and KA3R, who says as the temperature goes up, reports go down! WB3KJT is experimenting with antennas again. CARA's WA3VUQ reports the 1982 MDC QSO Party certificate winners: W5WG VE3KK K4DDB KE5B W8VEN and ON7YU. MDC in order: WA3VUQ K3WUW N3AC W3FG N3QA K3LK W3GG WB3JKC WB3HUP KA3JLW. The next one is Oct. 16. KA3EWV enjoys the MSN. W3CDQ is not too happy with band conditions. W3ZNW forgot to mention the time change. KB3WL does a stint as MEPN/NCS. KJ3E is off on another long hike. KB3VP flys his model airplanes right into the ground. KK3F is gonna have that 80-meter antenna up as soon as he gets some help. W3DQI gets bushed just helping in those foot races! KC3DW is trying to get more daytime activity started. W3FZV is about ready for summer operations. N4DR is learning French and Hebrew by cassette! N3IT is back on the ham bands. WB3BFK has two operating locations. K3OMN keeps Allegany Co. ARES alive. KA3T is finding more operating time. KC3AV is the MSN boss man.KC3Y was heard on 80-meter mobile! W3UT's workload is growing. K3NNI gives help to 3RN. N3QA is back at sea. W3YVQ is making a survey of RACES hams in all counties. Let him know. WB3GZU gets Sundays off, but the rest of the week is a killer! N3AGM is a full time retiree! KB3DE has Cape Cod in mind! Net reports from AARC 2-Mtr/KK3F, Mt. ARC/K3OMN, WC 2-Mtr/KC3DW, MDC PON/W3OYY, WR PON/WB3BFK 22/55/17, and MSN/KC3AV 30/120/7.3. (Sessions/Traffic/QNI average.) Traffic: WB3GZU 423, KC3DW 241, W3FA 225, K3NNI 167, KC3Y 132, KJ3E 108, KC3AV 56, KK3F 56, W3YVQ 55, W3UT 52, KA3EWV 43, KB3WL 38, N3QA 34, WB3BFK 22, W3DQI 21, W3ZNW 15, N3IT 11, WB3KJT 11, KA3T 8, N4DR 6, W3FZV 6, KB3VP 6, K3OMN 4. (Mar.) WB3GZU 397.

SOUTHERN NEW JERSEY: SM, Edward E. Wood, N2CER — SEC: W2HOB. STM: WA2HEB. SGL: W2XQ. Now that summer is here, we can expect some severe thunderstorms with varying degrees of damage, and hurricanes are a real possibility. Last year, the Toms River area suffered a tornado which caused heavy damage in a retirement community. Many of the local ARES members responded immediately and communications were established. Case in point — support your local ARES team. To become involved contact the SM or SEC, either of whom will be glad to point you in the right direction. We're overdue for that big one, and this could be the year that your community will need you! Traffic outlets are needed in the Long Beach Island area. Those of you in that area are urged to check into the various local and sections nets in New Jersey. W2HBE is back on the air after a 10-year absence. Welcome back. The 1983 New Jersey QSO Party is next month. Let's get ready for it. Traffic: WB2UVB 305, WB2ZJF 285, WB2IQJ 209, N2CER 189, WA2HEB 168, WA2CUW 79, WB2PXD 40, KC2PB 34, WA4JRP 33, W2IU 32, KC2TM 32, KM2E 30, KY2T 28, WA2GYF 22, KA2ANJ 19, WB2JCE 18, KA2CQX 13.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ACC: N2EH. PIO: WA2PUU. OO/RFI: W2AET. SGL: KO2X. TC: K2QR. BM: W2GLH. DEC: WA2AIV KA2BHR WB3CUF W2GJ WB2NAO.

Net	Freq.	Time/Day	QNI	QSP	QND
NARASEN	75/15	0930/Sn	67	—	4
NYS/1*	3677	1000/Dy	273	94	31
Mike Farad	3925	1300/M-S	201	88	26
THIN	3913	1600/Sn	44	—	4
NYPON*	3913	1700/Dy	653	284	30
NYSPTEN	3925	1800/Dy	690	61	30
ESS	3590	1800/Dy	459	45	30
OCTEN*	34/94	1830/Dy	515	83	30
Q Net	31/91	1830/Dy	349	16	30
STARE*	99/39	1830/Dy	31	7	8
WDN/E*	04/64	1830/Dy	575	111	30
Blue Line	93/33	1900/Dy	356	12	30
NYS/4*	3677	1900/Dy	574	237	30
SLVARES	31/91	1930/Mn	31	—	4
JCARCN	10/70	2000/Dy	360	17	30
OARCN	25/85	2000/W	61	—	4
VHF THIN	04/64	2000/T	42	—	4
WNYECN	3955	2000/3Sn	ARES		
BRVRN	055/655	2100/Dy	309	7	30
CNYTN*	90/30	2115/Dy	455	79	30
STAR/L*	325/925	2130/Dy	48	21	19
WDN/L*	04/64	2130/Dy	600	126	30
NYS/5*	3677	2200/Dy	462	308	30

*NTS. ARES nets: Central District 40/00 3rd Sun 2030; Chemung 10/70 and 93/33 Sun 2100; Lewis 43/03 Sun 1800; Oneida 34/94 Tue 1930; Onondaga 90/30 Tue 1930; Oswego 75/15 Sun 1900; Erie-Niagara 31/91 Sun 1200/1900; West Catskill 3540 Mon 1830. HAMFESTS: Batavia July 10; Trumansburg Aug 27; HAM-O-RAMA Sept 10; Elmira Sept 24; Syracuse Oct 1. Traffic Handlers Picnic Newark Valley Aug 13. CLUB OFFICERS: RAWNY WB2OKB KM2L KA2JWQ KA2IWJ. HONORS: Certificate of Merit to WA2RXO; to K2RUK Founder and first Pres. Odgensburg ARC. COMMS: Heartrun Utica ARC; SU ARC at M-D Dance Marathon; RARA Run for Life and March of Dimes Walkathon; many flood watches; W9JD/2 error-free FSK ASCII tests with W0PHD. APPTS: DEC-WA2AIV; EC-KA2AYZ KA2CMQ K2CWD W2EWQ WA2OVT KB2XI; ORS-AF2A N2ARD WA2AIV KA2BHR K2DNN K2RN; OO-WA2AIV; OES-W2TFL WA2TGZ; all Asst. SM positions. WA2KOJ new Mgr of NYPON — thanks to KC2SJ for service. PSHR: W2AET KA2BHR N2BLX KA2DQA/T WA2FJJ W2GJ WB2IDS WA2KOJ W2MTA WB2OWO KC2QQ WB2RBA KC2SW W2ZOJ. NOVICE CROP: GRAM and K2OS; RAGS and WA2GWN WA2KQE. SILENT KEY hurts extra when it is own ELMER; W2QHL will be missed. Traffic: W2AET 270, WB2OWO 254, WB2IDS 230, W2MTA 224, WA2FJJ 202, W2FR 184, KC2QQ 165, WB2RBA 157, WB2QIX 148, W2ZOJ 127, VE2FMQ 126, KA2BHR 84, K2GXT 67, WA2KOJ 50, KC2XD 48, W2GJ 40, KU2N 37, N2BLX 34, KG2D 30, KA2DQA 29, WA2OEP 27, WB2PID 27, WA2RXO 27, WB2PEE 25, KA2HRS 24, KA2BCE 21, KA2DBD 20, N2ABA 17, WB2CUF 15, K2RN 14, N2DZD 13, K2IUT 10, AF2K 9, K2VR 6, WB2NAO 1. (Mar.) WB2NAO 14.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB

Net	QNI	QTC	Sess.	kHz	T/D
WPACW	407	188	30	3585	7:00P/D
WPAPTN	629	123	30	3983	6:15P/D
WPA2MTN	481	76	30	146.28/88	8:00P/D
PFN	254	281	30	3958	5:00P/D

I regret to announce these Silent Keys KA3DHH W3NRY & W3LGD. New Novices: KA3KVU KA3ISV. New Generals: KA3SDF N3BIQ KA3HSV N3CMV N3DHY KA3IPM KA3PHY. New Advanced: K3SYP. New Extra: KN3M (ex-KA3ITO). New officers 83-84. Crawford ARS-WA3ZSC, pres.; KN3M, v.p.; WB3KRI, secy.; N3CUP, treas. KF3F K3YAK, directors. Penn State ARC-KI3C, pres.; WB3FRD, v.p.; KA3GPX, secy.; KA3HFS, stn. dir.; N4BLX KA3HFS & WB3KKX, MAL. The Crawford ARS CW Net has been moved to 21.145 MHz at 0130 UTC daily. Erie Co. was struck by a tornado on May 2. Amateurs responded well, working with the NWS (Skywarn) ARES with the Amer. Red Cross. RACES with EMA. The tornado wrecked a mobile home park; damage was extensive. If your club or group supplied comm. for any event, walkathons, canoe races, etc., any public service event, please send form CD-157 to League. I appreciate the newsletters that I receive from the various clubs. They, with one or two exceptions, are excellent and help promote the hobby. A lot of people read them and judge the hobby by what they read. If good relations exist in areas, we are praised, if not, a club is judged by its actions. Petty actions can cause the club's downfall. Hate is not for amateurs. Traffic: N3ADU 365, K3CR 288, AC3N 188, W3OKN 105, WA3UNX 78, N3CKQ 76, K3SMB 57, W3IQD 55, WA3QNT 54, K3NPW 51, W3RUL 40, KB3UO 40, W3MML 30, K3IC 27, KC3BB 26, W3SMV 26, KA3JRV 25, K3LTV 19, W3SMV 19, KB3DT 18, KB3NV 18, KN3B 14, KA3HSV 13, N3KB 13, W3KMZ 13, WB3GUK 12, K3HCT 12, W3NGO 12, W3SN 12, KF3V 9, K3VQV 8, WA3TTS 7, KA3HDL 6, W3KUN 6, WB3HBE 2, W3LOD 2. (Mar.) WB3GUK 26, KA3ETC 9.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH. STM: KB9X. OO/RFI: K9MX. BM: K9ZDN. PIO: WD9EED. ASM: K9ORP.

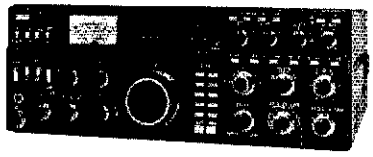
Net	Freq.	Time(s)(Z)	Day(s)	QNI	QTC	Sess.
ILN	3690	0030/0400	Dy	550	229	61
IPN	3915	2230	Dy x-Sn	—	—	—
NCPN	3915	1300	Dy	531	72	26
NCPN	7270	1815	Dy	156	45	23
ITN	3705	0100	Dy	291	72	28
IEN	3940	2230	Sn	111	3	4
IARES	3915	2230	1&3 Sn	—	—	2

Above Zulu times correspond to CST. IL 100% stations: 9RN-W9INZ W9NXG K9SW KD9K N9TN KB9X KA9NWO; 9RND-WB9NVN WB9WGD WB9ODN K9EHP K9ZTV K9CMO WA9BXB; CAND-W9HOT W9HXG WB9NVN WB9WGD. Hats off to this crew for seeing to it that IL is represented 100% on these nets! It is with deep regret and a sense of personal loss that I report the death of W9IRP. He was an active member of the Williamson Co. ARES, and was never too busy to lend a hand when needed, whether helping a new recruit get started in ham radio, giving the SIU ARC a hand or doing ARES work. He

5-STORE BUYING POWER in action!

Unlike some retailers, when Ham Radio Outlet guarantees satisfaction there'll be no question, *YOU CAN COUNT ON IT!*

KENWOOD SPECIALS!!



TS-930S w/Antenna Tuner
Plus 3 Free Bonus Items

1)-SP-930 SPKR.
2)-MC-60A MIC.
3)-YK-88C-1 FILTER.

Reg. $2029 Value
$1799
A $230.00 SAVING

Free Shipment UPS (Brown).

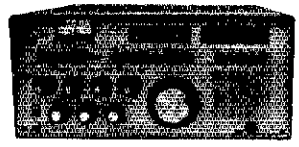
TR-2500/ TR-3500
SAVE!

SUBSTANTIAL SAVINGS
TS-430S
Check our low prices and don't forget Free Shipment UPS (Brown).

ALL ETO ALPHA
SPECIAL SALE PRICES

Example: **76PA**
$1699.95

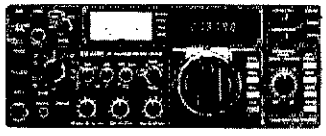
NEW! MIL-SPEC 1030 signal/one.



Ask for details.

General coverage: 10kHz-30MHz.
Power output: 150W PEP.
Built-in. AC/DC, speaker, RF clipping, Pre-IF adjustable noise blanker. Synthesized passband tuning. IF notch filter. Seven digit readout. Much more.

ICOM



IC-740 w/ *FREE*
EX-238 Power Supply
Plus
$50 FACTORY REBATE
LIMITED TIME ONLY

CHECK LOW, LOW PRICE

KLM

KT-34A
SALE $299
KT-34XA
SALE $459

PRICES ARE FOB CALIF. EXCEPT FOR CERTAIN COMBINATIONS. PLEASE INQUIRE

Tri-Ex

W-51
SALE $799
W-36
CALL FOR PRICE
LM-470D
CALL FOR PRICE

MIRAGE

B-3016 REG. $239.95 ***SALE $199.95***
B-1016 REG. $279.95 ***SALE $249.95***
B-108 REG. $179.95 ***SALE $159.95***
B-23$ REG. $89.95 ***SALE $79.95***

YAESU

CALL FOR LOW PRICES ON HAND-HELDS and all YAESU ITEMS

FT-208R ***FT-708R***

NEW!
FT-980

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.

SERVING HAMS BETTER
North south east west
Bob Ferrero W6RJ
Jim Rafferty N6HJ
other well known hams
give outrageous
personalized
service

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 • BELDON • BENCHER • BERK-TEC • BIRD • B & W
BUTTERNUT • CALL BOOK • 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
SIGNAL-ONE • TEMPO • TEN-TEC • TRISTAO • VOCOM • YAESU
and many more!

Prices, specifications, descriptions subject to change without notice. Calif residents please add sales tax.

will be deeply missed. EC WB9CWE reports that KA9LZF has upgraded to Advanced. Other upgrades this month, reported by WD9EED, include KA9s PJU PGP PGM PGL and PDW. W9SXL tells a handy trick to keep your dipole ropes in good shape; treat 'em with neetsfoot oil. Keeps the water out to prevent rot, and keeps them flexible in cold wx. N9ALK is involved in Champaign Co. with a proposed tower/antenna ordinance. These seem to be quite the "in" thing with municipalities these days, and the only way to keep ham radio from getting stuck with an unfavorable ordinance in your area is to be involved with the process BEFORE it is enacted. Some such ordinances are clearly in conflict with federal law, but getting them repealed is a lot harder than preventing or modifying them before they become law. Keep your eyes open and report such proposed legislation in your area to the SM or to Hq. W9VO tells us that he now has an Asst EC, KB9KX. SEC W9QBH attended the IL Emergency Services Management Assn. (IESMA) conference in Springfield April 8-10, and SM WD9EBQ represented ARRL at the Illinois Disaster Services Agencies Committee meeting on April 14 in Springfield. Other groups represented included Red Cross, Salvation Army, IL ESDA, IL Dept on Aging, Christian World Relief, IL Baptist Assn., IL Conference of Churches, IL Dept of Public Aid and the Mennonite Disaster Service. Forty-five-year-old mystery: An incident was reported in the March issue of *Short Circuits* that described some hams in a local feud who ended up plugging up the chimney of the rival's clubhouse and smoking them out. This event had been attributed to the work of W9LMJ, but W9MRT has come forward to say the LMJ was innocent. W9CFV says he never saw a pot belly stove smoke so much. The incident took place in the late 1930s. The truth finally comes out! Traffic: WB9UEA 222, W9HOT 216, K9CMO 213, W9NXG 183, KB9X 110, K9AZS 108, KA9NWO 84, KD9K 83, W9JIJ 79, W9OK 76, WA9BXB 65, K9EHP 58, W9HLX 50, WA9SHE 38, WD9IBH 37, WB9WGD 36, KN9BAM 30, K9QEW 29, W9TLU 27, K9SW 20, W9KR 16, N9DIX 13, KA9NBH 13, K9BVE 12, WD9CJB 12, KC9GT 9, WD9EED 8, KA9OZJ 6, WA9RUM 5, KA9ORI 5, KA9GJN 4.

INDIANA: SM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUJ. OO/RFI: KJ9G. SGL: WA9VQO. SRC: N9WB. ACC: K9TUS. SCC: W9OBF. TC: WD9ADB. PIO: K9DIY. SDXC: N9MM. BM: KC9TA. NMs: ITN-W9QYY; OIN-KJ9J; ICN-KA9CZD; VHF-W9PMT; IWN-N9BHT.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2300	2142	245	1467	60
QIN	3656	1430/0100/0400	829	309	1930	90
ICN	3708	2315	153	59	788	30
IPN	3910	2130	1070	80	790	30
IWN	3910	1310	2972	—	525	30

Hoosier vhf nets: QNI 5561, QTR 167, QTR 5898, bulletins 113 for 24 nets. D9RN 100%, 437 messages in 1871 minutes. In stns W9URQ W9JIJJ K9CGS W9IOM WB9MIK KB9NR N9AEI. 9RN 98%, QNI 378, QTC 454, QTR 1093 for 60 sess. In stn. N9AEI W9CSJ W9EI N9HZ KJ9J W9JUJ WA9QCF W9QLW KI9R WB4RNT WB9UYU K9WWJ. CAND 100%, 838 messages in 60 sess. In stns W9URQ W9JUJ. Appts: State Government Liaison, WA9VQO; EC Vanderburg Co., WB9RWB. Silent Key K9CIY, Frankfort. The Indianapolis Red Cross RC has made an interesting change in its constitution. It reads now: Any person holding a valid Amateur Radio license who resides in a county adjoining Marion Co. and obtained his or her Amateur Radio operators license by passing a test *including the Morse Code* is eligible for membership in the club. The National Weather Service offices at Indianapolis, Fort Wayne and South Bend have been awarded the NOAA Unit Citation. The Indiana WET Net and Skywarn programs have helped Indiana NWS to be FIRST. N9BHT KM9B WB9ZQE and many others are to be commended. Congrats to W9JUJ on her appointment as 9RN manager. The Annual Emergency Communications Forum will be held in connection with the Indianapolis Hamfest on July 10. Lake Co. Ham of the Year is AJ9N. New Michigan City Novices are KA9PGE KA9PGD KA9PGA KA9PGB KA9PGC and KA9PGF. Fort Wayne area upgrades are KA9OIT(G), K9MWU(A), KV9B(E), and KV9C(E). Congrats to WD9GHI for his Army MARS Operator of the Month award in the Central Area. Traffic: W9JUJ 940, KJ9J 210, WB9UYU 200, W9QLW 145, KM9B 139, W9URQ 116, W9QYY 84, N9AEI 70, WA9QCF 60, KA9OIU 53, W9JZV 50, W9PMT 44, KC9TA 42, KB9NR 41, W9UMH 41, WB9ZQE 37, K9WWJ 35, KC9ED 28, N9CQS 27, WB9JUV 27, AB9A 26, K9DCX 26, KB9HH 26, KA9LAU 21, N9DHX 20, K9ET 18, W9ZGC 16, KK9D 15, WA9KWH 14, WD9HII 12, WA9OKK 11, WB9PFZ 10, W9RTH 10, WD9CIV 9, WD9DWD 9, WD9GXT 8, K9DKP 7, K9OUP 7, K9FW 5, KK9N 5, WA9JNC 4, N9AST 2, WB9DP 2, KC9GX 2, W9URS 2, W9UPI 1. (Mar.) WB9PFZ 28, WB9EBI 20, N9HZ 15, KA9LAU 13, KK9N 3, KB9DE 2, KC9GX 2, K9SBW 1.

WISCONSIN: SM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1200Z QNI 1365, QTC 1528 WB9YPY. BEN 3985 1800Z QNI 695, QTC 266 WB9ESM. WSBN 3985 2300Z QNI 952, QTC 325 K9ANV. WNN 3723 0000Z QNI 197, QTC 68 KA9HPQ. WSSN 3645 0030Z QNI 232, QTC 92 KC9CJ. WIN-E 3662 0100Z QNI 301, QTC 126 W9YCV. WIN-L 3662 0400Z QNI 295, QTC 136 K9LGU. XPO 3925 1831Z QNI 282, QTC 18 WA9GYF. NWTN .34/.94 0030Z QNI 394, QTC 45 WB9YPY. Gr. BAY .72/.12 Thurs. 0245Z QNI 15, QTC 1 WB9NRK. WCWTN .31/.91 0030Z QNI 446, QTC 25 N9AUG. I appreciate the activity the Wisconsin stations give 9RN and CAND. WB9ESM has life membership. W9JNY has been a ham for 50 years. The MARA swapfest was well attended. Everyone is wondering when spring will arrive. All I can say is have patience. Severe weather season will be with us soon; hope you're all tuned up to operate in case of emergency. New Novice southwestern Wisconsin KA9PKZ. WB9QZA, age 88, has WAC and WAC, congrats. At the Engineering Expo at Madison, BARS W9YT won 2nd prize for their exhibit. Please note WSBN meets 2230Z effective April 26 until DST returns. BPL to KA9CPA. KA9IHR is now KV9U. KA9OVS KA9NOT KA9NPN KA9NPP K9NPO & KA9NTY have upgraded. WB9NCT & N9CPV have Advanced. Traffic: KA9CPA 2719, W9CXY 322, WB9YPY 241, W9YCV 238, KC9CJ 217, W9IEM 170, AG9G 163, W9CBE 158, WA9WYS 149, W9UCL 133, W9DND 127, K9FHI 124, KC9KQ 120, WB9ICH 102, K9AKG 92, W9LDO 88, WD9FRI 84, WB9ESM 79, KA9BHL 74, KG9B 72, W9SO 72, K9ANV 71, WB9NRK 60, K9UTQ 57, KA9HPQ 56, KA9OBP 55, K9SAO 54, K9HDF 50, K9LGU 47, N9AUG 46, N9BCX 46, N9BDL 42, N9BYK 40, WB9PKL 39, W9UW 39, N9ATP 34, K9VSO 34, K9JPS 33, WB9JSW 33, KA9NOT 33, WB9WNA 32, KB9GO 31, KB9NG 31, KA9KLZ 30, KA9NKQ 30, WD9IID 29, WA9ZTY 29, KA9IKR 28, WB9JGA 24, WA9DXW 23, KV9U 23, WA9YVC 22, N9DCF 21, KB9FM 21, KC9MX 20, WA9GYF 12, K9BED 11, W9IHW 8, KA9BHK 6, N9CP 6. (Mar.) KA9IKR 54, N9BDL 44.

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.

SPECIAL EDITION
July, 1983

Editor: Vern Riportella, WA2LQQ
Contr. Editor: George Johnson, WØMD
Harold Winard, KB2M
Managing Editor: Bob Myers, W1XT

Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest newsletter serving the Amateur Radio satellite community.

Amateur Radio's New Phase III Satellite

As we go to press, AMSAT's long-heralded Phase IIIB Satellite is poised for launch. By the time you read this, there's a good chance it's already in orbit and operating.

What's it all about? It's the most important new facet of Amateur Radio in two decades!

Imagine . . . reliable vhf DX to anywhere! Like a new band. Bigger than 20 and 15 meters combined. A virtual DX cornucopia could open before you . . . *if you know how to use it.* And it's basically simple.

Every pioneer needs a map. This is yours. *Amateur Satellite Report.* It comes out every other week. It comes to you by First Class mail. And it's your ticket to the stars. Really.

With *ASR* you'll find answers to how; when; where. You get the news and info that are a must for sure QSOs on the new Amateur Radio Satellite. It's the best in it's field! Endorsed by ARRL; quoted everywhere. The authoritative voice of Amateur Space technology today.

Want to try it cheap? A special Phase III Launch Issue with lots of "how-to-get-started" information is just coming off the presses.*

A big info-packed edition especially for the beginner is your introduction to Phase III, a new era in Amateur Satellite communications.

Special Satellite Launch Edition: For a limited time only, *Amateur Satellite Report* will send you a copy of this very special printing giving *all* the details for operating on this new satellite. It's not difficult . . . if you have the proper information. Order now to be sure to get your copy — even if you don't plan to use the new satellite just yet. You'll need this issue later. Send $3 ($4 for outside U.S.A./Canada/Mexico) to:

Amateur Satellite Report Special Offer
221 Long Swamp Road
Wolcott, Connecticut 06716

Note: Regular subscriptions to *Amateur Satellite Report* are $22.00 yearly (26 issues) for U.S.A., Canada and Mexico, $30.00 elsewhere (airmail). Subscribe for the year and get this special edition as part of the package.

*This issue will be sent automatically to current subscribers.

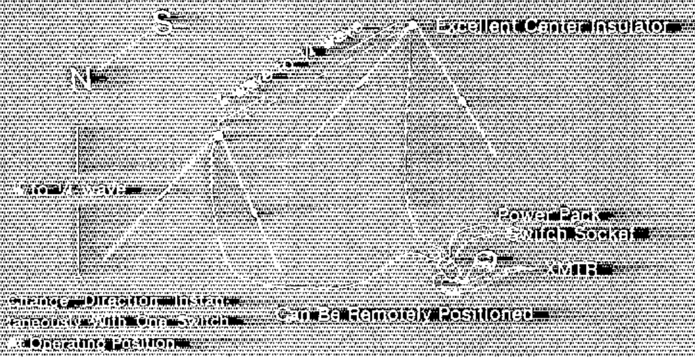
PRO-SEARCH™
Reaching The World

BIG SIGNAL......LITTLE EFFORT......

INTRODUCING........THE HJ-SERIES COAXIAL DIPOLES AND PHASING KIT.........

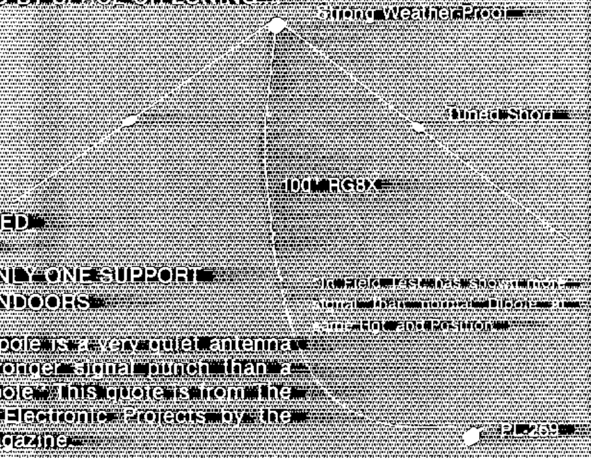
Example:
Antenna Tested ON 7.2mc. ¼ wave spacing
at 18' at APEX
ENDS AVERAGE HGT. 6'
SWR-FLAT or BELOW 1.5 to 1 over Phone Band

When Testing just one of
2 Antennas - SWR was Flat
or Below 1.5 to 1 over Entire Band
7.0 to 7.3 MHZ



HJ-DIPOLE*

FOR THE HAM WHO WANTS
A BETTER SIGNAL ON THE BAND
BUT IS LIMITED BY SPACE OR ZONING.



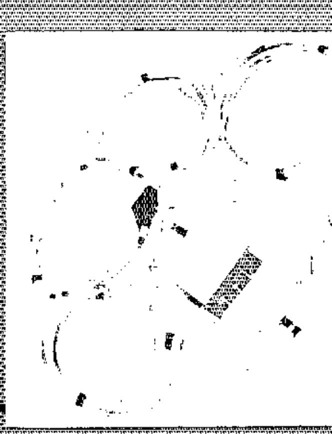
- BROADBANDED
- PORTABLE
- REQUIRES ONLY ONE SUPPORT
- CAN WORK INDOORS

*The Coaxial Dipole is a very quiet antenna with slightly stronger signal punch than a conventional dipole." This quote is from the Giant Book of Electronic Projects by the Editors of 73 Magazine.

THE SINGLE HJ-DIPOLE CAN BE UPGRADED TO A PHASED ANTENNA SYSTEM AT A LATER DATE. NO TUNER REQUIRED, HOWEVER, WITH A TUNER ANTENNA CAN BE LOADED UP ON A HIGHER FREQUENCY.

THE HJ-PHASING KIT CONTAINS EVERYTHING YOU NEED BUT A PLACE TO HANG THEM.

Contents:
- 9 PL-259
- 2 Coax Tees
- 1 Barrel Connector
- 6 Female Connectors
- 2 Male Phono Plugs
- 2 Female Phono Sockets
- 1 Cabinet
- 1 Power Pack
- 4 Short Covers
- 2 Center Insulators
- 6 Stainless Steel ⅜ Screws
- 6 Stainless Steel ⅜ Nuts
- 1 Relay
- 3 Sets of ¼ wave coax lines
- 2 100' lengths of coax feedline
- 2 Antennas Cut and Tuned



ALL ANTENNAS ARE ASSEMBLED PHASING LINES CUT AND HAVE PL-259S INSTALLED. LEAD-IN CABLES PL-259 ARE INCLUDED BUT NOT ATTACHED FOR USER CONVENIENCE. PHASING BOX IS ALSO ASSEMBLED AND READY TO USE.

PRO-SEARCH™ has designed quality into simplest of antennas. Center insulator is made up of high quali material that is virtually unaffected by heat, cold or impact. Will withstand rugged use and extreme en vironments. RG-8X has 93% shield. Antennas are very flexible and very portable, good for vacation or fie day, apartment dwelling. Tuned shorts are weather-proofed with gripping covers which also add strength to th area of the antenna. Stainless steel hardware of course. Antennas can be made for any frequency. The most im portant part, we stand behind our products. That's a Promise.

FREQUENCY	SINGLE ANTENNA	TUNED PAIR OF ANTENNAS	PHASING KIT	TOTAL
1.8	$139.95	$251.91	$110.95	$362.36
3.5	96.95	174.51	110.95	285.46
7.0	73.95	133.11	110.95	244.06
10.0	68.95	124.11	110.95	235.06
14.0	64.95	116.91	110.95	227.86
18.0	61.95	111.51	110.95	222.46
21.0	59.95	107.91	110.95	218.86
24.0	57.95	105.91	110.95	216.85
28.0	56.95	102.51	110.95	213.46

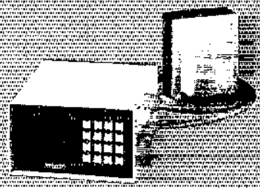
U.S. and Foreign Patents Pending

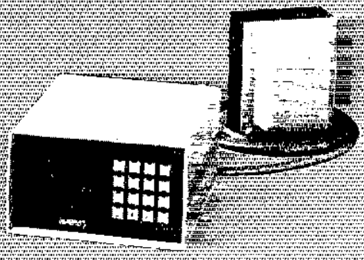
Prices and specifications subject to change without notice or obligation.

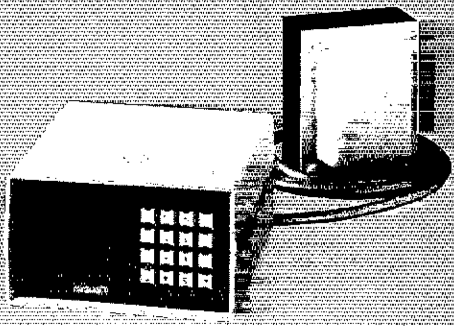
PRO-SEARCH
Reaching The World

ORE FROM PRO-SEARCH™ ELECTRONICS

NOW THREE MODELS OF OUR
DIGITAL ANTENNA CONTROL
Your Choice Of Center, North Or South







GOOD
PSE-1A/3A

"CONTESTER" provides the least expensive ...ITAL CONTROL UNIT WITH COMPLETE COM...TERIZED CONTROL — BUT WITH LESS ...TURES than the "DXER" and "DELUX" ...s unit gives you the current position of your ...enna digitally in 5° steps. It has 2 memories ...the command mode, plus single button opera... The PSE-1A "CONTESTER" comes with a ...amp continuous duty rotor supply. PSE-3A ...s 12 amp power pack. ...not capable of being modified to talk or accept ...computer interface or remote interface. ...completely shielded and made of the same ...lity components as the other models. ...warranty on our unit is one year on materials ...labor and ninety days on parts. ...s unit is a very inexpensive way to have the best ...both worlds. A real time saver during contests. ...his bit operation will save many hours of band... on the rotor. Just a few dollars more than the ...ual control box — but worlds apart in state-of-...art and operation. Price $229.95.*

BETTER
PSE-1/PSE-3

The "DXER" is the top of the line of the non-voice synthesized units, and is for the ham who is in need of more features on their controller. It has 2 digital readouts, one to show the antenna's current position, plus a storage reading which stores a heading or digitally displays your last position. This is valuable for switching between long path or short path, or checking front to back, or working between two different stations. A real time saver and a nice convenience.
The "DXER" also has 5 scan functions: 0-90, 90-180, 180-270, 270-360, and 0-360. This is a real aid in looking for that dogleg opening or peaking a weak signal. The "DXER" has 10 memories for storing headings. It can be expanded to talk, and does have the hardware necessary to use with the computer interface.
It can be remotely keyed where verbal confirmation isn't required. Price $362.95.*

BEST
PSE-2/PSE-4

This is the ultimate in rotor controls. Nothing tops this one.
It has all the features of the other models, plus it talks. Yes, it talks.
The "DELUX" has a voice synthesizer which confirms your entries, plus tells you your heading as you enter it and when your antenna arrives.
All commands are spoken, plus as your antenna turns you hear a 400Hz tone going in one direction and a 800Hz tone in the other. This gives you positive verification of movement.
This unit, as the others, will combine with the HAM IV, T2X and HDR-300, giving you the best antenna rotor combination you could ever want at any price. Price $469.00.*

INTRODUCING THE ULTIMATE PACKAGE ... FROM PRO-SEARCH™ NINE COMBINATIONS OF OUR CONTROL UNIT AND THE TELEX/HYGAIN* ROTOR MOTORS.
FOR JUST A FEW DOLLARS MORE YOU CAN HAVE THE CONTROLLER OF THE FUTURE TODAY!

Package #1 PSE-1A

The "Contester" Package. Try one of these ...LEX/HYGAIN rotors with our PSE-1A/3A. A ...tem which is low in cost, high in performance.

...M IV T2X HDR-300*

...1A will save you lots of time in your favorite ...tests. No more hanging on the rotor ...trol. Gives you positive control with DIGITAL ...out plus 2 memories, command positioning ...single button manual movement.

Package Special

PSE-1A + HAM IV $369.95
PSE-1A + T2X 415.95
PSE-3A + HDR-300 649.95

*Printed with permission of TELEX/HYGAIN ...elex Communications, Inc.

Package #2 PSE-1/PSE-3

The "DXER" Package. Couple this unit with a rotor and you have the best non talking control we make. Expandable, plus has 5 scan functions, 2 DIGITAL displays and RECALL to check long path or short path. Has all internal hardware to plug into our computer interface. Can be remotely controlled from accessory jack.
Try this with any of the TELEX/HYGAIN* Rotors! This will give you the broadest of functions with a mid-range price.

Package Special

PSE-1 + HAM IV $508.95
PSE-1 + T2X 548.95
PSE-3 + HDR-300 877.95

Package #3 PSE-2/PSE-4

The "Delux" is the most sophisticated antenna control unit ever made. With the "Delux" you have all the functions of our other units, plus it talks. Yes it talks. Not only do you have your headings digitally displayed, but is also said as your antenna stops. All commands are spoken, plus as your antenna turns you hear a 400Hz tone in one direction and an 800Hz in the other, giving you positive verification of movement. This unit, when combined with the HAM IV, T2X or HDR-300 gives you the best buy anywhere at any price.

Package Special

PSE-2 + HAM IV $608.95
PSE-2 + T2X 655.00
PSE-4 + HDR-300 784.00

Controllers also available for other rotors.

Prices and specifications subject to change without notice or obligation.

U.S. and Foreign Patents.

*For PSE-3A ... and $24.50 for 12 amp power pack.

PRO-SEARCH
Reaching The World

Write or Call for our Catalog • Pro-Search Electronics Co. Suite 305 10411 Clayton Rd. St. Louis, Mo. 63131 1-314/994-7872 (Missouri) 1-800-325-4016

DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, WBØHOX — SEC: KNØJ. STM: KDØCL Greetings! We finally made it into spring, but not in time for the Rochester Hamfest. Two years straight they've been snowed on. Sorry I couldn't be there. I went to Bemidji for the April 23rd hamfest. The turnout was great on a perfect day weatherwise. The Bemidji ARC had their emerg. services vehicle on hand and KAØKWM gave me the tour. It is a complete mobile communications unit with ht & vhf gear, telephone, CB, scanner and portable generators. FB gang! Speaking of hamfests, I'm informed by KAØCDO that the Range Wide Hamfest will be Sun. July 10 at the Clinton Comm. Center located 13 miles east of Hibbing on Hwy 37, CU there! Welcome to new Novices KAØPRQ KAØPRR KAØPTT & KAØPTU. Congrats to the following upgrades: Novice to Tech KAØPUB, Tech to Advanced KAØLTS KAØLVW & KAØMIV, Advanced to Extra KAØNRU. Hats off to the gang in Brainerd who assisted in the successful search for a 4-yr-old boy lost in a remote area near Merrifield. Responding to a call by KYØX was WBØCZZ KAØNRU KCØYG & KØZTZ. The boy was found the same day unharmed. The Shriners Childrens Hospital in Mpls has its station on the air. KBØWV of the Zuhrah ARC and coord. for the station says the objective of the facility is to put patients in contact with their parents throughout the 5 state area. Net news: The WX Net will be off the air for July and August. The Piconet has dropped its 4th & 5th hours until Sept. For all you early birds like me that are on your feet at 4 A.M., WDØCEX is NCS on the Transcontinental Net 3940 kHz Thurs. By the way, we need net controls on all the nets, alternates and regulars. Any volunteers? Please contact me or any of the net mgrs and we'll get you started. Finally, I regret to report two Silent Keys. K7WY (ex-WAØGLI & KØEC), a former SCM Minn., accidently on March 8. Also WØDFX a wx net NCS left us. His humor and wit will be missed by us all. Our condolences to the families of these Silent Keys.

Net	Mgrs	Time	Freq.	QNI	QTC
MSN/1	W9DM	6:30P	3685	321	95
MSN/2	KAØEPY	10:00P	3685	297	43
MSSN	WBØWXU	7:00P	3710	74	11
MSPN/N	KAØJUX	12:05P	3945	713	112
MSPN/E	KCØT	5:30P	3929	1121	165
MNAMWXNT	WAØONE	6:15P	3929	588	423
PICONET	WØHZU	Daily	3925	3314	283

Traffic: WAØTFC 443, WD9ESZ 277, WØHZU 260, KAØJUX 233, KAØEPY 160, KTØU 159, WAØRUF 150, KDØCI 138, WAØONE 107, W9DM 96, NØCLS 89, WBØHOX 82, WBØUKI 72, KØGSE 70, KTØR 50, KAØARP 49, KØBDD 37, WDØHDD 32, WØDUW 28, WØGRW 26, WBØLRK 19, KØOGI 18, KAØODJ 15, NØJP 14, WDØBGS 12, KN9U 12, KNØJ 10, KAØJQO 7, KYØX 5.

NORTH DAKOTA: SM, Dean R. Summers, KQØC — Goose River ARC hamfest at Island Park in Mayville June 4-5; contact WAØCSL. Congrats to new upgrades: Extra-WDØEQH (now NAØC); Adv-KAØNUD WDØGMD KAØOXN KØTMH NØBQR (now KDØEM); Gen-KAØNTZ; Techs-KAØLIL NØEPK. Special recognition to TRARC, Dickinson, for giving birth to a new newsletter, and to WBØSHD and XYL for new harmonic. ARRL books now on file at Bismarck and Mandan public libraries, tnx to BARK. Forx club has patches and T-shirts available; see KAØCAF. WAØRWM reports new NM needed next fall for YLWX net.

DATA	3.9965 Dy	2330Z	KAØFSM
G.R.	1.990 Sn	1300Z	WØCDO
NDSN	7.145 S	2200Z	KØIL

DATA 251 QNI, 15 QTC; Goose River 72 QNI, 2 QTC. Traffic: KAØFSM 65, WØCDO 32.

SOUTH DAKOTA: SM, Fredric Stephan, KCØOO — STM: WØKJZ. SEC: WØYMB. TC: KØAS. ACC: WBØPWA. SGL: NØCDX. Emergency coordination and related emergency communications topics are always available to you daily with the South Dakota Evening Emergency Net on 3960 kHz at 8 P.M. MDT. The South Dakota Net (SDN) doing excellent example FB job of handling traffic everyday on 3650 kHz at 6 P.M. MDT. Upgrades now are KØCXL KCØYT KAØNFB WBØPWA to Extra Class; WBØPZO WBØYXK NØBBP NØEDF WBØKUE WBØKUF to Advanced class; KAØPMA KAØKXG KAØEER to General class; KAØAZK and KAØMNO to Technician class. Fine work everyone and congrats all. NTS liaisons were WØKJZ KØFRE KCØOO WBØKWX. SDWX Net 387 QTC, 328 QNI; SD Traffic Information net 118 QTC, 202 QNI; SDN (cw net) 59 QTC, 129 QNI; SDSMEMG net 6 QTC, 120 QNI. PSHR: WØZWL WØKJZ NØCFS NØEEH KCØOO. Traffic: WØMZI 315, WØZWL 203, KCØOO 142, KØAIE 105, WBØKWX 98, WØKJZ 75, WAØVRE 61, WØDVB 60, KØFRE 54, NØCFS 41, WBØOMF 39, KCØAF 30, KAØHMI 28, W7UDB 27, WØRWE 23, NØEEH 21, WBØSUM 20, WØYMU 19, KØKLQ 13, WØNWM 11, WBØYDG 11, WAØBZD 10, NØCDX 8, WAØCIP 7, WBØZMW 7, NØABE 6, WBØLTV 3.

DELTA DIVISION

ARKANSAS: SM, Joel Harrison, WB5IGF — Welcome to new section officials: SEC-N5BPU, John Barnett; Technical Coordinator-W5FD, Elmer Wingfield; State Government Liaison-W5LCI, James Shaver. Contact these people if you need assistance in their respective fields. W5KL is home and recovering from a quad heart bypass. We all wish him the best. Don't forget to monitor 3995 kHz or 34/94 Little Rock during severe weather. W5RXU is weather net manager and can be contacted for more information. Ark nets: OZK CW 3760 kHz 0900Z QNI 183, QTC 20, 424 minutes. Phone net 3937 kHz 1100Z QNI 580, QTC 34, 1078 minutes. Razorback 3995 kHz 2230Z QNI 1071, QTC 54, 491 minutes. Mockingbird 3928 kHz 2130Z M-F. Traffic: K5BIL 33, W5UAU 28, W4AZJ 22, WB5IGF 18.

LOUISIANA: SM, John Meyer, N5JM — ASM: KC5SF. STM: W5GHP. SEC: WA4MUW. Welcome to WA4MUW, the new SEC. He is in Lake Charles and has been both EC and DEC. Check in LEN and find out how you can assist him. New faces at the DDXA are N5NO, prexy; K5PP, v.p.; WB5SSD, Secy and WA5YFQ, treas. At LCARA, K5DPG became chmn; KB5VC, v. chmn; W5QVV secy/treas.; KC5JM KD5SL KB5GQ K5ANK, bd. mbrs. The BRASS KEY CLARC's Newsletter now springs forth from a computer in fine fashion. JARC bailed 8 inches of water out of their club house during the April downpour and the wx bureau's land line went dead, so they QSYed to 7290 kHz and 2 meters to carry on business as usual. N5JM finally got to listen to the 10 MHz band by firing up a TCS rcvr. circa 1944, given him by W5CJO. The tfc count is up this month owing to Jupiter Pluvious.

Net	Freq. kHz	Time	Mgr.
LAN	3615	Dy 7 & 10 P.M.	KC5SF
LTN	3910	Dy 6:30 P.M.	N5ANH
LSN	3703	M-F 7:30 P.M.	WD5CWK
LRN	3587.5	Sn 6:30 P.M.	W5GHP
LEN	3910	M 8 P.M.	WA4MUW

Connect your computer to the air!

The "AIRWAVES" that is, thru the Microlog AIR-1, a single board terminal unit AND operating program that needs no external power supply or dangling extras to put your VIC-20 computer on CW & RTTY. And what a program! The famous Microlog CW decoding algorithms, superior computer enhanced RTTY detection, all the features that have made Microlog terminals the standard by which others are compared. Convenient plug-in jacks make connection to your radio a snap. On screen tuning indicator and audio reference tone make it easy to use. The simple, one board design makes it inexpensive. And Microlog know-how makes it best!

There's nothing left out with the AIR-1. Your VIC-20, America's most popular computer, can team-up with Microlog, America's most successful HAM terminal, to give you an unbeatable price and performance combination for RTTY & CW. If you've been waiting for the right system at the right price, or you've been disappointed with previous operating programs, your time is now. At $199, the complete AIR-1 is your answer. Join the silent revolution in RTTY/CW and put your VIC-20 ON-THE-AIR! See it at your local dealer or give us a call at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, Maryland. TEL (301) 258 8400. TELEX 908153.

Note: VIC-20 is a trademark of Commodore Electronics, Ltd.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

NEW

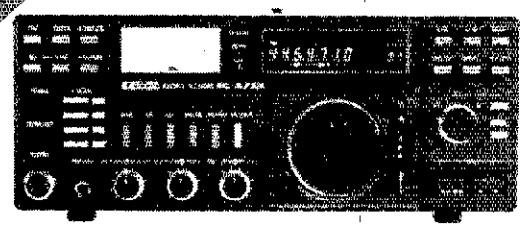
YAESU

FT-980

State-of-the-art features and engineering from the company who made "transceiver" a household word.

NEW

ICOM



IC-751

The New Standard!
A high performance transceiver with general coverage, QSK, 32 memories and many other features.

KENWOOD

TS 930S

Kenwood's best. Unparalleled performance for SSB and CW operators.

Our Lowest Price Ever!

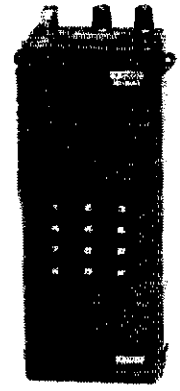
Accessories in stock.

KENWOOD

TS 430S

Now a general coverage receiver/ham band transceiver at an affordable price. Ideal for mobile, marine and portable use.

ICOM



ICOM HT's

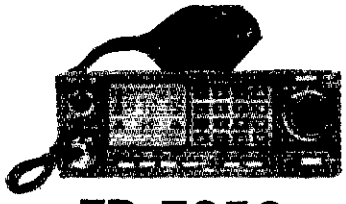
SUPER BUYS!

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



TR 7950

45 Watts! Multi-featured!

Available at Reduced Price!

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
DC-25 13.8VDC Adapter	19.95

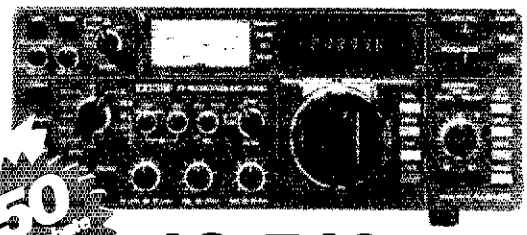
comm

Why is C-Comm the best place to shop?

- ★ **Competitive Prices**
- ★ **Immediate Delivery!** SAME day shipment most items.
- ★ **Extra Class Service!** We are a Warranty Service Station.
- ★ **Knowledgeable Sales People!** All are Active Hams.

Prices and specifications subject to changes without notice or obligation.

EXPIRES JULY 31!



$50 Certificate

IC-740

ICOM

This rig has the best receiver available. Call for testimonial!

Still Only $949

A Tremendous Value Gets Even Better! Now with FREE Internal Power Supply PS740. You save $309!

KENWOOD

R 2000

Features never offered before in a gen. cov. rec.

Available at Introductory Price!

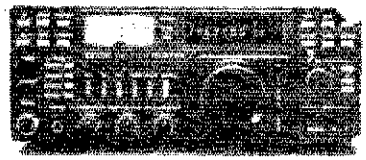
AEA

CP-1

Computer Patch™ Interface. For computerized RTTY and CW operation. Call for details.

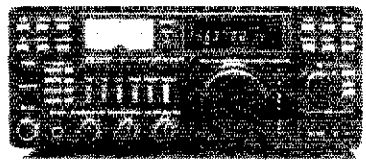
NEW NEW

ICOM



IC-271A

2 meter all mode, 25 watts, many new features.



IC-471A

All mode, 430-450 MHz coverage. Features not previously available.

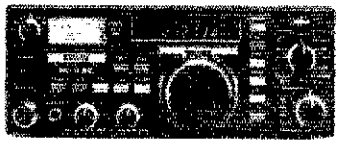
ICOM

IC-R70

Communications quality at an exceptional price! State of the art!

Call for our Lowest Price Ever

ICOM



IC-730

More performance per dollar than any other rig available!

Sale Priced $649

Suggested Ham Net $829

NEW

ICOM

IC-25H

Now available with 45 watts and easy to read green display.

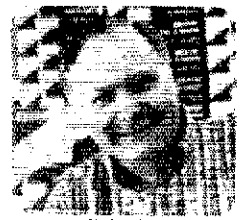
Only $349

25 watt version (IC-25A) available for $319.00.

K7LXC Steve

W7GAB Dale

KG7D Bob



K7DS Frank

C-COMM

8115 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

CCTN 146.01/61 M-F 6:45 P.M. GNOARC Traffic: KA5HDT 124, W5GHP 123, W5LQ 117, K5TL 102, WB5LBR 78, WD5JFY 43, W5TVW 40, W5VMY 35, WA5TQA 26, N5ANH 26, N5JM 21, WA4MUW 8. (Mar.) WD5JFY 90, WA5TQA 42.

MISSISSIPPI: SM, Thomas Hammack, W4WLF — SEC: N5DDV. STM: KB5W. Congrats to KW5T on FB SCM term and for his help in transition. Tnx to all who helped in MS & LA floods. Many hrs of hard work. Reports still coming in. Keesler AFB club now active. K5TYP rptr should be on soon. Comm for Special Olympics by club. FB. Need volunteers or nominations for OO/RFI Coord. Affiliated Club Coord., State Gov't Liaison, Tech Coord. & *Bulletin* Mgr. Need more OBSs, at least one for each rptr area. Many areas need ECs. Let's put MS on top. Come on — need activity reports. MTN - 30 sess., 57 QTC, 158 QNI.

TENNESSEE: SM, John C. Brown, NO4Q — ACC: WA4GLS. SEC: K4TKQ. SGL: W4WHN. STM: K4YOL. TC: W4HHK. Note that the usual warm weather drop in reporting of activity is making slim the station activity. Hope that's all it is. Congrats go to two clubs for becoming affiliated with ARRL: the Memphis Radio Relay Club and the Mid South VHF Assn. of Murfreesboro. The charters for the clubs will be presented at an early meeting. Hope to be getting more charters to present in the future. Some of the already affiliated may wish to make ARRL book donations to local libraries. If any of the clubs wish to do this, contact your ACC or the Section Manager about the procedure. W4ZJY has been appointed the new net manager for the TSN. All you fellows and gals need to get the old cw gear out and join the TSN gang to have some fun and get the fist back in the groove. Some need to get something other than a key to send the cw so the other station can read what ya gotta say, not guess. Also W4VQE has been appointed the TN section RTTY net manager. Now there is a place all of you can really use the computers and all the new gadgets on 3628 at 0030Z during the summer months. Try something other than the mike on the two nets. No cw honor roll this time. Had 100% coverage on DRN5. The station activity is kinda short this month. We still need some help with the DRN5 at 10:30 CDT on 7280. Get a day from the STM. Traffic: NG4J 361, W4ZJY 190, W4DDK 68, K4WWQ 64, K4VM 39, W4TYV 22, K4WOP 22, W4PFP 21, WD4GYT 18, WB4TDB 16, KI4V 14, KE4LS 11, W4DTI 9, W4PSN 7, NM4W 5, W4EWR 3, K4UMW 3. (Mar.) K4VM 29.

GREAT LAKES DIVISION

KENTUCKY: SM, Ann Sloan, KA4GFU — STM: KA4BCM. SEC: WA4JAV. New appt: Bruce Kille, WA4JAV, Bowling Green to SEC. Net/QNI/QTC: KRN/547/23; MKPN/1055/119; KTN/1103/90; KNTN/373/103; KYN/254/117; KSN/218/87; KEN/101/2; KYPON/68/9; PAEWTN/290/25; SEKEN/29/1; TSTMN/368/46; WTEN/34/7; BARES/102/12; LCARES/20/0; 3ARES/40/10; 4ARES/91/9; 5ARES/85/10; 6ARES/74/19; 11ARES/47/3; 13ARES/70/1. New Novices-Lex: KB4EFT KB4EHX; O'boro: KB4ESE. ORS appts: WD4IXS N4HZT WA4EBN. WTARC Jump Team at flooded cave rescue. 3ARES evacuates flooded nursing home during floods of April 30. Traffic: KA4SAA 185, WD4IYI 156, WA4JTE 134, KA4BCM 95, KA4GFU 93, KA4MZY 92, KZ4G 91, WA4YPO 74, KB4QZ 67, KC4WN 60, WB4ILF 56, WD4BWU 50, KA4SKV 43, KA4MTX 41, WD4BSC 38, WA4JAV 31, KS4V 31, N4GD 30, W4WQV 27, WB4ZDU 24, KD4TY 22, K4MHL 20, WB4APC 17, WD4CQF 17, WA4AVV 16, W4OYI 16, WD4CJQ 15, WA4GHQ 15, WB4AUN 10, KA4MBF 10, KA4YIV 10, W4PKX 9, WA4AGH 8, WB4NHO 8, WA4NOG 8, KD4SN 8, KA4GBZ 6, WD4IXS 3, WD4IYH 3.

MICHIGAN: SM, James R. Seeley, WB8MTD — ASM: WA8DHB. SEC: WA8EFK. STM: WD8RHU. DECs: K8BTH N8CUH WD8IXZ WD8MBB W8VWY. NMs: W8CUP WA8DHB K8LNE K8KMQ K8KQJ KA8NCR W8QHB W8SCW KV8U W8YIQ K8ZJU.

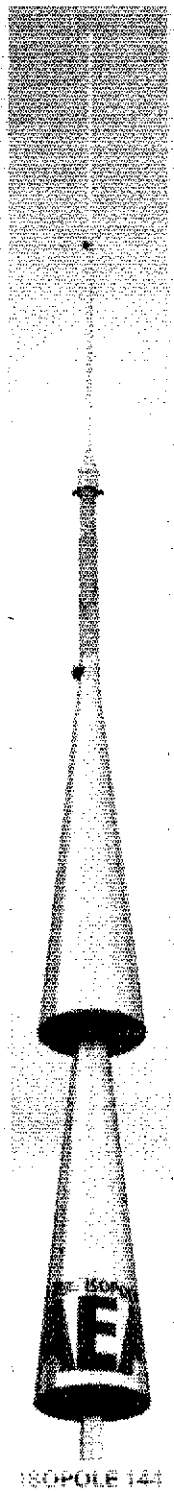
Net	Freq.	Time/Day	QNI	QTC	Sess.	Mgr.
QMN*	3663	1800 Dy**	3884	1215	267	KV8U
MITN*	3953	1900 Dy	2170	1102	89	K8KQJ
MACS*	3953	1100 Dy**	1769	556	89	K8LNE
MNN*	3722	1730 Dy**	1043	400	175	KA8NCR
GLETN	3932	2100 Dy	3219	310	89	WD8IBY
UPN*	3922	1700 Dy	1750	298	101	WA8DHB
WSSBN	3935	1900 Dy	1812	109	89	WB8SUR
TASYL	3922	1900 M	80	13	13	KM8E
VHF nets	39 reports		3710	147	236	W8CUP

*NTS nets. Times local. Figures are for Feb. & Mar. & Apr. **QMN late net, 2200; MNN Late net, 2000; MACS Sn. 1300. ARES net Sn. 3932, 1730. Traffic Workshop Sn, 3953, 1600, 3932 is MI hf emer. freq. Silent Key, with deep regret: WD8ROI. New ECs: N8EOI, Clare Co.; WD8IZH, Cass; KA9JFM, Branch; KC8UU, Chippewa. New ORS: N8CNY KA8OWN. It was a pleasure to meet so many of you at the ARRL State Convention in Muskegon. A high point for me, four years in a row now, was presenting the MI Lady Amateur of the Year award. Sponsored by TASYLS, it was given this year to the highly deserving WA8DHB. The coveted MACS Amateur of the Year award went to WB8TTA. A topic common to all the net meetings was, "Why can't we get more traffic outlets in the (you name it) area," with Detroit being the prime target. Strange indeed, the most populous part of our state traditionally is the most poorly represented in traffic activity. What *can* we do about this? Welcome to the affiliated club ranks to the Southeast MI DX Assn. Our OO/RFI Coord., K8JH, has the "help wanted" sign out. We do need more OOs in MI. This activity is subject to take on even greater significance once the FCC phases in its volunteer monitoring program. If you are a League member, licensed four years or longer, hold a Technician or higher license, and are truly in tune with the self-regulating traditions of our hobby, get in touch with K8JH. Traffic (Mar. & Apr.): WB8WKQ 1177, KA8CPS 733, WD8LRT 716, N8DTZ 672, AF8V 664, WB8MTD 374, W8QHB 362, WD8RHU 271, K8KQJ 230, WA8DHB 219, WD8MJB 205, N8BNC 177, K8GXV 152, KA8OWN 139, K8KMQ 132, W8CUP 131, KA8NCR 113, N8DNC 107, W8SCW 107, WB8TPM 99, WD8EIB 94, W8VIZ 89, W8IHX 82, W8YIQ 79, WB8HPZ 78, K8UPE 75, K8LNE 66, WB8SYA 59, KS8P 51, WD8BSE 48, W8LDS 48, WB8YRY 48, WD8ECM 47, WA8EFK 47, K8DD 40, W8YZ 39, WB8TTA 36, K8OCP 34, KV8U 30, N8BBY 27, KA9JFM 25, W8JXJ 22, N8EOI 21, KI8Q 20, WB8YWA 20, K8ZJU 20, WD8IXZ 17, KD8FF 15, KT8G 14, WB8DJS 13, K8MJK 13, W8URM 10, WB8POL 9, WB8ITT 7, W8BEZ 6, N8CQA 6, KF8M 6, KB8TD 6, WB8HSN 5, W8LOU 5, W8DSE 3, KI8Z 3, KJ8A 2, WA8LKC 2, KN7M 2, N8EBN 1.

OHIO: SM, Allan L. Severson, AB8P — SEC: K8AN. STM: K8OZ. ACC: K8US. PIO & SGL: N8CVK. TC: KB8MU.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	466	245	60	6:45/10 P.M.	3.577
BNR	321	152	30	6:00 P.M.	3.605
BSSN	321	192	56	9:45 A.M./ 7:15 P.M.	3.927

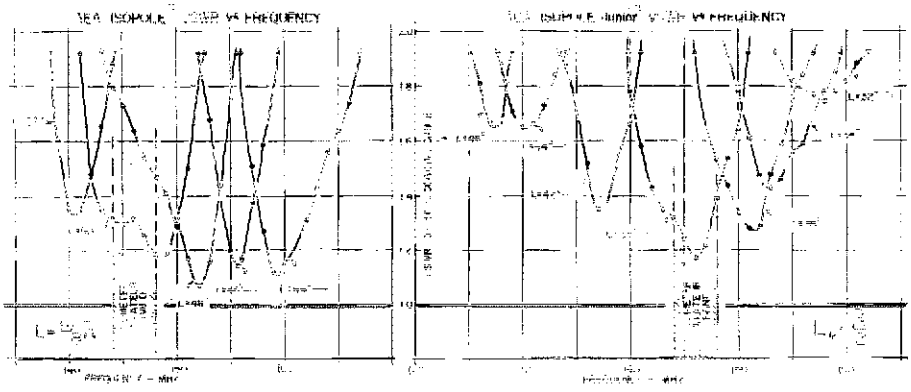
MORE PERFORMANCE FOR YOUR DOLLAR!
COMPETITORS KNOW ABOUT THE ISOPOLE™
DO YOU? STUDY THE FACTS . . .



ISOPOLE 144
ISOPOLE 220
MAST NOT SUPPLIED

The IsoPole antenna is building a strong reputation for quality in design and superior performance. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many new design advantages.

All IsoPole antennas yield the maximum gain attainable for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other when used with SWR protected solid state transceivers.

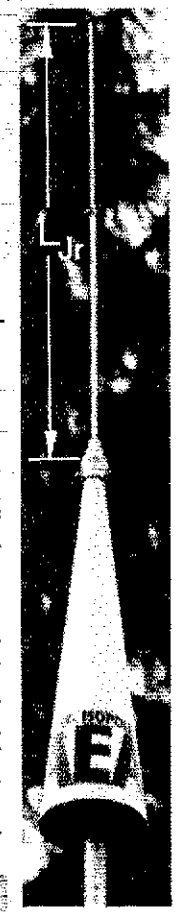


Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard Amphenol 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. All IsoPole antennas are D.C. grounded. The insulating material offers superb strength and dielectric properties, plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is not supplied).

IsoPole antennas have also become the new standard for repeater applications. They all offer low angle of radiation, low maintenance, easy installation, and low cost with gain comparable to units costing several times as much. Some repeater installations have even eliminated the expense of a duplexer by using two IsoPole antennas separated vertically by about twenty feet. This is possible because of the superior decoupling offered by the IsoPole antennas.

The IsoPole antenna is now available in a 440 MHz version which is fully assembled and tuned.

ISOPOLE 440



ISOPOLE 144JR
ISOPOLE 220JR
MAST NOT SUPPLIED

Burghardt INC.
AMATEUR CENTER
P.O. Box 73
WATERTOWN, S. DAK. 57201
605/886-7314

RIVENDELL
Warner Hill Road, Derry, NH 03038
Summer Hours:
Mon. - Thurs. 9AM-7PM; Fri. 9AM-5PM
Sat., Sun., Hol. Closed, but phone line open
Call 603-434-5371

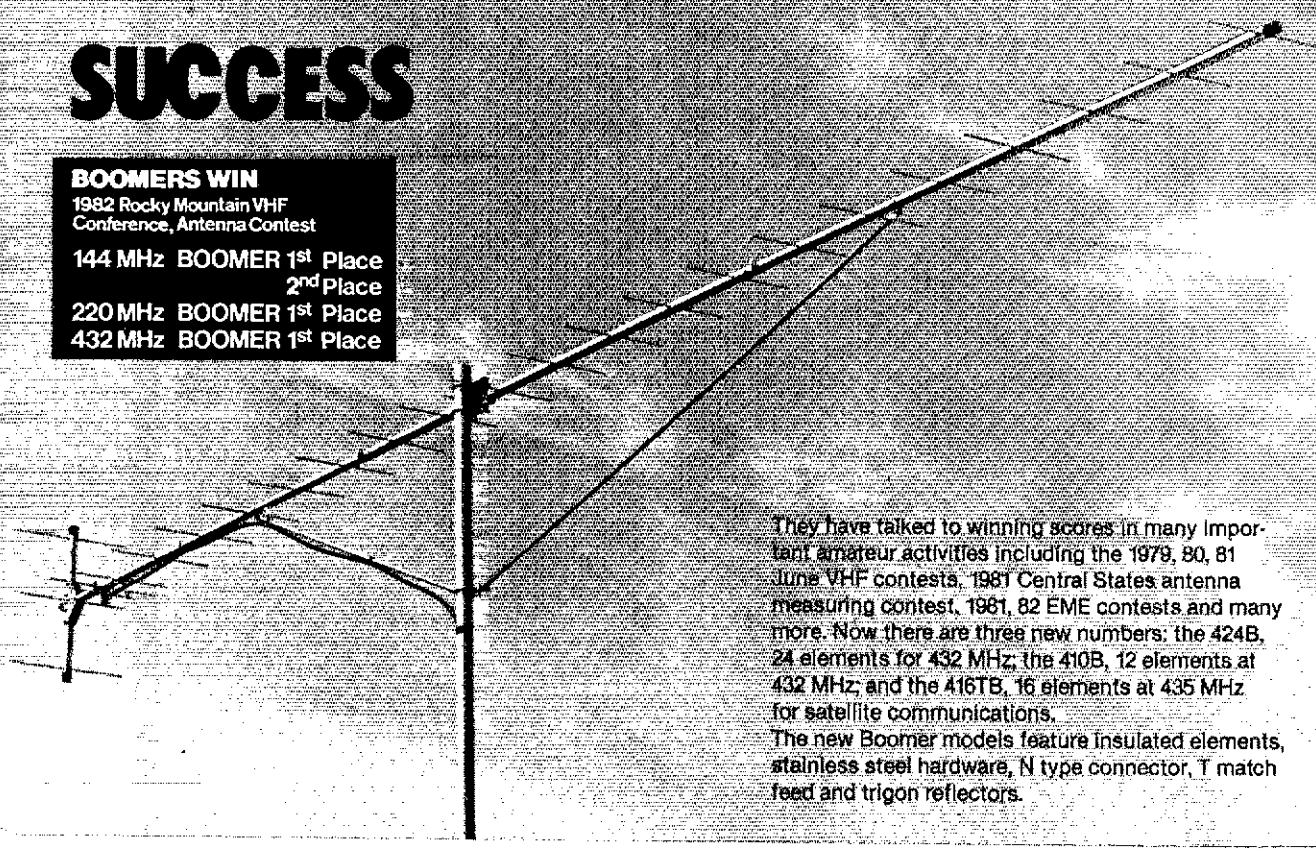
Our numbers talk

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:

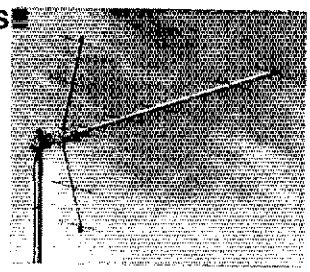
424-435 MHz, 7.6λ, gain *maximized, F/B ratio *excellent, beamwidth 19°, length 17.42 ft. 5.2 m.

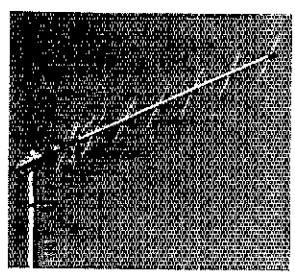
410B:

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

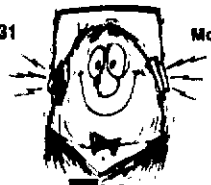
cushcraft
CORPORATION

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.

812-422-0231



Mon-Fri 9AM-6PM
Sat 9AM-3PM

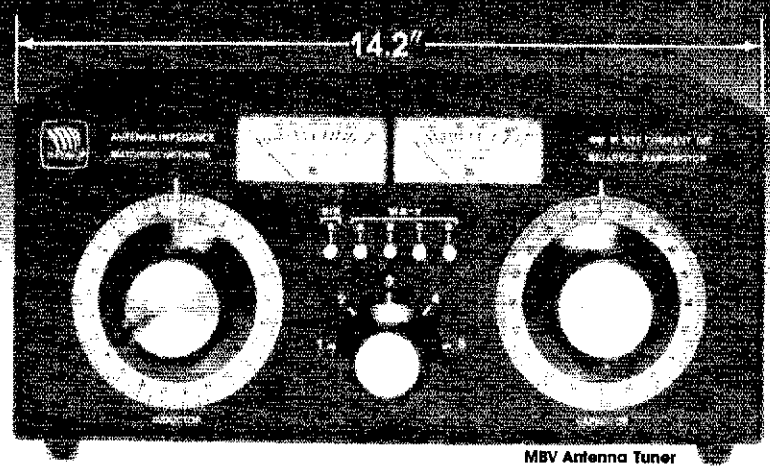
The HAM SHACK

808 N. Main
Evansville, IN 47711

Prices and Availability Subject to Change

AEA
CP-1 New Computer Interface ..... call
MBA-RO Reader $259.00
BT-1 Trainer 72.00
ALLIANCE
HD73 (10.7 sq. ft.) Rotator $99.00
U-100 Small Rotator 45.00
ASTRON
RS7A 5-7 Amp Power Supply $49.00
RS10A 7.5-10 Amp Power Supply 59.00
RS12A 9-12 Amp Power Supply 69.00
RS20A 16-20 Amp Power Supply 89.00
RS20M 16-20 Amp w/meter 109.00
RS35A 25-35 Amp 135.00
RS35M 25-35 Amp w/meter 149.00
RS50A 37-50 Amp 199.00
RS50M 37-50 Amp w/meter 225.00
AZDEN
PCS 4000 2M Xcvr $280.00
PCS 300 Handheld 275.00
B&W
Folded Dipole 80-10 Meter $135.00
BENCHER
BY-1 Paddle/BY-2 Chrome ..... $36.00/$45.00
ZA-1-A Balun 16.50
BUTTERNUT
HF6V 80-10 Meter vertical $119.00
CUSHCRAFT
A3 Tribander 3 EL $179.00
A4 Tribander 4 EL 225.00
214FB Boomer 14 EL FM 69.00
32-19 Super Boomer 19 EL 2M 89.00
ARX-2B Ringo Ranger II 2M 39.00
DAIWA
CN 520 1.8-60 MHz SWR/Pwr Mtr. 63.00
CN-620B 1.8-150 MHz SWR/Pwr Mtr. 110.00
DRAKE
TR7A Xcvr $1,375.00
R7A Receiver 1,349.00
TR5 Xcvr 675.00
12 inch Green Monitor 135.00
ENCOMM (SANTEC)
ST-144/μP ..... call
ETO
Alpha 78 ..... $2,495.00
HAL
DS3100/MPT/ST6000 ..... $2,825.00
CT2200/KB2200 ..... 949.00
HY-GAIN
Explorer 14 Tribander ..... call
TH7 DXS 7EL Tribander $375.00
TH5 MK2S 5EL Tribander 319.00
V2S 2 Meter Vertical 39.00
Ham IV 15 sq. ft. Rotator 195.00
T2X 20 sq. ft. Rotator 249.00
ICOM
R70 General Coverage Receiver $629.00
720A General Coverage Xcvr 989.00
740 Xcvr/Pwr Supply & Rebate 945.00
730 Xcvr 645.00
2AT 2M Handheld 215.00
3AT/4AT Handhelds 235.00
25A new display & mic 305.00
25H 45W Mobile 349.00
290H 2M All Mode 479.00
271A 2M All Mode ..... call
KLM
KT34A 4EL Triband Beam $305.00
KT34XA 6 EL Triband Beam 465.00
144-148-13LBA 2M Long Boomer 79.00
KANTRONICS
The Fantastic Interface for CW, RTTY, ASCII
Software available for VIC 20, VIC 64, APPLE, ATARI, TR80C & TI99. Call for package pricing.
LARSEN
NLA-150-MM 5/8 Wave 2M Mag. Mt. $39.00
MFJ
989 3KW Roller Inductor Tuner $280.00
941C Tuner 81.00
900 Tuner 45.00
313 VHF Conv for HT 36.00
MIRAGE
B1016 ..... 239.00
B3016 ..... 199.00
ROHN
25G $42.00
SHURE
444D Desk Mic $50.00
414A Hand Mic 36.00
TEN-TEC
New 2M Handheld ..... call
Corsair Fantastic Rig! ..... call
Digital Argosy $539.00
2KW Tuner Kit 185.00
TOKYO HY-POWER
HL30V 25W Amp $63.00
HL82V 80W Amp 139.00
HL160V 160W Amp 289.00
HC2000 2KW Tuner 289.00
YAESU
Now in stock. Call for Prices

Send SASE for Our New & Used Equipment List
Prices are FOB Evansville



MBV Antenna Tuner

NYE VIKING 3KW MASTER TUNER

Maximize Power Transfer . . .
Match your transmitter output impedance to almost any antenna system for maximum power transfer.

3KW Matchbox . . .
Low Pass Pi Network tuning — 1.5 to 30MHz. Heavy duty, silver plated continuously variable inductor with 25:1 vernier tuning. 7000 volt variable capacitor and 10,000v switch selected fixed capacitors on output side. Tunes 40 to 2000 ohm antennas.

Automatic SWR . . .
Hands free metering of SWR. No reset or calibration needed. Separate power meter — 300 or 3000 watts. Easy to read 2½" recessed, backlighted meters show SWR and power continuously.

Antenna Switch . . .
Pushbutton antenna switching to 4 antennas (2 coax, single wire and twin lead). Tuner bypass on one coax output. We designed this rugged switch to handle the power.

3KW Balun . . .
Trifilar wound, triple core torroid gives balanced output to twin feeders from 200 to 1000 ohms and unbalanced output down to 20 ohms.

Model No. MBIV . . .
MBIV-01 available without antenna switch and backlighting. Double torroid available as optional equipment (MBIV-02).

You Also Get . . .
■ Harmonic Suppression ■ Receiver Impedance Matching ■ Heavy Gauge Aluminum Cabinet Shielding ■ Nye's TWO YEAR Warranty.

Available at Leading Dealers.

WM. M. NYE COMPANY
1614-130th Avenue N.E.
Bellevue, WA 98005
(206) 454-4524

WE BUILD IT SO YOU CAN BRAG ABOUT IT!

Bencher 1:1 BALUN

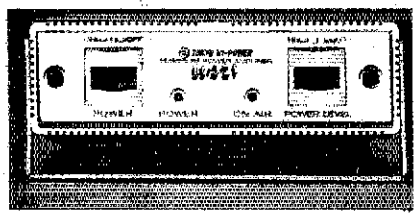
- Lets your antenna radiate, not your coax
- Helps fight TVI—no ferrite core to saturate or re-radiate
- DC grounded—helps protect against lightning
- Heavy brass contact posts; non-rusting materials throughout
- May be used with antenna tuners; rated 5KW peak
- Handles substantial mismatch at legal limit
- Built-in center insulator; Amphenol® coax connector
- Rugged UV resistant custom Cycolac® case, not plastic plumbing parts

ZA-1A $17.95
3.5-30 mHz

ZA-2A $21.95
14-30 mHz, with hardware for 2" boom

Available from your dealer in U.S.A. add $2.00 handling

BENCHER, INC.
333 W. Lake St., Chicago, IL 60606
(312) 263-1808



HL-32V VHF AMPLIFIER — The first of our super compact amplifiers for use with handheld radios. For VHF operations, this unit produces up to 25W output with drive from your 0.5W to 3W handheld. Low insertion loss on receive and selectable power level design provide low VSWR to the transceiver.

Excellent for mobile use in snuggly fitted smaller cars, this little beauty can be stowed under the seat, out of sight and out of mind.

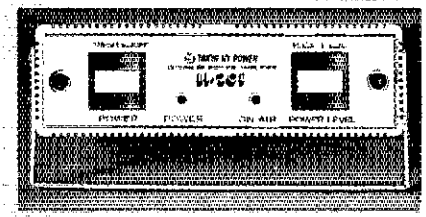
The HL-32V operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only $89.95 Suggested Retail!

Meets or exceeds FCC specifications.

TOKYO HY-POWER LABS, INC.

For catalog, send QSL card to
Department Q
2000 Avenue G, Suite 800, Plano, Texas 75074

All stated prices and specifications subject to change without notice or obligation.



HL-20U UHF AMPLIFIER — This is another super compact from THL, and it's beautiful, with the controls on the brushed metal face panel to make operations as easy as touch and go.

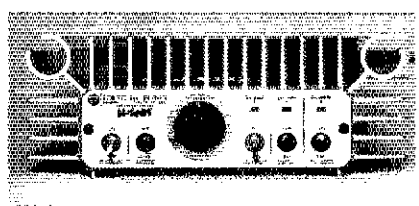
The ultra-compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to provide a big 20W output signal. Fixed antenuator design allows for full output from as low as 200mW drive.

Your UHF handheld operations have never experienced anything like this surprising little amplifier. $119.95 Suggested Retail

TOKYO HY-POWER LABS, INC.

For catalog, send QSL card to
Department Q
2000 Avenue G, Suite 800, Plano, Texas 75074

All stated prices and specifications subject to change without notice or obligation.



HL-160V VHF AMPLIFIER — This is our big 160W 2 meter linear amplifier which can work with a radio of 10W or even 3W output. This setup is achieved with a pair of rugged VHF R.F. transistors, using highly reliable one-board construction, and with the HL-160V's built-in 12db MOS-FET preamp.

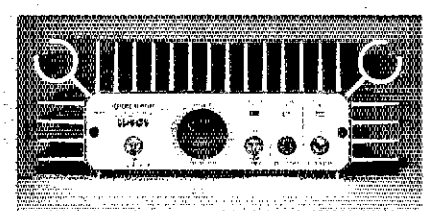
The HL-160V has convenient front panel controls and select switches, LED indicators and a very reliable RF wattmeter. This big amp works SSB, CW, FM and AM modes, and it has a true coaxial relay on the output side.

When you need the power, the HL-160V is the power you need. $349.95 Suggested Retail.

Meets or exceeds FCC specifications.

TOKYO HY-POWER LABS, INC.

Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL



HL-90U UHF AMPLIFIER — Our new 80W output big-power UHF amp, with GAS-FET preamp and drive requirements as low as 10W, is designed for the 70cm amateur band.

It features stable and powerful amplification along with excellent linearity, which is especially effective on SSB. With its built-in receiver preamp, the HL-90U enables you to enjoy more comfortable DX QSO's. Accurate output power can be read with the built-in precision directional coupler, and power can be reduced by one half by the power level switch.

The HL-90U works FM, SSB, and CW, it provides a remote control terminal, and it comes to you for $389.95 Suggested Retail.

TOKYO HY-POWER LABS, INC.

Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

ONN (Mar.)	152	39	27	6:30 P.M.	3.708
OSN	318	123	30	6:10 P.M.	3.577
OSSBN	2630	983	90	10:30 A.M., 4:15&6:45 PM.	3.9725
OSSN	210	81	29	6:45 A.M.	3.577
O6MN	424	22	30	9:00 P.M.	50.160

As I've mentioned before, Ohio went on the new section program effective Jan. 1, 1983. I've been remiss in not introducing our new section-level leadership appointees before now. If you'll glance above, you will see whom we have in Ohio. Our SEC, K8AN, and STM, K8OZ, carry on with their responsibilities. Joining them are K8US as Affiliated Club Coordinator, KB8MU as Technical Coordinator, and N8CVK as Public Information Officer and pinch-hitting as State Government Liaison. You will be hearing from them all, and they'll welcome your questions. K8AN performed his usual organizational magic with the ARES forum at the Dayton Hamvention. It was very enjoyable. Incredibly, K8AN had door prizes left over after his drawing! This is not a reflection on attendance; it's a reflection on his well-known super-generosity. It was good seeing so many new and old friends at the Hamvention. But I was also sorry to miss others owing to meetings and forums scheduled in conflict. One of life's unavoidable problems. Even before my plea for more club newsletters last month, more arrived, including a super job from the Portage ARC. (Pres. WD8MPV is also EC Portage Co.; and editor is Jole, KJ3O/8.) Also another blockbuster from those Buckeye Belles. Terrific job! Hope everyone is honing talents for this year's weather problems — tornados have already hit. (Including the Cuyahoga Co. for Pete's sakes! We don't have tornados, do we?) K8YUW N8CIX WA8NVW WD8PYV and many others showed how a Skywarn operation should be run. Let's hope it's the only one. Upgrades: to Extra — N8CIS and N8CWU. Congrats to you both!

Local Nets	QNI	QTC	Sess.
ALERT	50	3	4
BARF	114	83	23
BRTN	230	149	30
COARES	101	3	3
Medina Co.	309	45	30
NEON	132	42	28
NCTW	16	8	8
RARA	60	5	4
TSRAC	1034	65	37
VWCEN	37	2	4

Traffic: K8NCV 716, WD8MIO 504, WA8GMT 398, WD8KFN 281, K8OZ 273, W8QZK 228, KA8MEB 211, K8YUW 199, AB8P 184, K8JDI 174, N8DSU 173, KA8NFD 170, N8EES 153, KA8GJV 134, WB8DMF 128, WB8UBR 128, KF8J 123, W8SKP 98, K8DL 92, WB8JGW 83, WD8KBW 81, K8EM 80, WD8IKC 79, KA8IAF 73, N8BQK 72, W8UPD 72, KA8ICB 60, W8EK 56, WA8SSI 55, W8WEG 54, N8AKS 48, WD8RGP 47, N8CWU 43, WD8NEC 43, K8AN 42, W8MOK 41, N8EPC 39, K8TVG 34, WB8HHZ 33, WB8SIQ 32, W8TXV 29, WD8JAJ 26, WB8MRL 25, KV8Q 25, WA8HED 24, W8BHL 23, KA8GGZ 23, WD8RGZ 21, WB8AWM 20, WA8DYX 20, WD8DOS 19, K3RC 19, N8NJQ 18, N8EPD 17, WA8QYJ 17, N8CJS 16, KA8DJZ 16, KC8JV 16, KW8X 15, K8VOY 14, KC8JI 12, WB8KWD 12, N8CW 11, KA8GMF 9, WB8VOA 9, W8ZM 9, WD9HDZ 8, WB8HNV 8, WA8ZID 8, K8DCK 7, WD8RGS 7, WD8EKI 6, WB8NTR 6, WA8RUQ 6, WD8AYH 5, W8LZE 5, WD9ODV 4, N8AJU 3, N8CGM 3. (Mar.) W8WEG 100, WA8HGH 81, N8AUH 62, W8ZM 17, WA8QYJ 15, W8LZE 5, KA8DGO 3.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK — STM: WA2SPL. ACC & SC: N2BFG. BM: WB2EAG. CLUBS: Albany ARA had Director W2IHA and Vice Director WA2DHF speak at the May meeting. Also gearing up for communications for Special Olympics weekend before Field Day. Communications club of New Rochelle recently had WA2DHF speak on No-Code. Overlook Mtn. ARC operated a special events station to celebrate 300th birthday of Ulster Co. Also with Ulster, RACES provided communications for a 10K race the same weekend! Rip Van Winkle ARS reports that assistance was provided when a toxic spill from a tank car occurred in the area. Schenectady ARA had K1ZZ speak at May meeting. Reports new members KA2RME KA2QYF W2CJO WA2TQK KA2PCE W2FQG. Westchester ARA and W1OD from ARRL Technical Dept speak at May meeting. Westchester ECA had presentation on various computers and how they can be used in the ham shack. New info: EPN QNI 225; NYS 1036; NYPON 653; ESS 459. Best of luck to all on Field Day! All affiliated clubs: fill out and send in your forms for special service clubs-only one received so far, from PEARL. BPL: WA2SPL. PSHR: K2ZM WB2MCO WB2VUK KC2TF W2BIW W2YJR AK2E K2ZVI W2PKY KA2MBP. Traffic: WA2SPL 691, WB2MCO 326, K2ZM 222, WB2EAG 188, AG2X 121, W2BIW 110, KC2TF 96, W2PKY 81, WB2VUK 81, K2ZVI 65, WA2JQL 58, W2YJR 46, AK2E 44, KA2MBP 42, WB2OHR 34, WA2JBO 31, AA2Y 25, WA2CJY 25, WA2TBM 21, N2BFG 19, K2HNW 19, WB2SON 16, N2AWI 12, W2SWA 11, K2DW 3.

NEW YORK CITY—LONG ISLAND: SM, John H. Smale, K2IZ — SEC: WA2KKJ. STM: K2GCE. ACC: WB2IAP. OO/RFI: WA2PMW. TC: W2JUP.

NLI CW*	3630	1900/2200	W2LWB
NLIPN*	3928	1815	KS2G
NCVHF	6.145/7451	930 M-F	K2MT
SCVHF	4.77/5.37	2030 M-F	WA2ARC
BAVHF	6.07/67	2000 M-F	N2BQD
ESS	3590	1800	W2WSS
NYS	3677	1900/2200	N2APB
NYS	7077	1000 M-S	WB2EA

*Denotes section net; all times are local; please try and help out by checking in whenever possible. WB2IAP has been appointed Affiliated Club Coordinator (ACC). He will be getting in touch with the various clubs soon. Please give him all the support you can. K8YUW says the Hurricane Net will operate on 14,325 MHz when and if needed. WB2PYC has been appointed an OBS. He also runs "Pirates Cove" on 516-698-4008; speed is 300 bps. look for bulletins and other ARRL info. Radio Central will hold their indoor flea market on Sun. Nov 27 at Temple Isaiah of Stony Brook. For more info, contact K2RPZ. The following members of Radio Central provided back up communications for St. Charles Hosp. while their telephone system was being modified: N2DIA KA2DRR WB2FXN KA2HMJ KC2KU W2MZO K2VL K2YYM. Metroplex celebrated its 5th anniv. W2AHV was high QNI for NLI CW (early) and W2LWB was high QNI for late sessions. New Extra call in the Wantagh ARC is KZ2M. New members for Grumman ARC: WA2LOM W2QKW WB2YDS W2EAR KA2RAC W1HTL. Gt. South Bay ARC collected $70 which was forwarded to Handi-Ham. If anyone is interested, con-

AMATEUR ELECTRONIC SUPPLY - USED GEAR

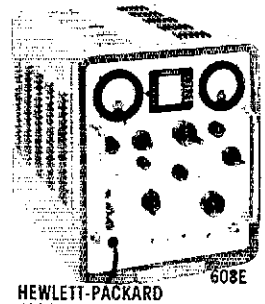
★ ***10 day Trial (pay only Shipping Charges)***
★ ***30 day Warranty***
★ ***Full Trade-in within 3 months on New Gear***
★ ***Mastercard or VISA welcome - Call Today!***

AMECO
PT-2 Xcvr preamp $ 59 w
CLIFFORD
XXRD 20A DC ps $ 89 e
COLLINS
75S-1 Ham Rcvr $199 mwtc
75S-3 Ham Rcvr 299 mwc
75S-3B Ham Rcvr 349 mf
75S-3B Rcvr (round) 399 mf
32S-1 Transmitter 199 mwf
32S-3 Transmitter 349 mtc
312B-4 Station control 199 mf
KWM-2 Xcvr 450 f
516F-2* AC supply 149 mtcv
*Not sold separately
516F-1 KWM-1 DC ps 69 m
DENTRON
GLA-1000B Linear $239 f
MLA-2500 Linear 589 f
Clipperton L Linear 469 m
HF-ACS 10A 12v ps 39 m
W-2 Wattmeter 69 c
DRAKE
2C Ham Rcvr $149 w
2CS Speaker 19 w
R-4A Ham Rcvr 169 wv
R-4B Ham Rcvr 249 m
R-4C Ham Rcvr 289 mwtv
MS-4* Speaker 19 all
*Sold with Rcvrs only
4NB Noise blanker 49 m
FL-250 Filter 35 m
FL-500 Filter 35 mw
FL-1500 Filter 35 mw
FL-6000 Filter 35 m
R-7 SW Receiver 899 me
R-7/NB/300/500Hz filts 999 c
R-7/.3/.5/1.8/4 filts 999 t
T-4X Transmitter 169 wc
T-4XB Transmitter 249 f
T-4XC Transmitter 289 wf
TR-4 Xcvr 229 mwtc
TR-4C Xcvr 299 mwte
TR-4CW Xcvr 369 m
TR-4CW/RIT/blanker 469 w
34PNB Blanker 49 f
RV-4 Remote VFO 69 w
RV-4C Remote VFO 89 f
TR-6/NB 6m Xcvr 399 m
AC-3 AC supply 59 m
AC-4 AC supply 89 all
DC-4 DC supply 69 mf
TR-7 Xcvr 799 m
TR-7/300/500 Hz 869 m
TR-7/NB/fan Xcvr 929 m
TR-7/NB/500 Hz filter 869 w
TR-7/fan/NB/500/1.8 899 v
TR-7/fan/warc/.5/1.8/aux 899 f
TR-7A/fan/1.8 KHz filter 1099 m
PS-7 Power supply 199 mtv
PS-75 Power supply 119 m
MN-75 Tuner 149 f
MN-2700 Tuner 229 m
RV-7 Remote VFO 129 wve
SP-75 Speech proc 89 mf
HAL
ST-6000 Demod/keyer $449 m
RVD-1002 Video conv 169 m
DS-3000KSR Term vers 2 599 m
DS-3000KSR Term vers 3 699 me
RKB-1 RTTY keyboard 89 m
RS-2100 RTTY scope 199 v
HENRY RADIO
PS-1220B 20A ps/2m amp $189 w
ICOM
IC-701 Xcvr w/ps $599 c
IC-701PS AC ps 99 wc
IC-720 Xcvr 699 m
IC-730/aud filt/pb/.5/mark 689 f
PS-20 Power supply 159 mt
IC-740 Xcvr/PS-740 ps 799 m
PS-740 Internal ps 119 m
IC-2KL Linear amp 1049 f
AT-500 Tuner 299 f
IC-551D 80w 6m Xcvr 469 m
IC-560 10w 6m Xcvr 329 m
IC-260A 2m Xcvr 269 m
IC-22S 2m FM Xcvr 119 f
IC-215/BC-20 2m port 119 m
IC-202S 2m SSB port 199 m
IC-3PA AC supply/spkr 35 f
KLM
Echo 70 432 SSB Xcvr $259 m
KANTRONICS
Field Day 2 Reader $159 f
KENWOOD
R-599A Ham Rcvr $199 wf
R-599D Ham Rcvr 229 e
T-599D Transmitter 299 fe
TS-130SE Xcvr (no fan) 449 v
PS-30 20A power supply 99 v
PS-20 4.5A ps 49 f
DFC-230 Dig freq cont 129 fe
DFC-230 (new close-out) 169.95 all
TS-180S/DFC Xcvr 569 m
TS-180S/DFC/CW filter 599 f
VFO-180 Remote VFO 99 c
TS-520 Xcvr 449 wv
TS-520S Xcvr 469 wc
TS-530S Xcvr 529 m
SP-230 Speaker 49 w
TS-820/DG-1 Dig Xcvr 549 v
TS-820S Xcvr 569 f
VFO-820 Remote VFO 129 f
BS-5 Pan kit (520/S) 49 w
R-820 Ham receiver 599 mv
TV-502 2m transverter 169 c
TV-502S 2m transverter 189 m
TV-506 6m transverter 169 m
TS-600 6m Xcvr 449 m
VFO-700S Remote VFO 49 m
TR-7625 2m FM Xcvr 189 we
TR-2400 2m FM HT 199 we
MFJ
525 Speech processor $ 69 w
941C Ant tuner 59 m
1020 Active rcv ant 49 w
MACROTRONICS
TA-650 Interface/Apple $229 m
T-2 Terminall/Apple II 329 m
MICROLOG
AVR-2 Demodulator $229 mve
AKB-1 Keyboard 129 e
ACT-1 Terminal 599 v
MIDLAND
13-510 2m FM Xcvr $169 w
MIRAGE
B-23 2/30w 2m amp $ 59 w
MOTOROLA
T-1670A AC supply $ 69 m
NPC
LR-16 10A power supply $ 69 m
104R 4A power supply 29 m
NYE VIKING
SSK-1K Keyer/paddle $ 69 m
046-001 Phone patch 39 m
PALOMAR
PT-2500 Tuner $199 w
PANASONIC
RF-2200 SW receiver $ 99 w
RF-2600 SW receiver 129 e
RF-2900 SW receiver 169 we
RF-6300 SW receiver 349 w
TR-9309" B & W monitor 119 v
RCA
TC-1501/16 Camera $149 m
ROBOT
70 Monitor $169 m
80 Camera 119 w
80A Camera 149 m
400 SSTV conv 329 m
SONY
ICF-2001 SW receiver $149 mwe
SWAN/CUBIC
Astro 150 Xcvr $489 m
PSU-5 AC supply 89 m
PSU-6 AC supply 129 f
PSU-6A AC supply 129 m
P-1215 AC supply 19 m
270 Cygnet Xcvr 199 w
500C Xcvr 249 m
500CX Xcvr 269 m
250 6m Xcvr 149 f
117C AC supply 65 v
117XC AC ps/spkr 99 mtc
412 DC supply 29 m
Mark II Linear 569 m
TEMPO
Tempo One Xcvr $249 m
AC/One AC supply 89 m
VF/One Remote VFO 89 m
TEN-TEC
509 Argonaut Xcvr $269 f
208 CW filter 19 m
210 AC supply 19 f
405 Linear 129 f
570 Century 21 Xcvr 249 f
276 Calibrator 19 m
540 Triton IV Xcvr 299 mw
244 Digital display 79 w
580 Delta Xcvr 499 mtv
580/NB/250 Hz filter 549 m
580/NB/500 Hz filter 549 m
283 Remote VFO 129 m
546 Omni D series B 489 w
546C Omni D series C 649 mv
252G AC power supply 79 m
262G AC ps/VOX/spkr 89 w
280 Power supply 99 m
255 Deluxe supply 129 v
234 Speech processor 79 m
247 Ant tuner 49 w
229 Ant tuner 189 w
670 Keyer 19 m
645 Keyer 39 w
215PC Microphone 25 v
216 Microphone 15 m
USI
PI-2 12" grn monitor $119 m
YAESU
FR-101S/FC-6/FM det $289 m
FR-101dig/6/2m/cw/am 349 w
FT-101 Xcvr 399 w
FT-101E Xcvr 499 m
FT-101E/CW filter 529 m
FT-101EX Xcvr 469 f
FT-101ZD Dig Xcvr 549 w
FV-101B Remote VFO 99 m
FT-301 Xcvr/AM/CW filts 369 m
FP-301 AC supply 99 m
FT-7 20w Xcvr 299 m
FP-4 Power supply 29 m
FT-901DM Xcvr 659 m
FV-901DM Remote VFO 249 v
YO-901P Monitor scope 349 m
FT-107M/DMS Xcvr 599 w
FT-107M/DMS/CW/int ps 699 m
FT-107M/dms/warc/int ps 749 f
FP-107E External ps 99 w
SP-107P Spkr/patch 35 mf
FC-107 Ant tuner 99 w
FT-102 Xcvr (like new) 789 m
FC-102 Ant tuner 199 f
FT-707 Xcvr 469 m
FV-707DM Remote VFO 189 w
FTV-707 Xvtr w/2m 189 w
FT-980 Xcvr (like new) 1199 e
FT-ONE Xcvr 1499 m
FL-2100F Linear 399 m
FRG-7000 SW receiver 279 v
FRG-7700 SW receiver 329 f
FRT-7700 Ant tuner 39 fe
FRV-7700F VHF rcv conv 89 f
FT-625RD 6m Xcvr 449 w
FT-690R 6m portable 249 m
FT-221 2m Xcvr 299 f
FT-480R 2m Xcvr 349 m
CPU-2500RK 2m FM/TTP 199 m
FT-720RVH 2m FM Xcvr 199 m
FT-720RVH/ttp/pl/cable 249 f
FT-720RVH/440/box/cables 399 f
FT-230R 2m FM Xcvr 229 m
FP-80 4.5A ps 69 v

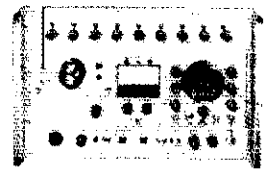
5-24-83

(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. (2) We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment special, Closeouts, etc.

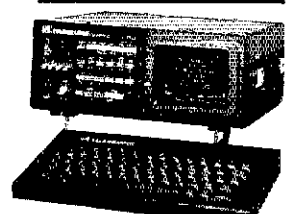
USED AES SHOP TEST EQUIPMENT



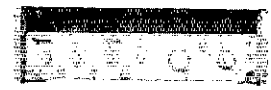
HEWLETT-PACKARD
608E 10-480MHz sig gen 1895
606A .05-65MHz sig gen 895



SINGER-GERTSCH
FM-10CS w/RFM-10A, FIM-3 & ODM-1 4995
OAM-1 AM module for FM-10C 295



HAL CWR-6850
Portable terminal/5"CRT & keyboard
Regular $995 - ***Sale $849.95***



HEWLETT-PACKARD
8640B .5-1024Mhz sig gen with options 002/003 5895
11710 10Khz-11Mhz down converter for 8640B 895

HYGAIN
ANTENNA/TOWER/ROTOR
Package Deal
E-X-T-E-N-D-E-D
until July 31st. 1983
See AES/Hy-gain ad on page 141, June QST

YAESU - New Close-Outs
FV-101Z 101ZD/902 ext VFO 129.95
FV-101DM 101ZD scan VFO 199.95
FV-901DM ZD/902 scan VFO 249.95
SP-107P FT-107M spkr/patch 45.00
SP-901P ZD/902 spkr/patch 59.95
FT-707 8-band digital Xcvr 599.95
FT-627RA 6m FM Xcvr 299.95
FT-680R 6m ssb/tm/am Xcvr 389.95
FT-720RU 10w 440 FM Xcvr 299.95
FT-404R/TTP 440 FM HT 189.95

TOP TRADES
toward NEW Equipment for Clean, Late Model SSB and FM Ham Gear
Contact AES Today for your Quote
Sorry we do not take in trade Hand-Helds, FM amplifiers or Kit Wired equipment.

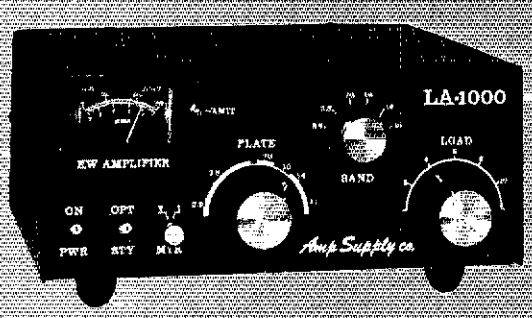
Location	Local Phone	Nationwide	In-State
m = Milwaukee, WI 53216; 4828 W. Fond du Lac Ave	(414) 442-4200	1-800-558-0411	1-800-242-5195
w = Wickliffe, OH 44092; 28940 Euclid Ave	(216) 585-7388	1-800-321-3594	1-800-362-0290
f = Orlando, FL 32803; 621 Commonwealth Ave	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = Clearwater, FL 33575; 1898 Drew Street	(813) 461-4267		
v = Las Vegas, NV 89106; 1072 N. Rancho Drive	(702) 647-3114	1-800-634-6227	
e = Chicago, IL Erickson Communications (Associate)	(312) 631-5181		

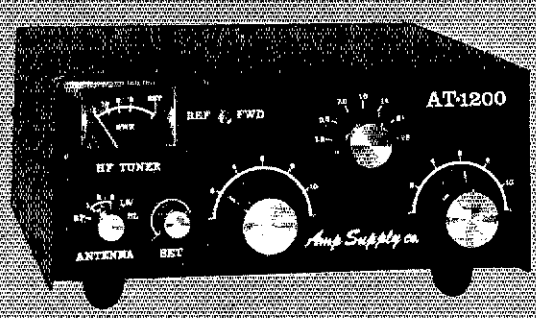
MasterCard VISA

THE AMPLIFIER CHOSEN BY IDXF

The Amp Supply LA-1000 was chosen by the International DX Foundation as the amplifier to be used in 1983 expeditions. The first DX-peditions with the LA-1000 were Heard Island and Nepal.

Heard Island's forbidding and desolate sheer black cliffs tower above the sea, layered alternately with black rock and glacial ice. The terrain is rugged and demanding, certainly not for the timid. The amateurs on this expedition needed amplifiers that were equally as rugged, dependable, and powerful.





Now you can own the LA-1000 and discover why it is so popular with DX-peditions. It's a compact (22 pounds) portable kilowatt featuring its own solid-state power supply and QSK full break-in. In addition, the LA-1000 covers the new WARC bands, and uses four inexpensive 6MJ6 tubes in the final.

One of the best features of the LA-1000 is the price. At $349.50 you'll love it when you buy it, you'll love it when you use it, and you'll love it if you ever sell it.

The perfect companion for the LA-1000 is the AT-1200 antenna tuner. It covers 1.8 - 30 MHz, features an antenna selector switch, and built-in SWR bridge. The AT-1200 will match just about any antenna impedance to a 50 OHM resistive load, and has a power capability of 700 watts average continuous duty, 1200 watts PEP.

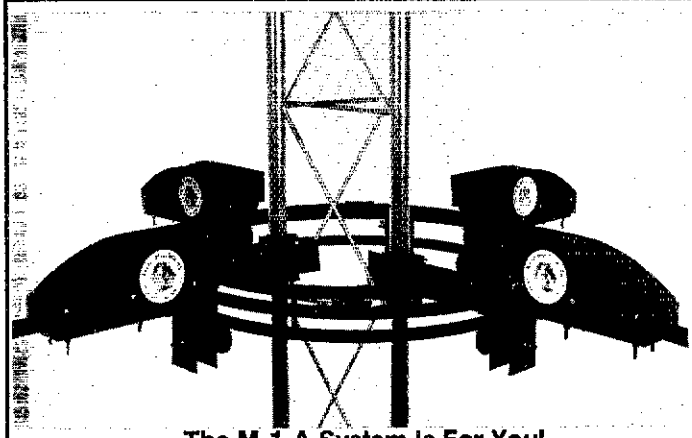
LA-1000 $349.50

Order direct from
Amp Supply Co.
P.O. Box 421
Twinsburg, Ohio 44087
216-425-2010

AT-1200 $159.50

Postpaid in Continental U.S.

MasterCard VISA



POLAR RESEARCH, INC.

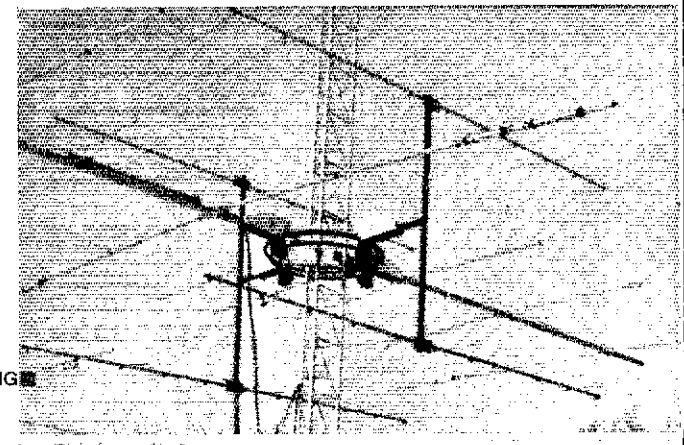
Rotating Antenna Mount M-1-A

for those who would like to have—

- A system which eliminates top mast mounted cluttering, inaccessible arrays, & top-heavy arrays.
- Independent antenna rotation control of HF, VHF, & UHF arrays at any elevation on the same tower.
- Maximum utilization of entire tower structure, not just the top, along with equalization of loading forces.
- 360 degree rotation with reduced interference to antenna pattern from the mounting structure. Unobstructed "view" for arrays at all angles of bearing.
- Elevation rotators for VHF/UHF antennas optional.

The M-1-A System Is For You!

- Segmented rings break apart to facilitate bracketing to all standard & telescoping towers up to 22" face width. Custom bracketing available for other supporting structures; telephone poles, masts, etc.
- Flexible & configurable! Examine the picture which illustrates one method of mounting & rotating a six element HF beam and a 44 element two-meter array on a single mount.
- Operates from 110VAC/12VDC. Perfect for mobile or emergency operation. System driven by two 12 VDC, gear-motors for safety & simplicity.



POLAR RESEARCH, INC. THIEF RIVER FALLS, MINNESOTA, U.S.A.

U.S. AND FOREIGN PAT. PENDING

Polar Research, Inc.
P.O. Box 781
Thief River Falls, MN 56701

CALL NOW!
(218) 681-7413
(800) 328-2041

tact WB2PJA or WA2HQB. N2CYU KC2DH and W2CJN are running a "slow fist net" on 21.150 MHz at 1900 local on Mon. and at 1930 local on Thur. Listen for "CQ SFN." KA2JMA is now the adviser for Explorer Post #521. K2MT is now an ORS and OVS; he is also looking for people to fill the NCS slots on the Nassau Co. VHF net. KS2G is also looking for stations to fill the slots on the duty roster for the NLI Phone net. Traffic: W2AHV 219, N2AKZ 176, K2MT 104, K2GCE 69, WA2ARC 66, W2DBQ 46, W2GKZ 42, K2IZ 26, KS2G 25, WB2BNA 12. (Mar.) WB2BNA 11.

NORTHERN NEW JERSEY: SM, Curtis R. Williams, W5DTR — SEC: WB2VUF. STM: W2XD. BM: N2BOP. ROC: W2CC. SGL: W2KB. PIO: WB2NQV. TC: AD7I. ACCs: KK2U KY2S. NMs: W2CC AG2R N2BNB KA2GSX KA2HNQ WB2IQJ KY2D N2XJ W2PSU.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJM	N2XJ	7063	1000 Dy	30	243	99
NJPN	W2CC	3950	1800 Dy 0900 Sn	34	—	—
NJSN	WB2IQJ	3735	1830 Dy	29	276	77
NJN/E	AG2R	3695	1900 Dy	30	410	220
TCETN	KA2GSX	147.255	1930 Dy	30	194	71
OBTTN	KY2D	147.12	2000 Dy	30	471	117
NJN/L	AG2R	3695	2200 Dy	30	343	139
NJVN	KA2HNQ	49/49	2230 Dy	—	—	—
NJRTTY	W2PSU	147.51	Autostart			

UPLINK NEWS NUMBER: 201-735-8550

The New Jersey Morning Net meets on 3695 when propagation is bad on 40 meters. W2XD reports 2RN cycle 2 needs more NNJ liaisons at 1345 on 7237 and at 1530 on 3930 (alt. 7237). The 24th annual NJ QSO Party sponsored by the Englewood ARA will be held from 2000 UTC Sat. Aug. 13 to 0700 UTC Sun. Aug. 14, and from 1300 UTC Sun. Aug. 14 to 0200 UTC Mon. Aug. 15. Details from Englewood ARA, P.O. Box 528, Englewood 07631. Your Affiliated Club Coordinators KK2U for the northern half and KY2S for the southern half of the section, are looking for any ARRL affiliated clubs in NNJ interested in becoming a Special Service Club. Remember reports should go to KB2WI, your new Section Manager effective July 1. A unique Amateur Radio news service is now available in the section thanks to PIO WB2NQV and PIA WB2ZHP. Dial 201-735-8550 for details and the latest news. Congrats to WB2NQV on upgrading to Advanced. The Sussex Co. ARC Hamfest will be held July 16, reports WA2LHX. The Cherryville RA supported the March of Dimes Walk-a-thon and on May 1 a double header — the YMCA River Ramble and Flemington Bike Races. A special congrats to this public service minded radio club. It has been a pleasure serving as your SCM and then your first Section Manager. I want to thank all your hard working section leaders who made my job bearable. Join me in supporting your new Section Manager, KB2WI, Bob Neukomm. Club newsletters should now be sent to him to help him keep up to date on your club activities. These newsletters were a big help to me, and I appreciate being on your mailing list — W5DTR. WA2KRZ has put a RTTY "mailbox" on 145.8 MHz, and discussed computer techniques at a recent meeting of the New Providence ARC — thanks *Mountain Spark Gaps Newsletter* PSHR: N2XJ KY2P W5DTR K2VX N2DPN KB2WI WB2GHN WB2KLF W2XD WB2QMP AG2R. Traffic: N2XJ 271, K2VX 219, AG2R 129, KY2P 127, W2RO 126, W2XD 107, KB2WI 86, WB2KLF 68, WB2GHN 61, N2DPN 57, W2ZEP 47, KA2GSX 43, W2UH 36, WB2QMP 35, W5DTR 29, W2RRX 17, W2CC 14, KX2L 10, N2EBA 8.

MIDWEST DIVISION

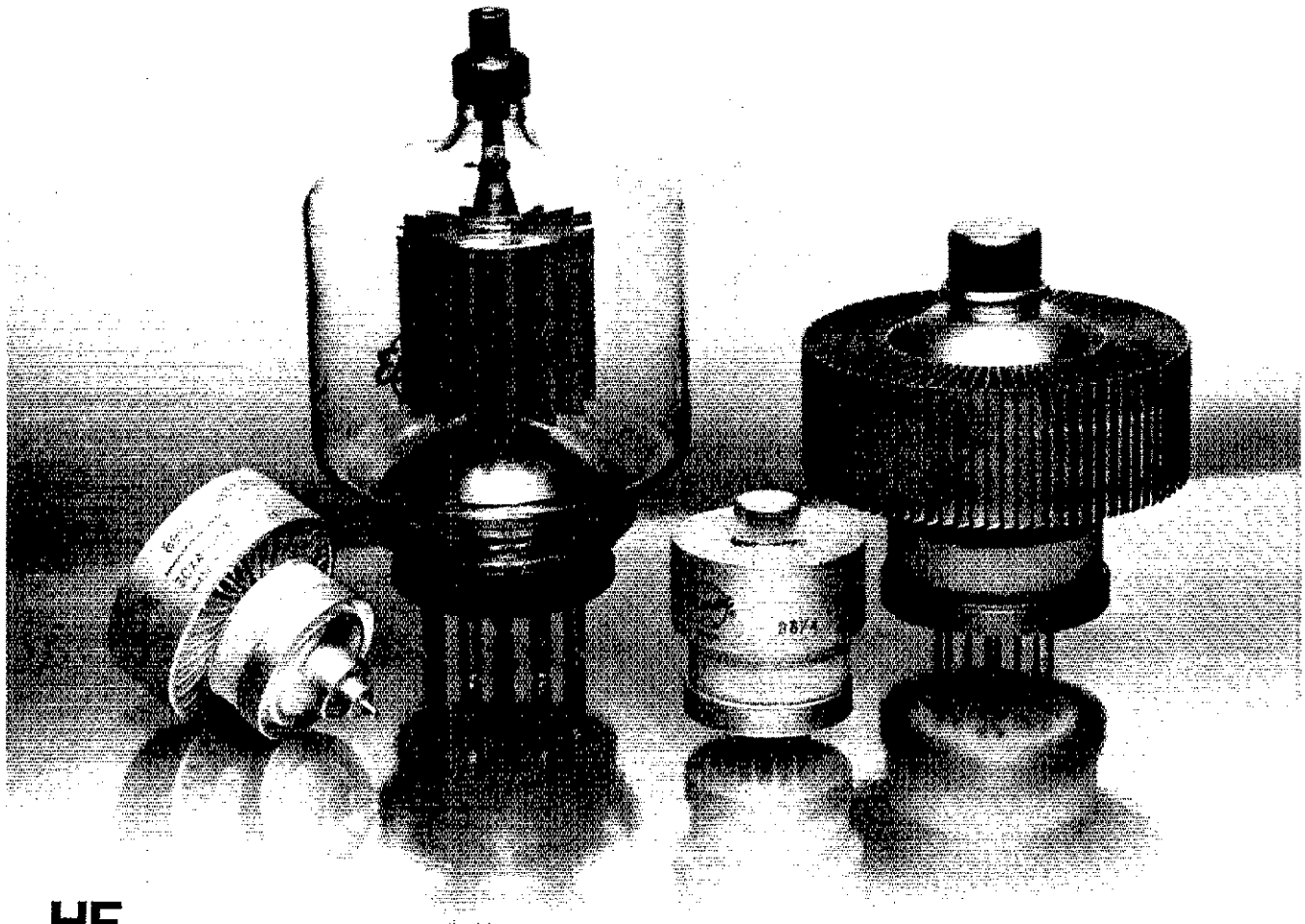
IOWA: SM, Bob McCaffrey, KØCY — SEC: WA4VWV. STM: KØGP. TC: KØDAS. BM: KØIIR. PIO: KBØZP. SGL: AKØQ. ACC: WBØQAM. Hats off the the ARES groups that participated during the foul wx that ravaged the section in May; good job. District 1 furnished generator for Pleasantnill public safety radio after tornado. Keep alert and assist your EC. WDØFOY new EC in Plymouth Co. New OBS are KCØKZ and WBØBGV. Tnx for your time. Both ssb/cw reps doing 100% to region; good job. Very disappointed in ICN becuz of poor support. If you have some ideas let KCØI or me know. This is a great training net and needs your support. WDØDOK/KAØJZF honored as "Neighbors of the Week" for their Amateur Radio activities. Two clubs have expressed interest in becoming SSCs. Are there more? Contact WBØQAM. The PIO has some PR tapes available, so if you can convince your local broadcaster to air them, let KBØZP know. WE can cover most of the state with OBS, so listen for regular bulletins. SEND ME YOUR HAPPENINGS. REMEMBER RAGBRAI!!!!

Net	Freq.	UTC	Dys	QNI	QTC	Sess.
75M Phone	3970	1730-2300	M-S	1144	129	52
TLCN	3560	2330-0300	Dy	331	105	60
ITEN	3970	2230	Sn	37	7	3
PM Net	3983	2230	M-F	95	0	16

Traffic: WAØAUX 286, WØSS 154, WØYLS 122, KØGP 119, WDØFWB 72, KAØADF 68, KØCY 62, W4JL 55, WBØJFF 42, KCØSC 39, NØEHV 38, WBØAVW 26, WA4VWV 22, KBØOZ 20, WØBW 17, KAØJQG 13, KEØY 9, WØFQ 8, KAØMHJ 2, KBØXY 2.

KANSAS: SM, Robert M. Summers, KØBXF — SEC: WØKL. STM: WØOYH. NM (cw): WBØZEN. NM (ssb): KAØCUF. Congrats are in order to WØKL who was recently elected to a 4-year term as a city commissioner of Ottawa. We all wish "Willie," XYL of WØCHJ the best on her recovery from recent illness. Computers seem to be the fad now, and the rptr around Hiawatha is being dominated by such talk according to WØPB. It appears that it won't be long before the Amateur Radio community will soon be responsible for the enforcement of rules and regulations set forth by the FCC. The responsibility could be TOTAL. The FCC may be involved only if the Dept of Justice is involved. Let us all shape up. Wichita ARC are planning for a river run and a Boy Scout show for forthcoming events. What are you and your club doing??? I missed the Division Convention; owing to the new League budget system, we could afford to send only one rep north. WØKL reported a fine convention turnout and programs. Be sure you get a copy of the new ARRL publication *THE FCC RULE BOOK*. It is a must for every station. Traffic: WØFRC 286, WBØZEN 158, WØHI 148, WØFIR 131, WAØLBB 123, KSØU 74, WØOYH 70, WØQMT 56, KØBXF 56, WØPB 51, WBØYLP 27, WAØTJU 22, KØGSC 15, WØCHJ 14, WØRBO 9, KAØE 2.

MISSOURI: SM, Ben Smith, KØPCK — The Central Missouri RA will underwrite the Amateur Radio booth at the Missouri State Fair this year. KT5Y and I will coordinate the operation of the booth. It takes both money and operators to run the state fair station. Any club or individuals wishing to contribute to the state fair station may send their contributions to CMRA P.O. Box 283, Columbia 65201. Anyone wishing to operate should contact KT5Y or me. The amateur station at the state fair is a great way to promote Amateur Radio in Missouri. It takes a lot of operators to run the station, so we need volunteers.



HF,
VHF,
UHF, Across the spectrum.
VARIAN EIMAC.

Ham operators know that EIMAC started in power tube development with the 150T in 1934. While the 150T is now a collector's item, EIMAC, a division of Varian, still holds leadership in power tube design with its 4CX250B, 8874, 3-500Z, 8877 and 3CX400U7; modern examples of EIMAC's continuing, innovative solutions to tough communication requirements.

EIMAC's proven power tubes are used in amateur service for heavy-duty, reliable performance in traffic; RTTY; SSTV; DX operation; VHF/UHF work; moonbounce, and exploration of the outer limits of communication techniques across the spectrum.

High quality and long life make EIMAC tubes the favorite choice of operator and equipment builder, amateur and professional alike.

For communication and research worldwide, choose EIMAC. For information on VARIAN EIMAC power tubes, call or write today. Or contact the nearest Varian Electron Device Group sales office.

VARIAN EIMAC
301 Industrial Way
San Carlos, California 94070
415•592-1221

VARIAN EIMAC
1678 S. Pioneer Road
Salt Lake City, Utah 84104
801•972-5000

VARIAN AG
Grienbachstrasse 17
Postfach
CH-6300 Zug, Switzerland
Tel: (042) 31 66 55
Telex: 845-78789

varian

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

Proven Success

Our best salesmen don't even work for Kantronics

Dear Sirs:

I am writing first of all to say how much I enjoy my Kantronics Interface and the software that I bought for my VIC-20 micro-computer. For a very reasonable price I have had a whole new world of amateur radio--not to mention some commercial tansmissions I have been able to copy--opened to me.

P.S.
Am #tickled pink"with this setup and having a ball. Thanks for a nice product !

Dear Phil:

I recently purchased a VIC 20 computer and your companies "Interface" and software for RTTY and CW and I must say it does a magnificent job. I have worked over twenty countries on RTTY on 15 and 20 meters in one month. The copy on CW is unbelievably excellent.. adding a new dimension to amateur radio for me. "You done good."as we say here in Tennessee.

I must tell you, I have the equipment in operation and it works super good! I think it is an outstanding piece of electronics.

Your directions f... CW state tha...

Gentlemen:

It's nice to find someone like you that responds to user suggestions - keep up the good work.

The Interface is available with software for six popular computers: Hamsoft is our original program for the Apple II, II+, or IIe; Atari 400 or 800; Radio Shack Color Computer, VIC-20, or Texas Instruments TI-99/4A. Hamtext, our advanced program, works with the Apple II, II+, or IIe; VIC-20, or Commodore 64.

The Interface and Hamsoft or Hamtext combination has put computerized communications at a reasonable price. Contact your local Kantronics dealer or write us for more information.

Kantronics

(913) 842-7745
1202 E. 23rd Street
Lawrence, Kansas 66044

Let's make the state fair amateur station a successful project of all Missouri amateurs. WØENW was presented by the Sedalia Chamber of Commerce the Outstanding Citizen Award. WØENW, who has been active in Red Cross and Civil Defense in his community, has also been active in RACES, section nets and other projects furthering the cause of Amateur Radio in Missouri. It's an award for a very deserving amateur. 1983 officers of the Table Rock Lake ARC are: WDØEAG, pres.; KØOGU, v.p.; KØPEG, secy./treas.; WØPH, PR officer. Happy birthday to WØEKK, who recently celebrated his 87th birthday, and who is still active on two meters. Congrats to OARS club members NØAQC on getting her Extra and to KAØPJE who received his license at the age of 9. Reports from Springfield indicate the amateurs in that community were ready and provided emergency communications during April 29 tornado. The St. Louis RC, Inc. is the latest club in MO to be approved for affiliation. Would like to see more MO clubs become ARRL affiliated. Contact ACC KT5Y for help. Field appointments for the past month: KAØOKS, PIA; NØDDZ, ORS. Callaway Co. amateurs, WBØPLY KAØCFX WØNUB and KSØM, were able to obtain health and welfare traffic from Popayan, Columbia, after the earthquake in the country. Teir help was very much appreciated by a Fulton, MO doctor whose family lives in Popayayn.

Net	QNI	QTC	Sess.	Mgr.
Mo. SSB	781	101	30	KT5Y
CMEN	137	2	6	KØPCK
St. Louis ARES	239	8	4	NØBKH
MTTN	180	9	22	NØDDZ
Jefferson City ARES	96	1	6	KCØSF

Traffic: KCØAS 530, KØSI 174, WØBMA 128, AIØO 128, KØPCK 101, WØOUD 50, KUØG 48, KT5Y 48, NØDDZ 43, WAØYJX 37, WA8MAZ 36, NØBLB 26, WBØSSB 26, WØNUB 24, NØSS 10.

NEBRASKA: SM, Reynolds Davis, KØGND — Lots to do this month! The Victoria Springs get-together is planned for July 30 & 31. Flea market, pot luck, and family campout all rolled together into a fun weekend! Let's see some Nebraska representation in the July 9-10 Radiosport contest. Nice to see the Lincoln club ran off with the honors among all entries in last ARRL "Sweepstakes." Hats off to KAØBWM, the first with 100 percent participation in both NE cw nets during April. Scottsbluff group helping with Don Child's Marathon & Oregon Trail Days parade July 14-15. Omaha's Aksarben club will tour the KFAB transmitter site July 29 before their meeting at the Bellevue Queen. Club news on the weekly Nebraska Section Bulletin. New appts: DEC-AJØA WDØBQM; EC-WØRAM; ORS-KAØBCB WØKK KAØBWM; OBS-WAØWRI. Traffic: KØDKM 82, WØKK 81, WØSGA 58, KAØBCB 49, WØHOP 29, KØIXY 20, KØGND 19, KAØBWM 18, WBØGWR 17, WØNIK 11, KAØELI 10, WØZNI 10, WAØBOK 9, WBØGMQ 8, WAØSCP 7, WAØPCC 6, KAØJLH 4, WØHTA 3, KØODH 2, KØTUH 2, WØWZR 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, KA1KD — SEC: K1WGO. STM: K1EIC. OO/RFI: KA1ML. BM: WA1DWE. TC: W1HAD. ACC: N1AZF. SGL: K1AH. PIO: WB1AIU.

Net	Freq.	Local Time	QTC	QNI
CN	3640	1900/2000	311	333
CPN	3965	1800/1000 Sn	148	285
NVTN	28/88	2130	69	277
WCN	78/18	2030	79	413
RTN	13/73	2100	94	265

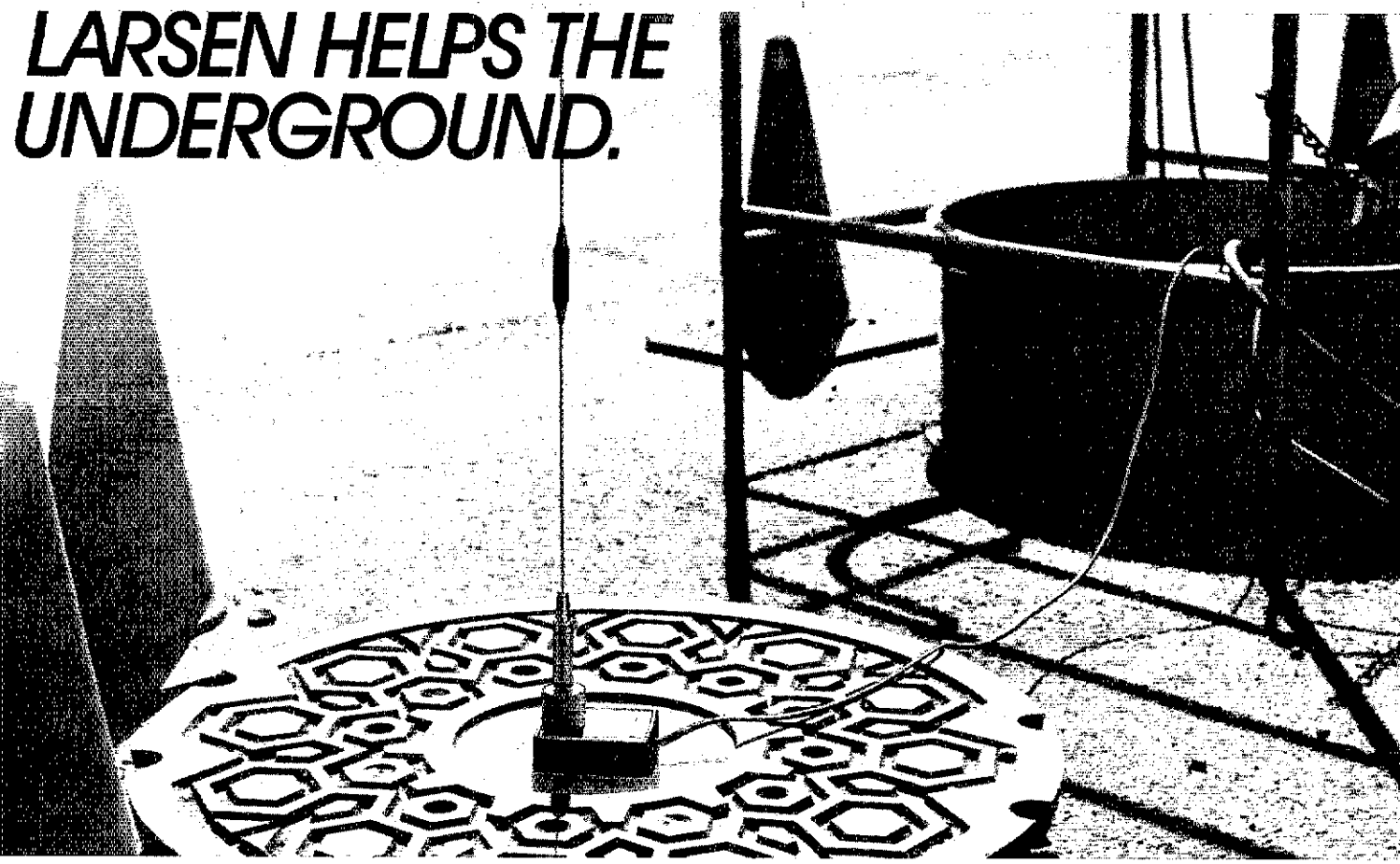
New OBS: KA1ECL. Everyone has been busy using their new found 20-meter phone privileges. Don't forget that the FCC is now accepting comments on future expansion on 10/15/80/40. WB1EMD has become a Silent Key. Welcome to the Connecticut DX Assn., our latest ARRL affiliated club. WA1GNA has finally worked all 300 districts in West Germany to qualify for a DARC award. N1AWP is back in CT after a two-year stay on the west coast. FARA sponsors RTTY net 146.55; KD1X for details. SCARA has been very busy on public service projects, providing communications for the Walk Against Hunger and for the March of Dimes WALK-AMERICA, both in the same month. SARA's rptr 146.655 has found a new home atop St. Joseph's Hospital. MARC members were recently treated to a fine presentation on sunspots by W1HDQ. W1CUT visited CARA to give a talk on the publication of *QST*. The new *Net Directory* is now being put together. All net managers please be sure to provide input to WB9IHH at Hq. FARA club provided communications for the town's annual Dogwood Festival. KA1GGT recently made his first satellite QSO. Tri-City ARC busy with communications for Expo 83. Bethel Middle School ARC has five more Novices on board. Summer is the time for antenna parties and maintenance checks. Be sure to keep safety uppermost in your planning. Aluminum ladders, safety belts, grounding systems, hard hats, utility power lines should certainly be considered when preparing to do your work. BPL: N1CLV. Traffic: W1EFW 388, WB1GXZ 380, N1CLV 221, WB2PJU 168, WB1ESJ 145, K1UQE 92, K1EIR 88, W1YOL 87, K1AQE 79, KA1BHT 56, KA1XG 45, K3ZJJ 31, W1BDN 29, W1CUH 12, W1QV 10.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: W1IAY. ASM: K9HI. ACC: K1AZE. OO/RFI & BM: WA4STO. TC: KA1IU.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	WA1LPM	3.658	1900/2200/Dy	527	468
EMRIPN	KA1GBS	3.959	1730/Dy	306	186
EM2MN	N1BNI	23/63	2000/Dy	390	111
NEEPN	K1BZD	3.945	0830/Sn	62	10
HHTN	KA1MI	04/64	2230/Dy	529	179
EMRISS	N1BHH	3.715	2020/Dy	159	54
CI2MN	N1BYS	045/845	1930/Dy	202	95

The ARRL Board of Directors has come out very strongly on the side of membership opinion by totally rejecting the FCC proposed No-Code License proposal. They also are refusing to entertain the volunteer licensing program unless some provision for out-of-pocket expenses is included. Board minutes will appear in *QST*. Please join me in welcoming our new section emergency coodinator W1IAY aboard. Many thanks go to WA1BLG for his efforts from the beginning of my tour of duty as SCM/SM. W1IAY will stay active in section emergency communications. The first meeting of the new council of Eastern Mass radio clubs was held recently in Framingham, chaired by Affiliated Club Coordinator, K1AZE. Waltham ARA newsletter *Intermod* devoted entire issue to ttc handling by STM WA1TBY. Massasoit club had a mini-auction run by WB1FLA. Framingham club had a visit from a three generation ham radio family: Grandpa, WN1TKD; son, K8AT and son, KZ8F. Billerica club had W1HBB give a talk on cellular radio. Norwood club had New England's Contest Advisory Committee member K1DG give a talk on

LARSEN HELPS THE UNDERGROUND.



When you're in a tight spot, dependable communications is crucial. Like repairing a split cable or a broken waterline underground. If you lose touch with the outside world, it's a long climb back to the top.

That's why underground crews use a Larsen Antenna and Magnetic Mount topside, attached to a handheld below. Because Larsen Antennas keep high performance standards, even with the underground.

Külrod® plating, a Larsen exclusive, gives your antenna high conductivity to assure that maximum power goes into communicating—not heat. And the precision tapered stainless steel whip provides flexibility while minimizing radiation pattern distortion, giving you a consistent signal.

Whether your communications take you down under, or just downtown, Larsen Antennas will keep you on top of the situation with dependable performance.

That full measure of performance goes into our product integrity too. With a no nonsense warranty that won't let you down.

For more range with your handheld, or your mobile, you'll find Larsen's performance is tops. Ask your favorite Amateur dealer to demonstrate how you can hear the difference with Larsen Antennas.

Larsen Antennas

IN USA: Larsen Electronics, Inc.
P.O. Box 1799 11611 N.E. 50th Avenue 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., U.S.A. and Canadian Larsen Electronics, Ltd., Canada.

WHEN ONLY THE **BEST IS** GOOD ENOUGH

NEW!

TERMINALL for ATARI*

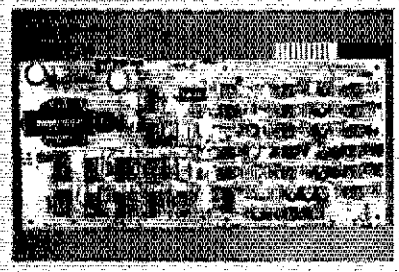
TERMINAL T4 is a hardware and software system that converts your Atari 400, 800 or 1200 personal computer into a state of the art communications terminal. TERMINALL features simple connections to your computer and radio plus sophisticated and reliable software.

New on Atari Version

- **Cursor Editing** - use the cursor keys to compose, overwrite, delete or insert any text to be transmitted, any preprogrammed message, or any received text.
- **Color Displays** - on a color TV or color monitor.
- **Disk Save and Retrieve** received text or any preprogrammed message. Files are compatible with most word processors including Text Wizard*.
- **Backup copy** saves all user selectable options as defaults - such as callsign, modes, messages, etc.

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.



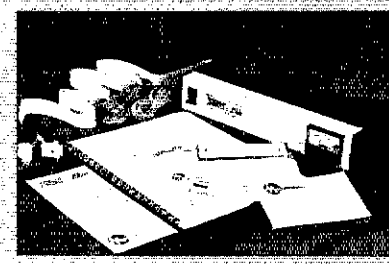
NO COMPROMISE HARDWARE

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.



MORE FOR YOUR MONEY

- **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** through controller ports or Atari 850 Module. Write for details.
- **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, break mode and more!
- **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.

Other versions available for TRS-80* Models I and III and Apple II, Apple II Plus or Apple IIe.

*Atari is a registered trademark of Atari Inc., TRS-80 is a registered trademark of Tandy Corp., Apple is a registered trademark of Apple Computer Inc. and Text Wizard is a registered trademark of DataSoft Inc.

1 yr. parts and labor limited warranty. Call or write for more details.

15 day money back trial period on factory direct orders.

SYSTEM REQUIREMENTS

Atari 400, 800 or 1200 computer with minimum of 32K RAM and one disk drive or a cassette recorder. Includes software on disk and cassette, assembled and tested hardware and an extensive instruction manual. $499.

Add $4.00 shipping UPS reg. delivery, CA residents add 6% sales tax.

VISA

master charge

C.O.D.

CALL OR WRITE FOR DETAILS

(209) 667-2888

MACROTRONICS, inc. ®

1125 N. Golden State Blvd.
Turlock, California 95380

We periodically experience telephone difficulties. Please keep trying.

The communications terminal that does it all!

Uncle Ben says...

"I give you much more than just the lowest price...

When you get that exciting new piece of equipment *from me*, you know you are going to be completely happy... I see to it, personally! I also give you earliest delivery, greatest trade-in allowances, my friendly assistance in every possible way.

Just ask any of the many thousands of hams all over the world who have been enjoying my friendly good service for over a half a century. *73, Uncle Ben, W2SOH*

"Uncle Ben" Snyder, W2SOH
the head man of

HARRISON
"HAM HEADQUARTERS, USA®" *...Since 1925!*

- ***CALL ME...***
  Toll Free (1-800) 645-9187
  New York (516) 293-7995
- ***WRITE ME...***
  For my prompt, personal reply.
- ***SEE ME...***
  At one of the world's largest Ham Supply Centers!

ALLIANCE MFG. CO.

cushcraft CORPORATION

CROSS NEEDLE METER DAIWA

Larsen Antennas

KENWOOD

ICOM

HARRISON
HAS THEM ALL IN STOCK!

YAESU

HUSTLER

DRAKE

NYE VIKING

Kantronics

TELEX hy-gain
TELEX COMMUNICATIONS, INC.

master charge VISA
CHARGE IT!

HARRISON RADIO
...Since 1925!

"HAM HEADQUARTERS, USA®"
2263 Route 110 (at Smith St.)
E. Farmingdale, NY 11735
1-(800) 645-9187 N.Y. 1-(516) 293-7995

Field Day and contesting. K1JMR newsletter also passed the sad news of the passing of W1ATX, known to many of us as an avid traffic handler and constant monitor on 52 direct. Middlesex club had a slide presentation by N1DM on satellite communications. Amateur Radio was well represented at the Boston Marathon again, with groups from the Wellesley and Framingham clubs helping out, as well as a group helping the Boston Red Cross. Colonial Wireless also assisted in Lexington on Patriots Day. Many of us had the pleasure of each other's company again this year at the Deerfield (NH) flea market. The wx was great and the fleas were biting. K1VXB now KM1Y. KS6X now KN1K, W1TPB now Extra Class. Traffic: WA1TBY 461, KA1GBS 313, N1BHH 242, KA1EPO 183, N1BGW 155, N1AJJ 137, K1BA 96, WA4STO 92, N1BQG 92, KE1U 88, W1CE 81, WB3FOC 78, K1GN 61, KA1BBU 59, KA1KF 58, KA1DJV 55, WA1DXT 49, N1BYS 47, KI1I 37, K1BZD 34, W1QLL 33, WA1FNM 26, KA1AMR 17, N1BUY 16, KA1EXJ 13, W1ZHC 11, W1MJ 8, K1LCQ 5, WA1FCD 1. (Mar.) W1AF 226, WB3FOC 128.

MAINE: SM, Cliff Laverty, W1RWG — SEC: KL7IJG/1. STM: AK1W. ACC: KA1EIW. OO/RFI: W1KX. SGL: K1NIT. PIO: KA1TJ. TC: K1YFY. OBM: W1JTH. The Aroostook Emerg Net is to be commended for its communications support of a realistic scenario of a simulated plane crash at Loring AFB. CEP said it was their most successful operation. Hams included were EC WA1YNZ KA1CNC WD5ICQ KA1JC N1BJX KA1SO WA9TVH KA1IWX WA1UPK KA1ENL KA1HIW WA1URS N1ANG N1BGO KA1FGZ. 52 simplex was very effective. PSHR: AK1W N1BJW WA1YNZ KA1AVU W1RWG KA1TJ KL7IJG. Number of station activity reports down ten. Please submit your traffic totals.

Net	Sess.	QNI	QTC	Mgr.
Pine Tree	51	478	185	AC1G/N1BJW
Sea Gull	25	931	145	K1GUP
RACES	4	40	3	W1RWG
Aroos. Emerg.	5	53	1	WA1YNZ

Traffic: AK1W 202, W1ISO 85, W1RWG 77, N1BJW 67, KA1AVU 57, KA1TJ 52, WB1BYR 49, N1BLZ 43, KL7IJG 36, W1BMX 28, W1JTH 22, W1KX 15, WA1YNZ 14, W1AHM 12, WA1JHT 11, W1OTO 11, N1BME 10, KA1AIF 8, K1PV 5, KA1ENL 4, KA1FTL 4.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH W1VTP KI1M. Electronic flea market July 16 at Manchester Airport. Call W1KGZ or K1WPM for details. W1FZ donated Azden PCS-300 to Great Bay RC. Deerfield extravaganza will be done again on Oct. 8. K1OX hosted Nashua club at Ham Heaven Hill. Seen on Hyways & Byways: K1BIP WA1NYS W1UN KB1A. King Ridge Hamfest Sept 25. W1NH has new IC3AT. W1ANF interfacing Vic-20 to ham radio. W1HNZ on 220. W1GS vacationed in Greece. Traffic: W1TN 234, N1NH 163, AK1E 117, W1OYY 110, K1IM 108, KK1E 92, KA1BJ 86, K1YMH 88, W1VTP 65, WB1CFP 54, W1CUE 49, W1ALE 48, W1MHX 28, K6UXO 28, N1ALM 26, WA1PEL 25, WA1YZN 25, N1AKS 22, KA1FKM 14, K1OIQ 14, N1BEV 12, W1FYR 12, K1UQX 12, K1ACL 11, K1PQV 5, W1LQQ 4, N1BVI 4, KA1DSC 4, K1NH 3, W1OKU 2.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: W1EOF. TC: AB1D. New appointment: KB1G — Kent Co. EC. Endorsements: W1JFF EC Newport Co.; KB1G, ORS. STM W1EOF has just made his 20th BPL with a traffic total of 797. Sorry to report the passing of W1IMY. He will be missed on the rptrs for his sense of humor and humanity. Most of the new upstarts don't know that he was one of the finest cw traffic handlers in NTS, and not many today can hold a candle to him. Again I have to report that the station activity reports were very scarce this month. No info, no column. Traffic: W1EOF 797, KA1EHR 20, KA1OX 17, K1AOS 12, N1RI 7, KA1FPP 6.

VERMONT: SM, Reed Garfield, WB1ABQ — STM: N1ARI. BM: AE1T. PIO: W1RNA. Tnx to hams who aided M. of D. Walkathon in Burlington 4/24. K1VT/R 146.25/85 carrying Westlink News TThSn 2030Q & Teleconference Net June 2 2030Q. BARC Int'l Hamfest 9/13-14; plan now. N1COB new NM/VFMN; congrats. Tnx to K1PQE for QSP VT tfc.

VTN	30/134/97
GMN	28/386/34
Carrier	26/589/27
VTRFD	4/87/23
VSBN	30/534/152
VPN	4/75/4
CVFMN	4/46/2

Traffic: K1BQB 139, N1ARI 109, N1COB 90, W1KRV 81, AE1T 70, WB1ABQ 55, W1OAK 36. (Mar.) AE1T 74. (Feb.) W1OAK 71.

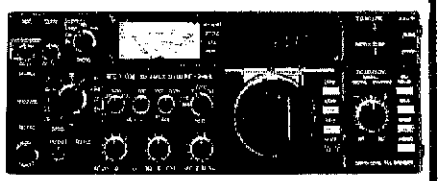
WESTERN MASSACHUSETTS: SM, William J. Hall, W1JP — Good news from the Mt. Greylock gang! The Advisory Council and Task Force technical experts have agreed that the rptr antenna must remain on the tower for amateur use. This should have very positive influence on upcoming legislation. Speaking of which, the section still needs a State Gov't Liaison (SGL) appointment. Any suggestions? EC K1JHC reports that 13 Worcester hams covered the annual walk for the blind from Ashby to Pepperell. K1JHC has achieved PSHR every single month since I became SCM Jan '81; quite an achievement! News from Montachusett ARA of the membership, 3% count contesting as their primary interest, 16% traffic, and 39% computers. Hmmmm. The UMass club still very active in public service but has no luck in obtaining money for equipment or repairs. I am sad to report that W1VON and W1ZS have both become Silent Keys. PSHR: KA1T W1PUO K1JHC WB1HIH. Traffic: KA1T 397, W1UD 182, WB1HIH 128, W1PUO 81, WA1YYW 71, W1KK 69, K1JHC 63, KA1CDC 39, W1JP 38, KB1W 36, K1IJV 25, WB1HKN 16, W1UKX 12, KA1EKQ 11, W1ZPB 10, KR4N 5.

NORTHWESTERN DIVISION

ALASKA: SM, Will Darsey, AL7AC — AL7O resigned as Section Manager effective 30 April. His new residence and return to unlimited duty status did not permit the daily communications required to provide adequate representation for the Alaskan amateur community. His contribution to Alaska hams has been immeasurable, and we all look forward to his return. Good luck to Rick, Cynthia and Mary. In a combined public service/emergency preparedness exercise, the Nome amateurs provided support for the All-Alaska Sweepstakes Sled Dog Race. Temporary stations were set up and operated under harsh arctic operating (–20°F) conditions. Sleeping and operating from tents, the group passed over 450 pieces of traffic. Poor band conditions caused by a strong aurora rendered ssb useless at times. But, thanks to the expert cw operations of KL7OD AL7X AL7BE KL7UX and KL7DZ, all traffic was handled quickly and accurately. Good work, Nome! Traffic: KL7LA 42, KL7VY 36, AL7AC 28.

IDAHO: SM: Dennis Hall, KK7X — The Emmett rptr is on the air with good coverage. Frequency is 147.18/78 and

ICOM - Check the Savings at AES®!



HF Transceivers: | Regular | SALE
IC-740* 9-band 200w PEP Xcvr..... $1099.00 | 949.95

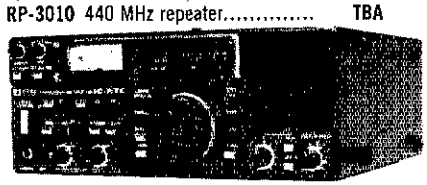
plus* **FREE PS-740 Internal power supply &
$50 Factory Rebate until 7-31-83

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 SSB filter (2nd IF).....	159.00	129.95
FL-45 500 Hz CW filter (1st IF).....	59.50	
FL-54 270 Hz CW filter (1st IF).....	47.50	
FL-52 500 Hz CW filter (2nd IF).....	96.50	89.95
FL-53 250 Hz CW filter (2nd IF).....	96.50	89.95
MB-12 Mobile mount.....	19.50	
HM-10 Mobile scan microphone.....	39.50	
IC-730 8-band 200w PEP Xcvr w/mic...	$829.00	649.95
FL-30 SSB filter (passband tuning)...	59.50	
FL-44 SSB filter (2nd IF).....	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	
MB-5 Mobile mount.....	19.50	
IC-720A 9-band Xcvr/.1-30 MHz Rcvr	$1349.00	899.95
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 transceive interface, R-70..	112.50	
New Model!	Regular	SALE
IC-751 9-band xcvr/.1-30 MHz Rcvr...	TBA	
Internal power supply.....	TBA	
FL-52A 500 Hz CW filter.....	TBA	
FL-53A 250 Hz CW filter.....	TBA	
FL-33 AM filter.....	TBA	
HM-12 Hand microphone.....	TBA	
SM-6 Desk microphone.....	TBA	
External frequency controller.....	TBA	
High stability reference crystal.....	TBA	
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

VHF/UHF Multi-modes: | Regular | SALE
IC-251A 2m FM/SSB/CW Xcvr/AC ps... $749.00 | 569.95

$50 Factory Rebate until 7-31-83

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/High 440-450 MHz Xcvr/ps	899.00	769.95
AG-1 15 db preamp, IC-451A/45A...	89.00	79.95
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 Multi-modes:	Regular	SALE
IC-290A 2m FM/SSB, TTP mic.....	$549.00	389.95
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 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-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
New models!	Regular	SALE
IC-120 1.2 GHz FM mobile.....	TBA	
RP-1210 1.2 GHz, 10w repeater.....	TBA	
IC-271A 2m, 25w multimode.....	TBA	
IC-471A 430-450 MHz, 10w base.....	TBA	
RP-3010 440 MHz repeater.....	TBA	



Shortwave receiver	Regular	SALE
R-70 100KHz-30MHz digital receiver...	$749.00	649.95
EX-257 FM unit.....	38.00	
IC-7072 Transceive interface, 720A	112.50	
FL-44 SSB filter (2nd IF).....	159.00	129.95
FL-63 250 Hz CW filter (1st IF).....	48.50	
SP-3 External speaker.....	49.50	
EX-299 (CK-70) 12V option.....	9.95	
MB-12 Mobile mount.....	19.50	

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 ext. time battery.....	39.50	
BP-3 Extra std. 250ma 8.4v 1.5w battery.....	29.50	
BP-4 Alkaline battery case.....	12.50	
BP-5* 450 ma, 10.8v 2.3w hi-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 chgr 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 amp. (Reg. $89).. SALE	79.95	
ML-25 2m 20w HT amp. (Reg. $199.50) SALE	179.95	
IC-M12 12 ch Marine hand-held.. SPECIAL	$199.95	
Misc. accessories:	Regular	
24-PP 24-pin accessory plug.....	$ 4.00	
BC-10A 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 mic, 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.....	49.50	
SM-2 4-pin electret desk microphone; 551D....	39.00	
SM-5 8-pin electret desk mic.; 251A/451A.....	39.00	
Mobile mount, specify radio.....	19.50	
GC-4 World clock.....	99.95	

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
15 min. from O'Hare!

It is an open rptr. Thanx to techs KA8CPA and WB7ZTM for the good work. KI7D lost his moonbounce ant to the wind. W7IGE also lost his 40M 8JK to the wind. Elmore Co. ARC provided communications for walk-a-thon in Mt. Home; members were N7AYL WD4HJA KA7EKR KA7IHO KA7PFO W7CVS KD7EV and K7BUY. Also provided communications for Elmore Co. Motorcycle Assn. Thanks to N7AYL N7DHM and KU7Y for information. 73 de Dennis, KK7X.

Net	Sess.	QTC	QNI
IMN	21	66	174
ICD	21	13	764
FARM	30	35	1375

Traffic: W7GHT/7 202, N7DHM 15, KA7IBY 6.

MONTANA: SM, Les Belyea, N7AIK — STM: KF7R. SEC: W7LR. OO/RFI: KS7U. Lots of upgrades reported: to Extra-WB7TNH; to Adv-KA7HEZ K7TAZ KA7LRD; to Gen-KA7NMI N7DKY KA7OJC N7EOM N7EOL KA7ONU; to Tech-KA7HEY KA7MGI. Congrats to all. W7FC of Bozeman got his first license 60 years ago, in July 1923 under the call 7FC. KB7SE is the new net mgr for the MTN; also KØPP is the new mgr for the MSN. The Yellowstone ARC will have a new updated Montana Callbook out this month. This is a very handy item to have, so please obtain a copy. The May meeting of the Lower Yellowstone ARC, known as the "Mothers Day Bash," was held at the home of WB7UTJ. The ACC and SM were there. Many thanks to all. More upgrades: Extra-WB7UAO; Adv-N7DKL WDØBXQ; Gen-KA7NXX; Tech-KA7PKK KA7PKM. PSHR: WA7GQO.

Net	Sess.	QNI	QTC	Mgr.
MTN	21	868	91	KB7SE
MSN	4	80	0	KØPP
BSN	15	198	6	WB7UTJ
IMN	21	174	66	K7RX

Traffic: KD7EG 122, WA7GQO 44, WB7WVD 37, N7AIK 27, W7LBK 10.

OREGON: SM, William Shrader, W7QMU — STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. RFI: AK7T. OO: N7SC. UPGRADES: KA7PRS KA7PVL (Novice); KA7MLN WB7TBY KA7COS KA7DNV KA7OTC (Tech); KA7OFM KA7JOH KA7JCX KA7MAA KA7HWS KA7GNQ N7EUS N7EUT (General); WB7VBQ WA7VIZ KA7LWK N7EET KD7FD KD7BF (Advanced); N7CVA NB7Y (Extra). Hearty congrats to all! AL7W made Public Service Honor Roll in March. WB7BPI made a rush trip to Kenya but did not operate. W6OFF was touring Europe. Morse Telegraph Club has new officers. N7CYR is pres.; and KN7B is v.p./secy./treas. They are looking for new members who want to learn history of telegraphy. Oregon State Univ. ARC officers are: KS4E, pres.; KH6JOD, secy.; WB7BSF, v.p.; N7AUO, treas. The club will be giving a demonstration at the Benton Co. Boy Scout Camporee to help the scouts with their communication skills. Hoodview ARC had a visit by OSP officers N7CJU KB7UY and WB7DLM for instruction in emergency reporting techniques for Amateur Radio. The Lane Co. Ham Fair will be July 16-17 at the National Guard Armory in Eugene, so plan to be there. W7TC is out of hospital and mending. W7VSE says Mother's Day traffic from Alaska is about to do him in. Keep up the GOOD work, Vic. Traffic: W7VSE 654, WA7LGN 125, KA7ELI 99, KA7AID 51, KI7Y 43, N7BGW 39, W7LNE 34, N7FAP 15, W7DAN 2.

WASHINGTON: SM, Joe Winter, WA7RWK — SEC: K7SH. STM: W7GB. ACC: K7RS. TC: K7UU. BM: KD7G. PIO/SGL: W7CKZ. OO/RFI Coord.: KB7WC.

Net	Freq.	Time(Z)	QNI	QCT	Sess.
WSN	3590	0145/0445	531	247	60
WARTS	3970	0100	2985	2175	30
NTN	3970	1900	941	54	30
NWSSB	3945	0130	---	---	---
EWTN	146.64	0030/0430	96	80	55
PSTS	145.33	0030/0430	188	141	59

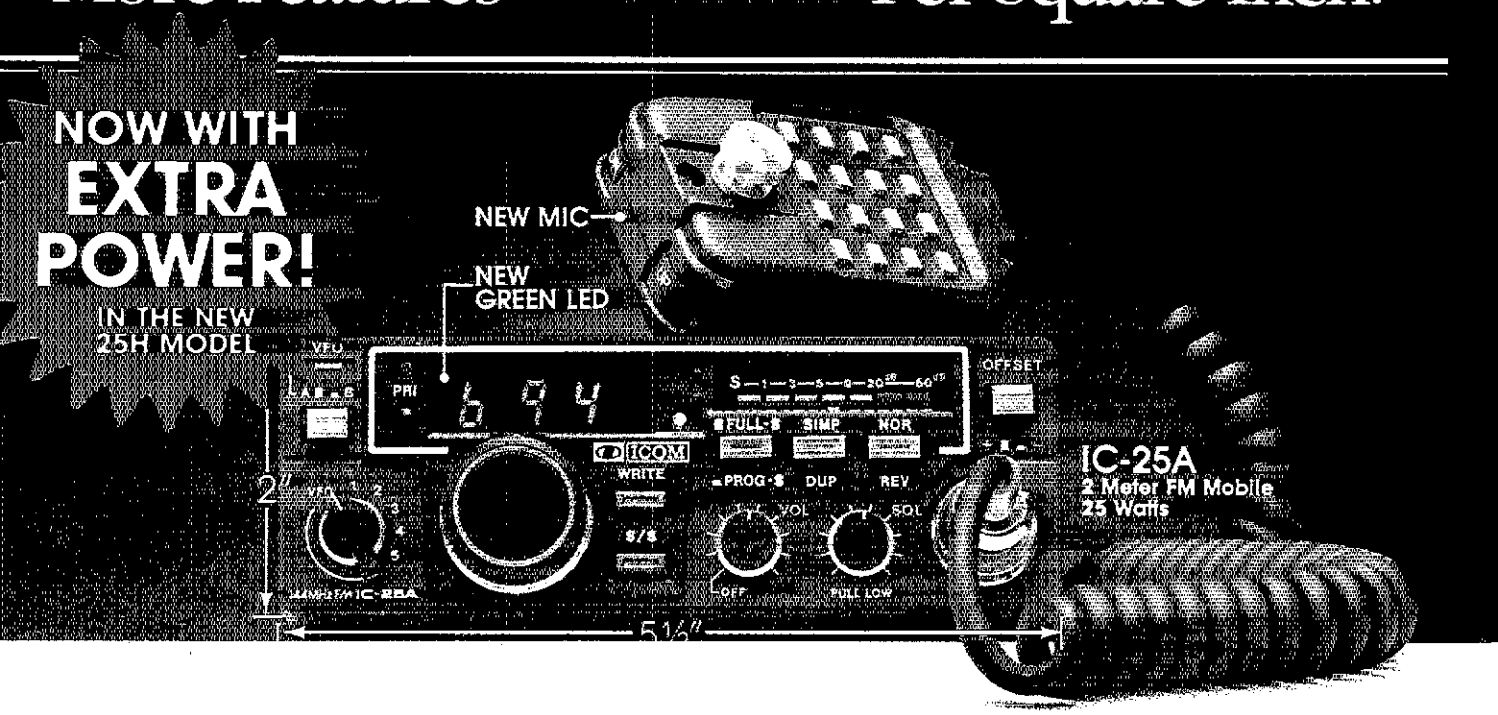
N7AFZ replaces W7IEU on the ECAC. Congrats. Tnx to W7IEU for his work. Radio Club of Tacoma's Mothers Day breakfast was again a huge success. Twenty-five mbrs worked the Tac. Daffodil Parade. Thirty mbrs worked the Walk-a-thon. Sixty five hams from Tacoma, Seattle, Olympia & Grays Harbor area provided comms and emerg. help for the large Norwester & Olympus Auto Rallies with great success. Clark Co. ARC operated Spec. Events Sta. W7AIA May 20-22 and issues Awards in memory of KA7AMF who died in the 1980 eruption. KB7WC is Awards mgr. K7SUQ rpts a new award plaque (the Sparkey Sherman Award) for outstanding public service. It will be presented each year to a worthy ham. W7EEA, the first recipient, received the '82 award posthumously. Clark Co. EC WB7TKZ rcvd the '83 Award at Vancouver HF. Congrats! Computer ops — join the Amateur Computer Experimenters (ACE) net 146.55 simp. Dy 7 P.M. PDT, Puget Sound area. Informal to encourage hi-speed digital. Olympia ARS (W7FEN) is planning to build 220 MHz rptr. BEARS spkr K7PF demonstrated his D.F. equip. He has an interesting approach to Direction Finding. N7IL is a new OBS. N7IL was also chrmn for Volunteer Exam's proposal. W7JIE was chrmn for No-Code Lic. proposal. Chehalis VARS preparing for Field Day, and is busy with 3 races and setting up the club stn in the new quarters. Everett ARS club sale at Skagit Hamfest went well. Also held a spring garage sale. Last NOTICE! Northwest '83 July 8-10. KA7CSP and committee have worked hard to provide an interesting NW Div Convention. Will see you there! Wash. State Amateur Radio operators were congratulated by Gov. Spellman to have been nominated for the 1983 Gov's Distinguished Volunteers Award. Although the hams were not selected for this year's Award, he said "the citizens of Wash. applaud your outstanding volunteer contributions." In recognition, he issued a certificate of appreciation with his thanks. PIO W7CKZ picked the following as Regional PIA's: Rgn 1-KC7KI & KA7CVI; Rgn 2-WA7QQN; Rgn 3-WB7PSO; Rgn 4-KA7DWH; Spec Events PIA-K6DOW. Traffic: WB7TQF 719, W7DZX 632, WB7WOW 586, KS7I 282, N7DNG 210, K7GXZ 166, W7HNA 152, W7GB 110, W7LG 109, K7CTP 104, N7ANE 94, WA7BDD 82, N7AFY 76, W7APS 54, WA7JEB 54, N7AFZ 51, KD7G 42, K7AJT 12, N7CT 6, KA7INX 4.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG — ASMs: W6ZF N6DHN VE2AQV/W6. SEC: W6LKE has made the following appointments: N6DRT, A/SEC; WB6JGV, DEC and liaison with state and Contra Costa Co. OES; W6CPO, A/DEC and liaison with Calif Dept. of Forestry; KA6IVF, EC for Central Contra Costa Co.; WA6ZFZ, EC for East Contra Costa Co.; N6EEQ, EC for Red Cross liaison, Diablo Chapter. STM NI6A made BPL again with 102 orig & del. He and W6VOM made PSHR. New officers of NCCC are: K6HNZ, pres.; NR6I, v.p./contest chmn; KC6D, secy./treas.;

ICOM IC-25A/H

More Features Per Square Inch!



The smallest 2 meter FM mobile on the market is now even easier to read and use with a green LED readout and a compact touchtone* /scanning microphone and gives you the option of 25 or 45 watts.

New Green LED. Easier to read in bright sunlight, and not glaring at night, the IC-25A(H)'s new readout provides good visibility under all conditions.

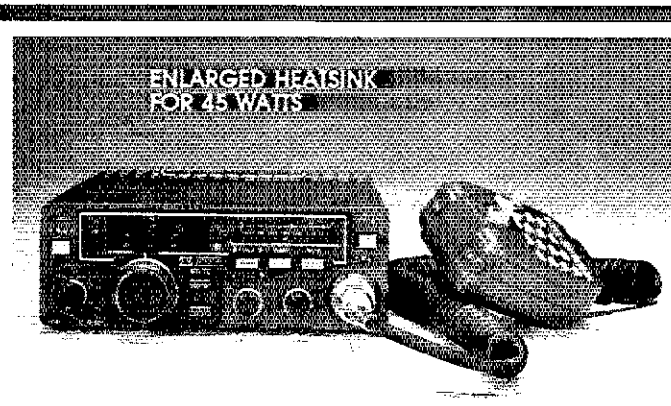
5 Memories. Instant access to most used frequencies. VFO A information is transferred to the selected memory by pushing the write button.

Priority Channel. Any memory channel may be monitored for activity on a sample basis, every 5 seconds, without disruption of a QSO conducted 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.

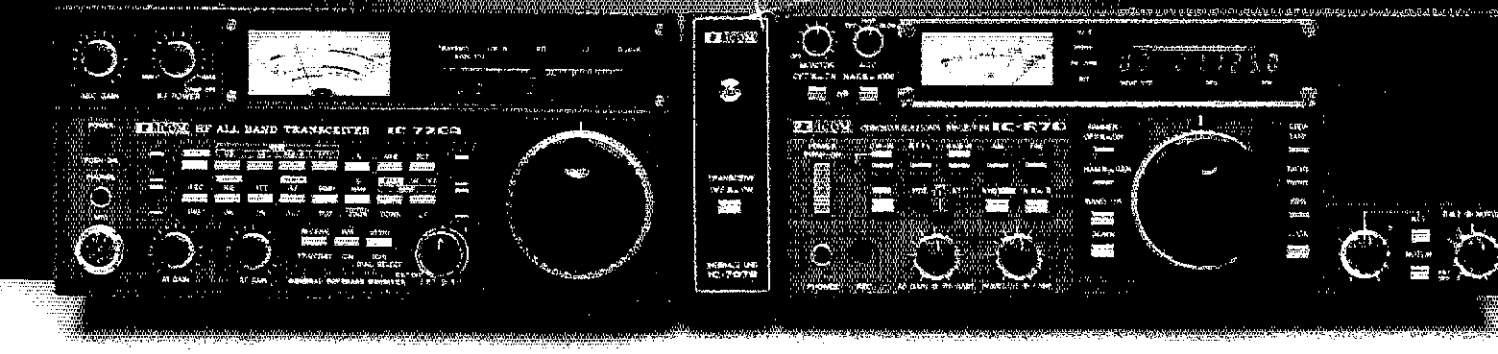
ICOM

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-720A + IC-R70

The "plus" is the New IC-7072 Transceiver Unit



Now you can add ICOM's **most versatile HF general coverage receiver to your IC-720(A). Combine the portability and operating convenience of the IC-720(A), with its long list of standard features...and the IC-R70, ICOM's latest general coverage receiver, into one transceiver by using the new IC-7072 transceiver unit.**

Check ths list of features that will be added to your IC-720(A) receiving system:

Audio Monitor. Monitor your own transmitted audio and check SSB audio quality/CW keying characteristics.

Selectable AGC With Off Position. Perfect for use with transverters.

2 Position Noise Blanker. Very effective, virtually eliminates impulse noise.

500Hz CW Filter Standard. 250Hz (FL63) optional 8-pole filter.

3 Stage Preamp/Off (Direct)/Attenuator Control. Controls input to ICOM's Direct Feed Mixer receiving system.

Squelch Control. Effective in all modes allowing only signals above a certain strength to be heard.

Audio Tone Control. For easier listening/less fatigue.

Record Jack. Allows connection of a tape recorder to record both sides of a QSO. Unaffected by the volume or monitor control. Also may be used to drive an RTTY decoder.

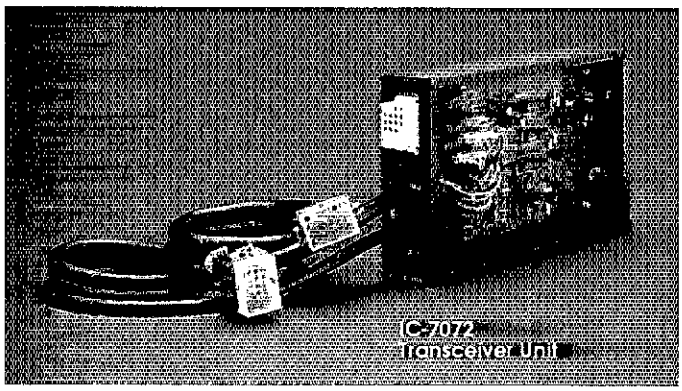
Notch Filter. Deep IF notch eliminates annoying hetrodynes from interfering adjacent signals.

Large Front Mount Speaker. Full 3 watts of audio.

Expanded Range Pass Band Tuning. For greater adjacent signal rejection in the AM mode.

Option for FM Reception. Useful for 10 meter FM.

Excellent, Clear Reception. With the R70's advance receiving system with the first IF at 70MHz, and with the lowest synthesizer noise level available -- better than receivers costing much more.



Bring all of these advanced features to your IC-720(A) shack with the R70 and the IC-7072 transceiver unit. The plug-in IC-7072 transceiver unit slaves the CPU of the IC-720(A) to the IC-R70 microprocessor. This allows the tuning knob and selector buttons of the IC-R70 to control the IC-720(A).

Included with the IC-7072 are cables for the mute line control on the IC-R70 and a coax line to patch the IC-720(A) antenna into the IC-R70. An accessory connector on the IC-7072 is provided for attachment of "ICOM System" accessories such as the IC-2KL linear amplifier or IC-AT500 automatic antenna tuner or both.

Now your base station can have the most advanced ham/general coverage receiver available and the crisp transmitted audio of the IC-720(A) with RF speech processor. And yet, the 12 volt operated IC-720(A) may be taken mobile or portable for the ultimate in a ham band transceiver...and you still have general coverage reception...at both places!

ICOM

The World System

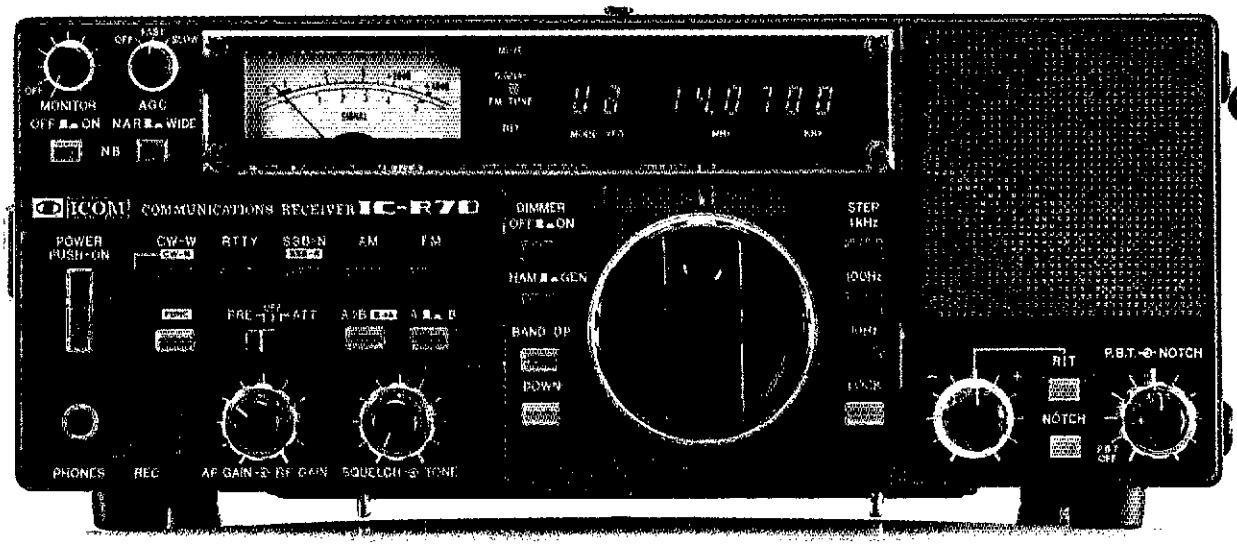
ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155**/3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780.**

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

IC-R70

NEW!

The Commercial Grade Communications Receiver that everyone has been asking for.....at a price you can afford!



GENERAL COVERAGE RECEPTION AT ITS BEST

Listen to the world of HF with the R70, a 100KHz to 30MHz commercial grade receiver designed by ICOM Incorporated, the leader in advanced receiver design. Built from knowledge gained by designing receivers for commercial, marine, and amateur use, the R70 surpasses other receivers on the market...even receivers costing more than twice as much.

Utilizing ICOM's DFM (Direct Feed Mixer), the R70 is a receiver which in normal usage is virtually immune to intermodulation distortion or cross modulation, yet still maintains superior sensitivity. Whether you are a SWL (short wave listener), Ham (amateur radio operator), maritime operator or commercial user, the R70 provides the features you need.

DESIGN

The R70 incorporates an UP conversion system, utilizing a direct feed mixer proven to be the best design for minimizing interference from strong adjacent signals. A preamp is provided for making the weakest of signals readable. High grade filters in conjunction with the built-in PBT (pass band tuning) system and notch filter, provide the ultimate in interference rejection. Selectable AGC (fast/slow/off), noise blanker (wide or narrow), and tone control improve readability under the worst conditions. An AGC derived squelch, operative in all modes, adds to operating ease.

Dual VFO's with three tuning rates provide quick QSY (frequency change), memory for an important station, or by equalizing the VFO's (A=B), a digital RIT. 13.8 VDC operation is provided as an option, 117 VAC is standard.

HAM'ING

The R70 is an ideal general coverage receiver to complement any ham shack. Use it with your existing tramsmitter or transceiver to provide dual receiver capability.

The R70's built-in monitor system lets you listen to your own transmitted audio and a mute input automatically protects the R70's receiver from your signal.

An option for FM allows listening to the 10 meter FM activity.

As an additional plus to ICOM IC-720A owners, the R70 has an optional interface that will allow the R70 to control the transmit frequency of the 720A for the ultimate in hamming versatility.

SWL'ING

For the short wave listener, the readout section of the R70 gives all the information for logging a station to be returned to at a later time. Frequency, mode, VFO, signal strength are all displayed. A dial lock prevents accidental loss of a signal.

A front mounted speaker provides 3 watts of crisp clear audio. A record jack allows easy attachment of a tape recorder.

ICOM SYSTEM

Like all ICOM HF products, the R70 fits into the ICOM system concept of accessories allowing you to use previously purchased accessories such as the HP1 headphone, SP3 external speaker, and AH1 auto bandswitching antenna.

PRICE

Check with your local ICOM dealer for pricing on the R70. You will be amazed.

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.

ICOM IC-730

ICOM's Go-Anywhere HF Rig for Everyone's Pocketbook

Compact.

Only 3.7 in (H) x 9.5 in (W) x 10.8 in (D) will fit into most mobile operations (compact car, airplane, boat, or suitcase)

Affordable.

Priced right to meet your budget as your main HF rig or as a second rig for mobile/portable operation.

Convenient.

- Unique tuning speed selection for quick and precise QSY, choice of 1 KHz, 100 Hz or 10 Hz tuning.
- Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
- One memory per band, for storage of your favorite frequency on each band.
- Dual VFO system built in standard at no extra cost.

Full Featured.

- 200W PEP input—powerful punch on SSB/CW (40 W out on AM)
- Receiver preamp built-in • VOX built-in
- Noise blanker (selectable time constant) standard
- Large RIT knob for easy mobile operation
- Amateur band coverage 10-80M including the new WARC bands
- Speech processor—built-in, standard (no extra cost)
- IF shift slide tuning standard (pass band tuning optional)
- Fully solid state for lower current drain
- Automatic protection circuit for finals under high SWR conditions
- Digital readout • Receives WWV • Selectable AGC
- Up/down tuning from optional microphone
- Handheld microphone standard (no extra cost)
- Optional mobile mount available

ICOM

2112 116th Avenue N.E., Bellevue, WA 98004
3331 Towerwood Dr., Suite 307, Dallas TX 75234

STEP UP!

DRAKE TR7A TRANSCEIVER

No-Nonsense Continuous Duty Performance and Versatility

• **CONTINUOUS FREQUENCY COVERAGE**—1.5 to 30 MHz full-receive coverage. The optional AUX7 expands traditional Amateur band coverage to include 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). • **CONTINUOUS DUTY RATED**—Full power 250 watt input operation on SSB and CW (same on SSTV and RTTY with optional FA7 fan). • **FULL PASSBAND TUNING (PBT)** enhances use of high rejection 8-pole crystal filters. • **BUILT-IN FEATURES**—NB7 noise blanker, 2.3 kHz SSB and 500 Hz CW crystal filters plus provisions for two additional filters. • **MODULAR CONSTRUCTION**—Plug in G-10 glass epoxy printed circuit boards. • **STATE-OF-THE-ART DESIGN** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provides a no tune-up, broadband, high dynamic range transceiver. • **ACCESSORIES**—A full line of compatible accessories, including the new RV75 digital synthesized VFO, is available from your Drake dealer. • Manufactured in U.S.A.

DRAKE. Let us take you there!

R. L. DRAKE COMPANY

DRAKE

For more information, write or call:
540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 Telex: 288-017

K6KLY K6TMB W6OAT W6SZN, dirs. Pittsburg's Los Mecanos Hospital lost its internal telephone system for 48 hours. During that time all internal emergency communications were handled on 2 mtrs by operators stationed at all priority locations within the facility. Those who participated were WA6ZFZ WB6UMT N6QS WA6GFT WB6JDO WB6EZI KE6RV WB6FBI WA6YVH WD6GDG & N6EIK. A FB job by all involved. Traffic: NI6A 460, W6VOM 186, K6APW 93, K6AGD 76, WB6UZX 42, WB6DOB 32.

NEVADA: SM, William J.D. Marshall-Gratrix, KA7Q — STM: W7BS. This is in fact the final activity report by this writer; the new SM is taking over on July first of this year. In addition to the outstanding work preparing for the 1983 Pacific Area ARRL Convention being held at the MGM Grand in Reno Aug. 19-21, being carried out by the Wide Area Data Group, I would like to salute the achievement of K7ICW of Las Vegas who has just received 5BDXCC #1402, culminating a ten-year effort. His junior op, N7AKB, a disc jockey at KUNV-FM, recently worked W6JKV/KH6 on 6M, which is rare DX on any band. For convention details, write Dave Colter, P.O. Box 3132, Sparks, NV 89432-3132. Nevada Sagebrush Net meets weeknights at 1930 PDT on 3905 kHz.

PACIFIC: SM, Army Curtis, AH6P — Aloha and hafa adai to all of the Pacific. The Maui group has been very active with their support of the Maui Triathalon and the March of Dimes WalkAmerica. Even more activity is planned. Nice work, gang! Kauai has a new rptr at KMVH at Waimea. KH6FMT has a new log periodic antenna up. KH6S hoping to use FMT's old KWM2 long enough to get his KWM2 back up to snuff. Good luck. KH6JHK helping KH6HIJ with traffic and doing a FB job. Mahalo! For those of you on Oahu, KH6WM is holding licensing classes at Waipahu Evening School, for Novice as well as for General/Tech. Please pass the word and have your hopefuls contact KH6WM for more info. Traffic: KH6B 204, KH6HIJ 68, KH6S 56, KH6H 18.

SACRAMENTO VALLEY: SM, Norman Wilson, N6JV — SEC: N6AUB. ASM: KI6T. STM: KE6NO. Congrats to KE6NO WA6ZUD and N6EPG on making Public Service Honor Roll. The annual North Hills Ham Swap in Roseville was another big success with over 400 registered and a lot more in attendance. KE6NO and N6BKC (EC-Shasta Co.) both passed their Extras, KA4HWW/6 made Advanced, and N6GEK is now a General class. N6EPG has been operating portable while in the hospital. Public service activities included the three-county Bike-For-Sight and a rain shortened walkathon in Redding. Traffic: WA6WJZ 53, WD6FEH 34, KE6NO 33, KA6VUC 18, WA6ZUD 13, N6CVF 14, WB6SRQ 12, N6EPG 4, WA6ERZ 3, N6JV 2.

SAN FRANCISCO: SM, Bob Smith, NA6T — SEC: N6BLN. STM: K6TP. BM: W6GGR. TC: N1AL. As you can see, a few appts are still unfilled. Would you like to be a section OO/RFI C, PIO or ACC? Let me know. The official League stand on NO-CODE is NO WAY!!! Don't forget to write your comments and MAIL them to everyone. See your club secy. for the proper forms, or write me with an s.a.s.e. Happy birthday to MARC, 50 years of continuous operation in Marin Co. FWRA rptr system in northern Cal. is now IDing with W6RNL/R, and a 220 MHz link to SF Bay Area is in the making. Mendocino Co. 145.13 rptr is being redone with a "hand-me-down" GE machine donated by AE6H. REDXA did a real good job at Visalia; congrats. K6ANP is closing in on 5BDXCC; just a few on 75 meters are left. The new REDWOOD EMPIRE AWARD is being offered by the REXDA for just contacting one amateur in each of the 5 Cal. counties Marin, Sonoma, Mendocino, Humbolt, Del Norte. Get out and support the award. Traffic: W6IPL 207, W6RNL 150, K6TWJ 87, K6TP 65, WB6RTE 16.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. A/SMs: W6THP K6YK NF6K. The ARES in Fresno and Kings Cos. came forward to provide communications following the May 2 earthquake in Coalinga. Fresno ARC sent their emergency van. Kings Co. amateurs were at the disaster scene within minutes. Amateurs from Kern, Madera and Merced Cos. also assisted. ARES again proved it can get the job done. Appts renewed: N6AWH as ORS and NM. WA6TNR and W6WPV are SILENT KEYS. New officers of the San Joaquin Net are W6WHM, NM; WD6CKT, secy; WB6DAZ, asst. secy. KB6YA is NS6R. KA6WZN KA8UYC and KA6WCP are General. KE6UZ is NK6F. K6JKQ has a TS820S. KE6OS found a Signal One. AK5B and KA5FUI visited the section. N6GJI is chasing DX. N6AWH makes PSHR each month. Traffic: N6AWH 90, WA6YAB 38, W6DPD 16, WA6JDB 4, W6SX 7, WD6FRS 2.

SANTA CLARA VALLEY: SM, Ross Forbes, WB6GFJ — SEC: KA6R. PIO: WB6BPU. ACC: W6MKM. Now that we are into the summer months, many of us are building (rebuilding?) antennas for this winter. Let's not forget the weather problems of last winter, as it could be repeated. Contact your EC to see how you can help your local Amateur Radio plan! Now that I am half way through my current term as your SM, it is not too early to look to the next election. I want to take this opportunity to announce that I WILL NOT be running for re-election as your SM. Therefore, anybody interested in the position of SM for the next term, please feel free to contact me for job descriptions and election information. Clubs who are interested in using the ARRL films, contact Vice-Director W6RFF who is the custodian. If you have free time during the noon hour, drop by the AMPEX museum at AMPEX in Redwood City. You will be in for a real treat! The section was saddened to learn the passing of W6TFZ. With the recent drop of many home computers, MANY of those in the section have become bitten by the computer bug. Don't forget the Pacific Division Convention next month in Reno! The WADG has a super convention planned for everyone. San Mateo RC had a program on touch tone pads. AA4RE gave a talk on computers to the Gabilan club. LERA club heard all about the current OSCAR plans from W6XN and W6SP. AA6T is having fun with his new antenna farm, while N6DAC is trying to improve his. SCCARA had K8AEP give a presentation on SSTV. W6PNV is busy with a new tower. Information on next month's flea markets can be found on 145.27. The Coastside ARC their Seagul hunt. Contact WA6AFT for more details. Congrats to KB6WP for placing first in the SSTV contest! Seems like SSTV and computers are really catching on in the section. Traffic: W6YBV 229, W6KZJ 155, W6PRI 75, W5RFF 28, W6OII 10.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: KU4W.

Net	Time	Freq.	QNI	QTC	Sess.	Mgr.
CMN	1245Z	3.927	540	189	30	W4EAT
CEN	2245Z	3.927	235	84	12	WB4MJH

CLEANLINESS...
a unique CORSAIR virtue

Cleanliness in the TEN-TEC CORSAIR means unusual spectral purity of both received and transmitted signals.

In Receive mode, even with the r.f. preamp in operation, the 3rd order intercept (at 20 kHz tone spacing) is +5 dBm. With the preamplifier off, the 3rd order intercept rises to a superlative +18 dBm and remains constant even at 3 to 6 kHz away from the pass-band.

In Transmit mode, if you look at the output of the CORSAIR on a spectrum analyzer, you note an almost complete absence of phase noise—a phenomenon which plagues most PLL transceivers. At 20 kHz from the carrier, the generated phase noise in the CORSAIR is a spectacular −148 dBc/Hz, and at 1 kHz it is −132 dBc/Hz.*

This breakthrough in circuit design, using proven crystal mixed oscillators with the latest USA solid state technology, is setting new standards of cleanliness and purity of signals. All of which means enhanced reception with less fatigue, lower noise floor, no overloading and more DX worked. And your signal will be a bit easier to read under adverse conditions. Compare.

Other virtues of the CORSAIR include:

• All solid state, broadband design • All 9 hf bands • Triple conversion receiver with 0.25 μV sensitivity on all bands and better than 90 dB dynamic range • Variable bandwidth plus Passband tuning • Dual range, Triple mode, Offset tuning • Variable Notch filter • Built-in Speech Processor • Built-in Noise Blanker • 200 W input, 100% duty cycle • Dual-speed QSK (full or semi) • Many operating conveniences including headphone attenuator, cw signal spotter, 5-function meter, WWV reception, adjustable ALC threshold lighted status indicators, selectable AGC, adjustable pitch and volume of sidetone, complete interfacing. • Full accessory line including remote VFO, keyers, microphones, power supplies, antenna tuners, ssb and cw filters. • Reliable American manufacture and service, fully warranted.

See CORSAIR at your TEN-TEC dealer, or write for full details.

TEN-TEC, Inc., Sevierville, TN 37862

**Specifications measured by independent laboratory*

CN	2300/0200Z	3.574	569	239	60	AB4S
JFK	2230Z	3.923	899	105	30	WB4WII
THEN	2330Z	3.923	805	111	30	WD4LRG

The Roanoke Div. LPM '83 was held at Myrtle Beach, SC in early May. As planning meetings go, this one had special significance. This was our first since new section reorganization went into effect. It quickly became apparent that this program has been a popular move. Only minor changes were suggested for that plan. Section reports by SMs and their staffs were all generally upbeat. Sunday, there was a general discussion period followed by the reading of, modifying, and voting on the resolutions which the assembly wished passed on to the *ARRL Board* of Directors. Many thanks to the Grand Strand ARC for a fantastic job of hosting our LPM. Reed Whitten, AB4W, is our new SGL. The present EC for Wake Co., he is expanding his duties to include the job of interfacing Amateur Radio with state govt. wherever and whenever it is needed. He is not on hf at present; seems every time he loads up the rig, he blows the heater switch on their waterbed. His spouse is taking a cold look at Reed's endeavors. In ham radio, that is. Also new this month, the CEN. The Carolina Evening Net is this section's NTS evening phone net. The net meets nitely on 3.927 MHz at 6:45 P.M. local. CU there. Traffic: WD4CNR 142, WD4LRG 135, AB4S 132, KD4PJ 127, W4EAT 125, WD4CNQ 125, WA4OBR 105, KU4W 95, W4GRO 76, K4NLK 67, WA4FKY 63, W8JUP 56, KA4KJI 54, WA4SRD 51, NT4K 49, WB4N 39, NE4J 37, WD4CEB 33, KA4DHP 30, WA4YTQ 29, KZ4A 25, N4EHM 23, KB4CUI 22, K4IWW 22, WB4CYN 21, WD4LOO 14, KA4ATK 10, W4EHF 9, WD4JER 8, N4GGI 7, W4TWD 4.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ — Can you remember where you were April 7 at 1900 EST? If the answer is no, you did not check into the SCSSB net on its 25th anniversary. KA4LRM did a commendable job in bringing recognition to the SCSSB net for this historic event. Through her efforts, W4KFC W4UG and N4MM were listed as checkins. And because of a delay in the US Mail, W1XX showed up one day late for his congrats. Not to be intimidated by all the dignitaries, N4BCD skillfully guided the net with class and professionalism. As the net came to a close, N4BCD asked Net Chaplain KC4AD to give benediction. I know no better words to describe what the SCSSB net projects than its motto: *PREPAREDNESS, SERVICE, FRIENDSHIP.* Jan-April reports: SCSSB 467/555; SCNT 1232/277; Blue Ridge 6693/233; Greater Pee Dee 3752/366; Western Carolina 1590/119; Anderson 1353/74; York 616/103; Lancaster 550/53; Newberry 250/18; Carolina State Line 114/3; Laurens 27/0. Traffic: K4ZN 216, W4ANK 97, W4NTO 95, KA4AUR 81, K4WJR 81, W4FMZ 69, K4ZB 36, KA4LRM 34, WB4UDK 33, KE4WC 28, WD4FJP 24, K4FRX 24, WD4NMF 24, WA4MIY 15, WA4JWS 15, WØIKT 14, W4DRF 4.

VIRGINIA: SM, Phil Sager, WB4FDT — Regret to report that W4ZRJ is now a Silent Key. He was a very avid QRP cw operatpr who had been licensed over 45 years. He had also been licensed as W2CJI and W2CHS. Understand that ex-PAM WB4DBK is now living near Roanoke and teaches at a community college there. Remember the Winchester hamfest Aug. 6. About 200 hams attended the Lynchburg ARC's "Swapfest" May 1. SEC WB4UHC, STM WD4ALY, ACC WD4KQJ, SM WB4FDT; K4LMB WB4MAE KA4WMU and several other Virginia amateurs attended the League Planning meeting in Myrtle Beach, SC. Several clubs in Virginia are planning to apply for "Special Service Club" status. The Valley Amateur Radio Assn. (VARA) has 80 paid members and averages 50 in attendance. N1PG is back in Virginia for the first part of the summer. The Southern Peninsula ARC in Hampton recently graduated 16 in its Novice class. WA5CCK taking over 4RN cycle 2 duties. WA1VRL, an active VN and VSBN/VLN member, recently got married. Congrats to WD4FTK who recently earned a BPL Medallion. Congrats to new ECs WA4TCJ of Virginia Beach, and N4GVQ of Lancaster Co. WB4KIT W3ATQ and WA4CCK all report new gear. Ex-PAM W4JMA now living in Israel and is active on 20-meter phone. N4YE and XYL expecting their first child in October. Traffic: WB4PNY 386, W3ATQ 344, WA4CCK 268, K4KDJ 238, K4JST 213, WD4ALY 195, WA4KJI 194, KA3DTE 161, K4AET 156, W3BBN 152, AA4AT 125, KR4V 115, WD4OCW 106, KA4IUM 78, K4JM 73, W4UQ 62, NT4S 56, K4VWK 53, WB4UHC 51, NN4I 49, WB4KIT 48, N4FNT 41, KB4WT 41, W4NFA 37, N4HAK 36, W4NWM 35, N4YQ 35, KB4OG 29, KA4ZTB 25, KA4JYZ 24, W3BBQ 21, KC4HN 21, K4MLC 20, W4CFV 18, NF4T 18, WB4FDT 16, W4LXB 15, WB4DQZ 14, WB4MAE 10, W4HIR 9, K3RZR 8, W4PVA 7, N3RC 7, WA4TVS 7, KI4W 6, W4KX 4, WA1VRL 4, N4BJX 3, WD4KQJ 3, W4TZC 3, N4LE 2, W4DM 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT — SEC: K8QEW, STM: KD8G, ACC: WA8GTO, TC: K8CG, SGL: K8BS. WB8UDY is now Extra; new call is NC8G. WD8IIH is now Gen. Congrats to both. WV Hillbilly Net now meets on 14290 at 1800Z year round. W8PZT announces new Novices in Weston area are KA8RXU KA8RUX and KA8RUY. Remember Jackson's Mill, July 2 & 3. Contact K8LG for info.

Net	Freq.	Time	QNI	QTC	Sess.
WVN	3567	7:00	123	27	27
WVFN	3990	6:00	471	71	30
WVMD	7235	11:45	528	34	30
Hillbilly	14290	2:00 Sn	127	4	4
KFC	87/47	8:30 M	86	5	4

Traffic: KZ8Q 349, WA8KCJ 52, K8KT 48, W8HZA 35, W8JWX 28, KD8G 22, N8AJC 21, W8FZP 18, K8QEW 17, WB8ZTV 12, KC8CR 11, W8OAL 8, K8JQ 8.

ROCKY MOUNTAIN DIVISION

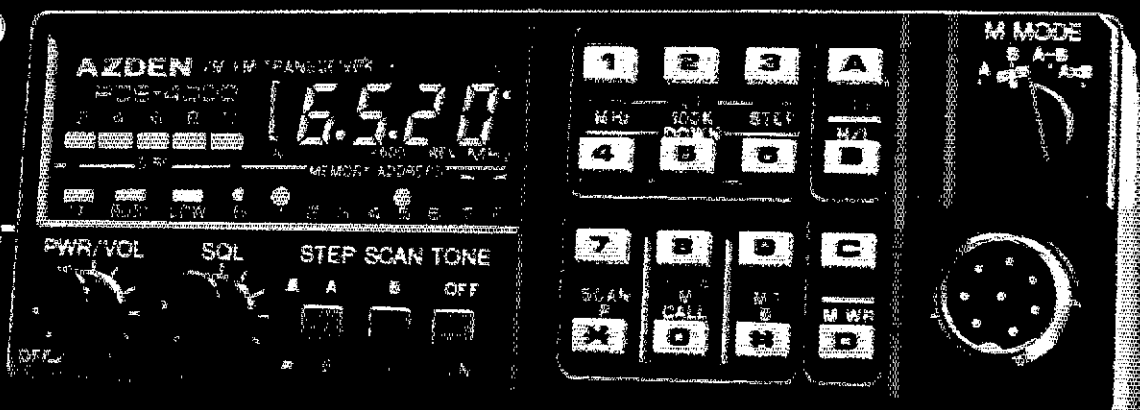
COLORADO: SM, William Sheffield, KQ0J — SEC: K3PUR, STM: WD0AIT. On Wednesday, May 11th, a new Section Manager was appointed for Colorado. His name, address and phone are: Bill Sheffield KQ0J, 1444 Roslyn St., Denver 80220; (home) 355-2488; (work) 355-6400. I have met with him already and have found he is excited and enthusiastic toward his new job. We will try and get the section back on its feet ASAP. Some records are missing, so we will be rebuilding the files. No appointment changes will be made, except for vacant positions. K3PUR is leaving (has left for the readers) his SEC appointment in June and is moving to West Virginia. Many thanks to him for all the great things he has done for the section and all the best. The CCARC hamfest in Glenwood Springs will be July 23 at the CMC building, 1402 Blake Ave. Hope to see you there. A big "THANKS" to all those that helped with the 9 NEWS Healthfair and the March of Dimes walk-a-thon. Both operations went very well. CBers worked with the walk-a-thon and the walk-a-thon board was very impressed. Three problems arose during the walk-a-thon: 1) Operators should stick to their assigned jobs ONLY; 2) Operators should be more familiar with their equipment (ex. battery life) and be prepared to correct the problem; 3) Operators

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 Kamirenjaku, Mitaka, Tokyo, 181 Japan Telex: 781-2822452

The BEST is still "made in U.S.A."

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

should wear some sort of conspicuous identification for easy recognition in a crowd by non-amateurs. Good ideas to keep in mind for all operations. Remember WDØAIT will continue to take traffic counts, PSHR counts, and monthly net summaries. Please have all the reports in by the fifth of the month. KQØJ will take over this column next month. 73 — WDØAIT. Nets: CWN-28 sess., QTC 137, QNI 194, time 710; HNN-30 sess., QTC 121 formal, 275 informal, QNI 1737, time 1575. Traffic: NØBQP 2088, WDØAIT 115, WØLAE 115, KAØNLI 110, KBØZ 106, WBØNHA 65, WØEJD 56, WBØMWH 36, WØLQ 30, WØNFW 19.

NEW MEXICO: SM, Joe T. Knight, W5PDY — DEC: KB5XD. STM: KV5U. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 211 msgs with 229 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 at 0100 UTC and handled 66 msgs with 1009 stations in. New Mexico Breakfast Club meets daily on 3939 at 0830 local and handled 79 msgs with 1052 checkins. Yucca 2-Mtr Net 78/18 & 93/33 handled 9 msgs with 436 checkins. Caravan Club 2-Mtr Net 66/06 handled 5 msgs with 84 checkins. The Bean Feed was a great success with approx. 650. Great to have KØPGM & AGØX down from Denver. Sure missed K5ECQ, the master chef! MVARC did a fine job, which was appreciated by all. Traffic: W5DAD 285, ND5T 132, W5JOV 100, W5ENI 77, N5SJ 61, KB5LI 29.

UTAH: SCM, Leonard M. Norman, W7PBV — June activity reports due July 1st should be sent to our NEW SM, Ronald C. Todd, K3FR/7, 2112 West 12060 South, Riverton 84065. Vice-Director AGØX presented W7OCX with a PLAQUE at the joint meeting of the Ogden ARC and the Utah Code Net signed by W4KFC WØBWJ KØPGM and W7PBV for his quarter century plus Public Service via Amateur Radio. WB7RPF reports K7BFI K7BGU K7ERR K7FY WA7FFM WA7RZO WA7TNZ WB7BEG WB7RPF KA7IWL KFØQ N7IE and N7OBU all providing emergency communications for towns of Birdseye and Thistle. Thistle is completely flooded. W7LNI assembled a new low-band ssb transceiver and is on the air thanks to the help from KA7YHD and KA7IMV. W7DKB talked about the early days of radio at the Army MARS meeting. Traffic: WA7MEL 93, WA7KHE 91, NA7G 39, W7OCX 17, K7CKF 13, W7PBV 12.

WYOMING: SM, Dick Wunder, WA7WFC — SEC: W7TVK. STM: WØOGH. KD7AN. TC & OO/RFI Coord: KC7QY. PIO & ACC: KC7QJ. The State Government Liaison appt. is open. WB7NHR is looking for net control stations for the Wyo. Cowboy Net. Wyo. Hamfest is July 23 & 24 at Meadow Lark Ski Area. WIMU/Rky Mtn. Div. Convention is Aug 5-7 at Jackson. Both are worth attending, so see you there. WB7NHR reports the Wyo. Cowboy Net held 21 sessions with 843 QNI & 13 QTC. WAØPFJ reports the Wyo. Jackalope Net held 26 sessions with 577 QNI & 2 QTC. Traffic: WB7NHR 250, K7SLM 22, KD7AN 2.

SOUTHEASTERN DIVISION

ALABAMA: SCM, H. H. Wheeler, W4IBU — ASCMs: WA4RNP KA4WVU. SEC: N4DMA. STM: WA4PIZ. If you are reading this you are an ARRL member. If not, you should be. Membership in the ARRL involves a certain responsibility. One of these is the election of the officials who direct the activities of the ARRL. Unless you read the fine print in the Minutes of the Director's meeting as published, you may not learn who stands for what issue or the proposals made at these meetings. At the present time, the directors have proposed an increase in their terms to four years. This may, or may not, be an advantage. Each member should remain aware of what is taking place and be able to cast their vote based on knowledge. Nearly 66% of the section members failed to vote in the last SCM election and Directors election. Don't be apathetic!! Know the issues and vote your mind. The Muscle Shoals ARC got a big write-up in the local news. Each club should have a public relations rep on its staff. Still waiting for the first Special Services Club in Alabama. Alabama represented 98% on DRN5 by N4FQD W4CKS KC4GS WA4JDH W4WJF KB4VI W4IBU NW4X WB4IXA. CAND represented 100% by W4CKS & N4FQD. Traffic: WA4JDH 397, W4CKS 109, N4FQD 84, W4IBU 54, WA4LXP 40, KC4GS 36, WB4IXA 26, K4HJX 22, WA4JPK 18, KA4IJT 17, W4DGH 12, W4WJF 12, NW4X 12, K4AOZ 8, KB4GT 8, K4GXS 6, WB4TVY 4, K4UMD 2.

GEORGIA: SM, Eddy Kosobucki, K4JNL — SEC: WB4HXE. ASEC: K4SWJ. STM: W4WXA. ACC: WA4ABY. PIO: WA4PNY. SGL: W4BTZ. OO/RFI: K4VHC. TC: K4UDR. NWS: WA4PZD. Red Cross: NC4E. GSSB pres. KF4EH invites all to the annual picnic to be held at Madison on July 9th. This is a family affair so bring the XYL & harmonics. 1983 Alford Memorial RC officers are; KD4LM, pres.; W4LHH, v.p.; WA3JBQ, secy.; KB4BMU, treas.; KB4ZM, trustee. Tnx to all who took time to write the ARRL on the subject of "No-Code licenses." In this day & time *we must* respond to the proper authorities on matters that pertain to our hobby. We will be heard. The ladies of MALARC have been keeping active and want you to check into their Mon nite net on 146.28/88 at 8 P.M. Congrats to new Extras KB4XO & K4BWV. Drop me a card on your upgrade. Many clubs in the section starting new code & theory classes. FB way to make real HAMS. FD should be over when you read this; make sure that you get those tallies into the League. If you need forms, write for them. Savannah area hams furnished communications for March of Dimes "Superwalk." After you elect your new club officers, please send me a card immediately. First for the Column, secondly for ACC WA4ABY & my records. Please send your traffic reports to STM, W4WXA, & PSHR reports to me. W4HON & WB4NTW continue to make PSHR each month. I know that many more of you qualify each month, so if you need further info, contact me. I just returned from the first Albany Hamfest and we must all say congrats to a job well done. The efforts that were put in really made it a fine day for all who attended. It was really nice to see some of you from the southern section of this great state. Here we are in the middle of summer & there are many things to do, but please take time out to check into one of the FB nets. Traffic: W4WXA 204, KA4ATM 88, WB4NTW 62, W4PIM 44, WB4RUJ 44, N4BIM 26, KA4BAI 18, K4NM 16, K4EV 15, W4HON 14, KJ4JNL 3, AA4EI 2.

NORTHERN FLORIDA: SM, Billy Williams, N4UF — SEC: W4UEA. STM: WF4X. ACC: N4ADI. PIO: WA4PUP. BM: W4GUJ. Members of the Silver Springs RC provided comm. for the Rainbow Run in Dunnellon. Tallahassee hams helped with 200-mile bike marathon. K4MZA upgraded to Extra amd KB4CVI to Tech. DBARA has new club "Elmer" program. First HCARA hamfest was a big success and plans already underway for next year. HCARA filling for non-profit status, with WB4TPG heading up com-

ege, inc.

Call for Quotes
Dealer Inquiries Invited

JULY 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—Sale Price $950.00
limited quantities
730—Sale Price $619.95
limited quantities
740—For the Serious Ham
751—The Latest Model

HANDHELDS
IC 2AT/2AT—2m
IC 3AT—220 MHz
IC 4AT—440 MHz

MOBILE RIGS
25A & 25H for 2m FM
45A for 440 MHz
290H for 2m SSB/FM
271 for 2m SSB/FM
471 for 430-450 MHz

MARINE RADIOS
M2—All-Channel Handheld
M80—New 25-Watt All-Channel

SWL LISTENING—The R70

A Complete Line of Accessories in Stock—Call for Quotes

SANTEC

144up 2m Synthesized Hand-Held 269.95
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 . 288.95
HL20U 440-450 MHz Amplifier, 2 in, 20 out 98.95
HL90U 430-440 MHz Amplifier, 10 in, 90 out 319.00

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!

NEW DIGITAL ARGOSY
MODEL 525D—$529.95

—All Accessories in Stock—

COMPUTER INTERFACES

FOR MORSE/RTTY

INTERFACE HARDWARE
Kantronics 144.95
MFJ 1224 ..... 89.95
AEA CP-1 ..... 189.95

HAMTEXT—the new software
VIC-20 ..... 89.95
Commodore 64 ..... 89.95

HAMSOFT
VIC-20 ..... 44.95
Apple 26.95
Atari 44.95
TRS-80C 54.95
TI-99 ..... 89.95

ANTENNA SALE

CUSHCRAFT
A3 ..... 172.95
A4 ..... 224.95

KLM
KT34A 299.95
KT34XA 449.95

WILSON (MACO)
SY33 ..... 195.00
SY36 ..... 259.95

MOSLEY
TA33 ..... 199.95
CL36 ..... 303.95

Tri-Ex Towers, Freedom Phones, Bearcat Scanners & Panasonic Radios

—Now in Stock—Call for Quotes—

MFJ PRODUCTS (Call for other MFJ items)
989 New 3-kW Antenna Tuner 285.95
962 1.5-kW Tuner switch/meter 185.95
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
202 Noise Bridge 48.95
752B Dual Tunable SSB/CW Filter 79.95
Keyers—401, 406, 408, 422, 482, 484 ..... CALL

BENCHER PADDLES Black/Chrome 35.50/43.95

AEA KEYERS (MM-2, CK-2, KT-2, KT-3) ..... 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

CABLE BY SAXTON
RG213 Mil Spec ..... 29¢/ft
RG8/U Foam 95% Shield ..... 25¢/ft
8-wire Rotor 2 #18, 6 #22 ..... 17¢/ft
Mini-8 ..... 13¢/ft

ASTRON POWER SUPPLY SALE

RS7A	49.95	RS20M	104.95
RS12A	69.95	RS35M	149.95
RS20A	88.95	VS20M	124.95
RS35A	132.95	VS35M	169.95

SUPER SPECIALS

ROTORS
Alliance HD73 ..... 92.95
CD45 II 103.95
Ham IV 195.95
Tailtwister T2X 245.95

AZDEN PCS 300 Hand-held 261.95
NEW! PCS 4000 2m XCVR 280.95

KENWOOD Radios and Accessories ..... CALL

HAM DATA — *Amateur Software for the VIC-20 & the Commodore 64*

The Super Log series provides all the advantages of computer data management without compromising traditional log format. They contain ALL standard log entries, 4-way search (Call, QTH, Name, Date), FWD/Rev scan, graphic log-like display, save on disk/tape and change ANY entry. Auto date/time.

SUPER LOG I (Min 8K expansion) 14.95

SUPER LOG II Includes print and WAS summary with worked/needed/confirmed. C64 or V20 (8K) ... 17.95

SUPER LOG III Same but for DXCC. List all ARRL countries. C64 or V20 (16K) 17.95

W.A.S. PAK Adds WAS and print to V20 (3K) 7.50

CONTEST LOG 3 in 1: SS, FD and Universal. Auto time/date/dupe (faster than basic dupe). Clock display. Specify C64 or V20 (8K) 17.95

PROPAGATION CHART Produces 24-hour MUF chart in MGHz for your specific QTH to ANY QTH! Uses sunspot information from WWV. Specify C64 or V20 (3K expansion) 12.95

For a complete software list, send a stamp to EGE.
Dealer inquiries invited

AMERITRON, AMP SUPPLY HF AMPLIFIERS

—Call for Quotes—

DAIWA/MCM/J.W. MILLER
CN-620 SWR/Watt Meter 59.95
CN-540 SWR/Watt Meter 69.95
CN-620B 2-kW HF Watt Meter 110.00
CN-630 VHF-UHF Watt Meter 130.00
CN-720B 2-kW HF Watt Meter 150.00
CNW-418 Antenna Tuner 169.95
CNW-518 Antenna Tuner 279.95
LA-2035 2m Amplifier, 2 in, 30 out 68.95

ANTENNAS
AVANTI AP 151.3G 2m On-glass Antenna 29.95
LARSEN LM-150 5/8 Mag Mount 37.95
MINIQUAD HQ-1 ..... 129.95
SUPER STICK II 5/8 2m Antenna 15.95
BUTTERNUT HF6V 10-80m Vertical 109.95
BUTTERNUT 2MCV5 2m Antenna 37.50

CUSHCRAFT (Other antennas in stock)
AV3 New 10-15-20m Vertical 44.95
ARX-2B New Ringo Ranger 2m 35.25
220B 220 MHz "Boomer" 74.95
A147-11 11-element 2m 37.95
R3 10-15-20m Vertical 226.95
214B SSB/214FB FM 2m Boomers 68.95
3219 SSB DX 2m Boomer 82.00

HY-GAIN ANTENNAS, TOWERS

—Call for Quotes—

KLM ANTENNAS ..... Call for Quotes

HUSTLER
6-BTV 10-80m Vertical with 30m 120.95
5-BTV 10-80m Vertical 111.00
4-BTV 10-40m Vertical 85.95

HF MOBILE RESONATORS	Standard	Super
10 and 15 meter	9.95	15.00
20 meters	13.50	16.95
30 and 40 meters	15.00	21.00
75 meters	15.95	32.50

VOCOM ANTENNAS/2m AMPLIFIERS
5/8 wave 2m Hand-held Antenna 14.95
2 watts in, 25 watts out 2m Amplifier 67.95
200 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 159.95
Power Pocket for ICOM 2A/2AT 179.95
Power Packet for Handhelds 66.95

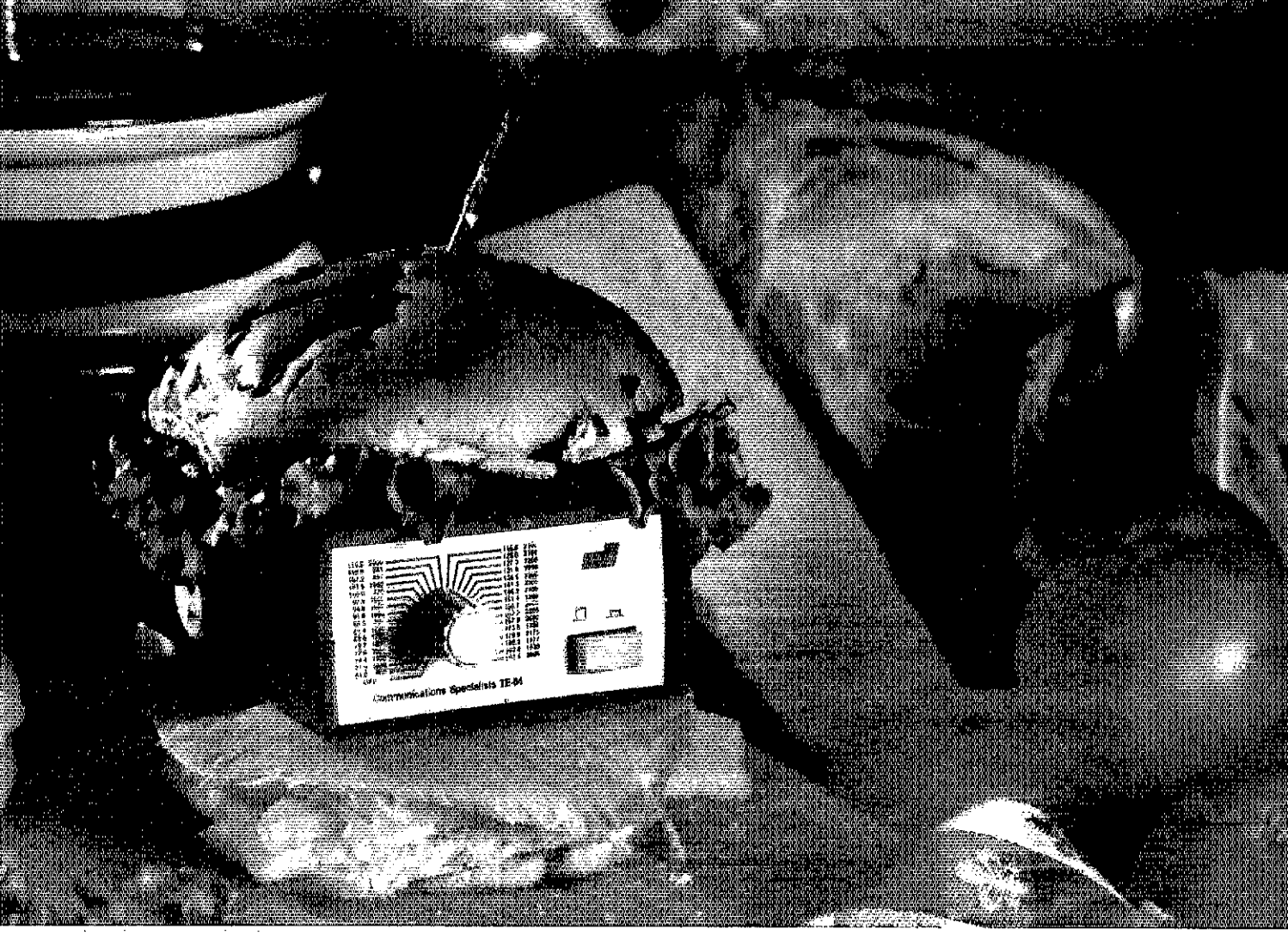
TELEX HEADSETS/HEADPHONES
C1210/C1320 Headphones 28.95/40.95
PRO COM 200 Headset/Dual Imp Mic 82.50
PRO COM 300 lt/wt Headset/Dual Imp Mic 74.95

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 2 stamps 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.



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

mittee. GCARA very active in public service work. WB4TZR and KE8O holding mall displays. WA4SGF and Tri-County ARC had successful Mothers Day message station at Palatka Mall. N4ADI reports 50 hams assisted with comm. for Orlando *Sentinel* Safari. The route was 410 miles with 850 bikers participating. KW4V designed new Lake Monroe ARS club logo. AB6I recovering from hospital stay. Seminole Co. RACES Net meets at 1900 local on 145.52 simplex. Nineteen BARS members provided comm. for 1983 Beaches Opening Day Festival. New OBS is N4DWH. New BARS officers are WB4QBM, pres.; KA4RDQ, v.p.; W8JGL, secy.; WA3UBA, treas.; WB4K W4KMX, directors. RANGE and NOFARS provided comm. for St. Andrews Society Scottish Games. More severe wx south of Jax caused Duval and Clay Co. ARES to be on standby. W4PCM had yard full of large tree limbs, and a group of hams came to his aid. For the latest news pertaining to Amateur Radio and ARRL, join the ARRL Information Net each Saturday morning at 0800 Eastern on 3,940 kHz. Questions can be answered and comments made to and by your Florida League Officials. KF4U, manager of Gator Net, reports another good month. Cw traffickers are urged to check in at 0830 daily on 7,090 kHz. (3,651 alt.) A large number of comments on the no-code license concept were generated in the NFL section. In addition to FCC, many were sent to Senators Chiles and Hawkins. Thanks to the many hams who wrote. Traffic: WF4X 682, WA4QXT 395, N4PL 379, WB4ADI 252, WD4IIO 184, WA4EYU 172, WF4Y 155, WD4HBP 142, N4GDT 131, KB4LB 117, KB9LT 117, W4MGO 95, KD4KK 93, WD4MLQ 82, KF4U 79, W4GUJ 68, WB4TZR 67, KA4RVQ 64, NY4E 62, N4ADI 60, WD4RIQ 55, WB4GHU 49, NF4O 47, W4KIX 37, KD4QZ 35, KB4T 33, W3IDO 28, NS4C 25, N4UF 25, WA4STZ 22, WB4AWG 17, KA4ETX 15, WB4FJY 15, KA4RBY 15, NQ4P 15, WD4ORO 14, N4HGD 11, W4LUW 10, W4OM 10, WB4YGP 9, KF4GY 8, KA4VXT 8, WD4FAB 6, KD4FI 5, KA4RMH 5, WB4DTS 2, WD4GUZ 1. (Mar.) KF4EU 12.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS. STM: K4ZK. ACC: AA4WJ. BM: WA4EIC. TC: KI4T. Summer is just around the corner because VE3BSY is on his way back to Canada and W4SME is heading back to W1-land. W4JM says he has been attending hamfests for 55 years and kept his record 100% intact-never won a prize — HI. N4KB said summer conditions limit him to QFN, so W1NJM is doing his TCC sked for the summer. Received the first report from the Bulletin Manager, WA4EIC. He reports that there were five bulletin stations reporting a total of 40 received and 83 transmitted this month. FB. Fourteen Polk Co. hams provided communications for the 1983 March of Dimes Walk-a-thon. They were WA4OZA K2CXH KA4NQK WB4ZVD WB4DUN W2HGV K8RIF NZ4H WB4NSQ WA4ZRB WB4RSC K9VTW KF4UQ and NW4R. A March of Dimes Walkathon was also held in Central Brevard during April. Fifteen hams assisted with the communications: W4BAL WB4HDX W4JMH W4PRK WA4WRI KB4HQ N4AKA W4DXZ WA4AJT W4JC W4OTM KB4IM W4YWA W4HVU WB4WYG. All hands said they felt their efforts were worthwhile, and a letter of thanks was received from the sponsor. K4URX reports that the Florida Keys Community College offered a 3-credit course, "Amateur Radio License" during Term 2. The class, taught by K4URX, covered FCC requirements of Novice and General/Technician Class Licenses, including Morse Code. WA4PFK originated 79 messages for participants in the Florida State Science and Engineering Fair held at Broward Community College. K7LCA and WE4Q have been appointed EC and Asst. EC respectively for Broward Co. Congrats to KE4DA who made Extra in April, and to KM4G, who received his degree in Electrical Engineering from Florida Atlantic University. N2WX in Palm Bay wants to know of anyone on the East Coast interested in a computer packet link. W4JM enjoyed a visit with DL3ME. He was enroute home from the National QCWA meeting in Texas. He spoke at a luncheon about ham radio in Germany. 73 de WA4PFK. Traffic: W3CUL 3077, W3VR 895, WA4PFK 484, K4ZK 360, WD4COL 337, WA4EIC 322, K4SCL 250, K4IA 221, K4EUK 170, WB4AID 169, KE4O 167, W4NFK 159, WD4AWN 149, W4YCL 138, KA4GUS 133, VE3BSY 132, W4DL 127, WB4WYG 109, W4ESH 95, W8BZY 82, KA4ASZ 79, KY4U 78, WD9AEP 75, W4SME 61, N4KB 58, W3TLV 53, WA4HXU 50, KA4NXF 50, W4PKP 47, KF4RL 44, N2WX 41, K7LCA 40, KA4FZI 38, K5IHH 37, NW4R 34, WO4L 33, KA4YHS 32, W4DVO 28, WK4F 28, WB4GCK 26, WD4KBW 26, K3NMR 25, AA4BN 19, W8ARW 18, WB2OUK 15, W1DLP 13, KA9AKY 12, KA4BBA 12, NJ4O 12, K4FQU 11, KB4KB 11, W4MVP 10, W3IJC 6, W4WYR 6, KA1CLP 4, K4JLL 4, WA4LKY 4, KF4UX 4, NX4X 4, K8BXT 3, W4MFD 3, KA4RWV 3, N8EL 2, K4KKP 2, WD4PPA 2, KA8CXQ 1, W9FPO 1, KA4GDU 1, KF4JA 1, K4OVC 1. (Mar.) WA4TWD 92, K8BXT 16, N4BXU 2. (Feb.) WA4TWD 39.

WEST INDIES: SM, Gregorio Nieves, KP4EW — During the month of April, members of ARES and RACES, in coordination with Puerto Rico CD, collected food, clothing and medicines for the victims of the earthquake at Popayan, Colombia. This team, headed by SEC NP4CF, and assisted by KP4AHX KP4FBG WP4BEF KP4ATZ WP4BOI and WP4ATZ, spent almost two weeks in the classification, packing and shipping of these goods, sometimes up to late in the evening. Congrats for a job well done. The Puerto Rico ARC will be assisting in the communications for the World Veterans Games (MASTERS) to be held at San Juan from Sept. 23-30. The radio communications committee is composed of: KP4EBQ, communications coordinator; KP4ABN KP4ABG, special events radio coordinators; KP4ATZ, club photographer; KP4EW, SM. A meeting was held on April 28 with coordinators of the games and representative of the San Juan Mayor, who is the patron of these games. NP4D reports the following totals for WINC NCS phone 9, NCS cw 12, liaison 12, QNI cw 30, QNI phone 18, Net Mgr. 5. Divd 2, Total: 87. Traffic: NP4D 104, KP4DJ 77, KP4ABX 18.

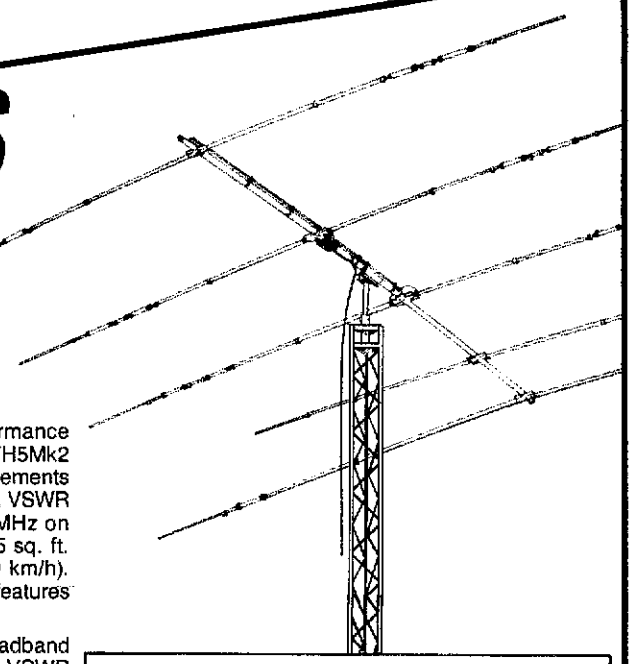
SOUTHWESTERN DIVISION

ARIZONA: SM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. April seems to have brought the fair weather of spring to AZ with continued public service activity by section amateurs. In March, the ARA reported that the following participated in the March of Dimes Walkathon: W7WGW WA7VWG K7TPW W7GFE N7ETP N7ECE N7AUW N7DOM KA7KLJ K7LKL KA7DRV N7AIY N7BHY WA7PMS K7PMS KA6GBY KA7DSR WB8TIX WA7DXQ WA7DZU. Meanwhile in Tucson, those participating in this event were: KBØIW W7DMT KC7HU WB7CGQ K7KYW WAØNNC KA7FRY. Superstition ARC reports the following officers: WDØHCD, pres.; WA7JZL, v.p.; WB7FAJ, treas.; KA7AKK, secy.; WA7IVA WB7QZB WB7FDF WB7CRK W7JPJ, directors. The TRA reports that the following participated in either the Old Pueblo Endurance Ride or the Camp Wildcat Triathalon comm. ac-

hy-gain®

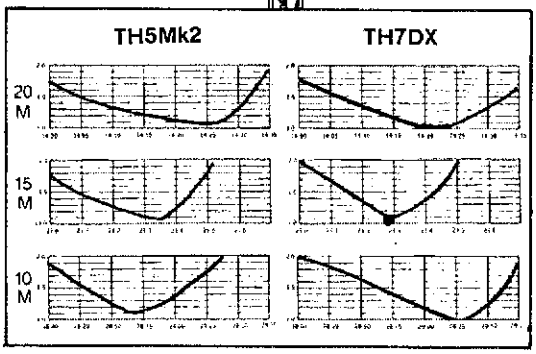
THUNDERBIRDS

NEW BROADBAND TRIBANDERS LOAD NEW AUTO-TUNE SOLID STATE RIGS



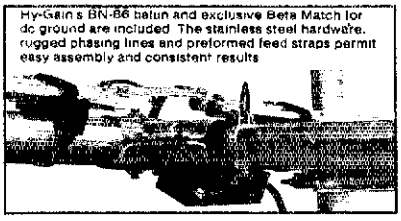
TH5Mk2 Now you can enjoy outstanding broadband antenna performance in a size to fit most city lots. With 5 elements on a 19 ft. (5.8 m) boom, the TH5Mk2 has 4 active elements on each band. Hy-Q traps and monoband parasitic elements achieve gain and front-to-back ratio comparable with stacked monobanders. VSWR is less than 2:1 over the 20 and 15 meterbands, and from 28.0 to 29.4 MHz on 10 meters. The TH5Mk2 weighs only 57 lbs. (25.8 kg). And with just 7.5 sq. ft. (.68 sq. m) surface area, wind-loading is 190 lbs. at 80 mph (86 kg-129 km/h). In addition, the TH5Mk2 offers the same solid construction and outstanding features as the TH7DX. See common features below.

TH7DX The new standard of comparison for high performance broadband tribanders. Using a dual driven 7 element system, the TH7DX maintains a VSWR of less than 2:1 on all bands including ALL of 10 meters. This computer aided design uses a unique combination of Hy-Q traps and inner-laced parasitic monoband elements. The result is gain and front-to-back numbers that add a whole new dimension to your station capability. Even with this amazing performance, the TH7DX boom is only 24 ft. (7.3 m) and the entire array is no bigger than the famous TH6DXX. Weight of the TH7DX is 75 lbs. (34 kg) with surface area of 9.4 sq. ft. (.87 sq. m) and wind-loading of 240 lbs. at 80 mph (108.9 kg-129 km/h).



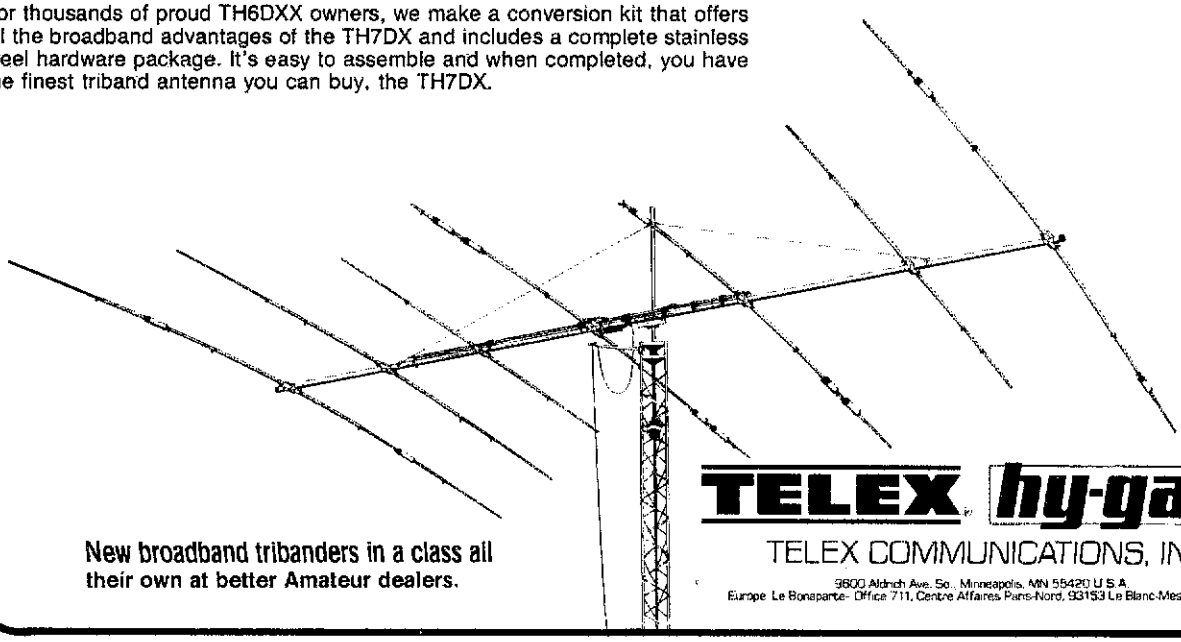
FEATURES COMMON TO TH5Mk2 AND TH7DX

- Broadband dual driven element system.
- Separate, highly efficient Hy-Q traps for each band handle maximum legal power with a 2:1 safety margin.
- Unique Beta Match assures efficient energy transfer.
- dc ground for lightning protection.
- BN-86, 50 ohm balun included.
- Performed feed straps.
- Stainless steel hardware and compression clamps for all electrical and most mechanical connections.
- Taper swaged 6063-T832 thick-wall aluminum tubing.
- Rugged die-cast aluminum boom-to-mast bracket.
- Twist and slip proof, die-formed heavy-gauge aluminum element-to-boom brackets.
- Packaged in two boxes suitable for UPS shipment.


Hy-Gain's BN-86 balun and exclusive Beta Match for dc ground are included. The stainless steel hardware, rugged phasing lines and preformed feed straps permit easy assembly and consistent results.

CONVERT YOUR TH6DXX

For thousands of proud TH6DXX owners, we make a conversion kit that offers all the broadband advantages of the TH7DX and includes a complete stainless steel hardware package. It's easy to assemble and when completed, you have the finest triband antenna you can buy, the TH7DX.

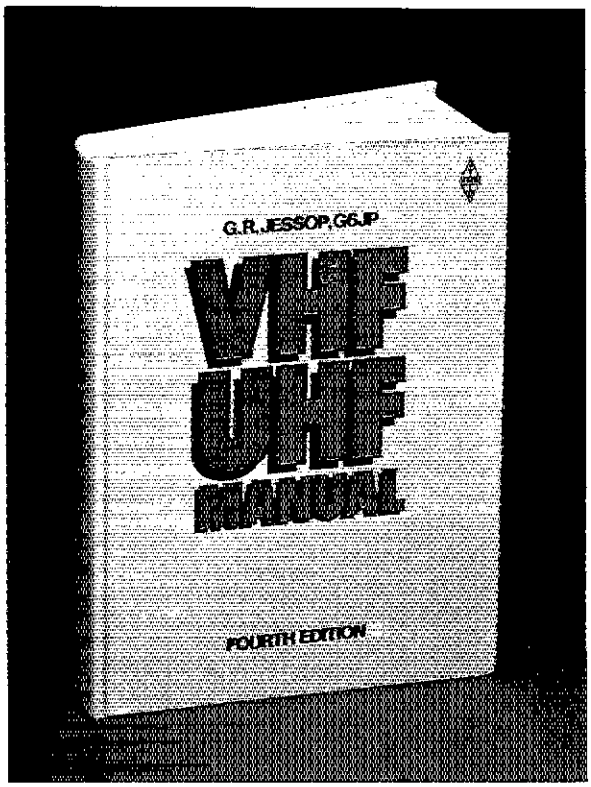


New broadband tribanders in a class all their own at better Amateur dealers.

TELEX hy-gain

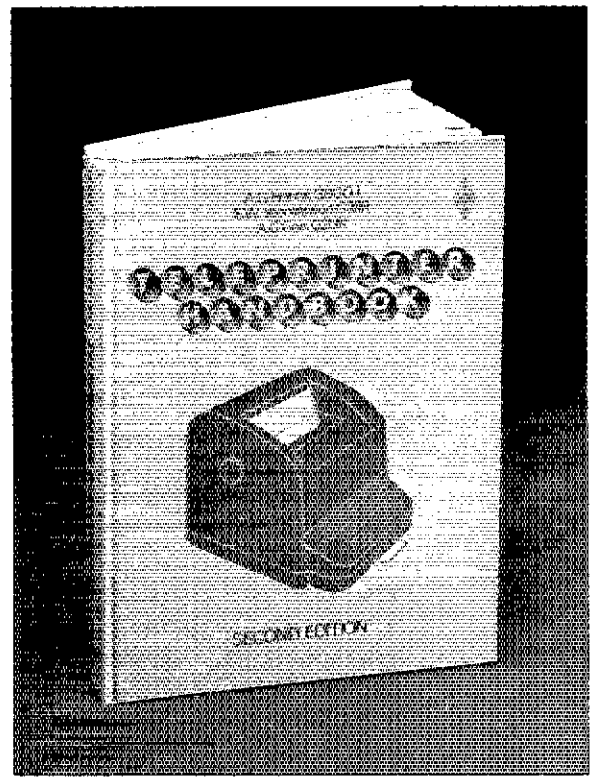
TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte- Office 711, Centre Affaires Paris-Nord, 93153 Le Blanc-Mesnil, France



VHF-UHF Manual by G. R. Jessop, G6JP. You will find the new fourth edition of ***VHF-UHF Manual*** jam-packed with practical theory and construction projects for the region above 30 MHz to 24 GHz. The microwave chapter has been expanded to 83 pages; and includes information on: converters, cavity amplifiers, Gunn diodes, waveguides, directional couplers, and antennas. Receivers and transmitters are covered in 181 pages. The balance of the 512-page book contains chapters on propagation, tuned circuits, space communications, filters, test equipment, antennas, and a handy data section. (Since this is a British publication, there is little coverage of the 6-meter band, but many of the 4-meter band projects can be adapted by the experienced amateur for use on 6-meters.) Copyright 1983 Hardbound $17.50

TELEPRINTER HANDBOOK With mechanical teleprinters available at inexpensive prices these days, this book shows how you can set up a RTTY station and keep the equipment running. Besides covering British made machines, the ***Teleprinter Handbook*** also covers maintenance, repair and operation of Teletype Model 15, 19, 28, 32, 33, and 43 units. Also covers reperforators, power supplies, demodulators, polar relays, keying methods, filters, and test equipment. 353 pages, Copyright 1983, 2nd Edition, Hardcover, $21.00



THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET
NEWINGTON, CT 06111

ELECTRONIC TECHNICIANS
COMMUNICATORS
RADIO OPERATORS

The Central Intelligence Agency has excellent career opportunities for individuals with experience in communications systems maintenance, HF radio, Morse intercept, satellite communications, or radio-teletype operations. If you are looking for the challenge of a CIA career... you could join a very select group of dedicated men and women who use their professional skills in unique and rewarding assignments throughout the world.

Electronic Technicians

Applicants should have AAS degree or equivalent education in Electronic Technology, or have similar commercial/military technical experience. Knowledge of solid state and RF circuitry desirable.

Starting salaries $16,559-$20,783 depending on qualifications, plus substantial overseas benefits.

Communicators and Radio Operators

Applicants should have experience as communicators, telecommunications specialists, radiomen, Morse intercept operators, or be radio amateurs with general license or higher. Morse code ability at 12 gpm is preferred; other applicants will be tested for Morse aptitude. Minimum touch typing of 30 wpm is required.

Starting salaries $15,398-$18,215 depending on qualifications, plus substantial overseas benefits.

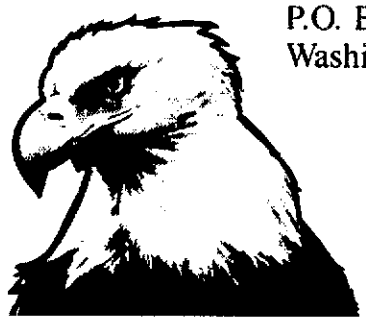
Personal Qualifications

U.S. citizen (self and spouse); high school graduate or GED; availability for extensive overseas service. Must meet security and medical standards. Civil Service status *not* required.

Attention Military Personnel:
Apply now if you are scheduled for separation within the next six months.

Send resume to:

Personnel Representative (HM)
Dept. A, Room 821
P.O. Box 1925
Washington, D.C. 20013



Central Intelligence Agency

An Equal Opportunity Employer

tivities: K7OMR WB7VOM WB7CGQ WB7TWM W8BID K7CRN K7KYW WA0NNC KC7HU KA7LEW WB7STA WØOQX K7SEC KBØIW AF7M KA7DAC KA7FTZ N7EKT WB7ESQ WA7FDN AG7H WB7OMM W7UCX. New apptees: ORS-K7RDH K6LL. With regrets WA7YMB is reported as a Silent Key. There are still openings in the new ARRL Field Organization within the section; volunteers are welcome. PSHR: W6KMF KB7FE W7EP. ATEN: QNI 1199, QTC 199. Cactus Net: QNI 947, QTC 100. Traffic: KB7FE 248, K7UXB 111, W7EP 99, W7AMM 77, W5KMF 71, WA7KOE 26, K7NMQ 21, K7RDH 14, N7EH 13, KA7HEV 10, N7CQY 7, KE7W 7, WA7YUL 6, WB3LQQ 3, WA7NXL 2, K7POF 1.

LOS ANGELES: SM, Stan Brokl, N2YQ — SEC: N6UK. STM: W6INH. ACC: NF6D. Hughes El Segundo Employees Assn. (HESEA) ARC provided communications for the Playa Vista 10K Run and the 2nd Annual Jimmy Stewart National Relay Marathon on Sunday, April 11th. A total of 36 hams participated. Three more runs will be supported in June. On April 24 the JPL ARC supported the Burbank Glendale March of Dimes Walkamerica Walkathon. W6ABW and KA6JAM headed this event. Also on April 24 the Downey ARC and Rio Hondo ARC ran communications for the March of Dimes Walkathon in the Downey/Whittier area. Rio Hondo ARC Pres. WA6GEV will teach a Novice to Advanced level class at Rio Hondo College in Whittier beginning on May 17th. Info no. is 213-692-0921, ext. 288. Lockheed Employees Recreation Club (LERC) ARC has reorganized and has a net on Tuesdays 1900 PST on 147.42 MHz. LERC will teach Novice classes starting on June 6th. Northrop RC is celebrating its 30th anniversary this year with a banquet to be held in October, probably at USAF Space Division, El Segundo. The Northwestern District of the ARES supported the Ironman Triathalon Competition on May 1. N6ZH headed the cooperation with the Red Cross. Over 70 operators helped in this pre-Olympic event. OO reports: K6CL 1, K6KA 80. Traffic has been lite this last month. Let's get busy and originate some, fellows. Also keep check on your appointments and let me know if a renewal is in order. New ORS appointments N6DZO AD7G congrats. Traffic: K6UYK 472, W6INH 308, WA6OCM 93, KT6D 82, AD0A 72, W6NKE 16, K6CL 6, N6DZO 2.

ORANGE: SM, Sandi Heyn, WA6WZN — SEC: W6UBQ. STM: WA6QCA. ACC: KA6NLY. BM: W6DXL. OO/RFI Co.: N6PE. SGL: N6HIQ. TC: AA6DD. DECs: WB6JBI W6LKN K6GGS WB6YZY. Owing to EC K5EDS's resignation, his asst, WA6OFT, has been appointed EC for San Bernardino RACES Dist #8 (Victorville/Apple Valley area). Congrats to AEC WB6ULU on his election of Commander of Coast Guard Aux Flotilla 24. For info on the new Org Co. YL Club Ladies Amateur Radio Assn. (LARA), contact founder VE7DLW/KA6WAH. EC WB6QHB reports growing activity, with Asst ECs WA6IQL (Upland), WB6JSC (Ontario), WB6DFI (Chino) and WA6LLB (Montclair). New club officers — Barstow ARC: N6DWL, pres.; N6ADV, v.p.; W6HUG, secy/treas.; Coachella Valley ARC (Indio): WB6VMR, pres.; NR6P, v.p.; WA6QGH, secy/treas.; Hughes Fullerton ARC: WA6JKZ, pres.; NC6U, v.p.; W6JXC, secy.; KA6PMT, treas. Mission Trail Net: K6UGS, pres.; N6ESU, v.p.; K6QMD, secy.; KA6BTU, treas. Western Public Service System (WPSS): KB6ZO, pres.; WB6BNA, v.p.; WA6FOU, treas; KA6EGO, secy. New directors for South Org AR Assn. (SOARA) are: N6ARZ WB7BNJ WA6ACB WB6SDU WD6AWP KF6EX KA6BJO. Nets on RTTY rptr WB6ZIR/R 145.12 (– .6) at Running Springs: ARES net Mon 8 P.M. ASCII net Wed 8 P.M., and PIX net Thur 7 P.M. 146.595 simplex is being used for 1200 baud ASCII packet radio. Rptr N6GWD 146.70 (– .6) in Palm Springs is phone operated days and RTTY at night. Lake Elsinore Valley ARC supports W6WPP/R on 146.76 (– .6). Rptr WB6RSD 146.985 (– .6) on Keller Peak now plays Westlink Tues & Thur 8 P.M. Rptr W6ZJU 147.33 (+ .6) at Big Bear gives road and weather info with 4-6-3-6 touchtone access. An ATV net meets Mon. 7:45 P.M. on 146.43 (video on 434 MHz). That includes Westlink tape and ATV swap net. Active ATV rptrs are W6ORG/R 1265.0 MHz on Johnstone Peak and WA6SVT/R 1253.0 MHz on Mt. Wilson (which is expected to be moved to Santiago Peak). Morongo Basin ARC (Yucca Valley) supports rptr on 146.79 (– .6), with new trustee KS6T and autopatch K4WRM/R on the output. SEC W6UBQ is running code practice Mon 8 P.M. on 21.15 MHz. The local Org. Co. gang that hangs out on 147.54 meet for breakfast Sat 8 A.M. at Denny's in Costa Mesa on Harbor near 405 freeway; a "non-roster" can be obtained from K6LBJ. SW ARRL convention (with chairman WB6QKB and vice chairman NC6H) will be held Sept 2-4 at the Marriott Hotel in Anaheim; astronaut WØORE will be main banquet speaker. PSHR: W6NTN N6GIW WB6QBZ WA6QCA AI6I.

Net	Freq.	Time	QNI	QTC	NM
SCN/1	3598 kHz	7 P.M.	454	422	K6XI
SCN/2	3598 kHz	8:15	183	138	K6XI
SCN/V (FM)	146.645	9 P.M.	682	319	WA6QCA
RTTY/V	145.12	10 A.M.	358	72	KA6HJK

Traffic: N6GIW 309, WA6QCA 211, W6NTN 142, K6XI 125, KA6HJK 118, WB6QBZ 89, W6HE 66, K6GGS 53, N6GOT 36, W6TKV 25, N6FRW 15, W1PBE 10, WB6LGL 8, WA6WZO 3. (Man) N6GOT 35.

SAN DIEGO: SM, Arthur R. Smith, W6INI — PIO: WA6CUP. ACC: WA6COE. BM: WA6HJJ. STM: N6GW. SEC: W6INI. New appt.: WA6CUP. Public Information Officer. SD Amateur Radio Council officers for '83: W6SLF, chmn; N6CQW, v. chmn; W6GVK, secy; W6RHI, treas. New 220 Club officers: W6INI, pres.; W6PDA, v.p.; NE6T, secy. Our good friend W6KBD became a Silent Key on Apr 13. April public service events included March of Dimes Walkathon, glider meet, Boy Scout Fair and a mass casualty drill in Ramona. Congrats to N6GGW who is now KF6TF. Palomar ARC solved its rptr site problem by buying the lot. The North County Tfc Net, sponsored by Palomar ARC, held 29 sessions and handled 148 msgs. The net meets nightly at 2000 on 146.13/73. New meeting place for the 220 Club is the Serra Mesa Recreation Center, 9020 Village Glen. New day is second Monday; time 1930. Escondido ARS is whipping up interest in T-hunts among its members. The club meets in Glendale Fed S&L, cor Valley Pkwy and Rose, Escondido, on 4th Mon at 1930. Traffic: KT6A 636, KM6I 203, K6HAP 201, W6HUJ 147, KB6AI 70, N6AT 32, N6GW 24, WA6IIK 7, W1LE 2.

SANTA BARBARA: SM, Robert N. Dyruff, W6POU — COALINGA, CA - 30 miles outside SBAR SCTN-pop. 6400. May 2, 4:45 P.M. 6.5 Richter QUAKE! Zero dead! 47 injured, $21 × 10^6 private prop. damage + $3. 7 × 10^6 contents + $6 × 10^6 public prop. damage; 563 uninhabitable homes, 250 habitable, 1,000 displaced persons, 9 blocks bus. dist. destroyed; 3,000 fed daily by public/private agencies. Comms severly disrupted. Hams volunteered in great numbers across state. Neighboring cities in Kern, Tulare, Kings & Fresno Counties supplied ops. W6IYY/R was mainstay rptr. Adjacent sctns linked via WB6QEV/R and

Cactus Net for info out: WPSS (3952), WCARS (7255), NTS mobilized for welfare tfc. State agencies considering Coalinga precursor/test case for anticipated 8.3 quake on San Adreas fault. N6DKV, Atascadero, served on scene from SBar sctn. Ship beacon (EPIRB) on 121.5 detected by Russian satellite, DFed by SBar So. Co. ARES in one hour. WL7ACO supplied critique info and inventory all local rptrs coverage/capabilities. Publ svc comm WD6EBY coord. March of Dimes walk; WB6RVA coord. Red Cross 1st aid stns for 1 May Triathalon. WB6UNH coord Law Enforce. Day Carpinteria with hf/vhf tfc by WA6MBZ N6WP WD6DNN N6AJA and N6CFO computer opns. SW Div. Officials Net moves to summer sked 3907 kHz Sun 2100 PT. Strong anti "No-Code" replies by N6FOU & N6EGY. Atty K2BAH files against FCC licensing responsibility giveaway. ACC W6ZZN developed Spec. Serv. club qualification plan. OBS stns give regular bulletins incl. WB6POE on WA6ZTT/R-Vent Co., K6SZS on N6ZF/R-SBar No. Co. DEC W6RIC spearheads Vent. Co. ID roster of 1482 hams. Singles Novices for upgrade pgm. Traffic: W6JTA 34.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC — A/SM: WA5QFD. SEC: W5GPO. STM: W5MVP. OO/RFI: WB5JBP. PIO: N5FDL. BM: W5QXK. TC: WB5IIR. SGL: W5UXP. NMs: K5UPN WD5JYI AE5I. As you can see above, your leadership officials here in NTX are the finest group of talented folks that one could hope to be associated with!! We still need an Affiliated Club Coordinator to work with the clubs in our section to get the new licensing and enforcement programs coordinated. Contact me for more details on this most vital position of leadership. WB5LAT is now NF5T; congrats, Mr. O! New officers for Garland ARC: WD5JYE, pres.; WB5PBE, v.p.; N5FTN N5EDI, treas. NA5M is new honcho for Richardson Wireless Klub. Both hospitals in Paris are sporting new radio shacks complete with all the trimmings, and the 146.16/.76 rptr. with autopatch is to be installed on St. Joseph's Hosp. Now that all that emergency gear has had a nice workout in Field Day, let's keep it ready, as hurricane season began June 1. Remember, a storm in the gulf can affect us here in NTX. Remember Albany, Breckenridge, and Graham!? PSHR: KA5AZK KB5UL K5UPN WA5QFD KD5FR NF5T N5FDL N5BT. Many thanks to WA5QFP who has computerized our EC and DEC rosters, which include much info on each county. Hamfest season has begun. W5GPO and I try to make most of them; be sure and look us up for an eyeball QSO. Traffic: KA5AZK 214, K5UPN 197, N5BT 196, KB5UL 75, WA5QFD 64, KD5FR 62, W9OYL 50, NF5T 33, W5PBN 19, N5FDL 18, K5SOR 11, K5PC 11, AE5I 8, W5YK 6, K5HGX 2.

OKLAHOMA: SM, Art Roberts, W1GOM — SEC: W5ZTN. STM: KV5X. OO/RFI: KB5EK. TC: W5QMJ. BM: W5AS. SGL: W5NZS. ACC: K5CAY. Greetings to the OK section. We now have a DEC for the Northwest quandrant, KB5XI, and for the Southwest, W5VXU. The OFON is now the Oklahoma Traffic Net (OTN) and meets at 6:30 P.M. local time, still on 3900 kHz. The response has been very good. I want to express my appreciation to all that are doing public service work around the section. There are excellent wx nets that are keeping up their record of good reporting and the individual amateurs that help when the public needs it. This is the time of year when many communities have events needing our help and we have been there! N5FUV and N5EGP were right on hand to assist a family that were victims of a serious traffic accident. A good example of public service handled well. N5DUB reports a Vic-20 Net on 145.29 in Enid, Saturdays at 9:00 P.M. local. WB5ELG attended the 7290 gathering. W5JJ continuing a 50-plus-year tradition of welcoming Novices on cw. Traffic: K5CXP 281, W5AS 236, KV5X 195, W5RB 149, W5REC 145, KB5EK 143, KD5OE 122, W5VXU 85, WB5ELG 66, WA5OUV 63, WD5IFB 55, KB5XI 46, WA5OGC 42, W5SUG 32, WA5ZOO 32, W5VOR 30, WD5JCE 29, W5VLW 27, W1GOM 26, N8IN 15, N5EO 9, KC5OU 7, K5ENA 6, WB5LSW 3, W5JJ 2.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR — STM/ASM: N5TC. SEC: WA5RVT. BPL: WB5YDD. New ACC: KA5KRI. New EC, Travis Co.: WB5LXD. The 7290/TTN/TEX/TSN picnic in Kerrville a big success with over 200 registered; W5CTZ re-elected NM of TEX; W5EDZ N5TC WA5RVT & W5KR among those present. New OBS N5DFO made 59 bscsts of ARRL bulletins and propagation fcsts. Blind Viet Nam vet walking across USA is in Texas most of May; many Texas Amateurs reporting progress back to St. Louis and Florida; ORS N5CRU busy coordinating ops for that plus rooting for his new grandchild to be born soon. DRN5 NM WB5YDD reports STX section represented 100% by WA5OYS WA5RVT KD5KQ W5URN N5DFO WB4FQU WB5EPA W5CTZ W5KLV W5SHN AK5M K5KJN K5WOB N5AMH KA5KRI N5EFG N5CRU & WB5YDD. N5AVR has been asked to be CD Director for Caldwell County. EC K5HGB says FD planning in high gear. ORS N5FN doing great amount of mobiling, both phone and cw; worked ON6BC/C9 on mobile cw; he was one of speakers at W5AC swapfest in March. OBS W5KLV broadcast 10 bulletins, 21 satellite bulletins, 4 propagation forecasts, 6 DX bulletins, 5 CRRL bulletins, 100 readings on 8 nets. STEN Convention in Flatonia elected W5KLV secy./treas. for 17th term; also elected K5JKV as NCS (pres.), K5URD alternate NCS (v.p.), and WA5NLT as PRO. CAND NM W5KLV reports DRN5 represented 100% by STX stations N5EFG K5WOB N5AMH N5CRU W5SHN W5URN KD5KQ N5DFO WB5YDD & W5KLV. Congrats to WB5BWV who will graduate from Univ. of Texas med school in May, then begin 4-year residency in radiology. Congrats also to W5KLV; he is first-ever recipient of the WA5YEA award for excellence in operating proper on-the-air conduct and true dedication to Amateur Radio; the impressive plaque now hangs proudly by his operating position. N5EM has won the Texas Traveling Trophy (for QRP operation) for 2nd time. El Paso welcomes new hams KA5QDY KA5PBS KA5PXT KA5QDZ KA5QEA. AC5K has his Atlas 350XL fixed up and working great; qualified for ARRL 25 wpm proficiency award; his wife has just been assigned KA5PXK and has worked all ten call areas and Colombia. Traffic: WB5YDD 510, N5DFO 318, W5CTZ 298, W5KLV 252, W5TPB 229, WB5FQU 86, N5TC 86, N5EFG 51, N5CRU 50, KD5GM 45, ND5C 43, W5KR 41, K5HZR 37, KS5V 35, WB5MMI 23, WA5RVT 23, W5BGE 18, WD5GKH 14. (March) K5GM 60, AC5K 2.

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.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievments added upon request. SASE brings TAD data sheet. W6LS, 2814 Empire, Burbank, CA 91504.

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.

MUSEUM now open for radio historians and collectors. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 replica store and telegraph displays. 15,000 items. Write A.W.A. for details: Bruce Kelley, W2ICE, Holcomb, N.Y. 14469.

HAMFESTERS 49th Annual Hamfest and Picnic, Sunday August 14, 1983, Santa Fe Park, 91st and Wolf Road, Willow Springs, IL, Southwest of Chicago. Exhibits for OM's and XYL's. Famous Swappers Row. Tickets; at gate, $3, advance $2. For advance tickets, check or M.O. and S.A.S.E. to Hamfesters, P.O. Box 42792, Chicago, IL 60642.

THE CENTRAL Kentucky ARRL Hamfest, sponsored by The Bluegrass Amateur Radio Society, will be held Sunday, 8:00 AM to 5:00 PM August 14, 1983 at Scott County High School, Longlick Road and US Route 25, Georgetown, Kentucky (Offl-75/64). Technical Forums. Awards and Exhibits in A/C facilities. Outside Flea Market space, no charge. Tickets $3.50 advance and $4 @ gate. For more information or tickets write Edward B. Bono, WA4ONE, P.O. Box 4411, Lexington, KY 40504.

YAESU Owners — join your International Fox-Tango Club — now ending its eleventh 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, 14.325MHz), more. 1982 or 1983 sets $8 each; both $15. Send dues to FT Club, Box 15944, W. Palm Beach, FL 33416.

Why I Love My Alpha 78.

It's just incredible.

I want lots of rugged, dependable power without sacrificing simple, no-tune-up operation. My ALPHA 78 gives me maximum legal power in any mode with a big margin of safety—and with no duty cycle or time limit. Even a rough 48-hour contest doesn't get it hot and bothered. Yet I can change bands instantly with just the flick of a switch. Nothing but an ALPHA can do that!

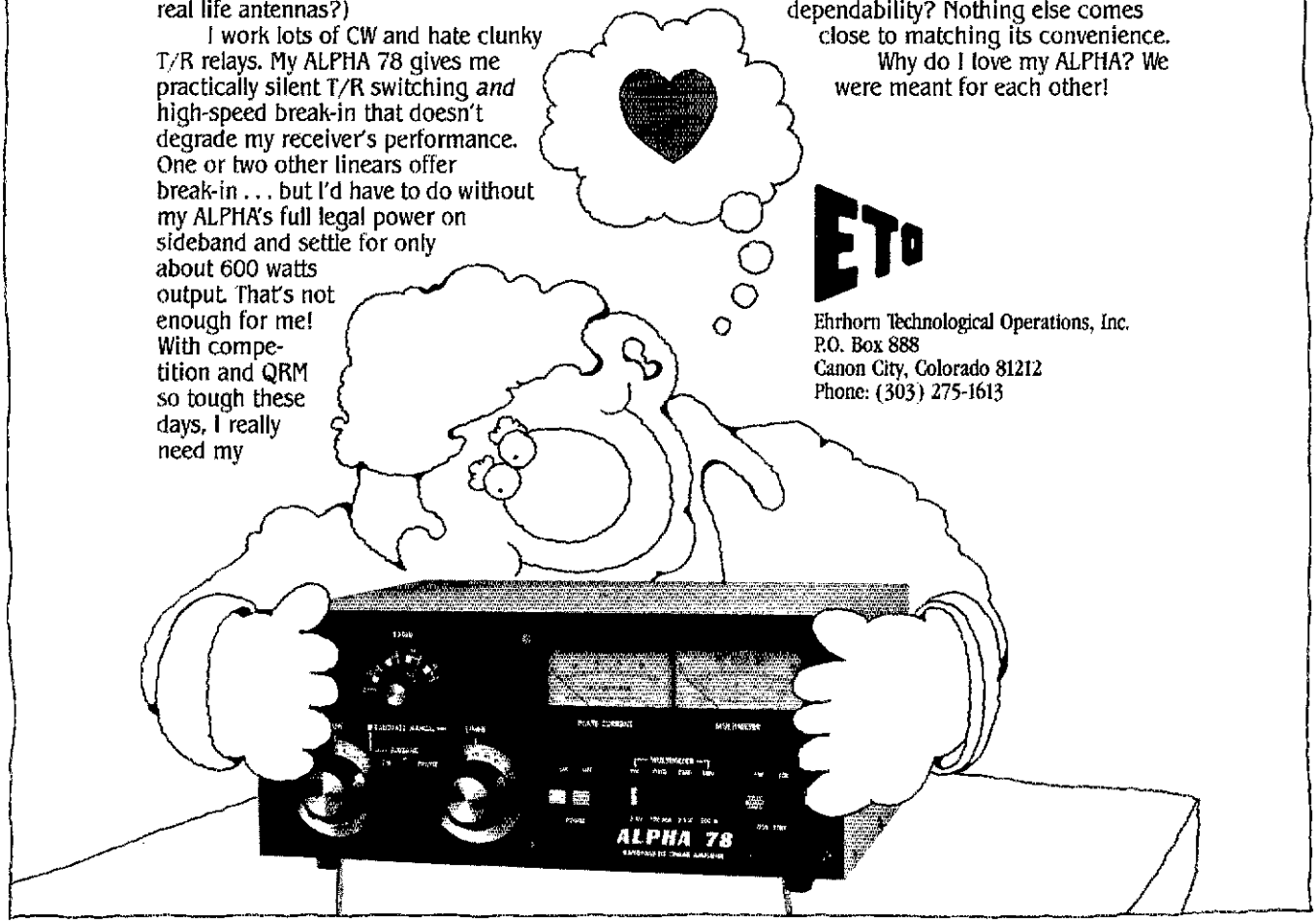
I insist on full power, even on a few favorite frequencies where my antenna SWR isn't too good. My ALPHA 78's auxiliary manual controls let me get full output even into a 2:1 SWR. I don't know of any other no-tune-up linear that has the ability to deliver full power into that kind of a mismatch. And with no antenna tuner! (After all, what's the point of having a "no-tune-up" linear if I have to clutter up my station with another box and tune *it* to get full power into real life antennas?)

I work lots of CW and hate clunky T/R relays. My ALPHA 78 gives me practically silent T/R switching *and* high-speed break-in that doesn't degrade my receiver's performance. One or two other linears offer break-in . . . but I'd have to do without my ALPHA's full legal power on sideband and settle for only about 600 watts output. That's not enough for me! With competition and QRM so tough these days, I really need my ALPHA's "full gallon" on all modes—*especially* sideband!

I'm not an electronics engineer, so I need an amplifier that works—and keeps on working. And if something should go wrong, I'd really hate to have a big hassle getting it fixed. My ALPHA's three year (limited) warranty protects me twelve times as long as the 90 days that's the industry standard. That says *everything* about how the ALPHA is built and how it stands up to hard use!

Finally, it'd be a real pain to have to collect a gang of gorillas with a hand truck whenever I want to move my linear. My ALPHA 78 takes up only about one cubic foot of space and I can easily handle its 50 pound weight. In fact, I never have to lift more than 35 pounds if I remove the plug-in transformer first. How many other amplifiers . . . even those weighing far more than my ALPHA . . . can deliver as much continuous RF output with as much dependability? Nothing else comes close to matching its convenience.

Why do I love my ALPHA? We were meant for each other!



ETO

Ehrhorn Technological Operations, Inc.
P.O. Box 888
Canon City, Colorado 81212
Phone: (303) 275-1613

RADIO EXPO 83, sponsored by Chicago FM Club, will be held Saturday and Sunday, September 24th and 25th at the Lake County Fairgrounds, Routes 120 and 45, Grayslake, Illinois. Flea market opens 6:00 AM. Exhibits open 9:00 AM. Displays by major manufacturers and largest-ever outdoor flea market area. Indoor flea market tables available at $5 per day. Seminars and technical talks. Ladies programs. Many awards. Tickets good for both days, $3 in advance, $4 at gate. Talk-in on 146.16/76, 146.52 and 222.5/224.10. Send SASE to Radio Expo 83, Box 1532, Evanston, IL 60204, or call 312-582-6923.

NEW 220 repeater group forming. PL, autopatch, great coverage of LA/Orange/Ventura county metropolitan areas. SASE & QSL card for info. WB6CGZ 3103 E. Ave. Q-15, Palmdale, CA 93550.

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: wil 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.

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.

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 — K@AAB collection, railroad employees and railfan's specials, front report styles. State your sample wants. 37¢ self addressed business size envelope required. Marv W@MGI, 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 $260. 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.

SPACE SHUTTLE cards done in 3-D design. Samples 25¢. 3-D QSL Co. P.O. Box D, Bondsville, MA 01009.

QSLs by W6BA "customized" $19.75 per 1000. Star Route 2, Box 241, 29 Palms, CA 92277.

NEW KID on block — for QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing and SWL's. Stamp appreciated.

RUBBER Stamps custom made to your satisfaction. Free literature. J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

CLUB Call pins: 3 lines 1-1/4 x 3-1/4 $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner, WA2ZHA, 2041 Lidnen, Ridgewood, NY 11385.

STAMP brings QSL catalog of new designs and samples, from $7 up. 22 years custom printing. WA6SOK, 4056 Acacia, Riverside, CA 92503.

QSL's by W4TG: Prices from $16 per 1000. Send SASE to PO Box F, Gray, GA 31032.

COLORFUL QSL's - samples 50¢. Introducing top quality hats with name and call. $4.95 plus $1.50 shipping. SASE Specialty Printing, Box 361, Duquesne, PA 15110.

BE SURPRISED - get a variety of cards - 100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

QSLs, Catalog 50¢ N & S Print, 2523 West Orangewood Avenue, Phoenix, AZ 85021.

"BARE BONES QSLs"-complete but economical. Nothing fancy, just good printing at a Bare Bones price ($7.50/500 and $10/1000) SASE for details. Goodwill Industries printers, 36 S. College St., Akron, OH 44308.

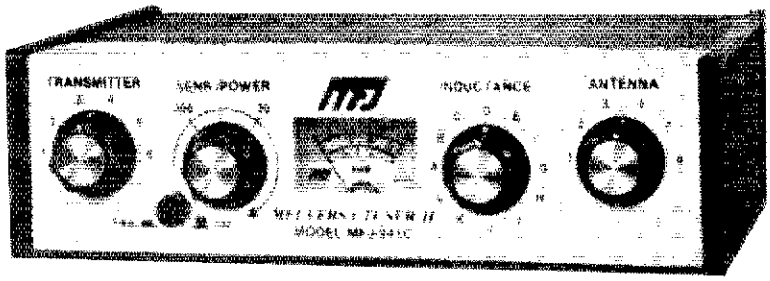
COFFEE MUGS, ceramic with black Call Letters. Choice of red, blue, or white. $9.95 plus $1.50 SH. Quality QSL samples, SASE. A-1 Printers, 3720 Sleepy Hollow, Brunswick, OH 44212.

COLOR Gloss Artist's QSLs - S.A.S.E. KO9L Design, 706 Brown, Evanston, IL 60202.

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.

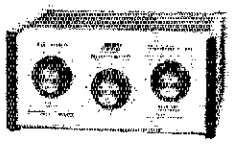
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

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.

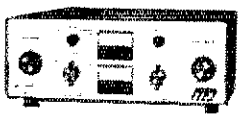
6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $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.

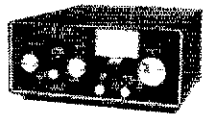
18 position dual inductor, ceramic switch.

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 2¾ 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

CALL TOLL FREE 800-647-1800

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.**

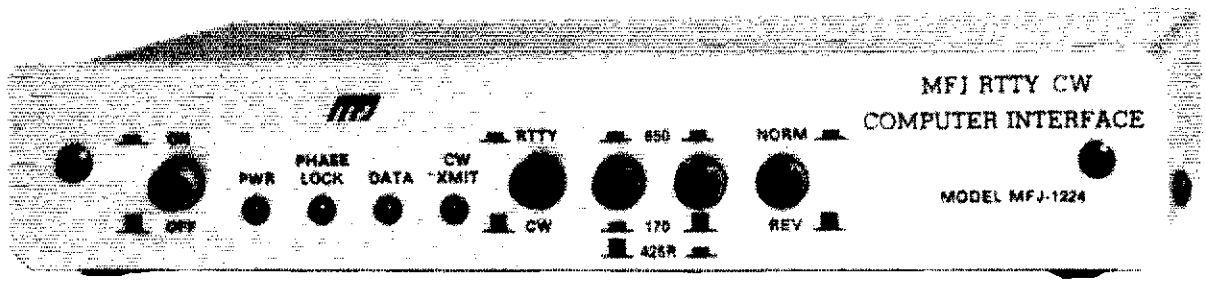
Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED

Box 494, Mississippi State, MS 39762

MFJ RTTY / ASCII / CW COMPUTER INTERFACE

Lets you send and receive computerized RTTY/ASCII/CW. Copies all shifts and all speeds. Copies on both mark and space. Sharp 8 Pole active filter for 170 Hz shift and CW. Plugs between your rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 or most other personal computers. Uses Kantronics software and most other RTTY/CW software.



- *Copies on both mark and space tones.*
- *Plugs between rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.*
- *Uses Kantronics software and most other RTTY/CW software.*

$99.95
MFJ-1224

This new MFJ-1224 RTTY/ASCII/CW Computer Interface lets you use your personal computer as a computerized full featured RTTY/ASCII/CW station for sending and receiving.

It plugs between your rig and your VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, and most other personal computers.

It uses the Kantronics software which features split screen display, 1024 character type ahead buffer, 10 message ports (255 characters each), status display, CW-ID from keyboard, Centronic type printer compatibility, CW send/receive 5-99 WPM, RTTY send/receive 60, 67, 75, 100 WPM, ASCII send/receive 110, 300 baud plus more.

You can also use most other RTTY/CW software with nearly any personal computer.

A 2 LED tuning indicator system makes tuning fast, easy and positive. You can distinguish between RTTY/CW without even hearing it.

Once tuned in, the interface allows you to copy any shift (170, 425, 850 Hz and all shifts between and beyond) and any speed (5 to 100 WPM on RTTY/CW and up to 300 baud on ASCII).

Copies on both mark and space, not mark only or space only. If either the mark or space is lost the MFJ-1224 maintains copy on the remaining tone. This greatly improves copy under adverse conditions.

A sharp 8 pole active filter for 170 Hz shift and CW allows good copy under crowded, fading and weak signal conditions. Uses FET input op-amps.

An automatic noise limiter helps suppress static crashes for better copy.

A Normal/Reverse switch eliminates retuning while stepping thru various RTTY speeds and shifts.

The demodulator will even maintain copy on a slightly drifting signal.

A +250 VDC loop output is available to drive your RTTY machine. Has convenient speaker output jack.

Phase continuous AFSK transmitter tones are generated by a clean, stable Exar 2206 function generator. Standard space tones of 2125 Hz and mark tones of 2295 and 2975 Hz are generated. A set of microphone lines is provided for AFSK out. AFSK ground, PTT out and PTT ground.

FSK keying is provided for transceivers with FSK.

High voltage grid block and direct outputs are provided for CW keying of your transmitter. A CW transmit LED provides visual indication of CW transmission. There is also an external hand key or electronic keyer input jack.

In addition to the Kantronics compatible socket, an exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. The following TTL compatible lines are available: RTTY demod out, CW demod out, CW-ID input, +5 VDC, ground. All signal lines are buffered and can be inverted using an internal DIP switch.

For example, you can use Galfo software with Apple computers, or RAK software with VIC-20's. Some computers with some software may require some external components.

DC voltages are IC regulated to provide stable AFSK tones and RTTY/ASCII/CW reception.

Aluminum cabinet. Brushed aluminum front panel. 8x1¼x6 inches. Uses 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

RTTY/ASCII/CW Receive Only SWL Computer Interface

$69.95
MFJ-1225

Use your personal computer to receive commercial, military and amateur RTTY/ASCII/CW traffic.

The MFJ-1225 automatically copies all shifts (850, 425, 170 Hz shift and all others) and all speeds.

It plugs between your receiver and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.

It uses Kantronics software which features CW receive 5-99 WPM, RTTY receive 60,67,75,100 WPM, and ASCII receive 110, 300 baud, plus more.

An automatic noise limiter helps suppress static crashes for better copy, while a simple 2 LED tuning indicator system makes tuning fast, easy and positive.

In addition to the Kantronics compatible socket, a general purpose socket provides RTTY out, RTTY inverted out, CW out, CW inverted out, ground and +5VDC for interfacing to nearly any personal computer with most appropriate software.

Audio in, speaker out jacks. 4½x1¼x4¼ in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT DELIGHTED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (LESS SHIPPING).
- One year **unconditional** guarantee • Made in USA.
- Add $4.00 each shipping/handling • **Call or write for free catalog, over 100 products.**

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

TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE
800-647-1800, Call
601-323-5869 in Mississippi and outside continental U.S.A. Telex 53-4590.
VISA
MasterCard

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 1KV. 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	$24.50
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	$5.25

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 5¾" x 3¾", 12 VDC	$79.50

Tubes

3-500Z	EIMAC	$97.50
811A		$14.50
572B		$48.50
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	$26.50
A-225-120	225pf 4.5 - KV	$28.50
A-232-45	250pf 2.2 - KV	$23.50

Loading

A-1100-53	1100pf 3 section 1.2KW	$12.25
A-1000-32	1000pf 2.5KW	$37.50
A-800-32	800pf 2.5KW	$28.00

Plate Chokes

PC-811-1A	Use with 4x811A or Sweep tubes	$ 6.25
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	$172.00
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	$ 299.50
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 $2.25 postage and handling, order direct.

VISA

MasterCard

Amp Supply Co.

2071 Midway Drive P.O. Box 421
Twinsburg, Ohio 44087
Phone # (216) 425-2010

THANKS to all the considerate folks who ordered cards to help us recover from Vegas. Also a big "thank you" to all our old customers and new friends that looked us up in Dayton. If you are looking for personal service and good quality, write for free samples. QSLs By W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

General

WANTED Collins 30S1, S-Line and Alpha-77S. Write Jin Fukata JA8BMK, P.O. Box 150, Asahikawa, Hokkaido 070-91 JAPAN.

CANADIAN battery radios (1920's); magazines; tubes wanted. Collector. A Nolf, 620 Auburn Cr., Burlington, Ont. CANADA L7L 5B2 416-634-3267.

NEEDED: R390A's unworking or incomplete for parts cheap. Also SSB converter and RTTY unit needed. Details and price to Keith, VE3GEM, 2 Royal York Rd. #607, Etobicoke Ontario.

TELETYPEWRITER parts, supplies, gears. Toroids. S.A.S.E. list.Typetronics, Box 8873, Ft. Lauderdale FL 33310. Buy unused parts, cash or trade.

SERVICE by W9YKA. Amateur and industrial SSB-FM repairs, calibration. Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 4 issues $2. Ham Trader Yellow Sheets, POB356, Wheaton, IL 60189.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top price to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1 Eighth Street, Pelham NY 10803.

VHF/UHF high power amplifiers. SASE. Fred Merry, W2GN, PO Box 546, 35 Highland Drive, East Greenbush, NY 12061. 518-477-4990.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels, "Skyrider Commercial," early transmitters — HT-1, HT-2, HT-8, etc., other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell, Austin TX 78745.

MOBILE Ignition Shielding gives more range, no noise. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

MOTOROLA: Marine, SSB, FM. New, used, up to 75% off. Ralph Hicks, Tulsa. Phone 918-266-2525.

HOSS-TRADER Ed: Selling radios far below dealer cost. Telephone the Hoss fast, for the best deal. Big-sale: New Drake TR-7A and PS-7 supply regular $1998, cash $1445. New Astro-Swan 100-MXA transceiver cash $399. New Icom IC-2AT walkie-talkie $209. New Azden PCS-4000 $288. New demo HAM-4 rotor $187. New Icom-730 regular $829, cash $599. New Drake TR-5 and supply, regular $988, cash $689. New Icom 25-A $289. New Drake L-7 linear $889. New KDK Model-2030 $255. HyGain TH5DXS $249. New Icom 720-A regular $1349, cash $879. New Icom 740 with free power supply, regular $1249, cash $859. Moory Electronics Company, P.O. Box 506, DeWitt, ARK 72042 Tel: 501-946-2820.

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.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

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., 202 Miriam Parkway, Elmont, NY 11003.

TRANSCEIVE with your scanner! 2m-70cm. Low cost add-on! Free info, SASE to W6GVC Apt. "O", 720 County Center Drive, Visalia, CA 93277.

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.

NEW solar electric panels, batteries, components. Send for information. Non-profit. Specs Inc., Box 155 Montrose CA 91020.

'83 CALLBOOKS US $19 DX $18 Both $35 ppd W9JVF 1147 N. Emerson Indianapolis, IN 46219.

WANTED: aluminum tower sections K4XS, 813-842-7315.

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.

RISK-FREE buy and sell service. Details $1 S.A.S.E. Selltronix (WB2AVE/7) P.O. Box 388, Cortaro AZ 85230.

LIQUIDATING shack. S.A.S.E. to WA5BQA.

CALL Toll-free 800-327-7798. Ask for Bob Hoffman. Jaro Electronics Corp. We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex, RCA, Western Electric, Raytheon, in Florida Call toll free: 800-432-8524. Address 412 27th St., Orlando, FL 32802.

ANNOUNCING: The latest, most complete and accurate listing of Hallicrafters ham gear, accessories, related equipment - ever compiled. List consists of model name, date, price and description. And, is all new! $3 plus large SASE (40¢ stamps) to: Chuck Dachis - The Hallicrafters Collector - 4500 Russell, Austin, TX 78745.

SELL: Vintage radios, tubes, and parts - S.A.S.E. Tom Wright, 4933 Yakima, Pocatello, ID 83204.

WANTED: Telegraph key made by J.A. Hills, known as the W8FYO key. Jack Shiels, W3OKP, 3212 Chestnut Street, Murrysville, PA 15668.

LOST Interest in ham radio. Sell, or trade for marine radio, video recorder or? Drake TR-4, speaker, mike, power supply, noise blanker; Palomar Engineers IC keyer; Kenwood TR-7400-A, 2-meter, antenna and microphone. Everything works. KA5LJK 713-783-1925.

WANTED - Tower-self-supporting crankup - send information, condition, price, and your telephone number. Maynard Allen, WA2RNN, 301 Boulevard, Pompton Plains, NJ 07444 201-835-2772.

DRAKE R-4, T-4X owners protect your investment from scarce, increasing cost of vacuum tubes. Get solid-state performance with increased sensitivity, higher dynamic range, reduced heat, and higher gain. Solid-state Tubes directly replace your vacuum tubes. T-4X(A-B-C): 6EJ7/6HS6, 6AU6, 12BA6, 12AX7A, 6EV7/6FQ7/6AQ8. R-4(A-B-C): 6EJ7/6HS6 (mixers), 6BE6/12BE6. $18.50 ppd, each. Also, Install Kits to upgrade performance: Basic Improvement Kit, Audio Low Pass Filter Kit, Audio I.C. Amplifier Kit, each $25 ppd. Overseas air $7. VISA/MC orders welcome! SARTORI ASSOCIATES - W5DA, Box 2085, Richardson, TX 75080. 214-494-3093.

COMPUTERS-TRS-80's-Big discount price. Monthly specials-call for current prices. Hancock Techtronics, Hancock, MD 21750 301-678-6000.

WANTED: McIntosh tube audio equipment, accessories, literature, etc. for bonafide personal collection. Information, appraisals given 100% reply. Marcus Frisch WA9IXP, P.O. Box 385, Elm Grove, WI 53122 414-475-5356.

WANTED: Microphones used in radio/tv broadcasting prior to 1960 for archive. Write: James Steele, N.A.B., Box 39190, Washington, DC 20016.

QST's — 24 issues $6 plus UPS. Most years starting 1948 thru 1970's. Individual copies 50¢ each. Charles Williams, WA8AXQ - 400 Broadway, Cincinnati, OH 45202. Purchase considered donation to Gray History-of-Wireless Museum.

RTTY Journal-30 years of devotion to RTTY. $7 per year. $13.50 foreign airmail. Beginners RTTY Handbook $8 plus postage. RTTY Journal, POB RY, Cardiff, CA 92007. 619-753-5647.

SUMMER SALE - 25% discount on heavy-duty self-supporting aluminum towers. Send for free brochure. World Electronics, Post Office Box 10706, Baltimore, MD 21204.

TENTEC 540 (Triton), 26M supply, $400, N4EY, 919-226-4142.

HEATH SB Line sell best offer takes all, seeking 60 cents on the dollar. Will split set for good offer. SB-104, SB230 w/10M & spare final, SB-644A, SB614, SB604, HD power supply, HM2140, call W1VVA for detailed list 203-848-1311 eves.

WANTED: Hallicrafters S-40 and S-52 S-77 series receivers. Working or not. Please give appearance, condition, modifications, price, etc. Fala Electronics, Box 04134-11, Milwaukee, WI 53204.

WANTED: Motorola VHF and UHF handle talkies NØCAM 303-632-8413.

DXPEDITION - 'Round-the-world - 1984 - Shipmates wanted - SASE - N3TM, Box 48, Harmony, PA 16037.

WANTED: VHF and UHF repeaters, must be Motorola, G.E., R.C.A. and in good shape. NØCAM, 303-632-8413.

WILSON 20M and 15M, and HyGain 10M 5-element monoband Yagis with Tri-Ex 20-foot mast, $300 plus freight. Must sell, will trade for OSCAR Phase III gear or ?? Mike, KC7WG 503-779-9835.

COLOR COMPUTER software. Send for list. KV5M, TNT Software, RT2 Box 76D, Manor, TX 78653.

IBM-PC RTTY and ASCII S.A.S.E. to E. Alline, NE5S, 773 Rosa, Metairie, LA 70005.

AGL® Electronics

AGL ELECTRONICS is an AUTHORIZED Dealer for over 70 product lines. Call us for your station needs. From Rubber Ducks to 80 meter beams, Handhelds to HF Transceivers, we have it and can help. Call Gordon, N5AU, and Mike, KG5F for advice on our products, while Gary, KM5X gets it out the door and on its way to you, and Bob, W5AH, stands by for the occasional warranty service. We also do service on most amateur and commercial rigs as well.

AEA

ISOPOLE 144 Special!	$ 39
CK-2 Contest Keyer	$ 125
MM2 Morsematic	$ 150
MBA-RO Reader...Special	$ 269
MBA-RC Reader-Sender	$ 399
Moscow Muffler for XCVR	$ 135

Other AEA products in stock. CALL

ASTRON POWER SUPPLIES

RS7 A 5 amp cont-7 amp ICAS	$ 49
RS20 A 16 cont-20 amp ICAS	$ 87
RS20 M above w/meter	$ 105
RS35 A 25 amp cont-35 ICAS	$ 134
RS35 M above w/meter	$ 145
RS50 A 37 amp cont-50 ICAS	$ 186

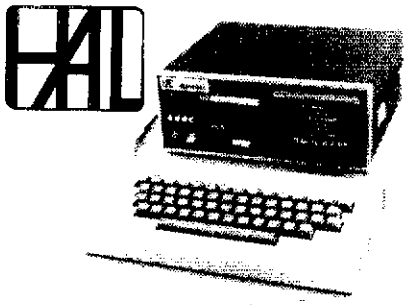
BENCHER

BY-1 Key Paddles	$ 39
BY-2 Keyer Paddles, Chrome	$ 49

Other Bencher products. Call.

HAL COMMUNICATIONS

CT2100 RTTY Terminal	$ 689
KB2100 Keyboard for Above	$ 141
CWR 6850 Telereader Term	$ 849



CWR-6850 Telereader — $ 849

Important—Please Read

Sorry, we can't accept personal checks for mail orders, and don't ship COD.

Remember, our prices are subject to the whims of the people who make the stuff, and are subject to change at any time without notice or obligation. Best to call and confirm before ordering.

We have a sidewalk sale on the first Saturday of each month. Come early to get the bargains. There are several restaurants and other shops in the area, too.

We also have an excellent service shop. Bob, W5AH, is ready, willing, and able to help you in any way he can.

Used gear available, and changes periodically. Call or write for list. This month's special is the FT-207R. They all work but don't necessarily have all accessories. $125 each . . . . . we have only two.

TEXANS AND VISITORS

We're open until one on Saturdays just for you. We're in Keystone Park Shopping Center, off Central Expressway, just across from Texas Instruments. Look for the two towers on top of the building.

HY-GAIN TOWERS

HG-33 MT2	$ 779
HG-37 SS	$ 669
HG-52 SS	$ 949
HG-54 HD	$ 1499
HG-70 HD	$ 2399

All accessories available. Call. Tower packages drop-shipped from factory pre-paid. Sales tax may apply. Please call.

YAESU ELECTRONICS

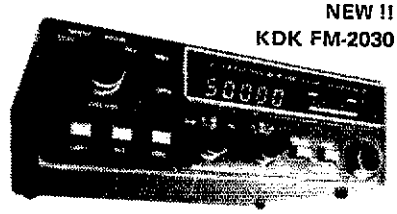
FT-ONE

Aptly named, because it is No. 1	$ Call
FT208 R 2 m handheld	$ Call
FT708 R 450 mhz handheld	$ Call
FT230 R 2 m 25 wt mini xcvr	$ Call
FT480 R 2 m all mode	$ Call
FT730 450 mhz mobile w/tt	$ Call
FT780 R 430 mhz all mode	$ Call
FT290 R 2 m portable all mode	$ Call

We have access to the complete YAESU line of Commercial Gear. Write for brochures and prices.

SPECIAL
The Serial Number Memory Keyer CK2

NEW !!
KDK FM-2030



2m Fm — 25 Watt XCVR with TTPAD

FT-230 now with TT MIC

NEW!!
Matching FT-730 450mhz Transceiver
Available Soon!

MONTHLY SPECIALS !!

ICOM IC—740 (+ $50 Factory Rebate) Limited Quantity	$ 857
DRAKE TR-5 Limited Quantity—Cash Only	$ 599
SANTEC ST440	$ 299
SANTEC ST-220	$ 292
SANTEC ST-144	$ 269
Tokyo HY-POWER HL30V (2 in-30 out) $50 w/purchase of 2m H.T.	
KWM-380 Cash only—(One Only)	$2,625
ETO Alpha 374A (One Only)	$1975
Robot 800H Cash only — (One Left)	$ 447

ANTENNA AND TOWER NEEDS?

We have plenty of each to serve you. Call for pricing on Hy-Gain, Cushcraft, KLM, and Telrex Antennas, and for Rohn and Hy Gain towers.

ROHN TOWER

HDBX 40	$ 249
HDBX 48	$ 305
HBX 56	$ 315

SPECIAL!!

Rohn 25G	$ 41/section
Rohn 45G	$ 93/section

Note: Our BX series towers include the rotor plate and base stubs. Some dealers charge extra for them—beware!!

ROHN TOWER FOLD-OVERS

FK 2548	$ 789
FK 2558	$ 879
FK 2568	$ 959
FK 4544	$ 1099
FK 4544	$ 1219
FK 4564	$ 1329

Foldovers will be drop-shipped from Rohn in Peoria, freight pre-paid. Price 10% higher west of the Rockies. Sales tax may apply. Please call.

ROTATORS

HDR 300	$ 439
T2X	$ 249
HAM-IV	$ 199
HD73	$ 99
220V. HAM IV	$ 229

KLM

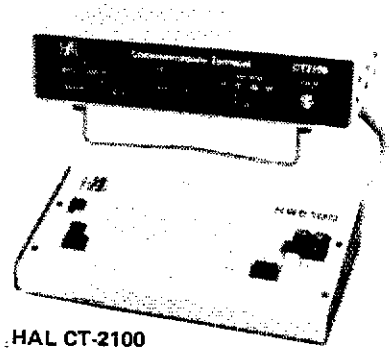
7.2—2A	$ 289
7.2—3A	$ 439
7—7.3—4	$ 599
13.9—14.4	$ 319
21—21.5—4	$ 135
28—30—4	$ 129
KT34A	$ 309
KT34XA	$ 469
144—148—13LBA	$ 79

HY-GAIN ANTENNAS

TH7DXS	$ 379
TH5MK2S	$ 319
HQ2S	$ 279
203BAS	$ 139
204BAS	$ 229
205BAS	$ 299
155BAS	$ 179
153BAS	$ 79
105BAS	$ 119
103BAS	$ 59
402BAS	$ 199
Explorer 14	$ 279
18 HTS	$ 339
12 AVQS	$ 40
14 AVQS	$ 49
18 AVTS	$ 89
2BDQ	$ 49
5BDQ	$ 99

TELREX ANTENNAS

15M532	$ 432.25
20M536	$ 535
TB5EM	$ 445



HAL CT-2100 with Keyboard

Many people thought we had died when we disconnected our WATS Line. We are happy to report that we are alive and well! We dropped the WATS Line because it cost about $1,000 per month. Some people liked to call on it to pass DX info., ask about the weather and generally shoot the bull. We don't mind shooting the bull, but we don't think our paying customers should pay higher prices so someone else can Bull Shoot! So from now on, call on your nickel. If you place any order with us that totals more than $100, we will credit you with $1.50 on that order, which is the national average for a 3-min. call.

CALL OR WRITE FOR CURRENT PRICES

13929 N. Central Expressway, Suite 419 • Dallas, TX 75243 • (214) 699-1081

QUALITY STAINLESS fasteners! Nuts-hex and more "U" bolts! Screws-lock-flat washers! Stainless and brass "Handi-Pacs"! Lists 25¢ or SASE! Walt, W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

KENWOOD TS-520S transceiver, AT-200 SWR/Wattmeter/Antenna Tuner, MC-50 Microphone, headphones. Will sell all together or separately. Rig used very little. WD4DAU 205-339-3713.

CONNECTICUT's Ham Store - Rogus Electronics, 250 Meriden, Waterbury Turnpike, Southington 06489 203-621-2252.

COLLINS KWM-380. Mint condition, ten hours operation, with Collins accessories, e.g., speech processor, 360 Hz. filter, microphones, service manual, updates, $2,750 cash. Will pack carefully, ship in original boxes. Send for full particulars, W4UJT, 85 Summer East, Williamsburg, VA 23185, 804-565-2160.

YOUR OWN diversified part time business started professionally, without re-inventing the wheel, can lead to a full time success. Professional counselling available from K1MAN. Glenn A. Baxter, P.E., Registered Professional Engineer. 207-495-2215.

FAST, ACCURATE, readable, nonsensational — The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send $19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

WANTED: Pre-1950 TV sets and old TV Guide magazines. W3CRH, Box 90-Q, Rockville, MD 20850. 301-654-1876.

MLA-2500B, 2kw amp, 160-10, $625. Filter capacitors, 130mfd-330v, 25/$15 shipped prepaid. Stan Stockton, 902 W. Holt, Harrison, AR 72601.

KEYER KITS, $15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

CUBICS: Astro 102BXA/PSU-6 - $750. Yaesu FT-720R/U, 440MHz synthesized, FM, PL, Touchtone - $425. Hammurland HQ-170 - $125. Radio Shack DX-300 - $250. 440A's - $25ea. KZ5E 405-743-2366.

WANTED speaker horn K4NBN "No Bad News"..

HALLICRAFTERS $$$ Serious Collector needs Hallicrafter and other ham equipment manufactured before 1940 for restoration and eventual museum exhibit. Need Hallicrafters, National, Hammarlund, Patterson, RCA, RME, Grebe etc. Condition not important. Also need QST mags Vols I & II and old tubes. All letters answered. Write Dave Medley, 6621 Duffield Drive, Dallas, TX 75248. WA5YXA.

EIMAC-3-500Z's. New-very limited quantity! $85 each, cash, COD, MO. Add $3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

WANTED: Early telegraph instruments for my collection. Keys, sounders, relays, meters, and related items including pre-1910 paper. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

CDE ROTOR Owners - You need a "D-Lay-5"! This easy-to-install circuit protects the rotor from damage caused by accidental braking. Works with the Ham II, Ham III, Ham IV, and Tail Twister models. Provides a five-second safety factor in your rotor brake. Incredible value at $19.95 - postage paid world wide. Lance Johnson Engineering, P.O. Box 7363, Kansas City, MO 64116.

IBM-PC Software. LOGGER/DUPER programmable any log format $39.95. QSLer for automatic QSL cards $19.95. DATA BASE DXCC bearings and records $49.95.For information write Micro Electronic Systems, 19 Annette Park Drive, Bozeman, MT 59715.

CLEANING house after 50 years S.A.S.E. for list 3CX2500A3 never used original sealed carton make offer. need 8122', W2GQA RD2 Box 537, Jersey Shores, PA 17740 717-745-7668.

COLLINS KWM-2, round, mint ser. #15892 and 516F-2 round, mint $800. AA6S 209-732-7163.

FREE money saving bulletin on popular brand name programs and books for your small computer. Superior, WD8BTK, 8030 Westchester Road, Westchester, OH 45069.

FOR IMPROVED DX contacts! Beamheadings for 450 cities including ham prefixes specifically for your QTH. Send $5 to N6DYU, P.O. Box 81341, San Diego, CA 92138.

WANTED: DX-60B, HR-10B, and Slinky Dipole. William Blair, 909 E. Emerson, Morton, IL 61550.

COLLINS KWM-2, 516F-2, winged, good condition, $550. KB6GK, 619 Hearst, San Francisco, CA 94112.

YAESU-102 & 902DM, Henry-3KA, J.W. Miller AT-2500, Nye-Matchbox, wattmeters, microphones, TH6DXX, etc. 214-680-9750 Greg Mann.

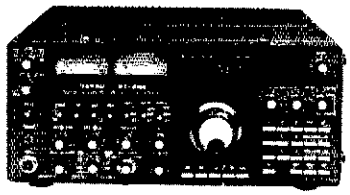
1984 CALLBOOKS. Prepublication orders before August 31, $19 either, $35 both, any 10 or more, $17 each. Postpaid. CA 6% tax. Century Print, 6059 Essex, Riverside, CA 92504-1599. 714-687-5910.

LOOKING FOR HT-37 HT-41, and 5X-115. Mike WA4FRB, P.O. Box 229, Riverton, VA 22651.

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.

WANTED: ARRL Handbooks, pre-1950; QST, pre-1930. N6AW, Jan Perkins, 11942 Bos St., Cerritos, CA 90701 714-732-7155.

YAESU SALE!

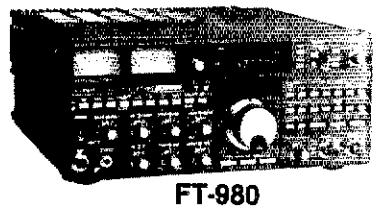


FT-ONE

GENERAL COVERAGE—ALL MODE DELUXE SOLID STATE TRANSCEIVER

Buy Now and Receive These Accessories Free:
300Hz CW Filter..$FREE 600Hz CW Filter..$FREE
800Hz CW Filter..$FREE 6Khz AM Filter..$FREE
Memory Backup..$FREE Installation.....$FREE

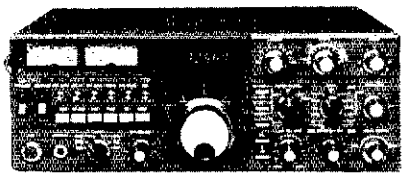
List Price $3074. CALL FOR YOUR SPECIAL PRICE!
Quantities Limited — Hurry!



FT-980

CAT SYSTEM—Computer Aided Transceiver
- Wide Dynamic Range • Low Noise Front End
- General Coverage • 10Hz Digital Readout
- All Mode Transceive—CW/SSB/AM/FM/FSK!
- Full Break-in CW • RF Speech Processor
- Variable Bandwidth • IF Shift • APF/Notch
- AC Power Supply • Adjustable Noise Blanker
- 12 Internal Digital VFO's with Memories
- Much, much more—call or write for info

Computer Interface now in development—
Own Tomorrow's HF Transceiver—Today!!
Manufacturer's Suggested List Price $1499
Call For Your Special Price Today!!

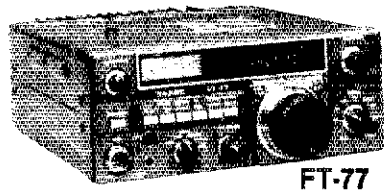


FT-102

160-10MTR WITH WARC BANDS TRANSCEIVER

- Digital Readout • Built-In AC Supply
- Variable Bandwidth • IF Shift
- CW/SSB/AM/FM Modes • RF Speech Processor
- Noise Blanker • Much, much more—

List Price $1149—Call for Special Low Texas Towers Discount Price and Save $$$



FT-77

New 80-10mtr Compact HF Transceiver

- Digital Readout • Adj Noise Blanker
- CW/SSB/FM Modes • CW Wide/Narrow
- Optional AC Supply, CW Filter, FM Unit External VFO, Antenna Tuner Available

List Price $599—Call for Special Low Texas Towers Discount Price and Save $$

FT-230R 2mtr FM.....$359
FT-730R 440Mhz FM.....$399

- 10 Memories • Two VFO's
- LCD Readout • 25W Out
- Memory or Up/Down Scan

Call today for Special Discount Price & Save $$

VHF/UHF All Mode Rigs

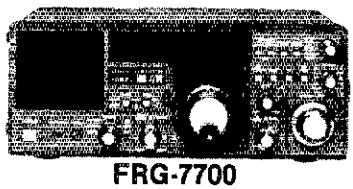
FT-680R 50Mhz.....$520
FT-430R 144Mhz.....$529
FT-780R 430Mhz.....$785

Call today for Special Discount Price & Save $$

VHF/UHF Multimode Portables

FT-690R 50Mhz.....$379
FT-290R 144Mhz.....$399
FT-790R 430Mhz.....$399

Call today for Special Discount Price & Save $$



FRG-7700

All Mode Digital Communications Receiver .15 to 29.99Mhz—Receives SSB/AM/FM/CW, Built-In S Meter, Speaker, Noise Blanker, Timer, FM Squelch, AC Supply and More!

Manufacturer's List $499—Call today for Your Special Discount Price!!

FT-208R 2mtr HT.....$319
RF Out: 300mw/2.5W

FT-708R 440Mhz HT....$319
RF Out: 200mw/1.0W

- LCD Display • 10 Memories
- Up/Down and Memory Scanning
- Complete w/Nicad Battery, Charger and Rubber Duck Ant

Accessories Available:
LCC-8 Leather Case.....$35
YM24A Spkr/Mic.....$39
FNB-2 Nicad.....$29
NC-8 Base Chgr.....$99
Call for Special Yaesu Discount Prices!!

IMPORTANT — Prices shown are suggested by the Manufacturer.
You can Save Money with a Big Texas Towers Discount!
Call today for our Special Yaesu Sale Prices and Save $$$!!

TEXAS TOWERS

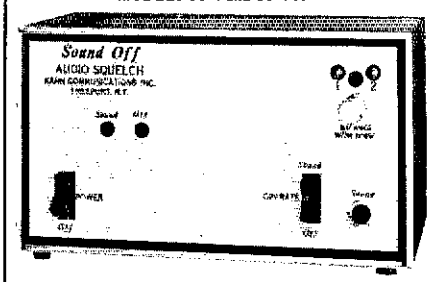
MasterCard VISA

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074
Telephone (214) 422-7306

SOUND OFF

AUDIO SQUELCH
WITH PATENTED SIGNAL-TO-NOISE
RATIO EVALUATION SYSTEM

MODELS SO-1 and SO-1-X



FEATURES

- QUIETS NOISE WHEN CIRCUIT IS IDLE
- QUICKLY IDENTIFIES SIGNAL AND ACTIVATES CIRCUIT
- CAN BE INSERTED ANYWHERE IN AUDIO LINE
- IDEAL FOR SSB, AM, TELEPHONE, VHF SYSTEMS, VOX, AND OTHER VOICE OPERATED CIRCUITS.
- ALSO WORKS ON TONE AND OTHER NON-VOICE SIGNALS

OTHER KAHN PRODUCTS:

BROADCAST

AM STEREO • CSSB • SYMMETRA-PEAK
VOICE-LINE • PROLINE

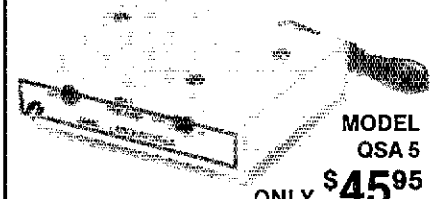
COMMUNICATIONS

HI-MODE • SSB RECEIVERS • EER-ISB TRANSMITTERS
COMMERCIAL SSB TRANSCEIVERS • RATIO SQUARE DIVERSITY.

KAHN COMMUNICATIONS, INC.
639 STEWART AVENUE
GARDEN CITY, NEW YORK 11530 • (516) 222-2221

PREAMP

FOR 2 METER TRANSCEIVERS



MODEL QSA 5
ONLY $45.95

The QSA 5 preamp is a high performance, low noise preamp for improving the receiving sensitivity of 2 Meter transceivers. This preamp features easy installation with no modification to the transceiver required. Can be used with virtually all 2 Meter transceivers and on all modes — FM, SSB, CW or AM. Relays in the QSA 5 automatically bypass the preamp when transmit power is sensed. Available with BNC or SO-239 connectors.

- **Now available from leading dealers.**

Please add $2.00 shipping and handling on all orders. Prices shown are for USA ONLY. Write or call for FREE CATALOG showing our full line of Preamps, Converters, and Precision Oscillators. Export inquiries (except Canada) should be sent to Extech Ltd., 5319 S.W. Westgate Dr., Portland, OR 97221.

VISA MasterCharge

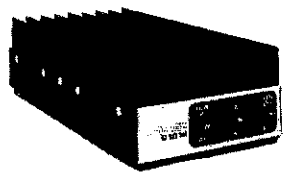
JANEL LABORATORIES

33890 EASTGATE CIRCLE•CORVALLIS, OR 97333•(503) 757-1134

COMMUNICATIONS EQUIPMENT SALE!

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

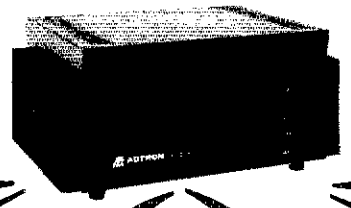
ASTRON POWER SUPPLIES

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

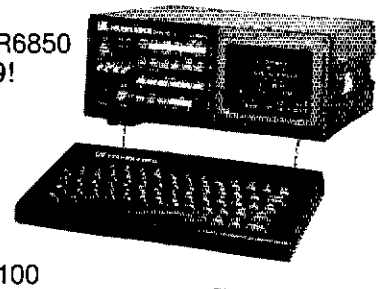
Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199

MODEL RS-50A



HAL Communications Sale!

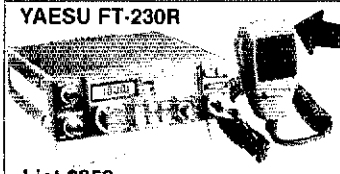
CWR6850
$849!



CT2100
KB2100 $859!

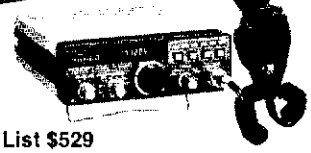
CWR6700 Receive Only Telereader	$439
DS2050KSR RTTY System with Keyboard	569
DS3100ASR Deluxe RTTY Terminal	1799
DS3100ASR with MSO3100 Message Unit	2132
RS2100 1" Scope w/Loop Supply	289
ST5000 RTTY Demodulator	219
ST6000 Deluxe Demodulator/Keyer	649
BMC12AU 12" Green Screen Monitor	111

YAESU FT-230R



List $359
Call For Your Special Price

YAESU FT-480R

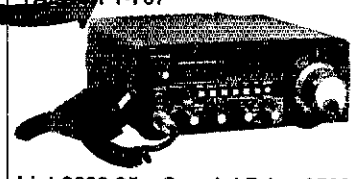


List $529
Call For Your Special Price

KDK FM2030

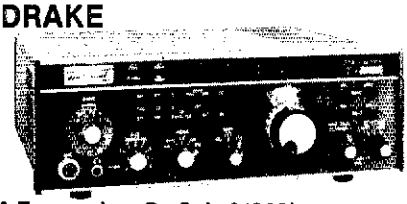
SALE PRICE $269!

YAESU FT-707



List $699.95 Special Price $589

R.L. DRAKE



TR-7A Transceiver On Sale $1389!
Accessories In Stock - Call!
L7 HF Amplifier Only $969 (Less Tubes)
Eimac 3-500Z Tubes $199/pair

TEN-TEC SUPER SALE!

Corsair List $1,169
Your Special Price $1,029

Omni-C Close Out $769!

New Argosy
Digital Transceiver
List $599.95 Sale $539

ALL ACCESSORIES IN STOCK—CALL!

SANTEC

ST144μP Handie Talkie ON SALE! Only $279

IN STOCK FOR IMMEDIATE DELIVERY

- 142-149.995 MHz
- 3.5W/1W/.1W Output
- 24 Hour Clock
- Liquid Crystal Display

OTHER SANTEC ITEMS

ST-440μP 440 MHz H.T.	$299
SM-3 Speaker Mic	33
ST-LC Leather Case	29
ST-6RC Base Charger	29
ST-500B3 Ni-Cad Battery	29

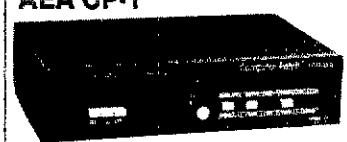
TOKYO HY-POWER LABS
Regular $69.95 SALE $59!

HL-30V 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-200 HF Ant Tuner w/Wattmeter	89
HC-2000 Deluxe 2KW HF Antenna Tuner	299

AEA CP-1



Computer Patch Interface
List Price $239.95
Call For Special Price
On All AEA Products.

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	$59
PB-90	$21	PB144	$21
PB-50	$21	PB220	$21

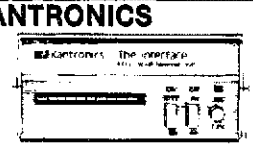
DAIWA CN-620B $111!
100/2 mtrs
20/200/2000 wts

BENCHER PADDLE
BY-1 Blackbase $39
BY-2 Chrome $49

[illegible] MODEL 196 On SALE For Only $32!

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. $169.95 SALE $149.00!

OTHER KANTRONICS ITEMS

Mini Reader	$[illegible]	Hamtext VIC-20	99
Mini Terminal	[illegible]	Hamtext Model-64	99
Apple Hamsoft	[illegible]	Atari Hamsoft	49
VIC-20 Hamsoft	39	TRS-80C Hamsoft	59

TEXAS TOWERS

DIV. OF TEXAS RF 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

NEW 2kW Roller Coil, 28 micro-H, limited quantity at $47.50 p.p. USA. Klio-Tec - P.O. Box 1001 - Oakview, CA 93022 - tel: 805-646-9645.

HELP - without your support the kids at Junior High School 22 on Manhattan's Lower East Side may not have English Through Amateur Radio in September. Contact WB2JKJ via Callbook.

WANT COLLINS: 136A-2 Noise Blanker for 75A-4; 35U-1 Low Pass Filter for 75A-4. Want Jones Micromatch wattmeter. Need sales literature for Collins 30K-1 transmitter, early series. Original only, no photocopies, and in good condition, please. Want xtal gripper for CP-1 Crystal Packet. Need 440E-1 extension cord for 516F-1 Power Supply; need also owner's manual for 51J-4, in good condition, please. Trying to complete collection. AC1Y c/o ARRL Hq.

SPANISH FOR Hams booklet/cassette $6.50. KA8GWI, 15625 Mayfield, Huntsburg, OH 44046.

AMERITRON AL-80 amp. 160-10 kW $500, FT221R 2-m multimode $250, FTV560 6-m transverter $75 TR22C $75 W1GNC 203-243-9482.

ARRL Handbooks from the estate of its creator, Ed Handy, W1BDI: 1931-1939 (+ 1939 Spanish edition), 1941, 1947, 1948, 1950, 1952-1966 (1-1962 hard bound, 1-1962 with inscription, 1-1964 hard bound), 1968, 1971, 1973, 1974 (2), 1975, 1976, 1977 (2), 1978. Richard Handy, 303 School St., Belmont, MA 02178.

SELL: Yaesu FT-102 with SP-102 spkr. & nar SSB filter. Mint cond. $785. W6OWD 415-728-7136.

HEATH SB300, SB400 with mic., excellent condition, both $325 separate $165 and $185 respectively. WA9CCX, 8070 Lieber Rd., Indianapolis, IN 46260 317-253-9742.

COMPUTER, TRS-80 Model III, 48K with cassette & Quick-Printer II for sale $750. Will trade for late model HF transceiver. Joe Schilling, 1409 S.W. 66th, Oklahoma City, OK 73159.

HEATH SB-220 2kW 80-10 meter linear amplifier. Clean and healthy. $450 pickup or $495 I ship. WA2KSY - Bruce 803-546-3626.

HRO - 50T mint unmodified with 10 plug-in coils $225 W9KVF 205 West Indiana, Urbana, IL 61801 217-344-4947.

WANTED: Old bugs for my wire and wireless telegraph key collection. I am trying to find each make and model of bug manufactured before 1950. Martin, Boulter, Dunduplex, Autoplex, D&K, Thomas, Lippencott, etc. Also looking for Spark keys. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

HAMMARLUND, Hallicrafters, and National receivers. Parts and tubes, SASE for 5 page list. W9VZR, 4627 North Bartlett Avenue, Milwaukee, WI 53211.

DRAKE T4XC; R4C, 4NB, FL1500, FL500, FL250; MS4; AC4; mic; keyer; all mint condition, other accessories to make complete station. $750. WB2QHQ, 914-478-1388.

WANTED - good 8122 tubes, matched pair. W2KU, 7 Brookside, Port Washington, NY 11050.

SELL: TS-520S cw filter DG-5 digital display, $550. Heath HD-1410 keyer, $35. Dick, K1ZZJ, 33 Colburn Street, Attleboro, MA 02760 617-695-0285.

HW32 - HP 23 ps-$75. Murch UT-2000A - $75. W2DOR - 201-349-1892.

WANTED: Ameco R5 receiver K. Neal, Rte A, Box 221A, Flippin, AR 72634.

KENWOOD TS520SE w/factory service manuals, $425, KB4SL 615-966-2606.

EIMAC 2000T tube wanted. Also want Heathkit Q-meter. Bill Smitherman, Rt 4, East Bend, NC 27018.

FOR SALE: SBE-34 transceiver - make offer Larry VanZee - 848 Oakhill - Grand Rapids, MI 49507-1-616-245-3113.

New CW filter, for IC720A $40, KB4SL, 615-966-2606.

INSTRUCTOGRAPH code machine. Latest model. Variable speed drive with builtin code oscillator. Eleven assorted speed tapes. Manuals. $75. W2GZD. 516-472-2394.

GONSET GSB-100 transmitter and matching Gonset GSB-101 linear. $350 203-481-2058 Bob, KA1FZS.

SELL Panasonic RF4900. $299 + UPS. KA4ZIU, 13901 SW 75 St., Miami, FL 33183.

SELLING Yaesu FT-107M and FTV-107R both in perfect condition for sale along with all cables to connect the two units together for satellite operation. All bulletins are included. The price for these two units is $1100 which includes UPS shipping to you. C. J. Clark, K4GEX, Rte 4, N.C. 28327.

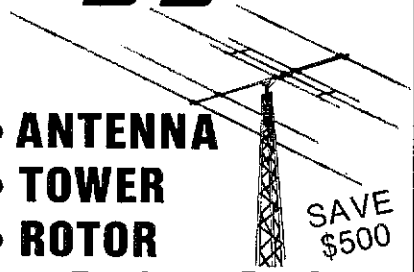
YAESU 207-R with speaker mike, wall charger, mobile battery eliminator, rubber ducky, telescopic whip antenna, new battery, memory scan, band scan, UP/DOWN manual scan. Built-in autopatch, $175 or best offer. Joe DiBlasi, W1EZE 203-567-0834, 203-567-5697, P.O. Box 398, Watertown, CT 06795.

RF noise bridge, model MFJ-202B $45 203-481-2058 Bob, KA1FZS.

LUNAR 30-150 with built in pre-amp $180 Transco transfer relays 24 volts type N connectors, good for 3 kW on 432 MHz $40 each. Polorad Spectrum Analyser model # SA84WA 10-84,000 MHz $600. Barry Forrest, N2MB, 212-327-4952, 347 Beach 43 Street 11691.

TS820S w/digital display $600, Henry 2KD5 linear $600, HyGain TH3-MK3 tribander w/balun, CDR rotator $210, Astatic 10-DA mike w/switching stand $77, Astron 13.8V/12 amp supply $50, Heathkit HM-102 power meter w/Cantenna $60, Viking patch $20, B&W and Johnson 1kW lo-pass filters $15 each, Palomar Eng'rs VLF-A converter $70. Sell as station for $1600 plus shipping. Louis - N6EFO - 714-622-3248.

hy-gain



- ANTENNA
- TOWER
- ROTOR

SAVE $500

★ ★ Package Deal ★ ★

Ends July 31st, 1983. Hurry! - Order from AES today. The complete package will be shipped to you PREPAID with NO SHIPPING CHARGES within the continental 48 States.

Hy-Gain EX-14 Explorer 14 20-15-10 meter beam. New driven element design, covers full band under 2:1. Maximum legal power; 14' × 1½" boom; 7.5ft² wind area; stainless hardware; 1:1 balun; 43 lbs.

Hy-Gain HG52SS 52' Self-Supporting Crank-Up Tower. Rated 9 ft² @ 50 mph. Galvanized steel, includes hand-cranked winch; retracts to 21'. With base, rotator plate, 10' mast and (3) coax support arms.

Hy-Gain CD-45-II Medium duty rotor for arrays up to 8.5 ft², in-tower mounted. Bell design, 98 ball bearings and disc brake system. Independent brake release & CW/CCW rotation switches. Meter readout accurate to ± 1°. Requires 8-conductor cable.

Package components:	*Regular*
EX-14 antenna w/BN-86 balun	$ 399.95
HG52SS crank-up tower	1095.00
HG10 10' mast	68.50
HGCOA coax arms (3), $13 ea	39.00
CD-45-II rotator	164.95

Total Regular Value - $1767.40

PACKAGE PRICE - $1267.40

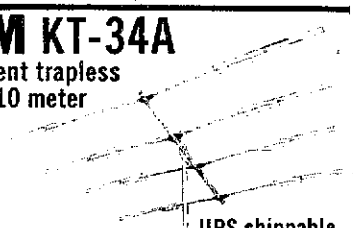
(YOU SAVE $500.00 + SHIPPING)

or

You choose a Package!... Purchase any other Hy-Gain Tower/HF Beam/Rotor Combination, add any other Hy-Gain or TELEX items and receive an additional 10% Discount from our already Low Sale Prices on the entire package, plus get FREE Shipping. Does not include Hy-Gain log-periodics or R-3501 rotor. *Ends 7/31/83 - Order Now!*

KLM KT-34A

4-element trapless
20-15-10 meter
beam

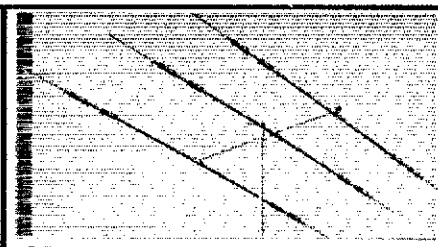


UPS shippable

Regular $389.95

Special $299.95

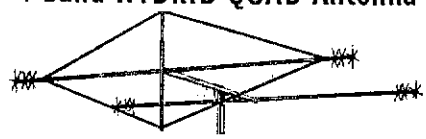
Quantity Limited at Special Price



CUSHCRAFT Multiband Beams

Model	Regular	SALE
A-3 20/15/10m, 3-el, 14' boom	$249.95	179.95
A-743 40 or 10 MHz add-on kit	89.95	69.95
A-3SK Stainless steel hardware kit	49.95	39.95
A-4 20/15/10m, 4-el, 18' boom	329.95	229.95
A-744 40 or 10m add-on kit	89.95	69.95
A-4SK Stainless steel hardware kit	54.95	44.95

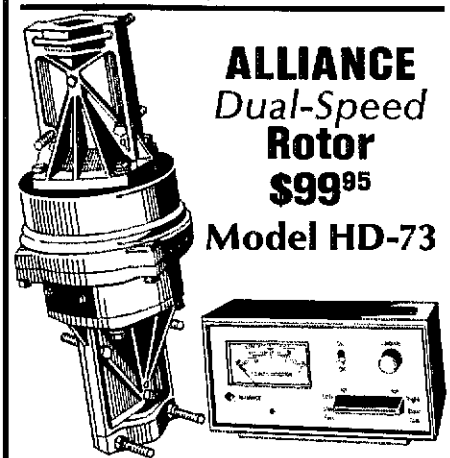
Mini-Products HQ-1
4-band HYBRID QUAD Antenna



A compact, gain antenna that providing maximum efficiency in the smallest practical size. Uses a unique loaded quad reflector and overcoupling principle that results in a wide bandwidth and good forward gain. Bands - 6, 10, 15 & 20 meters; Power - 1200W PEP; Element length - 11'; Boom - 4½'; Wt. - 15 lbs. Install & turn w/TV hardware. (Reg. $159.50) ... **Sale $139.95**

BUTTERNUT Vertical

		Regular	SALE
HF-6V	80/40/30/20/15/10m vertical	$169.50	119.95
TBR-160HD	High power 160m adapt.	55.50	49.95
RMK-II	Roof mount kit w/radials	47.00	42.95
STR-II	Radial kit, only	33.50	29.95



ALLIANCE
Dual-Speed
Rotor
$99.95
Model HD-73

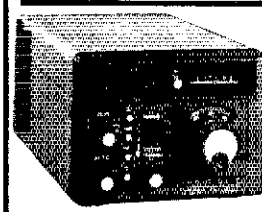
BELDEN 8214 RG-8 (foam-type) coaxial cable
100' bulk roll - **$36.95**; other lengths, 42¢/ft.

BELDEN 8448 8-conductor rotor cable
100' bulk roll - **$29.95**; other lengths, 33¢/ft.

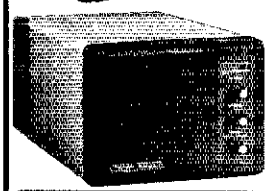
BELDEN 9405 8-conductor, hvy-duty rotor cable
100' bulk roll - **$39.95**; other lengths, 44¢/ft

CLOSEOUT

KENWOOD TS-120S, 130S, 530S, 830S Owners!
DFC-230 Digital Frequency Controller. 20 Hz step Digital VFO w/4 Memories/Scan. Control Xcvr frequency from UP/DOWN mic. (supplied) or FAST STEP switch. Scan speed selectable in single, slow, or fast continuous 20 Hz steps from mic. Transfer freq. from VFO-memory or memory-VFO; split-freq. with Xcvr VFO on Transmit, DFC-230 on Receive. (Reg. $289.95) .. **Closeout $169.95**

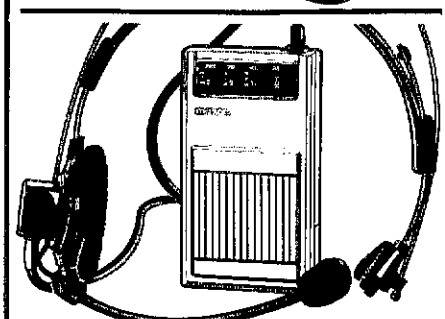


YAESU
FV-101Z
External VFO for the FT-101Z/ZD, FT-901/902 series transceivers.
Regular $175
Closeout $129.95



SP-901P
Speaker/Hybrid phone patch combination for FT-901/902/101ZD.
Regular $76
Closeout $59.95

AEA HTM MICROPHONE
Electret type w/volume control and plug wired for ICOM HT's.
Closeout - $9.95



MAXON MX-49S 49 MHz FM, 2-way radio with boom mic headset/whip ant. Clips to belt/pocket; Manual or ***"hands-free"*** VOX operation. Great for tower work! 100mW; up to 1/2 mile range. 4⅜"h × 2½"w × 1"d, 9 oz. Uses (1) 9v battery. **$49.95** each; **$44.95** each, in pairs.

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

SELL: Collins 32S-3 with DX Engr speech processor; two 516F-2 power supplies; 75S-3 receiver; 312B-4 station control-phone patch-watt-meter; mic. SM-2; mint, all manuals, spare tubes, demonstrate, $1200. Also, best offer or donate to non-profit: Military receiver AN-APR-4, 38-1000 MHz., manual. Frequency meter, BC221-F, AC, manual. Weston moisture meter, Model 8009, with case. Handbooks, 1931-52, Radio, Seventh Edition. Carton, old catalogs, manuals from 1928. W2KO, 516-868-2893.

QUAD KITS. $37.50. Quik Quad, 1101 Plantation Dr., Cary, NC 27511.

DUPLEXER, as seen in April '79 QST.Silverplated for maximum efficiency. 81 dB XT-XR isolation. Was used in club rept, W4NIW. Have moved to more complex system. $100, U-ship. 919-673-0841. Wilber, WB4JLT.

WANTED: Gonset "Super-6" mobil rx-converter; HW-7/8, FT-301/S prefer damaged/very low cost, can fix; WA7SSA 695 W 1400S, Provo, UT 84603 801-375-7132.

YAESU FT-101ZD Mark III with CW filter and fan. Like new. $565. WB7VOO, 602-298-4820.

SALE: TET HB33SP tri-band ant., $150, will deliver in CA, Nev., Chuck, WØRHZ, Gen. Del., Wofford Hts., CA 93285, 619-376-3074.

MARTIN Vibroplex, vertical Vibroplex, Camel Back key and Sideswiper wanted. Dick Randall, K6ARE, 1263 Lakehurst, Livermore, CA 94550.

WANTED - Heavy-duty tower around 100'. Prefer self-supporting type. Also need heavy-duty rotor and KT-34XA beam. Contact Nickie, 5PMU, LBDET, APO SF 96218.

ICOM 551D 6M rig mint $485. Kenwood TR-3500 70cm H/H mint $225. Kenwood TS-180S CW filter, DFC, mike $575. Robot 800A mint $385. GSC-20A ps $60. QF-1 filter $20. Astro CIR 200A transceiver + BPS-200PS + scanning mike. CW filter $390. SST-Ultra Deluxe tuner T-4 $50. MFJ 941-B Versatuner II $60. After 6 PM. Bert Iannone, M.D., KØXD, 515-288-8100.

FOR SALE: Hal RVD-1002 Video display, Hal RKB-1 keyboard, Flesher TU-170, $225 or trade for synthesized 2m rig. TS-700A all mode 2m rig, $320. SB-200 w/new finals, $275. Want 2kW amp with 4CX250B's in final. Don't have time or talent to build. S. D. Smith, WA4VWV, RR 2, St. Charles, IA 50240 515-297-2333.

VIC-20 Ham Software: SASE appreciated: Walt, KA9GLB, 4880 N. 49th St., Milwaukee, WI 53218.

COLLINS 51S1, winged, mint, manual. $725, I ship. 816-331-6959 KCØDE.

DCT-01 crystal-controlled Digital Capacitance Transducer accurately measures capacitors. Requires only two connections to your digital frequency counter for direct digital readout. Assembled and tested, $39.95. Bare board and manual, $11. BV Engineering, P.O. Box 3351, Riverside, CA 92519.

GALAXY GT-550, and associated accessories. Best offer. WØSMY, 5019 Burt St., Omaha, NE 68132.

PROTECT your Bencher Key. Rigid Plexiglas cover $9.95. George Chambers, KØBEJ, 302 S. Glendale, Coffeyville, KS 67337.

BIG DISCOUNTS on antennas and accessories - "Great prices our specialty" S.A.S.E. for list. Ham-Tenna, P.O. Box 4414, Utica, NY 13504.

COLLINS KWM-2 #12732 mint condition. 516F-2 p/s $450. 617-896-3549 Wilson, 58 Pilots Way, Brewster, MA 02631.

FANTASTIC DISCOUNTS: Kenwood R-2000 $509.95 Icom-R70 $669.95 RFG-7700 $439.95 Sony 2001 $209.95 Bearcat-100 $288.49 cordless phones, cable, switches, antennas, scanners, microphones, MFJ products, radar detectors, telephone answering machines, rotors, TV's much, much more. Free UPS shipping to 48 states. Picture catalog $1 refundable 1st order: Galaxy Electronics, Box-1202, 67 Eber Ave, Akron, OH 44309 216-376-2402.

SX115, HT32A, 205BA 60-ft crankup tiltover tower, like 25G construction. Both 2 years new. Dave W1GDQ, 1114 Ridgewood Dr., W. Palm Beach, FL 305-659-4395 305-732-6555.

SALE: 50 ft. tower, self-supporting, one-piece, galvanized 1" rod, T2X rotor and control, Mosley TA-36 - sold as package only - all in excellent condition - purchased new in 1979 - you can take down and haul away - $750 - 609-455-4912, George Diament, 15 Rugby Lane, Bridgeton, N.J. 08302.

ATLAS 350XL, mobile mount $500 Yaesu FT-225RD $700, manuels WB5SRO, 915-388-4685.

FOR SALE: A-Tronix CR101 Code Reader, mint cond. $125. I will pay shipping. Call George, KB1GF, after 6:00 PM EST at 207-797-2265.

WIRE, WIRE, WIRE! Antenna builders (especially quad men) take note. Multi-conductor Litz wire Will Not Break under continued flexing. Four-hundred strands of no. 38 enameled copper w/rayon outer insulation (equivalent to no. 8 in dia.) — $7 per 100 ft., postpaid continental U.S. Nine strands of no. 26 Litz (equivalent to no. 16), or no. 18 bare, hard-drawn, solid copper — either wire $6 per 100 feet, postpaid. M.O. or certified (no checks, pse) to: Dennis Lusis, W1LJ, 160 Curtiss St., Bristol, CT 06010. Tel. 203-589-7247 eves. 666-1541, ext. 275 days.

KENWOOD TS-180S, digital VFO's (DFC), cascaded SSB filters, like new $575. Dan 312-394-9418 AF9R.

VARIACS, POWERSTATS, Variacs! Variable autotransformers excellent for many uses: filament voltage regulation (saves your expensive power tubes!), line regulation, light dimmer, motor speed control, etc., 120-V primary, 0-140-V adjustable secondary, some 1.75 A, others at 2.25 A. All units cleaned and tested — $7.50 ea., postpaid W1LJ, 160 Curtiss St., Bristol, CT 06010. Tel. 203-589-7247 eves., 666-1541, ext. 275 days.

ILLINOIS' OLDEST HAMFEST

Sponsored by

The Fox River Radio League

Sunday — August 21, 1983

Kane County Fairgrounds — St. Charles, IL

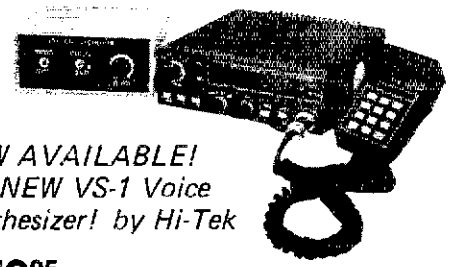
Commercial Exhibits • Flea Market • ARRL Booth • Contests • Demonstrations • Hot Food

Tickets: $2.00 in advance — $3.00 at gate

Send SASE: G. Frieders, W9ZGP, 1501 Molitor Road, Aurora, IL 60505

Dealers Contact: G. R. Isely, WD9GIG
736 Fellows Street
St. Charles, IL 60174

HI-TEK LAB's, inc.



NOW AVAILABLE! Our NEW VS-1 Voice Synthesizer! by Hi-Tek

$159.95

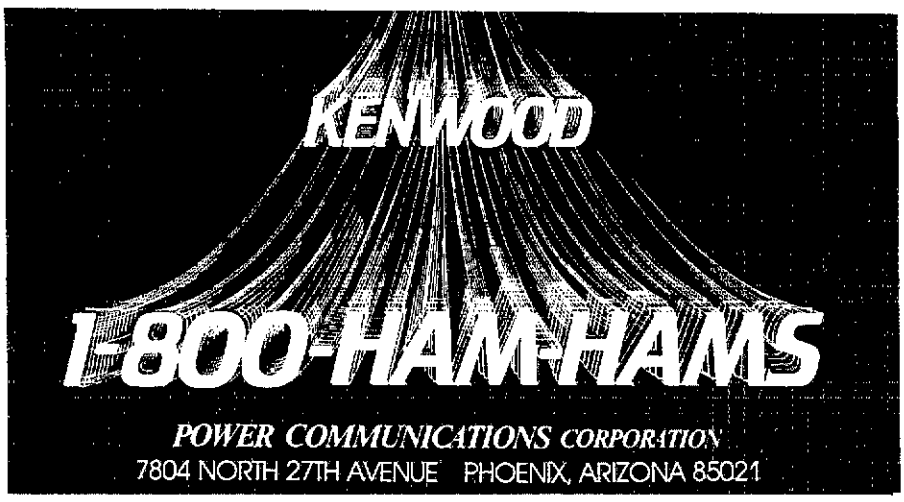
- **Specializing in VHF & UHF Repairs!**
- **Specializing in repair and parts availability for KDK Transceivers, models FM-144 — FM-2030!**
- **Authorized ENCOMM Dealer!**
- **Stocking KDK-2030**

Mastercard/Visa Accepted!

Hours of Operation — 9:30 a.m. to 5:30 p.m., Monday — Friday

HI-TEK LAB's, inc.

formerly KDK DISTRIBUTING CO., INC.
113 Saunders Ferry Road
Hendersonville, TN 37075
(615) 822-0943



DUPLEXER for sale. Brand new tx-rx, four-cavity duplexer. Won at Dayton Hamvention. Factory will set up desired frequencies and ship direct to you. Call Phil, KO8T 616-874-9129.

1296 MHz transverter, 28 MHz IF, UHF Units, new $275. Dan 312-394-9418 AF9R.

AMATEUR VACATION Dream: Rent Sarasota, Fla. home, furnished, triband beam, walk Siesta Key beaches, biweekly to annual. WD8NNB 513-922-3968.

SELL: Yaesu FT-101E, mike, blower, processor, speaker, mint $475; Hallicrafters SR-160 transceiver, AC, DC, mike, 160W, 80-40-20, $160; Elco 753 transceiver, 200W, 80-40-20, $130; HR05T, 8 coils, AC, 6VDC, mint, $200; Telrex Xmas tree: 3EL10, 3EL15, 3EL20, rotor, 55-foot crankup, $800; Clipperton linear, 4-572s, 160-10, mint, $475; mint Viking 500, $500; mint 75A-4, no. 5667, .500, .800, 2.1, 3.1, vernier, speaker, $575; 180-foot B.C. tower, guys, $1000; 100-foot-trailer-mount mast, 2500-watt generator, compressor, guys, anchors, winch, $2500; 32V-2, $135; Dentron 160XV, $135; Viking I, $75; Viking II, VFO, $75. FOB K8CCV, 216-427-2303 weeknights 6-9PM. Want: Telrex, KLM 80m antenna.

ICOM-730, ICOM-PS15, MFJ-949B, AEA-KT1, Vibroplex iambic paddle, older MFJ-CWF2, combination SWR/RF out/% of modulation meter, shipped, ins., first $800 Hurry! KA5JYE, 915-584-1627.

SACRIFICING ham equipment. Account sickness. Also one week timesharing vactiontime at ocean Hilton Head Island SC. SASE for details. William K4CLA 562-X Oak, Lexington, SC 29072-9059.

WANTED: 2C39 tubes for local repeater-must be good-Ken Booher 1421 Williamsburg Rd., Flint, MI 48507 313-238-8272.

MOTOROLA Maxar 80 VHF/FM 50W mobile radiotelephone. New. $400. Standard 20W basestation, matching 120V powersupply, maintenance manuals. $125. 150 MHz, private-channel crystals installed. W8OKS, 4 Briga, WhitePlains, NY 10605; 914-997-0171.

RESTORED: Johnson Valliant, HQ170A, Heath Maraduer HX-10, 10-80 all mode transmitter, Heath Mohawk RX-1 receiver, reasonable prices Mint equipment: WA6LSO 714-338-5126.

FT-480R 2-meter xcvr $375. W5UN 915-694-8684.

CX7 Signal/One. All modifications including RIT and high VSWR. $650 W5UN. 915-694-8684.

SELLING $400 excellent Heathkit SB104A CW 400Hz mode n.b. SB604 power supply with internal speaker microphone Palomar preamplifier and all manuals complete package will ship UPS KA6NDX (book) 415-941-6556.

TEN-TEC Delta 580,160-10 xcvr. Less than 2 months' use. Power supply included. Beautiful condition. $650. Roger Mock, 441 California, Watsonville, CA 95076 408-724-3298, KA6VJX.

COLLINS 51S-1. Round. Truly mint. $1000. 55G-1 round. New. $300. Wanted: McIntosh and Marantz tube-type hi-fi equipment. KA6NNR, Box 71703. Los Angeles, CA 90071 213-795-3397.

HAMMARLUND receiver service by former Factory Service Manager. Limited supply of service manuals and parts. Send wants. SASE. Wayne Cordell, K4HCS, Blue Ridge Communications, 770 New Stock Rd., Weaverville, NC 28787 704-645-7070.

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, Bencher, Ten-Tec, Icom, Mirage, MFJ, Tempo, Hustler, Hy-Gain, CushCraft and Satellite Earth Station equipment. 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.

BEST DX shows in Amateur Radio available for hamfests, conventions, etc. Two fantastic shows, "The Three Clipperton Island DXpeditions Revisited" and "30 Greatest DXpeditions of All-Time" narrated live with color slides and movies. Details available WA4WME (FOØXA-H, et. al.), 2308 Zinnia Court, Killeen, TX 76542.

PANASONIC U-Matic NV 2110 3/4-inch video tape player, like new $450 or swap for Icom IC-25H/IC-251A. A. Bruno, W2ZUP, days 212-747-9508, eve. 914-354-8899.

WANTED Microwave Modules 6 meters in 2 meters out MMT 144/50 transverter. WB3CTU 215-353-8853 evenings.

FREE ad when you subscribe! Get "The Radio Exchange" — the speedy and inexpensive newsletter for buy/sell/trade of radio & computer equipment. 24 issues (1 year) $8. The Radio Exchange, P.O. Box 486, Forest Lake, MN 55025.

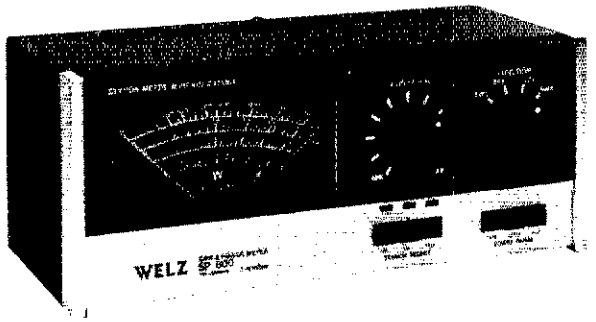
WANTED: Icom IC-720A w/wo accessories. 212-684-4703. P.O. Box 1941, Murray Hill Station, New York, NY 10156. O. Yilmaz.

COLLINS 30S-1 round, mint, cond, ser. over 35000. Two new extra 4CX1000A. Used very little, sell $1,995. Coy KC4PF ph. 704-857-9507 Rt 5, Box 101, Kannapolis, NC 28081.

KENWOOD TS-820S, CW filter, spinner knob, 10-MHz, VFO-820S, SP-820, MC-50, manuals, excellent condition, $725 you ship. N1FB Paul K. Pagel, 4 Roberts Rd., Enfield, CT 06082.

ROHN TOWERS - wholesale direct to users. All products available. Write or call for price list. Also, we are wholesale distributors for Antenna Specialists, Regency, and Hy-Gain. Hill Radio, P.O. Box 1405, 2503 G.E. Road, Bloomington, IL 61701-0887 309-663-2141.

WELZ



SP-600

THROUGH LINE POWER METERS

SP-600 Select 1 of 3 sensors by soft touch switch. Three wide bandwidth sensors cover 1.6-500MHz. **$159.00**
RS-1: 1.6-60MHz 0-2kW RS-2: 1.6-150MHz 0-200W RS-3: 130-500MHz 0-200W

SP-200 Two position antenna switch and indicators. Three power ranges to 1kW, 1.8-160MHz. **$107.00**

SP-400 Three band sensors (2m, 220, 450MHz), 10 percent accuracy, 0-150W CW, LED power range indicators. **$109.00**

Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

WELZ

SP-250

SWR & POWER METERS

SP-250 Low-profile, economy 2kW wattmeter. 1.6-60MHz bandwidth. 3W SWR sensitivity. Three ranges. A Best Buy! **$75.00**

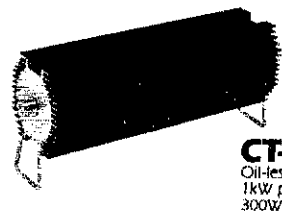
SP-15M 1.8-150MHz, 200 watt, low-profile wattmeter. VSWR, FWD PWR, REF PWR, 1.5W SWR sensitivity. Great for mobile HF. **$60.00**

SP-45M VHF-UHF to 100 watts. 3W sensitivity for SWR, 10 percent accuracy. All metal shielded construction. **$85.00**

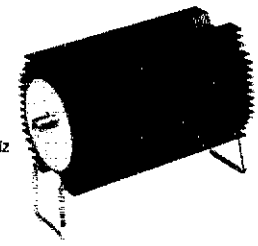
Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

WELZ

DUMMY LOADS

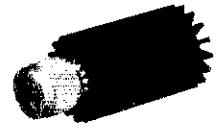


CT-300
Oil-less aircooled.
1kW peak for 3 min.,
300W avg. DC-250MHz
$68.00



CT-150
Oil-less aircooled,
400W peak for 3 min.,
150W avg. DC-250MHz
$46.00

CT-15A
50W peak, 15W avg.
50-239 Screw-on dummy
DC-500MHz, VSWR<1:1.2
$12.00



CT-15N
50W peak, 15W avg.,
Type N Dummy Load.
DC-500MHz, VSWR <1:1.1
$21.00

SURGE SUPPRESSOR

CA-35A
Contains replaceable,
chip-type surge
voltage protector.
Low loss, low VSWR.
DC-500MHz, 350V breakdown.
$22.00

COAXIAL SWITCH

CH-20N
Two-way coaxial switch
50-239 type connector.
DC-900MHz, 1KW power.
$54.00

TERMINATION POWER METERS

TP-05X
BNC connector,
5W talkie checker.
Field calibratable,
3W avg. Dummy Load,
1W center 50-500MHz.
$21.00

TP-25A
25 watt version of
TP-05X for mobile use.
Larger Dummy Load.
50-500MHz
$40.00

All prices are suggested retail and subject to change.

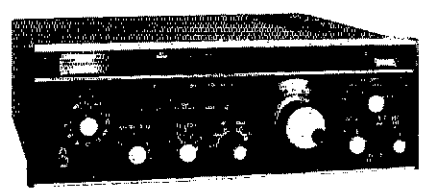
Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

DRAKE • Free Power Supply • Special!

For a Limited time Only! - Purchase either a **DRAKE TR-5** or **TR-7A** at the Low **AES**® Sale Price and receive a **matching Power Supply - *FREE!!!***

TR-7A 160-10m Xcvr/1.5-30 Mhz Rcvr
Regular $1699 - ***Sale $1449***
with - **FREE PS-7** *Power Supply*

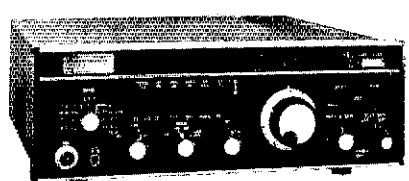
TR-7 Accessories	Regular	SALE
PS-7 25A continuous power supply	$299.00	269.95
PS-75 15A power supply	199.00	179.95
MS-7 Speaker	49.00	
RV-7 Remote VFO	195.00	174.95
RV-75 Synthesized remote VFO	299.95	269.95
FA-7 Fan for TR-7A or PS-7	34.95	
SL-300 300 Hz CW filter	59.95	54.95
SL-1000 1 KHz RTTY filter	59.95	54.95
SL-1800 1.8 KHz SSB/RTTY filter	59.95	54.95
SL-4000 4 KHz AM filter	59.95	54.95
SL-6000 6 KHz AM filter	59.95	54.95
MMK-7 Mobile mounting kit	79.00	69.95
7073 Hand microphone w/plug	29.95	
7077 Desk microphone w/plug	49.00	44.95
AUX-7 Range prog. board, 1 RRM-7	45.00	
RRM-7 Range rec. module ..... each	8.50	
WARC-7 WARC kit (3 RTM-7s)	24.95	
RTM-7 Range trans. module* ..... ea	8.50	
*Special order, requires proof of license		
7037 Extender card service kit	50.00	
7804 TR-7/TR-7A service manual	35.00	



R-7A 0-30 MHz digital Receiver
Regular $1649 - ***Special $1199***

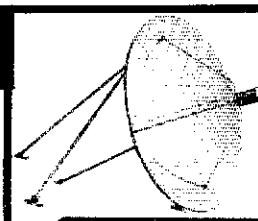
R-7A Accessories	Regular	SALE
MS-7 Speaker	$ 49.00	
RV-75 Synthesized remote VFO	299.95	269.95
1544 R-7A to RV-75 adaptor	29.50	
SL-300 300 Hz CW filter	59.95	54.95
SL-1000 1 KHz RTTY filter	59.95	54.95
SL-1800 1.8 KHz SSB/RTTY filter	59.95	54.95
SL-4000 4 KHz AM filter	59.95	54.95
SL-6000 6 KHz AM filter	59.95	54.95
1548 R-7A to TR-7A cable interface	29.50	
7037 Extender card service kit	50.00	
7805 R-7A service manual	35.00	

R-7A - Quantity Limited at Special Price!



TR-5 9-band Digital Solid State Xcvr
Regular $799.95 - ***Sale $679.95***
with - **FREE PS-75** *Power Supply*

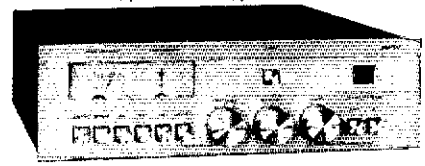
TR-5 Accessories:	Regular	SALE
PS-75 15A power supply	$199.00	179.95
PS-7 25A power supply	299.00	269.95
MS-7 Speaker	49.00	
RV-75 Synthesized remote VFO	299.95	269.95
FA-7 Fan for TR-5 or PS-7	34.95	
NB-5 Noise blanker	90.00	82.95
SL-300 300 Hz CW filter	59.95	54.95
SL-500 500 Hz CW filter	59.95	54.95
SL-1000 1 KHz RTTY filter	59.95	54.95
SL-1800 1.8 KHz SSB/RTTY filter	59.95	54.95
SL-4000 4 KHz AM filter	59.95	54.95
SL-6000 6 KHz AM filter	59.95	54.95
MMK-7 Mobile mounting kit	79.00	69.95
7073 Hand microphone	29.95	
7077 Desk microphone w/plug	49.00	44.95
Accessory range crystals ..... each	10.00	
Linear amplifiers		
L-7 2kw PEP linear w/3-500Z tubes	1400.00	1129
L-75 1.2kw PEP linear w/3-500Z tube	854.95	699.95
Terminals		
Theta 9000E Commmunications terminal	$995.00	869.95
550 Rec. only communications terminal	499.95	439.95
7030 12" green screen monitor	159.95	129.95
Tuners/Antenna		
MN-75 200w 160-10m ant. tuner	259.00	229.95
MN-2700 1kw 160-10m ant tuner	349.00	309.95
B-1000 4:1 balun; MN-75/MN-2700	29.95	
AK-75 Multiband dipole antenna	39.95	
AA-75 Antenna insulator kit	3.49	
Misc. Accessories:		
CW-75 Electronic keyer	$79.95	72.95
DL-300 300w dry dummy load	26.95	
DL-1000 1kw dry dummy load	59.95	54.95
FA-7 Fan for DL-1000	34.95	
P-75 Phone patch	79.95	72.95
HS-75 Headset	19.95	
RP-700 Receiver front end protector	90.00	
SP-75 Speech processor	159.00	142.95
LA-7 8-600 ohm line amplifier	49.95	
1549 200w antenna surge shunt	24.95	
Filters		
LF-2 2-outlet AC line filter	39.95	34.95
LF-6 6-outlet AC line filter	69.95	59.95
TV-3300-LP 1kw 80-10m low-pass	33.95	
TV-300-HP 300 ohm high-pass filter	14.95	
TV-75-HP 75 ohm high-pass filter	17.95	



DRAKE Satellite Television

	UPS O.K.!	Regular	SALE
ESS-2250 Earth station*		2250.00	1795

*A complete Earth Station System consisting of the ESR-224 receiver with built-in RF modulator, down converter, 120° LNA, 10 foot aluminum dish antenna, polar mount, polarotor & 150'cable.



ESR-24 Receiver w/down converter	$895.00	689.95
SA-24 Stereo adaptor	349.95	299.95
Modulator for channel 3 or 4	79.95	59.95
SPH-24 Splash proof housing	30.00	24.95
TM-24 Remote tuning meter	49.00	39.95
RT-24 Remote control w/30' cable	59.95	49.95
Fixed channel adaptor	50.00	
Internal mounting kit	15.00	
LNA-120 120° LNA	498.00	299.95

DRAKE Theta 7000E/TR-930 Combination Closeout

DRAKE **Theta** 7000E Communications Terminal. Complete, automatic send/receive of Morse code CW, Baudot & ASCII code (RTTY) ..... **Regular $1095***

DRAKE TR-930 9" Video monitor ..... **Regular 185***

Regular Combination Price - **$1280***

Combination Closeout Price - $699.95

*DRAKE'S Suggested List Price — 7000E (only) - $589.95

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.

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® *Inc.*

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 - Phone (414) 442-4200

AES BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

Associate Store
CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
15 min. from O'Hare!

WANTED, Military Surplus radios. We need Collins 618T, ARC-94, ARC-102, 718F-1/2, MRC-95, MRC-108, 671U, RT-980/GRC-171, RT-712/ARC-105, RT-804/APN-171, ARC-114, ARC-115, RT-823/ARC-131, or FM-622, RT-857/ARC-134 or Wilcox 807A, ARC-159, ARC-164, RT-859/APX-72, APN-153. Antenna couplers 490T, CU-1658A, CU-1669A, CU-1239/ARC-105, Sperry Rand 3226A1, 3226B1, 490B-1, 690D-1. Top dollar paid or trade for new Amateur Gear. Write or phone Bill Slep 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

ROBOT 800H RTTY/CW/SSTV terminal, and USI International 12-inch green screen monitor. Both new. $500. N5SM Scott McDowell, 3715 Lenwood Dr., Amarillo, TX 79109. 806-355-5019.

KANTRONICS Interface with Hamsoft for VIC-20, barely used, $145. Dave, KCØSV, 2501 S. 53rd St., Lincoln, NE 68506. 402-489-1060.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 490, 230 Woods Lane, Somerdale, NJ 08083.

FOR KWM-2. Collins Plug-in Relays Mod Kit. Half price. W6NIU 619-420-3845.

WANTED - Factory Service Manual for Tektronix 545A scope. Include your phone number. Lee Kent, KH6JQO, 6031 Kolopua St., Kapaa, HI 96746.

HIGHGAIN TH3MK3 three-element beam, Ham II rotator, CDE control box, 8-cond. cable $250. WA5OHI, tel. 505-888-4814.

AMPLIFIER PROTECTION: compact time delay relays. D.P.D.T., 10-Amp contacts, 120-Volt AC operation. Adjustable electronic timing. $15 postpaid. WA6PJR 36308 Panorama Drive, Yucaipa, CA 92399.

FOR SALE: Best offer received by July 20 takes all! Approximately 424 QST from Nov. 1940 plus 140 CQ from 1945. Buyer pays shipping! W1MXT P.O. Box 58, Millinocket, ME 04462.

QST's 1952 thru 1982 CQ's 1945 thru Oct. 1977 73's Oct. 1960 thru Oct. 1979 HR's March 1974 thru April 1980 12 Handbooks, others $125 plus shipping W9VQC 707 S. Osborn, Kankakee, IL 60901 815-932-5198.

HEATH SB220 $500. SB630 $75. SB620 $125. SB650 $150. HM2102 VHF SWR $35. HM2103 HF wattmeter $50. HW202 $100. W4UKU Jerry 803-278-0984.

KENWOOD TS-930S w/AT still under warranty with MC-60. Want new or near-new TS-830S with VFO-230, SP-230 & MC-50. Wendell Reynolds, KØMPR, 5833 North Lenox, Kansas City, MO 64151, phone: 816-741-6049.

WILL pay $15 for copy of Hallicrafters SX-116 manual or $25 for original. Eugene Santilli, 2415 Martha, Aliquippa, PA 15001.

SUPER summer sale: original boxes. Like new. Hal DS3000/ST6000, 30% off. Robot 800/400, Leedex vdu, 30% off. Bill Jones, 703-430-1529.

DRAKE TR7, PS7, excellent condition, $895. Collins KWM2A, round, $595, 75S3 with CW filter $250. W9ZR, 1-414-434-2938.

NEW Ginpole Kits, Standoff Brackets, Mast Adapters at realistic prices for Amateurs. Custom-welded fabrication and hot-dipped galvanizing also available. We solve antenna and tower mounting problems now. VISA and MC accepted. Free Catalog IIX Equip Ltd. P.O. Box 9 Oaklawn, IL 60454 312-423-0605.

TI99/4-4A Basic & Extended Basic Programs. CW RECEIVE/Transmit combined one program, CW Practice, DX Log/call locator, Amateur Call Locator, SSTV Keyboard, Programs for Hamkids. Write Sam H. Moore, Sr., AC5D, Box 368, Stigler, OK 74462.

HAL ST-5000 RTTY demodulator, mint, with manual $150. USA only. Money order or certified check. WA4GLJ, James Sohmers 2132 Glenwood St., Kannapolis, NC 28081 704-932-5362.

QST Magazines 1930-1981 $150. Transmitter 1000 watts 10 meters $150 ex-W2IKS Bill Carroll: 201-762-1937.

FOR SALE: Kenwood TR-7800, one owner xclet. Condx $260/offer John WB6BIK, 415-930-7119.

WANTED: Hallicrafters SX-101 MK1 with small window on left side of tuning knob. No others please. Eugene Santilli, 2415 Martha, Aliquippa, PA 15001.

KDK 2015/16, Kenwood 7600/25. Full scan facwired kit. $25. W6NIU. 619-420-3845.

WANT schematic, manuals on Fairchild-Dumont oscilloscope Model 704. W8BOC.

KENWOOD CW filter YG-455C-$65. Wanted: Single-lever (non-iambic) paddle, Kenwood MB-100 mobile mount. W1BL.

SB104A, PS1144 power supply, SB604 speaker, SB614 station monitor, SB634 console, Manuals. Mint condition. $550. Will ship UPS. N8CKG Call 216-431-6922 after 6:00.

MFJ-494 Super Keyboard, upgraded to MFJ-496, $200. Split-band speech processor $55. DX Engineering speech processor for TR-3, TR-4, TR-6 Drake series $70 N8AAN, 216-234-2069.

MICROPHONES - best prices, new and used professional, Amateur, commercial mics. Microphone Specialists, Box 1372, Bumsville, Minn. 55337.

MBA-RO Reader. Mint condition factory aligned. Includes power supply and tilt stand. Cost net $295. Sell $220. Free UPS. N6HLO 139 Third Avenue, Chula Vista, CA 92010, 619-425-1258.

SELL Yaesu 7700 mint cond. + MFJ722 CW/SSB notch filter $395 Elcan, 559 Longfellow Ave., Bronx, NY 10474 212-542-9300 (day) - 212-548-1444 (night).

TEN-TEC Argonaut 515 with power supply and xtal calibrator, mint $300 W1AB 203-767-8485.

SELL: Yaesu FT-301. Very good condition. Works fine. With manual, mike, more. Must sell. $300 UPS prepaid. Dave, N2BZK. 516-269-3888.

ANTENNA TUNER-Millen 2kW metered 3.5 - 29.7 MHz manual included $125 K2QOV 516-751-6447 after 2300 UCT.

WANTED: Hammarlund SPC 10 SSB converter, no junk. Harry A. Weber, 2605 W. 82nd Place, Chicago, IL 60652.

SIGNAL/ONE CX-7 formerly owned and modified by W2PV. Both CW filters $595 prepaid. K9LWT 414-554-9170.

KWS1 and 75A4 excellent condition. $900 or best offer. Jim Maloney, W7NWE. 206-822-4488 Day 483-5904 nite. P.O. Box 882, Woodinville, WA 98072.

ANTENNAS, TOWERS: discounts. Examples: Hy-Gain TH7DXS $349.95, TH5MK2S $299.95, Explorer $259.95, 18HTS $319.95, V2S $36.95. Ham-IV $179, T2X $239. Hy-Gain towers and package deals — get quote. Cushcraft A3 $165, A4 $215, AV5 $84.95, AV4 $79, AV3 $44.20. ARX2B $34.95, 32-19 Boomer $76.50, 214B $66.95, stacking and quad kits. Coax, wire, and more. Shipping extra. Free flier. RF Enterprises, RR7, St. Cloud, MN 56301.

168 QSTs plus some duplicates 1950-1975 plus 45 CQs, not all years complete, $65 you ship. W1AB 203-767-8485.

DRAKE L4B, excellent condition. LU5DEB/W2 212-858-2156.

HW-101 with HP-23C, speaker, CW filter, extra finals. Factory aligned 25 Apr. 83, A-1 condition $350. Military xcvr. Model AN/GRC-9, offer. Sid, NØEHY, 319-326-2246.

SWAN 600T and 600R good condition, offer. W7JKA, Box 960, Green Valley, AZ 85614.

WANTED: S-Meter for Hallicrafters SX-28. Paul Capito, 637 West 21 Street, Erie, PA 16502.

LICENSE Plates wanted for collection. Want old and current expired Ham tags. Also want D.A.V. keychain license plate tags. Can anyone help me? Send to Frank Sutera, 5 Spencer Path, St. Peters, MO 63376. All shipping reimbursed.

ATLAS 210X, mobile rack and base station unit. New DD-6C dial, xtal unit and mike. $400. Jim Maloney, W7NWE, 206-822-4488 Day 483-5904 Nite. P.O. Box 882, Woodinville, WA 98072.

CRYSTALS: FT-243 made to order - 1700 - 30,000 kilocycles. Also, surplus lists including other types. Stamp for listings-circuits. "Crystals Since 1933" WØLPS. C-W Crystals, Marshfield, MO 65706.

APPLE II Software: Deluxe 10-10 File Program, 5BDXCC, 10-10 Certificate Chaser. $10 each postpaid. Info SASE. K4HAV, 306 Frances, Sylvester, GA 31791.

VIC20 Software: PROKEY CW transmit program $20, VIDEOTITLIST to create video pictures for ATV/SSTV and VCRs $20, MINIMUF PLUS propagation program $6 SASE for details. Prompt, courteous service. Jim Grubbs, P O Box 3042, Springfield, IL 62708.

YAESU FRV-7700 Converter 150-170, 118-130 N.I.B. $100 Hamtronics Receiving Converter. 144-148 in 50-54 out $45 new. WA2HIZ, 914-967-6144.

DX Heading Maps centered on Baltimore, Philadelphia, NYC, Boston, LA, Detroit, Dallas, St. Louis, New Orleans, Atlanta, Chicago. $5.95 pp. Specify city. W. Massey, P.O. Box 397, Hainesport, NJ 08036.

NEW Astatic radio microphone (D-104-C) G-Stand, new Bencher Ultimate Paddle (BY-1) 203-225-8370 Sr. Dorothy Streichun..

YAESU FL2100B, linear 80-10 mtrs $350. Kenwood TR7800 25-watt 2-mtr transceiver $240. All in good condition. KA1N, Max 617-944-4508.

WANTED: Old HQ129X for parts. Manual and diagram also. (Xerox OK) Will pay postage. W. Dorese, W1DYH, 4 Carver St., Amesbury, MA 01913.

YAESU FT-101E, DC supply, fan, YD-148 mic $450, FV-101B ext. VFO $125, Yaesu speaker $20. All good, clean condition. AG2M, P.O. Box 515, Vails Gate, NY 12584 ph. 914-534-2733.

ICOM R70 absolutely mint, $540. Harvey, AD2S 212-263-3494.

VIC-20, Interface, Hamsoft $225 VFO-120, $120 VFO-243 $110 Omni-C $675 filters $30. All like new. K8CV 313-549-1846.

ESTATE SETTLEMENT. Collins KWM-2 modified to 2A serial 11371 with 516-F-2 AC power supply $599, Astatic 10DA mike $20, Collins 30L-1 RF Amplifier $499, Collins 312B4 station control $100, TH3MK3 Hy-Gain tri band with BK86 balun $125. You ship. Mrs. Dorothy Housholder, 500 Linda Rd., Mount Horeb, WI 53572.

QST's, 8/69-12/75, best offer. 657 Milford Hills, Milford, OH 45150. KB9HA.

STANDARD Vibroplex, unused $35. Collins F455FA mechanical filter, new $35 W7ODY.

UNUSED Tubes: two 4-125A & sockets $90; two w/o $80; two 833 $130; three used 572B, less than 4 hrs, $22 each. Mark K5GQ 713-391-0272.

SELL: 8 traps from HyGain THDX6; ARRL Handbooks - 1937, 1939, 1948, 1955, 1959. W6BIH.

HEATH STATION: SB-102, speaker, ps, filter, microphone, SWR, clock: $375. Drake TR22C, TouchTone mic: $135. Wilson Mark-II, TouchTone: $150. WB4CMQ 919-967-0337.

KENWOOD TS-520S, CW filter, microphone, mint, carton. I ship, $475. WB4WRL 919-286-7927.

WE WANT YOU!

TO CALL TOLL FREE

1-800-325-3636

FOR A TRADE-IN QUOTE

We Trade on New or Used Equipment

(Check for prices on available used equipment)

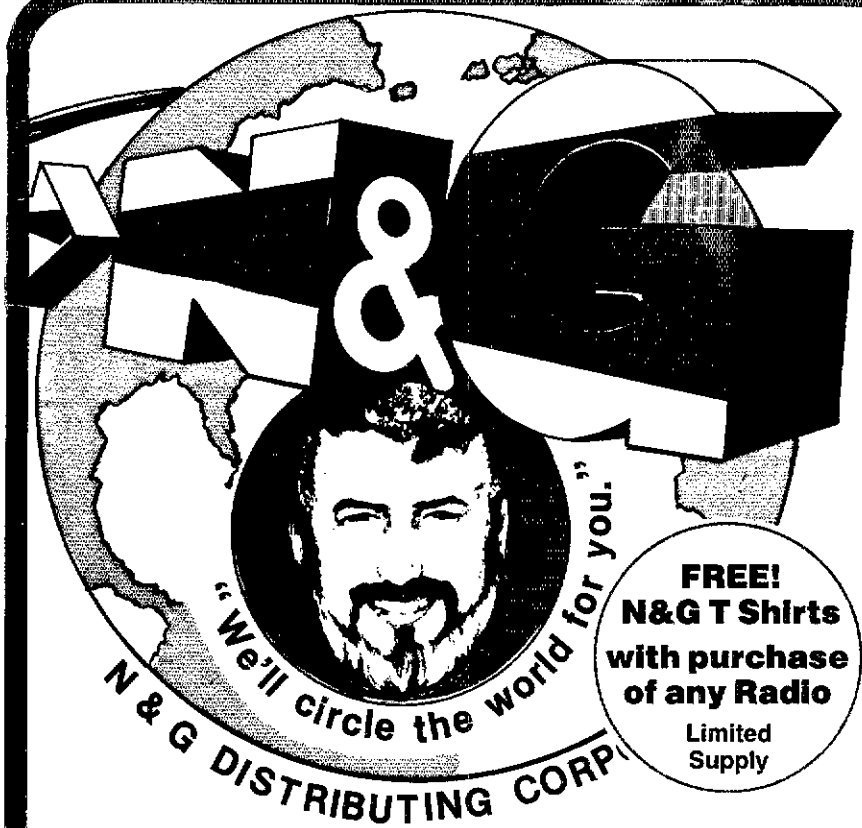
HAM RADIO CENTER

8340-42 Olive Blvd. • P.O. Box 28271 • St. Louis, MO 63132

VISA

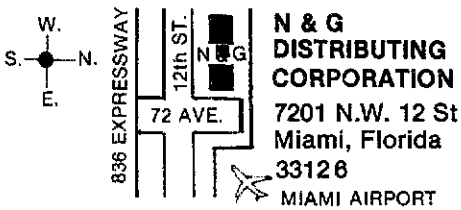
In Missouri Call 1-314-993-6060

MasterCard



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

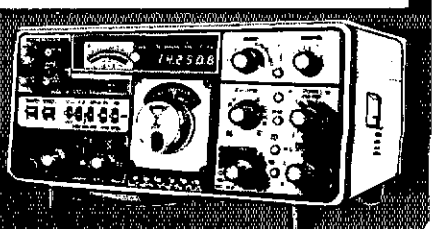
Call us TOLL FREE: for our Low Prices. . .

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.



GALAXY V MK2 80-10 xcvr, 400 W SSB, 1-150 or 300 W CW, VOX, 3.3-4.8 MHz special VFO, AC & DC supplies, manual, excellent condition $275 Mark K5GQ 713-391-0272.

DRAKE R-4C, 250 Hz, $275. T-4XB, AC-4, $280. MLA-2500B, 160-10, $625. K5GO, 501-741-1942, 902 W. Holt, Harrison, AR 72601.

ROSS $$$ New Bargains: Bird 4304 RF Wattmeter $299.90, Robot 450C $789.90, 800C $789.90, Ten-Tec 4229 antenna tuner kit $175, 545C $839.90, Icom IC-751 $1390, IC-120 $429.90, IC-271A $689.90, IC-471A $689.90, Every day is Icom day at Ross's. Kenwood TS-430S $779.90, TS-930S $1349.90, TL922A $1039.90, TR-2500 $278.50, TS-130SE & FA-4 548.90, TS-830S $804.90, TS-530S $627.90, Yaesu FT-707 $579.90, FT-102 $935.90, FT-980 $1299.90, FT-77 $569.90, FT-One $1999.90. Used Kenwood TS-120S $449.90, TS-180S/WDFC $189.90, TS-520S $499.90. Mention this ad to receive these bargain prices. All prices cash, FOB Preston. Closed Monday at 2:00 Ross Distributing Company, 78 South State, Preston, ID 83263 208-852-0830.

FOR SALE or Trade: Heath SB401-301, w/D104, all manuals, cables - very good cond. $325 or trade for 2m multi-mode or SB-200. Rich, KA1YP 203-753-6137.

CRYSTAL-controlled HT, NiCads, charger, case, extras. $135. Lane Zeitler, 7273 Rupert Dr., Fairview, PA 16415.

160 METER dipole, 110' long, coax-fed, $42.50. Details W1JC, 113 Stratton Brook, Simsbury, CT 06070.

WANTED: Collins 1500 Hz bandpass filter (F455FA-15), Morsematic or Grandmaster keyer or similar units, HQ-1 Mini-Quad antenna, also need rotor and roof or chimney mount. Write to N1CNB, 8 Westwood Hills, Ellsworth, ME 04605 or call collect 207-667-7706.

MINT TL-922A w/10 meter $1000, IC720A w/power supply $1,000, TR9130 w/PL $425, FTV 901R $275, HX30 $75, IC22S $125, or b/o on all equipment W9HRQ 1-414-375-3660 1-414-481-8047.

VIC-20 CW send and receive package. Software easily customized to your station needs. Interface works with any radio ever made. Automatic speed sense on receive. Transmits between 5 and 30 wpm. Eight memory messages on transmit. No memory expansion required. Inteface completely assembled and tested. $49.95 plus $2 shipping and handling. SASE brings information. WB5URY; RAM-SOFT 6363 Beverly Hill #166; Houston, TX 77057.

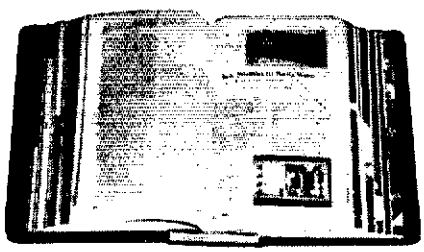
HALLICRAFTERS SX-101, $100. Drake TR-3 and RV-3 remote VFO, both for $225. National NC-300 receiver, $25. Uship. Jim, WB9IHH, days 203-666-1541; nights 203-666-4035.

WAVEMASTER™ - Complete and assembled multiband antenna. "Highest quality technology" 80-10M, 2kWPEP, 2-trap dipole, 110 feet. Includes balun, 90 feet Mini RG-8, connectors, Nylon guy rope and 90-day warranty. Only $79.95 postpaid. HAWK Technical Products, P.O. Box 36384, Denver, CO 80236.

MADISON Summer: AEA CP1 $189; Interface $139: MFJ interface $79.95; Kantronics software - stock; Nye MB-V deluxe tuner $435; FT208RA $269; TR2500 - call; IC2AT $219; Santec ST144uP, free DC cord $279; Kenwood VFO700S $50; BC5 (TR2400) $20; VIC20 software $45; Hamtexts Kantronics $89; T199 $89; other software-20% list (limited); Icom IC740 $969, free AC; New IC751,271 - call; Yaesu FT77 $539; FT102 $999; FV901DM $150; FT1, accessories $2300; FT980 - call; new Icom IC701 $600; books - special orders - 1981 DX Callbooks $5; 1982 US-DX $9 ea; call Saturdays interface questions. Madison Electronics Supply, 1508 McKinney, Houston, TX 77010. 1-713-658-0268. 1-800-231-3057 (orders). Mastercard/VISA.

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.



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.

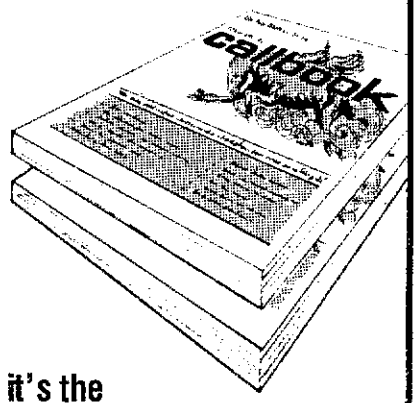
AMERICAN RADIO RELAY LEAGUE
225 Main Street
Newington, CT 06111

FREE
THE GREAT ELECTRONIC THINGS & IDEAS BOOK!
HUNDREDS OF UNUSUAL PARTS, GADGETS & IDEA ITEMS, UNAVAILABLE IN STORES OR CATALOGS ANYWHERE! Bargain prices on everything! New items in every issue! Rush postcard for your copy!
ETCO ELECTRONICS
Dept. 320
Plattsburgh, N.Y. 12901

Radio World
800-448-9338
Introducing
REPEATA-MATE RM-1
Create Your Own Repeater For Special Events or Emergencies. Two Mobile Rigs Plus an RM-1 makes a Super, Fast Repeater.
INTRODUCTORY PRICE **$39.95** (plus $2.00 shpg.)
RM-1
To Order or For More Information, Call or Write:
ONEIDA COUNTY AIRPORT TERMINAL BUILDING
ORISKANY, NEW YORK 13424
N.Y. Res. Call (315) 736-0184

When it comes to

QSL's...



it's the
ONLY BOOK!
US or Foreign Listings

1983 callbooks

Here they are! The latest editions of the world-famous Radio Amateur Callbook are available now. The U.S. edition features over 400,000 listings, with over 75,000 changes from last year. The Foreign edition has over 370,000 listings, over 50,000 changes. Each book lists calls and the address information you need to send QSL's. Special features include call changes, census of amateur licenses, world-wide QSL bureaus, prefixes of the world, international postal rates, and much more. Place you order for the new 1983 Radio Amateur Callbooks, available now.

	Each	Shipping	Total
☐ US Callbook	$19.95	$3.05	$23.00
☐ Foreign Callbook	$18.95	$3.05	$22.00

Order both books at the same time for $41.95 including shipping.

Order from your dealer or directly from the publisher. All direct orders add shipping charge. Foreign residents add $4.55 for shipping. Illinois residents add 5% sales tax.

SPECIAL OFFER!
Amateur Radio Emblem Patch
only $2.50 postpaid

Pegasus on blue field, red lettering. 3" wide x 3" high. Great on Jackets and caps.

ORDER TODAY!

RADIO AMATEUR callbook INC.
Dept. A
925 Sherwood Drive
Lake Bluff, IL 60044, USA

Dan's Got It All!

KENWOOD TR2500

ICOM

IC-730

YAESU, TENTEC, DRAKE
ICOM, KENWOOD!

1-800-241-2027

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

Master Morse Code in Days

Discover Code Quick

the amazing breakthrough which trades the frustration of conventional code methods for the thrill of virtual overnight success. Instead of a confusing maze of dits and dahs, each letter will begin to call out it's *own* name — like magic! Your rapid growth will surprise everyone.

Join the nearly 1000 delighted Code Quick users. Don't delay any longer. Send $39.95 for 5 power packed cassettes, visual impact cards and original guide in a beautiful vinyl case. Completion qualifies you for free upgrade bonus! EVEN IF YOU TRIED OTHER COURSES WITHOUT THE SUCCESS YOU WANT — CODE QUICK WILL BE THE LAST STUDY KIT YOU WILL EVER NEED TO BUY. **Complete money-back guaranteed!**
Full cash refund, if you do not master code much faster than you dreamt possible!

Order Today or Free Details from —
Wheeler Applied Research Lab
P.O. Box 3261
City of Industry, CA 91744
Always shipped in 24 hours. Calif. add 6% sales tax

ADVERTISING DEPARTMENT STAFF

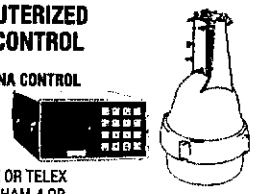
Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Jean Marhefka, Advertising Assistant

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!

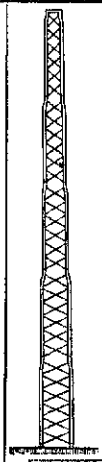
TELEX hy-gain

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!



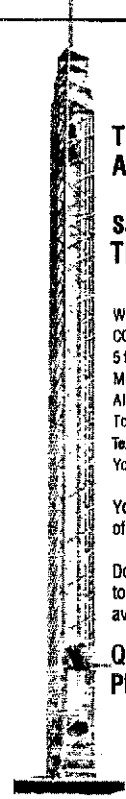
UNARCO-ROHN Self Supporting Towers — On Sale!

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	259	24	283
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	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429



Tri-Ex®

TRI-EX/MOSLEY/ALLIANCE Antenna System SPECIAL!

Save $44 on this Super Offer from TRI-EX and TEXAS TOWERS

W-51 Tower, Tri-Ex's most popular . . . reg. list $998
CO-3 Coax arm kit (set of 3) . . . reg. list $33
5 ft. 2 in. dia. Heavy-Duty Mast . . . reg. list $30
Mosley TA-33 3-el Triband Beam . . . reg. list $303
Alliance HD-73 Antenna Rotor . . . reg. list $155
Total package list price . . . $1519
Texas Towers Special Promotional Discount less $400
Your Total Cost for this Complete System . . . $1119

You can substitute any other antenna or rotor of your choice at comparable savings.

Don't miss out on this Fantastic Opportunity to own one of the Finest Antenna Systems available.

Quantities are limited. **Please Hurry!**

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

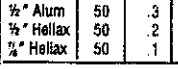
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss Foam Dielectric
- Non-contaminating Vinyl Jacket

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Impad.	10MHz	30MHz	50MHz	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
½" 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 ¼mi $30
450 Ohm H.D. Line . $.16/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
G6-144B 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	220B	$75
228FB	$189	418TB	$59	424B	$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 Cushc.aft models in Stock—CALL!

HY-GAIN

The ALL NEW Broadband 3-el Triband Beam Explorer-14, In Stock—$289

30/40-mtr. Add-On-Kit . . . Call for price
V2S 2-mtr Base Vertical . . . $39
TH5MK2S Broad Band 5-el Triband Beam . . . $319
TH7DXS 7-el Triband Beam . . . $379
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
28DQ 80/40 mtr Trap Dipole . . . $49
58DQ 80-10 mtr Trap Dipole . . . $99
BN86 80-10 mtr KW Balun W/Coax Seal . . . $19

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

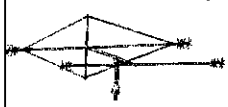
Transi-Trap™ Surge Protectors—In Stock Now!

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

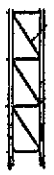
Alliance HD73 (10.7 sq ft rating) . . . $99
Alliance U100 (for small beams & elevation) . . . $49
Telex HAM 4 (15 sq ft rating) . . . $199
Telex Tailtwister (20 sq ft rating) . . . $249
Telex HDR300 Heavy Duty (25 sq ft rating) . . . $439

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	26.4 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 (3990 lb rating) . . . $.12/ft
1/4 "EHS Guywire (6000 lb rating) . . . $.15/ft
5/32 " 7 × 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
5000 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) . . . $.69/ft
9901LD Cable End (for 2100/4000 cable) . . . $4.95
9902LD Cable End (for 6700 cable) . . . $6.95
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 RF DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

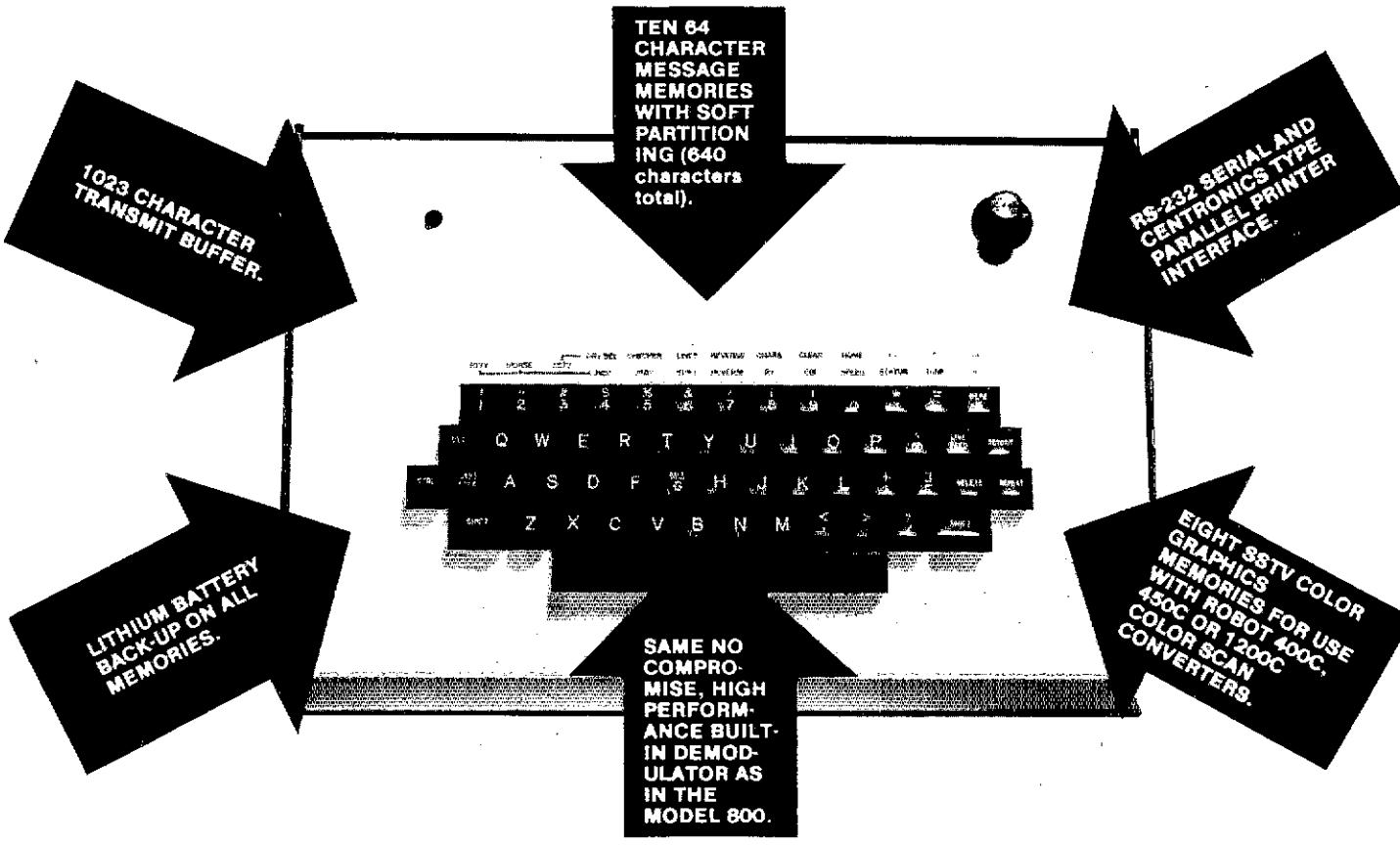
ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri.: 8:30 a.m. - 5:30 p.m. Sat. 9 a.m. - 1 p.m.

TELEPHONE: (214) 422-7306

MasterCard VISA

THE NEW ROBOT MODEL 800C SUPER TERMINAL!



The new Model 800C offers the same fine quality construction, high performance, and outstanding features as the popular Model 800, plus the many new operating features shown above. It is a complete specialty mode communications terminal offering unmatched ease of operation. The 800C is designed expressly for amateur radio and nothing else! By focusing our attention on this simple concept we are able to provide a product that works better, costs less and is easier to operate than systems that try to do "everything" and do nothing very well.

OUTSTANDING BUILT-IN DEMODULATOR

The Model 800C has the same high quality demodulator acclaimed by thousands of users of the Robot Model 800 in daily use world wide, with its ability to copy those weak signals that you usually give up on. The demodulator employs separate active two-tone discriminator filters for optimum demodulation of RTTY signals. It is available with the IARU standard "low tone" frequencies or "high tones" for use on VHF-FM.

BAUDOT/ASCII OPERATION

Split screen display. Autostart. Programmable WRU and SELCAL. On-screen status line and tuning indicator. Programmable narrow shift CW ID.

MORSE CODE OPERATION

Autotrack on receive. Side tone oscillator. Morse code trainer. On-screen speed indication.

SSTV OPERATION

Full color SSTV graphics capability when used with Robot's new color scan converters plus stand alone black and white SSTV graphics transmission. Eight color graphics memories available for CQ, QTH and special messages.*

ATTENTION ROBOT MODEL 800 OWNERS: All of the "new" features found in the Model 800C are available by adding the Model 800C Update Kit to your unit. All necessary parts and hardware are included for an easy single evening installation.

For complete information on all the Robot 800C's features write for literature or visit your Robot dealer.

*The Model 800C does not receive SSTV pictures. A scan converter is necessary for this.

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court • San Diego, CA 92111 • (619) 279-9430

World Leaders in SSTV, Phone Line TV and Image Processing Systems.

YAESU FT-726R TRIBANDER

NEW GALAXIES OF PERFORMANCE ON VHF AND UHF

FULL DUPLEX!!

ATELLITES!! SCATTER!!

M!! EME!!

The New Yaesu FT-726R Tribander is the world's first multiband, multimode Amateur transceiver capable of full duplex operation. Whether you're interested in OSCAR, moonbounce, or terrestrial repeaters, you owe yourself a look at this one-of-a-kind technological wonder!

Multiband Capability
Factory equipped for 2 meter operation, the FT-726R is a three-band unit capable of operation on 10 meters, 6 meters, and/or two segments of the 70 cm band (430-440 or 440-450 MHz), using optional modules. The appropriate repeater shift is automatically programmed for each module. Other bands pending.

Advanced Microprocessor Control
Powered by an 8-bit Central Processing Unit, the ten-channel memory of the FT-726R stores both frequency and mode, with pushbutton transfer capability to either of two VFO registers. The synthesized VFO tunes in 20 Hz steps on SSB/CW, with selectable steps on FM. Scanning of the band or memories is provided.

Full Duplex Option
The optional SU-726 module provides a second, parallel IF strip, thereby allowing full duplex crossband satellite work. Either the transmit or receive frequency may be varied during transmission, for quick zero-beat on another station or for tracking Doppler shift.

High Performance Features
Borrowing heavily from Yaesu's HF transceiver experience, the FT-726R comes equipped with a speech processor, variable receiver bandwidth, IF shift, all-mode squelch, receiver audio tone control, and an IF noise blanker. When the optional XF-455MC CW filter is installed, CW Wide/Narrow selection is provided. Convenient rear panel connections allow quick interface to your station audio, linear amplifier, and control lines.

Leading the way into the space age of Ham communications, Yaesu's FT-726R is the first VHF/UHF base station built around modern-day requirements. If you're tired of piecing together converters, transmitter strips, and relays, ask your Authorized Yaesu Dealer for a demonstration of the exciting new FT-726R, the rig that will expand your DX horizons!

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

483

YAESU ELECTRONICS CORPORATION 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU CINCINNATI SERVICE CENTER 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100

One size fits all...

NEW

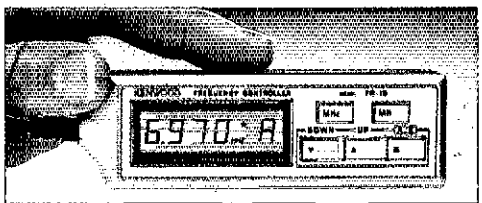
Ultra-compact and lightweight, priority, memory and band scan, 25 watts...

TM-201A

The KENWOOD TM-201A 2-meter FM mobile transceiver is designed to be the ultimate in compact size and lightweight, allowing maximum flexibility in automotive installations. New microprocessor controlled operating features, improved receive and transmit circuitry, a powerful 25 watts of RF output, and an easy-to-operate front panel control layout are packed into this new, ultra-compact radio, providing extended flexibility and ease of operation. The complete TM-201A system is supplied with a high quality external speaker, and a 16-key autopatch UP/DOWN microphone.

TM-201A FEATURES:

- **Ultra compact and lightweight**
  Measures 5.6 (141)W x 1.6 (39.5)H x 7.2 (183)D, inch(mm), weighs 2.8 lbs., (1.25 kg.).
- **25-watt output, with HI/LO power switch**
  Produces a powerful 25 watts RF output from a surprisingly compact design.
- **Dual digital VFO's built-in**
  Covers 142.000 to 149.000 MHz in 5-kHz steps, includes certain MARS and CAP frequencies. A "MHz" key shifts the frequency in 1-MHz steps.
- **5 memories plus "COM" channel, with lithium battery back-up (est. 5 yr. life)**
  Memories 4, 5, and the COM (common) channel store transmit and receive frequencies independently, for either odd or standard repeater offsets. COM channel switch for instant recall of frequency and tone (with optional TU-3 tone encoder).
- **Priority alert scan**
  With ALERT switch "ON," once every 6 seconds the unit scans back to memory channel 1 for approximately 0.3 seconds to monitor the activity on the priority channel (channel 1). A dual "beep" will sound if a signal is present on memory 1.
- **Memory scan/programmable band scan**
  Scan skips memories in which no data is stored. UP/DOWN switch on microphone initiates band scan in appropriate direction. Memory 5, set band scan limits. Scanning stops on busy channel, resumes after 6 seconds or when the signal ceases. Scan delay prevents scan resume if signal fades or is momentarily interrupted.
- **Highly visible yellow LED frequency display**
  The MHz decimal blinks while scanning, and the kHz decimal lights when VFO-B is in use. S/RF LED bar meter with "BUSY" indicator, "MR" (memory recall), "ALERT," and "ON AIR" LEDs.
- **High performance receive/transmit**
  GaAs FET RF amplifier for high sensitivity with wide dynamic range. Transmit modulation characteristics selected for best sound and minimum distortion.
- **External high quality speaker supplied**
  (No internal speaker)
- **16-key autopatch UP/DOWN microphone**
- **Repeater offset switch (±600-kHz or simplex) and reverse switch**
- **Audible "BEEPER" confirms operation**
- **Easy-to-install mobile mount**



Optional FC-10 frequency controller
May be easily connected to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green, easy-to-read, back-lighted LCD display indicates transmit/receive frequencies, memory-channel number, ALERT, and SCAN (with blinking MHz decimal). Size: 4.4 (112)W x 1.4 (35)H x 0.9 (22)D, inch(mm). Weight: 3.5 oz. (100 g).

Other optional accessories:

- **TU-3** programmable two frequency tone encoder
- **KPS-7A** fixed station power supply

More information on the TM-201A and TM-401A is available from authorized dealers of Trio-Kenwood Communications 1111 West Walnut St., Compton, CA 90220.

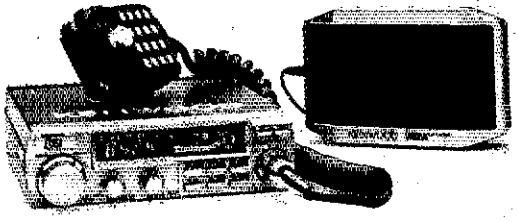
KENWOOD

pacesetter in amateur radio

TM-401A

70-cm FM ultra compact mobile transceiver

- **Dual digital VFO's covering 440-450 MHz**
  Covers 10-MHz of 70-cm FM band in 25-kHz steps. MHz key for 1-MHz step.
- **Repeater offset switch, plus reverse switch**
  ±5 MHz or simplex. Odd offset with memories 4, 5, and COM channel.
- **HI/LOW RF output power switch**
  Selects 12 watts or 1 watt
- **Virtually same size and weight as TM-201A**
- **Other features similar to TM-201A**
  The complete TM-401A system is supplied with a high quality external speaker and a 16-key autopatch UP/DOWN microphone. Features five memories plus COM channel with lithium battery back-up, priority alert scan, memory and band scan. Optional FC-10 frequency controller and TU-3 two frequency tone encoder available.



Specifications and prices are subject to change without notice or obligation.

TM-401A subject to FCC approval