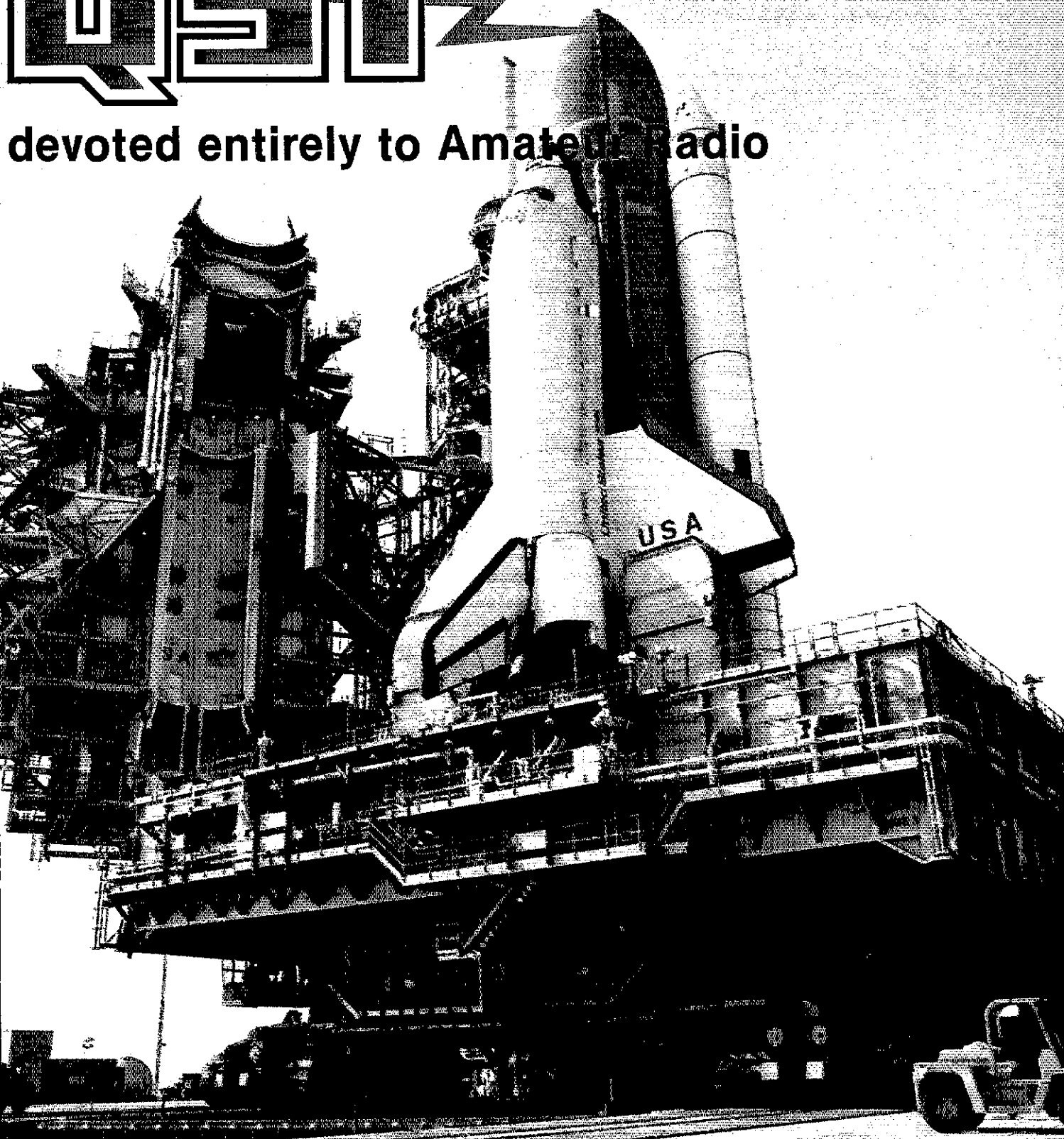
November 1983 $2.50

QST

devoted entirely to Amateur Radio



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

The Space Shuttle *Columbia* rollout
Are you ready for STS-9?

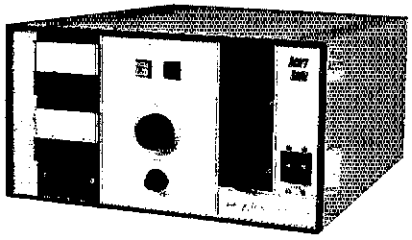
Henry has the amplifier you want!

Take your choice. The world famous 2K Desk Classic, 2K Console Classic and 3K Console Classic HF amplifiers speak for themselves. Now to complete your range of choice, the superb new 1002-A and 2002-A for 146 MHz and the 1004-A and 2004-A for 440 MHz.

Now a veritable cornucopia of superb amplifiers. Just make your choice!

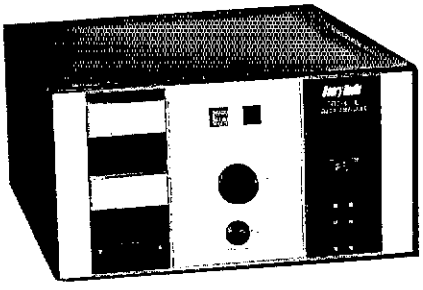
2K Classic...the culmination of more than fifteen years of developing the 2K series into the world famous line that sets the standards for top quality HF linears. A true "workhorse"; built to loaf along at full legal power, trouble free, for years of hard service. Operates on all amateur bands, 80 through 15 meters (export models include 10 meter).

2K Classic "X"...We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged...durable...the last amplifier you may ever need to buy.



2KD Classic...a desk model designed to operate at 2000 watts effortlessly, using two Eimac 3-500 Z glass envelope triodes, a Pi-L plate circuit and a rotary silver plated tank coil. We challenge you to find a better desk model for even a thousand dollars more.

3K Classic...uses the superb Eimac 8877 tube. More than 13db gain. We believe the 3K to be the finest amateur linear available anywhere...the amplifier of every amateur's dreams.



2002-A...a bright new rework of our popular 2002 2 meter amplifier. Uses the new Eimac 3CX800A7. The RF chassis uses a ¼ wave length strip line design for extremely reliable approach. It provides 2000 watts input for SSB and 1000 watts input for CW. Because this tube is rated at an unheard of 15dB gain, only about 25 watts drive is required for full output.

2004-A is identical to the 2002A except that it is set up for the 430 to 450 MHz band. This amplifier will use a ½ wave strip line and offer all of the same specifications as the 2002A. This will replace our limited production 2004.

1002-A A 2 meter amplifier with the same design as the 2002A, except using one 8874 tube for ½ power specifications. Rated at 600 watts PEP output and 300 watts continuous carrier output. It employs the same strip line design as the 2002A.

1004-A...a half-power version of the 2004A. Will cover the 430 to 450 MHz band using a ½ wave strip line design.

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

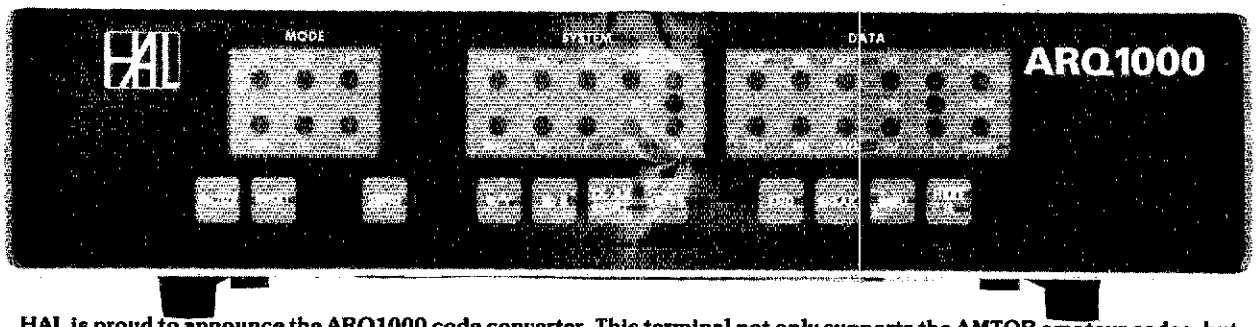
We stock these plus many other fine names:
AEA • ARCO • ASTRON • B & K • BIRD • COLLINS • CONNECT-SYSTEMS • CUSHCRAFT • DRAKE • EIMAC • HAL • HUSTLER • HY-GRAIN • ICOM • KENWOOD • LARSEN • NYE • ROBOT • YAESU

Henry Radio

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

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

AMTOR RTTY

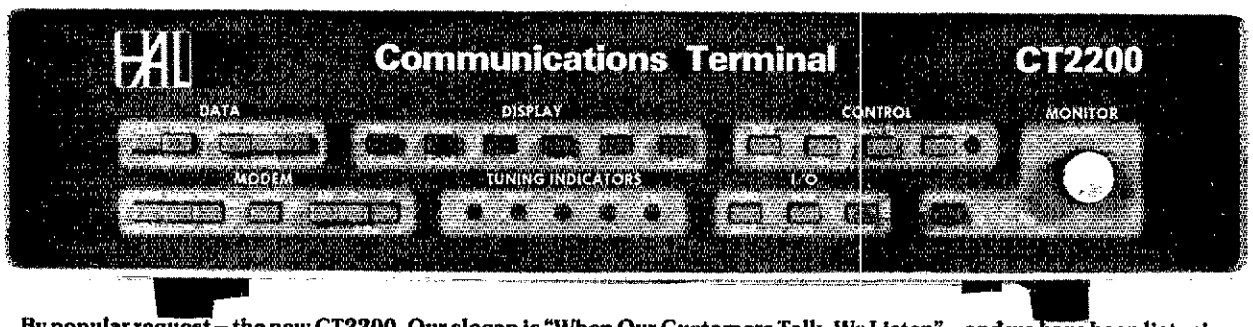


HAL is proud to announce the ARQ1000 code converter. This terminal not only supports the AMTOR amateur codes, but meets ALL of the commercial requirements of CCIR Recommendation 476-2. The ARQ1000 can be used with present and previous generation HAL RTTY products. In fact, any Baudot or ASCII full duplex 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

ICOM's IC-02A

Digital Readout, Scanning, Memories and...

ICOM introduces the new top-of-the-line IC-02A and IC-02AT to compliment its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-02A is a full-featured 2 meter handheld.

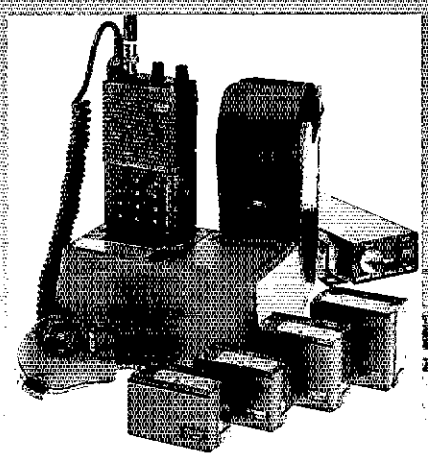
Some of its many features are: Scanning, 10 memories, duplex offset storage in memory, odd offsets, 32 keyboard selectable PL tones which store in memory, and internal lithium battery backup.

Keyboard entry through the 16 button pad allows easy access of frequencies, duplex, memories, memory scan, priority, dial lock, PL tones and DTMF in the IC-02AT.

An easy-to-read custom LED readout indicates frequency, memory channel, signal strength and transmitter output, PL tone, and scanning functions.

The new IC-02A has a battery lock, frequency lock, and lamp on/off switch. An aluminum case back is provided for superior heat sinking when the IC-02A is run at the standard 3 watt level or 5 watts (optional battery pack).

A variety of batteries will be available for the IC-02A including new long-life 8.4 volt and 13.2 volt packs. Charging may be done from a top panel connector for 13.8 volts which will also power transceiver operation.



ICOM's IC-2A(T) continues to be available...and its complete line of accessories work with the new IC-02A.

The IC-02A comes standard with BP3 NiCd battery pack, BC25U wall charger, flexible antenna, wrist strap and belt clip.

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

November 1983 *Volume LXVII Number 11*

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

Offices

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

Member of the Audit Bureau of Circulations

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

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

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

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No.: 21-9421. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

CONTENTS

OUR COVER

The Space Shuttle *Columbia* takes a final earthbound ride to the launch pad before it carries our first Ham in Space — W5LFL. For the latest STS-9 flight information, call 203-666-0688. *(photo courtesy NASA)*

TECHNICAL

BASIC RADIO

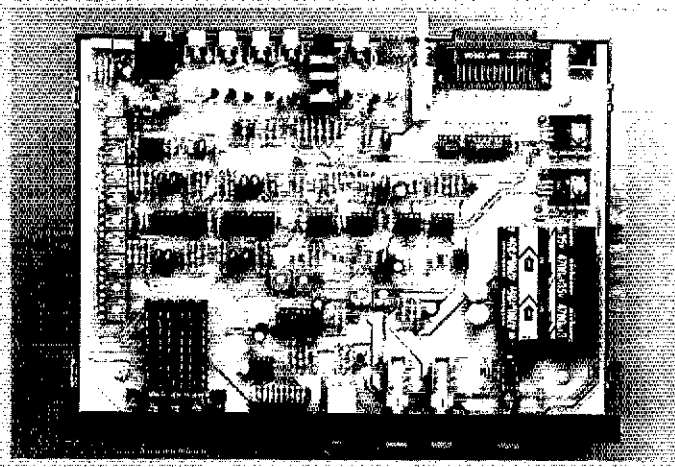
BEGINNER'S BENCH

NEWS AND FEATURES

OPERATING

DEPARTMENTS

CHAMPAGNE RTTY/CW on a Beer Budget



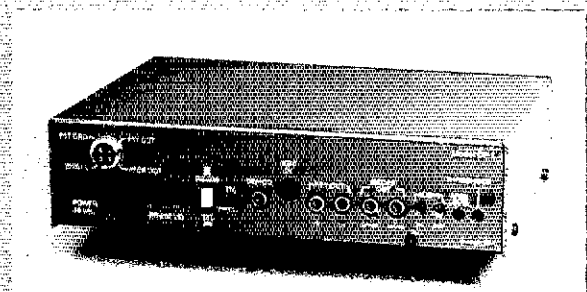
CP-1 Computer Patch™ Interface

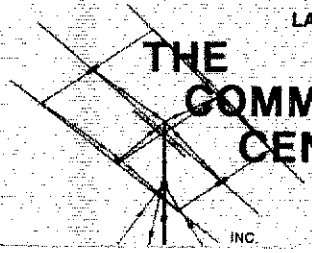
The AEA Model CP-1 Computer Patch™ interface will let you discover the fastest growing segment of Amateur Radio: computerized RTTY and CW operation.

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.





LAUREL PLAZA—RTE. 198
LAUREL, MD. 20707
301-792-7373

CALL TOLL FREE
800-638-4486

AEA

Brings you the Breakthrough!

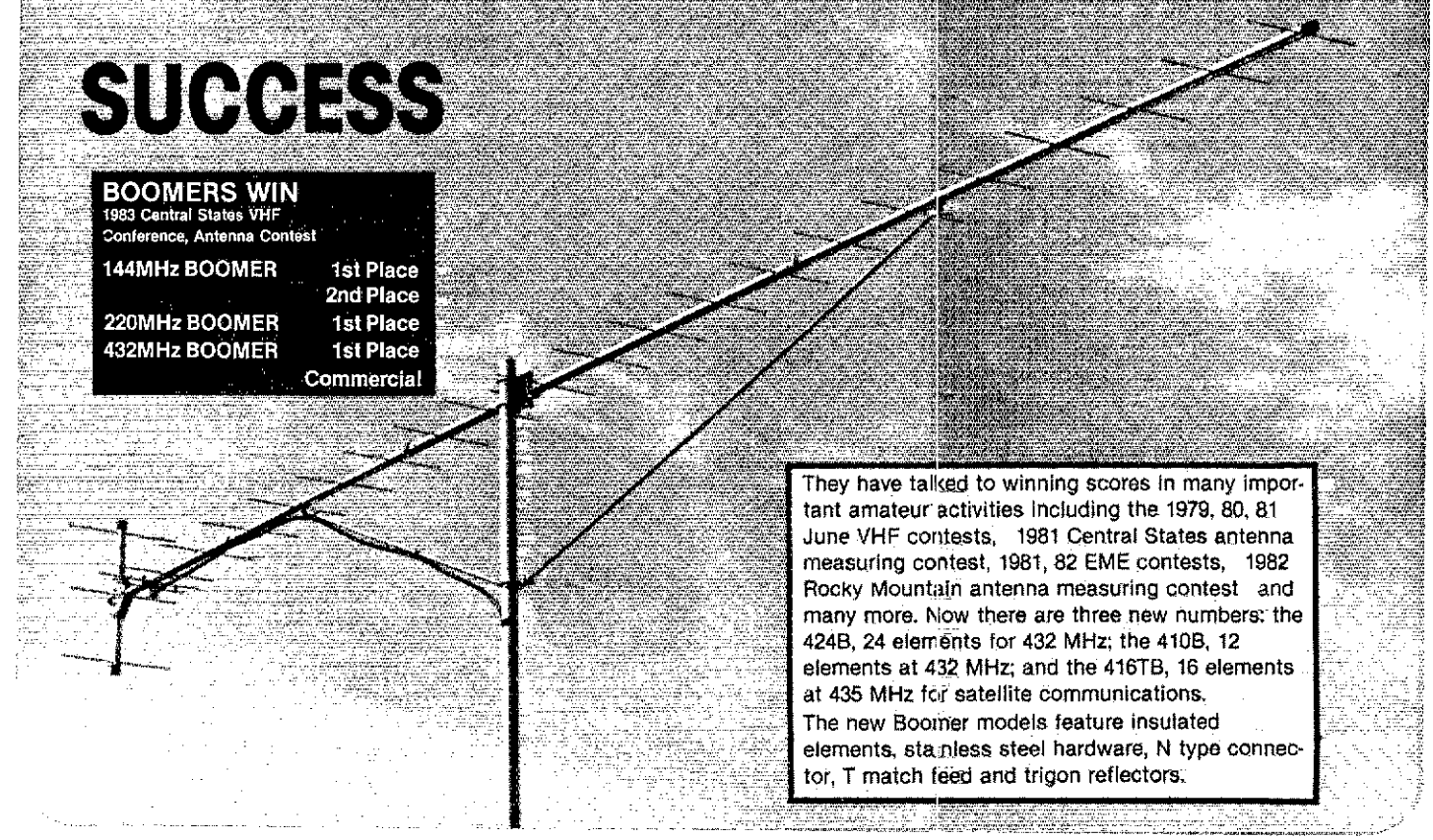
Our numbers talk

424B

SUCCESS

BOOMERS WIN
1983 Central States VHF Conference, Antenna Contest

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



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

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.

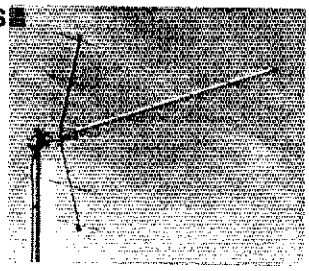
416TB:

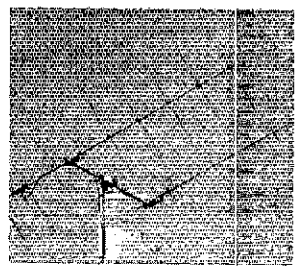
428-438 MHz, Circular Polarization 2.2λ gain *maximized, F/B *excellent, beamwidth 34°, length 6.7 ft. 2.03 m.

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

*estimated average retail price
*Gain and F/B ratio cannot be published in QST. They are included in Cushcraft specification sheets and other publications.





OSCAR BOOMERS

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

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

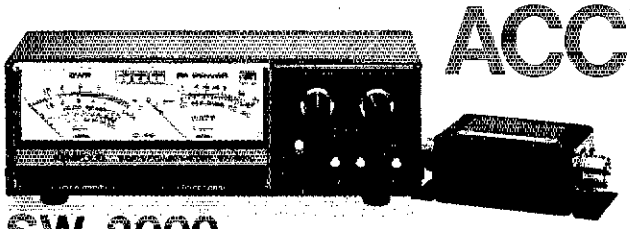
A LEADER FOR OVER 30 YEARS

cushcraft CORPORATION

THE ANTENNA COMPANY
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108 USA

TELEX: 953050
CUSHSIG

ACCESSORIES

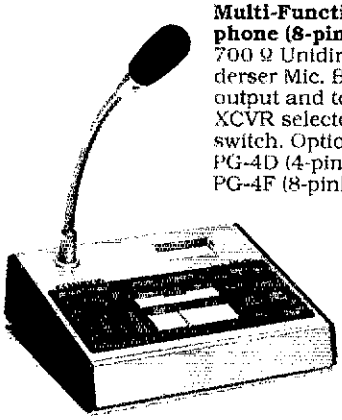


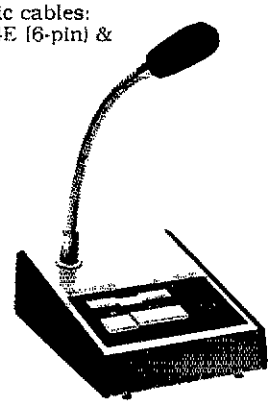
SW-2000

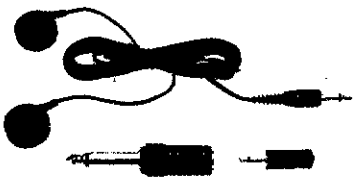
160~6-m 2 KW SWR/PEP-POWER Meter
Up to 3 separate directional couplers may be connected. (One SWC-3 is supplied.) Optional couplers: SWC-2 (2-m/70-cm, 200 W) & SWC-3 (160~6-m, 2 KW).

MC-85

Multi-Function Desk Top Microphone (8-pin)
700 Ω Unidirectional Electret Conderser Mic. Built-in mic-amp with output and tone control, meter, XCVR selector and UP/DOWN switch. Optional mic cables: PG-4D (4-pin), PG-4E (6-pin) & PG-4F (8-pin).

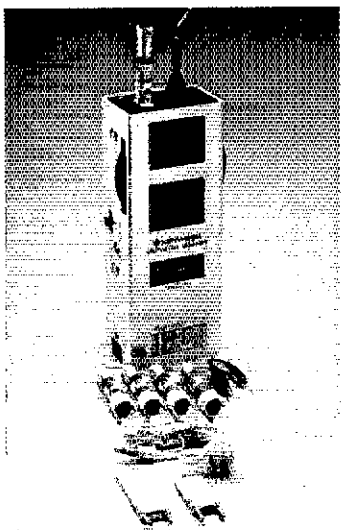






HS-7

Micro Headphones (16 Ω)
Ultra light weight and portable ear-fitting headphones supplied with two audio adaptor plugs.

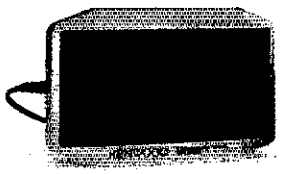


DM-81

700 kHz-250 MHz Dip Meter
All solid-state and built-in battery.

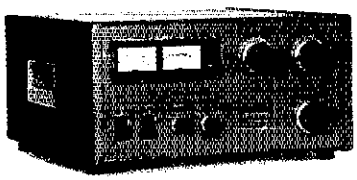
MC-80

Desk Top UP/DOWN Microphone (8-pin)
700 Ω Unidirectional Electret Conderser Mic. with "FLEX" type boom. Built-in mic-amp and UP/DOWN switch. Optional mic plug adaptors: MJ-84 (8p-4p) & MJ-86 (8p-6p).



SP-50

High Quality External Mobile Speaker

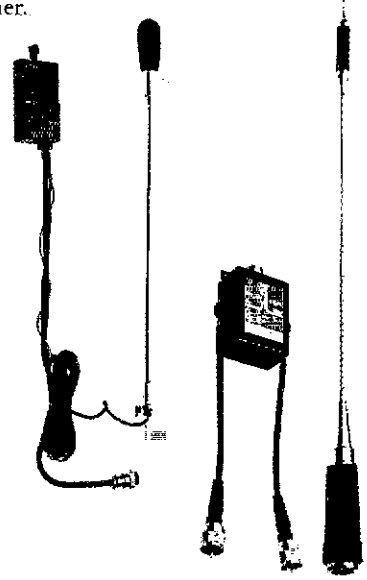


TL-922A

160~15-m 2 KW PEP/1 KW DC Input Linear Amplifier
Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

MC-55 (8P/6P)

Mobile Microphone (8-pin or 6-pin)
700 Ω Electret Conderser Mic. with flexible boom, and separate STAND-BY box built-in UP/DOWN switch and 5 minute Time-Out-Timer.

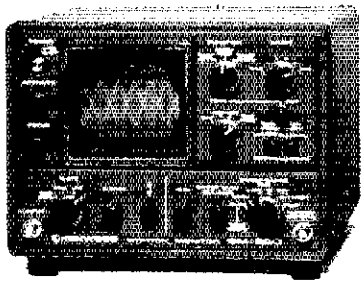


MA-4000

2-m/70-cm Dual-Band Mobile Antenna
5/8λ dB gain for 2-m and stacked 5/8 λ dB gain for 70-cm. Duplexer is supplied.

PC-1A

Phone Patch (FCC Part 68 registered)



SM-220

Station Monitor/High-Performance Oscilloscope
Pan-display capability with optional BS-8 (for TS-830S/820S/180S) or BS-5 (for TS-520 series). Transmitted waveforms and/or receiving signal waveform monitor. Built-in 2-tone generator.

SW-100A/B

A: 160-m~2-m. B: 2-m ~70-cm. 150 W SWR/POWER/VOLT Mete
Compact design with separate coupler, ideal for mobile use. Built-in 0-20-V volt meter.

MICROPHONES:
- **MC-60A** Deluxe desk top microphone with UP/DOWN switch. (8-pin) Pre-amplifier. 500/900 Ω
- **MC-60N4** Deluxe desk top microphone (pre-amp. not included). (4-pin) 50 k/500 Ω
- **MC-50** Desk top microphone, 50 k/500 Ω (4-pin)
- **MC-48** 16-key autopatch UP/DOWN microphone. (8-pin)
- **MC-46** 16-key autopatch UP/DOWN microphone. (6-pin)
- **MC-42S** Hand microphone with UP/DOWN switch. (8-pin)
- **MC-35S** Noise-cancelling hand microphone, 50 k Ω (4-pin)
- **MC-30S** Noice-cancelling hand microphone, 500 Ω (4-pin)

MICROPHONE CABLES:
- **PG-4A/4B/4C** For MC-60A/60N4. PG-4A(4-pin)/4B(6-pin)/4C(8-pin)
- **PG-4D/4E/4F** For MC-85. PG-4D (4-pin)/4E(6-pin)/4F(8-pin)

MICROPHONE PLUG ADAPTORS:
- **MJ-48** (4-pin mic to 8-pin XCVR)
- **MJ-84** (8-pin to 4-pin)
- **MJ-86** (8-pin to 6-pin)

HEADPHONES:
- **HS-6** Lightweight headphones
- **HS-5** Deluxe headphones
- **HS-4** Standard headphones

GENERAL PURPOSE AC POWER SUPPLIES:
- **KPS-7A** 13.8 VDC, 7.5A intermittent
- **KPS-12** 13.8 VDC, 12A intermittent
- **KPS-21** 13.8 VDC, 21A intermittent

ANTENNAS:
- **RA-3** 2 m 3/8 λ Telescoping antenna with BNC connector
- **RA-5** 2-m 1/4λ/70-cm 5/8 λ Telescoping dual-band antenna with BNC connector

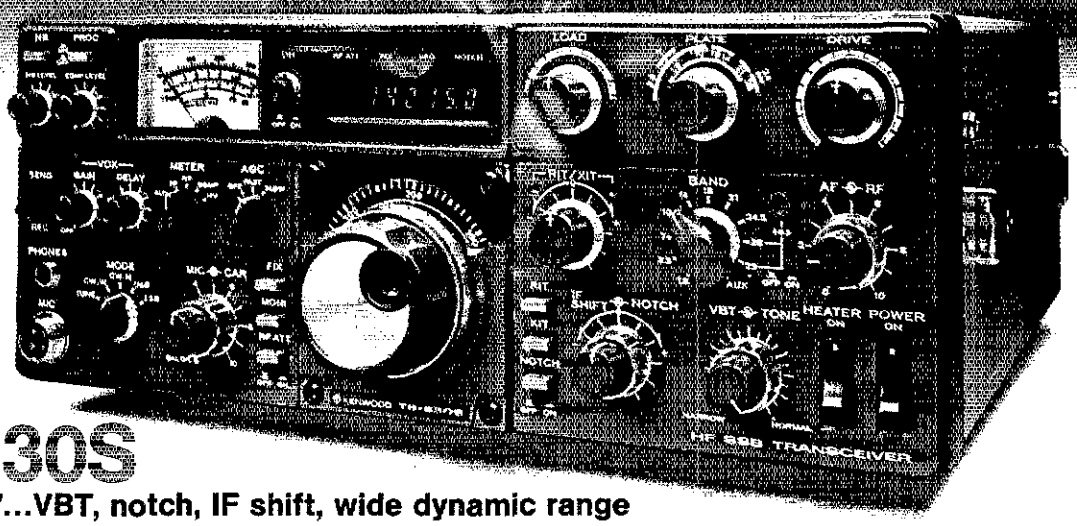
Other accessories:
- **RD-20** Dummy load, 50 Ω, DC-500 MHz, 50 W intermittent
- **SP-40** Compact external mobile speaker
- **AL-2** Lightning & static protector, 50 Ω 1 KW output
- **PG-3A** DC line noise filter for mobile

SERVICE MANUALS:
- Available for most transceivers, receivers, and major accessories

NOTE: Prices and specifications of all Trio-Kenwood products are subject to change without prior notice or obligation.

KENWOOD

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



TS-830S

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

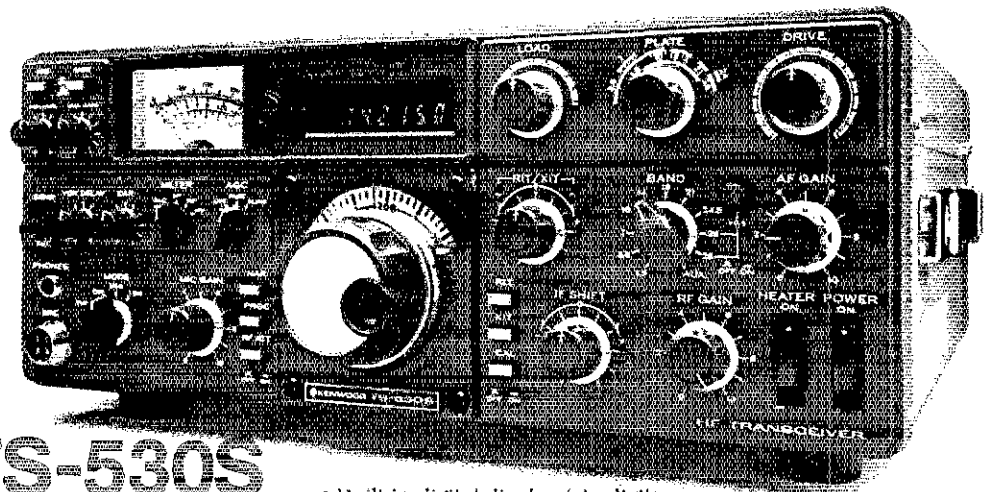
The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF.

TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- Wide receiver dynamic range, Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Noise-blanker threshold level control.
- Built-in digital display, (fluorescent tube), with analog dial.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- SP-230 external speaker.
- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.



TS-530S

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

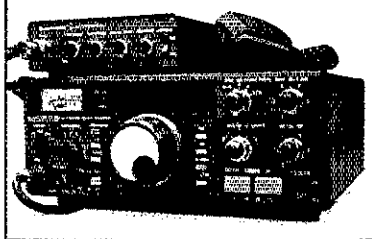
The TS-530S SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530S FEATURES:

- 160-10 meters, LSB, USB, CW, all amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- IF shift tunes out interfering signals.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.



TS-660

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

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

Optional accessories:

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

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

Directors

Canada

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

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

Atlantic Division

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

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

Central Division

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

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

Dakota Division

TOD OLSON, 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 Maiden 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 Quat, 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: Fried 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.

Canada

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 R0A X0 (204-355-4521)
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 J0H 1Y0 (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	Richard Baier, WA2HEB, 1226 Audubon Dr., Toms River, NJ 08753 (201-270-9292)
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 234, 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	Clevis 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 Darsey, AL7AC, SR Box 80660, Fairbanks 99701
Idaho	Dennis L. Hall, KK7X, 2415 Government Way, 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 (801-588-9859)
Pacific	R. A. "Army" Curtis, AH6P, P.O. Box 4271, Hilo, HI 96720 (808-959-8985)
Sacramento Valley	Ron Menet, N6AUB, P.O. Box 244, Cedar Ridge, CA 95924 (916-272-4873)
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	Joseph E. Smith, Jr., WA4RNP, 1211 13th St., N., Bessemer 35020
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, 2208 Elk Dr., N.E., Piedmont 73078 (405-373-3219)
Southern Texas	Arthur R. Ross, W5KR, 132 Sally La., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111, USA. Telephone: 203-666-1541, Telex: 643958 AMRAD NEWI.

"It Seems to Us..."

Gear That's Not Too Dear

"You guys really take the cake. You talk about how we need more young people in Amateur Radio, and how it's a worthwhile and rewarding pastime for kids — how it can lead to a successful career. But the price tags on that fancy equipment in the *QST* ads are enough to make a regular wage earner blanch, let alone a kid whose most valuable asset is a bicycle that probably came from Mom and Dad. If you think there's a place in ham radio for a youngster whose parents aren't well-heeled and inclined to buy expensive gadgets for their offspring, or who doesn't already have a ham in the family, take another look at the evidence in the back of your own magazine."

True? Some of our correspondents, and some members we've talked to at hamfests and conventions, seem to think so. And the comment does have some superficial validity: A lot of the gear that's advertised in *QST is* expensive. But, hasn't it always been that way? When *we* started out, be it 5, 10, 20 or 50 years ago, how many of *us* went out and bought top-of-the-line gear in factory-fresh cartons? The answer is, darned few. We scraped together whatever station we could afford, got on the air and went from there. Maybe we didn't work DXCC the first month, but who cared? Just managing to make a contact, even just across town, was thrill enough.

Even today, thousands of hams get great satisfaction from a total investment of a couple of hundred dollars. Digital readout, memories, instant bandswitching, linear amplifiers, towers, beams and computer interfaces are all nice to have, but are no more necessary for a beginner than is a Maserati for a student driver. Most 16-year-olds will consider themselves lucky to get a secondhand Chevy Nova for their first car — even though you won't see them advertised in *Road and Track.* Why should entry into Amateur Radio be any different?

For some reason it's being *seen* as different, and we — the Amateur Radio community — are going to have to change that. We have to call more attention to the fact that at the receiving end of a radio circuit, it doesn't make the slightest difference how expensive or fancy is the rig at the transmitting end. A watt is a watt, whether it's generated by a rig that's older than the operator or by the latest marvel of solid-state technology. Most of the new features in transmitting equipment add to operator convenience, not to communications effectiveness. And, while receivers have improved a lot in recent years, except in the most difficult or competitive circumstances almost any communications receiver will do pretty well.

In *200 Meters and Down,* Clinton B. DeSoto's classic 1936 history of the early days of Amateur Radio, one of the most inspiring stories is of a 17-year-old in a poverty-stricken family who, in 1920, put together a complete station for phone and cw by building *everything* himself, from bits and pieces discarded by others, right down to the vacuum tubes (he built his own vacuum pump so he could fabricate his own tubes from test tubes and bits of tungsten wire)! DeSoto's comment; "His was the spirit that has made amateur radio." It's probably too much to expect that someone would go this far to get on the air today, but it isn't beyond reason to hope that someone who is truly interested in Amateur Radio would at least be willing to scrounge a "first rig." Some of the most valuable learning experiences can come from one's efforts, however frustrating, to get that first station up and running. On that, this writer (and thousands of others) can speak authoritatively, from experience!

Okay, say you're a brand new Novice with a limited budget. Where should you look for good, inexpensive used gear? A good place to start is the local radio club. Some clubs will arrange a "loaner" rig for a new ham who participates actively in club affairs and who could not otherwise get on the air. If not, some club member may be able to help. Most hams have a couple of old rigs stored away, usually because the rig was thought to be worth more as a backup than as a trade or for resale. Often they will be willing, for a reasonable price, to part with a piece of gear that they wouldn't have bothered to advertise. Let people know that you're looking! Usually, if they see you're enthusiastic, they'll be glad to help you find something. Lots of good, serviceable equipment shows up at flea markets, swap meets, hamfests and club-sponsored auctions, too. The bargains don't last long — plan to get there early! Also, it pays to know something about older gear; a couple of hours spent leafing through old copies of *QST* (every club has at least one member with a 30-year accumulation) will tell you, from the ads and the Product Review (formerly Recent Equipment) columns, what you should be looking for.

One thing we *don't* recommend to the rank beginner is QRP (10 watts or less). Your first antenna is likely to be a simple affair, of a piece of wire and a couple of insulators, and this, combined with a lack of experience, is going to provide enough of a challenge. Once you have some experience under your belt, you may find, as have thousands of others, that you derive more satisfaction when operating within self-imposed power limits than when using the "full gallon." But, get the experience first.

If your budget can stand a bit more, say, $500 or so, you'll find that there are *lots* of good, used transceivers around that are no more than a few years old. The reason is that some of the manufacturers have been introducing new models with more features than the old, at lower prices! This is great for the ham searching for a bargain, but not so good for the resale value of the equipment that's already in someone's shack. There was a time when you could buy a piece of gear and expect it to retain its value for several years; today, this is more the exception than the rule.

Above all, when you're pulling together the bits and pieces for that first station, be willing to learn and *have fun!* Half the joy of a new experience comes from the anticipation, so don't be in too much of a hurry.

Whether it's made with a rig you've scrounged or with one right out of the carton, you'll remember your first contact for the rest of your life — and if you don't believe it, there are about a million hams in the world who will be glad to tell you about theirs! — *David Sumner, K1ZZ*

League Lines...

Late word from NASA! For U.S. stations, STS-9 ham radio operations will be as follows: Dr. Garriott will transmit on 145.55 MHz, with 145.53 or 145.57 as backup. He will listen only to 144.91, 144.93, 144.95, 144.97, 144.99, 145.01, 145.03, 145.05, 145.07 and 145.09 MHz. Remember: These are the U.S. frequencies, and only these frequencies will be monitored. He will not be listening on his transmit frequency. W5LFL will transmit for the 60 seconds of each even minute and will scan the 10 receive channels for the 60 seconds of each odd minute. (Set your clock to WWV.) When calling, say "Columbia W5LFL" only once, followed by your call several times.

Detailed analysis of the STS-9 timeline dictates some changes to the proposed operating schedule. For operation to be possible, Dr. Garriott must be off-duty and awake and the Columbia must be in the right attitude (192 attitude maneuvers are scheduled for STS-9). Here are the orbits that are most probable for operation.

REV (orbit)	Mission Elapsed Time								Area
Ascending									
48	2	days	21	hours	58	minutes to	22 hours	13 minutes	East Coast
49	2		23		27		23	42	East to Mid-U.S.
64	3		21		47		22	02	East Coast
80	4		21		36		21	51	East Coast
96	5		21		25		21	40	East Coast
112	6		21		13		21	28	East Coast
113	6		22		42		22	57	East to Mid-U.S.
129	7		22		29		22	44	East to Mid-U.S.
Descending									
56	3		10		10		10	40	Alaska, West Coast, South America

Remember, these are only the "possible" operating times based on the "nominal" flight plan. Check W1AW bulletins for late news. Other sources of late-breaking news on changes in operating times are W5RRR (28.6, 21.37, 14.28, 7.23 and 3.85 MHz), Electra/Bearcat (1-800-Scanner) and Westlink's Hollywood number (213-465-5550). Good luck!

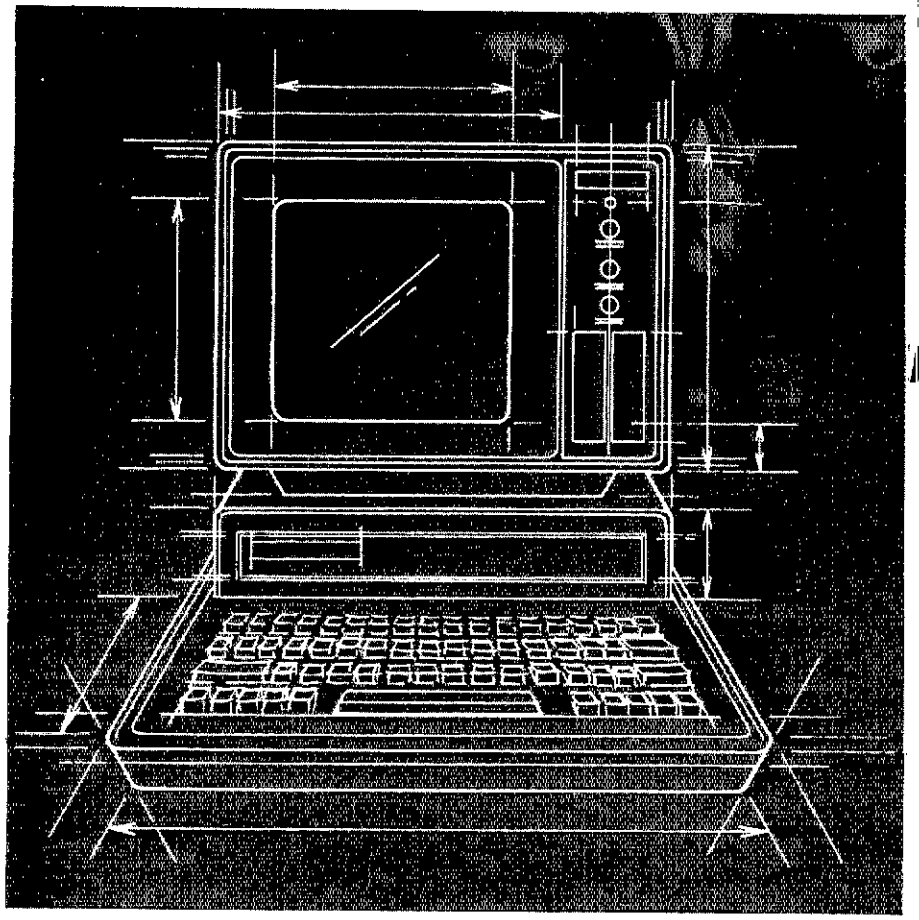
Ham-in-Space Info Line: For more information about the W5LFL/STS-9 flight, call 203-666-0688 anytime for the duration of the mission.

The deadline for submitting footage of hams working STS-9 for inclusion in the second ("timeless") version of the "New Frontiers" videotape is November 17. We need broadcast-quality, 3/4-inch U-matic cassettes. Send the tapes to STS-9, Public Information Office, ARRL Hq. All submissions must be accompanied by a release form from the TV station shooting it.

Plagued by the CATVI bug? Please take a minute to jot down your experience in a note to ARRL Hq. Your input will help us keep tabs on this national problem. We, in turn, will provide materials to support your local efforts. Cable television interference complaints should be submitted to Richard Palm, K1CE, at Hq.

The League will publish a special Antenna Compendium in May 1984. Potential contributors of unpublished papers on any aspect of Amateur Radio antennas are invited to send a one-page, double-spaced abstract to Paul Rinaldo, W4RI, at Hq. Authors will be notified of acceptance and provided preparation guidance. Deadlines are December 2, 1983, for abstracts, and March 15, 1984, for manuscripts.

ARRL is looking for volunteers for its new ARRL Interference Reporting System (AIRS). Please see the article in October QST, pp. 54-55. Write to ARRL Hq. for an application form.



The Personal Computer†

Part 1: Has the desire to acquire a personal computer struck you? Are you baffled by "computerese"? Perhaps the following information will help you avoid making a costly mistake.

The personal computer industry is enjoying a booming business. No matter where you go, talk of computers is bound to come up. There are many who would like to own a personal computer, but feel out of place in a computer store and are baffled by computer lingo. The following information should help you understand a little more about computers.

Buzzwords

The personal computer industry is a spin-off of scientific and industrial efforts spanning four decades. One result of this historical background is a plethora of buzzwords used to describe or explain a computer or peripheral device operation. To converse in the computer world, a vocabulary of "computerese" must be developed. The accompanying computerese mini-dictionary is by no means complete, but should provide you with the basics of computer jargon.

†Adapted from *Personal Computer*, a Combustion Engineering corporate technology newsletter published by the Electronics Technology Applications Center, Combustion Engineering, Inc., 44 South 122 East Ave., Tulsa, OK 74128. The individual articles were written by several C-E employees as an internal newsletter for the benefit of the corporation.

Bit — a unit used to describe the smallest active element in a computer operation. A bit can have one of only two values, 1 or 0. These two binary values can be used to represent logical conditions (1 = true, 0 = false), physical states (1 = on, 0 = off) or actual quantities of 1 and 0.

Byte — a group of eight bits used as a single unit to express a value within a computer operation. Since a single bit can represent two values, 0 and 1, if bits are in groups of eight, they could be used to express numbers as powers of 2. If we line these eight bits up in descending powers of 2 as in Fig. 1A, we can see that if we give each bit a value of 0 that the resultant byte would look like that of Fig. 1B and have a value of 0. This is the minimum value of the byte. If we then replace all the 0 bits with values of 1, then the byte would look like that of Fig. 1C. It would have a value of $2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 255$, which is the largest value of the byte. By altering the proper bits in a byte, values from 0 to 255 can be expressed.

The most common use for the term byte is to express the memory size of a computer. Most personal computers operate on eight-bit values, and thus store quantities in their memory as bytes. Generally, personal computer memories range in size from less than 1024 bytes to as much as 64,512 bytes or more. The term "kilo" is often used to shorten the expression of size to 64 kilobytes or 64 K.[1]

Baud — a unit generally used to express the rate at which data bits are moved in a serial manner. For personal computer use, 1 baud = 1 bit/second. Common signaling rates encountered in personal computing range from 110 to over 19,200 bauds.

BASIC — an acronym for Beginner's All-purpose Symbolic Instruction Code. Perhaps the most common personal-computing programming language, the original BASIC language was developed at Dartmouth to aid in teaching students computer programming. The use of BASIC helps remove the programmer from worrying about how the computer handles the manipulation of bytes and bits at the machine level, and allows the programmer to concentrate on the task to be performed. Virtually all personal computers offer some form of BASIC as their primary programming language. Most of these BASIC implementations are extended or modified versions of the Dartmouth standard version. Programs written in one BASIC

[1]Notes appear on page 14.

dialect can generally be made to run on a different machine with another version of BASIC if special extensions and machine dependent statements are avoided.

BASIC can be self-taught, and many good BASIC programming books are available. As with any programming language, you have to know what you want to do and *how to do it* before BASIC (or any other programming language) can be made to solve problems.

CP/M® — an acronym for Control Program/Microcomputer. This control program was developed by Digital Research Corporation of California to provide a disk operating system for microcomputers. CP/M has become the de facto standard for eight-bit microcomputers based on the Intel 8080 microprocessor or the Zilog Z80 microprocessor. CP/M provides full file management and interface abilities for custom machine environments. Some versions are now available to run on non-8080 or -Z80 systems. There are several hundred programs commercially available that will run under CP/M, including over 15 different BASIC dialects.

Cassette — a magnetic-tape storage device used by some personal computers to save programs for future use. Most cassette-based systems store data on the cassette at speeds of from 300 to 1200 bauds. This means that a typical program of 4 K in length (4000 × 8 bits = 32,000 bits) would take 106 seconds to load into the computer at a rate of 300 bauds and 27 seconds at 1200 bauds. This is not too fast, but much better than reentering an entire program by hand each time you want to run it!

Many personal computers that use cassette storage can use a standard audio cassette recorder in the $40 to $100 price range and moderate-quality audio cassette tapes for data storage. Cassette systems do not generally have supervisory programs that provide a directory of the programs contained on the tape, so you must keep track of what is on each cassette.

Disk — a magnetic media device that allows storage of programs for later use. The medium for use in a disk drive is called a *diskette* and is often referred to as a *floppy disk* since it is quite flexible and looks like a very thin phonograph record.

There are three disk sizes in use on personal computers: 5¼ inch, 8 inch and a 3½-inch version that is gaining in popularity.[2] A typical 5¼-inch diskette can store about 81 K of data or program material, and some special formats can store up to 500 K. The rate at which data can be stored is much higher with a disk unit than with a cassette tape. A typical transfer rate for a 5¼-inch disk is 125,000 bits/second or 125k bauds. To load a 4-K program would take about ¼ of a second for the actual transfer. (This doesn't include the various mechanical delays and processing overhead time to put the data away in memory.)

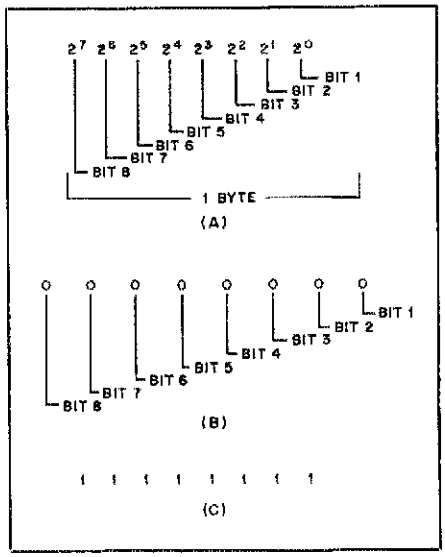


Fig. 1 — At A, bit positions and their respective powers of the base 2. A byte value of 0 is represented in B; the maximum byte value of 255 is depicted at C.

An 8-inch diskette can store about 140 K of program material and some special units store over 1 million bytes! The transfer rate for data is also faster, about 250k bits/second.

Density — a term generally applied to the method of recording data on a diskette. Single density (SD) is the most common format available to the personal-computer user. For a 5¼-inch disk, this works out to about 80 K per diskette; for an 8-inch disk, about 240 K. Double density (DD) is roughly twice the storage capacity of single density providing about 160 K on a 5¼-inch diskette or 500 K on an 8-inch diskette. Quad density is actually a misnomer. It is usually a special disk drive that can use both sides of a double-density diskette, thus providing 330-360 K for a 5¼-inch disk and over 1 megabyte for an 8-inch disk.

Format — a term related to the method of storing data on a diskette. The generally accepted "standard" (watch out for the use of this word) was adopted from IBM® . For single-density systems, it is generally patterned as follows:

A) The diskette is divided into concentric circles called *tracks,* usually likened to grooves on a phonograph record. Each track has a unique position relative to the center of the diskette. Each track is given a number or *address* to represent this position. For 5¼-inch diskettes of single density, this is usually from 0 to 34 or 0 to 39, with 0 being the outermost track from the center. For 8-inch diskettes of single density, it is 0 to 76.

B) The diskette is further divided into smaller subdivisions called *sectors.* Sectors also have addresses that are relative to their track address. A typical track has 16 sectors on a 5¼-inch SD diskette and 26 sectors on an 8-inch diskette. The sector size can range from 128 to 256 bytes.

Hard Disk — a magnetic recording device that uses relatively nonflexible disks, as compared to a floppy disk. The hard disk differs from the floppy disk in other, more important ways:

A) The pickup heads actually float a few micro-inches above the surface of the disk. The heads do not touch the surface of the disk as they do with a floppy disk. This means little disk or head wear occurs.

B) It has more tracks and sectors than a floppy disk and has a faster access to a given track or sector. Even a 5¼-inch hard disk typically has a capacity of 6.5 megabytes.

C) It is much more sensitive to damage from vibration or temperature extremes because the heads float above the surface. Hence, most hard disks are sealed against the environment. There are replaceable media "pancake stacks" containing multiple disk surfaces, but this arrangement is usually reserved for large disk systems (greater than 20 megabytes).

D) The cost of a hard-disk drive is from three to 10 times that of a floppy-disk drive, but the difference is steadily declining.

Modem — a device that allows a computer to communicate with a terminal or another computer, e.g., over a telephone line. "Modem" is a contraction of "modulator/demodulator." Standard modems use 300- to 1200-baud transmission rates. They use either a shift in frequency or phase to represent the two possible bit states of 1 and 0. For instance, to send a bit value of 1, 2225 Hz might be used, and 2025 Hz used for a bit value of 0.

In the Bell 103-series modems, there are two basic modem types, depending on who places the call: (1) *Originate* modems send 1270-Hz and 1070-Hz tones to a remote (answer) modem; (2) *Answer* modems send 2225-Hz and 2025-Hz tones to the originate modem. There are also combined Originate/Answer modems. This scheme allows for full duplex operation; that is, both modems can "talk" at the same time. A modem is simply a conversion device to make the computer binary output bits suitable for transmission over standard telephone lines.

Operating System — a supervisory program that interprets operator input and operates on it. An operating system can be as simple as a *system monitor* that can only provide basic I/O functions, memory display or alteration, and a means to execute assembly-language programs. Or, it can be as complex as CP/M with full file-handling facilities and multiple-language capabilities. Some low-end (small, less expensive) personal computers and even some more expensive units do not have a readily visible operating system. Rather, it is made a part of a BASIC interpreter, and all com-

mands are entered while in BASIC.

RAM — an acronym for random-access memory that refers to the changeable memory available within a given machine. RAM is used to store user programs in most systems. The stated memory size of a personal computer in advertisements usually refers to RAM. RAM is volatile, which means the data stored in RAM are lost if power is removed. RAM can be written to (store data) or read from (retrieve data) and is called "read/write" memory.

ROM — An acronym for read-only memory. It refers to memory that is not alterable by the user. ROM usually contains such things as the BASIC interpreter and is nonvolatile; it retains data when power is removed. Most types of ROM cannot be written to by the user. There are three basic types of ROMs that appear in personal computers today:

A) ROM. This IC has the required data programmed into it at the place of manufacture by a process called *mask programming*. Once programmed, the data cannot be changed.

B) EPROM. This type of ROM is erasable and programmable. The information is erased by exposure to ultraviolet light and the IC can be programmed in a special device. After programming, the EPROM is operationally identical to a standard ROM. EPROMs can be erased and reprogrammed many times.

C) EAROM. This is an electrically alterable, read-only memory. A special type of ROM, it has the nonvolatile capabilities of a true ROM, but it can be altered like RAM while in the user's system. It is usually slower to write to than normal RAM and there is a limit as to the number of times the data can be altered. The IC will retain the data after power is removed.

Serial — a term usually applied to a method of transferring data over a wire from a computer to a peripheral device. In serial operation, data is sent out 1 bit at a time to the peripheral device. Some printers, disk drives and CRT terminals use serial communication to transmit data to and receive data from the computer.

The most used serial hookup is the EIA RS-232-C. This designation refers to a standard interface specification for serial communication in which the signal levels to and from the computer are strictly defined. In addition, the connector type and its pin connections are standardized so that virtually any device specified for RS-232-C connection can be made to function by simply plugging it in.

Computer Shopping

What do you expect a personal computer to do for you? What are you willing to pay for it? These questions are not easy to answer. If you don't have the answers before you shop for a personal computer, you leave yourself open to all sorts of disappointment.

The general public tends to think of all computers in a sort of stereotyped manner; that is, if you tell a computer what you want, it will do it for you. Some sales people, for various reasons, try to reinforce this view by selling you a machine and telling you that you can do your taxes, keep personal records, catalog a record collection, etc. — all on the $200 special 4-K machine. Of course, what the salesperson failed to mention is that another 60 K of memory, two disk drives and several software packages must be added, at a net increase of $2000 or more!

Many people become soured to personal computing because the machine they purchased cannot do everything that it was expected to do. As with any job, if you need a tool to do a job, the better you define the job before you make or buy the tool, the better performance you can expect from the tool.

Let's look at a few possible answers that might be given to the two previously asked questions.

A) *I want it to play games, maybe even write a few games myself.*

This answer fits a fairly large number of first-time buyers and, fortunately, doesn't cost too much to satisfy. The machines available that can fill this requirement range in cost from less than $100 to about $400. Memory capacity is about 4 K or more, and a cassette interface is provided for use with a tape recorder as a program-storage device. The display unit is typically a modified TV or a standard TV with an external rf modulator inserted between the computer and TV set. The rf modulator converts the video signal from the computer into a TV signal that can be displayed. BASIC is usually provided in ROM for user programming.

The primary limitations of this class of machine are: (1) Memory size may be too small for significant program development or use with large games; (2) the cassette interface allows saving only program files written in BASIC without any directory of contents; (3) memory expansion may be limited, and the BASIC interpretor provided may be limited in scope; (4) the amount of information (lines and columns) that can be presented on the screen is limited by having to use a TV set as a video monitor. Formats of 22 lines and 22 columns, 16 lines and 32 columns, or 20 to 24 lines of 40 columns are provided. These formats cannot display a typical 8½ × 11-inch "page" of information.

B) *I want to do some financial/accounting work and keep my personal book records on the computer, but I can't afford to spend too much money.*

This response is probably applicable to a large segment of potential buyers. The purchaser, who sees the growing use of computers in home appliances, the automobile, on the ham bands and in the office, feels that he or she has to get involved in this computer business or fall behind. Caveat emptor (let the buyer beware) is applicable to this situation. The danger here is twofold. On one hand is the danger of over buying and spending far more than is necessary. On the other hand is the danger of underbuying and then becoming upset because the machine won't cooperate and produce the desired results.

Disappointed computer buyers are usually those who underbuy. That results from a lack of understanding of just what is to be done with the computer and/or by an enthusiastic salesperson who made excessive claims for the "Super-8" computer selling for only $99.95 plus tax.

The primary requirements of a system that will fulfill the needs mentioned earlier are

1) some means of data storage that allows data to be recalled by name. A simple cassette-storage capability will not suffice. There are some cassette systems that provide these features, but the vast majority of systems now use one or more disk drives, usually 5¼-inch types.

2) enough RAM to handle a reasonable amount of data when the control program is also in memory; 16 K is typically a minimum.

3) a BASIC interpreter that features floating-point arithmetic; that is, the ability to deal with fractional numbers, not just whole numbers (integers).

While these requirements are a minimum, there are a few desirable features that would minimize the required programming knowledge of the user and enhance the final results:

1) A program such as VisiCalc® would greatly simplify developing an accounting system. Most systems have some form of electronic spread sheet available. Cost: $100 to $300.

2) A printer enables you to maintain a printed record of financial information and spread sheets. Most systems will support a serial or parallel printer. Cost: $300 to $1500 or more. A minimum setup might consist of a game system (as in example A) with an added disk drive and memory expansion unit for costs ranging from $1000 to $1800.

C) *I want to learn programming.*

Buyers in this category are generally the prospective software hobbyist or those who have a desire to learn or improve their computer skills and do not have on-the-job access to the equipment to do so. A personal computer can be a valuable aid in learning programming techniques. However, it is only an aid; it cannot teach you to program. It can help you to learn to code. There is a difference:

Code — to write a sequence of steps, in a given computer language, that follows a predefined algorithm (plan) of program flow.

Program — to develop a workable algorithm to accomplish a given task.

There are many good books available for self-learning programming techniques, and some use the BASIC language for coding purposes. Remember: You must know what you want to do and how to do it before you can program a computer to do a given task! Just learning a language such as BASIC or FORTRAN will not enable you to write anything more than relatively simple programs. However, if the proper *way* to write a program is learned, then the language used to code the program becomes far less important.

A system for learning programming techniques must be configured according to the complexity of the desired skills. A simple 4-K memory machine and cassette interface are quite enough as long as you are not trying to develop file-handling skills. If you do desire to learn file structures, then a system like that of example B is required with at least one disk drive.

D) *I want a machine as a teaching aid for my children.*

Computer-aided instruction (CAI) is a rapidly growing field that is beginning to appear at all levels of education. Areas previously restricted to the college engineering or computer-science level are now appearing in elementary school science classes. Children are being exposed to the electronic media on an ever-increasing basis both in school and outside the classroom. The personal computer can be a great help in preparing children to meet the tremendous volume of electronic data that is sure to be a part of their lives in the next 10 to 20 years.

To accomplish this goal, a minimal system is required. A 4-K machine, preferably with color capabilities and a BASIC interpreter, will provide enough computing power to create math drills, word exercises, pattern recognition drills, etc. In addition, many prepackaged programs are available for teaching purposes on some of the more popular small machines. A good estimate would be about $250 to $600 for such a system.

E) *I'm an engineer and I want a machine that can handle some of the work I do so that I can work at home when necessary.*

This class of buyer is perhaps the most demanding of the personal computer users. To provide support for these requirements, a personal computer would need

1) sufficient memory to handle large user programs;

2) disk-storage capability for saving data and programs;

3) a versatile disk operating system (DOS) capable of supporting many different languages;

4) a system that has a large software inventory commercially available;

5) sufficient speed to rapidly perform complex calculations.

Fortunately, there is a good variety of systems available that will support these requirements, but they are not inexpensive. A typical system with 64 K of RAM, two 5¼-inch disk drives, CP/M operating system (or UNIX), a BASIC compiler and a FORTRAN compiler costs from $2200 to $6000 and up. The addition of 8-inch disk drives and hard disk capability can push the cost up to over $10,000.

Obviously these five situations do not describe all the possible reasons for buying a personal computer. Hopefully, they present enough angles of the problem to show that the purchase of a personal computer requires thought and planning if disappointment is to be avoided. So, to itemize some of the dos and don'ts:

Do

- know what you expect the computer to do for you.
- find out what those expectations should cost you.
- examine several systems before buying. Little things can make a difference in the long run.
- ask questions about a prospective system — lots of questions.
- think about what you may want to do with the system later on (and are willing to pay for now).
- check into the availability of repair service.
- read some of the personal-computer periodicals. *Byte, Popular Computing* and *Personal Computing,* for example, contain many equipment reviews and hints on buying a system, as well as advertising such systems.[3,4,5]

Don't

- believe everything you hear. Investigate sales claims.
- expect the computer to be able to do something you don't know how to do unless you are using a commercially available program.
- buy used or out-of-warranty equipment unless you are willing (and able) to fix it yourself or can afford to have it fixed by someone else.
- buy the first system you look at just because the salesperson was nice; check it out!
- buy the "Super Whiz 80" computer with all the bells and whistles unless you plan to use them in the future. They cost money.
- be afraid to ask for full explanations of things you don't understand about a given machine; it's your money.

Conclusion

Personal computers can be a useful tool or an expensive toy, depending on how well you prepare yourself before buying one. The average person can learn to use a personal computer and not spend a fortune doing it. The watchword is caution. There are a lot of computers on the market, and many of them are highly specialized. Select a machine that will fit your desires and your pocketbook.

Notes

[1]One kilobyte is equivalent to 1024 bytes.
[2]mm = in. × 25.4.
[3]*Byte* Subscriptions, P.O. Box 590, Martinsville, NJ 08836.
[4]*Popular Computing*, P.O. Box 307, Martinsville, NJ 08836.
[5]*Personal Computing*, P.O. Box 2941, Boulder, CO 80321.

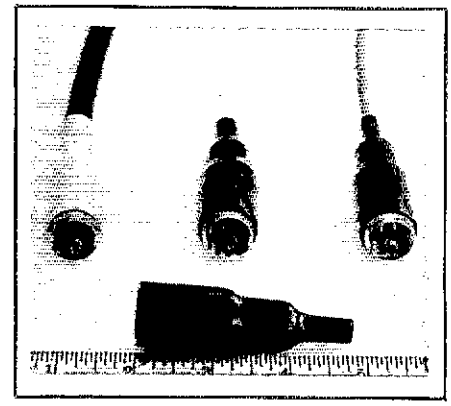
New Products

KILO-TEC WEATHER BOOT

☐ Kilo-Tec is supplying a custom weather boot for use with RG-8X, RG-59/U, RG-58/U and RG-8/U coaxial cables and PL-259/SO-239 combinations. During cable installation, simply slip the weather boot over the coaxial cable before soldering on the connector. Once the connector is attached, slide the boot over the PL-259 for a good weather seal.

The boots are manufactured from a flexible vinyl material that resists moisture and breakdown from the sun's rays. They are designed to keep the connections clean and dry, and should help to keep moisture out of the coaxial cable.

Kilo-Tec offers three models from which to choose: KTB-58 for RG-58/U, KTB-8 for RG-8/U, and KTB-8X for RG-8X or RG-59/U cables. (Custom-made boots can be made for other types of cables and connectors; contact Kilo-Tec for a quote for special requirements.) If the boots are not available from your local Amateur Radio equipment supplier, you can order directly from Kilo-Tec, P.O. Box 1001, Oak View, CA 93022; tel. 805-646-9645. A kit of two of each type costs $5.95 plus shipping and handling charges. — *Paul K. Pagel, N1FB*



Looking *Down* on the Aurora

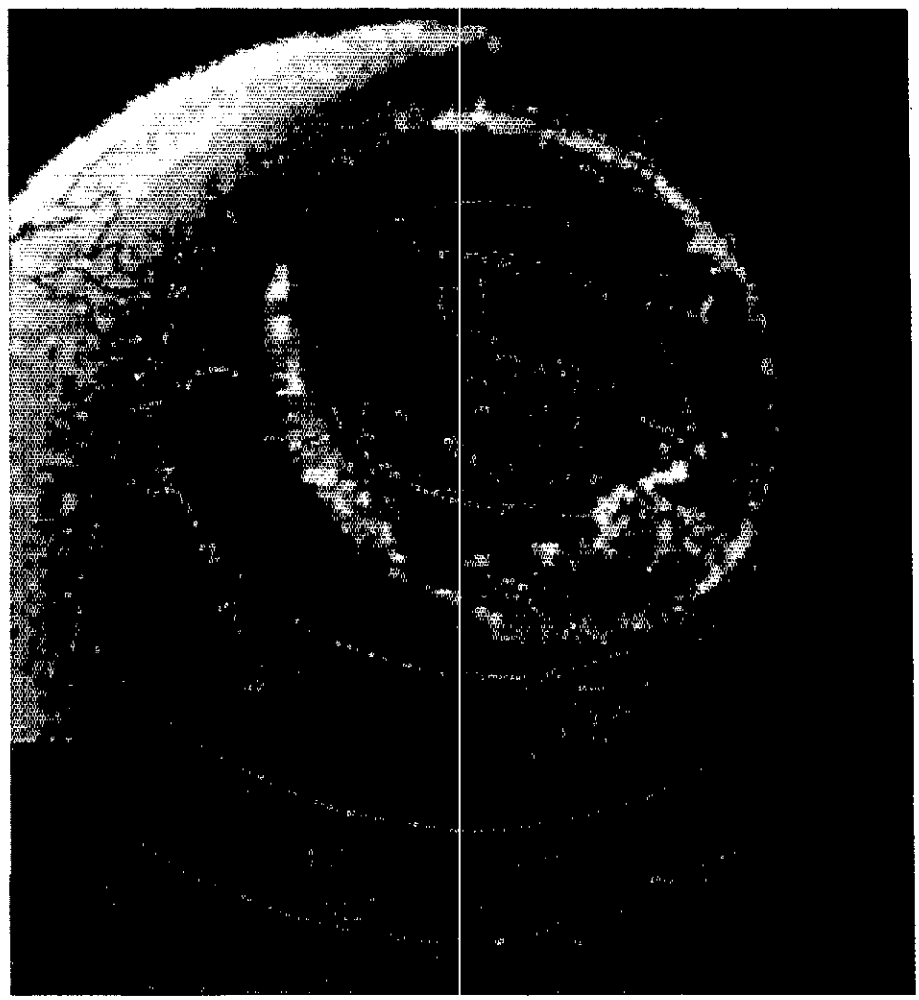
By Tom Frenaye,* K1KI

On August 3, 1981, a pair of research satellites were placed in orbit from the Western Test Range at Vandenberg, California, with a McDonnell-Douglas Thor/Delta 3914 launch vehicle. One of the two NASA/GSFC spacecraft, Dynamics Explorer 1, was placed into an elliptical, polar orbit, with initial perigee and apogee altitudes of 570 km and 23,280 km.[1] What makes the DE-1 satellite of interest to radio amateurs is the auroral imaging instrumentation carried on board that was developed by and is now used by the Physics and Astronomy Department of the University of Iowa. The instruments can record pictures of the entire auroral oval as taken from high altitudes, after centuries of ground-based studies and speculation.

The initial latitude of apogee was 78.2°N and the precession is about 0.328 degrees/day, moving the apogee to 90° N 36 days after launch. Apogee was located over the equator in early June 1982 and over the South Pole in early March 1983. With apogee at polar latitudes, continuous imaging of the aurora for more than five hours can be made during a single orbit (orbital period is 6.83 hours).

The instrumentation carried aboard the DE-1 spacecraft includes two imaging photometers able to "see" light from ultraviolet wavelengths (110-165 nm), through most of the visible light spectrum (175-700 nm). Protective circuits prevent sensor destruction as the dayside of the earth is scanned.

While Amateur Radio operators, in addition to scientists around the world, have been experimenting to learn more about the aurora for many years, the DE-1 spacecraft, and those to follow in the future, may allow current images of the aurora to be received, as easily as television pictures are now relayed by stationary satellites. The complete amateur station in the 1990s may include a color monitor that displays a picture of the current aurora, including true colors!



This image, the first view of the entire auroral oval from high altitudes, was taken on September 25, 1981 with the spacecraft located approximately 3.27 earth radii (20,860 km) above the North Pole. The light colors are the areas with the highest intensities. Although quite faint along some of its circumference, the auroral oval extends across the terminator into the sunlit hemisphere of the earth. Half of the earth is completely dark except for the auroral oval. The sun is illuminating the earth from the left-hand side of the picture.

Should you think that the aurora doesn't have much effect on communications, remember that while minor auroral activity can block communications across polar latitudes (and black out communications for those in polar latitudes), a major storm can black out communications for the entire radio spectrum, including satellite transmission. In addition, the entire power distribution grid in North America could be disrupted severely or even be completely useless. Ground-induced currents of more than 1000 A have been measured in the Alaska pipeline from more moderate auroral activity. Satellite-borne computers are extremely vulnerable, as is early warning radar in our defense system. Major solar substorms typically happen on the decay phase of the solar cycle. The present decline began in December 1979, and is expected to continue until mid-1987, after which activity will begin to increase. There are 20 solar superstorms on record since 1880, and none since 1960. As with California earthquakes, we are overdue for a big one.

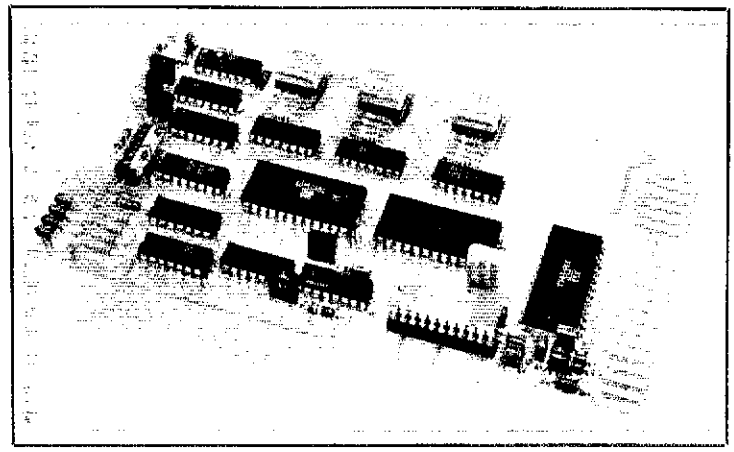
[1]The orbit of Dynamics Explorer 1 is an elliptical polar orbit, meaning that each orbit crosses both the North and South Poles. The highest point of the orbit (apogee) gradually changes from directly over the North Pole to directly over the South Pole over a time period of about 549 days. While over polar latitudes, DE-1 provides excellent coverage of the complete auroral oval.

*P.O. Box 62, Unionville, CT 06085

A DTMF Easy-Controller — With Security

Are unauthorized persons accessing your controller? This unit features an electronic combination lock that should keep "Tone-Pad Charlies" out.

By Phil Czerkies,* WA8KPY



This 16-function control package features a decoder patterned after "The DTMF 'Easy-Ceiver.'"[1] The system was originally designed for remote control of lights in a large auditorium, but it soon became apparent that this controller might be well suited for use as a repeater or remote-base controller.

[1]Notes appear on page 21.
*11831 E. 62nd Pl., Tulsa, OK 74133

The system shown in the accompanying photographs consists of a mother board supporting four identical output-control (relay) boards and the decoder board. All the boards in the controller system shown here are coated with a clear, conformal coating to prevent moisture and corrosion problems from occurring. A smaller, two-slot mother board can be used for systems requiring only four control functions.[2]

The decoder provides two levels of security. The first level requires the reception of the correct three-digit sequential security code, while the second level requires that each digit be entered within a given time period. Over 4000 code combinations are provided at the first level. Code combinations are selected on the board by means of three binary-coded DIP switches. At the second level, the time-out duration (N) is selected by choosing a single resistor value to provide delays of one, three or five seconds, or longer, if desired.

Security Mode

Each time a digit is entered, the timer is reset and you have N number of seconds to enter the next digit. If there is a pause greater than the time allowed, the previously entered security codes are

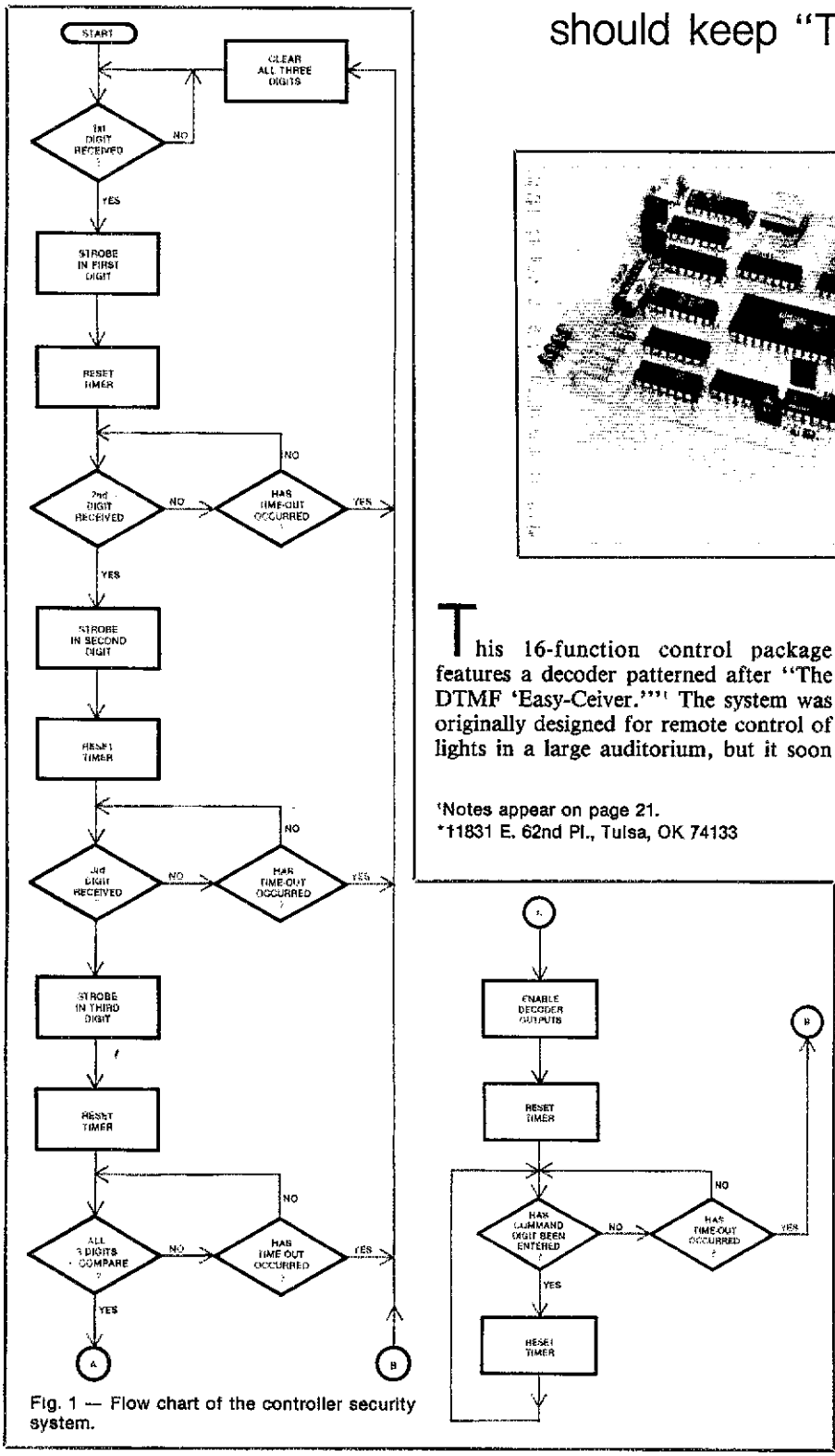


Fig. 1 — Flow chart of the controller security system.

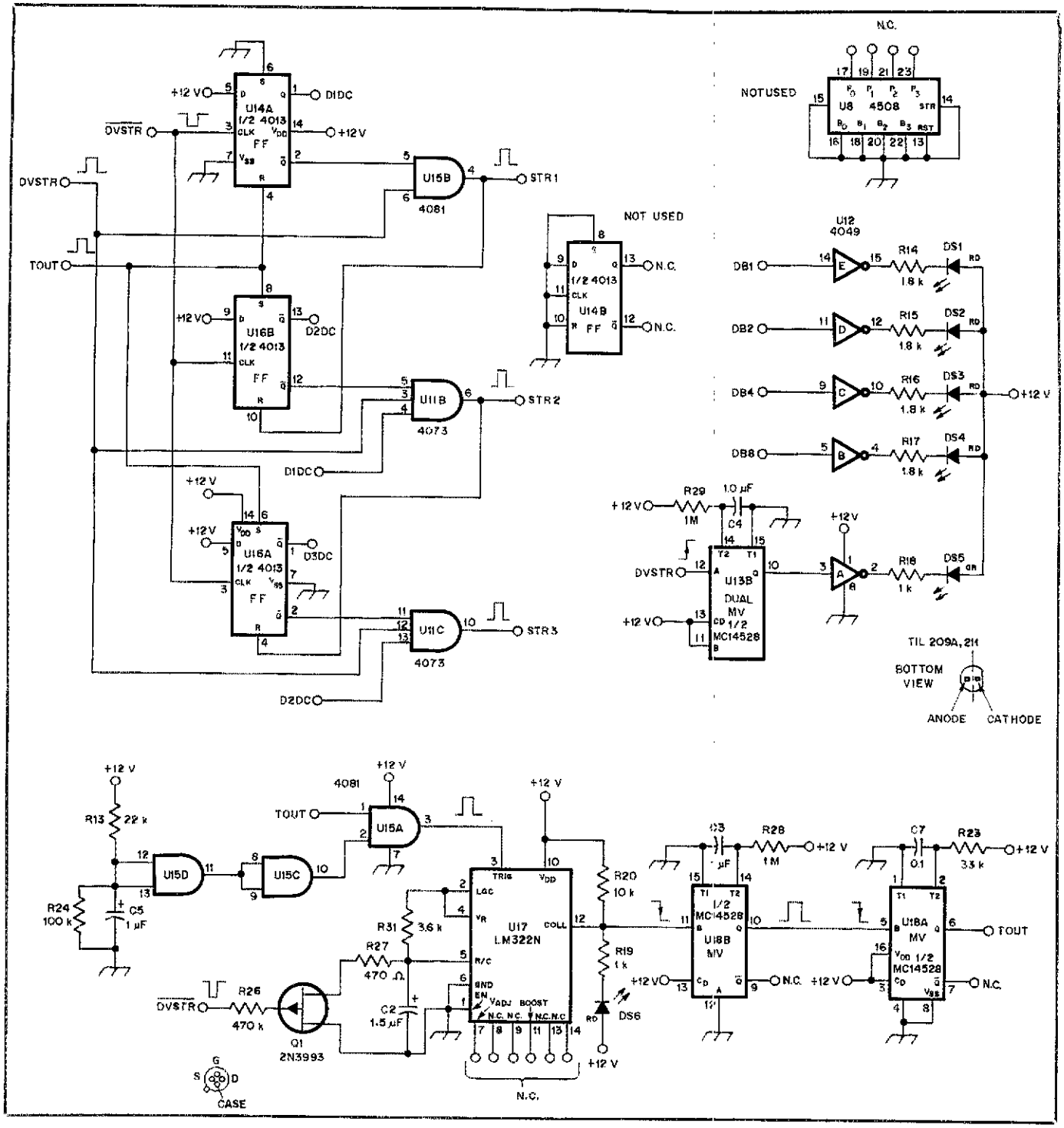


Fig. 2 — Partial schematic diagram of the DTMF decoder. The input section is shown here.

cleared and you start all over again. It's like playing "Beat the Clock."

Entering the wrong security code is like playing "Reverse Beat the Clock." The security codes are compared sequentially. If a bad code is entered, you have to wait until time-out occurs before a new security code can be entered; otherwise, you will never access the system.

User Function Mode

Once the correct security code has been entered, you can issue a full set of 16 commands to the controller. The time-out function still applies. You have N seconds for each digit entered. Let's say N is equal to five seconds. You enter a digit and three seconds pass before another digit is entered. You now have five seconds to enter the next control command.

When you're finished issuing control

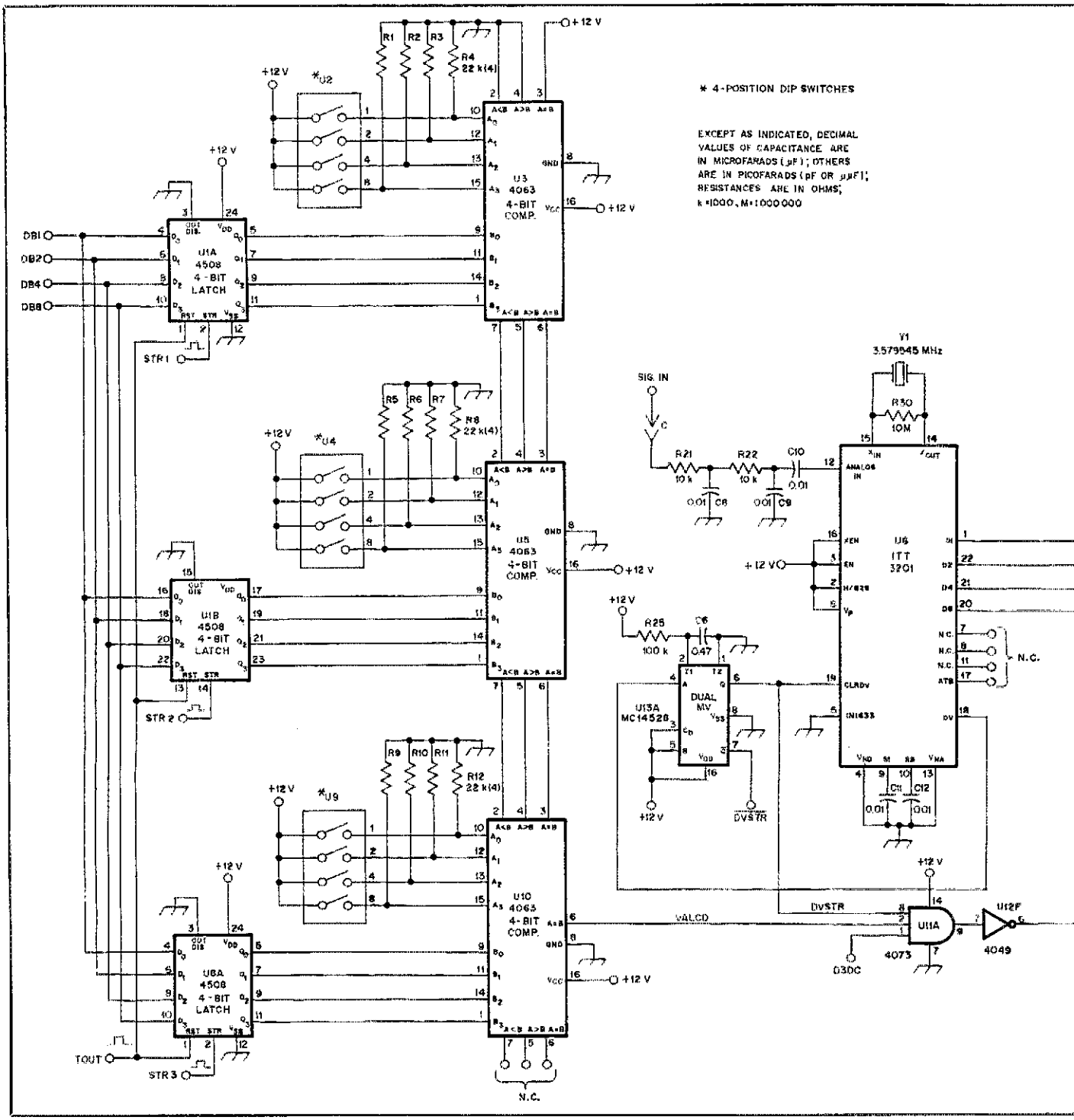


Fig. 3 — The DTMF controller decoding-section schematic diagram. U2, U4 and U9 are four-section DIP switches.

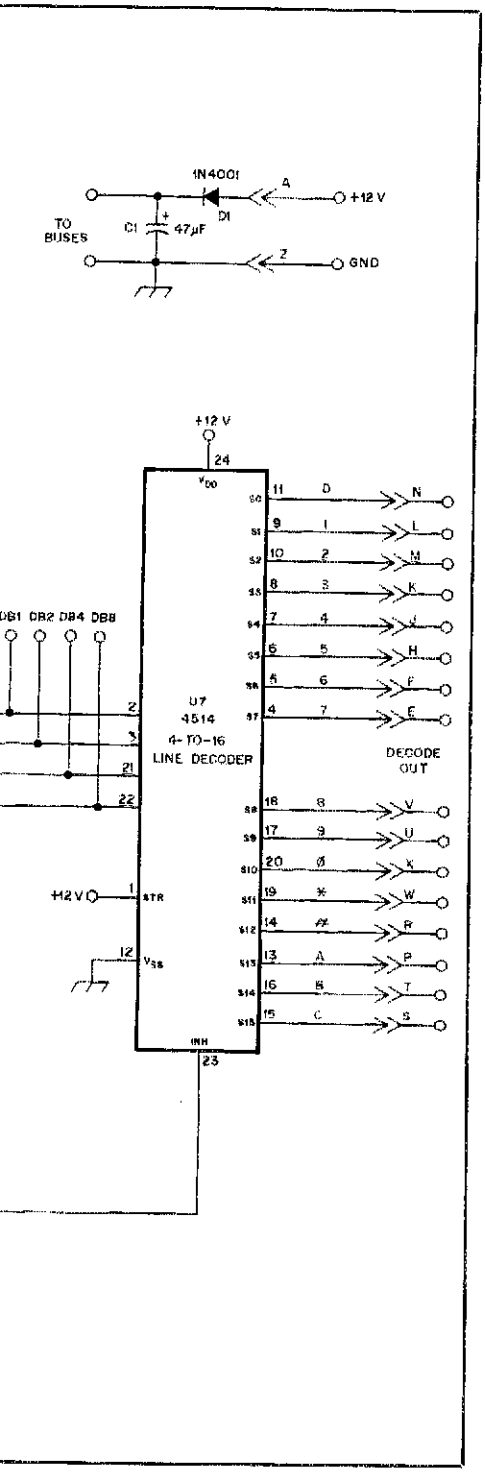
commands, all you have to do is let the system time itself out. Once that happens, you must again pass through security before any further control commands can be issued.

Other Decoder Features

Operation, setup and system troubleshooting are easy. The decoder board uses an ITT 3201 tone-decoder chip that requires a minimum of external parts for operation: a 3.58-MHz (color-burst frequency) crystal and an input filter to keep out the tone harmonics.

There are no adjustments to make except for an initial receiver-audio-level setting done at the radio receiver. LEDs display the binary representation of the decoded digits and presence of the strobe and timer signals. The LEDs are useful indicators, especially the timer LED. It blinks when each time-out occurs, giving a "system heartbeat" effect. So, if you see that the timer LED is not blinking during operation, you know you're in trouble!

The decoder operates on 12-V dc and uses CMOS ICs throughout. For those of us who occasionally take a notion to install boards backwards or to apply voltage of the incorrect polarity to a board, rest easy — the controller system boards have "idiot" diodes installed on each V_{cc} card pin. A pin-for-pin replacement for the



DTMF Easy-Ceiver, the decoder board is about 6.5 inches in length and 3.5 inches wide, just right for a 22-pin card-edge connector.[3]

Decoder Logic

The ITT 3201 IC contains all the high- and low-group filters and other circuits needed for DTMF decoding. It even has an option for selection of hexadecimal or binary output at pin 2.

For those of you who wish to go through the logic of the system, I have included a flow chart (Fig. 1) to make it easier to understand. Also refer to Figs. 2 through 4. The desired three-digit security code is chosen by means of the three four-section DIP switches. When U6 detects a valid digit, pin 19 Digit Valid goes high. This causes U13 to generate two pulses of opposite polarity called Digit Valid Strobe (DVSTR) and Digit Valid Strobe NOT ($\overline{\text{DVSTR}}$). These logic signals, along with the time-out signal (TOUT), are what make things happen and they serve many functions.

The DVSTR signal is used to clear the '3201 via pin 19 of U6 (CLRDV). This allows the '3201 to decode the next valid digit faster than is normal. Usually, the IC detects and decodes a valid digit, and then there is a pause of about 30 ms before it will be ready to decode the next digit. Resetting the IC (DV) from pin 19 (CLRDV) allows you to override this delay time. At U11, the DVSTR signal is ANDed with valid compare digits (VALCD) and Digit 3 Decode (D3DC) from U16 to enable the 4- to-16 line decoder (U7) for actual command functions to occur. DVSTR is also used to trigger U13 and turn on the STROBE LED for 500 ms, making it easier to see.

Timer

One of the functions of $\overline{\text{DVSTR}}$ is to reset the timer after each valid tone is decoded. $\overline{\text{DVSTR}}$ turns on an FET switch that discharges a 1.5-μF capacitor (C2) and resets the timer. U17 is a retriggerable type of timer. It does not time out until C2 charges to about 3 V; only then does its output go low. If the capacitor charge never reaches 3 V (having been reset by newly entered digits), the output will never go low until N number of seconds after the last valid digit was decoded.

The output stage of U17 has a current sink capability of about 20 mA, and will drive the timer LED directly. When the system is first turned on, U15 and the time-out signal (TOUT) form a power-on reset circuit. All the relay boards also have power-on resets. This keeps everything from coming up in a random state when first turned on.

Security Logic

Here's how the DVSTR and $\overline{\text{DVSTR}}$ signals are used to sequentially strobe the three received security digits into latches U1 and U8 and compare them. $\overline{\text{DVSTR}}$ is used as a clock input to U14 and U16. At the same time, DVSTR is input to U11 and U15. When the first digit is received, the $\overline{Q}$ output of U14 changes state, allowing both inputs of U15 to be ANDed, giving a valid strobe pulse (STR1). STR1 is used to latch the first digit into U1 for the compare operation. At this point, the first decoded digit is available for comparison at the inputs to a four-bit magnitude comparator, U3. Here it is compared to the code programmed into the DIP switch, U2. If there is a match, then A = B is true and it is cascaded down to U5. If the second and third digits match in like manner, then the output of U10 (pin 6) generates a Valid Compare Digit (VALCD) signal that will eventually enable U7 via U11 and U12.

Notice that there is some interlocking of this logic with U11, U14, U15 and both sections of U16. For example, when the first digit is decoded and U14 toggles and STR1 occurs, STR1 is used to clear the first section of U16, making it ready for the second digit. Also note that the D1DC signal is routed to pin 4 of U11 and unlocks it for the second digit only after a valid first digit has been received. The same type of interlocking is used on the second and third digits. The only difference is that when the third digit is received and STR3 strobes the third digit into U8 for a compare operation, D3DC is now an AND input to U11 and finally unlocks the 4- to 16-line decoder (U7) for 16 function outputs.

Output-Control Boards

The output-control boards are of a straightforward design and are identical physically and electrically, allowing them to be placed in any one of the four slots on the mother board. This also allows easy duplication when more expansion is necessary. Each board is comprised of identical control circuits and shares a common power-on reset circuit. The output control boards also have LED indicators on them. This aids in verifying that the correct function was selected, as comparison can be made with the decoded-output LEDs on the decoder board.

Plug-in 12-V relays are used in this design. Some might ask, "Why use a relay?" Well, relays do have a lot going for them, especially in the areas of isolation, power-handling capabilities and price! Relays are generally easier to acquire, and in this installation, if one does go bad, just pop off the retainer clip, plug in another relay and you're back in business.

Although the relay contacts are rated for about 7 A, they shouldn't be required to operate at their maximum ratings. This is because inductive devices, such as motors, can draw much more than their normal running current when switched on. The high current can weld contacts or otherwise damage them. If you must switch high-power devices, use the on-board relays to activate a contactor or an SCR controller that is capable of handling the load.

That inductive device mentioned earlier will also generate a high-voltage spike. That spike will radiate like a radio wave and may find its way back into the logic circuits and disrupt control settings. When switching other than signal sources, it's always a good idea to fuse the controller leads. This pre-

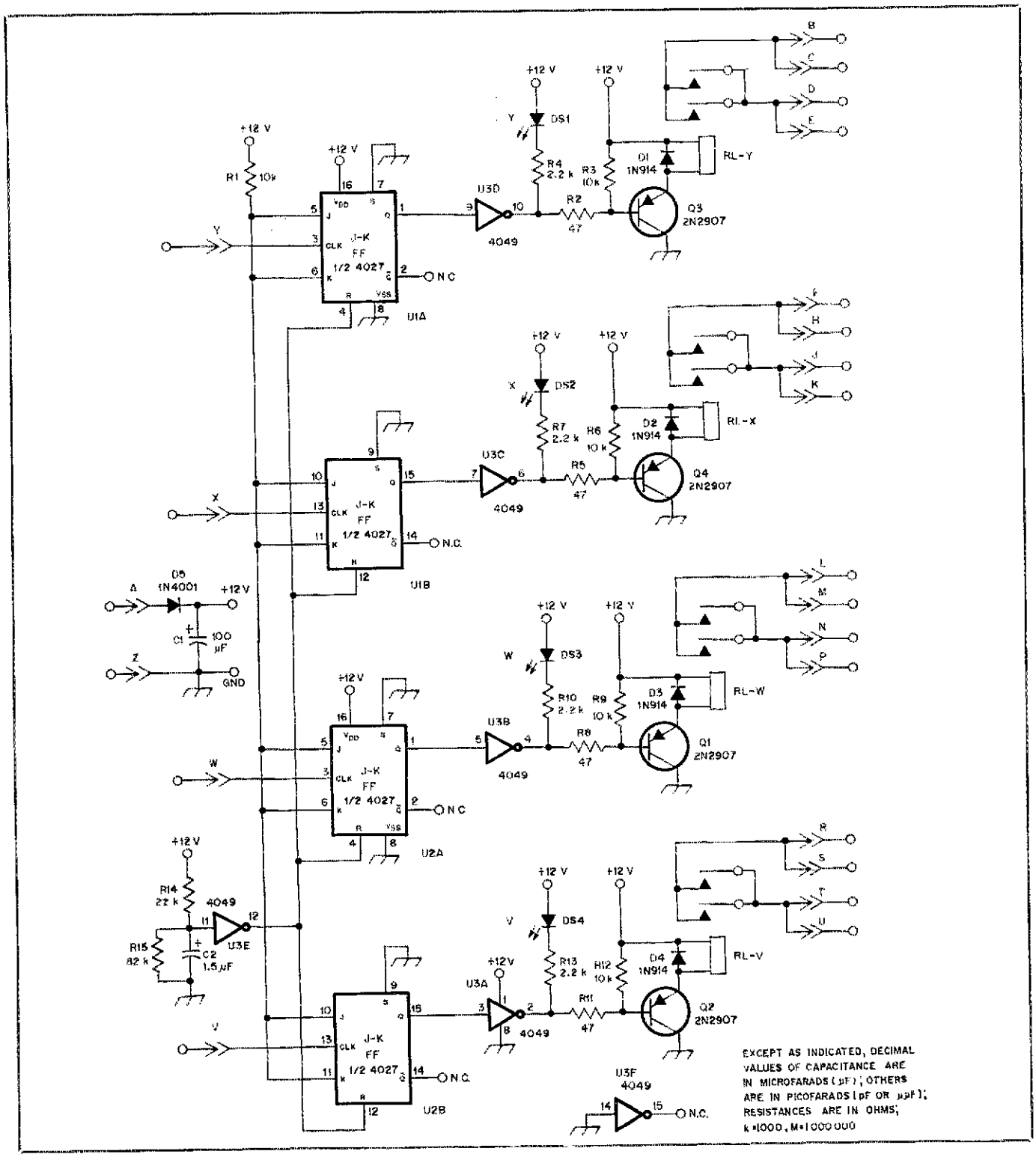


Fig. 4 — Schematic diagram of the controller output board. The relays used by the author are Potter & Brumfield R10-E1-W2-V185 types with a 12-V dc coil.

caution may keep a few boards from being burned up should something short.

Output-Control-Board Logic

The output signals from this board are routed along the mother board to each relay board in groups of four signals each. When they arrive at the output-control board, they are latched into respective latches. The Q output of each 4027 section (U1, U2) is fed to one section of a 4049 high-current driver IC (U3). The driver turns on a LED indicator and a transistor (Q1 through Q4) that finally energizes a 12-V relay. The relay contacts are paralleled to handle large currents. Connections to the relay contacts are routed to terminal strips on the lower edge of the mother board. The operational sequence of events is simple. One input pulse from the decoder board energizes a relay and another, identical pulse from the same line will de-energize the relay.

Mother Board

This board is designed for heavy-duty use. It is 1/8 inch thick and has a two-ounce

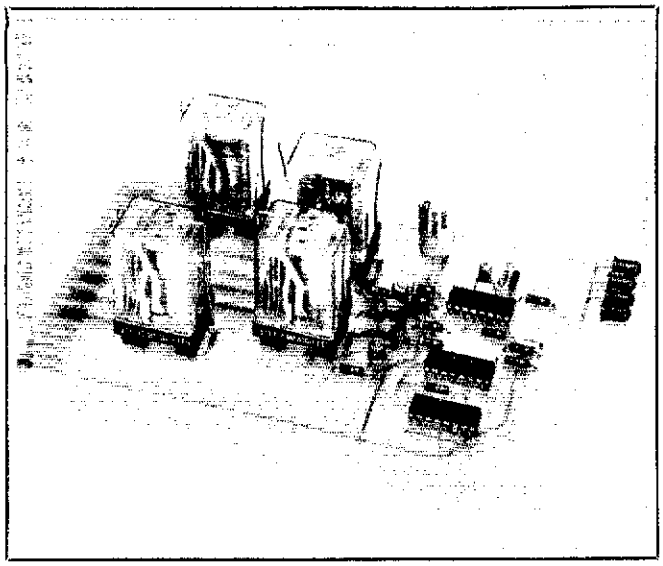


Fig. 5 — One of the output boards used in the controller.

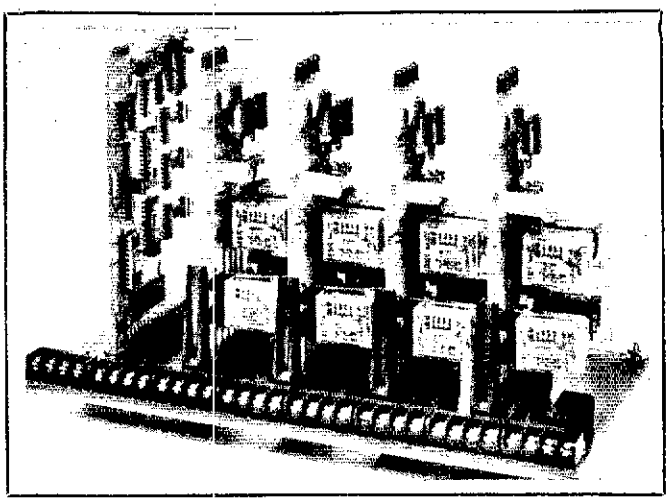


Fig. 6 — The completed controller. At the left is the decoder board; four identical output boards follow. A 1/8-inch-thick mother board supports the assembly. For applications requiring only four control functions, a two-slot mother board is available.

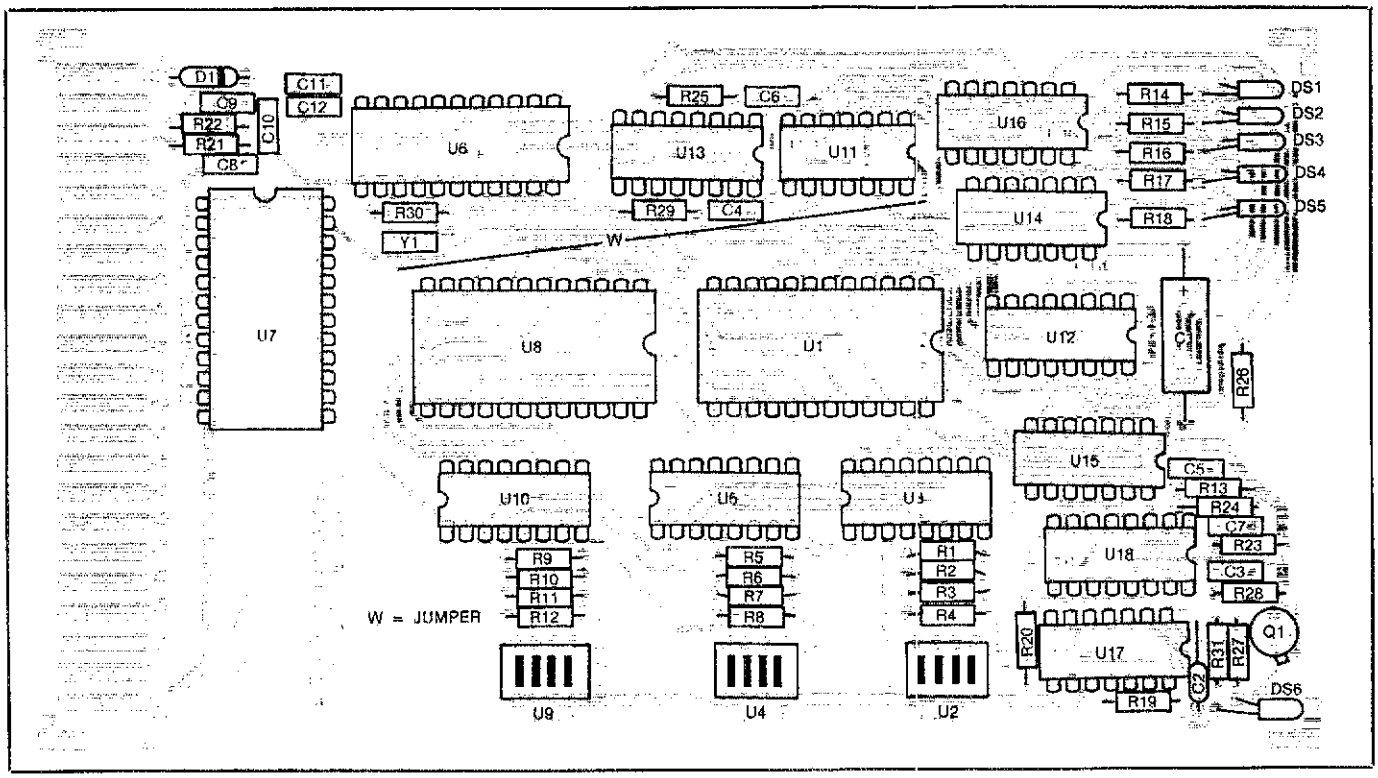


Fig. 7 — Parts-placement guide for the DTMF decoder board. Parts are placed on the top (lettered) side of the board. The shaded areas represent an X-ray view of the copper pattern. See Hints and Kinks, this issue for the etching-board patterns.

copper foil layer. The board thickness should help reduce flexing and cracking that may occur when inserting or removing the daughter boards. There are five 22-pin connectors on the board and screw-type terminals along the bottom and right-hand side of the board. The first four connections on the left side of the mother board are used for tone inputs and dc power to run the controller. The remaining terminals are assigned by the user. The backplane decoder bus on the mother board can route any control digit function to any output on each of the four output-control boards by means of jumper wires.

Summary

I am sure this controller will find many applications. It is compact, rugged and easy to use. At the present time, one controller is installed and several are scheduled to be installed at different repeater sites. Why not try it yourself?

Notes

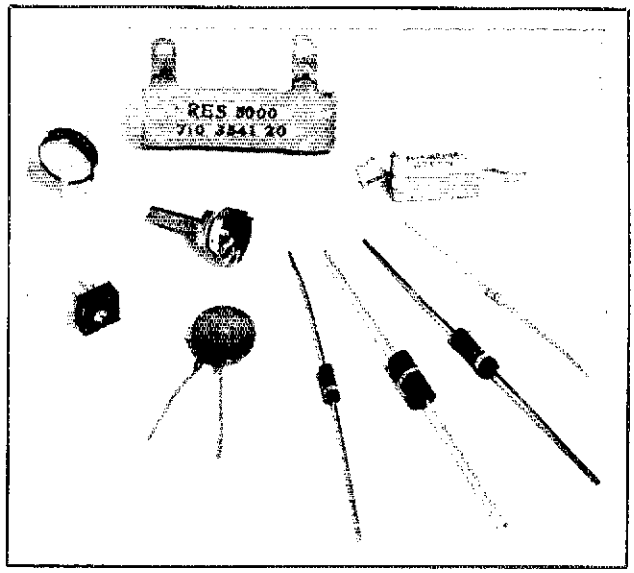
[1] J. Jarrett, "The DTMF 'Easy-Ceiver,'" *QST*, Jan. 1982.

[2] Boards, kits and assembled and tested boards of each type are available from the author. Please include an s.a.s.e. with your inquiry. Pc-board templates and overlays are available from ARRL Hq. for a large s.a.s.e. and $2.

[3] mm = in. × 25.4; g = oz × 28.35.

● *Basic Amateur Radio*

The Manufacture and Use of Resistors (Resistors for the Experimenter)



Have you been left wondering why a certain resistor type is specified in the latest *QST* project? What design parameters must be considered? Here are some answers to these questions and others you may not have even thought of yet!

By Larry D. Wolfgang, * WA3VIL

Most electronics construction projects use at least some resistors. Different types of components are often specified for particular sections of the project, such as metal-film resistors and Mylar® or polyester capacitors in a VFO. Most neophytes, and many seasoned veterans, become confused when it comes to substituting components with a different construction than the one specified

Why can I use this 5-W, 10-kΩ wirewound resistor to replace a 1/2-W, 10-kΩ composition resistor in a sidetone oscillator, but not one in the local oscillator of my hf rig? There seems to be a limited amount of information available concerning these problems. In this Basic Radio installment I will present some information about the manufacturing processes and the specifications for the various resistor types commonly used in amateur projects. After reading this article, you should have an understanding of why a certain type of resistor is specified for a project, and you should be able to make informed decisions about what type of substitutions may be acceptable to ensure proper circuit operation.

Resistance

All materials exhibit some opposition to electric-current flow. The resistivity of the material is a measure of this opposition. Most metals have a fairly small value of resistivity (1.673 μΩ-cm for copper) and so are good conductors. Insulating materials have a high value of resistivity. Powdered carbon (graphite) has a resistivity of 1375 μΩ-cm.[1]

Given the resistivity (ρ) of a conductor, you can calculate the resistance by:

$$R = \rho \frac{\ell}{A} \qquad \text{(Eq. 1)}$$

where

R = resistance

ℓ = length of the conductor

A = cross-sectional area of the conductor

Resistors can be constructed by measuring a length of wire that will have the desired resistance. Sometimes, the wire is wound onto a cylindrical form to make a neat package. Materials with a higher resistivity will require shorter lengths for the resistor. Mixtures of carbon and clay are formed around pieces of wire to make carbon-composition resistors.

Most amateurs will not be interested in "rolling their own" resistors, so finding the value of resistivity, length, and cross-sectional area may not be the most practical method of determining resistance. I am sure you are all familiar with Ohm's law. Some of you have probably conducted an experiment to verify this basic principle of electronics. If you have never done this, now would be a good time to try an experiment.

A Simple Experiment

For this two-part experiment you will need a variable-voltage power supply, a VOM (or two) and an assortment of 1-W resistors. Select a 150-Ω resistor, and wire a circuit similar to that shown in Fig. 1. Starting at 0 V, increase the supply voltage in 2-V steps, recording the current through the resistor at each step. When you have reached 14 or 16 volts you can plot a graph of voltage vs. current. You should see a straight line, or linear relationship, where any applied voltage divided by the corresponding current value gives a result of approximately 150!

For the second half of the experiment you will use a variety of resistors, maintaining the same voltage drop (about 10 V) across the resistor each time. One VOM is connected to measure the voltage across the resistor, and the other measures circuit current. One meter can be used if you are willing to switch it between these circuit posi-

* Assistant Technical Editor

[1]Notes appear on page 26.

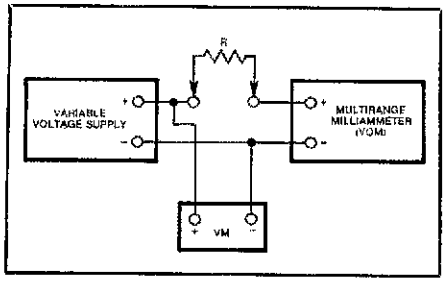


Fig. 1 — A diagram of the equipment arrangement for part (A) of the experiment to verify Ohm's law. The supply voltage is gradually increased, and the current through the resistor is measured at each step.

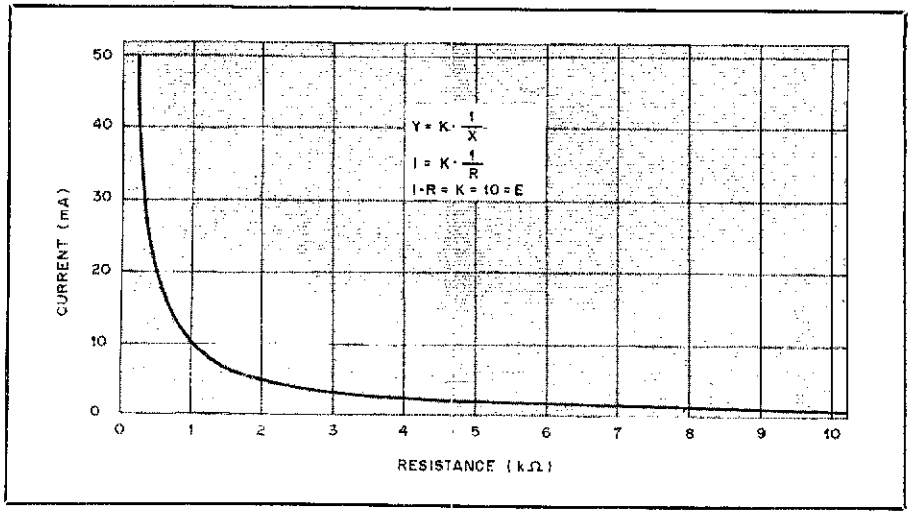


Fig. 2 — Graph of typical results from part (B) of the Ohm's law experiment.

tions. Select 10 or more resistors ranging from about 47 Ω to 10 kΩ. Be sure to record the exact values used. You may have to adjust the power-supply voltage slightly for each resistor in order to assure a constant voltage throughout the experiment. Now plot another graph, this time with resistance on the X axis and current on the Y axis.

This graph will not be a nice straight line but a curved line with very large current at low resistance and a current that is asymptotic to zero (or gets closer and closer to zero, but never actually becomes zero) as the resistance becomes very large. See Fig. 2 for a sample graph. This curve is called an inverse proportion. The product of any current value and a corresponding resistance will give the value of voltage you used. Both parts of this experiment illustrate the basic principles of Ohm's Law.

Construction

Carbon-Composition Resistors

Perhaps the most common type of resistor is the carbon-composition type. A mixture of carbon granules and clay or another bonding agent is made. The proportions of carbon and clay determine the approximate value of the resistors to be made from each batch. The compound is then formed around a pair of wire leads and baked. Finally a protective, insulating coating is put on the resistors and they are "graded out" as to resistance value (Fig. 3A). A certain batch can be made to target a particular resistance, but the actual resistors will have a range of values.

All of the resistors in a batch will be within ±20% of a standard value. Tolerances of ±10%, ±5%, and even ±2% can be obtained by sorting, or selecting individual resistors from each batch. The stability of carbon-composition resistors is not good enough over a typical operating lifetime to warrant selecting tighter tolerances. These resistors are manufactured with power ratings of 1/8, 1/4, 1/2, 1 and 2 W by controlling the diameter of the resistance element.

The standard component values, used for fixed resistors, some capacitors and other small components, are based on a number series. Each value differs from the previous value by a constant multiplier. The preferred values are rounded to two significant figures to make up the series. For tolerances of ±20%, ±10% and ±5%, the multipliers are $10^{1/6}$ (1.47), $10^{1/12}$ (1.21) and $10^{1/24}$ (1.10), respectively.

Most small calculators will find a power of ten. After you obtain the appropriate power of ten you simply multiply the number by itself, and each succeeding number by the same constant. Try generating one of these series, then compare your answers with Table 1. A complete listing of standard values can be found in *The ARRL Electronics Data Book.*[3]

Table 1
Standard Resistor Values

Tolerance		
±20%	*±10%*	*±5%*
10	10	10
		11
	12	12
		13
15	15	15
		16
	18	18
		20
22	22	22
		24
	27	27
		30
33	33	33
		36
	39	39
		43
47	47	47
		51
	56	56
		62
68	68	68
		75
	82	82
		91
100	100	100

Note that only one decade of values is given here. To find larger (or smaller) values, multiply by multiples of 10 (or divide by 10).

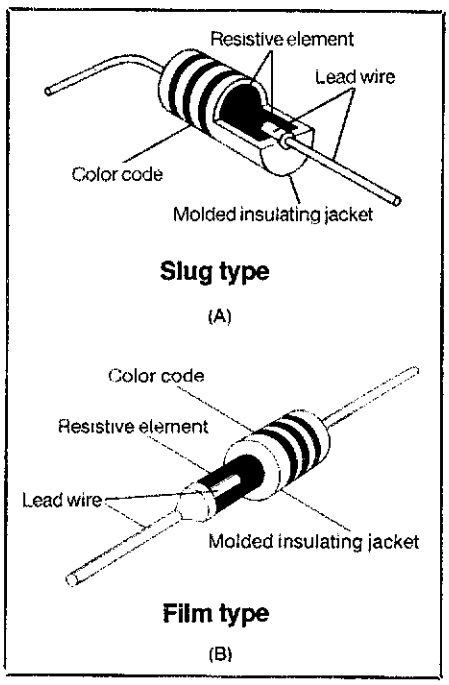


Fig. 3 — The construction of a carbon composition resistor is shown at A. B shows the construction of a carbon film resistor. (drawings courtesy Stackpole Components Co., Raleigh, North Carolina)

Some advantages of carbon-composition resistors are the wide range of available values, low inductance and capacitance, good surge-handling capability, and the ability to withstand small power overloads without being completely destroyed. The main disadvantages are large resistance changes with temperature change, operating time or on-the-shelf aging, and moisture or humidity. Several major manufacturers no longer make carbon-composition resistors, mainly because of the high cost and poor stability as compared to film-type resistors.

Operation at frequencies above 1 MHz will decrease the effective resistance of

carbon-composition units, and this should be taken into account in designing circuits. Other design goals should be to provide adequate cooling, to operate the resistor at no more than half its allowable power rating, and to not mount other heat-producing components within one diameter of the resistor.[4]

Carbon-Film Resistors

Another type of carbon resistor is the carbon-film unit. These are manufactured by using high temperatures to break down certain gaseous hydrocarbons. The resulting carbon is then deposited in a thin layer or film on a cylindrical ceramic form. The resistor is sealed with a plastic or other insulating material (Fig. 3B). They are commonly available in 1/8-, 1/4- and 1/2-W sizes with tolerances of ±5% and ±2%. The thickness of the deposited film provides a means to control the final resistance.

The major advantages of carbon-film resistors are low cost and improved stability with age and temperature changes. These resistors cannot withstand electrical overloads or surges. In fact, the film will open quickly under these conditions, so they can actually be used as fuses for some applications. Corrosion under the end caps was reported to cause open circuiting with early-production units; even those kept in storage. Silver-plated end caps and improved moisture-resistive coatings seem to have cured this problem however.

Metal-Film Resistors

Metal-film resistors provide much better temperature stability than other types, but they cost a bit more. As the manufacturing process is improved, prices continue to fall. Metal-film resistors, currently priced between carbon-composition and carbon-film types, are becoming increasingly popular for many general-purpose applications.

There are a variety of manufacturing methods being used to make metal-film resistors. One technique is to vacuum deposit a thin layer of Nichrome or other resistive alloy on a glass or ceramic form. Additional methods involve screening and other coating techniques to produce a film of metal on the base or substrate. This film is trimmed in a spiral, or helical, fashion to obtain tolerances of from ±5% to ±0.1%. The amount of film that is trimmed away determines the path length and conductor size in the resistor. This trimming can be done on a mechanical lathe, or by means of a laser. Fig. 4 illustrates the much-higher-resolution track that can be cut using laser technology.

The spiral track means that metal-film resistors may tend to exhibit some inductance, especially at frequencies above about 10 MHz. This effect is increased for the higher-value resistors because a tighter spiral will be required. There is very little skin effect with film resistors because of the thin film, so the resistance will not decrease with increasing frequency.

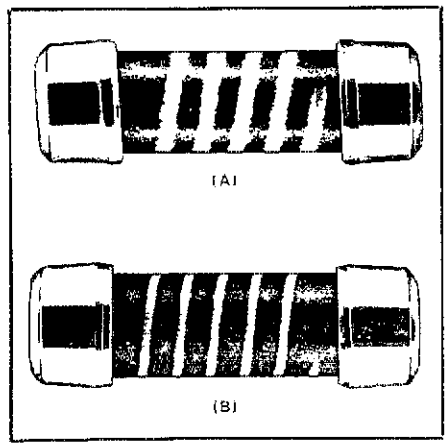


Fig. 4 — Metal-film resistors are shown in these photos. At A is a spiral track cut in the film using a mechanical lathe, and at B is a track cut using laser techniques. (photos courtesy RCD Components, Inc., Manchester, New Hampshire)

Metal-film resistors are generally low-power units (1/10 to 3 W), but they can be made in power ratings up to 20 W. After the film has been deposited and cut to specification, the entire unit is coated with a thermosetting resin to protect the resistor from mechanical damage or damage from moisture or chemicals.

Metal-oxide resistors are similar to metal-film resistors. A vapor or spray of tin-chloride solution is deposited on a heated glass substrate. Additives are used to modify the properties of the resulting tin-oxide film. This allows the manufacturer to produce specific temperature coefficients and control other resistor parameters. These resistors produce very little noise and exhibit excellent high-temperature operation. They are generally flame proof and can be made with power ratings up to 400 W, although the most common ones are in power ratings of 10 W or less.

Wirewound Resistors

Wirewound resistors are probably the most diverse type in terms of construction technique. Typically, a Nichrome wire (or other resistance alloy) is wound on an insulating form. The core may be a ceramic rod or tube, fiberglass or other material. It may be cylindrical, flat or rectangular. The completed resistor has leads welded in place, and the entire unit is coated with vitreous enamel, a protective silicone coating, cement or other insulating sealant (Fig. 5). Wirewound resistors are made in power ratings from 2 to 1500 W, with resistances of less than an ohm to a megohm. They are highly temperature stable, and can handle large power overloads if mounted in the clear to dissipate the heat.

Wirewound resistors have a significant inductance and distributed capacitance, and so are not suitable for use at radio frequencies. Some resistors are made with a so-called "non-inductive winding." These have the winding direction reversed half way through, so that the inductances will cancel. Even these may have an inductance of as much as 0.5 μH at 1 MHz, however.

Other Resistor Types

There are a variety of other resistor types on the market. Chip resistors are low-power, leadless devices for low lead-inductance rf applications. Amateurs are most interested in chip resistors for use in uhf and microwave equipment (Fig. 6). Thick-film resistor networks provide a variety of configurations in single in-line packages (SIP). These are also available in dual inline packages (DIP).

Two types of nonlinear resistors may also hold some attraction for the amateur. Thermistors exhibit a specific, reliable resistance change as the ambient temperature changes. These can be used in temperature sensing circuits and other related applications. Voltage-Dependent Resistors (VDR) or Metal-Oxide Varistors (MOV) have a significant, nonlinear change in resistance with a changing voltage applied to their terminals. When the voltage increases to a certain point, there is a sudden drop in resistance, allowing a much larger current to flow. Varistors find ap-

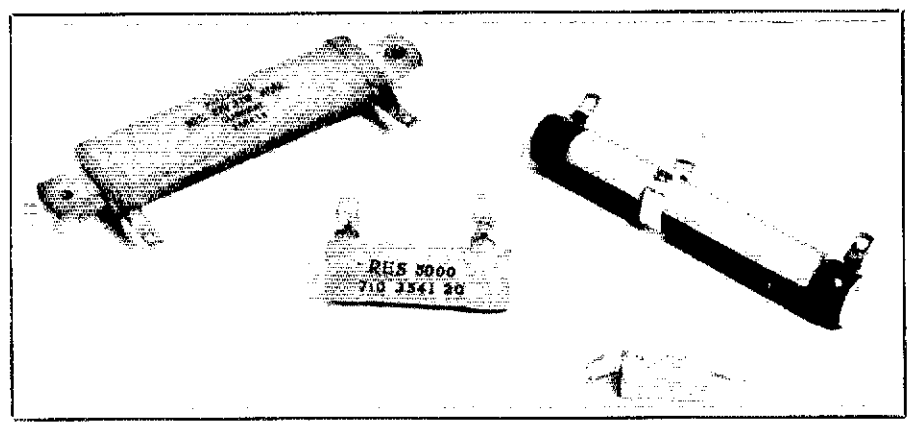


Fig. 5 — Examples of some wirewound resistor types.

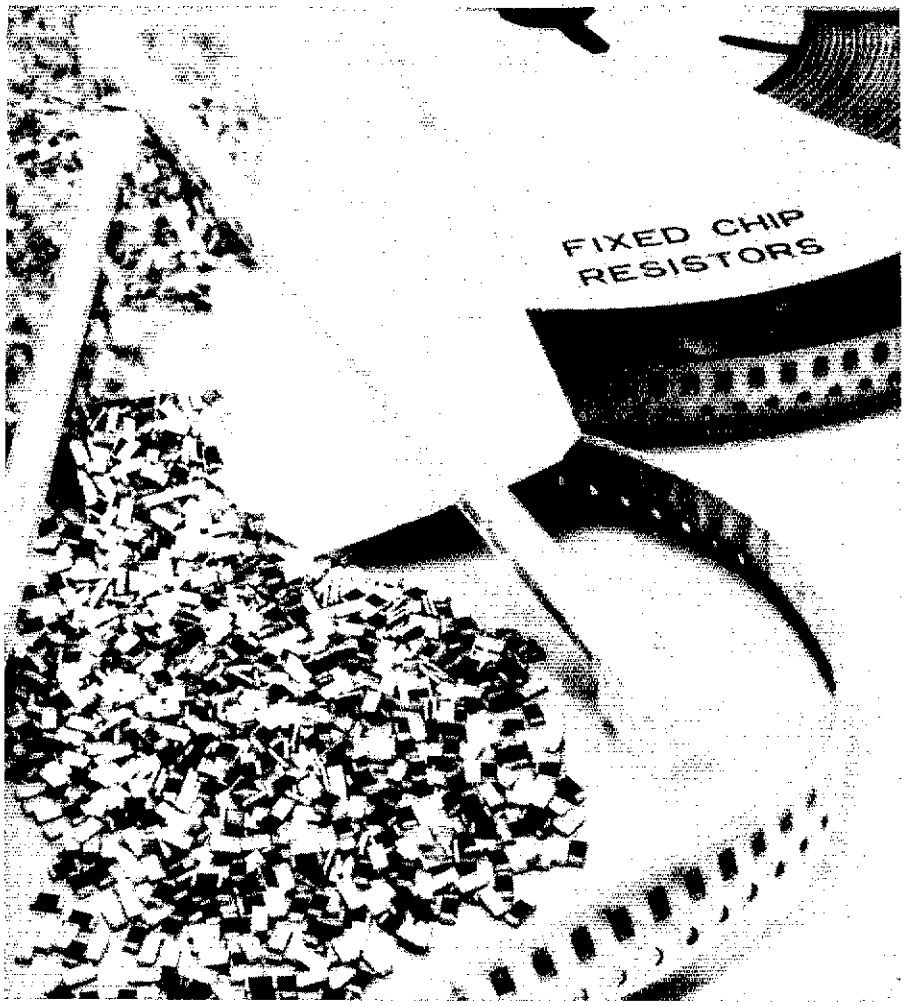


Fig. 6 — Photo of some chip resistors. (courtesy Stackpole Components Co., Raleigh, North Carolina.)

plications in RFI suppression, transient-voltage suppression, contact protection and other circuits. They resemble large ceramic capacitors, as can be seen in the title photo.

Variable Resistors

Variable resistors are available in a variety of styles and power ratings. The most common construction technique is to use a carbon-coated substrate as the resistance element, with a spring-loaded movable contact as the means of changing the resistance. Most of these require a rotation of slightly less than one full turn to cover the entire resistance range.

Another style of variable resistor is the multiturn trimmer potentiometer. These normally consist of a flat ceramic base coated with carbon material. The spring-loaded contact is moved by means of a threaded rod (see Fig. 7), and the entire unit may be sealed in plastic or have a metal cover riveted in place. Some of these small trimmers may have a wirewound resistance element, so you should be cautious about using them in rf circuits unless you can verify the construction.

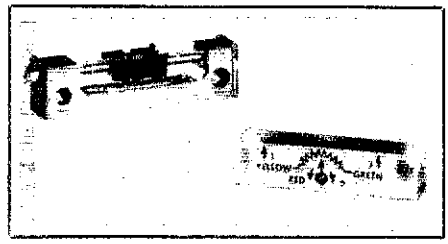


Fig. 7 — This photo shows the general construction of a multiturn trimmer potentiometer.

Wirewound resistors can include a moveable contact, either as a spring-loaded adjustment or as one that is set by hand. These can be rated to dissipate large amounts of power, and are often used as a type of autotransformer.

As you adjust the resistance of some potentiometers, you will notice that the resistance will change equal amounts for each degree of control-knob rotation. This is called a linear-taper potentiometer. A far more common situation is the one in which

Table 2
Nominal Resistor Dimensions

Power Rating (Watts)	*Body Length (Inches)*	*Body Diameter (Inches)*
1/8	0.145	0.062
1/4	0.248	0.094
1/2	0.375	0.142
1	0.562	0.225
2	0.688	0.313

mm = in. × 25.4.

the resistance change varies dramatically as you turn towards the high-resistance end of the scale. This is called an audio-taper, or logarithmic potentiometer. Such a resistance change is designed to approximate the way a human ear detects changes in volume of a sound. At low volume (low resistance above ground) a fairly small change in volume will be noticeable, but at higher volumes the ear is not as sensitive to changes, so a fairly large change in resistance is required to produce a noticeable volume change.

Tolerance Ratings

Resistor manufacturers specify a number of parameters that are important if you are to select a suitable resistor for a certain application. Perhaps the most obvious is the power rating. A good design goal is to not exceed about half the rated power dissipation for the resistor. Probably the easiest way to determine power ratings is by physical size. The larger the device, the more power it can handle. Table 2 summarizes the resistor body length and diameter measurements for common-size carbon-composition resistors. Film resistors have a slightly smaller diameter. You can always identify a film resistor by the thinner section in the middle. This is caused by the end caps that are placed on the resistor before it is coated and color coded. Wirewound resistors will usually have a power rating printed on the resistor body.

The value of a resistor is normally specified to within a certain tolerance, such as ±10%. This tolerance specifies the maximum variation from the nominal value that the resistor can be expected to have. In addition, the actual resistance will change with temperature, humidity and time in use.

The Temperature Coefficient Range (TCR) rating is usually given in parts per million per degree Celsius (ppm/°C). Resistors can have a positive TCR (resistance increases with a temperature increase) or a negative TCR (resistance decreases with a temperature increase). Power dissipated in the resistor, heat radiated from nearby components and ambient air temperatures can all affect the value of a resistor, so these factors must be considered when you are designing a circuit. Electrical conditions can be controlled

somewhat by specifying a certain TCR. For example, if a resistor with a positive TCR is used in a critical circuit, as the current through the resistor increases, the resistor will heat up. This will cause the resistance to rise, reducing the amount of current flowing in the circuit.

Manufacturers also specify the amount of resistance variation with relative humidity, resistance change after operation at a rated load for a certain time, such as 1000 hours, and a load derating factor that indicates the maximum ambient temperature to use the resistor at.

All amateurs should be familiar with the standard color code used to indicate values and tolerances. Table 3 summarizes this code. You will find three or four color bands on most resistors. One band will be closer to one end, and this gives the code for the first significant digit of the resistance. The second band indicates the value of the next digit. The third color band tells you how many zeros to add, and the fourth one indicates the tolerance. For carbon-composition resistors, the tolerance band will either be missing (±20%), silver (±10%) or gold (±5%). High-precision film resistors may have five color bands — three significant digits, a multiplier and a tolerance band. The tolerance band on these resistors may be gold, red, brown, green, blue or violet, as shown in Table 3.

Table 3
Resistor Color Code

Color	Significant Digits	Multiplier	Tolerance (± %)
Black	0	—	—
Brown	1	10	1
Red	2	100	2
Orange	3	1000	—
Yellow	4	10000	—
Green	5	100000	0.5
Blue	6	1000000	0.25
Violet	7	—	0.1
Gray	8	—	—
White	9	—	—
No Band	—	—	20
Silver	—	0.01	10
Gold	—	0.1	5

If you happen to come across a resistor with a single black stripe, don't be confused. These "zero ohm" resistors are simply a convenient way for manufacturers to place a jumper on the circuit board using automatic-insertion equipment!

Some types of resistors have actual values and ratings printed on them. To determine the other resistor specifications, you will have to consult the manufacturer's literature.

The average ham may not need to know all of these specifications in designing a simple piece of equipment, but being aware that they exist should help in making informed decisions concerning the suitability of a component for substitution.

Notes

[1] R. Weast, ed., *Handbook of Chemistry and Physics* (Cleveland: The Chemical Rubber Co., 1969).
[2] *Reference Data for Radio Engineers* (Indianapolis: Howard W. Sams & Co., Inc., 1975), Ch. 5.
[3] D. DeMaw, *ARRL Electronics Data Book*, (Newington: ARRL, 1976), p. 8.
[4] See note 2.

Strays

☐ *[Editor's Note: From time to time, we'll be publishing a profile on one of our Contributing Editors, to acquaint readers with people not on the Hq. staff who write columns that appear in* QST *month after month. Here is the first installment.]*

CE PROFILES

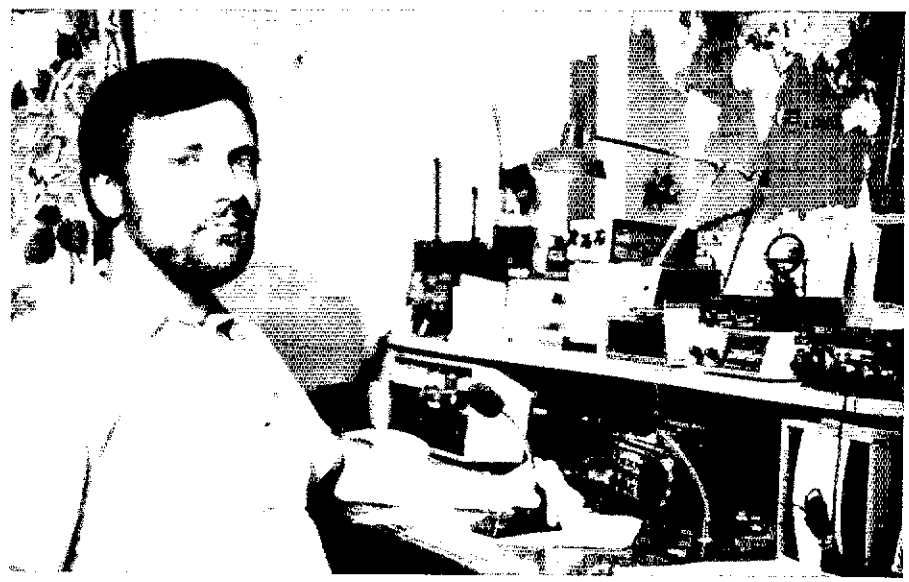
Contributing Editor Stan Horzepa, WA1LOU, has the distinction of conducting not one but two *QST* columns — FM/RPT and On Line. Stan became the conductor of FM/RPT in June 1979 having been on the ARRL Hq. staff for about two years. Two months later he left Hq. but continued with the column as contributing editor. On Line debuted in August 1981.

Stan's interests in repeaters and computers predate the multitudes that now populate these two fields of Amateur Radio. "Back in the early '70s, I had the good fortune of meeting (via 2-meter a-m) WA1NQP, who built one of the first 450 repeaters in the Northeast. That got me started in the world of 'boat anchors' and mini-rigs," says Stan. "And, when Radio Shack unveiled their first TRS-80® , I was the first one on my block (and in town) to buy one!"

First licensed in 1969, Stan is an Extra Class licensee and an ARRL Life Member. He has held a number of ARRL appointments (ASCM, NM, OBS, ORS, OVS) and is the former SCM of Connecticut. He has numerous operating awards, including A-1 Operator, BPL, DXCC, Public Service, PSHR, WAC, WAS and the Central Radio Club Cosmos silver medal for being among the first to operate through the Soviet amateur satellites.

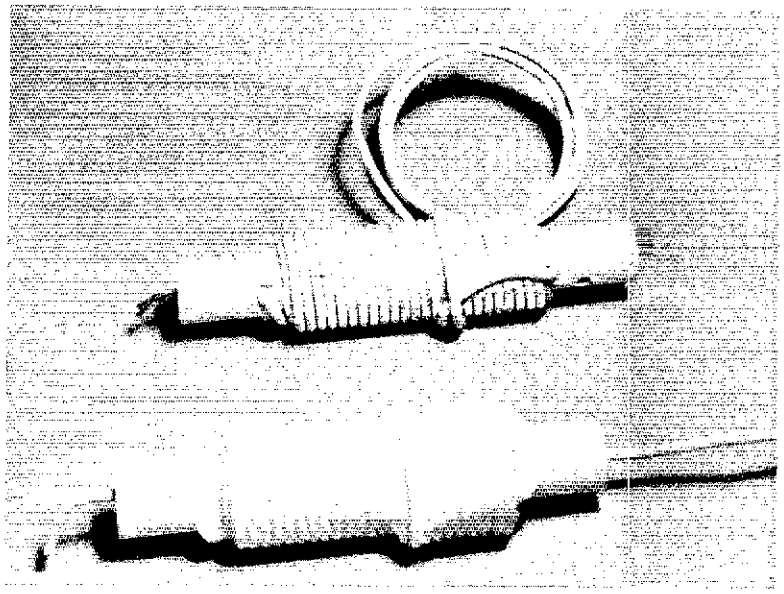
Stan lives in Wolcott, Connecticut, and is a senior technical writer for General DataComm Industries, Inc. He has a BA from the University of Connecticut and a JD from Western New England College. In 1977-78, Stan was a communications assistant in the Public Service Branch of the League's Communications Department. This sparked Stan's interest in traffic handling, and led to his founding of the Western Connecticut Net in the midst of the blizzard of 1978.

Stan operates RTTY, chases hf and vhf DX (278 countries worked on hf; 25 states on 144 MHz), and participates in contests. When not radiosporting, he raises giant squash, writes a book on UFOs and roots for the Boston Red Sox.



CE Stan Horzepa, WA1LOU, has his hands full these days alternating between columns on repeaters and computers. *(photo by Jeanette Horzepa)*

Dual-Frequency Antenna Traps



Although L-C antenna traps have been around for years, you've never seen any like these!

By Robert H. Johns,* W3JIP

Here is a new way to make antenna traps using only coils, without scarce and expensive high-voltage capacitors. An additional bonus is that these traps can be made to resonate simultaneously on two frequencies, greatly expanding their capabilities!

Cross-Linked Polyethylene (XLP) Insulation

The key to these new traps is a specially insulated wire that withstands several kilovolts. This wire is wound one layer on top of another, which produces some capacitance between the layers (Fig. 1). Enough capacitance in parallel with the coil inductance produces a resonant circuit, which can be used as an antenna trap. In transmitting service, this capacitor (formed by the insulation) will need to withstand high voltage and high currents without much dielectric loss. XLP, a recently developed type of insulation, has the excellent high-voltage and low-dissipation properties of polyethylene. It is also tough and hard from additional polymerization (or cross linking) of the molecules.

All of the traps described in this article are made from wire covered with XLP insulation. It is normally used for telephone-switchboard service and costs about 10 cents a foot for no. 14 stranded, type-SIS wire.[1,2]

How They Work

In Fig. 1, notice that the two coils are wound in bifilar fashion. The more turns added to the two coils, the lower the resulting frequency, since inductance and capacitance are increasing simultaneously. This tuned circuit is similar to the filters described by Doty, and is an extension of the coaxial cable traps of O'Neil and Johns.[3,4,5]

A second resonant frequency is achieved by winding a small *third* layer on top of the first two (Fig. 2). Another tuned circuit is formed by the capacitance between the outermost coil and the two others, together with the inductance of the small coil. This higher-frequency resonance appears only if the third coil is less than half

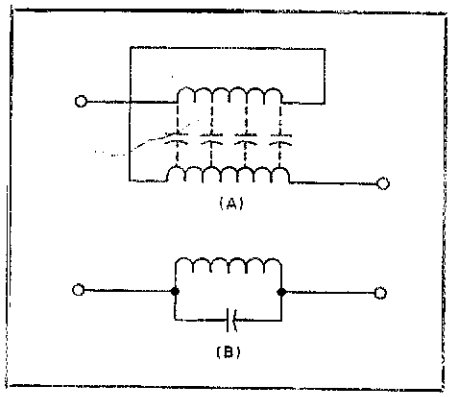


Fig. 1 — Illustration of distributed capacitance between coil turns (A). Electrical equivalent circuit of A (B).

*Chief Engineer, Barker and Williamson Co., 10 Canal St., Bristol, PA 19007

[1]Notes appear on page 30.

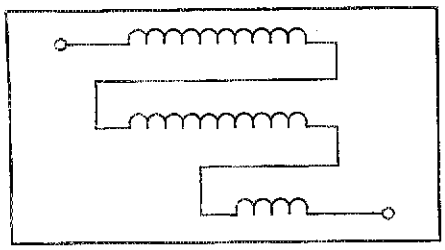


Fig. 2 — A dual-frequency antenna trap. The lower resonant frequency is determined by the entire three-layer coil and distributed capacitance. The higher-frequency resonance is determined by the smallest coil and associated capacitance. The two circuits interact, but can be adjusted individually by varying the number of coil turns.

the length of the larger coils. If too many turns are added, this resonance gets broader and shallower, finally disappearing when the coil becomes too large.

Dual-frequency resonance can be used to good advantage in a trap antenna. The common trap dipole for 80 and 40 meters will also work on 15 meters if the traps are tuned to 21 MHz. The half-wave section on 40 meters will function as three half-wave elements on 15 meters, and can also be fed at the center.

Construction Principles

The basic trap is a 40/15-meter version, and is made from ½-inch PVC pipe. Cut the PVC pipe to 6-inch lengths. One length is needed for each trap. Drill holes in the pipe, as shown in Fig. 3A. The form is now ready to accept the winding.

Start winding the trap by passing a 21-foot length of wire through the center of the form. Pass the ends out through a set of holes spaced 4 inches apart. One end of the wire should protrude approximately 8 feet from the form, the other approximately 13 feet. With the 8-foot wire on your right, wind it toward the left edge of the pipe for a total of 25¼ turns (Fig. 3B). Feed the end of the wire through the appropriate hole and out through the center of the trap to form a pigtail. Now coil the other wire on top of the first layer by winding in the opposite direction of rotation, laying each turn in the spaces between first-layer turns (Fig. 3C). Skip a space at the beginning of the second layer, for it has only 23 turns. This coil should finish at the right side of the trap. Feed the remainder of the wire *completely* through the trap form by passing it through two opposing holes.

Take the end of the second-layer wire (there should be about 2 feet left) and lay it perpendicular to the second-layer turns. Count 10 spaces from the right end of the outer coil and make a 90° bend in the wire at this point (Fig. 4). Lay the wire into this space and wind 9¾ turns over the second layer, making sure the coil is following the same direction of rotation as the second layer. The third layer is actually wound *over* the wire that lies perpendicular to the

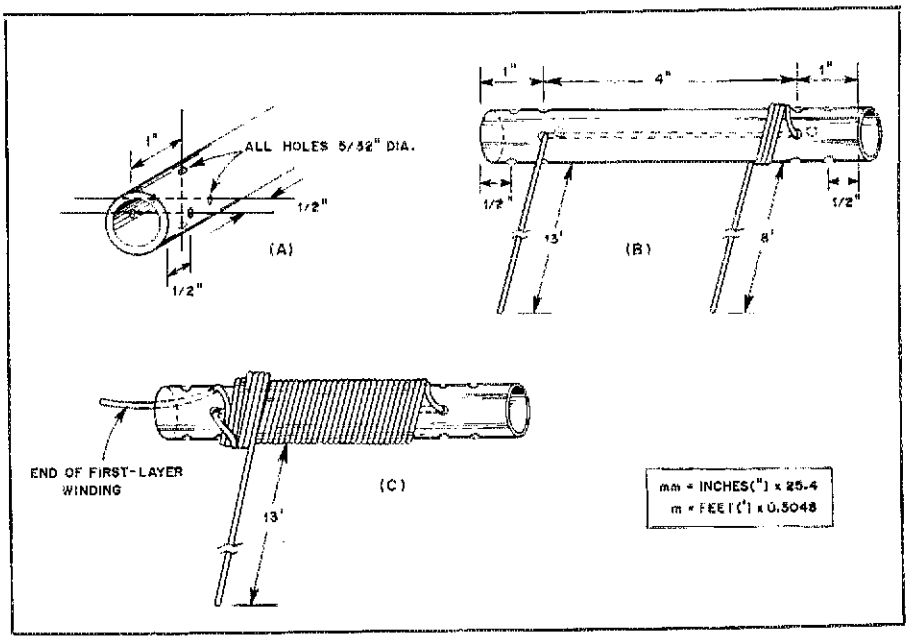


Fig. 3 — Construction details for a 40/15-meter trap. All text instructions follow this orientation of the coil form. Holes should be drilled as shown in A. First-layer coil winding is shown in B, and second-layer details in C.

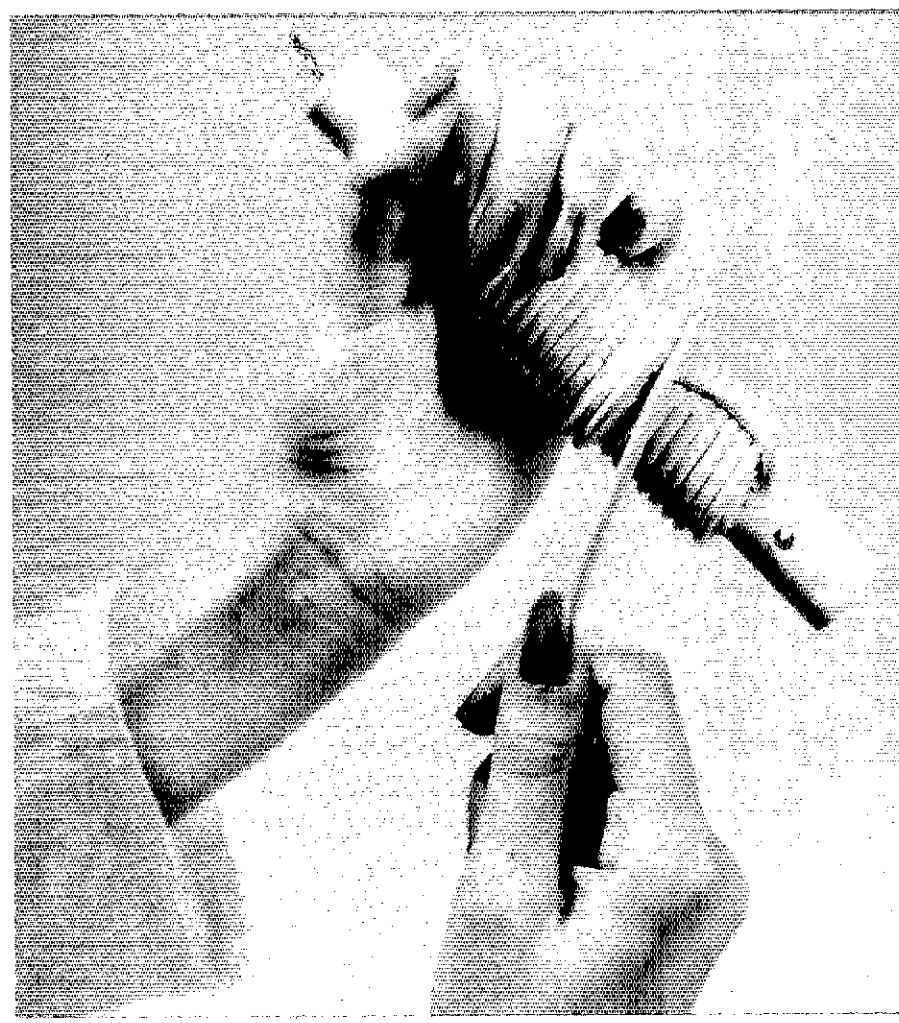


Fig. 4 — The third-layer coil winding technique for a 40/15-meter trap. This coil is wound on *top* of the wire lying over the second-layer coil.

coils. This outermost coil should end at the right side of the form. Pass the remaining wire through the appropriate hole and out through the center of the trap. You should now have a completed trap with three layers of windings and a pigtail of wire protruding from each end.

A Four-Band Antenna

Fig. 5 shows the dimensions of a trap dipole using one pair of the 40/15-meter traps described above. It is resonant on 80, 40, 15 and 10 meters.

The 10-meter resonance was a pleasant surprise, and exists because the entire antenna is resonant as five half-wavelengths, capacitively loaded by the traps. The 1½-λ and 2½-λ configurations on 15 and 10 meters, respectively, are not a good match to 50-Ω coaxial cable; a short matching section is used. This is made from the no. 14 SIS wire used in the traps. Two 6-foot pieces of wire lightly twisted together makes a ¼-λ, 10-meter transformer (about 130-Ω) that also provides a good match on 15 meters. The matching section is so short that it doesn't affect the 40- and 80-meter bands significantly. The SWR curves of this antenna are shown in Fig. 6.

Tuning

Here is a tuning trick that can be used with any trap antenna, not just the ones shown here. An insulated wire is passed through or around a trap and capacitively coupled to the antenna wire on either side of the trap (Fig. 7) This effectively places a differential pair of capacitors in parallel with the trap capacitor. The equivalent circuit is shown in Fig. 8. When the tuning wire protrudes equal amounts from both sides of the trap, additional capacitance is at a maximum. In this case, the trap (and antenna) frequency will be brought down to the lowest possible value. Sliding the tuning wire to either side causes the differential pair to decrease in series value, thereby raising the trap (and antenna) resonant frequency. The tuning wire can therefore be slid just far enough to bring the antenna up to the desired resonant frequency.

When the 40/15-meter traps are tuned in this manner, 40 meters is affected the most, with 15 meters affected to a lesser degree. This works out well, since 15-meter resonance is usually quite broad and should not need much adjustment. Although traps should normally be constructed to resonate in the middle of the band, they should resonate at the top of the band when tuning wires are to be used. They will bring resonance back down into the center of the band.

To lower the resonant frequency on 10 and 80 meters, another simple tuning scheme is used. At the ends of the antenna, some of the wire is folded back along itself and then out through a knot at the end (Fig. 9). To lower the resonant frequency on 10 and 80 meters, some of this wire is pulled out and attached to the nylon guy rope. If the antenna is set up as an inverted V, this adjustment can be made without loosening the guys.

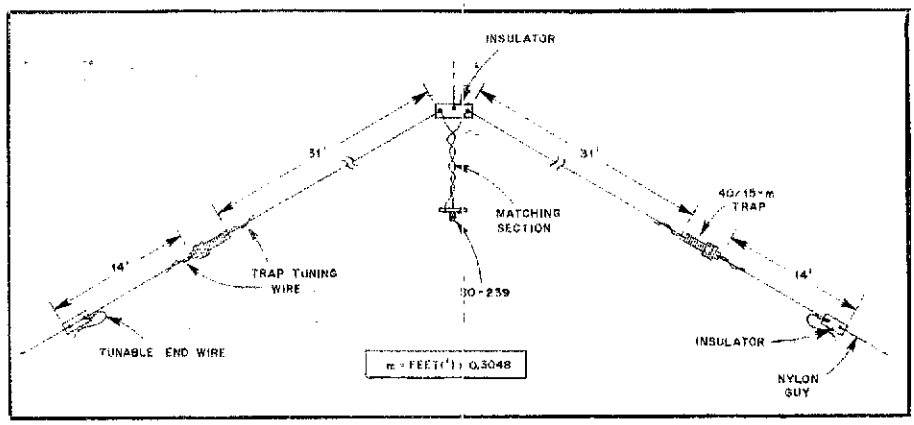


Fig. 5 — Dimensions of an 80/40/15 and 10-meter antenna using one pair of 40/15-meter traps. The center insulator can be made from ½-inch PVC pipe, and the SO-239 housing from 1-inch PVC slip caps. The 14-foot dimension includes the length of wire folded back for tuning. See text for details.

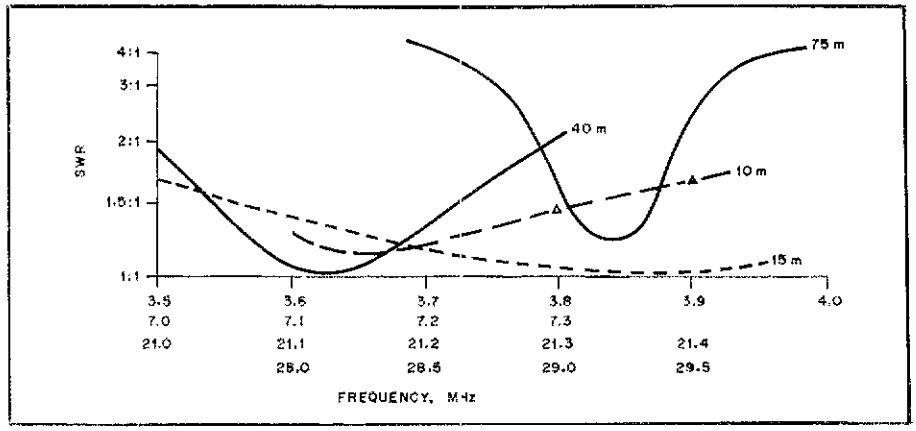


Fig. 6 — SWR curves for the antenna in Fig. 5.

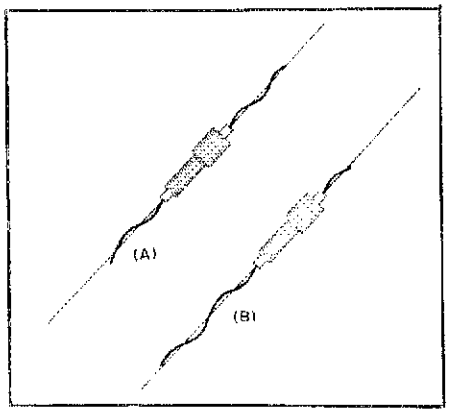


Fig. 7 — The trap-tuning element is a 3-foot length of no. 14, XLP-insulated wire. It is fed through the trap and loosely wrapped around the antenna wire on either side. At A, the capacitance is maximum and the resonant frequency will be lowest. At B, the parallel capacitance has been reduced and the resonant frequency will be higher than in A. A 3-foot wire can tune the antenna over 500 kHz on 40 meters. See text.

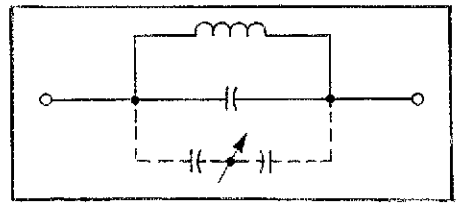


Fig. 8 — Electrical equivalent of a trap and tuning wire. The tuning wire forms a differential capacitor (dashed lines), which changes in series value as the wire is slid through the trap.

Other Frequency Combinations

Fig. 10 shows a 10- and 15-meter trap combined with a loading coil to shorten overall antenna length. The long coil is a single layer with a self-resonant frequency of approximately 29 MHz; it also serves as the loading coil. The smaller, second-layer coil forms a 21-MHz trap. The outer portion of the antenna beyond the traps can be cut for any band lower in frequency than 15 meters (except 20 meters). Fig. 11 gives

dimensions for a 40/15/10-meter antenna.

This antenna can also be tuned with insulated wires running through the traps. Two wires are used, one into each end of the trap (Fig. 10). The 15-meter tuning is quite critical. A ½-inch shift in the tuning wire position moves the resonant frequency across the entire band!

Last-Minute Hints

When constructing traps, the number of coil turns may need to be adjusted for your particular wire and layout. Typical variations in the insulation thickness are enough to change the number of turns required. A GDO (grid-dip oscillator) is essential when building traps, but don't try to measure the frequency of a trap with any wire connected to it or you will get an erroneous reading. Also, a trap cannot be dipped when it is in an antenna, for too many other resonances will appear. Once a trap is connected into an antenna, all measurements must be done from the feed point. When your traps are completed, wrapping them with electrical tape or dipping them in liquid silicone rubber to secure the turns in place is a good idea. This covering will also help protect the XLP insulation from the damaging effects of ultraviolet radiation.

Many features of the traps and antennas described here have been patented or are patent pending. Amateurs are welcome to build these for their own use, but manufacturers are cautioned that all patent rights will be strictly enforced.

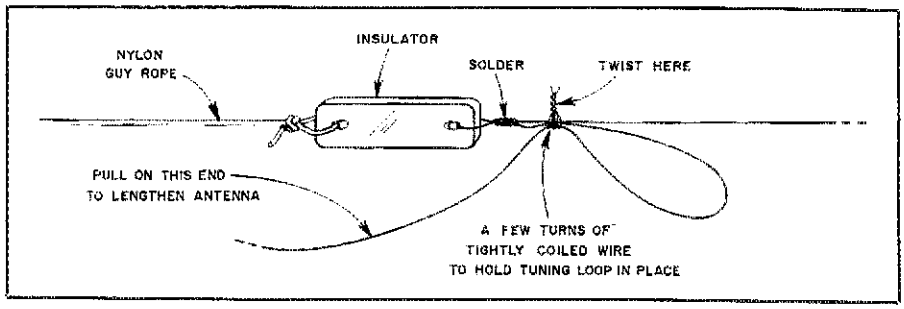


Fig. 9 — Method for tuning 80 and 10 meters on the four-band antenna in Fig. 5. Resonant frequency is lowered by pulling out the free end of the loop.

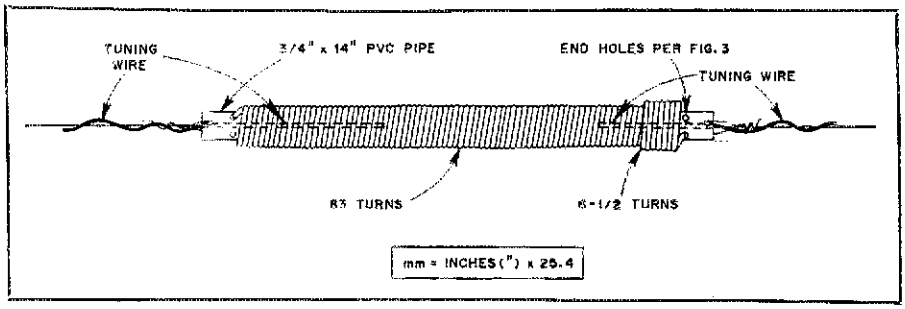


Fig. 10 — Dimensions of the 10/15-meter trap and tuning wires. The trap is wound in the same manner as the 40/15-meter version described in the text. Since this is only a two-layer coil, the end of the first layer is passed completely through the form and laid back over the windings. The second layer is then wound over this wire.

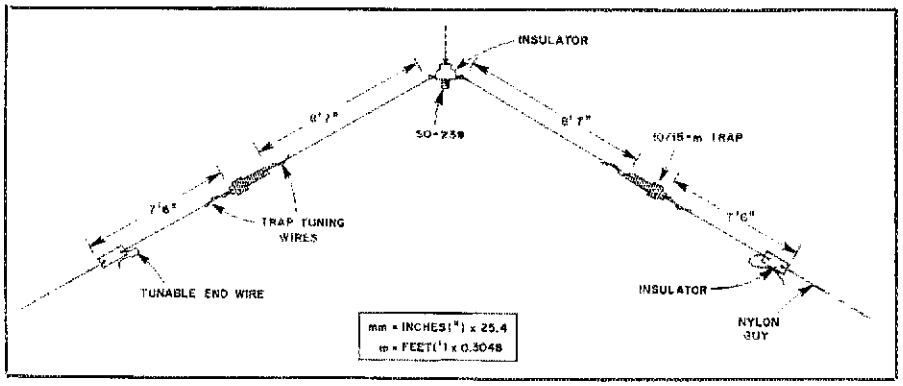


Fig. 11 — A 40/15- and 10-meter antenna using the traps shown in Fig. 10. Because of the loading coils incorporated in the traps, this antenna is approximately half the size of a standard 40-meter dipole.

Notes

'm = ft × 0.3048; mm = in. × 25.4.
²This wire is available from the local wire distributors and the Barker and Williamson Co., 10 Canal St., Bristol, PA 19007.
³A. Doty and A. Macnee, "Introducing the INCONS," *QST*, Feb. 1979, pp. 11-14.
⁴G. O'Neil, "Trapping the Mysteries of Trapped Antennas," *Ham Radio*, Oct. 1981, pp. 10-16.
⁵R. Johns, "Coaxial Cable Antenna Traps," *QST*, May 1981, pp. 15-17.

New Products

AVATAR MAGNETICS "GORILLA HOOKS" TOWER CLIMBING ACCESSORY

☐ You're 100 feet in the air. It's been a long, hard day installing your new 6-element 20-meter "death ray". Sure, it was a lot of work and you're exhausted. Descending the tower with the setting sun, your mind wanders and you grin in anticipation of those pile ups you're going to breeze through. Suddenly, halfway down the tower, you lose your footing. You scream before realizing that your Gorilla Hooks have saved your life. Instead of breaking your back in a 50-foot fall, you bruise your knee after falling less than 1 foot. After your heart stops beating like a race-car engine at top speed, you finish your descent in safety and go on to flex your new-found muscles on 14.001 MHz.

Avatar Magnetics handles a complete line of tower-climbing belts and accessories. The latest addition is the "Gorilla Hook." These hooks snap on to the D-rings of a climbing belt (the same rings the safety strap attaches to). The idea is to alternately attach the Gorilla Hooks to the next-higher tower rung as you climb. The climber is secured to the tower at all times when ascending or descending. In case of a slip, he or she cannot fall more than the Gorilla Hook's cable length.

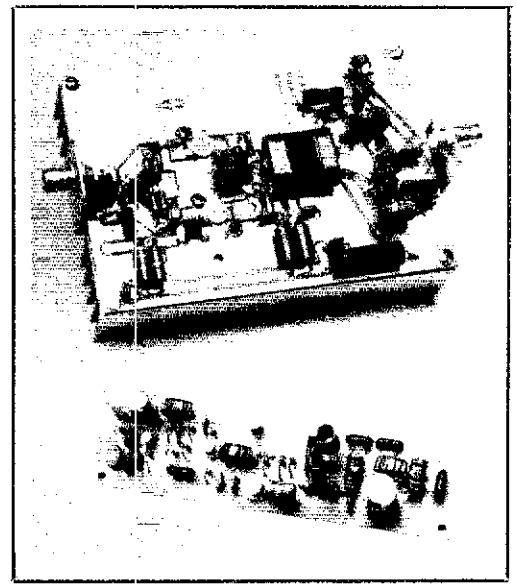
Gorilla Hooks are made by the Klein Tool Co., a respected manufacturer of high-quality climbing belts. The hooks themselves are made of forged steel and are attached to belt snaps by a flexible steel cable. The belt snaps must be pressed on both sides to open, preventing them from accidentally unhooking from the belt. Avatar rates the Gorilla Hooks at 4000-lb overall strength.

Although we didn't have the opportunity to hang a 4000-lb gorilla from the hooks, they are easily capable of supporting the weight of a fallen climber. Workmanship is excellent, and a pair of these would be a welcome addition to a tower-climber's accessory collection.

Gorilla Hooks cost $73 per pair (postpaid to all U.S. ZIP codes), and are available from Avatar Magnetics Co. (attn: W9JVF), 1147 N. Emerson, Indianapolis, IN 46219. — *Mark Wilson, AA2Z*

A VXO CW Rig for 30 Meters

Does your present transmitter lack 30-meter provisions? Have you wanted to try this interesting amateur band? Here are the details for building your own solid-state transmitter — QRP or 60 watts.



By Doug DeMaw,* W1FB

Have you been reluctant to spend money on a new transceiver or transmitter, even though your present rig does not permit you to work 10.1 MHz? Frugality in these troubled economic times has made many of us a trifle "slow on the draw" when it comes to investing in hobby types of items. But, we can build a cw transmitter inexpensively and quickly if we wish to enjoy the interesting characteristics of the new 30-meter band. A general-coverage receiver can be used to receive on 10.1 MHz, or we might consider building a simple 30-meter converter for use with an existing ham-band-only receiver. This article describes a transmitter and includes a suggested design for a little receiving converter.

What's 30 Meters Like?

We examined the 30-meter band in general terms last month in *QST* while discussing various simple antennas for that band.[1] But briefly, it is a spectacular crossbreed of the 40- and 20-meter bands in terms of propagation. I have seldom found 30 meters closed because of poor propagation conditions. QRN is lower than on 40 meters, but slightly more prevalent than on 20 meters. Occupancy is very low, owing to the lack of contesting and "award chasing." Therefore, QRM is seldom a problem. I find 30 meters the best of the hf bands for keeping schedules beyond a 300-mile distance. Low power seems to do as well as the legal 250-W dc input limit. Many amateurs are found on the band with QRP rigs, and I have had no trouble copying stations with 1- or 2-W signals. One fellow I worked was using a modified Heath HW-7 QRP transceiver, and he was running 0.5 W. Despite the 300-mile distance, his signal was S 8, and he was using a dipole in his attic! Be sure to remember the band limits and authorized U.S. segments: 10.100 to 10.109 MHz and 10.115 to 10.150 MHz. *Do not operate from 10.109 to 10.115 MHz!*

The Transmitter Exciter Module

If you're a QRP enthusiast, it is likely that the circuit of Fig. 1 will appeal to you. It is simple and can be built in an evening. Pc boards and a parts kit are available.[2] Power output will be on the order of 1-2 W, depending on the characteristics of the transistors used from Q1 through Q3. If you are interested in having more available output power, the power-FET amplifier described earlier in *QST* can be connected to the output of this exciter/transmitter.[3] If that is done, the FETs can be changed from the MRF138s specified in the article to Motorola MRF171s, which are more readily available than the former ones. The '171 is rated at +65 V maximum, V_{DSS} and an I_D of 4.5 A continuous. Maximum power output is rated at 45 W per device from 2.0 to 200 MHz. This transistor is directly interchangeable with the MRF138.

A VXO is used in the circuit of Fig. 1. This frequency element provides excellent stability and ample frequency swing for the 30-meter band. Q1 functions as a Colpitts oscillator with feedback from source to gate. The crystal is "rubbered" (or pulled) by means of L1 and C1. A 10-kHz swing should be easy to obtain when using a quality AT-cut plated crystal in an HC-6/U style of holder. Surplus FT-243 crystals are not recommended because they may be sluggish and will not provide ample frequency shift when C1 is tuned through its range. Output for Q2 is taken from the source of Q1.

Q2, the buffer amplifier, operates Class A and is broadbanded. It has a gain of approximately 12 dB and helps to isolate the final amplifier, Q3, from the oscillator. This eliminates potential problems with chirp on the cw note. Also, Q2 gives the signal sufficient boost to drive the power FET, Q3. A broadband transformer, T1, provides the coupling from the collector of Q2 to the gate of Q3.

R1, the emitter-bias resistor of Q2, can be changed in value to control the output level of the exciter. If the little transmitter will be used as an exciter for the 60-W power-FET amplifier mentioned earlier, R1 will need to have increased resistance to limit the Q3 output to approximately 0.5 W. If not, the exciter will drive the power amplifier beyond the safe limits. You may want to add a 1-kΩ potentiometer between the low end of R1 and ground for use as a drive control.

A Siliconix VN67AF power FET is used at Q3. I chose this device because it is inexpensive and requires very little excitation to develop the desired power output. It is biased for Class B linear service, with a forward gate voltage of approximately 1.2. Class A operation, and greater linearity, can be had by changing the value of R2 to increase the gate bias to 3 V. This will lower the drive requirements from Q2. However, the idling current of Q3 will be greater with increased gate voltage.

T2 is also a broadband transformer. It transforms the Q3 drain impedance to that of the harmonic filter, FL1 (50 ohms). A simple half-wave filter ensures spectral purity, with all spurious responses being −40 dB or better, as required by FCC regulations. When driving a successive

[1]Notes appear on page 34.
*Contributing Editor, P.O. Box 250, Luther, MI 49656

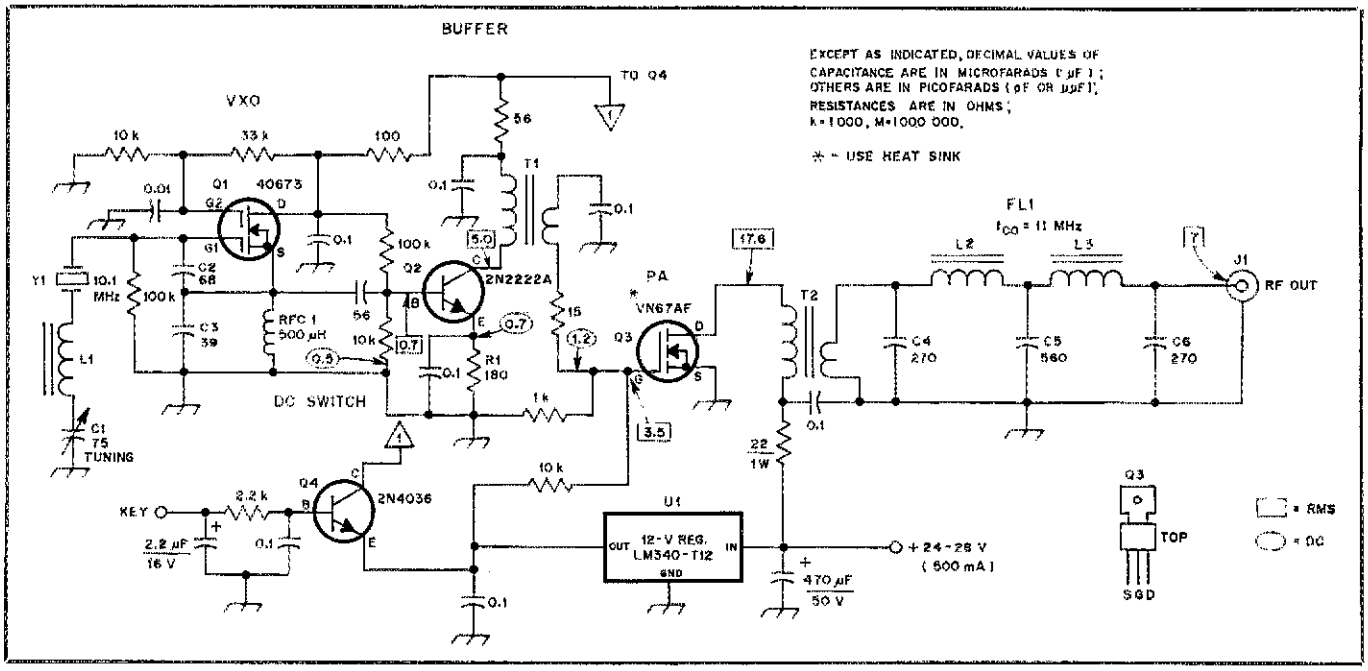


Fig. 1 — Schematic diagram of the 30-meter QRP transmitter/exciter. Fixed-value capacitors are disc-ceramic unless noted otherwise. Polarized capacitors are tantalum or electrolytic. Resistors are carbon-composition types, ¼-W, unless indicated differently.

C1 — Miniature air variable, panel mounted.
C2-C6, incl. — Silver mica or polystyrene.
J1 — Coaxial female connector of builder's choice.
L1 — 12-μH inductor. 50 turns no. 28 enam. wire on T50-2 toroid core.
L2, L3 — 0.72-μH inductor. 13 turns no. 24 enam. wire on T50-6 toroid core.
R1, R2 — See text.
T1 — Broadband transformer. Primary has 12 turns no. 26 enam. wire on an FT50-43 ferrite toroid. The secondary has six turns of the same type of wire.
T2 — Broadband transformer. Primary contains 15 turns no. 24 enam. wire on an FT50-43 ferrite toroid. Secondary has six turns of the same type of wire.
Y1 — Fundamental crystal, type AT in HC-6/U holder. Order for center of desired 10-kHz tuning range, 30-pF load capacitance.

power amplifier with the circuit of Fig. 1, clean excitation energy will be beneficial in assuring clean output from the power amplifier. It is always a good objective to supply the purest of driving power to any stage of a transmitter.

A 24-V power supply was chosen to permit Q3 to develop the desired output power easily. Although most power FETs will operate at low voltages, such as 12 V, they saturate readily at voltages below the rated potential. That is, a 28-V FET will deliver only a fraction of its rated power at 12 V. A VN46AF (available at Radio Shack stores) can be used at Q3 if we reduce the supply voltage to 18 or less. Unfortunately, the VN67AF contains a built-in Zener diode from gate to source, which can be shorted if the peak driving voltage to the gate is excessive on the negative half cycle. When this happens, the FET junction will become shorted, and that will be the end of our transistor! The safe gate swing for a VN67AF will not be exceeded in the circuit of Fig. 1.

A three-terminal regulator, U1, provides the operating voltage (regulated) for Q1, Q2, Q4 and the gate of Q3. This section can be eliminated if separate power supplies (12 and 24 V) are available, or if we choose to operate Q3 at 12 V. This reduced drain-source voltage at Q3 will require a different resistance value for R2 if we are to have the desired +1 to +3 V of forward gate voltage. Similarly, the turns ratio of T2 will need to be modified to accommodate the new drain impedance. The approximate impedance is obtained from $V_{DD}^2/2P_o$, where V is in volts and P is in watts.

Keying of the exciter is accomplished by means of Q4, which is a pnp dc switch. When the base is keyed (grounded) the transistor conducts, thereby allowing the +12 V to reach Q1 and Q2. This turns on the transmitter during key-down periods. Since Q3 operates in a linear manner, the keying is not hard (clicky) as it might be when keying the drive to a Class C amplifier. Two capacitors and a 2.2-kΩ resistor form a shaping network in the base lead of Q4. This aids in rounding off the sharp trailing edge of the cw waveform. Increasing the value of the 2.2-μF input capacitor at Q4 will further "soften" the cw note. If break-in delay is desired for the keying circuit, the module described in an earlier *QST* article can be used.[4] It is designed to prevent "hot switching" the final amplifier, which in turn protects the PA stage from no-load (momentary) damage. By avoiding hot switching of the PA (no antenna attached as the changeover relay cycles from receive to transmit), we also prevent unwanted spurious "blurps" from appearing on the air. Some commercial rigs are offenders in this regard. The referenced QSK module has switching capability for muting a receiver. It also features adjustable time constant for con-

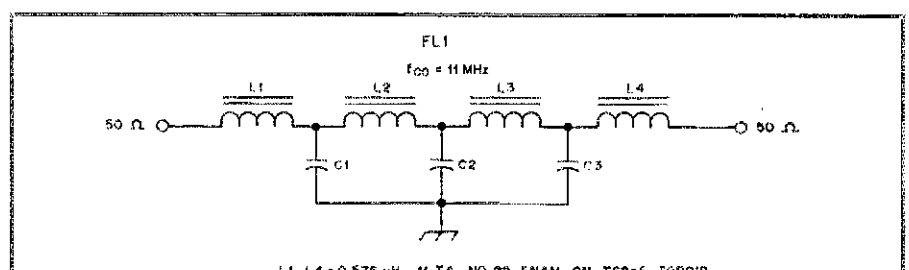


Fig. 2 — Details for modifying the power MOSFET amplifier of note 3 for use on 30 meters.

trolling the relay drop-out time. It can provide full QSK if a reed or mercury-wetted relay is used in place of the relay specified.

Interface to the Power-FET Amplifier

The exciter and the amplifier are designed for connection to 50-Ω loads. Therefore, we can use a short length of 50-Ω coaxial line to join the modules (output of the exciter to the amplifier input). A 28-V, 5-A regulated dc supply will handle the entire transmitter nicely. Many such power supplies are available from surplus houses at reasonable cost. Be sure to check the flyers and catalogs if you don't own a 24- or 28-V power supply.

We must permit only enough drive from the exciter to develop 60 or fewer watts of amplifier output power into a 50-Ω load. This will be on the order of 0.5 to 0.75 W typically. The +24 or +28 V line to the 60-W amplifier can be left operational at all times. This will avoid the need to include the amplifier in the T-R loop. The antenna lead will need to be switched, however.

Minor changes are necessary in the amplifier discussed in note 3. The only modification for 30-meter use involves changing the constants in the output filter, FL1 (Fig. 4, page 27, March 1983 *QST*). Fig. 2 of this article contains the coil and capacitor data for 30 meters. C1 and C3 may be formed by placing a 390- and a 12-pF capacitor in parallel at each spot in the filter. The powdered-iron toroid cores are available by mail from Amidon Associates, Palomar Engineers and RadioKit (see *QST* ads). The entire amplifier kit or a composite unit (also a kit) containing the amplifier and the exciter of Fig. 1 can be obtained from the supplier in note 2.

Receiving on 30 Meters

We mentioned earlier a suggested design

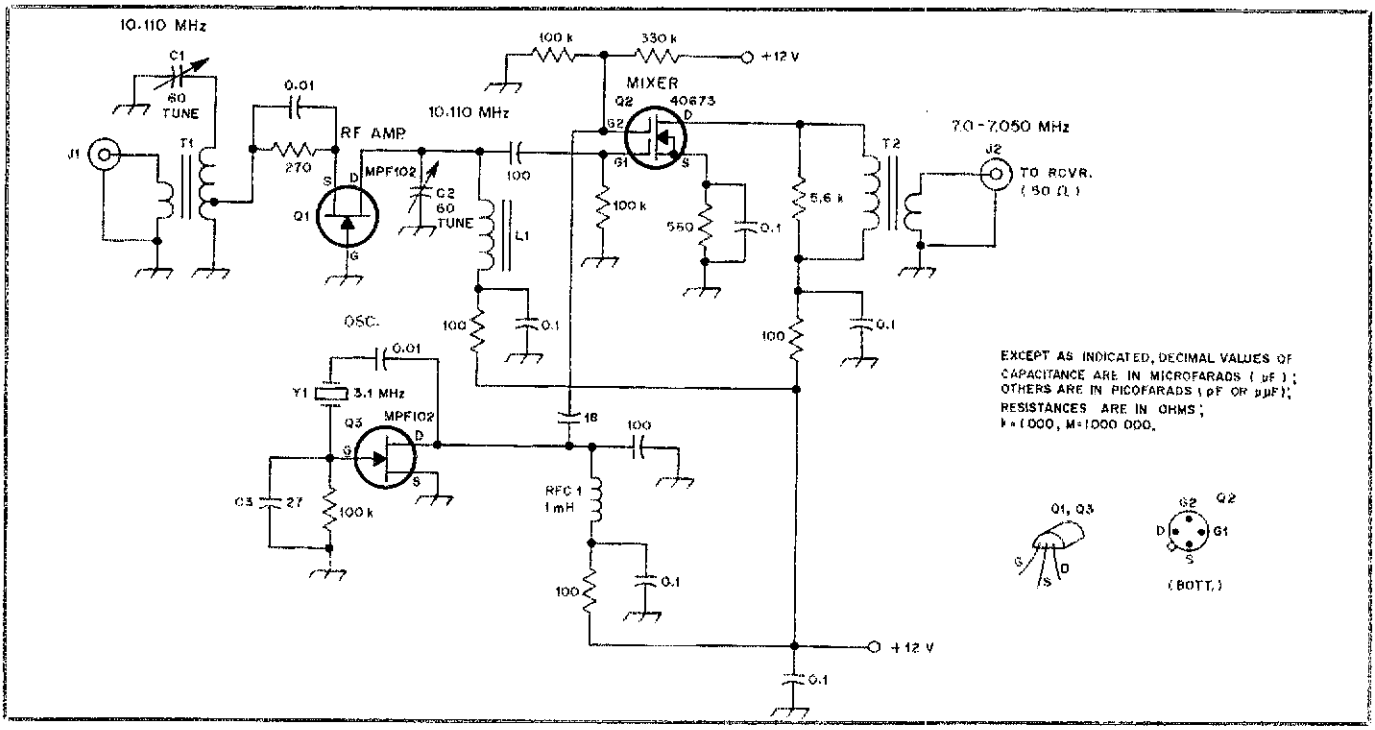


Fig. 3 — Suggested circuit for a simple 30-meter converter. The i-f is 7.000 to 7.050 MHz. C1 and C2 are mica compression trimmers or miniature ceramic or polystyrene trimmers. See text for C3. J1 and J2 are phono jacks. L1 is a 6-μH inductor (38 turns no. 30 enam. wire on a T50-6 toroid core). T1 has the same winding on the secondary as L1. Tap the source of Q1 eight turns above the grounded end. The primary has three turns of no. 30 wire. T2 has 15 primary turns of no. 24 enam. wire on an FT50-43 toroid. The secondary contains two turns of no. 24 wire.

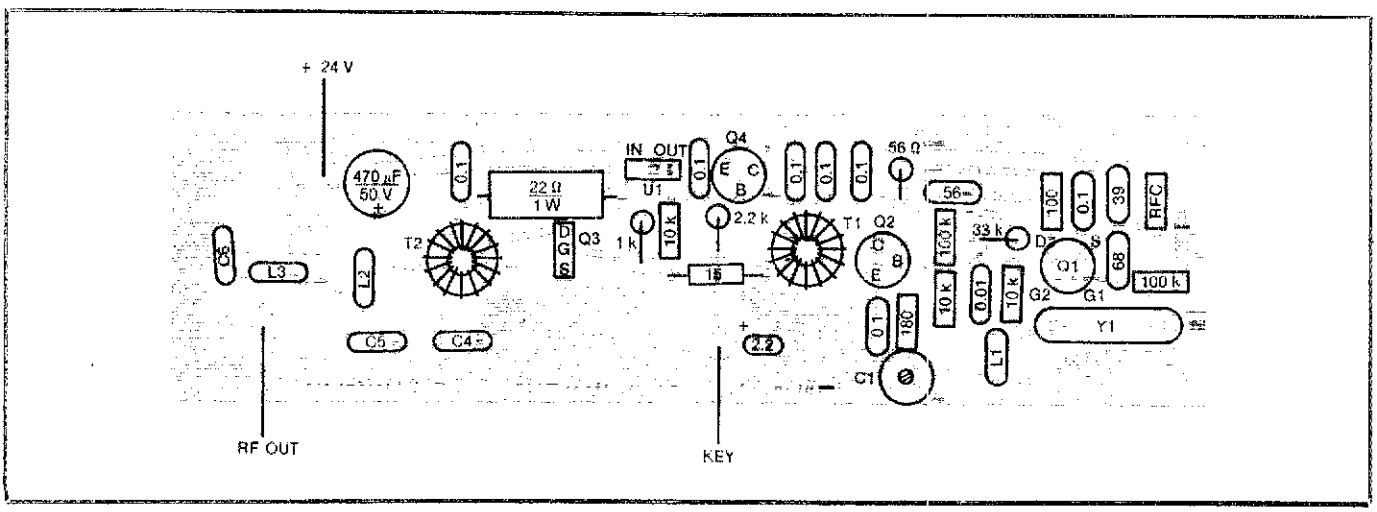


Fig. 4 — Parts-placement guide for the 30-meter exciter, as viewed from the component side of the pc board. See Hints and Kinks, this issue, for the etching-board pattern.

for a 30-meter converter. There are many designs to be found in the amateur literature, most of which could be modified easily to 30 meters. But, in the event you are not sure of what is required to perform proper alterations for a new operating frequency, the circuit of Fig. 3 should be entirely suitable. It has been proven during use on many of our hf bands.

The converter can be fed to a receiver that tunes the 40-meter band. A 3.1-MHz crystal at Y1 of Fig. 3 enables us to tune 10.100 MHz at 7.000 MHz on the receiver. When we tune our receiver to 7.050 MHz, we will be listening to the high end of 30 meters (10.150 MHz).

Q1 provides some 10 dB of gain as a common-gate rf amplifier. C1 and C2 are adjusted for a peak response at the center of the 30-meter band. Or, if you are interested mainly in the low segment of the band, you may wish to peak the trimmers at 10.105 MHz.

The mixer has a broadband output circuit to permit coverage at the i-f without need to retune the mixer output as the station receiver is tuned from 7.0 to 7.050 MHz. A 5.6-kΩ resistor is used across the primary of T2 to aid in IMD reduction and to establish a fixed-value impedance for the Q2 drain circuit.

A Pierce oscillator is used at Q3. A load capacitance of 30 pF is suggested when ordering Y1. If you use a surplus crystal and find it a bit sluggish with regard to oscillation, try increasing the capacitance of C3 slightly. This is a feedback capacitor.

Construction Data

Fig. 4 contains a parts-placement drawing of the 30-meter exciter. A scale template for the pc board appears in Hints and Kinks in this issue. Layout and construction information for the 60-W power-FET amplifier was provided in March 1983 *QST*. There is no layout data for the suggested converter. You may lay it out on perforated board, or try your hand at pc-board layout and etching. Check with the supplier in note 2 for the availability of converter boards and kits.

Closing Comments

Adventure is awaiting you on 30 meters. That, plus the thrill of going on that new band with a homemade station, will make these projects worth your while! Perhaps you will choose to start operation at the QRP level. It is logical that any newcomer would prefer to assess the band for interest and advantages before getting tooled up for the 60-W power level. That part of the project can come later if you find the band to your liking. Whatever the situation, good luck on 10.1 MHz!

Notes

[1]D. DeMaw, "Building and Using 30-Meter Antennas," Oct. 1983 *QST*.

[2]Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

[3]D. DeMaw, "Go Class B or C with Power MOSFETs," March 1983 *QST*.

[4]D. DeMaw, "20-Meter Hamcation Special," Nov. 1982 *QST*.

Strays

THANKSGIVING — A SPECIAL EVENT

☐ It all started in 1980 when a member of the Whitman (Massachusetts) ARC approached me and several other members of the club and asked a simple question: "With all the early-American historical sites around us, why haven't we done anything to bring this to the attention of the rest of the world?" None of us had ever operated a special-event station. The closest any of us had come to that was Field Day, and what we learned from that over the years really paid off.

With this thought in mind, we contacted the administrators of Plimoth Plantation, a nonprofit living history museum in Plymouth, Massachusetts, and related our ideas to them. Their response was overwhelming, and they welcomed us with open arms. It turned out we could operate from inside the museum library. Considering the operating date was set for Thanksgiving Day and the familiar adverse weather conditions of November, it seemed like the ideal place to operate.

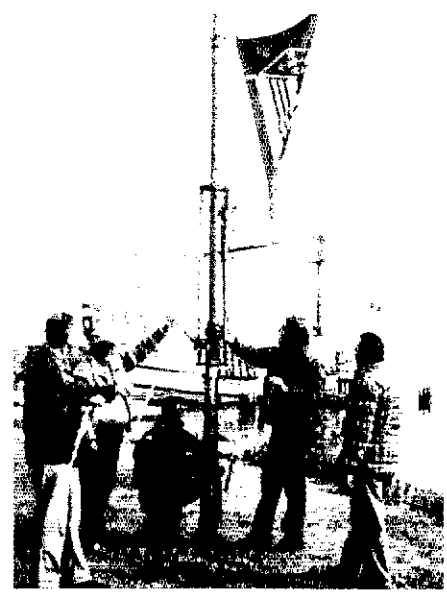
We decided to use 15 meters for distance and 40 meters for regional coverage. We had a dipole for 40 meters, a 3-element Yagi for 15 meters and an old (but in top shape) military, crank-up 50-foot field tower. The weekend before the operation, five of us went to the Plantation to set up the antennas. This is when our Field Day experience particularly paid off, as we had to brave 40-mile-per-hour winds and a downpour to get everything up and properly guyed.

On Thanksgiving Day, we worked just about every state in the U.S., all through Europe and parts of the Middle East and Africa. A special QSO occurred between a ham in Plymouth, England, and our Plantation Station.

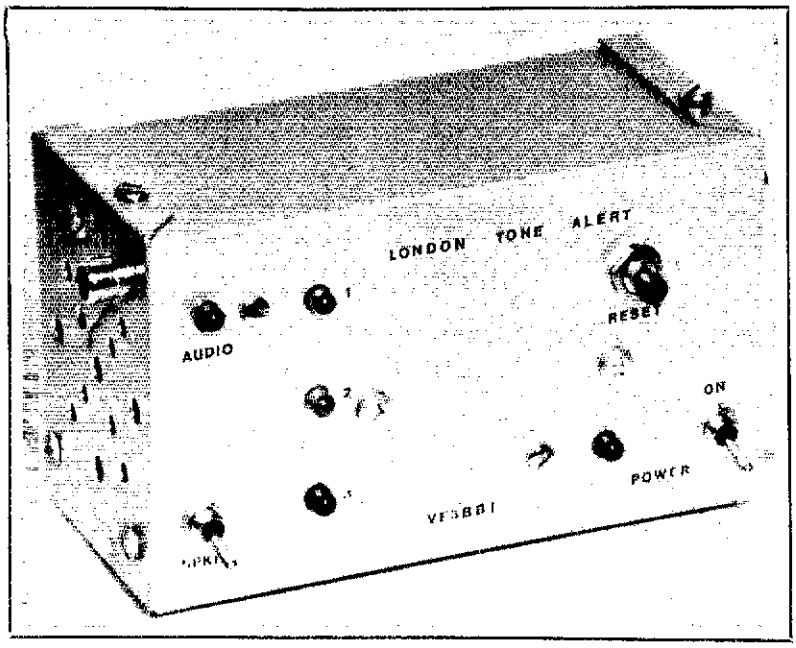
The second year of operation, conditions were poor. We did manage to work as many stations as the year before, but our DX total was only a dozen or so, with only a few in England.

This year, with propagation rapidly declining, we are going to expand our operations to include 20 meters and limited 2-meter operations (see Special Events, this issue, for more details).

This year's event will also be supported by members of the Plymouth (Devon, England) Radio Club, operating G3PRC from a site overlooking Plymouth Sound, from where the Pilgrims began their journey aboard the *Mayflower* in 1620. We are looking to break a 1000-QSO total in one day this year, so put on your rigs and be part of the holiday celebration! — *Jim Russell, WB1CNM, Brockton, Massachusetts*



Whitman (Massachusetts) ARC members stake a claim for Amateur Radio at Plimoth Plantation prior to their Thanksgiving Day operation there. Pictured (l-r) are WA1FSD, W1TC, WB1CNM, KA1CZS and KJ1X. *(photo courtesy WB1CNM)*



The London Tone Alert

Build this simple control decoder and never miss the ARES action!

By T. C. Tanner,* VE3BBI

The London, Ontario ARES needed a simple, easily constructed Touch-Tone® activated system to alert its members. One of the most important (and difficult) facets of any civil preparedness (CP) plan is activation. An ARES group needs a way of contacting its members independent of telephone lines (which will probably be out during an emergency). A unit that would allow *all* members to silently monitor the CP repeater until the Emergency Coordinator (EC) generated the "activate" command has been sought for some time.

With this in mind, Norm Ross, VE3ETJ, developed a prototype. This design contained a dual-tone, multi-frequency (DTMF) decoder and logic to drive three control relays. The system about to be described is similar to the prototype, but it uses silicon-controlled rectifiers (SCR) rather than relays. This drastically reduces the size and current demands of the device. The project is packaged in a standard 2¼ × 3 × 5-inch utility box.[1]

Design Objectives

Four basic objectives were considered in the original design:

1) three tones necessary for access, with false alert suppression;

2) automatic shutoff of the siren, and a means to disable it at any time;

3) low current drain, so the device could be left on indefinitely;

4) relatively simple and inexpensive construction, so *all* ARES members could own one.

In addition, several "bells and whistles" were incorporated to monitor proper operation and aid in the setup of the alert:

1) visual indication (LED), to let the operator know when an alert has been received;

2) LED indicator, to set the receiver audio to the correct level;

3) lights, to indicate when correct tones are received.

Circuit Description

The circuitry used in this device is simple. When a valid tone is received, it is detected by two 567 PLLs, producing a logic "low" at their outputs (pin 8). When this level is applied to one section of the 7402, a positive pulse appears at the output. This signal is transferred to the second circuit board for processing.

U4 responds to 1209 Hz, which is common to the left column on a tone pad; similarly, U1-U3 correspond to *, 1 and 7, which comprise the code selected by London-area hams. Any other vertical column of the pad could be used as well, requiring only frequency adjustments in the decoding circuitry.

Accidental triggering of the circuit by voice frequencies is prevented by a three-second time constant developed by the action of the 4.7-kΩ resistor and 220-μF capacitor between the emitter of Q1 and ground. Because of this, the first digit in the code must be held for approximately three seconds, until the capacitor is sufficiently charged to trigger Q2. This SCR lights DS3, providing a positive voltage at the anode of Q3. An SCR behaves like a latching relay. Once triggered, the device will remain on (latched), as long as current is being drawn through it. The second digit is decoded next, providing a positive pulse at the gate of Q3. This SCR lights DS4 and results in a positive voltage at the anode of Q4.

When the third number is received, Q4 turns on and lights DS5. This produces a positive voltage at the base of Q5. This transistor conducts, grounding the negative side of the audio alert circuit (U7-U8) to sound the alarm.

A 555 timer is employed to shut off the alarm. The timing cycle is triggered by acquisition of the first valid tone. After ap-

[1]Notes appear on page 37.

*548 Upper Queen St., London, ON N6C 3T9, Canada

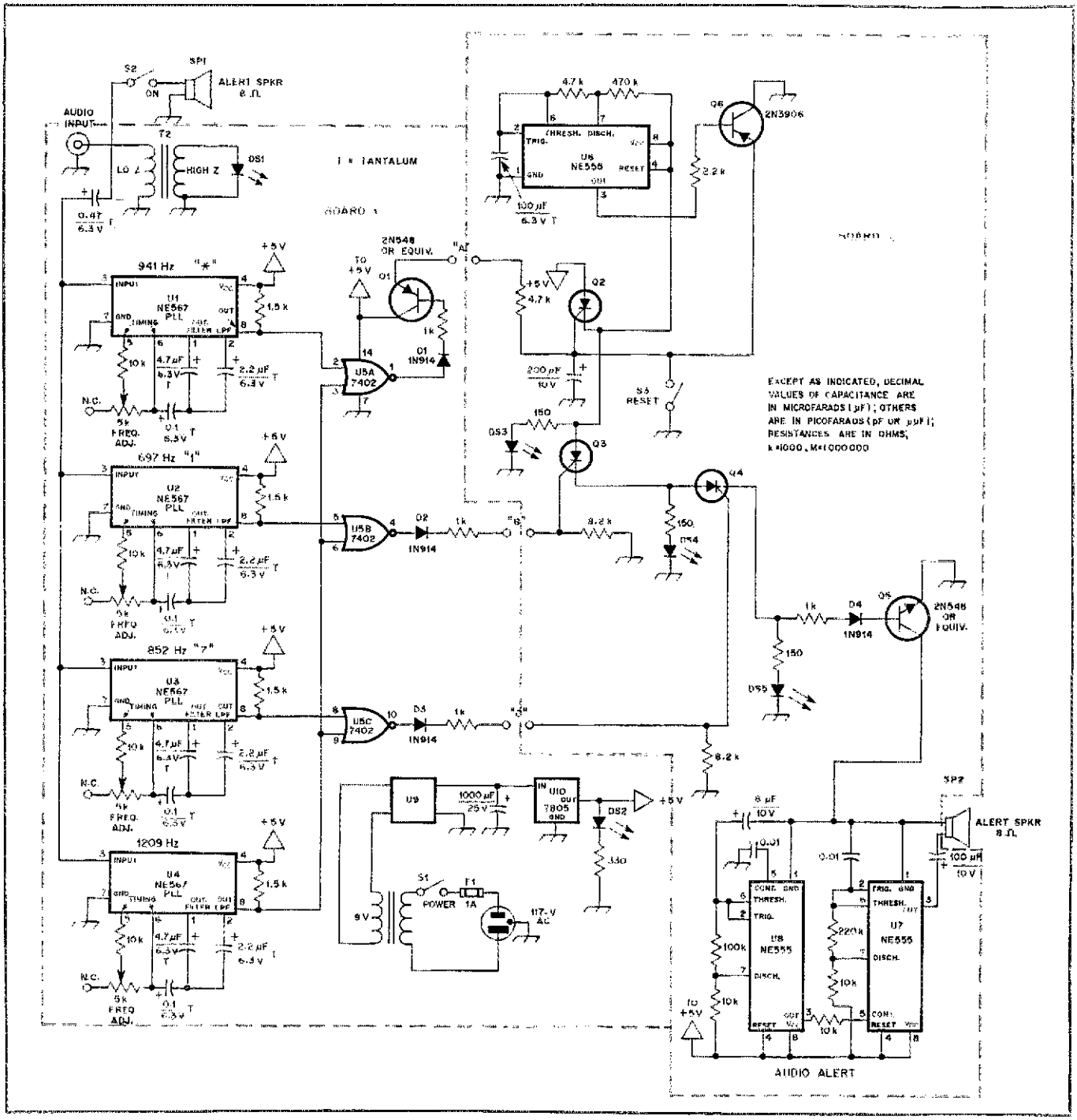


Fig. 1 — Schematic diagram of the tone alert. All resistors are ¼-W, 5% carbon types.

DS1, DS2, DS5 — Large LED (red).
DS3 — Large LED (green).
DS4 — Large LED (yellow).
Q2, Q3, Q4 — Silicon-controlled rectifier, 2N5060, 2N5061 or equiv.
S1, S2 — Spst miniature toggle switch.
S3 — Normally open push-button switch (Radio Shack 276-1811 or equiv.).
SP1, SP2 — 8-Ω speaker, 2- or 2½-inch-diameter.
T1 — Power transformer, 117-V primary; 9-V, 300-mA secondary.
T2 — Transistor-type output transformer (Radio Shack 273-1380 or equiv.).
U9 — Full-wave bridge rectifier, 50-V, 1 A.

proximately 45 seconds, the timer supplies a negative voltage to Q6. This effectively grounds the gate of Q2, shutting down most of the circuit. A small glow still remains in DS3, which brightens and dims as the timer cycles. With the given values, the dim portion of the cycle lasts for about one second, so DS3 remains lit. This serves as an indication that an alert has been received. The circuit is reset, however, just as if the RESET button on the front panel had been pushed.

A reverse-connected transistor-output transformer is across the audio input. An LED across the high-impedance side of this transformer serves as a level indicator. The receiver volume control can now be set for a level sufficient to activate the decoder;

the LED will flash when an ample voice level is received. While this is an optional part of the unit, it is highly recommended to ensure the volume is adjusted for proper operation.

When this circuit is plugged into the external speaker jack of a receiver, it will normally disable the receiver speaker. To alleviate this problem, a small speaker is provided to allow receiver monitoring. A bypass switch, S2, is included to disable the speaker for silent monitoring. The alert is still operational in this mode, even with the speaker off. A power switch and pilot LED are also provided on the front panel, to tell the operator when the unit is on.

A regulated 5-V supply powers the entire system. The bridge rectifier, filter capacitor and voltage regulator are on pc board no. 1. Four NiCd cells can also provide 5 V, if battery operation is desired. An alternative is to apply 12-V dc to the input of the regulator. One might consider a rear-panel jack and switch for this. Total current drain from the regulator is 55 mA.

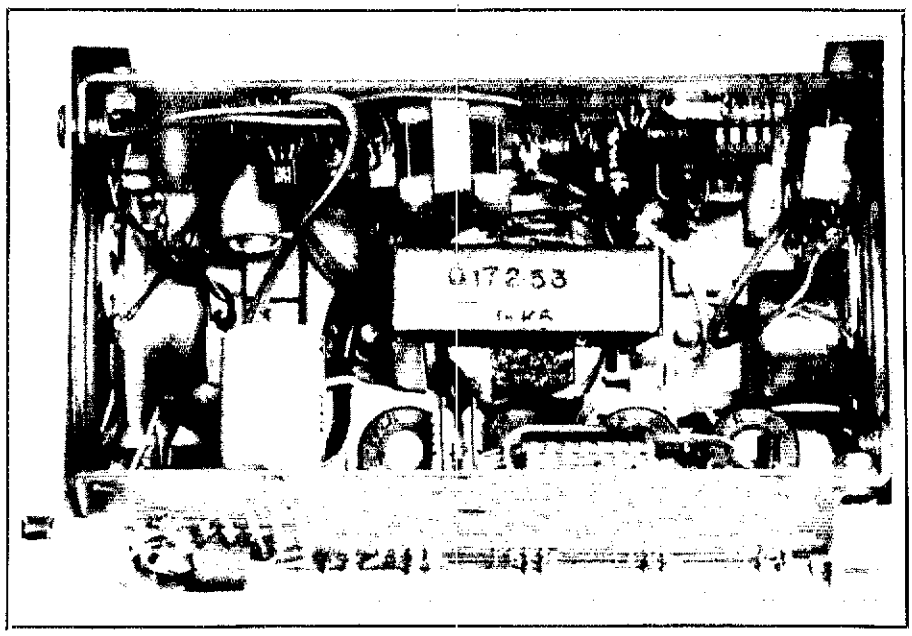


Fig. 2 — Internal view, taken from the rear of the unit.

Construction

Use ¼-W resistors, and capacitors with 6- or 10-V ratings. Use a 9-V, 300-mA transformer for power. I was able to locate almost everything at a local surplus store.

The bulk of components are contained on three pc boards. Q1, U1-U5 and their associated decoding circuitry mount on board no. 1. The LEDs, DS1-DS5 and transformer T1 are contained on board no. 3. All remaining components are housed on board no. 2. It may be necessary to adjust the mounting holes to accommodate the particular components you have. Also, if you are unable to locate a utility box of the correct size, you will have to alter the size or location of the mounting holes. This is not a "piece of cake," so give it some thought before proceeding. Don't forget that resistors can be mounted vertically to save space. The only critical components are the three tantalum capacitors in each decoder circuit.

Mount the LEDs on the Z-shaped circuit board. Using the same template, drill holes in the box to allow the LEDs to protrude up to the shoulder. No further insulation should be necessary.

Circuit boards no. 1 and no. 2 mount on each side of the utility box with spade bolts or threaded brackets. Allow enough space at each end to slip the speakers into place. Holes in both ends of the box serve as speaker grills. Use sockets for all ICs, and don't plug in the chips until the wiring has been checked. Also, note that all components are mounted in the larger section of the utility box, so it can be opened without any dangling wires.

Alignment

Alignment with a frequency counter is a snap. Begin by attaching a frequency counter to pin 6 of a 567. Adjust the corresponding 5-kΩ potentiometer until the counter reads the desired frequency to be decoded by that device. Tune each of the other decoders in the same fashion, until all four are aligned. This is all the tuning that is necessary. The device is now ready for testing.

Testing

To test the unit, it is necessary to supply amplified tones from a tone pad to the input. This can be accomplished by connecting the device to the external speaker of a 2-meter rig and sending the tones using another. I fed a Yaesu Touch-Tone microphone through a tiny audio amplifier using an LM383 chip plugged directly into the unit. Press the * button for three or four seconds, until the green LED, DS3, lights. If all is well, press 1 and 7 in succession. The yellow (DS4) and red (DS5) LEDs should light, and the siren should sound.

After approximately 45 seconds, the siren will shut down, and only DS3 will remain lit. The siren may be stopped at any time by pressing the RESET button.

Comments

This unit has been tested on the air from various locations, and worked like a charm every time. If necessary, certain modifications can be accomplished easily. For instance, if only one tone is needed to sound the alert, two 567s, Q3 and Q4 can be eliminated. However, it is a good idea to retain the delay caused by the R-C combination in the emitter circuit of Q1, to prevent triggering from voice transients.

The audio alert could also be simplified to eliminate the warbling note it produces. I prefer the distinctive note, which is like an ambulance siren.

A relay could be used at the output to control a heavier load for alerting a large group of people. To accomplish this, simply insert the relay and suitable power supply in place of the audio alert shown in the diagram. A 12-V relay could be used, and obtain its power from the same power supply, but ahead of the regulator.

Applications for this device are not limited to the functions described here. This is a practical control circuit with limitless possible uses.

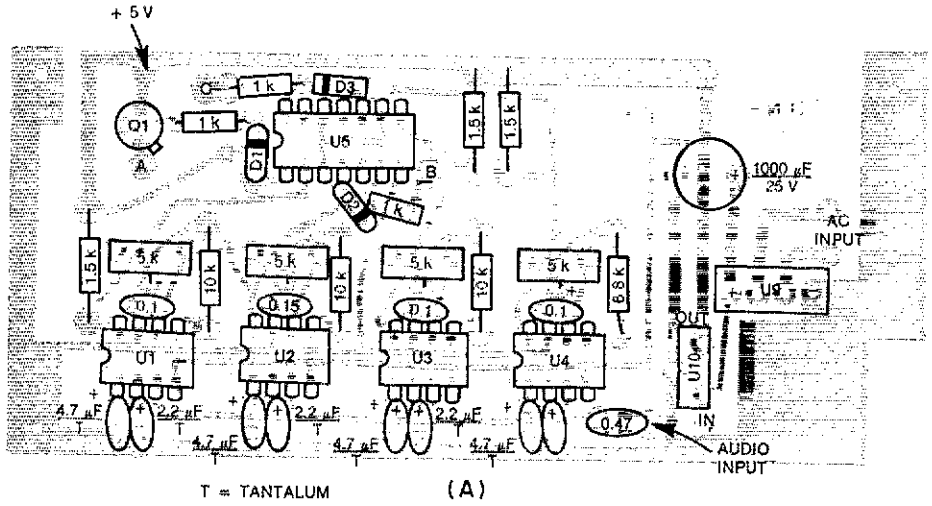
Acknowledgments

Thanks for help in developing the London ARES tone alert go to Harold Delagran, VE3VL; Hugh Clark, VE3WM; Jack Strangleman, VE3GV; and especially to Norm Ross, VE3ETJ. I would also like to thank the owner of Microtronix Systems Ltd., who allowed me to produce the artwork, negatives and pc boards for this project. Microtronix Systems Ltd. will also supply pc boards for $20 (U.S.) or $24 (Canadian).[2]

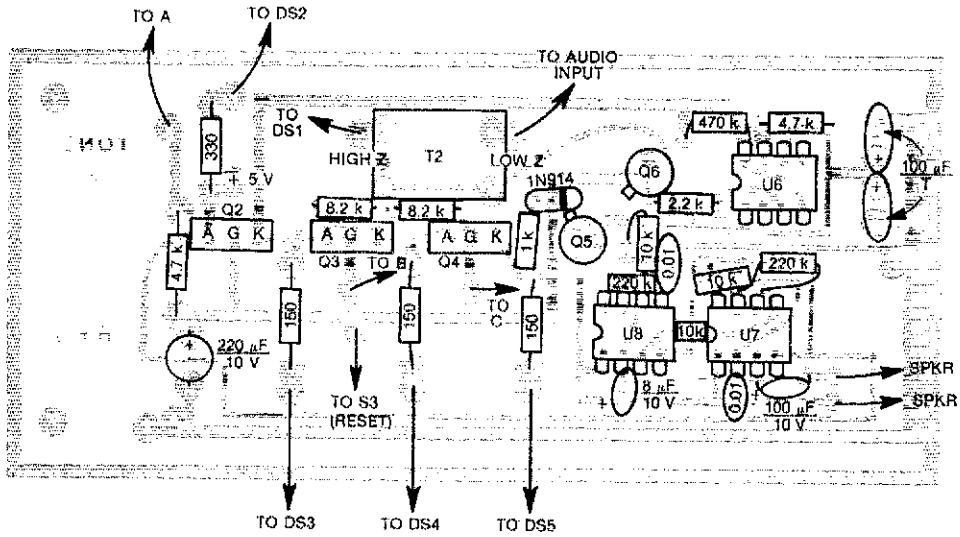
Notes

[1]mm = in. × 25.4.

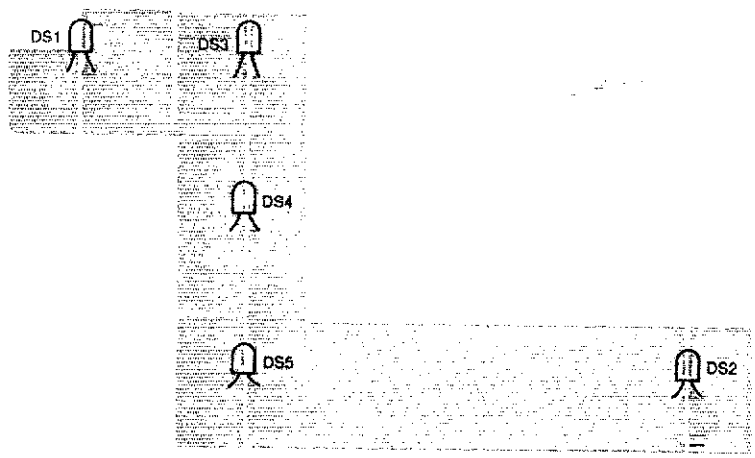
[2]Microtronix Systems Ltd., 120 Bessemer Rd., London, ON N6E 1R2, Canada. The ARRL and *QST* in no way warrant this offer.



(A)

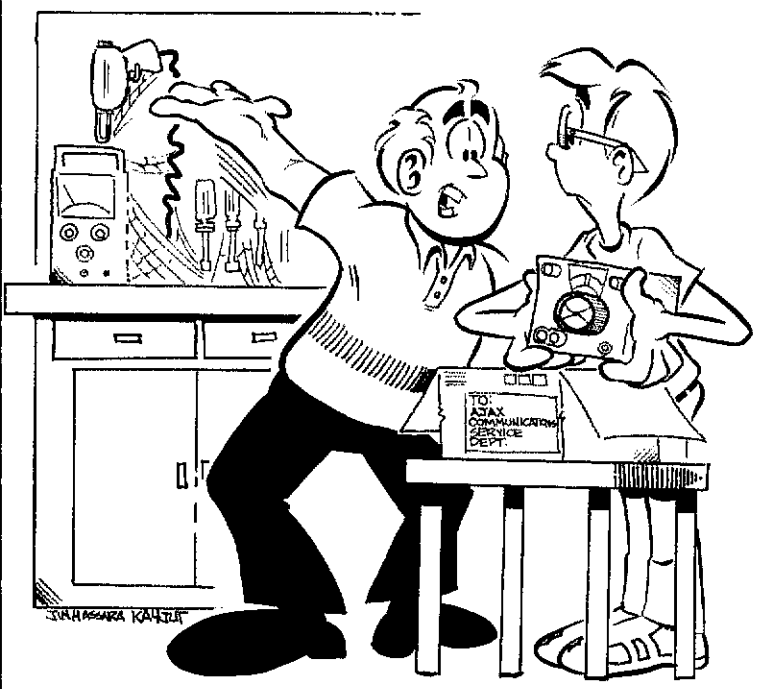


(B)



(C)

Fig. 3 — Parts-placement guide. This view is from the component side of the board. Gray areas represent unetched copper. See Hints and Kinks, this issue, for the etching patterns.



BEGINNER'S BENCH

Simple Ways to Test Your Transmitter

Is your rig inoperative? Is the rf output lower than it should be? Or, perhaps you suspect that you're radiating harmonics from your antenna? Whatever the problem, there are simple methods for checking your rig, and you won't need exotic test gear to do it!

By Doug DeMaw,* W1FB

It's easy to be confused and discouraged when your transmitter falters or refuses to deliver rf energy to the antenna. A truism, for certain. But all too many amateurs are fearful of digging into their equipment in an effort to locate and solve even the simplest of performance problems. Instead, the equipment is boxed and shipped back to the manufacturer for repair. A large percentage of the time, the amateur could service his or her transmitter and save countless dollars in shipping and repair cost, to say nothing of the inconvenience of being without the rig for weeks, or even months!

In the earlier days of Amateur Radio, it was practically unheard of to seek factory repair of one's equipment. Even the least-skilled operators had the courage to troubleshoot commercially made gear, but the unfortunate trend toward factory service seems to be ever-increasing in pace. A valuable by-product of doing our own repair work is added knowledge about circuits and how they work. Of course, the more we learn about our rigs, the more confidence we will have when the next servicing job crops up.

*Contributing Editor, P.O. Box 250, Luther, MI 49656

The intent of this article is to illustrate some simple techniques for tracking down those common ailments that befall our equipment as it ages. The test apparatus needed is neither costly nor hard to build. A common misbelief among hams these days is that one needs a laboratory and thousands of dollars worth of test gear to repair a piece of transmitting or receiving equipment. Balderdash! A volt-ohmmeter and an rf probe will serve admirably for most of the problems we may encounter.

First Things First

Learning to follow a circuit diagram is the first order of business in locating a fault. Most of today's factory-made ham radio equipment is dreadfully complex, and rightfully so if we are to enjoy the myriad operating features and conveniences that are common to the state-of-the-art transceiver or receiver. As a consequence of this circuit complexity, the schematic diagrams look bewildering and rather like a maze created by some demonic engineer. Fortunately, most of the operating manuals contain separate diagrams of the various modules in the equipment. The overall "master" diagram is even a bit much for an experienced amateur or engineer to decipher, and seldom do we find labels above the various stages to indicate what their functions might be. That, plus the countless interconnect lines that run back and forth across the drawing, can cause the strongest of heart to capitulate in favor of factory servicing! But, the individual diagrams for the various modules are generally quite easy to follow. I strongly recommend that approach when doing service work.

Most manufacturers will sell us circuit-board extenders (cables) that permit taking the modules out of the main frame while still keeping them operational. If you don't have a set for your rig, perhaps you will want to obtain one. Factory service manuals are often available for those who are willing to pay for them. They are greatly expanded versions of the basic operating manual that comes with the equipment. If you plan to keep your present rig for a period of time, you will find the service manual invaluable.

Where and How to Start

Let's consider one of the more common transmitter failures — low rf output, or no output at all. It makes no difference whether our rig is totally solid state or if it is a hybrid (tubes and semiconductors) unit; the procedure is the same when troubleshooting. We will always commence with the first stage in the transmitter chain.

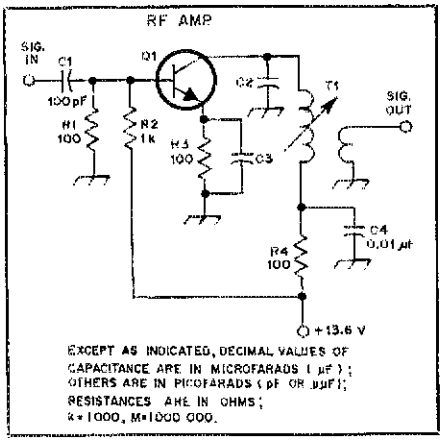


Fig. 1 — Example of a simple rf amplifier for text discussion.

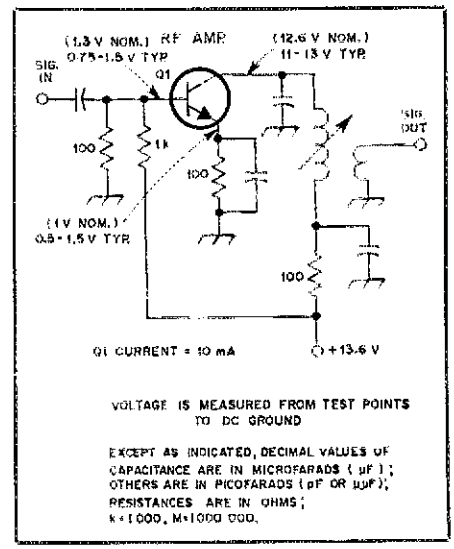


Fig. 2 — Typical dc voltages are listed here for use in locating faults in an inoperative low-level amplifier.

These early stages are commonly referred to as "low-level stages." This means that they generate low levels of power or voltage.

1) Phase 1 calls for visual inspection of the components that are related to the stage being examined. We will inspect the resistors for discoloration or fine cracks. A magnifying glass or jeweler's loupe is practically mandatory for this part of the check. A discolored resistor usually means that excessive current has been flowing in that branch of the circuit. Discoloration or cracking is caused by overheating of the component. These defective resistors are apt to change value significantly or become open-circuited. This prevents the correct operating voltage from reaching the tube or transistor. Fig. 1 illustrates a simple rf amplifier that could have one or more defective resistors. Assume, for example, that R4 were defective. What might cause this resistor to be burnt or cracked? The culprit — excessive current flow — would have to be caused by some anomaly above the resistor, or the side of R4 opposite the 13.6-V supply line. What could cause this to happen? There are four potential sources of the difficulty: (1) Q1 could be shorted and drawing excessive current; (2) resonating capacitor C2 might be shorted. (3) decoupling capacitor C4 might be shorted internally; (4) emitter bypass capacitor C3 could also be shorted, which could permit Q1 to draw high current and become shorted. A fifth possibility would be the input blocking capacitor, C1. If it were shorted there might be too much dc voltage at the base of Q1, thereby making it draw excessive current or burn out. If this were the bad capacitor, R1 might be defective also, because of excessive current flow through it.

A good method for locating the bad capacitor (or transistor) is to check each terminal of Q1 for operating voltage after placing a new resistor at R4. Apply operating voltage only in short cycles to prevent burnout of the new resistor. If you find no voltage on the upper end of R4 (Fig. 1), or if the voltage is very low, turn off the supply voltage and remove Q1 from the pc board. Repeat the voltage check at the high side of R4. If normal operating voltage (or slightly more) appears above R4, it is safe to conclude that Q1 caused the failure. If the bias voltage at the junction of R1 and R2 is normal, the transistor is probably shorted and needs to be replaced. It is suggested that you test C3 for leakage or short-circuiting with your ohmmeter if Q1 is defective. If C3 is shorted, it will permit the emitter of Q1 to be at dc ground, thereby negating the value of R3 as an emitter-bias resistor. This will increase the current drawn by Q1.

If normal base bias is found but there is no collector voltage at Q1, perform an ohmmeter check of C2 and C4. If either is shorted, it could cause R4 to become damaged, but would not harm Q1. The most likely cause of failure (damage) at Q1 would be a shorted capacitor at C1 or C3. Also, if R2 became too low in value through aging or heat, high bias on Q1 could damage the transistor. Likewise with R3 in the emitter circuit.

I'll bet you never thought there could be so many causes for failure in so simple a circuit! That's why we must learn to analyze one stage at a time and look for all manner of causes for the malfunction. The foregoing treatment of troubleshooting a simple stage is of course applicable to audio and video amplifiers as well. The primary objective here is to find out why too much current flowed in some branch of the circuit.

2) Phase 2 will find us doing dc voltage checks with a VOM (volt-ohmmeter) or VTVM (vacuum-tube voltmeter). This test assumes that our visual inspection revealed nothing unusual about the appearance of the resistors or other associated circuit components.

Let's check the operating manual to learn whether the manufacturer was considerate enough to include a voltage and/or voltage/resistance chart for the equipment stages. Some do, and others don't. If your manual has that important information, you should use it when making the voltage checks. If not, refer to Fig. 2 for what I will call very broad ballpark voltage values for solid-state low-level stages that have a 12-14 V supply line. Radical departures from the voltage ranges indicated in Fig. 2 will suggest problem areas to look at. The nominal voltages listed in the diagram are approximately what we would expect if Q1 were drawing 10 mA during normal operation. But, your rig may be biased differently, and depending upon the power the stage must provide for the following stage, the various voltages may be different than the nominal values. The typical voltages specified in Fig. 2 should be helpful during routine testing of low-level rf or audio amplifiers.

If a voltage is too low, missing completely or too high when you check at the base, collector and emitter of Q1, search for leaky or shorted capacitors as in Phase 1; they will cause too low a reading. If the capacitors are okay, then lift one end of each resistor from the pc board and check the resistance with your ohmmeter. Replace any resistor that is more than 30% removed from the specified value. Finally, if all components appear to be normal, replace Q1 and repeat the voltage measurements. Of course, if during your tests you found a voltage that was far too high, check for decreased resistance at R2 and R4. A high reading might also be caused if R3 of Fig. 1 had too high a resistance from the marked value.

3) Phase 3 is called "signal tracing." It may seem that we have placed the "horse after the cart," so to speak, by describing first the processes in Phases 1 and 2. After all, we did not discuss a technique for determining which part of our imaginary transmitter had the "blues." The assumption was, of course, that the failure was rather obvious, and that the affected circuit or module would be obvious to the person attempting the repair.

But, what if we have no strong thoughts about the general region of the circuit where the malfunction is taking place? Our best bet then calls for signal tracing. This can be done with an oscilloscope or an rf probe and a VTVM or FET VOM (field-effect-transistor voltmeter). The latter is perhaps the least expensive and most common ham shack method for signal tracing. An rf probe that is easy to build was described in Fig. 3 in Beginner's Bench, August 1983 *QST*. Information on this device can be found also in the measurements chapter of the ARRL *Handbook*. An rf probe is a detector that converts an rf (ac) voltage to a dc one so that the voltmeter can provide reasonably ac-

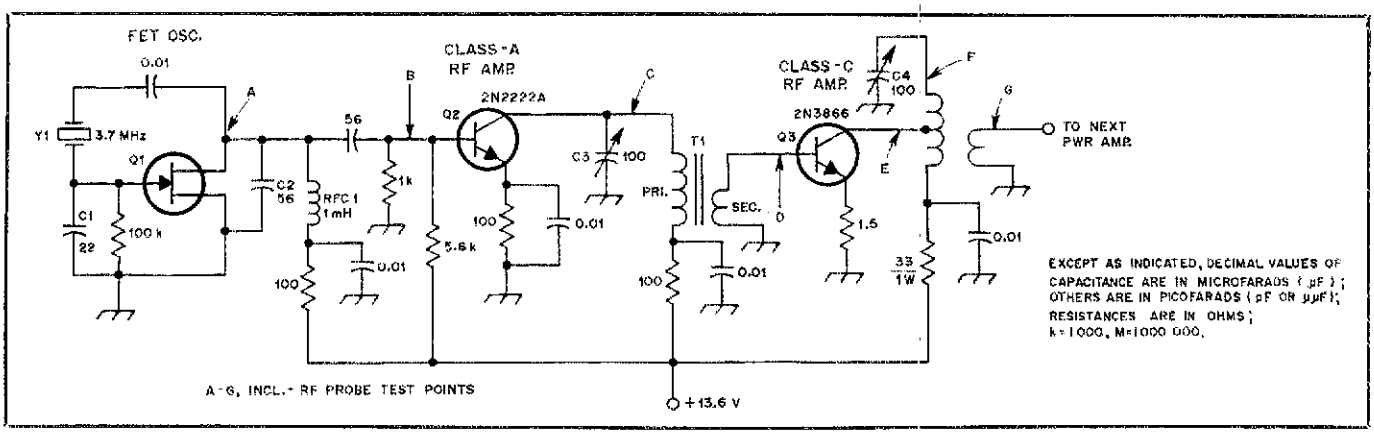


Fig. 3 — A basic transmitter rf strip showing various test points to which an rf probe can be connected during troubleshooting.

curate voltage-level readings. The ac scale of most VTVMs is not suitable for use at radio frequencies; therefore, the rf probe is required. We should remember that the accuracy of the rf-voltage measurements is dependent on the relative purity of the waveform at each test point in the circuit. Specifically, the probe is designed to read rms (root-mean-square) voltages, and if there is distortion in the waveform, it will affect the readings. In other words, our best accuracy will result when the test point contains a pure sine wave. This is seldom possible in solid-state circuits, owing to harmonic generation and distortion caused by the transistor junctions (diodes). However, we can still compare the relative voltages to determine whether a particular transmitter stage is amplifying and producing output energy. Our objective with the rf probe is to locate the stage that is inoperative or low in output. If we use a scope for this purpose, we will be able to see the waveform distortion, but our voltage readings will no longer be an rms type. Rather, they will be pk-pk (peak-to-peak) voltage measurements.

Fig. 3 shows a very basic type of transmitter circuit, such as might be found in the exciter portion of a cw transmitter. The simplicity is intentional for the purpose of easy discussion.

Let's suppose that our transmitter had ceased to deliver rf energy to the antenna. How should we pinpoint the trouble area? Well, the logical step would be to first ensure that the oscillator (Q1 of Fig. 3) was operating as it should. We'll rule out the possibility of Y1, the crystal, being defective, since it has worked satisfactorily for some time and has not been subjected to vibration or excessive rf feedback current. We will instead use the rf probe and voltmeter to check for rf energy at point A (Q1 drain). If the circuit is oscillating, we should find a few rms volts present at point A.

Next, we move to the input of the second stage, test point B of Q2. Remember that the higher the circuit impedance at the test area, the greater will be the rms voltage for a given power level. Test point A is of higher impedance than is point B, so there should be somewhat less voltage appearing at the base of Q2, since that is a lower impedance than we will find at the drain of Q1 in this particular circuit. The important thing is that we find *some* rms voltage present at B.

Next we move our probe to C, the collector of Q2. If very little rf voltage is indicated, or if there is none at all, we can conclude that Q2 or some component in that section is defective. We should find more voltage at point C than at B, since this is an amplifier stage.

If we have a normal voltage reading at C, we can then proceed to point D with our probe to learn if the last amplifier, Q3, is receiving excitation. Q3 is a higher-power amplifier than Q2, so the base impedance will be lower than that at Q2; the greater the driving power the lower the input impedance of an rf transistor. It may be on the order of 500 to 1000 ohms for a very-low-power rf amplifier, whereas it can be as low as a few ohms for a high-power amplifier. So, remembering that the lower the impedance the more diminished the rms voltage reading will be, we should find somewhat less voltage at point D than we did at C.

Our last test will take place at F, where we should find the highest of all the voltage readings. Point F is very high in impedance, hence the higher voltage appearing there. Collector tap point E of Q3 will show less voltage, owing to that being a lower-impedance area. Likewise with test point G.

We can see that finding the faulty part of the circuit is quite easy by applying the signal-tracing technique. We would proceed in the same manner if we were using an oscilloscope. Once the inoperative stage is spotted, we revert to the troubleshooting methods described in Phases 1 and 2 of this article. If no defective parts are found, we should then try a new crystal at Y1 of Fig. 3. If a spare crystal is handy at the offset, we might make that step no. 1 of our phase 3 test procedure. It could save some time, even though the odds are fairly high against a quality crystal going bad unless it is abused (dropped, or whatever).

Tracing the stages of an audio amplifier is done in a similar fashion to the foregoing. It is necessary, however, to apply an audio tone of normal level at the input to the audio chain in order to obtain an rms voltage response throughout the circuit. The rf probe can be set aside during audio tests. The ac range on your VTVM will be used for testing audio amplifiers. A scope can also be used if one is available. While speaking of scopes, I should mention that the scope used for rf testing needs to have a bandwidth (upper-frequency limit) that is as great or greater than the transmitter frequency. If not, the scope gain will be low and the voltage measurements (pk-pk) will not be accurate.

Digital Circuits

A scope or a logic probe can be used when attempting to find a defective section in a logic circuit of a complex transmitter or transceiver. An in-depth discussion of troubleshooting digital circuits is well beyond the scope of this article.

Harmonics and Spurious Responses

Let us imagine for the moment that we suddenly received a TVI (television interference) complaint from a neighbor, or that the FCC sent us a violation notice for excessive harmonic radiation. The rig seems to be working normally, but for some reason we're putting out one or more signals inside or outside of the band of operation. How could this be? Well, if we find no loose joints in our antenna system (loose joints can cause harmonic currents through rectification), and if our transmit-

ter low-pass filter is not defective, we may assume that something has gone afoul in the transmitter. Possible causes might be instability (self-oscillation) in one or more of the rf stages, or the harmonic filter in the transmitter output could have a bad coil or capacitor. Fig. 4 shows another simplified transmitter section. We will use it for text discussion purposes.

If self-oscillation is the malady in our transmitter, we may find any number of causes for it. Refer to Fig. 4. If C1 should become short-circuited, Q1 could develop excessive gain and break into oscillation. Generally, the emitter bypass capacitor is chosen to provide gain at the high-frequency end of the transmitter operating range, but at the lower end of the spectrum and into the audio region the gain drops off gradually. Too much gain, or too large a capacitance at C1, could cause Q1 to "take off."

Some designers include a parasitic-choke resistor in the base or collector lead of a transistor to stop vhf or uhf self-oscillations. R1 of Fig. 4 is that type of resistor. If it were to become very low in value, say 1 or 2 ohms, it could allow self-oscillations or parasitics to occur. Similarly, if collector bypass capacitor C2 were to become open or too low in value, self-oscillation might take place at Q1.

The condition of C3 might also affect the stability of the transmitter. If it becomes open or too low in value, we may find Q2 to be unstable. In a like manner, base-swamping resistor R2 is used in many designs to lower the circuit Q by swamping T1 to discourage unwanted parasitics. If it became too high in value, or if it were to become open-circuited, problems could result.

C4 of Fig. 4 is also an important bypass capacitor. Often, there are two or more capacitors in parallel at this circuit point, and each is a different value from, say, 0.001 to 0.5 μF. The various values permit effective bypassing at different frequencies in the high-frequency and vhf range. A defective C4 could mean instability of Q2. C5 is a much larger capacitor. It is included to serve as a bypass capacitor for very-low frequencies down to the audio range. Many solid-state amplifiers will self-oscillate vigorously at lf or audio. Even though they are designed to work at hf or vhf. Therefore, the condition of C4 is important to assure stability of the overall Q1-Q2 rf section.

If the transmitter once had a clean bill of health with respect to harmonic output but suddenly developed "harmonic-itis," the output filter, FL1 of Fig. 4, could have a bad component. C6, C7 or C8 could have changed value, become open or perhaps shorted. Similarly, filter inductors L1 or L2 might have developed shorted turns or could have a broken toroid core. Each part should be checked if harmonics occur. Various filter configurations are found in the broad scope of designs, so your filter may have many more or fewer sections than the one depicted in Fig. 4.

Harmonic and Spurious "Sniffing"

It is absurd to consider one of us amateurs buying a $20,000 spectrum analyzer for use in checking harmonic or spurious output. So, we must make do with a low-cost alternative, or poor man's analyzer. A sensitive, calibrated wavemeter of the kind described in the measurements chapter of the *Handbook* can be built inexpensively and used to sniff for unwanted output frequencies at the output stage of the transmitter. We may also employ a dip meter to search for these "frigglies." Fig. 5 shows a simple sampling circuit we can build in a Minibox or homemade pc-board box. It contains a single loop of wire in series with the antenna feed line. Coaxial connectors permit connection to the feed line. The dip-meter coil or probe is inserted through a hole in the box wall (Fig. 5B) and placed near L1. With the transmitter operating into a dummy load (sniffer between the transmitter and dummy load), the dip meter (set in the wavemeter mode) is tuned for peak indications. These responses will tell us where the harmonics or other unwanted output energy are in terms of frequency. Such responses should

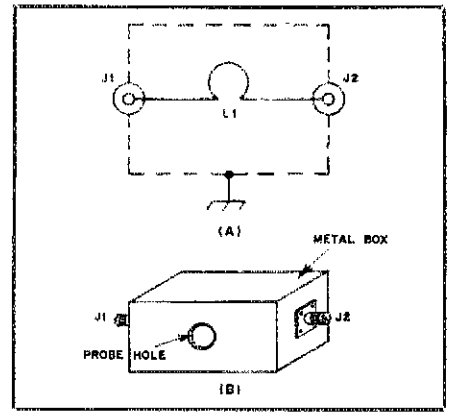


Fig. 5 — At A are the details of a one-turn loop contained in a metal box. This can be used for sampling the transmitter output when looking for unwanted spurious output. The loop can be made from no. 12 or 14 copper wire. The loop diameter is 1 inch (25.4 mm). It should be centered in the box and opposite the hole in the box wall (illustration B). See text for additional details.

be a fraction of the response at the desired operating frequency. If they are close to the same magnitude or as strong as the desired frequency, problems are definitely indicated. Troubleshooting must follow.

In Summary

We have dealt somewhat superficially with the theme of transmitter servicing. Our objective in this article is to illustrate the general approach to finding problem areas in our equipment so that we may avoid the expense and inconvenience of sending the rig back to the factory for repair. All that's necessary for home servicing is a little courage and self-reliance that first time or two. Working on our own rigs will help us to better understand the circuits in these gray, brown or black boxes. At least, let's give it our best shot the next time the old rig lets us down!

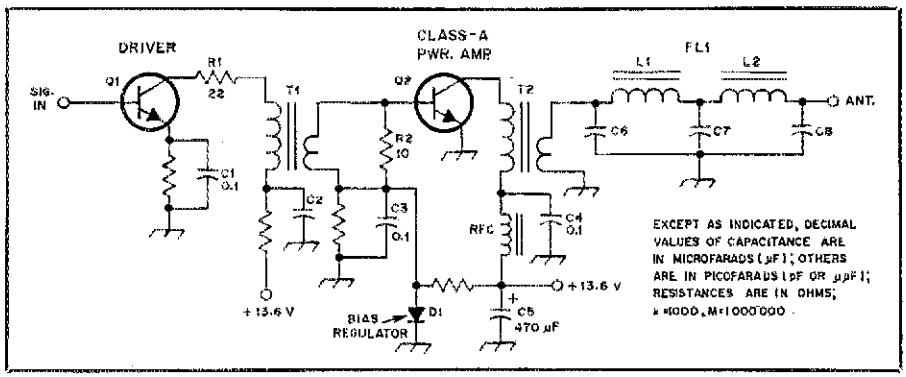


Fig. 4 — A driver and power amplifier illustration. Parts with R, C and L designators are discussed in the text. They could be the cause of instability or harmonic output.

Strays

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

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

- STS-9 Operating Schedule
- "A 12/70-Watt Class C Amplifier for 146 MHz," by Randy Bynum, WB2SZK
- Reprints of ZS6AXT Microwave Alignment Probe References

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

Tropospheric Scatter Propagation†

Work DX on vhf, uhf and microwaves using tropospheric scatter propagation. It's easy!

By J. N. Gannaway, PhD,* G3YGF

This article demonstrates the potential of communications while using tropospheric scatter (troposcatter) in the vhf, uhf and microwave bands. The troposcatter propagation mode is used regularly for working DX at vhf, but the predictability of the mode and its potential on the higher frequency bands are not widely appreciated. The nature of troposcatter propagation is explained, and an expression for the path loss is given, taking into account the characteristics of the sites at each end. By combining this expression with calculations of equipment performance at each end of the path, it is possible to predict the signal-to-noise ratio that should be obtained between the two stations under normal conditions, or to estimate the maximum range that can be expected from a given site.

Paths that involve only line-of-sight propagation are not very common, and usually the signals will have been scattered off or diffracted around several obstacles on the way. As the path length increases, so does the number of obstructions or the angles through which the signals have to be diffracted. Under these conditions signal levels will decrease very rapidly with distance, and signals arriving by other propagation mechanisms may be stronger. Propagation beyond the horizon can occur by a variety of methods, usually either by atmospheric ducting or reflecting off an object that is high enough to be visible to both stations. This object can be, for example, an aircraft, an aurora, or an ionization trail from a meteor. These phenomena are short-lived, however and a more permanent mechanism would be desirable. Satellites or moonbounce are more predictable but, apart from the case of geostationary satellites, can only be used some of the time.

The Mechanism of Troposcatter

Troposcatter uses the weak, but reliable, reflections that can be obtained from the dust particles, clouds and refractive index variations that occur in the atmosphere 1000 to 50,000 ft above sea level.[1] This mechanism can be used for working DX reliably over distances of many hundreds of miles. A brief illustration of the relevant part of the atmosphere is shown in Fig. 1. Air density decreases with height, and reaches one-third of its sea level value at about 30,000 ft. The refractive index of the atmosphere depends on such properties as temperature, density (pressure), humidity or the presence of water. Variations in any of these properties can scatter the signals. The scattering process is more efficient at lower altitudes where the atmosphere is denser. Turbulence associated with the weather can have marked effects on the signal levels and characteristics.

In practice, this mechanism is used by pointing both antennas along the great circle path between the two stations at as low an angle of elevation as possible. The two beams will intersect in a common volume of the atmosphere near the center of the path (Figs. 2 and 3). Propagation will be line-of-sight to the common volume from the transmitter. A very small fraction of the power passing through this volume will then be scattered in all directions by the irregularities in the atmosphere. This power then propagates by line-of-sight to the receiver. The height of the bottom of this scattering volume will depend on the path length, and to some extent on the horizons of the sites, but will be typically 2000 ft on a 60-mile path, and 30,000 ft on a 300-mile path.

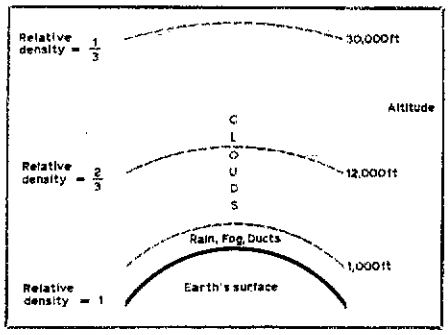


Fig. 1 — Diagram showing the structure of the lower atmosphere.

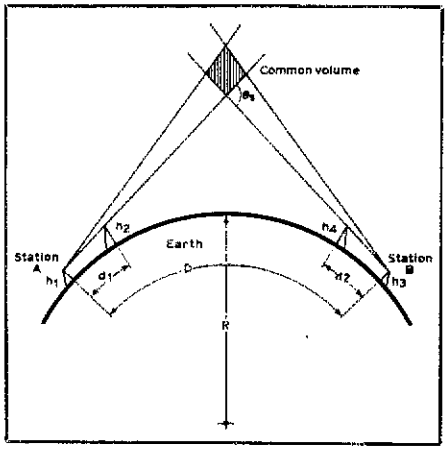


Fig. 2 — The geometry of a troposcatter path.

The loss in the scattering process is usually so large that the equipment is unlikely to have enough spare capability to overcome the extra losses introduced by

*Dept. of Engineering Science, Parks Road, Oxford, England

†Adapted from an article of the same title in *Radio Communication* (RSGB), August 1981.

[1]Notes appear on page 48.

any additional obstructions in the path. The path loss increases by about 10 dB for every degree of horizontal angle at each station. On paths over 60 miles the increase is about 9 dB for every extra 60 miles of path length. The choice of a site with a good horizon is vitally important; it can make a difference of several hundred miles in the obtainable range.

Derivation of an Expression for the Path Loss

The angle through which the signal is scattered is an important characteristic of a troposcatter path, because the loss involved increases with angle; the angle involved being usually only a few degrees. The relevant details of a troposcatter path are shown in Fig. 2. The station heights are h_1 and h_3; h_2 and h_4 are the heights of the obstructions forming the horizon at each station, at distances d_1 and d_2, respectively. All heights are with respect to sea level. R is the mean effective radio radius of the earth, 1.33 times the physical radius, i.e. 5280 miles. This allows for the amount by which the atmosphere refracts the signals toward the earth's surface under normal conditions. The scattering angle, θ_s, determined by the path geometry, consists of three terms, one depending on the overall path length and two being characteristic of the sites at each end.

$$\theta_s = \underbrace{\frac{D}{R} \times \frac{180}{\pi}}_{\text{term in path length}} + \underbrace{\left(\frac{h_2 - h_1}{d_1} - \frac{d_1}{2R}\right) \times \frac{180}{\pi}}_{\theta_A \text{ contribution from site A}} + \left(\frac{h_4 - h_3}{d_2} - \frac{d_2}{2R}\right) \times \frac{180}{\pi} \quad \text{(degrees)}$$

θ_B contribution from site B (Eq. 1)

The units used for the various distances do not matter, provided they are the same in each term. The path loss can now be expressed as the sum of several components:

The free-space loss[2]

$$L_{fs} = 32.5 + 20 \log D + 20 \log f$$

(dB, km, MHz) (Eq. 2)

The loss in the scattering process

$$L_s = 21 + 10\,\theta_s + 10 \log f$$

(dB, degrees, MHz) (Eq. 3)

This is an empirical expression derived from observed signal levels, and shows the variation of scattering efficiency with frequency and scattering angle. The loss increases by 10 dB per degree of scattering angle.

These expressions are plotted in Fig. 4, which shows the free-space loss and the sum of the free-space and scatter losses for comparison. Much greater losses are involved in troposcatter, and they increase very rapidly with distance.

The aperture to medium coupling loss

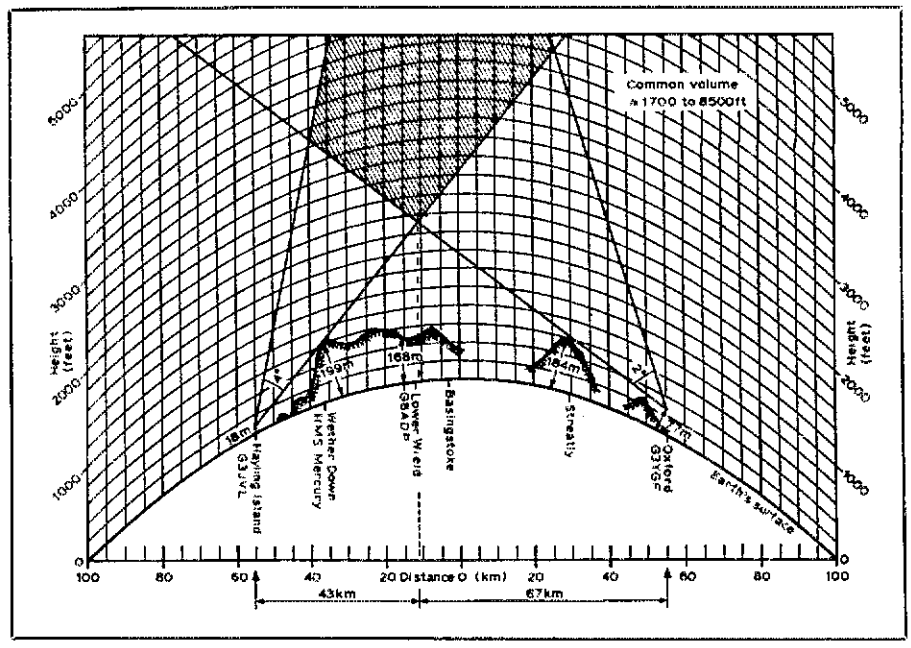


Fig. 3 — Path profile plot for the Oxford to Hayling Island path.

$$L_{am} = 2 + 2\,\frac{\theta_s}{\alpha} \quad \text{(Eq. 4)}$$

where α is $\sqrt{\theta_2\theta_3}$ the geometric mean of the two antenna beamwidths.[3] This takes into account the size of the two beams and the way they cross in the atmosphere, which affects the efficiency of coupling between them. It implies that there is no point in increasing the size of the antennas above a certain gain on a given path, because the expected increases in gain will not be realized when very high gain antennas are used. This condition occurs when the antenna beamwidths approach the scattering angle, i.e., a few degrees. This term will be negligible except on the higher frequency bands, where antennas with a beamwidth of a few degrees can be realized conveniently. (E.g., a 4-ft dish on 10 GHz has a 2° beamwidth.)

Loss attributable to variation of the mean radio refractive index of the atmosphere

$$L_N = 0.2\,(N - 310)\text{(dB)} \quad \text{(Eq. 5)}$$

where N is the refractive index expressed in millionths above unity — the nominal value is 1.000310 (310) — and will be affected by the climatic conditions mentioned earlier. If N varied by 30 units, this would affect the path loss by 6 dB, so it has a significant effect and probably accounts for the seasonal variations referred to later.

Calculation of the Path Loss

The total troposcatter loss is the sum of all these terms. It is convenient to split it into two parts: the basic loss, which only depends on the distance and frequency, and the variable losses owing to the nature of the sites used and the climatic conditions.

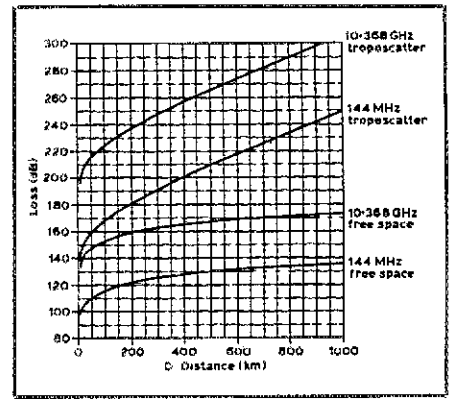


Fig. 4 — Comparison of troposcatter and free-space path losses.

The first part, the troposcatter loss between two stations on a smooth earth,[4] is obtained by taking the terms that are either constant or depend on path length or frequency.

$$L = 55.5 + 20 \log D + 30 \log f + \frac{D}{R} \times \frac{1800}{\pi} \text{ (dB, km, MHz)} \quad \text{(Eq. 6)}$$

This loss is plotted against distance in Fig. 5 for the frequencies 10,368 and 144 MHz. These graphs can be used at other frequencies by adding

$$30 \log \frac{f}{10{,}368} \text{ or } 30 \log \frac{f}{144}$$

to the value obtained from the appropriate curve. Values of this term for the various amateur bands are given in Table 1. The remaining terms are the variable ones that

depend on the sites or propagation conditions and weather, so these should then be added to the loss obtained from the graph:

$$L_v = 10\,\theta_A + 10\,\theta_B + \frac{2\theta_s}{\alpha} - 0.2$$

$$(N - 310) \qquad \text{(Eq. 7)}$$

For most purposes the total loss can be taken as the loss from the graph plus the contribution from each site. The other two terms will have little effect, and the value of N is not likely to be known accurately.

Once the details of the sites are known, the values of θ_A and θ_B can be calculated using the expression for θ_s given earlier, or the loss $10\,\theta_A$ can be found directly using the graph in Fig. 6. In this, d is the distance to the first obstruction, and Δh is the height of the obstruction above the site (see Fig. 2).

$$\Delta h = h_{obstruction} - h_{site} \qquad \text{(Eq. 8)}$$

The actual height of the site does not appear explicitly in the expressions, only inasmuch as it determines where the first obstruction is and the height relative to a site. It can be seen from the original expression for θ_s that the elevation angle the obstacle presents and the distance from the site are the important parameters in determining the path loss. There is little to be gained by going higher at a site if the object forming the horizon is far away, but significant improvements are possible if the obstacle is close. A distant horizon is the key feature of a good site which, in simple terms, might be described as a place having a "good view."

It is also very useful to calculate the loss from the site-dependent terms separately, as it provides means of accurately comparing the merits of various sites and is independent of frequency. Path profile plots[5] should be performed for each direction of interest at each site to find the object causing the horizon and thus the values of d and h. A very good site can give negative values of this loss and so reduce the overall path loss. This loss is typically in the range -5 to $+10$ dB.

Example of Path Loss Calculation

As an example, consider the Oxford-Hayling Island path, a distance of 65 miles. Converting to metric and taking the distances from the path plot in Fig. 3, the site losses are:

Oxford —

$$\theta_A = 57.3° \left(\frac{184\text{ m} - 77\text{ m}}{26{,}000\text{ m}} - \frac{26\text{ km}}{17{,}000\text{ km}} \right)$$

$$= 0.23° - 0.09° = 0.14° \qquad \text{(Eq. 9)}$$

$$\text{Loss} = 10\,\theta_A = 1.4\text{ dB} \qquad \text{(Eq. 10)}$$

Hayling Island —

$$\theta_B = 57.3° \left(\frac{199\text{ m} - 18\text{ m}}{18{,}000\text{ m}} - \frac{18\text{ km}}{17{,}000\text{ km}} \right)$$

$$= 0.57° - 0.06° = 0.51° \qquad \text{(Eq. 11)}$$

$$\text{Loss} = 10\,\theta_B = 5.1\text{ dB} \qquad \text{(Eq. 12)}$$

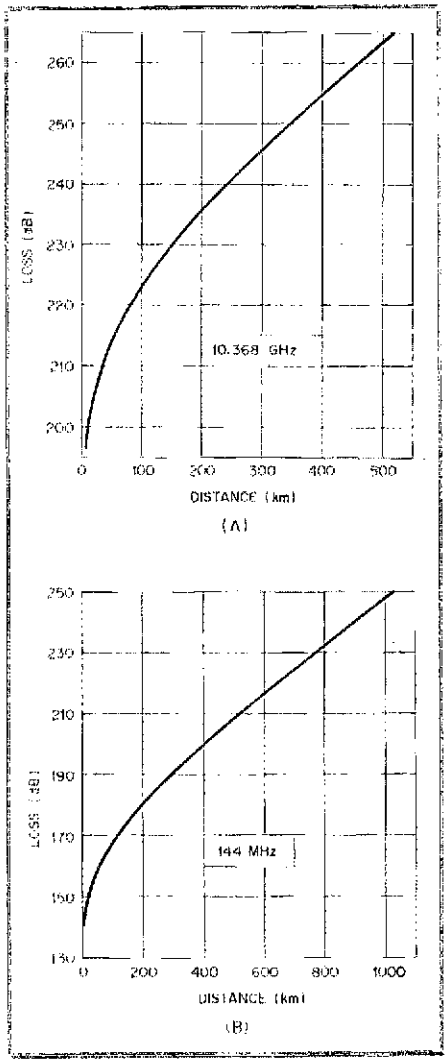


Fig. 5 — Troposcatter path loss against distance: (A) for 10.368 GHz, (B) for 144 MHz.

Table 1
Corrections to the Path Loss in Fig. 5 for Different Frequencies

Band	*Correction (dB) to be added to the loss given in*	
	Fig. 5A (10,368 MHz)	*Fig. 5B (144 MHz)*
24 GHz*	+ 11	+ 67
10 GHz	− 0	+ 56
5.6 GHz	− 8	+ 48
3.4 GHz	− 15	+ 41
2.3 GHz	− 20	+ 36
1296 MHz	− 27	+ 29
432 MHz	− 41	+ 14
144 MHz	− 56	0
70 MHz	− 65	−9

*An additional allowance must be made for water vapor absorption on this band.

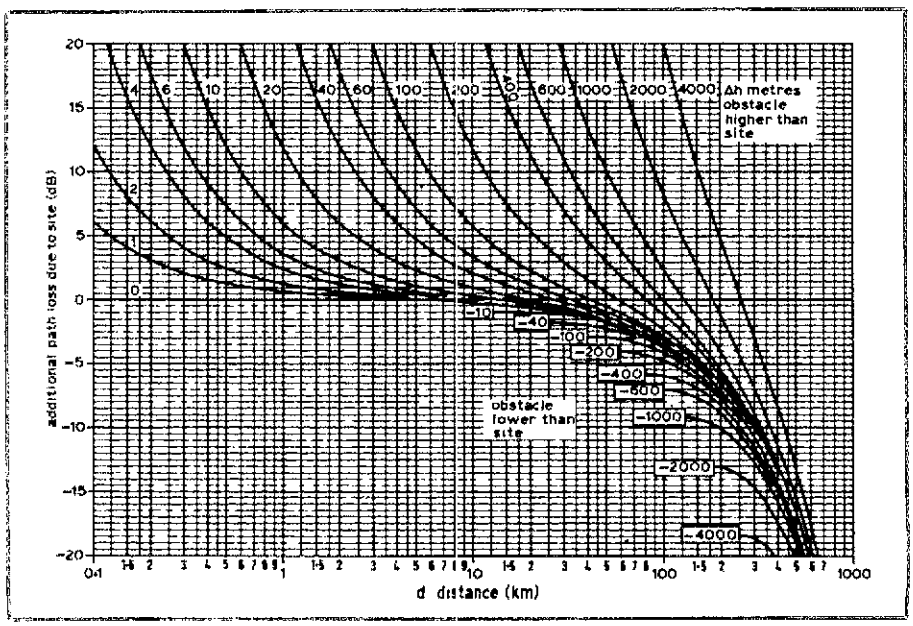


Fig. 6 — Graph showing the effect of site geography on path loss.

The total loss associated with the sites is 6.5 dB. The same results can be obtained by using these values of $\triangle h$ and d in Fig. 6.

Site A: d = 26 km, $\triangle h$ = 107 m
Site B: d = 18 km, $\triangle h$ = 181 m

Next, θ_S is needed to calculate the coupling loss. θ_S is the sum of the horizon angles at each site, plus the term in the total path length,

$$\frac{57.3\ D}{R}$$

$$\theta_S = \theta_A + \theta_B + 57.3° \times \frac{110\ \text{km}}{8497\ \text{km}}$$

$$= 0.14° + 0.51° + 0.74° = 1.4° \qquad \text{(Eq. 13)}$$

Now the coupling loss can be found. The antennas, 2-ft and 4-ft dishes, have beamwidths of 4° and 2° on 10 GHz, so the mean is 2.5°. The coupling loss is then

$$\frac{2.8}{2.5}$$

(approximately 1 dB), which is negligible, as expected.

The path loss from the graph in Fig. 5 for a path of 65 miles (110 km) is 224 dB at 10 GHz, so the total loss is

$$\text{Path loss} = 224 + 6.5 + 1 = 232\ \text{dB} \qquad \text{(Eq. 14)}$$

The path loss on 144 MHz can be found in a similar manner. The site losses will be the same, as they are independent of frequency, and the coupling loss will be even smaller, since θ_S is the same but the antenna beamwidths are much larger, typically 20° to 30°. The path loss from the graph is 168 dB, so the total loss is

$$\text{Path loss} = 168 + 6.5 + 0 = 175\ \text{dB} \qquad \text{(Eq. 15)}$$

These values are the mean values of loss averaged over a year. There are many factors that will affect this value slightly, and these are discussed later.

Equipment Performance

Now that the path losses (pl) are known, the next step is to calculate the capability of the equipment at each end of the path — the path-loss capability (plc).[6] This is the number of decibels of loss that must be inserted between the transmitter and receiver antennas to give a 0 dB signal-to-noise ratio in the receiver. The difference between the two terms gives the signal-to-noise ratio to be expected in the receiver,

$$\text{s:n} = \text{plc} - \text{pl} \qquad \text{(Eq. 16)}$$

The plc can be found for any two sets of equipment. It is the sum of the transmitted effective isotropic radiated power (eirp) and the effective receiver sensitivity (ers),

$$\text{plc} = \text{eirp} + \text{ers}. \qquad \text{(Eq. 17)}$$

The eirp is the sum of the transmitter power in decibels relative to 1 W (dBW). Antenna gain is in decibels relative to an isotropic radiator (dBi). The feeder loss in decibels is

$$\text{eirp} = \text{transmitter power (dBW)} + \text{antenna gain (dBi)} - \text{feeder loss (dB)} \qquad \text{(Eq. 18)}$$

Calculation of the ers is slightly more involved. The noise level of the receiver is expressed in decibels below 1 W, but as a positive number of decibels. The noise level can be found from the expression for thermal noise, — 10 log (kTB), where k is Boltzmann's constant,

$$1.38 \times 10^{-23}\ \text{W/K Hz}$$

T is the receiver noise temperature, which is related to the more familiar noise figure by the relation

$$\text{nf} = 10 \log \left(1 + \frac{T}{290}\right)$$

and B is the receiver bandwidth in hertz. Values for this noise level can be found from the graph in Fig. 7, which is for modes such as ssb or cw, which have no detector threshold. For a-m detectors the threshold is 2.6 dB, but for fm the situation is more complicated.[7] The threshold increases with modulation index up to about 10 dB for wideband fm. These values represent reductions in the receiver sensitivity. Feeder loss and antenna gain are included:

ers = receiver noise level (dBW, a positive number of decibels) + antenna gain (dBi) − feeder loss (dB) − threshold (dB) (Eq. 19)

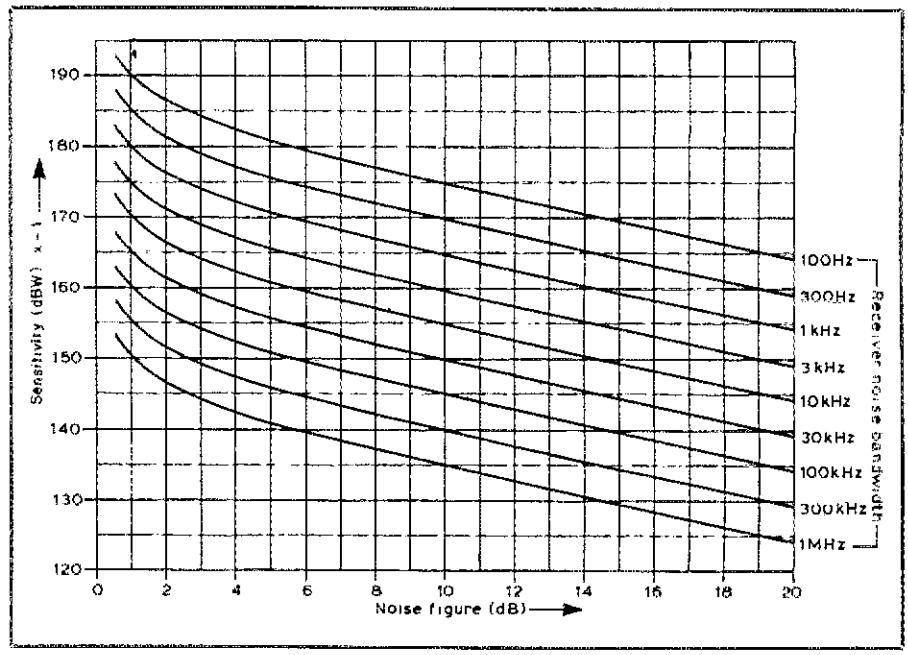


Fig. 7 — Graph of effective receiver sensitivity as a function of noise figure and bandwidth.

Examples of PLC

The plc will now be calculated for the equipment used on the path mentioned earlier on both 144 and 10.368 MHz.

144 MHz

G3JVL (transmit)	
Transmitter 20 W	+ 13 dBW
Feeder loss	− 1 dB
Antenna, 14 element	+ 14 dBi
eirp =	+ 26 dBW (Eq. 20)

G3YGF (receive)	
Receiver, nf 5 dB, bandwith 2.5 kHz	+166 dBW
Feeder loss	0 dB
Threshold (ssb)	0 dB
Antenna, 4 element	+ 6 dBi
ers =	+ 172 dBW (Eq. 21)

plc = eirp + ers = 198 dB (Eq. 22)

10,368 MHz

G3JVL (transmit)	
Transmitter, 5 W	+ 7 dBW
Feeder loss	− 2 dB
Antenna, 2-ft dish	+ 34 dBi
eirp =	+ 39 dBW (Eq. 23)

G3YGF (receive)

Receiver, nf 8 dB, bandwidth 500 kHz	+169 dBW
Antenna, 4-ft dish	+ 39 dBi
Feeder loss	− 2 dB
Threshold (cw)	0 dB
ers =	+206 dBW (Eq. 24)

plc = 245 dB (Eq. 25)

The path losses calculated earlier are 232 dB (10,368 MHz), and 175 dB (144 MHz). The predicted signal-to-noise ratios can now be calculated.

	Observed value	*Predicted value*
10,368 MHz	10 dB	245 − 232 = 13 dB (Eq. 26)
144 MHz	17 dB	198 − 175 = 23 dB (Eq. 27)

The 144-MHz measurement was done on only one day, so it is likely to be rather inaccurate, but the 10,368-MHz measurements were done over a period of many months and show good agreement with the predicted values. The discrepancy is probably caused by the seasonal and climatic variations, for which no allowance has been made, although there will always be a few decibels of uncertainty in the equipment parameters, antenna gains, etc.

The Potential of Troposcatter Communications

Details of various systems and the range that can be expected between two stations using them are given in Table 2. They illustrate the performance that should be expected under normal conditions from good sites. The loss contributions from the sites are assumed to be zero, and the figures are given for a signal-to-noise ratio of 0 dB in a 100-Hz bandwidth, representing a weak cw signal. The range obtained when using ssb in a bandwidth of 2 kHz, a factor of 13 dB larger, will be about 209 mi on each band. The equipment is typical of that which might be used for a serious entry in a portable contest. The noise figures given may seem rather high, but are those of the overall system, which may be significantly higher than those of the preamplifiers on their own.

Table 3 gives the troposcatter range between two systems that are capable of moonbounce communication to illustrate the relative magnitudes of the problems involved. For distances approaching 600 miles the challenge represented by the two modes of communication is comparable. These tables also show that the range attainable by troposcatter need not, in theory, vary much with frequency. In practice, however, physically smaller antennas tend to be used on the higher frequencies. It is also harder to generate comparable power levels on the higher bands. In view of the rapid advances being made in receiver and transmitter technology, however, the potential of the microwave bands for longer distance communication should not be ignored.

Characteristics of Troposcatter Signals

Several types of fading are experienced on troposcatter signals.[8] The effects are more severe at high frequencies, so are easier to observe and describe. At 10 GHz the note of the carrier can appear quite rough, being modulated by the scattering process at frequencies up to about 50 Hz. An example of this rapid fading is shown in Fig. 8 (A and B), which are oscilloscope photographs of a continuous carrier received over a 65-mile path from G3JVL to G3YGF, showing both the depth of the fading and range of frequencies over which it occurs. At times it produces a waveform that resembles 100 percent amplitude modulation. Fig. 8C shows the fading on a longer time scale, and the occasional very deep fades can corrupt cw as shown in Fig. 8D, where in the V of G3JVL the dash has been broken up into two dots.

There is also fading over a period of minutes and, in the longer term, signals tend to show a diurnal variation of about ±5 dB. These swings often peak in the afternoon when atmospheric turbulence caused by convection currents from the warm ground is at a maximum. Plots of signal level showing this effect are given in Fig. 9. There is also an annual variation of similar amplitude, with signals peaking in the summer and being at a minimum in the winter. The daily and annual variations are probably the result of corresponding variations in the average value of N over the path. These fading effects will all exist at lower frequencies, but the rates and depth of the short-term fading will be correspondingly slower. They can be seen as the slow fading on vhf DX signals, which has a period of several minutes.

The rapid fading is caused by the signal being scattered from various regions of air, each of which may be in turbulent motion, and moving relative to each other. This motion can cause both frequency and amplitude modulation of the signals. Frequency modulation results from the signals being scattered from air masses that are moving at different speeds, so there will be random Doppler shifts on the signals. At 10 GHz a speed of 30 mph will produce a shift of about 500 Hz, and this effect can spread the energy of the carrier out over 1 kHz or more; heavy rainstorms produce a sound rather similar to an auroral signal. This effect will also scale with frequency and so will be far less noticeable at vhf. These storms can also increase the signal levels by around 10 to 20 dB, as the raindrops scatter the signal more effectively. Amplitude modulation results from variations in the scattering efficiency or interference effects between signals arriving by different paths.

Several enhancements of 10 to 15 dB on 10 GHz have occurred at the same time as big lifts on the vhf bands, e.g. on November 10, 1978 and October 3, 1980. The note was T9, and very good quality ssb was obtained, showing that the clean signal that was enhanced by the ducting had swamped the normal rough troposcatter one.

Conclusion

This method of calculating troposcatter

Table 2
Range Obtainable by Troposcatter Propagation on Various Amateur Bands
(100 Hz Bandwidth Receiver)

Freq. (MHz)	Path Loss (dB)	Range (km)	Equipment	Antenna Gain
144	240	870	100 W, 3 dB nf, 2 × 16-el Yagi	18 dBi
432	247	790	100 W, 3 dB nf, 2 × 25-el loop Yagi	22 dBi
1,296	258	760	100 W, 3 dB nf, 4 × 25-el loop Yagi	24 dBi
2,304	262	720	50 W, 3 dB nf, 6-ft dish	31 dBi
10,368	234	240	100 mW, 10 dB nf, 4-ft dish	39 dBi
10,368	254	440	1 W, 3 dB nf, 4-ft dish	39 dBi

Table 3
Troposcatter Range of Equipment Capable of Moonbounce Operation

Freq. (MHz)	*EME Path Loss (dB)*	*Tropo Range (km)*	*Equipment*	*Antenna Gain*
144	252	990	500 W, 3 dB nf, 100 Hz, 4 × 16-el Yagi	21 dBi
432	262	940	500 W, 3 dB nf, 100 Hz, 20-ft dish	26 dBi
1,296	271	890	500 W, 3 dB nf, 500 Hz, 16-ft dish	34 dBi
2,304	276	860	100 W, 3 dB nf, 500 Hz, 16-ft dish	40 dBi
10,368	289	790	50 W, 3 dB nf, 1 kHz, 12-ft dish	50 dBi

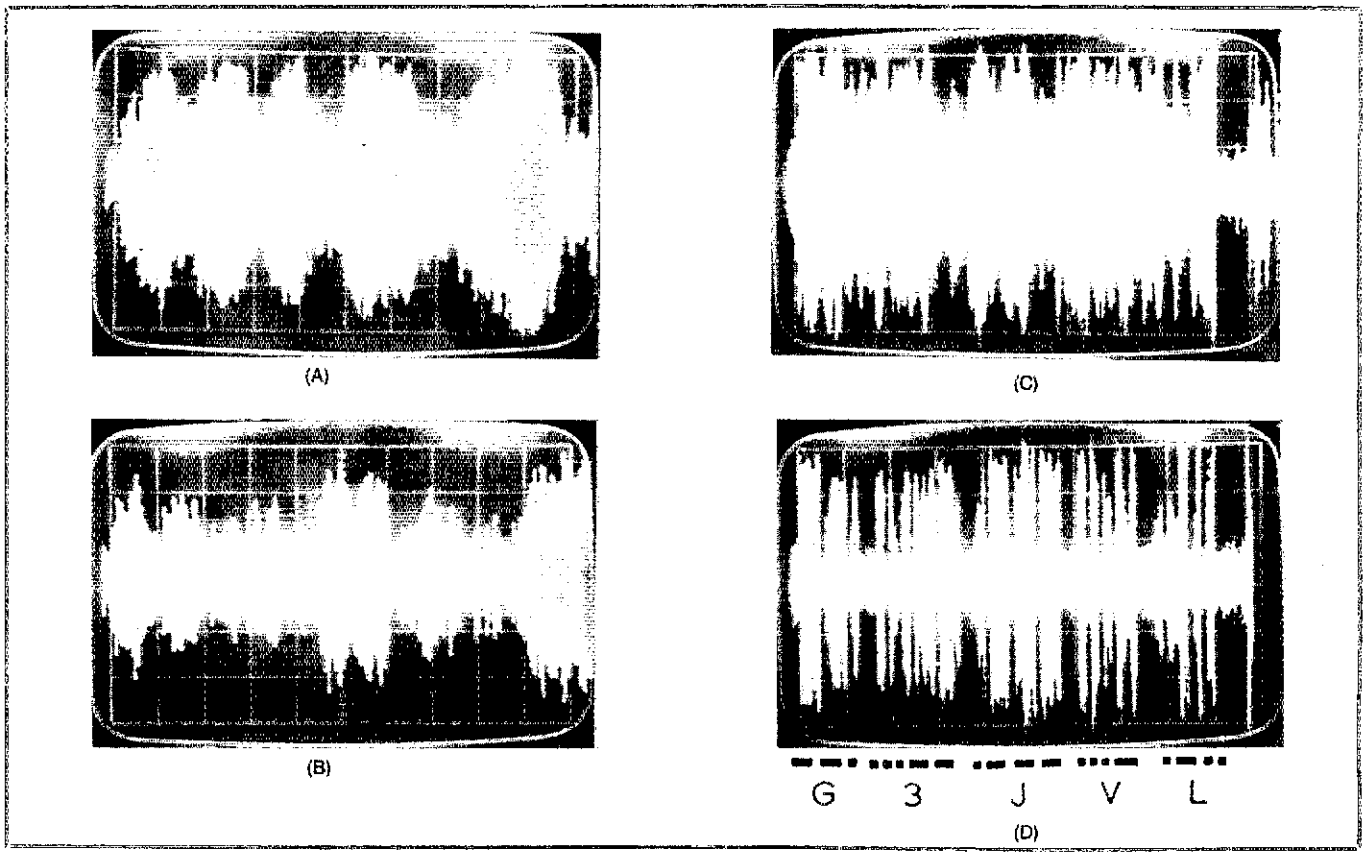


Fig. 8 — Oscilloscope traces showing rapid fading on troposcatter signals received from G3JVL on 10.368 MHz over a 65-mile (110-km) path in March 1979. At (A), continuous carrier, 50 ms/cm, showing fading at around 10 Hz. At (B), continuous carrier, 50 ms/cm, showing more random fading. At (C), continuous carrier showing fading on a longer time scale, 0.6 s/cm. At (D), Morse code from G3JVL showing occasional deep fading, 0.6 s/cm.

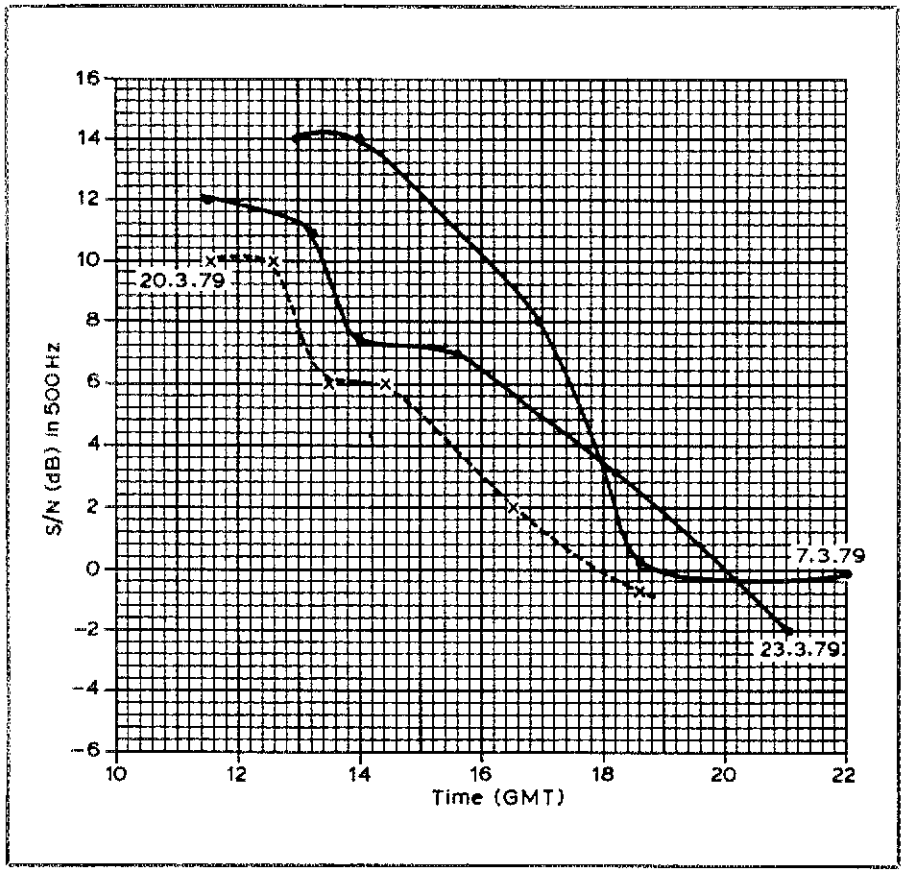


Fig. 9 — Plots of signal strength against time showing diurnal variations.

path losses has given predictions of signal levels that have been shown to be accurate to within a few decibels over a number of paths on 144 MHz and 10 GHz from 60 to 300 miles long, when used in conjunction with the calculations of the path loss capability of the equipment.

It enables the merits of various sites to be compared more scientifically, and an estimate to be given of the distances that should be workable under normal conditions. It has also demonstrated the potential of narrow-band modes on 10 GHz and has revealed several interesting propagation effects that can be investigated. The papers in the notes will provide more background information on the subject, and are quite light reading.

Notes

[1]mm = in. × 25.4; m = ft × 0.3048; and km = mi × 0.621.
[2]"Microwaves," *Radio Communication*, May 1978.
[3]Booker and DeBettencourt, "Theory of Radio Transmission by Tropospheric Scattering Using Very Narrow Beams," *Proceedings of IRE*, March 1955, p. 281.
[4]Bullington, Inkster and Durkee, "Results of Propagation Tests at 505 and 4090 MHz on Beyond the Horizon Paths," *Proceedings of IRE*, Oct. 1955, p. 1306.
[5]B. Chambers, "Microwave Path Checking," *Radio Communication*, March 1978.
[6]"Microwaves," *Radio Communication*, March 1978.
[7]D. Middleton, "On Theoretical Signal to Noise Ratios in FM Receivers," *Journal of Applied Physics*, April 1949, Vol. 20, pp. 334-351.
[8]L. Yeh, "Simple Methods for Designing Troposcatter Circuits," *IRE Transactions on Communications Systems*, Sept. 1960, p. 193.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu Electronics Corp. FT-77 HF Transceiver

Yaesu describes the FT-77 as a thrifty hf transceiver. This compact radio is easy to operate and well suited to mobile installations. A microphone or key, an antenna, and a power supply (20 A at 13.5 V) are all that is required to begin operation.

Features

The FT-77 is a solid-state transceiver, and no final amplifier tuning is required. It is rated to produce 100 watts (85 watts on 10 meters) of ssb or cw output power. Output power must be reduced to 50 watts when using the optional fm unit. Operating frequency is controlled by a VFO or a single crystal (not included). A scanning, synthesized, external VFO (FV-700DM or FV-707DM) is optional. Each optional accessory VFO has frequency-storage capability.

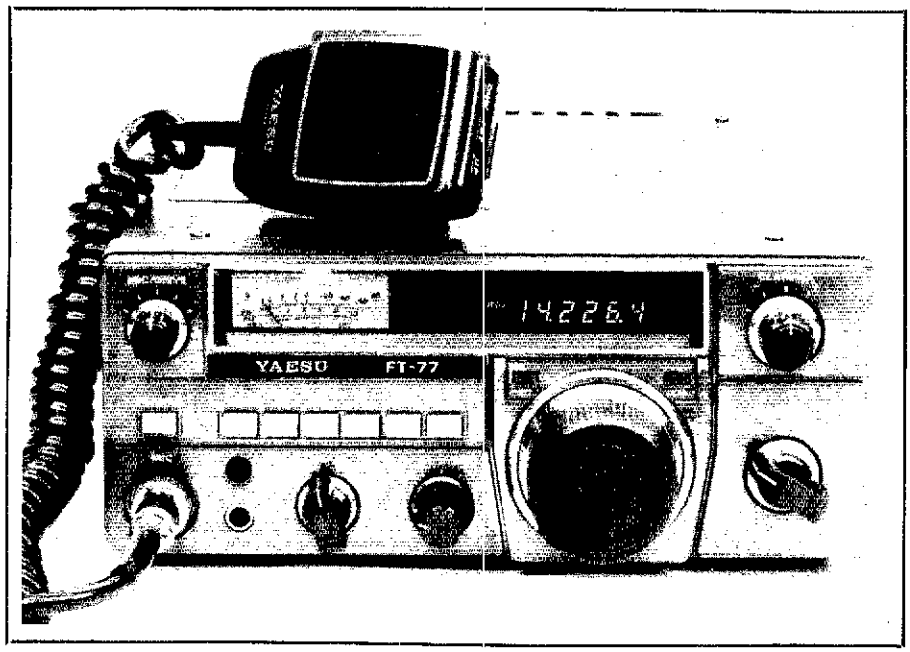
The transceiver has a single-conversion receiver section with the i-f at 8987.5 kHz. When the fm unit is operating, the i-f is shifted up 455 kHz and a second conversion is made from 455 kHz. The receiver bandwidth is 2.5 kHz for ssb and cw (wide). Ardent cw operators will probably want the optional, narrow-bandwidth filter (0.6 kHz). There are slow and fast agc settings, but no way to completely stop agc action. Two noise blanker settings are available. Set to the narrow position, the noise blanker will eliminate normal automotive ignition noise. In the wide position, longer noise pulses created by sources such as over-the-horizon radar ("woodpecker") will be reduced. A SQUELCH control is included for use with the fm unit. An optional 25-kHz marker unit is available.

I received the optional scanning microphone (MH-1B8) with the FT-77. The scanning function does not operate without the optional scanning VFO, but the microphone has a switch that allows a choice of frequency response characteristics. I found this microphone helpful with my low and "muddy" voice.

Front Panel Functions

The MIC/CAR control sets the microphone gain in the ssb mode and carrier level in the cw and fm modes. Below the MIC/CAR control is a push-on/push-off power switch. To the right of the power switch, but separate from it, is a row of six more push switches. The rf attenuator is operative when the RF ATT button is pressed. An LED at the upper left of the tuning knob lights when the attenuator is in use. Pressing the next button activates the noise blanker. AGC-F selects fast agc action for reception of cw or fast-fading ssb signals. FIX activates the crystal oscillator as the frequency control for the FT-77. MARK turns on the optional 25-kHz marker for confirmation of the frequency-display accuracy. A press of the CLAR button switches the clarifier (RIT) on; an LED to the upper right of the tuning knob indicates that it is on.

At the lower left of the front panel is an eight-pin jack with connections for audio input, PTT, up-scan, down-scan and fast-scan (up or down) controls. A ¼-inch-diameter PHONES jack allows connection of stereo or monaural headphones.[1] The RECord jack (2-conductor, "mini" phone plug) provides a fixed level (70 mV at 50 kΩ) for a tape recorder (this feature is useful if records of third-party traffic are kept on tape). LSB, USB, CW-W (wide), CW-N (narrow), and FM positions are available on the MODE switch. AF (gain) and SQL (squelch) controls are on concentric shafts, just left of the tuning knob. A hard-rubber tuning knob (similar to the focus ring of some cameras) covers about 17 kHz per revolution. The BAND switch allows selection of any one of the present hf amateur bands and the future allocations at 18 and 24 MHz. The CLARIFIER (RIT) shifts the receive frequency up to 3.4 kHz above, or 4.0 kHz below, the transmit frequency when the CLAR button is depressed.



Yaesu Electronics Corp. FT-77 HF Transceiver, Serial No. 2M010010

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 3.5 to 4.0, 7.0 to 7.3, 10.10 to 10.15, 14.0 to 14.35, 18.0 to 18.5, 21.0 to 21.45, 24.5 to 25.0, 28.0 to 29.7 MHz.	As specified.
Modes of operation: cw, ssb, (fm optional).	As specified.
Frequency display: 6 digit.	3/8 in. high, 6-digit blue vacuum tube.
kHz/turn of knob: 15.	17.
Frequency resolution: 100 Hz.	As specified.
Backlash: Not specified.	Nil.
S-meter sensitivity (μV/S9 reading): Not specified.	80 m, 24.5; 40 m, 24; 30 m, 35; 20 m, 40; 18 m, 35; 15 m, 28; 12 m, 30; 10 m, 25.
Transmitter output: 80-15 m, 100 W PEP; 10 m, 85 W PEP.	80 - 15 m, 100 W; 10 m, 95 W.
Spurious suppression: Better than 40 dB.	-54 dB (see photo).
Third-order IMD: Not specified.	-35 dB (see photo).
Receiver sensitivity: Less than 0.15 μV for 10 dB S+N/N.	Receiver dynamics measured with optional 600-Hz filter installed.

	80 m	*20 m*
Noise floor (MDS) dBm:	-139.5	-139.5
Blocking DR (dB):	99	99
Two-tone, third-order IMD DR (dB):	92	94
Third-order intercept:	-1.5	-1.5

Size (HWD): 3.7 × 9.5 × 11.8 inches[†] — As specified.
Weight: 13.2 lb. — As specified.
Price class: FT-77, $600; FP-700, $135.
Available from: Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723.
[†]mm = in. × 25.4; kg = lb × 0.454.

*Assistant Technical Editor

[1]mm = in. × 25.4.

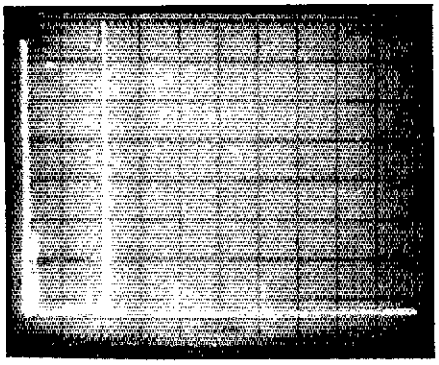


Fig. 1 — Worst-case spectral display of the FT-77. Vertical divisions are each 10 dB; horizontal divisions are each 5 MHz. Output power is approximately 100 W at a frequency of 10.105 MHz. All spurious emissions are approximately 53 dB below peak fundamental output. The FT-77 complies with current FCC specifications for spectral purity.

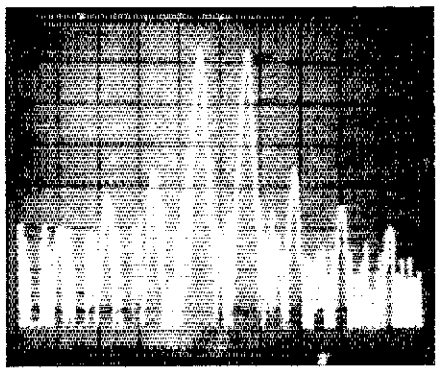


Fig. 2 — Spectral display of the FT-77 output during the transmitter two-tone IMD test. Third-order products are approximately 35 dB below PEP, and fifth-order products are about 44 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated input power on the 20-meter band.

The vacuum-tube frequency display is blue and has 100-Hz resolution. At the left side of the frequency display are frequency control indicators: VFO-A for the internal VFO, VFO-B for the external VFO, or F (fixed). Left of the frequency display is the meter that reads S units on receive, relative forward, power, and reverse power, or alc on transmit. The meter sensitivity and function, sidetone level, cw break-in delay, a crystal socket and a trim control for the crystal frequency are all located under a hatch on top of the FT-77 case.

Rear Panel

Rear panel connections allow for a wide range of operating possibilities. RF OUT provides a low-level (220 mV at 50 ohms) rf source for a transverter (FTV-700 optional). ACC 1 is a six-pin DIN jack with switching and alc signals for a telephone interconnect (phone patch) or power amplifier. A 1/8-inch phone jack is supplied for an external 4- to 16-ohm speaker (EXT SP). There's a dc power connector (DC 13.5 V) for the FT-77 (1 A on receive and 20 A on transmit). ACC 2 is a seven-pin DIN jack with connections for scanning control, transmitter audio input, PTT, and 13.5 V-dc transmit-signals from an external VFO. An eight-pin DIN jack EXT VFO is used for frequency control input from, and power to, an external VFO. The DC 8 V jack provides power for the optional FC-700 antenna tuner. KEY accepts a ¼-inch phone plug for cw keying (0.4 mA at 5 V maximum). Connections are also provided for the antenna (SO-239) and station ground.

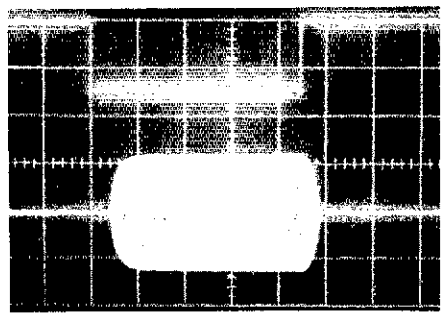


Fig. 3 — Cw keying waveform of the FT-77. Upper trace is the actual key closure; lower trace is the rf envelope. Each horizontal division is 5 ms.

Operation

This is simple: Switch on the power, and transmit! I found tuning with the rubber knob awkward at first and the tuning is a little fast for mobile operation. The scanning VFO option will make mobile operation easier. RIT offers a slower tuning rate than the main tuning knob and may be used as a bandspread control for receive only. Since the transceiver is intended for mobile use, no VOX circuit is present for voice operation. Cw operation is semi-break-in with a variable delay. The narrow noise blanker helps fight engine noise when mobile.

Comments

The FT-77 is a fine transceiver, but there is always room for improvement. The meter-function control and noise-blanker-selection control locations are awkward. To operate the controls, one must remove a hatch cover and reach inside the case to manipulate slide-switch settings. This procedure is troublesome at home, difficult and maybe impossible (dependent upon mounting location) while mobile. I am pleased to find a transceiver with an SWR meter and selectable noise blanker built in, but the controls should be on the case exterior.

The receiver "hears" the frequency counter, faintly, all across the 80-meter band. There are 20 spurious responses that are strong enough to compete with a weak cw signal in the hf bands.

The first time I used the FT-77 in my vehicle I had a problem. Each time I pressed the PTT button, the meter dropped to zero — no power at all! After an hour of searching, I found that a jumper wire had been omitted from the power connector. I installed the jumper, as shown in the manual, and when I again pressed the PTT button, the meter needle climbed the scale — and immediately fell to zero again! The fuse supplied in the dc power cord was rated for 2 A, but a 20-A fuse is required. With the proper fuse installed, the set works well. A quick QSO with a station in southern Indiana confirmed the successful installation.

The FT-77 is easy to operate. I can switch on and transmit in a few seconds. The radio is easily portable and installation goes quickly. Reports indicated a clean transmitted signal and good audio quality. Receiver performance is excellent.

Conclusion

I am happy with the FT-77. Through most of the trial period I used a mobile whip antenna. Eastern Europe and South America were worked easily. I erected a ground-mounted vertical antenna near the end of the review period and Israel was contacted the first afternoon. The FT-77 gave me many hours of enjoyable operating. The radio is fun! — *Bob Schetgen, KU7G*

ICOM IC-45A 450-MHz FM TRANSCEIVER

☐ The ICOM IC-45A is a small 450-MHz fm radio with big-rig performance. Packed with just about every conceivable feature, the IC-45A follows in the footsteps of the 2-meter IC-25A. In fact, they're matching units, and can be stacked neatly.

Not on 450 yet? The IC-45A could be your ticket to blissful solitude and quiet, away from the masses on 2 meters. Enjoy longer QSOs, and radio radio silence in the monitoring mode when you wish.

"Versatility" describes the IC-45A: a microcomputer provides many operating capabilities. Multipurpose scanning, dual VFOs, a continuous tuning system with protection against out-of-band operation, and priority/memory channel capabilities all add up to give the fm fan all he or she can handle.

Thanks for the Memories ...

Up to five frequencies can be programmed easily into the memory channels. I found this memory capability handy. A click of the switch, and you're on the next programmed frequency — simple.

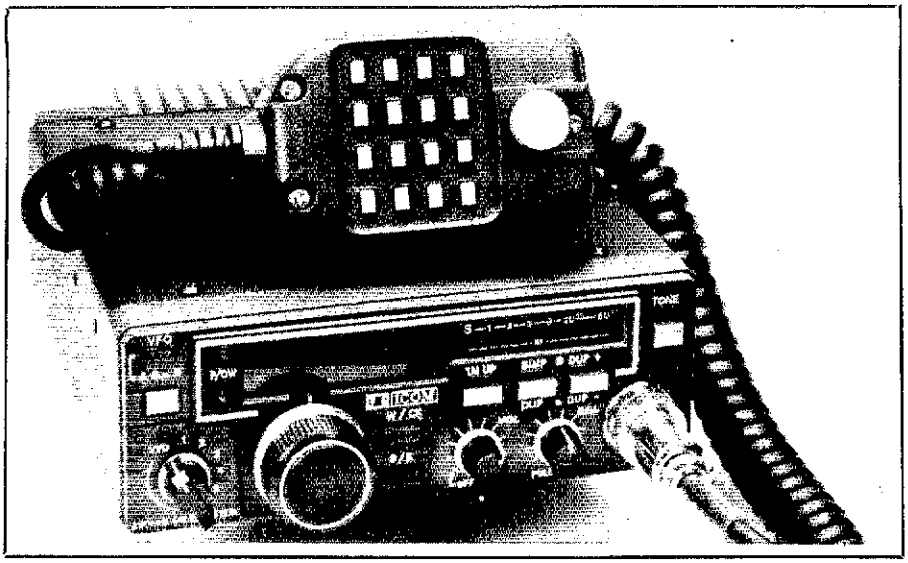
Scanning is a particularly useful function on any rig operating in the sparsely populated 450-MHz band. Multipurpose scanning capability is a feature of the IC-45A. The memory scan allows monitoring of the five memory channels and the two VFO frequencies *alone* — you don't have to wade through 10 MHz of spectrum to find a busy spot. (But, you *can* if you so desire). The program scan provides scanning between two programmed frequencies. Thus, you can search for a busy (or clear) frequency just about anywhere, with maximum efficiency.

Two VFOs can be used independently. Odd-ball splits can be implemented easily. VFO A changes frequency in 5-kHz steps; VFO B in 25-kHz steps. The dual VFOs allow you to set a certain frequency with one VFO, work up and down the band with the other VFO, and periodically check the set frequency simply by switching between VFOs A and B.

Another neat feature is instant monitoring of a repeater's input frequency (your transmit frequency) to determine if your friend is within simplex range. When the SIMP/DUP switch is in the "DUP" position and the memory W/CK button is pushed, you can receive the repeater's input frequency instantly.

A priority channel allows you to check your favorite channel, such as a local repeater or simplex frequency stored in a memory channel while operating on a VFO frequency. Every few seconds, the dial (receive) frequency will change to the priority channel to see if it's busy: five seconds of VFO frequency, then one second of priority channel check.

One thoughtful feature is the 1M UP switch. By pressing this switch, the dial frequency is raised by one MHz. This saves a good deal of arm-wrenching, and finger-twisting when traveling from the low end of the band to the high end.



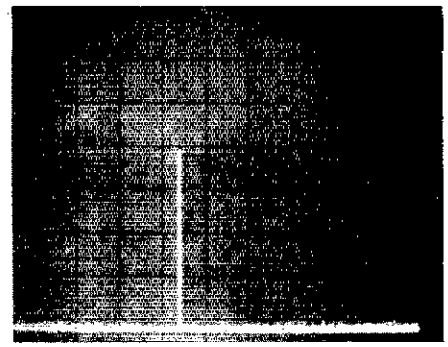


Fig. 4 — Spectral display of the IC-45A. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 16 W at a frequency of 444.0 MHz. Spurious emissions are all greater than 68 dB below peak fundamental output. The fundamental has been reduced in amplitude approximately 31 dB by means of notch cavities; this prevents analyzer overload.

ICOM IC-45A 450 MHz FM Transceiver Serial No. 01311

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 440.000-449.995 MHz.	Same.
Operating mode: 16F3	
RF Output Power: 10 W HI; 1 W LOW	16 W HI; 1.5 W LOW
Spurious emissions: −60 dB or better.	Better than −60 dB
Power requirements: 13.8-V dc ± 15%.	Same.
Current drain: at 13.8-V dc:	
rx 0.5 A (squelched).	Same.
0.7 A (full audio output).	Same.
tx 3.5 A (10 W).	3.4 A.
1.7 A (1 W).	1.6 A.
Receiver type: Double-conversion superheterodyne	
1st i-f — 21.8 MHz.	
2nd i-f — 455 kHz.	
S-meter sensitivity: Not specified.	4 μV/S9.
Sensitivity: Better than 0.3 μV for 12 dB SINAD; better than 0.4 μV for 20 dB noise quieting.	−119 dBm/20 dBq.
Squelch sensitivity:	0.1 μV (min) 0.5 μV (max).
Audio output power: More than 2 W.	
Dimensions (HWD): 2 × 5.5 × 7 in.†	
Weight: 3.3 lb.	
Color: Black.	

†mm = in. × 25.4 kg = lb. × 0.454

Remember, the IC-45A covers *10 MHz* of spectrum!

General

The IC-45A is durable, compact and easy to use. I found that the two power levels afforded fine performance for my mobile applications; an outboard amplifier was never required. Frequency choice is determined by the tuning control knob. Depending upon which VFO is employed, one complete rotation of the tuning knob results in a frequency change of 250 kHz or 1,250 kHz.

For home/base use, you'll need at least a 4-A power supply. The microphone has a convenient up and down switch arrangement for ease of frequency selection. A 16-key DTMF pad is also incorporated on the PTT mike.

Performance

I installed the review unit in my pick-up truck. A standard ¼-wavelength whip antenna was chosen for use with the rig. Pick-up trucks are not known for smooth rides. But this did not bother the IC-45A. It survived bumps and jolts on some of New England's ruttiest back roads.

Audio output is of sufficient level to be heard over the ambient noise in my truck. This is quite a feat considering the rig was mounted *behind* my seat. Reports of my transmitted audio were excellent — full and crisp. ICOM's reputation for good quality audio is manifested in their IC-45A.

The green color of the LEDs seemed to contribute to their readability in high ambient light situations, although LCD displays are still superior in these applications. But at night, they glowed clearly, providing for ease of reading.

I liked the feature of the low and high power option. When the truck engine was turned off, I could continue to operate at low power to avoid excessive battery drain.

The LED S-meter is easy to read even in high ambient light conditions. I also found the meter to be aesthetically pleasing to the eye. In fact, the entire rig is attractive with its avionics look. I had many admiring comments from both hams and non-amateurs alike.

The receiver is sensitive, and performs well. I experienced no difficulties with desensitization. The IC-45A worked well in cold temperatures as well as in direct sunlight and heat. Frequency stability was never a problem.

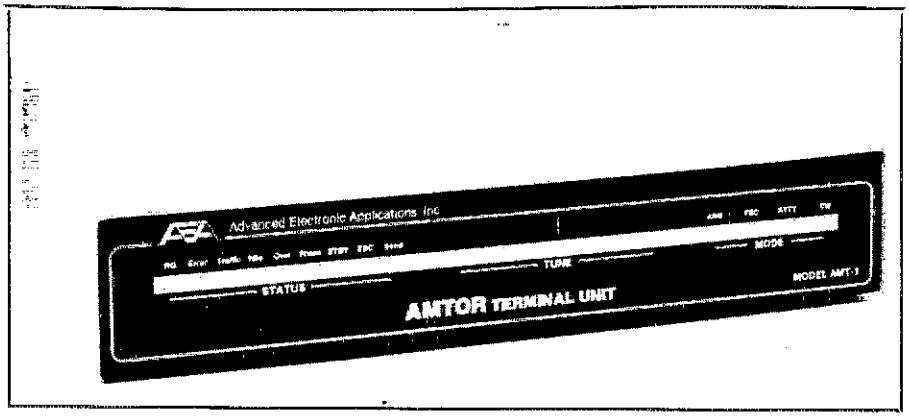
Overall, I enjoyed reliable performance with the review unit. The manual is complete, easy to read and understand. Try the "wilderness" approach to radio, and get on 450 MHz. You'll be glad you did! The IC-45A is available from ICOM America, Inc., 2112 116th Ave. NE, Bellevue, WA 98004. Price Class: $400. — *Rick Palm, KICE*

AEA AMT-1 AMTOR TERMINAL UNIT

☐ AMTOR (Amateur Teletype Over Radio) is an almost error-free mode of RTTY operation. Although it has been used for years commercially as SITOR, it is relatively new to the U.S. amateur fraternity. It has been in use on the amateur bands, primarily in Europe, but has just recently been authorized by the FCC for use on the hf bands where F1 emission is permitted. (For a complete explanation of the system, see the articles by Martinez and Newland in the June 1981 and July 1983 issues of *QST*, respectively.)

The AEA AMTOR Terminal Unit will get you on AMTOR quickly and easily if you have a home computer or an RTTY/ASCII terminal unit with RS-232-C compatible output. In addition to your regular transceiver you need a 12-V dc source, a five-wire cable to the terminal and a 4-wire cable to your transceiver. Connections to the terminal provide for serial data transmission to and from the AMT-1, ground and, for full interfacing, CTS (clear-to-send) and RTS (ready-to-send) lines. Connections to the transceiver are audio in/out, PTT and ground. The transceiver is used in the usb mode, and 1275- and 1445-Hz tones from the AMT-1 are fed into the audio input to produce the fsk signal. Be sure you have sufficient carrier rejection so your signal is really F1. If you desire to use the AMT-1 with an existing loop circuit, an audio tone to 20- or 60-mA loop interface will be required. In addition to AMTOR, the AMT-1 will receive and send Baudot RTTY up to 100 bauds and will send cw up to 100 wpm. The AMT-1 will not receive cw and will not receive or send ASCII. It can be bypassed for ASCII operation, but then must be switched off and on again for normal operation. The manual includes programs for adapting some of the more common home computers to the AMT-1.

The AMT-1 contains no external controls and, in normal use, no internal adjustments should be required. 110-baud ASCII data from the terminal ESC and CTRL functions is used to control the AMT-1. The front panel contains a 16-LED tuning display, a 4-LED mode indicator and a 9-LED status indicator. A properly tuned-in Baudot RTTY or AMTOR signal will result in



a two-green-LED display, with the dots being spaced equidistantly from the center line of the display. A red LED will indicate whether the AMT-1 is in the ARQ, FEC, RTTY or CW mode. In the status display, white LEDs are the indicators. ERROR is lit when a received block contains an error, RQ when a distant station requests a repeat, TRAFFIC when text is being sent or received, IDLE when no traffic is being sent, OVER when a change of direction of an ARQ contact is occurring, PHASE when the AMT-1 is trying to synchronize with another station, STBY when the unit is waiting to be used, ESC when the AMT-1 is in the escape mode and the next signal from the terminal will be a command. A red LED lights in the transmit mode. Parameters such as SELCAL, AMTOR time-out, RTTY baud rate, cw speed, echo on-off and automatic new line on-off may be programmed and will remain as long as the unit is not turned off. ESC Q will list the current settings of these parameters.

You will find operating AMTOR to be different from anything you have done before. When you first turn on the AMT-1 and tune in an ARQ signal you will probably find that the copy is anything but perfect. The slave may call for repeats while you are copying perfectly and your copy will show many blocks repeated. Conversely, you may get errors when the slave doesn't and those blocks will not be repeated. However, when you are in synchronization with another station you will receive almost completely error-free copy despite fading and interference.

Another AMTOR feature is SELCAL. A self-assigned four-letter group is entered into your AMT-1, the letters usually being derived from your call. For example, W1AW uses WWAW and G3PLX is GPLX. When another station calls using your SELCAL group, your station will automatically respond. The normal way to end a transmission is with +? which automatically reverses the master/slave relationship. The last station to transmit at the end of a contact finishes with CTRL D, which switches both stations to the standby mode.

The AMT-1 has a 960-character buffer so you can enter text in advance. However, when the data rate slows down because of QRM you must be careful not to exceed the buffer's capacity. This is where the RTS connection comes in handy; the text will be held in your terminal until there is room for it. An interesting characteristic of AMTOR is that the maximum range is governed by the speed of your transceiver change-over relay. With a change-over delay of less than 15-ms, contacts almost half-way around the world are possible. Slower relay action will shorten the range.

The manual is well-written with respect to the setup and operation of the AMT-1 itself, but I found it a bit vague concerning operating procedures. Fortunately, a contact or two straightened out the confusion. At the present time, almost all AMTOR activity is near the calling frequency of 14075 kHz. Undoubtedly, when there is sufficient activity, calling frequencies will be established on the other bands as well. The AMT-1 measures 2¼ × 12¼ × 9¼ inches (HWD). It is distributed by Advanced Electronic Applications, Inc., Bldg. O & P, 2006 196th SW, Lynwood, WA 98036. Price class: $590. — *Chuck Bender, W1WPR*

SUPER-RATT RTTY/CW SOFTWARE

☐ Super-RATT is a popular RTTY/cw software package designed to be used with an Apple® II (or //e) computer with 48 K of RAM, Applesoft BASIC in RAM and at least one disk drive using DOS 3.3. If you've got a clock card and another disk drive, you'll find them useful, but they're not absolutely necessary to use the software effectively.

The Super-RATT package consists of a 5¼-inch floppy disk containing several programs and a 70-page manual describing their functions. The RTTY software allows the computer to send and receive Baudot or ASCII (upper and lower case) RTTY at the popular speeds from 40 to 300 bauds. Speeds of from 5 to 100 wpm are accommodated for the reception and transmission of cw.

How quickly you become familiar with the software is dependent upon how much RTTY experience you've had and how well you know your computer. Don't expect to shove the disk into the drive, push a couple of keys and be on the air in five minutes! You've got to take some off-the-air time to become acquainted with the system operation.

Makeup

You probably can't think of more for an RTTY program to do than what is already contained within Super-RATT. There are three programs and a text file of importance: Super-RATT (the operating program); Super-RATT. UTL, used to maintain and edit the system directory, add message titles, create new indices and logbooks, etc.; Super-RATT. CONFIG, used to set up program options that meet with your particular system needs, and Super-RATT. EXEC, a file created by the previous program. This file is used to insert new information into several of the main program lines. In order to modify the main program to suit different system setups and modes, several such files may be kept on the disk. It all serves to make your operation flexible. You can have things configured so that you can use more than one TU.

An RBBS (Radio Bulletin Board System) is an integral part of the software. This subsystem has over 34 commands that a user can access. All message-handling functions and log-keeping routines are included.

If you have a 16 K RAM card installed or own an Apple //e, you have at your disposal 10 K of receive and 10 K of transmit text buffer. With the receive buffer you can elect to save off-the-air copy. At 50 bauds, an empty, initialized disk will hold over five hours of copy. The receive/transmit buffers may be independently erased and full-screen display of the transmit or receive buffer is operator selectable.

When transmitting, you can elect the fill ("diddle") character (letters, figures, blank or none), word- or character-mode transmission and carriage return position. The latter permits you to select automatic carriage return (CR) at 40- or 72-character intervals or to disable the CR function entirely.

The BREAK feature is a welcome part of the transmit section of the program. It allows you to respond to a question asked by the station being received or to answer a breaking station without losing text entered into the normal transmit buffer. If you've ever been on RTTY without such a feature, you can appreciate what this addition means! When you use the BREAK feature to answer a station, you will see the break transmission text appear on the screen immediately after the last transmit buffer information. Only the break transmission information will be output. After returning to receive, you can resume filling the transmit buffer. Although the screen shows the break transmission information lodged between the interrupted transmit buffer information, the break data will not be retransmitted.

Using QUICK LOAD files, you can store messages on disk for later transmission. It is a method of message storage that is conservative of machine memory space, as opposed to the use of stored message strings in RAM. File access is rapid.

Super-RATT offers an on-line LOGBOOK, and a feature called VERIFIED FILE TRANSFER. The latter is to be used with other Super-RATT-equipped stations. It is a method of file transmission that provides for two-way handshaking and checksum computation. Once contact has been established between the two stations and the process begun, the rest of the operation is fully automatic. The system is still under development, and the program developer welcomes input from Super-RATT users who will improve the process.

The software contains a copyrighted feature known as RATT-SOFT. It is a method of using the Apple ampersand jump routine for a number of different command functions. RATT-SOFT may be called by any Applesoft® program or directly from the keyboard. Over 30 different commands are at your beck and call.

The screen display is divided into five sections, if you count the top status line and the bottom command and status line. Below the top status line is a 13-line area reserved for incoming text. That is followed by a single-line "Times Square" scrolling area that displays the transmitted text as it is being output. This single-line area is separated from the sections above and below it by screen-wide dotted lines. Beneath the "Times Square" line is a four-line transmit-buffer-text area. Transmitted text (and received text) scroll once the bottom line of the respective area is reached. Both texts can be displayed using a full-screen format, if desired.

The bottom command/status area is the place to look for help when you can't remember which keys to push to accomplish your intended pur-

pose. The upper status line tells you your mode and speed of operation, T-R status (whether you're in receive or transmit mode), the receive buffer status, and whether or not you're saving incoming text to disk. There are also relay status and mark/space indicators. The mark/space symbols (letters M and S) flicker with incoming and outgoing text, acting as tuning/status indicators. Relay status informs you when you are re-transmitting just-received text or repeating your last transmission.

The status indicators on the top line are enclosed in brackets. This makes the line look rather busy, as far as I'm concerned. I opted to delete the brackets, and I find the line easier to read. You can modify program lines 2660 to 2880 to suit your personal tastes.

CW Software

I am somewhat disappointed with the cw section of the program. The plus it has (inclusion of most of the prosigns) is outweighed by its inflexibility. The speed algorithm is good, but it can stand some improvement. At higher transmission speeds, the weighting becomes too light and I couldn't find a way to vary it easily.

The operator must key in a cw speed for transmission. This keyed-in speed also sets up the cw receiving speed. Because I (and others) had trouble getting the program to respond properly during receive, I was told to try setting the receive speed at a figure about twice that expected. It does help, but not that much and because the receiving and transmitting speeds are interlocked, if the transmit and receive speeds differ appreciably, you'll have to change speeds as you go between transmit and receive. Ideally, the cw-receiving algorithm should be self-adjusting and adapt itself independently to the speed of the incoming code.

I would like to be able to alter the weighting of the cw characters by simply using a couple of keystrokes. It would also be nice to be able to use the computer speaker for monitoring sent cw. This feature could also be turned on and off by simple commands. As it stands, you must rely on the transmitter cw-monitor signal when transmitting.

General Comments

As I understand it, earlier versions of Super-RATT were composed of several smaller programs. The present version is, essentially, one big program. I would like to see the big program broken down into a few "bite-sized" chunks. While this would lead to code duplication, it would make the system more appealing to some, I'm sure.

One nice part of Super-RATT is that the programmer has enabled the user to modify much of what is available according to his or her tastes. When making changes to the program, ensure you make them to the operating version (Super-RATT) and not to Super•RATT REMarked. The latter version of the program is filled with REM statements that help explain the program to the user.

By all means, do as the program author suggests: Make a copy of the program disk and stick the original disk in your archives! Don't take a chance on losing the original copy. As you make changes to your backup disk, back that disk up with yet another in case something "crashes." Otherwise, you'll have to do all that work over again.

If you intend to LOAD and LIST the REMarked version of Super-RATT, you'll probably have to set MAXFILES to 1 or 2. Without doing that, I got a PROGRAM TOO LARGE error indication.

After five transmit-receive toggles, the program automatically sends a cw i-d whether or not text has been transmitted. The program purchaser's call sign is buried within the bowels of the program.

Unfortunately, Super-RATT (at this time) does not support the 80-column display capabilities of the Apple IIe. Perhaps someday this will become part of Super-RATT. The program is under constant improvement and users are kept in touch with the program developer by means of a newsletter.

I've only touched on the highlights in this review. There are other program features that are sure to be of interest to some. If you're looking for a comprehensive RTTY program for your Apple computer, you may find it in Super-RATT. The package does have some weak areas, but I've not used a piece of RTTY/cw software yet that doesn't. I hope these areas will be strengthened in the near future. Super-RATT is available from Universal Software, Inc., 9 Shields Lane, Ridgefield, CT 06877. Price class: $60. — *Paul K. Pagel, N1FB*

AEA HOT ROD ANTENNA FOR 2-METER HAND-HELD TRANSCEIVERS

☐ Fm operators have seemingly fallen in love with gain antennas for 2-meter hand-held transceivers ("HTs"), if brisk sales and high visibility can be used to judge such things. There are good reasons for this — compared to the "rubber duckie," the gain antennas (when properly designed) provide as much increase in effective transmitter power as a small amplifier. The gain antennas show the same improvement on the receiving end of things, too.

Previous efforts in this area have been limited to models designed around a 5/8-λ radiator. AEA has broken with this tradition by designing the Hot Rod around a 1/2-λ radiator. Fully extended the Hot Rod measures 39-5/8 inches, and it weighs in at a little under two ounces.[2] This makes it shorter and lighter than any of the other (5/8-λ) gain antennas on the market. This should add up to a longer life for the Hot Rod and for the BNC connector on the radio.

Does it work? Fully extended, the antenna works like a charm. I observed the same general improvement in transmitted and received signal that I've seen with the 5/8-λ variety antennas.

Collapsed, the antenna measures 8½ inches long. Although some of the AEA promotional literature suggests using the antenna in the collapsed position, you may want to check the VSWR safety rating of your rig first. VSWR measurements across the 2-meter band for the collapsed mode are included in Table 1.

If you are in the market for a gain antenna for that new 2-meter rig, you might want to give serious consideration to the AEA Hot Rod. Price class: $25. Additional information can be obtained from AEA, P.O. Box C-2160, Lynwood, WA 98036. — *Peter O'Dell, KB1N*

HEATH HL-2200 AMPLIFIER KIT

☐ I'm sure many readers have at least a nodding acquaintance with the popular Heath SB-220 and SB-221 amplifiers.[3,4] Therefore, a look at the exterior of the HL2200 might prompt one to ask, "How different is the '2200?" The exterior is quite a bit different. A warm brown finish has replaced the familiar green cabinet color, and other facial changes, such as the use of different styles of knobs, meters, switches and a new logo, are obvious. A couple of the exterior changes reflect modifications that have been made to the control and SWR monitoring circuits, but for the most part, the physical interior and electrical designs are identical to those of the earlier amplifiers.

Table 1
Frequency Vs. SWR for AEA Hot Rod

Frequency (MHz)	Extended	Collapsed
144.0	1.0	10.8
144.4	1.0	11.2
144.8	1.0	12.7
145.2	1.0	14.9
145.6	1.0	13.9
146.0	1.0	12.9
146.4	1.25	13.9
146.8	1.35	15.9
147.2	1.47	17.9
147.6	1.55	17.14
148.0	1.70	19.9

SWR values expressed are in relationship to unity. Measurements performed in ARRL lab with an IC-2AT, a Sola Basic Directional Wattmeter and a 5-W element.

Kit Assembly (and Some Hints to Avoid Kinks)

It took me approximately 22 hours to assemble the '2200. A few additions and changes to the assembly manual from supplied errata sheets are required before work is started. I found one additional minor error on page 32: The color code for R29 is given as red-violet-orange when it should be yellow-violet-orange for the 47-kΩ resistor. One assembly procedure, the installation of the pilot lamp, caused me a bit of grief. I could not get the grain-of-wheat lamp and diffuser combination to fit properly in the body of the lens. After several attempts to mate the two units, one of the lamp leads broke off. I substituted a Radio Shack 272-1140 lamp for the original bulb, and the fit is perfect.

When separating the line-cord leads, don't attempt to make two cuts of the length required, as you're bound to nick the insulation on one of the wires. A much easier method is to make a small cut either side of the green center wire and simultaneously pull the two heavy conductors away from the center wire; they'll separate easily, and no insulation will be damaged.

If you're going to operate the amplifier from a 234-V line, you'll have to purchase the proper line-cord plug. The molded plug supplied is for use only on 117-V circuits.

When installing the high-voltage transformer, I'd recommend leaving the red-yellow lead uncut until the transformer has been set in place. Once you've determined that the lead will comfortably reach the required point of attachment, you can cut it to the proper length.

Controls and Metering

One welcome addition to the new amplifier is the addition of an AMPLIFIER IN/OUT switch that allows the HL-2200 to be placed in standby. A red pilot lamp (located immediately above the POWER ON/OFF switch) illuminates when power is applied to the amplifier; it replaces that function of the lighted meters on the older amplifiers. The '2200 meters are not illuminated types.

[2] g = oz × 28.35.
[3] Recent Equipment, *QST*, Aug. 1970, p. 45.
[4] Product Review, *QST*, March 1980, p. 43.

Two meters monitor the vital amplifier functions. The left-hand panel meter measures tube plate current in increments of 50 mA to a maximum value of 1 A. To the right of the PLATE CURRENT meter is the PLATE VOLTS meter, which actually is a multifunction indicator used in conjunction with the FUNCTION switch. In the HIGH VOLTAGE position, the meter reads dc plate voltage in 400-V increments to a maximum of 4 kV. Grid current, in 25-mA increments and with a scale maximum of 400 mA, is measured with the FUNCTION switch in the GRID CURRENT position. The RELATIVE LOW and RELATIVE HIGH switch positions select taps on a voltage divider/detector network attached to the RF OUTPUT jack. In either position, relative forward power is measured, the full-scale reading dependent on the tap selected. These switch positions replace the SENSITIVITY control function present on the SB-220/221 amplifiers.

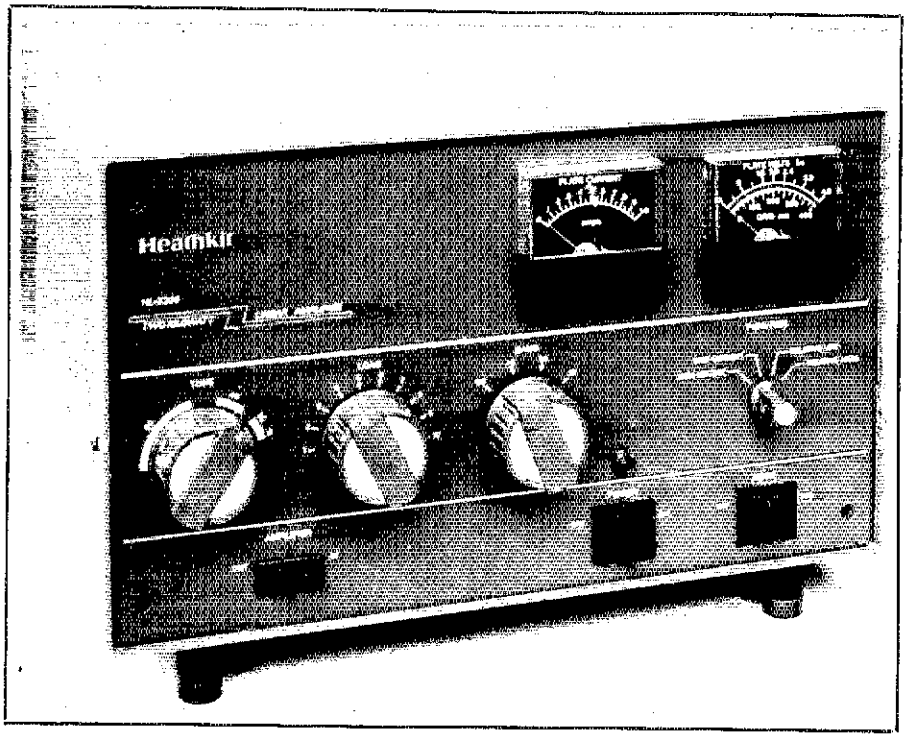
Some Observations

To comply with current FCC regulations, the '2200 has no provisions for operating on 10 meters. (At the time this review is being written, Heath has no 10-meter modification kit available for the HL-2200). The 15-meter input tuned circuit now consists of three series-connected pi matching sections, and acts as the 27-MHz filter; the main-chassis-mounted 27-MHz filter is no longer used.

The large front-panel paddle switches don't fit tightly and exhibit a small amount of front-to-back movement. These switches are snap-in types, unlike those on the older amplifiers that were bolted to the chassis. But this should not pose any problem other than one of aesthetics.

A "plug-in" high-voltage transformer arrangement is now used. Late SB-221 models have this feature. Of the eight high-voltage transformer leads, six are wired to a Molex plug. Only two easily reached wires need be unsoldered, and the Molex plug and transformer mounting screws removed, to take out the transformer for amplifier shipment or transformer replacement or substitution. Should you need to remove the front panel for any reason, taking out four screws will free the assembly.

In the past, some concern had been expressed about filament inrush-current protection for the 3-500Z tubes.[5-8] I spoke with representatives of Heath and Eimac/Varian about this subject. I was told that filament inrush current poses no problem with this amplifier because of the filament transformer design. There is enough sag produced by the transformer during turn-on that the tube ratings are not exceeded. The more important consideration regarding the tubes is one of installation. When the tubes are being inserted into their sockets, they should be pushed straight down until seated properly. No rocking motion should be applied! Such action may crack the glass beads around the tube pins creating small air leaks that will prematurely destroy the tube(s). If the socket fingers are too tight to permit the tube to seat properly, bend the socket fingers slightly until the tube pins fit firmly, but don't rock the tubes!



Heath HL-2200 Linear Amplifier

Manufacturer's Claimed Specifications	*ARRL Lab Test Results*
Frequency coverage: 80, 40, 20 and 15 meters.	Confirmed.
Maximum power input: Ssb, 2-kW PEP; cw, 1 kW; RTTY, 1 kW.	Confirmed.
Maximum recommended key-down time at full power input 10 minutes.	Confirmed.
Third-order IMD (dB): –30 or better.	See text.
Power requirements: 117-V ac at 50/60 Hz. (20 A max.), or 234-V ac at 50/60 Hz. (10 A max.).	
Driving power required: 100 W max.	Confirmed.
Color: Medium brown.	
Size (HWD): 8-1/4 × 14-7/8 × 14-1/2 in.†	
Weight: 50 lb.	
Price class: $850.	
Manufacturer: Heath Company, Benton Harbor, MI 49022.	

†mm = in. × 25.4; kg = lb × 2.2.

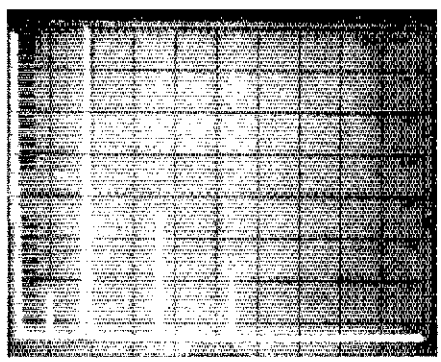


Fig. 5 — Worst-case spectral display of the HL-2200 amplifier. Vertical divisions are each 10 dB; horizontal divisions are each 2 MHz. Output power is approximately 680 W at a frequency of 3.6 MHz.

Table 2
HL-2200 HF Amplifier Performance

Band (meters)	P_{in} (W)	P_{out} (W)	Input SWR	Drive Power (W)	Efficiency (%)
80	1000	680	1.4:1	68	61
40	1000	720	1:1	70	65
20	1000	680	1.8:1	68	62
15	1000	680	1.9:1	100	59

Amplifier Testing

Results of the amplifier tests are shown in Table 2. No difficulties were encountered when the 10-minute key-down test was run.

The –30 dB third-order IMD performance of the HL-2200 is met easily. At present, the transceivers used in the ARRL lab to drive amplifiers such as the '2200 are the limiting factor when it comes to making this measurement. Because of this, new equipment is being ordered that will permit more-telling third-order IMD measurements to be made.

The HL-2200 looks like a perfect mate for the HW-5400 and SS-9000 transceivers, and should be a welcome addition to almost any amateur station. The HL-2200 is available from Heath Company, Benton Harbor, MI 49022. Price class: $850. — *Paul K. Pagel, N1FB*

[5]K. M. Gleszer, "Upgrading Your SB-220 Linear Amplifier," *QST*, Feb. 1979, p. 20; also, Feedback, *QST*, April 1979, p. 27.
[6]Hints and Kinks, "On Upgrading Your SB-220 Linear Amplifier," *QST*, Nov. 1979, p. 57.
[7]Hints and Kinks, "Comments On SB-220 Modification," *QST*, Feb. 1980, p. 44.
[8]Hints and Kinks, "Filament Inrush-Current Limiter For Linear Amplifiers," *QST*, Nov. 1982, p. 49.

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

USE YOUR 2-METER RIG FOR F2 OPERATION

☐ Audio-tone-modulated telegraphy (F2) is used by most repeaters for the Morse code i-d. But even most "all-mode" 2-meter rigs are not equipped to transmit on this mode. These radios transmit cw using A1, which cannot be received without a BFO. The simple circuit described here will enable you to operate F2 while using any fm rig, without modification to the radio, and for a cost of about $15 if you buy all new parts.

FCC rules permit F2 operation anywhere on the 2-meter band, except for the lowest 100 kHz, which is reserved for A1 operation. You should avoid the repeater frequencies in your area, but this still allows plenty of room for cw operation. Small groups can use F2 on 2 meters as a means to brush up on their code skills. If one of the members has difficulty, he or she can pick up the mike and break in. This is something you can't always do while operating cw on hf.

The principle of my circuit is quite simple. An audio oscillator that will drive a speaker is needed. You can use an old code-practice oscillator, or use the built-in side-tone oscillator from your electronic keyer. The audio output can be obtained from the speaker or headphone jack in that case. Fig. 1 shows the complete schematic diagram of the unit. As shown, S2 supplies power to the oscillator module, but some oscillators may not require this switch. J1 mounts on the project case, and is a type to mate with the plug on your mike. P1 mates with the mike connector on the rig. Allow about 18 inches of cable between the radio and the F2 unit.[1] The input can be from a keyer or straight key, and you will have to provide appropriate connectors. Fig. 2 illustrates my final arrangement.

You will have to adjust the value of R1 to provide the proper deviation for your transceiver. My circuit needed a 1.2-kΩ resistor, so that may be a good starting value. Connect the circuit to your radio, set S1 to the PTT position and turn on the transceiver. Normal voice operation should be possible at this point. Place S1 in the cw position. Using a deviation meter, or another amateur listening on a separate receiver, adjust R2 for a deviation of about 5 kHz. If this control does not provide enough adjustment, then you will have to change the value of R1.

A word of caution: The key-down time for some rigs is limited by heating of the final amplifier transistors. Since the transmitter is on continuously during your transmission, you should check the heat sink periodically to be certain that proper cooling is provided. You may have to limit the length of your transmissions accordingly.

Gather a few hams into a cw net, practice

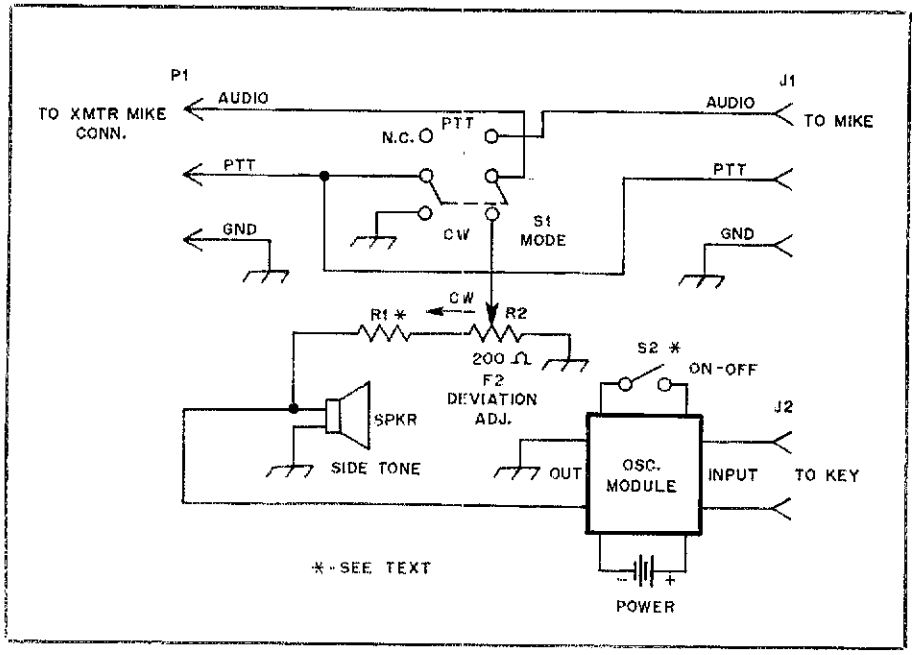


Fig. 1 — Schematic diagram of an oscillator circuit used by KA7AWD to add F2 capability to his 2-meter fm rig.

Fig. 2 — Photo showing the equipment used by KA7AWD for F2 operation. The oscillator unit is housed in the box on top of the electronic keyer.

[1]mm = in. × 25.4.

*Assistant Technical Editor

every night, and before long your code speed will begin to soar. But remember, if you get into a real bind and can't copy as fast as the others are sending, you can always pick up your microphone! — *Dennis Blum, KA7AWD, Show Low, Arizona*

SPACERS FOR MOUNTING PC BOARDS

☐ I needed some spacers to mount the pc board from a project inside a case. After looking around the shack for something to use, I came across an old Bic® pen. I cut lengths of the plastic tube with a tubing cutter and had perfect spacers for mounting my project board. Now, I save all of these pens when the ink is used up. By cutting spacers to almost any desired length, I can stack boards on top of each other or stand them side by side. A hacksaw should also work for cutting pieces of the tubing. — *Walter Yatzook, N1CJB, South Meriden, Connecticut*

KEYING THE IC-701 WITH AN FET

☐ While planning to build a new keyer for my station, I became concerned that my chosen design would not properly key my IC-701.[2] This radio (and some others) requires a key-down potential of less than 0.4 V. The output circuit of the Digital CMOS Iambic Keyer uses two silicon devices in series (a 92PU10 transistor and a 1N4004 diode), and I was concerned that this would prevent the minimum key-down voltage from being small enough. Also, I could not find the 92PU10 devices in any of the local supply stores.

I decided to use a 7404 hex inverting buffer IC between the keyer and my rig, but a friend suggested that I try a VN67AF VMOS power FET in the keyer output section instead. One manufacturer of these transistors is Siliconix Incorporated. With this transistor in the output section of my keyer, the key-down voltage is less than 0.1 V. Fig. 3 shows how I modified the keyer output circuit to suit my needs. I have also made a few turns around some ferrite toroids with the leads to my paddle and to the IC-701. This has cured a problem that I had with rf getting into the keyer. — *Darwin Bingham, N4HZC, Virginia Beach, Virginia*

[2]T. Theroux, "A Digital CMOS Iambic Keyer," *QST*, June 1982, pp. 26-28.

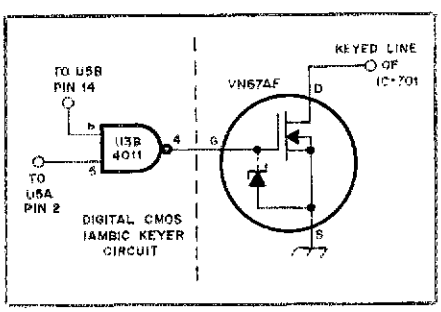


Fig. 3 — Schematic diagram of a keying circuit, used by N4HZC, with an electronic keyer and an IC-701. Some VN67AF transistors contain the built-in Zener diode to prevent overdrive, as shown here, while others do not include the diode.

A "NAVY" KNOB FOR STRAIGHT KEYS

☐ I have found that a straight key is much easier to use if it is equipped with a "Navy" style knob. This style of knob does not seem to be very common anymore. I found a way to add this style of knob to most straight keys. A small disc, cut as shown in Fig. 4, is all it takes. The material that I use is Formica®, available as a color sample or scrap from many building-supply stores. Shaping can be done with a diagonal cutters or tin snips, followed by a file or sandpaper to smooth off the rough edges. You may have to adjust the dimensions of the disc or the cut out to make it fit your key. Try this simple addition to your straight key. You might like it! — *J. A. Wright, Jr., W4UEB, Edenton, North Carolina*

SILICONE SEALER FOR MOUNTING PARTS

☐ I would like to pass along an idea that I have been using to hold batteries, large capacitors and other items in place. Simply spread a thin layer of silicone sealer on the part to be mounted, set it in place and let the sealer dry for about a half hour. Rub away any excess material with your fingers or a pencil eraser. This sealer makes a good bond to almost any clean surface, and it maintains its flexibility and strength under most conditions. If you use this material as a battery holder, you can cut or break the battery loose when it goes dead.

I have found this to be an ideal method of securing large parts to a chassis without drilling mounting holes. Occasionally you may need to isolate a capacitor or other component from ground. The silicone sealer will also serve this purpose well. Try it, and you'll probably discover even more uses for this inexpensive material. — *Hellmuth Hinz, KA8RNN, Athens, Ohio*

DESOLDERING HINT

☐ Most hams occasionally want to salvage a used PL-259 connector, or are faced with another difficult desoldering job. Here is a method that I have found to be quite helpful. When the unit is heated enough to melt the solder, try a blast of compressed air at about 80 lb/in² to blow the solder out of the joint. I have used this technique to solve a number of tasks that would have been difficult otherwise.

Several precautions must be observed in using this method, however. Be sure to wear eye protection at all times. You must also be certain that the molten solder will not hit anything that can be damaged by heat, such as a carpet or synthetic materials. Don't allow other persons to be in the area where solder may hit them, either! — *Lynn Burlingame, N7CFO, Bellevue, Washington*

SIMPLE TUNING-DIAL DRIVE REDUCTION

☐ I have a Kenwood TS-130S that I use for mobile operation. The VFO tuning is too fast for easy operation in a vehicle. I built a drive-

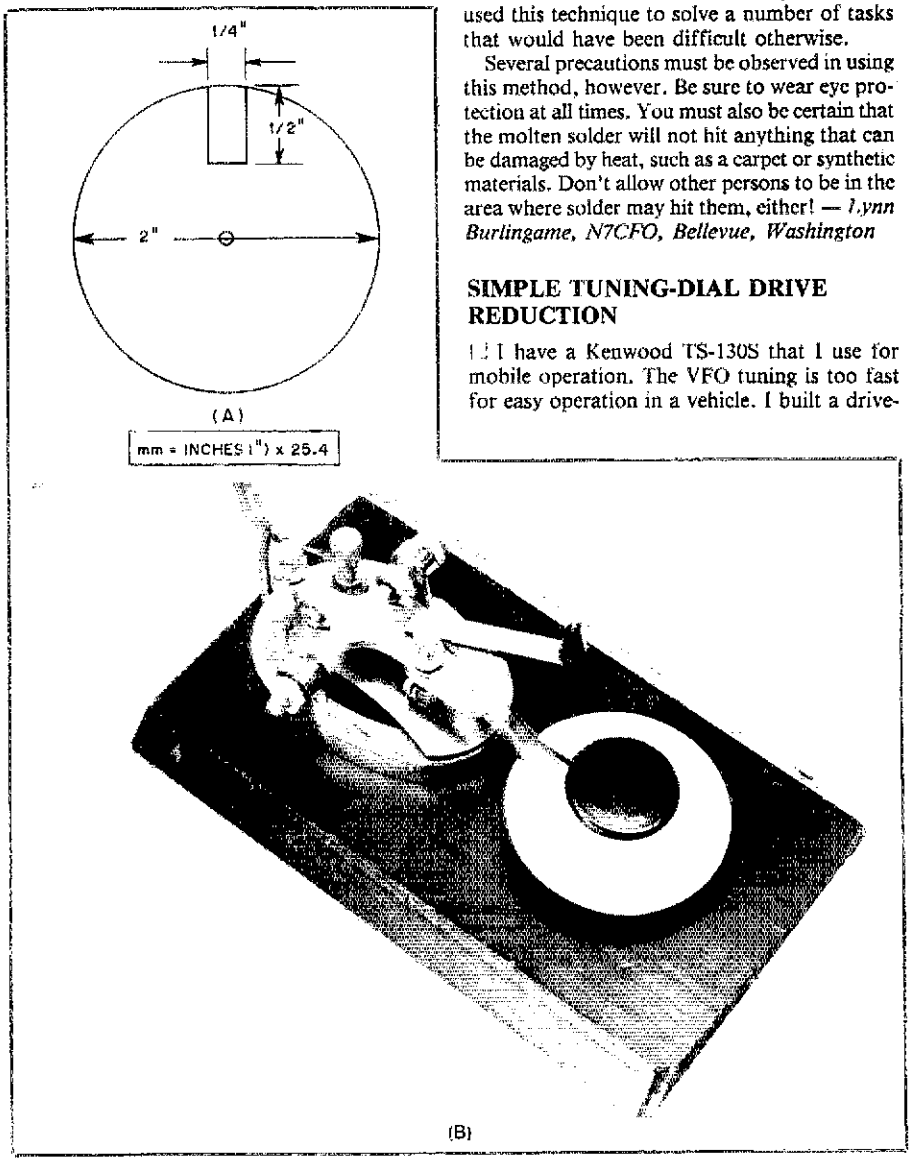


Fig. 4 — The dimensions used by W4UEB to cut a thin disc of material to form a "Navy" style knob are shown at A. At B, the disc is shown in place between the knob and arm of a straight key.

reduction adapter (for less than $2) to cure this problem. I used a ¼-inch phone plug, an enclosed jack and an angle bracket.* The bracket can be aluminum or steel, 1½ × 1 × ¾-1 inch wide.

Drill holes in the bracket as indicated in Fig. 5. The TS-130 has a screw 1½ inches from the front of the cabinet top that I used to mount the L bracket. If you are adding this drive-reduction unit to another rig, you may have to drill a hole in the cabinet to mount the bracket. I used a small piece of double-sided tape under the front of the bracket. Mount the phone jack to the angle bracket and insert the plug. Now stretch a wide rubber band over the phone-plug barrel and around the tuning knob.

You can use the phone plug for a tuning knob, or if you want a larger diameter knob, solder a short piece of ¼-inch-diameter copper tubing to the phone-plug terminals. Replace the barrel on the plug and secure a larger control knob to the extension.

The tuning rate is much slower now, but if I want to make a large frequency change I can still use the main tuning knob. — *Larry Dougherty, KN8I, Yale, Michigan*

FASTER AGC RELEASE TIME FOR THE TEN-TEC ARGOSY

☐ I have found my Ten-Tec Argosy to be a fine all-around rig. I especially like the full QSK feature. However, I believe the age release time is too slow for cw operation. I prefer the age to release a bit faster, even for phone work. I changed a single capacitor in the age circuit to provide a release time more to my liking.

Remove the top cover and locate the I-F/AF circuit board. It is the large board just behind the front panel. Find C12, a 33-μF capacitor at the center rear part of the board. This capacitor is connected from the base of Q4 to ground. The rate of discharge for this capacitor controls the age circuit release time.

Unplug all cables going to the I-F/AF board, remove the five screws that fasten it to the chassis and lift the board out. Remove C12 and replace it with a 5- to 10-μF capacitor rated at 16 V or higher. I prefer the 5-μF unit for a faster release time, but you may want to experiment. Reinstall the board and connect the cables.

I find the cw operation of my rig to be much smoother after this change. I also notice that I am able to copy more weak stations than before because strong nearby signals don't limit the receiver gain as much. — *Bill Scott, AG0O, Elizabeth, Colorado*

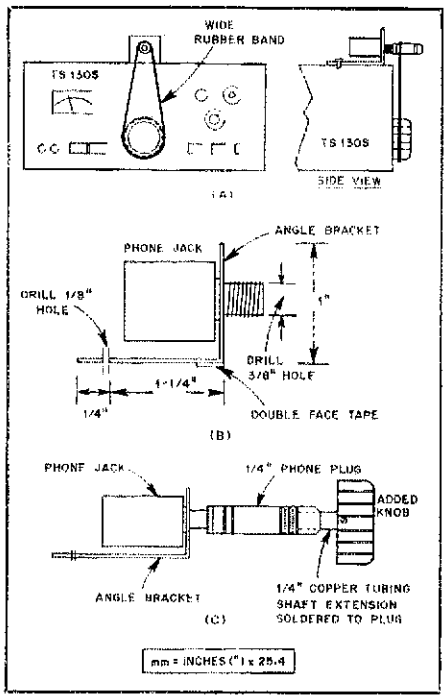


Fig. 5 — At A are shown the mounting details for a tuning-dial-drive reduction system used by KN8I. The dimensions for the mounting bracket are given at B. One method of adding a larger-diameter tuning knob is shown at C.

2-METER AMPLIFIER INSTABILITY

☐ I built a solid-state amplifier to boost the 1.5-W output from my 2-meter hand-held transceiver to about 30 W. The amplifier suffered occasional instability problems, depending on the lengths and positions of the rf input and output cables. The measured SWR, both into and out of the amplifier, was less than 1.5:1.

Some research led me to the conclusion that my problems were caused by rf energy being conducted on the outside of the RG-58/U coaxial-cable braid. The ground connections for the transceiver, amplifier and amplifier power supply were separated from each other by significant fractions of a 2-meter wavelength. There was no good ground reference for the rf energy. The chassis of each unit could "float" above rf ground, inducing rf currents to flow along the outside of the coaxial-cable shield braids. My amplifier was affected in unpredictable ways by these currents.

I found a simple cure for the problem. I looped each rf cable twice through an Amidon FT-114-43 ferrite torroid. My calculations indicate that this effectively adds about 2.4 μH of inductance in series with the outside of each braid. The result is an rf choke with over 2200-ohms reactance at 2 meters. I chose type-43 material for high loss above 100 MHz, so the toroid dissipates rf energy like a ferrite bead does. This combination of effects has completely cured the instability problems with my amplifier, regardless of cable length or orientation. — *Kenneth H. Kerwin, II, K6UXO, Londonderry, New Hampshire*

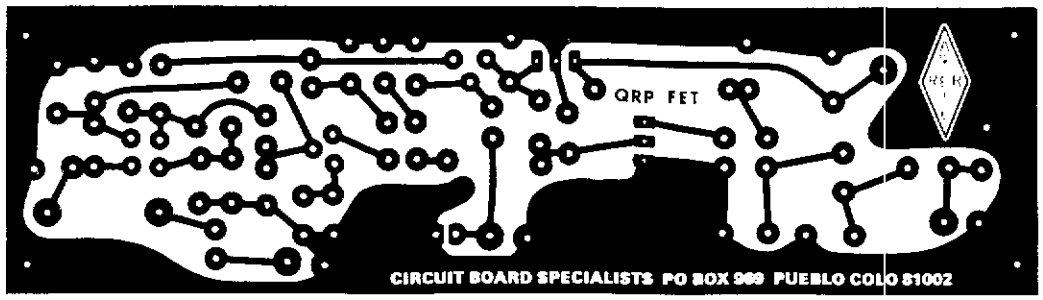
USING RUB-ON ETCH-RESIST TRANSFERS

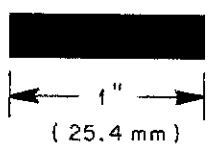
☐ Here are a few suggestions for those who have had problems with rub-on etch-resist transfers coming loose. First, the board must be very clean. Then, warm the board before applying the transfers. I warm small boards by placing them on the shade of my desk lamp for a few minutes. Apply the transfers to the warm board, and burnish them well. Rewarm the board if it cools off during circuit layout. After all of the circuit is laid out, warm the board for several hours and then burnish all of the transfers again. Using a small piece of paper towel, gently wipe the board to remove any fingerprints or other dirt.

I have not had any problems with transfers coming off in the etchant since I began using this method. The warming technique also works well for applying panel-marking rub-on labels. — *J. T. Miller, N6BM, Ukiah, California*

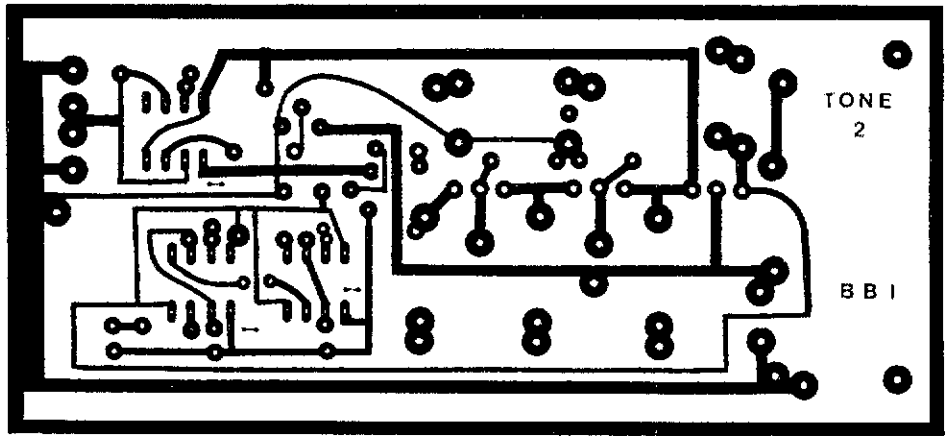
A TUBING CUTTER AND COAXIAL CABLE

☐ I read with interest the hint by Kirk Carter in the September 1982 Hints and Kinks column about using a tubing cutter to prepare RG-8/U coaxial cable for a PL-259 connector. I have used a method like this for many years, and find that it works well. But I would add a word of caution. Before you use the tubing cutter to cut the tinned braid, be sure the cable has cooled completely! If you try to cut it while the cable is still warm, the inner dielectric will be soft. The cutter will distort the cable and mess up the job. — *George Rulffs, AA4GR, Chelmsford, Massachusetts*

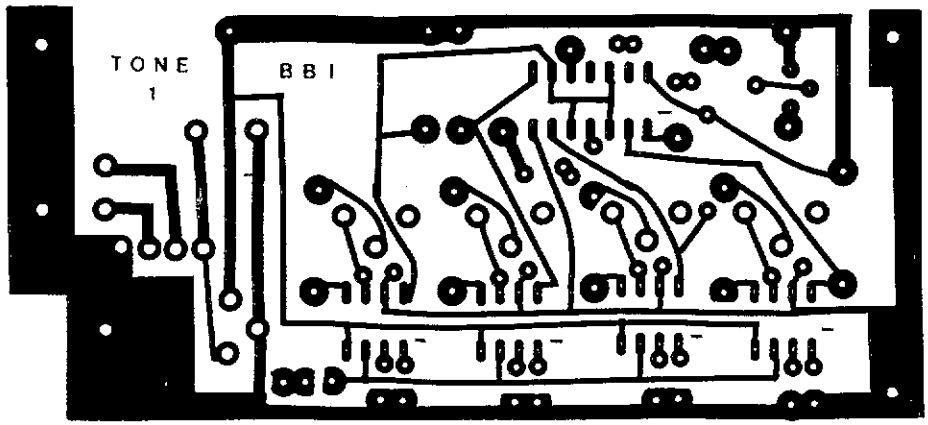




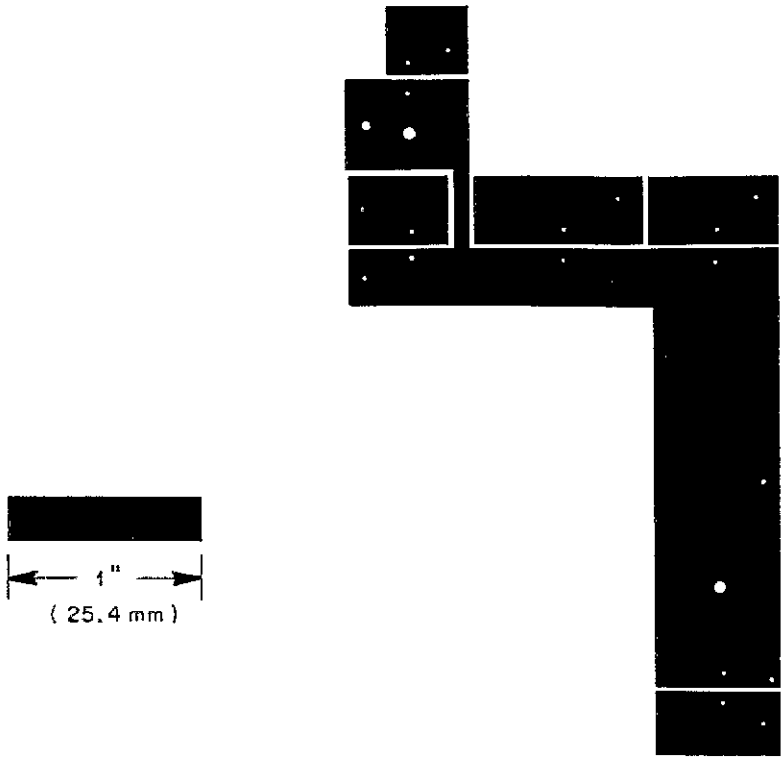
Circuit-board etching pattern for the VXO cw 30-meter exciter. The parts-placement diagram appears on page 33, this issue. Black areas represent unetched copper.



(A)

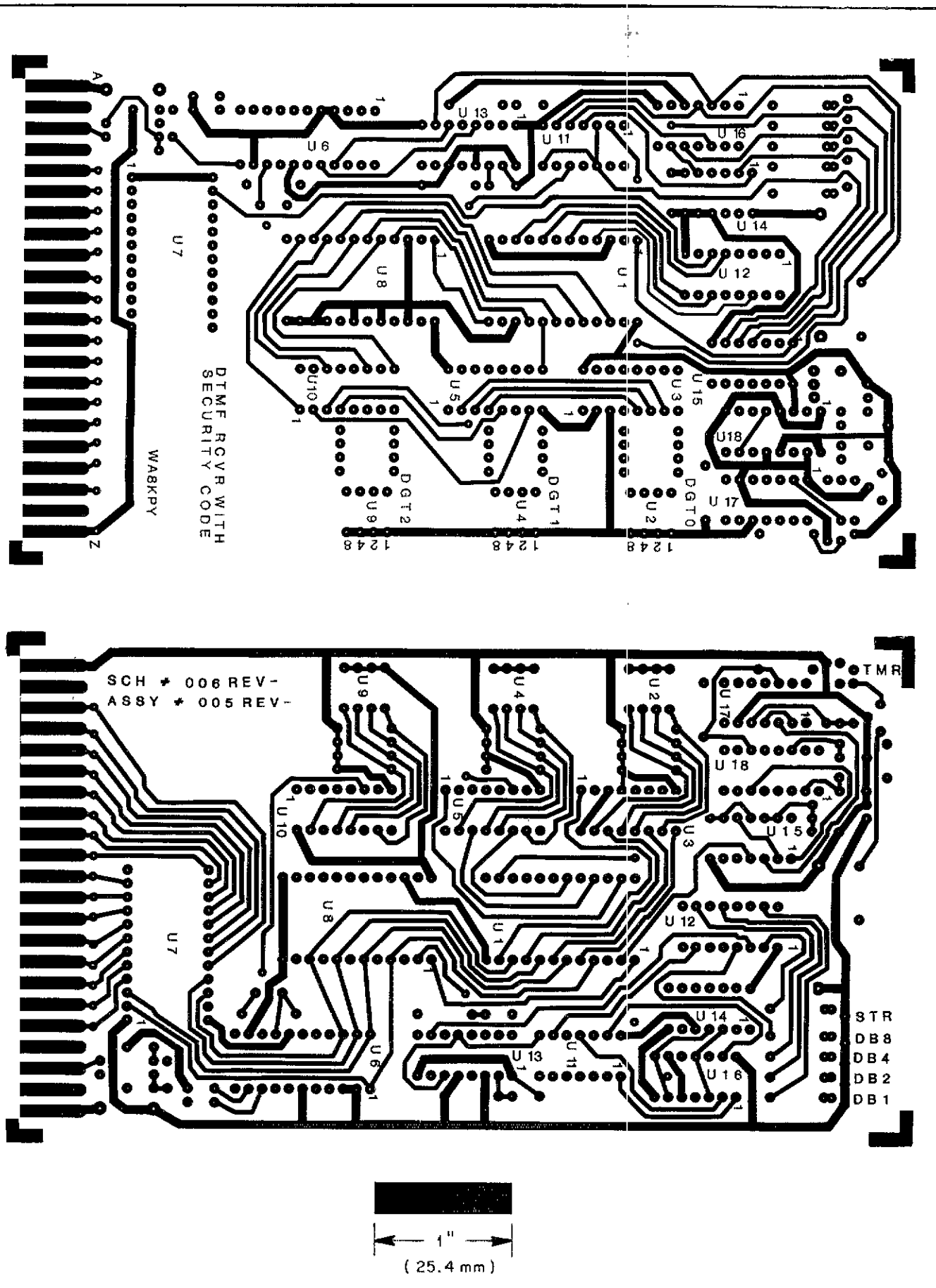


(B)



(C)

Circuit-board etching patterns for the London Tone Alert see the parts-placement diagrams of Fig. 3, on page 38 of this issue. The patterns are shown actual size. Black represents unetched copper.



Circuit-board etching patterns for the DTMF decoder board (see the parts-placement diagrams of Fig. 7, on page 26 of this issue). The patterns are shown shown actual size. Black represents unetched copper.

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

NØAJY cb STANDARD

☐ There are a few major problems with "The NØAJY cb Standard" (Aug. 1983 *QST*) that make it impossible to expect "... the ultimate in frequency-counter accuracy." The problems are not with the circuit itself, but rather with the network-affiliated television stations. Almost all of them are now using digital frame synchronizers on some, or all, network shows. These synchronizers convert network video from analog to digital form, delay it by a fraction of a frame (less than 1/30 of a second) and convert it back to analog form — in sync with the local station sync generator. Local color subcarrier frequency is required by FCC rules to be within 10 Hz of 3.579545 MHz, and in most cases is generated by a crystal oscillator no better than one found in a good frequency counter. In most stations, the color subcarrier frequency is rarely adjusted or calibrated. There are a few "major market" TV stations where the color subcarrier (and hence the sync generator) is locked to atomic standards, but that is quite rare. Additionally, many network television shows are delayed on videotape with no indication (to the viewer) of the delay. For example, in Dallas, the "CBS Late Movie" is a two- and one-half hour program that is tape-delayed 30 minutes (not an easy task)! When the videotape is played back, it is in sync with the local station, not with the network. Furthermore, all network atomic standards operate with an offset of −0.03 parts per million from the ideal 5 MHz. The 5-MHz signal is multiplied by 63/88 in a synthesizer to get a color subcarrier frequency of 3.5795454545 ... MHz.

Anyone who is interested in achieving "the ultimate in frequency-counter accuracy" should probably leave the frequency counter on continuous standby, rather than wait for it to settle down after first being turned on. More accurate calibration of frequency counters can be achieved by phase locking an oscillator to WWVB on 60 kHz, or by simply counting the WWVB carrier frequency. Several manufacturers offer clocks and oscillators that phase lock to WWVB, but most of them are priced beyond the typical Amateur Radio budget. A few good articles have been written on the subject of calibration via WWVB.[1,2,3] Perhaps the best book available on this subject is the *Time and Frequency Users' Manual*, published by the National Bureau of Standards.[4]

WWVB is the primary standard-frequency broadcast service in the United States, whereas the network television color subcarrier comparison system is no longer viable.[5] Therefore, the horizontal sweep-frequency system in "The NØAJY cb Standard" is obsolete. It should be noted, however, that the NØAJY circuit is a clever one and it would have worked fine only 10 years ago. — *Andrew K. Dart, AE5D, Duncanville, TX 75116*

[1]D. Lancaster, "Experiment with WWVB," *Radio Electronics*, Aug. 1973.
[2]H. Isenring, "WWVB Signal Processor," *Ham Radio*, March 1976.
[3]E. Manly, "WWVB Frequency Comparator Receiver," *73*, Sept. 1972.
[4]G. Kamas and S. Howe, *Time and Frequency Users' Manual*, NBS Special Publication 559, U.S. Department of Commerce, Washington, DC, Nov. 1979.

*Assistant Technical Editor

TRUE ANTENNA HEIGHT

☐ "Getting the Most Out of Your Antenna" (July 1983 *QST*), by Chuck Hutchinson, K8CH, is a good article, but it omitted one aspect of antenna height that many of us on the West Coast take advantage of. To get a low vertical-takeoff angle, antenna height is not necessarily considered as the distance above ground, *but the distance above the rf reflecting surface.* This surface may be quite a horizontal distance from the antenna (see Fig. 5 in the K8CH article).

Many of us have stations on hills overlooking large bodies of water (Seattle/Puget Sound; San Francisco-Oakland/S.F. Bay; Los Angeles/Pacific Ocean). My station is about 250 feet above the surface of Puget Sound — about 3½ wavelengths high on 20 meters.[6] I get exceptionally good signal reports from DX stations in those directions my otherwise mediocre antenna "sees" Puget Sound. My antenna is only about 40 feet above the earth! — *Jack Wichels, W7YF, Edmonds, Washington*

NOTES ON SPREAD SPECTRUM

☐ The article by William Sabin, WØIYH, on spread-spectrum techniques (July 1983 *QST*) raised two questions about implementing spread-spectrum communications. First, except for the intrinsic charm of using a pseudo-random hop sequence, it seems that only privacy is gained by using this technique. If interfering signals occur randomly on the hop frequencies, there seems to be no additional signal-to-noise ratio gain from use of a pseudo-random sequence rather than a sequential-hop sequence. Because of limited spectrum allocations in the hf bands, a long random sequence must map into a small number of available frequencies. As an alternative hopping strategy, I suggest that the frequencies chosen by the operators be visited sequentially, rather than randomly. This technique yields advantages of simpler equipment and minimal synchronization problems.

Second, following Mr. Sabin's suggestion of using a-m rather than ssb, there should be consideration given to heterodyne problems. An a-m carrier will mix with any interfering carrier and produce audio beat notes, which can be different for each hop frequency occupied by an interfering signal. This is certain to produce annoyances. One possible solution is to use ssb, with the carrier reinserted at a level that allows phase locking at the receiver. Any phase-locked loop (PLL) frequency synthesizer suitable for transmission could then be used on reception. The acquisition range of the PLL can be restricted to prevent accidental lock to an interfering carrier. A loss-of-lock indicator used to signal a move to the next hop frequency could simplify the sync problem. For initial sync, the out-of-lock condition could allow fast jumps through the hop frequencies until lock is achieved. Once in lock, the hop rate would be controlled by the active transmitter. — *Paul Selwa, N9CZK, Brownsburg, Indiana*

☐ In response to Mr. Selwa's letter, consider 50 frequencies, sufficiently separated so that there will be no adjacent-channel interference. Fifty groups of stations, each group with two or more stations, could share these frequencies with no interference between groups. All of the groups would be part of a packet-network system. Protocol would include time and frequency management, and various control terminals would have rapid signal deployment capabilities for both domains. As an extension of this idea, consider a group of 250 frequencies. Using frequency-hop, each group could search for a clear operating frequency. When such a frequency is found, the group could elect to stay there until conditions deteriorate. Some members would want to hop on a set of frequencies in order to simultaneously address several groups.

The frequency hopping discussed above is done under protocol control. In addition, frequency hopping of the type described in my article could be used to provide increased reliability of communication during fading or interference. That is, some group(s) could hop on a set of the available frequencies mentioned above. (This hopping could be done sequentially, as Mr. Selwa suggests, rather than randomly.) If 50 frequencies were reserved for fast hopping, 50 groups could hop on these with no mutual interference when using protocol frequency management. The main advantage of nonsequential hopping is that errors from certain patterns of fading and interference (called burst errors) are more easily avoided. These hop sequences are easy to generate and supervise.

My article *does* mention ssb in a slow-hop system. Nbfm should also be considered. "Ancient modulation" is not a very attractive mode, I agree. Primarily, I would like to see an amateur data-packet network using spread spectrum. — *William E. Sabin, WØIYH, Cedar Rapids, Iowa*

[5]"NBS Time and Frequency Bulletin, Number 304," U.S. Department of Commerce, Washington, DC, March 1983.
[6]mm = in. × 25.4; m = ft × 0.3048.

ANTENNA PRUNING FOR 30 METERS

☐ I recently wasted a good bit of time because I didn't think before constructing a new anten-

na. It is easy to make incorrect assumptions concerning the new 30-meter band that are based on experience with "traditional" hf bands.

I was using a dipole for 80 and 40 meters with separate quarter-wave radiators fed with a single coaxial feed line. Wanting to get on the 30-meter band quickly, I decided to prune the 40-meter dipole to resonance on 10.1 MHz. This idea seemed great until I tried to load the antenna; the SWR was terrible. After a little thought, I realized that the 80-meter dipole (cut for cw at 3.525 MHz) was acting as a 3/2-wave dipole resonant on 10.575 MHz (three times 3.525). Apparently, the input impedance of the 80-meter dipole was not high enough to be insignificant at 10.1 MHz. Because I had two 30-meter antennas in parallel, the combined input impedance was no longer 50 ohms. To correct the problem, I left the 80-meter dipole alone, and trimmed approximately one foot from each end of the 30-meter dipole. This gave a combined input impedance that my solid-state rig could tolerate, but I know that the system is now way off resonance at 10.1 MHz. In short, I wouldn't recommend this combination!

By the way, the 80-meter dipole wouldn't load up worth a darn by itself on 30 meters. Progress is *so* frustrating! — *Dave Christie, WB5KFP, Bartlesville, Oklahoma*

SELECTIVE HEADPHONE FREQUENCY RESPONSE

☐ WB2KJL's letter (Technical Correspondence, Aug. 1983) raised the idea of headphones with response tailored for use by radio amateurs. Headphones of this type are available. Military surplus headsets H-140, H-227 and H-251 have tailored frequency response in the 300- to 3500-Hz range. — *David Wiesen, K2VX, Newark, New Jersey*

DIGITAL AUDIO GENERATION

☐ The *Wall Street Journal*, April 29, discussed digital audio, which is now entering the recording industry. This particular technique might benefit Amateur Radio. A reduction in voice bandwidth would effectively release many frequencies for use. A transmitter modulated by a digital representation of speech could reduce the modulated-signal bandwidth to a degree not possible with conventional methods. An ssb bandwidth of 250 Hz might be possible with sharp-cutoff filtering. Reception with a computer-enhanced and filtered system would be necessary. We have come a long way in the last 50 years; could this be in our future? — *Russ Mercer, W8JST, Union City, Michigan*

POWER INTERLOCK SAFETY

☐ I've noticed that several ARRL publications, including the *License Manual*, recommend a power-safety interlock that consists of wiring a female ac receptacle in series with the hot side of the station power line. This safety feature is suggested to ensure power isolation and prevent tampering by children and unauthorized operators who are not likely to spot or suspect the empty receptacle.

I haven't yet heard of any disasters, but I worry about the child who finds the shorted male plug and tries to install it in a live power receptacle. What happens if an unsuspecting person plugs an appliance into the interlock, energizing the station equipment and appliance?

It seems that standard U.L.-listed electrical devices should not be "jerry-rigged," whatever the intention. Please, use only approved power-isolation breakers. The life you save could be *your* child's. — *Bruce Chadbourne, KA2PAS, Vestal, New York*

CAGE ANTENNAS

☐ Jerry Hall's article, "The Search for a Simple, Broadband 80-Meter Dipole" (April 1983 *QST*), is a good one. He does, however, leave the reader "hanging" with respect to the cage antenna. My following comments are based on experience as a cage designer (bet you didn't think there was any such animal!) and on feedback I've received from various installations.

Looking at the cage, we can see that there are three variables affecting performance:

1) Size of the conductor(s).

2) Diameter or width of the array (a cage does not have to be round, but a cylindrical configuration leads to fewer mechanical problems).

3) Total length of the array.

The size of the conductors is additive. I have found the following to be good limits:

40 meters — minimum of four conductors, no. 12 to no. 18 wire.

80 meters — minimum of six conductors, no. 12 to no. 14 wire.

160 meters — minimum of 12 conductors, no. 14 to no. 16 wire.

Spacing the wire elements of a cage can pose a problem. Hall suggests that nonconductive and conductive spreaders will provide the same results. I've found that conductive spreaders make the two sides of the dipole act like the plates of a capacitor. The antenna Q goes way up, and the bandwidth gets very narrow. As a strict rule of thumb, do not use conductive spreaders! Some experiments use waxed dowels. I originallly used Frisbees® (Whamo, Inc.). They provided the necessary spacing, but were not strong enough for the winter climate. When they froze, they cracked. I bought a plastic mold, and now make my own ABS spreaders. For 80- and 40-meter antennas, the spreaders I use are less than 10 inches in diameter. On 160-meter antennas, I use 22.5-in. circular PVC plates. I have also found that there is *no significant difference* in antenna characteristics within the following range of cage diameters:

40 meters — 6 in. to 10 in.

80 meters — 9 in. to 20 in.

160 meters — 19 in. to 36 in.

The total length of a cage array will be shorter than that of a single-wire antenna. Basically, a cage is a "fat" dipole that takes advantage of a lower length-to-diameter ratio. As Hall says, there are no tables on this subject. However, Fig. 2-4 of The *ARRL Antenna Book* can be used, but does not go below a K factor of 0.90; true cage antennas have K factors below this. For 80- and 40-meter versions, I suggest a K factor of 0.885; for 160 meters use 0.832.

Mechanical problems also manifest themselves when a cage antenna gets long. Hall suggested using a spreader every couple of feet, but with good spreaders you can obtain 19-ft spacing on a 40-meter cage. Up to 29-ft spacing is possible on 80-meter cages. On 160 meters, my tests are not complete enough to finalize a good spacing, but I expect it to be approximately 35 ft.

The free-space feedpoint impedance of the antennas in this discussion is 67.8 ohms — a good match to popular coaxial cables. This directly corresponds to Hall's computer model. For a cage designed for 3750 kHz, SWR at resonance is 1.09:1; the 2.0:1 SWR points are 3200 kHz and 4300 kHz!

I hope that I have helped in the continuing search for a broadband dipole. Any questions? I will be more than glad to answer them if the need arises. — *David C. Johnson, W2BN, Burlington, New Jersey*

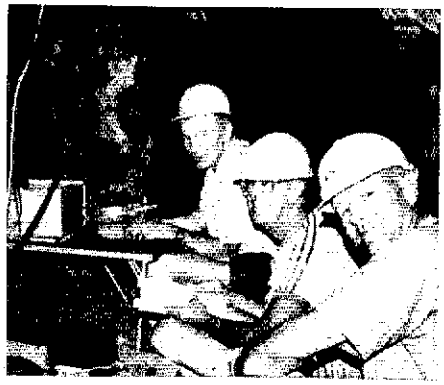
Feedback

☐ Author Zander has some corrections for "Build the AA6PZ Power Charger" (Dec. 1982 *QST*). Eq. 1 requires that the current be expressed in amperes (0.7 represents 700 mA), rather than milliamperes. In Fig. 8, the component labeled R1 (at the upper right) is actually R5. The author has a list of "bugs" and application hints for the Power Charger that he will send to constructors for an s.a.s.e.

☐ Please note these corrections to the Viewstar VS 1500A Transmatch Product Review (Oct. 1982 *QST*): The price is $390, and the unit is available from the Ham Radio Outlet Stores in California, tel. 800-854-6046.

☐ There are two errors in "WARC Bands for the TS-820(S)" (Feb. 1983 *QST*). On page 41, the third line of the second paragraph under 18-MHz Modifications should read: "On the PD board . . ." On Page 42, the third line of the first paragraph under 24-MHz Modifications should read: "35-MHz crystal X10 . . ."

Strays



On August 12-14, members of the USAF MARS Los Angeles Base Support Team conducted their annual emergency communications project by operating from a century-old gold mine near Johannesburg, California. During the exercise, the amateurs contacted members of the Johannesburg Chapter of the South Africa Radio League who also were stationed in a gold mine. Among the operators who participated were (l-r) ZS6BFS/G4LRF (visiting from South Africa), KK6L and W6ULZ. (*WA6NKL photo*)

Reading, 'Riting and Radio

Ham Radio in the elementary-school classroom? It's well worth the trip.

By Allan R. Leslie,* KA5NPV, Carole Perry,** WB2MGP and Steve Place,*** WB1EYI

In response to ARRL's new Ham Radio on the Road program, many volunteers are already taking Amateur Radio to youth, civic and church groups around the country. Another favorite target has been the high school or college science classroom. Though you're doing a bang-up job as "roadies," we hope you won't overlook the younger school children in grades 5 through 8 — their enthusiasm can't be beat. And lest you fear that Amateur Radio is a bit beyond the reach of this age group (10 to 13 years old), two experts share their experiences and put you on the right track.

Allan Leslie, KA5NPV, is an old hand at introducing elementary-school students to the wonders of Amateur Radio, and Carole Perry, WB2MGP, is an elementary school teacher who uses Amateur Radio in her classrooms with great success. Both agree that success comes only when the material is presented clearly in ways that are relevant to the students' abilities, needs and experience — in other words, made interesting from the students' perspective. In their articles that follow, Allan looks at the demonstrator's role and Carole assesses the situation through a teacher's eyes.

An Outsider Learns Why

When asked to tell an elementary school class about Amateur Radio, Allan Leslie, KA5NPV, responded, "Isn't Amateur Radio a little too complicated for kids that young?" After his first presentation, a challenge both for him and the children, he realized that's one reason why amateurs have several classes of license.

"Any subject, Amateur Radio included, is as difficult as the student and the teacher make it. If it's over the student's head, it won't be understood; but if the teacher is willing to meet the student at his or her own level, and if the student is willing to learn what is being taught, then Amateur Radio need not be too complex. But why bother?

"The benefits are vast. The most obvious one is that of helping children learn various subjects they are already studying in school. Children at that age are wide open to new experiences and want to learn more. But they are also unsophisticated, not yet sure quite what they want to learn, or how to go about learning it. Opening a social studies book, for example, students read of some far-off place, but it is only a name on a page. By means of Amateur Radio, geography becomes wonderfully alive for them: 'KL7? I've got *friends* there!'

"In other subjects, the same can hold true. For instance, children must apply basic arithmetic to get even the Novice license or to do some experimenting on their own — something that kids are frequently inclined to do. Further, they are aided in the study of grammar, punctuation, spelling and vocabulary — all important parts of a child's educational development. These also can be enhanced via Amateur Radio.

"And yet Amateur Radio can benefit children in other areas not readily recognized either by the ham who is not involved in education or by a teacher who is not involved in Amateur Radio. For instance, there is the skill of memorization. Morse code is an example of something that must be memorized if a child is to become proficient in its use. If students can memorize for Amateur Radio, they will likely have an easier time memorizing multiplication tables or spelling words. Teachers welcome the chance to have their students memorize material in which they're interested and for which they have a real, immediate application.

"Another seemingly unlikely skill that Amateur Radio can help develop in children is eye-hand coordination. As late as the fourth grade, many students still are developing their fine motor skills. Using a straight key and a code practice oscillator (or for that matter using the code in QSO) is excellent practice, particularly when striving to distinguish correctly between a 'dit' and a 'dah.' "

An Insider Reports Results

Carole Perry, WB2MGP, has been teaching the course, "Introduction to Ham Radio" for several years at Rocco Laurie Intermediate School 72 in Staten Island, New York. Carole reports that she found strong motivation and self-confidence were not only the key to getting the children to learn the Morse code and technical material, but also emerged as a *result* of experiencing success in the course. Her in-

THE WHITE HOUSE
WASHINGTON

November 18, 1982

Dear Students:

Recently I learned of the amateur ham radio operation project you, along with the faculty and friends of Junior High School Number 22, have undertaken. Having read the details which Colonel Roger Wells supplied to my office, I must tell you how impressed I am with this worthwhile endeavor. I can personally attest to the opportunities which radio work can provide. As you may already know, my first job after putting myself through college was with a small radio station out in Davenport, Iowa, as a sports announcer.

It is encouraging to know that students like you are combining your efforts with others so that you can share and enjoy together the freedoms which we are so fortunate to have in this country. The freedom to speak out, to put forth personal initiative, and the freedom to reap the rewards of a job well done. The educational experience this project allows you is one that will help you to make sound judgments when you become tomorrow's decision-makers. Congratulations and keep up the good work!

With my best wishes now and for the years ahead,

Sincerely,

Ronald Reagan

The Students of G. Straubenmuller
Junior High School Number 22
111 Columbia Street
New York, New York 10002

The use of Amateur Radio by junior high school English teacher Joseph Fairclough, WB2JKJ, in New York City, has been lauded by a longtime friend of radio.

*P.O. Box 701, Zuni, NM 87327
**10 Berglund Ave., Staten Island, NY 10314
***Manager, Club and Training, ARRL

sider's perspective should be of interest to any elementary school teacher you approach.

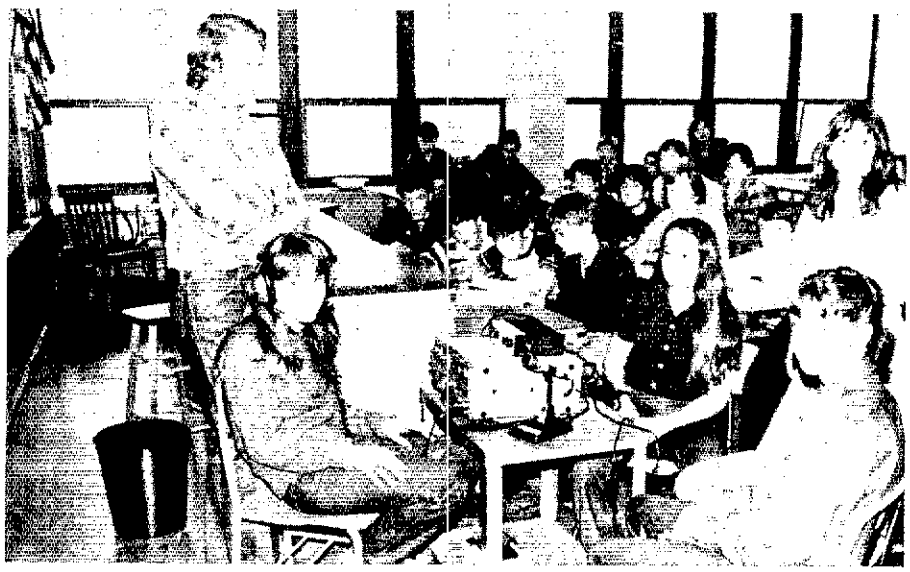
"Parents, other teachers and students were soon reporting back to me that work and study habits had improved in other subject areas, and that a new enthusiasm for school was evident in many children. Discipline and behavior problems are virtually nonexistent. In class we continuously stress courteous behavior on the air and to each other. Intelligent and responsible use of the airwaves is also discussed often. My students realize it is a privilege to get a license and to get on the air, and they act accordingly.

"Students began to develop an interest in geography, world affairs and scientific phenomena related to the hobby. The ARRL's map of the world call areas became a focal point of the room as we discussed future DX contacts. Stimulating discussions erupted spontaneously about such issues as why certain countries don't allow Amateur Radio. Observing eager young minds being stimulated is a thrilling experience for any teacher.

"I am especially interested in drawing young women into the program, and I won't allow them to delude themselves into believing that women are somehow genetically ill-equipped to learn technical things. Quite simply, girls do in fact fare as well as boys once they gain self confidence. A course like this provides the opportunity for helping young people, especially girls, get over their preconceived misconceptions and attitudes about dealing with scientific material.

"Though each student's motivation for obtaining a license is different, each is able to find an area of the hobby that is most appealing. For instance, one student was a Vietnamese boy who escaped with his sister from Vietnam three years ago with the "boat people." He couldn't speak English when he got to this country. We spent hours together practicing code with the use of flash cards and tapes. He got his Novice license and is presently studying and trying to upgrade. His hope is to be able to relay a message to his parents in Vietnam someday via ham radio. Another young man has decided on a career as an exobiologist, combining his new love of radio with his interest in astronomy, to determine if there is extraterrestrial life that can be detected via radio signals to earth.

"To date, 189 youngsters have become licensed. Many of them have experienced a sense of accomplishment and achievement for the first time in their academic lives. Even parents and other teachers have been caught up in the tremendous enthusiasm generated by Amateur Radio. I have personally witnessed incredible social and academic growth of children in this program, and strongly urge school administrators to consider introducing a similar program in their school systems. It will open new worlds to children who would otherwise experience little beyond the bounds of their neighborhoods and communities."



Gerald Skloot, KE2N, has his students at Rockaway Beach Junior High School in Rockaway Park, New York, listening to the tune of a different radio — Amateur Radio. In the class's three years of operation, 25 students have earned their Novice licenses or upgraded to General class.

Before the Classroom Door Swings Open

When you take Ham Radio on the Road to a local elementary school, share Allan's and Carole's experiences above with your contact teacher. You'll be on firm footing both theoretically and practically. With your foot in the door — assuming you've convinced an elementary school teacher that Amateur Radio is worth a try and have secured an invitation — you'll want to tailor your presentation to your very special audience. Allan Leslie again offers a few tips on effectively preparing for presenting and following up an elementary-classroom demonstration.

"Because you might have only a half hour or so in which to state your case for ham radio on the first visit, list the things you want to talk about long before you get near the classroom. What are the most important things to cover? Strike out anything that requires a lot of talking and explaining. Remember: Some things are so basic that you needn't waste a lot of time on them. For example, every child probably knows that a radio needs an antenna. They may not know, however, that there are various kinds, sizes and shapes of antennas.

"When your list is pared down to what you think are the essentials, outline the order of your presentation. What will you talk about first? Second? Third? How will you end your discussion?

"Then practice. Get it under the time limit. And don't do it by talking fast, either! You aren't doing a Federal Express commercial; you're explaining new ideas to children. Tape your rehearsals and listen carefully to the tape. Ask questions. 'Is this too hard? Am I telling too much here? Should I explain a little better there?'

"You'll probably find yourself saying, 'Wow, better add something; that's not everything they need to know about Amateur Radio!' Don't do it. This is a first session. Allow the students 5 to 10 minutes to ask questions. You may get a chance to come back and explain areas of interest in more detail. In your first visit, however, give only a general overview of Amateur Radio and try to plant some seeds of interest.

"Audio and visual aids are a must. By all means, take a rig to school with you. Even if there isn't time to set it up, you'll have it to show off. Kids like to see new things, and to see just what makes them new and different. If you have a special piece of equipment you don't want touched, don't bring it!

"I use drawings a lot; either I take the time to make them in several colors before I go (teachers like to keep them, to display in the classroom) or I use the blackboard. The trouble with blackboards is that you have to keep up a running commentary on what you're drawing, to hold the children's interest. You can't get away with, 'Just a sec, while I draw this!' In junior high, drawings and sketches can be a little more technical; a sine wave or a simple schematic diagram are all you'll need, though more is better.

"What sort of technical background do the children have? Have they studied electricity? Have they gone over basic electronic or electrical symbols? Establish beforehand just how much technical background they have. Find out where you can start. A look at their science text will help.

"A great tool is the 'beeper.' As far as many of those kids are concerned, that is

the name for a code-practice oscillator. 'Beeper' gets the point across quickly and effectively.

"With a little luck, the school may have oscillators lying around somewhere. If so, you need only ask the teacher if you can borrow them, check them out for operation and bring them to class with you. By stringing a wire across the room or even into the next room, two students can read the code stamped on the case, and 'beep at each other.' Headphones are most useful for private practice without disturbing the rest of the class.

"If the school doesn't have oscillators, make a few. A very simple one that produces a tone is all you'll need. Then, leave detailed instructions with the teacher so the kids can make similar oscillators, or arrange a date to come in at another time for a building-project afternoon with the class.

"But all the visual aids in the world and all the audio toys you invent still won't do a bit of good if you stick too closely to the special jargon we hams use. Watch your vocabulary! Keep it simple. If you use technical words or phrases, be sure to explain them clearly. If you can't explain a term in 10 words or less, don't use it. Now you are ready for the classroom."

At the Head of the Class

"Your very first words and actions will set your listeners' attitudes toward the rest of what you have to say. Begin where the children already are. They know about a few bands: a-m and fm commercial and CB, and perhaps they have even heard of something called 'shortwave radio.' They have only a hazy notion of just what that is. Start by clearing away the haze.

"I begin with a chart, on which I locate the commercial a-m bands and discuss that briefly. I follow this with a chart showing five more bands, with a different color ink for the ham bands. We then discuss the bands they can use as Novices. When bringing in each new chart or drawing, chatter a little to help fill the time needed to tape or tack it in plain view. For example, 'How many of you have read such-and-such book?' By asking that, I develop both an intimacy with those who have read it, and the curiosity of those who have not.

"My next drawing is a picture of the globe, on which transmitter towers stand out to exaggerated heights, each representing a continent or nation. I use this to explain that shortwave travels farther. 'When was the last time you heard Los Angeles or Chicago on the radio? It's not often. With shortwave, you can hear and talk with stations as far away as Moscow or London.'

"You need to know as much as possible about the age group you're talking to. Remember, for example, that fourth graders are very curious but still naive about the world in general. They want to know, they just don't know *what* they want to know. You are there to tell them, and to tell them in a way they can understand.

"To wrap the presentation up, a section on how to get into Amateur Radio that mentions code, theory and regulations works nicely. The children want to know what they'll have to do to get on the air. Recitations of FCC Part 97 certainly won't do the trick; what might is to tell them about a follow-on licensing class and how you or another friendly local ham will give them the test."

After Class

"What's the use of introducing these children to the world of Amateur Radio, when after all they *are* still children and probably would have a hard time getting enough money for a rig to actually go on the air? This is a common question that can be answered in any number of ways. You should discuss the problem with the teacher; he or she may know of money within the school that could be used: entitlement funds or PTA money, for example. Try working within the system getting help from the teacher or principal.

"Alternatively, if the children are willing to do some work, and if you want to help out, suggest activities such as paper drives or aluminum can collections to raise money for equipment. Also, look around for used equipment, sales and donations from other hams. Schools aren't necessarily cheap; rather, everyone is faced with a budget crisis these days, and schools are no exception. If you can provide an inexpensive alternative, you can go a long way toward getting a club going in that school. (See this month's editorial for more thoughts on this subject.)

"Once you have gone into the classroom to begin introducing children to Amateur Radio, be prepared for a lot of hard work. Possibly no one will want to have anything to do with Amateur Radio, no matter how brilliantly you have prepared your presentation. But if one, two, six or even a dozen decide to accept the challenge you've offered them, you're their link to Amateur Radio and they won't let you go. You may be asked to help or advise in setting up a club, teaching code and theory, and coaching for the FCC exam. You may even end up taking them into your own shack to use your rig. No one ever said it was going to be easy, but the rewards are tremendous."

Yes, Amateur Radio does have a place in the elementary and middle school classrooms. And your offer to take ham radio on the road will be welcomed by most good teachers.

Let us at ARRL Headquarters know how we can best support your work. To get started, refer to "Ham Radio on the Road" in last month's *QST* and send for your HROTR kit to Leo Kluger, WB2TRN, Recruitment Program Manager, at ARRL Hq. With your kit and this article in hand, you'll be ready to hit the road. As Carole and Allan both attest, "The small amount of time you invest in your local classrooms will pay dividends 10 times over — both to the students and to you." QST

Strays

Twelve-year-old Michael Popella, KA3HID, of Belle Vernon, Pennsylvania, beams with pride for good reason: He recently upgraded to Extra Class, giving the Popellas a full house of Extra Class licensees. The others are WA3CXW (father), WB3DUE (mother) and KA3HIE (brother).

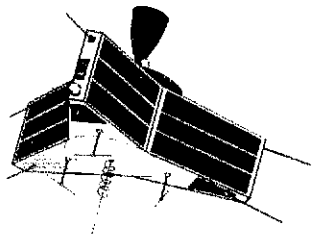
During the recent March of Dimes WalkAmerica walkathon, Marion Ross, television star of "Happy Days" fame, stopped by a checkpoint to thank members of the Los Angeles Amateur Radio Emergency Support Team (AREST) for their assistance in providing communications for the event. The lucky ham with Ms. Ross is West Valley ARC President Bill Stevens, W1WEX. *(March of Dimes photo)*

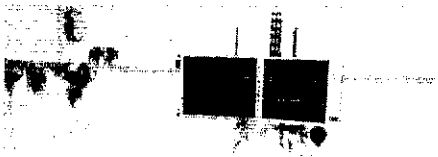
Next Month in QST

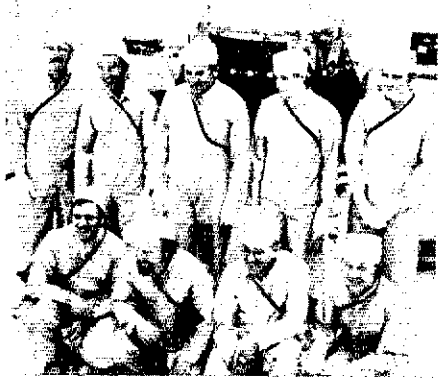
What happened at the October ARRL Board Meeting in Houston? A full report including the Minutes of that meeting will be published in the December issue. In case you can hardly wait for the results of the 6th UHF contest, there will be a treatise of this along with rules for the upcoming 1984 ARRL DX Test and the January VHF Sweepstakes.

Technical articles will feature a "basics" treatment of hf propagation, including a discussion of the ionosphere. Were you hooked by this month's treatment of the Personal Computer? Part 2 in December will go into the computer peripherals, and much more.

AMSAT-OSCAR 10 — A Tribute



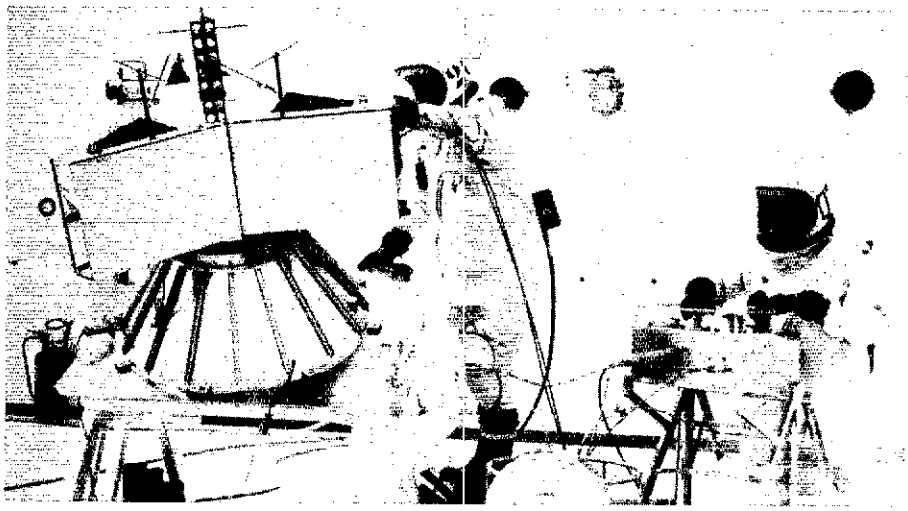




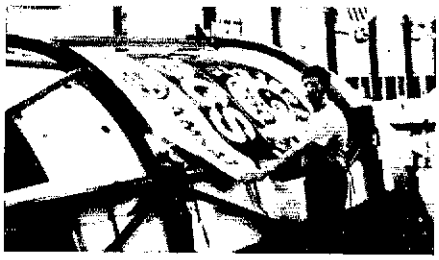
The AMSAT launch support crew: Standing (l-r) are W4PUJ, DK4VW, DJ5KQ, W3GEY and ZS1FE. Kneeling are W. Gladisch, W. Mueller, K. Mueller and DJ4ZC. *(photos courtesy AMSAT)*

The success of AMSAT-OSCAR 10 is a tribute to the spirit and creative drive of thousands of radio amateurs from all corners of the world, united in a common purpose. With their support, the kernel of talent that is AMSAT's technical crew conquered countless "insurmountable" obstacles in the quest for predictable, long-distance, long-duration communication at vhf and higher frequencies.

Few of us have the opportunity to meet the wizards who make it happen, and fewer still get the chance to witness the work that leads to launch day. In tribute to their perseverance and accomplishment, then, we salute the AMSAT technical crew and provide a brief glimpse into the prelaunch days of AMSAT-OSCAR 10.

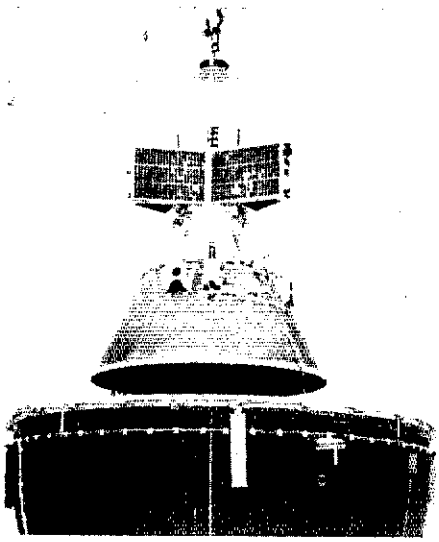


W. Mueller (left) and Dick Daniels, W4PUJ, wear protective clothing while loading the on-board kick motor with the highly toxic liquid fuel, Unsymmetrical Dimethyl Hydrazine.



Jan King, W3GEY, applies the AMSAT decal to the third-stage fairing of the European Space Agency Ariane rocket.

Just before the fairing is closed, the ECS 1 satellite sits atop the SYLDA. AMSAT-OSCAR 10 is beneath it, inside the SYLDA.



A last view of AMSAT Phase IIIB, mounted on its attach fitting, as it is lowered into the bottom half of the SYLDA. During launch, the SYLDA (a carbon-filament "cocoon") completely encased the satellite; the top half was jettisoned shortly after the ECS 1 spacecraft was separated, and just before Phase IIIB was separated and became AMSAT-OSCAR 10.

Ignition ... liftoff! The Ariane rocket rises above the ESA launch facility in Kourou, French Guiana, at 1159 UTC on June 16, 1983.

Meet Robert A. Foosaner, Chief, Private Radio Bureau

By Carol L. Smith,* AJ2I

A chance to talk to someone with real governmental authority doesn't come along too often. This interview with Robert Foosaner, newly named FCC Chief of the Private Radio Bureau (PRB), provided such an opportunity. Mr. Foosaner does and will, after all, have a profound influence on Amateur Radio, so I wanted to take full advantage of the occasion. Your concerns, your questions — that's what I wished to express. The questions I posed are, I hope, questions you would have asked.

A native of New Jersey, Mr. Foosaner came to Washington after graduating from Rutgers University. His first association with the FCC was as a clerk while he was attending American University School of Law. Now (17 years later), as Chief of the PRB, he still subscribes to an ethic of hard work and dedication, plus some of the idealism that was characteristic of the '60s and '70s. "I don't think anything can equal having the feeling that you're doing something good for the American public," he said. It's easy to believe he means it!

QST: You're something of an unknown quantity to hams. What can we expect?

Foosaner: I don't think I'm a totally unknown quantity to amateurs, but I haven't worked so directly with amateur issues. I have been at the agency 17 years, and I've worked in the Broadcast Bureau, Office of Science and Technology, and Office of the General Counsel prior to coming to the Private Radio Bureau. I've done an extensive amount of enforcement and international work as well. When I came here as deputy chief to Jim McKinney two years ago, we worked on everything together. I was involved in each one of the decisions that was reached in the last two years concerning the Amateur Radio Service. My perspective on the Amateur Radio Service is that it is one of major importance.

QST: What is it you like about the Amateur Radio Service?

Foosaner: I particularly like three things: (1) the goodwill it generates. It generates goodwill domestically, and I think a lot of hams in this country see that when they go to a social affair and somebody else there happens to be a ham. Hams also generate good will internationally, which is extremely valuable to this country. I've seen that goodwill when I go to an international meeting, and I walk in and immediately there's a sign for amateurs to get together. I was recently at a WARC that dealt with global marine future distress safety systems [a satellite system]. There was an amateur night! That's helpful; it gave me entry to discuss other things. (2) Perhaps much more important is that the amateurs stand up when it counts, in emergency disaster situations, for example. (3) They are also on the forefront of technology, as was shown in the past with single sideband and as is being shown today with packet concepts and satellite communications.

QST: What do you like about amateurs?

Foosaner: They are everywhere! The things I mentioned about the Amateur Service are really just a reflection of the individuals. They are there when you need them. They are good, general people who are able to communicate their concerns, and are willing to work.

I would like to see a little more participation from individual amateurs before the Commission. I think the trade press that you are representing does a good job. I think organizations that represent the amateurs do a good job, but I'd like to see more participation from individual amateurs before the Commission. For example, we will be receiving volunteer-exam questions from different organizations. I'd really like to see some questions come from members of those organizations directly.

QST: So amateurs should let the Commission know how they feel about policies affecting our Service?

Foosaner: Yes, I would like to receive more policy queries in the Amateur Service. I think this *Service* is important; I think an *individual's call sign* is less important. The great amount of time amateurs force this agency to work on their individual call signs allow us less time to work on much more significant matters. I understand that a call sign is important to an individual amateur, but is it more important than the Service? If you look at the mail we get, you begin to believe that amateurs feel that their call is *the* most important thing.

I'd say off the cuff that the last two years I've been here, call sign requests outnumber everything else we deal with in the Amateur Service by two to one. The Commission's call sign policy is an administrative decision we made. I believe it's a proper decision. The alternative would be to take our personnel off processing your licensing requests, off processing the important rule makings that you want considered in order to have a call sign request. If we do just one, we must do thousands of them.

QST: It's true that there have been no exceptions to the policy of no special call sign requests?

Foosaner: There have been no exceptions, and there will be no exceptions!

QST: Many amateurs have strong feelings

*Membership Services Assistant, ARRL

about some of the things going on in our Service; in fact, they view this as a "general decline" in Amateur Radio. I'd like to address some of these issues — for example, bad language on the air. Amateurs are generally upset about this.

Foosaner: I'm a lawyer. I'm also the main policy advisor to the Commission on this Service as well as a number of other services. You will see us prosecuting *with our best capabilities* the use of bad language on the air. There's a case on appeal right now, which I can't talk about, that will be keying in on what we are able to do. I will do anything that is legally permissible to keep the Service as it was intended.

QST: What can amateurs do when they encounter bad language?

Foosaner: I have a difficult time responding to what they can do. I *want* to do things, and I *need* to do them legally and properly. I would hope that amateurs continue to bring these matters to our attention, and the best way to do that is through our local field offices. Secondly, if I received as many complaints about bad language as I receive requests for individual call signs, I think Congress would take heed.

QST: What do you have to say about another thorny problem in the Amateur Service — deliberate interference?

Foosaner: Most cases that we have dealing with enforcement problems are delegated to the Field Operations Bureau to handle. Deliberate or malicious interference is a problem we retain responsibility for. We will work closely with the Field Bureau, and we will prosecute. It's not always easy to establish a deliberate or malicious interference case, but I'm pleased to say that we have been winning these cases. There is an emerging body of case law now that should make it plain to see that the FCC revokes licenses for malicious interference. I expect that within the amateur volunteer enforcement powers of P.L. 97-259, some procedures will come about to help us in cases of deliberate or malicious interference.

QST: So, the best thing amateurs can do is contact the nearest field office and report deliberate or malicious interference?

Foosaner: Absolutely.

QST: What about the increasing state and local restrictions on Amateur Radio operations?

Foosaner: Anytime there is a restriction dealing with transmissions in the Amateur Service, it's something we would be concerned about, and I would anticipate being able to participate in. When you talk about zoning laws, antenna heights, etc., it's beyond our jurisdiction, and we haven't attempted to intervene. It's certainly of concern. I would, however, caution the Amateur Service that they have to deal with this on a local level. Cooperating with local authorities would probably be the most successful path to follow.

The right of the amateur to transmit, however, has been preempted by the federal government. We will, and we have, exerted federal preemption in the past, and we would in the future in transmission interference matters, not in zoning matters.

"I will do anything that is legally permissible to keep the Service as it was intended."

QST: One of the more frequent times that hams get to deal with the FCC is when someone complains that an amateur is causing TVI. What can amateurs do to make these occasions more productive?

Foosaner: In most cases, the amateur community is already doing what it should be doing. A lot of areas have TVI committees that help work with the amateur and with the people receiving the interference. Most of the problems are easily correctable, but there's no easy overall solution. Receivers pick up emissions they shouldn't. I would hope that the amateur community would help in the 1 or 2 percent of the cases where the amateur licensee is at fault. The individual amateur licensee might not be cooperative in that situation. If the amateur community would bring their goodwill to help in cases where the amateur licensee is at fault, I think a lot of damage could be eliminated. TVI committees are a good way of dealing with this problem. Unfortunately, they don't cover the whole nation.

QST: You mentioned that you were involved in international affairs, in particular, the WARCs. What is in store for the Amateur Service on the international front?

Foosaner: The Amateur Service has a network throughout the world that is unlike any other service. Entering WARC-79, the Amateur Service was concerned about how many frequencies they would lose, about how much spectrum cutback there would be. It was a defensive mechanism — a defensive mode — that we entered approaching WARC-79. The result of that conference was that nothing was touched concerning the Amateur Service. Everything was retained, and some potentially very interesting spectrum was obtained. A total success!

In the international community, the Amateur Service is well set. It will do well in the future. That feeling is being reinforced whether I am in bilateral meetings with Canada or in multilateral meetings in Geneva when I go to discuss other services. I always am asked about the Amateur Service. They always want to know what *more* they can do for the Amateur Service. I don't think you have a problem.

QST: I'm glad you mentioned Canada. Since the recent 20-meter phone-band expansion came about for U.S. amateurs, many Canadian hams are upset. Do you know if this has affected the goodwill between Canadian and U.S. hams?

Foosaner: This is the first time anyone has mentioned that subject, so I must assume that whatever unhappiness exists has not affected our goodwill. Anytime you have change there will be some problems, though. The Canadian government certainly has not brought it to my attention.

QST: How greatly will budgetary cutbacks affect Amateur Radio in the future?

Foosaner: In the Private Radio Bureau, I don't anticipate any budgetary cutbacks this year or next year. I don't believe the past budgetary cutbacks have adversely affected the regulatory program for the Amateur Service. There has been a greater impact in the Field Operations Bureau, especially in the areas of exam administration and enforcement. We have to work through how we are going to administer those programs. There will be kinks as they are administered, and there will be things that have to be ironed out. But I don't think the budgetary cutbacks will adversely affect the Amateur Service.

QST: How would you like amateurs to characterize your term as chief of the PRB?

Foosaner: I would hope to be characterized as being open and having an open-door policy — available, willing to listen to concerns and interested. I believe, however, that I will be characterized strictly on the outcome of one proceeding. It's a proceeding that I haven't reached a conclusion on yet as to what I'll recommend to the Commission. It's called *no-code*. I believe no matter what I do, if I'm here for 20 years or one year, the outcome of that proceeding will determine how amateurs think of me.

QST: Is there anything else you would like to say to amateurs out there?

Foosaner: Yes, I don't have an opportunity to communicate with individual amateurs very often. I think that the amateur press does an excellent job providing that communication. I hope the amateur community appreciates that. It's important that I and this bureau have communication with the amateur community, all the community that we're responsible for regulating. I would like to continue that dialogue. I truly understand that it is essential to do so.

FCC Approves Volunteer Examining

By Steve Place,* WB1EYI

At their September 22, 1983 meeting, the FCC Commissioners reviewed and approved the Report and Order to implement a program of volunteer examining in the Amateur Radio Service for license classes above Novice. The Report and Order was released on September 29, 1983. The Commission was authorized to accept the voluntary and uncompensated services of radio amateurs in preparing and administering Amateur Radio license examinations by the Communications Amendments Act of 1982, specifically in Public Law 97-259. The Report and Order stems from ARRL's Petition for Rule Making (RM-4229, filed on October 22, 1982) and subsequent comments filed by ARRL and other concerned parties. ARRL's Washington Area Coordinator, Perry Williams, W1UED, attended the Commission meeting and interviewed Ray Kowalski, chief of the FCC Special Services Division shortly thereafter to clarify some of the issues.

Much of what was proposed by the ARRL remains intact. Several areas, such as conflict of interest, Volunteer Examiner Coordinators, fees, retesting and instant upgrading, were more clearly defined or changed. These modifications will be reviewed here, and the full details reported in a subsequent issue of *QST*.

The Report and Order provides for regional Volunteer Examiner Coordinators (VEC). As defined, the 13 regions correspond one-to-one with the 13 FCC call sign districts: the 10 U.S. call areas plus the Pacific area, the Alaskan area and the Caribbean area. Any organization that enters an agreement with the FCC to serve as a VEC within a given region will be responsible for meeting the VEC criteria, performing all functions required of VECs and serving the entire region. More than one VEC per region will be permissible, and one VEC may serve more than one region. No organizations other than the ARRL have indicated to the FCC any interest to date in applying to become a VEC.

Fees

In this Report and Order, the FCC has interpreted the "voluntary and uncompensated" clause of P.L. 97-259 as prohibiting individuals and organizations from charging fees. This prohibition in FCC rules is based on the statute: The Commission believes it is not authorized to rule otherwise at this juncture. The FCC Private Radio Bureau, however, is on record as supporting, in principle, remedial legislation designed to permit recouping the real operating costs of administering such a program. The ARRL has drafted legislation proposing that Congress establish an overall ceiling of $4 as an initial fee and thereafter authorize an increase in the fee of no more than 50 cents per exam in any one year; Congress would not have to act each time. Jack Lee, FCC's Director of Legislative Affairs in the Office of the General Counsel, has indicated that the FCC would probably support such legislation.

Volunteer Examining Background

For more information on the Volunteer Examination program, see the following references in *QST*:

- "ARRL Proposal to Restructure FCC Examination Procedures," Happenings, April 1982 *QST*, p. 58.
- "Volunteer Examining," In Training, June 1982 *QST*, p. 79.
- "Volunteer Examining: The Ideal, the Real and You," It Seems To Us, Dec. 1982 *QST*, p. 9.
- "An Expanding Examination Program for Radio Amateurs," In Training, Aug. 1983 *QST*, p. 84.
- "License Examinations and Clubs: An Exciting New Relationship," Club Corner, Sept. 1983 *QST*, p. 84.
- "Deregulation and Amateur Radio," It Seems To Us, Oct. 1983 *QST*, p. 9.

Conflict of Interest

To address the issue of possible conflict of interest should a publisher of Amateur Radio training manuals or study guides want to participate as a VEC, the FCC will require that there be some sort of bona fide separation between employees who administer the volunteer examining function and those who write, produce and sell instructional publications. Referring to such a separation as a "Chinese wall," likening the situation to that often found in the legal profession, the General Counsel's Office intends that the rule prevent "VEC's exploiting their access to questions to benefit the commercial side of their operation."

Other Changes

Among other changes incorporated into the Report and Order is the FCC's retaining its authority to retest anyone who is licensed based on having taken an examination administered by volunteers. A licensee would be subject to retest only on those elements administered by volunteers, not on those previously administered by the FCC. Also, instant upgrading will be permissible; the VEC will establish a two-letter code (WA-WZ, KA-KZ, NA-NZ and AA-AL) for each exam opportunity, and successful applicants must append the slant bar and proper code to their call signs until they receive their new licenses from the Commission. The telegraphy test will remain exactly as it is now.

The basic requirements of Volunteer Examiners are that they be 18 years of age or older and not related to the applicants. The license of anyone who falsifies or accepts money for taking someone else's exam will be revoked. Exams will be administered by teams of three Volunteer Examiners, though the concept of Team Chief has been eliminated. VECs are permitted to require advance registration and at least 30 days in advance of the registration deadline must notify the FCC Engineer in Charge at the relevant Field Operations Bureau District Office about the time, place and registration requirements for an exam session. A Public Notice will be issued detailing how an organization may apply to become a VEC. Though the new amendments to Part 97 take effect December 1, 1983, testing will not likely start for a month or so thereafter.

More to Come

This summary leaves many questions unanswered and probably raises a few in the process. We'll pass more detailed information on to you as soon as possible.

In the meantime, we ask all Advanced and Extra Class licensees who are interested in serving as Volunteer Examiners to join the hundreds of others who have sent statements of their intent to ARRL Volunteer Examiner Program Manager Curt Holsopple, K9CH, at ARRL Headquarters. Though we have not yet been approved as a national Volunteer Examiner Coordinator, the ARRL is laying the groundwork now for our future involvement. Those who communicate their interest with Curt will be among the first to be contacted when the requirements for accreditation as a Volunteer Examiner are known. We're one step closer to a program that the Amateur Radio Service needs in the face of otherwise dwindling exam opportunities. QST

*Manager, Club and Training Program ARRL

Happenings

Conducted By Carol L. Smith,* AJ2I

- *ARRL Board Candidates*
- *Volunteer Examining Program Approved*
- *More License Revocations*

ARRL Director and Vice Director Nominees

Every two years, ARRL full members have the opportunity to select Directors and Vice Directors to represent their ideas and needs on the ARRL Board. The ARRL Board of Directors is ultimately responsible for all League matters, such as determining ARRL policies and priorities and deciding what services will be made available to members. ARRL Directors and Vice Directors are elected to represent specific geographic areas called divisions. (To determine your Division and the names of your Director and Vice Director, see page 8 of *QST*.)

This year, nominations were open in the *Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific* and *Southeastern Divisions*. The ARRL Executive Committee met September 10 to examine the nominating petitions filed by members in these eight Divisions. The following were the only candidates nominated and eligible in their divisions, and for that reason, the Executive Committee declared them elected for two-year terms beginning January 1, 1984, without need for membership balloting.

Atlantic Division: For Director — Hugh A. Turnbull, W3ABC.

Canadian Division: For Director — Thomas B. J. Atkins, VE3CDM. For Vice Director — Harry MacLean, VE3GRO.

Dakota Division: For Director — Tod A. Olson, KØTO. For Vice Director — Howard B. Mark, WØOZC.

Delta Division: For Vice Director — Robert P. Schmidt, W5GHP.

Great Lakes Division: For Director — Leonard M. Nathanson, W8RC. For Vice Director — George S. Wilson, III, W4OYI.

Midwest Division: For Vice Director — Claire R. Dyas, WØJCP.

Ballots already have been sent to all ARRL full members (of record as of September 10) in those Divisions in which two or more candidates were found to be eligible for elective office. Those Divisions and the eligible candidates are as follows:

Atlantic Division: For Vice Director — Vince H. Bardsley, KB3OM; E. Merle Glunt, W3OKN; George "Bud" Hippisley, K2KIR; Edward J. Kuebert, K3KA.

Delta Division: For Director — Clyde D. Hurlbert, W5CH; O. D. Keaton, WA4GLS.

Midwest Division: For Director — Paul Grauer, WØFIR; Robert S. McCaffrey, KØCY; Wellington B. Stewart, KØSI.

Pacific Division: For Director — Jettie B. Hill, W6RFF; William J. Stevens, W6ZM; Robert B. Vallio, W6RGG. For Vice Director — Frederic N. Barry, K6RTU; Gary Kip Edwards, W6SZN; James Knochenhauer, K6ITL; James A. Maxwell, W6CF.

Southeastern Division: For Director — Frank M. Butler, Jr., W4RH; Stewart H. Woodward, K4SMX. For Vice Director — Evelyn D. Gauzens, W4WYR; James A. Gundry, W4JM.

League Elections — Make Your Voice Heard Now!

To be valid, ballots must be received at Headquarters by noon, November 21. A committee of tellers, under the supervision of the accounting firm of Price Waterhouse, will count the ballots, and results will be announced over W1AW and in *QST*. Any full member of record September 10 in one of the Divisions in which elections are being held should receive a ballot by November 1. Those members eligible to vote who have not received a ballot should immediately contact Donna Camera at Hq.

FCC APPROVES USE OF VOLUNTEERS FOR AMATEUR EXAMINATIONS

The Commission has authorized volunteers to prepare and administer examinations for Amateur Radio licenses above the Novice class (see Jan. 1983 *QST*, pp. 56-57, March 1983 *QST*, p. 57, and June 1983 *QST*, p. 60, for details of PR Docket 83-27). This change, the FCC said, "will offset the limitations in opportunity for amateurs to take the examinations that have resulted from funding and personnel cutbacks."

Under the program (more details appear on page 68 of this issue) individuals and organizations will propose questions for all examinations based on the FCC's Study Guide for the Amateur Radio Operator License Examinations. Individuals are encouraged to submit such questions to the Commission. The FCC will issue lists of approved questions, to be used for exams.

Written examinations will be administered by teams of three examiners who will report to a regional Volunteer Examiner-Coordinators (VEC). The VEC will assist in an orderly flow of information to and from the Commission, coordinate the efforts of volunteer examiners and minimize the likelihood of fraud or abuse. In a departure from the proposed rules, the Commission has decided to substitute regional VECs for nationwide VECs or a VEC may elect to be national in scope. The regions will correspond to the present amateur licensing call sign districts.

Specific qualifications for participating in the volunteer program will be spelled out (details will be reported in *QST* when they become available). This action does not affect the volunteer examining procedures recently adopted for the Novice class license.

The changeover from FCC Field Office test sites to more-local examination opportunities will require plenty of volunteer examiners. Join the hundreds who have stepped forward already. Send nominations (include name, license class, call, full address and phone number) to ARRL Headquarters, Attn: Curt Holsopple, K9CH, Volunteer Examiner Program Manager.

PERMANENT SPACE SHUTTLE WAIVER REQUEST GRANTED

The FCC has issued a blanket waiver for the duration of all Space Shuttle flights, launched under the auspices of NASA, to allow any licensed Amateur Radio operator to retransmit audio and video communications from the Space Shuttle. Permission for the retransmission of Space Shuttle communications must be obtained from NASA prior to such retransmission. The retransmitted communications must also be for the exclusive use of licensed Amateur Radio operators.

In granting the waiver, requested by the Jet Propulsion Laboratory Amateur Radio Club, the Commission recognized amateurs' tremendous interest in space communications. "Retransmission of Space Shuttle communications," it said, "affords amateur radio licensees a unique opportunity to become better informed about space communications and to feel a sense of participa-

*Membership Services Assistant

tion in the United States space program. Further, retransmission of the Space Shuttle communications gives amateur radio operators experience in setting up *ad hoc* links and networks of amateur stations around the country in order to carry the Shuttle information to interested amateurs. This experience would be invaluable in the event of a natural disaster or emergency in which similar communications links were required."

The waiver will apply to any licensed Amateur Radio operator who complies with the following:

a) The provisions of Section 97.113 are waived to permit retransmission, by any licensed amateur radio operator, of communications from a station in a radio service other than the Amateur Radio Service, i.e., communications between the Space Shuttle and its associated earth stations operating on frequencies allocated to the U.S. Government.

b) Permission for the retransmission of Space Shuttle communications must be obtained from NASA prior to any such retransmission.

c) Both audio and video communications from the Space Shuttle may be retransmitted.

d) The retransmitted communications are for the exclusive use of licensed radio amateur operators only and may not be used by other persons.

e) This waiver will continue in effect for the duration of Space Shuttle flights launched under the auspices of NASA.

RULES VIOLATIONS BRING $2000 FINE

Gary W. Kerr, ex-WA6JIY

A monetary forfeiture in the amount of $2000 has been issued to Gary W. Kerr, ex-WA6JIY, of Palo Alto, California. Kerr had previously held a General class operator license and station license WA6JIY. Kerr had been found to have caused intentional interference to amateur 2-meter repeater operations in the San Francisco Bay area (see Oct. 1982 *QST*, p. 52, for details).

Though his renewal application had been denied, local FCC Field Offices continued to receive reports that Kerr was still operating on amateur frequencies. After numerous complaints, a field investigation was initiated by the San Francisco district office. It was determined that Kerr was operating an unlicensed transmitter on a frequency used by a local 2-meter repeater station.

Despite two additional official requests, Kerr has not yet paid the forfeiture. The Commission says that when certain follow-up efforts don't resolve monetary forfeitures, such cases are routinely referred to a United States Attorney for collection in federal court proceedings. The FCC also warns that continued violations of the Communications Act could result in additional fines or criminal prosecution. *QST* will report more details as they become available.

CALIFORNIA OLYMPIC CALLS OKAYED FOR SUMMER OF '84

The Commission has waived provisions of Section 97.51(b) of the Rules to allow all Amateur Radio stations located in California whose call signs contain the digit "6" to use either "23" or "84" in place of the digit "6." The special calls would be used to "spread friendship, goodwill and excitement from the location of this international event." This provision is in effect only from July 1, 1984 to August 31, 1984. The numerals 23 and 84 designate the 23rd Olympiad and the 1984 Olympics.

Governor Richard H. Bryan signs into law the bill that authorizes "Radio Amateur" decals to be affixed to amateur call plates in Nevada. Approving of the proceedings are (l-r) N7RH, KD7DI and State Senator Lawrence Jacobsen, Senate sponsor of the bill. *(KB7VT photo)*

Are You a Lawyer?
Amateur Radio Wants You!

Your legal expertise is needed in the Amateur Radio community to help build and maintain the legal foundations for our hobby. The League is initiating a Volunteer Counsel Program, designed to help stem the tide of overly restrictive regulations on Amateur Radio. You can help. If you have an interest in this exciting area of communications law, are a reputable member of the bar of at least one state and are a League member, please contact us. As a Volunteer Counsel, you will be kept well informed about areas of law affecting Amateur Radio. For further information, write to the ARRL Volunteer Counsel Program, 225 Main St., Newington, CT 06111.

PRIVATE RADIO BUREAU DEPUTY CHIEF NAMED

Michael T. N. Fitch was recently named Deputy Chief of the Private Radio Bureau (PRB) of the FCC. Mr. Fitch is a Glenwood Springs, Colorado, native who holds degrees in Electrical Engineering and Law. This year, he was nominated by the Commission for the Arthur S. Fleming Outstanding Young Men and Women in Government Award.

POWER ERRATA

The Commission issued a correction of the Report and Order in PR Docket 82-624, dealing with the definition of measurement of transmitting power in the Amateur Radio Service (see Sept. 1983 *QST*, p. 64, and Oct. *QST*, p. 59). The FCC chose to recognize two alternative valid measurement standards for output power. The first was the "reading of a thru-line peak radiofrequency (rf) wattmeter, properly matched." The term "thru-line" is not as accurate or as generic a term as the Commission intended; the term meant in this context was "in-line." Accordingly, paragraph 5 of the Report and Order is changed to read:

"(1) The reading of an in-line peak reading radiofrequency (RF) wattmeter, properly matched, or . . ."

Additionally, a line from Section 97.77(d)(6)(ii) was missing from page 64 of September *QST*. The section properly reads as follows:

"(ii) No amplifier shall be capable of amplifying the input RF signal by more than 15 decibels. (This gain limitation is determined by the ratio of the input RF driving signal to the RF output power or mean power.) If the amplifier has a designed peak envelope power output of less than 1,500 watts, the gain allowance is reduced accordingly. For example, an amplifier with a designed peak envelope output power of 500 watts shall not be capable of amplifying the input RF driving signal by more than 10 decibels."

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia and Pacific Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue. [Editor's Note: Solicitations for petitions in Canadian Sections henceforth will appear in Canadian Newsfronts].

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 immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, December 9, 1983.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 2, 1984. Returns will be counted February 21, 1984. SMs elected as a result of the above procedure will take office April 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 April 1, 1984.

If no petitions are received for a Section by the specified closing date such Section will be resolicited in April *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 Southern New Jersey Section, Richard Baier, WA2HEB, has been appointed to com-

New Hampshire Governor Sununu made use of ham radio to declare June 19-26 as Amateur Radio Week in his state. Looking on (l-r) are WB1BWR, KI1M, KA1HLG, N1BAO, N1CHY, W1NH, WA1PEL and N1AIX.

plete the term (December 31, 1984) of Edward E. Wood, N2CER (resigned).

SECTION MANAGER ELECTION RESULTS

The following were elected for a two-year term of office beginning January 1, 1984:

Uncontested

Alaska	David W. Stevens, KL7EB
Alabama	Joseph E. Smith, Jr., WA4RNP
Delaware	John D. Hartman, WA3ZBI
Kansas	Robert M. Summers, KØBXF
Michigan	James R. Seeley, WB8MTD
Tennessee	John C. Brown, NO4Q
Western Massachusetts	R. Donald Haney, KA1T

MORE ON CATVI

The ARRL has filed with the FCC a Reply to the National Cable Television Association's Opposition to the League's Motion for Expedited Action on RM-4040 (the League's petition to preclude cable operation on amateur frequencies). See March 1982 *QST*, p. 58, March 1983 *QST*, pp. 57-58, and October 1983 *QST*, p. 58, for background information.

In its Opposition, the NCTA pointed to its "comprehensive efforts to cooperate with ARRL and its members to identify and resolve cable/amateur interference problems." It also submitted evidence purportedly demonstrating that the cable TV industry was solving cable-television interference (CATVI) problems on a voluntary basis.

ARRL Hq. wrote to approximately 100 CATVI complainants to determine, from the amateurs' viewpoint, the present status of past-reported CATVI problems. Of the 43 responses received in only a two-week period, 33 reported that cable leakage is still present at levels sufficient to disrupt or interfere with Amateur Radio communications. All indicated that the cable company was notified of the problem. Eleven responses indicated that actions taken by the cable company were sufficient to remedy the problem, but of those 11 cases, eight systems chose to vacate Channel E as a means of dealing with the interference problem — *precisely the action the ARRL is requesting in RM-4040.*

It is clear that there is a difference of perception between what hams consider "solved" and what the cable industry considers "solved." This simply points out the necessity of maintaining channels of communications between amateurs and the cable TV industry. A properly operating cable TV system is actually a boon to amateurs because the net result can be *fewer* TVI complaints. Moreover, it is true that NCTA's publications and seminars have focused on the CATV interference problem, and for this the League is very much appreciative. The CATV industry has become more aware of the interference problem than it was before. The publicity NCTA and others have given to the problem has enhanced this awareness. — *Harold Steinman, K1ET*

SUMNER B. (TED) YOUNG, WØCO

It is with a deep sense of loss that we note the passing of Sumner B. (Ted) Young, WØCO. Recovering from an illness, in 1951, Ted noticed that the first five volumes of *QST* were not indexed. Three years and some 30,000 3 × 5 file cards later, he had produced a privately printed index for each year. However, it was about as interesting to read as a telephone book. Young was persuaded to write a foreword for each yearly index, and these began to appear in *QST* starting in 1954. Filled with detail and the excitement of those early times, each foreword captured the flavor of some of the most challenging times in Amateur Radio. Ted will be sorely missed by the amateur community.

DR. ROBERT H. WIETBRECHT, W6NRM

Dr. Robert H. Wietbrecht, W6NRM, of Redwood City, California, Amateur Radio RTTY pioneer and inventor of a communications system for deaf persons, became a Silent Key on May 30, 1983. He was 63.

Wietbrecht first became licensed as a teenager, as W6NRM — one of the first deaf persons to earn an Amateur Radio license. In the '40s and '50s, he became very active in radioteletype, pioneering developments and writing numerous articles on that subject. In 1964, as a result of his work with RTTY in the previous two decades, Wietbrecht developed the first acoustic modem hooked up to a teletypewriter, enabling deaf persons to communicate with one another. He received an honorary doctorate from Gallaudet College in Washington, DC the world's first college for the deaf, and a commendation from the National Association of the Deaf.

CURRENT RECIPROCAL-OPERATING LIST

The United States has reciprocal-operating arrangements with the countries listed below. U.S. amateurs wishing to apply for a reciprocal-operating permit from one of these countries should write to the Membership Services Department at Hq. (be sure to include an s.a.s.e.) for information.

Governments that have reciprocal arrangements with the U.S. are

Argentina	Greece	Nicaragua
Australia	Grenada	Norway
Austria	Guatemala	Panama
Bahamas, The	Guyana	Paraguay
Barbados	Haiti	Peru
Belgium	Honduras	Philippines
Belize	Iceland	Portugal
Bolivia	India	St. Lucia
Botswana	Indonesia	Seychelles
Brazil	Ireland, Rep. of	Sierra Leone
Canada*	Israel	Solomon Is.
Chile	Italy	Spain
Colombia	Jamaica	Suriname
Costa Rica	Jordan	Sweden
Denmark	Kiribati	Switzerland
Dominican Republic	Kuwait	Trinidad & Tobago
Ecuador	Liberia	Tuvalu
El Salvador	Luxembourg	United Kingdom
Fiji	Monaco	Uruguay
Finland	Netherlands	Venezuela
France	Netherlands Antilles	Yugoslavia
Germany, Fed. Rep. of	New Zealand	

*The U.S. and Canada have an automatic reciprocity agreement, and visiting amateurs no longer need reciprocal-operating permits.

NEW CAR BUYER AND HAM, TOO? BEWARE!

Sam A. Gilliam, KC5XO, of Shreveport, Louisiana, decided to make a sizable investment in Toyota's top-of-the-line Cressida, with the idea that he could use his newly acquired automobile in conjunction with his 2-meter rig. According to Sam, the car began "running rough, stalling and refusing to start." The dealer told Sam that he had damaged the "brain box" by using his two-way radio. They also insisted that the damage was his liability and was not covered under the new or extended warranty that he had purchased. The cost of the "brain box" was quoted at approximately $400.

Toyota does have a precautionary suggestion in its owner's manual regarding the use of two-way equipment. They feel that since there could be the "possibility of high output from the transmitter, it could cause a malfunction of the vehicle's computers." If this happens, Toyota will assume no liability for the replacement of such components. The lesson for amateurs — caveat emptor. QST

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Business Brouhaha

Business communications — what we *can* and *cannot* say on our radios — is the talk of Hamtown, USA. Two months ago, we discussed the Commission's clarification of the no-business aspects of our Service. Examples were given illustrating the types of communications and activities in which hams may participate. This month, we'll continue our treatment of this "gray area" with more examples, and how you can decide for yourself what communications are inbounds.

Q. First things first. What is the Commission's definition of business communications? What are the applicable rules?

A. *Business communications:* any transmission or communication the purpose of which is to facilitate the regular business or commercial affairs of any party (97.3[bb]).

Business communications are prohibited by Section 97.110 in general cases, except for emergency situations. Section 97.114 prohibits business communications in third-party-traffic situations (again, except in an emergency where the immediate safety of life and/or property is threatened).

Q. Who is a party?

A. "Any party" includes individuals and organizations that can be for profit or not for profit; charitable or commercial; or government or nongovernment.

Third-party traffic is ham communications by or under the supervision of the control operator at an Amateur Radio station to another Amateur Radio station on behalf of anyone other than the control operator (97.3[v]). A third-party message is one the control operator (first party) of your station sends to another station (second party) for anyone else (third party). Third-party messages include those that are spoken, written, keystroked, keyed, photographed or otherwise originated by or for a third party, and transmitted by your amateur station live or delayed. Examples of third-party traffic include autopatch and phonepatch operations, traffic handling and participation in Amateur Radio communication by unlicensed persons.

Q. How do I determine if my transmission is consistent with the Rules in Part 97 concerning business communications?

A. Before making a transmission that you have some doubts about, ask yourself the following questions:

1) Is the *purpose* of my transmission to facilitate the *regular* business or commercial affairs of some party? If so, don't do it. Examples of forbidden transmissions are business transactions; direct promotion to assist the sale of a product or service; calling the office to leave or receive business messages; providing a regular communications service to an employer, a government agency or other entity. Note: The Amateur Radio Service should not be used as an alternative to the land mobile, broadcast, maritime or common carrier radio services.

2) Is the *purpose* of my transmission something else, and it only *incidentally* facilitates someone's regular business or commercial affairs? If so, it is permissible. Examples include *emergencies*, where the immediate safety of life or the immediate protection of property is an overriding consideration. *Public service* transmissions may be made where service to the public is an overriding consideration. This may include communications for parades, marathons, walk-a-thons, eye banks, bike races, fireworks displays, Olympic games, and so forth.

Q. How about helping out with communications for the police?

A. Providing communications assistance to and cooperating with local police departments are fine ways to contribute to the welfare of your community. However, hams and their equipment should not be used in lieu of police communications *on a routine or day-to-day basis*. Amateur participation in police activities should be limited to practice drills for emergency preparedness, actual emergency communications support and *occasional* augmentation of regular police communications whereby the public is served ("Goblin Patrols" and the like).

Q. All this talk about business communications — does it apply to overseas QSOs as well?

A. The above discussions, rules and policies only apply to domestic communications in areas where radio services are regulated by the FCC. For international Amateur Radio communications, all transmissions must be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications system is not justified. This is an international requirement that can be found in our own Part 97, Section 97.111. If third-party traffic is involved, make sure the country in which the corresponding amateur resides has a third-party traffic agreement with the United States. For a list of countries holding third-party traffic agreements with the U.S., see October 1983 *QST*, page 91.

[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.]

FCC Scorecard

The following proposals are on tap for FCC action in the near future. For copies, send an s.a.s.e. to ARRL Hq. with your request. News of FCC actions are reported in Happenings and League Lines. Discussions and interpretations of new rules can be found in this column.

Docket	*Subject*
21006†	Proposed relaxation of leakage standards for cable-television systems.
78-369†	Inquiry into ways of dealing with radio-frequency interference (RFI).
79-144†	Proposed rule making and inquiry into effects of rf exposure standards on radio services and equipment, and FCC proposal to adopt regulations to protect health of employees and the public exposed to radiation in excess of national standards.
80-739†	Proposal for implementation of 1979 WARC frequencies and rules.
81-414†	Proposal for spread-spectrum operation in the Amateur Radio Service.
82-83†	Further proposal for hf phone subband expansion at 80, 15 and 10 meters.
83-28†	No-code Amateur Radio license proposal.
83-337†	Proposal for 10-year license terms and two-year grace periods for expired station and operator licenses.
83-485†	Proposal for 10-meter repeater subband expansion to 29.0 MHz.
83-524†	Proposal for additional RACES frequencies in times of national emergency.

†Comment deadlines passed; awaiting Commission actions.

ARRL Response to FCC Rule Making Actions

The League continuously monitors FCC Amateur Radio regulatory proceedings, and participates formally in the majority with comments and replies to Commission proposals. Members have an important say in the manner in which ARRL responds. News of significant proceedings are carried in such *QST* forums as "Happenings" and "League Lines." If you feel strongly about a certain rule-making matter, voice your opinions to your ARRL Division Director (name and address appears on page 8 of every *QST*). It is the League's Board of Directors that effects ARRL policy, and it is your elected representative on this Board that assures that your voice will be heard.

*Deputy Manager, Membership Services, ARRL

Correspondence

Conducted By Peter R. O'Dell,* KB1N

HAMS ON PATROL

☐ A little more than two years ago, I wrote to the League for a list of North Carolina ECs. I thought I'd take a minute to let you know what's happening in NC. After you sent me the EC list, I began sending letters to ECs and county Emergency Management Coordinators. Amateur Radio as a resource has been somewhat revitalized.

Our State Government Liaison, AB4W (also Wake County EC), has so far done a remarkable job of coordination between our agency and the hams. He has literally gone "where no man has gone before."

I would like to personally thank the League for the magnificent job that is being done both at Newington and in the field. It seems to me that no further improvement in the League or *QST* is possible (or necessary), yet they both keep getting better! Thanks for your help and support. — *Steven E. Riddle, WA4AFV, Crime Control & Public Safety, Raleigh, North Carolina*

QSL QSL QSL

☐ I wonder how many thousand amateurs in this "good ole US of A" have had their QSL cards sadly defaced by the U.S. Postal Service.

I am referring to the routing marks on the call letter side of cards made by the LSM (letter sorting machine). I have one card which has nine such marks. They consist of a letter and a numeral or two letters.

Since the postal employees are looking at the address side of the card to key in the zip code on these machines and the stamping is on the opposite side, the call letters or picture on that side take the brunt of these "chicken tracks."

I keep it from happening to my cards by placing them in an envelope when I mail them, but I have no control over incoming cards. Many otherwise beautiful cards are destroyed for display purposes by this idiotic system. — *Woody Fugate, W4JDU, Catlettsburg, Kentucky*

☐ When enclosing IRCs or a "Green Stamp" to cover the return postage with a QSL card to a DX station, I wrap the QSL card and return postage in 1.5-mil black polyethylene plastic. It keeps the contents from being observed and possibly removed. — *Lance Haserot, K6LWS, Moscow, Idaho*

FT2? DE W1AW K

☐ I have come across a very interesting legal question. The regs say amateurs may only communicate with other licensed amateurs.

But: I read an article on space research stating that because of budget cuts it would be very likely that any extraterrestrial communications would be done by amateurs instead of the federally funded research institutes. It seems to me that the amateur community is stuck between the proverbial "rock-and-hard place." How could we legally take part in such communication, if (or possibly *when*) it takes place? — *Klaus Spies, WB9YBM, Niles, Illinois*

WHERE HAVE ALL THE FLOWERS GONE?

☐ On September 7, I went to the FCC office in San Francisco to take the code and written exams for the Advanced class. Starting out with no license at all, I managed to pass all the necessary elements. I had a little help, though. I was a Novice back in 1971.

Since I had to sit through three written elements and the 13 wpm code test (the 5 wpm was given during my element 4A test), I had quite an opportunity to see what kind of people were becoming amateurs.

The applicants ranged from high school age to elder retirees. Included were those who had impaired hearing, vision or movement. The only group that was noticeably absent from all of the different sessions was the YLs. There was only one young lady in all the sessions (she came in for the 5 wpm code test).

The expressions of joy when the examinations were graded were good to see, and I think I still would have left happy had I not passed any of the elements.

It's good to be (almost) a ham again, and keep up the good work! Still waiting for my license and call. — *James V. Sohn, Santa Rosa, California*

POSITIVE ADDICTION

☐ The August issue of *QST* made me happy. I thought I was the only "hamaholic" in the world. But now, after reading WA1VVH, Peter's causerie "Low SWR, Q5 and Addicted to RF," I know I am not alone.

I recognized myself in several details, like praying for rain at weekends to give me an excuse for ham radio instead of doing any garden work. But sometimes, the rain comes okay, but propagation is poor on every band and soon I will find myself helping clean the house ...

I am afraid Peter is right when he says there is no cure. So Peter and I have to live with our disease for the rest of our lives. And why not? There are other "aholics" that are worse.

Please give my regards to Peter and tell him how much I appreciated his story. — *Harry Goransson, SM4KAJ, Ludvika, Sweden*

INTRUDER ALERT

☐ The intruder station that operated at the lower end of the 40-meter band during June has moved back down below the band. This station was operating at 7002 KHz using 850-Hz shift RTTY, and was strong enough in the New York metropolitan area to render the first 5 KHz of the 40-meter band useless from about 10 P.M. to 2 A.M. almost every evening. In May, I first observed the station operating below the band, then in a month's time gradually "creeping-up" in frequency into the amateur portion. Since the lower portion of the 40-meter band is exclusively amateur on a worldwide basis, this station was definitely an intruder. Transmission was continuous and could not be copied on ASCII or BAUDOT at any speed; nor did it appear to be SITOR. On June 17, I reported its presence to the FCC Monitoring Station in Belfast, Maine, and also to the ARRL. That weekend I constructed an hf DF loop antenna from a ½-inch-diameter rod of ferrite. On the evening of the 19th-20th, I succeeded in obtaining a sharp null in a northeast direction from my QTH in Ryebrook, New York, a suburb about 25 miles northeast of New York City. On July 11, I called the FCC again. They verified my DF as being "pretty close," and said they also had intercepted and identified the station but could not tell me who it was. They did state that it probably would not happen again. — *Shelly Rubin, KT2L, Rye Brook, New York*

HAM RETIREMENT HOME?

☐ The thought has occurred to me: "Are there any retirement homes for hams?"

I called ARRL Hq. this week, and the young lady who answered said she knew of no such facility, but it sounded like a "good idea."

My dad has been a ham since 1913. He is now 86. He used to live in a cooperative apartment in Florida, but his ham radio activity annoyed his neighbors, forcing him to buy a house in order to pursue his beloved hobby. He is still keeping house for himself, but his eyesight is deteriorating due to diabetes. His four-to-seven schedules daily keep him as sharp as a tack.

I can't help but think that a retirement facility for hams who want to continue their radio interests would be a useful kind of activity for the ARRL to sponsor. — *Marilyn Agnew, Wellesley, Massachusetts*

REALLY?

☐ In reference to the letter from KK9A (Aug. *QST*, p. 62): When I realized there was actually a *real live* "KK9" station operating from that remote, *rare* state of Illinois and he was having trouble affording QSL cards, I got so excited I called all my DXing buddies at 3 A.M. and had them rush over to my shack so we could work in round-the-clock shifts listening for those faint signals from Illinois with a "KK9" call. I just knew this was one of those "most wanted" calls the whole world was dreaming of.

I thought maybe we could start up an organization to secure donations to be used in keeping such a rare station on the air. I knew it would be a lot of hard work manning the new QSL bureau we would need to keep up with the flood of cards a honest-to-goodness "KK9" call would cause. I quit my job as an engineer in order to devote all my time to being the supervisor of the newly formed "KK9" QSL Bureau. Then I realized that of the 50 states, 44 are rarer than Illinois, including Pennsylvania. Mmmm. I wonder if anyone in Pittsburgh with one of those rare "WA3" calls needs a QSL manager. — *Hugh Brunson, AE4N, Greensboro, North Carolina*

*Public Information Coordinator, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

CRRL Profile: Tom Atkins, VE3CDM

CRRL President-ARRL Canadian Director Tom Atkins has been an amateur for over 30 years. He first passed the requirements for an amateur licence in the United Kingdom in 1950, and still holds the call G4ABN. Tom came to Canada in 1952, and picked up his Amateur Radio interests in the 1960s. He passed the Canadian licencing requirements in 1968 to become VE3CDM.

Since that time, Tom has served Amateur Radio in a variety of ways. He is a past-president of RSO, the Radio Society of Ontario, and is closely linked with the production of the Canadian Amateur Radio film *Fine Business* and the creation of ONTARS, the Ontario Amateur Radio Service Net, which still operates 11 hours a day, 365 days a year. Tom was a founding director of CARF, the Canadian Amateur Radio Federation, and a founding director of CRRL. He has served as CRRL Secretary-ARRL Canadian Vice Director, and represented Canadian amateurs at the 1980 IARU Region 2 Conference held in Lima, Peru. In 1982, Tom became CRRL President-ARRL Canadian Director. Earlier this year, at the Eighth Triennial Conference of IARU Region 2 held in Cali, Colombia, he was elected to the Region 2 Executive Committee. Tom will also be the Region 2 Treasurer for the next three years (for a full report on the Cali Conference, see Sept. 1983 *QST*, p. 49).

CRRL President-ARRL Canadian Director Tom Atkins, VE3CDM

Throughout all this, Tom has remained active: He can be found on 160 metres to 70 cm on phone, cw, fast-scan television and now RTTY. He participates in many amateur organizations besides the League: CARF, RSO, Royal Signals ARC, Westside ARC, CANAD-X and the Ontario ATV Association. Tom has also sponsored a whitecaner.

Outside of Amateur Radio, Tom's background includes 26 years of active and reserve military duty in both the British and Canadian Armed Forces, and a long involvement with the Canadian Power Squadron. Tom, 58, is Vice President of Standard Broadcast Sales, Television. He is married, has two daughters and makes his home in Willowdale, Ontario, a suburb of Toronto.

SECTION MANAGER ELECTION NOTICE

(Note: In the future, all elections for Canadian Section Managers will be announced in this column and will be conducted wholly in Canada. This is part of a continuing program of having Canadian League members take responsibility for the management of their own affairs.)

To all CRRL members in the Maritime-Newfoundland Section: You are hereby solicited for nominating petitions persuant to an election for Section Manager. The name of the incumbent is listed on page 8 of this *QST*. A petition, to be valid, must contain the signatures of five or more full League members residing in the Maritime-Newfoundland Section. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on the petition*. It is advisable to have more than five signatures.

Petition forms (CD-129-C) are available from the CRRL Headquarters office, but are not required. The following form is suggested:

(place and date)

The Secretary, CRRL
Box 7009, Station E
London, ON N5Y 4J9

We, the undersigned full members of the League residing in the Maritime-Newfoundland Section hereby nominate . . . as Section Manager for this section for the next two-year term of office. (Signatures . . . Calls . . . Addresses, including postal codes.)

The Section Manager candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur holding a Canadian Advanced Amateur certificate immediately prior to the receipt of petition at the CRRL Headquarters office.

Petitions must be received at the CRRL Headquarters office on or before 5:30 P.M., Eastern Local Time, December 9, 1983. If more than one valid petition is received, a balloted election will take place. Ballots will be mailed from the CRRL Headquarters office on or before January 2, 1984. Returns will be counted on February 21, 1984. A Section Manager elected as a result of this procedure will take office on April 1, 1984, and serve for two years.

If only one valid petition is received, the person nominated will be declared elected without opposition.

If no petitions are received by the specified closing date, the Maritime-Newfoundland Section will be resolicited in April 1984 *QST*. A Section Manager elected after resolicitation will serve for 18 months.

Vacancies in any Section Manager office between elections will be filled by the CRRL Secretary acting on the advice of the CRRL Board.

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

Harry MacLean, VE3GRO
CRRL Secretary

*163 Meridene Cresent West, London, ON N5X 1G3, tel. 519-433-1198

DOC NEWS

☐ In response to a CRRL request, DOC approved the use of Telidon on Canadian amateur frequencies. (For a description of Telidon, see VE3FTT's excellent article in September 1983 *QST*.) No rule changes were necessary, and the mode was made available immediately. DOC did ask that amateurs transmit the ASCII characters NAPLPS, standing for North American Presentation Level Protocol Syntax, before transmitting a Telidon data file.

☐ If rumors around Ottawa are true, DOC is planning some sweeping changes in the Amateur Service. Apparently, the Amateur Service is just taking too big a chunk out of DOC's budget, and DOC is looking for ways to cut back. By the time you read this, DOC will likely have indicated its thinking in a notice published in the *Canada Gazette*.

☐ Finally, DOC has released its revised version of the new TRC-24 to all DOC district offices. The technical portions of the new document are exactly as requested by CRRL and CARF in their joint submission. Topics have been listed in an order that will facilitate teaching and study. Unduly difficult topics have been eliminated. The number of diagrams has been reduced from 36 to 17, keeping the simplest examples of circuits in all cases. Next task: a thorough review of all questions in the DOC questions bank, to ensure that future DOC examinations are in line with the revised new TRC-24.

CRRL NEWS

☐ CRRL President-ARRL Canadian Director Tom Atkins, VE3CDM, and CRRL Vice President-ARRL Canadian Vice Director Harry MacLean, VE3GRO, will serve for another two years. Both were nominated for their positions and ran unopposed, eliminating the need for a ballot in this round of CRRL-ARRL Canadian elections.

☐ CRRL is looking for amateurs who are legal counsels to take part in a Canadian Volunteer Counsel Program. Amateurs experiencing legal difficulties related to rf interference or antenna and tower restrictions will be referred to a volunteer counsel for one free visit. This will allow an amateur to decide if his case has merit, and what course of action to follow. If you are a legal counsel and would like to help with this program, contact CRRL President Tom Atkins, VE3CDM, 55 Havenbrook Blvd., Willowdale, ON M2J 1A7.

☐ Many clubs across Canada have borrowed a copy of the new videotape *Amateur Radio's Newest Frontier*. Even though the STS-9 mission is likely to be over by the time you read this, the tape is still of great interest, both to amateurs and the general public. Copies for you, your club or your local television station, with permission to dub, are available from Bill Kremer, VE7CSD (604-522-3548), in New Westminister; Bill Munday, VE5WM (306-586-4963), in Regina; David McCarter, VE3GSO (519-472-1437), in London; and Daniel Audet, VE2FNK (418-659-6489), in Quebec City. There is no charge to borrow a tape except for the cost of return shipping by courier service or *Priority Post*.

CRRL BULLETINS ON RTTY

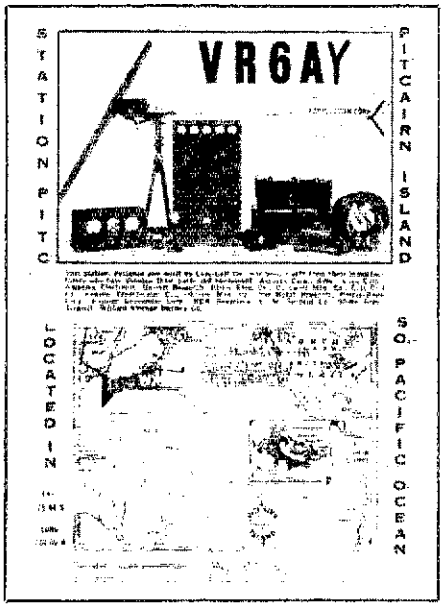
CRRL bulletins are available on RTTY. Listen to VE2QST every Sunday at 1930 UTC for bulletins in French, and VE7QST every Sunday at 2100 UTC for bulletins in English. Frequency: 14.075 MHz. French bulletins are a new service courtesy of Jean-Serge LaBelle, VE2ED. English bulletins are courtesy of Bill Kremer, VE7CSD. Of course, you'll still hear the weekly CRRL bulletins first on the 14.14 MHz Trans-Canada Net, every Sunday at 1730 UTC. Listen for VE7QST, with Wally Garrett, VE7CJT, at the mike.

How's DX?

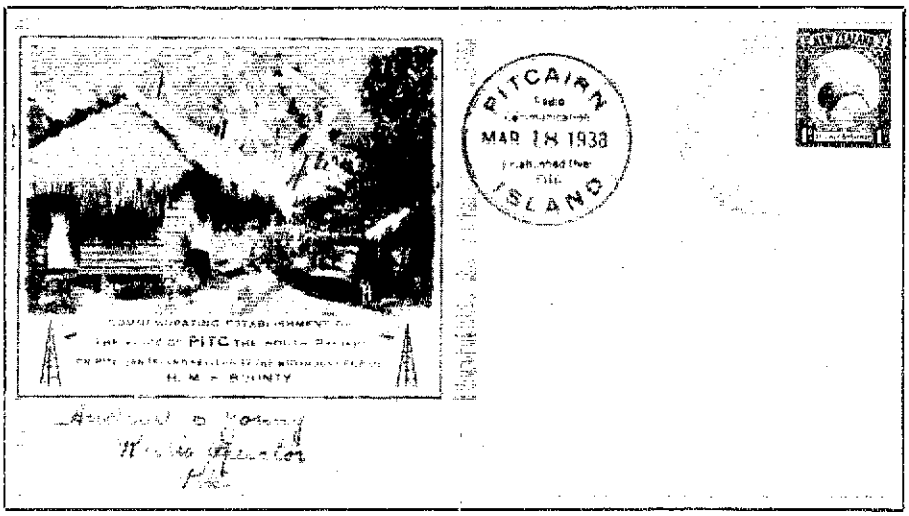
Conducted By Ellen White,* W1YL/4

Pitcairn Island

Pitcairn, a lonely dot of land, a British Colony in the South Pacific, was annexed by Great Britain in 1839. It consists of Pitcairn Island along with the uninhabited islands of Henderson, Ducie and Oeno (annexed in 1902). Pitcairn is located at 25° 4' S lat., 130° 6' W long., about 100 miles south-southeast of the nearest island of the Tuamotos and equidistant between Tahiti and Easter Island. It is 2½ miles long, with an area of under 2 square miles. The only village is Adamstown. Pitcairn is of volcanic origin, with a high point of about 1000 feet. The land is fertile. Philip Carteret discovered Pitcairn in 1767, and it remained uninhabited until 1790, when it was settled by the mutineers from the English ship, the Bounty. *Their settlement was discovered in 1808, and the population removed temporarily to Tahiti in 1831 (and to Norfolk Island in 1856). Some later returned to Pitcairn, and their descendants today constitute the present population of under 100.*



The ham patriarch of Pitcairn, VR6AY, and a 1938 QSL to W6YO



A "first" Pitcairn franked envelope, signed by Andrew Young, the then VR6AY

Several months ago, both W6YO and W6KPC saw to it that your editor received copies of the Pitcairn paper, the *Pitcairn Miscellany* (April 1983), which reviewed the origins of Amateur Radio on the island, in the words of Andrew Young, formerly VR6AY. Surely, Pitcairn is unique in perhaps every aspect: society, descendants, history, geography — let alone representing the very epitome of what *DX is.*

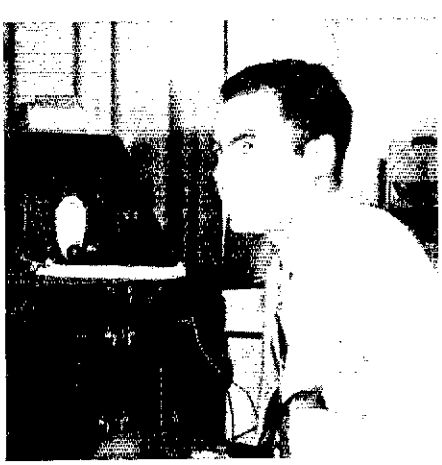
In 1921, New Zealand Shipping Company Captain Hemming gave Pitcairn Magistrate Fred Christian a card illustrating the Morse code. Fred gave the card to Andrew Young, who, along with his Uncle Fisher and Cousin Percy, became interested in learning to use those dots and dashes. They practiced evenings by flashing sentences to one another down the main road. As they improved, they would sometimes go off to two mountains (about a mile apart) and flash messages. The idea, of course, was to be able to stop night-passing ships to permit them to pick up their outgoing island mail.

News of what was happening on Pitcairn got back to the Marconi Company. Marconi sent a small crystal receiver with dry batteries to the island. No one there knew how to connect it up. After a fruitless trial, Captain Cameron of the ship *Remuera* sent his chief operator ashore to lend a hand. The operator correctly hooked up an earth ground, and signals began to be picked up. One night, Andrew Young copied signals from a ship, understanding that it would arrive the following morning. Sure enough, the ship appeared on the horizon at 7 A.M., right on schedule. When Andrew Young boarded the vessel, he and the operator were elated to have been part of that first message received on Pitcairn Island.

In 1928, a family whose trade was building small wireless sets came from New Zealand. They brought two car motors with them. One was put on the first Pitcairn motor boat. The second was used to run a generator for a small spark gap transmitter to go with the wireless receiver. Ships could pick up signals from this transmitter up to 150 miles away. When the ship *Yankee* called in 1937, the radio operator stayed with Andrew and his wife, and expressed amazement at Andrew's station. The operator wrote an article for *QST*. As always, the power of our journal was evident: Over a dozen different firms put together parts to make a small ham set to be called the "Pitcairn Expedition." In 1938, Lew Bellem (W1BES) and Granville Lindley brought the gear to the island and obtained a temporary ham license for Andrew. But then the war came and the station had to be closed down.

Nelson Dyett, ZL2FR, was sent to Pitcairn for the duration of the war, as part of the New Zealand army team. Nelson stayed on as a radio operator following the war, until Mr. Long arrived. (*He* didn't stay very long because the power supply stopped working!) Once again the problems of radio contact became those of Andrew Young, until 1948. At that time, the schoolhouse was built and the power supply was put in working order. Anderson Warren, Floyd McCoy (who died about 20 years ago) and Andrew worked together — until Tom Christian arrived from his schooling.

Tom Christian, VR6TC, had hoped to be enroute to England at the time of preparation of this column — to be presented with the M.B.E. by Queen Elizabeth. Tom also expected



W1BES, on Pitcairn in 1938

*19620 SW 234 St., Homestead, FL 33031

to be indoctrinated with the care and feeding of new radio equipment.

W6YO notes that there are no scheduled ships going to Pitcairn and that last year it was eight months between mail and supply ships (from New Zealand), the only way to get mail there. Outgoing mail is occasionally picked up by passing freighters. There is a new yacht, the *Manatea*, that recently made its first trip to Pitcairn, from Managareva in French Polynesia, carrying 14 passengers. Hopefully, a trip will be scheduled in November, with continued visits in the future. The lifeblood of this island community depends on the sale of stamps, carvings and baskets, and hopefully, on increased tourism.

From Marconi's day to now, there have been generous donations of radio gear to aid Pitcairn communications. Several years ago, Atlas and ICOM helped the effort, as has Tri-Ex. VR6TC utilizes everything, including his 32-year-old Hallicrafters gear! When at home, Tom is on regularly every Tuesday at 2330Z and Fridays at 1700Z, both on 21350 kHz, and most nights at 0700Z on 14180 kHz. The hams on Pitcairn have permission for third-party traffic, including ordering of supplies for their needs. There have been times when urgent medical traffic has been handled this way. Pitcairn QSLing: VR6KY via NE5C; VR6KB direct (Pitcairn Island, South Pacific via New Zealand); the same for VR6TC (or via W6HS). The Pitcairn stamps are beautiful.

The saga of Pitcairn then, as well as now, was illuminated by a recent talk with Lewis Bellem, W1BES. Lewis notes that he spent nine weeks on Pitcairn in 1938, living with Andrew Young. During that period of time, three historic NBC broadcasts took place (one being the then-famous Ripley Show). The world social climate at the time was greatly different than that of today, with antipathy toward Pitcairn Islanders still very evident — a resistance Lewis feels he helped to dissipate. Today, W1BES still enjoys frequent 15-meter talks with the hams on Pitcairn and, in particular, one recent one with Andrew Young, after a hiatus of 45 years — friends still, half a world away and after close to half a century.

National Geographic has a feature on Pitcairn in the October issue — don't miss it!

CLIPPERTON

The following was written in French by FO8IW and translated into English by WB6GFJ/FOØFB.

"After many different obstacles have been overcome, the 1984 DXpedition to Clipperton Island has been organized and is now in the final stages to put the island on the air. The present status of the DXpedition is as follows: It is planned for sometime during March or April of 1984. Final transportation arrangements are being completed and, once finalized, the exact date will be announced. The group of operators now include FO8s BI DO EM IW JD, WB6GFJ, W6OAT, W6SZN, N6PO and K1CC. A few additional operators are being contacted and will be announced as they confirm their participation. The call sign to cover the entire DXpedition will be FOØXX, and operation will take place from 160 to 10, divided about equally between cw and ssb. Operators are verbally proficient in English, French, Spanish, Japanese, Polish and Russian. Questions or correspondence to either FO8IW or WB6GFJ."

DX QSL SERVICES

The August 29 issue of *QRZ DX* (DX tips for big guns and little pistols), features an interesting article by editor W5KNE. Bob compares the current three services: the WD8AWS DX QSL Service, the N7RO DX QSL Service and the W1EP DX QSL Service. Of course, the main advantage of using a service is money. It is less expensive to route your DX QSLs that way, and also reduces your QSL chores (you do not need to know the address of the DX station or manager, etc.). In general, charges run from 8-15 cents/card. Check out the advantages by writing to the services: WD8AWS DX QSL Service, 1613 Merrill St., Kalamazoo, MI 49008, N7RO DX QSL Service, 2935 Plymouth Dr., Bellingham, WA 98225; and W1EP QSL Service, 293 Center St., Raynham, MA 02767. Also, make note of the new service being offered in this column by N6ADI.

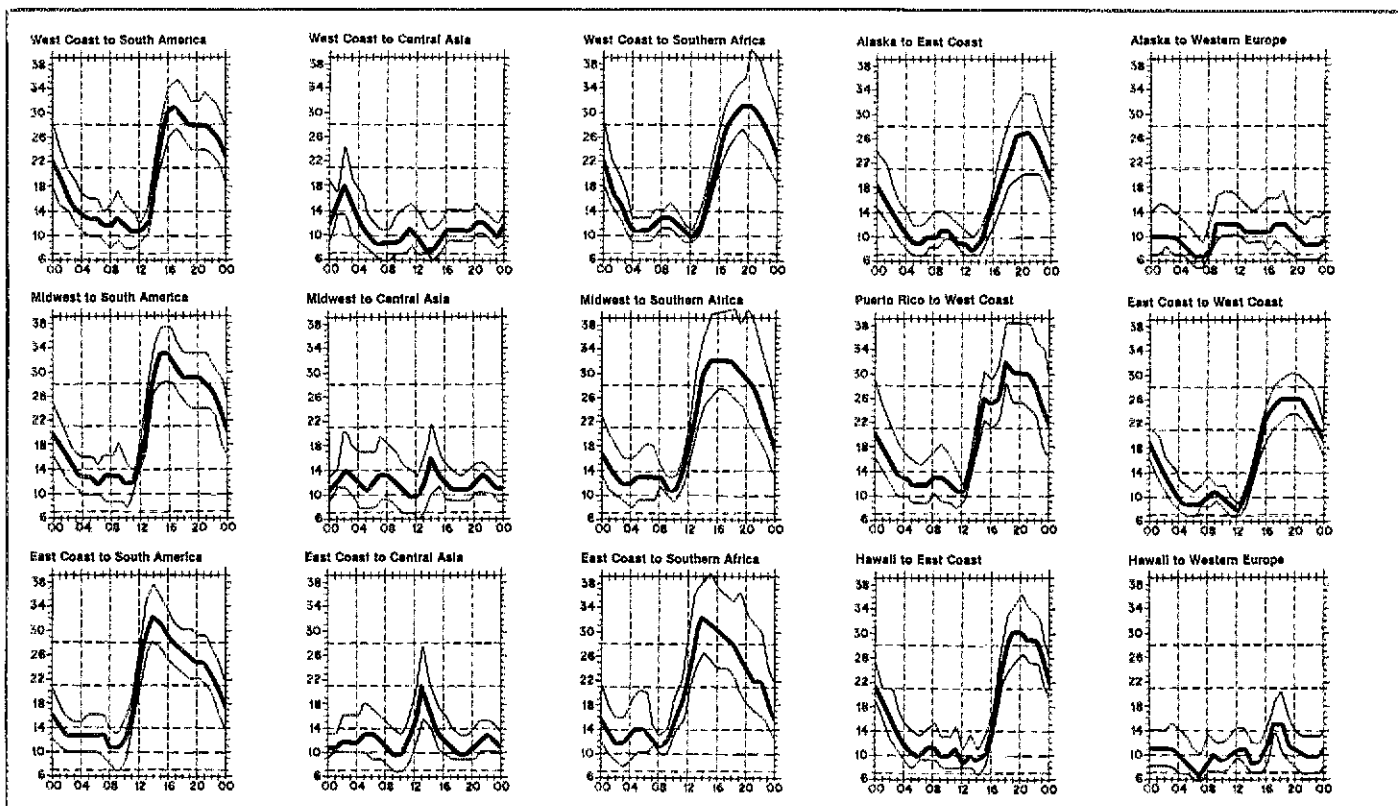
THE CIRCUIT

☐ Lord Howe: The Down Under DXers Contest Club plans to activate Lord Howe Island for CQWW, planning to be on October 23-November 2. Tentative plans called for using VK2WU portable LHI. W/VE cards go to WA2BFW. Usual phone frequencies on 10, 15 and 20; on 75, it will be 3695 TX and 3805 + RX; 160 in the DX windows.

☐ Anguilla: The Anguilla Contest Team will be active from VP2E from November 21 to December 14, covering CQWW cw and the ARRL 160 and 10 Meter Contests. During noncontest periods, all band/mode activity will take place. During CQWW, K8ND notes he will compete on 40; at 7020 and 7030 using 2-element Yagis at 60 ft. and 46 ft., plus a quarter-wave vertical. Jeff reminds that sunset will occur at approximately 2110Z and sunrise at 0950Z on Anguilla during the CQWW cw. For the 160 Meter Test, look for operation just below the DX window. If you want to set up a sked for 160 or 80/75, contact Jeff Maas by mail prior to November 20, 4410 Norwell Dr., Columbus, OH 43220. (The Anguilla Contest Team is associated with the renowned Mad River Radio Club, a group of contest-oriented hams from Ohio and the surrounding states.)

☐ French Polynesia: The O'Briens are at it again, leaving for Moorea on November 19, planning to be on for a couple of weeks. Jay will concentrate on CQWW cw, as FOØJO, while Jan will handle phone from a second station, as FOØOJ. Cards: FOØJO via W6GO, FOØOJ via K6HHD.

WB6GFJ's savvy updates on French Polynesia include the following: 5T5JD is now living there signing FO8JD. For a short period of time, Jose also used



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

FOØJD. Cards for him go to Jose Dumoulin, B.P. 85, Papeete, Tahiti, French Polynesia. FOØFB/TOØØFB, FO8DF/TO8ØDF, FO8HI/TO8ØHI, all via WB6GFJ; FO8IW/TO8ØIW via K1CC. The following stations will handle their own cards direct, except for N.A. stations who should QSL via WB6GFJ, N.A. stations only: FO8HO/TO8ØHO, FO8HL/TO8ØHL, both via WB6GFJ. Direct addresses: FO8HO, Joseph Ina, 25 rue Yves Martin, Pirae; FO8HL, Richard Ley, B.P. 5872, Pirae; FO8KB, Gabriel Lan San, B.P. 926, Papeete — all to Tahiti. Ross notes that TO8Ø and TOØØ prefixes were used by stations only during the July 10-17 Tiurai Celebration, and any call heard with those prefixes should be considered questionable. Applying for an FOØ license? Expect a six-month wait as of now!

☐ Ivory Coast: Look for activity, as N4NW will operate TU2NW for the next year from Abidjan. Tom will operate about 80% ssb, balance cw. Preferred frequencies: 28.55, 21.300, 14.155 ±10 MHz; 7.070 and 3.795 ±5 kHz. Split operation will be used when conditions demand, cw up 20 kHz from the band edges (QSX up). All QSL requests must go via Mike Hayden, AK3F, Box 573, Gettysburg, PA 17325. (TU2NW does not have QSL cards at the Abidjan station, so cards sent either direct or via the TU Bureau will not be answered.)

☐ Isle of Man: Look for GD4UFB all bands phone/cw plus activity in CQWW cw by Vasek, DL4FF (ex-GD5BLG), and Stefan, DF7FH (ex-GD5CGV). All cards via DK9ZL, Ella Grindel (DK9ZL), Bischofsheimer Platz 24, D-6000 Frankfurt, Main 1, Federal Republic of Germany. In previous years, cards went astray; the following is correct GD5BLG via DL4FF, GD5CGV via DF7FH, GD5DUR via DF4FO, GD5DVT via DK8WT and GD6EOO via DK9ZL. All cards for these calls may also be sent via the new manager, DK9ZL.

☐ Montserrat: Before and during CQWW cw, AJ6V will return as VP2MEV.

☐ N7YL: Jan has a new address: 2195 E. Camero Ave., Las Vegas, NV 89123. The stations she manages are T32AB, T3LAB, T3LA, VR3AR, W1DDV/C6A, C6ADV and KA3BUJ/8R1 (1981/1982), and 1976-1979 logs for VR1AG, VR1AF, FK8BG and VK4FJ/LH.

☐ Help! W7HRD is looking for clues to 5U9MPR: Oct. '75; VR1AR, May '74; VR1AT, Aug. '75; KR6MA, May '67; KR6MH, May '62; KR6SE, Nov. '67; and KR6BA, May '62. SMØBZH is looking for a QSL route for XZ2TH for contacts in the 50s/60s. WB4EHS can't find a QTH for HZ4DE and FRØGG for contacts about a year ago. Bob also asks a relatively rhetorical question, "Why would anyone call a pileup, break it and then ask the other station's call?"

☐ Belize: N6ADI will be QRV from V3DX October 23 to November 3. Ski also makes note of his QSL Management Service. Info: Box 379, Ojai, CA 93023. This service is in addition to the three other services detailed elsewhere in this column.

☐ Nigeria: VE7CXN is now managing cards for VE7BBC/5N1. Dennis has Steve's log for his stay from Feb. 19, 1982 to Aug. 24, 1982. Steve has left for American Samoa for a two-year stay and should be on the air at this time signing /KH8. Cards via Dennis Pekrul, VE7CXN, 2131 Duthie Ave., Burnaby, B.C. V5A 2S1, Canada.

☐ Singapore: WB2HTJ will be an active 9V1 for about a year and needs help with cards. Care to be a manager? Please contact WB2HTJ via the brand new *ARRL Amateur Radio Call Directory*. 9V1VP has a new address: Bob Furzer, 12-01 Naga Court, 355 Bukit Timah, Singapore 1025. Bob, who is also N6BFM, has asked that word get out rapidly on this, as he doesn't want the new occupants of his former address to be deluged with his mail. 9V1VP says his antenna at the new location is 175 feet high! (tnx W6GO/K6HHD).

☐ Bangladesh: VO1OC, ex-VE3JKZ, 9V1UK, HS1ALT, etc. has left on a government posting in Dacca, says VO1HP.

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.

FGØHYJ/FS7 (VE2EWS)	VP2VA (VE3MJ)
FOØJD P.O. 85, Papeete	ZP5XDW (N4DW)
FPØIDQ (VE1CCM)	ZS3E (K8EFS)
FM7WD Box 879, Fort Du France, Martinique	3B8FK Box 1080, Port Louis, Mauritius, Africa
FØHLC (ON9AA)	4X6DF (KC2MS)
FØRG/TJ (W5RU)	5N1OL (NØAFW)
OA3AK (W8AVH)	5T5RY (F6FNU)
ON8GA (K4UJB)	5Z4DR (YU3TU)
PJØAD (W2OY)	5Z4MX (SM3CXS)
YB3AQA (KB2IB)	8Q7BQ (K9AJ)
YB3ARK (K2LQ)	9J2TY (JH3DPB)
VP2KBZ (VE3KZ)	

QSL Manager Volunteers

WB8HLI	W2PCS
K6EDV	W8UE
W2KF	KA2PSL
KA1XN (African or Asian stations)	N9CPW

Special Notes

☐ Reports indicate that T77A recent operation appears to be a "bootlegger." This is a radio club station, and seldom is call activated.

☐ The Kwajalein Amateur Radio Club QSL Bureau would like all amateurs who have previously held any KX6 calls to advise the bureau of their present address. This is to facilitate the disposal of QSLs held for as long as 10 years.

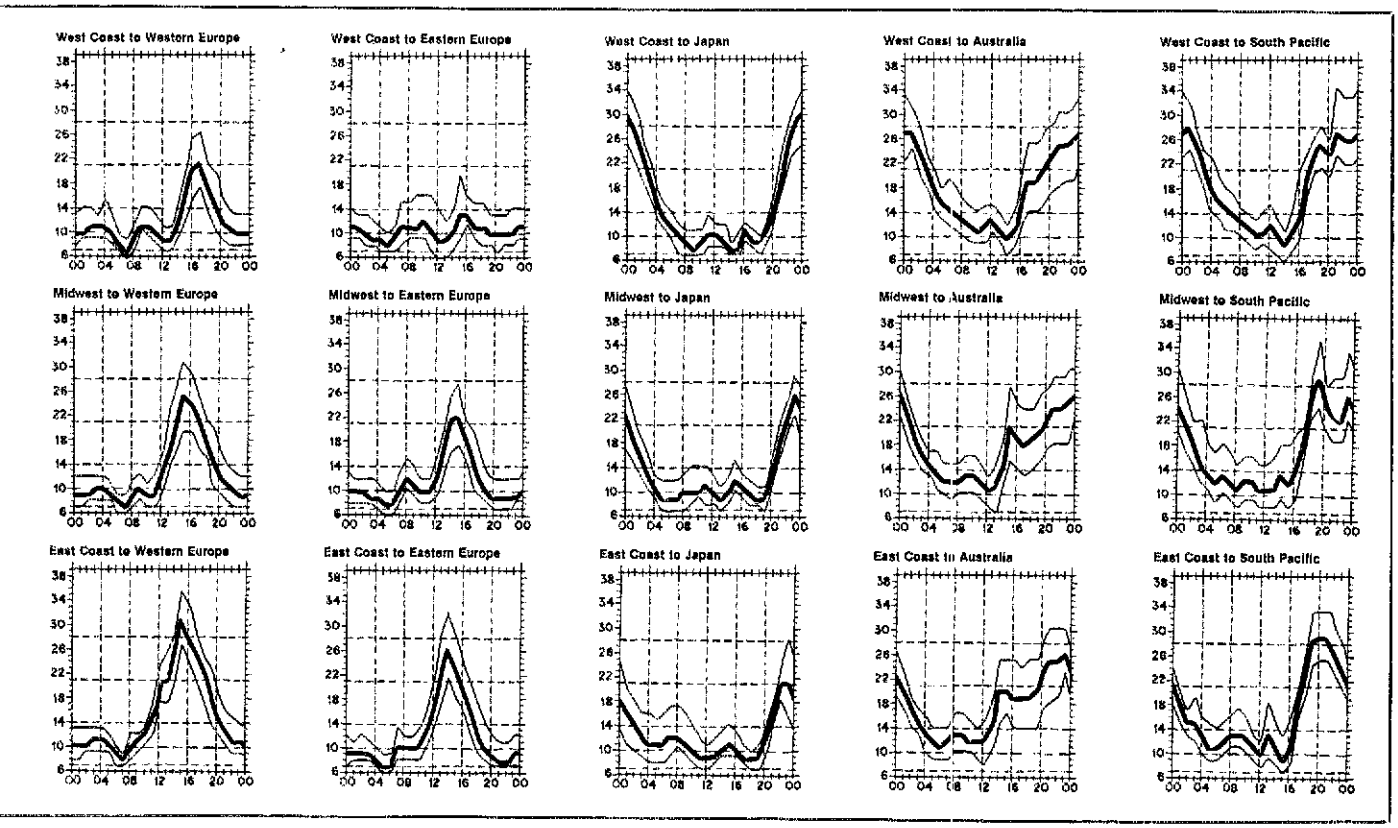
After the first of the year, the bureau will no longer hold cards past six (6) months. They have a large number of QSLs belonging to previous residents and DXpeditions that have failed to register with the bureau.

KX6A thru KX6Z calls are not in the Marshall Islands. These calls are issued to California by the FCC.

Corrections

☐ WB2LCH is the manager for HI8CH (error in Aug. 1983 *QST*).

☐ WØIJN is the manager for CX7BY.



lowest curve (optimum traffic frequency, or fot). See April 1983 *QST*, page 63, January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for November 15 to December 15, 1983, assume a sunspot number of 77, which corresponds to a 2800-MHz solar flux of 127.

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 408
September 10, 1983

Agenda

1. Approval of minutes of July 23 meeting
2. Recognition of new Life Members
3. Affiliation of clubs
4. Approval of conventions
5. Review of FCC matters
6. Review of local antenna/RFI matters
7. Review of actions taken by General Manager in response to previous Board directives
8. Certification of candidates for Director and Vice Director, and review of candidates' statements
9. Selection of Committee of Tellers for ballot counting on November 21
10. Consideration of legislative approach to volunteer examination expense reimbursement
11. Tentative dates for 1984 Annual Meeting of Board of Directors
12. Report on Amateur Radio preparations for 1984 Olympics
13. Date of next meeting of Executive Committee

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 9:20 A.M. Eastern Daylight Time, Saturday, September 10, 1983, at the Headquarters offices of the League in Newington, Connecticut. Present were President Victor C. Clark, W4KFC, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Paul Grauer, WØFIR, Jay A. Holladay, W6EJJ, Gay E. Milius, Jr., W4UG, and Leonard M. Nathanson, W8RC; and General Manager David Sumner, K1ZZ. Also present was Counsel Christopher D. Imlay, N3AKD.

1) On motion of Mr. Nathanson, the Minutes of the July 23 meeting (No. 407) were accepted in the form in which they were distributed.

2) On motion of Mr. Milius, the Committee recognized the names of 42 newly elected Life Members, and directed the General Manager to list their names in *QST*.

3) On motion of Mr. Milius, the affiliation of the following Category I clubs was approved: Iron Range Amateur Radio Club, Stambaugh, MI; Kerbela ARS, Knoxville, TN; Metro DX Club, Oak Forest, IL; Middle Tennessee DX ARC, Hendersonville, TN; Mobridge Area ARC, Mobridge, SD.

In addition, the earlier mail vote approving the affiliation of the Clackamas Amateur Radio Club, Clackamas, Oregon, was ratified. With this action the League has the following number of active affiliated clubs: Category I, 1,712; Category II, 11; Category III, 186.

4) On motion of Mr. Grauer, the Committee approved the holding of the following ARRL conventions: Atlantic Division/New York State, May 18-19, 1984, Rochester, NY; Michigan State, June 29-30, 1984 Livonia, MI; Southwestern Division, October 12-14, 1984, Santa Maria, CA; Pacific Division, August 16-18, 1985, Reno, NV.

5) FCC matters were reviewed as follows:

5.1) Mr. Imlay reported that the ARRL Motion for Expedited Action on RM-4040, our petition to FCC to ban cable television operation on Channels E and K, had set off a flurry of opposing comments from the National Cable Television Association (NCTA) and the cable industry. The amateur community and cable operators clearly have differing perceptions of what constitutes a "solution" to a given CATV interference problem. Counsel Imlay is filing appropriate responses to the comments of the cable industry representatives.

5.2) Concerning the status of FCC General Docket No. 83-114, a reexamination of the Commission's technical regulations, Mr. Imlay reported that ARRL comments were filed on August 1 arguing for elimination of the ban on the marketing of amplifiers for 24-35 MHz, on the grounds that type acceptance of amplifiers accomplishes the Commission's objective to prohibit CB use of amplifiers and that the ban is unnecessary overregulation. A concern apparently felt by the Commission is that lifting of the ban might be misinterpreted by the less responsible elements in the CB community as a sign that it was safe to make and use CB amplifiers.

5.3) The status of the FCC no-code proposal, PR Docket No. 83-28, was reviewed briefly. No Commission action is expected before the first of the year; in the meantime, opposition to the proposal continues to build in Congress and in other parts of the government, and members should continue to seek such support for the ARRL position.

5.4) The Committee reviewed FCC General Docket 83-806, concerning regulations for rf Lighting devices, without formal action. It appears desirable that ARRL file comments in this proceeding before the deadline of October 31, to reiterate our concern about the interference potential of at least some of these devices. Additional technical information is being gathered.

6) Mr. Imlay reviewed the status of local litigation involving Amateur Radio as follows:

6.1) *Spencer (ABØI) vs. County Court of Clay, Missouri.* A request for a final determination on the question of ARRL financial support had been received from the plaintiff's attorney. On motion of Mr. Nathanson, the Committee directed that a letter be sent to the attorney to the effect that, since the case now appears to be moot, it is not in the League's interest to participate financially.

6.2) *Ellis (WD8BCM) vs. Farmington Hills (MI) Zoning Board of Appeals.* Ellis was denied a variance for a 75-foot tower; the county court affirmed the denial and Ellis appealed to the Michigan State Court of Appeals. On August 22, the Court affirmed the lower court's action. According to the attorney for Mr. Ellis, the case will not be pursued further.

6.3) *Goumas, et al. vs. City of Cerritos, California.* Efforts to arrange a presentation by ARRL to the members of the City Council have been proceeding very slowly, owing to some apparent reluctance on the part of the City to schedule such a presentation. On motion of Mr. Nathanson, the Committee authorized the expenditure of up to $1000 for the presentation, with the stipulation that assurance must be obtained that the entire City Council will attend the presentation.

7) The General Manager presented a written report describing actions taken in response to Board directives since the previous meeting of the Executive Committee.

8) The Committee then proceeded to examine the qualifications and candidates' statements of those nominated for Director and Vice Director for the 1984-1985 term.

On motion of Mr. Milius, the Committee found the following candidates to be lawfully nominated and eligible. In the case of uncontested positions, the candidates were declared elected without membership balloting pursuant to the By-Laws, the terms of office to begin at noon on January 1, 1984; in the case of contested positions, the candidates' names were ordered placed on ballots to be sent to Full Members of the respective Divisions, accompanied by the candidates' statements of no more than 300 words.

Atlantic Division — For Director: Hugh A. Turnbull, W3ABC. For Vice Director: Vince H. Bardsley, KB3OM; E. Merle Glunt, W3OKN; George "Bud" Hippisley, K2KIR; Edward J. Kuebert, K3KA.

Canadian Division — For Director: Thomas B.J. Atkins, VE3CDM. For Vice Director: Harry MacLean, VE3GRO.

Dakota Division — For Director: Theodore A. Olson, KØTO. For Vice Director: Howard B. Mark, WØOZC.

Delta Division — For Director: Clyde O. Hurlbert, W5CH; O. D. Keaton, WA4GLS. For Vice Director: Robert P. Schmidt, W5GHP.

Great Lakes Division — For Director: Leonard M. Nathanson, W8RC. For Vice Director: George S. Wilson, III, W4OYI.

Midwest Division — For Director: Paul Grauer, WØFIR; Robert S. McCaffrey, KØCY; Wellington B. Stewart, KØSI. For Vice Director: Claire R. Dyas, WØJCP.

Pacific Division — For Director: Jettie B. Hill, W6RFF; William J. Stevens, W6ZM; Robert B. Vallio, W6RGG. For Vice Director: Frederic N. Barry, K6RTU; Gary Kip Edwards, W6SZN; James Knochenhauer, K6ITL; James A. Maxwell, W6CF.

Southeastern Division — For Director: Frank M. Butler, Jr., W4RH; Stewart H. Woodward, K4SMX. For Vice Director: Evelyn D. Gauzens, W4WYR; James A. Gundry, W4JM.

9) A Committee of Tellers for the November 21 ballot counting was appointed as follows: Vice President Price, Chairman; Director Metzger; Director Milius; alternate, Director Nathanson. The Executive Committee was in recess for lunch from 12:20 to 1:39 P.M.

10) Counsel Imlay reported on recent discussions with FCC staff concerning the specific legislation the Commission would support to enable volunteer examination coordinators to be reimbursed for out-of-pocket expenses. On motion of Mr. Holladay, it was unanimously voted that the President, Counsel and staff are authorized to proceed with the drafting and introduction of enabling legislation to permit FCC to authorize volunteer examination coordinators to recoup reasonable expenses incurred in program administration.

11) In Directors' Letter No. 1824, tentative dates of March 22-23, 1984, were suggested for the 1984 Annual Meeting of the Board. One Director has indicated that it would be impossible for his Division to be represented on those dates; therefore, after discussion, the Committee suggested that the meeting be scheduled tentatively for Wednesday and Thursday, March 28-29, 1984, so as to avoid conflict with a Division Convention the following weekend. Final selection of dates will be made in Houston next month.

12) Mr. Holladay reported on preparations being made for Amateur Radio participation in support of the 1984 Olympics. Considerable progress has been made toward the goal of having an amateur station at each of the three Olympic Villages in the Los Angeles area. Mr. Holladay reported that a draft agreement outlining the respective responsibilities of the Olympic Committee and the amateur community is in preparation.

13) After discussion, it was agreed that the Executive Committee would not meet immediately prior to the Board Meeting in Houston. Instead, a brief meeting will be scheduled for Thursday evening, October 6, following the conclusion of the Board Meeting.

There being no further business, the Committee adjourned at 3:05 P.M.

Respectfully submitted,

David Sumner, K1ZZ — Secretary

Victor C. Clark, W4KFC — President

LIFE MEMBER APPLICANTS
September 10, 1983

Correction to the list of April 20, 1983 Life Member Applicants as it appeared in September 1983 *QST*: Elmer L. Steingass is WD8LLD, not WB8LLD.

Charles W. Arnold, KA4MOA; Ralph A. Baker, WB2ZPC; John B. Barnett, N5BPU; Diane G. Bidgood; W. Dean Bidgood, Jr., WT4A; Jean Pierre Bourdeau, VE2EXU; John Bross, Jr., K3QMR; Marilee Ann Cantelmo, KA1BCV; D. Michael Cegelski, K8EHP; Leonard A. Cone, WA4EDI; Daniel S. Conklin, KQØD; Gerald Cowles, KA8HAS; Charles W. Emely, II, KA1KIN; William J. Fay, KAØFDI; Linda I. Gosline, N6IJT; Kenneth W. Graf, NA8G; Linda A. Grimes, KA9PLP; Paul C. Hild, KD3L; Randy Hill, VE3MUR; Frederick W. Hoffman, K5OG; Edith B. Holsopple, KA1KRQ; David R. Hourdequin, NS4V; John Hughes, W9NUD; Francis C. "Cleve" Irby, NV4O; Scott La Barre, KTØU; Charles F. Masten, Jr., WB6HZZ; Jean Claude Moutouh; Dean L. Nelson, N8BLZ; John S. Neola, Jr., KZØQ; Richard E. Paret, Jr., WA1ZLQ; John H. Pearson, K2GVP; Jon Michael Peters, KA9EPK; Jorge E. Ramirez, NC6C; R. L. Rinden, WA6EGX; David J. Shain, W1EDP; Michael B. Silevitch, K1PEV; Beverly A. Spotswood, KA3JWV; Herbert G. Stark, Jr., K5GAB; Masao Uchiyama, JA1MRC; Janet P. Underwood, KA9PSA; Elmer R. Watkins, KB5CP; G. A. Wurdack, KØVUW.

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 August 1 through August 31, 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

DF8LU/110 JA1OYY/315 JA7REE/184 VE2FJR/108 W1SDU/106 WB2FEL/109 WB4M/104 WA6ODY/113 KA9AKS/100
DJ9KB/103 JH1OXV/257 JH7CNI/106 VE4MT/101 WA1WOM/100 WB2IPX/110 WB4NMA/173 KB7NU/102 KA9HUW/110
DL5FF/252 JA1QWF/272 JA8CAQ/207 XE1VIC/178 WB1ADR/108 KC3EK/135 WR4R/102 N7AME/109 KN9B/110
F5II/333 JH1VHU/104 JH8CZB/153 YU2GIJ/166 K2AAN/104 KG3D/103 AJ5E/107 K8SIA/175 KT9P/138
F6BFH/318 JL1UXH/210 LA4CAA/100 YU3TLT/201 KA2ESQ/105 K4AVX/110 KB5ML/107 W8QXO/102 N9BTW/103
F6FGW/261 JP1BJR/130 OE7PHI/141 YU3UJK/170 W2DH/116 N4DRC/246 KN5R/197 WB8BMX/102 KØHRF/273
F6GUG/207 JR1UTH/145 ON4AJ/129 5Z4CX/120 WA2UZB/101 N4FXC/107 N5AUB/149 WB8IKO/104 KCØMJ/110
FO6JO/101 JJ3WUG/105 V3DX/104 W1FG/171 WB2CEI/299 W4UFH/105 W6IYN/108 K9ATJ/110 KIØW/101
HA7UJ/103 JA4JBZ/109

Radiotelephone

C21RK/125 EA8ADP/207 JA1QWF/254 JA7REE/177 5Z4CX/103 KC3EK/135 KD5QS/161 NE6I/113 K8MR/134
CE3DQR/109 F6GUG/205 JH1KKT/111 JH8CZB/135 AE1L/110 KD4LZ/101 N5AUB/140 W6DN/281 K8SIA/147
DL3FAL/105 G4MUW/103 JH1OXV/151 OK1VAM/156 KB1N/102 W4CFO/272 N5FW/286 WB6STZ/161 WD8DTD/103
EA5CTP/158 I2VUJ/189 JL1UXH/204 PR7CPK/103 W1FG/162 W4UFH/102 W5NYN/210 KA7DDQ/102 K1PP/138
EA5DNG/115 IV3JNH/107 JM1SMY/110 PZ5JR/127 WB1AJG/126 WD4MXD/103 WA5PDD/100 KC7CE/110 N9BTW/101
EA5JC/104 I4KDJ/251 JJ3WUG/105 V3DX/104 N2BZP/102 WM4W/100 WD5CUG/103 N7AME/106 KCØXK/124
EA7BIF/108 JA1OYY/314 JR4RHK/106 YU3TIR/117 WB2RKM/108 AJ5E/106

CW

CT1AJW/133 JA1QWF/125 JA8CAQ/201 PP2FFM/103 YU3DCD/109 KT2G/119 N5LN/114 ND7K/104 N8ACA/101
DL3HAH/106 JH1OXV/213 OK1IVP/103 SM4FZC/109 W1RLQ/106 N2BNB/105 WA6ODY/106 K8MR/104 WA9TAH/107
EA2HW/200 JP1BJR/130 PY1AJK/102 YU2GIJ/121 WB1ADR/100 KT5V/104 KC7V/104 K8SIA/132 KØLUZ/163
HB9APJ/101 JR6UDM/175 PT2CWR/122

RTTY

N1BNK XE1M

5BDXCC

EA8ZS W2UI K8WW N8AQV YU2TS KB6OK OZ1FRR PT7BZ NØZA (1500)
KT5F JA1RWI HB9G AA6G YU2TI Y23UO IK3CSC

Endorsements

Mixed

DJ4OP/261 JI1WLL/160 VE7DP/312 AF2C/281 N3RT/315 WA4MOQ/251 KA6HNY/224 W7LGG/303 KC9A/225
DJ6KH/324 JR1FYS/309 VO1CA/272 K2LQ/319 W3CDG/321 WB4MXI/278 KA6MKY/177 W7OAX/275 KD9E/311
DK3FD/313 JA3CSZ/306 WL7L/176 K2PK/257 W3EV/299 WB4UBD/297 KE6LT/277 W7PHO/359 KF9W/258
DK3SF/319 JA7BVA/207 XE1MMD/155 K2QF/291 W3ICM/255 WD4CRN/175 KE6PQ/176 W7SFF/276 KK9Q/254
DK6NP/297 JH7BDS/275 XE1OX/291 K2SX/284 W3TEF/259 WD4JEQ/200 KT6T/255 W7ZR/309 N9CPW/227
DK8KC/231 JA8ZO/336 XE1XF/266 KB2E/262 WA3YLN/200 WD4R/273 N6HL/283 AI8D/281 W9DH/334
DL1BS/317 LA2GV/302 YU1GTU/275 KB2RZ/287 WB3CQN/296 WD4RHL/257 NE6I/189 K8CH/330 W9DS/273
DL1RB/310 LA8GJ/313 YU2OM/271 KC2YI/150 WB3DNA/296 WI4K/177 W6AYQ/276 K8DB/299 W9GDI/324
DL1YD/319 LA8DY/167 ZL1AMO/332 KG2T/200 AA4KT/300 AD5E/222 W6CS/311 K8MR/185 W9IT/291
DL2FAG/170 OH1SM/253 ZS6ANL/142 KS2O/174 AA4NA/300 AE5H/293 W6DPD/287 K8JRM/295 W9KRI/247
DL9TJ/290 OK1TA/331 4U1UN/210 KX2L/158 K4DDB/295 K5EOA/300 W6GO/312 K8BIZ/296 W9LW/320
EA2HW/303 OK2SW/287 4X4FU/318 N2CGB/261 K4ILX/263 K5GKC/209 W6JD/304 KC8PX/219 W9MP/125
F6EYS/281 OK3YEB/149 9Y4VU/302 N2US/265 K4KJZ/300 K5KV/291 W6MUS/302 KM8E/134 WA9CYG/129
G3JAG/335 ON4SH/278 AE1L/216 W2AOY/170 K4SB/309 K5UR/333 W6OMM/314 KN8COQ/295 WA9OVU/260
G3LP/202 ON7EJ/296 K1BPN/127 W2ARQ/297 K4WMB/284 K5WE/310 W6OMR/325 N8DUY/153 WA9TAH/264
GI3IVJ/355 ON7WW/295 K1MEM/317 W2AZX/341 K4YI/191 KA5V/303 W6ONZ/352 N8EL/266 WA9YTQ/261
HB9BXE/201 OZ5EDR/130 K1WJ/307 W2BXC/321 KT4D/256 KB5FV/226 W6RQ/281 W8AN/209 WA9YZN/230
HB9CIP/292 OZ7GI/290 KA1BU/300 W2FB/277 KC4ZH/205 KC5M/287 W6YK/357 W8GIO/309 WB9POH/282
HB9CIQ/204 OZ7KV/274 KA1ED/236 W2FCR/294 N4BBB/263 KO5E/266 W6ZID/266 W8YGR/343 WB9YXY/307
HB9KO/295 PY4DD/259 KI1Y/135 W2IQB/310 N4EA/337 N5DX/336 WB6JMS/205 AA9M/307 WD9BEG/222
HI8LC/303 SM5BRW/312 N1ALR/257 W2MJ/347 N4GFI/150 N5NR/281 K7EG/304 K9BB/317 KØKES/285
HKØBKX/317 SM7BAU/293 W1HSB/299 W2PK/295 N4JF/333 W5ASP/234 K7ZR/322 K9IL/316 KØKTP/307
I1RB/340 SM7FDO/297 W1III/210 WA2VEE/303 N4OI/299 W5HJA/349 KB7VD/251 K9NB/308 KØLST/274
I2QMU/227 SM0BFJ/313 W1KSC/151 WB2FTK/209 N4PB/309 W5INL/250 KC7ET/236 K9TI/293 KØLUZ/317
I2VUJ/207 SP6RT/327 W1OGZ/161 WB2GTB/202 N4SR/310 WD5DHY/255 N7MC/305 K9UAA/299 KG0E/270
IV3HL/259 SP9AI/320 WA1AYS/206 WB2GYS/154 ND4Y/153 AA6EE/133 N7US/314 K9UWA/316 KMØQ/149
I4CJW/132 SP9PT/324 WB1AJG/127 WB2JBJ/303 NF4U/310 K6BUU/260 W7EDA/316 KB9M/226 KZØC/291
I4UFH/199 TF3SV/308 WB1EMN/295 K3EH/313 W4PTH/311 K6FM/290 W7EKM/324 KB9KB/304 WØBX/260
I8KDB/353 VE1BWQ/127 WB1EAZ/283 KC3EN/154 W4RA/292 K6RN/349 W7HKI/225 KB9MI/227 WØGAX/250
I8WY/270 VE3JKZ/261 AA2Z/260 N3ATQ/279 W4YVZ/128 K6ZH/154 W7HZL/200 KB9PY/202 WØNS/307
JH1FDP/259 VE3LDT/280

Radiotelephone

CX7BF/292 I4UFH/199 SM5BRW/284 W1KSC/151 K3EH/301 WI4K/176 KN6H/152 K8IXU/199 KK9Q/244
DJ6KH/262 I5BDE/300 VE3BDB/326 WA1AYS/205 KA3BTH/185 AE5H/284 KT6T/254 K8JRM/290 KR9G/253
DK3SF/307 I5TDJ/342 VK6HD/326 WB1EAZ/283 W3CDG/305 K5GKC/200 N6BAK/258 KC8PX/193 KU9C/150
DL1YD/310 IØOLK/319 VO1CA/246 AF2C/260 W3ICM/235 K5PC/127 N6HL/265 KN8COQ/257 N9CPW/225
DL2FAG/157 JA3CSZ/284 XE1MMD/151 K2ARO/289 W3IF/313 K5PR/187 W6DPD/287 N8ASV/185 W9CA/251
DL7QG/253 KV4JC/125 XE1OX/291 K2GPL/311 K4DDB/278 KA5DGX/179 W6FAH/150 N8DUY/150 W9DH/320
EA1AWW/135 LA7ZO/307 XE1VIC/177 KB2MY/251 K4KJZ/300 KA5V/299 W6MDH/212 W8GDA/239 W9DNE/321
EA1QF/302 LA8GJ/308 XE1XF/263 KB2RZ/287 K4SB/302 KC5M/286 W6MUS/289 W8GIO/307 W9DS/194
EA7BLU/282 LU1BR/320 YU2OM/262 KB2VK/291 K4UAS/300 KC5WJ/201 W6OMR/302 W8YGR/307 W9GBI/300
F5II/332 LU4MEE/288 ZL1BOQ/278 KG2T/196 K4WMB/252 KR5W/253 W6GO/308 WA8LXW/150 W9HUW/151
F6AJA/317 OK1TA/320 ZP5JAL/180 KS20/184 KC4ZH/205 N5AJW/300 K7EG/268 WD8IDZ/175 W9LW/255
F6BFH/317 OK2SW/260 ZP5JCY/164 N2CGB/261 N4BCV/287 ND5N/295 K7ICW/297 AI9U/275 WA9TAH/259
G3OPU/200 ON7EJ/291 ZP5MJY/182 W2FCR/294 N4PB/307 W5LLU/263 KB7VD/250 K9BB/300 WA9YZN/164
G3WYN/203 ON7EM/297 9Y4VU/286 W2HXF/300 N4SR/309 W5INL/249 KC7ET/230 K9DXO/313 KØJS/290
GI3IVJ/351 ON7WW/290 K1BPN/127 W2IQB/292 NF4U/302 W5VUZ/202 KI7M/252 K9QXK/199 KØKTP/307
HB9CIP/268 OZ7KV/179 K1MEM/308 W2NC/305 W4BLB/200 W5ZKK/172 N7US/311 K9TI/283 KBØZU/127
HK3YH/232 PAØKB/306 K1MIZ/275 W2NCL/300 W4CYC/322 WD5DHY/251 W7EDA/224 K9ZO/284 KZØC/291
HI8LC/302 PA3AWQ/196 K1UM/313 WA2GEA/203 W4RA/287 WD5GJP/152 W7OAX/262 KB9KB/290 KNØQJY/259
I1RB/340 PY4VX/304 N1ALR/257 WA2VEE/303 W4TFB/318 K6EDA/303 W7PHO/358 KB9MI/225 WØGAX/198
I1TLJ/251 PY5EX/209 W1HJF/209 WB2CEI/297 WB4UBD/297 KD6CN/176 W7ZR/296 KB9PY/182 KØHRF/270
I2EOW/160 PT7BZ/267 W1DNZ/326 WB2GTB/193 WB4YZC/189 KD6ZM/125 K8DB/295 KC9JT/165 KØLUZ/262
I2PKF/295 PP8DD/290 W1JR/272 K3BCG/304 WD4JEQ/200 KE6LT/275 K8DR/337 KF9W/257 WØYMH/312
I4WZK/304

CW

DF3SV/272 I5BDE/225 OK2SW/214 K1MEM/301 W3EKN/279 K5KV/265 K6VL/197 N7US/229 K9IL/259
DJ4OP/175 I8WY/260 ON4SH/239 W1GU/296 WB3BVL/148 K5PC/129 NE6I/150 W7EDA/263 K9TI/258
DK8KC/214 JR1FYS/296 ON7EJ/290 W1IHN/285 K4DDB/190 K5PR/158 W6DN/200 W7HZL/173 KB9KB/294
DL1QT/179 JA3CSZ/281 ON7WW/283 W1OGZ/154 KB4JS/227 K5UR/305 W6GO/285 W7ZR/178 KD9E/252
DL1YD/298 JH3LPT/290 OZ7GI/250 WB1ATZ/129 N4OI/290 K5WE/228 W6JD/268 K8ZH/300 KE9A/249
DL5FF/237 JA7BVA/192 SM5BRW/259 AF2C/136 WA4NEU/150 K5YY/230 W6JI/280 KB8KW/250 W9DH/250
DL6QW/208 JH7BDS/256 SM7FDO/283 K2QF/235 AD5E/212 KA5V/151 W6SN/240 W8AN/202 KØKES/277
DL9TJ/204 JA8ZO/291 ZS6ANL/133 K2SX/251 AE5H/241 N5DX/290 W6ZID/252 W8NPF/224 KR0S/125
HI8LC/174 LA8CJ/292 4X4FU/258 W2ARQ/203 K5DYZ/225 W5ASP/202 K7EG/224 WB8OZX/176 WØGAX/177
I3HDH/261 OK1TA/286 9Y4VU/196 W2IQB/200 K5EOA/263 AA6DP/253 K7ZR/289 AK9Y/157

DXCC NOTES

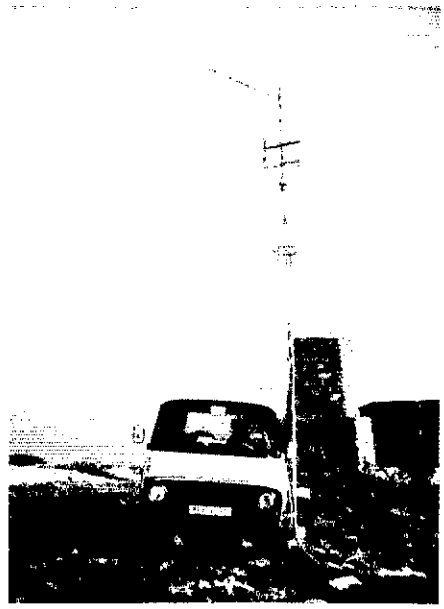
Honor Roll Corrections: Mixed, K2UU 306/320, W8QWI 307/320, W9RF/311/330, W8BKP 309/348, K8NA 306/314, N4WW 314/336. Phone, JA7JH 306/321, N4WW 309/327. DL1HH 308/333. CW, K2UO 297/301.

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

The Standings Boxes

From the mail, it is evident that the standings boxes are among the most popular features of The World Above 50 MHz. I consider them a very important part of reporting the achievements made on our vhf and uhf bands. Unlike what some may believe, they are far more than an outlet for those seeking to blow their own horns. Actually, there is nothing wrong with this. If one has worked hard to set up an efficient vhf station and spent long hours amassing the necessary contacts, why not tell fellow vhfers about it. But the boxes are far more than a place to show off. They provide a synopsis of what can be accomplished on the various bands. As such, they serve two important purposes. One is to entice amateurs who may not have yet tried the bands above 50 MHz into giving our part of the spectrum a whirl. In the case of the states boxes, where home states are included, they provide a useful list of calls of active stations for vhfers wishing to set up schedules in an attempt to pick up a new state or two. But there is another and most important justification for the boxes — to document, in a concise manner, what can be done on the various bands above 50 MHz.



This evidence can be quite useful in convincing officials concerned with allocating valuable spectrum space that we are using our vhf bands and that propagation other than line of sight exists on them. The "bottom line" is that more vhfers are urged to submit information for the box, or boxes, devoted to the various bands on which they are active.

Next month, this space will be devoted to a description of how best to provide the information needed to keep the boxes up to date and meaningful, as well as some of the considerations I use in setting up and maintaining them.

An example of the level of European interest in vhf and uhf, Pavel Sir, OK1AIY, of Mrklov, Czechoslovakia, builds all of his equipment and runs 500 W on 2 meters and 70 cm, 60 W on 23 cm and 80 W on 13 cm. A varactor multiplier and 1-meter dish handle chores on 3 cm. Pavel's best DX on 23 cm is 1350 km (845 miles) to G3AUS; on 13 cm, it is 1028 km (645 miles) to G4BYU. This photo, supplied by W3EP, shows OK1AIY at a portable location in the mountains near the Polish border.

THE FALL SPRINTS

The Sprint mini-contests, introduced last spring, were so popular that it has been decided to run them again this fall. The 23-cm Sprint will be held Thursday, November 10; the 70-cm affair on Wednesday, November 16; 1¼ meters on Tuesday, November 22; and 2 meters on Monday, November 28. As in the spring, the 6-meter Sprint will be held last in order to take advantage of any Sporadic E that might come along. It will occur Sunday, December 11. Details of the slightly revised rules appear in October *QST*, page 98. Look them over, send for the log sheets and be ready for some fun during this normally rather dull part of the year for the vhf bands.

ON THE BANDS

6 Meters — As this is being written in mid-September, no one can predict what is ahead for DX this coming fall and winter. One thing is sure, though. Conditions will not approach those reached in the past few years. After all, we are now about four years beyond the peak of Cycle 21, which has been declared to be December 1979. The East Coast may get a few breaks across the Atlantic beginning about the time this issue of *QST* arrives in mailboxes. If nature cooperates and such an opening does come to pass, we could be in for some particularly interesting times, as efforts are being made to obtain limited daytime 6-meter operating privileges for a few U.K. amateurs who, because of their locations, should not represent any potential for interference to TV. Keep tuned to 28.885 and WIAW for late-breaking news on this exciting prospect.

At this lull between the end of the E_s season and whatever is in store for us this fall, there is not much in the way of DX news to pass along. One report that may portend good things to come — for some of us, at least — comes from W5UWB Kingsville, Texas. John, and several other southern stations, caught an opening to HC2FG from 2130 to 2230Z September 4. If anyone is going to be treated to F_2 DX in the coming months, it will the stations in the southern part of the country. During the last cycle, those along the Gulf Coast experienced daytime openings to southern South America as late as 1972. That cycle peaked sometime in 1968 and was far inferior to this one in terms of its production of 50-MHz DX. Moral: Don't give up on 6 meters!

2 and 1¼ Meters — The major propagation news for this period was the strong East Coast tropo the evenings of September 2 and 3. Many stations here in the Washington area worked up the coast as far as Nova Scotia. One of them, KA1GD/3, sharing the rig with father K1HTV, contacted a number of 2s and 1s including K1WHS Maine and W1AJR Rhode Island, as well as VE1UT. Andy says that VE1UT and many other stations were well over S 9 at his QTH, about 15 miles from the nation's capital.

As more reports come in, it appears that this year's Perseids was quite good. WD4DGF Nashville, Tennessee, reports working WA7ADK Utah, at 1417 miles for 2-meter state number 41. On 1¼ meters, Steve landed KØALL North Dakota, W1JR Massachusetts, WB1FVS and W1VD Connecticut, along with K1WHS Maine. The latter contact represents the best DX on this band, 1000 miles. He also notes that he was heard by W5FF on a 5-second burst, but no two-way resulted. WD4DGF's 1¼ station consists of a solid-state amplifier putting out about 80 W to a Boomer at 85 feet. KB5MR northeast Oklahoma tried randoms on 2 meters and managed to make only a single QSO, WB7AEM Wyoming, but this contact produced signals sounding almost like a solid E_s opening. He notes that tropo conditions have been excellent in his area this summer. W1JR comments that the shower produced several good contacts on 1¼ meters, but only from about 700 to 1000 miles. Joe racked up three new states by hooking up with WD4DGF Tennessee, WA4PCS Kentucky and WB4NMA Georgia. He was unsuccessful with WA4CQG Alabama and KØALL North Dakota. He also notes that the Perseids peaked when he predicted it would following the data he presented at the 1981 Central States VHF Conference. I still have copies of this paper, and will be happy to send one to anyone dropping me an s.a.s.e.

The Higher Bands — The late summer tropo managed to include the northeastern corner of Massachusetts, reports W1JR. Joe notes that many of the sessions that often benefit the more southerly New England stations do not help his area. But on August 19, he worked WB8BKC Michigan on 70 cm. Six days later, he QSOed W8YIO, also Michigan, and then switched to 23 cm where he also hooked up with that station along with WB8BKC, who was 579. Michigan makes state number 11 for W1JR, and the 655-mile path to WB8BKC represents his best DX on the band. W1JR definitely subscribes to the premise that the presence of hurricanes often produces outstanding tropo conditions. He specifically notes the high-pressure area often accompanying them and the abundance of moisture as the right ingredients to "make it happen." WB8BKC comments that he has had a great summer on 23 cm. Don has added six new states to his total. In addition to W1JR, he worked WØOHU Minnesota and WBØZJP Missouri on August 7; WØRAP Iowa on the 20th; WA9JFM Wisconsin on the 24th; and WA3NZL Maryland on September 9. WB8BKC is now running 80 W to a 6-foot dish at 130 feet fed with one 5/8-inch gas-filled line. Receiving is aided by an MGF-1402 preamp that produces a 1-dB noise figure.

During the September 4 coastal opening mentioned in the 2-meter section, N3FL Laurel, Maryland, reports completing 23-cm contacts with New Jersey stations WB2ONA, W2DWJ, W2TTM and KA2INY, along with WA1JOF in Massachusetts. The following weekend, during the September VHF QSO Party when overall conditions were much poorer, Fred, nevertheless, hooked up with N2SB/3 on the Maryland eastern shore, KA2INY, WB2RVX, W2EUF, W2VP, K2UYH, K2BWR and KA2JKI all New Jersey, as well as K4QIF southern Virginia. His total of contest contacts on the band, despite limited operating time, was 12. This is certainly a far cry from the activity level existing on 23 cm in this area only a few years ago. N3FL's current setup consists of 1 W from a Microwaves Modules transverter to a single F9FT at 70 feet. He estimates his feed line loss at 5 dB.

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

50-MHz DX Standings

DXCC countries based on information received as of September 16, 1983. Space limitations dictate that continental U.S. and lower-tier Canadian stations with fewer than 15 countries, except those who claim WAC, not be listed. Crossband totals listed are those not duplicated by 6-meter two-ways. Credit has not been given for contacts made with stations known not to be authorized 50-MHz operation; otherwise, countries are those listed in latest ARRL DXCC Country List. Totals are those worked by individual or club stations at a single location or multiple locations within a radius of 150 miles.

	1	2	3	4
JA4MBM*	77	76	0	0
VE1YX*	75	72	17	16
KH6IAA	71	68	0	0
K8WKZ*	69	68	17	16
LU3EX*	68	60	0	0
VE1BNN	67	65	6	5
W5VY*	67	63	11	9
K5FF*	66	63	3	3
JA1RJU*	65	65	0	0
WD4IYS*	65	53	15	13
W4OO*	65	61	0	0
W2IDZ*	64	60	12	11
JA1VOK*	63	63	0	0
W5FF*	63	59	2	2
ZD8TC*	62	62	10	—
WA4OWO*	62	54	0	0
JA3EGE*	61	60	0	0
WA7JTM*	61	57	1	1
WA8LXJ*	60	55	18	18
W3XO*	60	52	15	8
JA5HTP*	59	58	0	0
JA2DDN*	59	58	0	0
WA5IYX*	59	50	10	8
W6XJ	59	—	3	—
KA1PE*	58	54	0	0
LU9AEA	57	56	0	0
JA2DDN*	57	53	0	0
W4CKD	57	51	20	18
W3JO	57	50	10	4
K1ZFE*	55	55	5	5
LU3DCA	55	55	0	0
W8CMS	55	50	11	7
W6BJI*	55	50	2	2
JE1TGN*	54	54	0	0
WB7OHF*	54	52	1	0
N6AJ*	54	51	1	0
WA6BYA*	54	52	0	0
N3AHI*	54	48	13	11
LU7DZ*	54	48	0	0
K8EFS*	53	51	18	15
W7KMA*	53	51	1	1
JA2ODM*	53	48	0	0
W5UWB*	53	42	0	0
WB8BKC*	52	52	16	15
JA0AGA*	52	52	0	0
WA4UAS*	52	48	0	0
K4CKS*	52	46	18	13
WA6JRA*	52	18	3	1
W0SF	51	51	0	0
W1QXX	51	50	14	12
WA1OUB*	51	45	15	12
WA2BPE*	50	50	14	6
K5ZMS*	50	50	2	0
K5SW*	50	49	10	10
WB4OSN*	50	49	8	6
W6SMS*	50	48	1	—
PY2XB*	50	47	2	1
WB7TOV*	50	47	0	0
N6CT*	50	44	1	1
WA9AHZ*	48	48	14	13
KA1BRD*	48	46	0	0
N5DDB*	48	43	1	1
JF3KQA	47	47	0	0
WA1UQC*	47	45	16	3
K4KUZ*	47	43	0	0
W4WHK	47	39	15	6
W3IWU*	46	46	16	16
W1EJ*	46	45	14	12
WB8GEX*	46	44	14	12
N0LL*	46	44	8	7
K2QIE*	46	43	7	2
K2QWD*	46	39	13	11
K1ICM*	45	44	15	8
JA9DUR*	45	45	0	0
WB8GEW*	45	44	5	5
W1JR	45	43	10	9
WB2WSV*	45	42	2	2
WA8ONQ*	45	41	7	7
WA7EPU*	45	41	1	1
K8UNV*	44	42	2	2
K1MNS*	44	42	0	0
JA2GHT	44	42	0	0
WA6PEV*	44	41	3	3
WA5HNK*	44	38	14	14
K2YOF	43	43	13	13
AE3T*	43	42	14	14
JA3EGE	43	41	0	0
WA3DMF	43	40	17	17
K0GJX*	43	40	—	—
W5DZF/4	43	22	4	0
K5CM	43	—	0	0
WB4NMA	43	—	0	0
KA0AYN*	42	41	0	0
WB2CZE*	42	40	14	8
KG6DX	42	40	0	0
W2MPK*	42	38	12	6
KG6JDX*	42	38	0	0
W4NVW/3	42	37	3	0
KH6FLD	42	35	0	0
K3QMX	41	43	12	11
W3BWU	41	40	11	11
K1FWF*	41	40	18	10
WB5CHW*	41	37	7	4
W5KRH*	41	37	3	3
JG3AOD*	41	37	0	0
K7ICW	41	34	1	1
WB4RUA	41	34	0	0
WA0CSL*	41	15	6	4
VP2VGR*	41	—	11	—
K4VPK*	40	39	7	7
K6KLY	40	39	0	0
W2RTW	40	39	0	0
WD4FAB*	40	38	7	5
XE1GE	40	37	1	1
W5HN*	40	35	0	0
WA1AYS	40	34	15	14
VP2MO	40	34	0	0
WB6KBZ*	40	29	1	0
K6QXY	40	—	0	0
N5KW	40	—	0	0
K1SF	39	35	8	3
WB6BMB*	39	34	0	0
LU8BF	38	38	0	0
JA1NVG	38	38	0	0
KA1DHO	38	37	13	9
WB8YFE*	38	37	5	5
K1FJM/4	38	36	7	6
KS2T	38	36	0	0
N7AKB*	38	34	1	1
W1AIM*	38	33	3	0
VE3ASO*	38	31	0	0
WA1CRE	37	36	5	4
K0TLM*	37	35	5	5
JA7QVI	37	35	0	0
W3OTC	37	36	0	0
K7GGJ	37	28	0	0
N9CEX*	36	35	6	6
WD2AKA	36	34	9	6
N5WM*	36	34	6	2
WA0SBZ*	36	33	3	2
K4QXX	36	33	0	0
K0AYN*	36	33	0	0
W6ABN*	36	32	3	3
JH3WXB	36	32	0	0
K3HCE	36	31	6	4
WA9ETW*	35	34	2	2
WB2PMP/4*	35	32	9	9
K0UDZ*	35	32	3	1
N6ANG	35	27	0	0
W2VO*	35	26	0	0
K4GOK	34	34	13	12
N7DB	34	34	0	0
W0IJR*	34	33	0	0
W5NZS*	34	33	0	0
KA0ETE*	34	31	0	0
WA1ZUB	34	30	11	7
KC2TX/5	34	29	1	1
WD2AFH	34	28	4	0
WA5VJB	34	27	1	1
K6JYO*	34	22	0	0
W2LT	34	20	9	0
K0US	34	20	1	1
ZL1MQ	33	32	0	0
WA7GCS	33	32	0	0
W2RLV	33	31	3	2
KA4AOK	33	30	11	6
KA1A	33	29	0	0
N6RZ	33	24	1	1
AE9M*	33	23	11	1
K6GSS	32	32	0	0
K2OVS	32	30	12	9
W2CNS*	32	30	10	5
WB8IGY	32	30	9	7
AD1C*	32	31	0	0
KS4J*	32	31	0	0
WB8PAT*	32	30	11	8
K1ZKR	32	29	0	0
WB8KAY*	32	27	0	0
WB2QLP/4	32	26	5	4
VP2MJ	34	26	1	1
W5NKG	32	25	2	1
VP2MJ	34	21	1	1
K4LFF	32	21	0	0
N6VI	31	30	0	0
WA2EQK	31	26	6	9
VE3DSS*	31	28	13	7
K1DAT	31	28	7	5
W1GXT	31	27	13	2
K6PHE	31	27	0	0
WB6NMT	31	26	2	1
VE1RC	31	26	0	0
W2BN	31	24	4	1
W1SC/7	31	14	2	1
LU6DLB	31	16	0	0
WB2MAI	30	29	9	7
WB0PKN*	30	29	6	5
WA5UFH*	30	28	0	0
N4CD	30	27	12	8
K6JZK	30	27	0	0
N4TL	30	25	3	3
JG3RGG*	30	22	0	0
K3ICH/4	30	22	0	0
K4ROM	29	27	5	5
WA0NOK	29	27	2	1
K8RZB*	29	26	8	3
K6QAX	29	26	0	0
K5VVV*	29	25	3	0
WA8OGS*	29	25	0	0
8P6KX	29	24	8	2
WB7SLY	29	20	1	1
C5AEH*	29	—	13	—
VK2BA	28	28	0	0
N5DDS*	28	25	2	2
WA0NOK	28	25	2	1
WA7UJH*	28	25	0	0
W9TC	28	25	—	—
KB4CRT	28	23	1	1
N7AQM*	28	22	1	1
VE3EVW	28	17	13	7
N4VC	27	27	1	0
WA5QCP	27	27	0	0
KQ0J*	27	25	0	0
KA7IXS	27	23	0	0
WB2TMD	27	21	6	4
YV4UA	27	20	0	0
N2ASC	26	26	3	3
K9XY*	26	22	0	0
WA9DYT	26	22	0	0
KC3EP	26	22	0	0
K0SE*	26	21	2	2
NP2AE	26	21	0	0
KA1CDZ	26	13	15	3
WA2YWP	26	13	4	2
N9ANO*	25	25	0	0
N7EIJ	25	25	0	0
KA0CDN	25	25	0	0
K1LPS	25	22	4	0
JF3TDC	25	22	0	0
W0RGU*	25	21	3	3
VE5JQ	25	20	2	2
N8AXA*	25	19	5	4
9Y4LL	25	13	0	0
K0SFH*	24	23	1	1
WA4TJW	24	24	0	0
W8NE	24	21	1	1
JM1LCW	24	17	0	0
K9SM	24	12	5	5
WA9DYV*	23	22	1	1
KA5CAW	23	20	0	0
WA5OLT	23	17	5	5
HC8VHF*	23	—	4	—
OA8V	23	—	0	0
W7KNT	22	22	0	0
WB6AAG	22	22	0	0
WB0RJR	22	19	4	2
W9NAW	22	19	2	2
W7HAH	22	19	0	0
WB2QLP	22	18	5	4
KA1YQ	22	17	7	1
VK2DDG	22	17	3	0
PY2TTV*	22	15	0	0
KA5FLE*	22	14	0	0
KA1GIY	22	12	2	1
JE3YIA	22	12	0	0
HC1MD/ HC5	22	—	2	—
KA0CDN	21	21	0	0
KJ3F	21	20	0	0
WB6CTQ	21	19	0	0
K6ZMW	21	18	0	0
NI6E	21	16	0	0
K1HTV/3	21	15	17	3
9Y4JW	21	12	1	1
N4MM	20	20	0	0
JG3JLC	20	19	0	0
KD4HP	20	18	4	2
K2JF	20	17	5	5
W8QOI	20	17	2	2
VE1BUF	20	15	4	3
KA7BTQ	20	13	0	0
KA6ING	19	19	0	0
ZB2BL	19	18	8	4
WA8LLY/6	19	17	0	0
W9OEH	19	—	0	0
VE6CX	18	18	1	0
W0LSD	18	18	0	0
N0AJU	18	16	0	0
WA4TNV/ KL7	18	15	0	0
KC4KK	18	14	0	0
WB9OPD	17	16	1	0
KB7Q	17	16	0	0
VK4AYX	17	14	0	0
HK4EB	17	13	0	0
W7IDZ	16	16	0	0
K0CJ	16	15	5	2
W0PKN	16	12	1	1
W8SMD	16	11	5	5
WA0OFO	16	—	0	0
OA8CW	16	—	0	0
K0WM	15	15	1	1
WB4WXE	15	15	0	0
VK3AQR	15	14	0	0
VK3AVI	15	14	0	0
WA6HXM	15	13	0	0
8P6CX	15	11	2	1
V2ADX	14	4	0	0
KL7JAI	13	11	0	0
VK3NM	13	11	0	0
EI2W	13**	—	—	—
WA0LHK*	12	12	2	1
VP9WB	12	11	4	1
W1QXX/ KP4	12	10	0	0
G4BPY*	11**	11	34	30
J6LOV	11	9	2	2
JN1DQO	11	5	0	0
GW3LDH	11	—	3	—
KL7WE	10	10	0	0
KL7JJH	10	10	0	0
KL7IKV	10	10	0	0
ZD7BW	10	0	0	0
5Z2DH	10	—	0	0
XE2BC	10	—	0	0
G5KW	9	4	36	—
WB4WXE/ KL7	9	8	0	0
KL7HMH	8	8	0	0
VP2VDL	8	6	0	0
GI3SZC	8	—	—	—
AL7C	7	7	0	0
8P6MH	6	6	4	1
G4JCC	6**	4**	29	24
GU2HML	5	—	16	—
G4BAO	4	—	—	—
GW3MHW	6	—	—	—
G4GLT	6	—	—	—
G4HVP	5	—	—	—
G4JLH	5	—	—	—
G2AOK	4	—	—	—
GM4FZH	3	—	—	—
VK2ZDI	2	2	0	0
SM7BAE	1	1	6	3
G4JCC	—	—	32	—
SM6PU	0	0	23	10
G3COJ	—	—	20	—
G4IDE	—	—	18	—
DJ2RE	0	0	14	9
G4GLT	—	—	13	—
G3PWK	—	—	12	—
DK6JL	0	0	11	4
SV1DH	0	0	10	—
GM4WOJ	—	—	9	—
CT2EE	0	0	5	2
OZ9QV	0	0	5	1
G3VZJ	0	0	4	4
G3PLP	0	0	4	2
I5CTE	0	0	4	0
GJ3YHU	0	0	4	—
G4ANT	0	0	3	2
G3TAA	0	0	3	2
F6EMT	0	0	3	2
HA6NP	0	0	3	—
HB9QQ	0	0	2	2
G3RDQ	0	0	2	2
OE1HGW	0	0	2	1
OZ7IS	0	0	2	—

1 — 6-meter two-way claimed.
2 — 6-meter two-way confirmed.
3 — Crossband (6 to 10) claimed.
4 — Crossband confirmed.
*Indicates 6-meter two-ways claimed with all continents.
**Includes 4- to 6-meter crossbands and 4-meter two-ways.

Strays

QST congratulates...

☐ Rich Gelber, K2WR, on winning an Emmy Award as a Technical Director during coverage of the 1981 New York City Marathon on ABC's "Wide World of Sports."

☐ The following on being elected to the Grade of Fellows in 1983 by the Radio Club of America:

• Dana Atchley, W1CF, of Lincoln, Massachusetts

• Victor C. Clark, W4KFC, of Clifton, Virginia

• Hazard Reeves, K2GL, of Tuxedo Park, New York

• Dr. Ulrich L. Rohde, DJ2LR, of Upper Saddle River, New Jersey

☐ Frank Thornburgh, WA6GYR, of Pleasant Hill, California, on completing a National Defense Executive Reserve (NDER) course at the Emergency Management Institute, Emmitsburg, Maryland. The NDER recruits and trains top-level civilian personnel to serve in key government positions in the event of a national emergency.

☐ the following radio amateurs on 50 years as members of ARRL:

• Edwin Limberger, W3DRD, of Newark, Delaware

• Cedrick D. Justis, W3QQ, of Newport, Delaware

• Harold K. Low, WA3WIY, of Millsboro, Delaware

• George Montgomery, W3KVS, of Washington, Pennsylvania

I would like to get in touch with...

☐ anyone who has a schematic diagram for a T19/ARC-5 transmitter and a BC-187 transmitter. Dwight Threepersons, KA2PUH, P.O. Box 165, Kensington Station, Brooklyn, NY 11218.

☐ any amateurs interested in starting a TRS-80® color computer net. Bob Mauro, KZ2G, 257 Center Ln., Levittown, NY 11756.

YL News and Views

Conducted By Jean Peacor,* K1IJV

Two in Tune

In early 1979 when Paula (Hodell) DiGennaro saw the bumper sticker "Tune in to the World of Ham Radio," she had no idea what that world was like. She decided to find out, and tackled the code and theory. By November 1979, Paula entered that world as a Novice, KA8HQJ.

As summer 1980 approached, Paula worked several Amateur Radio-related public service events. It was at such an event that she met Nelson DiGennaro, WB8VUU. Field Day in 1980 with the Upper Valley Amateur Radio Club, near Dayton, Ohio, was their second date. Paula explained, "When I saw Nelson climb the 40-foot tower mast hand carrying the beam while club members held the guy wires, I knew this guy was a true ham — a little crazy — but a true ham!" During the next year there were many fun-filled Amateur Radio-related dates and activities, including the annual Field Day.

On November 28, 1981, with many ham radio friends in attendance, Paula and Nelson were united in marriage. There was even a talk-in station standing by for those who might need directions to the wedding.

That was two years ago, and Paula and Nelson have been active members in three radio clubs ever since. Presently, Paula is recording secretary for the Upper Valley Amateur Radio Club. She also served as Assistant Chairman of Advanced Registration for the 1983 Dayton Hamvention — "the world's largest," Paula is quick to add.

This was the first year since they met that Paula and Nelson did not assist in UVARC's annual Field Day operation. Instead, they set up their own Field Day, operating mobile from their motor home while traveling through Pennsylvania and Connecticut. While driving through Pennsylvania, Nelson made a 40-meter Field Day contact with Murgas Amateur Radio Club near Wilkes-Barre, Pennsylvania. With Paula receiving directions on 2 meters, they visited the club's site, enjoyed lunch and swapped ham radio stories for several hours.

Paula, KA8HQJ, with Nelson, WB8VUU, logging a contact during their Field Day operation in their motor home.

As a conclusion for their Field Day weekend, Paula and Nelson visited ARRL Headquarters. The visit included a personal tour of the Hq. building and W1AW.

Where will Paula and Nelson be off to next? Who knows! "When I became a Novice, I had no idea what the world of Amateur Radio had to offer, but in the last four years, I've met so many fine people, upgraded to Technician and have had so many fun experiences. I am learning just how great it is. Above all, I have Amateur Radio to thank for meeting Nelson. I have really enjoyed "tuning into the world of ham radio," and I plan to help others tune in as well," Paula says with a smile.

THREE MONTHS AND 19 DAYS IS ALL IT TOOK

Yes, in just three months and 19 days, Evelyn Hotz, KX6O, graduated from being a Novice licensee to Extra Class. No small feat. Her license history: licensed as Novice — December 6, 1982, KA6WYG; upgraded to Tech — December 10, 1982, N6HYN; upgraded to General — February 14, 1983, N6HYN; upgraded to Advanced — February 25, 1983, KF6SR; upgraded to Extra — March 25, 1983, KX6O.

Evelyn, totally blind since birth, and Jim, her OM of seven years, live in Santee, California, with her golden retriever guide dog, Skittle, and their Siamese cat, Kay.

In 1974, Jim read her a magazine article about ham radio. Neither knew anything about it, but it sounded interesting and they decided to look into it further. They enrolled in a class together. Jim received his call, WD6GIU, but Evelyn somehow lost interest. Nine years of Jim's gentle persuasion convinced Evelyn to give it another try. Needless to say, the time was right and she loved it.

Evelyn attended a Novice class conducted by WA6PEZ of the El Cajon Radio Club. His instruction proved to be most inspirational. She continued studying for the Technician/General license in a class taught by W6RHV. Her OM, Jim, was also a constant help as she studied. The Courage Center HANDI-HAMS provided additional assistance for the Extra Class exam at their Radio Camp held in Malibu, California.

Evelyn Hotz, KX6O *(Courage Center photo)*

Evelyn's first love is traffic handling. She's involved in several nets, including a YL net, ARES and a net run primarily by other blind operators. Rag chewing is another favorite activity.

Reading RTTY Via Voice Output

Jim, an avid RTTY operator, is currently working on a method that would enable Evelyn to "read" the RTTY screen through a voice output. If any readers have ever done anything like this, Evelyn and Jim would be most interested to hear from you.

Evelyn and Jim have a computer. Her letter was written using it. She's currently working on the WAS award, and finds it a real challenge since their antenna is hidden away in the attic of their condominium. She enjoys the activities of the El Cajon Radio Club. The club's Field Day exercise proved exciting, as she stayed up all night at their hilltop campsite working one station after another on 20-meter phone. She's attending a local junior college while taking a break from her career in early childhood education (preschool teaching).

Sister Alverna O'Laughlin, WAØSGJ, of Courage Center, met Evelyn at the HANDI-HAM Radio Camp and wrote of this most interesting and knowledgeable YL. Evelyn's many achievements can prove to be inspirational for all of us.

*Country Club Dr., Monson, MA 01057

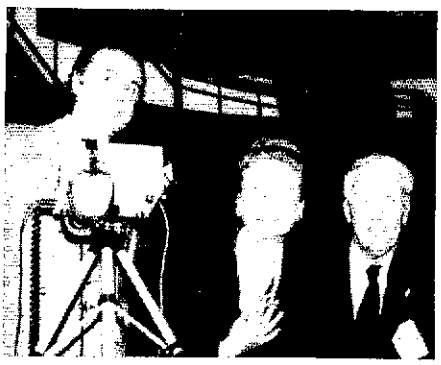
The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

MICROWAVE ASSOCIATES 10-GHz DX AWARD PRESENTED

As previously mentioned in this column (Nov. 1980), Microwave Associates had announced a prize for the first amateur contact over 1000 km on 10 GHz. IØSNY, Nicola Sanna, made this first contact over 1000 km with IØYLI (see The New Frontier, Nov. 1982) and, in April of this year, the award was presented to him in Modena, Italy. Shown in the photograph are Nicola Sanna (IØSNY) Princess Elettra Marconi Giovanelli (Guglielmo Marconi's daughter) and Dana Atchley (W1CF) of Microwave Associates. Also shown is one of a pair of 24-GHz Gunnplexer transceivers presented to the Italian amateurs in recognition of their pioneering work. So, look out for some long DX records on that band before too long (and remember that there is another Microwave Associates award for the first contact over 250 km on 24 GHz!).



Nicola Sanna, IØSNY (left), Princess Elettra Marconi Giovanelli and Dana Atchley, W1CF, were at the presentation of the Microwave Associates award for the first two-way amateur contact over 1000 km on the 10-GHz band.

CENTRAL STATES CONFERENCE NOISE-FIGURE AND ANTENNA-GAIN RESULTS

Kent Britain, WA5VJB, has sent along the results of the noise-figure and antenna-measuring sessions for 902 MHz and up conducted at the Central States VHF Society Conference, held in Kansas City, Kansas, on July 30 this year.

10-GHz NEWS

Jim Hagan, WA4GHK, has written with news of his recent 10-GHz work with K4NTD. As mentioned before in this column, they have had a number of 75-100 mile contacts over land and water. This time, on August 22, they made a 294-mile contact from Sebastian Inlet, Florida (20 miles south of Melbourne), to WD4NGG at Hilton Head in South Carolina (60 miles south of Charleston). Equipment used was 10-mW Gunnplexers at both ends, phase locked at 10250.0 and 10279.9 MHz. The antennas were one 2.5 ft. and one 4 ft. dish. The received signals were downconverted to 29.9 MHz and fed to an hf communications receiver, permitting the use of nbfm (5-kHz deviation) or cw (500-Hz bandwidth). The contact began around 8 P.M. local time and lasted about 30 minutes. Jim notes that a good inversion path was present between north Florida and South Carolina, as evidenced by TV reception (if only we had some beacons!), but 2-meter propagation was only just above normal between north Florida at Sebastian Inlet. Longer DX paths are planned for future work.

*103 Division Ave., Millington, NJ 07946

Central States VHF Society Antenna Gain Measurements

902 MHz

Call	Antenna	Gain (dBi)
WØPW	Ref. dipole	2.1 dBi
WB5LUA	Spectrum Int'l 23-element Yagi	13.0 dBi
W5UPR/K5JRH	12-ft dish w/log periodic feed	17.0 dBi

2304 MHz

Call	Antenna	Gain (dBi)
WB5LUA	1-lb coffee can	9.0 dBi (reference)
WA5VJB	60-element loop Yagi	22.0
WA5VJB	40-element loop Yagi	20.0
WA5VJB	20-element loop Yagi	17.5
K5PJR	Std. gain horn	13.0
WA5VJB	Single 3-lb coffee can	10.2
WA5VJB	Double 3-lb coffee can	7.0
WØPPF	Quad rhombic	3.5

Note: 902-MHz measuring equipment was built by WØPW. 902-MHz and 2304-MHz antenna gain measurements were run by WB5LUA.

902-MHz Preamplifiers

Call	Device	Gain (dB)	NF(dB)
VE4MA	MGF1402	14.6	0.45
VE4MA	MGF1402-spray cooled		0.35
WB6NMT	Lunar Prototype No. 1	15.7	0.63
WB6NMT	Lunar Prototype No. 2	10.5	0.76
WA5VJB	NE64535	14.3	2.10

1296-MHz Preamplifiers

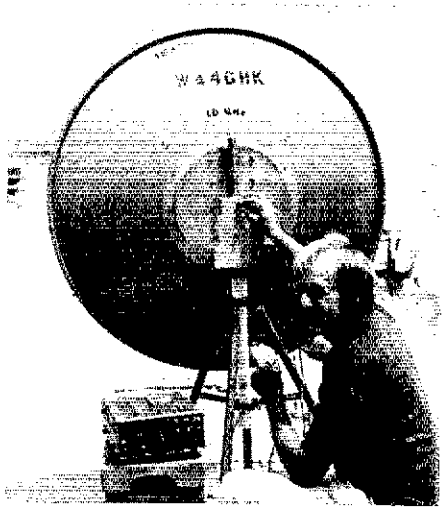
Call	Device	Gain (dB)	NF(dB)
WB6NMT	Parabolic	15.4	0.52
VE4MA	NE218	18.6	0.68
VE4MA	NE137	15.5	0.68
W3IWI	Dual NEC218	20.4	0.81
WBØTEM	MGF1402	17.0	0.89
WB5TCO	N6CA NE218	10.6	0.90
K5JL	DXL2002	14.8	0.95
W9ZL	MGF1202	13.2	1.03
WØRAP	NE218	12.7	1.11
W9ZIH	MGF1202	14.4	1.19
WA5VJB	DXL2503	15.0	1.42
K9UIF	MGF1402	16.4	1.57
NØUU	MGF1402	9.2	1.61
W4ODW	MGF1200	9.8	1.62
KXØO	MGF1402	16.4	1.76
WØGR	D432	8.2	1.80
K5JL	HP HXT 2501	13.8	2.32
W5DFU	MJE2110	10.1	2.99
WA5VJB	MRF901	9.7	3.21

1296-MHz Converters

Call	Device	Gain (dB)	NF(dB)
WB5TCO	Sota	25.4	4.28
W9UD	MMT1296	26.2	5.50

2304-MHz Preamplifiers

Call	Device	Gain (dB)	NF(dB)
VE4MA	MGF1412	21.0	1.5
WA5VJB	NE64535	11.9	2.84
WA5VJB	NE64535	10.2	3.26
K5JL	2-NE64535	10.6	3.95



Jim Hagan, WA4GHK, with his 10-GHz station on the beach in Florida.

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Advisory Committee Members	Oct. 1982, p. 46
Amateur Radio Station Call Sign Assignment System	June 1983, p. 61
License Renewal Information	Jan. 1983, p. 53
Major ARRL Operating Events and Conventions — 1983	Jan. 1983, p. 54
November Sweepstakes Rules	Oct. 1983, p. 96
QST Abbreviations List	Dec. 1982, p. 65
Reciprocal-Operating Countries	Nov. 1983, p. 71
Simulated Emergency Test Announcement	Oct. 1983, p. 94
Third-Party-Traffic Countries	Oct. 1983, p. 91
U.S. Amateur Frequency and Mode Allocations	Jan. 1983, p. 53
VHF/UHF Fall Sprints Rules	Oct. 1983, p. 98

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1CLU, Harris A. Sprague, Jr., Danielson, CT
WA1FHT, Joseph W. Condie, Southbury, CT
W1GGG, George B. Humphrey, Tenants Harbor, ME
KA1MG, Myron D. Lockwood, Southbury, CT
W1NP, William B. Gould, Elberon, NJ
WA1NPF, Everett W. Smith, Sr., Newport, RI
WA1QMS, Richard A. Ross, Allenstown, NH
WA1YFN, Paul E. Bernier, Pawtucket, RI
WA1YPF, Wilfred F. Burke, Jr., Gloucester, MA
K2BX, Merrill Beam, Mount Holly, NJ
W2CPP, James D. Freelain, Jacksonville, FL
KA2DAB, Theodore S. Tsucalas, Shelter Island, NY
K2EVV, John F. Bailey, New Port Richey, FL
K2GFG, Robert H. Blickenderfer, Bergenfield, NJ
WA2ICS, Hans K. Weiss, Wayne, NJ
WA2ISR, Harold W. Foster, New Port Richey, FL
WB2JGV, Henry H. Forsyth, Jr., Fairport, NY
W2KOF, Alfred L. Allee, Paramus, NJ
KA2PCD, Constance S. Waldron, Grand Island, NY
*KC2QC, James A. Ruth, Thornwood, NY
WA2RQA, Fortunato D. Cuillo, Wassaic, NY
W2RXS, John L. Ebell, Pennsville, NJ
K2T, Courtney A. Snell, Teaneck, NJ
K2YEZ, William B. Ringwood, Colonia, NJ
N3BBW, Walter Konopka, Larksville, PA
N3BII, Patricia B. Murray, Braddock Heights, MD
W3CKA, Louis H. Jones, Bear, DE
W3EPZ, Charles C. "Chuck" Baney, Butler, PA
WB3EVQ, Ellis S. Nolley, Sykesville, MD
W3KVG, Clarence B. Thompson, Verona, PA
N3MB, Martin E. Berman, Sarasota, FL
W3NPL, Harry M. Boone, Baltimore, MD
WA3PAA, Lloyd L. Elliott, Boonsboro, MD
K4BLH, Armand M. "Doc" Fischer, Tequesta, FL
W4BTM, Richard M. Jones, Narania, FL
KA4DSN, Harry W. Welch, Mobile, AL
W4FMF, James L. Carter, Medina, TN
WD4IYA, Charles L. Crockett, Southport, NC
K4JYA, Jerry D. Jarrell, Fort Walton Beach, FL
AI4K, John A. Blackman, Dothan, AL
WD4KOQ, Clyde D. Moreland, Cordele, GA
W4LGQ, Marshall L. Mott, Columbus, GA
W4PMI, John C. Rybon, Heathsville, VA
WA4PMY, Samuel J. Bremer, Fayetteville, NC
W4ULO, Walter H. Gietz, Norfolk, VA
K4VHQ, John H. Dyer, Jr., King, NC
W4ZP, Charles W. Arnold, Kilmarnock, VA
W5BCO, Ralph Hicks, Tulsa, OK
N5BJ, Bernard J. Ortscheid, Jasper, TX
WA5BPM, Roland L. "Ed" Edrington, Waco, TX
K5IRB, Donnie Redwine, Tahoka, TX
W5KOK, Ervis G. Williams, El Paso, TX
W5MDV, Wayne A. Stenback, Houston, TX
WB5PYQ, Larry L. Neel, Rosharon, TX
WB6CIE, June B. Moore, San Anselmo, CA
W6EBG, Gene E. Royer, Los Angeles, CA
K6EIA, Ellen Blue, Quartz Hill, CA
KD6HZ, James D. Ronk, Santa Cruz, CA
W6IQ, A. Brent Parker, San Diego, CA
KA6MHN, Lauri W. Johnson, Berkeley, CA
WA6MST, George V. Green, Hemet, CA
WA6OUL, Charles F. Soper, Costa Mesa, CA
KA6PVW, Ervin W. Blasinski, San Diego, CA
W6QUU, Frank Gillelen, Jr., Long Beach, CA
W6QZC, Charles M. Hunt, Long Beach, CA
N7BEY, Lloyd W. Stromgren, Vancouver, WA
K7BJB, Gilbert L. DeBard, Reno, NV
W7JFV, Sheldon J. Pettibone, Ventura, CA
KB7LJ, Julian A. Parvin, Tucson, AZ
WA7NCT, Robert B. Baker, Billings, MT
W8BLR, Walter E. Straesser, Southfield, MI
KA8C, Kermit R. Osborn, Proctorville, OH
KA8DMC, George E. Spengler, Cincinnati, OH
WA8DZD, Martin F. Kelly, Delaware, OH
WA8EJL, Leo L. Hannah, Salem, WV
W8GKA, Robert H. Geisman, Painesville, OH
W8JUP, Gilbert B. Heaton, Harrisburg, NC
W8LAS, Willard L. Geiger, Chagrin Falls, OH
WB8NRJ, Cecil H. Russell, Huntington, WV
W8TZD, Cass Burris, Wixom, MI
WA8ZQC, Robert W. Ekman, Ironwood, MI
KC9AU, Kenneth L. Hawkes, Dodgeville, WI
WA9CYJ, Donald Lungstrom, Lee, IL
KA9EQK, Leon Gerson, Chicago, IL
WB9FUM, Orris H. Hoffmann, Plymouth, WI
WD9HVS, Charles M. Monnier, Indianapolis, IN
W9IGP, Val F. H. Thomson, Indianapolis, IN
KA9JLD, Stephanie A. Meyer, Lincoln, IL
KA9KAO, Allen H. Gordon, Princeton, IN
W9KLV, Frank A. Witowski, Burbank, IL
KA9LUX, Richard L. Curtis, Elizabeth, IL
*W9ROS, Ignaz Schwinn, II, Chicago, IL
WA9TRT, Charles A. Everett, Indianapolis, IN
W9ZTZ, Charles H. Ballard, Marion, IN
WØCVU, Charles W. Boegel, Jr., Cedar Rapids, IA
AFØD, Earl W. Barrett, Boulder, CO
WDØENU, Richard C. Houser, Wichita, KS
WØGEF, Fred L. Whitson, Jackson, MO
WØHCF, Fay W. Medhurst, Storm Lake, IA
KAØKIE, Dan E. Yule, Owatonna, MN
WØNRJ, Stanley J. Migalski, Kensington, KS
WØREQ, Warren R. Wheeler, Littleton, CO
KØZHO, Doyle E. Gamber, Abilene, KS
VE1AGM, John K. Weeks, Cleveland, NS
VE1AKJ, Thomas P. Cowan, Digby, NS
VE3GBU, Thomas W. Sanders, Toronto, ON
VE3YY, Arthur J. Vivian, Burlington, ON
VE4TT, Theodore T. Timlick, Winnipeg, MB
VE7APZ, Angus M. Shaw, Richmond, BC
G3XTJ, Ed Hodson, London, England

*Life Member, ARRL

Feedback:

William J. Hoenig, WA2WEJ, who was listed in the Silent Keys column of the October issue, is not a Silent Key.

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

November 1933

☐ Automobile ignition is a serious problem of interference to amateur (and other) communications services. The Editor calls upon car manufacturers to install suppressor plugs and other remedies in new models.

☐ G. Grammer takes Jim Lamb's "tri-tet" circuit for a simplified five-band two-tube breadboard exciter unit.

☐ Paralleling interest in more stable transmitters for 56 Mc. and higher, W1AFC finds that the regenerative autodyne circuit is a good receiver compromise between a complicated superhet and the broad superregen.

☐ Because our 160- and 80-meter bands are subject to regional allocation, we can be relieved that the recent North and Central American Conference in Mexico City, where amateurs were represented by Secretary K. B. Warner, unanimously reaffirmed those two bands as exclusively amateur.

☐ James Lamb explains the complexities of his crystal filter circuit, relating input tuning to output impedance and voltage — and resultant selectivity.

☐ Jim has also been working on improvements in automatic gain control for the single-signal super, and describes the most practical circuit he found. The system must be turned off for telegraphy, of course.

☐ W1BJD is the engineer in charge of radio communications for the Byrd Expedition, which recently left Boston bound for the South Pole. Hams will be QSOed for recreation and backup communication.

☐ We learn a bit more about practical application of the new amateur regulations, such as change of address procedures and license upgrading, and the need (to eliminate deadwood) to show activity in the final 90 days of the license term as prerequisite to renewal.

☐ W1QP shows us some ways the new type 800 tube can be used for r.f. work as low as 5 meters, and also in Class B modulators.

☐ Members of the Army Amateur Radio System in the far west have been hired, in most cases with their own rigs, to furnish communication (on AARS frequencies) for the far-flung Civilian Conservation Corps.

☐ To improve operating standards on voice, A.R.R.L. announces the new appointment of "Official Phone Station." Primary requirement is adherence to a code of good procedures on the air.

☐ A sad note: The William B. Duck Company is closing its doors. Many a real old-timer cut his eye teeth on the famous Duck catalog.

☐ Gross Radio will sell you a transmitter kit, three-tube receiver (one set of coils), crystal and power supply for $39.95.

25 Years Ago

November 1958

☐ W2QEX and W1ZXA of the Radio Corporation explain why there are nearly 2000 receiving tube types, and present a list of about 20 "recommended" types for amateur use, with specific applications in each case.

☐ Screen voltage regulation and negative peak clipping are features of W6MDI's Class AB modulator using 813s.

☐ The flashlight lamp loop is still a good tune-up indicator, and in parallel with a short section of one "twin lead" wire, the lamp can show output variations. From W1ICP, of course!

☐ And K6QHZ applied the "twin lamp" principle to his s.w.r. indicator to simplify the electrical problems and eliminate some components.

☐ W1IKE's v.f.o. combines operating convenience (including a spotting switch) and good keying characteristics.

☐ Hundreds of reports from television DX chasers were analyzed by K6EDX, who found many instances of sporadic-E propagation. The summary was helpful in the International Geophysical Year programs.

☐ K8CFU finds that beams with elements formed of loops of 1 wavelength have higher gain than conventional beams, provide low angle radiation and are especially effective in contacting mobiles with vertical polarization.

☐ Fifty-one delegates and observers from 17 countries attended the Region 1 conference of the International Amateur Radio Union in Germany. Secretary W1BUD represented Hq.

☐ K3CUI details the organization of amateur radio in the Soviet Union. Much activity, particularly by beginners, is restricted to club stations under strict rules.

☐ Building a power supply seems simple enough, but WA2ANU provides some suggestions on physical construction, layout, selection of components, and circuits.

☐ W5LFM has a new method of feeding a Yagi — 95-ohm coax cable from the transmitter inserted into the hollow tubing of one-half of a folded dipole driven element.

☐ The antenna coupler built by W4UWA is switchable into several configurations, including the usual pi-network, to match "almost any" antenna.

☐ This issue features activities from exotic QTHs, such as VQ4 and FP8, resulting from DXpeditions and vacations.

☐ The Army is resuming moonbounce transmissions on 151 Mc., and amateurs are invited to submit reception reports. — *W1RW*

The World Amateur Radio International Conference — Tokyo, 1983

Strange as it may seem, the International Amateur Radio Union hasn't been in the habit of holding international conferences. Except for the occasion of its founding in 1925, the conference work of IARU has been on a regional basis. Conferences that were heralded as being international in scope have been organized either by individual member-societies or by some group outside the structure of IARU. Such conferences were generally organized not to conduct the business of IARU, but to deal with some particular aspect of Amateur Radio, technical or social.

So it was with the World Amateur Radio International Conference (WARIC) held in Tokyo on September 19-22, 1983. It was jointly organized by the Japan Amateur Radio League (JARL) and the Japan Ministry of Posts and Telecommunications. It was a conference held outside the framework of IARU, yet officers and representatives of some 16 IARU societies attended, representing all three IARU regions and all six continents. The conference agenda items broadly covered the subject of how the growth of Amateur Radio could be encouraged in the developing countries, and yet the conference went far beyond that, particularly in recognizing the importance to the Amateur Radio Service of adequate preparation for and participation in the ITU World Administrative Radio Conferences, a la 1979.

Those who attended as delegates from a particular country included: Saifud Dahar Shahid, Bangladesh; Quingya Wang, Jianyuam Yang and Mrs. Xuezhen Xia, People's Republic of China; Philipp Lessig, DK3LP, Federal Republic of Germany; Mohammed Saleh Belbeisi, JY4MB, Jordan; Chang-Kyun Kang, HL1CR, and Yungho Lee, HL1AKH, South Korea; Eu Khuan Kew, 9M2BS, Malaysia; J.F.C. Johnson, ZL2AMJ, New Zealand; Oyekunle B. Ajayi, 5NØOBA, Nigeria; A. Razok al-Shahwarzi, A4XJT, Oman; Lycan T. Murray, VE7EWG, Pakistan; Mrs. Mayuree Chotikul, HS1YL, and Marakat Chotikul, HS1DF, Thailand; Nick Percival, 9Y4NP, Trinidad & Tobago; John Allaway, G3FKM, Great Britain; and Victor C. Clark, W4KFC, USA.

Representing the regional organizations were Wolcott H. Benjamin, EL2BA, of Liberia, for Region 1, and David H. Rankin, 9V1RH, of Singapore, for Region 3. A number of members of TIARA (The Tokyo International Amateur Radio Association) were present, including Joe Speroni, AHØA/JH1ZDJ, and Bill Stenson, NA2Y/JR1YGP, both of whom played an active role in the committee work of the conference.

IARU President W1RU was aboard, while the guest of honor (and active participant in conference discussions) was ITU Secretary-General Richard E. Butler. Although not (yet) a radio amateur, Mr. Butler is a patron of the International Amateur Radio Club in Geneva and throughout WARIC was actively involved in every phase of its activities.

There were, of course, dozens of Japanese amateurs involved in the organization and staff support. Mr. Shozo Hara, JA1AN, president of JARL, had his fine hand in every aspect of the conference. "Casey" Kasahara, JA1CLN, had heavy responsibilities for the physical arrangements and scheduling of the conference, while Masayoshi Fujioka, JM1UXU (and the

Chairman of the conference was ARRL President W4KFC (left); Vice Chairman was JARL Vice President JA6AV.

Conference delegates (l-r) ZL2AMJ, 5NØOBA and A4XJT. There was simultaneous translation of Japanese and English.

In the foreground (l-r) are 9Y4NP, G3FKM and W4KFC. In the background, are some of the 100 or so observers.

*President, IARU

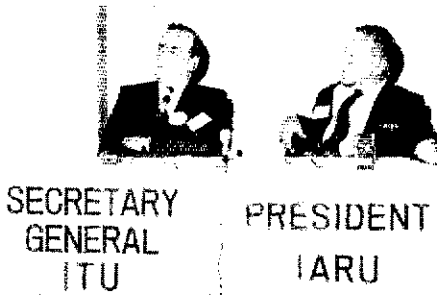
secretary of IARU Region 3), was responsible for setting the course of the conference discussions. At least a dozen JAs from JARL Hq. participated in the work of the conference and provided staff support, and there were a dozen young men and women from the Japanese RRB (their equivalent of the U.S. FCC) who provided staff support. The officers were a veritable beehive of activity.

Mr. Tokuda, vice minister of the ministry of Posts & Telecommunications, made the opening address, while Mr. Y. Otaki, of the Japan Radio Regulatory Bureau, participated in the conference. Mr. Otaki was also extremely helpful in some discussions outside of the work of the conference, helping to straighten out some temporary snags in the reciprocal-operating agreement being worked out between the U.S. and Japan.

In addition to all of those who have been mentioned or alluded to above, there were about a hundred JA amateurs who attended the meeting as observers but who were often called upon to help with the work of the committees.

The conference had before it a number of papers submitted by the societies in the USA, New Zealand, Nigeria, Liberia, Trinidad & Tobago and Oman. These papers dealt with such things as representation of the Amateur Radio Service at ITU conferences, common standards for entry into the Amateur Service, intruders in the amateur bands and assistance to Amateur Radio in developing countries. Using the committee and subcommittee approach, which is typical also of IARU conferences, each paper was discussed at length and modified or expanded as appropriate. An Editorial Committee (W4KFC, JA6AV, 9V1RH, ZL2AMJ, AHØA/JH1ZDJ, NA2Y/JR1YGP, W1RU and JM1UXU) then took over, and during the wee hours of the last day of the conference, from the work of the committees, produced a "Tokyo Declaration," which will be distributed to all IARU societies. The Tokyo Declaration states the concerns of WARIC and recommends to the members of IARU certain actions.

Representing China were Mr. Quingya Wang, Deputy Secretary General of the China Radio Sports Association (left); Mrs. Xuezhen Xia, interpreter from the All-China Sports Association; and Mr. Jianyuan Yang, of BY8AA.



Mr. Richard E. Butler (left), Secretary-General of ITU, gave an opening address and participated in the discussions of the conference. To the right is IARU President W1RU.

Principally, the Tokyo Declaration urges that IARU and its member-societies be encouraged to prepare adequately for future ITU conferences; that more IARU member-societies establish an intruder watch and that centralizing offices be established; that there be a uniform and international standard for entry into Amateur Radio (this would facilitate reciprocal-operating agreements and, someday, an international Amateur Radio license); that amateurs worldwide recognize the full significance of ITU Resolution 640 and the handling of emergency communications; and that there be a continued effort to encourage the growth of Amateur Radio in the developing countries.

There was nothing startlingly new in either the agenda items or the discussions. Rather, the conference clearly demonstrated the continuing concern of all areas of Amateur Radio over what are perceived to be common and consistent problems. For example, how to encourage the growth of Amateur Radio in the developing countries has been vexing us for more than 20 years, and we are no nearer to a simple answer — the sort of simple answer that everyone seems to have been looking for — than we were 20 years ago. That tells this writer that there *is* no simple answer, that it's a complex problem that not only requires a unique answer for each case but also requires a great deal of work and persistence.

Especially encouraging to this writer is the growing recognition of an increasing number of people that we were successful at WARC-79 because we began our preparations 15 years in advance of the conference and that we had therefore better start getting ready for WARC-199X! For 1979, we had to start from scratch; this time we already have some left-over momentum.

A report on WARIC-1983 could not be complete without an expression of thanks to our Japanese hosts and organizers. As always, their hospitality was outstanding — culture and language barriers were nonexistent, and JARL continued to demonstrate its leadership in Amateur Radio.

A special events station — 8N1WCY — was set up at the Toshi Hall conference site, with several operating positions available to the delegates. The station was on the air from 9 to 5 local time each day, generally manned by JA operators. QST

Club Corner

Conducted By Sally O'Dell,* KB1O

CLUBS AND SCHOOLS

Many clubs are contacting us asking for help. "What can we do to revitalize our meetings, our club, our members?" Perhaps the elusive solution is right in your own backyard or down the street: Adopt a school. Get in touch with your local high school or junior high school. Contact the science or industrial arts teacher and be prepared to participate in educating the minds of Amateur Radio's future. If the teacher is not already a ham, explain the fields that a background in Amateur Radio can open — from a career as an electronics technician to an astronaut. Tell them about a young boy who started in high school with a ham license, went on to earn an engineering degree and finally found his place in the astronaut program. The name of Dr. Owen Garriott, W5LFL, has been in many Amateur Radio conversations recently.

How to Get Started

Your club must decide if this is the type of project in which everyone *can* (or wants to) participate. If the decision is no, then stop here. If after discussion and careful analysis, the club decides to go ahead, then give it everything you've got. There can't be enough planning at the beginning and all the way through. Map out a plan of action and be prepared to revise it when necessary. Decide who will contact the school, and who is available to help teach — after your exhibit and other attention-getters have drawn in all those who have an interest in the subject. This project doesn't end with the school saying, "We are interested." That is just the beginning. From there, the school club needs your support.

Members of the Rochester (New York) Institute of Technology ARC (an ARRL-affiliated club) at a recent meeting.

Once the students are licensed (and hopefully a teaching adult joins the group), they will need a station and someone to help them get on the air on a regular basis. Are *you* willing to follow through? A club may use this activity as a participation requirement in the training or miscellaneous section of the Special Service Club program. All club members must participate to make the program work to its fullest. If the task falls on a few participants, the full value will not be realized — to either you or the students. The students need to know that the whole club is behind them and the whole club supports participation.

Some of our affiliated school clubs were started with the support of a local club on the side. An interested ham, usually a teacher who has a desire to help young people learn and grow, volunteers. One of these clubs is the Bethel (Connecticut) Middle School ARC. The

*Club Program Manager, ARRL

advisor, Peter Kemp, KA1KD, keeps his students involved on a daily basis. There is no club for the students who have graduated and gone on to high school, so they come back to the middle school club as alumni and continue to participate.

Although the requirements for an Amateur Radio license can be fulfilled by people at any age, learning seems to come easier to the young. Students are studying every day and are working with textbooks daily. Those of us who have been out of school awhile may have found the studying a bit more difficult as we worked on our licenses.

Today, there are approximately 2000 affiliated clubs around the country; 257 of them are school clubs. We would guess that this ratio within affiliated clubs more or less reflects the ratio of school clubs to clubs in general. One club — Selma (Alabama) High School ARC — is supported by the Selma-Dallas County Radio Club *and* the Dallas County Civil Defense *and* the Selma Public School Board of Education. The club has been organized for three years and includes Novice to Extra Class licensees among its members. The club members have joined Navy MARS, and will operate an fm broadcast high school station this fall and sponsor a highly active computer group. Most of the members of the club are honors students. This club exemplifies the cream of the crop in high school students.

Public Relations

In addition to helping students, finding an extra activity for the club *and* assisting some new people interested in Amateur Radio, this program also has a very strong public relations value. The community will value your contributions to the town youth. Amateur Radio has always stood for excellence and achievement — values that are gaining popularity in most school systems these days.

After you make your initial presentation (with school approval), contact the press and ask for coverage. As the class progresses, contact the press again when students become licensed. Then continue to offer press releases as the students make contacts and become more involved in our hobby.

Conclusion

If your club needs a new project, think about adopting a school. Plan your activities in advance, and keep in mind the following guidelines.

1) Evaluate the program and discuss the possible avenues of approach. Does the whole club wish to participate or is this something that one individual wishes to do?

2) If the whole club is interested, plan activities in advance. Be sure the club knows what to expect.

3) Speak to the local school principal and teachers. Let them know of your desire to work on this project and to commit club members to specific (preset) times, dates and support. Those who work while school is in session may not be able to teach in the classroom, but they can support the project by helping to prepare lesson plans, or by contacting the press or speaking with the class as a guest speaker after school or on weekends.

4) At various stages of class development, contact the press with the story. Your club is involved in sponsoring a school club. The school club is beginning to learn; the school club has passed the code portion of the exam; the school club members have passed their Novice license tests and are speaking to other radio amateurs around the world. The students have used Amateur Radio to hone their math, science and geography skills, and they feel great.

Make this a club project in which everyone participates. You may find that the rewards far outweigh your wildest dreams. There's no guarantee that you will be starting a youngster on a career path to become an astronaut, but you never know. QST

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.

ARC of Augusta
c/o P.O. Box 3072
Augusta, GA 30904
Club membership — 43

Chesapeake Bay Radio Association, Inc.
c/o P.O. Box 171
Northeast, MD 21921
Club membership — 60

Kentucky Colonels Amateur Radio Club
c/o 2168 Greenhill Dr.
Bowling Green, KY 42101
Club membership — 59

L'Anse Creuse ARC
c/o P.O. Box 72
Utica, MI 48087
Club membership — 156

Lincoln Amateur Radio Club, Inc.
c/o P.O. Box 5006
Lincoln, NE 68505
Club membership — 250

North Shore Repeater Association
c/o P.O. Box 8
Prides Crossing, MA 01965
Club membership — 265

St. Paul Radio Club, Inc.
c/o Box 30313
St. Paul, MN 55175
Club membership — 284

Stamford Amateur Radio Association
c/o 118 Lockwood Rd.
Riverside, CT 06878
Club membership — 135

Tuscaloosa Amateur Radio Club
c/o 4314-6 St. East
Tuscaloosa, AL 35404
Club membership — 77

Wellesley Amateur Radio Society
c/o 211 Washington St.
Wellesley, MA 02181
Club membership — 69

Special Events

Conducted By Mark J. Wilson,* AA2Z

Laurel, Maryland: Comm Center and Volunteers in Technical Assistance will operate N3SC from 1700 to 0100Z daily *Oct. 28 to Nov. 5* during the Space Shuttle mission. Frequencies: phone — 14.260 and 21.375; RTTY — 14.083. Certificate and QSL via The Comm Center, Attn: Barbara, 9624 Fort Meade Rd., Laurel, MD 20707.

Blythewood, South Carolina: K4MJN will operate from 1400 to 2200Z *Nov. 5* during the J. Gordon Coogler poetry festival. Operation on 14.270, from 1400 to 1800Z, and on 21.320, from 1800 to 2200Z. Certificate via Rte. 3, Box 154, Blythewood, SC 29016.

Monmouth County, New Jersey: Ocean-Monmouth ARC will operate KC2Q from 1800Z *Nov. 5* until 1800Z *Nov. 6* from the Guglielmo Marconi Memorial Tower, used during early transoceanic receiving experiments. Frequencies: 3.965 7.265 14.265 21.365 28.565. Certificate and QSL via P.O. Box 357, Bradley Beach, NJ 07720.

Bloomington, Illinois: Central Illinois RC will operate W9AML on *Nov. 5 and 6* to celebrate the club's 50th anniversary. Frequencies: 7.230 14.226 21.355 28.650 144.190.

Kern County, California: Kern Co. RC will operate W6LIE from 1600 Nov. 5 to 0500Z Nov. 6 and starting at 1400Z Nov. 6 to commemorate the landing of the Space Shuttle at nearby Edwards AFB. Frequencies: phone — 7.280 14.295 21.375; cw — 21.150. QSL via P.O. Box 743, Bakersfield, CA 93307.

Canadaigua, New York: Armored Force AR Nationwide Emergency Team members will operate from 1200 to 2400Z daily *Nov. 11-13* to commemorate Veteran's Day. Operation on 7.285, 14.325 and 21.375.

Nitro, West Virginia: Tri-County Ham Club will operate W8WVA to commemorate the "Living Memorial to World War I" from 1500Z *Nov. 11* until 2200Z *Nov. 12*. Operation 25 kHz up from lower General class 80, 40 and 20-meter band edges. Certificate via 77 Dunbar Ave., Dunbar, WV 25064.

Tulsa, Oklahoma: Tulsa ARC will operate W5FU from 1800Z *Nov. 12* until 0600Z *Nov. 13* to commemorate 50 years of ARRL affiliation. Frequencies: 3.915 7.250 14.300 21.375 28.550, and Novice bands. Certificate via P.O. Box 79245, Tulsa, OK 74170.

Plymouth, Massachusetts: Whitman ARC, Plimoth Plantation and Plymouth (Devon, England) RC will operate WA1NPO and G3PRC from 1300 to 2000Z *Nov. 24* for Thanksgiving. WA1NPO will operate from Plimoth Plantation, while G3PRC will operate from a site overlooking Plymouth Sound, where the *Mayflower* began its voyage. Operation on the following times/frequencies: 1300-1430/21.260; 1430-1730/7.280 or 7.050; 1730-2000/21.385; 1300-1600/14.255 or 14.180; 1600-2000/14.345. Certificate via P.O. Box 48, Whitman, MA 02382.

Gobler, Missouri: Bootheel ARS will operate NØBZA from 1400 to 2300Z *Nov. 24* for Thanksgiving. Frequencies: up from 14.250 21.350 28.600. QSL via 2000 Dorothy St., Malden, MO 63863.

Bethlehem, Connecticut: Henhouse Gang will operate W1FHP from *Nov. 26 to Jan. 7* to bring Christmas cheer to children of all ages. Operation on 40- through 10-meter phone bands. QSL via *Callbook* address.

Niagara Falls, New York: Niagara Falls RC will operate W2QYV during the Festival of Lights from 1500 to 0300Z daily *Nov. 26 until Jan. 8*. Operation in the General class portions of 80, 40 and 20 meters. Certificate via 16 Council St., Niagara Falls, NY 14304.

Grenada, West Indies: Grenada ARC will operate J39AA from 0001Z *Nov. 26* until 2359Z *Nov. 27* to celebrate World Communications Year. Operation on 160 through 10 meters, phone and cw. QSL via WB2LCH, P.O. Box 64, Gloucester, NJ 08030-0064.

Hartford, Connecticut: Connecticut DX Assn. will operate KO1R from 1300 to 2000Z *Dec. 3* from the Mark Twain Memorial. Operation around lower cw and phone General class band edges. QSL via P.O. Box 181, Columbia, CT 06237.

Homestead, Florida: Everglades ARC will operate W4SVI from 1300Z *Dec. 3* until 2200Z *Dec. 4* to celebrate the 36th anniversary of the dedication of Everglades National Park. Operation 10 kHz up from lower 40- through 10-meter General class phone-band edges and 10 kHz inside Novice bands. Certificate via 14511 S.W. 287 St., Leisure City, FL 33033.

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 November 15 to make the January issue. QST

*Assistant Communications Manager, ARRL

Coming Conventions

By Marjorie G. Tenney,* WB1FSN

FLORIDA STATE CONVENTION
November 26-27, Clearwater

The beautiful Sheraton Sand Key Resort on the sparkling water of the Gulf of Mexico in Clearwater will be the site of the Florida State ARRL Suncoast convention sponsored by the Florida Gulf Coast Amateur Radio Council. There will be a huge flea market and commercial booths, all indoors. ARRL President Vic Clark, W4KFC; QCWA President Stu Meyer, W2GHK, and ARRL Southeastern Division Director Frank Butler, W4RH, will participate in the convention activities.

A QCWA luncheon will be held on Saturday, Nov. 26, and a women's luncheon on Sunday, Nov. 27. Everyone is invited to either luncheon, but get your tickets early. Our famous Luau will be held on Saturday night, with good food and entertainment. Get your tickets early, for the Luau is usually a sellout. Some interesting programs are planned, featuring technical talks and demonstrations on antennas, computers and AMTOR. There will also be club meetings and traffic nets. The ARRL forum will be on Saturday afternoon, hosted by Frank Butler, W4RH. Bring your QSL cards, as we will judge the best card of the group.

Registration tickets will be $3 until Nov. 18; tickets at the door will be $4. The luncheons are $7 each, and the Luau is $15. The swaptables are $12 for both days. Make your check payable to FGCARC, and send it to FGCARC, Box 157, Clearwater, FL 33517. Please enclose an s.a.s.e. For hotel reservations, call the hotel direct at 813-595-1611, or write to the Sheraton Sand Key Resort, 1160 Gulf Blvd., Clearwater, FL 33515, and mention the Suncoast convention. (Do not use the Sheraton 800 phone number.) The room rates are $42 per day double. Road directions to the hotel are as follows: From the south, take Rte. US-19 N to Rte. FL-60, then take 60 W across the Clearwater Causeway, then south across the Clearwater Pass Bridge (toll 25¢). A few hundred yards south of the bridge is the hotel. From the east, go on I-275 W to Rte. FL-60, then proceed as above. From the north, go on US-19 S to FL-60, then right on 60 W and proceed as above. A remote parking lot with a free shuttle bus to the hotel will run on both days. The remote lot is at the Clearwater City Hall Annex, located on the corner of Rte. FL-60 and Missouri Ave. The talk-in stations will be on 37/97 and 96/36. In Tampa, try 16/76. For convention information, write to FGCARC, Box 157, Clearwater, FL 33517. The convention hours are 9 A.M. to 4 P.M. both days.

November 26-27
Florida State, Clearwater

ARRL NATIONAL CONVENTIONS
July 20-22, 1984
New York, New York
September 27-29, 1985
Louisville, Kentucky

Hamfest Calendar

Arkansas: The Arkansas DX Assn. will hold its annual DX meeting and banquet on Saturday, Dec. 3, at the Riverfront Hilton, North Little Rock. DX forum, meeting and banquet. For details, contact ADXA President Larry Woolsey, W4HJA, 1015 N. McKinley St., Little Rock, AR 72207.

†**Florida:** The Treasure Coast Ham and Computerfest, sponsored by the Vero Beach ARC, will be held at the Vero Beach Civic Center, Nov. 19, from 8 A.M. to 6 P.M. Admission is $3. Talk-in on 146.73 and 52. For information, write to Richard McKee, WD8RHN, 2625 S.W. Monterrey La., Port St. Lucie, FL 33453, tel. 305-878-1712.

†**Illinois:** "RA-COM '83," sponsored by the Mt. Prospect ARC and Tri-County Emergency, will be held on Nov. 13, at Prospect High School, 801 W. Kensington, Mt. Prospect. Large indoor electronic flea market area, commercial exhibits, seminars, and more. Doors open at 8 A.M. Talk-in on 52. For more information and flea market or commercial-booth reservation forms contact: "RA-COM," P.O. Box 452, Mt. Prospect, IL 60056. Please send an s.a.s.e.

†**Indiana:** AC-ARTS (Allen County Amateur Radio Technical Society) will hold their 11th Fort Wayne Hamfest at the Allen County Memorial Coliseum on Nov. 13. Forums: KA9A on OSCAR; W9NTP on fast- and slow-scan TV; K9EID on 10-meter fm and audio forums; a computer forum; and W9UMH/W9JUJ on traffic handling. Tickets in advance are $2.50 (with s.a.s.e.); at the door, $3. Children under 12 admitted free. *Deadline* for advance tickets by mail is Nov. 1. Plenty of parking — $1. Tables $6; premium tables $20. Talk-in on 88 and 52. For more information, write to Hamfest Chairman, AC-ARTS, Inc., P.O. Box 10342, Fort Wayne, IN 46851.

†**Louisiana:** The Twin City Ham Club will sponsor the Twin City Hamfest at the West Monroe Convention Center, West Monroe, on Saturday, Nov. 12, from 9 A.M. to 5:30 P.M. Free admission. Forums on DX, contests, computers, RTTY, and more. A variety of dealers will be present, as well as plenty of space for swap tables and fellowship. Talk-in on 25/85 and 52. For further information, contact Benson Scott, AE5V, 107 Contempo, West Monroe, LA 72191, tel. 318-323-3478.

Massachusetts: The Honeywell 1200 Radio Club, sponsor of 147.72/12 repeater, and the Waltham ARA, sponsor of 146.04/64 repeater, will hold their annual Amateur Radio and electronics auction on Saturday, Nov. 19, at the Honeywell Plant, 300 Concord Rd., Billerica, Exit 27 off Rte. 3. Snack bar and bargain parts store. Doors open at 10 A.M. Free admission and parking. Talk-in on both repeaters. For more information, contact Doug Purdy, N1BUB, 3 Visco Rd., Burlington, MA 01803.

†**Michigan:** The Oak Park High School Electronics Club presents the 14th annual Swap-N-Shop on Nov. 27 at the Oak Park High School, Oak Park. Hours are 8 A.M. to 4 P.M. East and west doors open at 6 A.M. Admission: $2. All 8-ft tables: $6. Send s.a.s.e. to Herman Gardner, Oak Park High School, 13701 Oak Park Blvd., Oak Park, MI 48237, tel. 313-968-2675.

†**Michigan:** The Hazel Park ARC will sponsor the Hazel Park Swap and Shop at the Hazel Park High School on Dec. 4, from 8 A.M. to 2 P.M. Advance admission is $1.50; at the door $2. Talk-in on 52 simplex. For further information, contact N8DEI, c/o HPARC, P.O. Box 368, Hazel Park, MI 48030, tel. 313-544-2965.

Minnesota: The annual HANDI-HAM Winter Hamfest will be held Saturday, Dec. 3, at the Eagles Club in Faribault, starting with registration at 9 A.M. There will be a HANDI-HAM equipment auction, dinner at noon, program and other activities. Talk-in on 19/79. For more information, contact Don Franz, WØFIT, 1114 Frank Ave., Albert Lea, MN 56007.

Missouri: The Annual PHD Auction will be held Saturday, Nov. 12. Doors open at 9:30 A.M. Auction starts at 11 A.M. Location: Pleasant Valley, Missouri Community Center, Exit MO off I-35, just south of Liberty, or north of Kansas City. Talk-in on 34/94.

New Jersey: RADIOSPORT '83, sponsored by the StateLine RC of New York and New Jersey, will be held Saturday, Nov. 19, at the Alpine Boy Scout Camp in Alpine, (Exit 2 of the Palisades Interstate Parkway). Ample parking, refreshments and activities. Talk-in on 235/835 and 52. For further information and/or table reservations, contact Abel David, Jr., KX2F, 82 Lexington Ave., Dumont, NJ 07628, tel. 201-387-8129.

†**New York:** "Ham Central" 1983 edition, *an all-inside hamfest*, will be sponsored by Radio Central ARC, at Temple Isaiah, the Main Social Hall, 1404 Stony Brook Rd., Stony Brook, on Sunday, Nov. 27. Sellers: Doors open at 7:30 A.M. Buyers: Doors open at 9 A.M., close at 3 P.M. General admission $3; tables $7 per table. Children and wives free. Seminars by Art Greenberg, W2LH, and past ARRL president Harry Dannals, W2HD. Dealers from all over the East Coast. Some electricity is available. Big indoor location near Smithaven Mall for holiday shopping, and historic Stony Brook and Port Jefferson. Food and drinks available. For further info and reservations, contact Scotty Policastro, KA2WQW, 80 Seventh St., Bohemia, NY 11716, tel. 516-589-2557, or Bob Yarmus, K2RGZ, 3 Haven Ct., Lake Grove, NY 11755, tel. 516-981-2709.

†**North Carolina:** The Guilford ARC will hold its annual Hamfest/Computerfest on Nov. 26-27, at the National Guard Armory in Greensboro, beginning at 9 A.M. each day. Admission is $3.50 by pre-registration or $5 at the gate. Food and free parking available. Talk-in on 144.65/145.25 and 52. For more information or advance tickets, write to GARC, P.O. Box 7007, Greensboro, NC 27407, and enclose an s.a.s.e. Checks for advance tickets should be made payable to GARC. An equipment check-out booth with test equipment and a technician will be available as a free service to those wishing to check used equipment prior to purchase.

†**Ohio:** The Massillon ARC, W8NP, will present "Auctionfest 83" on Sunday, Nov. 13, from 8 A.M. to 5 P.M., at the Massillon K of C Hall, 988 Cherry Rd. N.W., Massillon. Flea market setup at 7 A.M. and Auction at 11 A.M. Advance tickets $2.50; $3 at the door. Tables available for $5 per 8-ft space. Talk-in on 78/18. Information and reservations for s.a.s.e. to MARC, 920 Tremont Ave. S.W., Massillon, OH 44646.

Pennsylvania: The R. F. Hill ARC will hold its annual "Winterfest" Amateur Radio Fleamarket and exhibit on Sunday, Nov. 13, at the Sellersville National Guard Armory on PA Rte. 152, Sellersville. Indoor sales space available, and outdoor "tailgating" will be permitted. Refreshments available on site; many other places to eat nearby. Flying hams should land at Pennridge Airport in Perkasie. Basic rates: Buyers $2, indoor sellers $4, tailgaters $3. See flyer or write to P.O. Box 29, Colmar, PA, for additional information. Talk-in on 144.71/145.31 Almont, 146.28/88 Souderton, and 52 simplex in local area. Take Sellersville or Perkasie exits from PA Rte. 309. Location is approximately half way between Philadelphia and Allentown. Talk-in station is W3AI.

[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.]

Note: Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

*Convention/Travel Coordinator, ARRL
†ARRL Hamfest

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,*
W9KDR

AMSAT-OSCAR 10 OPERATING SCHEDULE

Mondays (UTC) will be QRP (low-power) day. AMSAT requests that all satellite operators not run more than 100-W erp. Wednesdays (UTC) will be Mode L operation one hour before and after apogee, on a temporary basis. Mode B will be on at all other times except during the 40 counts before and after perigee.

How Much Uplink Power is Necessary?

It is very simple to determine if your signal (or any other) is uplinking more power than is necessary to maintain communications. Monitor the satellite general beacon signal strength, then monitor your received signal. If your signal is stronger than the satellite's beacon, reduce your uplink power until it is the same signal level or less at all times.

This simple procedure applies to any transponder operation. Running more uplink power than is necessary defeats everyone's attempts to communicate, including the offender's. The result is that only a few of the signals are heard and all of the weaker ones are lost.

Rules of proper satellite operation need to be a part of a continuing-education process. Remind those who are new to satellite operation and those who have forgotten. You will find most amateurs will respond in a positive manner to the QRP satellite rules. Those who don't observe the rules usually end up with no one to talk to.

PACSAT Progress

The PACSAT satellite is being designed to use a low earth orbit to store and forward digital messages. The final design meeting for the project was held in late September and was attended by volunteer teams from England, Canada and the U.S. All the electronics and software that will operate the communications system for both the satellite and ground stations will be developed in Canada and the U.S. When the space-hardened hardware is prepared, integration with the spacecraft will be done at the University of Surrey, England, where the spacecraft will be built (the University built the UoSAT-OSCAR 9 satellite).

The most likely launch opportunity proposed to date would be the LANDSAT-D recovery mission planned for a Space Shuttle flight in August 1986. The spacecraft would be housed inside a NASA "Get Away Special" (GAS) canister.

VITA (Volunteers In Technical Assistance), a not-for-profit organization, is working with AMSAT on the PACSAT project. VITA has raised $15,000 for the design effort and expects to find other funds to help finance the project. AMSAT has requested the assistance of VITA in preparing a design study of this low-cost satellite system. AMSAT sees promise in this technique for linking Amateur Radio operators worldwide for digital communications experiments. VITA would use identical technology to provide dissemination of energy technology information for less-developed countries using solar-powered remote ground stations.

Connection to the satellite would be made through inexpensive Amateur Radio stations, operating either in the Amateur Radio Service or by using Experimental Service licensing. The equipment required would consist of a simple communications processor, rf modem and simple whip antennas that are easily transported. (Tnx Gary Garriott, WA9FMQ, VITA Senior Technical Advisor)

New Computer Software Available

VIC 20 and Commodore 64 users can now buy satellite software from AMSAT. The program has been dubbed AMS 2064 and costs $15. You may send your orders to AMSAT Software Exchange, Box 27, Washington, DC 20044.

*OSCAR Program Manager, ARRL

AMSAT-OSCAR 10 Frequency Conversion Chart† (Revised 9/8/83)

Revised Mode B Frequency Guide (Exclusive of Dopper Shift)*			*Preliminary Mode L Frequency Guide** (Exclusive of Doppler Shift)*		
Uplink	*Downlink*		*Uplink*	*Downlink*	
	145.987	Engineering Beacon	1269.050	436.950	Upper Limit
435.0323	145.9720	SSC H1	.075	.925	
435.0423	145.9620	SSC H2	.100	.900	
435.0447	145.9600	GCB Upper Limit	.125	.875	
435.0477	145.9570	ACNF	.150	.850	
435.050	145.955		.175	.825	
.055	.950		.200	.800	
.060	.945		.225	.775	
.065	.940		.250	.750	
.070	.935		.275	.725	
.075	.930		.300	.700	
.080	.925		.325	.675	
.085	.920		.350	.650	
.090	.915		.375	.625	
.095	.910		.400	.600	
.100	.905		.425	.575	
435.1037	145.901		1269.450	436.550	
.105	.900		.475	.525	
.110	.895		.500	.500	
.115	.890		.525	.475	
.120	.885		.550	.450	
.125	.880		.575	.425	
.130	.875		.600	.400	
.135	.870		.625	.375	
.140	.865		.650	.350	
.145	.860		.675	.325	
.150	.855		.700	.300	
.155	.850		.725	.275	
.160	.845	GCB Lower Limit	.750	.250	
435.1647	145.8400	SSC L2	.775	.225	
435.1747	145.8300	SSC L1	.800	.200	
	145.810	General Beacon	.825	.175	
			1269.850	436.150	Lower Limit
				436.040	Engineering Beacon
				436.020	General Beacon

†Revised September 8, 1983. Table from *ASR* 62, Sept. 7, 1983.
*Based on conversion frequency of 581.0047 MHz.
**Based on a translation frequency of 1706.00 MHz, estimated.
SSC — Special Service Channel
GCB — General Communications Band
ACNF — AMSAT Calling and Net Frequency

FCC Okays Shuttle Transmissions

For the past several Space Shuttle missions, Amateur Radio club stations associated with NASA have been retransmitting Space Shuttle communications carried over NASA's public affairs channel. They have been doing so under waivers granted by the FCC specifically for each mission.

Now, any Amateur Radio station may retransmit Space Shuttle communications for the duration of all upcoming flights launched under the auspices of NASA provided that (1) permission is obtained from NASA prior to any such retransmissions and (2) the retransmitted communications are for the exclusive use of licensed radio amateurs only. Both audio and video communications from the Shuttle may be retransmitted. (*ARRL Letter*, Sept. 14, 1983)

Satellites on Parade

National Geographic for September 1983 contains over 30 pages of satellite history. One of the foldouts, "Satellites on Parade," has paintings of satellites. Number 13 in the series of 21 paintings is OSCAR 8. The painting's caption reads, "These tireless servants have in a few years become indispensable tools in the service of communications, science and defense." (*ARRL Letter*, Sept. 14, 1983)

Monthly Listings

☐ *ASR* (Amateur Satellite Report) is available for $22 ($30 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 includes 2 units 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. QST

Strays

I would like to get in touch with...

☐ owners of Collins "S" line equipment who have any modifications, hints and kinks and other information to improve the equipment's performance. I will gladly act as a clearinghouse, whereby I will send a complete computer printout of all information received to anyone who sends me information. Joseph T. Adinolf, WB6ZWS, 1028 Fairview Rd., Ojai, CA 93023.

☐ any amateurs interested in starting a crystal swap net. An s.a.s.e. to Ken Hand, WB2EUF, P.O. Box 708, East Hampton, NY 11937.

Conducted By Stan Horzepa,* WA1LOU

PC Repeater Control

This time, FM/RPT gets into using an inexpensive personal computer (PC) to control a repeater. Repeater owners can save money using a Sinclair/Timex PC to do the job, and gain a lot of flexibility in repeater control. The concepts presented here can be used to control other equipment in the ham shack, too. So, let's dig in!

Such is the plight of many radio amateur repeater owners! Their entire hobby-allocated income for the next 20 years is spent on a state-of-the-art repeater-controller, only to discover 10 years later that they are bound by the limits programmed into the controller 10 years before.

May I suggest an alternative involving a bit more work, but resulting in greater satisfaction for prospective repeater designers? Purchase a plain-Jane repeater and use a PC for control. For the (approximately) $300 charged for a professionally programmed controller, you can have a user-programmable controller. Now, changing the personality of your repeater will be as easy as writing a BASIC program.

*75 Kreger Dr., Wolcott, CT 06716

Typical Implementation

For my prototype controller (see Fig. 1), I chose the most inexpensive computer on the market at the time, the Sinclair/Timex ZX81/1000 PC. Only occasional programming of the computer is necessary, so its nonstandard keyboard is tolerable. Two types of peripheral I/O need to take place with whatever PC you use:

1) Input from a DTMF tone decoder chip for autopatch access and operator functions (an Aptex MicroSystem 3201 chip is used here).

2) Output to a set of relays to control electrical devices such as station identifier, transmit on/off, lights at repeater site, etc (721A05 chips are used here).

The 745-0008 Diodelite LED chip shown in Fig. 1 is optional. I use it to see what digit is being decoded by the 3201 DTMF receiver. Without this LED, the only way to see what is being

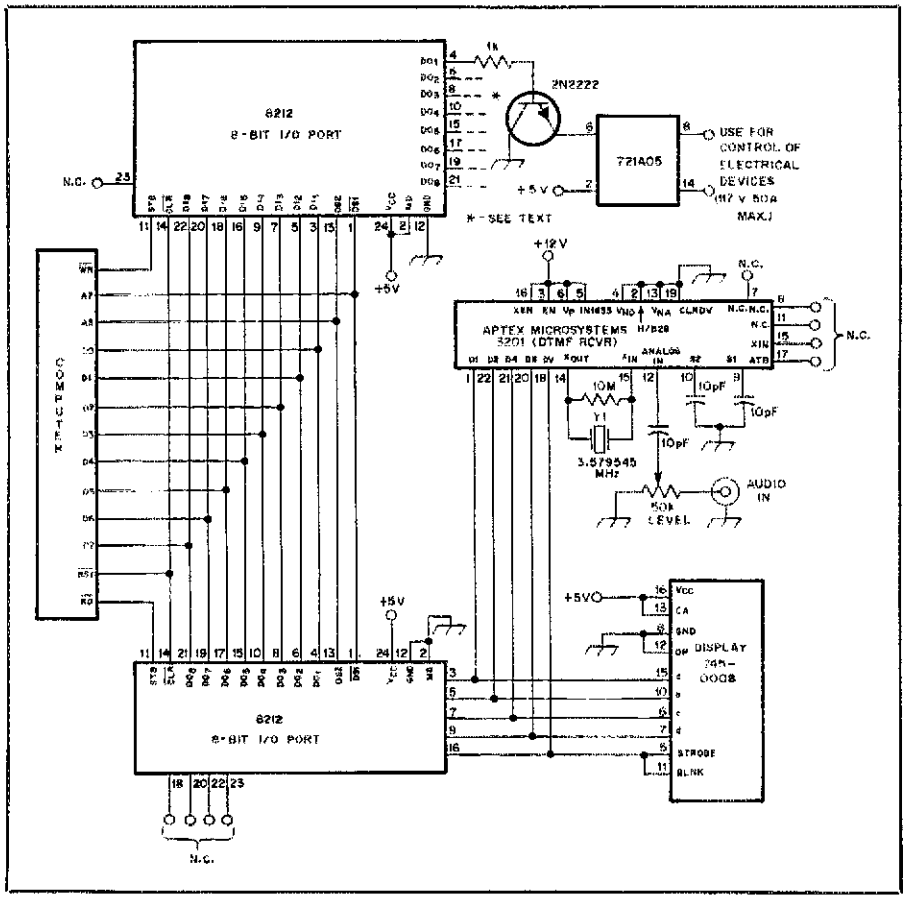


Fig. 1 — Schematic diagram of programmable repeater controller using the Sinclair/Timex computer. For more details on this circuit, write to this column's conductor.

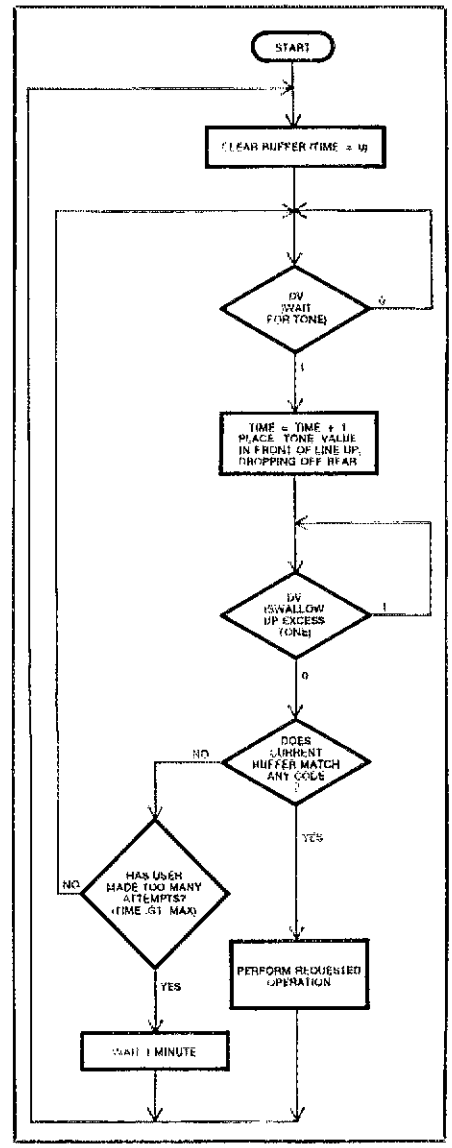


Fig. 2 — Program flowchart for repeater control via computer.

decoded is by inputting the value into your program and writing it to the computer's CRT. The Data Valid (DV) signal on the 3201 is high (1) only during valid tone interception, so using this value as the most significant bit serves as a flag to the programmer that the lesser significant bits represent a tone being detected.

Up to eight 721A05S may be used to control devices at the repeater site. The same circuitry seen on pin 4 may be used on pins 6, 8, 10, etc. of the Intel 8212 I/O controller. You may not need all eight, so only build as many as you need. The binary equivalent of the number written to this port determines which relays are turned on or off. For example, writing a 147 places 10010011 on the latch, which turns the first, second, fifth and eighth relays on and the third, fourth, sixth and seventh relays off until a new integer is sent. To toggle the second relay off, writing 145 (placing 10010001 on the latch) does this while leaving the other relays unaffected.

Possible Configurations

Fig. 2 is a flowchart of one of the many possible algorithms for a basic repeater controller. It works according to a buffer concept, which is a queue of the digits received of whatever length you desire (let's use three for this example). If you dial 3754, the buffer will contain 003, 037, 375 and 754, respectively. Each time the buffer contains a new value (four times in the above example), it will check to see if that code is used for anything. If eight relays are used, you could utilize 16 codes, one for turning each of the eight relays on and off, or eight codes, with the relay being toggled from its current value when referenced through software.

There are many functions you could program into your controller to make it unique. Instead of a boring monotone Morse code identifier, why not have two or three harmonic tones that either alternate randomly or sound simultaneously?

I have always wanted to install a private autopatch without using the conventional range-limiting subaudible system. One way this could be accomplished would be to assign your club members with their own private repeater access code. An advantage to this method is that your computer could keep track of who has been using the patch instead of using a tape recorder. [Editor's Note: The FCC no longer requires autopatch logging].

In short, the sky's the limit. Whatever can be done with a repeater and DTMF remote control can be programmed by you in BASIC. If you tire of your repeater's operation, rather than buying a whole new controller or struggling to change its ROM, you can simply write a new program. Let's see some fierce repeaters on the air, hams! — *Carl Neihart, KE5BX, Dallas Texas*

REPEATER LOG

According to reports received between July 10 and September 9, repeaters were involved in the following public service events: 28 weather emergencies, 6 crimes, 20 medical emergencies, 574 vehicular emergencies, 24 fires, 6 search and rescues, 65 public safety events, 50 drills/alerts and 10 power failures.

The following repeaters were involved (followed by the number of events): WB1DNZ 1, K1HF1, N2JC 3, K2JD 1, WB2KAO 1, WA2PAV 13, WB2RUH 1, W2VL 77, WB2ZII 5, WA2ZWP 1, N3BFL 16, W3GV 5, K3PSP 2, VE3TTT 6, W3UER 14, W3VRZ 7, W4HBB 3, K4HY 8, WB4QES 39, WA4SWF 5, W5GIX 10, W5RVT 6, WR6AOK 2, WD6AWP 14, K6BJ 1, KH6H 1, KH6HHG 6, WB6IIY 42, K6JE 1, K6LY 2, W6RHC 10, K6TZ 7, K7CC 7, W7EX 387, W7HSG 7, K7OMR 19, K8DDG 15, WA8EFG 3, WD8IEL 11, WD8SBD 2, WA8ULB 4, W9KXQ 9, WØAFG 2, WDØBQM 9, KØKKV 1, WAØRDC 2, WBØSBH 1, KØSCM 11, WØVQR 1.

In Training

Conducted By Jonathan Towle,* WB1DNL

YOUR COURSE IN AMATEUR RADIO

Fall classes have begun in most areas by now. Students and instructors should be in a regular pattern. By this time, you may also have asked yourself, "What am I doing here?" or "How did I get myself into this?" Well, you're not alone, so there's no reason to panic. To help you along, the Training Branch offers a few reminders.

For the Instructor

Remember the first time you got up in front of a room full of anxious students to start your class? You probably asked yourself several questions. If you're a seasoned veteran of the classroom, we hope you have answered most of them by now. If you're just starting to teach a course, you may still have a few doubts or need a little help to find the answers. Unfortunately, no one can give you the answers — you have to find your own. However, we can tell you that the motivation lies within you and that teaching fulfills an inner need. That is, teaching provides rewards to you as well as to your students.

Keep in mind that your goal is to communicate your knowledge to others. Don't direct your course with the sole objective for your students being to obtain an Amateur Radio License. Instead, aim your course at producing active and informed Amateur Radio operators, not someone who can simply pass a test.

As an instructor, you should be preparing the necessary materials for your class and developing a lesson plan for each session. Don't expect to be able to walk into the classroom and start talking. You'll find your students will become frustrated and lose interest. Here are some do's and don'ts to keep in mind.

Do

- introduce yourself
- make the class at ease
- clarify the class objectives
- be prepared
- use audio-visual materials
- establish a rapport with your students
- be enthusiastic
- encourage student participation
- be flexible
- provide feedback
- be yourself

Don't

- break time commitments
- waste time
- be the only active person in the room
- read a lecture
- interrupt a student
- lose student respect
- ridicule or intimidate
- discuss personal problems in class
- argue with students in class

Use your enthusiasm in the classroom to make the course as fun for the student as it is for you. The "secret" of effective teaching is keeping the attention of your students. If they stay awake and listen, they are bound to absorb something. How you present the material in class is at least as important as the material itself. Keep your students motivated by conveying your own interest in ham radio. Finally, don't forget your students — help them to get involved.

For the Student

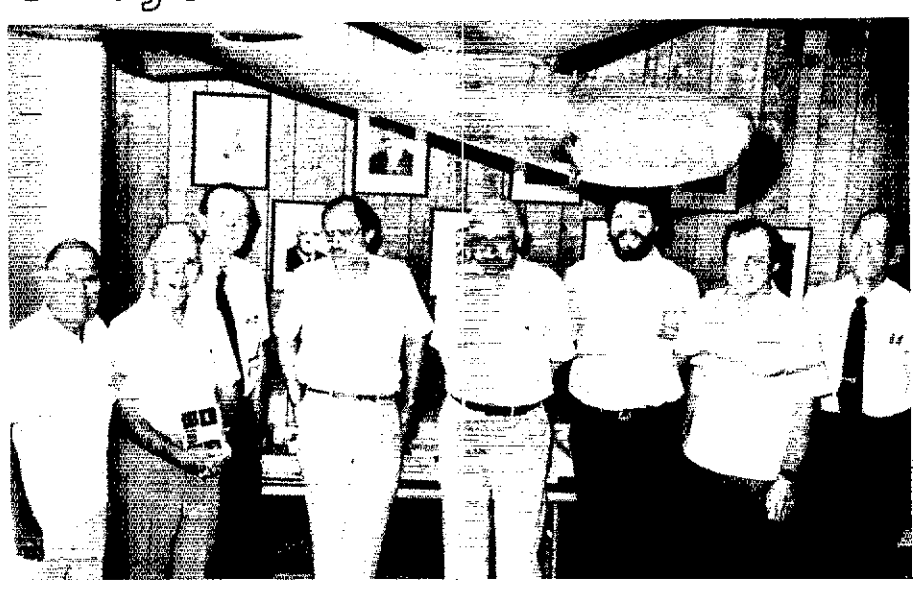
As a student, you've got it made. Sure, you know why you're there. Just sit back and relax while the instructor makes you learn about Amateur Radio. Easy, right? Well ... not quite. Your instructor can't *make* you do anything if you don't want to; you have to *want* to learn.

The student needs to prepare just as much as the instructor. Take time to read your text and do your problems before class. Remember that you are doing it for you, not for the person in the next chair. Don't just sit there. Get involved with your class. Ask questions if you don't understand or if you want to know more. Above all, pay attention. Listen to your instructor and help him or her to do the best job.

Putting It All Together

Learning can and should be fun. Work together — instructor with student, and student with instructor. Your class time is valuable, so make sure you are communicating. Ask questions often, so little problems don't become big problems. Spend some time between classes to prepare yourself. Last, but not least, make it fun. After all, it's your hobby.

Strays



League Headquarters was honored recently by the visit of famous model radio-control pioneers and *QST* authors Walt Good, W3NPS/4, and Bill Good, W2CVI. The group involved with the visit is shown standing under the R. B. Bourne/Ross Hull radio-controlled sailplane that hangs in the Hq. lobby. From left to right are W2CVI, W3NPS/4 (holding an experimental 926.1-MHz RC rig), W1CUT, N1BKE, W1DX, WB2PFB, N2BLZ and K1ONG (a champion RC model pylon racer).

Results, Field Day 1983

By Bill Jennings,* K1WJ and Mark Wilson,**AA2Z
(WØTX 2A)

On the weekend of June 23-24, 1983, we celebrated a golden anniversary — 50 years of Field Day. It wasn't a fancy celebration with speeches, decorated cakes and the like. We celebrated the 50th year of the ARRL-sponsored Field Day by doing what we as Radio Amateurs do best — getting on the air and enjoying our hobby, all the while using the Field Day exercises to test our worth as communicators under emergency conditions. That being the essence of the justification for the privileges that we amateurs have been given.

Even though it has been 50 years since that first Field Day in 1933, cultural and technological differences aside, the sights and sounds — yes, the very "soul" of the Field Day experience — has remained the same. Let's look back in decade increments at reports of Field Days past to see just what we mean.

1933. "Portables were operated from all conceivable locations and on almost all amateur frequency bands ... Participants reported insect and weather hazards ... The Field Day activities were a real trial for portables ... The reports indicate the effort successful both from the viewpoint that practical building and testing of emergency communication equipment was furthered, and from the standpoint that an enjoyable operating activity was made possible" (Sept. 1933 *QST*, p. 35).

1943. No Field Day activities held because of governmental restrictions during World War II.

1946. "Total of 1936 operators, 187 stations, and 53,622,879 (estimated) insects ... The importance of advance planning, both for equipment and operation cannot be overemphasized. Gear will pick a Field Day everytime for 'breakdowns' " (Feb. 1947 *QST*, p. 45).

1953. "But there is more to Field Day than statistics, as anyone who has taken part well knows ... No small amount of astute planning is prerequisite to a smoothly functioning portable installation on mountain or hilltop ... this, mind you, often with sleeping and culinary facilities lacking, perhaps at the mercy of the elements (snow, rain, lightning, etc.) and with the abundant miseries of poison ivy, mosquitoes, flies and other noisome flora and fauna. No, it isn't all fun and frolic. Small wonder that Field Day, as the test exercise for the ham fraternity under the stress and strain of conditions afield, has become an important part of civil defense equipment testing. The amateur who doesn't learn a lesson or two on this annual outing is a rare creature, indeed!" (Dec. 1953 *QST*, p. 48).

1963. "The annual ARRL Field Day exercise is many things to many people. Some find it an event to officially start the summer, others look to it for the competition aspects within each class. This yearly test of the emergency capabilities of Amateur Radio is all that and more ... Everyone is a winner in the Field Day exercise. The experience gained in operating away from the home location points up equipment weaknesses leading to better preparation for potential emergencies ... How ready are *you* for emergency-type operation independent of commercial mains?" (Dec. 1963 *QST*, p. 36).

1973. "Up, Up, Up! Everything was up in the 1973 Field Day held June 23-24. Conditions were great — 15 was open almost 'round the clock, 10 showed signs of life, 80, 40, and 20 were packed to the gills as usual, and 6 and 2 helped many a QSO total increase.

"Participation was up. In fact, the 12,221 participants we had this year are the most since 1967, when over 15,000 hardy souls braved the rigors of this annual event. This year, 1132 logs were submitted, representing 2805 transmitters; both of these figures are healthy increases of about 20% compared with 1972" (Nov. 1973 *QST*, p. 60).

1983. Ditto on all of the above (this page, Nov. 1983 *QST*).

Once again, the amateur's spirit of innovation, inventiveness and "can-do" ability saw the majority of the 25,552 Field Day participants, who put 4217 transmitters on the air at 1746 individual FD sites, come through the FD exercise in fine style — much better communicators for the experience.

The annual W1AW Field Day message this year happened to be special 50th FD Anniversary greetings from Senator Barry Goldwater, K7UGA. Thanks for the kind words, OM.

The following are narratives of individual FD operations that were received with this year's FD entries.

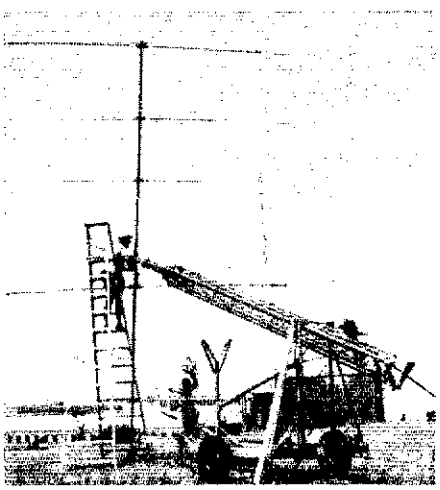
KA7BCD (1B Battery)

Anyone for Murphy's law? Murphy wasn't going to get the best of me, not Field Day 1983.

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

Out on Blake Mt. in Idaho, they believe in that old saying, "A snake in the hand is worth two in your sleeping bag." John, W7JDA, stepped on this three-foot rattlesnake while on his way to refill the generator. (W7JDA/7 2B)

J. R., KF4KS, has all the necessities for a successful Field Day at his fingertips: a working radio, a stash of Doritos and a big can of bug spray. J. R. was with the Kerr Lake Campers. (N4SW 2A-Battery)



"Beams and Ballistic Missiles" — anything goes on Field Day with the Goddard ARC. (WA3NAN 2A)

KA3IYL (in the passenger's seat) and W8JF, took to the highways in style in this vintage 1964 Morgan. W8JF's daughter lends moral support from the back seat. Note the front license plate. (KA3IYL 1C)

Mike, KM1R, puts out the welcome mat on Faulkner Island (located six miles out from Guilford, CT). (KM1R/1 1A-Battery)

This was going to be my first Field Day ever.

Preparations began weeks in advance. First, it was necessary to prepare my HW-8 for the trip. This involved finishing the RIT and QSK modifications as described in July 1977 *QST*. I also added WWV for calibration and operating convenience. Then came the final touch — the rig was calibrated to obtain maximum performance.

Was June 24 as busy for you as it was for me? The day began by making the final preparations for the antenna system. Then, as the morning turned into early afternoon, my younger brother, Lynn, (not a ham, yet) and I scouted out the preselected field day site on motorbikes.

As we arrived at the site, questions started rolling around in our minds. What will we use to support our antenna? Where will we place the rig? And what about shelter? Well, the optimum location was found and our questions were all answered.

The rest of the day was spent on the final preparations. This meant that the jeep had to be cleaned, its oil checked and the estimated amount of gas put in. The rig was given one last check. Yep, everything is in working condition.

The rig was then carefully packed to endure the treacherous two-hour drive up the mountain. Naturally, the weather was monitored very carefully — no sign of rain anywhere. What more could I ask for? Everything was in perfect condition.

The day long-awaited finally arrived — June 25, 1983. My brother agreed to go up on motorbike to be my photographer. I didn't want to forget this Field Day.

We loaded up the jeep and set out for the Field Day site. As we neared the top of the mountain, a fallen tree was blocking our path. But Murphy wasn't going to get the best of us, not this Field Day. The power saw in the back of the jeep came in handy.

Twenty minutes later, we had conquered the mountain and the so-called Murphy's law. Well, then again maybe I shouldn't speak too soon.

All the way up, the weather was just great. The equipment was unloaded and taken to the operating site. A table was made for the rig out of a couple of rocks. The Tenna-Tape antenna was strung between two old trees and was tuned for the 15-meter band. Next, the rig was set up underneath a very old tree, and I do mean, underneath! Do you give 100 points for a natural shelter?

Everything went together beautifully. Could I ask for more? By now, it was 1830 UTC and operation began. The band was crowded, but surely I would make a lot of contacts this Field Day. The key was pressed and the rig tuned. I could hardly wait for my first contact.

But what was that forming in the sky and falling to the ground? It couldn't be rain, could it? It just couldn't rain on Field Day, could it? Well, it wouldn't stay for long, right?

Well, since they don't give 100 points for natural rain, I decided to pack up the rig before Murphy got really mad. While descending the steepest dugway in the furious rainstorm, the jeep ran out of gas. Fortunately, the spare five-gallon can was filled with gas. How about 100 points for being prepared? Or just plain old, good intentions? Needless to say it rained all weekend.

Anyone for Murphy's law? Murphy isn't going to get the best of me, not Field Day 1984. — *KA7BCD*

Mankato ARC (WØWCL-4A)

If your club is like ours used to be, Field Day site selection was the first preparation made. Once the location was picked, all the rest of the details fell into place. For too many clubs, that's the way it has always been and the way it will always be. But not for the members of the Mankato (Minnesota) Area Radio Club. We decided in early April to truly test our abilities to operate under actual emergency conditions for the 50th anniversary of the ARRL Field Day. To accomplish this, we asked our club president, WBØSCN, to invite Blue Earth County Emergency Services Director Robert Shaw and Sheriff LaRoy Wiebold to pick a site for us and *not tell us until the morning of Field Day!* We thought this new twist on our plans would be the only change in our operations, but Murphy's law prevailed.

Our local Knights of Columbus chapter always provided a large tent for our shack. But this year it was booked for a wedding reception. After frantic telephone calls to the Boy Scouts, the National Guard and rental shops, we still had no tent. Forty-eight hours before Field Day, a young Novice, KAØPEB, found a family friend at the 492nd Engineering Co., U.S. Army Reserve, and arranged to use one of their tents. While this search was occurring, NØCXP informed us that her church would probably loan us a school bus to use as a shack. All of a sudden we were ready for Field Day, or so we thought.

On Saturday morning, the sheriff's dispatcher called Southwest District Emergency Coor-

Table 1
Entries Per Field Day Class

Class	Entries	Class	Entries
1A	232	2B	24
2A	491	1C	37
3A	318	2C	1
4A	116	1D	105
5A	106	2D	10
6A	33	3D	2
7A	22	4D	3
8A	14	8D	1
9A	4	1E	48
10A	2	2E	10
11A	2	3E	3
13A	1	4E	1
15A	1	5E	1
17A	1	Check logs	18
21A	1	Incomplete	9
1B	129		

The "laid back" approach to tower raising with the AK-SAR-BEN ARC. (W0EQU 4A)

The Farinon Radio Amateurs are never *stuck* for a center insulator for the dipole as long as there is a tree nearby. You should see what they sent in for Field Day *logs*. (N6SJ 3A)

dinator WBØZQN and WBØLOR. A mock emergency had been declared in Blue Earth County, and amateurs were asked to set up a communications post on the Oscar Birr farm, 11 miles southeast of the city of Mankato. As soon as the orders were received, our Emergency Services telephone tree notification system was activated, as well as an emergency net on 147.84/24, KØKLY/R.

Within minutes Mike, KAØMIV arrived at the law enforcement center to pick up maps made for us by the sheriff's department. Mike relayed detailed instructions to the net on how to find the site. Then Mike drove to the site to tell us all what equipment would be needed and to provide talk-in. Upon Mike's arrival an astonishing fact was learned: The Sheriff and the Civil Defense Director had taken the term "Field" Day seriously and assigned us to operate in a real field! (There must have been an Officer Murphy on the staff.)

Imagine our amazement when we learned we were to set up in what had been a cornfield the previous year! There were no trees or shelter of any kind. Just dirt, thistles and corn stubble everywhere!

The next people to arrive, WAØOHE, KAØPEB and WBØMHK, selected the highest point, cleared out thistles and prepared for the arrival of Field Day Committee Chairman NØCAJ and the rest of the crew. Signs were constructed and posted on the gravel roads leading to the field.

By this time, KAØMIV had returned to town and met our bus driver, WØCHT, and drove around town to pick up the tower and other equipment. Then Mr. Murphy found them. The gas gauge was broken, and the bus ran out of fuel!

Finally, by noon, we were ready to set up. That's when we realized we had no sanitation facilities. (As mentioned earlier, there were no trees to sneak behind!) When the power crew, KØCBZ and KBØKV, arrived, the two Katolight generators were unloaded and the boys were sent on an emergency run to rent a portable outhouse.

From here on things proceeded almost as planned. We had no trees to anchor our dipoles, but ham ingenuity came into play. We tied one end of the 80-meter dipole on the bus window frame and attached the other end to the top of a spare section of tower. Setting up the beam and two verticals went without a hitch. At long last, WØWCL/Ø was on the air!

Operating the four rigs was far from comfortable. The day was hot, and moderate winds blew dirt all over the equipment and operators. And as luck would have it, club member WAØWUC was video taping a crew of tired, dirty hams for the local television station where he is a producer.

We might add that media response to Field Day was very impressive! WBØMHK distributed press releases to four local radio stations, the daily newspaper and the TV station. Each was called on Saturday morning and given directions to the site, and a warm welcome to visit. Stories were read on all four radio stations before and during Field Day. The newspaper carried articles and a photo in three editions, and the television station ran a 1½-minute feature on the 10 P.M. newscast. We strongly believe involving the government officials in the Field Day plans and mentioning this in the releases greatly increased our chances of receiving publicity. Of course, having hams on staff at a radio station and the TV station and the newspaper editor's son being a ham helped our chances!

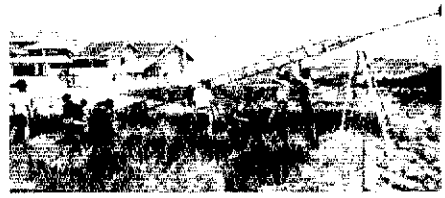
Operating went fairly well. The rigs did not blow up, and only minor sunburn, cuts and bug bites were reported. Saturday evening, a call went out on the repeater for charcoal, more 807's and more ice. KØYQX responded quickly, arriving with the emergency supplies.

Just as Field Day was winding down, good old Murphy stopped by for a visit. As soon as we shut down the generators and took down antennas, the clouds opened up and dumped 1 inch of rain in 30 minutes. Our hot, dry field suddenly became a mud hole. It took three hours to tear down the remaining equipment and drag it to the nearby road. Luck was with us, as KBØKV just happened to have his four-wheel-drive pickup along to remove the stuck cars of club V.P. WBØJYT and NØCAJ.

ARRL Field Day 1983 will long be remembered by the members of the Mankato Area Radio Club. We highly recommend that all clubs try this approach at least once! Some words of caution are in order here: Make it very clear to the person selecting the site that the words "Field Day" should not be taken literally! Otherwise, think of the worst possible place to operate from, and be prepared to use it. — *WBØZQN*

WB9VTF (1B-Battery)

This year was a Field Day solo for me. I've always wanted to try roughing one! Next year, I will ask someone along! It almost went off without a hitch, but Murphy was present. I got a late start Saturday because of work. By the time I got up to Chain O'Lakes State Park, all of the camp sites were taken. Finally, about one hour later, one site did open up and I took it. The time was now 3 P.M. and I hadn't even got my antenna strung, much less my tent pitched. Finally, I got the tent up and the antenna strung (80-meter dipole at 10 feet sloping to 5 feet at each end) and on the air by 3:30. I was using an Argonaut 505 on 10-80 meters into the dipole



The Orange Hill Contesters find FD a truly "up-lifting" experience. (NI6W 3A)

It really is *Field* Day for the KISS ARC. (K3KW 3A)

Steve, KA6OND, puts the finishing touches on the rotator at the Field Day site of the San Mateo RC. (W6LMN 3A)

without a tuner. My power source was an automobile battery that was charged the week before. Everything seemed to be doing fine until about 11 P.M. At that time, through my head phones, I could hear some vulgar noises coming from outside my tent. As I opened my tent, I could see these two bodies on horseback caught in my antenna! Well those two bodies turned out to be a couple of Park Rangers, and they were not very happy to be tangled in my antenna. I was asked to take it down or lower it. I did lower it and that is when it became much harder to compete with the strong stations. By the time the sun was rising, I had put together a vertical to use on 10, 15, and 20 meters. It worked so well, I didn't mind being off the air for five hours!

Weather conditions for Field Day weekend were 90-100° F, sunny, no breeze, no rain.

On the list for next year are another person, insect repellent and two batteries. By the time I ended, my Argonaut was down to 1 W out on ssb PEP and 1 W cw with a real flaky sounding side tone.

All in all, I wouldn't have passed it up. See you again next year. — *WB9VTF*

North Hills RC (K6IS 8A)

Our Field Day Site is the 4K Ranch, located near Somerset, California, and owned by WA6LXT. Site preparation consisted of mowing the tall grass, digging new holes for and painting the three outhouses, repainting the picnic tables, filling the 55-gallon drums with water for fire protection and miscellaneous area cleanup. In addition, a general inventory of equipment was made and needs noted.

As the members of the NHRC began to arrive in late afternoon on Friday, June 24, they were immediately advised that Randy Alexander was reported missing by his father, Robin Alexander, N6CJZ. Randy's bicycle was located near the Consumnes River, approximately 1½ miles from the Field Day site. Several ablebodied members of the NHRC with hand-held radios, accompanied by Sheriff's Department Personnel, began a search. Groups of three hams combed the rugged terrain and used flashlights as darkness fell upon the scene. The search groups remained in constant contact with a hastily arranged 2-meter net control. Field Day Chairperson NM6T had previously constructed a "Handie Truckie," which consists of a two-wheel hand truck, a 12-V automobile battery, a Kenwood TR-7950, a Mirage B 3016 amplifier, a Bearcat 200 scanner, and a 5/8-wave antenna, with lighting provided by a flexible 12-V auto cigar type lamp assembly. NM6T asked N6EJH to act as net control. The 2-meter command post was subsequently placed adjacent to a table, with a field phone that ran to the ranch house and river post. The search was called off later Friday night by the Sheriff's deputies in command. Two amateurs, NA6M and N6ICW, remained at the river all night, in hopes that Randy would return.

At the crack of dawn Saturday, the Sheriff's people begin to arrive along with Forestry Personnel, Department of Corrections Officers with two bus loads of search people from the Growlersburg Facility. In addition, five people on horseback, two bloodhound handlers, scuba people and the California Highway Patrol Helicopter arrived.

The various search parties had no common radio frequencies, and each agency used different type codes. The value of Amateur Radio became acutely apparent. NM6T asked KB6HP to assist N6EJH with the Amateur Radio Command Post. The Bearcat scanner was set on the frequencies of the CHP search helicopter and Sheriff's ground units. Low-level 2-meter simplex and repeater frequencies were copied and relayed by the command post.

Mountainous conditions prevented one agency from contacting another at times. Amateurs with hand-held radios accompanied various search groups and were able to assist in mutual communications and coordination via the Amateur Radio 2-meter base station. The search for Randy continued through the Field Day weekend without success. Despite the heroic efforts of the Sheriff's Department people and many volunteers, no trace of Randy has been discovered. As of this writing, the search continues, as do our prayers for successful conclusion to the search.

El Dorado County Sheriff Richard F. Pacileo indicated that he was most pleased with the involvement between the assembled search agencies and the Amateur Radio Operators, who exhibited such sophisticated and efficient communications systems. He is preparing a letter of appreciation for the assistance rendered by the involved people from the NHRC and others.

Left to right are KF4VV, N4QB, K4ELV and N4OKD, who "get down" to get "up" for Field Day '83. (N4QB 1A)

This year marked the fiftieth anniversary of Field Day, an exercise designed to practice and refine ham skills for times of emergency. In summary, the proclamation by California Governor George Deukmejian states: "Whereas, operators are on a continual alert to furnish vital emergency communication facilities in times of accident or natural disaster, such as the Coalinga Earthquake ..." This challenge was unexpectedly presented to the members of the NHRC who quickly proved they could cope with the emergency situation as expected of them in providing service to their nation and community. — *NM6T*

W6PW (3-D)

The San Francisco Radio Club held its annual Field Day observance aboard the last liberty ship, the *S.S. Jeremiah O'Brien,* which has become part of the Golden Gate National Recreational Park. The radio room aboard the ship has been restored to its original World War II condition by several members of the San Francisco Radio Club. The entire ship has been completely restored so visitors have the opportunity to visit and see just what it was like for the many soldiers and sailors who sailed these valiant ships. The ship is open to the public every day, and every third weekend of each month, the fireroom is "lit-off" so visitors can see how the engines operate. Once a year, the ship is crewed and sails the San Francisco Bay, and visitors can have an opportunity to sail aboard the ship.

At the invitation of the captain and the crew of the ship, the San Francisco Radio Club was invited aboard the *Jeremiah O'Brien* for the purpose of observing the ARRL Field Day and operating aboard the ship. A "blind" eye was turned to the club when they began installing antennas that were not "exactly" World War II vintage; in fact, one old salt remarked upon seeing WA6DDM's TH-3 Jr. Tri-bander: "Gosh, I don't remember seeing one of those aboard liberty ships." Jim told him that during World War II, they were classified; you weren't supposed to see them! All in all, approximately 30 Club members participated in the *S.S. Jeremiah O'Brien* Field Day. Many visitors came aboard to visit the ship and found a bonus. Club members handed out literature explaining the purpose of Field Day and demonstrated what we were doing. It was further explained that if San Francisco has another severe earthquake someday, perhaps the Liberty Ship might become an ideal location for emergency communications.

The San Francisco Radio Club decided to hold its Field Day aboard the *S.S. Jeremiah O'Brien* because we wanted to see if it would indeed be feasible as an emergency operating site in the event of a natural emergency. At the conclusion

of Field Day, it was decided that, indeed, the *S.S. Jeremiah O'Brien* was a very good site for emergency communications.

Three transmitters were used, and dipoles for 80,40 and 20 meters were employed, while a 3-element beam (TH-3 Jr.) was used for 15-10 meters. Aboard was a ship's emergency generator, but because of operating expense, it was not used. Commercial shore power was used, although, next year, the club plans to employ other power means. Food was prepared by the ship's cooks, and berthing was available (although little used!) — *WA6DDM*

Adios, FD '83

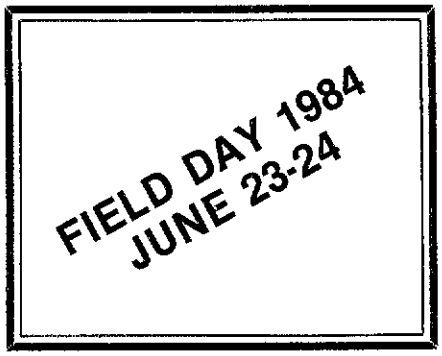
Let's give a big "thank you" to contest aides Linda Kraut and Bruce Press, KA1CUT, for their help in readying the FD scores for this report.

That's about it for FD '83. Happy 50th anniversary, Field Day. May you have many more.

Please try to join us for FD '84 and help celebrate the 51st anniversary.

FEEDBACK

Please refer to November 1982 *QST*, pages 85-94, for the following corrections. The Belleville AR Foundation, K9BGL/9, should have been listed with the 1A stations, not with the 4A stations. Their score of 4728 points puts K9BGL/9 in fifth position in the 1A category. The operators of the Northland ARA, KØMAT, forgot to check the battery box in the power source column. The KØMAT score in the 1A-Battery class would be 4270 points, for a tenth-place finish in that category. A clerical error on our part resulted in the Westside Radio Club, VE3JJ, being listed in class 10A-commercial rather than in class 4A-commercial, where they belong. Their score of 3664 points remains the same. The Foothills ARS, K6YA, number two in the 4A class, should have been credited with an additional 1000 bonus points. This would raise the K6YA total score to 13,402 points, but does not change their standing within class. A little mix-up in the mails prevented the Schenectady ARA, K2AE (+ KA2DVM), from being listed correctly in the 5A category with a linescore of 2387-B-50-8416. The South Eastern Michigan ARA sent along their missing dupe sheets; thus, they move from the "incomplete" list to the 6A class with a line score of 2326-B-40-6718. W4OGG's ID entry got lost in the shuffle, but should have been listed as 142-B-284.



Scores

Class A stations are clubs or groups operating portable with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation. The listings show club or group name, call(s) used, total number of QSOs, letter indicating highest power level used (A is less than 10 W; B is less than 200 W; C is more than 200 W), number of participants (if known) and total score including bonus points. Scores are listed from highest to lowest in each class.

Class B stations are those portable manned by one or two operators. These may have one or two transmitters in simultaneous operation. Class 1B stations manned by one operator are listed first, followed by those with two ops, followed by Class 2B stations. When there are two operators, the other operator's call is listed in parentheses, if it is known. Numbers following the calls indicate QSOs, power and final score.

Class C stations are mobiles. They are listed by call (number of operators), QSOs, power and final score.

Class D stations are home stations using commercial power. Line scores are the same as for Class C.

Class E stations are home stations using emergency power. Line scores are the same as for Class C.

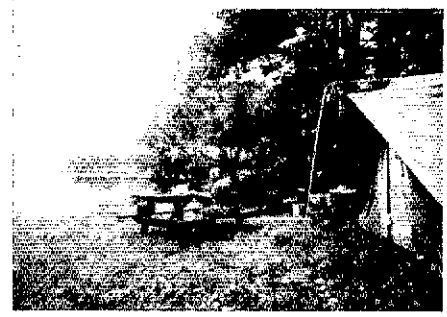
An asterisk (*) following the call sign in classes A and B indicates that the group did not begin setup until after 1800 UTC Saturday.

Club/Non-Club Portable
1A-Battery

Guano Reef Bashful Perverts
N4BF/4* 965 A- 3-7730
Northern Illinois FD Assn.
K9RS 725 A- 6-7450
Central Carolina HX's
N4DAZ* 684 A- 6-5765
CRA Sorri-Tracy
VE7CBS 530 A-20-5445
Virgin Islands ARC
KV4IE 813 A- 8-5395
Morrice,Minnis,Barthelow & Goldman
WB6ITM/6* 542 A- 4-5175
Elgin ARS
W9IKN 458 A- 4-4680
Massillon ARC
WBNP* 427 A-10-4640
Guilford CO Radio Group
KM1R/1* 406 A- 3-4430
Pacific Northwest Alpine International QRP Assn.
W7EL* 413 A- 4-4430
The Principia College ARC
WØVM 394 A-11-4340
RCA ARC
N9RJ 704 A-18-4415
Arrowhead RAC
WØCKP 494 B- 6-4185
Idaho Contest Conspiracy Group
K7TM/7 835 A- 4-3912
Three Musketteers ARC
VE7AAP 399 A- 3-3770
E. Alab. ARC
KE4T 577 A- 9-3555
High On Aspen All Solar ED Party
KAØLRW 327 A- 3-3470
The Crazy Expedition
KICE* 291 A- 4-3310
Surely Temple Solar Society
WBØEET 782 A- 8-3215
USA6 Mars, Hawaii
KH6IJ 541 A-20-3060
Gennison Valley ARC
WØGYV* 1017 A-11-2790
Diamond Bar ARS.
W6HCP 435 A-14-2775
Calabogie Reg'ers
VE3JRT 250 A- 6-2700
Northern Lites QRP Assoc.
K7RR/7 301 A- 3-2570
The Drenched Mountaineers
KØBP* 1126 A-11-2544
Confederacy of Idiots
WB5KUO 365 A- 4-2500
Escambia County MC
N4QV 702 B- 7-2486
University ARC
KB7M 706 B-10-2174
Winnipeg DX Club
VE4AA 864 B- 9-2128
Harry Diamond Lab RC
K3TC 589 B- 5-2038
Four Hams and a Little Bacon
WC4B* 600 B- 5-1982
OQUIRRH Sunshine Hill Independent Team
N7ARE* 323 A- 4-1950
Houston Echo Society
K5PGS* 277 A- 2-1910
Morris and the Cheshire Cats
KA1VR 771 B- 5-1842
Non-Club Group
KU6X 847 B- 4-1794
Trapline QRP
VE7CRQ 182 A- 1785
C.L.A.R.A.
WØLSD 832 B- 3-1764
Huron ARC
WØHOZ 661 B-10-1622
South Florida Hamsters
N4FL* 559 B-20-1616
Jefferson Co. ARC
WD5SSV 493 B-15-1596
Non-Club Group
WA6YEU 316 B- 4-1564
Non-Club Group
KØMP* 441 B- 3-1544
Sterling Heights Independent Phone Team
AA8W* 515 B- 4-1530
Jessamine Amateur Wireless Society
WB4CWF 337 A- 1490
Worldradio Staff ARC
NØWR* 467 B- 6-1384
Midway ARC
WØKY 394 B-43-1380
Utah Band Buzzards
KA7LUK 657 B- 3-1170
Albemarle ARC
NM4R 566 B 16-1284
Mich QRP Club
W8LCD* 124 A- 3-1215
Northern Panhandle ARC
WØZQ 362 B-10-1024
Irvington R.A.C.
K2QQ* 347 B-20- 930
Marshfield Area ARS
KB9SS 344 B-18- 886
Steamboat ARC
KCØZQ* 236 B- 4- 778
Non-Club Group
KJ6F* 190 B- 4- 580
Lehigh Valley ED Society
W3ZMN 158 B- 4- 538
Canadian Broadcasting Corp. ARC
VE7CBC* 135 B- 3- 470
Santa Fe ARC
WSYE** 88 B- 3- 457
Benicia ARC
K2CMT/6* 30 A- 3- 440
The Oggsters
NØBMP 727 B- 5- 432
491 Simplex Crew
W7AZU 77 B- 4- 424
Arkansas Valley ARC
NØFS* 153 B- 8- 406
Penny Pines Brass Pounders
N6FMR 28 A- 3- 380
Green Lake Sailors
K9NWM/9* 93 B- 3- 372
AHRL Board Membership Affairs Committee
WIØHR* 1 A- 3- 105

1A

Father Leon's Group
N9AG/9* 1770 B- 5-6152
7 MC DX Group/Shenango Valley AR ED Group/NOARS
K3LR 1786 B- 3-6034
Aduntas Radiotelegraphers RC
KP4EA* 1246 B- 4-5484
Raiders of the Lost ARC
N5RO 1490 B- 8-5102
Rizo and the Lids
W9TG 1093 B- 4-4772
Belleville AR Federation
K9BGL/9 1048 B- 3-4600
Muskogee ARC
W5KJK 1966 B-20-4576
St. Mary Parish CD Group
AC5T 1066 B- 7-4432
Contest Oriented Operators Nat'l Soc.
N4QB 1007 B- 4-4428
Holbrook Allstar Wireless Gang
KIØW 951 B- 8-4400
Thibodaux ARC
W5YLI* 1507 B-10-4147
Mercer County ARC
WIILE* 1227 B-14-4107
Cherokee Lodge R.C.
N2DC/2 919 B- 3-1976
Pro-Search ARC
KØVUW 1758 B- 4-3884
Sterling Heights Independant CW Team
WRØMP 821 B 4-3768
Radio Amateur Contest Operators Operating In Natural Surroundings
K4ZR 780 B-18-3670
Athens County ARC
NC8V 1417 B-20-3570
The Motley Crew ARC
KE9H 1582 B-17-3528
Greenwood F.D. Group
K5RI/5 805 B- 3-3520
Callaway A.R.C.
NØNT 852 B-19-3418
Batesville ARC
NG5M 799 B- 4-3396
Chollas Heights Pole Climbing Hardline Hanging Society
AB6H 1695 B- 5-3190
Ozarks ARS
KØFA 1332 B-25-3190
Rebel ED Society
KC9RO 770 B- 4-3180
Stonemar Lake FD Group
N7RK 1128 B- 6-3116
Litton ARC
KR6D 1414 B-12-3128
Collins ARC
K5CQ 1100 B-35-3068
Los Alamos Amateur R.C.
W5PUO* 909 B- 9-3050
Owensboro (Ky.) ARC
K4RY/4 837 B-18-3044
Rotten Radio ARC
WK4D* 1102 B-12-3032
Delta DX Assoc.
W5RU* 826 B-12-2974
Winona ARC
WØNE* 999 B-22-2964
Captain America's Legal Manoeuvres
KB5CA 1193 B- 6-2936
Hill & Swamp Country Bunch
KC5ZT 869 B-12-2922
Denton Co. ARC
W5NGU/5 1009 B-15-2898
10M ARC - San Jose
K6KL 811 B-12-2878
Mid-Ohio Valley ARC
KC8JR 1339 B- 3-2878
OSU ARS
W5YJ/5 792 B-10-2838
York County ARS
K4YLZ/4* 951 B-16-2820
S. of the Brazos DX and Poker Soc.
N5RN/5 907 B- 6-2814
Old Pueblo RC
WJGV 843 B-35-2722
Wabashn Area ARC
KB9S 907 B- 5-2656
Associated Radio Amateurs of Southern New England
WJAQ* 816 B-12-2598
Dr. Loomis Memorial Junior Mechanics League
NA4M* 790 B- 9-2568
The Renegades
WF4I* 868 B- 5-2504
Douglas County ARA
K4PI 850 B-12-2468
Miami County ARC
WBØW 874 B-10-2452
Independence ARC
KØPUX/Ø 666 B-35-2412
807 ED Group
WB8UCW* 953 B-15-2410
New Mexico State Univ ARC
WSGB 951 B- 5-2404
Tri-City Rptr and Ottawa ARC
WBYEK/8 755 B-20-2357
Chibi's Flea Pick'n Super-dupers
KF6AM 577 B- 3-2308
Northern Illinois Contest and Drinking Society
KØHV/9* 648 B- 7-2294
Lucky Lester's CPA QRPers
KF4H 364 A- 6-2220
Greater Bridgeport ARA
KK1V 595 B-10-2200
Keybeupers ARC of Sedro-Woolley U.S.
KC7EE 979 B- 6-2158
The Granite State Hilltoppers
AB1T/1 867 B- 6-2134
Sussex ARA
K3IL 524 B-12-2124
Harrison Twp. Fire Dept.
KI8Y* 607 B-10-2124
Overlook Mtn. ARC
K2HA 603 B-10-2120
Sharon ARA
KIJNQ 768 B-15-2092
Lower Yellowstone ARC
NJAQQ 571 B- 7-2076
Great Bend ARC
KØKD 893 B-10-2066
Collins RC
WA7JOF 767 B-12-2046
North Coast Contest Club
WB8BTQ 856 B- 5-2026
ARC of Central Wisconsin
NØBBN* 758 B- 9-2020
CCM ARC
K2MBZ 485 B- 5-2012
Wallingford ARS #2
KA1YL* 520 B-20-2004
Red River Valley ARC
WB5RDD 624 B-15-1982
Wolf Ridge Emergency Contest Communication Station
K4ME 372 B- 5-1888
Utah Code Net
NA7G 397 B-10-1888
Kitimat & Terrace ARC
VE7DRW* 539 B- 6-1854
Maui ARC
KH6RS 533 B-12-1852
The Utah Liquor Commission
KC7O 759 B- 5-1828
SRO/CFMC
WB9EJ 666 B-23-1828
Software Techniques ARC
KK2E 576 B- 7-1820
Orangeburg ARC
AD4U* 745 B-20-1798
Great Falls Area ARC
WI4SW 790 B-10-1777
Murray State Univ. ARC
KI4W 603 B- 7-1688
Shell ARC
K9SOA* 1457 C-11-1669
Shelby County ARC
KU4AF 668 B-15-1668
C.R.A. Sud-Ouest
VE2CKV 391 B- 8-1664
Bobby's Blasters
N6ZB* 1269 C- 3-1651
DS Guys
W7AEP 767 B- 3-1624
Signal Hill ARC
KØHP 569 B-10-1612
Central Missouri R.A.
KØPCK 583 B- 6-1610
UH-2
N6FKA 697 B-14-1594
Very Fine Operators
N6KG* 407 B- 5-1588
Northeast MS ARC
K5DGL 511 B-15-1574
Theodore Roosevelt ARC
KØND* 486 B-28-1547
The DX Kids
K8ZR 458 B- 5-1516
Colorado Code Crankers
WØNT 467 B- 3-1488
North Kitsap ARC
WJ7V/7 597 B-15-1464
Imperial Valley Amateur Radio Assoc.
W6NST* 401 B- 3-1452
District 22 ARES Co.
WHØTUB/Ø 541 B-20-1428
Mickey Mouse and his Looly Gang
KA1MM 497 B- 7-1402
Clearwater ARS
KO6J 549 B-25-1398
N.E.R.T. - BARS
N8CAH 571 B-17-1380
Non-Club Group
WA5ZKP/5 539 B- 8-1378
Sabine Valley ARA
N5ANN/5 493 B-15-1372
Texans ARC
K5OJI 441 B-25-1356
Hastings ARC
WØWWV 509 B-15-1356
Ham Hill Gang
KC3AQ* 474 B- 6-1330
McLean County ARC
W3VV 553 B- 4-1306
Barron County Wis. ARES
W9MP 427 B- 3-1282
Huron County ARC
KFBO 531 B- 5-1262
Northern New Mexico ARC
N5EPA 396 B- 4-1230
Bell System of Indiana ARC
W9ZW 405 B-16-1180
First State ARC
K3QBD 488 B- 8-1176
Eastern Nevada ARS
WB7WTS 378 B-17-1156
Lake Martin ARC
K4YWE 374 B- 7-1148
Lima Area ARC
WB8Q* 278 B- 7-1136
Fort Armstrong Wireless Assoc.
W3SFA 621 B-14-1126
Saratoga Co. RACES
KG2H 419 B- 7-1080
Bismarck AR Club
WØZRT 379 B-20-1058
Georgian Bay ARC
VE3KPT 331 B-15-1050
Dusty's Rangers
WB2UBL* 337 B- 4-1040
Richland Raiders
KD7BK* 360 B- 8-1034
Society of NFLD Radio Amateurs
VO1AA 398 B- 4-1026
Ellis County ARC
WD5DDM 417 B-15-1024
West Nebr ARC
WØAFG 444 B-15- 997
University of MO-Rolla ARC
WØEEE 387 B- 5- 984
Club Radio Amateur de Charlevoix
VE2CCX 189 B-36- 956
East Mountain RC
VR5LM* 238 B-11- 930
Wake Tech College ARC
WB4TOP 169 B-23- 927



Walt, KA1ITX, was lucky to receive some help in stringing his antenna from some interested passers-by. Debbie and Kathy showed up with their canoe, while Tim and Nancy offered the use of their motorized raft. Walt enjoys the fruits of their efforts. (KA1ITX 1B-Battery)

Suwanee River Send-Sations
KA4MPZ 347 B- 6- 912
Cache ARC
WA7MXZ* 216 B- 5- 912
Hiawatha ARC
KØNL/Ø 248 B- 7- 896
WBØCS
WØCBR 376 B- 7- 894
Indian Hill ARC
NØRF 796 C- 8- 894
Univ. of Central Florida
WB4TGW 363 B- 5- 890
Kennydale Key Klicks
WJ1E 287 B- 4- 888
MacLean's Mercenaries
VE3QST 390 B-10- 880
Yolo County Amateur Society
KoHAC 353 B- 864
Big Bear ARC
WØAT* 310 B-19- 848
Mason County R.C.
KBØXF 360 B-15- 820
Emerald ARS
KA7C 367 C-37- 808
Wallingford ARS #1
KB1ES* 233 B-20- 804
Hays ARC
KCØPT 302 B-10- 804
Three Rivers ARC of Nebraska
KAØDCC 191 B- 3- 798
EMA R.C.
KØCFV/Ø 296 B-20- 792
Lakes Area ARC
N5BJ 345 B-10- 790
Honey Lake Hams
KA9ADJ 342 B- 4- 784
ARC of Carrollton
KB5A 270 B-25- 740
Sacramento ARC
W6AK 313 B- 7- 726
Non-Club Group
VE4GM* 237 B- 4- 714
RF Hill ARC
W3AI* 167 B- 7- 684
G.E.R.C. ARC
WBiS 185 B- 5- 682
TCC Group
WB6WMI 234 B- 5- 668
435 Club of South Texas
WA5TWT 252 B- 4- 604
Flathead Valley ARC
K7LYY* 199 B-42- 598
VE4 Micro 80 Club
VE4TRS 191 B- 7- 582
Central AR Emergency Net
W5FD 227 B- 8- 554
Benton County ARC
WBØGTV* 263 C-10- 543
Lehigh Valley Field Day Soc.
W3ZMM 158 B- 3- 538
Thatuna ARC
WB/TBM// 208 B- 6- 524
Morongo Basin ARC
KS6T 192 B- 8- 484
220 Club of San Diego
WD6HFR 76 B- 452
Streator ARC
K9CAU* 86 B- 8- 372
Benison ARC
NØDQS* 168 C- 5- 368
Non-Club Group
WBØBJP 124 B- 3- 348
Albert Lea Spiderweb ARA
WØKIT/Ø 68 B- 8- 336
Half Moon Area RC
WB6ASD* 91 B- 6- 282
Pussantawney ARC
W3FF 40 C-18- 140

1A-Commercial

Getting Loaded AR Foundation
K9CL/9 451 B- 8-1182
Mountain Emergency Network
WB4F* 308 B- 6- 616
Keowee-Toxaway ARC
WA4MLY* 155- B- 6- 490
Principia College ARC
KØBO 170 B- 8- 468

2A-Battery

Arapahoe RC
KØNA* (+KAØQOU)
2013 A-19-15,400
Conn. Wireless Assn.
WIRM* (+KA1BUQ)
1682 A-14-15,235
Meriden AR
W1NRC* 1383 A-20-11,885
Kitty and DX Mix
KB8LB 1367 A-12-10,125
Southwest Ohio Contesters
K8PL* 1083 A- 8-7460
Walton Radio Assn.
W2LZ* 637 A- 8-6875
Western Ky DX Assn.
WM4N 948 A- 9-6870
Montachusett ARA
WIGZ (+KA1CMD)
813 A-20-6285
FD AR Telegraphy Society
WA6EUZ* 566 A- 3-6060
Sticky and the QRP Bulkhead Bashers
N7RT 699 A- 3-5765
Harper Air Hawks
KN9W* 643 A- 7-5695
Thumb ARC
W8AX 596 A- 7-5610
Great River ARC
WØON/Ø (+KAØMRN)
904 A-10-5100
Best of Mt Baldy
N6DX* 723 A-48-5000
Nanaimo ARA
VE7NA* 1600 B-16-4722
Tamaqua Area ARA
W3VA 1271 B-25-4606
Hendricks County Ham Club
N9ACD 1375 B-18-4454
Elkhart Red Cross A.R.C.
WØXD 1053 B- 5-4010
The A Team
W4RM* 407 A- 5-3805
Sandy River ARC
W1KX 1131 B- 8-3802
Sun City of El Paso RAC
K5WPH* (+N5FAZ)
479 A- 9-3800
Capital City ARA
NR4A (+KB4BDW)
1101 B-20-3732
Morton Amateur Radio Club
W9EEB (+KA9MCQ)
1040 B-16-3650
Oneonta ARC
KC2M1* (+N2CZL)
423 A-10-3610
Pine Bak ARC/Featuring the 2 Whats
WA6POC 340 A- 5-3315
Clallam County ARC
W7FEL (+KA7KNH)
174 A-30-3275
Robious Road ARC
K4WBW 1047 B- 4-3180
Pine State ARC
K1CZ 842 B-10-3172
Kerr Lake Campers
N4SW 1298 B- 6-3096
CFB Petawawa ARC
VE3PET/2 543 A-11-3075
Top of Panhandle ARC
N5AE/5 290 A- 7660
South Whidbey F.D. Group
K7WA 693 B- 5-2408
Extra Efforts
N9AX* (+N9UXY)
316 A- 6-2325
Milford ARC
WB1DK* (+KA8RJP)
809 B-15-2186
Naval Post Graduate School ARC
K6LY 704 B-12-2152
Mammoth Cave ARC
KD4SS 647 B-16-2120
Granite State ARA
K1RD (+KA1JDL)
590 B-10-2090
Kern Valley ARC
W6OLW 703 B- 8-2042
Va Tech AKA
K4KDJ 567 B-12-2022
Rolla Regional ARS
WØTA* (+KAØOPE)
540 B-32-1924
Hollywood ARC
KM4Y 186 A-13-1875
Memphis RC
K8AJ 650 B- 1834
The King and his Court
NA2K* 636 B- 7-1772
Friendly AR Transmitters Society
W3TV* 175 A- 3-1760
Volunteer Wireless Society
WE4S 541 B-15-1614
Paducah ARA FD Group
N2AK 562 B-11-1558
The Morning Show
VE7LAW 582 B-13-1464
Elmo Rptr Assn. Bev. Consumers Group
KC2P* 565 B- 9-1430
Lima QRP Group
N8EAA (+KA8OFT)
169 A- 3-1405
Adventurers Radio Group
KW7C 325 B- 6-1342
Cass BK-ARC
KØAQO 439 B- 5-1296
Pecos Valley ARC
W2RRY (+N5ECE)
344 B- 3-1280
Western Pennsylvania FD Assn.
W3WGM 499 B- 5-1198
Lockport ARA
W2RUT 376 B-11-1134
WB6ZQZ FD Group
WB6ZQZ 458 B- 6-1122
Alamo Mountaineers
WAØQZW* 279 B- 936
Ottawa Valley Mobile RC
VE3RAM 344 B- 5- 888
Clearwater Valley ARC
KY7J* (+N7EHT)
116 A-13- 880
3 Generations
WB5CGJ 171 B- 3- 826
Quad County ARC
WA3CHR (+KA3FHV)
95 B-15- 492
Long Beach ARC
WB6TAN 84 B- 6- 368

2A

Mad River Radio Club Mich. F.D. Group
KBCG (+KABLES)
2909 B- 6-8754
Ohio Valley ARA
W4FU/8* (+KABSEG)
2676 B-20-8614
Heart of America RC
WØRR (+KAØQEX)
2699 B- 8376
Richardson Wireless Klub
K5RWK 2817 B-48-8326
The ARC of the Ohio State Univ.
WBLT (+KABRUL)
2311 B- 8-8214
N. Arkansas ARS
K5UC (+KA5PFV)
2799 B-15-7884
Desert DX Corps
AA7A/7 2475 B- 6-7616
Grand Rapids ARA
WBDC (+N8ETN)
2451 B-32-7276
Northern Berkshire ARC
K1FFK (+KA1IOV)
214 B-23-7240
Rockwell International ARC
WBTFZ/8* (+KA8HFO)
2175 B-15-7148
Flyweight DX Group
W6JD (+KA6ZZC)
2377 B-25-7018
Mobile ARC
WD4D* (+KA4ZCO)
2346 B-40-6962
Central Kansas ARC
KØWA 2060 B-15-6802
Radio Amateur Tech. Soc.
W9RM 2233 B-10-6794
The Western Illinois ARC
W9AWE (+KA9EYT)
2124 B-15-6598
Montrose ARC
KJØC* (+KAØCUD)
2134 B-17-6550
Mid-Mo ARC
NØSS (+WBØTPN)
1955 B-15-6474
Kanawha ARC
WBØK (+KA8MTC)
2064 B-21-6442
Soothing Libations Consumer Corps.
W8XU 1686 B- 8-6406
Gallatin ARC
W7FD 2040 B-13-6360
Salt City DX Assn.
K2NY/2 (+KA2AJK)
1828 B-28-6336
Azalea Coast ARC
K4UWH 1914 B-12-6044
W/K ARC of Greater Milwaukee
N9AW* (+KA3GAZ)
(814 B-11-5798
Cedar Valley ARC
WØGQ 1586 B-12-5794
N.I.R.A.C.
K9SA (+KA9JZT)
1682 B-15-5790
Northern Arizona DX Assn.
W7GYX 1936 B- 5-5680
Ski Country Echo
WØKEA (+NØENR)
1751 B-17-5664
Wooster Wireless Operators
K8MFO (+KA3NUV)
1709 B-13-5650
Radio Amateur Megacycle Soc.
W9UY* (+KA9PFE)
1398 B-10-5604
ARINC ARC
W3ZH/3 (+KA3IEN)
1626 B-20-5592
McDonnell Douglas Astronautics ARC + Southern Calif. Amateur Net
W6VLD 2090 B-12-5562
Ten Four Gud Buddies
NM6A (+KB6AZN)
1641 B-10-5520
Rankin Co. ARC
KV5R (+KA5OGD)
1141 B-11-5516
Motor City RC
WBMRM (+WD8KZU)
1646 B-40-5494
American Bel Denver ARC
WØRG 1771 B-12-5488
Telco ARC
W6MPH 2199 B- 8-5447
Mecklenburg ARS
W4BFB* 1745 B-23-5378
Rochester (NY) DX Assn.
W2TZ* 1880 B- 8-5374
Ole Virginia Hams ARC
N4RS 1522 B-25-5368
Edison Radio Amateur's Assn.
WBICM (+KA8JSI)
1510 B-24-5280
Sheboygan County ARC
WØRF (+KA9UPS)
705 B-25-5250
A.K.T.S.
W4CM* (+KBØDDV)
1647 B-65-5224
Sussex County ARC
N2JV (+KA2UFF)
1419 B-23-5206
N.W. Arkansas ARC
N5XR 1472 B-24-5166
St. Louis Police ARC
WØEF (+KAØPAE)
507 B-16-5136
San Angelo Amateur Radio Club
WSQX (+K5WIV)
1631 B-25-5118
Story County ARC
NAØI (+KAØJEL)
1496 B-14-5038
Dayton ARA
WBØI (+KA8GYV)
1603 B-30-5036
Virginia Beach ARC
K4IX (+N4IGR)
1307 B-50-5034
Sevier County ARC
K4XU 1285 B-10-5028
Tuscaloosa Amateur Radio Club
W4XI 1656 B-25-5024
Ham Assn. of Mesquite
KW5A (+N5ALB)
1457 B-26-5006
Austin ARC
W5KA 1512 B-20-4984
South Lyon Area ARC
NBAR* (+KA8SIC)
1512 B-50-4926
Bartlesville ARC
W5NS* (+KA5QLL)
1361 B-43-4890
State Line R.C. of NY & NJ
K2LSA (+N2JVO)
1526 B-20-4832
Ottumwa ARC
NØSM 1316 B- 7-4772
Bell Laboratories and Western Electric Urea ARC
WBZPF 1501 B-15-4774
Lynchburg ARC
KA1HEX (+N4EDS)
1520 B-26-4712
Laurel ARC
W5NA (+N5DWU)
1311 B-16-4636
Ft. Smith Area ARC
W5ANR (+KA5PZR)
1521 B-30-4550
Kettle Moraine R.A.C.
NØKS (+KA9LIT)
1517 B-27-4550
Wichita ARS
N5FX 1473 B-28-4548
Muncie Area ARC
K9NN* (+KA9PIV)
1239 B-25-4512
Ottawa ARC
VE3RC 1203 B-20-4482
Shenendoah Valley ARC
W4KKC 1389 B-26-4464
Broken Arrow ARC
W5DRZ (+KA5QXV)
1142 B-25-4442
Medina Two Meter Group
K8TV (+KA8DSP)
1149 B-74-4442
East Bay Amateur Wireless Assn.
N1RJ 1344 B-15-4408
Jet Propulsion Lab ARC
W6VIO (+WA6VQI)
1254 B-24-4382
Kingsport ARC/Bays Mountain RC
W4TRC 1223 B-15-4380
Goddard ARC
WA3NAN (+KA3IEF)
1476 B-25-4378
Robbinsdale MN ARC
KØLTC 1409 B-40-4374
KAW Valley ARC
WØCET (+KAØLIA)
1514 B-23-4374
Tuscon IBM ARC
K7KZ (+N7ERC)
1292 B-14-4332
Utah ARC
W7SP (+KA7PIN)
1354 B-27-4272
Cape Fear ARS
K4MN (+N4EWC)
1286 B-42-4272
Hoosier Lakes R.C.
K9RD 1508 B-20-4164
Calumet ARES
W9EWC/9 1037 B- 8-4162
Blue Ridge ARS
W4NYR (+K4GWY)
1214 B-35-4050
Inter-County ARC
W2NY* 1350 B- 9-4030
Northland ARA
WØGL (KAØQMA)
1113 B-50-4030
Morgan Co. ARC
K9XX* 1169 B-22-4022
MARCOM
K3RY 1041 B- 7-4004
Intermedics ARC
W5PWC/5 (+KA5NXA)
1216 B-23-3980
Anoka County RC
ADØT 1221 B-13-3842
Northeast Missouri ARC
WØCBL* (+KAØEFS)
1070 B-20-3836
Milford ARC
AC8M 1228-23828
Livonia ARC
K8UNS 1245 B-36-3814
Middlesex ARC
W1HEB* 1200 B-20-3800
Eastern Shore ARC
W4OID (+KA4HJT)
1278 B-15-3730
Big Bend ARC
K5PD (+WB5ZAB)
1264 B- 9-3704
Casper Outlaws
KI7W 1136 B- 9-3686
Viking ARS
KØRVN 1070 B-13-3684
Northeast Georgia ARC
AA4U/4 (+KB4EZL)
970 B-15-3646
Bellgate ARC
KY7I (+KA7LEB)
1144 B-20-3646

Steubenville-Weirton ARC
N8RH* 1501 B-20-3644
Neenah-Menasha ARC
W9ZL* 1199 B-15-3594
ARA of Tonawandas
W2SKX* 1235 B- 8-3584
Redwood Coast ARC
W6OS* 1376 B-10-3580
Sourland Mtn. ARC
W2ANA 1464 B-10-3578
Faulkner County ARC
W5LL 1276 B-15-3546
Guantanamo Bay ARC
KG4VD (+KG4BP)
1509 B- 7-3508
Twin City Hams
W5EA (+KA5PLB)
2281 C-40-3506
Club Radio Amateur De Quebec
VE2CQ* 774 B-30-1496
Tuscola County ARC
K8DU 1543 B- 8-1486
Candlewood ARA
W1QI (+KA1JAE)
1078 B-13-3474
Minneapolis RC
W0CKP* 1127 B-15-3474
Warren County ARES
W8RFE 1081 B-10-3474
Quad City ARC
W9YCR (+KA9LSD)
1093 B-24-3472
Tampa ARC/Hillsborough ARS
KY4G/4* (+WD4RKX)
932 B-32-3464
Tandem Radio Amateurs' Club
KE6M 1709 B-12-3440
Brandon ARS
K4TK* (KB4ROR)
954 B-23-3438
Parsons Area ARC
WB8RCZ (+KA8QKG)
932 B-15-3410
Anderson RC
W4FX (+KA4UVN)
946 B-30-3424
Canton ARC
W8AL* 966 B-32-3420
Lake County ARC
W9IJ 960 B-28-3410
Arlington RC
K5SLD 1466 B- 3402
Iowa City ARC
W0JV 1158 B-20-3380
N. Augusta-Belvedere R.C.
K4FR 874 B-14-3356
West CA ARS
N6JZ (+N6TJA)
1174 B-20-3354
Daubenville DX Assn.
KC3Q/3 (+KA3KDL)
1105 B-10-3348
Kishwaukee ARC
WA9CJH (+K9OVZ)
846 B-25-3336
Williamson County ARC
KA5T 1029 B-10-3320
Communications Club of New Rochelle
K2DN 1045 B-17-3298
Bell ARC
AE4Q 942 B- 6-3288
Brazosport ARC
N5KV* (+KA5CDA)
1052 B-28-3276
Wilderness Ham-Radio Operators
K0SC* (+KA0EZD)
935 B-14-3264
West Carleton ARC
VE3JOR 865 B-30-3230
Canadian Police College ARC
VE3CPC/3* 994 B-25-3210
Ogden A.R.C.
N7GJO 1010 B-14-3198
Centralina ARC
N0AH (+WD4CEB)
993 B-46-3194
Union Metropolitaine Des Sans-Filistes De Montreal
VE2UMS 801 B-174-3158
Findlay RC
W8FT* (+KA8PQU)
1085 B-23-3134
Beaches ARS
W4DU (+KA4YTF)
1027 B-23-3124
Tallahassee Amateur Radio Society
KN4Y (+KB4CRS)
872 B-36-3116
Coconino County ARC
N7FU (+KA7PZL)
905 B-10-3108
Sub Sig ARC
K1WEW 1016 B-14-3100
Beaumont ARC
W5KIR* (+N5KBM)
894 B-20-3100
St. Paul RC
K0ACF* (+N0ELC)
915 B-35-3076
Milacron A.R.C.
N4RX 910 B-10-3066
Iowa-Illinois ARC
W0LAC/0 934 B-25-3028
COFARS
K6FT (+KA6ULM)
650 B-10-3020
Amherst ARC
W1UN (+KA1JDI)
828 B-25-3004
Garden City ARC
W8WI (+KA8MCF)
933 B-35-2984
Baby Gorilla Unit-Montreal ARC
VE2MC* 1088 B-12-2982
Carmine Al Group
K5DL 643 B- 5-2972
Oklahoma City Autopatch Assn.
K5MK 922 B-24-2966
Ky. Col. ARC
WA4IGS 902 B-15-2936
Southern Counties ARA
K2BR 788 B-50-2924
Green Country Chapter 10-10 International Net
W5NKL 809 B-15-2924
Forsyth ARC
W4NC* 854 B-20-2922
West Alabama Amateur Radio Society
WG4F (185 B-20-2920
Missouri Valley ARC
WWNH/0 1099 B-26-2916
Albany County ARES/RACES
W2UJ 986 B-15-2914
Denver R.C.
W0TX* (+WD0DNE)
1087 B-26-2914
Loveland Repeater Assn.
WB0Z 898 B-20-2878
Dade Radio Club
W4NVU* 1026 B-25-2856
Smoky Mt. ARC
W4OLB* (+KB4HHK)
850 B-17-2846
ARS of Tennessee Tech
WA4UCE 871 B-10-2842
Central Georgia ARC
KN4A (+KB4ATZ)
937 B-26-2834
Non-Club Group
N6RZ 1094 B- 5-2828
WESVARS
N4DOT 995 B-19-2812
Univ of Saskatchewan ARC
VE5US 735 B-15-2802
Smokey Valley ARC
W0CR* (+N0DVC)
1067 B-17-2796
Foshay's Fools
W9VK (+KA9KUK)
901 B- 6-2760
Bullitt ARS
N4EEC (+KA4MIS)
800 B-47-2746
Non-Club Group
KA0D 836 B- 4-2740
Telephone Pioneer ARC
KD4A/4 1116 B-17-2722
Keesler AFB ARC
K5TYP (+KA5QMJ)
981 B-14-2722
Gulf Coast ARC
KE4O 792 B-30-2710
ARA de la Maurice
VE2MO* 795 B-15-2698
Neptune ARC
KX2K (+WB2TZJ)
745 B-16-2670
Three Rivers ARC
WB8RN/0 1770 B-17-2670
Athens ARC
W5CB (+N5ERF)
987 B-32-2658
Tri-City ARC
KA1BB (+KA1IFG)
675 B-20-2637
El Coqui Radio Group
KP4FTX 514 B- 7-2618
Raleigh ARS
W4DW/4 (+KA4NSA)
767 B-25-2606
Ocean Monmouth ARC
KC2Q 799 B 10-2597
Carbon ARC
K3II 730 B- 8-2592
Non-Club Group
WD0CVY 660 B- 2586
CCARC
WA9DBS (+KA9PHR)
899 B-12-2578
Rip Van Winkle ARS
W2FSL (+KA2PAM)
844 B-20-2576
Lamoine Emergency A.R.C
WB9TEA 1081 B-12-2566
New River Valley ARC
KT4Z 863 B-12-2542
Non-Club Group
KN0G (+KA0PII)
787 B-23-2536
S.C. ARS
N4ZV 984 B-13-2508
Merrymeeting ARA
N1MA (+KA1IEG)
768 B-20-2487
Mountaineer Amateur Radio Assn.
W8SP (+KA8RHJ)
697 B-15-2458
Kankakee Area Radio Society
W9A2* 902 B-24-2458
Wecomo ARC
W0IE 862 B-15-2454
Michigan City ARC
W9CSF 715 B-20-2446
Yellowstone RC
K7EPA* 1006 B-15-2416
Algoma ARC
VE3SOO 685 B-20-2416
The Aggie Effort
W5AC 792 B- 9-2402
Bastrop ARC
KE5L 596 B- 7-2398
Issaquah ARC
AF7N (+WB7SWL)
630 B-18-2397
Cimarron ARA
K1SP 594 B-12-2390
Columbia ARC
N4WR* 806 B-25-2387
Knox County ARC
W9GFU 877 B-20-2387
Ausable Valley ARC
W8GP 610 B-12-2374
The Coleman-Coyote Conspiracy For Continuation of CW at Cedarbend for Field Day
KY9T 495 B- 4-2364
Cullman Amateur Radio Club
K04I (+KA4GKR)
965 B-18-2360
Pioneer ARC
VE3NA 635 B-16-2356
Central PA DX Club
AF3T 691 B-12-2354
Pennyroyal ARS
KD4WJ 774 B-12-2344
Falmouth ARA
K1RK* (+KA1IVL)
589 B-25-2342
Tater Knob Group From Hamilton, Ohio
KN8I/4 914 B- 5-2338
HCARA
N4US (+KB4BEX)
584 B-28-2328
Central Ky. DX Assoc.
K4RN (+WN4ISX)
1592 C-15-2319
Tupelo ARC
AI5R 817 B-30-2310
Hamilton County A.R.A.
K0KWO 955 B-16-2310
Norwood (MA) RC
K1JMR (+KA1FHF)
576 B-15-2302
Harrison County ED Group
KI0S 773 B-17-2266
Starke County ARC
KA9MBC 692 B-15-2262
Gonzaga Prep Ham RC
KC7EJ 830 B-17-2260
Piqua ARC
WR8WS 787 B-60-2238
Metropolitan Amateur Radio Club
N5CNA (+N5ARW)
666 B-23-2210
Hopkins Co. ARC
NU4O* 632 B-20-2208
Gaston County ARS
K4TP 883 B-13-2202
Non-Club Group
K8RO 1734 C- 6-2193
Putnam ARA
WA8ZDL* 656 B-15-2188
Lakes Area ARC
W2WOE/9 (+KA9OMI)
634 B-17-2168
Three Rivers ARA
KV0Y 927 B- 8-2156
Decatur ARC
W4ATD (+KB4ACM)
588 B-30 2150
Alamogordo ARC
K5LRW 609 B- 9-2134
Mt. Baker ARC
K7SKW (+KA7IIY)
682 B-30-2118
Kansas State Univ. ARC
W0QQQ 671 B- 2116
Onalaska Area ARC
W9UP* 585 B- 5 2076
Sandhills ARC
W0MI (+KA0NCG)
770 B-33-2076
Lower Yakima Valley Radio Amateurs
W7ACA* (+N7PCF)
518 B-18-2072
FM CW Club
K7GE* (+KA0LXH)
515 B-12-2068
Libertyville and Mundelein ARS
W9HOG (+KA9NGN)
472 B-18-2058
Grande Ronde Radio Amateurs
KC7NT (+KA7EJT)
548 B-26-2054
Indianapolis Red Cross ARC
WA9LCQ 835 B-33-2054
Indpls Power & Light ARC
K9PC 620 B-10-2048
Jersey Shores ARS
W2GOR 684 B-25-2046
Farmington ARC
W8NBN (+N8ANR)
685 B-21-2028
Shuswap ARC
VE7RW 604 B-10-2026
ENARC
K6OC* 780 B-20-2018
Oakville A.R.C.
VE3HB 614 B-25-2008
Oak Park ARC
W8MB/8 665 B-20-2006
Fort Madison LARC
KQ0I 667 B- 2002
Otsego County ARA
W2TKB/2 519 B- 6-1990
Waldo County ARA
K1BZ 608 B-15-1988
Northern Delaware Band Busters
AG3T 884 B- 5-1968
Clark County ARC
W9WWI (+N9DPR)
585 B-60-1968
Petersburg ARC
W9WB 597 B- 4-1940
High Plains ARC
KC7EC 589 B-10-1926
Amateurs for Better Communications R.C.
KB9AA (+KA9MUH)
746 B- 9-1902
Wellesley ARS
W1TKZ 947 B-13-1900
Kings ARC
K6RGZ (+N6EWZ)
649 B-55-1898
WVRA
W9SM 582 B- 8-1886
Lake Huron ARC
WR1C (+KA8QVJ)
756 B-15-1884
ARC of Savannah
W4HBB (+KA4LNJ)
583 B-21-1882
Central Wis. Radio Amateurs
W9NN/9 (+KA9KUH)
539 B-25-1880
Turtle Mountain ARC
VE4LB/4* 707 B- 7-1876
Ticonderega ARC
KA2BSS (+KA2MWB)
476 B-17-1877
Stoughton Civil Defense
W1WSN 665 B- 9-1870
Wichita ARC
W0SOE 522 B-17-1862
Clackamas ARC
KA7ELI (+KA7ORD)
562 B-30-1840
New Ulm ARC
N0BMA (+KA0LET)
442 B-22-1840
Johnson City R.C
K4SE 556 B-12-1824
ARC of El Cajon
WA6BCS 699 B-17-1820
Palatka ARC
KC4SE (+KA4VSO)
528 B-18-1814
Nevada ARA
K7CP* 743 B- 8-1812
Dept. of State ARC,W/NASA Hq. ARC, and Capitol Hill ARC
W3DOS (+KA3HSD)
527 B-19-1810
Holland ARC
K8DAA 587 B-13-1808
Newport County RC
W1SYG 519 B- 1796
TRW ARC
WA8WSO 474 B- 1796
Vermilion ARC
AA0U 380 B- 8-1756
Humboldt ARC
K0GP/0 (+KA0MDH)
509 B-35-1756
Big Island ARC
KH6CC (+WB6ARF)
484 B-12-1748
Kent County ARC Mosquito Extermination Squad
W3HZW (+WB3IJM)
561 B-14-1740
Carlsbad ARC
NE5O (+KA5OCU)
630 B-20-1730
Rideau ARC
VE3BPC 439 B-16-1718
Sumter ARA
WA4UMU* (+KB4FID)
685 B-25-1714
Jackson ARC
K4EP 458 B-12-1712
Clinton Co. ARC
K9OGS 502 B-10-1710
Kauai ARC
KH6LC* 1154 C-27-1702
DX Boggery & Poetry Appreciation Soc.
W9YT* 446 B- 7-1694
Cape Ann ARA
W1RK 504 B-15-1676
Tri-City RAC
W0VQN (+KA0LEW)
358 B-19-1668
Arrowsmith ARC
VE7EMO 525 B-15-1654
Explorer Post 373
W9CUS 759 B-11-1652
Sweetwater ARC
KW7L (+KA7PZI)
455 B-18-1638
Caterpillar Tractor ARC
W9DDJ* 668 B- 5-1636
Ford AR League
K8UTT 426 B-20-1634
Fresno ARC
W6TO (+KA6AUS)
501 B-31-1616
Sierra Nevada ARS
W7TA (+N7FEH)
411 B-26-1604
Pearl River County ARC
W5OO
485 B-15-1602
Ascension ARC
WB5KRM/5 713 B-10-1574
Chippewa ARC
WB8AA 547 B-28-1568
P.H.D. ARA
WA0UCU 585 B-31-1562
Lake Success ARC
W2YKQ 540 B-15-1560
Karl's Killers
KU9AA 620 B- 8-1554
Clarksville Amateur Transmitting Society
N4IHI 563 B-34-1552
IBM ARC Boca Raton
KC4V 437 B-12-1550
Vancouver ARC
VE7ARV* 391 B-17-1540
Dublin ARC
WA4HZX 444 B-22-1510
South Orange ARA
K6MJ 319 B-13-1510
Bay Area ARS
KM3I 495 B- 7-1506
Glynn RA
K4TVE (+KA4QTR)
331 B-12-1504
Kankakee ARA
KB9N (+KA9WBI)
552 B-16-1504
Boonville ARC
WD2ADX 397 B-10-1502
Explorer Post #73
K0QB 504 B- 8-1498
Grand Island ARS
W0CUO/0 (+KA0FEY)
370 B-20-1494
Western Colorado Joint Venture
N0ZA/0 402 B-14-1458
Childress ARC
N5OX 310 B-16-1444
Mike's Last Stand
N4CGV 497 B- 6-1442
Hartford County ARA
W1NEM 575 B-10-1430
Regina ARA
VE5NN 502 B-19-1426
CFB Trenton ARC
VE3YTR/3 562 B- 9-1424
Calhoun County ARA
NE4V 555 B-18-1410
Jefferson County RAC
K2PNA 406 B-25-1396
Victoria-Hadawaska Group
VE1NBA 406 B-15-1396
DeltaCounty ARS
K8ZAS* 378 B-15-1392
Southern Illinois ARS
K8QSB* (+KA9JYM)
986 C-16-1386
Jackson/Cass ARESS
WB8TCF* 415 B- 8-1386
Richie Amateur Group
WB8NSL 677 C- 4-1385
Mason County ARC
AG7U 767 B-18-1368
Chas. E. Newton ARC
K4HYR 467 B-10-1364
Military Recreation Radio Station
K4NDH* 416 B- 5-1354
Chippewa ARC/Ottawa ARA
W8QW 379 B-10-1344
Manatee ARC
K4GG (+WB4CKS)
516 B-30-1388
Larkfield ARC
WA2PNU 667 B- 1334
Central Vermont ARC
W1BD/1 920 B- 8-1331
DeForest ARC
WA8VVC (+WB8ILW)
340 B-20-1314
Cold Springs Mtn. Crew
NU4B 365 B- 8-1312
Lake County ARC
N6GP* (+KB6ALT)
456 B-18-1306
Copper Country RAA
WK8DZ 319 B-12-1302
Non-Club Group
VE3BKI 587 B- 6-1302
Tri-Counties Ham Radio Club
W8XPX 487 B- 7-1296
Concord Brasspounders
W1QC 299 B- 6-1290
Clearwater Valley ARC
KV7J* (+N7EHT)
116 A-14-1290
Art's Raiders
W8VA 467 B-15-1282
Okla. City AR and Electronics Club
WA5ZAA 414 B-11-1254
Que'bout ARC
VE3CDH/2 439 B- 4-1254
Prince George's Wireless Assn.
K3CEZ 275 B-20-1252
Culpepper ARA
AK4B (+KA4WGA)
447 B-13-1248
Martuni Group
KU7R 411 B- 4-1242
Collier County ARC
N4KB 282 B-13-1236
Coon Valley ARC
W0AJA* 406 B-25-1212
Miami Valley AR Service Group
WA8RUO 343 B-12-1208
Tippecanoe ARA
W9REC 532 B-15-1198
Ogdensburg ARC
N4IW/2 (+KA2CCU)
422 B-25-1180
Barrie ARC
VE3GCB 378 B-24-1180
Central Carolina ARS
WR4E (+KA4VVJ)
446 B-17-1178
Sue Parlour ARC
VE3SPR 392 B-13-1172
South East ARC
KB8MY (+KA8KTR)
797 B-12-1170
UQ RC
K1BG1 776 B-11-1156
Three Rivers RC
WB0RCW* 406 B-24-1112
Uvalde Area ARC
WB5AIG* 268 B-15-1086
Orange ARC
W3NB 275 B-34-1084
Western Carolina ARS #11
K4TDX 334 B-16-1074
N1KARA
K2BBR* 271 B- 4-1056
ISRA - Boise Education Group
N7AND 283 B- 6-1044
Hawkins Co. ARC
W4PTS* 367 B-10-1034
Kenton ARC
WB8MV* 235 B-15-1034
REDCOMSEVEN
W4NUS 187 B- 7-1030
West Cum ARC
VE1WRC 274 B-11-1022
North Suburban Wireless Assn. and North Star HiBanders
KW8PM/8 332 B-30-1020
Pinehurst ARA
KY5C (+KA5HXB)
390 B-15-1016
Triangle ARC & Durham F.M.A.
W4LEN* 258 B- 8-1004
Lake A.R.A.
K4FC* 405 B-20- 998
Eaton County ARC
K8PTZ/8 398 B- 6- 996
Catalpa ARS
WB8CQ 282 B-10- 994
C.R.A.B. St-Georges
VE2ETN 326 B-17- 992
WB8INH Repeator
N8NE* 427 B-12- 982
The Kaptain & Crew
K1DII 241 B-18- 968
North Okanagan RC
CY7NOR B- 956
Douglas County ARC
K0RW (+KA0LQZ)
196 B-12- 944
Mt. Prospect ARC
N9ACQ (+N9BIS)
240 B- 947
Hermiston ARC
KC7LK* (+KA7IRG)
300 B-19- 940
York Radio Club
W9PCS 369 B-12- 938

Western Arizona RC
KC7ZL* (+KA7MUN)
351 B-12- 926
Hualapai ARC
WA7LAZ* 263 B- 8- 926
Irving ARC
WA5CKY 459 B-15- 922
Bumboldt ARC
NQ4Y 670 B-20- 910
Mesabi Wireless Assn.
K@MK* 252 B-16- 904
Augusta Emerg. AR Unit
WITLC 189 B-16- 896
Wareham ARC
W1BTA 344 B-20- 888
Memphis Radio Relay Club
WB4EXI* 287 B-17- 874
Camp Joy Expedition
W9RVP (+KA9ODQ)
215 B- 3- 844
Mountain Empire ARC
N4HMN (+WD4GSM)
266 B-12- 832
Bellbrook ARC
N8DRE 316 B-18- 832
Indian Hills ARC
WB@WMH* 259 B-10- 820
Ozone ARC
K5ZOZ* 211 B-15- 818
Covington ARC
KZ4S 297 B- 9- 802
Spark
AI7DD* (+KA7HGR)
613 C-12- 793
Haystack West
K2WJK/1 (+KA1ICM)
229 B- 7- 784
Petaluma DX & Experimenter Soc.
WB6ECE (+KA6AHK)
175 B- 9- 768
Wheatstraw ARC
WA5IPE/5* 183 B- 5- 766
Gladwin Area ARC
K8JOI 228 B- 5- 756
Defiance County ARC
K8VDN 224 B-10- 756
P.C.R.A.C.
W8UI (+KA8NOL)
231 B-12- 748
Ararat Shrine ARC
WA@NDA 203 B-17- 729
Elmwood Park ARC
K9YHR/9* 107 B- 5- 714
Exploitn ARC
VE1AT 194 B- 4- 714
Hardee County ARES
WD4KBW (+KB4CRR)
172 B- 9- 706
Sitka ARC
KL7FFR/KL7* 478 C-12- 681
Coastal Area Rptr. Soc
KA6LX* 167 B- 6- 672
Shy-Wy RC
W7FT 221 B- 5- 670
Madison County ARC
W9VCP* 227 B-17- 654
Arlington Civil Defense
N1CID* 138 B-14- 618
Marco's AR Operators
WA5SNL (+KA5LBC)
137 B- 4- 606
Muskegon Area AR Council
WB2HO 179 B- 558
Explorer Post 1159
W4WRJ 122 B- 8- 548
Lake Co. ARES
W7MLJ 274 C- 5- 547
Puckerbrush Hams
W9.V* 497 C- 7- 516
Thompson ARC
WB4TRC 176 C- 8- 498
Alexandria RC
W4BHB* 81 B- 6- 417
Pentucket RA
WA1FCK* 82 B-12- 364

2A-Commercial

Order of Boiled Owls of NY
W2AO 2680 C-12-3674

Rockingham County ARC
W4JF (+N4EGK)
939 B-20-3300

Spartanburg ARC
K4JLA (+KA4OTH)
873 B-35-3238
Fall River ARC
W1ACT 796 B- 6-2288
Rowan ARS
W4EXU 520 B-11-1538
Rappahanock ARA
K4DCA 484 B-13-1514
Tri-State ARS
W9OG (+KA9KRE)
330 B-53-1426
Rutherford Co. ARES
N4BBB* (+KB4BLL)
553 B-15-1320
Big Thicket ARC
KD5ID* 581 B- 8-1162
Big Rapids Area ARC
W8DWN/8 370 B- 6-1082
NARL North RC
W1OD/1 331 B- 5- 882
Islander ARA
W2PCC/6 399 B- 7- 808
Alameda County RACES
W6RCG 338 B- 5- 756
Matagorda Co. ARC
W5WIM (+KA5PVY)
295 B-20- 728
Osage ARS
WD5BNN (+KA5OPR)
234 B-14- 690
Chelmsford ARA
W1LUS* 743 B-14- 586
VE2CSO
VE2GRO* 141 B-12- 324

3A-Battery

Barnesville Area ARC
W8FYF (+N8BAP)
1707 A-35-11,960
Tektronix Empl. RAC
K7AUO 1422 A- 8-11,785
Split Rock ARA
K2RF (+WB2TNO)
1127 A-38-8940
Williamsburg Area ARC
K4RC (+KA4VUB)
1924 B-40-7214
Fusion ARC
W2PU 664 A- 7-6980
Free State ARC
K1VD 716 A-17-5775
Peel ARC
VE3PRC 1407 B-25-5954
Central Oregon RAC
N7CSH 813 A- 7-4765
HMASS ARA
N1XZ* (+KA1JTX)
595 A-19-4755
Bellflower ARA
WA6SEM* 591 A- 4-4330
Alliance ARC
WB2ZZS 418 A-17-2805
Anchorage ARC
KL7AA 446 B-14-2770
Univ. of MO. ARC
W3EAX/4* 507 B-11-1480
Beach Cities Wireless Society
K6WO 145 A-12-1380
Kennedy Family
WB2CCC 163 B- 4-1112
Chehalem Valley ARC
K7PM* 370 B- 8- 942

3A

Columbia ARA
K3EF* (+KA1IWP)
3375 B-35-10,736
Orange Hill Contesters
N1GW (+KA6TKV)
3010 B-17-10,260
Cherryville Rptr Assn.
K2NJ (+KA2OEK)
2693 B-25-10,238
Billerica ARS
K1AR (+KA1FBY)
3178-49816
Central S.C. DX Assn.
AA4V (+KA4WIW)
3076 B-23-9222
Poughkeepsie ARC
N2YL (+KA2SMO)
2867 B-35-9218

Chehaw ARS
K4HAV* (+KA4OGE)
2778 B-22-9200
Ashtabula Co. ARC
W8CY (+KA8LTE)
2674 B-16-8644
Platinum Coast ARS
AF4Z (+KB4EWI)
2543 B-25-8370
Jackson ARC
W5PEC (+KA5MLU)
2893 B-30-7564
Dallas ARC
W5FC (+N5BKL)
2285 B-50-7376
Centerville ARS
K8CN (+KA8QND)
1275 B-25-7246
HFEA ARC
K6QEH (+KA6PMT)
2161 B-30-7162
Springhill ARC
N5IL (+KA5QIS)
2495 B-24-7118
"We thought it was a Contest"
FD Group
K8MN 2422 B-15-7046
Schaumburg ARC
W9TK (+KA9NPT)
2281 B-24-6846
Shreveport ARA
K5TL (+N5EWT)
1934 B-63-6798
North Shore Rptr Assoc.
W1CE (+N1CSI)
2010 B-26-6620
Aurora Repeater Assn.
K@PT 2277 B-25-6432
Johnson Co. ARC
W@LRH* (+KA@OEQ)
1905 B-50-6426
Eastern Michigan ARC
K8EPV (+KA8PRS)
1803 B-28-6148
Northern Ohio DX Assn.
NA8A/8 2131 B-17-6134
Redwood Empire DX Assn.
KK6X 1995 B-16-6044
St. Charles ARC
K@8M (+KA@KAZ)
2039 B-35-6018
Portsmouth ARC
W4POX (+KB4CWI)
1818 B-34-5892
Columbus ARA
W8TO 1897 B-23-5814
Ampex Employees RC
K6@BZ 1650 B-11-5760
Enfield RA Group
N1SB/1 (+KA1CIC)
1761 B-24-5680
West Texas ARC
W5NW* 1987 B-30-5608
Acton Boxboro ARC
W1DC (+KA1CC8)
1452 B-25-5584
Davenport RAC
KW@L (+KA@OVA)
1476 B-40-5574
Farinon Radio Amateurs
N6SJ 1738 B- 9-5500
Central Illinois RC
W9AML 1783 B-75-5480
Mississippi Coast ARA
W5CH (+KA5OJQ)
1734 B-28-5460
Goz's Gang
K2SA 1587 B-11-5456
Magilla's Gorillas
KB2MG (+WB2VXS)
1849 B-27-5400
Satellite ARC
W6AB (+KA6STW)
2064 B-30-5388
Old Barney ARC
N7@@ (+WB7JPY)
1642 B-15-5374
General Dynamics ARC
W5IU 1937 B-80-5327
Montgomery ARC
N3BE (+KA3KMG)
1591 B-34-5214
Santa Barbara ARC
K6TZ/6 (+WA6UQK)
1524 B-50-5134
Surrey ARC
VE7SAR 1532 B-13-5137
Ozaukee R.C.
W9WQ 1653 B-25-5060

Escondido ARS
N6WB 1673 B-20-5058
Valley ARA
W4XD (+KJ4WSI)
1703 B-25-5044
Fullerton R.C.
W6ULI 2043 B-30-5014
Baltimore ARC
W3PT/3 1671 B-18-5000
Harvard FM Rptr
W1XH 1542 B-28-4992
Rome RC
W2OFQ (+KA2NIL)
1389 B-22-4960
SPARK
W4PRO/4 (+N4LTE)
1552 B-26-4958
Glacier Ridge FD Group
N9RC 1352 B-12-4956
Band DIT-D/HS
K2MP 1555 B-15-4930
Spark
W4PRO/4 (+N4LTE)
1552 B-26-4958
Gowichan Valley A.R.C.
VE7CVA* 1454 B-26-4888
Telephone E.A. Pioneer Soc.
W8ILC 1496 B-12-4848
Lincoln ARC
K@KEV 4869 B-71-4828
West Allis RAC
W9FR/9 1636 B-18-4802
Delaware - Lehigh ARC
W3OR (+KA3LAT)
1561 B-34-4774
Independent ARC
W@WP 1430 B-15-4704
Southwest Dallas County ARC
AA5U 1785 B-75-4670
Framingham A.R.A.
W1FY (+K/11KO)
1247 B-12-4642
Fairfield AR Tuners
W8RD 1613 B-26-4628
Chicago Suburban R.A.
K9BY (+KJ9LAO)
1830 B-30-4488
Tri-County AR Group
KS90* 1444- B-15-4442
CRAM
W2HCX (+KA2OCQ)
1580- B-72-4420
Blackstone Valley ARC
W1DDD (+KA1JIJ)
1453 B-20-4398
New Providence Amateur Radio Club
K2JV 1253 B-18-4398
Orange Park ARC
NU4Y 1692 B-29-4324
Carroll County ARC
K3PZM 1047 B-18-4314
Trident ARC
N4EE 1410 B-47-4312
Falls ARC
K9RHH 1496 B-26-4306
Cherryland ARC
K8XX (+KJ8QVH)
1267 B-17-4282
San Mateo RC
W6LMN (+EA6VBO)
1368 B-24-4276
Fulton Co. ARC
W9JOO 1236 B- 7-4238
Passaic Co. ARES and Morris Co. ARES/RACES
W2UH/2 (+N2EAA)
1209 B-28-4228
Hot Springs ARC
WA5BRF 1292 B-20-4226
Telephone Employees ARA
K2RB (+WA2AVJ)
1145 B-16-4204
Pottstown Area Repeater Team
KI3S 1383 B-11-4158
Parkersburg ARK
W8VT (+WH8NHN)
1218 B-20-4090
Kendall ARS
W5BE* (+KA5QER)
1139 B-11-4024
Cte de la Vallee du Richelieu
VE2GVR 1103 B-12-3992
Sioux Falls ARC
W@ZWY 1150- B-25-3942

Green Mt. Wireless Soc.
N1VT 1324 B-20-3938
Southwest Missouri ARC
W@EBL 1378 B- 3896
Chesapeake Bay RA
N3ND (+N3CWX)
1033 B-24-3872
Stockton ARC
W6SF (+KA6CDZ)
1082 B-36-3870
William Penn RC
W3FPC/3 1122 B- 6-3846
Tulare County A.R.C.
WA6BAI (+KA6RFT)
1178 B-25-3834
Texoma ARC
K5GQD (+KA5NJR)
1091 B-15-3822
Racine Megacycles
W9UDU 1295 B-23-3812
Great South Bay ARC
KV2V 1209 B-21-3796
Argonne ARC
W@QVE (+KA9BNR)
959 B-25-3768
West Park Radiops
W8VM/8 1165 B-15-3738
Paso Robles RC
W6LRF 1028 B-15-3710
Irwin Area ARA
W3NY 1216 B-20-3708
Monsanto ARA
W8OVY 1041 B-55-3698
Boulder ARC
W@DK (+N@DRS)
981 B-47-3686
CVARC
W2UXC/2 (+KA2MLQ)
1100 B-25-3640
Great Bay RA
WB1CAG (+KA1HYU)
919 B-20-3618
Bankhead ARC
N4AKW (+KB4EEK)
1485 B-16-3578
Chaut Co. Amateur FM Assn.
K2HK 1545 B-19-3568
Lakeland Community College ARC
WA8S8G 846 B-10-3558
Chatham County Group
KX4G (+KB4ERD)
1210 B-12-3548
"Edwards Fritz, Dean, Noe"
N6SO 1078 B- 5-3544
Greater Fairfield ARA
WB1CQO (+KA2OGQ)
990 B-25-3510
Ephrata Area Repeater Society
W3AD 1074 B-31-3458
Poway ARS
K6CD 1177 B-25-3450
Laurel ARC
KO3S 991 B-12-3424
Rappahannock Valley RC
K4TS* 897 B-75-3398
Convair ARC
W6UOS 1098 B-20-3386
Coastside ARC
WA6TOW* 1480 B-10-3360
Rochester ARC
W@HXW (+KA@PIC)
1522 B-50-3328
West Jersey Radio Amateurs
W2JUC (+KA2IBJ)
1303 B-19-3308
Huber Heights ARC
N8TD (+WD8KYY)
847 B-21-3260
Virginia Amateur Comm. Assn.
WB4YVE (+KB4AQW)
1022 B-18-3256
Allegany Highland ARC
W2SAM 932 B-15-3236
Hannibal ARC
W@KEM 950 B-15-3228
N. Ottawa ARC
KC8P (+KA8KZD)
960 B-15-3224
Greater Lawrence ARF
W1FW 888 B-30-3212
Fauquier ARA
K4MZ 897 B-10-3208
West Seattle ARC
W7AW (+KA7PGP)
944 B-20-3192
Codex Cap of Motorola ARC
N1CC (+N1BKB)
1077 B-10-3182

When it seems that Murphy is winning the annual Field Day battle, the members of the OQUIRRH Sunshine Hill Independent Team don't just "grin and bear it"; they simply "put on a happy face." (N7ARE 1A-Battery)

Meet all 35 operators of the N.E. Iowa Radio Amateur Assn. (W@MG 5A-Battery)

Pocono ARK
W3PM 832 B-25-3154
Suburban Cincinnati ARS
KB8Z (049 B-15-3150
Lake Country ARC
AE5B 1183 B-12-3138
Lake County RACES
A49W (+KA9MCX)
983 B-22-4138
Monroe County Radio Comm. Assn.
WA8MTX* (+KA8RNC)
1007 B-20-4134
Baton Rouge ARC
N8SG 1360 B-25-3128
Flambeau ARC
KQ9J 1070 B-14-3128
Non-Group
VE7FC 996 B- 3128
Adams County A.R.C.
K9UR (+KA9ORN)
1152 B-15-3082
UCHUZIT
W3BI/3 760 B- 6-3074
Foxboro Co. ARC
W1XA (+KA1RCS)
982 B-16-3064
Maryland Mobileers ARC
K3WD 881 B-16-3054
Fontana Jr. High A.R.C.
WA6ZEF* (+KA6DLW)
1067 B-10-3042
Livingston ARS
KT5W* 984 B-40-4034
Allen Co. AR Technical Soc.
N9CT (+KA9FFZ)
1109 B-30-3037
Adirondack ARC
KE2Q (+KA2MST)
833 B- 3020
West Island ARC
VE2CWI 1118 B-15-3018
Sperry ARA
KW0Q (012 B-12-2998
Lincoln Trail ARC
W4HSJ/4* (+WB4MWP)
819 B-18-2966
Xeroids
KA9RO (103 B-17-2944
Detroit Metropolitan RC
W8RJI 975 B- 8-2944
Colonial Wireless
N1AD* (+N1ATT)
961 B-15-2940
Gwinnett ARS
N4TM (+N4CUJ)
747 B-21-2882
Burnaby ARC
VE7BAZ 822 B-60-2864
Smoky Mt. ARC
W4OLB* (+KB4FMB)
850 B-17-2846
UMPQUA Valley ARC
KL7M (+KA2PRS)
834 B-15-2834
Corry Station ARC
WA4ECY (+KB4DEK)
814 B-10-2832
Aroostook ARA
K1JE* 951 B-33-2784
Echo Repeater Assn.
K9BTB* 1002 B-31-2770
Wilderness Trail ARC
K1AB (+WB4RDG)
841 B-20-2718
Huntington Co. ARS
W9EI (+KA9NDZ)
738 B-10-2717
Estero A.R.C.
W6KW* 675 B-14-2692
Lewisville Texins ARC
K5DOI* 769 B-25-2668
Dufferin ARC
VE3FS* 728 B-14-2688
North Hills Amateur Club
K3GT (+WB3KUM)
759 B-37-2604
Juneau ARC
KL7GPC 707 B-20-2600
Wantagh ARC
W2VA (+KA2PKZ)
766 B-18-2578
Montgomery ARC
W4AP 786 B- 7-2564
Oroville ARS
W6AF* 755 B-26-2560
Madison ARC
W9EFU* 877 B-10-2554
SLAC ARC
W6CB* 786 B- 7-2532
El Paso ARC
W5ES 1031 B-10-2514
Midland ARC
W8KEA/8 (+KA8MIH)
844 B-20-2510
Jones Co. ARC
W0GN 767 B- 6-2496
Naval Research Lab ARC
W1NKF (+KA1LBB)
753 B-15-2488
Des Moines RAA
W0AE 813 B-15-2430
Delaware ARC
W3SL 607 B- 9-2430
Welland County ARC
VE3WCA* 758 B-18-2396
Shinwassee ARA
W8QQQ (+KA8FLL)
849 B-18-2378
Chippewa Hills ARC
KA8T 854 B-12-2368
Radio Amateurs of Greater Syracuse
W2AE 596 B-15-2340
South Co. ARC
W1AF (+KB4CQT)
1250 C-17-2330
Greensboro-Guilford Co. ARES
N4XB/4 878 B-50-2320

Tri-County ARC
N04Q 544 B-15-2288
Portage ARC
N8KW/8* (+KA8KYX)
678 B-17-2278
Intercity ARC
W8WE (+KA8QEE)
704 B-21-2268
Caravan RC
WA5VKY 729 B-14-2262
North Fulton AR League
KD4W 730 B-18-2260
Briarpatch ARC
N4VL* 1122 B-20-2244
Oxford County ARC
VE3OH 601 B-12-2226
Butler County VHF Assn.
W8CCC 872 B-15-2218
North Bay ARC
VE3NBC 607 B-18-2206
Orleans County ARC
KZ2R 682 B-10-2190
Albany ARA
K2CT 687 B- 6-2188
Northwest Minn. ARC
KY0V 676 B-17-2186
Fulton ARC
W2CXV (+KA2BWK)
618 B-32-2184
Island County ARC
W7PN* 516 B-10-2170
Fort Myers ARC
W4LX 830 B-18-2160
Huron ARC
W4BKM 863 B-13-2160
Boeing Employees ARS of Wichita
AE0A 664 B-10-2156
Peninsula Radio Operators Society
K3CNH (+KA3LEB)
718 B-27-2148
Winnipeg ARC
VE4BB 673 B-30-2138
Walla Walla Valley RAC
W7DP (+WB7ESP)
619 B-25-2120
Whitewater Hills ARC
W9AIP 636 B-16-2102
Seneca RC
WB1D/8 (+KA8OVV)
698 B-12-2074
Parma RC
K8UZW 678 B-10-2056
7213 Group
W5NT 680 B-12-2038
Piatt Co. ARC
K9IYP 761 B-25-2027
Henry County ARC
KB7II* 580 B-15-2020
Old Post ARS
WW8OC (+KA9NNW)
1246 B-30-2019
Mobridge Area ARC
WØYMR (+KAØMEI)
476 B-10-2002
MARA
AE1P 671 B-15-1996
John Ross ARC
WQ4B 645 B-12-1984
Portland ARC
W7KYC* (+KA7AHF)
484 B-16-1946
Pike County ARC
W9CZH* 483 B-14-1944
Yellowhead ARC
VE6YAC 557 B-10-1944
Watertown ARC
KE9C 617 B-20-1940
Parkland and RC
VE5PRC 456 B-10-1918
Iredell County ARS
WJ4W (+KB4DJB)
436 B-12-1904
Gray's Harbor ARC
WJ7A* 600 B-11-1900
Tri County ARC
KS0I (+NØAUY)
685 B-14-1900
Columbus ARC
WD9DWE (+N9CJT)
478 B-16-1898
South Bay ARA
K6OI* (+KA6BOI)
683 B-15-1870
Chehalis Valley ARS
WA7UHO* (+KA7PQR)
491 B-32-1862
Ebonaire ARS
KQ2J* (+KA2QJQ)
639 B-18-1834
Onslow ARC
WD4FVO (+KA4SFF)
587 B-12-1818
Non-Club Group
W3IW 376 B- 1788
Atchison
WØBEV 489 B-13-1774
Jackson County ARC
KBØCJ* (+KA8RJY)
404 B-11-1752
Branch Co. ARC
WD8KAF 500 B-25-1742
Auburn ARA
KS2J 458 B-35-1738
Conneaut ARES
WB3D* (+KA8RPS)
589 B-12-1718
The Tri-Town RAC
W9VT (+N9DRO)
629 B- 1690
N.H. Civil Air Patrol Hams
KA1WK* 544 B- 7-1666
General Electric Kvendale ARS
K8LUC 452 B-20-1664
Everett ARS
W7TOK* (+KA7NDG)
519 B- 5-1652
Kansas Nebraska RC
WØTQ 377 B-11-1648

Kansas City ARC
KØOK1 505 B-40-1628
W. Mass Indep. Radio Group
WB1DMF 508 B- 7-1626
Monmouth Cty. Emergency Communications
N2RV* 422 B- 6-1612
Casper ARC
WØVNJ* 426 B-20-1606
Delta ARC
KA6UV 964 C-12-1606
2M Repeater Group ARC
W9WM/9 452 B-15-1568
Ben House Gang
W1FHP 563 B-14-1562
Huntingdon County ARC
W3VJ 764 C-14-1560
King's County ARC
VE1EMO 559 B-12-1558
Hartford Contest Group
K3CXB 363 B-12-1550
Tulsa ARC
W5FU 575 B-40-1550
Tidelands ARS
K5BS* 462 B-25-1548
Tri-City ARC
W7VPA 566 B-12-1532
Bishop ARC
NM6C 546 B- 9-1492
Sequatchee Valley ARC
DK4XX 525 B- 8-1470
Peterborough ARC
CF3AKA 366 B- 1456
Cumberland ARC
K3IEC 542 B-10-1434
Tu-Boro RC
W2BNW* (+KA2SAZ)
436 B- 7-1418
Dial RC
WB8ILV 623 B-10-1414
Hoop Hole Ridge Runners
KC8AT* 500 B- 6-1408
Kalamazoo County ARES/RACES
KY8D 325 B-10-1394
Walton Hills ARC
KC8VY 466 B- 7-1346
Kootenai ARS
K7ETJ (+KA7PQW)
405 B-16-1334
Lake Cumberland ARC
AJ4O 450 B-15-1312
Green Fox RC
KB9UI (+KA9EXF)
255 B-12-1310
Panama City ARC
W4RYL 603 C- 1301
Volunteer ARC
NY4M (+KB4BQR)
682 C-10-1284
El Dorado ARC
W6MIX 389 B-14-1282
Mt. ARC
W1YMW 426 B-15-1266
Pioneer ARC
WØRCH (+KAØFYY)
426 B-32-1262
Fort Lavoca ARC
W5KTC 372 B-17-1258
Tioga Co. ARC
WB1IPW (+KA2QEF)
393 B-10-1236
Univ. School of Engineering ARC
W9UHX* 348 B- 8-1196
Jamestown ARC
WØEK 719 B- 8-1178
Owatonna-Steele County ARC
KØUNY* 271 B-12-1162
Burlington County RC
K2KED 360 B-27-1120
Grand County ARC
KØOTU 205 B- 7-1092
Suburban RC
WØBCW 580 B-50-1072
Lebanon Valley Society of Radio Amateurs
W3EIA 400 B-14-1062
Carnegie Teen ARC
W3VC 269 B- 5-1057
KISS ARC
K3KW 293 B- 4-1040
North Woods ARC
AA9Y (+KA9NTZ)
244 B-20-1040
Fort Vennogo Mike & Key Club
W3ZIC 286 B-10- 972
Vero Beach ARC
W4OT 433 B-10- 966
Antenna Hill Gang
KN8I 272 B- 4- 944
Bucks-Lehigh VHF Repeater Assn.
WA3KEY 144 B- 3- 900
Catalina RC
N7WS (+KA7FNT)
282 B-15- 890
Non-Club Group
K9IQH* (+KA9ORH)
253 B- 4- 890
Grant County ARC
W9ESN* (+KA9IYY)
288 B- 8- 882
Cascades ARS
WB8CSQ* 284 B-18- 868
Panoramaland ARC
K7LAR 220 B- 6- 840
High Plains ARC
WØCCP* 166 B- 6- 832
South Bay ARC
WB6MYD* 255 B- 9- 810
Elmore County ARC
K7JD* 333- B- 6- 786
Cedar Mountain ARC
W7PT/7 221 B-14- 784
ARES Tenn T
K7HD 238 B-12- 782
Valley of the Moon ARC
WB6DWY 237 B- 7- 774
Northwest AR & Electronics Club
KG0I 136 B- 770

Wythe ARC
KA4EMH 181 B-15- 762
St Louis ARC
NØIS 1748 B-18- 700
Plymouth FD Group
KA8HVA/8 (86 B- 6- 672
Bluff ARC
WDØAXV/Ø* 90 C- 9- 536
National Trail ARC
K9UKZ (45 B-17- 290

3A-Commercial

TOC & Friends
WJ7AC/7 4158 C- 5200
Pottstown Area Repeater Team
K13S 1383 B-11-4158
RA of Western New York
W2PKS* 861 B-10-2958
West Morris Wireless Soc.
KS2M* (KA2DEW)
963 B-20-2502
Hogtown Renegade AR Contest Soc.
KB4HF 1019 B- 6-2232
Portsmouth ARC
KA8QW* (+N8EEU)
819 B- 7-1964
Miss. State Univ. ARC
W5FD 781 B-15-1960
Brightleaf ARC
WA4MC (KB4ASC)
529 B-16-1504
The Kinney Family
KC8YR 795 B-34-1176
Mich-A-Con ARC
WB8FS 511 B-10-1148
Ber-Nesco ARC
KF3Y 830 C-16-1004

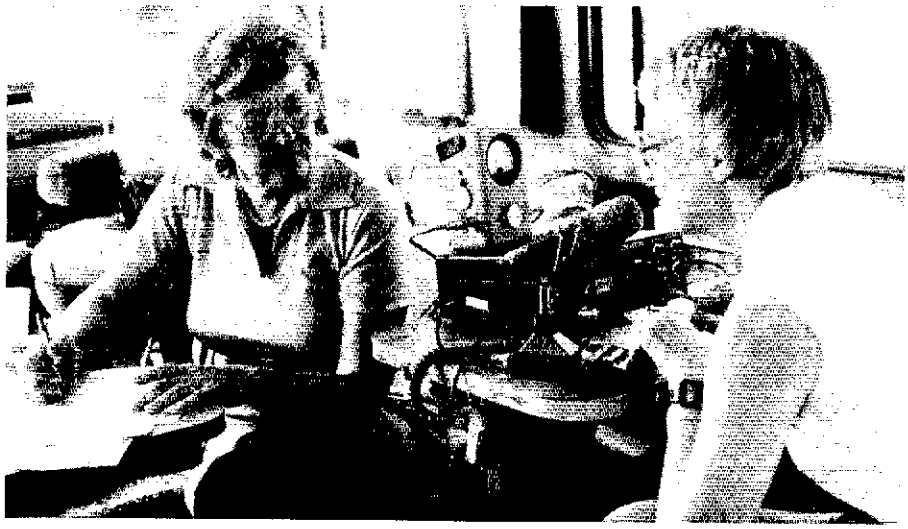
4A-Battery

Northern Ohio ARS 4A Effort
WB8IBM (+KA8SMA)
2029 A-127-17,345
Anne Arundel RC
W3VPR (+KA3DCS)
1842 A- 60-13,750
Oregon Tulatin Valley ARC
K7JF (+KA7MDC)
2113 B-57-7072
Sowinski-Kominski Radio Group & Friends
WB8HKR (+WD8BSA)
789 A- 9-5610
Roanoke Valley ARC
W4CA 1348 B-28-4818
Fellowship ARC
ND4E* 505 B-25-1824

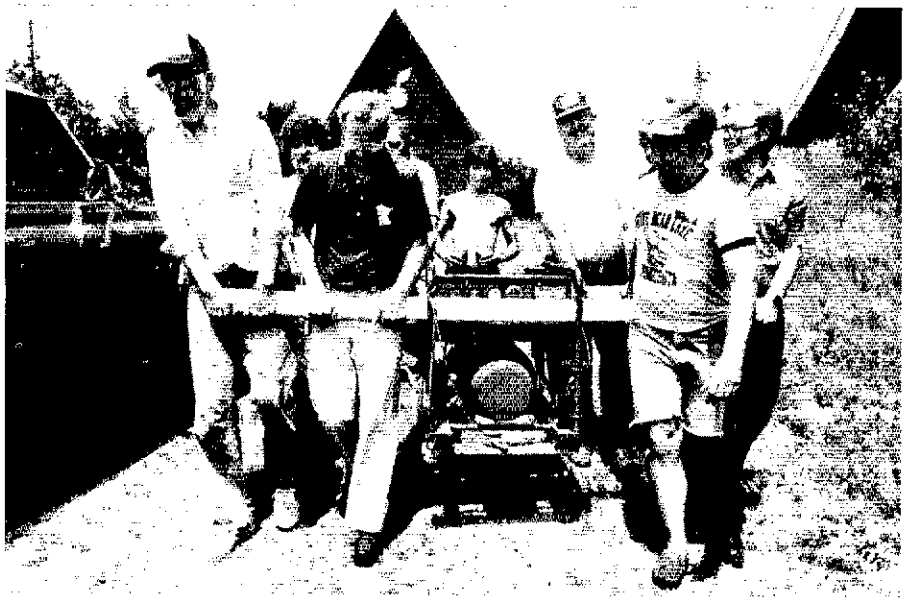
4A

Palo Alto ARA
K6YT (+KA6RMA)
5773 B-46-16,122
Albuquerque DX Assn.
N5RR (+KA5RDX)
4175 B- 4-17,680
Fort Wayne RC
W9TE (+KA9LLJ)
4019 B-65-12,112
Northwest ARC
W9LM 3274 B-32-10,414
Pilgrim Amateur Wireless Assn.
K1BL 3577 B-35-9638
Reading RC
W3BN (+KA3DSX)
1055 B-30-9532
Natchaug ARA
W1TR (+KA1KEJ)
3361 B-20-9234
Hamfesters RC
W9AA (+KA9PFN)
2904 B-37-9078
Scottsdale ARC
K7TR/7 2797 B-41-8460
Hughes El Segundo Employees ARC
K6ZT/6 (+KA6SKW)
2491 B-23-8344
Joliet ARS
W9OFR (+KA9KMC)
2738 B-43-8000
CARS
WØLF 2466 B-25-7936
Alamance ARC
K4EC 2683 B-32-7690
Radio Central ARC
K2RI (+KA2ITS)
2145 B-55-7212
Arizona ARC
W7IO/7 1730 B-50-7124
Kilocycle Club of Fortworth
W5TI* 2179 B-30-6852
Providence RA
W1QP* (+KA1RCD)
2368 B-20-6808
Reservoir ARA
W8DK (+KA8QKK)
2371 B-30-6742
Utica ARC
K2IQ 2108 B-25-6616
RCA Astro Electronics ARC
W3RM (+N2CTW)
1764 B-15-6232
Anaheim ARA
K6SYU 2003 B-56-6096
AK-SAR-BEN-ARC
WØEQU 2717 B-84-5997
Westchester Emergency Comm. Assoc.
N2SF (+KA2DVD)
1456 B-25-5544
Kokomo ARC
W9KX 1428 B-20-5506

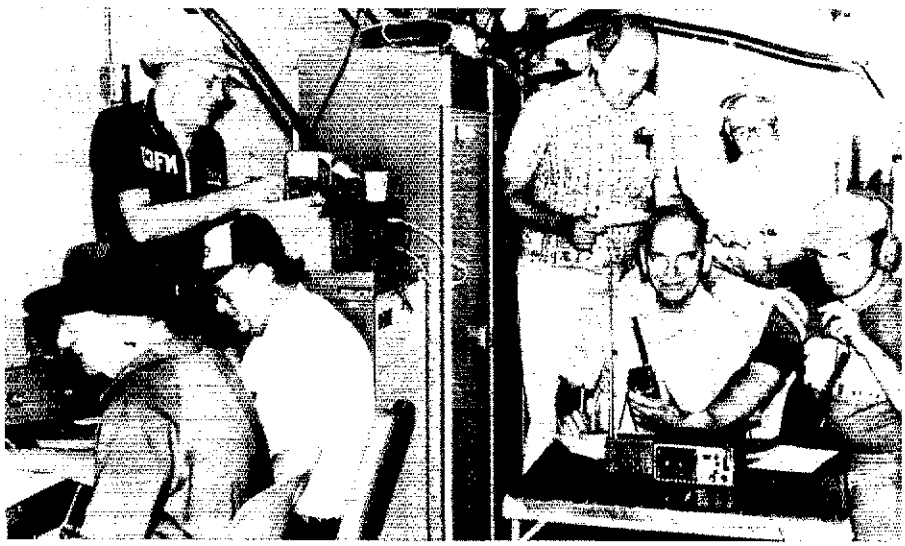
Steel City ARC
W3KWH/3* (+WB3EDI)
2760 B-22-5330
Orange County ARC
W6ZE 2139 B-25-5282
Tri-County ARA & Electac ARC
N6CA (+KA6WXR)
2774 B-13-5278
Sarasota ARA
W4IE (074 B-11-5096
North Shore ARC
VE1NSR 1609 B-26-4862
Riverside County ARA
W6TS (+KA6FQW)
1673 B- 4806
Pasadena RC
W6KA (+WD6CRN)
1649 B-30-4798
Suffolk Co. RC
W2DQ 1354 B-14-4754
Bryan ARC
W5TC 1425 B-20-4726
Southeastern Michigan ARA
KB8YT (447 B-20-4644
McHenry County Wireless Assn.
KB9E (+KA9ILA)
1689 B-25-4556
Tonto ARA
N7XA 1291 B-22-4452
Stonewall Jackson ARA
KV8S (+KA8QHA)
1025 B-24-4398
Van Wert ARC
W8FY (+KA8MSC)
1492 B-35-4396
Harrisburg Radio Amateurs Club
W3UU (+KA3JKA)
1161 B-30-4358
Sonoma County Radio Amateurs
WB1EJ (+N6LIY)
1172 B-30-4192
Mount Vernon ARC
NJ4F (+KB4EDU)
1147 B-30-4116
Everglades ARC
W4SV1* 1060 B-14-3970
Portland Amateur Wireless Assn.
& Blackstrap Repeater Assn.
W1EVI (337 B-17-3958
Sabine Parish ARC
K5ABA 623 A-16-3880
Marshall RC
WØBMJ 1480 B-20-3700
Harlan County ARC
NQ4C (749 B-12-3670
Santa Clarita Valley ARC
Jud San Fernando Valley ARC
W6JW (142 B-24-3600
Willmar Area Emergency AR
WØSW 1755 B-21-3568
Wheaton Community Radio Amateurs
W9LCU (+KA9OSW)
1049 B-25-3552
Yuba-Sutter ARC
NR6M 1158 B-25-3507
Hope Valley ARA
KA1EE (+KA1FFY)
1033 B-30-3444
AR Repeaters of Washtenaw/ Univ. of Mich. ARC/Huron Valley ARA
W8UH 1159 B-25-3402
Delaware ARA
N8AJ (+N8DRU)
914 B-19-3370
Simi Settlers ARC
K6FH 1051 B-23-3174
Marin ARC
W6SC* 1017 B-18-3092
Horseshoe RC
W3QZF 783 B-15-3030
S.L.U.R.P.
KC8PTK* 1079 B-10-2998
Rio Hondo ARC
W6GNS (+KA6NOO)
1015 B-20-2984
South Bay Amateur Radio Society
K6QHQ 812 B-23-2960
QM ARC
WB8BQG 916 B-19-2866
Paul Bunyan Wireless Assn.
KC8WYG 751 B- 9-2810
McMinnville ARC
KC7YNM* (+KA7EDU)
866 B-12-2776
Silver Creek ARA
WD8PNF 826 B-25-2744
Porter Co. ARC
N9RD (073 B-18-2684
Western Piedmont ARC
K4VLY* (+KA4ZEM)
758 B-20-2670
CPB Gagetown ARC
CY1JO 691 B- 8-2614
Indian Hills RC
W8ICS/8 733 B-16-2542
Mankato ARC
WØWCL* (+KAØPEB)
872 B-24-2522
Spokane Dialtwisters ARC
K7LRD 974 B-20-2508
Miami County ARC
K9ZEV (+KA9ERK)
685 B-10-2442
Chelsea Communication Club
AJ8X* (+KA8HAR)
695 B- 9-2436
Thornhill RAC
VE3RAT 988 B-20-2378
Olympia ARS
KG7S 768 B-17-2358
Spokane Radio Amateur
W7NBR (+KA7FQB)
721 B- 6-2284



Jeanne, KA3CEO, is the logger, while Anna, KA3EGE, runs 'em on 80-meter phone for the Foothills ARC. (W3LWW 5A-Battery)

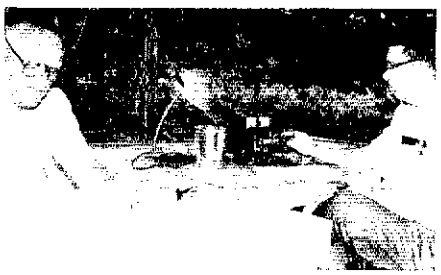


It takes eight members of the St. Paul RC to put their "portable" generator in position. (KØAGF 2A)

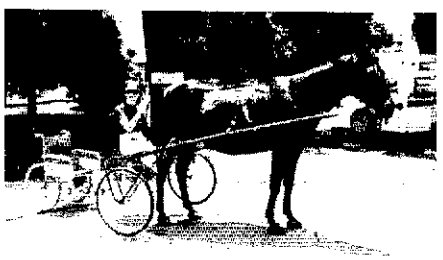


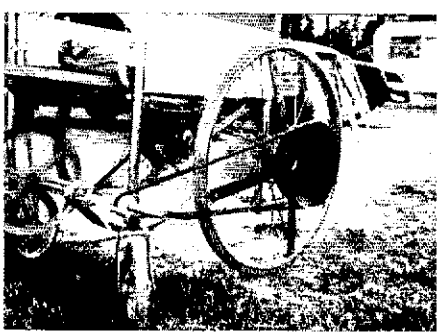
The cramped but comfortable operating location of the Tamaqua Area ARA. (W3VA 2A-Battery)

Natural power via the water wheel for the A Team (l-r): WA4APG, W4RRW and K4ZRJ. (W4RRW 2A-Battery)



KA8GNJ logs and W8PPG operates for the Ausable Valley ARC, W8GP. We can't tell who that third operator is, as that hat has no call sign on it. (W8GP 2A)





The Portsmouth ARC used a one horsepower "natural" power source for the 100 point bonus. (W4POX 3A)



Rulon, KA7BCD, enjoyed some spectacular scenery, but some not-so-spectacular operating conditions on his first-ever Field Day. See his story elsewhere in this report. (KA7BCD 1B-Battery)

Columbus ARC
K4KS 546 B-15-2766
Southern Sierra ARS
K6RL 477 B-10-2248
Iroquois Ford ARS
WB9TAB (+KA9EPO)
632 B-12-2216
ARC of Augusta
W4DV* 501 B-17-2198
R.A.K.A.
W9ZK 790 B-10-2190
Soc. for the Preservation of Key Click, Splatter & TVI
AA3E 822 B-10-2144
Gainesville ARS
K4DPZ/4 685 B-17-2098
Clark County ARC
W7A1A 765 B-30-2096
Hampden County Radio Assn.
WI1NY 540 B-15-2084
Bay City ARC
K8BK 567 B-18-2070
East Bay Amateur Radio Club
W6CDS* (+KA6MVL)
337 B-30-2018
Mid-Mich ARC
KA8DCQ 652 B-16-2016
Grattot ARA
W8AWE 690 B-12-2006
South Towns ARS
WB2ETW 670 B-12-1994
Butler County ARA
W3UDX 556 B-20-1938
Central Texas ARC
W5ZON 497 B-27-1902
Western Carlons RS
W4MOE* 514 B-14-1878
Blossomland ARA
W8MA1 (+WD8MWT)
789 C-24-1794
Lucas County ARES
W8MTU* 408 B- 8-1662
Seaway Valley ARC
VE3SVC* 417 B- 9-1616
Barry ARA
KM8U* 357 B- 7-1598
Raritan Bay Radio Amateurs
K2GE/2 509 B-19-1544
Pymatuning ARC
W3LNAB (+KA3KZF)
408 B-11-1392
Rock River RC
W9TCH 485 B-17-1276
North Platte ARC
W0CXH* 241 B-15-1262
Ashland Area ARC
N8DS (+KA8ROQ)
346 B-15-1248
Glasgow ARC
K3NI* 258 B- 5-1200
Libby ARC
K7YFF 315 B-19-1196
Burlington Bombers
WA1ROG 413 B-10-1174
Sierra Foothills ARC
K6CBP 579 B-13-1158
Red Rose Repeater Assn.
AC3L 615 C-12-1128
6 Meter Club
K9ONA 215 B-17-1030
Cascade Radio Club
W7EK 256 B- 8- 618

4A-Commercial

West Side RC
VE3JJ/3 1370 B-11-4466
V.A.R.A.
KA1Z 91 B-14-2500
Coax RC
K0GFM* 1482 C- 6-1700

5A-Battery

Northern Ohio ARS 5A Effort
K8RRG (+KA8REQ)
1854 A-127-15,340
Foothills ARC
W3LWW 867 A-18-6945
N.E. Iowa Radio Amateur Assn.
WØMC 9+KAØQQG)
2043 B-35-6245
Lincoln Co. ARC
K7PQ 712 B-22-2160
Sheridan Radio Amateur League
W7GUX (+KA7OGI)
571 B-14-1846

5A

Foothills ARS
K6YA (+K6HIQ)
5060 B-31-15,196
United Radio Amateurs Club
K6AA (+KA6AAA)
3884 B-60-11,950
Western ARA
N6ME (+KA6JOT)
3960 B-55-11,858
L'Anse Creuse ARC
KC8F 3359 B-45-10,004
Lake Monroe ARS
AJ4L (+KA4WJT)
3207 B-35-9946
Birmingham ARC
W4CUE (+WB4UWI)
3394 B-66-9728
Garden State ARA
W2GSA 2812 B-37-9326
Schenectady ARA
K2AE (+KA2OPC)
2535 B-50-8996
Stu Rockafellow ARS
W8NJH (+WB8SAE)
2562 B-50-8084
BARS
AE9M (+KA9OFN)
3309 B-25-7828
Eastern Connecticut ARA
K1MOJ (+KA1JKD)
2085 B-21-7420
Capeway RC
K1BU (+KA1GTU)
1923 B-25-7034
Dutpoint Amateurs and Technicians Assn.
K5CB (+KA5OHV)
2514 B-24-6948
Adams County ARS
W3KCM (+KA3HNN)
2400 B-25-6756
Delta Club Mid-South ARA & Tristate DX Assn.
W4BS (+WD4SMW)
2188 B-35-6756
C.R.A.N.O.Q.
VE2RN 2103 B-26-6554
Fox River Radio League
W9CEQ (+KA9LYK)
2265 B-45-6436
RA of Erie
W3GV (+KA3IMF)
2025 B-12-6220
Tioga County ARCs
K7QR 1831 B-25-6130
Panhandle ARC
W5WX/5 (+KA5OFA)
1727 B-40-5970
Armadillo Gang
KC5UN (+KA5JVD)
2052 B-45-5674
Metuchen ARC
K2YNT (+KA2AGF)
1829 B-28-5654
Grumman ARC
WA2LQO/2 1677 B-58-5650
VA. ARA
KG4W* 1590 B-45-5574
Texas ARC
KRAB1 (+KA8SJC)
1581 B-25-5524
OH-KY-IN ARS
K8SCH (+WD8BTB)
1989 B-49-5472
Antietam RA
W3CWC 1927 B-11-5274
Kalamazoo ARC
WRVY (+WA8STV)
1512 B-55-5270
Four Lakes ARC
W9JZ (+KA9OTQ)
1597 B-28-5248
Double Cheese No Onion
WB8REE 1601 B- 9-5110
Delaware Valley RA
W2ZQ (+WA2LWY)
1603 B-55-5054
Hamilton ARC
VE3DC 1636 B-20-4908
Middle Tenn. ARS
W4UOT/4 1397 B-40-4704
Oakland Co. ARS
W8TNO (+KA8EEM)
1412 B-30-4650
Orlando ARC
K7AF (+KA4ATB)
1238 B-35-4272

Central Michigan ARC
WB8MAA (+KA8EFF)
1027 B-50-4124
Pentagon ARC
K4AF 1257 B-20-4098
South Waterloo ARC
VE3SWA 1444 B-16-4042
Perkiomen Valley ARC
W3GOS 1015 B-12-4010
Monongalia Wireless Assn.
K8WV 1169 B-30-3898
Orange County ARC
K2MI (+KA2KYB)
1178 B-24-3840
Marion ARC
WB8S (+KA8RMA)
962 B-80-3734
Southwest Iowa ARC
WA0YRS (KAØQBP)
1489 B-18-3732
Elk Grove ARC
KM9Z* 1397 B-14-3724
Milwaukee RAC
W9RH 1253 B-18-3718
Central KY ARC
NA4D (+WD4DIH)
884 B-12-3638
Sturdy Memorial Hosp ARC
KI2ZJ 1001 B-14-3596
Bankhead ARC
N4AKW (+KB4LEK)
1585 B-16-3578
Hazelton ARC
W3SJI 945 B-40-3540
Quannapowit RA
W1EKT 918 B-29-3476
Tri-County RA
W2LI* 1118 B-29-3400
Pueblo Ham Club
KRØK 1303 B-28-3308
Playground ARC
W4ZBB 954 B-15-3298
Mt. Diablo ARC
W6CX 114 B-15-3212
North Shores ARC
K6HAT 1089 B-17-3178
Vintage Radio Group
N6VY 1098 B- 6-3118
Klamath Basin ARA
W7VW 944 B-27-2996
GUELPH A.R.C.
VE3ZM 9 B-60-2992
South Central Indiana ARC
N9BIC (+KA9MZV)
839 B-14-2844
Toledo RAC
KC8H (+KA8BWQ)
932 B- 9-2828
Hurst ARC
K5YM/5 (+KA4ZSM)
957 B- 9-2818
Pawnee ARC
WBØGOB (+NØAEL)
665 B-18-2790
Alameda County Repeater Club
W6HOR (+KA6VFT)
792 B-70-2774
Jayhawk ARC
WØLB* 848 B-30-2708
Rogue Valley ARC
W7OEX (+KA7CZX)
817 B-15-2678
Okaw Valley ARC
W9KKQ 818 B-18-2540
Boeing Employees ARS
K7NWS 758 B-32-2530
Lockheed ARC
WA8GPY 705 B-14-2478
ARC Silverton
K7AA 690 B-10-2476
North Coast ARC
K8MO* 811 B-12-2418
Tuscarora ARA
KJ1F 1396 C-14-2376
Muscatine ARC
KEØY (+KAØKUH)
704 B-15-2288
Green Bay Mike & Key Club
K9KAM 1218 C-24-2282
Flint Hill ARC
WØHT 788 B- 6-2176
Chicago ARC
W9CAF 459 B-24-2170
Tri-County ARC
W9MQB 659 B-21-2144
Empire Radio Club
NØAY 667 B-12-2056

Brazos Valley ARC
ND5F 550 B-14-2038
Brantford ARC
VE3BA 913 B- 9-2036
North Hamilton Co. ARC
WK4N 722 B-15-1960
F.R.S. and VCARA
W9MJL* (+KA9FOR)
526 B-16-1952
Fulton County ARC
K8BXQ 454 B-13-1917
Placentia Neighborhood Radio Watch
WB6DCC (+KA6ORD)
599 B-20-1868
Turlock ARC
W6BXN* 504 B-25-1828
Champaign-Logan ARC
WB9RFC* 805 B-40-1748
Southern Berkshire ARC
W1BAA (KA1PHB)
434 B-25-1678
Moose Lake Area ARA
WAØQEC
307 B-15-1616
Scotts Bluff ARES
WDØBQC 290 B-16-1566
Union County Races
W2NKD* 371 B-40-1516
Eagle Rock ARC
KA/DOU (+KA7QAG)
325 B- 6-1492
Jefferson Barracks ARC
KØZFK 440 B-12-1480
Quinte ARC
VE3CJJ 400 B-12-1472
Stone Harbor AR Klub
WA3KKG (KA2KJA)
209 B-12-1256
Northwest Ohio AR
WB8ULC* (+KA8KMS)
286 B-50-1254
United Airlines Mainliner ARC
WB6BFA/P 306 B-12-1252
North East Michigan ARS
WD8OOM 134 B-10-1222
Downey ARC
WA6TU 253 B-18-1006
Cass County ARC
W9VMW 128 B-12- 856
Lancaster and Fairfield County ARC
KBQIK* 119 B-16- 256

5A-Commercial

TARCOM
W2FWC 677 B-24-1956
Goat River ARC
WB8MOQ 619 B-29-1514

6A- Battery

Santa Cruz RC/San Lorenzo Valley Repeater Club
K6BJ* 459 B-50-1676

6A

Lake County ARA/Lake Geauga ARC
K8BL (+WB8ZGH)
4133 B-35-12,868
Huntsville ARC
K4BFT
3685 B-29-11,498
Gary ARC
N4MC 3301 B-36-10,842
N6S-Brass
X3AA (+KB4BYK)
3248 B-32-10,400
Woodview ARC
WB7QIW (+KA7IWH)
3160 B-48-9068
Triple States RAC
K8AN (+KA8PLD)
2556 B-40-8678
Northrop RC
W6GN (+KA6JFL)
2833 B-35-8414
Genesee County RC
WB8ACW 2518 B-35-7850
Murrin RC
K2AZ* 2042 B-24-7378
Saginaw Valley ARA
K8DAC (+KA8POC)
2022 B-40-6898
Warren ARA
WA8TTD (+KA8RKW)
1870 B-26-6364
Two Rivers ARS
AG3H (+KA3LBT)
1843 B-32-6194
Windsor ARC
VE3OW/3 2077 B-78-6194
West Branch ARA
W1AVK (+KA3IDD)
2031 B-65-6148
West Palm Beach ARC
W4HAW 2362 B-30-5734
Palomar ARC
W6NWG 2176 B-29-5502
Rockford ARA
W9AXD 1536 B-35-4706
Michigan Robins 10-10 Chapter
WD8OXB 1966 B-17-4632
Whitman ARC
WA1NPO+ (+KA1KHI)
1157 B- 4476
Bellevue ARC
WØHTV 1277 B-20-4238
Colorado Repeater Assn.
WØXR (+WAØITN)
1617 B-35-4238
Whitewater Valley ARC
K9KY 1501 B-25-3908
Michiana ARC
W9AB (+KA9MRE)
923 B-50-3674
Golden Empire ARS
W6RHC* (+KB6AEK)
928 B-18-3224
Clifton ARS
KB2N 698 B-25-2956
Binghamton ARA
W2ON 589 B-18-2312
Washington Amateur Comm.
AD3T 787 B-50-2266
Durango ARC
KDØOT 544 B-10-2144
Mid-Coast Repeater Club
KR1E (+KA1HLN)
698 B-50-1962
Associated Radio Amateurs of Long Beach
W6KO 1147 C-23-1796
Cumberland Valley ARC
W3ACH 556 B-18-1312
Hyland Communications Assn.
KA1DBK* 189 B- 9-1172

7A

Penn Wireless Assn.
W1SK (+KA3IBN)
4387 B-35-14,484
S. Fla. ARS
W4IZ (+N4GEJ)
4386 B-50-12,698
Mike and Key ARC
K7LED 3920 B-60-11,304
Sterling Park ARC
KW4I 3011 B-21-10,114
Warminster ARC
K3KT (+KA3JFR)
2829 B-40-9106
Murgas ARC
K3YTL (+KA3ILE)
2696 B-42-7618
Long Island Mobile ARC
W2VL/2 (+WB2DIN)
2342 B-61-7342
London ARC
VE3LON 2069 B-30-6834
Alamo Repeater Assn./ San Antonio Repeater Org./San Antonio RC
W5SC (+KA5FQS)
2055 B-28-5914
Cuyahoga Falls ARC
W8VPV (+KA8NRL)
2086 B-40-5844
Southern Ga. Amateur Trans. Soc.
WB6LRU 2192 B-31-5408
Rock Creek ARA
WJRUN* 1440 B-35-4840
HTC South Campus ARS
KGØN (+KAØUOF)
1304 B-78-4258
TMRA
W8UHF 1092 B-17-4178
Stamford ARA
K1GF 1209 B-50-4150
Triple "A" ARA
N3FA 1258 B-20-4008
Whidbey ARC
KE7C 1275 B-10-3656
Valley RC of Eugene
W7PXL (+WA7LSE)
1046 B-25-3514

Adrian ARC
WB7QE* 845 B-55-2934
Beloit ARC
K9EP 743 B-15-2286
Mobile Sixers RC
W3AWA 543 B-17-1890
Hayward ARC
K6KAC* 308 B- 7-1498

8A-Battery

Conejo Valley ARC
AD6T (+KA6VRW)
2585 A-30-18,055
Scarborough ARC
VE3WE 1322 A-40-10,890

8A

Crystal RC
W2DNC (+KA2CML)
2595 B-25-7818
North Hills RC
K6IS (+KA6ZUW)
2168 B-84-7680
South Pickering ARC
VE3SPC 2273 B-37-7734
Mahoning Valley ARC
WR0LY (+KA8RDQ)
2273 B-20-7096
Gloucester Co. ARC
W2MMD 1527 B-50-5620
Middlesex ARS
W1EDH 1615 B-20-5220
Kitchener-Waterloo ARC
VE3IC/3 1268 B-30-4872
GTARA
K8ALB 1212 B-27-4612
Beaver Valley ARA
W3SGJ (+KA3GCR)
1322 B-48-4144
Metropolitan ARC
K8NOW/P8 (+N8EDV)
1032 B-11-3494
Kern Co ARC
W6LIE/6 (+KA6VXL)
925 B-30-3032
Headwaters ARC
K@CUV* 634 B-16-2452

9A

Woodbridge Wireless
W4IY (+KB4FFP)
3434 B-74-11,988
Skywide ARC
VE3DRT 2378 B-31-6986
The Vienna Wireless Society
K4HTA 1700 B-50-5696
Sangamon Valley ARC
W9DUA 988 B-23-2818

10A

Cumberland County AR Service/
So. Mt. Rptr. Assn.
W3RF* 1097 B-18-3838
Independent RA
KB8WV 994 B-30-3250

11A

RC of Tucson
W7DK/7 3616 B-55-10,924
Silver Springs RC
W4WW 3041 B-22-8920

13A

South Jersey RA
K2AA/2 (+KA2SCD)
4870 B-65-14,608

15A-Battery

Nashua Area RC
W1YR (+KA1ITR)
2507 A-75-20,115

17A

Nortown ARC
VE3NAR 3039 B-63-10,648

21A

Englewood ARA
K2ND* (+KA2GMB)
436 B-20-1522

One or Two Person Portable

1B-1opr.-Battery

KC4D/4 314 A- 3140
KB8N/8 289 A- 2990
W9OA 257 A- 2635
KB7SK 212 A- 2405
WA2DXT/7 196 A- 2160
KN1R/1 195 A- 2150
KN7W 177 A- 1935
KM8X 181 A- 1910
K5ER* 367 B- 1498
AF5O* 140 A- 1120
AC7A* 110 A- 1100
WB9VTF* 112 A- 960
N8AXA 149 A- 845
K7EC 156 B- 824
W@VS/7 60 A- 800
KA8ODE 68 A- 780
W7TU* 63 A- 730
N3ANW* 95 A- 725
KA3ENX 107 A- 705
VE3FME/3* 58 A- 680
KB6GK* 54 A- 640
N6EHU 51 A- 635
WB8HQS 100 A- 600
KH6CP 31 A- 470
NF6Q/6* 178 B- 470
WB2MBM/3 45 A- 440
W7DPO 58 A- 395
WA1PDY* 120 B- 340
NF5W/@ 10 A- 300
WA6GLE 99 B- 298
KA1TTX 32 B- 228
AH6EK* 20 A- 205
WA3LGC 3 A- 115
KA7BCD 0 A- 100
W6WR/7* 9 A- 90

1B-1 opr.

N7AZ 958 B- 3358
W4NW/8 708 B- 2932
K3WUW/3 968 B- 2276
K2OLD 402 B- 1788
W8ON/8 (KJ8I,opr.)
509 B- 1698
KV8Q 439 B- 1278
K7DQ/7* 160 B- 690
VE2EGH 151 B- 502
KA5NLY 30 A- 360
N9DAW 116 B- 332
K6LMN* 43 A- 315
KA1IDH* 143 B- 294
AF@T/@ 95 B- 290
WD@FNE 132 B- 264
WA2TBA/1 16 B- 136

1B-1 opr.-Commercial

WB3EHS* 268 B- 536
KA2PVH 63 B- 328

1B-2 opr.-Battery

N6IC (+N6NE)
707 A- 6850
W2YC/2 (+WA2OOS)
729 A- 6575
W1ECB* (+WB1DOI)
681 A- 6080
N5EM (+K5HCB)
871 A- 4855
W3TS (+WB3IDP)
420 A- 4490
W3ERC (+WB3DRE)
345 A- 3625
WA@VBW (2oprs)
435 A- 2940
N3AE (+WA2SOC)
310 A- 2525
W2UYQ/2 (2oprs.)
228 A- 2380
N1AR (+KZ4D)
249 A- 2195
W6RCP (+W6WQY)
209 B- 2190
VE3HIE (+VE3NTO)
197 A- 2120
AA1O (+KA1BM)
443 B- 1882
WA6VPH* (+KA6WAP)
260 A- 1865
KL7IJG/1 (+KA1KIX)
158 A- 1720
N3TO/VE3 (+N1BEZ)
467 B- 1584
VE3ETT/VE2 (+VE3EEK)
118 A- 1445
W4ILE* (+WB4JJH)
140 A- 1400
KB2V (+KA2GSM)
118 A- 1380
WA2HSQ (+KA2JXF)
175 A- 1365
WD8AXB (+WD8CJJ)
310 B- 1314
VK2XL/VE3 (+VK2XS)
217 A- 1185
WA7NTO/7 (+WB7EFI)
210 A- 1150
WA4MXF* (+WA4MXH)
92 A- 1120
AC8P* (+N8AAU)
90 A- 1000
KB8VX (+N8EUK)
317 B- 954
W6SQN (+WA6ALA)
84 A- 948
W@UY (+K@WRY)
201 B- 904
N3CU* (+WA@VHD)
50 A- 800
KY@Q (+KA@MZN)
168 B- 710
W7IWU (+W7GCL)
93 A- 665
WB9MBD (+KA@CAD)
264 B- 628
AG1B* (+W1QC)
77 A- 585
KC@PM* (+KA@QEH)
216 B- 544
KA@OIU (+WA7PKH)
63 B- 226

1B-2 oprs.

W8TK (+WD8AUB)
1078 B- 4812
W6OUL/6 (+W7CB)
1516 B- 4566
N9NE* (+K9DFB)
922 B- 3926
K9RK/@ (+W9OBF)
1222 B- 3596
N9NC (+N@EBM)
744 B- 2720
W1WP (+AD1O)
709 B- 2680
K8TW (+WB8III)
660 B- 2598
WB@NCR (+WA@JYP)
1076 B- 2502
N2RA (+N2AE)
631 B- 2478
K9DC/9 (+KA1WQ)
850 B- 2412
W@RCZ/@ (+N@AWE)
348 A- 2300
N7AVG* (+KA7HBK)
492 B- 2268
W@VHE/@ (+WA@DCJ)
1037 B- 2174
K9SQ (+K2OC)
517 B- 2168
KB7CQ* (+KB7CR)
1028 A- 2156
KC4L (+W1XO)
456 B- 2124
WD@END* (+KA@QXK)
671 B- 1942
KC7E/7* (+AJ/Z)
571 B- 1830
KK7C (+KA7GIP)
177 A- 1680
NG7B (+ND7A)
787 B- 1674
WA7QKO/7 (2oprs.)
662 B- 1424
VE2QST (2oprs.)
188 B- 1212
KG7VM (+WB7NJO)
537 B- 1174
KR5R (+KA5KYK)
408 B- 1119
VE2OJ* (2 oprs.)
286 B- 1056
N7EWE (+WA7ZWD)
440 B- 980
WB4MJF* (+KA4WPS)
414 B- 958
K3IC* (+WB4YQP)
276 B- 884
AE6C (2oprs)
294 B- 830
K7RN (+N7ARD)
131 B- 560
K1ZQB/1 (+WA1HTI)
167 B- 522
W@IZ (+KD@Q)
34 B- 406
K3PRP* (+WA3DDB)
146 B- 392
WB9GJH/@ (+WA2VWR)
191 C- 191
K7THW/7* (+KA7QAH)
61 B- 344
N7COR* (7oprs.)
43 B- 266
AB7X* (+W7HIA)
118 B- 236
CY1BII/VE1 (2oprs)
22 A- 188

1B-2 oprs.-Commercial

K1XM (K1PR,N1EE,oprs)
1753 C- 1969
W1OH (+N1BTQ)
329 B- 658
WA4DYD (+KB4BKV)
107 B- 230
WB6MCG* (+WA6FXZ)
144 C- 144

2B-Battery

WA6QII/7 (+N4ARV)
265 A- 1735
RO2I (+N2DUU)
438 B- 1420
KQ5U (+KC5EV)
93 A- 1200
W7ER (+W7TXZ)
292 B- 1190
W6JTH (+KA3BLO)
78 A- 965
WA1VOC (+K2HZN)
459 B- 944
KX5L (+KA5KFM)
255 B- 842

2B

K8MP/3 (+KC3AMJ)
1110 B- 3910
AK8A (+N8EMV)
1086 B- 3672
K8CIV/8 (+K8BQI)
927 B- 3050
W7IL (+N7FBF)
1003 B- 2850
VE2CLZ/2 (+VE2MJX)
585 B- 2494
WA2EYA (+WA2AFQ)
667 B- 2186
WB7NNA (+WB7QOY)
746 B- 1880
KT7Y* (+KS/N)
766 B- 1878
KF@X* (KC@ZM,WD@FHK,oprs.)
671 B- 1788
K1ZT (+K7IDX)
855 B- 1670
WA2APZ (+WB2GWA)
1048 C- 1148
N@LJZ/@ (+W@VCZ)
353 B- 1026
W7JDA/7 (+WA6IRM)
297 B- 870
N4HK1* (+KA4PQH)
165 B- 716
KA@OXX (+KA@MBS)
17 B- 348

2B-Commercial

VE3AUI/3 (+VE3GAM)
831 B- 2798
KD5KR (+KC5AL)
167 B- 334

Mobile Stations

1C

WB5AZI 449 A- 4-3655
K6TQ 677 B- 2-2920
W6MXO 241 A- 1-2210
N4TG/M4 709 B- 6-1674
W3NZ/M3 327 B- 1-1408
VE3FIT 401 B- 2-1380
N6AL 129 A- 1-1370
KM5Y 235 A- 1-1345
KP4PS 283 B- 3-1232
N6ESV/MM 162 A- 6-1205
N4IO/6 99 A- 1-1090
WA5DTK 179 A- 1- 995
WA6DKY/6 148 A- 3- 845
KT7B 79 A- 1- 790
N5IB/MM 204 B- 2- 700
KD@EX 299 B- 2- 680
K6ELD/M1 271 B- 1- 642
N@BLY 162 B- 1- 554
KC@VB/N 222 B- 2- 544
WA5BUC 87 A- A- 535
KA4CJC/4 518 C- 4- 518
WA9ZDC 196 B- C- 492
WA6PAC 72 A- E- 460
W1ECV 226 B- 4- 452
WH6C 64 A- 1- 450
N7EOO/M 83 B- 1- 432
KE6SR/MM 158 B- 4- 416
N@CKC 142 B- 2- 374
K1RM 112 B- 1- 324
KA3LYL 18 A- 2- 280
W8VSR/M8 37 B- 1- 248
VE3EYJ/MM 71 B- 2- 230
WA1TRJ/AERC 25 A- 3- 225
WB1GQR/VE2 107 B- 1- 204
N6DDX 51 B- 1- 202
K1EM 46 B- 2- 192
WA6HUX 10 A- 1- 50

2C

W7KJ/5 142 B- 1- 316

Home Station
Commercial Power

1D

K@ET 1259 B- 5-4218
K8NZ 1035 B- 4-3232
NF6CC 1251 B- 2-2502
W@PXY 997 B- 2-2364
KD3H 570 B- 2-2280
K@EJ 885 B- 1-2180
W7JBN 740 B- 3-1866
KY@S 1196 C- 3-1796
KH6ND 441 B- 6-1690
W9EDC 503 B- 6-1564
KB6JK 767 B- 2-1540
W7TC 357 B- 1-1428
KA4SYW 612 B- 3-1248
RS7T 946 C- 1-1217
WB0PH 721 C- 1-1116
K9CDF 300 B- 1- 996
WA1WAW 222 B- 1- 888
N9CHA 321 B- 9- 824
WB9ZAJ 378 B- 3- 822
N5BMD 380 B- 1- 760
KA1B 362 B- 2- 724
KK5K 175 B- 2- 700
WB8BMV 250 B- 1- 700
WA7GHZ 336 B- 2- 672
AA8S 583 C- 1- 669
WB6BXE 178 B- 1- 652
N@RXX 162 B- 1- 648
KA3EJC 187 B- 1- 608
WB5YLT 583 C- 1- 583
KN1M 150 B- 1- 574
W9CHD 131 B- 1- 524
WW1V 103 B- 1- 500
WD9FUJ 442 C- 1- 442
WB1COB 214 B- 2- 428
KY2J 159 B- 1- 394
K@EJ/KL7 131 B- 1- 366
WLNUS 180 B- 1- 360
W5NR 175 C- 1- 350
WB2VPY 147 B- 5- 348
KD5DR 167 B- 1- 334
W8IZV 157 B- 1- 312
N6APE 164 B- 2- 328
K2MR 78 B- 1- 312
KA6CSH 298 C- 8- 298
WA@AGM/@ 95 B- 1- 285
N2WX/4 71 B- 1- 276
KT4L 88 B- 5- 262
KA1JJJ 65 B- 1- 260
RK9S/@ 125 B- 1- 250
WN4DVN 120 B- 2- 240
K5DM 136 C- 1- 229
WA5LYX 111 B- 1- 222
KA@FXH 111 B- 1- 222
W9REC 107 B- 1- 218
W7DW 82 B- 1- 210
K5VR 52 B- 1- 208
W2TI 50 B- 1- 200
KA8QGD 50 B- 1- 200
W5UFA 199 C- 1- 199
WA8AGH 98 A- 1- 196
KS6Q 97 B- 1- 194
KA7KAR 46 D- 2- 184
K6MR 48 B- 1- 182
KA1DSQ 87 B- 1- 174
KA1HSY 84 B- 1- 174
KW8B 87 A- 1- 174
WB5RUS 84 B- 1- 168
WA1EEP 83 B- 1- 166
AA2Z/1 160 C- 1- 160
WA6UAD 40 B- 1- 160
KA3IPY 39 B- 1- 156
K8NI 39 B- 1- 156
K9DIY 78 B- 1- 156
WD@BBN 72 B- 1- 148
N8EIX 35 B- 1- 140
W8VEN 140 C- 1- 140
WB9AMX 70 B- 2- 140
WA1LQU 131 C- 1- 131
KA3IDY 64 B- 4- 128
KA6TWW 63 B- 1- 126
NA4VC/VP2 56 B- 1- 112
WB1HGL 50 B- 1- 104
WB8VKL 45 B- 6- 102
W2KZE 48 B- 1- 96
W2HBE 44 B- 1- 88
N5EYF 22 A- 1- 88
W9FDY 87 C- 1- 87
AB1U 82 C- 1- 82
W3HUM 19 B- 1- 76
KA2LAS 17 B- 1- 68
KA5MOS 27 B- 2- 68
WD6DXH 33 B- 1- 66
KD7EJ 33 B- 1- 66
W4IZI 32 B- 1- 64
KA2IWJ 29 B- 1- 58
KC9OG 29 B- 1- 58
EV@W 14 B- 1- 54
WD6CQH 12 B- 1- 48
KB9PA 21 B- 1- 42
WB9IHH/1 10 B- 1- 40
NL7X 30 C- 2- 34
KM@W 11 B- 1- 22
VE3E1M 9 C- 1- 18
N9DIJ 3- A- 1- 6
WB9EQY 1 C- 1- 1

2D

WA5ZUP 1809 B- 2-3618
W@IO 1136 B- 3-2830
K3MJW 791 B-15-2492
W1FM 812 B- 4-2480
KW8G 512 B- 2-1852
WR4F 548 B- 3-1356
WA2MAN 633 C- 3- 912
WB5AIE 385 B- 2- 799
W3TKQ 459 C-15- 467
WB5OLT 79 B-11- 186

3D

W7KSS 1144 B- 8-3640
W6PW 708 B-30-1884

4D

KB6N 700 B- 4-2020
K2USA 617 B- 6-1390
K9YKX 497 B-10-1290

8D

N8ECT 673 B-37-1456

Home Station
Emergency Power

1E

KA1R 550 A- 1-4625
W@WJ 441 A- 5-4410
W5LXS 342 A- 1-3420
N4IV 312 A- 1-3120
N8DEU 623 A- 1-3115
W9XT 1026 B- 3-2660
W5ORM 259 A- 1-2590
K7PG 277 A- 1-2590
WA1YLN 360 A- 3-2395
W6ASH 230 A- 1-2300
K6QFR 1092 B- 3-2294
AH6BK 1329 C- 4-2075
WW2K 875 B-12-2066
K7BBO 489 B- 1-1956
NF8EEC 185 A- 1-1850
KA7CKU 357 A- 3-1785
WA4FKK 172 A- 1-1720
WA2DHF 579 B- 1-1688
WB6SRM 633 B- 1-1310
KU7I 119 A- 2-1190
WA2JXJ 225 A- 1-1125
KH6JAT 534 B- 3-1068
KD@EC 507 B- 2-1040
W6YVK 181 A- 1-1005
K8CV 470 B- 1- 940
W6PRI 277 B- 1- 938
W3JMM 82 A- 1- 820
K4FPF 202 B- 1- 740
KB1DH 67 A- 1- 670
WB8AAD 60 A- 1- 600
WI@QO 237 B- 1- 516
K6KA/@ 36 A- 1- 360
WB/CYO 175 B- 1- 350
KV9A 165 B- 1- 332
WD8OFB 63 A- 1- 315
WA5ZSH 76 B- 2- 252
WA2HCC 102 B- 1- 214
WA8VFA 63 B- 1- 202
WB2DIA 20 A- 1- 200
KA7GXK 15 A- 1- 150
W6RKX 26 B- 1- 148
KC1EP 69 A- 1- 138
W6PFE 61 B- 1- 122
N7CYW 20 A- 2- 100
KA9MXZ 44 B- 2- 88
KA9NZI 7 A- 1- 70
W7ERH 28 B- 1- 56
KL7DC 1 A- 1- 5

2E

W@A1R/9 1740 B- 8-6514
N6MI 823 A- 2-6305
K5QHO 1822 B-24-5012
W6AB 1952 B-37-4994
WA7UEC 1470 B- 9-3824
KA3MC 548 B-25-1756
K5QBM 741 B-10-1482
KA2MKD 255 B- 2-1020
W8RCC 411 B- 7- 922
KA1MP 484 C- 7- 660

3E

WB9EGA 883 B- 4-1794
N5EK 805 B-25-1676
KA6MBF 433 B- 8- 870

4E

N6NR 348 A- 7- 790

5E

K5DX 6019 C-50-7987

Checklogs

K1JP,KA1EKR,W1AW,W1OAR,
W1PBE,N2DQE,W3ARK,K4WD,
WB4ZTE,N5CMF,N5FXQ,K6NS,
W6NKT,KA7FEF,W8FFN,W8IMZ,
W8VUV,W9TAL,

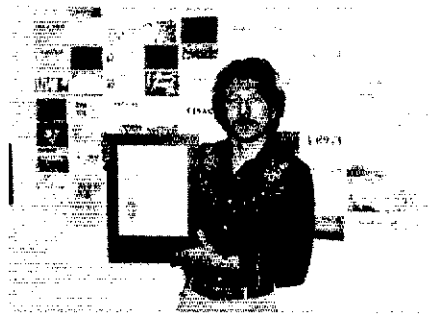
Incomplete

AK3J,NA6EVC,K6JEY,ND6D,
W6TRW,W7VNE/7,WA@HOU,
WB@STR,VE7ARM

Rules, ARRL 10-Meter Contest

The big change for this year's 10-Meter Contest is in the QSO point structure. To promote cw activity, the ARRL Contest Advisory Committee voted to double the point value for cw contacts. Now, phone QSOs are worth two points each and cw contacts are worth four points each. As in the past, Novice/Technician contacts are worth double the going rate for other cw QSOs, and now count eight points apiece.

Official entry forms are available from ARRL Hq. for an s.a.s.e. If you need log sheets for more than 200 QSOs, please include one extra unit of First Class postage for each five sheets ordered.



Larry Pace, N7DD, is offering a plaque like this to the station making the highest phone-only score. V2ARO won this award in 1982, and KØRF won in 1981.

Rules

1) **Object:** For amateurs worldwide to exchange QSO information with as many stations as possible on 28 MHz.

2) **Contest Period:** Second full weekend of December (December 10-11, 1983). Forty-eight-hour period; all stations operate no more than 36 hours. Starts 0000 UTC Saturday; ends 2400 UTC Sunday. Listening time counts as operating time.

3) **Categories:**

(A) *Single Operator:* One person performs all operating and logging functions. Use of spotting nets (operator arrangements involving assistance through DX-alerting nets, etc.) is not permitted.

(1) Mixed mode (phone and cw)

(2) Phone only

(3) Cw only

(B) *Multioperator:* Single transmitter, mixed mode only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) **Contest Exchange:** (A) W/VE stations (including KH6/KL7) send signal report and state or province (District of Columbia amateurs may send "DC" in the exchange, rather than "Maryland." However, "DC" and "Maryland" count as the same multiplier). (B) DX (including KH2/KP4, etc.) transmit signal report and serial number starting with 001. (C) Maritime or aeronautical mobile stations send signal report and ITU Region (1, 2 or 3). Novice and Technician stations sign /N or /T.

5) **Scoring:**

(A) QSO Points: Count two points for each complete two-way phone QSO. Count four points for each complete two-way cw QSO. Count eight points for QSOs with U.S. Novice or Technician stations (28.1 to 28.2 MHz only — signing /N or /T. Higher class licensees: Remember that your power limit in this segment is 200-W output!).

(B) Multipliers: Fifty U.S. states, Canadian call areas (VE1-8, VY1, VO1-2), DXCC countries (except the U.S. and Canada), ITU regions (maritime and aeronautical mobiles only).

(C) Final Score: Multiply QSO points by the sum of states/VE call areas/DXCC countries/ITU regions. Example: WB5VZL works 2539 stations, including 1633 phone QSOs, 896 cw QSOs, 10 Novices, for a total of 6930 QSO points. He worked 49 states, 10 Canadian call areas, 53 DXCC countries and a maritime mobile station in Region 2 for a total multiplier of 113. Final score = 6930 (QSO points) × 113 (multiplier) = 783,090 points.

6) **Miscellaneous:**

(A) Call signs and exchange information must be received by each station for a complete QSO.

(B) No crossmode contacts; cw QSOs must be made below 28.5 MHz.

(C) Mixed-mode single operator and all multioperator stations may work stations once on cw and once on ssb.

(D) Your call sign must indicate your DXCC country (K6LL in Arizona need not send K6LL/7, but K1JD in Hawaii must send K1JD/KH6).

(E) One operator may not use more than one call sign from any given location during the contest period.

(F) All entrants may transmit only one signal on the air at any given time.

7) **Reporting:**

(A) Official forms are recommended (available for an s.a.s.e. or two IRCs from ARRL Hq.).

(B) Logs must indicate time in UTC, mode, call and exchange for each QSO. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs must include cross-check sheets (dupe sheets).

(C) Postmark your entry by January 11, 1984.

8) **Awards:** A certificate will be awarded to the highest-scoring single-operator station (in each category) from each ARRL Section and DXCC country. Top multioperator entries in each ARRL Division and each continent will receive certificates. Additional certificates will be awarded as participation warrants.

9) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: Excess duplicates and call sign/exchange errors. See January 1983 *QST*, page 85, for complete details.

Rules, ARRL 160-Meter Contest

The rules for this year's 160-Meter Contest are similar to last year's. The only change is that DX stations are no longer required to send their country name. They will send signal reports only. Please remember that W/VE stations are prohibited from transmitting in the 1825-1830 kHz DX Window.

Official entry forms are available from ARRL Hq. for an s.a.s.e. If you want enough log sheets for more than 300 QSOs, please include two units of First Class postage. Good hunting!

Rules

1) **Object:** For amateurs worldwide to exchange QSO information with W/VE amateurs on 1.8 MHz **cw only**. DX-to-DX QSOs are not permitted for contest credit.

2) **Contest Period:** 2200 UTC December 2 until 1600 UTC December 4. Forty-two-hour period with no time limitation.

3) **Categories:**

(A) *Single Operator:* One person performs all transmitting, receiving, spotting and logging functions.

(B) *Multioperator:* Single transmitter only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) **Contest Exchange:**

(A) W/VE: Signal report and ARRL Section.

(B) DX: Signal report. Country name is obvious from the prefix. Send ITU Region if maritime or aeronautical mobile.

5) **Scoring:**

(A) QSO Points: Two points for QSOs with amateurs in an ARRL Section. W/VE stations count five points for DX QSOs.

(B) Multipliers: ARRL Sections plus VE8/VY1 (maximum of 74) and DXCC countries (W/VE participants only).

(C) Final Score: Multiply QSO points by multiplier. Example: K1MM works 357 stations, including 13 DX stations, and has a multiplier of 67. His score would be 753 QSO points (344 × 2) + (13 × 5) multiplied by 67 for 50,451 points.

6) **Adherence to Band Plan:** W/VE stations may transmit only in the segments 1800-1825 and 1830-1850 kHz, in conformance to the ARRL band plan.

7) **Reporting:**

(A) Official forms are recommended (available for an s.a.s.e. or one IRC from ARRL Hq.).

(B) Logs must indicate time in UTC, call and exchange. Multipliers should be clearly marked in the log the first time worked. Entries with more than 200 QSOs must include cross-check sheets (dupe sheets).

(C) Postmark your entry by January 4, 1984.

8) **Awards:** A certificate will be awarded to the top-scoring single-operator station in each ARRL Section and DXCC country, and to the top-scoring multioperator stations in each ARRL Division and continent.

9) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: Excess duplicates and call sign/exchange errors. See January 1983 *QST*, page 85, for complete details.

Public Service

Conducted By Robert J. Halprin,* K1XA

What Does an EC Coordinate?

When you become an ARRL Emergency Coordinator (EC), you are supposed to coordinate things. Right? That means you don't *do* anything; you just coordinate what everyone else is doing! The only problem is somebody has to be doing something before you can coordinate it.

In the Indian Wells Valley, nobody was doing much of anything about disaster preparedness. There was nothing to coordinate. Oh, that wasn't exactly true. The REACT people (Radio Emergency Associated Citizens Teams) were monitoring Channel 9 and giving assistance to motorists on a 24-hour basis. We in the ARES (American Radio Emergency Service) supplied them with long-distance communications when needed. We teamed up with them on disaster drills and dinners from time to time. But all of this didn't keep an EC busy. In fact, it ran along so smoothly it seldom needed any coordination.

But, this was a start. Other groups that would take part in any major disaster exist in our area, so I decided to call in some of them for some coordination. We started with the Civil Air Patrol (CAP), followed by the Search and Rescue Group (SARG) for joint meetings. It soon became apparent that this was a worthwhile effort.

I have always felt that emergency groups could be made to work together rather well by simply keeping them in touch with each other, sort of like fitting pieces of a jigsaw puzzle together to make a coherent picture. In any community, you have two groups of organizations that would be active in any major emergency. The first is made up of volunteers, such as SARG, CAP, REACT, ARES, Red Cross, RACES and the Salvation Army. The other group is in the professional category, who, by virtue of their jobs, would be concerned with emergencies. These are fire, police, utilities, the hospitals and the ambulance services, as well as, in our area, the Forest Service and Park Service personnel.

In 1981, before the current alarm created by the Mammoth Mountain series of earthquakes and the attendant volcanic scare, as well as the Coalinga earthquake, we decided to send out a letter to all of the above-mentioned groups and bring them together to see if better coordination could be accomplished. The City of Ridgecrest was busy with other activities and, up to then, hadn't seemed to be very interested. The County of Kern was interested, but we are on the other side of the Sierra from the county seat and the preponderance of the population. (The voice of one EC is *so* small from so far away!)

The response was overwhelming! After the first meeting, we had not only the city and county attending officially, but also the Navy from the local Naval Weapons Center and all of the above groups on a more-or-less regular basis. Training sessions were held by the various groups in the council to familiarize us with their problems and techniques, and a number of side projects began as an outgrowth of the council, which by now even had a name.

Here's KØDJ, whose former titles include EC, SEC and SCM. Bob is currently serving as Transcontinental Corps Director for the Pacific Area, Cycle Four. *(W1YL photo)*

The *Indian Wells Valley Emergency Services Volunteer Council* serves the eastern side of the Sierra and brings together all of those agencies that will be active in an emergency. It has coordinated those agencies whether local city or county officials chose to participate; however, they did choose to participate and became very involved in utilizing the council to rewrite the city's emergency plan. The Council has begun an Operations Plan that will be a compendium of plans (who is going to do what!) of all of the organizations in the valley. The county has organized a RACES plan. I, as the EC, have also become not only a Radio Officer for RACES on this side of the Sierra, but also communications chairman for the council, working closely with all of the groups that have a radio communications capability as part of their normal day-to-day jobs. I now have more to coordinate than I can keep up with!

At each council meeting (roughly one a month), each group may report on any activity they have had since the last meeting. One of the groups will provide a training session. Usually, someone comes up with an idea that must be considered in disaster preparedness. For example, somebody asked how we were going to publish fliers, handbills, posters, etc., when all of the electricity is out and none of our duplicating machines can be hand-cranked. Someone else asked how you get people to read their phone books, since instructions for preparing for an earthquake are contained therein. One of my own concerns became supplying the emergency power to our local radio stations that had no facilities of their own. Also, I became concerned with supplying them with an emergency antenna in the event their high towers should come down. There are no shortages of concerns!

There is much for the council to do, and in the meantime, members of each group are getting acquainted with members of the other groups with whom they may have to work. The best kind of i-d you can get is for police at the roadblock to know personally the members of RACES who must get through. If the two of them have worked together on drills and tests, each knows the other's problems, needs and capabilities.

We are building a message center that will contain all of the radio equipment needed to talk on all of the nets in the area. Ham radio operators will be trained to operate this message center at the Emergency Operations Center (EOC). We had considered a van, but decided

Representing the League at the 1983 Red Cross Convention in Atlanta were Georgia ARRL field organization leaders (l-r) Section Manager K4JNL, Emergency Coordinator WB4ABY, Assistant Emergency Coordinator K6YI and Affiliated Club Coordinator WA4ABY.

*Deputy Communications Manager, ARRL

that was putting all of our eggs in one basket. Flexibility and diversity was what we wanted.

We have conducted emergency drills with the Park Service in Death Valley (a simulated mid-air crash with two planes to be found), ELT searches with CAP and damage-assessment training for the Red Cross, with more to come. We have received considerable training with the Red Cross, so several of our members are officials in that organization as well.

The Emergency Services Volunteer Council has served as a spark plug to begin the planning necessary to prepare for any major emergency. It's something that any EC can do. Just make a list of the organizations in your community that you'd like to bring together, and start them talking. Don't be dismayed if one of the groups starts to take over. Remember, you *coordinate;* you can't do everything. In our case, the CAP became a ramrod, and things really began to move!

Of course, it's nice if you have a few earthquakes, a flood or a hurricane to prod people into action. We even had the possibility of volcanoes to prompt things along! Be sure to get the geologists or the weather people into the act. They can advise you on the nature of the threat and its likelihood. Be sure to call the local newspaper to take part. They are your ace in the hole. Once the council starts doing things and others (the politicians?) hear about it, they will want to get on the band wagon.

Remember that a Volunteer Council is just what it says it is. It has no official position. All it does is get people together. It has a great advantage in that it can cut across county lines and bureau boundaries, and promotes a friendly and cooperative atmosphere. It deals with understandings and getting things done. I recommend one for your community. It gives the EC something to coordinate! — *Lloyd W. Brubaker, WA6KZV, Ridgecrest, California*

PUBLIC SERVICE DIARY

☐ Preble County, Ohio — July 3. Driving to a watch post during a severe-weather-watch net, N8EHA came upon two cars off the road as a result of a head-on collision. After reporting the accident to weather net NCS KA8NYT, he stopped to help. He noticed smoke pouring from one of the vehicles. The driver had suffered a compound fracture to her right leg, so N8EHA pulled her from the wreck and applied temporary treatment. The other driver had suffered severe facial injuries, so N8EHA attempted to stop the bleeding. The Ohio State Police and the City of Eaton Life Squad arrived within 10 minutes, thanks to the amateurs' quick actions. (WD8DJR, EC Preble Co.)

☐ Salisbury, North Carolina — July 5. While hiking along the Appalachian Trail, KB4BM's only source of communications with the outside world was his 2-meter hand-held radio. Lucky thing he had it along. KB4BM's in-laws were suddenly hospitalized, and local amateurs located him via K4ITL/R and passed the message along. He took appropriate action. (W4EAT, STM North Carolina)

☐ Near Ojai, California — July 10-17. A controlled burn got out of control and began raging through a very inaccessible area of steep canyons. During the week-long fire, a total of 22 amateurs were at the site handling formal welfare traffic to families of the estimated 1600 firefighters who were working the fire, as well as for the American Red Cross and the Forest Service. During the same period, KA6BPH and KA6BPG, a husband and wife team, spent 235 total hours assisting communications and standing watch. The Sulphur Mountain repeater (WA6ZTT/R) was used extensively for the amateur communications. (K6VK)

☐ Colchester, Vermont — July 21. A small boat with three young men on Lake Champlain was swamped by large waves from an afternoon thunderstorm. From his location at nearby Mills Point, W1HRG saw the accident and called for help on the Burlington 146.01/61 repeater (W1KOO/R). He was answered by both W1TBG and VE2GWA/mobile, who notified the Coast Guard. (WB1FWA)

☐ Maryland to Bermuda — July-August 1983. AG3L made a solo round trip from the Chesapeake Bay to Bermuda. He used his battery-powered amateur gear to maintain daily traffic schedules with KJ3E during the outbound trip, and with Maryland Section Manager W3FA during the return leg. All traffic that AG3L originated was sent using cw. (AG3L)

☐ Andover, New Hampshire — August 10. While driving home, AK1E spotted the glow of an equipment fire inside a machine company. He used the W1ALE repeater to contact KA1HWH, who then notified the local police. The fire department arrived quickly and extinguished the flames within eight minutes of the call. (AK1E, SEC New Hampshire)

☐ Erie, Pennsylvania — August 13. While driving home from a hamfest, K8WLP and WB8FWE came across a single-vehicle motorcycle accident. They reported the accident to KA3FOE via the W3GX repeater, and he in turn telephoned the Pennsylvania State Police. Rescue personnel arrived within 10 minutes of the call. (K8WLP)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Long Beach, California — March 1-4. Flooding caused by a storm forced the evacuation of several residents. The American Red Cross set up three shelters for the evacuees. During the next 24 hours, ARES members provided communications on 2-meter simplex between ARC headquarters and the shelters, and later worked with ARC during damage assessment in the stricken area. (KB6EX, EC Southwest Area 3, LA Section)

☐ Tulsa, Oklahoma — June 27. A severe thunderstorm and tornado struck the nearby communities of Skiatook and Collinsville, killing one woman and causing extensive property damage. N5FWS, N5EPB, N5EZK, N5BDJ and assistant Tulsa Co. EC WB5OSM assisted the local Civil Defense in tracking the storm. After the storm passed, they provided key communications links between disaster sites in the field and the Emergency Operations Center in Tulsa, using WA5LVT/R and various simplex frequencies. (K5ENA, DEC Northeastern OK)

☐ Lake County, Indiana — July 1-2. Northwestern Indiana was subjected to a series of storm cells that brought record-setting rainfall and numerous tornadoes. The regularly scheduled ARES net on W9LJ/R started on time Friday night, but was converted to SKYWARN operations when the storms reached their full potential. During the next 11½ hours, there were five different net control stations for the SKYWARN net and over 60 participants, some of whom followed through Saturday morning by assisting the American Red Cross with damage assessment of flooded areas. (KD9BE, EC Lake County)

☐ Maui County, Hawaii — July 31. Eleven Maui County ARES members provided communications for the annual "Run to the Sun," a 36.2-mile ultra marathon to the peak of Mt. Haleakala. Using the KH6HHG and KH6H repeaters, amateurs kept mobile medical units and aid stations along the route in contact with the race officials and park rangers. After the race, one of the runners developed hypothermia, and KH6MD called for paramedics on the KH6HHG autopatch. (KH6H, EC Maui Co.)

☐ Capistrano Beach, California — August 8-9. High ocean tides brought on by a tropical storm were expected to cause severe damage to homes along the beach. American Red Cross officials requested Amateur Radio communications to relieve the burden on the single telephone in the area and to supplant their out-of-order radio system. Local ARES members passed Red Cross messages for three days, until the ocean tides subsided, using the WD6AWP repeater. (WB6JBI, DEC Orange Co.)

COMMUNICATIONS SERVICE OF THE MONTH

Hurricane Alicia

☐ Bexar County, Texas — August 18. The Disaster Services Director of the Bexar County Chapter American Red Cross called Bexar County EC WA5RNV shortly after midnight and asked that the San Antonio ARC station W5SC be activated to provide communications between emergency evacuation shelters set up at a local school in Universal City. W5SC was operated by WB5CIT and WA5RNV on both 40 and 75 meters to monitor the progress of the hurricane. They also used WD5AIG/R to coordinate activity between the shelters and Red Cross headquarters. The WR5ADJ repeater was used to work with San Antonio amateurs at their homes.

About 7:45 that morning, landline communications with the shelters had been secured, and amateurs closed down operations. A half hour later, WA5RNV (who had just gone to bed) was notified that the landline facilities failed to function properly and that the amateurs were once again needed. WA5QZI and KD5KO were called in to help, and together they provided the required communications until mid-afternoon.

After that operation, WA5RNV again returned home to get some sleep, but was awakened by yet another phone call. This time it was WA5FSR advising that the National Weather Service was asking for communications into the Galveston, Houston and Palacios areas. They went to the San Antonio NWS headquarters, where just the night before they had completed the installation of hf gear. The station was used to link up the San Antonio NWS and other NWS offices in the affected area until hard-line communications were back in operation. (WA5RNV, EC Bexar County)

☐ Brazos County, Texas — August 17-18. The Brazos County Chapter of the American Red Cross requested that the local ARES provide communications among the civil defense emergency operating center (EOC), Red Cross headquarters and the refugee relocation center at a local high school. Fifteen local amateurs responded and were assigned to different stations. Texas A & M University club station W5AC was activated for communications hookup with stations in the coastal areas.

Telephone lines were established late the first night. Amateur Radio operations were then ended until the next morning, when Hurricane Alicia struck Brazos County and knocked out both telephone and electrical services. The same 15 amateurs who had worked the previous evenings returned for an additional eight hours of operating duty. (N5ETD, EC Brazos County)

☐ When Hurricane Alicia slammed into the Texas Gulf Coast, local civil defense organizations quickly swung into action. A network of centralized emergency operating centers (EOC) was set up in various communities surrounding Clear Lake City, near Houston. The EOCs were manned by local civil defense, Red Cross and various emergency-preparedness groups. The Clear Lake Emergency Amateur Radio Service (CLEARS), which uses Johnson Space Center ARC repeater W5RRR/R as its communications mainstay, had hams stationed at each of the EOCs to assist with communications.

Most of the traffic passed through the W5RRR command post consisted of water-level readings, damage reports and information on power outages and flooded-road conditions. In addition, ham radio links to local police, fire departments, hospitals and public shelters were quickly set up — some on direct frequencies to free the repeater for more pressing communications. Thousands of local residents sought shelter in public schools during the hurricane. One suburban police department asked for Amateur Radio assistance when its own repeater went off the air. Ham operators stepped in and passed messages to officers in the field.

Although about a dozen people were killed during the hurricane, it's fortunate that there was not more loss of life. The fact that there wasn't was attributed to the emergency preparedness of local civil defense groups, such as CLEARS, and the heavy involvement of hams at and through the W5RRR repeater. Once again, Amateur Radio fulfilled one of its basic purposes, that of providing communications during times of emergency. (W5YI, *W5YI Report)*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For July, 40 SEC reports were received, denoting a total ARES membership of 22,948. Sections reporting were: AB, AZ, AR, CO, DE, ENY, IN, KS, KY, ME, MI, MN, MO, NE, NH, NLI, NC, NFL, NTX, OH, OK, ON, ORG, PAC, RI, SDG, SJV, SC, SD, SFL, STX, TN, UT, VA, WA, WV, WMA, WNY, WPA and WI.

☐ For August, 37 SEC reports were received, denoting a total ARES membership of 17,568. Sections reporting were: AB, AZ, CO, CT, DE, EMA, IN, KS, KY, ME, MN, MS, MO, MT, NE, NH, NLI, NC, NFL, NTX, OH, OK, ON, PAC, RI, SDG, SF, SJV, SC, SD, SFL, TN, VA, WV, WMA, WNY and WI.

NATIONAL TRAFFIC SYSTEM

August Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	1077	34.7	.713	93.0	
CAN	31	1007	32.5	.599	100.0	
PAN*	31	826	26.6	.494	98.9	

Region Nets						
1RN	60	395	6.6	.307	71.5	100.0
2RN	57	245	4.3	.242	78.0	96.8
3RN	31	210	6.8	.456	95.2	100.0
4RN	62	761	12.3	.439	75.3	100.0
RN5	62	720	11.6	.364	97.4	100.0
RN6	62	448	7.2	.343	98.4	100.0
RN7	93	594	6.4	.499	94.0	96.8
8RN	62	422	6.8	.335	98.4	96.8
9RN	62	477	7.7	.321	100.0	100.0
TEN	31	520	16.8	.477	86.0	100.0
ECN						64.5
TWN	50	190	3.8	.298	56.8	100.0
TCC						
TCC Eastern	117[1]	708				
TCC Central	75[1]	399				
TCC Pacific						
Cycle Four						
Area Nets						
EAN	31	1859	60.0	1.367	93.5	
CAN	31	1102	35.5	.940	100.0	
PAN	30	977	32.6	.992	95.2	
Region Nets						
1RN	61	797	13.1	.546	94.8	100.0
2RN	93	706	7.6	.504	95.7	83.9
3RN	62	257	5.8	.613	97.3	100.0
4RN						96.8
RN5	62	584	9.4	.523	92.9	100.0
RN6	62	627	10.3	.588	98.8	96.8
RN7	62	569	9.2	.732	94.6	96.8
8RN	59	498	8.4	.431	94.0	87.1
9RN	62	459	7.4	.402	98.4	100.0
TEN	62	580	9.3	.597	73.4	100.0
ECN						93.5
TWN	55	410	7.5	.324	79.8	91.9
TCC						
TCC Eastern	124[1]	697				
TCC Central	51[1]	444				
TCC Pacific	105[1]	771				
Sections[2]	7019	28,593	4.1			
Summary	8416	48,168	5.7			
Record	8995	51,307	15.2			

*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), MG (AK), AENB AEND AENK AENX ATNM ECARES (AL), ACN ATEN HARC (AZ), BCEN (BC), NCN NCTN RTTY/V SCN/1 SCN/2 SCN/V SVTN (CA), DEPN DTN (DE), BEN DEN ENMC FAST FMSN FMTN FPON FPTN GN LCEN NFPN PEN QFN QFNS SVTN SWFTN TPTN (FL), I75MN ITEN TLCN (IA), ICN ITN QIN (IN), CSTN KMWN KPN KSBN KWN QKS QKS-SS (KS), 3ARES 4ARES 5ARES 7ARES 11ARES BARES CARN KEN KNTN KRN KSN KTN KYN KYPON MKPN NKARC PAEWTN SEKEN TSTMN WTEN (KY), CITN EM2MN EMRI EMRIPN EMRISS HHTN NEEPN RIEM2MTN (MA/RI), MEPN WRIN (MB), AEN MPSN PTN SGN (ME), MACS MITN MNN QMN UPN (MI), MN MNAMWXNT MSPN MSSN PICO (MN) CMEN HBN IFN MEOW MON MSSB PHD RRAB SAMN STAN (MO), CAEN MMN MNRA MSBN MTN (MS), CEN CMN CNCTN (NC), CN CSN (NC/SC), BVARES CCN CCTMN EN2MARES MNARES NE40M NE75M NCHN NCN NMPN NEQCWA NSN PV2M SBARES TCARES WNN (NE), GSFM GSPN NHN RCARES (NH), HCATEN JSARS MCN NJM NJN NJPN NJVN OBTTN SJVN TCETN (NJ), NSN (NV), CDN CNYTN HVN NLI NLIPN NYPON NYS NYS/M OCTEN SCVHFTN SDN STAR WDN (NY), ALERT BN BNR BRTN BSSN COARES HCARES LCNWOARES LCTN MCTN NCTW NEON O6MN OSN OSSN (OH), NON OLZ ONON OPEN OTN OTWN QCWA-63 STN (OK), KTN OLN OPN OSN2 (ON), BSN ORARES OSN PTTN WCN (OR), NWPATMTN WPA WPA2MTN WPAPTN (PA), PTN (PAC), QSN (PQ), GPD2MN LC2MN SCNTN SCSSBN (SC), NJQ SDEEN SDEN SDMN SDN SDPN SDTIN WCEN (SD), TNCW TNPN TNVN TSRN (TN), DFW NET TEX TSN TTN (TX), BUN DCEN UCN (UT), VLN VN VSBN VSN VTN (VA), VTN (VT), EWTN NTN NWSSBN PSTS SCARES WARTS WSN (WA), BEN BWN NWTN WIN WNN WSBN WSSN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

Congratulations to W5GHP, Director of TCC/c4 for Central Area, who was recently elected (unopposed) as ARRL Vice Director for the Delta Division.

1	2	3	4	5
Cycle Two				
TCC Eastern	124	94.3	1412	708
TCC Central	93	80.6	839	399
TCC Pacific				
Summary	217	87.4	2251	1107
Cycle Four				
TCC Eastern	151	82.1	1403	697
TCC Central	62	82.3	814	444
TCC Pacific	124	84.7	1519	771
Summary	337	83.0	3736	1912

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (August) *Cycle Two* — Eastern Area (AF8V, Director) — N3ADU AA4AT N1BHH WA4CCK N2CER K1EIC VE3GOL WB3GZU KO2H WB1HIH KB2HM VE3HTL K8KQJ WA4LJI WD8LRT AH2M K8OZ W8PMJ W1QYY W1TN KB3UD AF8V AK1W N2XJ W1XX WB8YDZ. Central Area (W9JUJ, Director) — N5AMH N5AMK N5BT N5CRU W5CTZ N5EFG W0FRC W4JL W9JUJ K5KJN W5KLV KD5KQ WB9NVN W9NXG WB5OXE WB9WGD WF4X WB5YDD. Pacific Area (W0HXB, Director) — KT6A N0ACW N7CSP N0CXI KU6D W7DZX W0EJD KB7FE N7FKA W7GHT N6GIW K6HAD KM6I W5JOV KB0MB WB0MTA K7OVK K6OWA WA7OYI ND5T K6UYK W7VSE WB7WOW W6YVY KM7Z. *Cycle Four* — Eastern Area (W2CS, Director) — VE3AWE W3BBN KI3C WA4CCK W2CS W1EFW W2FR KB3FW W2GKZ VE3GOL WB3GZU KB2HM W1ISO KN1K AH2M W1NJM W8PMJ W1QYY WB4PNY W3PQ W2RQ K3RZR WA2SPL KB3UD W4UQ AF8V VE1WF W2XD N8XX K4ZK. Central Area (W5GHP, Director) — W0AM W9CXY K0EZ K5GM W0HI W5LQ K5OAF W5RB N5TC W5TFB K5TL WB9UYU KB9X W4ZJY. Pacific Area (K0DJ, Director) — AD0A KN7B K0BN KA7CPT KC0D K0DJ W7DZX N0EBM W6EOT W7EP W7GHT WA7GYQ W0HXB N2IC W7LG W7LYA KA0NLI ND5T WA7TEH W5UH W7VSE W6VZT VE6ZK.

Public Service Honor Roll August 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. Stations that are listed in the Public Service Honor Roll for 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from Hq.

204
WB7WOW
188
KV5X
182
K7VW
173
KB5EK
171
WB5YDD
142
WD4COL
141
WD8MIO
138
WD8LRT
KT5Y
135
K4SCL
131
VE3GOL
127
W9YCV
123
KA1JZC
122
WF4X
KA1GBS
WB2MCO
119
WA2FJJ
W1EOF
116
KU0G
115
WB1GXZ
114
W0OYH
N2XJ
113
WB4WYG
KI1M
111
W2MTA
K2ZM
110
K4JST
109
KS7I
KD7ME
AL7W
108
KC0OO
KA0ARP
107
WB3GZU
WB1HIH
W3YVQ
KC5NN
K8KQJ
106
WF4Y
WD4ALY
WB0TED
WA4PFK
105
WA7GQO
WA2HEB
W1PUO
W0KJZ
KB3UD
KB5W
104
WA8GMT
WA4QXT
WA4JDH
KF8J
AF8V
103
WA4CCK
WA0TFC
W9JUJ
KZ8Q
102
WD8RHU
KU4W
N5AMK
101
W4CKS
W3VA
W1TN
VE3BDM
KC2QQ
KA8NCR
AG2R
100
WA7MEL
N8DSU
N4FQD
KT6A
KB0MB
99
KY4U
KA8IAF
KA4GFU
AK1W
98
KA3GJT
K4ZK
WB2VUK
97
WB2UVB
WB2KLF
W5GHP
KK1E
AG9G
96
WA3WIY
N1BGW
KT9I
KA5HDT
95
W7VSE
K2VX
94
WD4CNQ
W6INH
W0FRC
KX7W
KR4V
KA1TJ
93
WB2RBA
W6NTN
KA1AVU
KA0KWM
92
W6RNL
N5DKW
KA4SAA
K4IWW
K2ZVI
91
N4PL
N3COY
KB4WT
KA4MTX
KA3DLY
KA2GSX
90
WB6QBZ
W2BIW
89
WA4LXP
WA1YNZ
VE3DPO
KA1BHT
KA0EPY
88
WA4EIC
VE3HGJ
KA5AZK
KA1EPO
K6UYK
KC2TF
87
WB4GHU
WA4YPQ
KD5FR
KA4GUS
KA2BHR
86
WD9FRI
N7CSP
N3CKQ
N1ARI
85
W4ESH
KC2SW
K3JL
AA4AT
84
W2AET
N6AWH
K7LCA
K4EV
83
N1BJW
KL7IJG
KA8CPS
KA0BWM
82
W9NXG
NA8G
KB2KW
81
KT0U
KA8MEB
KA3EJG
80
WB9IHH
KA4BCM
79
W2XD
NG4J
KB2WI
KA9IKR
K1JHC
78
WA4LJI
W0KK
NT4S
NN4I
N2AKZ
AE1T
77
WB5LBR
W9TLU
N7BGW
KD4TY
76
WB2IDS
KQ0I
75
WB4WII
WB2GHN
KA7AID
74
WB8MTD
WA2KOJ
N5TC
K1CB
73
WB8TDA
W4ZJY
KD2BE
KB4OZ
KA0BCB
AK2E
72
VE3GT
VE2EDO
KX7T
KB3FW
KA0JQG
K9CMO
71
WB3EKP
NW4R
K0SI
70
WD8KBW
WD4HBP
WA3UNX
W3DKX
KS2G
KA1T
69
W5KLV
W4LXB
NI5V
N2BLX
N1AJJ
68
W2ZOJ
N4GDT
KP4DJ
KD9K
AI0O
WB2OHR
67
WB6RTE
WB4AID
WA4EYU
WA2AIV
W6IPL
N0CFS
K3CR
K0CY
AI6E
66
WB8SYA
WB4TZR
W7LNE
N0EEH
KB7FE
KA4IUM
K4VWK
AC3N
65
WD9HII
WA6QCA
N2CER
64
WB8NHV
WB2OWO
W5KMF
W0OUD
N5BFV
KU2N
KA4BBA
KA1KEP
63
WB4RUJ
WB4HRR
WB0HOX
W7LG
N6GZP
N5EZM
KB4LB
62
W5CUE
W1RWG
W1KX
N5BT
KV8Q
KB0Z
KBJDI
N5DDV
KA2MBP
61
W4HON
VE3KK
N3ADU
KB4OG
KA3DTE
60
WD4BSC
WA8DHB
WA4JTE
WA0SCP
VE2FMQ
KW9D
KA9OBP
56
N5FDL/T
52
KA6HJK/T
50
KA1KML/N
46
KA9JFM/T
KA8GGZ/T
43
N1CLV/T
42
N0DGM/T

Brass Pounders League August 1983

A BPL Medallion (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: KH6B.

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	2183	1741	1600	141	5625
W3CUL	745	1006	1394	88	3233
KA9CPA	29	1434	210	982	2655
N0BQP	34	1393	172	863	2462
WA0HJZ	0	765	24	524	1313
K8NCV	32	685	603	14	1234
WD8MIO	284	239	489	52	1064
W9JUJ	0	549	489	2	1040
N5DFO	3	562	278	18	861
W3VR	296	194	305	19	814
W1EOF	2	295	461	23	781
WA4JDH	0	396	341	3	740
KA1GBS	5	312	320	21	658
WB7WOW	32	292	271	63	658
AI0O	0	335	315	4	655
W7VSE	2	307	319	6	634
N3ADU	0	326	303	2	628
KT6A	4	345	256	11	616
WB5YDD	4	285	248	37	574
VE3GOL	2	257	312	2	573
N4PL	66	195	246	37	554
KB0MB	126	125	256	24	534
AF8V	2	303	226	3	534
K0JAN	0	292	31	192	514
W0WYX	78	177	255	0	510
Multioperator Station:					
WD0DVG	700	16	702	0	1418
BPL for 100 or more originations plus deliveries:					
KB5EK	131				
WB2UVB	112				
KA0CIR	104				

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

Independent Nets (August 1983)

1	2	3	4
Amateur Radio Telegraph Society	27	415	228
Central Gulf Coast Hurricane	35	889	3216
Clearing House	29	50	206
Early Bird	31	980	352
Empire Slow Speed	31	46	341
Golden Bear	31	94	1727
IMRA	27	669	1468
Midwest RTTY	30	35	256
Mission Trail	31	354	1001
New England Novice	31	133	397
Vermont Sideband	31	125	544
West Coast Slow Speed	31	68	345
20-Meter ISSB	27	892	446
75-Meter ISSB	31	649	1065
7290 Traffic	*61*	*953*	*4006*

1 — NET NAME
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

NOVEMBER

2

West Coast Qualifying Run, 10-35 wpm, at 0500Z Nov. 3 (9 P.M. PST Nov. 2). 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 sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

5-6

ARRL November Sweepstakes, cw, Oct. *QST*, page 96.

Corona 10-Meter RTTY Contest, May *QST*, page 82.

YL Anniversary Party, phone, Oct. *QST*, page 98.

International Police Association Contest, Oct. *QST*, page 98.

9

W1AW Qualifying Run, 10-35 wpm, at 0300Z Nov. 10 (10 P.M. EST Nov. 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.55 MHz. See Nov. 2 listing for more details.

10

ARRL 1296 MHz Sprint, from 7 P.M. to 11 P.M. local time. See Oct. *QST*, page 98, for details.

12-13

ARRL Midnight Special, Oct. *QST*, page 98.

European DX Contest, RTTY, July *QST*, page 86.

CQ WE Contest, sponsored by the Bell System AR fraternity, with various sessions from 1900Z Nov. 12 until 0500Z Nov. 14. The contest is open to present and retired employees of Bell, Western Electric, AT&T and subsidiaries of AT&T. Contact your local interworks coordinator for logs and complete rules, or write to Phil Pearson, WA1LXY, 1600 Osgood St., North Andover, MA 01845.

Delaware QSO Party, sponsored by the Delaware ARC, from 1700Z Nov. 12 until 2300Z Nov. 13. Work stations once per band and mode. Exchange serial number, signal report and QTH (county for DE stations; ARRL Section or country for others). Suggested frequencies: cw — 1.805 3.570 7.070 14.070 21.070 28.070; phone — 3.975 7.275 14.325 21.425 28.650; Novice — 3.720 7.120 21.120 28.120. DE stations count one point per QSO. Multiplier is total ARRL Sections and DX countries worked. Others count 5 points per DE QSO. Multiplier is total DE counties worked per band and mode (36 multipliers possible overall). Mail logs by Dec. 16 (include large s.a.s.e. for results) to Charlie Sculley, AE3H, 103 E. Van Buren Ave., New Castle, DE 19720.

Missouri QSO Party, sponsored by the Northland ARA, from 0001Z Nov. 12 until 1800Z Nov. 13. All Amateur bands except 30 meters. Work stations once per band and mode. Cw QSOs in cw subbands only. Work MO portables/mobiles again as they change county. MO stations operating on county lines count as one QSO but multiple multipliers. Exchange signal report and QTH (county for MO stations; state, province or country for others). Suggested frequencies: phone — 1.835 3.963 7.230 14.280 21.380 28.570 145.43; cw — 1.805, and 60 kHz up from lower band edges; Novice — 25 kHz up from lower band edges. Count 2 points per phone QSO and 5 points per cw QSO. MO stations multiply by total MO counties, states, VE provinces and DXCC countries worked. Others multiply by total MO counties (max. 115) worked. Entries must be on official forms available from sponsor. Mail entry by Dec. 13 (include large s.a.s.e. for results) to Northland ARA, P.O. Box 6710, Kansas City, MO 64123.

North Carolina QSO Party, sponsored by the Alamance ARC, from 1700Z Nov. 12 until 2359Z Nov. 13. Work stations once per band and mode. Work mobiles again as they change county. NC-to-NC QSOs allowed for QSO point credit. Exchange signal report and QTH (county for NC stations; ARRL Section for others). Suggested frequencies: phone — 3.980 7.280 14.280 21.380 28.580; cw — 60 kHz up from lower band edges; Novice — 20 kHz up from lower band edges. NC stations count 1 point per QSO. Multiplier is number of ARRL Sections worked. Others count two points per QSO and multiply by total NC counties worked (max. 100). Add 25 bonus points to final score for working club station K4EG. Mail logs to be received by Dec. 16 (include large s.a.s.e. for results) to F. R. Ashley, WB4M, Rte. 1, Box 471, Mebane, NC 27302.

OK International DX Contest, sponsored by the Central Radio Club, for the 24-hour UTC period Nov. 13. No rules received for this year, but here is the format from past years. Phone and cw; 160 through 10 meters. Exchange signal report and ITU zone. Count 1 point per QSO; OK QSOs count 3 points. QSOs with your own country count for multiplier credit only. Multiply QSO points by sum of zones worked per band. Entry classes: single op, all band; single op, single band; multi-single. Mail entry by Dec. 31 to CRC, P.O. Box 69, 11327 Praha, Czechoslovakia.

OMISS QSO Party, sponsored by the Old Man International Sideband Society, from 0000 to 2400Z Nov. 12. Work stations once per band. Exchange signal report, name, state and OM number (if any). Count 5 points per OMISS-member QSO, 2 points per nonmember QSO. Multiply by total states, VE provinces and DXCC countries worked. Mail logs within 15 days to Rich Besitka, KA1HGY, 480-B Radmere Rd., Cheshire, CT 06410.

Rhode Island QSO Party, sponsored by the East Bay Amateur Wireless Assn., from 1700Z Nov. 12 until 0500Z Nov. 13 and from 1300Z Nov. 13 until 0100Z Nov. 14. Work stations once per band and mode. RI-to-RI QSOs allowed. Exchange signal report and QTH (city or town for RI stations; state, province or country for others). Suggested frequencies: phone — 3.900 7.260 14.300 21.360 28.600 50.110 144.200; cw — 1.810 3.550 7.050 14.050 21.050 28.050; Novice — 3.710 7.110 21.110 28.110. Count 2 points per phone QSO and 3 points per cw QSO. RI stations multiply QSO points by total states, provinces and countries worked; others multiply by number of different RI cities and towns worked (max. 39). Mail entry by Dec. 15 (include large s.a.s.e. for results) to EBAWA, P.O. Box 392, Warren, RI 02885.

States Prefix-Suffix Contest, from 0000Z Nov. 12 until 2359Z Nov. 13. All bands, cw and phone. Exchange grid-square locator (see Jan. 1983 *QST*). Count 1 point per phone QSO, 2 points per cw QSO. Multipliers are two-letter state abbreviations within a call sign. For example, *NJ5J* counts as a NJ multiplier; *KA5MAL* counts as both an MA and AL multiplier. Multiplier is total different state abbreviations worked per band (max. 50 per band). Mail logs by Dec. 31 (include large s.a.s.e. for results) to Carl Perkins, NJ5J, 2021 Sandra La., Grand Prairie, TX 75052.

16

ARRL 432 MHz Sprint, from 7 P.M. to 11 P.M. local time. See Oct. *QST*, page 98, for details.

19

W1AW Qualifying Run, 10-35 wpm, at 2100Z (4 P.M. EST) Nov. 19. See Nov. 9 listing for more details.

19-20

ARRL November Sweepstakes, phone, Oct. *QST*, page 96.

22

ARRL 220 MHz Sprint, from 7 P.M. to 11 P.M. local time. See Oct. *QST*, page 98, for details.

26-27

ARRL International EME Competition, Part 2, Sept. *QST*, page 100.

CQ World-Wide DX Contest: cw, Oct. *QST*, page 98.

28

ARRL 144 MHz Sprint, from 7 P.M. to 11 P.M. local time. See Oct. *QST*, page 98, for details.

DECEMBER

3-4

ARRL 160-Meter Contest, this issue, page 105.

Telephone Pioneers QSO Party, sponsored by the Telephone Pioneers of America, from 1900Z Dec. 3 until 0500Z Dec. 5. Open to TP members. For more information, contact Ted Phelps, W8TP, c/o Western Electric, Dept. 45430, 6200 East Broad St., Columbus, OH 43213.

6

West Coast Qualifying Run, 10-35 wpm, at 0500Z Dec. 7 (9 P.M. PST Dec. 6). See Nov. 2 listing for details.

8

W1AW Qualifying Run, 10-35 wpm, at 0300Z Dec. 9 (10 P.M. EST Dec. 8). See Nov. 9 listing for details.

10-11

ARRL 10-Meter Contest, this issue, page 105.

HA DX Contest, (this year's rules not received).

11

ARRL 50 MHz Sprint, from 7 P.M. to 11 P.M. local time. See Oct. *QST*, page 98, for details.

27

W1AW Qualifying Run

26-Jan. 1

QRP Winter Sports, cw.

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs, and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as regulations established for Amateur Radio in my country." The declaration should be signed and dated.

*Assistant Communications Manager, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADA

ALBERTA: SM, E. Roy Ellis, VE6XC — SM/SEC: VE6XC. A/SM: VE6AMM. STM/DEC/NM (APSN & ATN): VE6ABC. Govt approval to install a 2M station complete in ADS Hqs has been given, and equipment will be purchased soon. A genuine recognition and assistance to Alberta hams has and will be exercised. All Alberta hams will be contacted by mail later this fall as to their willingness to volunteer in the planned program. Traffic: VE6CHK 55, VE6ABC 32, VE6BKP 5, VE6SA 4.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — BCEN NM VE7CSI. A/NM and Net Recorder VE7BNI. The thanks goes to VE7BNI for keeping the records and sending reports to ARRL and SM monthly. The same goes to VE7QC of B.C. Phone Net. Who could be holding the record for being NM the longest in North America? VE7DDF A/NM and thanks to him for printing the net roll call and seeing that all NCSs are kept up to date. We are seeking volunteers to join the appointments we have like ORS, OBS, OO, etc. Let us know. VE7ZA and his XYL, a trained nurse, are leaving for service aboard the hospital ship, Good Hope. Listen on 14122 for them.

MANITOBA: SM, Peter Guenther, VE4PG — ASM: AJE. STM: RO. OO/RFI: FK. PGL: CZ. SEC: HK. Code and theory classes will again start on Sept. 19 in Winnipeg. Contact VE4ADS. VE4TE recently earned a Merit certificate for being one of the originators of the Manitoba Evening Phone Net over 35 years ago and for giving dedicated service for over 40 years. MMN QNI 538, QTC 33, sess. 31. MTN QNI 76, QTC 24, sess. 23. WRIN QNI 217, QTC 9, sess 8. MEPN QNI 821, QTC 30, sess. 31. Traffic: VE4AJE 66, VE4TE 32, VE4AAD 23, VE4PG 23, VE4NE 21, VE4BI 13, VE4JA 13, VE4ADS 6, VE4AAU 4, VE4LB 4, VE4PA 4, VE4CR 3, VE4FK 3, VE4OO 3, VE4DT 2, VE4GB 2, VE4NM 1.

ONTARIO: SM, Larry Thivierge, VE3GT — OBS: VE3AR VE3CDS VE3DZH VE3FOI VE3GDJ VE3FN VE3GRO VE3IBV VE3MNI. A tip of the hat to all those traffic handlers who helped keep the nets going this summer by taking on extra skeds and duties. The ranks were thin with a goodly number away on vacations and the load was heavy with traffic from both "Man and His World" and the CNE. London ARC operated a special event station from the Centennial Museum during the Marconi Exhibition. Using equipment from the London Seniors Station, VE3LS, VE3LON made 200 contacts. Special thanks for its success to VE3s MGU LRU NMD ELN CMQ GAM NMT OEC FQ. VE3MNI is a new OBS in the Kingston area. Congrats to the Ottawa ARC on celebrating 50 years of public service to their community. VE3ILN, with a new roof top dipole, is back on 80 meters after visiting old friends in the New England area. XN3GT worked 339 contacts including 16 countries for the Renfrew Anniversary, despite several solar flares. VE3BZB after a VE1 vacation has been busy getting repeater VE3PBO's autopatch working again after it was severely damaged by lightning. In order to complete the new appointment structure within the section I am looking for interested people to fill the ACC, OO/RFI, PIO and TC positions. Please contact me if you need further details. VE3UR is now operational on AMTOR. A number of members of the Peterborough ARC had a great weekend supplying communications for the annual Rice Lake Bass Tournament, VE3KPK of Owen Sound has a message mailbox operating on 3635 and 7051.2 kHz. 147.45 MHz simplex is being used at 2200 local in the London area as an RTTY Net and is called the Rover's Roundtable. Known to check in are VE3s JEV ETA ASF EGP AGC MBN CYQ EZJ LSD ZK as well as several U.S. stations. The roundtable operates on 60 Baudot and will switch to ASCII 110 if the group wishes. The Windsor area has a similar net on 146.46. Traffic: VE3GOL 573, VE3HGJ 249, VE3KK 223, VE3GT 159, VE3AJN 65, VE3DPO 59, VE3HTL 57, VE3BDM 56, VE3FGU 44, VE3KCZ 43, VE3KXB 33, VE3WV 26, VE3BAJ 13, VE3EWD 13, VE3WG 12, VE3BZB 10, VE3MPF 10, VE3KLX 9, VE3MCO 8. (July) VE3HTL 30.

QUEBEC: SM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2EDO. PIO: VE2YW. NMs: VE2EDO, VE2FSA.New appt.: VE2ED, OBS and TC. For one week, VE2TDH, (operated by UMS members, was on the air at Man and his World. The out-of-section traffic was handled by QSN, which did the job again. Technical Coordinator VE2ED will provide assistance to amateurs or clubs who need technical advice. Felicitations a VE2FJR, le nouveau responsable du reseau VE2MO. Traffic: VE2EDO 242, VE2GFH 110, VE2EC 59, VE2FFE 47, VE2BP 47, VE2EKC 28. (July) VE2EDO 104.

SASKATCHEWAN: SM, W. C. Munday, VE5WM — STM: VE5HG. SEC: VE5RP. TC: VE5GF. NMs: SATN VE5BAF; SPN VE5NJ; PWXN VE5EX; RARA2 VE5OI; SKTN2 VE5HG; SK QSL Mgr VE5AE. Net reports: SPN 31 sessions, 886 QNI 12 QTC; PWXN 31 sessions, 402 QNI; RARA2 31 sessions, 529 QNI, 4 QTC. The dog days of summer have not appeared to have slowed down Amateur Radio activities. Members of MJARC, RARA and SARC provided communications for local parades and road runs. Best wishes extended to VE5AFT on his new venture. VE5GF and VE5KS are big guns on 40 meters with their monoband beams. Is your 5" × 7½" self addressed envelope on file with the QSL mgr? Traffic: VE5UX 12, VE5BAF 7, VE5AAT 5, VE5WM 3.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PO. PSHR: WA3WIY K3JL W3DKX Edwin Limberger, W3DRD, has been licensed since March 1933 under the same call. Cedrick Justis licensed Sept. 1933. Had call W3EEB but is now W3QQ. Congrats to both of you. Delmarva Hamfest now history. Nice affair with good weather. A contribution from hamfest proceeds was made to a young ham, towards school expenses. It is hoped this can be done every year, so please support the next one. DTN: QNI 383, QTC 52 in 23 sessions. DEPN: QNI 59, QTC 2 in 4 sessions. SEN: QNI 57, QTC 4 in 5 sessions. KARC: QNI 16 in 3 sessions. Traffic: W3PQ 134, W3QQ 92, WB3DUG 61, W3DKX 55, WA3WIY 36, K3JL 18, WA3PWT 8, W2AGR 7, K3ZXP 7, KC3FW 6, W3WD 4, WA3ZBI 3. (July) W3PQ 8. (June) W3PQ 75. (May) W3PQ 148. (Apr.) W3PQ 115. (Mar.) W3PQ 139.

EASTERN PENNSYLVANIA: SM, Karl W. Pfeil, W3VA — ACC: KB3NE. SEC: WA3PZO. SGL: N3CJP. STM: KB3LF. DEC: AA3C K3QXC KB3LR KB3UD N3AIA N3BFL W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	466	275	31
EPA	3610	7/10 P.M. Dy	370	210	59
PTTN	3610	6:30 P.M. Dy	140	58	27
PFN	3958	5 P.M. Dy	206	217	31

Local and VHF nets reporting (QNI/QTC/sess): D3ARES 138/19/5; D5ESN 67/4/4; D6ARES 50/19/5; CUM Co. ARSN 46/3/5; LUZ Co. ARES 90/19/9. BPL: K3NSN WA3DFU. Congrats. OBS reports: K3EBZ KA3EJG W3CL W3VA. PSHR: KA3DLY KA3RJG KA3JGT KB3FW KB3UD N2BSK N3COY W3GOA W3KEK W3VA WA3JRL WB3FKP. New appointment: N3AIA to DEC for District 10, which consists of Adams, Cumberland and York Cos. I wish to thank N3CJP for the FB job he did as DEC for D10. He moved out of the district. KB3LR, DEC D7, announces N3DMB has been appointed EC for Bradford Co. He also hopes to have a D7ARES net in operation soon. EPAEPTN welcomes KI3S N3BKC WB3DEK KA3HBK. PTTN welcomes K3NTD. Upgrades: KB3CS KB3MN to Extra. KA3GUT KA3JZN (10 yrs old), N3DOR to Tech. New calls: KB3JW (KA3IRA), KO3B (KB3MN), KA3LLI new Novice in York area. New gear: KB3LR TS430, Alpha 76A KT-34Xa tribander. WB3FYT FT-230R. Nice to hear OT W3AXA active in EPA again. Warminster ARC set up an information and tfc booth at the Wrightstown Grange Fair and handled a large volume of traffic. Congrats to W3BBS and K3YTL for their excellent showing in the June VHF QSO Party. W3BBS was tops in the Atlantic Div. and 2nd nationally. K3YTL was 5th nationally. ORS N3AKQ, moving to Camp Hill. KA3DLY and K3MZO on the mend after spending some time in the hospital. W3GOA reports a major overhaul on his equipment. K3KW now QRT; no HF antennas because someone cut his trees down. KO3N sporting a new 5-ele tribander on a 40' tower installed by a "strike force" of MARC members. WA3KFT reports AWARE has code practice for 30 minutes every Saturday at 8 P.M. on 146.955/355. Traffic: K3NSN 5625, WA3DPU 605, KB3UD 412, KB3FW 256, N3COY 223, WA3EHD 222, W3IPX 141, KA3GJT 125, AA3B 111, WA3WQP 110, WB8KPE 92, KA3DLY 67, KA3IME 59, K3QXC 53, W3VA 49, W3TWV 42, W3AQN 32, WA3CKA 29, N3AIW 26, WB3FKP 25, N3CD 22, N3AKQ 20, KA3EJG 20, W3FAF 16, WB3KUZ 16, W3ADE 13, N3BFL 12, W3CL 11, N2BSK 8, N3CMC 6, K3EBZ 4, W3GTN 2. (July) W8KAG 84, WB8KPE 68, AF3Z 7, W3ADE 6.

MARYLAND - DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — ACC: KA3DRO. PIO: KA3DBN. STM: WB3GZU. SEC: WA3TAI. Congrats to KJ3T a grandma! The Antietam RA put their WC 2-Mtr net to good use at the Hagerstown Air Show. KC3DW (NCS), W4PRA (Chairman) with WB3FTQ W3IUT W3FZT WB3FXI WB3JBZ K3UMV K8RYA W3HNR K3EXH WB3GEJ K2AVA and N3ATS doing the work. FAR reports 94 applicants from 35 states competed for the 14 scholarships awarded. W3ZNW sounds good with the new keyboard. W3CDQ is about to shift into winter gear. KJ3E has completed by foot the whole Appalachian Trail. KA3R and W3MR are resident OOs. KC3D has a new dipole for SS. WB3KJT is thinking about antennas again. Congrats to upgrades WA3LIP now N3DPE and WA3LIQ now N3DPF. KC3AV and most of the MSN got together for planning purposes. WA3EOP has a new address but no HF antennas yet. W3YVQ is right in the middle of some RACES exercises. W3FZV is collecting addresses. KC3Y has many projects. W3LDD ardent tone man surprised the MDD boys! KA3EWV has a keyboard too. KK3F has his rig in the repair shop. Congrats to W3AKO who is 83 years young 1 Sep and very active. K3NNI is a cabinet maker. W3DQI is into computers. N4DR has a new rig, and spices his DX contact with a little of their language! WB3IVO is operated by W3CVE. WB3BFK operates daytime. W3OYY looking for more activity soon. AG3L made it back from Bermuda on his sailboat Juno. WB3GZU makes it under the wire. With the nets: Net/manager sessions/traffic/QNI avg. MSN/KC3AV 30/64/6.4; MDC PON/W3OYY 4/7/10; WC 2-Mtr/KC3DW 5/3/16.4; WR PON/WB3BFK 23/39/11; MEPN/WB3GZU 31/103/24. KC3DW Topper with W3LDD and MDD/W3PQ 62/258/7.4. W3DKX missing 3 or less. Brass W3FA W3YVQ and W3QQ. For May, June and July Brass included WB3GZU KC3Y and W3FZV. Thanks newsletters CARA, CBRA, FAR, MD Mobileers, Mt. ARC, AARC So. Md ARC and GSFC. Traffic: WB3GZU 306, W3FA 249, KC3DW 243, WB3IVO 239, W3YVQ 134, KC3Y 106, KC3AV 63, K3NNI 59, KA3EWV 39, KJ3T 33, W3ZNW 26, WB3BFK 25, W3FZV 25, WB3KJT 13, W3DQI 10, KJ3E 8, KC3D 6, W3LDD 6. (July) KK3F 72.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB — SEC: K2NE. STM: WA2HEB. SGL: W2XQ. BM: WB2UVB. TC: W2IJX. Citing personal reasons, our SM, N2CER resigned and I have been appointed to complete his term. N2CER worked very hard to implement the new SM structure and he will be missed. As of this writing, 5 of the 8 "departments" have been filled. We still need an OO/RFI Coordinator, a Public Information Officer and an Affiliated Club Coordinator. If you would like information on any of these positions, feel free to get in touch with me. Many of us shy away from taking a leadership position simply because we're afraid of the time it might take or the amount of travel that may be involved. Let me assure you that the time involved can be as much or as little as you can spare and most of the travel would be going to the post office to mail/pick up correspondence. The most important thing is to give it a shot. Give the SM concept a chance to work for all of us in SNJ. Its success depends on all of us! Congrats to Eric Cruser, W2DYR of Lakehurst for receiving a 50 year membership plaque from ARRL. Traffic: WB2IQJ 348, WB2UVB 215, WA2HEB 103, N2CER 97, KC2PB 30, KY2T 28, WA2JRP 17, W2IU 16, WA2MGV 10, KA2CQX 6.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ACC: N2EH. BM: W2GLH. TC: K2QR. OO/RFI: W2AET. PIO: WA2PUU. SGL: KO2X. DECs: WA2AIV Western; KA2BHR Central; WB3CUF Mohawk; KB2KW Southern; WB2NAO Northern Districts. APPTS: KB2KW, WB2DHB (EC, Livingston). MORE APPOINTEES needed, contact appropriate ASM above with your recommendations for qualified stations/operators. Eight Assistant Section Managers (ASMs) will be meeting with me in November to address Section NEEDS...let us know your thoughts for the League and the future of its field organization here in Western New York. Many thanks W2GJ for acting as Southern DEC past year; welcome KB2KW former SEC Eastern New York.

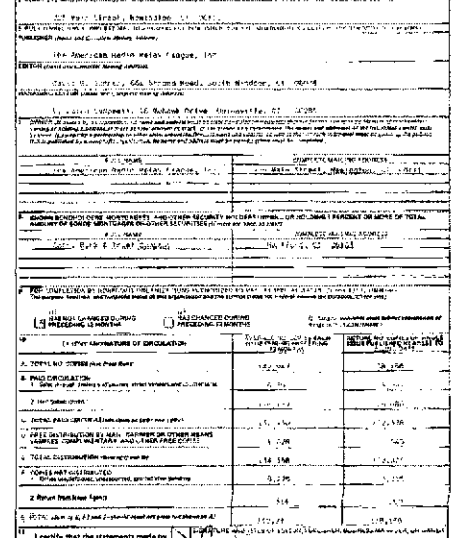
Net	Freq.	Time/Day	TRAFIC	DATA	NM
NARA	SEN 75/15	0930/Sn	061	000-04	KC2JO
NYS/1*	3677	1000/Dy	238	086-31	WB2EAG
Mike Farad	3925	1300/M-S	132	027-26	VE2FMQ
NYPON*	3913	1700/Dy	538	272-31	WA2KOJ
NYSPTEN	3925	1800/Dy	627	090-31	WB2HKU
ESS	3590	1800/Dy	341	046-31	W2WSS
OCTEN*	34/94	1830/Dy	383	075-30	WB2HLY
Q Net	31/91	1830/Dy	340	005-30	KA2CMQ
STAR/E*	99/39	1830/Dy	022	006-07	N2BLX
WDN/E*	04/64	1830/Dy	519	121-31	KC2QQ
Blue Line	93/33	1900/Dy	—		WA2SEF
NYS/4*	3677	1900/Dy	423	195-31	N2APB
CARCN	10/70	2000/Dy	479	015-28	WA2WAX
OARC Net	25/85	2000/W	083	001-05	K2VTT
VHF THIN	04/64	2000/T	047	000-05	KC2QQ
WNYECN	3955	2000/3Sn	(ARES)		W2BCH
BRVRN	055/655	2100/Dy		-31	WB2OFU
CNYTN*	90/30 +	2115/Dy	380	051-30	WA2PUU
STAR/L*	99/39 +	2130/Dy	041	016-16	N2BLX
WDN/L*	04/64	2130/Dy	612	111-31	KC2QQ
NYS/5*	3677	2200/Dy	401	382-31	N2APB

*NTS. + Other repeaters supporting. ARES Lewis Co. 3/03 1800 Sun-WA2OEP; SLVARES 31/91 1930 Sun-WB2NAO; Central District 40/00 2030 3rd Sun; Oneida Co. 34/94 1930 Tues; Onondaga Co. 90/30 1930 1st and 3rd Mon; Chemung Co. 10/70 and 96/36 2100 Sun; Erie-Niagara 31/91 1200/1900 Sun; West Catskill (Delaware) 3540 1830 Mon; other ARES net info will be published if you let us know! PSHR: W2AET WA2AIV KA2BHR N2BLX WA2FJJ VE2FMQ WB2IDS KB2KW W2MTA KU2N WB2OWO KC2QQ KC2SW W2ZOJ. CONGRATS—COMMS: Empire State Games with a hundred operators under lead of WA2PUU; Rome RC steered by WA2FLX; two by Boonville ARC; Central NY Firemen's Parade with KB2DP in charge; numerous RARA events led by N2EH. Traffic: WA2FJJ 284, W2MTA 265, W2AET 208, WB2IDS 205, WB2QIX 192, WA2HSB 168, KC2SW 145, WB2OWO 133, VE2FMQ 131, W2FR 130, KB2KW 104, KC2QQ 91, WA2KOJ 77, KG2D 75, KA2BHR 71, W2ZQJ 65, KU2N 42, N2BLX 37, KA2QIK 34, AF2K 33, KA2DQA 30, WA2AIV 25, WA2OEP 24, W2HYM 23, N2ABA 22, WB2PID 20, N2CSB 17, W2GJ 13, KC2XD 12, KA2DBD 10, WA2RXO 8, K2IUT 6, WB2NAO 4, W2PHQ 3, K2VR 2. (July) K2RN 10.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB — SEC: AB3Q. STM: AC3N. ACC: N3EE. OO/RFI: KN3B. PIO: WB3CEW. SGL: W3OKN. TC: W3FE. BM: WN3VAW.

Net	QNI	QTC	Sess.	kHz	T/D	NM
WPAQW	376	194	31	3585	7:00P/D	WA3UNX
WPAPTN	619	134	31	3983	6:15P/D	N3ADU
WPA2MTN	452	72	31	146.28/88	8:00P/D	W3MML
NWPA2MTN	72	4	31	146.04/64	9:00P/D	WB3JDI

With deep regret I must announce these Silent Keys: W3MJ W3EPZ W3KVG W3NAW (Florida) WB3JCG (Ohio). New extras: KN3Q KO3M/ex-KB3UO K3TUA; Advanced: KC3JQ/ex-KA3HSV; Novices: KA3LIW KA3LNP KA3JVO KA3LIS. Atlantic Div. Director, W3ABC, presented W3KVS with his 50-year ARRL membership plaque, and the South Hills BPRS AND Mod. with their 50-year affiliated club

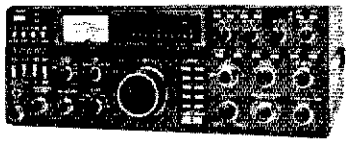

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

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 BIG VALUE COMBINATIONS

TS-930S



with Antenna Tuner
Plus
3 Free Bonus Items

1) SP-930 Speaker.
2) MC-60A microphone.
3) YK-88C-1 filter.

REG. $2029 VALUE

$1799

A $230 SAVING

TW-4000A

FM "Dual Bander"

2m and 70cm in a single package!

Buy a TW 4000A for

$599.95

and select two of the following items absolutely free!

1) **VS-1 Voice Synthesizer.** $39.95 value.
2) **TU-4C sub-audible tone generator.** $39.95 value.
3) **MA-4000 Duo-band Mobile Antenna.** $44.95 value.

TS-430S

Buy a TS 430S for

$899.95

and select your free package from among the following three groups:

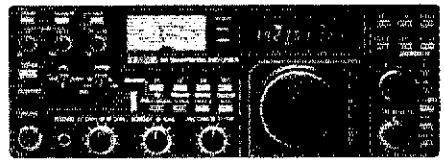
1) **MB-430. FM-430. YK-88A** $119.85 value.

or 2) **MB-430. MC-42S. YK-88-SN.** $112.85 value.

or 3) **Ham Radio Outlet $90 CASH REBATE.**

PLUS FREE SHIPMENT UPS (Surface) ALL COMBOS

NEW!! ICOM IC-751



$1399 *PRICE*

INCLUDES: FREE PS-35 POWER SUPPLY

(Mounts internally)

REG. $160 VALUE

Tri-Ex

W-51
SALE $799
W-36
CALL FOR PRICE
LM-470D
CALL FOR PRICE

KLM

KT-34A
SALE $299
KT-34XA
SALE $459

PRICES ARE FOB CALIF. EXCEPT FOR CERTAIN COMBINATIONS. PLEASE INQUIRE

YAESU

FT-208R **FT-708R**

CALL FOR LOW PRICES ON HAND-HELDS and all YAESU ITEMS.

NEW!
FT-980

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-23S REG. $89.95
SALE $79.95

SERVING HAMS BETTER.
North...south...east...west.

Bob Ferrero,W6RJ
Jim Rafferty, N6RJ
other well known hams
give you courteous, personalized service.

FREE SHIPMENT *UPS (Surface) CONTINENTAL U.S.A.*

ON MOST ITEMS THAT CAN BE SHIPPED UPS BROWN.
THERE ARE SOME EXCEPTIONS IN ALPHA, TRI-EX AND KLM

FREE PHONE 800 854-6046

9:30AM to 5:30PM PACIFIC TIME.

OVER-THE-COUNTER, 10AM to 5:30PM.
MONDAY THROUGH SATURDAY

CALIFORNIA CUSTOMERS PLEASE PHONE OR VISIT LISTED STORES.

HAM RADIO OUTLET

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033 (213) 860-2040
Between Disneyland & Knott's Berry Farm

BURLINGAME, CA 94010
999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport.

OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road (619) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd.

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON
AVANTI • BELDON • BENCHER • BERK-TEC • BIRD • B & W
BUTTERNUT • CALLBOOK • CDE • COLLINS • CURTIS • CUSHCRAFT
DAIWA • DRAKE • DX EDGE • DX ENGINEERING • EIMAC
HUSTLER • HY-GAIN • ICOM • J. W. MILLER • KANTRONICS
KENWOOD • KLM • LARSEN • LUNAR • METZ • MFJ • MICRO-LOG
MIN-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.

plaque at the SHBPM Hamfest. It was accepted by charter member W3MML & WA3ZNP. The Allegheny Co. ARES provided communications for the Pittsburgh Vintage Grand Prix and it was a great event. We worked with the Lake Erie Com. group who controls the race starts, finishes and flagging. They had only high praise for the 32 amateurs who participated. We'll be back next year. Cars from all over the country competed in the charity event. The Radio Assn. of Erie amateurs provided comm. for the ErieFest '83 10K Race and OCTAD Bike Race. Also add new Generals KA3DFK and N3DBE; Advanced is N3BOA. When you notify me of a call change please give old & new so I know who you are. Traffic: N3ADU 828, W3OKN 217, AC3N 196, K3CR 164, N3CKQ 159, WA3ONT 104, WA3UNX 101, W3NEM 100, K3NPW 67, N3FM 66, K3SMB 42, W3NGO 40, W3RUL 38, KQ3M 31, W3MML 30, W3IQD 25, KN3B 24, WN3VAW 22, W3KUN 22, KC3JC 20, W3TTN 18, W3GVI 14, W3KMZ 14, K3TUA 12, KA3COX 10, K3NPX 10, KB3X 10, W3GGZ 9, K3LTV 9, KF3V 9, KB3L 8, K3HCT 5, K1PLR/3 5, KA3JGN 4, W3LOD 1.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH. STM: KB9X. OO/RFI: K9MX. BM: K9ZDN. PIO: WD9EED. SGL: W9KPT. ACC: WB9SFT. ASM: K9ORP.

Net	Freq.	Times (Z win)	QNI	QTC	Sess.
ILN	3690	0030/0400 Dy	493	179	62
ITN	3705	0100 Dy	217	56	30
ILPN	3915	2230 Dy (X Sn)	728	164	31
NCPN	3915	1300 Dy (X Sn)	489	71	27
NCPN	7270	1815 Dy (X Sn)	192	67	25
IEN	3940	1500 Sn	120	2	4
IARES	3915	2230 1+3 Sn	41	—	2

Illinois was represented 100% to 9RN by stations K9s AZS BVE CMO QEW SW KW9J KD9K N9TN KB9X W9INZ W9NXG and WB9NVN. Illinois was represented 100% to D9RN by stations W9HOT NXG NAV JJU KW9J K9EHP K9AZS CMO WA9BXB WB9ODN NVN. D9RN was represented 100% to CAND by IL stations W9HOT NXG and WB9NVN and WB9WGD. W9LNQ and N9ALC used the HAMFESTERS W9AA callsign in the recent IL QSO party and racked up over 300 contacts. This is the club's 50th year in ham radio. Also celebrating their 50th year is the Starved Rock Radio Club (SHRC), who were established on Sept. 1, 1933 and became affiliated with ARRL on March 15, 1934. CONGRATULATIONS TO BOTH CLUBS ON FIFTY YEARS OF SERVICE!! N9ALK informs us that despite his efforts and those of other hams in the Champaign area, the new county tower ordinance has gone into effect. Hopefully hams will be able to get variances on a case by case basis. THE NET THAT CHANGED ITS MIND!! IL STM KB9X has informed me that the new IL SECTION PHONE NET, which was scheduled to begin on Oct 1 meeting at 6:30 A.M. has been changed. The net will still be firing up on Oct 1, but it has been decided that an evening net will better suit the needs of the section in terms of interfacing with ILN. The schedule now calls for the net to meet at 6 P.M. local time on 3905 with K9AZS as NM. As this will not go to print until after the scheduled starting date of the net, come and join us. We should be going strong by now!! The IL Bulletin Manager could also be called the IL Section Software Manager. As a result of superhuman efforts by K9ZDN over the summer months, both the Northeast IL Emergency Net (NEIL) and the Southern Illinois SKYWARN System (SISS) are operating using computers to select products from various NWS and FAA TTY circuits for relay to the amateur SKYWARN nets. Prior to the use of K9ZDN's system the circuits were monitored by mechanical selectors which relied on circuit conditioning codes sent before each item. Items were sent by categories, and although the NWS cooperated whenever possible in coding the circuit so that desired products were received, we were quite limited in our ability to control the data that was printed. This meant many hours spent sorting out relevant info for relay. His hard work has simplified operating greatly, as well as given circuit users additional flexibility in tailoring the items received to their needs. THANKS! Congrats to Cass Co. EC WD9HQW on his upgrade to Advanced! Traffic: K9ZDN 286, W9NXG 254, KW9J 181, W9JIJ 163, W9HOT 156, K9CMO 107, K9AZS 103, W9OK 101, W9TLU 88, W9HLX 66, KB9X 65, KN9BAM 48, K9EHP 42, KD9K 36, K9QEW 35, WA9SHE 30, WA9BXB 26, K9BVE 22, W9KR 19, K9SW 18, W9LNQ 16, KA9NZI 14, KA9NBH 12, W9VEY/M 12, WA9RUM 7, W9HBI 3.

INDIANA: SM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUJ. OO/RFI: KJ9G. SGL: WA9VQO. PIO: K9DIY. SDXC: N9MM. BM: KC9TA. SRC: N9WB. ACC: K9TUS. SCC: W9OBF. TC: WD9ADB. SHC: WA9FUD. NMs: ITN-W9QYY; QIN-KJ9J; ICN-KA9CZD; VHF-W9PMT; IWN-N9BHT.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	2654	400	2215	93
QIN	3656	1430/0100/0400	894	341	2068	31
ICN	3708	2315	126	38	688	31
IWN	3910	1310	1747	—	495	31
IWN	VHF	Kokomo-Bloomington	2211	—	310	31

Hoosier VHF nets: QNI 3615, QTC 172, QTR 4543, bulletins 52 for 18 nets. D9RN 100% QTC 477 messages in 1485 minutes stns W9JUJ W9URQ KB9NR K9CGS. 9RN 100% QNI 415, QTC 459, QTR 1143 in 62 sessions. Stns N9AEI W9FC N9HZ KJ9J W9JUJ WA9QCF W9QLW WB9UYU K9WWJ W9XD CAND 100% D9RN 1007 messages in 31 session. Stns AB9A W9JUJ W9URQ KB9NR W9PRD. Appointments: ECs: WB9RLE, Fulton Co.; KW9D, Franklin Co.; N9DLN, Johnson Co.; WB9OTX, Ripley Co. PIA WD9HII Fort Wayne. KJ9G, the OO/RFI Coordinator has moved to New Castle. The Lincoln City special events station set up by the Pike Co. ARC drew many visitors, made a goodly number of contacts and had great participation. Thanks to WB9NCE and XYL. The Columbus ARC held their picnic at the QTH of WA9LCM. Owing to a smokey fire we now have SMOKED HAMS. I hate to see the LaPorte ARC plan to sell their snowmobile I guess it is a sign of the times. We soon forget the blizzards of 77/78. There was a nice article in the *ARC REPORTER* about KB9HH, who was chief radio operator for three years and deserved the recognition. I received a letter from W9BDP who is now 82 and caring for a sister 75. His Amateur Radio activity was a spin off from RR telegraphy. He says the Morse wires are now all gone. Hang in there, we appreciate having you. The Clark Co. ARC would like a name for their communications van. I am sure the van gets plenty of attention for the club is real public service oriented. There are many pros and cons to having mobile equipment. Traffic: W9JUJ 1040, KJ9J 257, WB9UYU 212, W9URQ 173, W9EI 111, W9QYY 101, W9QLW 95, W9UEM 93, WA9QCF 80, KB9HH 63, W9XD 55, N9AEI 52, N9HZ 48, K9WWJ 47, W9UMH 45, WB9JUV 43, W9PMT 39, KB9NR 38, AB9A 31, W9JZV 29, KD9BE 28, K9ET 24, KW9D 22, WD9HII 21, KA9LAU 20, WD9DWD 18, W9IOH 16.

ICOM IC-745

A New Transceiver Worth Celebrating!

HAM BANDS! GENERAL COVERAGE RECEIVER! 16 MEMORIES! SCANNING! PASSBAND TUNING! VARIABLE NB & AGC!

What's the celebration about? The IC-745 . . . a new all ham band HF transceiver with SSB, AM, CW, RTTY and an FM option . . plus, a 100KHz — 30MHz general coverage receiver.

And . . . the IC-745 has a combination of features found on no other transceiver at such an incredibly low price.

Compare these exceptional features:

- 100KHz — 30mHz Receiver
- 16 Memories
- Full function Metering with a built in SWR Bridge
- IF Shift and Pass Band Tuning
- 10Hz / 100Hz / 1KHz Tuning Rates with 1MHz band steps
- Optional Internal AC Power Supply
- Adjustable Noise Blanker (width and level)
- Continuously Adjustable AGC with an OFF position
- Receiver Preamp
- 100% Transmit Duty Cycle

Other Standard Features:

- 100 Watt Output Transmitter with exceptionally low IMD
- VOX
- Speech Compressor
- Tunable Notch Filter
- RIT and XIT
- All Mode Squelch
- Scanning
- ICOM System Compatibility

Optional Accessories:

• IC-PS15	External Power Supply
• IC-PS35	Internal Power Supply for the ultimate in Portability
• IC-2KL	Linear Amplifier
• IC-SP3	External Speaker
• IC-MB12	Mobile Mounting Bracket
• IC-AT100	Antenna Tuner (100W)
• IC-AT500	Antenna Tuner (500W)
• IC-HP1	Headphones
• IC-EX241	Marker Module
• IC-EX242	FM Module
• IC-EX243	Electronic Keyer
• IC-FL52A	500Hz 455KHz CW Filter
• IC-FL45	500Hz 9MHz CW Filter
• IC-FL54	270Hz 9MHz CW Filter
• IC-FL53A	250Hz 455MHz CW Filter
• IC-FL44A	2.1KHz 455KHz SSB Filter
• IC-SM6	Desk Mic
• IC-HM12	Hand Mic

The IC-745 is the only transceiver today that has such features standard . . . the number of options and accessories available . . . and such a low price.

ICOM is ...*Simply the Best* in quality built ham equipment today. See the IC-745 at your local authorized ICOM dealer or contact ICOM for more information.

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-751

The New Standard of Comparison

NEW Competition Grade Transceiver!

ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade ham receiver, a 100KHz to 30 MHz continuous tuning general coverage receiver, and a full featured all mode solid state ham band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable/field day package.

Receiver. Utilizing an ICOM developed J-FET DBM, the IC-751 has a 105dB dynamic range. The 70.4515MHz first IF virtually eliminates spurious responses, and a high gain 9.0115MHz second IF, with ICOM's PBT selectivity. A deep IF notch filter, adjustable AGC and noise blanker (can be adjusted to eliminate the woodpecker), audio tone control, plus RIT with separate readout provides easy-to-adjust, clear reception even in the presence of strong QRM or high noise levels. A low noise receiver preamp provides exceptional reception sensitivity as required.

Transmitter. The transmitter features high reliability 2SC2097 transistors in a low IMD (-32dB @ 100W), full 100% duty cycle (internal cooling fan standard), 12 volt DC design. Quiet relay selection of transmitter LPF's, transmit audio tone control, monitor circuit (to monitor your own CW or SSB signal), XIT, and a high performance speech processor enhance the IC-751 transmitter's operation. For the CW operator, semi break-in or full QSK is provided for smooth, fast break-in keying.

Dual VFO. Dual VFO's controlled by a large tuning knob provide easy access to split frequencies used in DX operation. Normal tuning rate is in 10Hz increments and increasing the speed of rotation of the main tuning knob shifts the tuning to 100Hz increments automatically. Pushing the tuning speed button gives 1KHz tuning. Digital outputs are available for computer control of the transceiver frequency and functions, and for a synthesized voice frequency readout.

32 Memories. Thirty two tunable memories are provided to store mode, VFO, and frequency, and the CPU is backed by an internal lithium memory backup battery to maintain the memories for up to seven years. Scanning of frequencies, memories and bands are possible from the unit, or from the HM 12 scanning microphone. In the Mode-S mode, only those memories with a particular mode are scanned, others are bypassed. Data may be transferred between VFO's, from VFO to memories, or from memories to VFO.

Standard Features. All of the above features plus FM unit, high shape factor FL44A 455 Khz SSB filter, full function metering, SSB and FM squelch, convenient large controls, FM option, a large selection of plug-in filters, and a new high visibility multi-color flourescent display that shows frequency in white, and other functions in white or red, make the IC-751 your best choice for a superior grade HF base transceiver.

Options. External frequency controller, external PS-15 power supply, internal power supply, high stability reference crystal (less than 100Hz, -10 C to +60 C), HM12 hand mic, desk mic, filter options: SSB: FL30
CWN: FL52A, FL53A
AM: FL33

ICOM

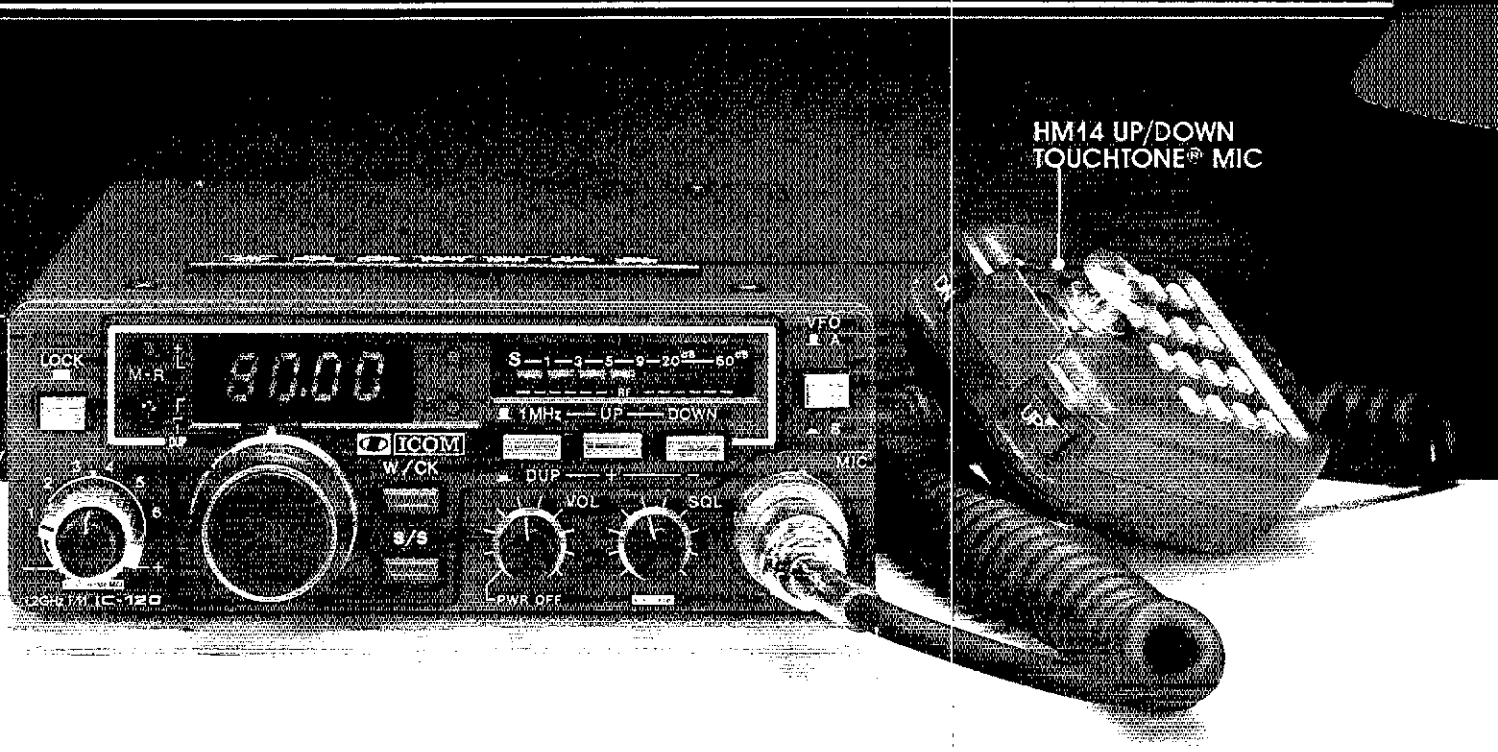
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-27**

1.2 GHz!

NEW!

Explore the world of 1200 MHz FM with ICOM's new IC-120 Mobile!



Now you can move out of the crowded 144 and 440 MHz bands into the wide spectrum of 1200 MHz because ICOM gives you the opportunity to explore the spectrum from 1260 to 1300 MHz . . . 40 MHz . . . with all the features found on popular 2 meter and 440 MHz rigs plus more:

Memories. Six memory channels plus 2 VFO's provide storage of most used frequencies in this wide band. Each memory allows memory of frequency, offset direction, offset frequency, and tone encoder frequency. Internal memory backup available.

Scanning. Scan the memories, scan all 40 MHz or program a segment to be scanned. All scanning has the option of scanning for a busy or open channel.

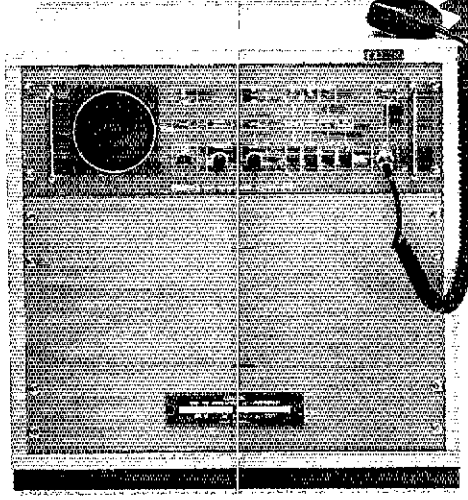
Duplex. Be able to work different repeater offsets, with ICOM's programmable offset system, as they become available.

3 Tuning Rates. Tuning increments of 10 KHz, 20 KHz or 1 MHz are available for rapid or slow tuning of the band.

RIT. RIT on FM? Yes, ±5 KHz on either side of the transmit frequency allows you to tune signals offset from yours.

Readout. Four digit green LED readout for easy visibility day or night.

The ICOM IC-120 gives you all of this plus a very quiet PLL circuit, with excellent signal to noise ratio, high sensitivity and a stabilized power amplifier to provide full power over its temperature and voltage ranges, and the IC-120 is small, only 2"H x 5½"W x 8⅛"D.



NEW 1.2 GHz Repeater

Complete your system with the IC-RP1210 repeater.

- PLL frequency selection (198 channel, 10 KHz steps, DIP switch)
- High stability PLL (0.5PPM/-30° to +60°C)
- Repeater access via CTCSS
- DTMF control functions
- Selectable hang time
- ID'er.

ICOM

The World System

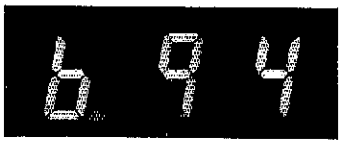
ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

ICOM IC-25H

45 Watts of Compact Power

IC-25H
2 Meter Mobile
45 Watts

45 watts / green LED readout / compact size / touchtone® scanning microphone / 2"H x 5½"W x 8¾"D / 2 VFO's / 5 memories make the IC-25H the best 2 meter mobile value on the market.



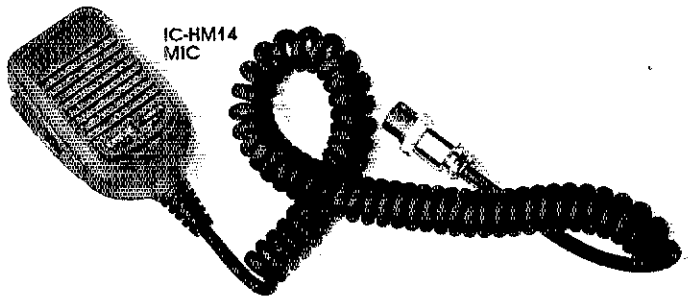
New Green LED. Easier to read in bright sunlight, and not glaring at night, the IC-25A's new readout provides good visibility under all conditions.

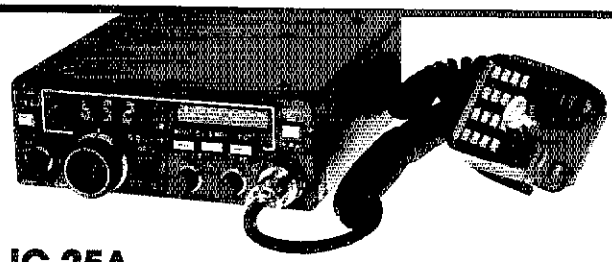
Dual VFO's. Dual VFO's give an extra stored frequency for scanning (memory scan scans 5 memories plus 2 VFO's) and each VFO has a different tuning rate for easy QSY.

5 Memories. Instant access to most 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.

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 repeater access tones.





IC-25A
25 Watts / 2 meters

The IC-25A is a very compact 2 meter FM mobile. Only 2"H x 5½"W x 7"D, the IC-25A features a green LED readout which is visible in any lighting condition, a touchtone® / scanning microphone and 25 watts of output.

These standard features have made the IC-25A the most popular 2 meter mobile on the market.

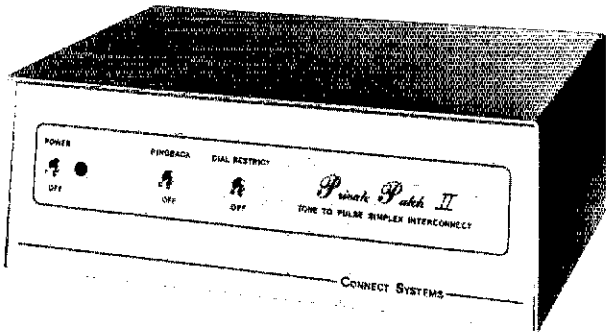
Scanning. Pushing the S/S button initiates the scan circuitry. With the mode switch in a memory position the unit will scan all 5 memories plus the 2 VFO frequencies. With the mode switch in a VFO position, the unit will scan the entire band or the portion of the band defined by memories 1 and 2.

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**

PRIVATE PATCH II



STANDARD FEATURES

- CW identification
- Tone to pulse — no wrong numbers ever!
- Five digit access code — 60,000 code combinations
- Speed dialer compatible
- Sophisticated toll restrict—user programmed digits
- Single chip xtal controlled tone decoder
- Ringback — pages with CW ID
- Busy channel ringback inhibit — will not page if channel is busy
- Operates simplex
- Operates through "any" repeater — no optional tone equipment required
- Three/six minute "time out" timer — resettable from the mobile. Four CW ID warnings during final minute
- Control interrupt timer — assures reliable control
- Glass circuit board — reflow soldered, machine clipped
- Self contained 115VAC supply — 230V 50/60 HZ available at slight additional cost.
- Modular phone jack — and seven foot cord
- One year factory warranty
- 14 day return privilege — when ordered factory direct

CONTACT A DEALER NEAR YOU

AMATEUR ELECTRONIC SUPPLY
Milwaukee WI, Wickliffe OH, Orlando FL, Clearwater FL, Las Vegas NV, Chicago IL

HAM RADIO OUTLET
Anaheim CA, Burlingame CA, Oakland CA, San Diego CA, Van Nuys CA

HENRY RADIO
Los Angeles CA, Anaheim CA, Butler MO

JUNS ELECTRONICS
Culver City CA, Reno NV

N&G DISTRIBUTING CORP.
Miami FL

PIZA ELECTRONICS
Ponce, PR

CANADA:

DOLLARD ELECTRONICS
Vancouver, BC

PHILIPPINES:

CORONA INTERNATIONAL
Cubao, Quezon City

Private Patch II is for the discriminating amateur who demands the finest in simplex autopatch performance/quality. Our digitally processed vox and simplex loop create a level of communications quality which is not even closely rivaled. Do not confuse our technique with sampling . . . Private Patch II is totally kerchunkless! Private Patch II will interface with any FM radio in 15 minutes, connects only to the mic and speaker jacks! No options are required for superb performance through "*any*" repeater!

CUSTOMER FEEDBACK:

Gentlemen:

I received my "Private Patch II" today and immediately put the unit into service. I had to sit down and write to you upon completion because in all the years I have spent as a ham, (27) I have NEVER purchased any piece of equipment that has made so positive an impression on me as has the "Private Patch II."

The unit was delivered to me in less than one week (coast to coast) from the time I mailed my order. It arrived in perfect working condition and proved to be the easiest piece of equipment I have ever had the pleasure of learning to use.

Since putting the "patch" into service, I have had more compliments than I can count. The audio quality is nothing short of SUPERB!! It is hard to believe that you are not actually conversing on a telephone. The VOX control circuitry is probably the best I have ever had the pleasure to use. Its responsiveness is almost instantaneous and when properly adjusted, yields control that is so fine that no words or syllables are lost. The control circuitry was well thought out; the sequences and operational methods chosen have proven to be easy to master and even easier to use in the field than ever hoped for.

I could go on and on . . . the merits of the equipment are many and each feature is "better than the next". Congratulations on the production of one of the best and most useful pieces of gear to come along in quite a while.

Sincerely yours,

Edmund Schneider, K2RCO

Gentlemen:

I received my Private Patch II via UPS today—exactly one week to the day after mailing in my order to you. That's very fast service.

A comment about the Private Patch II: This unit has surpassed my dreams about a simplex patch. I cannot believe how it is like a half-duplex patch. I have run patches before and have never had such ease of installation (about 12 minutes) and such excellent performance. Thank you again for this product!!! Sampling patch manufacturers had better give up because they just cannot compete with this model!

Incidentally, no adjustments were needed to the level pots . . . it worked "right out of the box".

Sincerely,

Richard Norton, WB5FFO

Gentlemen:

Patch works great. Much superior to Sampling Interconnects, the (censored) as an example. Excellent product! Keep up the good work!

Michael Chisholm, KA6DAC

Connect Systems Inc.

P.O. Box 4155
Torrance, CA 90510
Phone (213) 540-1053

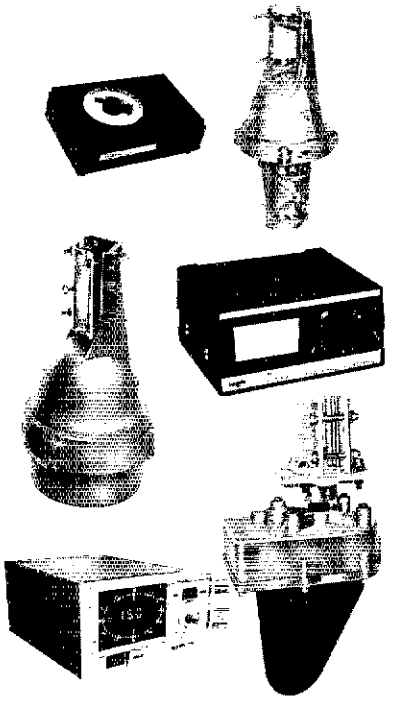
hy-gain ANTENNA ROTATORS

for your peace of mind.

Determine the total wind-load area of your antenna(s), plus any antenna additions or upgrading you expect to do. Now, select the matching rotator model from the capacity chart below. If in doubt, choose the model with the next higher capacity. You'll not only buy a rotator, you'll buy peace of mind.

ROTATOR MODEL	ANTENNA WIND-LOAD CAPACITY: MOUNTED INSIDE TOWER	ANTENNA WIND-LOAD CAPACITY: WITH STANDARD LOWER MAST ADAPTER
AR22XL or AR40	3.0 sq. ft. (.28 sq. m)	1.5 sq. ft. (.14 sq. m)
CD45 II	8.5 sq. ft. (.79 sq. m)	5.0 sq. ft. (.46 sq. m)
HAM IV	15.0 sq. ft. (1.4 sq. m)	N/A
T²X	20.0 sq. ft. (1.9 sq. m)	N/A
HDR300	25.0 sq. ft. (2.3 sq. m)	N/A

For HF antennas with booms over 26' (8 m) use HDR300 or our industrial R3501.



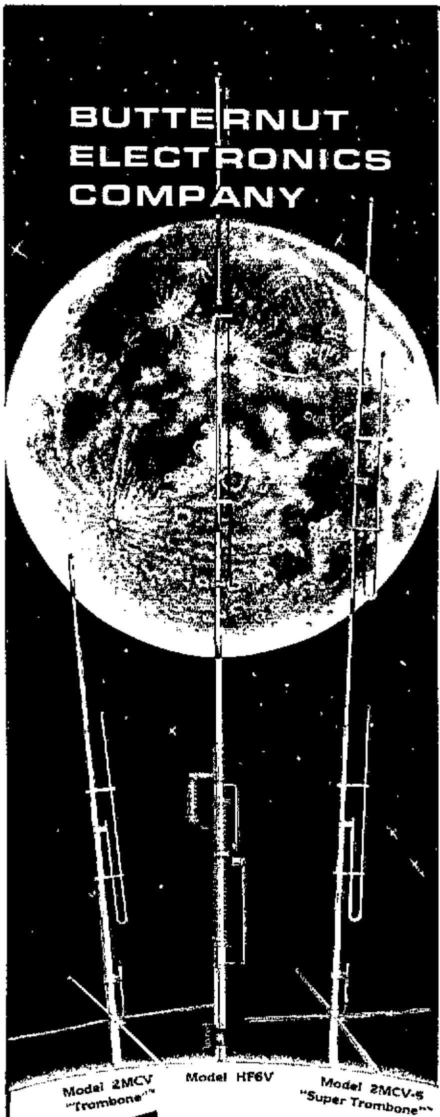
Full details at better Amateur dealers or write:

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.

BUTTERNUT ELECTRONICS COMPANY



THE WINNERS

Model HF6V-Completely automatic bandswitching 80 through 10 **plus** 30 meters. Outperforms **all** 4- and 5-band "trap" verticals of comparable size. Thousands *in use* worldwide since December '81! 160 meter option available now; retrofit kits for remaining WARC bands coming soon. Height: 26 ft/7.8 meters; guying not required in most installations.

Model 2MCV "Trombone"™ —omnidirectional collinear gain vertical for 2 meters having the same gain as "double-5/8λ" types, but the patented "trombone" phasing section allows the radiator to remain unbroken by insulators for maximum strength in high winds. No coils "plumber's delight" construction and adjustable gamma match for complete D.C. grounding and lowest possible SWR. Height: 9.8 ft/2.98 meters.

NEW Model 2MCV-5 "Super-Trombone"™ — Same advanced features as the basic 2MCV but a full wavelength taller with additional "Trombone"™ phasing section for additional gain. Height: 15.75 ft/4.8 meters.

All BUTTERNUT ANTENNAS use stainless steel hardware and are guaranteed for a full year. For further information on these and other BUTTERNUT products write for our FREE CATALOG!

BUTTERNUT ELECTRONICS

405 EAST MARKET ST. LOCKHART, TX 78644

WILLIAMS RADIO SALES

Unconditionally Guarantees Its Two-Meter and 220 Mhz. Bomar

CRYSTALS

2-METERS-STOCK FOR FOLLOWING RADIOS

- WILSON - 1402,1405,MK II,MK IV
- ICOM - IC21, 21A,22,22A,215
- DRAKE - TR22,22C (No Sub Band), 33C,72
- KENWOOD - TR220, 7200
- MIDLAND - 13-500, 13-505, 13-520
- REGENCY - HRT-2, HR2,2A,2B,212,312 (No Sub Band)
- HEATH - HW-2021 ONLY
- TEMPO - FMH,FMH-2,FMH-5 ONLY
- CLEGG MK-III • HY-GAIN 3806
- SEARS 3573 • YAESU FT-202

C.A.P. VHF CRYSTALS FOR MOST RADIOS

IN-STOCK CRYSTALS SHIPPED WITHIN 24-HRS.

220-MHZ.-STOCKING FOR FOLLOWING RADIOS	MIDLAND	CLEGG	COBRA
	13-509	FM-76	200

We Can Special Order Non Stocking Crystals For Amateur-Built Radios Not Listed Above. *Same Price! Allow 3-4 Wks.*

TWO METER CRYSTALS—30 kHz. standard band plan & 15 kHz. splits. Lo-in/Hi out on 146 mHz. and Hi-in/Lo-out on 147. Sub band, 20 kHz. plan from 144.51-145.11 (Lo-in/Hi-out). Most standard simplex 146-147 pairs. ALL others special order, same price!

220 MHZ. CRYSTALS—Stocking all pairs every 20 kHz. beginning with 222.02-223.62 thru 223.38-224.98, (Lo-in/Hi-out) Simplex pairs of 223.46,50,66 & 68. ALL others special order, same price!

3.95 EACH

NO CARDS

FREE SHIPPING

Special Orders Allow 3-4 Weeks

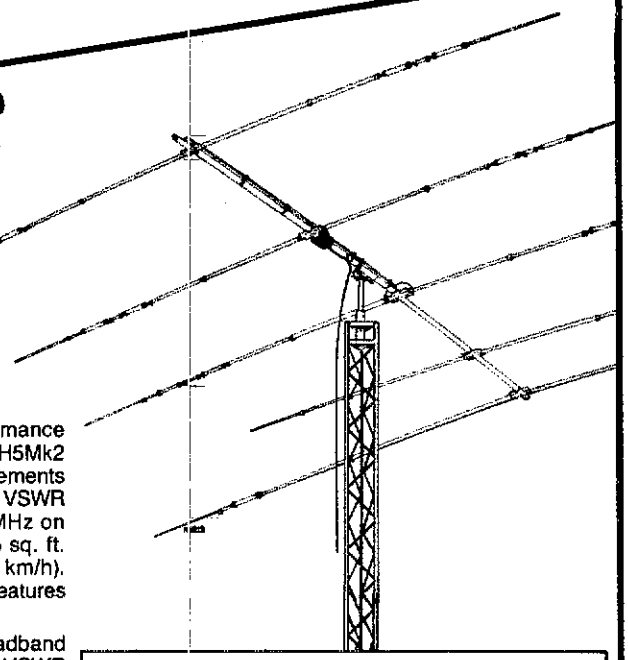
Two Meter or 220 Mhz. Crystals Only. For Most Standard Amateur-Built Radios. We cannot supply any other type crystals.

WILLIAMS RADIO SALES
600 Lakedale Road, Dept S
Colfax, N.C. 27235
(919) 993-5881 Noon to 10 pm EST

hy-gain®

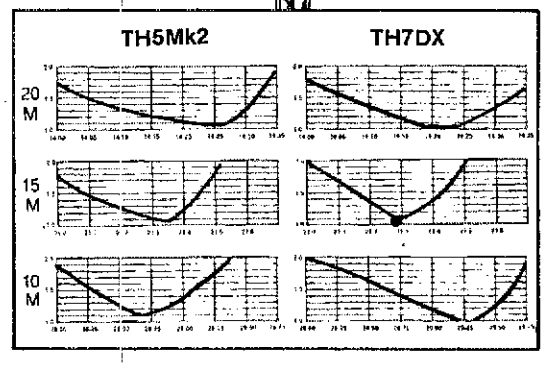
THUNDERBIRDS

NEW BROADBAND TRIBANDERS LOAD NEW AUTO-TUNE SOLID STATE RIGS



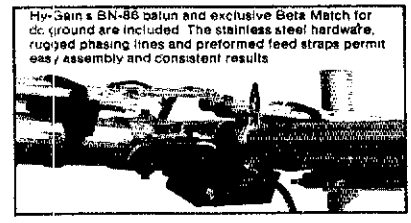
TH5Mk2 Now you can enjoy outstanding broadband antenna performance in a size to fit most city lots. With 5 elements on a 19 ft. (5.8 m) boom, the TH5Mk2 has 4 active elements on each band. Hy-Q traps and monoband parasitic elements achieve gain and front-to-back ratio comparable with stacked monobanders. 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).



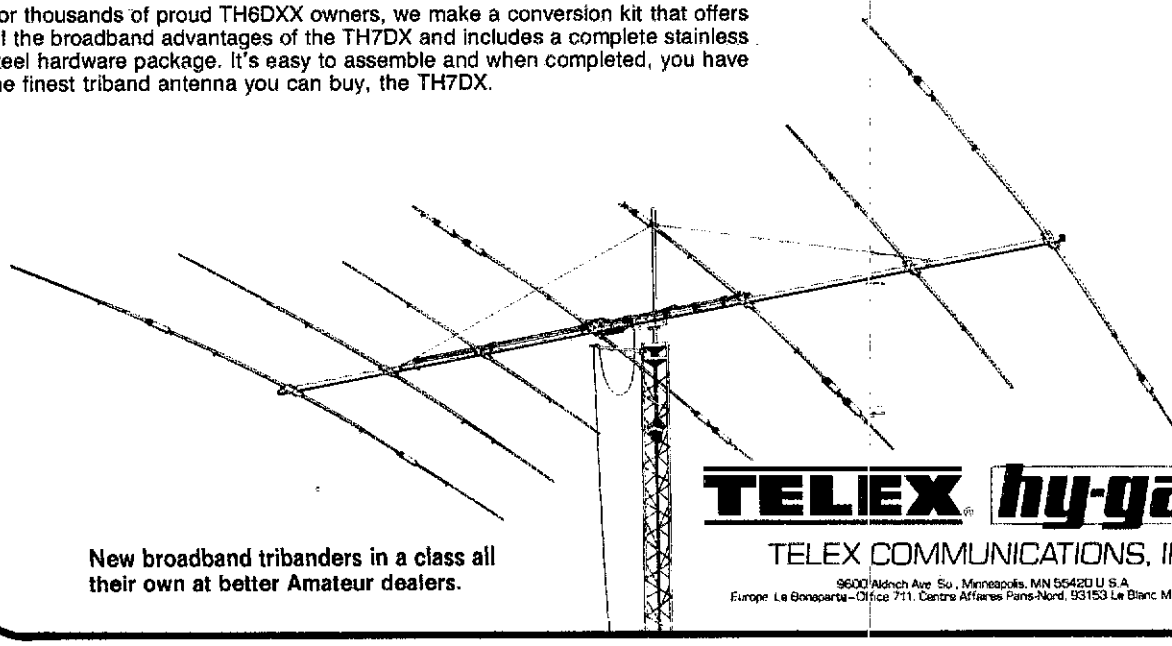
FEATURES COMMON TO TH5Mk2 AND TH7DX

- 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

CES INTRODUCES THE NEW 510SA "SMART PATCH"

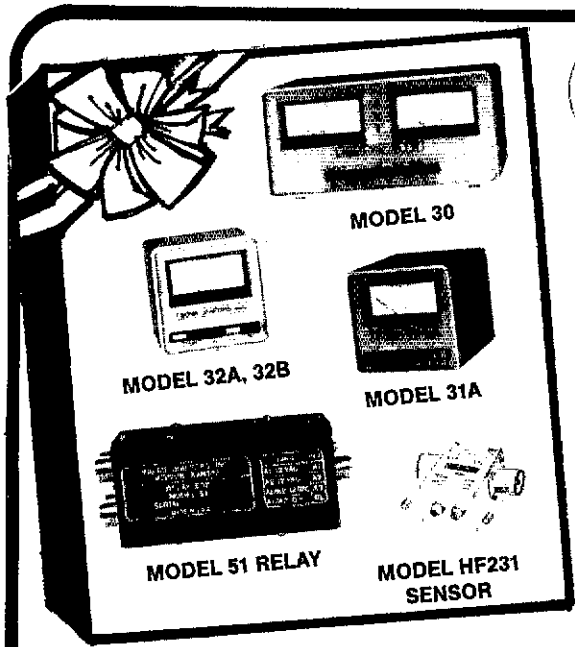
The State of the Art Simplex Interconnect

Communications Electronics Specialties introduces the CES 510SA "Smart" Simplex Autopatch, with many important new features never available before: • Three digit control codes with user programming. • A sophisticated toll restrict provides positive long distance lock out. • Time-out and COR activity timers with warning beeps and digital programming. • Rotary or DTMF dialing. • Phone line in-use detector prevents interrupting a call in progress, and sends unique CW sequence. • Phone ring detection logic enables unique CW sequence. • Digital programming of the sample rate and width, and noise gate sensitivity control, for easy interfacing with most radios. Simple and direct connections to radio.

Options available: • Smart CW identifier with unique CW messages for each patch function. • FCC type accepted phone line coupler. • Special tone squelch kit to operate patch through repeaters.

CES

The 510SA—the newest advance in interconnect technology, from the innovators at:
Communications Electronics Specialties, Inc.
Post Office Box 507 • Winter Park, Florida 32790
(305) 645-0474 • Toll-free (for orders only): (800) 327-9956



SIGNALCRAFTERS

RF POWER AND VSWR MEASUREMENT AT IT'S BEST... *AT THE BEST PRICES EVER!*

ALL MODELS feature highly accurate peak and average power measurements and *fully automatic* VSWR readout on precision calibrated taut-band meters, requiring no manual adjustments.

POWER SENSOR Model HF231 for 1.8-30 mHz., 50 ohms, up to 2000 W., is supplied with each instrument. Sensor mounts on rear of instrument or remote in the coax line. Write Signalcrafters for other power sensors available at extra cost.

MODEL	METERS	RANGES	AUTO-RANGE	PWR	REGULAR PROFESSIONAL QUANTITY PRICE	SPECIAL OFFER WITH HF231 SENSOR
30	2	0-20, 200, 2000W	YES	AC	$359.10	**$199.95**
31A	1	0-200W	NO	BATT	273.00	**149.95**
32B	1	0-20, 200W	NO	BATT	280.00	**169.95**
32A	1	0-200, 2000W	NO	BATT	280.00	**169.95**

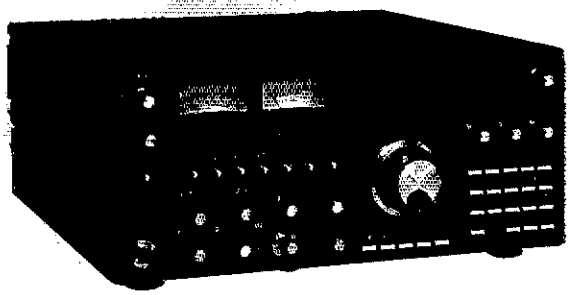
MODEL 51 ANTENNA RELAY For use with Mod 30. Instrument panel switch selects one of four possible 50 ohm loads. Indoor. Regular **$95.20.** **SPECIAL OFFER $69.95.**

SIGNALCRAFTERS, INC., P.O. BOX 3406, LAWRENCE, KS 66044 913-841-7556

This special reduced price offer of Signalcrafters Professional RF Power Measuring Devices Expires Feb. 28, 1984.

YAESU

HF FAMILIES

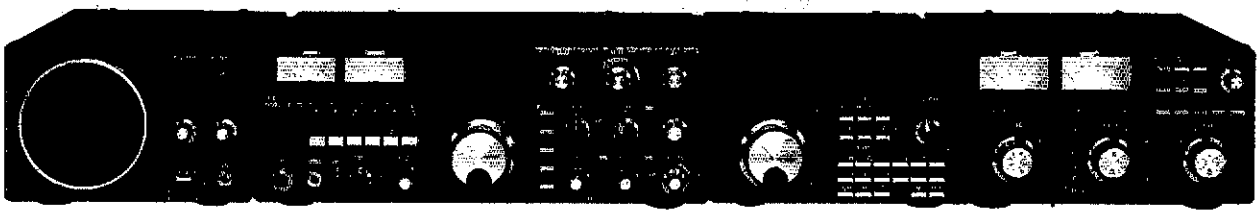


FT-ONE

THE TOP OF THE LINE HF ALL MODE GENERAL COVERAGE TRANSCEIVER WITH COMMERCIAL-GRADE CONSTRUCTION, COMPETITION-GRADE DESIGN WITH UNEQUALLED RECEIVER FILTER PERFORMANCE.
TX: 100W 1.8–29.99 MHz
RX: 150 kHz–29.99 MHz

FT-980 CAT

NEW HF ALL MODE TRANSCEIVER WITH GENERAL COVERAGE RECEIVER, 8-BIT MICROPROCESSOR CONTROL, AND INTRODUCING YAESU'S NEW COMPUTER-AIDED TRANSCEIVER SYSTEM FOR COMPLETE EXTERNAL COMPUTER CONTROL.
TX: 100W 9 bands
RX: 150 kHz–29.99 MHz



FT-102 LINE

Designed for wide dynamic range and clean transmitter output—to give you that extra competitive edge. Three 6146B's give power to spare, while the ultra-modern features give you total operating flexibility and control.

Simple, reliable and thrifty, the all solid-state rig that gives you everything you need for no-frills mobile HF, or base station with the optional FP-700 Power Supply. 100W: 9 bands, SSB and CW, w/FM optional

All mode synthesized general coverage receiver—perfect for serious shortwave listening. Options include 12-channel Memory Unit, VHF Converters, Antenna Tuner and an Active Antenna.

Specifications subject to change without notice or obligation.

V/UHF FAMILIES

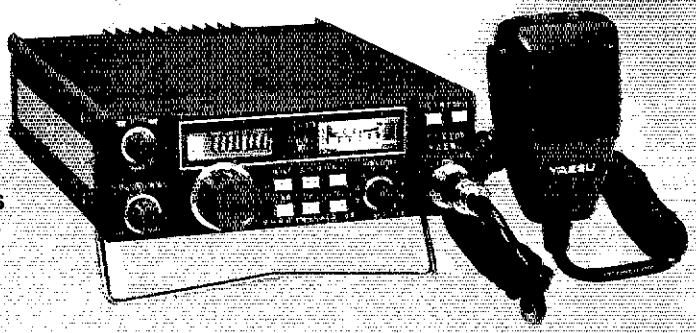
FT-208R/708R

Feature-packed FM Handhelds that have proven their superior performance. Microprocessor control assures convenient operation while incorporating every worthwhile feature the serious operator needs.

FT-208R 2.5W/1W RF: 143.5–148.5 MHz

FT-708R 1W/200mW RF: 440–450 MHz

10 memories w/lithium backup
Full scanning features



FT-230R/730R

Compact FM mobiles engineered for reliability and convenience. The perfect balance of current drain and power output for all mobile needs. Built to withstand years of punishing mobile use.

FT-230R 25W RF: 143.5–148.5 MHz
FT-730R 10W RF: 440–450 MHz

FT-290R/690R/790R

All mode portables with full microprocessor control and all of the features needed for serious SSB, CW and FM field operation when powered by eight optional "C" cells. Options also available for mobile and base operation.

FT-690R 2.5/1W RF: 50–54 MHz
FT-290R 2.5W/1W RF: 143.5–148.5 MHz
FT-790R 1W/200 mW RF: 430–440 MHz

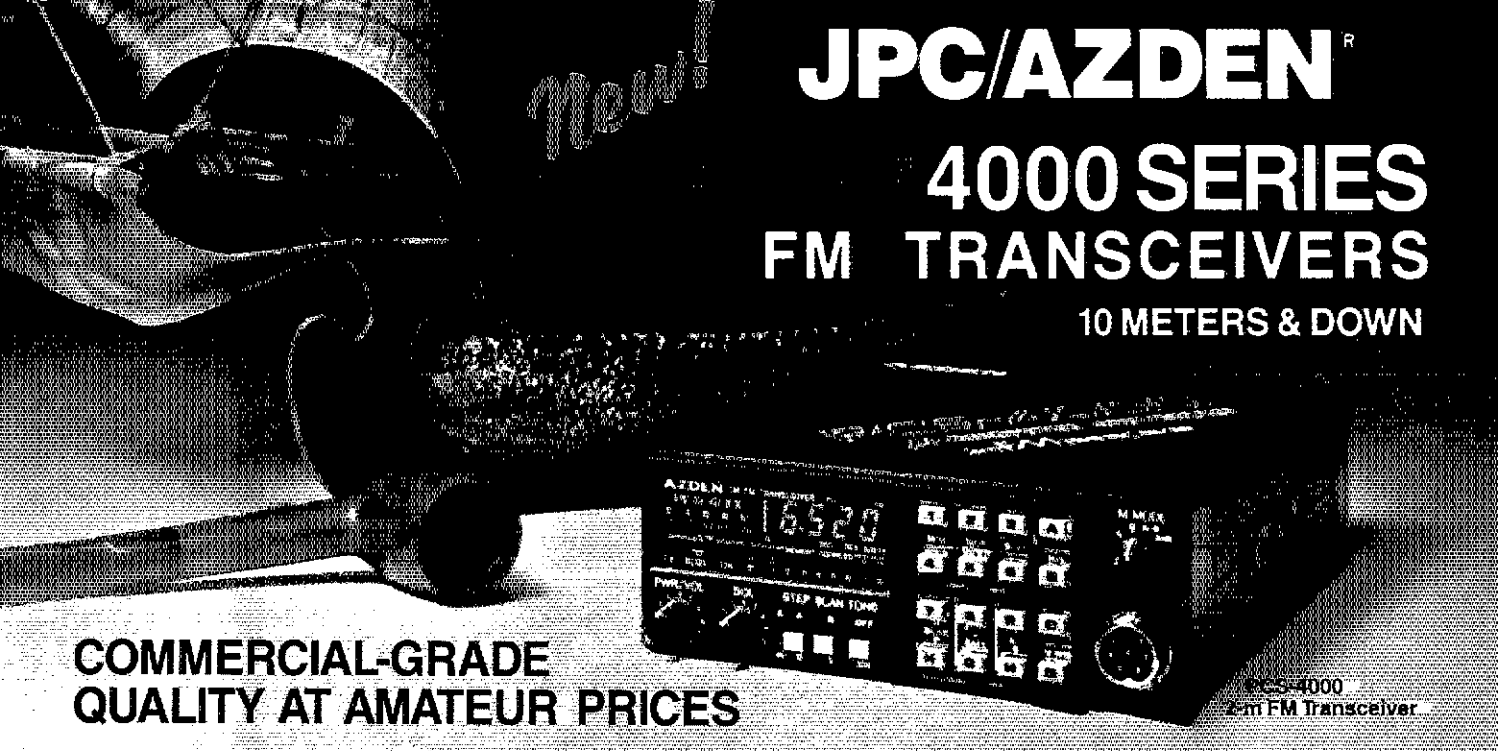
FT-480R/680R/780R

All mode base/mobiles with power and performance in all SSB, CW and FM applications. Optional matching FP-80A AC Power Supply makes the perfect base station.

FT-680R 10W RF: 50–54 MHz
FT-480R 10W RF: 143.5–148.5 MHz
FT-780R 10W RF: 430–440 MHz

YAESU

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU Cincinnati Service Center, 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100



JPC/AZDEN®

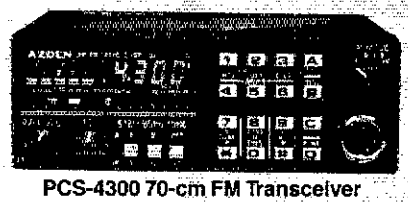
4000 SERIES
FM TRANSCEIVERS
10 METERS & DOWN

PCS-4000
2-m FM Transceiver

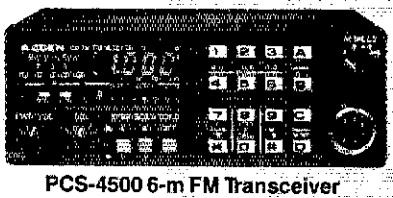
COMMERCIAL-GRADE QUALITY AT AMATEUR PRICES

EXCLUSIVE 1 YEAR LIMITED WARRANTY! *COMPARE!*

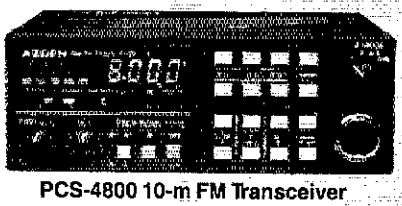
THE 4000 SERIES



PCS-4300 70-cm FM Transceiver



PCS-4500 6-m FM Transceiver



PCS-4800 10-m FM Transceiver

COMING SOON
PCS-4200 1¼-m FM Transceiver

PCS-300
2m Handheld
FM Transceiver
142-149.995 MHz

- **WIDE FREQUENCY COVERAGE:** PCS-4000 covers 142.000-149.995 MHz in selectable steps of 5 or 10 kHz. PCS-4200 covers 220.000-224.995 MHz in selectable steps of 5 or 20 kHz. PCS-4300 covers 440.000-449.995 MHz in selectable steps of 5 or 25 kHz. PCS-4500 covers 50.000-53.995 MHz in selectable steps of 5 or 10 kHz. PCS-4800 covers 28.000-29.990 MHz in selectable steps of 10 or 20 kHz.
- **CAP/MARS BUILT IN:** PCS-4000 includes coverage of CAP and MARS frequencies.
- **TINY SIZE:** Only 2"H × 5.5"W × 6.8"D. COMPARE!
- **MICROCOMPUTER CONTROL:** At the forefront of technology!
- **UP TO 8 NONSTANDARD SPLITS:** Ultimate versatility. COMPARE!
- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard simplex or plus/minus offsets. Standard offsets are 600 kHz for PCS-4000, 1.6 MHz for PCS-4200, 5 MHz for PCS-4300, 1 MHz for PCS-4500, and 100 KHz for PCS-4800.
- **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; auto-resume can be overridden if desired. 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 power 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 (except in PCS-4800).
- **PL TONE:** Optional PL tone unit allows access to private-line repeaters. Deviation and tone frequency are fully adjustable.
- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and audio fidelity.
- **HIGH/LOW POWER OUTPUT:** 25 or 5 watts selectable in PCS-4000; 10 or 1 watt selectable in PCS-4200, PCS-4300, PCS-4500, and PCS-4800. Transmitter power is fully adjustable.
- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV or better for 20-dB quieting. Circuits are designed and manufactured 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, rugged built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses, and hardware are included.
- **ACCESSORIES:** CS-7R 7-amp ac power supply, CS-4.5R 4.5-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.
- **ONE YEAR LIMITED WARRANTY!**

EXCLUSIVE DISTRIBUTOR — DEALER INQUIRIES INVITED

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

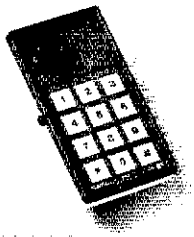
JPC AZDEN — **JAPAN PIEZO CO., LTD.**

1-12-17 Kamirenjaku, Mitaka, Tokyo, 181 Japan — Telex: 781-2822452

Morse Keyers & Trainers by AEA

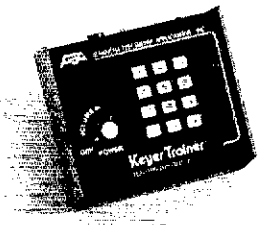
AEA produces the finest Morse keyers and trainers in the world. All AEA keyers operate with any standard keyer paddle and offer selectable monitor tone, selectable dot and dash ratios, full weighting and selectable dot and/or dash memory. In addition, all our keyers offer full, semi-automatic or straight key modes. The keyers and trainers are keypad controlled which significantly reduces the complexity of operation for all the features offered. Each keyer has separate + and - keyed outputs for keying any modern transmitter. All keyers and trainers operate from 12 VDC (or 117 VAC with optional model AC-1 wall adaptor) which makes them ideal for portable operation. AEA microcomputer-based products are all subjected to a full burn-in and test prior to shipment, as well as being designed for maximum R.F. immunity.

NEW BT-1



The **BT-1 Basic Trainer** is a hand-held computerized unit which teaches the code one character at a time at 18 or 20 words per minute. The BT-1 contains a self-paced training program that allows serious students the possibility of learning Morse to 20 wpm in as little as one month! Each character represents a separate practice session in which the character is first introduced by itself, and then presented 50% of the time along with all previously learned characters. There are no tapes to memorize, wear out, or break. No programming skills are necessary; the BT-1 is very easy to use. The tone oscillator can also be keyed for sending practice. An earphone jack is provided for private listening. The BT-1 will go as high as 99 WPM in 1 WPM increments. A battery operated version, the BT-1P, is available with wall charger and internal NICAD batteries.

NEW KT-3



The **KT-3 Keyer-Trainer** unit uses the teaching program used in the BT-1 trainer. In addition, the KT-3 features a full function Morse automatic keyer for keying any modern transceiver, or for sending practice. Speed range is 18-99 wpm for transmitting and 1-99 wpm for training.

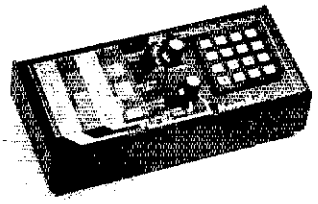
KT-2 Keyer Trainer

The **KT-2 Keyer-Trainer** is a computerized keyer with all the features shown above, plus a Morse proficiency trainer. It is designed to increase your existing code as quickly as possible. The unit can be set for beginning practice speed, ending practice speed, and duration of practice. The microcomputer does all the rest by gradually increasing the speed during the practice time selected. You can even select between fast code (Farnsworth) or slow code methods. The characters are sent in 5 letter groups, or random word lengths. Two levels of difficulty can be selected; common Morse characters or all English Morse characters. A 24,000 character answer book is provided for the 10 separate starting positions. There is also random practice mode for which no answers are available.

CK-2 Contester™

The **CK-2 Contester™ Keyer** is the lowest cost automatic keyer available featuring an automatic serial number generator for contesting. The CK-2 keyer features a large 500 character message memory that can be soft-partitioned into as many as 10 sections. An exclusive AEA edit mode makes it possible to correct mistakes made while entering messages or to insert words into previously established messages. Two different speeds can be set for fast recall in addition to a stepped variable speed control. The CK-2 features an automatic message repeat mode with variable delay-before-repeat for automatic CQ transmissions or TVI testing.

MM-2 MorseMatic™



The **MM-2 Morsematic Keyer** represents the most sophisticated paddle keyer ever designed and features two powerful microcomputers. The Morsematic incorporates virtually all the features (except the preset and stepped variable speeds) of both the CK-2 and KT-2 shown above. In addition, the MM-2 offers an exclusive automatic beacon mode which is invaluable for meteor scatter, moonbounce scheduling, or beacon operation.

AEA Brings you the Breakthrough!

Advanced Electronic Applications, Inc.

P.O. Box C-2160, Lynnwood, WA 98036
(206) 775-7373 Telex: 152571 AEA INTL

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 gone!

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-45 500 Hz CW filter (1st IF)	59.50	
*FL-54 270 Hz CW filter (1st IF)	47.50	
*FL-52A 500 Hz CW filter (2nd IF)	96.50	**89.95**
*FL-53A 250 Hz CW filter (2nd IF)	96.50	**89.95**
*FL-44A SSB filter (2nd IF)	159.00	**144.95**
SM-5 Electret desk microphone	39.00	
HM-10 Mobile scan microphone	39.50	
MB-12 Mobile mount	19.50	
Options also for IC-745 listed below		
IC-730 8-band 200w PEP Xcvr w/mic	$829.00	**599.95**
FL-30 SSB filter (passband tuning)	59.50	
FL-44/A SSB filter (2nd IF)	159.00	**144.95**
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	
SM-5 Electret desk microphone	39.00	
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	
IC-745 9 band xcvr/.1-30 MHz rcvr	$999.00	**899.95**
PS-35 Internal power supply	160.00	**144.95**
CF5-455K5 2.8 KHz wide SSB filter	TBA	
SM-6 Desk microphone	39.00	
HM-12 Hand microphone	39.50	
See IC-740 list above for other options (*)		

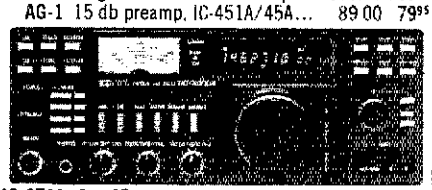
IC-751 9-band xcvr/.1-30 MHz rcvr	$ 1399.00	1229
PS-35 Internal power supply	160.00	**144.95**
FL-52A 500 Hz CW filter	96.50	**89.95**
FL-53A 250 Hz CW filter	96.50	**89.95**
FL-33 AM filter	31.50	
SM-6 Desk microphone	39.00	
HM-12 Hand microphone	39.50	
External frequency controller	TBA	
High stability reference crystal	TBA	
Options: 720/730/740/745/751	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	

ICOM

Options - continued	Regular	SALE
EX-310 Voice synthesizer (IC-751)	39.95	
SP-3 External speaker	49.50	
Speaker/phone patch (specify radio)	139.00	**129.95**
BC-10A Memory back-up	8.50	
EX-2 Relay box w/marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	**314.95**
AT-500 500w 9-band automatic ant tuner	449.00	**399.95**
MT-100 Manual antenna tuner	249.00	**224.95**
AH-1 5-band mobile ant w/tuner	289.00	**259.95**
GC-4 World clock	99.95	**99.95**
HF Linear amplifier		
IC-2KL 160-15m/WARC solid state linear	1795.00	**1299**
VHF/UHF Multi-modes		
IC-251A 2m FM/SSB/CW xcvr	$749.00	**549.95**

$50 Factory Rebate - until gone!

IC-551D 80w 6m Xcvr	$699.00	**599.95**
PS-20 20A switching ps/spkr	229.00	**199.95**
EX-106 FM adaptor	125.00	**112.95**
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
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**



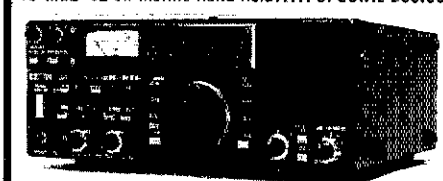
IC-271A 2m, 25w xcvr	699.00	**629.95**
IC-471A 430-450 MHz, 10w xcvr	799.00	**719.95**
PS-25 Internal power supply	TBA	
EX-310 Voice synthesizer	39.95	
HM-12 Hand microphone	39.50	
SM-6 Electret desk microphone	39.00	
VHF/UHF FM		
IC-25A 2m, 25w, up-dn-ttp mic, grn leds	$359.00	**319.95**
IC-25H as above, but 45 watts	389.00	**349.95**
IC-45A 440 FM xcvr, 10w, TTP mic	399.00	**359.95**
BU-1 Memory back-up	38.50	
IC-22U 10w 2m FM non-digital Xcvr	299.00	**249.95**
EX-199 Remote frequency selector	35.00	
RP-3010 440 MHz repeater	999.00	**899.95**
VHF/UHF multi-modes:		
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:		
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**
IC-402 432 portable SSB xcvr	389.00	**299.95**
BP-10 Internal nicad battery pack	79.50	
BC-15 AC charger	12.50	
EX-248 FM unit	49.50	
SP-4 Remote speaker	24.95	
LC-10 Leather case	34.95	
IC-3PS Power supply for portables	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**
1.2 GHz equipment		
IC-120 1w 1.2 GHz FM xcvr	$499.00	**449.95**
RP-1210 10w 1.2 GHz repeater	TBA	
Cabinet for RP-1210 or RP-3010	249.00	

Hand-held Transceivers

Synthesized; 800 channels; 1.5/.15 watts; 250 ma. NiCd Pak; AC wall charger; flexible antenna; earphone; wrist strap; belt clip. Models with or without Touch Tone® Pad (TTP).

Model	Regular	SALE
IC-2A for 2 meters	$ 239.50	**214.95**
IC-2AT with TTP	269.50	**219.95**
IC-3A for 220 MHz	269.95	**234.95**
IC-3AT with TTP	299.95	**239.95**
IC-4A for 440 MHz	269.95	**234.95**
IC-4AT with TTP	299.95	**239.95**

Accessories for Hand-helds:	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 1/4-wave 2m antenna	10.00
CA-5 5/8-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**
3A-TTN 16-button TTP front for 2A/3A/4A	39.50
CommSpec SS-32M 32-tone encoder	29.95
ML-25 2m 20w HT amp. (Reg. $199.50) SALE	**179.95**
IC-M12 12 ch Marine hand-held..... SPECIAL	**269.95**



Shortwave receiver Regular SALE

R-70 100KHz-30MHz digital receiver... $749.00 **599.95**

'til 12/31/83 - purchase R-70 and receive certificate for free GC-4 World Clock ($99.95 Value) from ICOM.

EX-257 FM unit	38.00	
IC-7072 Transceive interface, 720A	112.50	
FL-44/A SSB filter (2nd IF)	159.00	**144.95**
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	

MasterCard VISA

HOURS: Mon. thru Fri. 9-5:30; Sat. 9-3

Milwaukee **WATS** line **1-800-558-0411** answered evenings until 8:00 pm, Monday thru Thursday.

Please use WATS 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
Outside Illinois 1-800-621-5802

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

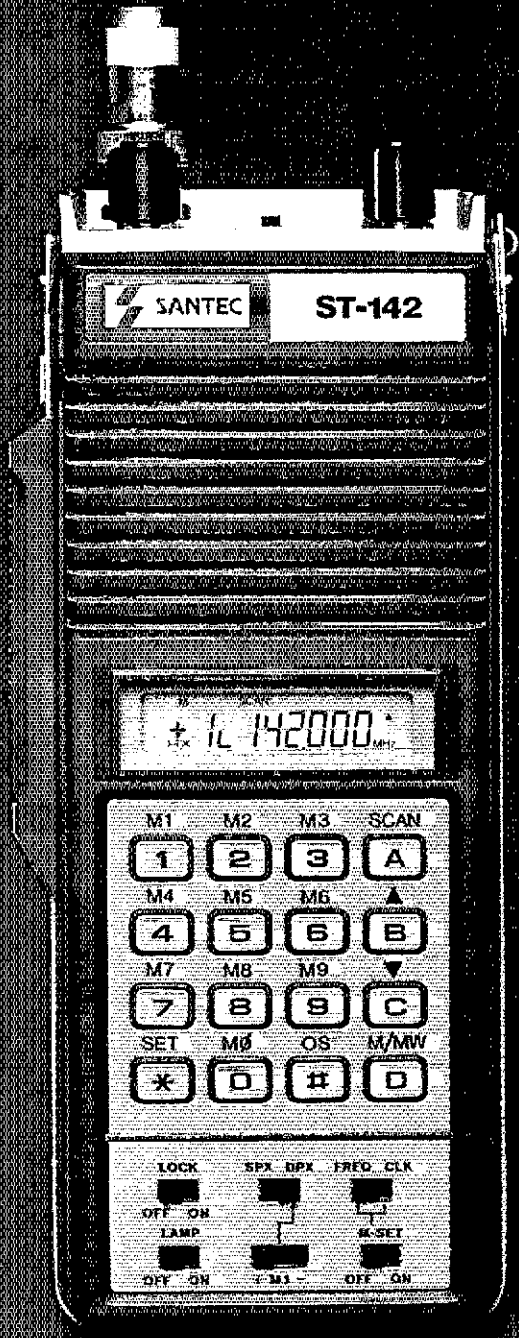
D24 2W in=40W out $199.95
(1W=25W)

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



SANTEC presents the smarter handhelds

FOR 144 VHF, 220 VHF & 440 UHF

SANTEC Handhelds just got a little smarter, with new computer-control software designed by U.S. Hams who are also professional programmers. Now SANTEC Handhelds, which were the first to offer you varactor diode tuning in a handheld, first to offer you thick-film technology, first to provide 3.5W as a selectable handheld option and first to give you the time of day on a handheld read-out, have made another user-friendly leap forward in the logical progression of computer-controlled handhelds.

Now three SANTEC Handhelds can lock out selected memory channels from the memory scan, allowing you to check your favorite frequencies much faster, without interruption from less commonly used ones or from unprogrammed memory channels. SANTEC Handheld's new operating programs now allow you to store variable offset values in all 10 user-written memory channels; and, as always with SANTEC Handhelds, your stored offset automatically comes back when you select a channel through the memory mode, and the plus or minus indication shows on the LCD display.

Other new features are the provision in Memory 9 for split memory offset operation, for those really unusual offset situations, and the capacity for hardware storage of a special PL tone for each memory channel (requires an optional encoder, available December, 1983). The new SANTEC Handhelds will also accept the keyboard input of all frequencies as either short, fast 4-digit numbers or the familiar 6-digit versions; your SANTEC Handheld is smart enough to know what you want, either way.

The handhelds with the most now have more for you. Don't you dare settle for anything less: get your hands on a SANTEC Handheld today!

Shown above is just one of the three new smarter handhelds from SANTEC, the **ST-142** VHF, the **ST-442** UHF, and the **ST-222** VHF. Owners of earlier SANTEC models **ST-144**, **ST-440** and **ST-220**, please write for information on how your SANTEC Handhelds can be upgraded to the new state of the art in handheld transceivers.

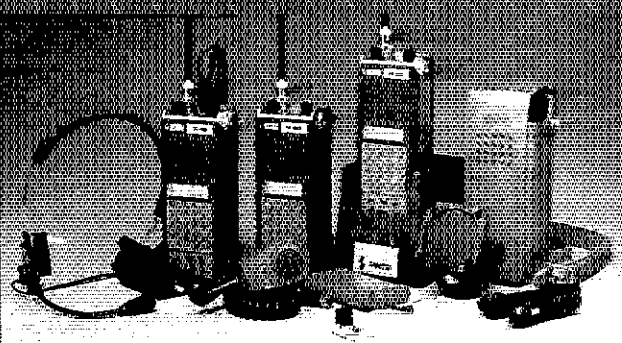
SANTEC®
THE HANDHELD TRANSCEIVERS

1983 Encomm, Inc.
2000 Avenue G, Suite 800 Plano, Texas 75074
Phone (972) 423-5002 TLX 79-4753 ENCOMM DAL

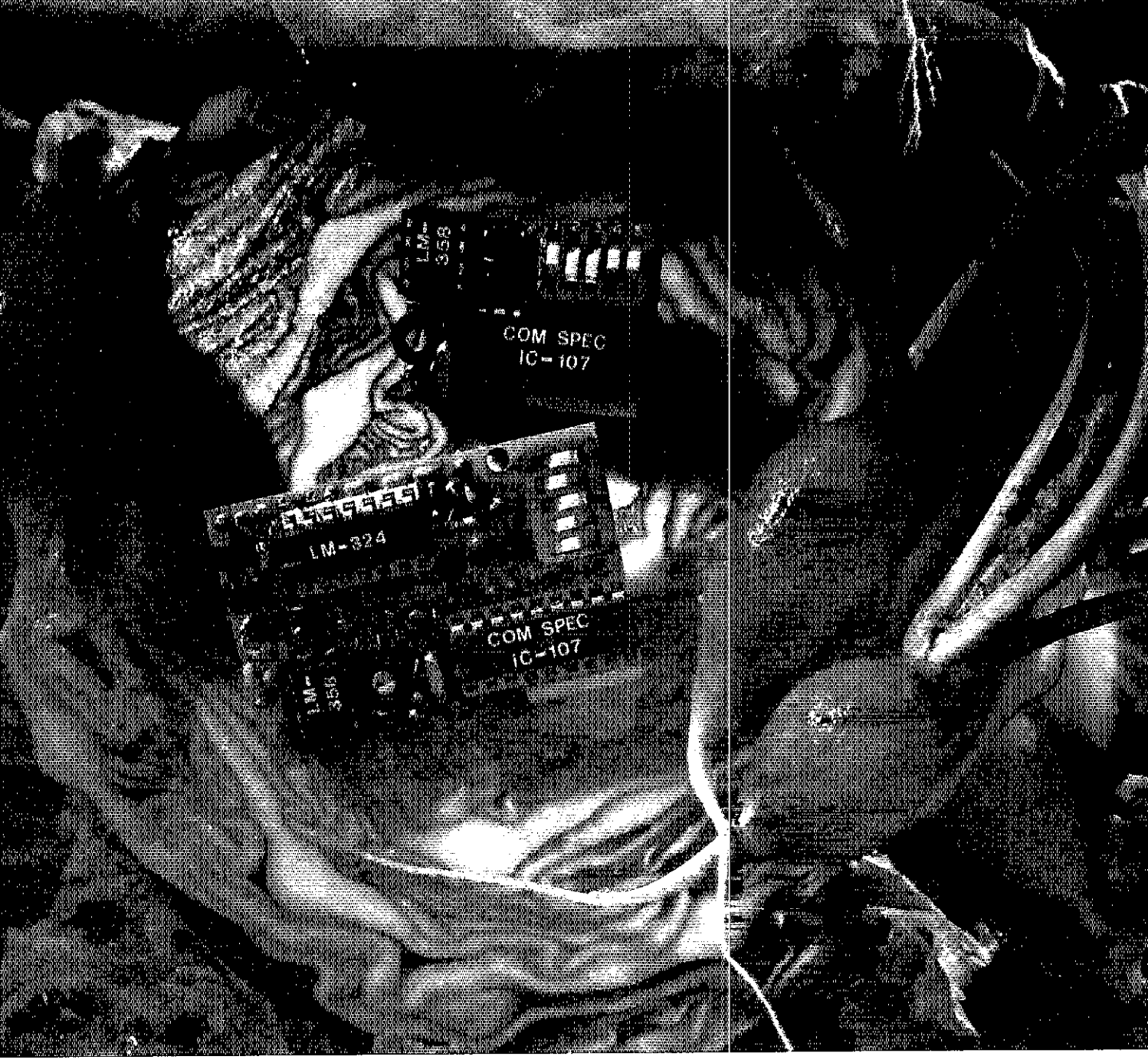
Repair • Parts • Services Available

Export Orders Invited

All stated specifications are subject to change without notice or obligation.

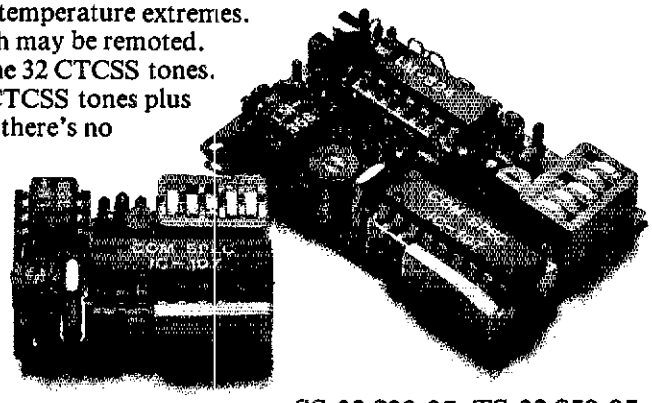


The Smarter Handhelds, clockwise from upper left: **ST-142** VHF Transceiver; **ST-442** UHF Transceiver, **ST-222** VHF Transceiver, operating from the **ST-4QC** Quick-Charge Battery Charger & Power Supply; **ST-LC** Leather Case and Strap; **ST-MC** Mobile Charger; **MS-50S** Remote Speaker; **ST-500B3** Rechargeable 500 mAhr NiCd Battery Pack; **ST-EC** External Charge Adapter; **SM-3** Speaker Mic; **ST-HA-1/HBM-1** Head Set Boom Mic & Adapter.



A fresh idea!

Our new crop of tone equipment is the freshest thing growing in the encoder/decoder field today. All tones are instantly programmable by setting a dip switch; no counter is required. Frequency accuracy is astonishing ±.1 Hz over all temperature extremes. Multiple tone frequency operation is a snap since the dip switch may be remoted. Our TS-32 encoder/decoder may be programmed for any of the 32 CTCSS tones. The SS-32 encode only model may be programmed for all 32 CTCSS tones plus 19 burst tones, 8 touch-tones, and 5 test tones. And, of course, there's no need to mention our one day delivery and one year warranty.



COMMUNICATIONS SPECIALISTS

426 West Taft Avenue, Orange, California 92667
(800) 854-0547 / California: (714) 998-3021

SS-32 **$29.95**, TS-32 **$59.95**

it has features never before available in one handheld, it's made in the USA and it's priced right!

COMPARE TENNESSEE TECHNOLOGY WITH THE OTHERS...

Do their handhelds have memory lockout?
Exclusive memory lockout on the TEN-TEC 2591 allows scanner to temporarily bypass channels for quick lockout of busy frequencies yet retain them in memory for normal operation on demand.

Do theirs store transmit offset?
The 10 memories of the 2591 allow stored offset for easiest operation. And memory channel 0 accepts any non-standard offset.

Do theirs offer selectable SKIP or HOLD?
When scanning with the 2591, choose HOLD to stop and stay on a busy frequency. Choose SKIP to stop for several seconds and continue.

Do theirs offer modifiable Band Scan without complete reprogramming?
With the 2591 you can scan any section of the band with user defined upper and lower limits in steps of 5, 10, 15, 25, or 30 kHz. Change step size, upper and lower limits independently. Manual Scan also, up or down, in 5 kHz steps.

Do theirs have Quick-Release NI-CAD Battery Pack?
The 2591 battery pack slides off easily, yet is secure in use, has a heavy duty 450 mAH rating at 8.4v, and the 2591 has capacitive memory retention to permit pack changing without reprogramming.

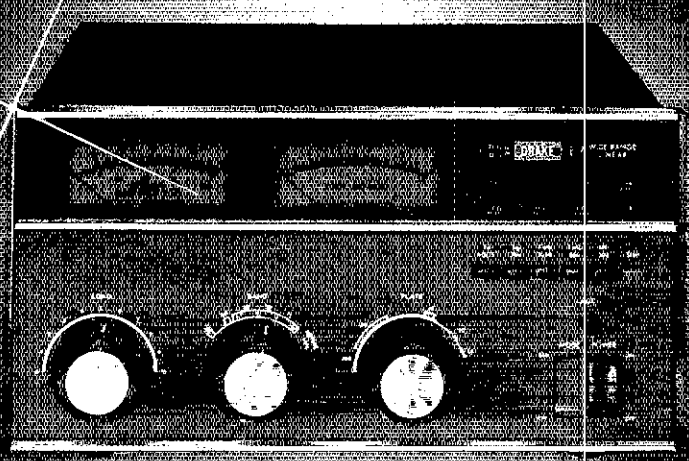
THE TEN-TEC 2591 HAS ALL THE RIGHT FEATURES...

• **Memory Scanner scans only programmed channels** and has user selectable HOLD or SKIP • **Selectable 2.5 Watts or 300 Milliwatts power,** top panel switched • **Extended Frequency Coverage—143.5 to 148.995 MHz.** Covers full Amateur Band plus some CAP and MARS frequencies. • **4-Digit LCD Readout with Switchable Back Light** —large, easy-to-read digits, selectable for frequency or memory channel number. • **Key-Pad Frequency and Function Control** —16 key dual tone encoder • **Dual Function LED**—shows battery status and transmit mode. • **Electret Microphone** plus separate speaker for superior audio. • **Compact, Lightweight, Complete**—easy to handle and rugged. Standard equipment includes flexible antenna with BNC connector, AC charger, belt clip, connectors for mike and speaker. Options include: adaptor pack for +12 VDC mobile operation, speaker/mike, 25 watt power amplifier, leather case, desk charger, subaudible tone module, and spare NI-CAD pack.

DESIGNED AND MANUFACTURED IN TENNESSEE and it carries the famous TEN-TEC 1 year warranty. See your dealer for the best in 2 meter FM—the TEN-TEC 2591. Or write for information to TEN-TEC, Inc., Sevierville, TN 37862.

TEN-TEC

POWER UP!



DRAKE L7
2kW Linear Amplifier

• 2kW PEP, 1kW cw, RTTY, SSTV operation — all modes full-rated input, continuous duty cycle • 160-15 meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services. • The Drake L7 utilizes a pair of 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. • Accurate built-in rf watt-meter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales. • Temperature controlled two-speed fan is a high volume, low noise type and offers optimum cooling. • Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control. • Bypass switching is included for straight through, low power operation without having to turn off amplifier. • Bandpass tuned input circuitry for low distortion and 50 ohm input impedance. • Amplifier is comprised of two units — rf deck for desk top, and separate power supply. • Operates from 120/240 V-ac, 50/60 Hz primary line voltage. • Manufactured in U.S.A. •

R.L. DRAKE COMPANY

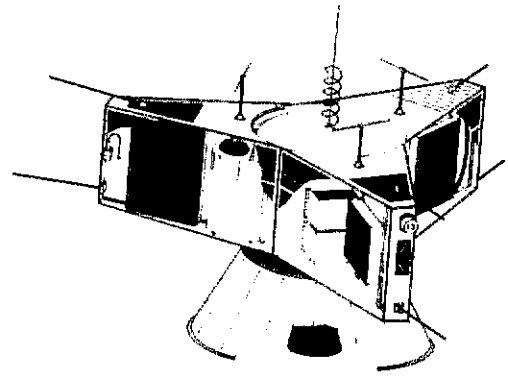
DRAKE

For more information write or call:

[illegible]

Your Ticket for a Spaceflight

A Unique Opportunity to Fly Your Name in Space



OSCAR 10

Imagine your name in a spacecraft traveling over 250,000 miles a day, for years and years to come!

For your tax-deductible contribution to The Radio Amateur Satellite Corporation (AMSAT), your name, call sign and QTH will be placed on microfiche and affixed to the spacecraft body of the next available AMSAT built and launched satellite.

You will receive a handsome personally numbered certificate confirming your reservation for the spaceflight. And even though you'll be going in name only, you will be recognized for your important contribution to the Amateur Radio Space Program.

★ A GREAT GIFT IDEA ★

Yes! I want to fly with AMSAT! Please fill out the ticket (or a copy of it) and mail it with your tax-deductible contribution today!

AMSAT
Name in Space Project
Post Office Box 27
Washington, DC 20044
U.S.A.

Last Name _____ First Name _____ Call _____

Address _____

City _____ State _____ Zip _____

My donation is ☐ $15 (minimum) ☐ $25 ☐ $50 ☐ $100

AMSAT Membership ☐ $24 ☐ $26 outside North America

Enclosed is ☐ Check ☐ Money Order ☐ Visa/MC

Bank card No. _____ Exp. date _____

Signature _____

Ticket No. 0000

While you're at it, why not join a winning team?

AMSAT Membership is $24 per year, $26 outside of North America and includes a subscription to ORBIT Magazine.

hy-gain®

V Series Antennas

More ERP* for your Repeater

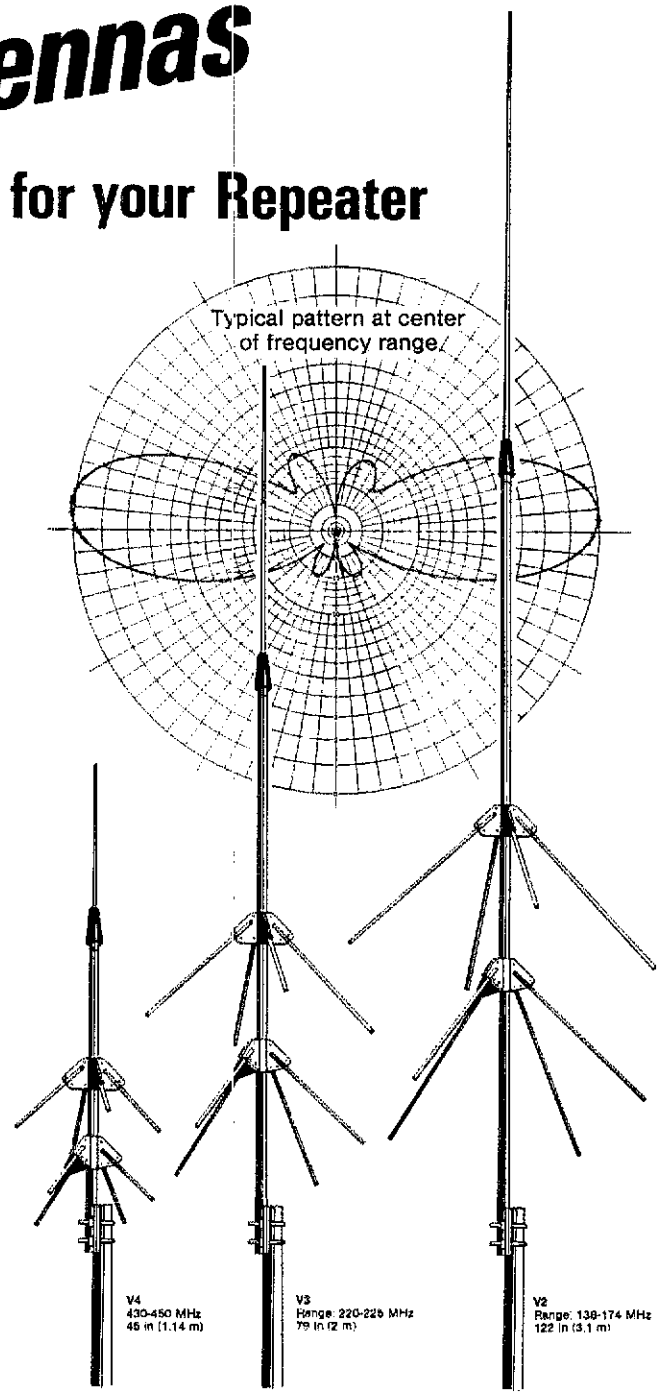
Hy-Gain V Series antennas focus the omnidirectional pattern evenly at the horizon, without high angle lobes or horizontally polarized content. By concentrating the power at the horizon you get cleaner transmissions over longer distances, improved communications in valleys and reduced picket fencing of the signal between tall structures. A Hy-Gain V antenna is like adding an amplifier and receiver pre amp. And, because antennas which "talk" louder, also "hear" better, a V Series antenna is also ideal for your home QTH.

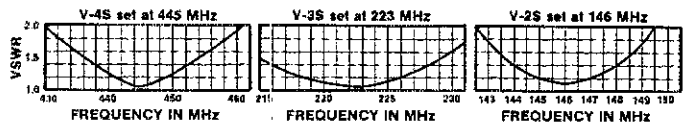
Extended double zepp V Series antennas consist of two stacked .64 wave vertical sections in phase. Two sets of 1/4 wave radials decouple the antenna from the mast and feed line so all RF goes into the antenna and is not radiated by the coax. The feed line connects through the lower section to the center matching coil. This not only provides weather protection for the connector (SO-239 connectors for V2, V3. Type N connector for V4) but also places the entire antenna at dc ground to reduce lightning hazard and QRN.

V Series antennas are easily assembled in one hour or less. Rugged and maintenance free, they're made of seamless, corrosion resistant 6063-T832 aluminum and all critical hardware is of passivated stainless steel. They'll withstand winds of 100 mph (160 km/h). V models accept mast diameters up to 2" (50 mm) so you can readily mount a V above your HF antenna.

Since a Hy-Gain V Series antenna costs only a fraction of a re-tuned landmobile antenna, you can now realize the *full* potential of your communications with the repeater or your home station, economically.

For unbiased information ask any of several thousand V2 users or read the product review in QST May '82 or Amateur Radio Profiles Vol. 2, No. 3.





V Series antennas cover the entire band with VSWR below 1.5:1. Broadband characteristics insure optimum repeater performance on both input and output frequencies.

*Effective Radiated Power (ERP)

TELEX hy-gain

TELEX COMMUNICATIONS, INC.

9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: Le Bonaparte-Office 211, Centre Affaires Paris-Nord, 93153 Le Blanc Mesnil, France

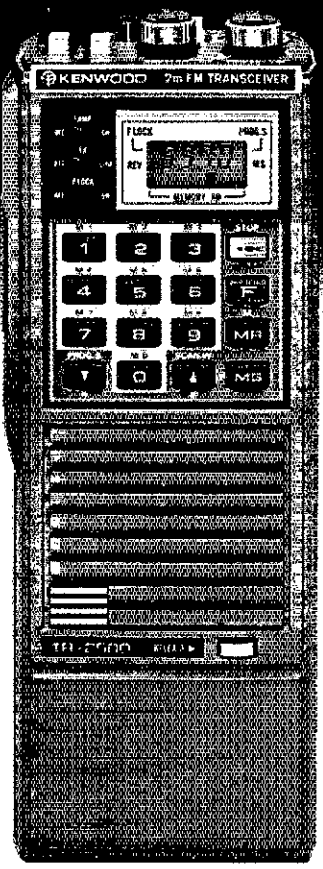
TR-2500

size, smaller price!

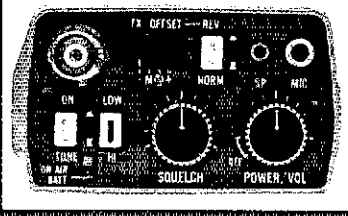
The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

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.



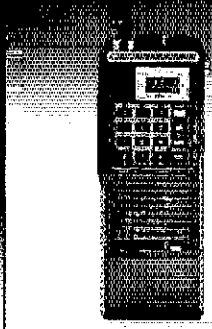
CONVENIENT TOP CONTROLS



- Optional 12 VDC 2 amp or 13.2 VDC 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

Digital DX-terity...

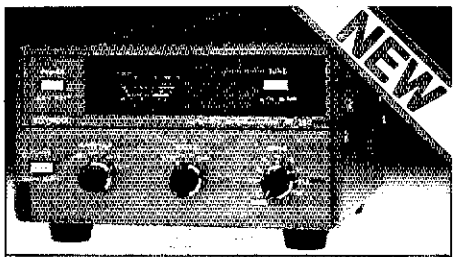
General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch...COMPACT!

TS-430S

The TS-430S combines the ultimate in compact styling with advanced circuit design and performance. An all solid-state SSB, CW, and AM transceiver, with FM optional, covering the 160-10 meter Amateur bands, it also incorporates a 150 kHz-30 MHz general coverage receiver having a superior dynamic range, dual digital VFO's, 8 memories, memory scan, programmable band scan, IF shift, notch filter, all-mode squelch, and built-in speech processor.

TS-430S FEATURES:

- **160-10 meter operation, with general coverage receiver**
  With 160-10 meter Amateur band coverage, including WARC 30, 17, and 12 meter bands, it also features a 150 kHz-30 MHz general coverage receiver. Innovative UP-conversion digital PLL circuit, for superior frequency stability and accuracy. UP/DOWN band switches for Amateur bands or 1-MHz steps across entire 150 kHz-30 MHz range. Two digital VFO's continuously tuneable from band to band. Band information output on rear panel.
- **USB, LSB, CW, AM, with optional FM**
  Operates on USB, LSB, CW, and AM, with optional FM, internally installed. AGC time constant automatically selected by mode.
- **Compact, lightweight design**
  Measures only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm), weighs only 14.3 lbs. (6.5 kg.).
- **Superior receiver dynamic range**
  Use of 2SK125 junction-type FET's in the Dyna-Mix high sensitivity, balanced, direct mixer circuit provides superior dynamic range.
- **10-Hz step dual digital VFO's**
  10-Hz step dual digital VFO's operate independently, include band and mode information. Different band and mode cross operation possible. Dial torque adjustable. STEP switch for tuning in 10-Hz or 100-Hz steps. A=B switch quickly shifts "B" VFO to the same frequency and mode as "A" VFO, or vice-versa. VFO LOCK switch provided. RIT control tunes VFO or memory. UP/DOWN manual scan possible using optional microphone.
- **Eight memories store frequency, mode, and band data**
  Memories store frequency, mode, and band data. Eighth memory stores receive and transmit frequencies independently. M.CH switch for operation of memory as independent VFO, or fixed frequency.
- **Lithium battery memory back-up**
  Estimated five-year life.
- **Memory scan**
  Scans memories in which data is stored.
- **Programmable automatic band scan**
  Scans programmed band width. Scan speed adjustable. HOLD switch interrupts band or memory scan.
- **IF shift circuit for minimum QRM.**
  IF passband may be moved to place interferring signals outside the passband, for best interference rejection.
- **Tuneable notch filter built-in**
  Deep, sharp, tuneable, audio notch filter.
- **Narrow-wide filter selection**
  NAR-WIDE switch for IF filter selection on SSB and CW when optional filters are installed. (2.4 kHz IF filter built-in.)
- **Speech processor built-in**
  Improves intelligibility, increases average "talk-power."
- **Fluorescent tube digital display**
  Indicates frequency to 100 Hz (10 Hz modifiable).
- **All solid-state technology**
  Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Built-in cooling fan, multi-circuit final protection. Operates on 12 VDC, or 120/220/240 VAC with optional PS-430 AC power supply.
- **All-mode squelch circuit, built-in**
- **Noise blanker, built-in**
- **RF attenuator (20 dB)**
- **Vox circuit, plus semi break-in with side-tone**



Optional AT-250 Automatic Antenna Tuner
Designed to match the TS-430S in size, color, and appearance. Functionally compatible with any HF transceiver of 200 watts PEP or lower. (Requires manual bandswitching.)
• Covers 160-10 meter incl. WARC • ABC Automatic Band Changing System (when used with TS-430S) • SWR/Power meter • 4 antenna terminals • Built-in AC Power Supply.

Other optional accessories:

- PS-430 compact AC power supply.
- PS-30 or KPS-21 AC power supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket.
- AT-130 compact antenna tuner, 80-10 m incl. WARC.
- FM-430 FM unit.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand microphone.
- MC-55 (8P) mobile microphone.
- MC-60A deluxe desk microphone.
- MC-80 UP/DOWN desk microphone.
- MC-85 multi-function desk microphone.

More information on the TS-430S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

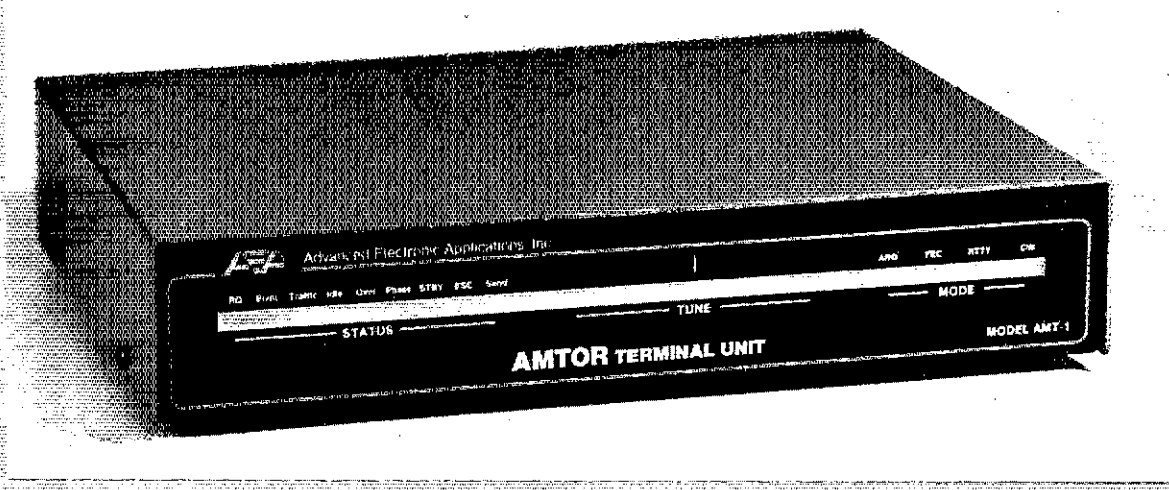
KENWOOD

...paceseiter in amateur radio

Specifications and prices are subject to change without notice or obligation.

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

AMT-1
The Definitive AMTOR Terminal Unit



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

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

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

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

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

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

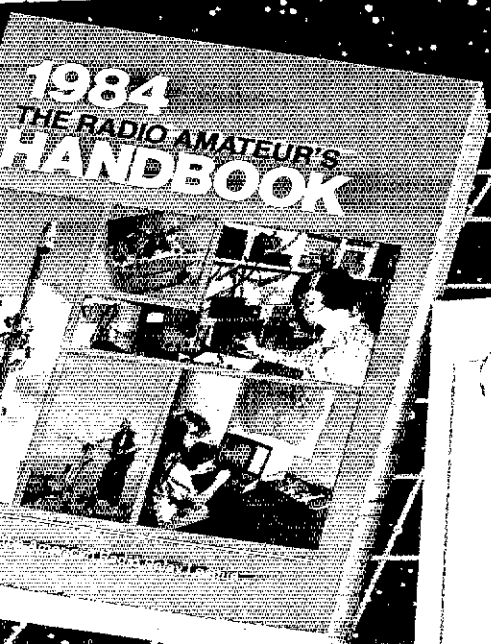
C & A ROBERTS, INC.
18511 Hawthorne Blvd., Torrance, CA 90504
213-370-7451 24 Hours call 213-834-5868

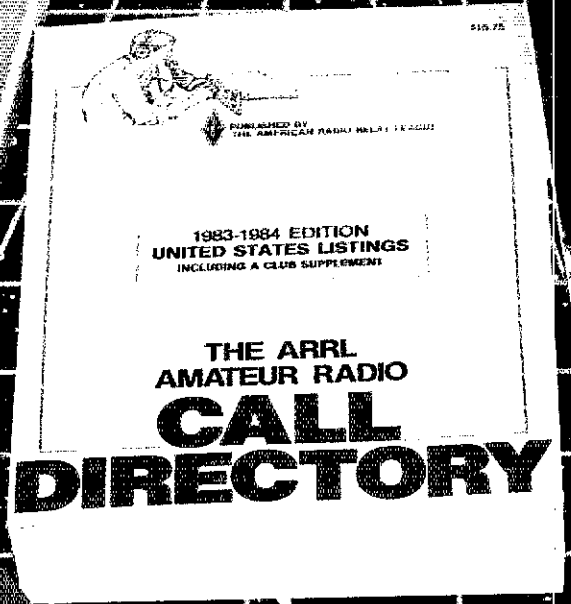
AEA **Brings you the Breakthrough!**

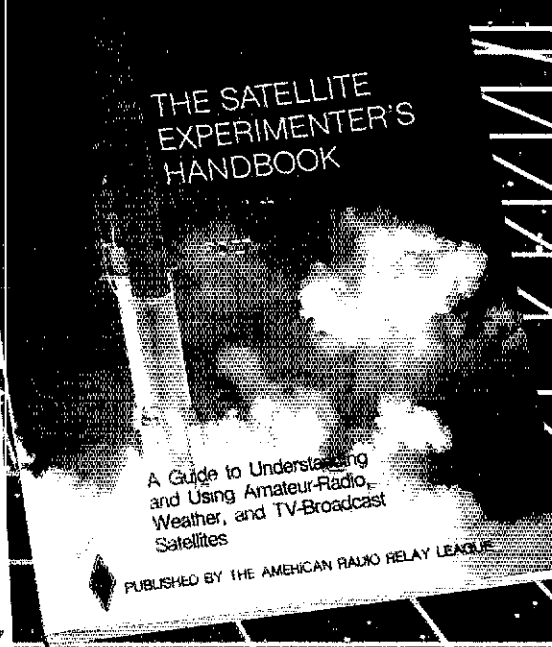
The ARRL Bookshelf

BEST SELLERS!

COMING SOON!

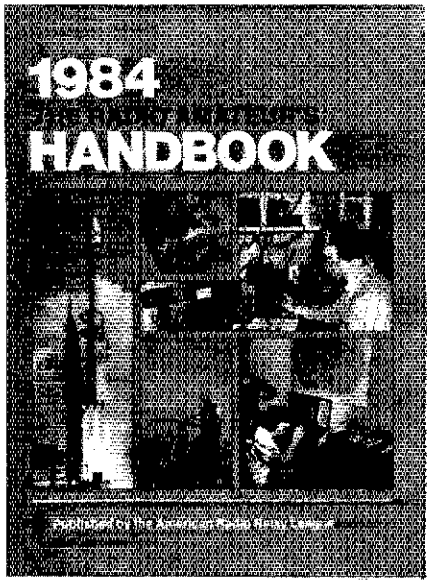






BEST SELLERS!

Dozens of publications and supplies for everyone who loves Amateur Radio!



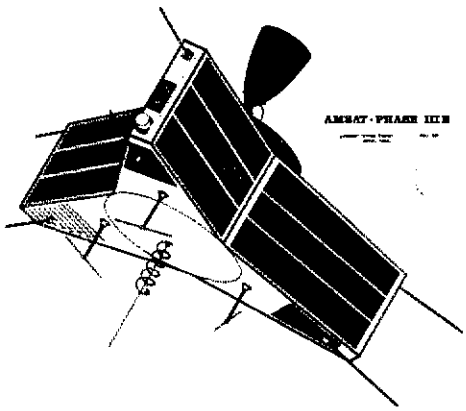
Each year, the *Radio Amateur's Handbook* is updated to reflect changes in the state-of-the-art. New projects in the big 640-page 61st edition include:

- New tables on low-pass, high-pass and band-pass filters
- Updated section on the classes of amplifier operation (Class A through Class E)
- A new kilowatt amplifier for 160, 80 and 40 meters
- 4—1000 amplifier for 6 meters
- A refined version of the Deluxe Audio Filter
- A new solid-state regulator for automobile alternator systems
- The chapter on Specialized Communications Systems has been completely revised with new material on Packet Radio, AMTOR, Spread Spectrum, etc.
- The interference with other Services chapter has been reorganized and updated
- A new and better index. All construction projects are indexed in a single listing as are bibliographies, glossaries and important tables and charts

The *Handbook* covers in depth these chapter topics:

- Amateur Radio
- Electrical Laws and Circuits
- Radio Design Technique and Language
- Solid State Fundamentals
- AC-Operated Power Supplies
- HF Transmitting
- VHF and UHF Transmitting
- Receiving Systems
- VHF and UHF Receiving Techniques
- Mobile, Portable and Emergency Equipment
- Code Transmission
- Single Sideband
- Frequency Modulation and Repeaters
- Specialized Communications Systems
- Interference
- Test Equipment and Measurements
- Construction Practices and Data Tables
- Wave Propagation
- Transmission Lines
- Antennas for High Frequency
- VHF and UHF Antennas
- Operating a Station
- Vacuum Tubes and Semiconductors (Tables)

Paper Edition: $12 in the U.S., $13 in Canada, $14.50 elsewhere. Cloth Edition: $17.75 in the U.S., $20.00 elsewhere.



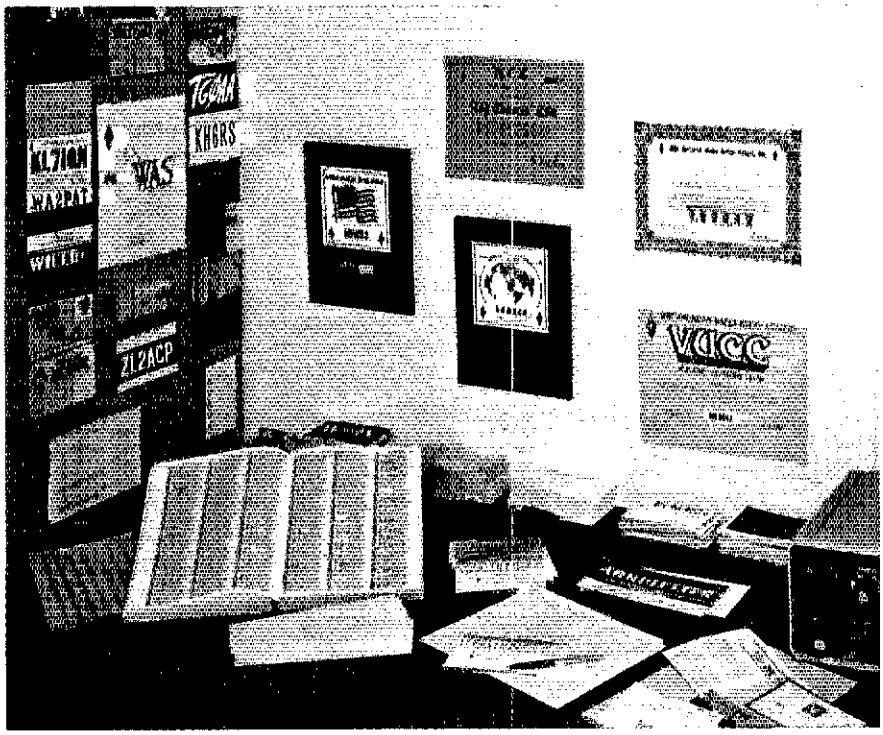
SATELLITE EXPERIMENTER'S HANDBOOK

Now, under one cover, here is all you need to communicate through or pick up the signals from orbiting satellites. Whether your interest is in Amateur Radio, weather or TV-broadcast spacecraft, you'll find what you're looking for in *The Satellite Experimenter's Handbook.*

Since the first OSCAR (Orbiting Satellite Carrying Amateur Radio) was launched in 1961, thousands of ham radio operators, scientists, educators and satellite enthusiasts from around the world have used these "birds" for pleasure, education and experimentation. You can join them! And if you're already into satellite communications, you'll find a wealth of practical information on all aspects of these spacecraft—from satellite design to ground-station equipment and antennas.

Whether you're a beginner, an experienced satellite enthusiast, a teacher or a scientist, you'll find *The Satellite Experimenter's Handbook* to be indispensable. $10 U.S., $11 in Canada and elsewhere. Copies in early 1984.

THE ARRL AMATEUR RADIO CALL DIRECTORY



Whether you are *Honor Roll* bound or just beginning to collect QSL cards for the Worked All States award, you'll find the addresses you need quickly and easily in this new ARRL publication! It has 1090 pages of the addresses of U.S. Amateur Radio licensees listed alphabetically in callsign order. There is even a separate section covering club stations. You can't beat the price!

ONLY $15.75 POSTPAID

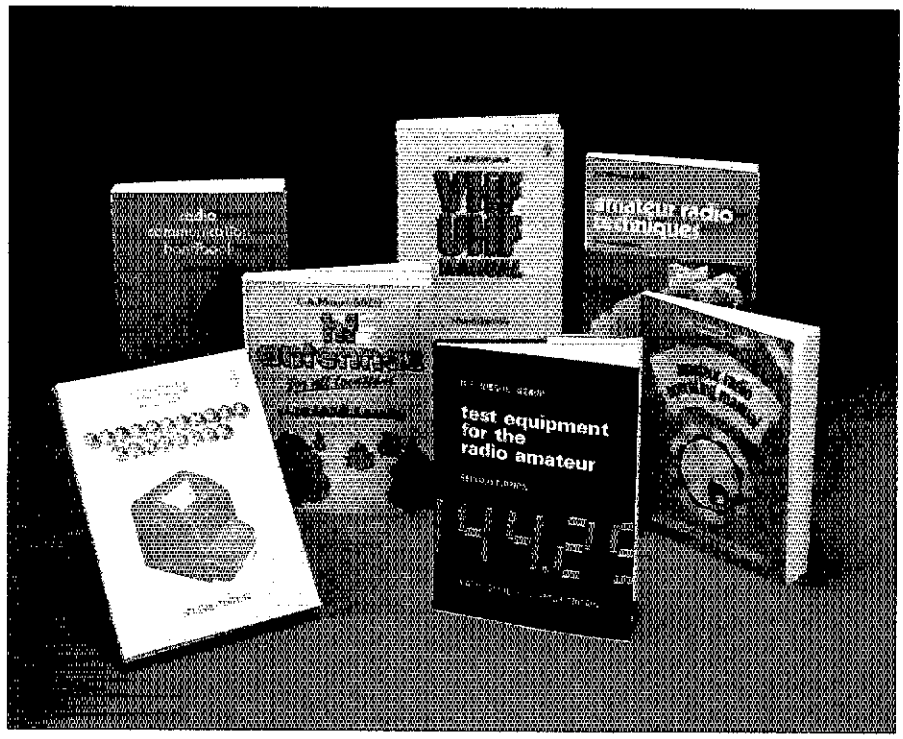
$19.75 POSTPAID IN CANADA AND ELSEWHERE

ANTENNA BOOK 14th EDITION

The most comprehensive and up-to-date antenna book available. It is chock-full of theory and practical information and includes proven designs and topics shown at the right. You'll find antennas for any kind of real estate from the apartment dweller to the true antenna farm. Covers in complete, easy-to-understand language antenna, transmission line theory, propagation, and includes the most complete explanation available of the SMITH CHART®. 328 pages. $8.00 in the U.S., $8.50 elsewhere. Cloth bound $12.50 in the U.S., $13.50 Elsewhere.

BEVERAGE • BOB-TAIL CURTAIN • BROADSIDE • CENTER-FED MULTI-BAND • COMBINATION J-POLE • CONSTRUCTION • CONTINUOUSLY LOADED • CORNER REFLECTOR • COUPLED • CURTAIN ARRAYS • DDRR • DIRECTION FINDING • DISCONE • FISHBONE • FIVE-BAND, TRAP DIPOLE • FOLDED DIPOLE • GROUNDING SYSTEMS • GROUND REFLECTION FACTOR • HALF-WAVE LOOPS • HALF-WAVELENGTH • HELICAL • HF, RESTRICTED SPACE • • IMPEDANCE • INDOOR SYSTEMS • INVERTED V • INVISIBLE • ISOTROPIC • LONG-WIRE • LOOPS • MATCHING • MOBILE • MULTIBAND • MULTIELEMENT • MULTIPLE DIPOLE • PROPAGATION • QUAD • QUADHELIX • REMOTE SWITCHING • RESONANCE • ROTATABLE • ROTATING SYSTEMS • SCREEN-REFLECTOR ARRAYS • SHORT HELICALLY WOUND VERTICAL • SHORT VERTICAL • SLOPER • SPACE COMMUNICATIONS • SPECIALIZED • STACKING • SUPPORTS • TILTED-WIRE • TOP-LOADING • TRANSMISSION LINES • TWO-AND FOUR-BAY ARRAYS • V • VHF AND UHF SYSTEMS • VERTICALS • WINDOW • YAGI-UDA

"A STATION IS ONLY AS EFFECTIVE AS ITS ANTENNA SYSTEM"



PUBLICATIONS FROM THE RADIO SOCIETY OF GREAT BRITAIN

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 for these bands are covered in 181 pages. The balance of this 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.**

AMATEUR RADIO OPERATING MANUAL by R. J. Eckersley, G4FTJ. Get the British side of operating. Besides such chapters as Setting up a station, and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU callsign allocations, callsign systems for each country, notes on foreign amateur operation, addresses of licensing administrations and the names and addresses of National Amateur Radio Societies. 189 pages. Copyright 1979, 2nd Edition. Softbound **$10.00.**

HF ANTENNAS FOR ALL LOCATIONS by L. A. Moxon, G6XN. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwith; Antenna Design for Reception; The Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **$12.00**

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.**

RADIO COMMUNICATION HANDBOOK 5th Edition. You probably have the ARRL *Radio Amateur's Handbook* in your library. Now you can have a second source of authoritative radio frequency and electronics information at your fingertips. Contains 23 chapters (778 pages); Principles, Electronic Tubes and Valves, Semiconductors, HF Receivers, VHF and UHF Receivers, HF Transmitters, VHF and UHF Transmitters, Keying and Break-in, Modulation Systems, and RTTY, Propagation, HF Aerials, VHF and UHF Aerials, Mobile and Portable Equipment, Noise, Power Supplies, Interference, Measurements, Operating Techniques and Station Layout, Amateur Satellite Communication, Image Communication, the RSGB and the Radio Amateur, and General Data. Now in one paperback volume. Copyright 1982, **$22.00**

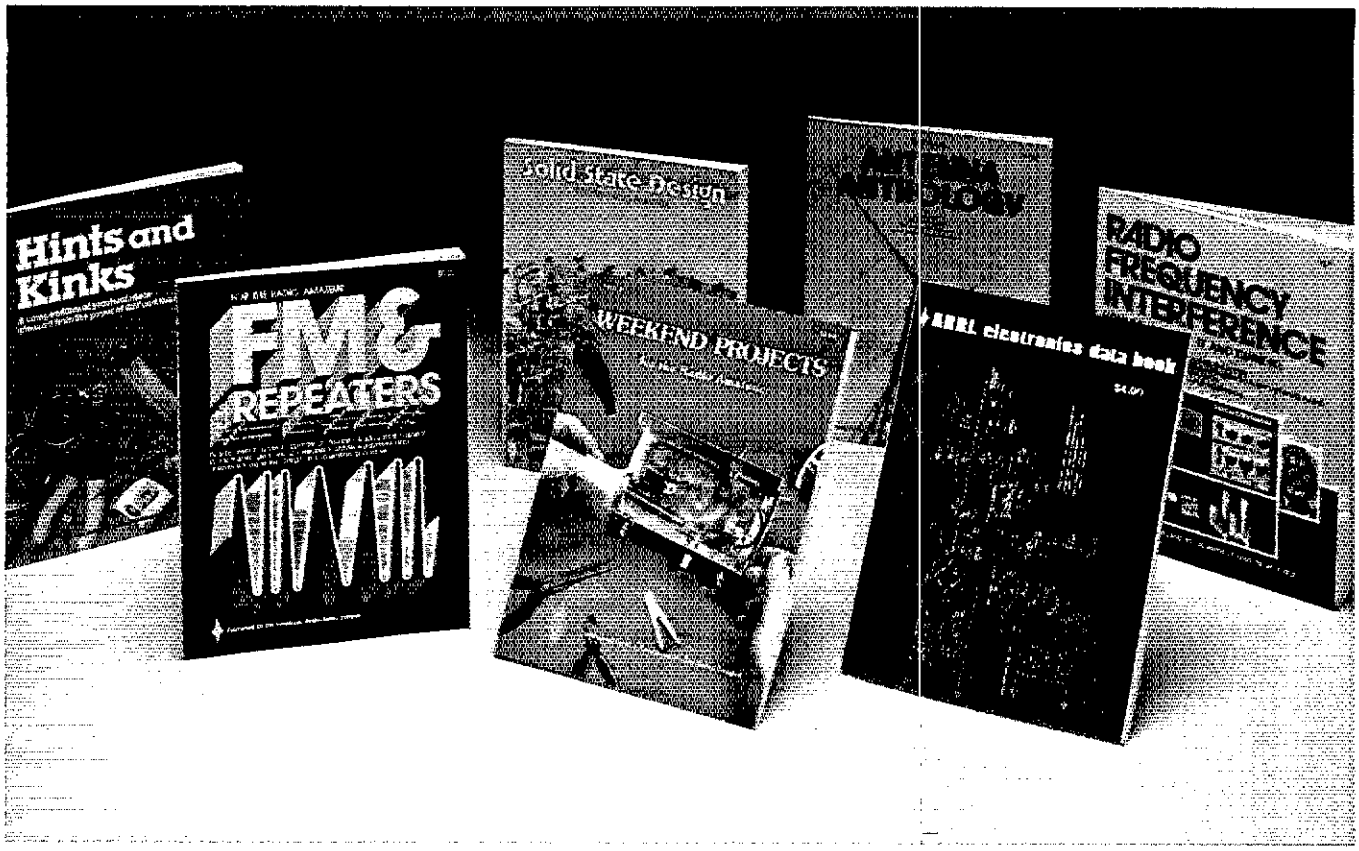
AMATEUR RADIO TECHNIQUES by Pat Hawker, G3VA. Contains 800 diagrams and 364 pages of circuit ideas and devices which the author has gathered during 22 years of writing the *Technical Topics* columns in *Radio Communication*. It is not a text or handbook, but an idea book —RSGB's version of ARRL's *Hints and Kinks*, but on a larger and more in-depth scale. Copyright 1980, 7th Edition. Soft cover **$12.50.**

TEST EQUIPMENT FOR THE RADIO AMATEUR by H. L. Gibson, G2BUP. A great addition to the library of the Radio Amateur who builds his own equipment. Beside measuring techniques, you will find a wealth of test equipment you can build yourself. Construction projects range from simple dummy loads and attenuators to a 150 MHz digital frequency counter and timer. You will find simple signal sources for 1296 and 2304 MHz and 10 GHz. Chapter titles and number of pages devoted to each: Current and Measurement — 23, Frequency Measurement — 23, Wavemeters — 19, RF Power Measurement — 9, Aerial and Transmission Line Measurements — 9, Noise Measurements — 8, Components, Valves and Semiconductors — 12, Signal Sources and Attenuators — 12, Oscilloscopes and Modulation Monitors — 8, Power Supplies — 3, and Reference Data — 8. Copyright 1978, 2nd edition. Hardbound **$11.00.**

THE HISTORY OF A.R.R.L. AND AMATEUR RADIO

200 METERS & DOWN by Clinton B. DeSoto. Chronicles the exciting evolution of Amateur Radio from the pioneers who perfected the "wireless art" up through the technical advancements of the mid-1930's. Tells first-hand how the ARRL came about and how the League saved Amateur Radio from certain oblivion during the early years. Copyright 1936 (reprinted in 1981). 184 pages **$4.00.**

FIFTY YEARS OF A.R.R.L. A reprint of the golden anniversary articles that appeared in the 1964 issues of *QST*. Packed with photographs of old gear. "Old Timers" can relive their own amateur experiences, and newcomers can learn the fascinating tale of Amateur Radio's early 1960's. Copyright 1965. 151 pages **$4.00.**



GREAT TECHNICAL PUBLICATIONS

FM and REPEATERS Whatever your interest in fm — repeaters, amplifiers, transmitters, receivers, mobile and portable gear, antennas or accessories — you'll find it covered in detail in the 2nd Edition of this popular book. Includes repeater design, operation, control, and troubleshooting. Also has tips on buying gear as well as projects you can build yourself. Copyright 1978, 175 pages. **$5.00** U.S., **$5.50** elsewhere.

WEEKEND PROJECTS FOR THE RADIO AMATEUR Some of the most popular construction articles which have appeared in the pages of *QST*. You'll find simple converters, preamps, power supplies, test equipment and station accessories. Copyright 1979, 61 pages. **$3.00** U.S., **$3.50** elsewhere.

RADIO FREQUENCY INTERFERENCE This book has been prepared to help you slay the RFI dragon. You'll learn the causes of RFI and how to cure it. The 2nd Edition contains a chapter on interference to and from cable television (CATV) systems. Extensive coverage is given to preventing and curing interference to home entertainment devices. 70 pages, Copyright 1981. **$3.00** in the U.S., **$3.50** elsewhere.

ELECTRONICS DATA BOOK Now in one place, all of these needed tables, charts and formulas: Math Aids, Time and Frequency, RF Circuits, L, C, and R Networks, Transformers, Filters, Antennas and Feed Systems plus a Catalog of Solid State Circuits, Construction and Testing Data, and Data Potpourri. Copyright 1976, 125 pages. **$4.00** U.S., **$4.50** elsewhere.

HINTS & KINKS One of the most popular columns in *QST* is "Hints and Kinks." Every so often during the past 50 years we have collected the best of the gimmicks, gadgets and small construction projects presented in the column and published them in an anthology. The 11th Edition of *Hints and Kinks* is the latest in the series (past editions are out of print.) The price of this *new* edition remains at **$4.00** in the U.S. and **$4.50** elsewhere.

SOLID STATE DESIGN For those who wish to extend their theoretical understanding of these devices and gain experience in their practical application in communications equipment. Includes an extensive appendix and bibliography and these 9 chapters: Semiconductors and the Amateur, Basics of Transmitter Design, More Transmitter Topics, Power Amplifiers and Matching Networks, Receiver Design Basics, Advanced Receiver Concepts, Test Equipment and Accessories, Modulation Methods, and Field Operation, Portable Gear and Integrated Stations. 253 pages, copyright 1977. **$7.00** U.S., **$8.00** elsewhere.

ANTENNA ANTHOLOGY The best *QST* hf antenna articles and theory presentations. Verticals: 2 and 4 band verticals for the Novice, Cheapie GP, High Performance system for 20, 40 and 80, other loaded systems. Yagis: Short antennas, and The Log-Yag Array. Quads: Wire quads for 80 and 40, 2-Element Quad for the Novice. Miscellaneous Antennas: Loops, Delta-loops, antennas for travel trailers and campers, plus matching devices and antenna test accessories. Copyright 1978, 148 pages. **$4.00** U.S., **$4.50** elsewhere.

INSTRUCTION AND LICENSING

- **TUNE IN THE WORLD WITH HAM RADIO** Teaches you all you need to know in order to pass the FCC Novice exam and get on the air! The 60-minute cassette teaches you the Morse Code letter-by-letter and number-by-number. Packed into the booklet are chapters on:

  EXPLORING HAM RADIO: Hams come from all walks of life: age is no barrier; building your own station; a look back in time.

  MANAGING THE RADIO SPECTRUM: The FCC; rules and regulations; the Novice license; licensing classes.

  LEARNING YOUR NEW LANGUAGE: The Morse Code—why every ham knows it; how to learn it the right way.

  UNDERSTANDING BASIC THEORY: Easy-to-learn explanation of electronic theory and what you need to know to qualify for a Novice license.

  SETTING UP YOUR STATION: Choosing a location; how to select your equipment; what antenna to use; glossary.

  OVER THE AIRWAVES PAINLESSLY: How to operate; tuning up; safety; identifying stations in foreign countries; awards; clubs; The ARRL and QST.

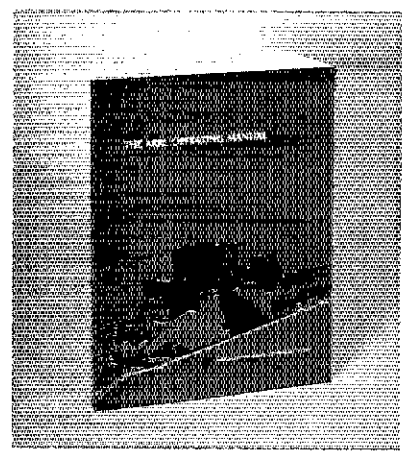
  134 pages of text, plus 26 pages of equipment and publication advertising. Copyright 1981. **$8.50.**

- **FCC RULE BOOK** Every ham needs a copy of the current FCC Regulations. *The FCC Rule Book* goes one step further by presenting explanations of the rules in the popular "Washington Mailbox" style adapted from *QST*. You will also find addresses of FCC field offices, international regulations, information on reciprocal operation and third party traffic, and a chart of available Amateur Radio frequencies including the WARC-bands. Pocket-size. Only **$3** in the U.S. **$3.50** elsewhere.
- **LICENSE MANUAL** Every ham needs an up-to-date *License Manual*. Contains complete FCC rules, FCC study outlines and theory needed for upgrading to the Technician/General, Advanced and Extra license classes. You'll find addresses of all FCC field offices, international regulations, information on reciprocal operation in foreign countries, lists of countries permitting third party traffic with the U.S. and Canada, a chart of available Amateur Radio frequencies. Copyright 1983 (Revised as needed.) **$4.00** U.S., **$4.50** elsewhere.
- **ARRL CODE KIT** Boost your code speed from 5 to 13 words-per-minute quickly and enjoyably. Two C-60 cassettes provide one-half hour of random code characters at 5, 7½, 10 and 13 wpm. The booklet included in this package is packed with proven suggestions and hints for increasing your ability to "copy". Copyright 1976. **$8.00.**
- **C-60 CODE PRACTICE CASSETTES** Consist of random code groups and straight text. Tape #1 30 min. at 5 wpm. and 30 min. at 7½ wpm. Tape #2 30 min. at 10 wpm and 30 min. at 13 wpm. Tape #3 30 min. at 15 wpm and 30 min. at 20 wpm. Each tape is **$5.00.**

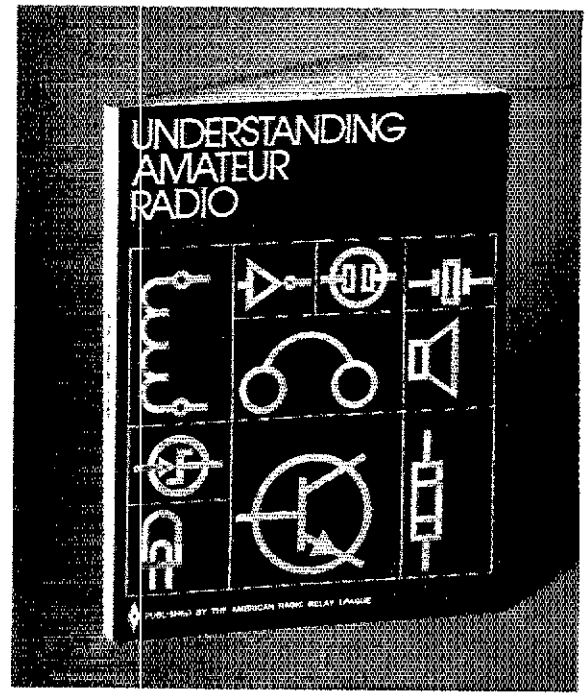
THE ARRL OPERATING MANUAL

All facets of operating are covered in a style which shows how fun and rewarding the Amateur Radio experience can be. Chapters include: Basic Amateur Radio, Rules and Regs, Traffic Handling, Emergency Communications, DX and DXing, Contests, Awards Chasing, FM and Repeaters, VHF/UHF Operating, Satellites, Visual Communications, Microcomputers, and Shortwave Listening. Each chapter was written by an expert with extensive on-the-air experience in his or her field. You'll also find dozens of useful charts and tables.

154 Pages **$5.00** in the U.S., **$5.50** elsewhere



UNDERSTANDING AMATEUR RADIO



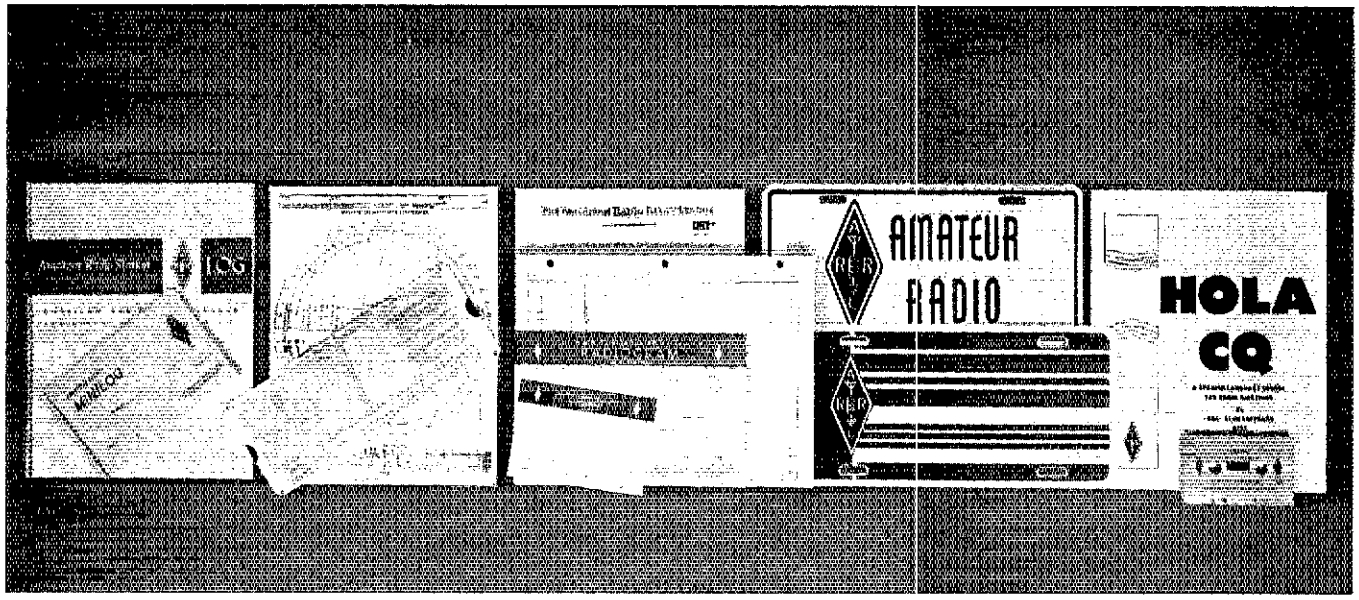
Just the book for the newcomer and experienced amateur. Some of the topics contained in this "junior handbook" of interest to the beginner are:

- HOW TO SOLDER
- HOW TO USE A VOM
- THEORY NEEDED FOR THE TECHNICIAN/ GENERAL FCC EXAM
- HOW TO USE A TRANSMATCH
- HOW TRANSMITTERS AND RECEIVERS WORK

The more experienced amateur will find:

- HOW TO TROUBLESHOOT YOUR EQUIPMENT
- WHERE TO BUY COMPONENTS
- HOW TO BUILD USEFUL ACCESSORIES
- REVIEW OF ELECTRONIC BASICS

3RD Edition, Copyright © 1977, 217 pages. $5.00 U.S., $5.50 elsewhere.



SUPPLIES FOR THE ACTIVE AMATEUR

HOLA CQ - Learn to communicate with Spanish-speaking amateurs by using this course. Includes 90 minute cassette and 16 page text. $7.00

ARRL Logs - Keep all the information about your QSO's in one neat place. Meet FCC logging requirements. STATION LOG 8½ x 11, spiral bound $1.75 in the U.S., $2.50 elsewhere. MINI-LOG, 4 x 6 for mobile and portable work. $1 U.S., $1.50 elsewhere, LOG SHEETS 96 punched loose leaf sheets $3.00

ANTENNA PATTERN WORKSHEETS 100 8½ x 11 sheets $3.00

SMITH CHARTS®

Standard	$1.00 for 5 sheets
Expanded	$1.00 for 5 sheets

AMATEUR RADIO LICENSE PLATE $5.00

L/C/F CALCULATOR Tells you at the flick of your wrist the number of turns you need for a particular coil. Determining the resonant frequency of a coil or capacitor is a snap. Can be used to solve most common problems involving inductance, capacitance, frequency or coil dimension. $3.00

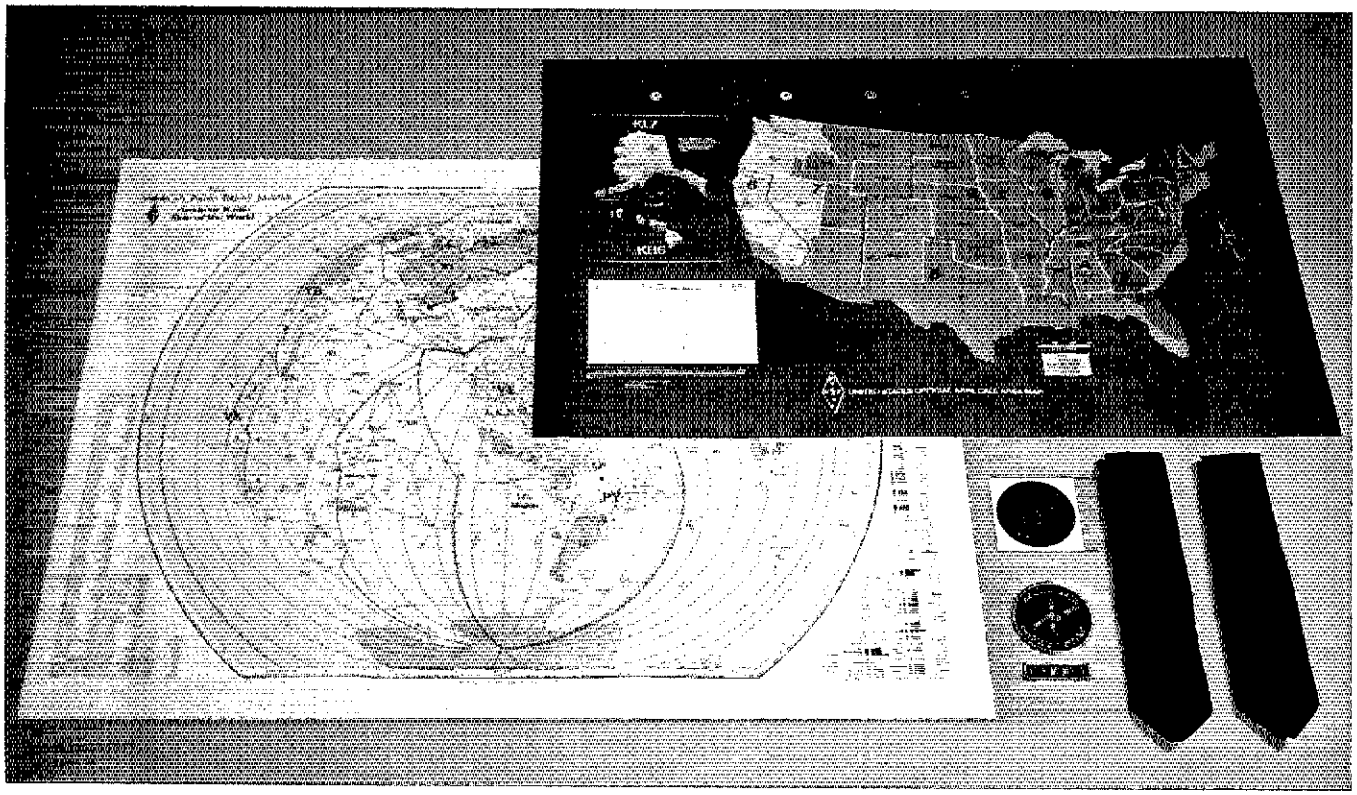
RADIOGRAM PADS - 70 sheets $0.75

MESSAGE DELIVERY CARDS 10 for $0.50

THE ARRL FLAG

License Plate (shown)	$5.00
Lapel Pin	2.50
Cloth Patch	5.00
3' x 5' flag primarily inside use	21.00

MEMBER'S STATIONERY 100 8½ x 11 sheets $3.00



ARRL SCARF Blue League emblems on a white polyester background. 21" square. $6.50 in the U.S., $7.50 elsewhere.

ARRL BANNER Black and Gold. 14" wide by 18" long. $7.50 in the U.S., $8.50 elsewhere.

MORE MEMBERSHIP SUPPLIES

ARRL WORLD MAP A great circle map centered on the U.S. which shows country boundaries, prefixes, radio districts, and ITU boundaries. Printed in 6 colors by Rand McNally. The countries listing is by prefix and shows country, continent and both ITU and CQ zones. Map size is 30 × 40 inches. Copyright 1980. $4.50

ARRL U.S. CALL AREA MAP A big 24 × 37 inch, full color map that is a show piece for your ham shack as well as a useful operating aid. ARRL divisions and sections are clearly indicated, as are time zones, state lines, state capitals and call areas. $3.00.

ARRL TIE Available in either blue or maroon. $12.00

ARES — THE AMATEUR RADIO EMERGENCY SERVICE EMBLEM Available as a 3-1/2 inch patch for $2.50, as a decal or sticker 2 for $0.50 or 5 for $1.00. Specify type and color: Black and Gold or Red, White and Blue.

LIFE MEMBERSHIP Small patch $1.00, large patch $1.25. Can be used in conjunction with the ARRL diamond patch. Replacement pins are available for $2.50. Replacement plaques are $25.00 with a 10 to 12 week delivery.

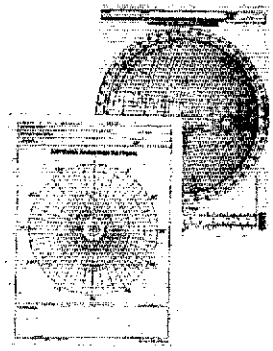
Second ARRL Amateur Radio Computer Networking Conference

This booklet contains papers presented at the "Packet Radio" Conference held in San Francisco during March, 1983.

CONTENTS **Page**

Prices: 1-9 $9 each, 10-49 $6.75 each
50 copies or more $6.00 each
Available from:
A.R.R.L.
225 Main St., Newington, CT 06111

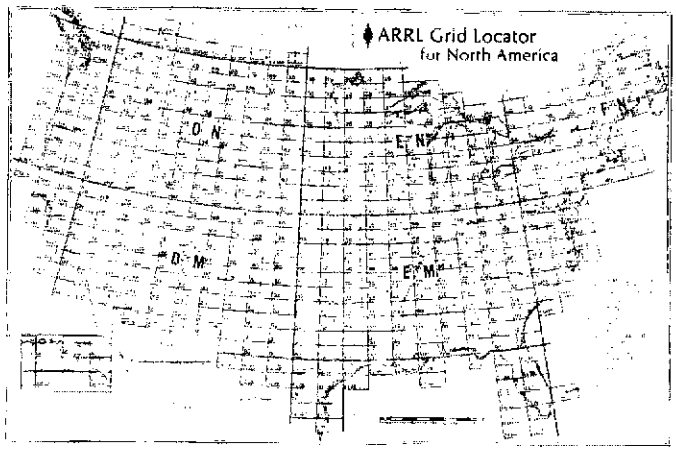
HANDY GRAPHS FOR ANTENNA TESTING



With the ARRL's *Antenna Radiation Pattern Sheets* you can determine your antenna's directivity faster and easier than before. Using this system, designed and implemented by the *QST* technical staff, you will see at a glance just what signal strength you have at any given antenna azimuth angle. (See QST, July 1980 page 26 for a thorough description of their use.)

100 plotting sheets just $3.00.

Before you order, check your supply of *Smith Charts*. These charts will allow you to plot and determine feed point and load impedances for transmission lines. With them you can also design stub matching sections, gamma matches, determine SWR at line input and load, and more. Available in Standard and Extended form. Each is a set of 5 sheets for $1.00.

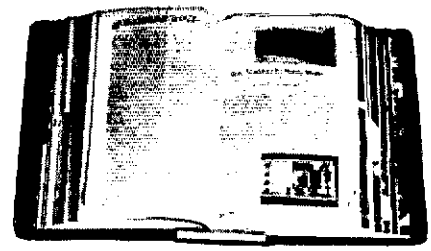


ARRL GRID LOCATOR

— A MUST FOR THE VHF/UHF OPERATOR —

Find grid locations *fast* with this handy 12" x 18" map. Mark off the squares you have worked for the VHF/UHF Century Club Awards (See January, 1983 *QST* page 49 for details.) The map is available for only $1.00, U.S. funds from ARRL.

MANY IARU SOCIETIES, BOOK STORES AND ELECTRONICS DEALERS STOCK ARRL PUBLICATIONS



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.

THE LEAGUE EMBLEM

Adopted by the ARRL Board of Directors in 1920.

PIN Gold Border and black enamel background for regular members. League officials and appointees should specify title so that pin with the proper colored background can be provided. $2.50.

REPRO PROOF of various size emblems, $2.00.

RUBBER STAMP or **LOGOTYPE** ⅝" high $2.50.

PATCHES 3" high $1.00, 5" high $2.00.

⅝" **CHARM** $2.50.

Replacement Life Member Pin $2.50 Repro Proof of various size Life Member emblems $2.00.

OSCAR!

- POLAR PROJECTION MAP

OSCAR buffs—the essential map boards for plotting the orbits of OSCARs, Soviet RS or even weather satellites. Particularly useful for studying the orbits of future or new satellites before commercial OSCARLOCATORs are available. All future groundtracks and ranging "spiderwebs" print in *QST* will be to this standard scale. Only $1.00.

- OSCAR LOCATOR PACKAGE

Watch *QST* for availability.

THE ARRL DXCC COUNTRIES LIST

- COMPLETE DXCC RULES
- SHOWS COUNTRIES WHERE CARDS MAY BE SENT THROUGH THE ARRL OUTGOING QSL BUREAU
- LISTS ITU AND CQ ZONES PLUS THE CONTINENT OF EACH COUNTRY
- CHECK-OFF BOXES FOR MIXED, PHONE, CW, RTTY, SATELLITE, AND FOR EACH BAND.

Now keep all of your DXCC records on this handy and complete 12 page form. Available postpaid for $1.00 a copy.

IMPORTANT ORDERING INFORMATION

Use the order form on the next page or copy.

Remittance must be in U.S. FUNDS in the form of a check drawn on a bank located in the U.S., or a money order. (Outside the U.S. use an international money order.) VISA or MASTERCARD also accepted.

Orders are normally shipped within 6 working days from receipt. Since orders with remittance are shipped postpaid, please allow 3 to 4 weeks for delivery within the U.S. and up to 12 weeks for orders shipped via international parcel post or printed matter.

All prices shown are valid until Mar. 31, 1984. Please consult the current issue of *QST* or the order form supplied with the catalog version of the *ARRL BOOKSHELF* for current prices.

Because of the uncertainty of rates, we do not publish the additional cost of shipment via 1st class, UPS Blue, or Airmail. Please contact us for additional charges for these special services.

JOIN ARRL

BENEFITS FOR YOU

- QST Representation before government agencies
- Inexpensive Equipment Insurance
- Operating Awards
- Low cost outgoing QSL Bureau
- NTS Field Service
- W1AW Code Practice and Bulletins
- TVI/BCI and Tower Ordinance assistance
- Reciprocal Operating guidance
- Licensing Training Aids
- OSCAR Education Program
- Blind and Handicapped help
- Operating Aids
- Club liaison
- Amateur Radio Publicity through mass media
- Technical Information Service
- ARRL Lab research and development
- Testing of Commercial Products

. . . AND MORE

Membership Application On Next Page

ORDER FORM

THE 1984 RADIO AMATEUR'S HANDBOOK

☐ SOFT COVER $12.00 U.S. _ $13.00 Canada $14.50 Elsewhere

☐ CLOTH BOUND $17.75 U.S. $20.00 Elsewhere

☐ ARRL Amateur Radio Call Directory, U.S. listings $15.75 U.S., $19.75 in Canada and Elsewhere.

☐ TUNE IN THE WORLD WITH HAM RADIO. $8.50

☐ ARRL ANTENNA ANTHOLOGY $4.00 US, $4.50 Elsewhere

ARRL ANTENNA BOOK

☐ SOFT COVER $8.00 U.S. _ $8.50 Elsewhere

☐ CLOTHBOUND $12.50 U.S. $13.50 Elsewhere

☐ ARRL CODE KIT $8.00

☐ ARRL ELECTRONICS DATA BOOK $4.00 U.S., $4.50 Elsewhere

☐ THE FCC RULE BOOK A guide to the regulations. $3.00 U.S., $3.50 Elsewhere

☐ FIFTY YEARS OF ARRL $4.00

☐ FM AND REPEATERS FOR THE RADIO AMATEUR $5.00 U.S., $5.50 Elsewhere

☐ HINTS AND KINKS Vol XI The best from QST. $4.00 U.S., $4.50 Elsewhere

☐ LICENSE MANUAL $4.00 U.S., $4.50 Elsewhere

☐ ARRL OPERATING MANUAL $5.00 U.S., $5.50 Elsewhere

☐ RADIO FREQUENCY INTERFERENCE $3.00 U.S., $3.50 Elsewhere

☐ THE SATELLITE EXPERIMENTER'S HANDBOOK, $10 U.S., $11 Elsewhere*

☐ SOLID STATE DESIGN FOR THE RADIO AMATEUR Practical circuits and theory. $7.00 U.S., $8.00 Elsewhere

☐ 200 METERS & DOWN $4.00

☐ UNDERSTANDING AMATEUR RADIO $5.00 U.S., $5.50 Elsewhere

☐ WEEKEND PROJECTS FOR THE RADIO AMATEUR Easy to build projects from QST. $3.00 U.S., $3.50 Elsewhere

*SATELLITE EXPERIMENTER'S HANDBOOK available in early 1984

RSGB PUBLICATIONS

☐ RSGB RADIO COMMUNICATIONS HANDBOOK 5th Ed. in one paperback volume, 778 pages $22.00

☐ VHF-UHF MANUAL $17.50

☐ AMATEUR RADIO TECHNIQUES $12.50

☐ TELEPRINTER HANDBOOK Covers mechanical teleprinters, demodulators, test equipment $21.00

☐ TEST EQUIPMENT $11.00

☐ HF ANTENNAS for all LOCATIONS $12.00

☐ AMATEUR RADIO OPERATING MANUAL $10.00

THE ARRL FLAG

☐ 3' x 5' cloth flag $21.00

☐ Pin $2.50

☐ License Plate $5.00

☐ Cloth Patch $5.00

BINDERS

☐ 6½ x 9½ (U.S and Canada only) $6.00

☐ 8½ x 11 (U.S. and Canada only) $7.00

☐ L/C/F CALCULATOR Slide-rule type for problems on inductance, capacitance and frequency $3.00

BUMPER STICKERS $2.00 each

☐ "Amateur Radio - A National Resource"

☐ "Amateur Radio - One World, One Language"

CODE PRACTICE TAPES each $5.00

☐ 30 minutes of 5 wpm and 30 minutes of 7.5 wpm on one standard cassette.*

☐ 30 minutes of 10 wpm and 30 minutes of 13 wpm on one standard cassette.*

☐ 30 minutes of 15 wpm and 30 minutes of 20 wpm on one standard cassette.

*Same as the tapes provided in the CODE KIT.

☐ COMPUTER NETWORKING CONFERENCE $9.00

☐ HOLA CQ Learn to communicate with Spanish-speaking amateurs. Cassette and 16 page text. $7.00

DECALS

☐ Amateur Radio Emergency Service Color _____ 2/$0.50

☐ Amateur Radio Emergency Service Color 5/$1.00

☐ Member or Life Member, each 2/$0.50

CLOTH PATCHES (washable)

☐ Amateur Radio Emergency Service $2.50

☐ 3" League Diamond $1.00

☐ 5" League Diamond $2.00

☐ Life Membership for 3" League Diamond Patch $1.00

☐ Life Membership for 5" League Diamond Patch $1.25

☐ Rubber Stamp $2.00

MEMBERSHIP PINS

☐ Membership $2.50

☐ League Official _____ $2.50
Title

LEAGUE EMBLEM CHARM

☐ Membership $2.50

☐ League Official _____ $2.50
Title

☐ 14" x 16" LEAGUE EMBLEM BANNER $7.50

☐ 6" EMBLEM BUMPER PLATE $5.00

☐ Replacement Pin for Life Members $2.50

☐ LIFE MEMBERSHIP PLAQUE (for replacement—allow 8 wks. delivery) $25.00

LOG BOOKS

☐ 8½ x 11 Spiral $1.75 U.S., $2.50 Elsewhere

☐ Mini Log 4 x 6 $1.00 U.S., $1.50 Elsewhere

☐ 3-hole Loose Leaf 96 8½ x 11 sheets $3.00

MAPS

☐ U.S. Call Area: $3.00

☐ World Map $4.50

☐ Grid Locator $1.00

☐ Polar (for OSCAR) $1.00

☐ MESSAGE DELIVERY CARDS 10 for $0.50

☐ RADIOGRAM PADS 70 sheets $1.00

SMITH CHARTS®

☐ Standard (set of 5 sheets) $1.00

☐ Expanded (set of 5 sheets) $1.00

☐ ANTENNA PATTERN WORKSHEETS 100 8½ x 11 sheets $3.00

☐ MEMBER'S STATIONERY 100 8½ x 11 sheets $3.00

TIE

☐ Blue $12.00

☐ Maroon $12.00

☐ Scarf $6.50

☐ YES!

Sign me up for membership $25 per year in the U.S., $30 in Canada, $33 elsewhere. **Licensed amateurs** under 18 or over 65 with **proof of age** $20 U.S., $25 Canada, $28 elsewhere. Family membership $2.00—a member of the immediate family of a regular member. 50% of dues for QST, balance for membership. Cannot be separated.

☐ QEX _____
See ad for rates

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALLOW 3-4 WEEKS FOR DELIVERY.

PAYMENT MUST BE IN U.S. FUNDS
$1.00 PER TITLE FOR POSTAGE AND HANDLING ON ORDERS UNDER $10.00.

( ) Payment enclosed Charge to my: (MasterCard) ( ) VISA ( ) American Express

Acct. # _____ Good from _____ Good to _____

Mastercard bank # _____

Date _____ Signature (charge orders only) _____

Name _____ (Callsign) _____

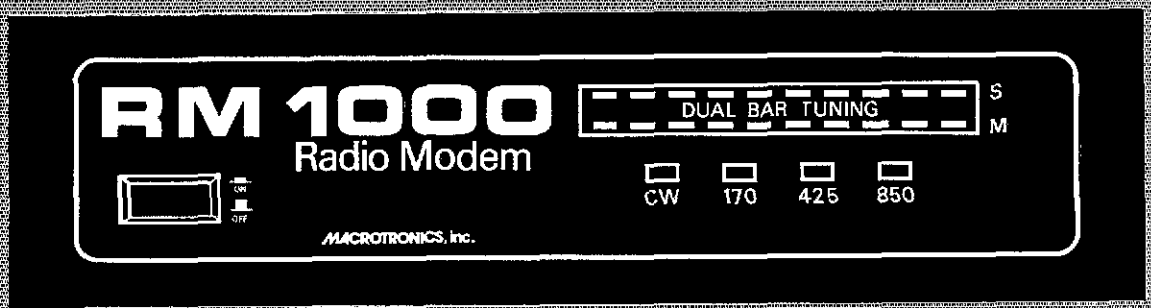
Address _____

City _____ State/Prov _____ Zip/PC _____

Have you fully completed your order form? Is your check (which must be drawn on a U.S. bank) signed or charge number indicated?

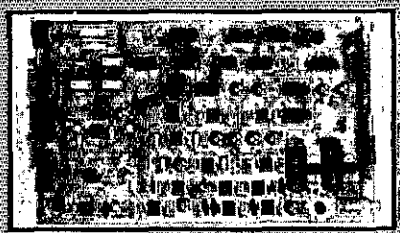
THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST., NEWINGTON, CT 06111

NEW NEW NEW



FOR

TRS-80 · apple · ATARI · IBM



1125 N. GOLDEN STATE BLVD. · TURLOCK, CA · (209) 667-2888

MACROTRONICS, Inc.

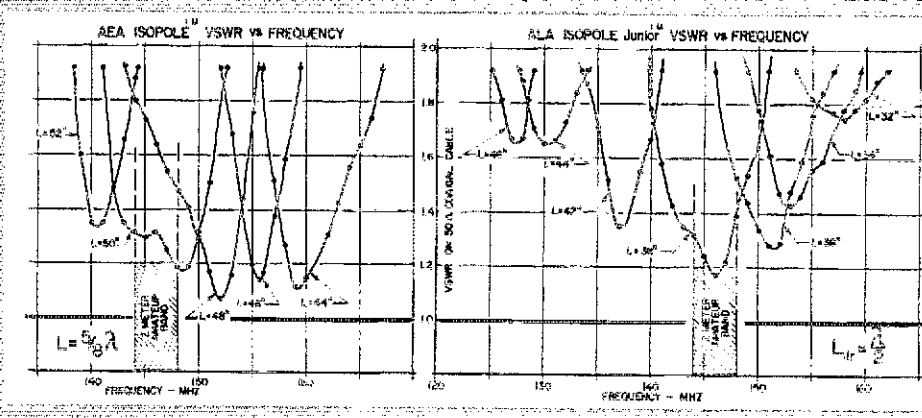
TRS-80, Apple, Atari, IBM are registered trademarks of Tandy Corp, Apple Computer Inc., Atari Inc., and International Business Machines Inc. respectively.

MORE PERFORMANCE FOR YOUR DOLLAR!
COMPETITORS KNOW ABOUT THE ISOPOLE™
DO YOU? STUDY THE FACTS . . .

ISOPOLE 440

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.

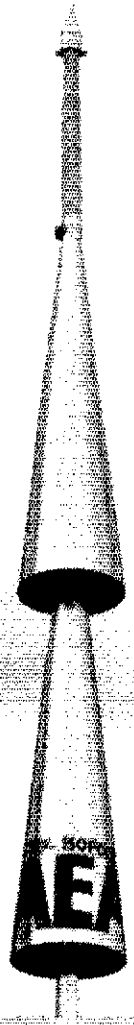


Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard Amphenol 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. 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**).

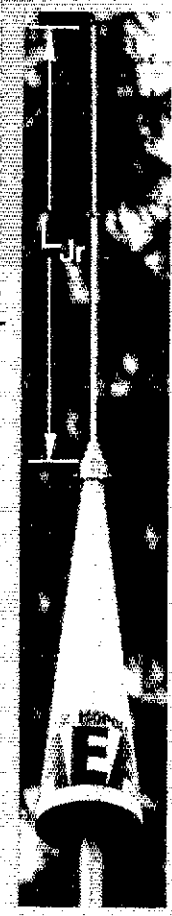
IsoPole antennas have also become the new standard for repeater applications. They all offer low angle of radiation, low maintenance, easy installation, and low cost with gain comparable to units costing several times as much. Some repeater installations have even eliminated the expense of a duplexer 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.

Our competitors have reacted to the IsoPole, maybe you should too! Order your IsoPole or IsoPole Jr. today from your favorite Amateur Radio Distributor.



ISOPOLE 144
ISOPOLE 220
MAST NOT SUPPLIED



ISOPOLE 144JR
ISOPOLE 220JR
MAST NOT SUPPLIED

AEA Brings you the Breakthrough!

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

Actual slow motion frames from Ham MasterTapes

1. Larry, N2NY, Lee, KA2RNV, Virginia, N2EGJ

2. Lee discharges cap

3. In slow motion it's dazzling

4. Wow. Can we see it again?

You've never seen this, like this, before this!

And you can see it—in color—again and again when you own the N2NY Ham MasterTapes.

Ever see a cap discharge in slow motion? You will on Ham MasterTapes. Ham MasterTapes can perform the dozens of complicated demonstrations necessary for a beginner's understanding of Ham Radio Theory.

Finally, a step-by-step course in Ham Radio Theory is available on color videotape. The Larry Horne N2NY Ham MasterTapes video course is a unique, effective teaching technique expertly produced by New York's leading professionals in studio and field videotape.

☐ Video Graphics highlight important details.

☐ Carefully worked-out demonstrations on video avoid the problem of getting complex gadgets to work on command in front of a class.

☐ Working examples of every ham radio component, device, or system covered in the FCC guide can be clearly understood.

The N2NY Ham MasterTapes give you a basic grasp of concepts that build theory background—not only for passing the FCC tests, but for understanding electronics.

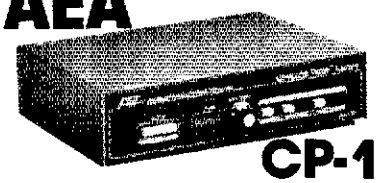
The hobby has long needed better, clearer, high-tech teaching aids to help newcomers into our wonderful world of Ham Radio.

These six-hour tapes cover completely all the material needed to understand Novice and Tech/General Theory and operations, and include the new 200-question FCC syllabus used beginning September 1983.

Only $199.95. Order direct and specify Beta or VHS format. Call or write: Larry Horne, N2NY or Virginia Hamilton, N2EGJ at
Ham MasterTapes
136 East 31st Street
New York, N.Y. 10016 212-673-0680.

Ham MasterTapes™
THE N2NY HAM RADIO COURSE ON VIDEOTAPE

AEA

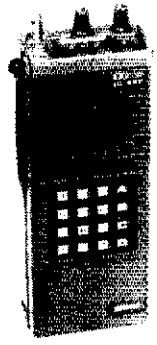


CP-1

Computer Patch ™ Interface.
For computerized RTTY and CW operation.
Call for details.

$199.95
Call for YOUR Low Price!

ICOM



ICOM HT's SUPER BUYS!

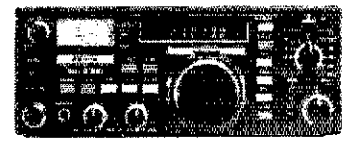
2 Meter Sale $219
220 MHz Sale $239
440 MHz Sale $239

(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

ICOM



IC-730

The best VALUE in ham radio!

Now! Reduced to Only $599 !!!

KENWOOD

TS 430S

Now a general coverage receiver/ham band trans—ceiver at an affordable price. Ideal for mobile, marine and portable use.

Suggested Retail $899.95
Call for Low, Low Price!

SATURDAY, Nov. 19th is...

ICOM

So ALL of November will be

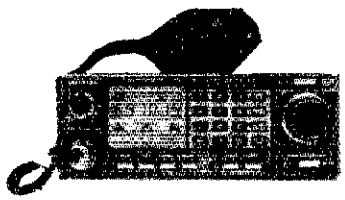
ICOM

Saturday, Nov. 19 ICOM DAY:

For those who can come to our store:

- Hourly Drawings
- Main Door Prize: A sensational NEW ICOM radio to be announced on ICOM DAY!

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

C-Comm

Why is C-Comm the best place to shop?

★ **Competitive Prices**

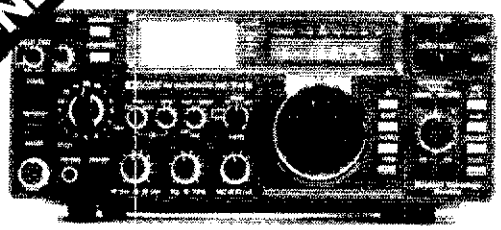
★ **Immediate Delivery!**
SAME day shipment most items.

★ **Extra Class Service!**
We are a Warranty Service Station.

★ **We take the time**
to answer your questions and help you make an intelligent buying decision.

Prices and specifications subject to changes without notice or obligation

NEW



ICOM

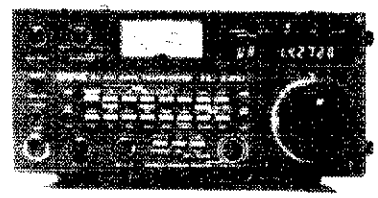
The IC-740 grows up! Now-with general coverage receiver, 16 memories, and scanning makes this one of the most versatile high performance rigs ever.

Suggested Retail $999

IC-745

Your Price $899

ICOM



IC-720A

A high performance ham transceiver NOW AT AN UNBELIEVABLE PRICE! This standard of the industry is also ideal for marine and portable use. Transmitter rated at 100% duty cycle for RTTY use.

Regular $1349

CLOSEOUT SPECIAL! $899

Day Month

on our WATS Line!

All November ICOM MONTH:

All ICOM purchases during November will be shipped for FREE within the continental U.S.

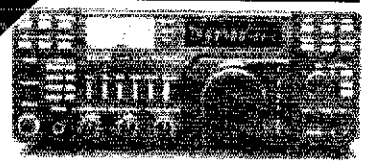
Also, great prices and the usual great service!

Remember: FREE SHIPPING all month!

NEW NEW

Ideal for satellite contacts!

ICOM

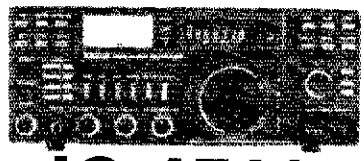


IC-271A

2 meter all mode, 25 watts, many new features.

Suggested Retail $699.00

Call for Low, Low Price!



IC-471A

All mode, 430-450 MHz coverage. Features not previously available.

Suggested Retail $799.00

Call for Low, Low Price!

NEW

ICOM

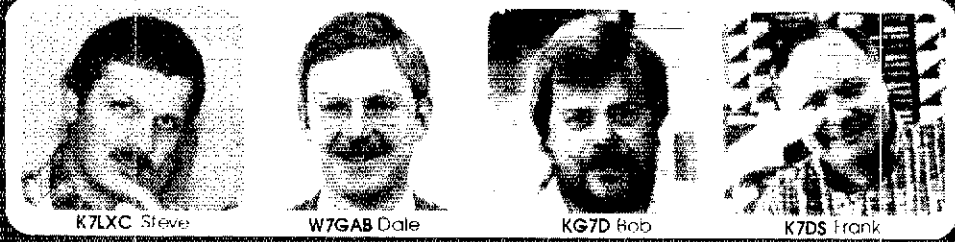
IC-751

The New Standard!

ICOM'S top-of-the-line HF transceiver.

Suggested Retail $1399

Only $1259



C-Comm

C-COMM

6115 15th Ave. NW
Seattle, WA 98107
(206) 784-7337

HOURS:
Mon thru Sat
9:00am — 5:30pm

Call TOLL FREE Nationwide — Including Alaska and Hawaii!

800-426-6528

Wash. Residents: Add applicable sales tax. Call 800-562-6818
International Orders: Telex 15-2391 C-Comm

WB9MIK 15, W9PRD 14, WA9OKK 12, N9CQS 10, W9RTH 10, WD9GET 9, KK9D 8, KC9TA 8, WB9AWI 7, W9ATG 7, W9DKP 6, KK9N 5, N9DHX 5, WD9ART 5, W9OZJ 5, KW9C 4, WB9OZZ 4, K9SBW 4, W9ZGC 4, WD9CIV 4, W9UPI 3, W9BDP 2, WB9AJY 2, K9OUP 1, WB9TOW 1, W9URS 1.

WISCONSIN: SM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1100Z QNI 1376, QTC 1533 WB9YPY. BEN 3985 1700Z QNI 738, QTC 228 WB9ESM. WSBN 3985 2230Z QNI 920, QTC 317 K9ANV. WNN 3723 2300Z QNI 26, QTC 20 KA9HPQ. WSSN 3645 2330Z KC9CJ. WIN-E 3682 0000Z QNI 310, QTC 162 W9YCV. WIN-L 3662 0300Z QNI 252, QTC 109 K9LGU. XPO 3925 1731Z QNI 316, QTC 9 WA9YVC. NWTN .34/.94 2330Z QNI 486, QTC 44 N9BDL. Gr. Bay .72/.12 Thurs. 0145Z QNI 18 (July 14), QTC 0 (July 1) WB9NRK. WCWTN .31/.91 2330Z QNI 437, QTC 35 N9AUG. WD9JID has WAS. Are your Section Net certificates up to date? Contact the NM and STM for renewals or issuance. KA9IKR has been appointed OO/RFI coordinator for the state. Please give him your full support. New Novices Baraboo area KA9QGL. N9DIL is now KD9BC. N9ATA has Advance. Mark January 7 on your calendar WARAC midwinter swapfest Waukesha Co. Exposition Forum building. KC9NH had contact with 350 stations during Winneconne Secession Day as the 51st state. Does your club qualify for "Special Service Club?" Contact WA9POV, the Affiliated Club Coordinator. WD9IID is new NM of BWN, effective September 1. BPL to KA9CPA. K9EYA is now KY9W. Traffic: KA9CPA 2555, WB9YPY 210, W9YCV 199, W9CXY 181, KC9KQ 182, K9GDF 170, WA9WYS 151, W9IEM 148, W9CBE 144, WD9FRI 132, W9UCL 130, K9FHI 123, KA9OBP 108, WA9YVC 83, K9AKG 82, W9SO 77, WB9ICH 68, W9DND 59, WB9ESM 59, WB9JSW 59, KA9IKR 54, KB9NG 59, KA9HPQ 53, AG9G 47, N9AUG 45, KA9BHL 45, WA9ZTY 45, N9BDL 43, W9FDY 39, K9UTQ 49, K9ANV 36, W9LDO 33, KA9AFB 31, WD9IID 29, WA9GYF 28, WB8RGE 28, W9IHW 27, KN9P 26, N9CRO 25, N9DCF 25, KC9MX 25, N9BCX 23, WD9BKT 23, WA9DXW 23, K9SAO 23, KA9GYD 14, KV9U 10, KG9B 9, WB9NRK 7, KB9FM 6, KA9BHK 5. (July) KB9NG 32, WB9NRK 30.

DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, WBØHOX — SEC: KAØARP. STM: KDØCI. Incidently, I want to say thanks to KAØEPY and others in MSN who have covered for W9DM during his absence. On Aug 28th, several amateurs in the Brainerd area participated in a mock fire disaster drill at Mission Township. Stations on site or standing by to assist were: WDØBAC NØEUZ KAØJQO KAØJSW KØMAH KAØNAO KXØV KØVOO KYØX and EC KCØYG. The group assisted the sheriff's dept in traffic control and in a simulated evacuation of the area. WBØDHS reports that the Marshall rptr frequency has changed to 147.765/.165 and that it will change again in the near future. WBØOLY was forced to terminate his canoe trip in Canada owing to supply shortages and other unexpected problems. He canoed as far as York Factory on the Hayes River by July 20th, where ice was still in the river. He returned to Winnepeg via airplane on July 23rd. Tnx to WBØLRK for that report. Net news: WAØONE has resigned as mgr of the WNAMWXNT due to a heavy workload. WDØBAC has been named as the mgr for the 1983-84 season and we know he will do a super job. At the MSN meeting, KAØEPY presented a motion to recognize W9DM for his outstanding work in the CW nets. The motion was accepted in due recognition of a fine radio amateur. Congrats to the following: Upgrading from Novice to General KAØPRI, Tech to General NØEUP & KAØJRS, General to Advanced NØEKZ & KAØODJ, Advanced to Extra WAØAXG KBØDV KØIUC KAØODB & WBØQBZ. Call sign changes: KAØOIJ now NØEUP, KAØPEQ now NØEXP & WØECR now KXØX. DXCC: KCØMJ. Somehow, the OLD ARRL Radiograms are still in circulation, this should not be the case! If you do not have the updated CD-3 (980), contact your local club or myself and we will see to it that you get one ASAP. We are looking for a Bulletins Manager and a Public Service Information Officer for our section, any volunteers? Contact WBØHOX if interested. NET MGRS: MSN/1 W9DM, MSN/2 KAØEPY, MSSN WBØWXU, MSPN/N KAØJUX, MSPN/E KCØUJ, MNAMWXNT WDØBAC, PICONET WØHZU.

NET	Freq.	Time	QNI	QTC	Sess.
MSN/1	3685	6:30P	323	155	31
MSN/2	3685	10:00P	224	58	30
MSSN	3710	7:00P	101	18	27
MSPN/N	3945	12:05P	714	94	31
MSPN/E	3929	5:30P	1119	173	31
MNAMWXNT	3929	6:15P	—	—	0
PICONET	3925	Daily	2505	227	27

Traffic: KBØMB 534, WAØTFC 369, KT9I 362, KTØU 233, KAØCIR 208, WØHZU 181, WØEHI 153, NØCLS 114, WØMFW 91, KAØJUX 85, KBØCI 60, WBØHOX 56, WØRIQ 46, KCØUJ 43, WØOJH 41, WØGRW 36, KTØR 27, KCØT 23, WBØLRK 22, KAØODJ 13, KØOGI 12, WDØBGS 6, NØJP 5, NØELB 4, KAØJQO 4, KN9U 4, KCØYG 4, KXØV 2.

NORTH DAKOTA: SM, Dean R. Summers, KQØC — KØPYZ Memorial Cornfeed at Abercrombie was well attended. Make plans for next year, 1st Sunday in August. Three Rivers ARC meets every 3rd Thursday at the Law Enforcement Center in Wahpeton. BARK provided communications for the Northland Baja. Sioux Falls ARC had a good Dak. Div. Conv. A trust fund has been set up for the son of KCØIW, who has cancer. For info contact me. WAØLPV has RBBS up, who also has a nice technical column in the *Forx Feedline*. Register your rptr. for the Directory. Send info to either me or ARRL. DATA net 28 sessions, 215 QNI, 20 QTC. Goose River 4 sessions, 41 QNI, 1 QTC. KAØFSM 46, Tnx to all net controls WØCDO WBØBPS KBØCH NØAFP WØOSP & KAØFSM.

SOUTH DAKOTA: SM, Fredric Stephan, KCØOO — SEC: WØYMB. SGL: NBØD. STM: WØKJZ. TC: KØAS. BM: NØCFS. ACC: WBØPWA. This is the time of year to sharpen up your CW skills and to take part in the many CW contests and QSO parties. Upgrades: NBØD sailed easily into Extra Class over two years ago; KCØOO finally struggled and climbed way up to Extra Class this last July; KAØLPV moved to General Class. KAØQVE KAØQYT and KAØRBN are welcomed as recent Novices. We congratulate everyone. The Section Managers' Public Service Award this month is awarded to KØFRE in recognition of his fine CW volunteer labors for many years. NTS TEN and DTEN liaison stations were KØFRE WØKJZ and WBØSUM and KCØOO. PSHR: WØKJZ KCØOO NØCFS NØEEH. SDN 65 QTC, 105 QNI; SDTIN 38 QTC, 152 QNI; SDEEN 36 QTC, 171 QNI; SDSMEN 5 QTC, 74 QNI; WCEN 6 QTC, 30 QNI. Traffic: KØAIE 107, WØKJZ 93, KØFRE 83, NØCFS 59, WØDVB 58, KCØOO 43, WBØOMF 36, WØRWE 28, WØYMB 28, WBØLTV 26, W7UDB 25, WBØSUM 14, NØEEH 10, WAØBZD 4, NBØD 4.

DELTA DIVISION

ARKANSAS: SM, Joel Harrison, WB5IGF — SEC: N5BPU. STM: AE5L. TC: W5FD. SGL: W5LCI. DEC: W5TUM. The

Faulkner Co ARC and I had an excellent meeting with the OES directors from each county at their state meeting. Our part on the program consisted of a 2-meter demonstration, computer demonstration, and a video tape from some Field Day activities. It is our hope that this is the beginning of an excellent coordination between hams and the county OES directors.

Net	Freq.	Time	Days
RAZORBACK	3995	6:30 P.M.	Dy
OZK CW	3760	7:00 P.M.	Dy
Phone net	3937	6:00 A.M.	M-S
Mockingbird	3925	4:30 P.M.	M-F

LOUISIANA: SM; John Meyer, N5JM — ASM: KC5SF. STM: W5GHP. SEC: WA4MUW. PIO: KO5R. ACC: K5DPG. Congrats to W5GHP who takes over our Division's Vice Directorship on Jan. 1st. He has been both SCM and STM, is very active in traffic work and will continue to help all of us in ham radio. Nice to have K5DPG become Affiliated Club Coordinator. He is a former Div. Dir. and active in LCARC, which offers a complete list of all statewide repeaters for an SASE for starters. ARRL Pres. W4KFC did much to help make SARA's annual hamfest the large success that it was and gave many the opportunity to meet him in person. Should a disaster strike LA and cause comm. problems it would be tragic since more than half our parishes lack an appointed EC or formal plan of any kind. Your help is needed! Info via the LEN; please check-in soon! Welcome to WD5KFG, the new EC for Cameron Parish. Thanks!

Net	Freq. kHz	Time	Mgr.
LAN	3615	Dy 7 & 10 P.M.	N5BFV
LTN	3910	Dy 6:30 P.M.	N5ANH
LSN	3703	M-F 7:30 P.M.	WD5CWK
LEN	3910	M & P.M.	KA5PFB
CCTN	146.01/61	M-F 6:45 P.M.	GNOARC

Traffic: W5GHP 201, KA5HDT 184, N5BFV 154, W5LQ 108, K5TL 72, KC5SF 58, WA5LBR 55, WA5TQA 35, N5ANH 20.

MISSISSIPPI: SM, Tom Hammack, W4WLF — SEC: N5DDV. STM: KB5W. PIO: ND5M. ND5M is working hard to get ham radio into the news media. Help him whenever you can. N5XA reports his visit to ARRL Headquarters. He indicated that it is well worthwhile. Delta Division convention in Shreveport, LA was a great success. Hearing ARRL President Clark, W4KFC, was a great highlight. W5CH had very worthwhile comments in ARRL forum. If any of you have problems owing to cable TV, be sure to notify ARRL and please send a copy to your SM. The slow net needs your help. Check in when you can. We still need volunteers for the offices listed last month. What about you?? Traffic: N5AMK 332, K5OAF 217, KT5Z 87, AE5H 68, N5DDV 20, N5XA 4.

TENNESSEE: SM, John C. Brown, NO4Q — ACC: WA4GLS. PIO: WK4V. SEC: K4TKQ. SGL: WA4GZZ. STM: K4YOL. TC: W4HHK. It will be noted that there are two new section staff members in this report. The State Government Liaison position is being filled by WA4GZZ, and the previously unfilled position of PIO is being filled by WK4V. He has been very active in the Atlantic crossing by sail boat of the Welshwoman Rosie Swale alone. All section members extend a welcome to the team. All seasonal events are over now, so it's time to get down to the winter operations. I you haven't already done so, better get all the antennas beefed up for the coming high winds and possible icing conditions. We also have a new evening section phone net manager, WB4YPO. Should say repeat net manager. The TSN-CW net honor roll is WD4DDK K9IMI/4 W4ZJY and KA4ZNU. Keep up the good work. Net summaries for this time are: LF-sessions 84, QNI 3108, QTC 143; VHF-sessions 113, QNI 2392, QTC 500; RTTY-sessions 26, QNI 85, QTC 8; CW-sessions 62, QNI 400, QTC 122. Come on computer-minded people, show your skills. Some net managers did not say what they did; we need your activity. Looks like quite a few decided not to send in reports. Give us a call, we would like to hear from your station. Hope a lot of the fellows and gals made contact with our ham-in-space. Know it was difficult because many were calling. Try working some into the other space vehicles as they orbit. Might remind you to get your repeater coordinated before you start in on the air. Failure to do will just create problems for you as some found out the hard way. Traffic: NG4J 222, W4ZJY 165, K4WWQ 121, W4DDK 94, K4YOL 34, KA4BSG 23, WD4GYT 20, W4PFP 18, W4TYV 17, WD4SIG 14, K4WOP 8, NM4W 7, WA4HKU 6, KI4V 6, W4PSN 5.

GREAT LAKES DIVISION

KENTUCKY: SM, Ann Sloan, KA4GFU — STM: KA4BCM. SEC: WA4JAV. J. Sam Jackson, K4TAJ, appointed new KY Public Information Officer. Local clubs should notify him of their PIA. Bulletin Mgr WA4AGH needs OBS to read ARRL bulletins on local nets. New ORS: KD4OG NW4A WK4D. New WTEN Net Mgr, ARES Dist 3, is WD4IXS. KU4A received ABEGWEIT Award for working Prince Edward Island stations. New Novices: KB4FXS & KB4GUB in O'boro. More Novices needed for KNTN and CW ops for KYN and KSN. Plan now for the holiday traffic. Net reports: KRN 540 24, MKPN 939 116, KTN 855 144, KYN 167 81, KSN 202 72, KNTN 309 73, TSTMN 511 59, PAEWTN 253 19. Traffic: WA4JTE 275, WD4IYI 162, KA4BCM 89, KA4SAA 74, KB4OZ 70, NW4A 60, KA4MTX 58, KA4GFU 57, WD4BSC 52, K4MHL 52, KA4SKV 43, WA4JAV 42, WB4APC 32, WD4RWU 30, WB4NHO 25, WA4EBN 25, WK4D 23, WD4CQF 21, WD4IYH 21, WA4YPQ 20, W4WQV 17, W4PKX 16, KD4TY 16, WB4AUN 13, WD4CJQ 13, WA4AGH 11, WA4AVV 11, N4GD 10, WA4NOG 10, KA4YIV 10, WA4SWF 8, N4HZT 6, WD4IXS 5.

MICHIGAN: SM, James R. Seeley, WB8MTD — ASM: WA8DHB. SEC: WA8EFK. STM: WD8RHU. OO/RFI Coord.: K8JH. ACC: K8SB. SGL: N8CNY. TC: WB8BGY. BM: KZ8V.

Net	Freq	Time/Day	QNI	Tfc	Sess.	Mgr.
QMN*	3663	1800 Dy**	782	314	62	KV8U
MITN*	3953	1900 Dy	505	257	31	K9KQJ
MACS*	3953	1100 Dy**	635	165	31	K8LNE
UPN*	3922	1700 Dy	561	100	35	WA8DHB
GLETN	3932	2100 Dy	537	86	31	WD8IBY
MNN*	3722	1730 Dy**	252	73	60	KA8NCR
WSSBN	3935	1900 Dy	504	35	31	WB8SUR

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. ARES net Sn, 3932, 1730. Traffic Workshop Sn, 3953, 1600. ARRL Info Net M, 3953, 1745, 3932 is MI HF emer. freq. As you can see, I did not wait until Jan. to have my "hard look" at the new method of listing traffic reports and net stats in this column. I acquiesce! The only feedback I have had, some solicited, some volunteered, has been negative from the traffic group and a shrug of the shoulders from the "others." So be it. Reporting has fallen off, even PSHR. These data are too valuable an index of activity in our section to have them artificially distorted by human nature — and that's what it comes down to really. It seemed like a good idea...but so did the Edsel! The ARPSC Workshop in Lansing by any measure was a success. I have to admire the enthusiasm and dedication, along with the com-

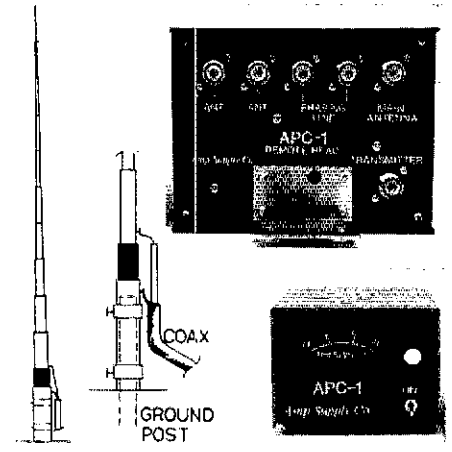
*Reliable Products with a Guarantee***
More Than Parts from Amp Supply

LA-1000A

The LA-1000A is a portable kilowatt now covering 160-15 meters. Typical drive requirement is 100 watts PEP yielding 1200 watts PEP SSB 700 watts CW. The compact linear uses four 6MJ6 tubes, has a tuned input and QSK built in and comes in an attractive gray-on-gray finish.

This is a super linear for all purposes, the LA-1000 excelled during the Heard Island DX pedition with over 30,000 contacts. The rugged design lends itself to continual use during contests and users are even running it on RTTY at 500 watts input.

LA-1000A $399.50*



AEX-1, APC-1

The AEX-1 is a 33' self-supporting vertical full 1/4 wave on 40 meters (or any band). It is constructed of adjustable seamless aluminum, and will handle 4 KW.

The APC-1 is a two piece phasing control for verticals, dipoles or loops. The outside switching box and the indoor control system combine to eliminate all phasing guess work.

AEX-1 ..... $79.50*
APC-1 ..... $99.50*
APC-1 + 3 AEX-1 antennas .. $299.50*
This combination provides complete 360 degree rotation
80 Meter Add-on $24.50*

AT-1200

The AT-1200 antenna tuner is the perfect companion for the LA-1000A or any amplifer running up to 1200 watts input. It covers 1.8 to 30 MHz, has an antenna selector switch for 3 coax positions and 1 long wire or balanced feedline, and a built in SWR bridge and meter.

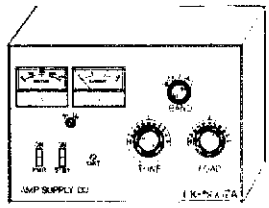
AT-1200 ..... $169.50*

NVR Signal Injector Antenna

The NVR antenna is an excellent all band 102 foot dipole. It comes completely assembled and will handle 2KW PEP. This antenna was originally developed in Great Britain and has enjoyed worldwide acceptance for years. It consists of 102 feet of copper antenna wire, 31 feet of 300 ohm transmission line, 70 feet of RG-8X coax, 2 end insulators, 1 center insulator 1 PL-259 and sleeve connector.

NVR Antenna $50.00*

NEW! NEW!



LK500ZA 2KW AMPLIFIER

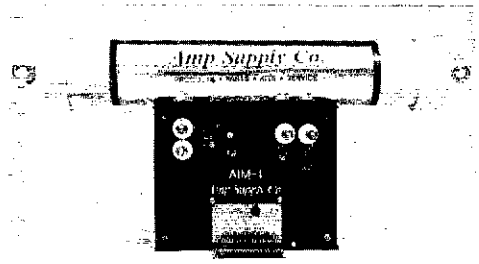
The all new Amp Supply LK-500ZA 2 KW Input Amplifier is the right amplifier, with the right features at the right price. The LK-500ZA is available in kit form or completely assembled and covers 160-15 meters. Two Eimac 3-500Z triodes in grounded grid are featured with a dual cooling system, one for the power supply and the other cooling the 3-500's. There's only one 2 KW amplifier with a pair of 3-500Z tubes in the world that sells for under $800.

The Amp Supply LK-500Z!

- 2 KW CW, SSB
- 1 KW SSTV, RTTY
- QSK Full Break-in CW
- 9" H x 15" W x 15" D
- 117/234 AC 50/60 Hz

NEW!

LK-500ZA Kit $679.50*
LK-500ZA
Wired and Tested $799.50*



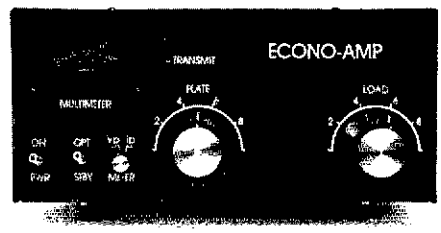
AIM-1™

Major Antenna break through!

The AIM-1 is an antenna impedance matching network for random, long wire or loop antennas. It provides continuous coverage from 500 KHz - 30 MHz, is completely *automatic*, no knobs to turn or coils to tap. Installation is simple; hook on wire antenna, ground, coax cable to station and balancing module at opposite end of wire. The antenna is ready for transmission from 1.8 - 30 MHz at up to 3KW PEP.

- SWR max 2:1, 1.5:1 average
- wire lengths should be 1/2 wave on lowest frequency for maximum efficiency.
- inverted V, inverted L, rombic, random wire or loop antennas
- weatherproof
- 2 year warranty

AIM-1 ..... $129.50*
with 130' antenna wire and insulators $139.50*
Stranded Ant. Wire .08 ft.



EA-160M

160 meter 1200 watt Amplifier

The 160 meter Econo-Amp will give you the edge on "Top Band" this season. With 100 watts of drive, the Econo-Amp will produce 1200 PEP input on SSB or 700 watts CW. This is a great little amp for "Top Band".

- 1200 watts PEP
- 117/234 VAC
- Tuned input
- Pi-net output
- 4 - 6MJ6 tubes
- Forced air cooled

NEW!

Special: EA-160M $289.50*

*POSTPAID CONTINENTAL USA.

****Statement from K8KXK**

As founder and President of Amp Supply Co., I guarantee you'll be satisfied with our products. If you are not, write to me and I'll refund your money or replace your order.

Amp Supply Co.

VISA

2071 MIDWAY DRIVE
P.O. BOX 421
TWINSBURG, OHIO 44087
216–425-2010

MasterCard

petence, that the leadership people in MI bring to the tasks for which they have volunteered. All I can say is "thanks," but I say it with deep feeling. Congrats to L'Anse Creuse ARC on being approved as a Special Service Club. This brings us to two SSCs in this new program, with more applications in process. I am saddened to have to report the resignation of WA8PII from the position of PIO. She was one of the really enthusiastic ones, but has had to step aside for reasons of health. Her replacement in this vital appointment will have been chosen long before you read these words, but this is my way of publically saying "Thanks, Kelly, for a good try." As noted by many, this is the time for 50th anniversaries, and we have another good one to report this month: The 50th year continuously licensed for W8LDS, one of our most faithful traffickers. May you enjoy many many more! BPL: AF8V. Traffic: AF8V 534, KA8CPS 359, WD8LAT 269, W8QHB 200, K8KQJ 188, WB8MTD 148, WD8RHU 137, KB8GT 119, KA8NCR 119, KR8Q 119, WA8QAF 101, WA8DHB 100, NA8G 94, K8GXV 90, WD8MJB 82, K8EQO 79, WA8WZF 77, KA8OWN 69, W8IHX 55, WD8EIB 50, W8PDP 50, K8PQO 44, WB8SYA 42, W8YIO 42, WB8YDZ 39, KV8U 37, KI8Q 32, W8VIZ 30, K8OCP 26, W8CUP 17, W8LDS 17, W8YZ 17, WB8YRY 14, W7LVB 12, KA8JCL 11, WB8ITT 10, N8CNY 9, WB8TTA 9, KT8G 8, N8EOI 6, W8SCW 6, W8TEP 6, W8URM 6, KA8JFM 5, K8UPE 4, W8BEZ 2, KC8K 2, K8DD 1, N8EBN 1. (July) WD8EIB 63, K8UPE 19, KA8LHR 10.

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	368	251	62	6:45/10 P.M.	3.577
BNR	296	122	32	6:00 P.M.	3.605
BSSN	398	305	61	9:45 A/7:15 P	3.927
ONN	—	—	—	6:30 P.M.	3.708
OSN	231	144	31	6:10 P.M.	3.577
OSSBN	2307	1600	93	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
OSSN	130	67	30	6:45 A.M.	3.577
O6MN	365	27	31	9:00 P.M.	50.160

If the enthusiasm of K8JE is anything to go by (and I assure you that it is), then next year's Ohio ARRL Convention (Cincinnati ARRL '84) is going to be another "don't miss" affair. Just this week I received 6 messages with a total count of 147 from 'JE, so if anyone needs info on the Convention, I've got it! Forums (from ARRL to UHF, alphabetically), where (Great Oaks Vocational Campus), details on the headquarters hotel, info on the hospitality suites on Friday and Saturday nites (courtesy of Cincinnati FM Club), etc., etc. Roll on February! More info next month. Good to see so many of you at this year's hamfests and meetings. Hope to get to even more next year, especially if the economy continues its recovery and my work allows me more fun travel for a change. August 1983 was another great month for public service and traffic. Public service champs again are Columbus' COARES (W8BKO, DEC) and note the BPL column—K8NCV with a total count of 1,234 and WD8MIO with 1,064. Congrats to you both. Club elections: DARA-WA2KOO/8, pres.; KB8ZR, v.p.; N8ALN, Secy.; KG8Q, treas. Upgrades, to Extra: NE8X WB8BSB W8DWP KD8IY. Appt: WA8NRC for EC Scioto Co. Congrats to all!

Local Nets	QNI	QTC	Sess.
ALERT	64	4	4
BRTN	233	111	31
COARES	141	25	5
Hardin Co. ARES	26	—	4
Lorain Co.	48	28	13
LCNWO	337	106	33
Medina Co.	300	47	31
NEON	105	31	22
NCTW	32	26	15
RARA	88	2	5
TSRAC	1081	69	47
VWCEN	16	3	3

Traffic: K8NCV 1234, WD8MIO 1064, WD8KFN 480, K8OZ 457, WB8MZZ 453, W8PMJ 451, KA8MEB 326, K8JDI 296, WB8JGW 277, W8QZK 263, KV8Q 256, N8DSU 254, NE8X 235, WB8KKI 230, KD8IC 215, K8YUW 209, W8SKP 165, WD8KBW 158, W8BO 150, KA8CGF 148, KF8J 148, WA8SSI 139, WA8GMT 135, AB8P 122, WD8IKC 120, WD8RIB 118, KA8IAF 100, KC8ZF 96, WB8UBR 86, W8CXM 71, K3RC 71, K8TVG 70, WB8DMF 64, W8EK 64, KA8GJV 57, WD8RGP 55, K8AN 51, WB8MRL 45, W8TXV 39, N8EVC 38, KA8ICB 36, WD8DOS 33, N8JR 31, WB8YTD 31, W8ZM 31, K8EM 29, WB8VOA 26, WA8HED 24, WD8ODV 24, W8BHL 23, N8AEH 21, KC8JI 20, W8RG 20, WB8SIQ 20, W8WEG 20, WD8RGS 19, WB8HOE 18, K8ND 18, N8CJS 17, KA8GGZ 17, K8CKY 15, KA8GMF 14, WA8MOK 14, K8JE 13, W8UQY 12, WA8MIH 10, WB8NHV 10, N8CGM 9, N8CW 7, W8FUP 7, W8OOL 6, WB8KWD 5, WB8NTR 5, WB8SRC 5, N8AJU 4, WB8AWM 4. (July) WD8KFN 299, KV8Q 15, WB8QYT 4, WD8ODV 2, KG8H 1.

HUDSON DIVISION

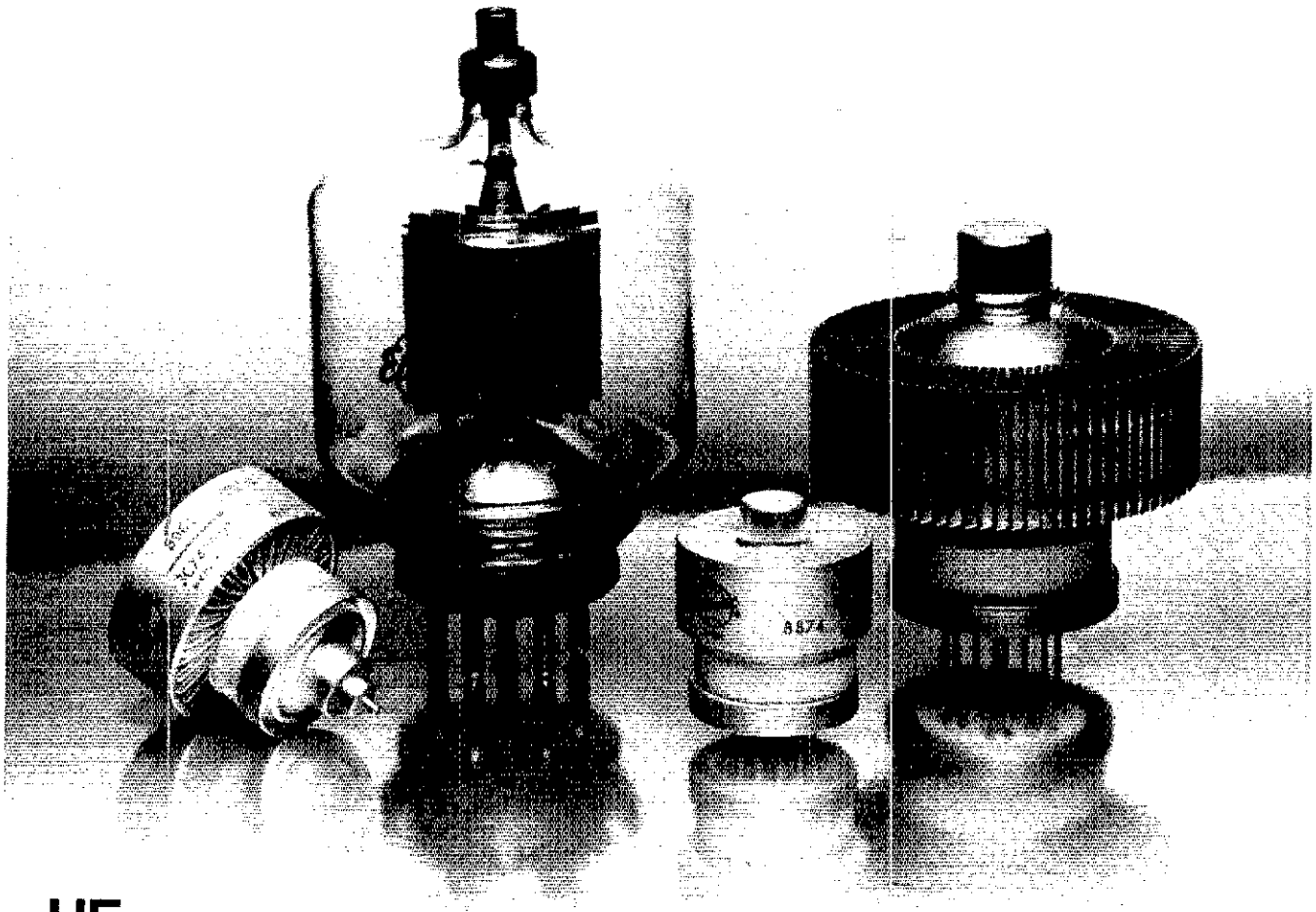
EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ACC & SC: N2BFG. BM: WB2EAG.

Net	Time/Day	Freq.	NM
EPN	2300Z	3.902	AG2X
ESS	2300Z	3.590	W2WSS
NYS	0000/0300Z	3.677	N2APB
NYS/M	1500Z	7.077	WB2EAG
NYPON	2200Z	3.913	WA2KOJ
NYSPTEN	2300Z	3.925	KA2Q
NYS RATT	2330Z	3.625	W2ODC
CDN	2330Z	146.34/94	WB2ZGM
HVN	0030Z S-M-T	144.535/135	N2BDW
HVN	0030Z W-S	146.37/97	N2BDW
SDN	0230Z	147.66/06	K2ZVI
SCRN	0100Z	147.735/135	KV2U

CLUB NEWS: Orange Co. ARC provided comm. for Empire State Triathlon. WECA provided comm. for 1st West. Triathalon and had program on National Weather Service. Rip Van Winkle ARC is preparing for Pumpkin Patrol on Halloween. Albany ARA reports upgrades KC2IX KA2BAI WB3HHJ. Also Silent Keys K2ACB WB2TDN WB2WZM. Mt. Beacon reports hamfest successful. West. ATA already preparing for holiday dinner. Nets: AESN sess. 5, QNI 73; NYPON sess. 31, QNI 538, QTC 272; NYS/M sess. 31, QNI 238, QTC 96; NYS sess. 62, QNI 642, QTC 577; ESS sess. 31, QNI 341, QTC 46. Let's all get out and help with holiday traffic! PSHR: WB2MCO K2ZM WB2VUK K2ZVI W2BIW KC2TF AK2E WB2OHR KA2MBP. Traffic: WB2MCO 227, K2ZM 215, WB2EAG 148, W2BIW 114, WA2SPL 85, WB2VUK 84, K2ZVI 69, KC2TF 60, WA2YBM 54, WA2JBO 53, WA2JQL 47, AK2E 34, WB2OHR 34, WA2CJY 28, N2AWI 27, KA2MBP 27, WB2SON 18, AA2Y 17. (July) WB2EAG 98, WA2YBM 41, WA2CJY 30, WB2OHR 28.

NEW YORK CITY - LONG ISLAND SM, John H. Smale, K2IZ — SEC: WA2KKJ. STM: K2GCE. ACC: WB2IAP. OO/RFI: NB2T. TC: W2JUP.

NLI CW*	3630	1900/2200	W2LWB



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

NLIPN*	3928	1815	KS2G
NCVHF	6.145/745	1930 M-F	K2MT
SCVHF	4.775.37	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	WB2EAG

*Denotes section net; all times are local; please try and help out by checking in whenever possible. Plan now to attend the ARRL National Convention July 20-22 at the New York Statler. Dr. Owen Garriott, W5LFL, will be the guest speaker at the banquet. Great South Bay ARC provided communications for the Jewish Arts Festival of Long Island. There were more than 50 operators involved. Suffolk Co. had a special events station at the Town of Islip Tercentennial. They will also operate a special events station for the Tercentennial of Suffolk Co. Grumman ARC sponsored the annual Grumman - LILCO - Sperry picnic at Eisenhower park. Radio Central ARC will hold their indoor flea market on Sun, Nov. 27. They will also operate the RCA special events station Nov. 5 & 6 to commemorate the 62nd anniv. of the commissioning of RCA Rocky Point. N2AWM now has Advanced class license. New members of Radio Central are KA2SMD KA2GFA W2SGI N2BFT K2KSK & KA2MUH. At their yearly dinner, Staten Island ARA will honor W2GIS for being an amateur for 50 years. W2GIS, along with K2JFE, became life members of SIARA this year. N2EM has moved to Potsdam, NY, to take a position as Asst. Professor of Computer Science at SUNY, Potsdam. Once again the Grumman ARC provided emergency communications support for the Int'l Soccer Tournament sponsored by the Hicksville-American Soccer Club. Stations participating were WB2MPP W2BLH K2HPG KA2DFI K2DOD WA2PFF WB2LVB WA2HSQ K2AAN W2ZZE WB2FMP W2VQD W2CJN WA2FGB W2INJ & WA2TSN. N2DPN is now KD2BE. Traffic: W2AHV 201, N2AKZ 183, W2GKZ 98, W2DBQ 54, K2GCE 54, KA2FFC 43, WB2IDP 17, KS2G 14, K2IZ 10, K2JFE 2. (July) K2MT 28, K2GCE 16.

NORTHERN NEW JERSEY: SM, Robert Neukomm, KB2WI

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QTC
NJM	N2XJ	3695	10 A.M. Dy	31	150	46
NJN/E	AG2R	3695	7 P.M. Dy	31	341	161
NJN/L	AG2R	3695	10 P.M. Dy	31	241	95
NJSN	WB2IQJ	3735	6:30 P.M. Dy	31	203	70
NJPN	W2CC	3950	6 P.M. Dy 9 A.M. Sn	35	350	116
NJVN	KA2HNQ	49/49	10:30 P.M. Dy	31	277	86
TCETN	KA2GSX	085/685	6:30 P.M. Dy	29	150	33
OBTTN	KY2D	72/12	8 P.M. Dy	31	274	62
NJ RTTY	W2PSU	147.51	Autostart			

Please note NJM frequency changed to 3695 at 10 A.M. N2DXP, with a new call and back on the air after QRP for over 5 years, has received VUCC #1 in this area. N2EJO is the new PIA for Ramapo ARC and K2UFM is PIA for BARA. Congrats to these "newshounds." More clubs should have PIAs. Let's hear from each club. Let me hear more on emergency events that you handle. Noteworthy emergencies will appear in the "Public Service" column in *QST*. N2DPN is now KD2BE. W2XD spent a combined business trip and vacation in Switzerland and Italy. Countyline ARC is active again after being inactive for a number of years. Come to their "Radiosport '83" at Camp Alpine Nov. 19th; talk-in on 146.835. An AMSAT display and station will be there. Check our your 2-meter gear on their "H-P" test bench. Their new president is WA2KPR. N2BNB reports Sussex ARC auction is Thursday, Nov. 17, 8 P.M. in Newton, with talk-in 147.90/30. The Metuchen ARC (wish they would report to me on a routine basis) has an on-going "study group" for would-be Novices and those interested in upgrading. They meet every Thursday evening 8 P.M. at Metuchen HS, one block off of Hwy 27 and Grove St. PARA is again holding Novices classes at Bergen Community College. Classes started Sept. 27 and will run each Tuesday evening. For the spring class, contact Jim Greer, KK2U, 201-445-2855. Ramapo Mt. ARC reports that K2BJG and AD7I are collaborating on a new program to run AMTOR bulletins using W1AW's H-89 computer. Look for these bulletins (if you have AMTOR equipment) following the Friday UTC baudot/ASCII DX bulletin. Metroplex reports Lt. Cdr. Peter Olsen, N2ELL, will talk on the US Coast Guard worldwide search-and-rescue computerized communications system. Meeting place will be held at Ft. Lee Firehouse, Nov. 9th, with talk-in on 145.45. New Providence ARC reports Novice classes starting Sat., Oct. 1 in the library meeting room from 9 to 11 A.M. For information call Dick, KA2PGY at 464-8428. This club has frequent foxhunts. If you're interested in this kind of activity, call KA2PGY. Fairlawn ARC reports KA2OTY is a new General. OO reports from KJ2O and WA2QZO. Jersey Shore ARC reports KA2BQK is now NA2P. They are planning Novice classes starting in October. Contact WA2HEB (SNJ's new SM-cgns!). Cgns to W2DYR for his 50-year membership with ARRL. The Pickeral Chapter of the SOWP will meet at the Colts Neck Inn the first Tuesday in October. All SOWP members invited. This report has been written in the Valley Hospital while the "old ticker" mends. Traffic: N2XJ 239, AG2R 172, K2VX 148, KA2OIW 92, W2XD 76, KB2WI 69, KA2GSX 65, W2ZEP 38, WB2GHN 34, WB2KLF 30, KD2BE 27, N2DZZ 18, KC2YG 17, N2EBA 12, W5DTR 12, W2CC 11, W2UH 10, W2RRX 7, N2BNB 1.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY — SEC: WA4VWV. STM: KAØX. ACC: WBØQAM. PIO: KBØZP. TC: KØDAS. SGL: AKØQ. BM: KØIIR. NMs: WØYLS WBØAVW KCØI WAØAUX. Hats off to all the EC and ARES groups for the cooperative effort with the state ODS and the Emergency Drill. Our SEC and WØWL have the ODS stn operational again at the Hoover Bldg. "Certificate of Appreciation" was awarded this year to two members of the 75-Meter Net. Congrats to WDØFWB and WØJPJ. New EC WØNRR. We did very well in the evaluation of 1982. Let's get ALL the ECs to file reports this year for SET. Traffic ranking went from 35 to 26; nice job!!! Keep up the support. The ICN has found new life and will be on 5 nites a week.

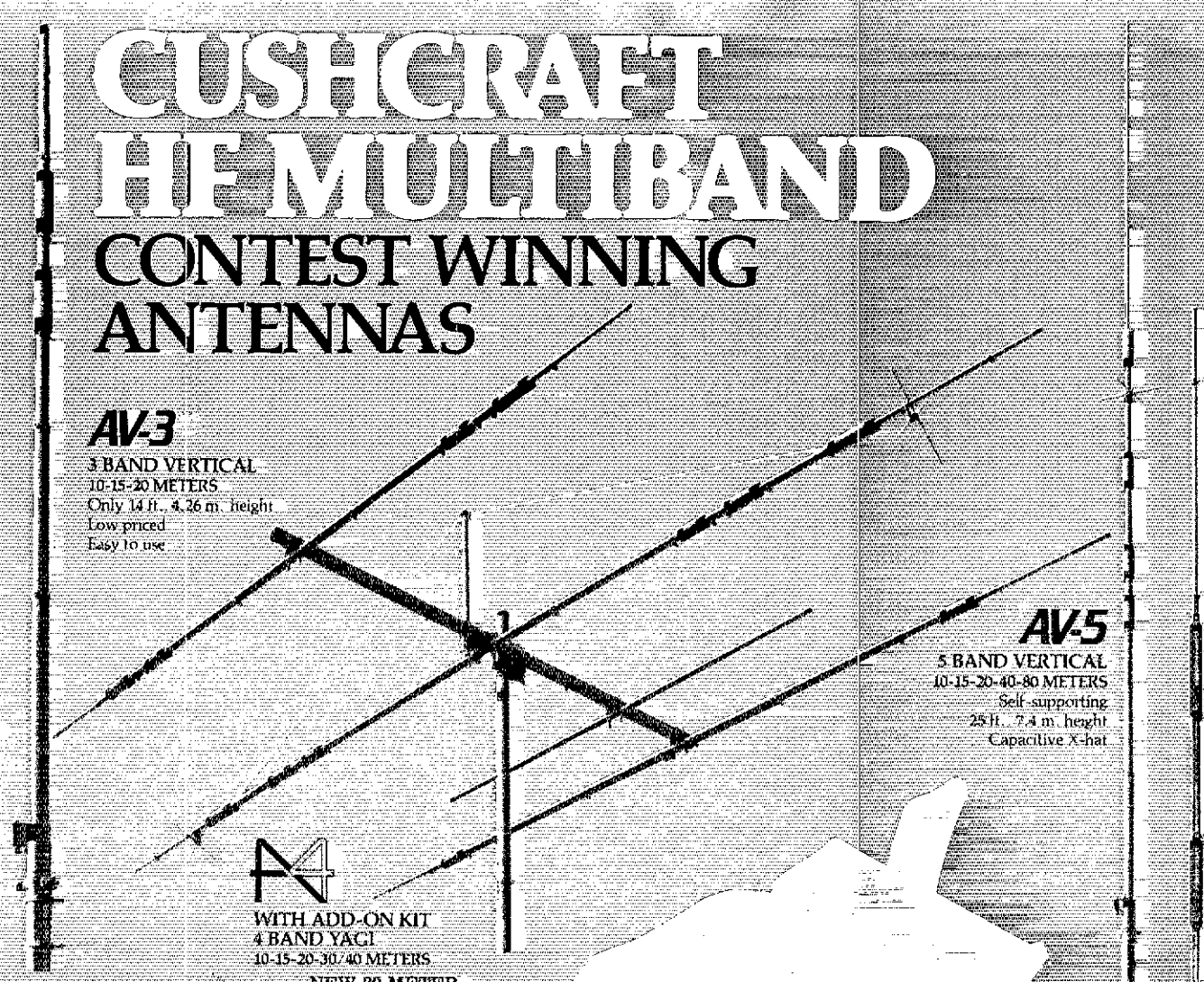
Net	Freq. UTC	Day	QNI	QTC	Sess.
TLCN	3560 0030-0400	Dy	388	168	62
ICN	3713 0100	M-F	84	48	14
75M Phone	3970 1830-2330	M-S	2065	215	54
ITEN	3970 2230	Sn	55	—	4

Congrats to the IaCy club for 50 years affiliation. CVARC is providing communication for the "Farm Progress Show," a huge undertaking. As usual the CR hamfest was great. Too bad you missed it. Clubs should be back active after the summer, so hope the newsletters will begin again. Traffic: WAØAUX 356, WØSS 184, WDØFWB 168, KØGP 142, NØDYE 130, WØYLS 113, NØAHP 100, KBØZP 76, KQØI 75, KAØADF 69, WBØJFF 68, W4JL 66, KØCY 64, KAØJQG 42, WBØAVW 39, WØBW 35, KBØOZ 28, WØZTP 19, KØTFT 16, KA9GBG 15, NØEFG 7. (July) WØZTP 20.

KANSAS: SM, Robert M. Summers, KØBXF — SEC: WØKL

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

A3

3 BAND YAGI
10-15-20 METERS

R3

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

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

STM: WØOYH. State Govt Liaison: NØBLD. Technical Coordinator: KØEZ. Bulletin Manager: KØJDD. Public Information Officer: Open. OO/RFI Coordinator: Open. Sure would like to fill those other two appointments! It is indeed a sad way to start a column but to the list of Kansas SILENT KEYS: add KØZHO of Abilene and KØUNE of Clay center. Both have been very active in years past both on amateur and MARS frequencies.

Net	Sess.	QNI	QTC	Mgr
KSBN	31	1235	279	KAØCUF
KPN	21	367	33	KAØCUF
KWN	31	850	570	WAØLBB
KMWN	31	614	478	WAØLBB
CSTN	31	1891	133	WAØOMB
QKS	32	307	102	WBØZEN
QKS-SS	13	48	13	WØMYM

Guess all club editors took the past month off. I received only 3 bulletins this month. The ol' QKS gang will want to congratulate KC (Kevin Cook) ex-WBØHTR, now N5EVB) who married KAØQNL August 27th. ARRL is looking for an artist to design a logo for the ARRL Special Service Club program. Surely KANSAS has a winner out there. Traffic: WØFRC 390, WBØZEN 163, KSØU 153, WØHI 137, WØOYH 127,WØFIR 104, WAØLBB 79, WØFDJ 75, KØBXF 45, WØCHJ 44, WØAM 41, WØQMT 34, KØGSC 32, WØPB 28, WØRBO 14, WØKL 13, KADE 6.

MISSOURI: SM, Ben Smith, KØPCK — The amateurs of Linn, MO now have a repeater pm 145.39, using the call KCØLL. It is an open repeater and has good coverage in Southeast Central Missouri and will provide 2-meter coverage in an area that was badly needed. On behalf of the Central Missouri RA who underwrote the AR station at the Missouri State Fair, for KT5Y and I who coordinated the operation of the station, we want to thank the clubs and individuals that came to Sedalia to help operate the station, those who made financial contributions and everyone that helped handle traffic from the state fair station. Seven hundred messages were originated by fair goers, 256 contacts logged and a lot of information handed out about Amateur Radio to the public. Again thanks from all of us. WDØFLT received ORS appointment this month. With fall and winter upon us and more time spent on the air, try to participate in section and local nets. The NMs work hard to keep the nets going, so let's support them. NØAJI DEC in the Kansas City area was interviewed by KMBZ to explain amateur radio and its involvement in the shuttle mission.

Net	Sess.	QNI	QTC	NM
MSSN	31	529	140	KT5Y
MON	62	344	243	KØSI
PHD	5	91	14	WAØKUH
CMEN	5	71	2	KØPCK
STAN	5	288	2	NØBKH
RRARBN	31	437	32	NØECM
MEOW	31	289	67	KØDSQ
HBN	23	477	62	KØDSQ
IFN	4	28	0	WØKNF

Traffic: WDØDVG 1418, AIØO 655, KØSI 329, KT5Y 291, KØPCK 197, KØDSQ 134, WAØYJX 122, KØBM 98, WØBMA 82, KØCW 80, K2ONP 78, WØOUD 41, WBØHOP 35, KCØAS 33, KUØG 22, WDØFLT 15, NØBLB 14, WAØKUH 7, KMØL 3.

NEBRASKA: SM, Reynolds Davis, KØGND — This is the month for STS-9! Our new Public Information officer, David Ahrendts, KCØXT, has been working hard to maximize Amateur Radio exposure in the news media. If your club needs some help organizing its PR effort, it's not too late. Give KCØXT a call for advice. Also, welcome to Ken Johnson, WDØEMR, aboard as the new Bulletin Manager for the Nebraska Section. He is handling much of the Saturday (12:15 P.M. CT) RTTY section bulletin at 7085 kHz which is repeated on phone on the NE 40 phone net in the following hour. Please note the ARRL Midwest Division Convention is in Kearney on March 30, 31 and April 1. Early reservations encouraged. Finally, traffic must follow ARRL format to count on nets; also you must report traffic in form CD-210 format (orig, received, sent, delivered) in order to have it below. Traffic: WØKK 143, KØDKM 97, WBØTED 95, NØDGM 62, WØSCA 46, KØGND 45, KAØBCB 34, KØIXY 27, WAØSCP 19, KAØBWM 14, WBØGMQ 9, KAØELI 6, WAØDXY 6, KØODF 4, WØNIK 3. (July) WAØSCP 27.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kamp, KA1KD — STM: K1EIC. SEC: K1WGO. OO/RFI: KA1ML. BM: KS1F. TC: W1HAD. ACC: N1AZF. SGL: K1AH. PIO: K1NGL.

Net	Freq.	Local time	QTC	QNI	NM
CN	3640	1900/2200	218	308	K1EIR
CPN	3946	1800/1000 Sn	83	271	KA1BHT
NVTN	28/88	2130	—	—	WA1ELA
WCN	78/18	2030	49	343	WB1GXZ
RTN	13/73	2100	25	246	K1UQE

Call changes: KA1JS/KR1O; KA1BLU/KR1W; WB1GUX/KB1JJ; WA1DWE/KS1F. Congrats to *QST* columnist and former SCM WA1LOU on his recent marriage. TNX to ICRC for participating in the Barry Goldwater teleconferencing net. Upgrades: Adv-KA1KKD KA1KBQ; Gen-KA1KCA. Advanced and Extra class ops are encouraged to participate in the Volunteer Examiner Program; contact K9CH at Hq for details. TNX to all who participated in the recent SET. Members of SARC are currently organizing a program to work alongside police communicators of the Old Saybrook Police Dept. to provide ham radio backup capability. SCARA recently provided communications for the annual New Haven Labor Day Run, using W1GB/R. SCARA's Flea Market is up and ready to go Nov. 13th. WA1GNA has QSYed to PA. Congrats to all the section hams who had the opportunity to work W5LFL on board the shuttle, and to all the radio amateurs who were instrumental in providing us with this most historic event. The PVRA has a new hotline telephone number for jammer coordination. This might be the Thanksgiving season but Turkeys are not always appreciated. With the winter season upon us, we should turn our thoughts to being prepared for the snow and the emergency services that we can provide. A reminder: If you are listening to a repeater and a station comes on requesting emergency assistance, by all means help them, even if it means spending a quarter on a phone call. The true ham spirit mandates this. Traffic: WB1GXZ 393, W1EFW 180, K1UQE 154, WB9IHH 137, KA1BHT 59, W1XX 59, K1AQE 47, K3ZJJ 44, KA1EGE 35, W1YOL 13, W1CUH 12, W1QV 9, N1CLV 6, W1DPR 6.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: KA1GBS. SEC: W1IAY. ASM: K9HI. ACC: K1AZE. OO/RFI & BM: WA4STO. TC: KA1IU. PIO: WA1IDA.

Net	Mgr	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	WA1LPM	3.658	1900/2200/Dy	554	516
EMRIPN	KA1GBS	3.959	1730/Dy	240	211
EM2MN	N1BNI	23/63	2000/Dy	477	224
NEEPN	K1BZD	3.945	0830/Sn	61	21
HHTN	KA1MI	04/64	2230/Dy	602	448
EMRISS	N1BHH	3.715	2030/Dy	186	86

INTRODUCING A REVOLUTIONARY NEW "ULTIMATE" LINEAR AMPLIFIER FROM ETO

You knew that the next DRAMATICALLY ADVANCED new linear amplifier would again come from ETO. The ALPHA 85 won't disappoint you. It's like no amplifier you've ever seen.

THE MICROPROCESSOR DOES THE WORK—YOU OPERATE "HANDS FREE"

The ALPHA 85 is microprocessor-controlled. You simply pick the band and start talking—the '85 does the rest.

NO TUNE-UP, NO COMPROMISE

The ALPHA 85 is factory programmed to deliver full output across each amateur hf band.* You can program it in seconds to perfectly match your actual antenna load at every point in each band . . . and even "teach" it your favorite band segments for each mode.

After that you just select the band and mode—and your ALPHA 85 tunes itself up perfectly in about half a second!

1500 WATTS RF OUTPUT—THE ULTIMATE "ALPHA" SIGNAL

Two EIMAC 3CX800A7 ceramic-metal triodes loaf along at 1500 watts PEP SSB or CW output—dependable, crisp, QRM-busting ALPHA power!

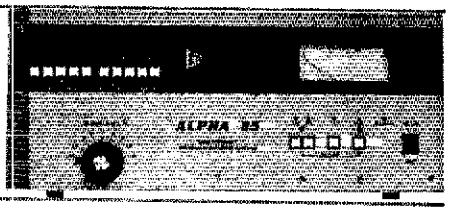
THIS INTELLIGENT AMPLIFIER MAY SAVE YOUR . . . BANDSWITCH

The ALPHA 85 actually recognizes common operator errors and avoids damage. Accidentally change bands "hot"—or forget to connect a suitable antenna—and your '85 will switch to standby.

Of course, you won't risk using the wrong antenna if you have the (optional) automatic antenna selector. Or the automatic antenna coupler. Both fully programmable from the amplifier panel.

EVERYBODY WILL WANT ONE

We expect initial demand for the ALPHA 85 to substantially exceed supply. Drop us a card with your name and address, and we'll send detailed literature plus up-to-date delivery information.



ALPHA 85: YOU'VE NEVER SEEN ANYTHING LIKE IT

ETO

EHRHORN TECHNOLOGICAL OPERATIONS, INC.
P.O. BOX 888
CANON CITY, CO 81212
PHONE (303) 275-1613

The ALPHA 85 may not be, and is not, offered for sale prior to FCC type acceptance.

*U.S. models exclude 24-35 MHz; qualified amateurs, however, may legally restore 28-29.7 MHz coverage easily and at no cost.

Cl2MN N1BYS 045/645 1930/Dy 150 56

I'm pleased to announce that we have our first Special Service Club in Eastern Mass. As a matter of fact we have two. The North Shore RA and the Wellesley ARC have both been officially accepted as SSCs. One of the responsibilities/privileges of an SSC is to process the VHF/UHF Century Club (VUCC) awards, so if you have your own hundred grid squares worked and confirmed contact one of the above clubs. In the meantime these clubs will be working with Hq on the details of this program. At a recent meeting of the Falmouth club a motion was passed to apply for SSC status. OO/OBS coordinator WA4STO is looking for more Official Observer and Official Bulletin Stations. You must be a League member, be *willing to* send WA4STO a short report each month, and be willing to help. If you're interested, contact WA4STO about one of these important functions. Massasoit club held a picnic at Watson Park in Taunton. Billerica club had an interesting talk by AI1H on how he used a microprocessor to spice up his 2-meter rig. Greater Lawrence club had a picnic at the home of KM1D. Framingham club holding Novice classes. The teleconference with K7UGA was a smashing success with the 72/12 (Billerica) and 265/865 (Sharon) repeaters participating. If your club needs a speaker or you have a member that gave a good talk at your club please contact ACC K1AZE, who is keeping a speaker's bureau to help clubs get good speakers at their meetings. Bellingham ARES assisted Foxboro ARC with communications for 10 km roadrace in Foxboro State Forest. Falmouth club participated in the annual Falmouth road race. Traffic: KA1GBS 658, N1BGW 410, KA1KEP 306, W1AF 214, WA4STO 180, KA1EPO 177, N1AJJ 167, WA1TBY 162, KA1EXJ 161, K1CB 155, WA1DXT 115, WA1LPM 103, WB8TDA 82, KA1JZC 71, KA1MI 69, K1II 63, K9HI 55, N1BYS 50, KB1JM 50, WB3FOC 48, W1CE 43, WA1FNM 43, N1BYS 40, K1BZD 36, KA1DJV 23, W1QLL 20, K1LCQ 8, KA1KF 7, W1ZHC 2. (July) KB1JM 26, K1GN 15.

MAINE: SM, Cliff Laverty, W1RWG — SEC: KL7IJG/1. STM: AK1W. ACC: KB1JF. OO/RFI: W1KX. SGL: K1NIT. PIO: KA1TJ. TC: KQ1L. BM: W1JTH. Maine hams have been busy with public service: Comms for Skowhegan Log Days which included road race, white water canoe race, parade and an emerg ambulance, were handled by W1HTG W1HHV KA1FXH KA1FXI N1AII & N1BLZ. Farmington AR Nite included participants KA1TJ K3IJF W1KX KA1GTQ KA1JGF. Comms for Wilton Blueberry Festival handled by KB1JF KA1TJ KA1GPQ KA1JGF KA1TE K1PV KA1JOJ. Skowhegan State Fair road race comms handled by KA1FXI KA1FXH N1BLZ KA1C KA1EMK KA1AVU & KA1BHF. PSHR: WA1YNZ KA1TJ KA1AVU KL7IJG N1BJW AK1W W1KX W1RWG. New officers Yankee RC: K1VFG, pres.; W1OKS, v.p., W1EZR, secy.; KA1FTQ, treas.

Net	Sess.	QNI	QTC	NM
PTN	54	397	173	AC1G/N1BJW
SGN	27	961	169	K1GUP
AEN	5	67	3	WA1YNZ
MPSN	4	48	0	KL7IJG

Traffic: WB1BYR 137, AK1W 133, KA1TJ 92, W1RWG 71, KA1AVU 69, W1ISO 63, W1BMX 57, N1BJW 57, KL7IJG 45, N1BLZ 44, WA1YNZ 27, W1JTH 19, W1AHM 19, KA1ENL 9, N1BME 7, KA1FTL 4, K1PV 4, W1OTQ 3.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — SEC: AK1E. STM: W1TN. NMs: N1NH KI1M KK1E. GSPN certificates to AG1Z & N1CPX. W1HJF & KA1ZO now Extra. A great time was had by all at WB1BRE's and Dot's Podunk Vermont shindig. WA1YQQ needs more input from GBARA members for newsletter. KK1E new manager of GSPN. Thanks to W1VTP for getting the net organized and functioning properly. W1JB & & WB1AOB seen at many ham functions. The 1RN picnic & meeting was outstanding again, thanks to Zaiga & W1QYY. Traffic: KI1M 255, N1NH 238, KK1E 225, W1TN 224, W1GUX 158, WB1CFP 140, N1CPX 91, AK1E 88, W1ALE 60, WA1YZN 57, W1MHX 45, KA1BJ 37, N1AKS 28, K1PQV 24, W1FYR 24, N1ALM 23, K8UXO 20, W1CUE 18, WA3BZM 17, K1OIQ 14, W1OKU 8, N1AHN 6, WA1PEL 6. (July) K1PQV 9.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: W1EOF. TC: AB1D. NM: WA1OSL RIEM2MTN. Net appt: KA1KML ORS. Endorsement: KB1G OES. Newport Co. RC provided communications for Siege Day, with following members taking part: W1LO N1DB W1AXO WA1SEY W1JFF. East Bay Amateur Wireless Assn. sponsoring RI QSO Party Nov 12 to 14th. RI stations work other RI stations and rest of the world. All others work RI stations. See "Contest Corral" this issue for further info, or contact either KA1EHR or N1RI. KO1X has antenna back up and is active on CW traffic nets. KA1KML Sunday NCS on EMRISS. Traffic: W1EOF 781, KA1KML 63, WA1CSO 20, KA1EHR 18. (July) KA1EHR 14.

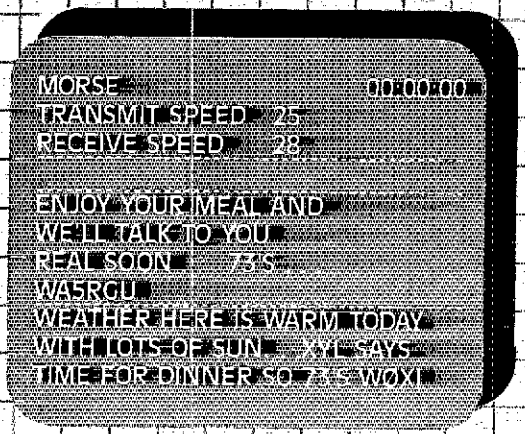
VERMONT: SM, Reed Garfield, WB1ABQ — STM: N1ARI. BM: AE1T. SGL: W1KRV. Happy to add W1RNA to LO list as new SEC. He gave up PIO slot to oversee emergency communications. Really nice to have SEC. Congrats to ops using ATV during Green Mt. Island Marathon on Aug. 20; K1LJL N1QG KA1BJP K7IJH (de WB1BWV). Had grand time at BARC hamfest, met lots of hams. Hope to meet more next time. Would like some activity reports from the VHF/UHF ops and from anyone using any specialty modes. Hope to be active on 2-meter SSB again by time this in print, tnx to WA1MMD. Nets: VTN 31/139/79; VFMN 31/692/76; VSBN 31/544/125; GMN 27/353/30; Carrier 27/585/31; VPN 4/70/4. Traffic: AE1T 88, W1KRV 80, N1ARI 79, N1COB 68, WB1ABQ 51, W1OAK 43.

WESTERN MASSACHUSETTS: SM, William J. Hall, W1JP — SEC: WB1HIH. PIO: WA1MJE. ACC: W1YI. STM: W1UD. Great news for the traffic hounds in Central MA. Called the Central Mass Amateur Traffic Net (CMAT), it meets at 9 P.M. on Tuesday and Thursday. AK1J and N1AUP got it all started, and although not affiliated with NTS, it has been employed successfully by KA1T and me to pass NTS derived traffic. On another note, I have heard that WA1RWU, a top VHF Sweepstakes winner, is now turning to serious EME activities. A 16 Yagi array for 70 cm. is well into construction. Speaking of space communications, I would like to know how many of you have succeeded with Oscar 10, and who heard or worked Owen Garriot? News from W1ZPB indicates that he erected 1 40m delta loop last summer. The biggest job was clearing brush and trees! PSHR: WB1HIH K1JHC KA1T. Traffic: W1PUO 263, WB1HIH 174, W1UD 88, KA1T 82, K1JHC 61, W1JP 40, W1ZPB 22, WB1FSV 13, WA1OPN 11, WB1HKN 9, W1JSV 6.

NORTHWESTERN DIVISION

ALASKA: SM, Will Darsey, AL7AC — Now that summer is drawing to a close and winter is just around the corner, our evenings are occupied more by Amateur Radio. Check-ins and traffic count on all nets are picking up and so is interest in Amateur Radio. Now is the time for club

KANTRONICS SOFTWARE
Hamsoft,™ Hamtext,™ and Amtorsoft™



Kantronics has led the amateur community in software and total computer communications systems with our original program, **HAMSOFT**. With five-computer compatibility and reasonable prices **HAMSOFT** has become the industry standard. **HAMSOFT** includes split screen display, type ahead buffer, message ports, and complete keyboard control for Morse Code, Radioteletype, and ASCII communications. With THE INTERFACE or INTERFACE II, **HAMSOFT** can make any of five computers a complete amateur communications terminal. All programs are on a ROM board, except the Apple diskette.
VIC-20 – $49.95, ATARI – $49.95, APPLE – $29.95,
TRS–80C – $59.95, TI-99/4A – $99.95

HAMTEXT is our advanced CW/RTTY/ASCII program for the VIC-20, COMMODORE 64, and APPLE computers. **HAMTEXT** gives you the ability to store incoming messages in the computer's memory, transmit files directly from tape or disk, and use your computer to its fullest potential. Features like Diddle, Time Transmission, Text Transmission, Printer Outputs, and Word Wraparound, make **HAMTEXT** the program for the serious amateur. **HAMTEXT** was created with input from our users as guidelines, and with total use of the computer in mind.
Suggested Retail **$99.95**

On January 27th, 1983, AMTOR, Amateur RadioTeletype Over Radio, became a legal mode for the amateur service. AMTOR is an essentially error-free radioteletype form of communication. **AMTORSOFT,** Kantronics' newest software package, gives your computer the ability to become an AMTOR communications terminal when used with The Interface or Interface II. **AMTORSOFT** is currently available for the Apple, VIC-20, and COM-64 computers. **AMTORSOFT** brings you the newest in computer-amateur communications at an affordable price.
Suggested Retail **$89.95**

For more information see your Kantronics dealer, or contact:
Kantronics 1202 E. 23rd Street Lawrence, KS 66044

representatives to visit Junior High and High Schools and recruit some new Novice operators. It looks like a busy month ahead with the SOME run over south and central Alaska, beginning classes, flea markets, bunny hunts and others. EVERYONE THINK DISASTER PREPAREDNESS!! Traffic: KL7VY 128, KL7LA 61, AL7AC 26.

MONTANA: SM, Les Belvea, N7AIK — SEC: W7LR. STM: KF7R. OO/RFI Coord.: KS7U. TC: K0PP. ACC: WB7TWG. PIO: WA7GQO. BM: KB7SE. SGL: W7JMX. The Montana Traffic Net is now a 7-day-a-week operation, 3910 kHz at 0030Z. Also don't forget the Idaho - Montana Net on 3635 kHz at 0300Z. This net needs more Montana help. For a new copy of the Montana Callbook - it's a dandy - send $4 to either WB7TWG or N7ATT. Treasure State chapter of the QCWA #104 new officers are: VE6EO, pres.; W7BXI, v.p.; W7PX, secy./treas.; W7OIO, historian; W7BOZ W7JMX W7DB VE6VN, directors. New 2M repeater in Wolf Point is WB7QDN on 146.26/86. W7BQE enjoyed the CRRL meeting in Saskatchewan this past summer. WA7MKN has been selected for inclusion in the 1983 edition of "Outstanding Young Men of America." Very FB. KA7PUI, whose 4-year-old daughter vanished during Field Day this summer, has begun a search-dog project to help others who may experience the same situation. PSHR: WA7GQO.

Net	Sess.	QNI	QTC	Mgr.
IMN	22	179	115	K7RX
MTN	22	644	109	KB7SE

Traffic: WA7GQO 57, N7AIK 24, WB7WVD 9, KD7EG 8.

OREGON: SM, William Shrader, W7QMU — STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. RFI: AK7T. OO: N7SC. UPGRADES: KA7OZO (Novice); N7FHE (General); N7ECQ (Advanced); K7AWP (Extra). KT7Z got a big job promotion. PARC now ARRL affiliated club again. Hoodview's "Ham Fair" was a success. Congrats to all concerned. N7FHE, "Fire House Engineer" is in fact a Roseburg fireman. K7WPC has resigned as publisher of the BSN newsletter, *Eager Beaver* for personal reasons. Thanks for several years hard work producing a fine newsletter. During the state fair in Salem, SARC did a fine job as usual promoting Amateur Radio with their booth. W7BU, Columbia Lightship, in Astoria completed WAS during the past year. EARS, LaGrande, will operate a steam train mobile at Sumpter Valley Railroad Project on board a narrow gauge Heisler locomotive. The call will be W7NYW from RARE Baker Co. KX7T (KA7ELI) and KX7W (WA7LGN) and the OSN gang took W7VSE camping at Silver Falls State Park. W7VSE really ROUGHED IT. BSN totals: QNI 604, QTC 632. W7VSE still making BPL *EVERY* month. Congrats. Traffic: W7VSE 634, KX7W 231, W7ZB 195, AL7W 162, KX7T 132, KA7AID 52, N7BGW 40, W7DAN 20, W7LNE 14, KA7DNV 7, W7LT 4, N7NZ 2.

WASHINGTON: SM, Joe Winter, WA7RWK — SEC: K7SH. STM: K7GXZ. ACC: K7RS. TC: K7UU. BM: KD7G. PIO/SGL: W7CKZ. OO/RFI Coord.: KB7WC.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0245/0545	636	231	62	N7CSP
WARTS	3970	0200	2791	192	31	W7SFT
NTN	3970	2000	981	50	31	W7UU
NWSSBN	3945	0230	660	55	30	W7JGM
EWTN	146.64	0130/0530	72	61	51	WA7CBN
PSTS	145.33	0130/0630	141	77	62	W7IEU
SCARES	147.18	0330(Wed)	27	3	4	KA7AML

Thanks for your support in reelecting me as your SM beginning Oct. 1st. I will do my best. The Teleconf. Radio Net (TRN) Sept. 1st, sponsored by the BEARS on their 145.33 rptr was again a great success. It was interesting to hear Sen. Goldwater K7UGA respond to the many questions. The BEARS will bring us another TRN on Dec. 1st at 5:30 P.M. with "Rip" Riportella WA2LQQ on "The Amateur Space Program." Clubs and rptr groups should try to join TRN. (See Aug. *QST* pg. 10.) Radio Club of Tac. Hamfair '83 broke all records in attendance, space, exhibitors, flea market, etc. The club is planning for a bigger and better Tacoma Hamfair '84. Mt. Baker ARS held a ragchew night on 80 mtrs Sept. 16th. Seems like a good way to get all the mbrs. acquainted with each other. A club auction is scheduled for Nov. 8th. A group from Clark Co. ARC presented a program on the ELT (Emerg. Locator X'mtr.) to the Lower Col. ARA. A similar unit is being installed on the 147.86/.26 machine. (ELTs help to locate downed aircraft.) Clark Co. ARC changed their Hamfair weekend to May 19-20 (not on Mother's Day). An additional attached bldg. will insure an enclosed space for all events. WB7NAU heads ham comm's for Triathalon race at Vancouver Lake Park. Chehalis Valley ARS: KA7EOV Lewis Co. EC rcvd a commendation for his work in the Navy MARS program. KA7EOV reports that a RACES/ARES program for Lewis Co. is being formed. Hams interested in emerg. comms. contact him. W7BUN presented a slide show at the WWDX club of his recent trips to Malta showing the country and describing ham radio as it is there. PIO W7CKZ reports that Area AMSAT Coord. KA7APJ is setting up a station and public display at the Pacific Science Center in Seattle to work the STS-9 space flight. KA7APJ also hosted a sizeable group of county hunters from New Zealand at the Alderbrook Inn on Sept. 4th. PIO W7CKZ is very busy promoting STS-9 and appting new local PIAs. ACC K7RS reports two SSC applications are in the mill with more coming. (How about your club?) Congrats to K7GXZ who is now our new STM. Let's all support him and wish him the best. Traffic: WB7WOW 658, W7DZX 365, KD7ME 294, KS7I 279, W7HNA 135, W7LG 106, N7ANE 103, N7DDP 103, K7GXZ 94, W7GB 88, W7IEU 65, K7CTP 46, W7APS 37, WA7BDD 37, N7AFY 36, W7LUP 33, K7AJT 17, KA7INX 15, K7OXL 8, W7AIB 2.

PACIFIC DIVISION

NEVADA: SM, L.M. Norman, W7PBV — SEC: WB5VDV/7, Odis D. "Johnnie" Johnston, POB 126, East Ely 89315. W7JEU is a Silent Key and will be missed by all those who knew him. Apparently there are some members who are holding ARRL appointments that neither Hq or W7PBV knows about, get in touch with W7PBV if you think you are holding an appointment from the previous SCM. WA7ANA WA7HVU WA7MOP WA7UEC WB7SUY N7DFY N7RH KF7E KW7W KY7N KX7Q & maybe more we don't know about assisted on fire control communications near Sparks. WB5VDV/7 appointed Emergency Management Officer by White Pine Co. Commissioners. WADG put on a FB Convention. All clubs and radio amateurs are invited to submit their activity to W7PBV on first of each month. Appointments: WB5VDV/7, SEC; W7JMN, EC; W7MRN, ORS; K7QOP, ORS; N7OK, OBS. W7YDX made Sargent on PD. Traffic: W7BS 107, W7PBV 6.

PACIFIC: SM: Army Curtis, AH6P — Aloha and hafa adai to all of the Pacific. We have some new appointed officials in the section I would like everyone to meet. The new ACC is KH6BZF, and the new BM is KH6W. If you feel you can contribute, please contact me. Other positions are available. If you missed the Pacific Division Convention in Reno this year, you really missed a good one! The Wide Area Data Group put together an outstanding weekend and are to be congratulated for their efforts. Next year will

ICOM DAY!

Saturday, November 19, 1983, 9:00am til 5:00pm

WIN!!

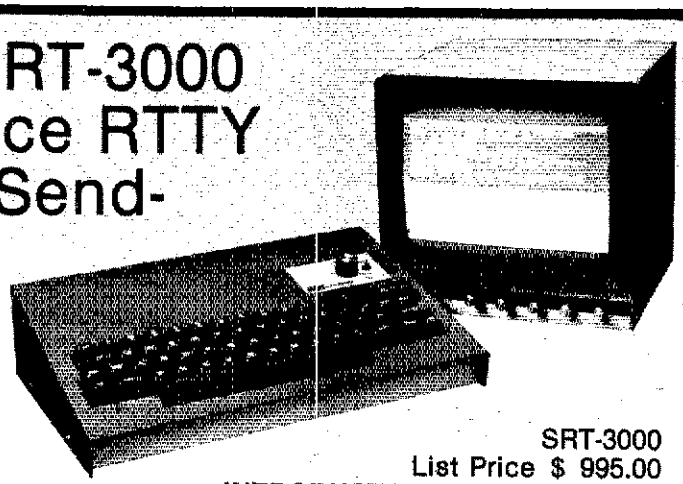
- ✶ Telephone buyers will receive a surprise gift in their package!
- ✶ Special in-store drawings each hour. Come and register to win!
- ✶ Grand prize could be selected during any hourly in-store drawing!
- ★ No purchase necessary to register for in-store drawings!
- ★ Special in-store pricing!
- ★ ICOM Personnel to demonstrate new equipment!
- ★ Refreshments will be served!

C-COMM

C-COMM
6115 15th NW
Seattle, Washington 98107

IN US:
(800) 426-6528
IN WA: (800) 562-6818
LOCAL: (206) 784-7337

Introducing The SRT-3000 A High Performance RTTY Communications Send-Receive Terminal



SRT-3000
List Price $ 995.00
INTRODUCTORY PRICE $ 795.00

• Built-in demodulator & AFSK modulator for 170,425,850 Hz shifts, high and low tone pairs • 60,66,75,100,132 WPM Baudot, 110,300 Baud ASCII, 5-99 WPM Morse • 1000 character text buffer with BREAK feature • Ten 80 character message memories with battery backup • Selectable display formats, 24 lines x 72 characters (2 pages), 24 lines x 36 characters (4 pages), 16 lines x 36 characters (6 pages) • Split screen operation • On screen status line displays a tuning bar, mode, speed, shift, tone pair, normal/reverse, USOS, WRU, SELCAL, buffer mode and buffer count • Cassette interface for long "Brag Tapes" or unattended message storage • Baudot and ASCII printer outputs • Built-in audio monitor • Built-in 110 VAC power supply • Other features—PTT control, WRU, SELCAL, sync idle, CW ID, USOS, autostart, full or half duplex, scope outputs, weight control, intercharacter spacing, reverse video, RS-232, word wrap around • Compact size only 13.3 x 10.3 x 4 inches • Made in USA.

Send For Free Information

DGM ELECTRONICS, INC.

Optional 9" video monitor shown $149.00

787 BRIAR LANE, BELOIT, WISCONSIN 53511 (608) 362-0410

be Santa Clara and '85 will be in Reno again. Now is not too early to begin planning the trip. At least 12 KH6s were seen at Reno. Next time will I will see you? Traffic: KH6HIJ 92, KH6S 55, KH6H 24, KH8AB 5.

SACRAMENTO VALLEY: SM, Norman Wilson, N6JV — SM elect and SEC: N6AUB. ASM: KI6T. STM: KY6Q. Sacramento's RACES officer is W6QHP, and W6LSK and K6QIF are his assistants. The Yuba-Sutter ARC made over 400 bucks at their yard sale. After about 120 of these section reports, this will be the last by N6JV. It has been a special pleasure being the SCM and SM of this great section. I have made a lot of friends over the years, and they will not be forgotten. I filled 30 log books trying to stay active. Please give N6AUB all the support you can. Vy 73 es GL.

SAN FRANCISCO: SM, Bob Smith, NA6T — SEC: N6BLN. STM: K6TP. It's SET time again. I hope everyone will participate this year. This is the time to find the major problems within the section and bring them up to the SEC for remedies. Get well, WB6RHP. cards can be sent via CB Address. Don't forget W5LFL/STS-9 on Oct. 28. He might be rarer than ZA. HARC-FWRA is participating in 2nd annual Wxperimental Aircraft Fly-in. Fiftieth Annual Birthday party-BBQ was a big success with lots of stories and good times. I have copies of the League's new video tape on VHS and 3/4" U-Matic. Let me know if you need a copy for your PR for W5LFL/STS-9. Get out and support your club's activity and put Amateur Radio on the front page with NASA. Traffic: W6RNL 260, W6IPL 259, K6TWJ 60, K6TP 56, WB6RTE 12.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. TC: WA6EXV, WA6SHO is EC for Kings Co. Many clubs in the SJV are sponsoring code classes. There was good SJV attendance at the Pacific Division Convention in Reno. W6XP and CN8CU (KJ6E) won prizes. KB6AMY is a Novice. KB6AHG is a Tech. KA6AQD WB6OIV and KA8VAF are Generals. KA6CDZ is Advanced. WD6BNO is an ARRL Life Member. N6OZ is returning to the air. WA6SZS, now KZ7F, has moved to Nevada. N6AWH has a TS-930. W7POR has an Azden PCS-3000. W6DPD has a TR-7950. KE6CZ has a TR-9100. KU6A has a Santec 220 handheld. W6KPC K6JR and K6XJ made DXCC Honor Roll. the Fresno-Madera Chapter of the Northern Cal DX Club meets the first Sat. at 8:00 A.M. at Denny's on Shaw near First. All clubs should keep the SM informed of their activities. The Central Cal DX Club meets quarterly in the section. Contact WB6VIN for details. The 42nd Fresno Hamfest is May 18-20 at the Tropicana Inn (note new site). Mark your calendars and plan to attend. Traffic: N6AWH 66, WA6YAB 27, K6PMG 23, W6DPD 22, W6SX 7, K9YBM 4, WD6FRS 1.

SANTA CLARA VALLEY: SM, Ross Forbes, WB6GFJ — ASM: KB6ZV. SEC: KA6R. PIO: WB6BPU. ACC: W6MKM. If you are wondering what happened to the column in the September issue of QST, in a rush to get on a plane for the South Pacific, I accidentally left part of the address off the envelope. When it was dropped in the mail, the postal service returned it to my W6 QTH, yet I was 10,000 miles away. Sorry 'bout that! Anyway, let me again announce that KB6ZV has been appointed as my assistant for the section. If you cannot reach me, feel free to contact him. Your SM spent the month of July and part of August in FO8 and VK. My call sign in FO for one was TO0FB. Try that one on CW! The N.P.S. ARC finished the summer with their Novice class taking the exam. By now we should be hearing some new activity on the bands from Monterey. FARS had their usual end of the summer flea market, providing many an opportunity to stock up on parts before the rains begin. Gabilan ARC jumped right on the OSCAR 10 bandwagon with a presentation on the new "bird" by Project OSCAR president W6XN. Section stations active on AO-10 are W6KH and WB6GFJ, who have had contacts into JA, ZL, DL and LU. If your club is looking for some ideas for your newsletter, contact WA6AFT, president of the Coastside ARC. The *Pacifica Communicator* is an excellent newsletter with lots of info from club members on all areas of Amateur Radio. As you should know by now, there will be an election this year for Director and Vice Director. It is most important that each and every ARRL member cast a ballot. Make your voice heard. These two positions are most important to everyone as it is the one sure way of making your opinions known at Hq. VOTE! Traffic: W6YBV 307, W6KZJ 117, W6PRI 94, WB6GFJ 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR —

Net	Time	Freq.	QNI	QTC	Mgr.
CMN	1245Z	3.927	521	222	W4EAT
CSN	2200Z	7.114	199	42	NJ4I
JFK	2230Z	3.923	625	68	WB4WII
CEN	2245Z	3.893	597	289	WB4MJH
CN E/L	7&10 P.M.	3.573	524	291	K4WJR
CNCTN	0100Z	VHF	1105	56	—
PETN	0100Z	VHF	406	30	—

Net reports this month include two VHF nets. These two nets now provide regular liaison in the system. Any net doing this will be so recognized. Three noteworthy newsletters in the pile this month. From Kinston, notes on their first Field Day, and mention made of vote to affiliate. This small but active and growing club has had this as a goal for some time, and now has the move in progress. Lack of response from Field Organization noted, fellas. Steps being taken. Mecklinburg ARS provided an introspective view and some very chewy food for thought via W4MHF. Specially noted the idea of greater community service thru use of updated equipment. And included this month was an interview with our Division Director. His message was timely as always. One of the best newsletters this month was *Ham Chatter* from the Brightleaf ARC up in Greenville. Along with up-to-date info on STS-9, Novice test procedures, and a hamfest calendar, was the program announcement for next month, featuring the new ARRL presentation: "120 Years of Brass-pounding." Also included was a complete emergency communications plan for Pitt Co. Nice job, guys. August gave us a lot of static and poor propagation. My sincere thanks and respect to those stns. listed below for their dedication. Traffic: WD4CNR 329; WD4CNQ 250, WA4OBR 183, W4EAT 159, K4NLK 136, WD4LRG 135, KU4W 96, NT4K 93, WB4N 91, W4GRO 84, WB4WII 65, KA4KJI 65, W4TWD 52, K4IWW 48, AB4S 40, WA4SRD 39, WB4MJH 31, KB4BXA 31, N4EHM 30, WB4HRR 29, K4JHF 28, WD4HTE 22, WA4YTQ 20, WB4CYN 15, N4GGI 14 W4EHF 12, WD4LOO 9, KC4AM 7, KA4ATK 7. (July) W4EHF 8.

VIRGINIA: SM, Phil Sager, WB4FDT — ACC: WD4KQY. SEC: WB4UHC. STM: WD4ALY. Chief OO: W4HU. BM: K3RZR. PIO: WN4VAU. SGL: W4THV. TC: Vacant-need volunteer!

Va Traffic Net	1 P.M.	7260
Va Sideband Net	6 P.M.	3947

Va Slow-Speed CW Net	6:30 P.M.	3680
Va CW Net	7:10 P.M.	3680
Va Phone Net	7:30 P.M.	3947
Va Traffic Net	10:15 P.M.	3947

I am pleased to announce the appointment of Donna White, WN4VAU, as Public Information Officer for Virginia. She has been very active in the Tidewater area getting publicity for Amateur Radio. She is looking for some volunteers from the Richmond and northern Virginia areas. Her address is: 1631 McDaniel St., Portsmouth 23704. PSHR: K4JST WD4ALY WA4CCK KR4V WB2RBA KB4WT AA4AT NN4I WA4LJI NT4S W4LXB KA4IUM K4VWK KA3DTE KB4OG. The number of stations reporting traffic totals to WD4ALY was 56, with a total of over 4650 message traffic handled. WD4ALY's monthly report also includes the calls of 22 ORS appointees who did NOT report to him this month. Please try to keep your calls OFF this list, gang! W4KFC says his ARRL travels have taken him to nearly all 50 states. He only needs Africa for traveling to all continents. Thirty amateurs, including former SCM WA4STO, were present at the annual net picnic held this year over WD4ALY's QTH August 21. Nominations for Virginia Section Manager must be at ARRL hq. prior to December 1. I regret that because of business pressures I cannot run for re-election. Traffic: AA4AT 435, WA4CCK 428, W3ATQ 347, WA4JLI 305, WD4FTK 231, WD4OGW 204, WD4ALY 199, K4AET 196, K4JST 195, KR4V 149, WB2RBA 146, W3BBN 140, KA3DTE 135, WB4FLT 126, KB4OG 116, K4JM 106, KA4IUM 97, WB4PNY 91, K4KDJ 77, KB4WT 58, W4JLS 56, NT4S 53, W4UQ 53, KA4ZTB 48, N4TE 44, NW4O 43, NF4T 41, WB4UHC 38, K4VWK 36, KA4JXZ 36, NN4I 32, WB2OMZ 29, N4FNT 28, KB4PW 22, KC4HN 17, KZ4K 17, WB4KIT 17, K4MLC 16, W4NFA 14, W3BBQ 13, N3RC 12, WB4FDT 11, WB4DQZ 10, W4PVA 9, NK4U 8, Ki4W 7, W4KFC 4, W4LXB 4, WA4TVS 3, W4KX 2, N4LE 2, W4TZC 2, W4DM 1, WA4EQW 1, WB4MAE 1, WB4ZNB 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. SGL: K8BS. TC: K8CG. Rptr. Coord.: WD4KHL. ACC: WA8CTO. New ECs: WD8BXS, Marshall Co.; KZ8Q, Wayne Co. KB8DA, Huntington, has been appointed as an additional OO for WV. Kanawha and Putnam Co. hams were actively involved in the Sternwheel Regatta and the Scarlet Oaks Golf Classic again this year. These activities were coordinated by K8BS and WB8GDY. K8TPF has become active on the CW net.

Net	Time	Freq.	Sess.	QTC	QNI	NM
WVMD	11:45	7235	28	35	455	W8FZP
WVFN	6:00	3900	31	102	504	N8AJC
WVN	7:00	3567	30	55	131	W8LYV
KFC 2M	8:30 M	47/87	5	10	98	WD8RHL
Hillbilly	1600	14290 Sn	4	11	134	KC8YU

Traffic: KZ8Q 155, K8TPF 102, W8HZA 48, N8AJC 44, WA8KCJ 44, K8KT 39, KD8G 35, K8QEW 29, W8FZP 22, KC8CR 20, KA8DTD 10, K8JQ 9.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J — STM: WD0AIT. PIO: WD0HNQ. ACC: WB0DUV. TC: KQ0P. BM: W0MDT. OO/RFI: WA1RFR. SGL: KE0M. New section leader: WB0FQB moves from SGL to SEC. Congrats to all Colorado amateurs: you ranked 3rd in nation on amt of traffic handled, and 1st in Class, 1st in Nation on ARES reporting for 1982. WD0HDR reports Sterling 31/91 has been rebuilt & has extended its coverage. Also 144.575/145.175 available for RTTY/ASCII use. N0ZA reports W. Slope upgrades KA0s RCP RDG RDH and RDU. Grand Junction's 22/82 now has an auto patch. ARA has a new location for the 72/12 repeater on Conifer Mt. with excellent coverage. Colorado's SET program was new to this SM. I am impressed. Statewide we are in good shape, EC related. Can still use some ECs in certain counties, and of course ORS, OES, OBS, PIAs. Congrats to this month's name droppers: WB0UAW W0KEA WB0ZZR. Look for new improved format for RMRL QRZ publication. OSCAR 10 getting more Colo activity. You should try it. 73, KQ0J.

Nets	QNI	QTC (F & IF)	QNF	Sess.	NM
Col	925	81-213 Inf.	1073	27	WA0RYL
CWN	129	148	658	26	WD0AIT
CWXN	2449	3372	2790	31	WA0HJZ
HNN	1663	80-357 Inf.	1597	31	W0LAE

Traffic: N0BQP 2462, WA0HJZ 1313, K0JAN 514, W0WYX 510, W0FPT 486, WB0ACH 446, KA0BMR 324, WA0OYI 233, N0CXI 230, KA0CZW 173, KB0Z 132, WD0AIT 120, KA0NLI 105, W0LO 81, WB0NHA 77, N0EBM 55, W0EJD 53, W5HRS 52, W0NFW 23, W0GW 8. (July) W0NFW 7.

NEW MEXICO: SM, Joe T. Knight, W5PDY — DEC: KB5XD. STM: KV5U. NM's WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 215 msgs with 158 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 at 0100 UTC and handled 90 msgs with 925 stations in. New Mexico Breakfast Club meets daily on 3.939 at 0630 local and handled 93 msgs with 1066 checkins. Yucca 2-Mtr Net 78/18 & 93/33 handled 15 msgs with 429 checkins. Caravan Club 2-Mtr Net 66/06 handled 9 msgs with 140 checkins. Vy sorry to report the passing of WB5SXS & K5YRY. They will certainly be missed. Good newsletter fm Las Cruces club. Sorry 16/76 cabillo is down and hope it will soon be up. Its Fall and new Novice classes starting. Traffic: W5UH 348, W5DAD 276, ND5T 273, W5ENI 155, W5JOV 125.

UTAH: SM, Ron Todd, K3FR — STM: W7OCX. SEC: NA7G. BM: WA7MEL. OO/RFI: KD7FL. ACC: KB7XO. TC: K7RJ. Note masthead change: K7RJ moving over to TC, a more suitable assignment. Now that winter is approaching, don't forget the SLC WX & Road Net during comuting hours on WA7YTE/Rpt 34/94. Going through sect. notes, I find there are more nets, repeaters and clubs than listed. Please send msg or card with info/addr etc. for my files regardless of affiliation. Don't forget PSHR data on the back of CD-210 forms. Color Country ARES Net doing fine in southern Utah. Let's get some more contest activity from the section. Start by involving Novices and casual ops in multis. I've got an '83 ARRL HB for Utah's top Novice/Tech in SS, 10M test or NR, whichever reports first. Traffic: K7HLR 162, WA7MEL 91, WA7KHE 61, WA7WIB 49, W7OCX 13, KO7H 9, K7UM 7, K3FR 5, NA7F 4, N7BQE 2.

WYOMING: SM, Dick Wunder, WA7WFC — SEC: W7TVK. STM: W0OGH. BM: KD7AN. OO/RFI & TC: KC7QY. PIO & ACC: KC7QJ. Was nice to see many old friends at WIMU. Thanks to Sweetwater ARC for all the hard work in sponsoring the event as this year was Wyoming's turn. Many thanks to KC7YM for doing a fine job as OO. Recent upgrades include K7ISG & WA7BPO to Extra. Congrats to all. I am still in need of a volunteer to fill the Section Government Liaison position. Anyone interested in a net manager or net control position, contact me. WB7NHR reports the Wyo Cowboy Net held 23 sessions with 627 QNI & 19 QTC. WA0PFJ reports the Wyo Jackalope Net held 26 sessions with 351 QNI & 2 QTC. TNX to W7TVK

Everybody's making money selling microcomputers. Somebody's going to make money servicing them.

Now NRI Trains You At Home To Make Money Servicing, Repairing, and Programming Personal and Small Business Computers

Seems like every time you turn around, somebody comes along with a new computer for home or business use. And what's made it all possible is the amazing microprocessor, the tiny little chip that's a computer in itself.

Using this new technology, the industry is offering compact, affordable computers that handle things like payrolls, billing, inventory, and other jobs for business of every size...perform household functions including budgeting, environmental systems control, indexing recipes. And thousands of hobbyists are already owners, experimenting and developing their own programs.

Growing Demand for Computer Technicians

This is only one of the growth factors influencing the increasing opportunities for qualified computer technicians. The U.S. Department of Labor projects over a 600% increase in job openings for the decade; most of them *new* jobs created by the expanding world of the computer.

Learn At Home to Service Any Computer

NRI can train you for this exciting, rewarding field. Train you at home to service not only microcomputers, but word processors and data terminals, too. Train you at your convenience, with clearly written "bite-size" lessons that you do evenings or weekends, without going to classes or quitting your present job.

Your training is built around the latest model of the world's most popular computer. It's the amazing TRS-80™ Model 4, now with disk drive and the capabilities and features to perform a host of personal and business functions. No other small computer has so much software available for it, no other is used and relied on by so many people. And it's yours to keep for personal and business use.

You get plenty of practical experience. Under NRI's carefully planned training, you even install a *disk drive* verifying its operation at each step. Using the NRI Discovery Lab® that also comes as part of your course, you build and study circuits ranging from the simplest to the most advanced. You analyze and troubleshoot using the professional 4-function LCD digital multimeter you keep to use later in your work. Then you use the lab and meter to actually access the interior of your computer...build special circuits and write programs to control them. You "see" your computer at work and demonstrate its power.

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

Same Training Available With Color Computer

NRI offers you the opportunity to train with the TRS-80 Color Computer as an alternative to the Model 4. The same technique for getting inside is enhanced by using the new NRI-developed Computer Access Card. Only NRI offers you a choice to fit your specific training needs.

Become the Complete Computer Person

In addition to training in BASIC and advanced machine language, you gain hands-on experience in the operation and application of the latest computers for both business and personal jobs. You're trained to become the fully rounded, new breed of technician who can interface with the operational, programming, and service facets of all of today's computers. You're ready to take your place in the new electronic age.

Other Opportunities

NRI has been giving ambitious people new electronic skills since 1914. Today's offerings also include TV/Audio/Video Systems servicing with training on our exclusive Heath/Zenith computer-programmable 25" diagonal color TV...Industrial Electronics...Design Technology...and other state-of-the-art courses.

The Catalog is Free. The Training is Priceless.

Send the coupon for our 104-page catalog showing all courses with equipment and complete lesson plans. There's no obligation other than to yourself. See how NRI can help you take advantage of the exciting job and earning opportunities in the exploding field of microcomputers. If coupon has been removed, please write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

NRI McGraw-Hill

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

All career courses approved under GI bill.
☐ Check for details

The catalog is free. The training is priceless.

Please check for one free catalog only

- ☐ Computer Electronics including Microcomputers
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile CB • Aircraft • Marine
- ☐ Industrial Electronics
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council 19-113

for filling in as ARES/RACES Net Mgr. Traffic: WB7NHR 168, W7HLA 73, W7SQT 26.

SOUTHEASTERN DIVISION

ALABAMA: SM, H. H. Wheeler, W4IBU — I will take this opportunity to thank all the amateurs in the section for their support in my efforts as SCM during my tenure. Please give the new Section Manager your full support to improve the section activities in the ARES and net operations. Support your clubs and hamfests. I have regretted the limitation of space for my section reports that prohibited more news from clubs in the section. I shall tender my resignation in late October to permit the new SM an opportunity for familiarization with his new duties and to ease the transfer of records in an orderly manner. I shall continue to assist in any way I am able. The Volunteer Examining program has not been resolved though expect it sometime after the first of the year. I have been advised that the FCC will continue exams for Advanced and Extra Class licenses until that time, though the General class exams may be discontinued. The new Novice exam program began Sept. 1. DRN5 reports Alabama represented 98.4% by WA4JDH W4CKS W4IBU KC4GS WB4IXA N4FQD W4WJF and NW4X. CAND represented 100% by Alabama stations N4FQD and W4CKS. PSHR: WA4JDH W4CKS N4FQD WA4LXP. VRY 73 and God bless you all. Traffic: WA4JDH 740, W4CKS 149, N4FQD 109, WA4LXP 64, NW4X 48, W4IBU 44, KC4GS 30, WB4IXA 28, N4JAW 22, WD4DHI 11, K4AOZ 8, W4DGH 6, WB4TVY 6.

GEORGIA: SM, Eddy Kosobuckl, K4JNL — Section hamfest tour ends with Stone Mt. "FAMVENTION" on Nov. 5 & 6. They promise it to be their best yet. A record 15 were held in '83. If your club or group is planning one for '84, please let me know so we might avoid any conflict. Drop me the info in the mail as soon as ur date is set. The Atlanta Metro RC's met at a joint meeting & are hoping to form a federation of clubs to help further the hobby in the Metro area. I attended the meet & it was vy promising. Sunbelt Expo '83 was agn a success tnx to the vy FB hams of the Colquitt Co. HRS. Tnx fer a job well done. WA4PNY agn pres of the Atlanta RC. VP is AA4RM, secy KD4EB, treas is KA4ZRC, & act mgr is KF4CQ. Columbus ARC elected: W4FIZ, pres.; WD4GRR, v.p.; KA4SWL, secy.; KD4NZ, treas.; N4AGO, act. mgr. I must say a big TNX to all who take time to write & publish monthly bulletins fer their clubs. If there were to be a contest held fer the best, we'd have all the winners. Macon ARS has some fantastic programs at their meets. If you're located in the area, they invite you to attend. The Augusta ARC is the 1st SSC club in the section. Congrats from all of us. The 1st session of the Georgia Section ARRL Info net will commence on Oct 5th at 6:30 P.M. local time & will continue for 55 minutes. Won't u come & join the group & alr ur views abt things. Computers come in many makes, just like rigs. We have many well versed computer experts in the amateur fraternity. Won't u come forward & let us know who u are so we can pass on info to the ones who need help. Happy birthday to W4CAN, who will celebrate 93 on Oct 11th. Let's all send him a card. We have to watch all thos FB YLs in MALARC. Guys, when they put their minds to do something they really get it done. Albany ARC agn out in force to help with the annual Pecan Festival Parade. . . Happy Thanksgiving. . .

NORTHERN FLORIDA: SM, Billy Williams, N4UF — SEC: W4UEA. STM: WF4X. ACC: N4ADI. BM: W4GUJ. PIO: WA4PUP. KC4N and Leon Co. ARES provided backup comm. when telephones at Tallahassee Community Hospital went out. WB4VFS moving to Nebraska. TARS has drawn up a nice set of guidelines for administering Novice exams under the new FCC plan. Write KA4DCF for more info. New NM of FMSN is AA4FG who took over from W4ESH on Sept. 1. 1983 Jax Hamfest was very successful. Many upgrades at the FCC exams there. OPARC membership now at 103. HCARA now meets at CD in Brooksville. The Spring Hill rptr AK1M/R is operational on 147.795/.195. GCARC has new autopatch on their repeater. W2GDP rcvd QCWA Golden Certificate for 50 years in ham radio. Daytona repeater K4BV is now at 200 ft. level on WESH TV tower. OARC held "past presidents night." KD4JL appointed to OARC Board of Directors. W4DTV has a new Novice class going. The Playground ARC of Ft. Walton had its annual picnic at the QTH of W4WKQ. K4KJP has info on converting the Heath HW-8 for 30 meters; cost of conversion is less than ten bucks. Severe wx caused an activation of the Okaloosa Co. ARES. WB9RKJ is now editor of *Keyed-Up*, PARC monthly bulletin. BARS provided comm. for 5-mile Beaches Run. WA4EYU ran in that race and was happy to cross the finish line. RANGE visited Jax Electric Authorities Northside Generating Station for tour during Sept. meeting. N4GIH was the organizer. After passing General exam at Jax Hamfest, N4HSD was looking up at a potential place for his new antenna. Still looking up, he took a step back and fell into swimming pool. NF4L is new PIA for Jax area. WB4GHU is interested in RTTY/ASCII operation on 2 meters and 220 MHz. Hopes to generate interest in traffic handling there. The West Volusia Emergency Net now meets at 2315 local time on the 147.91/.31 repeater. Those interested in a revived QFN bulletin should contact WB4GHU. Traffic: WF4X 464, N4PL 554, WF4Y 295, WA4QXT 198, WD4HBP 170, N4GDT 169, WA4EYU 155, WB4ADL 150, WB4GHU 143, KB4LB 110, WD4IIO 92, KB9LT 74, WB4TZR 74, N4ADI 70, W4GUJ 76, WD4ORO 61, KD4KK 57, KC4FL 57, WD4RIQ 40, NF4O 39, NS4C 34, WB4YQP 33, W4DTV 33, N4HGD 19, N4UF 19, NQ4P 18, WA4STZ 17, KD4QZ 16, K4PYV 8, KA4RBY 8, KF4GY 8, WB4AWG 8, W4LUW 8, KA4ETX 7, N4HWV 6, KA4YLI 6, NA4F 5, KA4SGC 6, WA4PUP 5, W3IDO 5, WB4FJY 4, KA4RMH 4, KX2L 1. (July) WF4Y 210, WB4GHU 139, WD4MLQ 55, W4KIX 31, W3IDO 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WA4EIC. ACC: AA4WJ. The League Officials Bulletin just received includes not only SET information, but also section rankings for traffic handling and EC/SEC reporting in 1982. For section ranking in traffic handling, sections are ranked twice: once from greatest to fewest number of reports, and once from largest to smallest traffic totals. The ranks are then added together to yield the overall rank. We were ranked first in total traffic with a count of 143,203. We were ranked third in SARs with 759 reports. The section ranked second in SARs had 760. One report more in 1982 would have tied us in that category - two more and we would have been ranked second for SARs, and Southern Florida would have been tied for first place overall instead of a very commendable second place! Is your report important even if you handled only one piece of traffic? YOU BET IT IS! KEEP THEM COMING IN! For 1982, EC/SEC ranking Southern Florida was first in Class II. There are four classes based on the number of ECs in the section.

Connect your computer to the air!

The "AIRWAVES" that is, thru the Microlog AIR-1, a single board terminal unit AND operating program in ROM that needs no external power supply or dangling extras to put your 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 cross tuning indicator and audio pitch 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. "HARDWARE" front end has: AFSK, PTT, ± CW/FSK keying loop switch, hand key input and dual tone mark/space RTTY DEMOD plus single tone CW detector. "SOFTWARE" in onboard ROM has: split screen, large type ahead transmit buffer, automatic keyword controlled receive data storage, WRU, SELCAL printer control and user programmable memories that can dump/store on disc and tape. Full speed RTTY, 60 to 132 wpm, CW to 150 wpm, 110/300 ASCII and optional 4 mode AMTOR operation covers all the bases. 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 for VIC-20 and "64" (with 4 mode AMTOR, $279). Join the silent revolution in RTTY/CW and get ON-THE-AIR! See it at your local dealer or give us a call at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, Maryland 20879. TEL (301) 258 8400. TELEX 908153.

Note: VIC-20 is a trademark of Commodore Electronics, Ltd.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

W4ESH was appointed as an Official Bulletin Station and will bring official bulletins to Collier Co. Any area with local nets that does not have an OBS, please let WA4EIC know and he will help arrange an appointment. WA4EIC reported that in July there were 120 bulletins received or transmitted by WA4EIC W4DL AA4BN and K4IEK. WA4EIC also reported that in August there were 118 bulletins received and transmitted by WA4EIC NW4R W4DL AA4BN and K4IEK. The Florida Medium Speed Net has a new manager, AA4FG from the Northern Florida Section. Congrats and a big "well done" to W4ESH who has been manager the past year. I heard that WD4CHO had lightning damage this past month; we've had a lot of severe thunderstorms this summer. W4WVB in Marathon reported that he upgraded to Extra Class. Congrats, Wayne. He also said he would be glad to help as a Volunteer Examiner under the proposed licensing program. W4OMY wrote that the directors of his condo rescinded their negative vote and that he can now reinstall his antenna on the condo roof! WB4AID has developed a program for weekend only participants in the Florida Midday Traffic Net to earn a net certificate. There were 13 stations who made the Public Service Honor Roll this month. I bet there are a lot more who are eligible but do not submit reports. N4KB reported that his shack was under water for 5 days following heavy rains on the southwest coast. W4LLA handled 39 phone patches this month. 73 de WA4PFK W3CUL 3233, W3VR 814, WA4PFK 275, WA4EIC 252, K4EUK 248, K4ZK 234, WD4COL 223, K4SCL 190, KY4U 167, WB4WYG 167, K4IA 147, W4NFK 127, KA4GUS 121, WB4AID 117, KE4O 86, WD9AEP 74, NJ4O 71, K4JLL 69, KA4AMC 64, W4ESH 63, W3TLV 60, KA4ASZ 59, W4LLA 58, WD4CHO 52, WB8ZY 52, WD4KBW 49, W4PKP 49, W4DL 49, KA4FZI 47, WA4HXU 42, KA4WXF 42, K4JI 40, W1DLP 37, N4KB 30, K7LCA 30, AA4BN 29, KF4RL 29, WD4AWN 23, K2RUE 23, KM4Y 22, WB4GCK 22, KA4BBA 21, KB4KB 21, WA4TWD 19, KA4YHS 18, N2WX 17, KF4JA 15, NW4R 14, W3IJR 13, W4DVO 12, WB2OUK 10, W2WYR 10, WK4F 9, K4FQU 9, KA4GDU 7, WA1VOB 6, WD4MCC 5, W4MFD 5, KA9AKY 4, N4BXU 4, W4MPV 4, W4NNW 4, K4VSN 4, WB4GJH 3, WR4J 3, AF3S 3, KB4AOO 1, KA8CXQ 1, KA4EBO 1, W9FPO 1, K4IRT 1, KF4JI 1, WA4LKY 1, WD4PPA 1, NX4X 1. (July) KE4O 77, KA4BBA 27, W4MPV 15, N4BXU 1, AF3S 1.

WEST INDIES: SM, Gregorio Nieves, KP4EW — West Indies Net Slow (WINS) daily 7:00 P.M. (2300 UTC) on 3.710 MHz. West Indies Net Central (WINC) daily 6:30 P.M. (2230 UTC) 145.350 MHz. Owing to his tight schedule and other responsibilities on his job, NP4D resigned as STM for West Indies. We regret his resignation, though he is not leaving us and will be working in the net in other capabilities as time permits him. Thanks for all your good services; a job well done. The selection of the new STM was not difficult as our former WINC net manager, Jose A. Purcell (Tony), WP4BCV is appointed as new STM. He is a very active and enthusiastic amateur, whose capabilities are well known by the amateur community in this area. Congrats and good luck. To substitute for WP4BCV as net manager for WINC, he appointed WP4BEF as new net manager. Other appointment made by the STM was KP4DJ as net manager for WINS. KP4DJ, a well known and active CW operator and esteemed in our amateur community and whose performance is outstanding, will be an asset to the region. Another appointment in succession was KP4ABK as Official Relay Station. KP4ABK, who is blind, has been working in different positions in the net, is being very active and he manages to do his job with the assistance of XYL Dalila. Thanks to all of you for your cooperation and good luck in your new positions. We will soon have news of a communications van being equipped by our SEC for RACES, ARES and CD mobile communications. The section net changed its name again to WINS (West Indies Net Slow), 10 wpm operation. NP4D reports the following totals for WIN: QNI 68, QTC 53, 15 sessions. WP4BCV reports the following totals for WINC: QNI 242, QTC 35, 23 sessions. PSHR: KP4DJ.

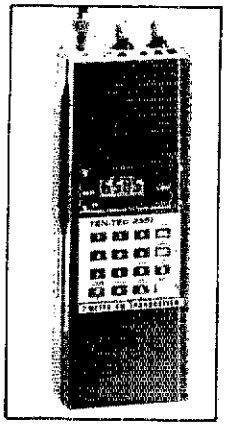
SOUTHWESTERN DIVISION

ARIZONA: SM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. August seems to have been a quite month activity-wise. KB7FE reports that he was involved in setting up phone patch schedules with the family of AZ's first liver transplant recipient, who resides in Grand Jct. CO. KB7FE and WA6KLV linked up on 40M to report a bad motorcycle accident on Mt. Graham to DPS HQ in Phoenix. I would like to take this opportunity to announce that N7ECE has been appointed as the Section Affiliated Club Coordinator. Many clubs report via their club newsletter interest in the upcoming spacelab comm. exercise with W5LFL. I am still looking to fill the remaining positions in the new section-level structure. Some of the vacancies are Public Information Officer, State Gov't Liaison, and Bulletin Mgr. Business precluded my attending the ARRL SW Division Convention. I hope all who attended had a good time. PSHR honors this month go to KB7FE and W5KMF. ATEN: QNI 837, QTC 128. Cactus Net: QNI 767, QTC 83. Traffic: KB7FE 193, K6LL 108, W5KMF 80, K7UXB 79, WA7KQE 64, N7COY 23, K7NMC 21, KA7HEV 19, W7KXE 16, K7POF 12, N7CVT 10, N7EH 8, WA7NXL 3. (July) KE7W 4.

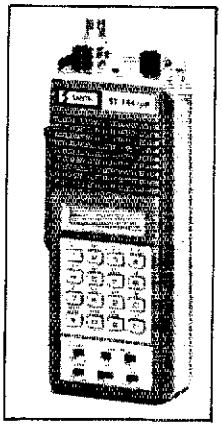
LOS ANGELES: SM, Stan Broki, N2YQ — SEC: N6UK. STM: W6INH. August, being the middle of summer fun in the sun, was dull and no great activity was going on. N6VI is now working via OSCAR 10 & has made several DX contacts. He is also team captain for the UCLA Olympic Village station. Things should be back to normal by October. Traffic: WA6OCM 108. (July) WA6OCM 124.

Traffic has been low in this area this year, owing to poor band conditions. By the time you read this, things should be back to normal. The holiday traffic should be picking up, and hopefully we can pick up some originations of your own. I still would like more monthly reports regardless what they may be. AD7G has been doing double duty on SCN and RN6 lately. K6CL is picking up OO reports again after a period of poor conditions. N6GZP active on VHF, SSB and RTTY nets handling traffic. AD7G met many of the SCN group at recent convention. Traffic: K6UYK 443, W6INH 164, AD7G 42, AD6A 39, N6GZP 31, K6CL 26, N6DZQ 24.

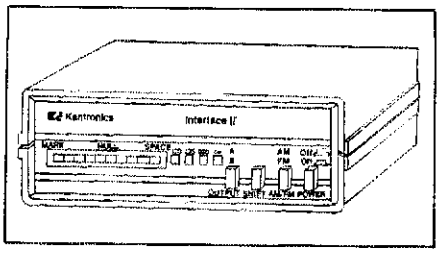
ORANGE: SM, Sandra Heyn, WA6WZN — SEC: W6UBQ. STM: WA6QCA. ACC: KA6NLY. BM: W6DXL. OO/RFI Coord.: N6PE. PIO: NS6W. SGL: N6HIQ. TC: AA6DD. DECs (by counties): WB6JBI (Orange); W6LKN (Riverside); K6GGS (San Bernardino); WB6YZY (Inyo). NMs: AI6E (CW); WA6QCA (FM); KA6HJK (RTTY); W6CPB (SSB); WA6WZO (ASCII). ARRL SW Div Convention held at Anaheim Marriott big success with about 2500 attending. ARES/RACES booth and ARES program headed by EC WB6GUC and DEC WB6JBI with the help of many others received much praise. Particular thanks go to chairman



TEN-TEC 2591

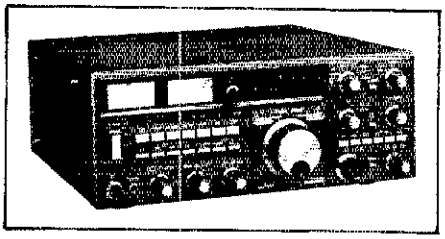


SANTEC 144/μP



KANTRONICS INTERFACE II

ICOM 745



YAESU 726

AEA
CP-1 New Computer Interface for VIC-20 & C-64 & AEA Software Package.....Call for Special Package Pricing

ARRL
US Call Directory.....$15.75
1984 Handbook.....12.00
Antenna Book.....8.00

ALLIANCE
HD73 (10.7 sq ft) Rotator.....$99.00
U-110 Small Rotator.....49.00

ASTRON
RS7A 5-7 Amp Power Supply.....$49.00
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
PCS4000.....$280.00

B&W
Continuous Coverage Ant. 2-30 MHz
No Tuner Necessary.....$135.00

BENCHER
BY-1 Paddle/BY-2 Chrome.....$36.00/45.00

BUTTERNUT
HF6V 80-10 Meter Vertical.....$119.00

CUSHCRAFT
A3 Tribander 3EL.....$215.00
A4 Tribander 4EL.....279.00
R3 Motor Tuned Vertical.....279.00
214B/214FB Boomers 14EL 2M.....75.00 each
32-19 Super Boomer 19EL 2M.....89.00
ARX-2B Ringo Ranger II 2M.....39.00
144-10T 2M Oscar Antenna.....52.00
144-20T 2M Oscar Antenna.....75.00

DAIWA
CN-520 1.8-60 MHz SWR/Pwr Mtr.....$63.00
CN-620B 1.8-150 MHz SWR/Pwr Mtr.....110.00
CS-201 2-position switch.....22.00

DRAKE
TR7A Xcvr w/PS7.....$1,495.00
R7A Receiver.....1,345.00
TR5 Xcvr w/PS75.....679.00

ENCOMM (SANTEC)
ST-144/uP, 220/uP, 440/uP
The Handhelds Offering the Most Features
Call for Your Discount Price

HAL
DS3100/MPT/ST6000.....$2,825.00
CT2200/KB2200.....945.00
CWR6850 Telereader.....749.00

HY-GAIN
TH7 DXS 7EL Tribander.....$375.00
TH5 MK2S 5EL Tribander.....319.00
Explorer 14 Tribander.....279.00
5/8 Wave 2M Mag Mt.....22.00
CD45 8.5 sq ft Rotator.....119.00
HDR 300 25 sq ft Rotator.....435.00
Ham IV 15 sq ft Rotator.....195.00
T2X 20 sq ft Rotator.....249.00
Free Shipping on all crank-up towers

ICOM
751 Ultimate Transceiver.....$1,225.00
745 Amazing New Transceiver.....900.00
730 Super Buy.....599.00
IC-2AT.....Now Only 215.00
3AT/4AT Handhelds.....235.00
25A new display & mic.....305.00
25H 45 Watt 2M.....345.00
290H 2M All Mode.....479.00
271A All Mode.....625.00
471A Oscar All Mode 430-450 MHz.....715.00
402 430 MHz (takes Oscar Xtal).....249.00
45A 440 MHz.....335.00
R70 Receiver.....599.00

KLM
KT34A 4EL Triband Beam.....$299.00
KT34XA 6EL Triband Beam.....459.00

144-148-13LBA 2M Long Boomer.....79.00
143-150-14C 2M Satellite Ant.....79.00
420-470-18C Satellite Ant.....59.00
CS-2 Circularity Switch.....49.00

KANTRONICS
The Interface II. The brand new computer interface for CW, RTTY, ASCII. Software Available for VIC20, C-64, APPLE, ATARI, TR80C, TI99

LARSEN
NLA-150-MM 5/8 Wave 2M Mag Mt.....$39.00

MFJ
1224 New Computer Interface.....Call
941C Tuner/Meter/Ant. Switch/Balun.....$81.00
422 Keyer/BENCHER Paddle combo.....89.00
313 VHF Conv for HT.....36.00
989 3KW Tuner.....285.00
940B Tuner/Meter/Ant. Switch.....72.00
900 Tuner.....45.00
401 Econokeyer.....45.00
722 Filter w/notch.....63.00
812 VHF Meter.....29.00
816 HF Meter.....29.00
1040 Deluxe Preselector.....89.00
103 New 24hr Clock.....33.00

MIRAGE
D1010/N 440 MHz Amp.....$279.00
B1016 10/160 Preamp.....245.00
B3016 30/160 Preamp.....199.00
B108 10/80 Preamp.....155.00
MP1/MP2 Watt Meters.....100.00

ROHN
25G.....$42.00

SHURE
444D Desk Mic.....$50.00

TEN-TEC
New 2M Handheld (Model 2591).....Now Available
Argosy II Digital.....$535.00
2KW Tuner Kit.....185.00
The Fantastic Corsair.....1,029.00

TOKYO HY-POWER
HL30V 2/30W Amp.....$63.00
HL160V 3 or 10/160W Preamp.....295.00
HC2000 2KW Tuner.....295.00
HL82V 10/80W Preamp.....145.00
HL20U 2/20W UHF Amp.....99.00
HL45U 10/45W UHF Amp/Preamp.....175.00
HL90U 10/80W UHF Amp/Preamp.....305.00

YAESU
Finally In Stock!
Call for Discount Prices

Prices and Availability Subject to Change

Send SASE for our new & used equipment list.
MON-FRI 9AM-6PM • SAT 9AM-3PM

WB6QKB and vice chairman NC6H plus other officers and chairmen WB6BIC N6ECA KA6RRR KA6WAH NR6C K6OSC WB6EIF WA2TMP WB6GCT WB6DCC KØOV KK6V. Coast Guard Aux Commander WB6ULU announced net M-F at 0130Z on 14.328 MHz. EC W6RE and K6LJA reported that WB6ARK WB6BJY WB6LAR KA6NNU KA6SAT K6UMK & WA6VZO provided communication support of Orange Co. Fire Dept coordinating with Red Cross during Oceanside disaster caused by high waves from tropical storm. Buena Park ARC now meets the 1st Wed of each month at Mercury Savings starting at 7 P.M. Pres. WA6BRI of Hesperia Amateur Radio Society (HARS) regretfully reports past pres WD6HDI is a Silent Key. West Coast ARC has formed an alliance with CLARA and Baldwin Santiago ARC to develop a repeater network. WA6FIE has replaced WA6QMW (who will continue to assist with AE6I) as EC in charge of Riverside VIP/CDF (Volunteer in Prevention program in Calif Dept of Forestry). PSHR: W6NTN WB6QBZ AI6E WA6QCA KA6HJK.

Net	Freq	Time	QNI	QTC	NM
SCN/1 (20+)	3598 kHz	7 P.M.	292	358	AI6E
SCN/2 (13–)	3598 kHz	8:15	86	178	AI6E
SCN/V (FM)	146.645	9 P.M.	567	277	WA6QCA
RTTY/VHF	145.12	10 A.M.	520	138	KA6HJK

Traffic: WB6EIG 202, WA6QCA 200, AI6E 152, W6NTN 146, KA6HJK 137, WB6QBZ 126, N6GOT 92, K6GGS 86, W6RE 85, W6CPB 40, W6PNS 14, K6ZCE 14.

SAN DIEGO: SM, Arthur R. Smith, W6INI — BM: WA6HJJ. STM: N6GW. SEC: W6INI. PIO: WA6CUP. ACC: WA6COE. TC: N6NR. Palomar ARC's No. County Tfc Net met 30 times, handled 98 msgs in Aug. Repeater operators, present and future, are urged to review page 68 of Sept 1983 *QST*, concerning FCC's views on frequency coordination, nationally promulgated band plans, and documentation such as *ARRL Repeater Directory.* Attn clubs: Do you have an event or spcl program that you would like to publicize thru this column? If so, info must be in my hands by 5th of month for publication two months later. For example, if I receive an item by Dec 5th, it will be in Feb 84 *QST.* Pse keep it brief. The 1984 Southwestern Div convention will be held in Santa Maria on Columbus Day weekend. Remember those Santa Maria barbecues? Conventions provide opportunity to meet old friends and see new equipment. KM6I operated for two weeks at QTH of WA6EEP in No. Calif. The 220 Club meets on second Monday at the Serra Mesa Rec Cen, 9020 Village Glen. Time: 1930. Traffic: KT6A 616, KM6I 321, K6HAP 306, KU6D 207, W6HUJ 101, KB6AI 84, N6AT 48, WA6IIK 13, N6GW 9.

SANTA BARBARA: SM, Robert N. Dyruff, W6POU — New appts: Ass't SM WB6JHW, Ernie Kapphahn from Arroyo Grande (former SEC); DEC SLO Co. KJ6R; EC Simi Valley WD6EVT; EC Oxnard/Port Hueneme W6HWK; EC SBar So.Co. WB6UNH. Mni tnx to Vent. Co. DEC W6RIC for many years fine service to AR. N6AJA named 1984 Olympics UCSB Village Team Cap't ARRL SW Div. Conv. 1984 in Santa Maria; Chrmn WB6HJW. ACC W6ZZN supplies new licensee names/calls to affil. clubs; 2nd annual PG&E nuclear site siren test comms by 78 SLO Co. ARES ops using WB6FMC/R WB6IIY/R. Vegas to Reno 500 mi. off-road race comms by BARRA incl. W6MSG KJ6R K6YZR (new Asst. EC SLO No. Co.) Avila Beach sea-to-sea Triathlon comms by N6BUY WB6IIY W6JTA W6TZW. 2nd annual SBAR quake disaster drill includes cities, counties, region, state OES, hospitals, schools, ARC using ARES voice and data comms 9/23. KD6ZM 1st op at Moorpark train derailment with comms. N6BUY provided comms at Cuyacos Fireworks display; Paso Robles AR Club buys emerg. comm. trailer. EC W6HWK and retired fire chief KA6YCF rec'd Oxnard Mayor's commendation for disaster preparedness project. Ventura hams support street fair. County ops take Incident Command System (ICS) training for Co. Fire and ARC certifications. OO reports by W6PN alert HF ops to problems/violations. VCARC's N6VR leads drive against Vent. Co's antenna ord. requiring cond. use permit. Traffic: W6JTA 35.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC — ASM/ACC: NI5V. SEC: W5GPO. STM: W5VMP. PIO: N5FDL. SGL: W5UXP. OO/RFI: WB5JBP. BM: W5OXK. TC: WB5IIR. The Garland ARC teamed up with the JCs in a demo of traffic handling and emergency capabilities of Amateur Radio. K5UPN reports he has organized a 2-meter net, the Northeast Texas Traffic and Emergency Net meeting Sunday and Wednesday evenings at 2100L on the Longview 147.90/.30 repeater. All stn. invited to QNI. WA5GGJ has again taken the reins as EC of Parker Co.; thanks! Our section has once again received the #1 rating from Hq. as the best ARES unit in North America! Thanks to YOU it works for all of us! ECs - your annual reports are due and manditory. Send to W5GPO who will forward to Hq. for you. Hope to see you at the ARRL Nat'l. Convention in Houston. PSHR: KA5AZK N5DKW NI5V N5FDL N5BT N5EZM KD5FR KC5NN W5CUE. Traffic: KA5AZK 301, N5BT 132, W9OYL 103, KD5FR 77, KC5NN 77, NI5V 75, N5DKW 48, W5CUE 28, K5PC 23, N5FDL 22, AJ5F 20, WA5EZT 20, N5EZM 16, WB5YUC 12, K2SCU 10.

OKLAHOMA: Art Roberts, W1GOM — ASM: KB5EK. SEC: W5ZTN. STM: KV5X. ACC: K5CAY. TC: W5QMJ. BM: W5AS. SGL: W5NG6. Greetings to the OK section. First I want to thank everyone for helping KB5EK and me with carrying on section business. I am extremely busy, trying to become a Registered Nurse. Congrats to the Cimaron ARC on their affiliation with ARRL. This club has really come a long way in a short time. ACC K5CAY has been busy traveling to a number of clubs with the ARRL tape about STS-9. Div. Director W5EDZ presented plaques at Ham Holidays to some very deserving amateurs: W5REC KI5P AE5N W5RB. Good work! The Broken Arrow ARC and Edmond ARC carried the teleconference with K7UGA. This time EARC transmitted on 3900, besides their repeater. Any reports on the effectiveness? We now have a section PIO, KA5LIH, and two area PIAs, KB5N in Tulsa and N5BEQ in OKC. Anyone wanting to help with public information, contact KA5LIH. Keep Nov. 12 open for the Tulsa ARC QSO Party. This is to commemorate their 50 years of ARRL affiliation. They will be sending a nice certificate. BPL: KB5EK. PSHR: KV5X KB5EK. Traffic: KD5OE 298, KB5EK 280, W5AS 220, KV5X 186, W5RB 179, WB5EAY 107, W4VXU 94, WA5OUV 72, NG5G 71, WA5ZOO 66, WD5IFB 57, W5REC 57, KB5XI 49, WB5ELG 48, W5VLW 31, WD5JCE 27, WA5OQC 26, KC5OU 26, W5VOR 25, K5CAY 24, W5SUG 24, W5FW 22, K5ENA 8, N6IN 4.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR — BPL: N5DFO WB5YDD. DRN5 mgr WB5YDD reports Southern Texas represented 100% by W5CTZ W5URN KD5CB N5DFO WB5YDD W5KLV WB5EPA WB5FQU KD5KQ N5EFG & N5AMH. ORS K5GM busy in June & July filling

In tialson and NCS spots for vacationers. Thanx. N5AVR has distributed more than 20 sets of plans for "Columbia Turnstile" antenna; says anyone sending a QSL with a request will receive one free. ORS K5RVF reports Jefferson Co. amateurs operated at NOAA Weather Station and Red Cross during Hurricane Alicia emergency. CAND mgr W5KLV reports DRN5 represented 100% by KO5X W5KLV WB5YDD N5EFG N5AMH N5DFO KD5KQ and W5URN. ORS AC5K made 348 mobile CW QSOs in TDXS "Armadillo Run" — activated 13 Texas counties; says it was lots of fun being the "fox" instead of a hunter. Hurricane Alicia disrupted the Texas Coast from Houston to Port Arthur; many amateurs still "digging out." Have heard many stories of Amateur Radio ops doing fantastic work; details not available and will be slow emerging, if they ever do; hundreds of amateurs involved. Tropical Strom Barry gave Southern Tip of Texas a good "shakedown" of emergency preparedness and procedures; more than 26 Amateurs from Brownsville, Port Isabel, Harlingen and Port Mansfield operated from emergency locations as the storm passed by. Traffic: N5DFO 861, WB5YDD 574, W5KLV 445, W5CTZ 192, ND5C 179, WB5EPA 106, WB5FQU 102, K5OWK 45, W5BGE 40, K5RG 31, WB5MMI 25, W5KR 21, AK5M 10, AC5K 7, N5TC 84.

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 weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

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. Join the 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 achievements added upon request. S.A.S.E. 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 Suncay, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 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.

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.

CHESS PLAYERS! Join Chess-Amateur Radio International. CARI, Box 682, Cologne, NJ 08213.

THANK-YOU for attending 1983 Warren Hamfest, Warren, Ohio. Hope to see you next year, August 19, 1984.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

NORTHEAST: Southcentral Connecticut ARA 4th Annual Indoor Flea Market and Show — Sunday, November 13, 9-3, North Haven Recreation Center. Also Christmas — Channuka gifts show for entire family!! Tables $7, $10 at door. Admission $1.50 for both events. Information, reservations, S.A.S.E. to: SCARA, WA1ZZO, 433 Ellsworth Avenue, New Haven, CT 06511. 203-773-0646.

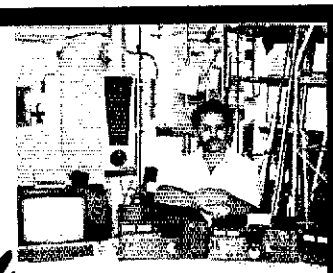
QSL Cards/Rubber Stamps/Engraving

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.

Rob, WA3QLS

Delaware Amateur Supply



Paul, WA3QPX

71 Meadow Road, New Castle, Del. 19720 **302-328-7728**

Factory Authorized Dealer! **9-5 Daily, 9-8 Friday, 9-3 Saturday**

YAESU ICOM SANTEC TENTEC MICROLOG KDK AZDEN KANTRONICS

Large Inventory

800-441-7008

Order & Pricing

NO Sales Tax in Delaware! one mile off I-95

Daily UPS Service

GREAT GIFT IDEA!!

McCARN

Kreskit McCARN

HANDCRAFTED
WOOD CALL LETTER PLAQUE

$21.95 POSTPAID U.S.A.

Your call letters expertly carved in a 1½" thick by 2" h block of pine, and attached to a ¾" x 3" x 12" base. Handsomely finished with your choice of walnut, oak or mahogany stain and clear lacquer.

Send name, mailing address (with Zip), call letters (name to be handlettered on base), and choice of stain finish. Satisfaction guaranteed. Goldtone and black pen available installed in end for $3.95 extra. Allow 2-3 weeks delivery. Include check or money order and mail to

ROGERS ADVG. SPECS.
1625 Whittier Lane, New Castle, IN 47362

Visa & MasterCard Accepted Telephone (317) 529-2149

$4.95 FIRST CLASS POSTAGE PAID U.S.A.

HANDCRAFTED KEY TAG

Your call letters expertly carved in a ½" x ¾" x 1½" to 2½" lg. solid oak stick, handsomely finished with dark stain and clear lacquer.

Send name, mailing address and call letters with check or money order to

ROGERS ADVG. SPECS.
1625 Whittier Lane, New Castle, IN 47362

WORLD FAMOUS
CURTIS KEYERS
Write for Brochures
8044/8044B still $16.70 ppd

$14.95
(plus $1.75 shipping)

CURTIS ELECTRO DEVICES, INC.
(415) 964-3846
Box 4090, Mountain View CA 94040

Super Specials

NEMAL ELECTRONICS
COAXIAL CABLE SALE

POLYETHYLENE DIELECTRIC

RG213 noncontaminating 96% shield mil spec	36¢/ft
RG214/U double silver shield 50 ohm	$1.55/ft
RG11U 96% shield 75 ohm mil spec	25¢/ft
*RG-8/U 96% shield Mil Spec ($27.95/100) or	31¢/ft
RG6A/U double shield 75 ohm	25¢/ft
RG-55B/U double shield (RG-58 size) 50 ohm	50¢/ft
RG58U mil spec 95% shield	11¢/ft

LOW LOSS FOAM DIELECTRIC

*RG-8X (Mini 8) 95% shield ($14.95/100) or	17¢/ft
RG8U 80% shield	18¢/ft
RG-8/U 97% shield 11 gauge (Equiv. Belden #8214)	31¢/ft
RG58U 80% shield	07¢/ft
RG-58A/U 95% Shield Stranded	12¢/ft
RG59/U 100% foil shield TV type $7.00/100 or	10¢/ft
Rotor cable 2-18 ga 6-22 ga	19¢/ft
Heavy Duty Rotor Cable 2-16 ga 6-18 ga	36¢ ft.

CONNECTORS MADE IN USA

PL-259 push-on adapter shell	10/$3.89
PL-259 & SO-239	10/$5.89
Double Male Connector	$1.79
PL-258 Double Female Connector	98¢
1 ft. patch cord w/RCA type plugs each end	3/$1.00
Reducer UG-175 or 176	10/$1.99
UG-255 (PL-259 to BNC)	$2.95
Elbow (M359)	$1.79
F59A (TV type)	10/$1.99
UG-21 D/U Type N Male for RG8 Amphenol	$3.00
UG-88C/U BNC Male for RG-58 Amphenol	$1.25
Amphenol PL-259	79¢
3/16 inch Mike Plug for Collins etc	$1.25
PL-259 Teflon, Silver	$1.59

Call or write for Free Catalog

shipping
Cable — $3.00 per 100 ft.
Connectors — add 10%, $3.00 minimum.
COD add $2.00. Florida Residents add 5%.

NEMAL ELECTRONICS
12240 N.E. 14th Ave., Dept. Q, Miami, FL 33161
Telephone: (305) 893-3924

First Annual
AMATEUR RADIO OPERATORS' YEARBOOK

This is not just another call-book! It contains pictures and info of ham operators worldwide. Insure your place in AROY. Send your photo today! [Black and white preferred.]

NO OBLIGATION

Aroy, P.O. Box 257, Malden, Mo. 63863; Ph. 314-276-5476

© 1983

R-4C+SHERWOOD CRYSTAL FILTERS
STILL THE FINEST COMBINATION

600 HZ LOW-LOSS 1st-IF CW FILTER. Improve early-stage selectivity. Eliminate high-pitched leakage around 2nd-IF filters. Improve ultimate rejection to 140 dB. Eliminate strong signals overloading 2nd mixer, causing intermod and desensitization. CF-600/6: $80.00. New PC board relay switch kit: $45.00.

1st-IF SSB FILTERS. 140 dB ult. rej. CF-2K/8: $150.00 pair.

5kHz 1st-IF FILTER. Reduces hi-pitched QRM. CF-5K/8: $80.00

16-POLE R-4C SSB Plug-in filter. Best skirt selectivity. 1800 Hz -6 dB; 2400 Hz, -60dB. CF-2K/16 (Also 1.5K/16): $135.00.

250, 500 and 1000 Hz 8-POLE 2nd-IF PLUG-IN FILTERS. CF-250/8, CF-500/8 and CF-1.0K/8: $80.00.

PC Board mod. and switching kits. Special AM filters/detector.

Filters also for R-4 (B), R-7, TR-7, TR-4, Signal/One, Atlas.

Add $3 shipping per order; $6 overseas air.

Europeans: Ingoimex, Postfach 24 49, D-8070, Ingolstadt, W. Germany.

Sherwood Engineering Inc.
1268 South Ogden St.
Denver, Colo. 80210
(303) 722-2257

VISA

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 — KØAAB collection, railroad employees and railfan's specials, front report styles. State your sample wants. 37¢ self addressed business size envelope required. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From $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 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 × 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.

BE SURPRISED - get a variety of cards - 100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST custom QSLs, large cut catalog and samples $1 refundable on first order. Ritz Print Shop P.O. Box 45018, Westlake, OH 44145.

PICTURE QSL cards of your shack etc. from your photograph of black ink art work. 500 $21, 1000 $29.50. Send stamp for illustrated literature. Generous sample pack $1; half pound of samples $2. Custom printed cards, send specifications for estimate. Raum's, 4154 Fifth Street, Philadelphia, PA 19140. Phone 1-215-228-5460.

BUSINESS Card QSL — LSASE, Sample. KØOJW, 814 Riderwood, Dept. QST, Hazelwood, MO 63042.

RUBBER STAMPS - Nametags - Signs - Fast Serve - S.A.S.E. for info. KB7AS 1230 West Main, Bozeman, MT 59715.

HATS — with name and call — $4.95 plus $1.50 shipping — S.A.S.E. — Specialty Printing, Box 361, Duquesne, PA 15110.

QSL CARDS: Don't buy QSL cards until you see the NEW catalog from Mail Order Express. We start from scratch and create a special QSL just for you. Top quality, low prices and service that you need. Free catalog. Mail Order Express, P.O. Box 703Q, Lexington, NC 27292.

ENGRAVED Call Pins by "Steve" K4VLE. Colors: white-red letters; black, green, orange-white letters; white-black letters. Badge size 1½ × 3½. 2 lines, $1.50; 3 lines, $2. ARRL logo 50¢ addl. Current Concepts, Inc., P.O. Box 5486, Lighthouse Point, FL 33074.

OUR CUSTOMERS are our best advertising ... "Your work is excellent and the price would fit anyone's pocketbook ..." Mary Ann, WA3HUP. Write for free samples, we can save you money! QSLs By W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

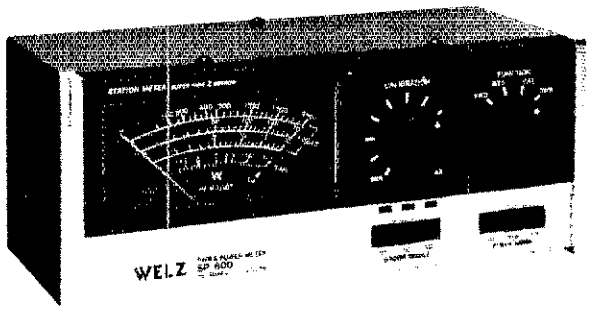
General

ICOM IC-751 with FM unit, brand-new Yen 200,000. ($870, approx.) Makoto Takano, JA8OBL/1, D13-4 Nagahori, Tokai, Ibaraki 319-11 JAPAN.

TRANSVERTERS MMT-220/28 $220, MMT 432/28 $260, MMT 1296/144 $320. Hans Peters VE3CRU 416-759-5562.

WELZ

SP-600

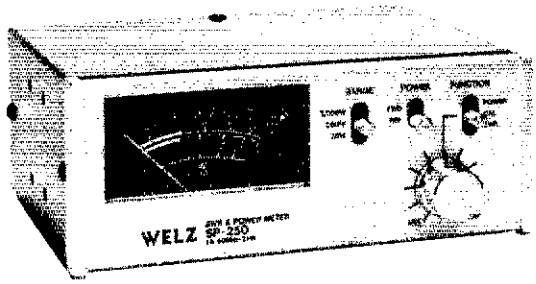


SP-600	Select 1 of 3 sensors by soft touch switch. Three wide bandwidth sensors cover 1.6-500MHz. RS-1: 1.6-60MHz 0-2kW; RS-2: 1.6-150MHz 0-200W; RS-3: 130-500MHz 0-200W
SP-200	Two position antenna switch and indicators. Three power ranges to 1kW, 1.8-160MHz.
SP-400	Three band sensors (2m, 220, 450MHz), 10 percent accuracy, 0-150W CW, LED power range indicators.

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!
SP-15M	1.8-150MHz, 200 watt, low-profile wattmeter. VSWR, FWD PWR, REF PWR, 1.5W SWR sensitivity. Great for mobile HF.
SP-45M	VHF-UHF to 100 watts. 3W sensitivity for SWR, 10 percent accuracy. All metal shielded construction.

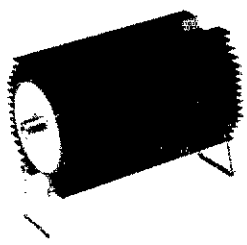
Distributed by
Encomm, Inc.
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

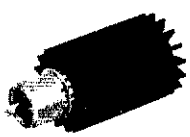
WELZ

DUMMY LOADS

CT-300
Oil-less aircooled.
1kW peak for 3 min.,
300W avg. DC-250MHz

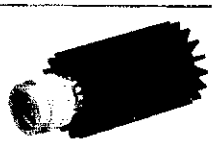
CT-150
Oil-less aircooled.
400W peak for 3 min.,
150W avg. DC-250MHz





CT-15A
50W peak, 15W avg.
SO-239 Screw-on dummy
DC-500MHz, VSWR<1.1.2

CT-15N
50W peak, 15W avg.,
Type N Dummy Load.
DC-500MHz, VSWR <1.1.1



SURGE SUPPRESSOR

CA-35A
Contains replaceable,
chip-type surge
voltage protector.
Low loss, low VSWR.
DC-500MHz, 350V breakdown.

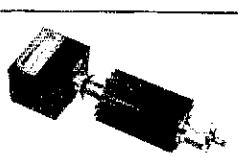
COAXIAL SWITCH

CH-20N
Two-way coaxial switch.
SO-239 type connector.
DC-900MHz, 1kW power.

TERMINATION POWER METERS

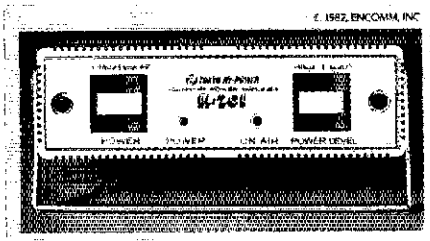
TP-05X
BNC connector.
5W talkie checker.
Field calibratable.
3W avg. Dummy Load,
1W center. 50-500MHz.

TP-25A
25 watt version of
TP-05X for mobile use.
Larger Dummy Load.
50-500MHz



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



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.

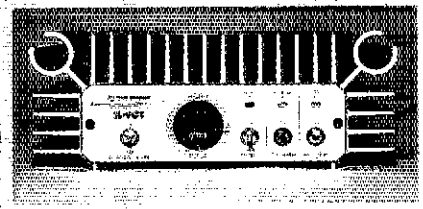
The ultra-compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to provide a big 20W output signal. Fixed antenuator design allows for full output from as low as 200mW drive.

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-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.

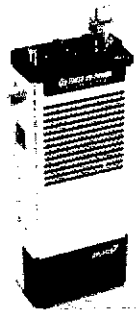
It features stable and powerful amplification along with excellent linearity, which is especially effective on SSB. With its built-in receiver preamp, the HL-90U enables you to enjoy more comfortable DX QSO's. Accurate output power can be read with the built-in precision directional coupler, and power 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

$99.00
UHF Transceiver



Yes, It's True!

Now there is a truly unsophisticated 3 channel crystal controlled radio to get everyone on UHF NOW. This radio is so affordable everyone should have at least two.

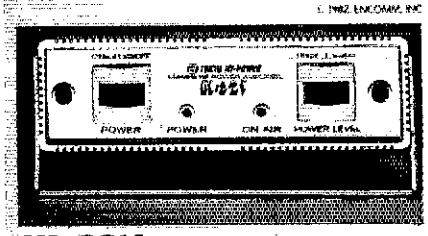
The low cost MICRO-7 (Model HT-7) comes with one channel of two crystals, a transmit and a receive already installed, the four drycells (AA size) needed to power the unit, an antenna and 200 mW of transmitting power.

A rather wide variety of accessories are available to boost your enjoyment and convenience such as: Speaker / mic (HSM7) (24.95) compatible with other audio systems like Kenwood and ICOM units, Subtone generator (HTE7) (19.95) set for 103.5 by a crystal, the VOX module (HVX7) (19.95) use with the boom-mic headset (HBM7) pictured below (39.95) and a rechargeable Ni-Cd battery and charger (39.95). For more output use the HL-20U THL amplifier (114.95) for up to 20 watts output.

The HT has been around for a long time but not like this. The MICRO-7 makes it time you got yourself a UHF radio and joined the evolution . . . upward.

THL Highpower Amplifiers Couplers, Transceivers

Distributed by: **Encomm, Inc.**
2000 Avenue G, Suite 800
Plano, Texas 75074



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.

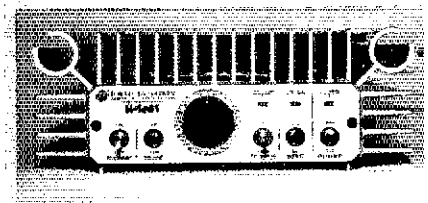
The HL-32V operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only $89.95 Suggested Retail!

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-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

MFJ TUNERS

QUALITY TUNERS THAT DELIVER MORE PERFORMANCE, MORE FEATURES, MORE VALUE FOR YOUR MONEY.

MFJ-941D 300 WATT VERSA TUNER II

$99.95 (+$4) **MFJ's fastest selling tuner packs in plenty of new features.** **New styling!** Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 watts RF power output.

Matches everything from 1.8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black, 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ-940B, $79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
MFJ-945, $79.95, like MFJ-940B with balun, less antenna switch.
MDJ-944, $79.95, like MFJ-940B with balun, antenna switch on front panel, less SWR/Wattmeter.
Optional mobile bracket for 940B, 945, 944, $5.00.

MFJ-900 200 WATT VERSA TUNER

Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. **$49.95** (+$4)
5x2x6 in. **Use any transceiver**, solid state or tube. Operate all bands with one antenna.

OTHER 200 WATT MODELS:
MFJ-901, $59.95, like 900 but includes 4:1 balun for use with balanced lines.
MFJ-16010, $39.95, for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B 300 WATT DELUXE VERSA TUNER II

$139.95 (+4) **MFJs 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 and 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-962 1.5 KW VERSA TUNER III

Run up to 1.5 KW PEP **$229.95** (+$10) and match any feedline continuously from 1.8 to 30 MHz; coax, balanced line or random wire. Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. **6 position** antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors, 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 inches.

MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

$329.95 (+$10) **Meet "Versa Tuner V". It has all the features you asked for,** including the new smaller size to match new smaller rigs - only 10 3/4"W x 4 1/2"H x 14 7/8"D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP the power rating you won't outgrow (250 pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter MFJ-1312 is available for $9.95.

6-position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ-981, $239.95, 3 KW, 18 position switched dual inductor, SWR/Wattmeter, 4:1 balun.

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 shipping/handling shown in parenthesis**
- **Call or write for free catalog, over 100 products.**

MFJ

MFJ ENTERPRISES, INC.
Box 494, Mississippi State, MS 39762

TO ORDER OR FOR YOUR NEAREST DEALER, CALL TOLL-FREE
800-647-1800. Call 601-323-5869 in Miss. and outside continental USA
Telex 53-4590 MFJ STKV

VISA MasterCard

SELL: 3-Drake R4C's, T4XC's, AC4, MS4, 1.5, 500, 250c Filters, 5 Pos. AGC. N/B. 1-has 3 Sherwood Filters, I-I-Sherwood Filter I-Standard. VE7WJ Box 3112, Langley B.C. CANADA V3A4R3. Ph. 604-534-7774.

WANTED: 50 MHz and 144 MHz converter boards for FR-101 KC2HQ (KA1APO).

CANADIAN Amateurs: For disposal-tubes, transistors and spare parts for International Systcom Autophone series. Model VTR-3. Please send for list. John Davies, 123 Morley St., Greenfield Park, P.Q. J4V 2Z1. CANADA.

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, wirsless 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 "Says, Shop Around for the best price then telephone the Hoss last, for the best deal."
Sale: New Drake TR-7A & PS-7 supply, regular $2138, cash $1449. Display Icom IC-2AT $199. New Azden PCS-4000 $268. New Icom-730 regular $829, cash $579. New Drake TR-5 & supply regular $998, cash $669. New Icom 25-A $279. New Drake L-7 linear $879. New KDK Model-2030 $259. New Icom-740 with factory installed power supply, regular $1258, cash $839. New Display Icom-751 $1155. New Kenwood 930-S $1259. New Display Icom-745 $819. Mint Collins KWM-2 $545. Perfect Drake B-line $699. VISA Accepted! Moory Electronics Company, P.O. Box 506, DeWitt AR 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.

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.

NEW solar electric panels, batteries, components. Send for information. Non-profit. Specs Inc., Box 155 Montrose CA 91020.

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 (40c stamps) to: Chuck Dachis - The Hallicrafters Collector - 4500 Russell, Austin, TX 78745.

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.

MFJ ACCESSORIES

HEAR POLICE/FIRE/WEATHER ON YOUR 2 METER HANDHELD

Scanning Handhelds become Police/Fire Scanners

MFJ-313

$39.95

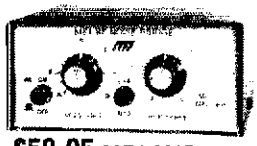
This MFJ VHF converter turns your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner.
144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA weather, maritime coastal plus more on 160-164 MHz. Mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Highpass input filter and 2.5 GHz transistor gives excellent uniform sensitivity over both bands. Crystal controlled. Bypass/Off switch allows transmitting. Won't burn out if you transmit (up to 5 watts) with converter on. Low insertion SWR. Uses AAA battery. 2¼ x 1½ x1½ inches. BNC connectors. Enjoy scanning, memory, digital readout, etc. as provided by your handheld on Police/Fire band.

"GRANDMASTER" MEMORY KEYER

MFJ-484
$139.95

Up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages (4096 bits). Repeat any message continuously or with pauses of up to 2 minutes. LEDs show message in use. Record, playback, or change messages instantly at touch of a button. Memories are resettable with button or touch of the paddle. Built-in memory saver— 9 V battery takes over when power is lost. Iambic operation with squeeze key. Dot-dash insertion. Dot-dash memories, self-completing, jam-proof spacing, instant start. 12-15 VDC or 110 VAC with optional adapter, $9.95. 8x2x6 in.

RX NOISE BRIDGE



Maximize your antenna performance! **$59.95 MFJ-202B**
Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.
New Features: individually calibrated resistance scale, expanded capacitance range (±150 pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

INDOOR TUNED ACTIVE ANTENNA

"World Grabber" rivals or exceeds reception of outside long wires! Unique **tuned** Active Antenna minimizes intermod, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antennas. Covers 0.3-30 MHz. Telescoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

$79.95 MFJ-1020

RECEIVER PRESELECTOR

MFJ-1040
$99.95

Improve weak signal reception, reject out-of-band signal, reduce image response from 1.8 to 54 MHz. Up to 20 db gain. Low noise MOSFET. Gain control. Bandswitch. Can use 2 antenna, 2 receivers. ON-OFF/Bypass. 20 db attenuator. LED. Coax, phone jacks. 8x2x6 in. Also for XCVRs to 350 watts input. Auto bypass. Delay control. PTT jack. 9-18 VDC or 110 VAC with optional AC adapter MFJ-1312, $9.95.
MFJ-1045, $69.95. Same as MFJ-1040, less attenuator. XCVR auto bypass, delay control, PTT. Use 1 ant., 1 rcvr. 5x2x6 in. 9 V battery, 9-18 VDC or 110 VAC with optional AC adapter, MFJ-1312 $9.95.

MFJ/BENCHER KEYER COMBO

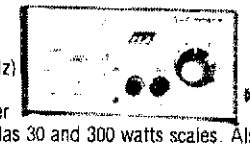
MFJ-422
$99.95

The best of all CW worlds- a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044 IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, $9.95.

VHF SWR/WATTMETER

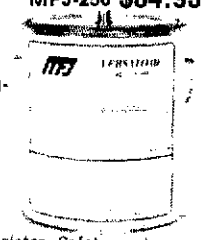
MFJ-812 $29.95

Low cost VHF SWR/ Wattmeter! Read SWR (14 to 170 MHz) and forward/ reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.



1 KW DUMMY LOAD

MFJ-250 $34.95



Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7½x6¾ in.

24/12 HOUR CLOCK/ ID TIMER

MFJ-103
$34.95

Switch to 24 hour GMT or 12 hour format! Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Switchable seconds readout. Elapsed timer. Just start clock from zero and note time of event up to 24 hours. Bright blue .6" digits. Alarm with snooze function. Synchronizable with WWV. Lock function prevents mis-setting. Power out, alarm on indicators. Black. 5x2x3 in. 110 VAC, 60 Hz.

DUAL TUNABLE SSB/CW FILTER

MFJ-752B $89.95

Dual filters give unmatched performance! The primary filter lets you peak, notch, low pass or high pass with extra steep skirts. Auxiliary filter gives 70 db notch, 40 Hz peak. Both filters tune from 300 to 3000 Hz with variable bandwidth from 40 Hz to nearly flat. Constant output as bandwidth is varied; linear frequency control. Switchable noise limiter for impulse noise. Simulated stereo sound for CW lets ears and mind reject QRM. Inputs for 2 rigs. Plugs into phone jack. Two watts for speaker. Off bypasses filter. 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT 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 Miss. and outside continental USA
Telex 53-4590 MFJ STKV

VISA MasterCard

ege, inc. — For Your Computer

HAM DATA

Amateur Software for the VIC-20 & Commodore 64

New Release! Version 3 I includes the most popular suggestions of over 350 users. Super Logs now have larger files; selectable AUTO or MANUAL time. 5th search mode (band); selectable print--all entries, by band, QTH, and, now, QSL! Prop Chart now prints direction and distance in addition to 24-hour MUF Chart.

SUPER LOG I All the above except Print and Summary. VIC-20 only (Min 3K expansion) File approx 256 w/16K 12.95

SUPER LOG II New print and WAS summary. C64 file - 500. VIC-20 (Min 8K expansion) approximately 197 w/16K 16.95

SUPER LOG III DXCC instead of WAS summary. Specify either C64 or VIC-20 (Min 16K expansion). 16.95

SUPER LOG IV Disk only log (includes both WAS & DXCC summary. Largest file size on less memory C64 or V20 (Min 8K expansion) 21.95

CONTEST LOG 3 in 1: SS, ED and Universal. Auto time/date/dupe (faster than basic dupe) Clock display. Specify C64 or V20 (8K expansion) 17.95

PROPAGATION CHART 24-hour MUF chart AND antenna direction AND distance to any QTH. Specify either C64 or V20 (Min 8K expansion) 12.95

Send stamp for a complete listing.

SOFTWARE

HAMTEXT the new software

VIC-20	79.95
Commodore 64	89.95
Apple	89.95

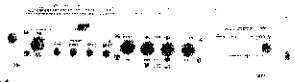
HAMSOFT

VIC 20	39.95
Apple	39.95
Atari	44.95
TRS-80C	34.95
TI-99	89.95

AMTORSOFT ..... CALL

INTERFACES

FOR MORSE / RTTY

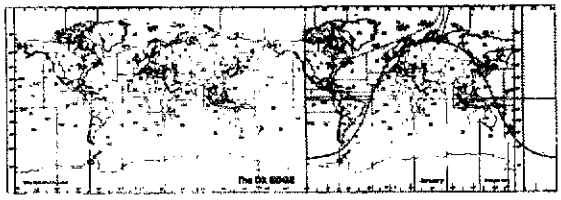


MFJ 1224	85.95
Kantronics Interface I & II	CALL
AEA CP-1	179.95
AMT-1 AEA for Amtor	CALL
Microlog AIR 1 VIC 20/COM 64	179.95
Microlog ACT-1 Demonstrator Special	850.00

13646 Jefferson Davis Highway, Woodbridge, Virginia 22191

For Orders and Quotes Call Toll Free: 1-800-336-4799 ege, inc.

The DX EDGE: The Hottest DX Aid Since Sunspots



Improve Your DX Achievements on All Bands

See times of sunrise & sunset propagation peaks instantly for any QTH in the world.
Know when to look for the DX you need;
Long path and Gray Line possibilities seen at a glance.
Plastic slide rule format—Easy to use—Large size

Price: **$14.95 ppd.** in U.S., Canada, Mexico. $18.95 elsewhere, by air. Please make check or M.O. in U.S. funds payable to the DX Edge and mail to:

The DX EDGE, P.O. Box 834, Madison Square Stn., New York, N.Y. 10159

An information flyer is available free of charge. A product of Xantek, Inc. ©Xantek, Inc. 1983

The QSL ORGANIZER™

Size: 9"X14"

30 Day Free Trial GUARANTEE
Your money refunded if not completely satisfied.

Display 240 QSL's in this handsome FREE ALBUM!

This richly padded grained vinyl album is yours Free with every 40 pages ordered. No more need to clutter walls or stuff QSL's in boxes or drawers. Organize, preserve and display cards in crystal clear vinyl with roomy 4X6 pockets. Each page holds 6 cards (back to back).

QSL Organizers are great as gifts, prizes, or for DX contests. Join thousands of delighted hams around the globe. Fill in the handy mail form below, send for yours today!

HANDY MAIL FORM

Please send:		PRICE	U.S. Postage	TOTAL
☐ 1 FREE Album and 40 pages (min) at	55¢ ea.	22.00	3.20	$25.20
☐ 2 FREE Albums and 80 pages at	52¢ ea.	41.60	4.85	$46.45
☐ 3 FREE Albums and 120 pages at	49¢ ea.	58.80	6.20	$65.00

Pages in pkgs. of 40 only

POSTAGE & Handling Foreign Canada/Mexico $5.50 (U.S.) ea. Album & 40 Pages

Please Print

☐ Check ☐ Mastercharge # _____ Exp _____ TOTAL $

☐ Money Order ☐ Visa Signature _____

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

(CA residents add 6% tax)

MIL INDUSTRIES Dept. T
P. O. Box #44457
Panorama City, CA 91402

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.

KEYER KITS, $15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

EIMAC-3-500Z's. New-very limited quantity! $85 each, cash, COD, MO. Add $3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

CDE ROTOR Owners - You need a "D-Lay-S"! 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.

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.

MICROWAVE, satellite, video, audio components and equipment. Send $1 for 1983 Catalog. DSCo, Department E, 3110 Evelyn Street, Roseville, MN 55113.

QUAD KITS, $37.50 Quik-Quad, 1101 Plantation Dr., Cary, NC 27511.

AHOY - SAILOR/HAMS-Why not charter a new Morgan 41 foot, sailboat from Ft. Lauderdale equipped with a TS-130SE and Hustler ants. for your next vacation/Dxpedition. Call Shelly at 800-237-2291 or 813-753-3934 (Fla.) and reserve "Sojourner".

IBM-PC RTTY and ASCII S.A.S.E. to E. Alline, NE5S, 773 Rosa, Metairie, LA 70005.

1984 CALLBOOKS, $20 either, $37 both, any 4 or more, $18 each. Postpaid. CA 6% tax. Century Printing, 6059 Essex, Riverside, CA 92504. 714-687-5910.

APPLE Computer Net every Sunday 1700 GMT on 14.329 MHz. For information on running RTTY/CW with Apple Computer send two stamps. WB7TRQ Jim Hassler 2203 Park Avenue O.V., Cheyenne, WY 82007.

APPLE COMPUTER owners-announcing "The Logger". A very sophisticated, full-featured disk-based log book for ham radio operators. "The LOgger" manages over 1900 log entries per standard DOS 3.3 diskette with sixteen separate functions including personalized QSL cards for less than 2 cents each! Unlocked program diskette and User's Guide $35. ppd. U.S. large SASE for more information. Bob Jackson, Dept. QST, Box 57304, Webster, TX 77598.

RTTY FDM Demodulators. FDM RTTY exists on satellites, FM SCA broadcast subcarriers (e.g. CNS) and HF radio. Four solid state synthesized models, NSA surplus, new-used $50 to $350. Call/write for brochure. Electrovalue Industrial Inc., Box 376-Q, Morris Plains, NJ 07950. 201-267-1117.

FAST professional ham repair, N.Y.C. area. All major brands. Commercial FCC Lic. #P2-2-33167. Amateur Extra. In business 7 years, on the air since 1965. Rich Tashner N2EO 212-352-1397.

WANTED - Kenwood TS-700SP transceiver & MARS 7600 adapter C.T. Huth, 146 Schonhardt, Tiffin, OH 14883.

AMRAD (Amateur Radio Research and Development Corporation) is a nonprofit organization of experimenters in packet radio, spread spectrum and digital communications. Monthly newsletter. Mail $15 to AMRAD, 5829 Parakeet Drive, Burke, VA 22015. Add $2 for Canada, Mexico; $8 overseas air, $2.30 surface.

TRS-80 Model I/III/IV Radio Amateur Software. Super-Log & Super-Duper $19.95; Compu-Log $16.95; Antenna Anatomy $14.95; Custom Beam Headings $19.95; Code Trainer II $16.95; General, Advanced or Extra Theory (specify) $19.95 each; more. Add $3 S/H. Specify Model, Tape or Disk? MICRO-80, 2665 Busby Quarter, Oak Harbor, WA 98277.

CALLBOOKS 1984 editions, Flying Horse, since 1920. Deliv starts Dec. 1. Postpaid all USA ZIPs. US $19, DX $18, both $34. 6 or more any mix $16.50 ea. Ron Williams W9JVF/ZB2CS. Avatar Magnetics Co., 1147 N. Emerson, Indianapolis, IN 46219.

WANTED: Aluminum tower sections. K4XS, 813-842-7315.

BUY-SELL-TRADE twice monthly publication! S.A.S.E. for Free issue. The Ham Boneyard, 364 Kilpatrick Ave., Port St., Lucie, FL 33452.

COLLINS CLASSICS: 75A4 and KWS1, $375 each, $700 pair. Pick-up only. K1IFJ. 203-438-5944.

MADISON-REPAIR: Collins KWM, S-Line; Rockwell KWM380; Drake, Kenwood, Yaesu, Icom, older U.S.; guaranteed. Used: 75A4/KWS1, 75S1/32S1 parts - call! Prices on request. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268.

FOR SALE — receiving tubes, some rectifiers and transmitting tubes. Send $2 for complete list and prices. Refundable on first order. To: Avionix Inc., Box #557, East Hanover, NJ 07936.

IBM-PC Ham Radio Software. Micro Electronic Systems, 19 Annette Park Drive, Bozeman, MT 59715.

NEW PRODUCTS

TINY 2 M POWER AMP MOUNTS ON HANDHELD

7 to 20 watts out for 0.1 to 3 watts in. Carrier operated T-R switch. MFJ-2040, 144-148 MHz, $79.95. MFJ-2045, 430-440 MHz, $99.95. MFJ-2041, Portable Power Pack, $89.95.

This tiny MFJ-2040 2 meter power amplifier mounts on your handheld between your antenna and HT. You can also mount it separately with a cable.

It provides 7 to 20 watts output for .1 to 3 watts input. T-R switching is carrier operated. Covers 144-148 MHz.

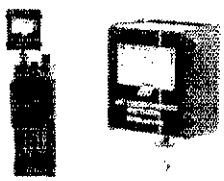
Die cast aluminum body is 1½x3¾ inches. Weighs about 6 oz. BNC connectors.

Requires 12 to 13.8 VDC at 50 ma. for receive and 1 to 2 amps for transmit.

MFJ-2045, $99.95. Like MFJ-2041 but for 430 to 440 MHz. 4 to 15 watts output for .1 to 3 watts input.

MFJ-2041, $89.95. Portable Power Pack Batteries provides 120 minutes operation of MFJ-2040 or MFJ-2045 at 10 watts output. Has battery check meter. Has carrying case with belt loop and shoulder strap. 1½x2¼x7½ inches. Weighs 2 pounds.

2 Meter Handheld Wattmeter



MFJ-840
$19.95

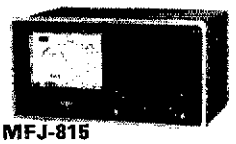
MFJ-840 lets you accurately check the output of your 2 meter handheld transceiver. 5 watts full scale. 50 ohm load. BNC connector. 2x2¼x1½ inches. Black.

2 Meter Handheld SWR/Wattmeter

MFJ-841
$39.95

MFJ-841. Connects in line with your 2 meter HT. Read SWR from 1:1 to 6:1 and forward power to 5 watts. Expanded scale. 50 ohm impedance. BNC connectors. 2x2¼x1½ inches. Black.

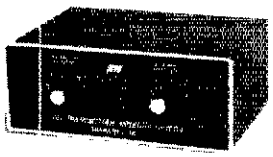
Cross Needle SWR/Wattmeter



MFJ-815
$59.95

New MFJ-815 Cross Needle SWR/Wattmeter lets you monitor SWR, forward and reflected power at a single glance in 3 ranges (20/200/2000 watts forward and 2/20/200 watts reflected) and SWR from 1:1 to 6:1 on a 2 color scale. Works from 1.8 to 60 MHz. Accuracy is ±10% full scale. Mechanical zero adjustment, push button range selection. All aluminum, black w/ brushed front panel. 6½x3¼x4¼. SO-239 connectors.

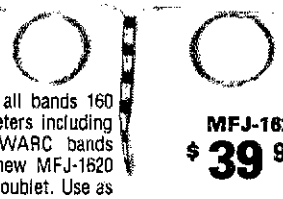
Antenna/Transmitter Switch



MFJ-1700
$69.95

If you have **several coax feedlines** and more than one rig, this MFJ-1700 gives instant selection of 1 of 6 antennas and 1 of 6 transceivers in any combination. Also plug in an antenna tuner, SWR/wattmeter, linear, etc., so that they are always in the circuit for any antenna/transceiver combination. Handles up to the full legal limit of 2 KW PEP for 50-75 ohm loads. SO-239 connectors. All aluminum, black with brushed aluminum front. 8x2x6.

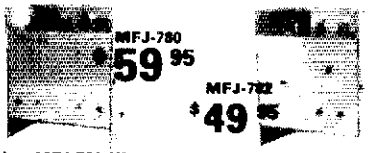
MFJ-1620 All Band Doublet



MFJ-1620
$39.95

Operate all bands 160 thru 10 meters including the new WARC bands with this new MFJ-1620 All Band Doublet. Use as doublet, sloper, inverted-V or as V-beam. Completely assembled. 130 ft.(hard drawn stranded copper antenna wire) but can be trimmed to fit your lot. Center fed with 100 feet of low loss 450 ohm balanced transmission line. You need only add rope to the ends and pull into position. Antenna tuner with balanced output required.

New Antenna Isolators



New MFJ-782 HF/2 Meter Antenna Isolator lets you use a single coax line to feed a 2 meter antenna and any antenna below 30 MHz. **The new MFJ-780 Antenna Isolator** feeds separate 10,15,20 meter antennas (tri bander, etc.) Both isolators handle 2 KW PEP at 50/75 ohms. Negligible insertion loss. Completely automatic with no relays, switches or other moving parts. Easy outdoor mounting (includes hardware). SO-239 connectors.

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 Miss. and outside continental USA
Telex 53-4590 MFJ STKV

VISA
MasterCard

DRAKE TR7/DR7 w/ps, SL1800, 500 & 300 filters, AUX 7, NB7; $1300. Drake R7 w/SL400D, 1800, 500 & 300 filters, AUX 7 & NB7; $1200. RV7 RVFO; $125. KB4O 703-941-7760 after 2300 GMT.

FOR SALE: 1-bedroom unfurnished apt., all-recreation, write for details with complete Ham Station: TA 33 SR beam, rotator, Swan 500-CX transceiver, Swan 1200W linear. All mint condition $39,000. Radio W4IIT, Apt. 77, 2371 Israeli Drive, Clearwater, FL 33575.

QST BACKISSUES — Computer print-out of current inventory of *QST*'s from 1916 to date. S.A.S.E., W3ZD, 520 Centennial Road, Warminster, PA 18974 . . . 215-675-4539 Handbook and radio book listing included.

CLEANING OUT shack, S.A.S.E. only. Louis D'Antuono, WA2CBZ, New Address, 8802 Ridge Blvd., Brooklyn, NY 11209. Local pick-up only.

TI99/4-4A Basic, Extended Basic, Assembly Language programs. CW RECEIVE/Transmit, CW Practice, DX Log/Call Locator, Amateur Call Locator, Amateur Call Locator, SSTV Keyboard, 1010 Record, WAS, Programs for Hamkids. Write Sam Moore, AC5D, Box 368, Stigler, OK 74462.

WANTED your QSL K4NBN "No Bad News".

GRAY MUSEUM received large donation of QST's, CQ, '73, Ham Radio. Must sell. $5 for 12 issues — $6 for $24. Individual copies 50¢. Plus UPS. Won't break complete year. 10% discount over 120 issues. QST's start 1945 others 1950. Charles Williams — 400 Broadway — Cinti. OH 45202.

"KT5B" Multi-Band Antenna 160-10M $59.95, SO239/PL259 Weather Boot Kit $5.95, 2M DDRR Mobile Antenna $39.95, 2kW Roller Inductor 28mH $47.50 plus more! — Kilo-Tec — P.O. Box 1001 — OakView, CA 93022 — Tel: 805-646-9645.

DRAKE R-4 (A-B-C), T-4x (A-B-C) owners: protect your investment from scarce, increasing cost of vacuum tubes. Use solid-state tubes with increased sensitivity, dynamic range and gain. Directly replace vacuum tubes: 6EJ7/6HS6, 6BE6/12BE6, new 6BA6/6BZ6, 6AU6, 12BA6, 12AX7A, 6EV7/6FQ7/6AQ8 $23 ppd. each. Kits upgrade performance: Basic Improvement Kit, Audio Low Pass Filter Kit, Audio IC Amplifier kit, $25 ppd. each. Overseas air $7. VISA/MC. Sartori Associates — W5DA, Box 832805, Richardson, TX 75083.

SELLING OUT: TS-520, CW filter, VFO-520, mics, Byrd wattmeter, phonepatch, Heath scopes, 25 years of QST, SSB CB base. Reasonable offers. WD9IWG 608-783-7767.

TEN TEC Omni-C: 9 bands, power supply, remote VFO, 1.8 & .5 filters, mike all $769. Call 803-682-6787 or 882-0357. WA4MIY.

COLLINS KWM-380 with 1700, 400 and 200 Hz filters, control interface and keypad, speech processor, noise blanker, dust cover, service manual, all production improvements except WARC ROM, $1950. Bill Myers, K1GQ, 603-465-2673.

KENWOOD TR-7730 radio for sale, complete, in excellent condx. VHF Engineering 140W 2m amplifier, excellent condx. Best offer. Andrew Mueller, WB9GAC W12668 Donges Bay Rd., Germantown, WI 53022.

WANTED: Drake R4C noise blanker. And TA-4 Transceive Adaptor for SPR-4. Call Bill WA2TDR 201-482-6629.

TELETYPE equipment, parts, and supplies. S.A.S.E. for list. K8JOF 37249 Hebel, Richmond, MI 48062. 313-727-1964.

RTTY/CW VIC-20/C-64 interface, easy-to-build kit, with power supply. Introductory price $89.95. Ham Log program VIC-20 + 8K, logbook format printout, $9.95. $3 shipping/order. VISA, MC, M.O. S.A.S.E. for complete catalog of all kits, software. WES-COM Inc., WD0CDU, 4915 Galena Dr., Colorado Springs, CO 80918. 303-598-5745, 7-10 P.M..

ATTENTION CONTESTERS: Contest Super Program now available for Radio Shack TRS-80 Model III, 2 disk drives, 48K of memory and printer. Fast, easy to use. Handles up to 9000 contacts, almost instantaneous duping and prints log during contest. Prints dupe sheets, score sheets and QSL card labels after contest. Sixteen page instruction packet. Only $34.95 (PA residents add 6% tax). Send your check or money order today to Lawrence R. Walker, N3CQM, P.O. Box 459, Springfield, PA 19064.

FOR SALE-Swan 500C with power supply, new balanced and neutralized finals $350. K3DHM, Lawrenceville, PA 16929 717-827-2521.

TR-7800 2M FM transceiver $200 plus shipping. CDE Tail Twister rotor A-1 $150 plus shipping. KD7NY 406-363-3231.

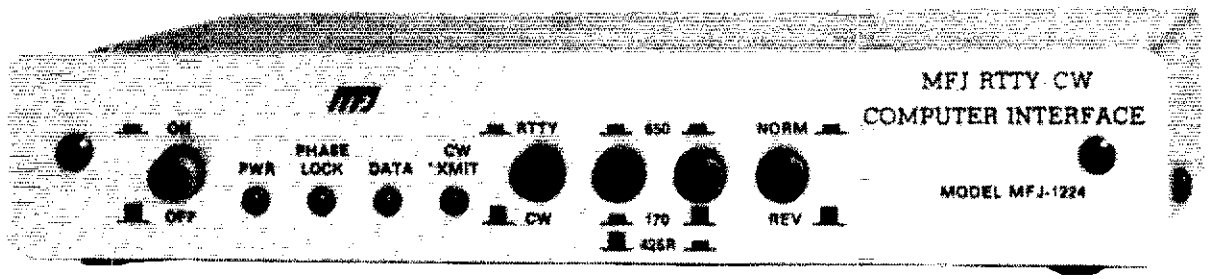
ROSS $$$$ New November Specials: Hustler #3 TBA $189.90, 4BTV $79.90, G6-144B $74.95, TenTec #Corsair $989.90, Delta 580 $649.90, Hercules $1489.90 4229 $175, Dentron #MLA-2500B $759.90, DTR-1200L $469.90, AT-3K $209.90, GLA-1000B $379.90, Icom #IC-751 $1,999.95, IC-451A $729.90, IC-551D $569.90, IC-471 $799.90, IC-745 $859.90, IC-R70 $569.90, Kenwood #TS-430S $779.90, TS-830S $799.90, TR-9000 $379.90, TS-130SE $539.90, TM-201A $319.90, Yaesu # FT-708 $259.90, FT-102 $$$ Phone new low price, FT- 726R $709.90, FT-980 $1,299.90, All major lines stocked, Used Kenwood TS-180S $539.90, TS-120S $449.90, TS-520 $429.90. L.T.O. mention ad. Prices cash, FOB Preston. Closed Monday at 2:00. Ross Distributing Company, 78 South State, Preston, ID 83263. 208-852-0830.

TELREX TB5ES 5-element tri-band full legal power beam and 2 x 72 inch heavy-duty steel mast. Never used. $280. Pick up only. Ernie Farkas, K3CBW. 301-747-1377.

WANTED: Above-30 MHz equipment from 1930s by National, REL, Utah, others. Nagle, 12330 Lawyers, Herndon, VA 22071..

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

VHF: Icom IC-45A 440 MHz mobile, mint $200. Icom IC-4AT ht with BP-3, BP-4, BP-5, BC-30 rapid charger, light use-$200. Ace MX-6Z 6 meter ssb HT, tunes 50.1-50.2, slight noise in tuning cap, otherwise mint-$40. Includes UPS, M.O.'s only. Dave Easton, N6IYD, 6752 Clybourn #114, N. Hollywood, CA 91606. 213-762-7454.

ATTENTION CONTESTERS: Contest Super Program now available for Radio Shack TRS-80 Model III, 2 disk drives, 48K of memory and printer. Fast, easy to use. Handles up to 9000 contacts, almost instantaneous duping and prints log during contest. Prints dupe sheets, score sheets and QSL card labels after contest. Sixteen page instruction packet. Only $34.95 (PA residents add 6% tax). Send your check or money order today to Lawrence R. Walker, N3CQM, P.O. Box 459, Springfield, PA 19064.

RANDOM CODE Practice — Commodore 64 program. Five character groups of letters, numbers, and punctuation marks. Selectable speed from 5 to 25 WPM and current or post display. Absolutely best way to learn or improve code. Never repeats and cannot be memorized. Specify Tape or Disk. $14.95. N2ZM, 56 Rolling Hills Rd., Clifton, NJ 07013.

WANTED: Band Switch for SX88 receiver. RME DB-22A preselector K7GCO, 202 S 124th Seattle, WA 98168. 206-243-5174.

NC-109, Heathkit Q-Multiplier wanted. Myers, 1425 E. Jackson Blvd., Elkhart, IN 46516.

GALAXY 5MK2 xcvr, ps, manual, four extra finals, Turner Plus 2 mic, Hallicrafters T.O. Keyer, Vibroplex paddle — $250. WB7NRE 401-822-1943.

HEIL Audio Products are now available thru HAM RADIO OUTLET, 800-854-6046, FREE UPS.

HEATH SB303 solid state receiver, used three times, perfect condition $250. Umphres 725 Pickwick, Springfield, MO 65804.

FIRST RIG, reasonably priced, Heath xmtr SB-400, 180W CW/SSB, tube-type with two 6146 output tubes, $180. Heath rcvr SB-300 with two 400 Hz CW filters in series and SSB filter, $160. Heath HM-102 rel. pwr/swr mtr, $40. QRM Fighter, built and working, w/o ps, $20. Heath HM-15 refl. pwr mtr, $20. Microtana 3-range pwr/swr mtr, $10. Manuals with Heath eqpt. K5OGX, 1716 Burnham Rd., Ft. Smith, AR 72903, 501-452-8630, after 6 P.M..

FOR SALE: Late model Heath SB-102 transceiver and HP-23B AC supply, $425; SB-630 station console, $100; SB-610 monitorscope, $110; HW-2036A 2-meter transceiver with Micoder II and HWA-2036-3 AC supply, $250; HW-32A with HP-23A AC supply, $160; SB-200 amplifir, $350. All professionally wired and in "mint" condition. W5MMG 405-751-2801 after 8:00 P.M. CDT.

ICOM 2AT, Heath HR-1680, Kenwood R-600, VoComm 30W 2M amp, GBC 12V-10 amp power supply. Must sell. N1CCW. 617-491-8951.

TEN TEC model 540 transceiver with CW filter and 262M power supply. Mint, $365. WB7VOO, 602-298-4820.

COLLINS WANTED: CT-2 cable trough; 136C-1 noise blanker for 75A-4; 35U-1 LPF for 75A-4; SC-301 antenna control console for front of 516F-2 P.S. Also need original sales brochures for 30K-1 transmitter. AC1Y, ARRL Hq.

WANTED: Old keys for my collection. I am trying to find each model of bug made before 1950. Vibroplex, Martin, Albright, Warner, D&K, Boulter, etc. Also looking for spark keys, Boston keys, military/spy keys and foreign made radiotelegraph keys. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

TEN TEC Century 21 $320. KA8RJY, 614-286-6182.

ROBOT 400-Brand new, Magnavox video/sound camera, GBC zoom lens 15-90 mm. $595. KA2B 201-364-3382.

WANTED: German WWII military radio and radar equipment, and accessories. Steve Schreiner, 7829 Via De La Entrada, Scottsdale, AZ 85258.

FOR SALE: Kenwood TS-180S w/DFC, YK-88S & YK-88C xtal filters, PS-30 AC PS, AT-180 ant. tuner, SP-180 spkr., MC-50 desk mic., all for $750. Mint condition 28ASR teleprinter w/typing repert, loop PS, and all manuals for $375. Azden PCS-2000 w/touch-tone mic. & tone encoder for $185. Clegg FM-27B w/ 011 AC PS only $175. Kenwood TR-2400 hand-held FM xcvr. for $185. Call Mark Holland, W6JOB, @ 213-821-9185, 4038 Moore St., Los Angeles, CA 90066.

RTTY, Hal CT-2100, KB2100 terminal w/keyboard, mint $499. W2GVK 516-499-7958.

ESTATE SALE — Drake SPR-4 rcvr, Kenwood AT-200 tuner, Okigawa PM-3HV swr meter, Heath HW-8 with HW-7-1 power supply, Autek QF-1 filter, bass keyer paddles. Byron Looney, K6FI, 6540 Buckley, Cambria, CA 93428. 805-927-8733.

DRAKE T4X-R4B-AC3-MS4 cashiers check $475. Free UPS to 1000 miles. Bartel W2LQ, 15 Heather Hill, Holmdel, NJ 07733.

COLLECTORS, Harvey Wells TBS-50, 50D Atwater-Kent type "L" chassis with cabinet RCA Radiola 18, QST's 61-77, Steve WB2GYK, 490 Coolidge St., Hempstead, NY 11552.

HAMMAROUND HQ170 for sale 160-6M receiver with clock/timer, good condition, manual, $125. Paul K1SSO 203-633-3806.

COLLINS KWM-2A(re) with NB, PM-1 PS $675. Wilson WE-800 2M transceiver $150. W7LTL 702-451-8243.

WANTED: Surplus equipment: Panoramic Indicator APA-10, APA-38; Panoramic Receiver ARQ-5; Pulse Analyzer APA-6, APA-11; Direction Finder APA-17. Prefer un-modified units. Please state condition and price. Steve Schreiner, KD7KK, 7829 Via De La Entrada, Scottsdale, AZ 85258.

MICROPROCESSOR trainer, Heathkit EE3400A trainer fully assembled and working, also EE3401 Programmed Learning Course, two volumns, $200, Steve Sant Andrea, 490 Coolidge St., Hempstead, NY 11552.

Don't be CRAZY! Call HAM RADIO OUTLET, 800-854-6046, before you buy your next piece of gear. We stock the major brands and offer free UPS shipping on most items.

WANTED: for Atlas 210X-Cigarette Lighter Cable or DC Cable and MT-1 matching transformer. WA5PME Box 278, Jackson, LA 70748, 504-344-1352.

LOGBOOK-V2 A complete log program consisting of seven modules to handle all phases of logging. Features multi-key and multi-level searching of thousands of records in seconds and full feature editing. Prints Station Logs, Contest Logs, Contest Dupe Sheets, QSL Cards, WAS Lists, DXCC Lists, 6-Band WAS Lists. For TRS-80 Models I, Model III, & Model IV. Price $39. Supplied on 5 ¼" DOSplus formatted disk with complete documentation. Specify model of computer when ordering. WB8YUO, 6333 Willowdale Ct., Columbus, OH 43229, 614-895-1130.

ATTENTION DXers! Get your Russian QSLs quicker! All Soviet local QSL bureau addresses, in 2 languages. Send $4 to: KA2MXO, P.O. Box 715, Brooklyn, NY 11230.

FOR SALE: FT-902DM, AM, FM, FSK, SSB, CW, ac/dc supply, VBT, Notch, Keyer and APF factory installed. Mint condition with manuals and original cartons — $1200. Call Bob, KU7G 203-666-8063.

LICENSE PLATES: Ham calls, want to swap, buy, or will reimburse postage. All states. K7RDH Bob, 1903 West Holly, Phoenix, AZ 85009.

AEA, MBO-RO Code/RTTY Reader, new $175. KAØPGO, 314-392-3793.

DRAKE RV-7 $130, bought RV-75. Icom IC251-A $450, bought HT. Both like new. Cushcraft 15-3CD beam, all hardware and instructions, $55 plus shipping. W7LJI, 503-686-8879.

WANTED: Tektronix pamphlets-Spectrum Analyzer Circuits Manual; Spectrum Analyzer Measurements Manual. Power; H.V. Transformer & Scope Tube for 564 Scope. Charles King, Miner St., Middletown, CT 06457.

WANTED: Working VFO I can use with my Knight T-60 transmitter, such as old Heath, Globe, Knight. KC9SI, 419-726-2467.

TS520S, CW filter, outboard speech comp. Mint cond. $475. K3BFQ, Larry, 215-364-1336.

MINT Collins KWM2A(we), 516F2(re), PM-2 and full crystal pack. All for $695. 2kW antenna tuner, MT3000A (Dentron) $175. NC7D, 1-509-966-8661.

WANTED: Hunter Bandit 2000B, mint. N3JT.

HALLICRAFTERS SX-117 and HT-44, $300. Swan 1200 linear, HA-1 keyer, Heath Monitor Scope — make offer. K8GF, 719 Fox Valley, Longwood, FL 32779. 305-869-5869.

FOR SALE: Yaesu FT-101E, w/manuals, fan, extra finals, excellent condx, $500. Quinton N7BDH 307-682-5381.

SELL: Johnson Desk Kilowatt amplifier $550. Collins KWS-1 transmitter $525. Collins KWM-1 transceiver, 516-F-1 supply, 312B-2 console $350. 302-C-3 Wattmeter $100. SM-2 microphone $35. Paul, KB8Q 313-428-7200.

KW AMP-LA-1000 and matching ant tuner-AT-1200 mint, both $400. Will sell separate. Nye Viking automatic SWR and Wattmeter, $50. Nye Viking SKM-1 Memory Keyer, $90. Lafayette HA-600A rx needs work, $25. UPS 48, KA3IVB Curt 412-693-9890.

COLLINS 75A-4 for sale, serial 5764, mint, manual, will ship on receipt $415 cashier's check. N3BRV, Jack Calhoun, 4010 Winchester Road, Allentown, PA 18104. 215-398-0584.

ICOM IC-740 PS-15 CF-1 and SM-5 desk mike. All mint condition. Asking $850 or best offer. Ken Lorkowski WB8HIW 1604 Norledge Rd., Akron OH 44305 216-733-5978.

SELL complete station Silent Key W2KOF: HW101, cal, HP23A p/s, Torrestronics Digital Freq Read Out. HM102, Shure mic, Cantenna, Fld Strength Mtr., Spkr, Ear Phones, Key. All manuals. $350. No shipping. W2NZG 201-427-3893.

HEATH IM2215 DMM, $90. Heath IT2250 capacitance meter, $130. OSI BASIC in ROM (tutorial), The First Book of OSI and an OSI C4P SYNMON Monitor IC, $3 each. You ship. S.A.S.E. inquiries. Paul K. Pagel, N1FB, 4 Roberts Rd., Enfield, CT 06082.

KENWOOD 2M allmode, TR-9130, KPS-7A, TK-1 like new. $500. Postpaid. N5CEN. 214-935-3930. Eves. 107 Ashwood Terrace, Marshall, TX 75670.

KENWOOD 820S, D104, beam, key, $599. Tempo S1 2/mtr H.T., $119. Evan, 66 Tremont, Medford, NY 11763, 516-289-7368.

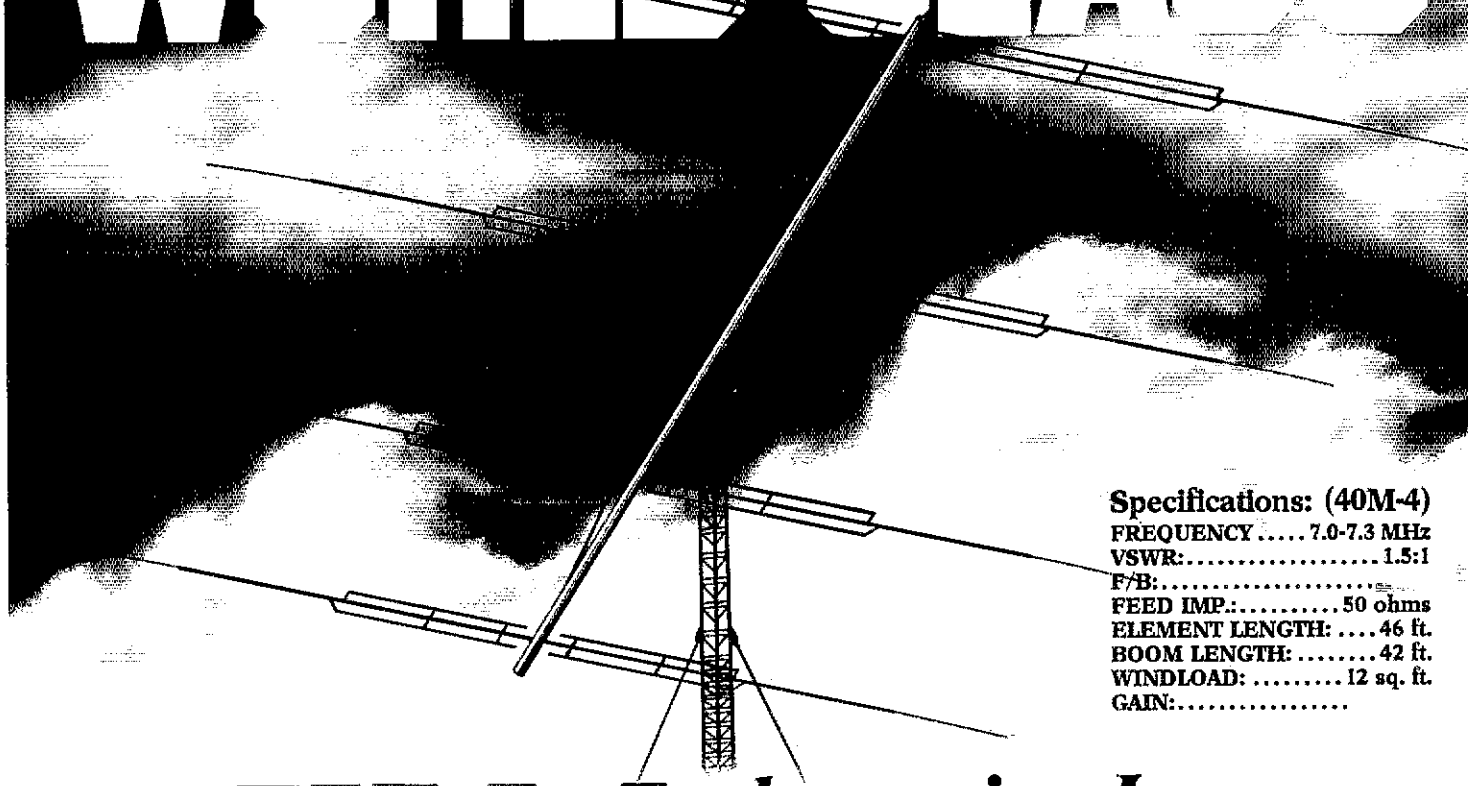
SELL-Telrex 10M 3el beam; Temp S1T leather case; Yaesu FT-202, 8 pr. xtals; Viking Ranger I; Hammarland Super-Pro SP200; RA34 supply 1kV, 1A-12Vac, 18A; Viking Mobile VFO; RCA #158 5" Scope; Make offers. W2JCI, 201-342-5743.

TEN-TEC 544, 262-G, $550; Yaesu FT-207-R, $179; Gonset GSB-201 linear $200; Heathkit HW-2036-A $150; Regency HR2-A w/GLB-400 Synthesizer $135; Wanted Alpha 374. William Fulcher, N4WF, 217 Bluegrass, Hendersonville, TN 37075.

DRAKE T-4XC/AC4/MS-4/W-4/D-104 mic/new set of 6JB6's/mint condition $375. Will ship UPS. K2QFX 201-752-4845.

NATIONAL NCX-5 transceiver with matching VX501 VFO console and NCX-A power supply/speaker console with all manuals, like new, will ship on receipt of cashier's check. Best offer. N3BRV, Jack Calhoun, 4010 Winchester Rd., Allentown, PA 18104 215-398-0584.

WORLD CLASS

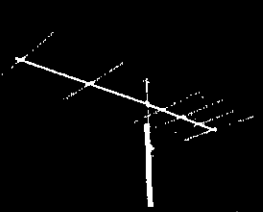


Specifications: (40M-4)
FREQUENCY ..... 7.0-7.3 MHz
VSWR: 1.5:1
F/B: .....
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: .... 46 ft.
BOOM LENGTH: ..... 42 ft.
WINDLOAD: ..... 12 sq. ft.
GAIN: .....

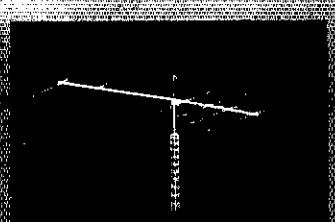
KLM electronics, Inc.
Full Line Performance

The incredible performance of the World Class KLM 40M-4 is used by many DX'ers as a "Standard of Comparison" in Competitive Antenna Equipment.

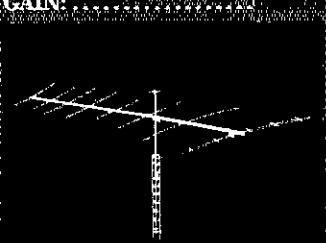
Obvlously, not everyone needs this type of Awesome performance, but its nice to know that the same performance proven design theory and quality construction have been carried over into our full line of quality antennas for all frequency ranges.



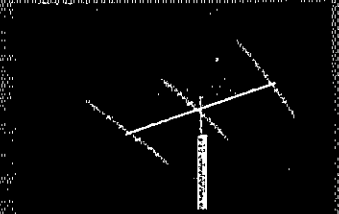
Specifications: (20M-6)
BANDWIDTH: ... 13.9-14.4 MHz
VSWR: 1.5:1
F/B: .....
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: .... 37 ft.
BOOM LENGTH: ..... 57 ft.
WINDLOAD: ..... 12.8 sq. ft.
GAIN: .....



Specifications: (30M-3)
BANDWIDTH: .. 10.1-10.150 MHz
VSWR: 1.5:1
F/B .....
FEED IMP.: .... 50 ohms unbal.
ELEMENT LENGTH: .... 35'6"
BOOM LENGTH: ..... 24'3"
WINDLOAD: ..... 7 sq. ft.
GAIN: .....



Specifications: (15M-6)
BANDWIDTH: .. 21.0-21.5 MHz
VSWR: 1.5:1
F/B: .....
FEED IMP.: ..... 50 ohms
ELEMENT LENGTH: ..... 25 ft.
BOOM LENGTH: ..... 36 ft.
WINDLOAD: ..... 8.5 sq. ft.
GAIN: .....



Specifications: (7.2/10-30-7LPA)
BANDWIDTH: .. 7.2/10-30 MHz
VSWR: ..... 2:1 typical
F/B: .....
FEED IMP.: .... 50 ohm unbal.
ELEMENT LENGTH: .... 46 ft.
BOOM LENGTH ..... 42 ft.
WINDLOAD: ..... 12 sq. ft.
GAIN: .....

And there's more!
See your local dealer or write to KLM, Electronics, P.O. Box 816, Morgan Hill, CA 95037.

HEWLETT-PACKARD SHF signal generators usable for satellite receiver alignment 3.8 to 7.6 GHz. HP 620A, HP 618B, and HP 618C, $600 each or best offer. W. Drennan, P.O. Box 3434, Port Arthur, TX 77640.

SANTEC 1200 H.T. new, just won at hamfest, $200. Wanted: Bearcat Scanner with aircraft. Wanted: Ten-Tec amplifier for Argonaut 509. Will trade and deal with Santec 1200. R. McConnell, KB5VO, Star Rt. Box 188-A, Glenmora, LA 71433, 318-748-4129.

HUSTLER 5BTV $75. Tel. 415-526-7345. Ron, W6RQZ.

KENWOOD TS-830S, SP-230; microphone, $700. Paul Adler NB5Y, 214-596-9179.

INVERTER: 350 Watts, 12V. Tel. 415-526-7345. Ron, W6RQZ.

OLDIES Clean Out: RME69 $95. Johnson Invader 200 $150. Thunderbolt $395. 6+2 xmiter with little VFO $78. CE20A VFO $75. Meisener Signal Shifter $68. National SW173 $78. SW98 $68. SW54 $38. Hallicrafters Torando SR500 with AC $195. SR40 $55. SR20R $48. SX85 $48. Eico 720 $55. DX60 $45. DX40 $45. VF1 VFO $25. 301 Rcvr $125. HQ145 $128. HX50 $128. Swan 250 $195. 175-140 or 120 single banders $95 each. Harvey-Wells 50C $68. Instructorgraph with tapes $48. F. E. Coble, N4LX, 251 Collier Ave., Nashville. TN 37211. Phone 615-833-2724.

TS820S w/Astatic 10-DA mike-$600, TH3-MK3 tribander w/rotator-$200, Astron 13.8V/12A pwr supply. N6EFO, Louis, 714-622-3248.

HEATH HW101, power supply, CW filter. $250. Tim, N2BCF, 609-589-0997.

COLLINS — 75S3, 32S1, 516F2, winged emblem. Mint. $650. No ship. Atlanta area. Ray N5DIJ 404-253-7572.

HEATHKIT H-8 Computer, 32k, 3 port I/O, VDT/cassette I/O, two tape decks, w/BASIC, Editor, Assembler, Debugger software, and documentation — $200. N6EFO, Louis, 714-622-3248.

MADISON "Don & Tom" Picks: Yaesu FT726R $699; FT77 $499, accessories stock; KDK2030 $259; TR7950-call; TR5 $600 (limited); TenTec Corsair $1025; latest Rockwell KWM380 $3995; AEA CP1 $189.95; Kantronics Interface $139; Hamsoft, hamtest-10%; -10%: Janel, FoxTango, Welz, Sherwood; Butternut HF6V $125; DB Enterprises 2elQuad — stock; TH7DX $369.95; HD73 $99; B&W AV25 vertical $85; Used, guaranteed: TS520S $395; 30S1 RE $1600; Belden 9258 RG8X 19¢/ft; Amphenol PL259 silverplate $1.25; UG176 adaptor 30¢. Prices FOB Houston, subject change, prior sale. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268 (inquiry) 1-800-231-3057 (orders). Mastercard/Visa.

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.

WANT: Kenwood SM-220/BS-5 scope for TS-520S, P. Beautrow, N6IXE, 111 Sequoia Glen, Novato, CA 94947, 415-897-8466.

WANTED: Out-door P.A. speakers. Send details to WB2OTC, James Brewer, Sr., R.D. #1 Box 27; West Winfield, NY 13491 or call 315-822-6773.

FT-101ZD-MK III. Absolutely mint, with mike, $695; N2ZM 201-773-0406.

HEARD THE Latest? You will if you read The Westlink Report (formerly HR Report). Only $22.50 for 26 issues. Fewer words-more facts. Send $1 for two sample issues (refundable for $3 if you subscribe). Poco Press, Offer #1711, 11119 Allegheny St., Sun Valley, CA 91352.

WANTED: Collins CW and RTTY filters for 75S-3B/C. State model/bw and price. Ron Lawson, NA2O, 1 Pleasant St., Leroy, NY 14462.

KENWOOD TS-520S $400. Azden PCS-4000 $220. Eico 753 SSB Transceiver $35. WB3AGL 814-265-1779.

FOR SALE: All Ten-Tec station-Argosy, p.s., mic, ant. tower/SWR bridge 277. All excellent cond. Best offer-W2YLH.

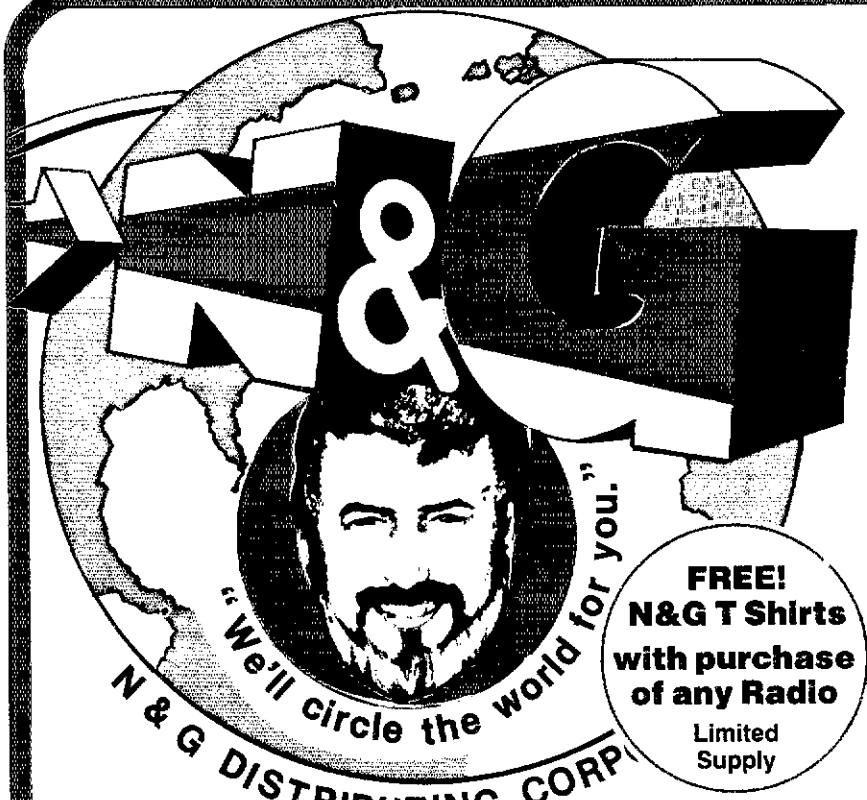
BOB, WB7PFO, has AEA, Ameco, Amidon, ARRL, Astron, Azden, B&W, Bencher, Butternut, Cushcraft, Daiwa, KDK, Larsen, MFJ, Nye Viking, Ten-Tec, and more! The Rocky Mountain area's newest ham dealer. RJM Electronics, 4204 Overland Road, Boise, ID 83705. 208-343-4018.

SALE-four transformers-110V-60V two 75 Amp-C.T. 12V-secondary weight 75 lbs. 8×8×6.5 Variac-type Q-115V-two KVA. Decode-condenser 219-M-General-Radio. Link-belt. Heavy duty speed reducer input 1750 RPM. Output 50 torn 865 lbs. LM13 freq. meter-with-book-power-supply-in-cabinet-two-Sprague-Vitamin Q-capacitors-17. mfd-5000 V. Sprague 4 mfd-4000V. Aerovox 2 mfd-5000V, any fair offer. EQ200P equalizer $40. Kenwood M.C. 50 mike $25. Pagel-VHF preamp $20. 301-566-6060-W3VP-zip 21229.

COMPLETE Microlog CW RTTY ASCII AKB-1 keyboard AVR2 terminal unit-split screen-expanded memories-reverse image-text magnification-ten soft partitioned memories-brand new NEC green phosphour monitor-all cabling, manuals ready to operate. AFSK generator or FSK $1200. Firm. AK2I 609-428-5924.

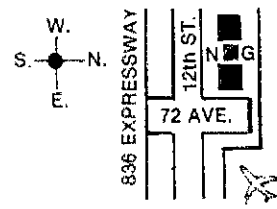
HAM STATION-Will sell or swap. WB2EUF.

REPAIR SERVICE by W2YJ: All type Amateur gear from newest handhelds to older tube rigs. 20 years experience. G. Krickovich, 47 Wren Ave., Lancaster, NY 14086. 716-684-3562 after 5 P.M.



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

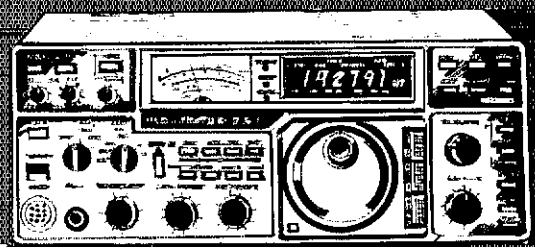
Call us TOLL FREE: for our Low Prices. . .

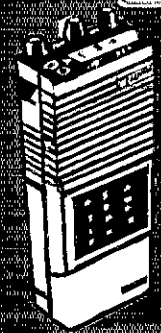
1-800-327-3364

(Dade) 1-305-592-9685 (Broward) 1-305-763-8170

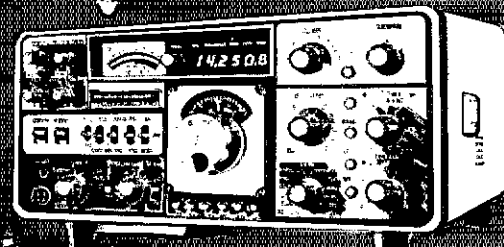
Prices subject to change without notice.

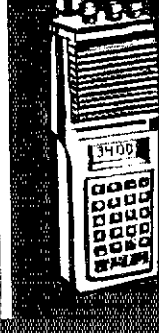
ICOM





YAESU





WILSON Mark-11 $75, MFJ Explorer-II shortwave converter $50, N9BPD 312-356-1939.

COLLINS 51-S1, spkr; Heath SB-110, SB-600, HP-23; TR44 rotor; Gonset G50; Bob-K1SF-94 Chestnut St., Spencer, MA 01562.

FOR SALE: Hallicrafters HT-37 mint condition, used only couple hours total; Hallicrafters HT33A w/spare PL-172 tybe; Tech. Material Corp. GPR-90 receiver; Palomar Engineers 2kW antenna tuner (PT2500-A); Elmac AF-67 w/AC power supply; transformer coupled 2kW ant. tuner; two 7.5kVA Acme transformers 240/480V prim; 120/240 Volt secondary; Stabiline type EM 10089 52 Ampere A.C. regulator for 115 Volts. 50 or 60 cycles, 98 to 132 Volt input; Variacs 20 Amp 240 Volts, also 120 Volts; isolation transformers various sizes; make offer. Drake R-7/DR7 receiver, mint. $900; Boonton type 260-A "Q" Meter $150. Two 4CX1000A's new. Merle J. Newton K2KVU..

SELL Yaesu FT-102 with SP102 spkr, MD-1 mic. & nar. SSB filter. $750. Ameritron AL80 linear amp. late model in sealed carton, $425. Yaesu FRG-7 $150. All mint. You ship. W6OWD 415-728-7136.

KENWOOD TS820 (digital) with Shure 444D, mint condition, $485 firm, N9BPD 312-356-1939.

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.

SELL 10 meter converted CB, $65. Dentron power/SWR/VOM, unit works on 3.5-150 MHz, $25. Chet Peugh KA9FXK. Callbook.

WANTED Heath VFO model HG10 in good condition. W2LYZ 212-979-3823 or mail.

FOR SALE: Swan 270 B, needs some work on h.f. Swan VOX Shure Mike 444D. Swan Mobile Mike, Autek Filter. All for $125. Swan 1200X linear amplifier with spare set of 8950's tubes, good condx. $250. Heath Keyer, good condx. $20. All with manuals. I ship. Everett Priest, W8DDH, 7 Ashgrove Ct., Franklin, OH 45005. Phone 513-746-8007.

KENWOOD TR-2500 ht with extra battery pack $210. WD8KNL, 942 Amherst, Massillon, OH 44646.

AUTEK QRM eliminator QF-1A AC-115 volt audio filter like new $40, John Bittens, W8WTK, 6463 Buckingham Dr., Parma, OH 44129.

FOR SALE: Heath HW-101 with HP23-A (110 Volt) and HP-13A (12 Volt) power supplies. HW-101 and HP23-A recently (August, 1983) overhauled by Heath and in unopened Heath packaging. Complete with manuals and Heath invoices verifying overhaul dates. $325. You ship. W1WF Box 103, Windsor, MA 01270. Phone 413-684-3903.

SSTV Sale: Robot 400, RCA TC1000 camera, Sanyo mon. All like new, no modifications or scratches. $550. Package only. K6GLJ 805-398-2111.

SELL Hustler 4-BTV vertical, little use. $35 plus UPS W2EZM, 431 Oakland Ave., Maple Shade, NJ 08052, 609-663-8137.

KENWOOD TS-530S with CW, narrow SSB filters, and WARC bands, like new, $525. Vibroflex Original Deluxe (chrome) $38. Lightning Bug $30. Vibro-Keyer $30. Chuck, W6REO, 512-655-1233.

DRAKE TR-7 with two accessory filters, mint. $850. You ship. 609-627-5683. WA2LYZ.

FOR SALE: 3 bdrm 2 ba one yr old house on 4 level acres 38 mi NE of San Diego. New well & city water on property with complete underground irrigation system. Sale includes complete 1kW station 10-160. 50' crankup tower, KT34A, 2 mtr beam & vertical. Long wire & inverted V with untold possibilities. No TVI or line noise. Price $176,000. K6BPP, 1329 Pine St., Ramona, CA 92065.

FOR SALE: HW-101 spkr pwr supply, manual, $250. MO CF CK gets it. SX-101 rcvr. 500 to 5K filters plus varnotch filter $150. Joe Schnur, W8CYG, 1581 Edler, Lake Village, MI 48632.

1 Drake TR4CW with speaker & power supply. 1 Dentron GLA-1000B linear. 1 Dentron Super Tuner. 1 Palomar 310X Preamplifier. 1 Heathkit HM-2140 SWR meter. 1 SA-1480 Remote Coax Switch. 1 Autek MK-1 keyer. 1 chrome Bencher Paddle. 1 Vibroplex. 1 J-38 key. 1 B&W Coaxial Switch. 1 Drake 2NT Xmtr. 1 Heath HG-10 PS. 1 DM-104 mike. 1 CDE Roter & Control. All for $1000. W4PBN 615-732-4620.

RBG-2 Navy receiver, Type CHC-46140, Hammarlund manufacture 1943, 0.54 to 31 MHz, working order, unmodified with manual. $180 shipping prepaid. W4FL, 229 Bimini Road, Cocoa Beach, FL 32931.

WANTED: Heathkit HG-10B VFO transmitter control. Jim Simonson, 415 5th Ave. N.E., St. Cloud, MN 56301, 612-253-2167.

OSCILLOSCOPE, Heathkit Model IO-4555 single-trace, DC-10 MHz, laboratory-grade instrument. Guaranteed brand new condition. 2 yrs old. $325. Next day shipment by UPS. KAØAFG, 517 South Lakeshore, Spirit Lake, IA 51360.

PROTECT your Bencher Key. Rigid Plexiglas cover $9.95. George Chamgers, KØBEJ, 302 S. Glendale, Coffeyville, KS 67337.

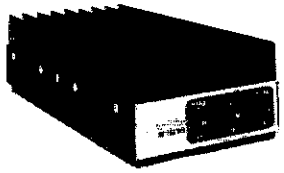
WANTED: One or two power transformers for Heathkit DX-40s. Chester Tourtelotte, KA1IIA, 24 Kimball St., A-12, Richmond, ME 04357. Tel.: 1-207-737-8615.

SELL: DRAKE TR-4Cw with MS-4 power supply and speaker. Like new, used less than 30 hours. $325 plus shipping. 1-404-288-5296 nights and weekends. Kevin Tyre, 3944 Appleton Ct., Decatur, GA 30034.

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

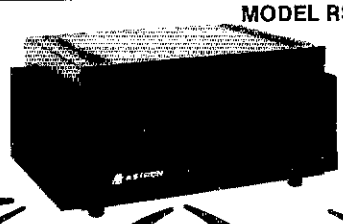
ASTRON POWER SUPPLIES

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

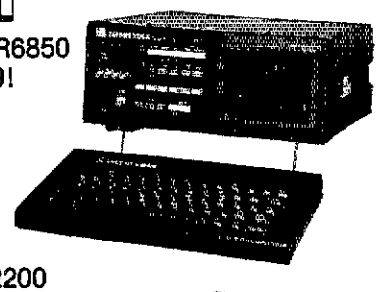
Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

MODEL RS-50A



H&L Communications Sale!

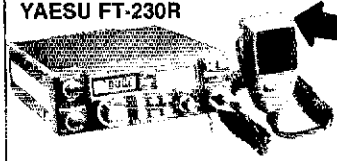
CWR6850
$849!



CT2200
KB2100 $959!

CWR6700 Receive Only Telereader	$439
CWR6750 Receive Only Telereader	629
DS3100ASR Deluxe RTTY Terminal	1699
MPT3100 Message Processor Terminal	2199
RS2100 1" Scope w/Loop Supply	289
ST5000 RTTY Demodulator	219
ST6000 Deluxe Demodulator/Keyer	649
DSK3100 Disc Storage Unit	829
ARQ1000 Amtor Error Correcting Terminal	649
KG-12 12" High Resolution Monitor	169

YAESU FT-230R

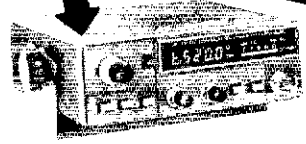


List $359
Call For Your Special Price

YAESU FT-726R

List TBA
Call For Your Special Price

KDK FM2030

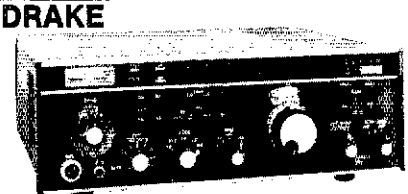


SALE PRICE $269!

YAESU FT-77

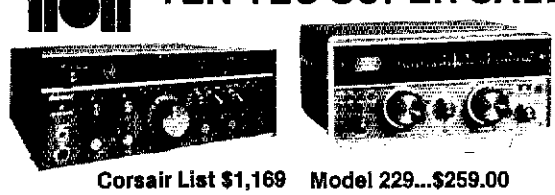
List Price $599.00
Call For Special Price

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

Model 229...$259.00
Model 4229 Kit...$189.00

NEW 2591
NOW AVAILABLE
$275.00

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	39
ST40C Base Charger	69
ST-50083 Ni-Cad Battery	29

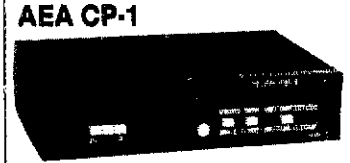
TOKYO HY-POWER LABS

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
V75	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-30	$25	PB144	$25
PB-50	$25	PB220	$25

DAIWA CN-620B $111!
160/2 mtrs
20/200/2000 wts

BENCHER PADDLE
BY-1 Blackbase $39
BY-2 Chrome $49

MFJ MODEL 104 On SALE For Only $33!

202B Noise Bridge	$54
250 2KW Dummy w/Oil	31
260 300W Dry Load	25
262 2KW Dry Load	59
422 Keyer w/Paddle	89
482 4 MSG Mem Keyer	89
484B 12 MSG Keyer	125
494 Keyboard	249
496 Keyboard	299
525B RF Processor	109
624 Phone Patch	59
901 300W Tuner	54
940B Tuner w/Meter	72
941C Tuner w/Meter	79
949B Deluxe Tuner	129
989 Deluxe 2KW Tuner	289

KANTRONICS

THE INTERFACE Reg. $169.95 SALE $149.00!

OTHER KANTRONICS ITEMS

Mini Reader	$249	Hamtext VIC-20	99
Mini Terminal	259	Hamtext Model-64	99
Apple Hamsoft	79	Atari Hamsoft	49
VIC-20 Hamsoft	49	TRS 80C Hamsoft	99

TEXAS TOWERS

DIV. OF TEXAS RF DISTRIBUTORS INC.

MasterCard VISA

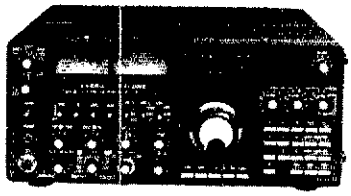
1108 Summit Ave., Suite 4 / Plano, Texas 75074

ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri.: 8:30 a.m.-5:30 p.m. Sat. 9 a.m.-1 p.m.

TELEPHONE: (214) 422-7306

YAESU SALE!



FT-ONE

GENERAL COVERAGE—ALL MODE DELUXE SOLID STATE TRANSCEIVER

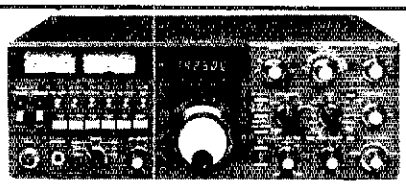
Buy Now and Receive These Accessories Free:
300Hz CW Filter..$FREE 600Hz CW Filter..$FREE
800Hz CW Filter..$FREE 6Khz AM Filter..$FREE
Memory Backup..$FREE Installation.....$FREE

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

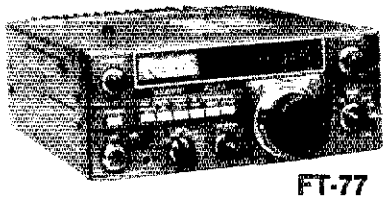
Computer Interface now in development—Own Tomorrow's HF Transceiver—Today!! Manufacturer's Suggested List Price $1499 Call For Your Special Price Today!!



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 $$$



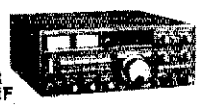
FT-77

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 $$

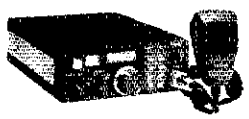
FT-230R 2mtr FM.....$359
FT-730R 440Mhz FM.....$399
- 10 Memories
- Two VFO's
- LCD Readout
- 25W Out
- Memory or Up/Down Scan

Call today for Special Discount Price & Save $$



FT-726R VHF/UHF
All Mode Tri-Band Transceiver
- 50-54 Mhz
- 144-148 Mhz
- 10 watts output on all bands
- 430-450 Mhz
- 21, 24.5 & 28 Mhz option available soon

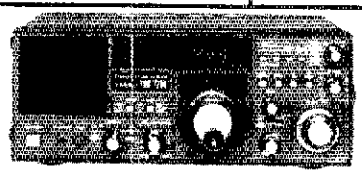
Please Call For Price & Delivery Information



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!!

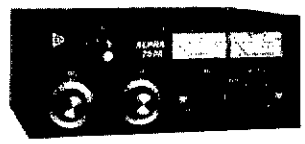
FT-208R 2mtr HT.....$319
RF Out: 300mw/2.5W

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

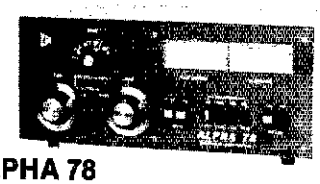
Accessories Available:
LCC-8 Leather Case.....$35
YM24A Spkr/Mic.....$39
FNB-2 Nicad.....$29
NC-8 Base Chgr.....$99
Call for Special Yaesu Discount Prices!!

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 $$$!!

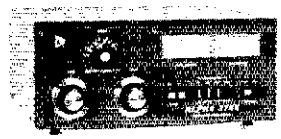
ETO ALPHA



76PA $1699



ALPHA 78

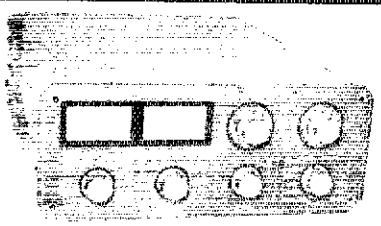


ALPHA 374A

SPECIAL SALE PRICES

Model	List	Sale
77DX	$5450	*
78	$3495	*
374A	$2595	*
76A	$1985	*
76PA	$2395	*
76CA	$2695	*

***Sale Prices Too Low To Print!! Call For Your Special Prices!!**



TOKYO HY-POWER HC-2000 Tuner

$339.95 List Price
SALE $289.00
- Heavy Duty 2 KW Construction
- 160-10 Meter Operation (including WARC Bands)
- Calibrated Vernier Dial
- Built-in SWR and Watt Meter
- Built-in 12 Position Antenna/By-pass Switch
- Built-in Balun for Balanced Feedline

MasterCard VISA

TEXAS TOWERS

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Telephone (214) 422-7306

AL-80 Compact QSK CW and SSB Kilowatt Amplifier

At the suggested retail price of $699.50, the Ameritron AL-80 is one of the lowest priced kilowatt amplifiers available.

- For CW and computer enthusiasts, the AL-80 is the only amplifier in its price range to offer QSK (full break-in).
- Individually tuned broad band pi network input presents a 50 ohm resistive load to the transceiver.
- The AL-80 incorporates the rugged 3-500Z tube.
- Compact size; 12"W x 6.6"H x 11.8"D. Weight: 43 lbs.

Frequency Coverage: 1.8-21.5 MHz amateur bands. Export model includes 10 meter amateur band.
Power Input: 1500W PEP SSB, 1000W CW and RTTY.
Drive Required: typically 65W PEP on SSB and 55Won CW.
Intermodulation distortion Products: In excess of – 33 dB below PEP.
Power required: 120 volts 50/60 Hz 15 amperes or 240 volts 50/60 Hz 7.5 amperes.
Suggested retail price: $699.50

AMERITRON, Division of Prime Instruments, Inc.
9805 Walford Avenue • Cleveland, Ohio 44102 • (216) 651-1740

JUN'S ELECTRONICS

VISA

Our Prices Are Competitive

800-882-1343 Culver City, CA

For Orders Only Please Call
For trades or other information call our headquarters in Culver City.

800-648-3962 Reno, NV

YAESU FT-ONE

FT-720RU...$239.00
440/450mc. UHF-Mobile
FT-780R...$399.00
430/440mc. All Mode for Oscar Operation

ICOM IC-730

BIRD Wattmeters

ICOM IC-740

ICOM 2-AT 3-AT 4-AT

YAESU FT-102

YAESU FRG-7700

YAESU FT-208R FT-708R

Listen to foreign broadcasts with the All New Yaesu FRG-7700 or ICOM IC R70. Call for special prices.

ICOM IC R70

Call Us On Our 800 Numbers For Our Specials! **"Aqui Se Habla Espanol"**

3919 Sepulveda Blvd.	460 E. Plumb Lane, #107	In San Diego P.O. Box 1762
Culver City, CA 90230	Reno, Nevada 89502	La Mesa, CA 92014
(213) 390-8003	(702) 827-5732	Call (714) 463-1886
Mon-Sat.: 9:00 a.m. to 6:00 p.m.	Tues.-Sat. 10:00 a.m. to 4:00 p.m.	Mon.-Sat.: 10:00 a.m. to 5:00 p.m.

ARGONAUT 509, mic, keyer, CW filter, cal., ACPS, manuals, mint! $325. WA7FAY, John Conrad, 602-774-1752.

JOHNSON 240-304-2 Viking Invader 2000 Transmitter (2kW PEP SSB, 800W AM, 1kW CW, 80-10 meters, crystal filter, two PL-175A tubes in final), p/s, manual, $450 negotiable. New 4-CX1000A, socket, $190. Uship, John, WØYDX, 507-835-2627.

EIMAC 8874's, new-$160, 3-500Z's, new-$75. Schaaf, W9ZR, 1-414-434-2938.

TELETYPE Model 28RO. Ready to plug into Robot 800. Excellent condition. $150. Immediate shipment. KAØAFG 712-336-1354.

RADIO AMATEUR Callbook Special. $17.95 U.S., $16.95 Foreign, $33.90 both, add $3.60 for Map Library, Shipping $2 (1 book) $2.50 (2 books) (add $1 zone 6-8) — From the CB to 10 — wire & cable-Copperweld and more people: Certified Communications, 4138 So. Ferris, Fremont, MI 49412.

WANTED: Operating Heathkit HO-10 Monitor Scope. W2EKL, P.O. Box 746, Melbourne Beach, FL 32951.

NEW Eimac 3-500Z. $80. W1TAK.

GALAXY V Mk2, ps, manual. No modulation; RX CW ok. $100. W2IMS 503-648-1857.

KENWOOD TS-820 purchased new 1982, very clean, $450. Bill Dean 615-292-9715.

ICOM 22S transceiver, excellent condition in original container $125. Buyer pays postage. WA1HMW, 57 Pinewood Road, Bolton MA 01740.

TENTEC OMNI-D Series B+, 500 and 1.8 kHz filters, n.b. 242-MO supply, 243 remote VFO, mike: $750 you ship. KE5C, 817-774-8376.

SELL: HW-16 xcvr and HG-10 VFO. Want: Kenwood TV-506. KI7W, 1729 S. Fenway, Casper WY 82601. 307-234-1408.

IC-730 w/AC supply, xtal CW filter, & mobile mount. $650 & shipping. K3DMG 216-493-8553.

KWM-380 $2500. 75S3B, 32S3, 516F2, 312B4 (R/E) $1250; (W/E) $995. 312B5 $350. 312B4 (R/E) $275. 75S-1 $200. KWM2 (R/E), 516F2 $650. 351D2 (new) $65. James Craig, 32 Birchwood Drive, Rye, NH 03870. 1-603-964-6658.

TEXAS Instruments Home Computer peripherals: Expansion Box, Disk Drive, Disk Controller and 32K RAM card-new $475. Knight 6m AM transceiver, $50. K2UOR 203-673-2399, 124 Winding Lane, Avon, CT 06001.

TS-120S, excellent condition, $385. Dentron CM-U solid-state transceiver to amplifier matching device $35. KB4FQ, 919-844-3895 evenings.

DRAKE R-4B $225, BC-221B freq. meter $30, QST 7/76-3/83 $40. I pay shipping. Mike Olmoen, 4501 Mineral Pt. Rd., Madison, WI 53705.

CRYSTALS: Build something! QRP rigs and other. See "Weekend Projects" $3; ARRL, July 1982 QST. We have crystals and sockets. FT-243 General, Novice all frequencies. .01%, 4001 - 8700 kilocycles (including 30M doublers), $2, minimum five $1.75 each. 30M fundamentals 10100 - 10150, .01% $2.95, five $2.45. 3500 - 4000 $2.95, five $2.50, 160M $3.45, five $2.95. Sockets 50¢. Postage - Airmail 25¢ per crystal. "Crystals Since 1933" WØLPS. Stamp for 1700 - 60000 kilocycles-listings-circuits. C-W Crystals, Marshfield, MO 65706.

THE CAT's Out Of The Bag — Great reviews on our new professionally written, band opening predictor. Priced right! Commodore computers. Free info from Base (2) Systems, 2534 Nebraska, Saginaw, MI 48601, 517-777-5613.

A-TRONIX CR101 Code Reader, mint cond. $125 or best offer. I pay shipping. KD8CQ (KA8HWZ) 216-327-8833.

QST's WANTED. March, 1916; May, June & July 1917. Any reasonable price paid. Joseph Mullan, W3RLR, 217 Northway, Baltimore, MD 21218. 301-323-0943.

YAESU FT-227RB two meter mobile with YM-22 touch tone mike. Five memories and scan feature. KB9DO, 522 Bruce Ave., Milan, IL 61264 309-787-0004.

FOR SALE: all factory alligned HW-101, HF-23B, HM-103 power meter, two HD-234 coax ant. sws. station speaker, mic. MFJ-J-941 B ant. tuner, Palamor multi speed keyer, navy keyer, Cantenna, IM-4100 frequency counter, asrtd test tapes, manuals. Lost interest. 2 hrs. air time, all $650. U ship. Ed Balcer, 10 Milly Pitcher Ct., Red Bank, NJ 07701.

WANTED: Knight-Kit (Allied Radio) R-100A receiver in perfect condition. John Curtis, WB8AHH, 2711 Montcalm Road, Columbus, OH 43221. 614-488-4647.

WANTED: Drake L4-B in good condx, for cash. K2AK 212-358-6837.

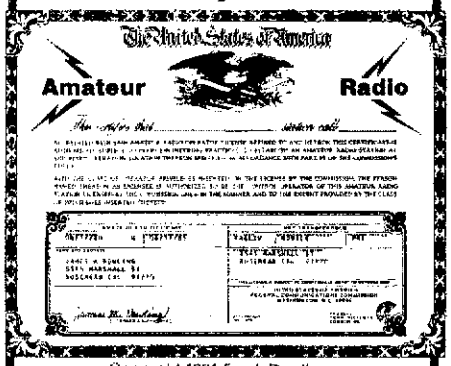
SALE: Heath SB-104A with Fox Tango improvements, SB-604, PS-1144 and HD-1410 keyer with all manuals. Mint condition. An $800 value. $500 or make offer. KB7YY. 206-675-5790.

NEED an exciting DX presentation for your Christmas banquet? Consider "30 Great DXpeditions" and "Three Clippertons Revisited" — live narrative and color slides/movies spanning thirty years. Accepting December engagements only. Details WA4WME, 2308 Zinnia Court, Killeen, TX 78541.

HEATH SB 102 - 10- 80m xcvr, p/s, manual, CW filter, EV638 mic, speaker. Retubed & aligned plus many new parts installed. $375 KA3HFC Ron 301-663-8572.

HALLICRAFTER SX101A good condition except off-on switch. Swan 600T output needs work. Both now on air. Best offer for both. Pick up only. W2IEI, 914-668-1268. After 7 P.M.

WANTED: Heathkit DC mobile power supply for HW100-type transceivers. KE6VL, 2291 Notre Dame, Chico, CA 95926.



impressive in all ways
ul Rig! Excellent Re
(physically and tech
Corsair is everything

FREE CRYSTAL FILTER and 30-DAY MONEY-BACK GUARANTEE

Just buy your Ten-Tec Corsair between Sept. 15, 1983 and Jan. 15, 1984. See your dealer for details.

ALABAMA
ACK Radio Supply, Birmingham

CALIFORNIA
Ham Radio Outlet, Anaheim
Ham Radio Outlet, Burlingame
Ham Radio Outlet, Oakland
Ham Radio Outlet, San Diego
Ham Radio Outlet, Van Nuys

DELAWARE
Delaware Amateur Supply, New Castle
Amateur & Advanced Comm., Wilmington

FLORIDA
Amateur Electronic Supply, Clearwater
Mike's Electronic Dist. Co., Ft. Lauderdale
Amateur Electronic Supply, Orlando

GEORGIA
ACK Radio Supply, Atlanta
Doc's Communications, Rossville
Britt's 2-Way Radio, Smyrna

IDAHO
RJM Electronics, Boise
Ross Distributing Company, Preston

ILLINOIS
Erickson Communications, Chicago

INDIANA
Lakeland Electronic Supply, Angola
The Ham Shack, Evansville
Electrocom Industries, South Bend

MARYLAND
The Comm Center, Laurel

MICHIGAN
Purchase Radio Supply, Ann Arbor
Omar Electronics, Durand
Michigan Radio, Mt. Clemens

MISSOURI
Ham Radio Center, Inc., St. Louis

NEVADA
Amateur Electronic Supply, Las Vegas

NORTH CAROLINA
F & M Electronics, Greensboro

OHIO
R & L Electronics, Hamilton
Ken-Mar Industries, North Canton
Amateur Electronic Supply, Wickliffe

OKLAHOMA
Radio Incorporated, Tulsa

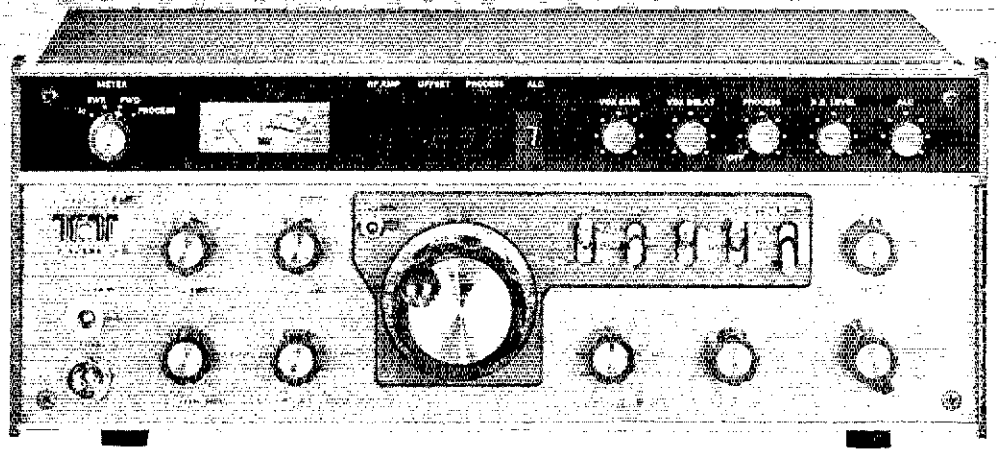
PENNSYLVANIA
Westech Electronics Co., Pittsburgh
Supina Electronics, State College

TEXAS
Madison Electronic Supply, Inc., Houston
Texas Towers, Plano

VIRGINIA
EGE, Inc., Woodbridge

WISCONSIN
Amateur Electronic Supply, Milwaukee

CANADA
R & S Electronics Ltd., Dartmouth, Nova Scotia



Read what owners say about TEN-TEC Corsair:

Completing my 53rd year as an active Ham-DXer, Contester Rag Chewer etc.—the Corsair is an excellent transceiver and performs superbly for me on both CW and SSB **W1BIH (P42J)**

A fine piece of equipment—thanks for building it in America **KV8Q**

Radio is impressive in all ways. **KA8RQK**

Wonderful Rig! **WB2RBA**

Excellent Results! **VE1CCK**

Finally! A rig made for the RTTY operator—Excellent gentlemen, absolutely excellent! **N4EIV**

Beautiful (physically and technically) **W4SFT**

Thank you for an American radio & the 1 year warranty. **KA3KMK**

Consistently get good audio reports on SSB. **N8BAR**

The Folks at Ten Tec are reason enough to purchase their products. **K4CJX**

Corsair is everything I hoped for in a transceiver. **W8DRW**

Extremely Ham oriented radio made for high performance and operating excellence. **KB4IL**

Excellent equipment. **W2LOG**

Outstanding Radio! **W9GIN**

Engineering is **Superb!!** **W2ZSX**

First QSO Report—"5x9 Plus With Beautiful Audio." **K5SP**

A fine instrument. **K6AY**

I am "convinced!" **K5PXM**

You have proved that Americans can still make the Best. **K8WYH**

Nice, neat, not crowded. Receive section best I have used. Great on RTTY. **W0YFR**

Superb receiver. **W9DWT**

A perfect performer and a pleasure to operate. **W3LKA**

I like the Ten-Tec quality and service. **W4DDK**

Well-Built—EZ to Operate. **VE3NZQ**

It is a great pleasure to deal with a company which gives their customers some real attention and service. **W4BW**

And our thanks to all the others whose comments we didn't have room to print.

CORSAIR features 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).

See Corsair at your TEN-TEC dealer, or write for full details.

TEN-TEC, Inc., Sevierville, TN 37862

SELL: Meissner Signal Shifter, $50, RME 152R converter, $40; Clegg 22"ER", no case, $35; H-P FM Detector 417A, 10-500 MHz, $20; Collins Moniter 1012 for 3 455kH inputs, $25; TS186D Frequency Meter, 100-10,000 MHz, with case, $25; TS909 Null Bridge with Decapot, manual, cables in Hemetic aluminum case, 9½ × 11½ × 13½", new, $20; Dolinko-Dolins Fixed Vacuum Capacitors, 6-50 mmF, $18; Taffet TS-617 Q Meter, cover, $50; TV collectors note: Supreme Video Tube Tester, complete, near mint, circa 1951, $35; GRE 10.7 MHz crystal filter, specs, 3/$5; Sylvania ECG 1058 4.4 Watt audio chip, specs, $3/5. All plus shipping. Lisalus, 116 Orton, Caldwell, NV 07006, 201-226-7943.

TOWER-80 feet, self supporting. Sturdy Rohn sections 3 WN, 4N, 5N, 6N, plus top mount. $800 pick up only. W4LMJ, 200 Lake Drive, Sterling, VA 22170. 703-430-3842.

COLLINS WANTED!! Looking for Collins CT-2 cable trough. This is a plastic duct that attaches to the back of the shack table and the station cabling is contained within it. Tidies up an otherwise "rat's nest" of wires. Was mentioned in S-line sales brochures of the early to mid-sixties. Do you have one and don't know what to do with it? Contact AC1Y at ARRL Hq.

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.

TEN-TEC Triton-IV 413-665-2746 W5WY.

160 METER Dipole 110' long, coax-fed $42.50. Tom Evans W1JC, 113 Stratton Brook, Simsbury, CT 06070.

HENRY K-2000 linear 10 thru 80 with pair 8873 including ps in case size of TS820. Only 20 hours perfect condition $475. Ultimate Transmatch Murch UT-2000 A $75. Dovetron MPC 1000 R-the DX man's Terminal Unit $450. Best offer. K7BHI 619-728-2668.

WANTED: Copy of the Phillips Code published 1968 by Vibroplex. KE6VL, 2291 Notre Dame, Chico, CA 95926.

TERMINALL I RTTY interface and terminall unit for the TRS-80 Model I computer. Used very little. KB9DO, 522 Bruce Ave., Milan, IL 61264 309-787-0004.

FOR SALE: Complete mint IC-730 station PS15 power supply desk mike, dustcovers, original boxes, manuals, all for $630. KC3DJ ex-WB3EGH, 215-896-8343.

WANTED: HP Audio Oscillator Model 200. W6EBY, 415-327-8919.

COLLINS WANTED: 312B-4 Speaker Console. Contact K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

IC 22S w/2 antennas, mike, brackets, mint cond. $170. WA1ZQE, James Kelly, 4 Willow Ave., Salem, MA 01970. 617-741-1856.

VIC-20 Code Practice Programs. Morse lessons & Morse text both on cassette for $8. WA6JHW/7 55W700N, Spanish Fork, UT 84660.

KDK REPAIR by former KDK Service Center Manager, Mark Thomas, N4FMC. You know you'll get qualified service if you send your KDK with a note describing the problem to: High Technology Service Center, 8742 S.W. 192 St., Miami, FL 33157. 305-255-7660.

ROBOT 800 RTTY Terminal, low tones, with book and all cables, in original carton, new, hardly used, $375. Pete Buehner, KC8ER, Eastlake, OH 44094, phone 216-951-0244.

FOR SALE: Heathkit SBA-104 ss transceiver. Complete system including Heathkit HP-1144 AC power supply, SB-604 speaker, SBA-104-1 noise blanker, microphone, assembly manual, and operational manual. Richmond Brouker, W1YXQ, 8 River Road, Unionville, CT 06085. Phone 203-673-2976 after 5 P.M.

MOTOROLA 2-meter repeater, two 60W tx, rx, ps, audio control. All housed in cabinet. Pick up. N8EMR, Gary Sanders, 614-457-4595.

SALE-Viking Valiant $100, Viking Ranger-1 $40, National NC-109 receiver $50, Meissner 150-B military surplus transmitter, $200, operate or build two High-power linears, spare 813's $40 each, other spare tubes with unit. HQ-170 receiver $80, Subraco MT-15X mobile xmtr with Gonset ham-A.M. converter $50, WB2FHP 516-283-3326.

TEN TEC Triton IV, 262G pwr, CW filter, manual $400, Charles Powers, 34 Burke Ave., Towson, MD 21204, 301-321-1149.

IBM-PC RTTY. CompRtty is a comprehensive new RTTY communications program for the IBM-PC. Features include: all standard ASCII and BAUDOT speeds, selectable parity, split screen display with status, hardcopy, diskcopy, key-string detect for autostart/stop, text file transfer, autologging, 12 programmable messages. Requires 64k PC-DOS 1.1 or 96k PC-DOS 2.0, disk, and an RS-232C compatable TU. $50. David A. Rice, KC2HO, 7373 Jessica Dr., N. Syracuse, NY 13212.

OSCAR: Icom IC-451A $595, IC-251A $425, Mutek IC-211/251 front end $99, IC-551D $425; KLM 144-16CW/CS1 $75, Atlas 215X $275, Atlas: DMK mount $25, 220CS $95, VX-5 voxcw $40; Shure 444 $25; Clegg All bander 1-30/2m SW converter (1)/80 QST) $75/trade; Cincinnati Microwave "Escort" radar $195/trade; Flesher TU-170 for VIC, COCO $125; Crown ROM-116 TRS80 RTTY/CW interface $225; Heath SB221 chassis, panels, extras (brand new) $30. Want Yaesu SP-120, SP-980. Bob WA6ERB/0, 14311 W. Virginia Dr., Lakewood, CO 80228, 303-986-0189(e).

HEATH VF-2031 2M-Handheld, like new with manual $150. Includes: auto-patch, carrying case, charger, and 8-xtals. Send money order to James Sohmers, 2132 Glenwood St., Kannapolis, NC 28081.

ege, inc.

November Values

13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Store Hours: MWF: Noon—8 p.m.
TThS: 10 a.m.—4 p.m.
Dealer Inquiries Invited

For orders and quotes call toll free: 1-800-336-4799
Information and Virginia Orders: (703) 643-1063

Order Hours: M-F 11 a.m.-7 p.m.
Saturday 10 a.m.-4 p.m.
Pay by Cashiers Check, Money Order, VISA, or MasterCard
Send 3 stamps for a flyer.

Terms: No personal checks accepted. Prices do not include shipping. UPS COD fee $2.25 per package. Prices subject to change without notice or obligation. Returns are subject to a 10% restocking fee.

SANTEC

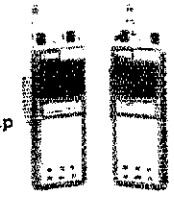
144up 2m Synth Hand-held	269.95
440up MHz Synth Hand-held	CALL
SPLC Leather Case with Strap	34.95
SM3 Speaker Mic	34.50

KDK

FM2030 New 2m 25-watt	259.95

WELZ

SP5X Hand-held watt meter	18.95
SP10X 1.8-150MHz Watt Meter	32.95
SP250 1.6-60MHz Watt Meter	65.00
SP600 1.6-500MHz Watt Meter	139.95



TOKYO HY-POWER AMPLIFIERS

HL30V 2m Amp 2-30 FM	59.95
HL32V 2m all-mode Amp 2-30	75.00
HL82V 2m Amp & Preamp 10-80	149.95
HL160V2m Amp & Preamp 2/10-160	288.95
HL20U 440-450 MHz Amp 2-20	98.95
HL90U 430-440 MHz Amp 10-90	319.00

TOKYO HY-POWER TUNERS

HC200 300-watt, Meter & Switch	86.95
HC2000 2000-watt, Meters & Switch	289.95

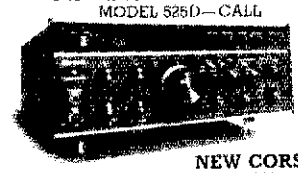
Complete Line of Accessories in Stock
—CALL FOR QUOTES—

TEN-TEC

2591 New 2m Synth Hand-held	CALL
226 Argosy Power Supply	129.00
260 Power Supply for Corsair	173.80
229 1kW Tuner/Meter	249.95
4229 1kW Tuner Kit	179.95

—All Accessories in Stock—

NEW DIGITAL ARGOSY II
MODEL 525D—CALL



NEW CORSAIR
Model 560—CALL

RADIOS

PANASONIC RADIOS RF 3100

Call for Quotes
Other Models in Stock

AZDEN

PCS 300 Hand-held	261.95
PCS 4000 2m Transceiver	290.95

KENWOOD
Radios and Accessories CALL

BEARCAT
NEW DX1000 Gen Cov SWL Recvr CALL

YAESU
ICOM
Bearcat Scanners
All Radios and Accessories Available
Call for Quotes

ACCESSORIES

BENCHER PADDLES
Black/Chrome 36.80/43.95

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

AEA KEYERS ..... CALL
TELEX HEADSETS/PHONES CALL
MFJ Products Available CALL

DAIWA/MCM/J.W. MILLER

CN-520/CN-540 Meters	59.95/69.95
CN-620B/CN-630 Meters	110.00/130.00

AMPLIFIERS

DAIWA/MCM/J.W. MILLER

LA-2035 2m Amplifier 2 in, 30 out	58.95

MIRAGE

B23 2m Amplifier 2-30	CALL
B1016 2m Amplifier 10-160	236.95
B3016 2m Amplifier 30-160	199.95
D1010 10-100 Amplifier for 440	269.95

AMERITRON HF AMPLIFIERS
AL80 1200 watt 589.95

AMP SUPPLY HF AMPS/TUNERS
GA1000/AT1000 CALL

VOCOM AMPLIFIERS
2 watts in, 25 watts out 2m Amp ... 67.95

For Orders and Quotes Call Toll Free: 1-800-336-4799

ege, inc.

"CHOICE OF THE DX KINGS"

the CUBEX Skymaster FIBERGLASS QUAD KITS

2 ELEMENT—
3 BAND
KIT SPECIAL

ONLY **$189.95**
FOB Calif.

CONTENTS

- 8 Fiberglass Arms, 1 pc. White 13 ft.
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler, 2" to 2"
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

MK III 2 EL COMPLETE "PRE-TUNED" QUAD ONLY $239.95

2-3-4 or more element Quads available. Send 30¢ (cash or stamps) for complete set of catalog sheets, specs & prices

CUBEX COMPANY
P.O. Box 732, Altadena, California 91001
Phone: (213) 798-8106 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

WANTED FOR CASH

Your Military Surplus Electronic Material: Airforce, Navy or Army Equipment, Modules, Tubes, or Parts. It costs nothing to get our highest offer.

Call Collect NOW
201-440-8787
35 Ruta Court
South Hackensack, N.J. 07606
SPACE ELECTRONICS Co.
Our 22nd Year

EIMAC 4-1000A
Sub/Extra heavy duty 2KW+

only $69.95 Limited Quantity

Tested and guaranteed to run legal limit • Used tubes • Note: Draw about 5 Amps more than 4-1000A. Most all transmitters will handle easily.

MIKE FORMAN
3740 Randolph • Oakland, CA 94602 415-530-8840

Terms: Cash, M.O., or COD.
Add $5 shipping & handling

★ I pay cash or trade for all types of transmitting or special purpose tubes.

WARC for FT-101/901

Modernize any model of the original FT-101 Series by adding *all three* WARC bands for RX and TX!

- Use 10 MHz now; be ready for the others.
- Increase resale value of your rig.
- Easy installation, detailed instructions.
- Includes all crystals, relays, etc.
- Tested, fool-proof design for all but 'ZD.

FT-101 WARC Kit #4N ..... ONLY $25.
FT-901 WARC Kit #4J (30M only) ONLY $10.
Shipping $3 (Air $5). Florida sales tax 5%.

GO FOX TANGO — TO BE *SURE!*

Order by Mail or Telephone

For other great Yaesu modifications get the top-rated FT Newsletter. Still only $8 per calendar year (US), $9 Canada, $12 Overseas.

FOX TANGO CORPORATION
Box 15944 , W. Palm Beach, FL 33416
(305) 683-9587

---

the good neighbor.
The American Red Cross
advertising contributed for the public good

WANTED: A surplus Merchant Marine HF CW xmtr (or info leading to same) from WW-II era; in operating cond.; all-vac-tube ckt., 4 or 5 MHz to 22 MHz; Model No. ET-8019 (RMCA) or 136-A (Mackay) or similar type; plus a (110-V AC source) HV power supply adapted to it. W. J. Johnson, Jr., 1142 Hillsdale Ave., Pittsburgh, PA 15216.

TEN TEC Omni D Series B, 1.8 & .5 filters and noise blanker $500; speech processor $60; KLM 10-70 BL amplifier $90; WA4OEJ, 205-881-5327.

SALE: Yaesu FRG-7 communications receiver, $170; AR-22 box and rotator, $38; 14 element KLM 432 MHz antenna, $20; 28 Volt 8A power supply, $15; AA-18 Heath amp, $20; TR-7500 2-meter, b/o $115; Heath 2-meter 40W amp, $35; Wanted: Teletype 28 ASR dome reperf, 5 FP7 CRT. W2WHK, 210 Utica St., Tonawanda, NY 14150. 716-692-5451.

REGENCY HR2B twelve-channel 2mFM transceiver $70 plus shipping WB2RVE 609-227-8007.

HEATH AR-3 receiver $45; Mohican receiver, ac/dc supplies $95; Elmac AF-68 $60. All excellent. F. R. Claus W3QM, 310 McKinney Rd., Wexford, PA 15090.

WANTED, Military Surplus Radios, we need Collins 618T, ARC-94, ARC-102, RT-712/ARC-105, ARC-114, ARC-115, ARC-116, RT-823/ARC-131, or FM-622, RT-857/ARC-134 or Wilcox 807A, ARC-159, RT-1167 or RT-1168/ARC-164, RT-743/ARC-51A, RT-1022/ARN-84, RT-859/APX-72, RT-868/APX-76, APX-101, APN-153, APN-155, APN-171, MRC-95, MRC-107, MRC-108, 718F-1/2, Collins Antenna Couplers 490T-1, 490T-2, 490T-9, CU-1658A/ARC, CU-1669/GRC, 490B-1, 690D-1, CU1239/ARC-105, top dollar paid or trade for new Amateur Gear, Write or phone Bill Slep 704-524-7519, Slep Electronics Company, Highway 441, Otto, N.C. 28763.

TRISTAO 67' heavy duty self-supporting tilt-over rotating crank-up mast, complete with base and raising fixture. Excellent condition, $750, AG6X, Upland, CA 714-981-6883.

SELL many antique radios, tubes, etc. list S.A.S.E. plus $1. W3LST Joe Szabat, 228 Plummer, Oil City, PA 16301. Ph. 1-814-677-4042.

NYE-VIKING MBII-02: One kilowatt antenna tuner with balun; perfect condition; only 10 months old; $200; please call Kevin, KO1T; (H) 617-242-3873, (W) 617-227-7940.

HEATHKIT Manuals. Ham/Test Gear. S.A.S.E list. KA6NNR. Box 71703. Los Angeles, CA 90071.

TS-820S with built-in 12-Volt d.c. supply and Magicom processor plus external VFO. $625 or best offer. K7ZA, 206-432-9838.

TS-820-S & MC-50 mike mint condx $550 & 75AI good condx manual & extra tubes $150. W2MOF 201-383-3274.

YAESU FTDX560 with mint Yaesu FV400 $275. National 183/WS $75. Hallicrafter S38 $30. Rare Model 55 Atwater-Kent $100. Dentron MLA2500 $295. WØKKU, 8608 W 89th, Overland Park, KS. Phone 913-648-6598.

HALLICRAFTERS monitor receivers, new, boxed, CRX-100 $25, CRX-105 $40. Mosley VPA20-3 coil set, new, $25. F. R. Claus W3QM, 310 McKinney Rd., Wexford, PA 15090.

HW-101 Heath transceiver, two years old, PS-23 power supply, HS-1661 speaker, B.W. Clipper. $300. K5HVM 512-435-2476.

UNEXPANDED VIC-20/Datasette Logkeeper. Only $15 for Cassette program tape. Log your QSO's: Call, DTG, Name, RST, Freq, Mode, and QTH. Save log on Cassette for rapid recall and display on TV screen. WBØEEH, Fred Zumwalt, 22E Rutherglen, Columbia, SC 29210.

DRAKE 2B receiver with 2CQ Speaker/Q-Multiplier, mint $145. Dave WA3WHR 301-774-9131.

SELL: MBA-RO reader $179.50; Katsumi memory keyer $75; Sinclair ZX81 with 32K $75; 20 ZX81 programs, write for price. Sherman WA8IRN, 2550 Elizabeth Blvd., Twin Falls, ID 83301. 208-734-0915.

Jobs for Hams

THE CLUB AND TRAINING DEPARTMENT is looking for an Assistant Training Manager. Solid technical writing ability is required to assist in writing the Advanced Class License Manual, in revising Instructor Guides, in contributing to department periodicals, and in helping develop training materials for instructor certification. An Advanced or Extra Class license is essential. Send resume and writing sample to Jonathan Towle, WB1DNL, at Hq.

Birthday
Anniversary
Holiday
Anyday

There's always a good reason for giving ARRL publications.

ADVERTISING DEPARTMENT STAFF

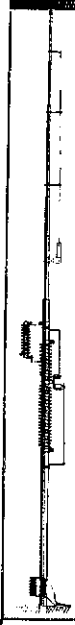
Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Danielle Huot, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

ANTENNA/TOWER SALE!

BUTTERNUT ELECTRONICS CO.

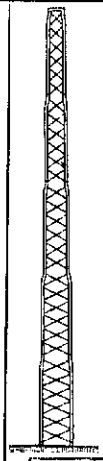


- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
- New Model HF6V $129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) $49.00.

Model RMK-11 (roof mount kit with multiband radial kit $39.00. Model STR-2 (Stub Tuned Radial Kit) $29.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

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	289	24	313
HBX48	48 ft	10 sq ft	303	BXB7	369	26	395
HBX56	56 ft	10 sq ft	385	BXB8	449	30	479
HDBX40	40 ft	18 sq ft	281	BXB7	339	26	365
HDBX48	48 ft	18 sq ft	363	BXB8	429	30	459

Tri-Ex®

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

Check these features:

- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
W-36	36 ft.	9 sq. ft., 50 mph	$549
WT-51	51 ft.	9 sq. ft., 50 mph	$999
LM-354	54 ft.	16 sq. ft., 60 mph	$1599
LM-470D (Motorized)	70 ft.	16 sq. ft., 60 mph	$2999

Masts—Thrust Bearings—Other Accessories Available at Sale Prices—Call!

RG-213U

$.29/ft $279/1000 ft Up to 400 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

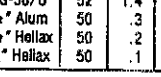
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss Foam Dielectric
- Non-contaminating Vinyl Jacket

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
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 ¼ mi $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
G5-144B 2-mtr Base $79 G7-144 2-mtr Base . . $109

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$10	$10	$12	$15	$19
2KW Super	$14	$15	$19	$24	$33

Bumper Mounts - Springs - Folding Masts In Stock!

CUSHCRAFT

A3 3-el Tribander	$219	A4 4-el Tribander	$289
R3 20/15/10mtr Vert	$279	A743/A744 40mtr Kit	$75
103CD	$95	15-3CD	$115
20-3	$199	40-2CD	$289
A50-5	$79	A147-4	$29
214B	$79	3219	$95
228FB	$219	424B	$79
147	$63	144-20T	$75
147MB	$29	AMS-147	$29
10-4CD	$109	15-4CD	$125
20-4CD	$279	AV5	$99
A50-6	$99	A147-11	$49
214FB	$79	220B	$95
416TB	$59	617B	$199
144-10T	$52	432-20T	$49
ARX2B	$39	PD-2	$25

Many other Cushcraft models in Stock—CALL!

HY-GAIN

The ALL NEW Broadband 3-el Triband Beam Explorer-14, In Stock—$289

QK710 30/40 mtr. Add-On-Kit	$75.00
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
2BDQ 80/40 mtr Trap Dipole	$49
5BDQ 80-10 mtr Trap Dipole	$99
BN86 80-10 mtr KW Balun W/Coax Seal	$19

MOSLEY

CL-33 3-el Triband Beam	$269
TA-33 3-el Triband Beam	$229
TA-33JR 3-el Triband Beam	$179
TA40KR 40mtr Kit for TA33	$99

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

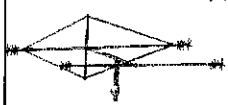
Transi-Trap™ Surge Protectors—In Stock: Now!

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
Kenpro KR-500 Heavy duty elevation rotor	$189.00

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 $45.50 45G $97.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$789
FK2558	58 ft	13.3 sq ft	$879
FK2568	68 ft	11.7 sq ft	$959
FK4544	44 ft	34.8 sq ft	$1099
FK4554	54 ft	29.1 sq ft	$1219
FK4564	64 ft	28.4 sq ft	$1329
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

All Foldover Towers Shipped Freight Pre-Paid!
Foldover prices 10% higher west of Rockies.
All Rohn 25G & 45G Accessories in stock - Call!

TOWER/GUY HARDWARE

3/16 "EHS Guywire (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
500D Guy Insulator (5/32 " or 3/16 " Cable)	$.95
502 Guy Insulator (1/4 " Cable)	$1.95
5/8 " Diam - 8 ft Copper Clad Ground Rod	$11

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.43/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$6.95
9902LD Cable End (for 6700 cable)	$7.95
Socketfast Potting Compound (does 6-8 ends)	$12.95

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

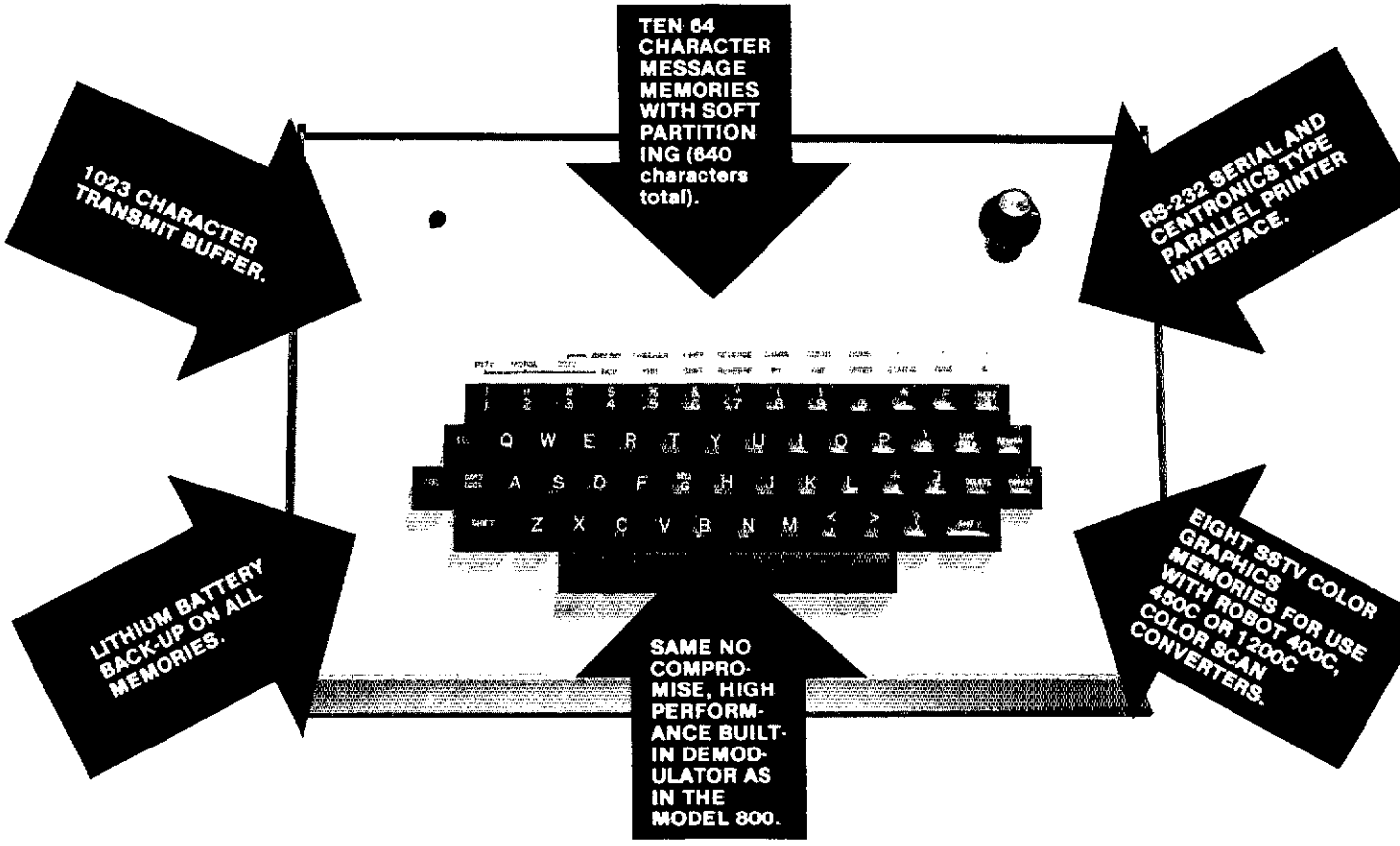
ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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 traine 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 wri 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.

MEET THE NEW YAESU FT-102

The FT-102 is factory equipped for operation on all present and proposed Amateur HF bands. An extra AUX band position is available for special applications. Equipped for SSB, CW, and AM (RX), the FT-102 may be activated on FM and AM (TX) via the optional AM/FM-102 Module.

The all-new receiver front end utilizes a low-distortion RF preamplifier that may be by-passed via a front panel switch when not needed. Maximum receiver performance is yours with this impressive lineup of standard features: IF Notch Filter, Audio Peak Filter, Variable IF Bandwidth Control, IF Shift, Variable Pulse Width Noise Blanker, Independent SSB and CW Audio Channels with Optimized Audio Bandwidth, and Front Panel Audio Tone Control. Wide/Narrow filter selection is independent of the Mode switch.

The celebrated transmitter section is powered by three 6146B final tubes, for more consistent power output and very low distortion. An RF Speech Processor, Mic Amp Audio Tone Control, VOX, and an IF Monitor round out the transmitter lineup.

Futuristic panel design and careful human engineering are the hallmarks of the FT-102. Convenient pop-out controls below the meters may be retracted when not in use, thus avoiding inadvertant mistuning. Abundant relay contacts, rear panel phono jacks for PTT, microphone/patch input, and other essential interface connections make the FT-102 extremely simple to incorporate into your station.

SPECIFICATIONS

TRANSMITTER

Power Input: (1.8-25 MHz) (28-29.9 MHz)

SSB, CW	240W DC	160W DC
AM	80W DC	80W DC
FM		160W DC

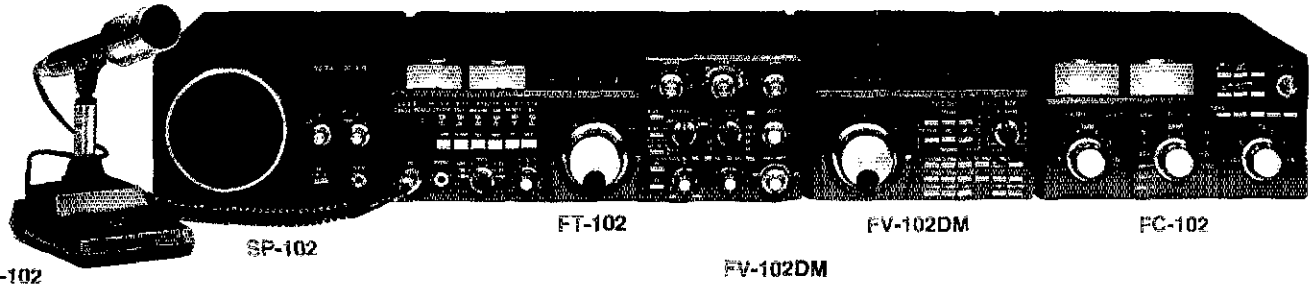
RECEIVER

Image Rejection:
Better than 70dB from 1.8-21.5 MHz
Better than 50dB from 24.5-29.9 MHz

IF rejection:
Better than 70 dB

Selectivity (−6 dB/ −60 dB):
SSB, CW, AM; 2.7/4.8 kHz (with no optional filters)
Width adjusts continuously from 2.7 kHz to 500 Hz (−6 dB)

Spurious Radiation: Better than −40 dB



SP-102

The SP-102 External Speaker/Audio Filter features a large, high-fidelity speaker with selectable low- and high-cut audio filters. The front panel A-B switch allows selection of two receiver inputs for maximum versatility. Also available is the SP-102P Speaker/Patch.

See your Authorized Yaesu Dealer today for a hands-on demonstration of the rig that everybody's talking about. It's the FT-102, The Transceiver of Champions!

FV-102DM

The FV-102DM Synthesized External VFO tunes in 10 Hz steps. Keyboard entry of frequencies, UP/DOWN scanning, and 12 memories make the FV-102DM a "must" for serious DX or contest work.

FC-102

The FC-102 Antenna Coupler is capable of handling 1.2KW of transmitter power, with an in-line wattmeter, separate SWR meter, and A-B input/output selection expanding your station's capability. The optional FAS-1-4R allows remote selection of up to four antennas via one coaxial cable connected to the FC-102.

Price And Specifications Subject To Change Without Notice or Obligation

1082

YAESU **ELECTRONICS CORPORATION** 6851 Walthall Way, Paramount, CA 90723 (213) 633-4007
CINCINNATI SERVICE CENTER 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100

One size fits all...

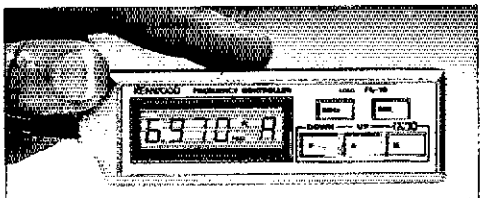
Ultra-compact and lightweight, priority, memory and band scan, 25 watts...

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.

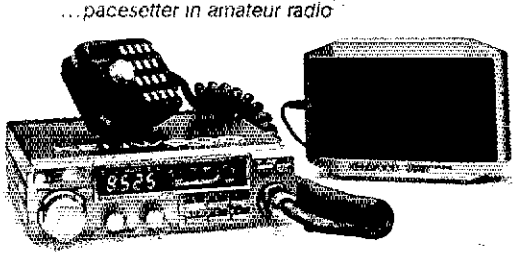
KENWOOD

...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.