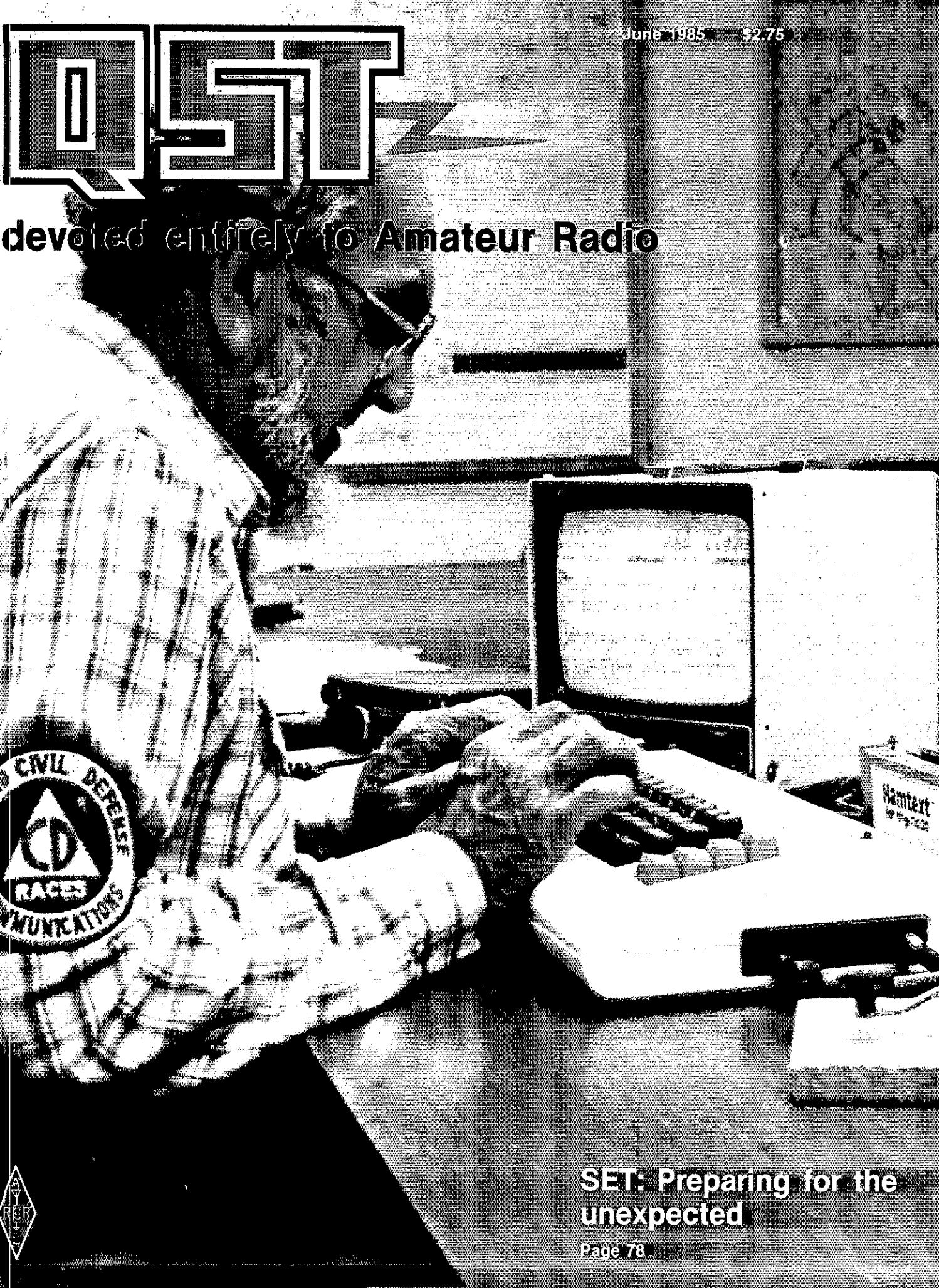
QST

devoted entirely to Amateur Radio

June 1985 $2.75



SET: Preparing for the unexpected

Page 78

HENRY

REPORT #2

New models reflect our policy by design. Technology moves fast. At Henry Radio we keep up with a steady flow of new models, some for amateur use, some for commercial use, some for industrial use and some for scientific research.

Here are three new models for this month:
***New UHF model 3004 1500 watts output at 400 MHz.**
***New VHF model 3002 1500 watts output at 144 MHz.**
***New HF 5K Classic, 3.5 to 30 MHz (not for sale to U.S. amateurs)**

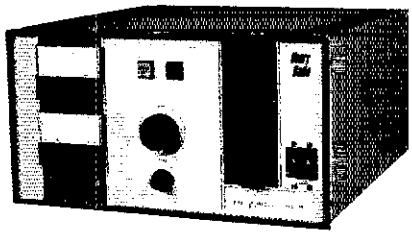
These three added to the already broad line of amplifiers we offer means that we can now cover two MHz to 500 MHz and power outputs as high as 10,000 watts depending on frequency. This may be the most complete line of power RF amplifiers available in the world.

Let us know your requirements. We want to help you.

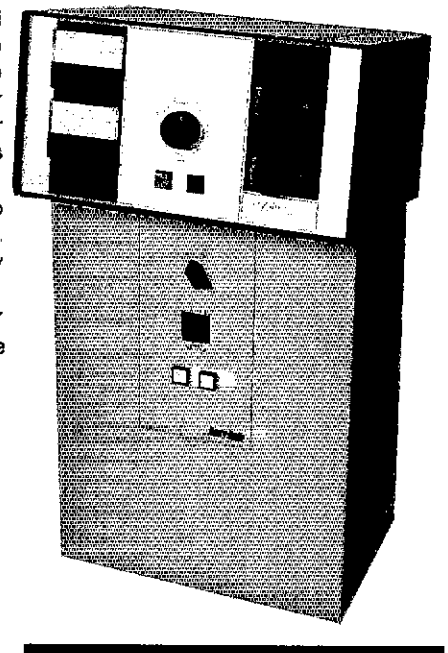
2K Classic...the culmination of more than fifteen years of developing the 2K series into the world famous line that sets the standards for top quality HF linears. A true "workhorse"; built to loaf along at full legal power, trouble free, for years of hard service. Operates on all amateur bands, 80 through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

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.

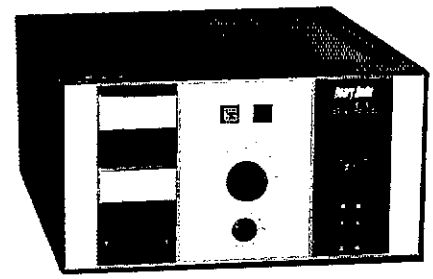
3K Classic Mark II...uses the Eimac 3CX1200A7 tube. More than 13db gain. We believe the 3K to be the finest amateur linear available ...the amplifier of every amateur's dreams.



2KD Classic...a desk model designed to operate at 2000 watts effortlessly, using two Eimac 3-500Z 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.



2002-A...a bright new rework of our popular 2002 2 meter amplifier. Uses the new Eimac 3CX800A7. The RF chassis uses a 1/4 wave length strip line design for extreme reliability. 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 uses a 1/2 wave strip line and offers all of the same specifications as the 2002A.

1002-A A rack mount 2 meter amplifier with the same design as the 2002A, except using one 8874 tube for 1/2 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 rack mount half-power version of the 2004A. Covers the 430 to 450 MHz band using a 1/2 wave strip line design.

Henry amateur amplifiers are available from Henry Radio and select dealers throughout the U.S. and are being exported to amateurs all over the world. In addition to our broad line of commercial FCC type accepted amplifiers we offer 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 • AARL • ASTRON • B & K • B & W • BIRD • CDE • CONNECT-SYSTEMS • CUSHCRAFT • EIMAC • HAL • HUSTLER • HY-GAIN • ICOM • KENWOOD • LARSEN • NYE • ROBOT • TEMPO • VIBROPLEX • YAESU

57 YEARS OF SERVICE

Henry Radio

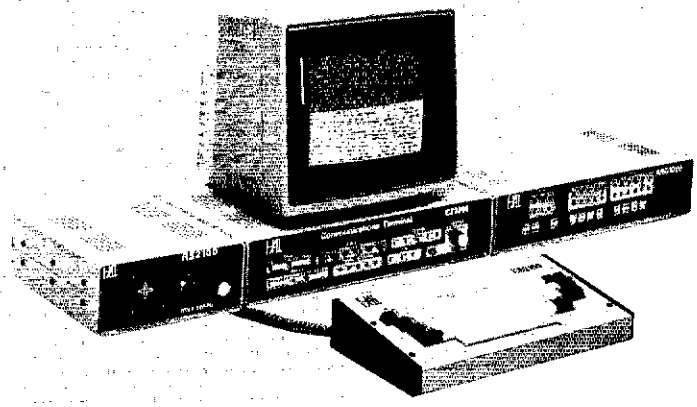
2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
Butler, Missouri 64730 (816) 679-3127

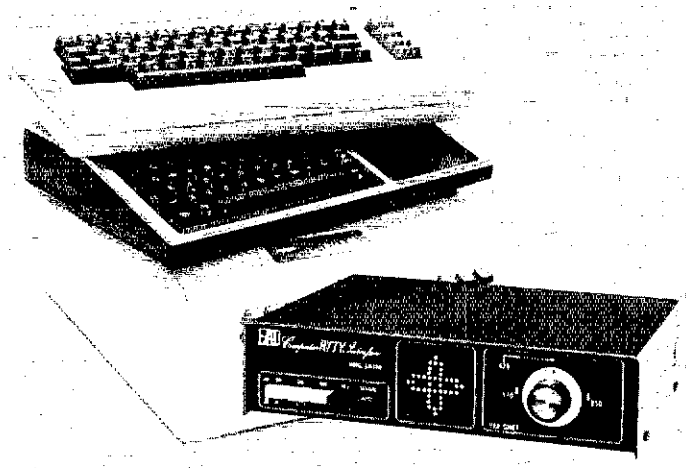
TOLL FREE ORDER NUMBER: (800) 421-6631 For all states except California. Calif. residents please call collect on our regular numbers.

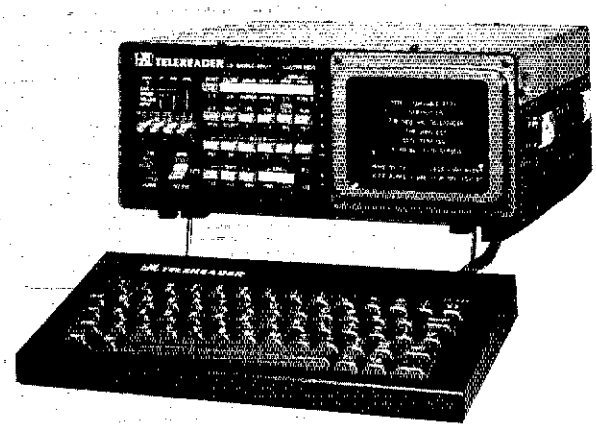
RTTY FOR ALL

MPT3100 + DSK3100 + ST6000:
MPT3100—the acknowledged top-of-the-line system for both commercial and serious amateur RTTY and CW stations. HAL pioneered the radio mailbox technique with the MPT3100, and now the new DSK3100 disc drive option gives you 326,000 characters of message storage. The system is designed particularly for the amateur, commercial, or military operator who has to handle a large amount of traffic. You can collect, edit, and retransmit traffic perfectly with a minimum of effort. The ST6000 is renowned for its weak-signal performance and reliability. Add the ARQ1000 for full AMTOR operations, including an AMTOR mailbox. If you are serious about your code and need high performance and reliability, this system is the proven world leader.

CT2200 + KB2100 + ARQ1000 + RS2100 + KG12:
The CT2200 and KB2100 give you an integrated system that includes video, RTTY demodulators (high, low, modem low, and modem high tones), and many advanced features. Operate Baudot or ASCII at 45-1200 baud and CW at 5-99 w.p.m. Add the ARQ1000 for ALL AMTOR features (not just *some* of them). The RS2100 RTTY Scope gives you the acknowledged best tuning indicator for a complete RTTY system. Also included in the CT2200 is selective-call ASCII printer output, split screen, 36 or 72 characters per line, smooth scroll, and 2 or 4 pages of display memory. In addition, the CT2200 has 2 HERE IS and 8 large "brag-tape" memories that are programmable and non-volatile. This is our most popular system, used by thousands of amateurs around the world.





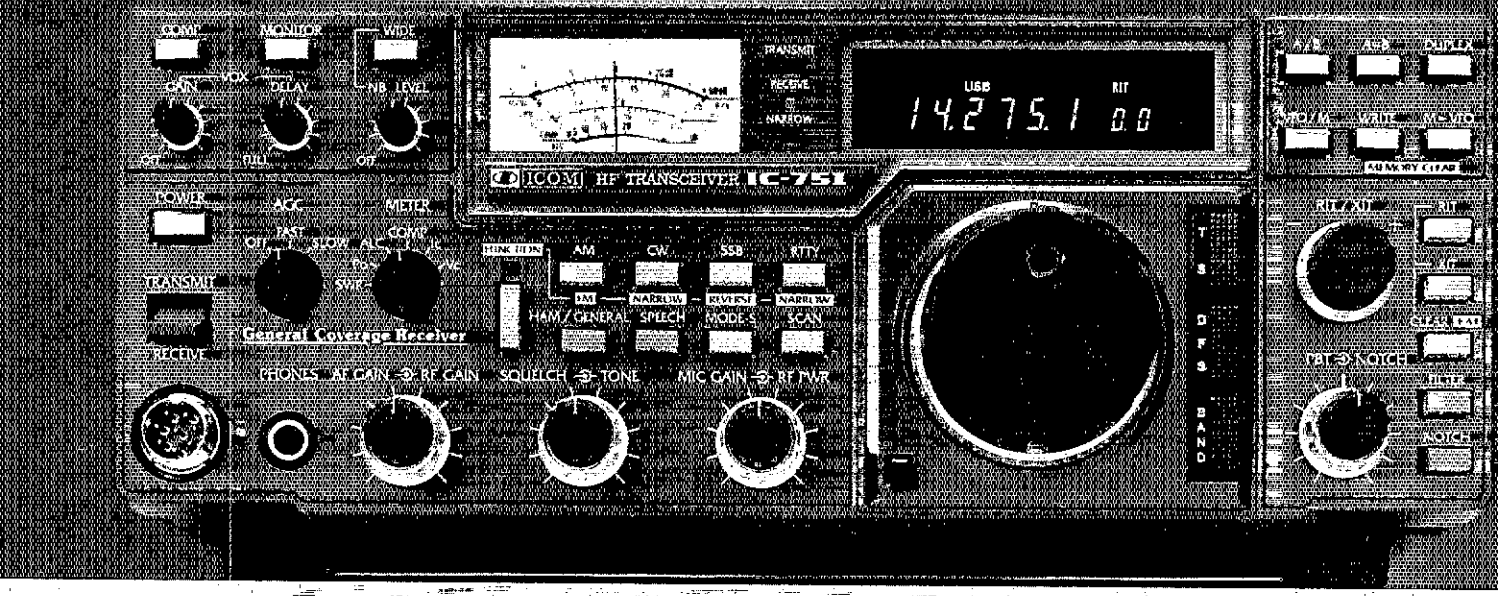


CRI-200:
At last, a computer interface that *really* works and has an accurate tuning indicator. Take advantage of HAL's years of experience in RTTY and see how good computer RTTY can be. Best of all, it's universal and you can select the computer and software of your choice. Why be frustrated with computer RTTY? Hook-up the CRI-200 and work ALL the stations!

CWR6850:
Have a space problem or want portable RTTY? The CWR6850 is a one-package complete RTTY system. All you need is your transceiver and 12 VDC—the rest is in the CWR6850, including the screen. The high-performance RTTY demodulator for all shifts and either high or low tones is built-in. AND, the system is expandable! Add the ARQ1000 for AMTOR, the RS2100 RTTY Scope, and an ASCII printer, and you have a no-compromise base station for all modes.

HAL COMMUNICATIONS CORP.
BOX 365
URBANA, IL 61801 • (217) 367-7373

ICOM HF Transceiver IC-751



Reach Out To Your Friends With The IC-751

Here's what other hams have to say about the "dream rig."

"To put it concisely, the IC-751 easily meets all of its advertised claims with regard to technical specifications."

"The filters used on the IC-751 are about the sharpest one can imagine."

"It performed flawlessly over the entire period. Particularly if the IC-751 is used with an internal power supply, it has to be regarded as the most compact, full-featured transceiver available for either fixed station or portable operation."

John J. Schultz W4FA
CQ Magazine
September 1984

"...we seriously doubt anyone finding a unit superior to ICOM's new 751 HF 'dream rig.'"

Dave Ingram K4TWJ
Computer Trader Magazine
September 1984

"The general-coverage receiver is excellent."

Mark Wilson AA2Z
QST Magazine
January 1985

"The Notch measured 55dB, and is the best ICOM Notch yet."

"The stability of the 751 deserves mention. We measured 10Hz drift in the first hour."

Robert Pohorence N8RT
International Radio, Inc.
September 1983

Now with a ONE YEAR Warranty!

ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3331 Towerwood Drive, Suite 307; Dallas, TX 75234

June 1985 *Volume LXIX Number 6*

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: 650215-5052 MCI

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 $2.75.

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.

OUR COVER

Just after a tornado's ripped up your town *isn't* the time to begin thinking about emergency preparedness! The annual Simulated Emergency Test allows groups to prepare for anything Mother Nature can serve up. WD5JYE operated this SET station in Garland, Texas, last October. The story begins on page 78.

CONTENTS

TECHNICAL

BEGINNER'S BENCH

NEWS AND FEATURES

OPERATING

DEPARTMENTS

TIME FOR AN AEA BREAKTHROUGH

The high quality of AEA products is appreciated long after the price paid is forgotten.

$99.95

THE FANTASTIC DOCTOR DX™
CW Band Simulation That Is So Real You Won't Believe It!

- Will improve the operating skills of ANY CW operator!
- More fun than ANY Morse Code trainer yet devised.
- Use with a C-64, TV set, and key (or keyer).
- Experience the thrill of a "DXpedition" to anywhere in the world.
- Operate anytime you want, ideal for travelers.
- Impressive award certificates available for verified performance.
- On-going contests, 8-hour sprint and 24-hour marathon.

Plan to enter the DOCTOR DX™ World Championship Contest at the Atlanta Hamfestival, July 6 & 7, 1985.

HOT ROD™
½ Wave Telescope Antenna — $24.95*

- Fewer telescopic sections than any ¾ wave whips.
- Shorter and lighter than all ¾ wave whips.
- Special matching network designed by Professor D.K. Reynolds (co-inventor of Isopole™ antenna) makes Hot Rod competitively priced

- Most gain attainable for length of antenna—3 dBd (0 dBd for JR models).
- Best decoupling of any commercial VHF base station antenna available.
- More gain than many antennas claiming up to 7 dB gain—don't be fooled by misleading claims!
- Zero degree angle of radiation
- Factory-tuned matching net work.
- Greater bandwidth than any competitive product
- DC grounded for static discharge protection.
- Documented cases of wind survival in 140 + mph hurricanes
- Easier than any competitive antenna to assemble.

Mast Not Included

ISO = 144 or 220—$59.95*
ISO = 144 JR or 220 JR—$49.95*
ISO = 440—$84.95*

ISOPOLE ANTENNA™

CP-1 $239.95*
Computer Patch™ Interface

- Better performance than any competitive product
- Dual channel filtering with auto threshold correction
- Variable shift
- 117 VAC power supply included

NEW!

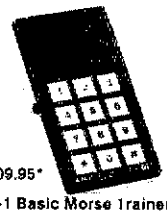
DOCTOR QSO™ $79.95*
Morse Code Trainer

- Makes Morse Training Fun, Fun, Fun!!!
- Plug-in Cartridge For C-64 Computer
- Simulates Real Morse Ragchews
- Can Operate With Only C-64 and TV Set

PKT-1 Packet Controller
$589.95*

- Easy to use—five usual commands.
- Multiple conversations on simplex channel.
- EVERY PKT-1 is a digipeater.
- Send computer files error free.
- Operates from 9-15 VDC for portable or fixed operation.

ELECTRONIC KEYERS

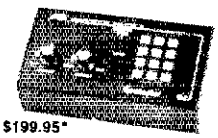


$109.95*
BT-1 Basic Morse Trainer

- *Teaches* code at 20 wpm.
- Random practice mode.
- Variable monitor tone.

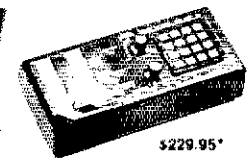
$149.95*
KT-2 Keyer/Trainer

- Proficiency Trainer.
- 01-99 WPM.
- Full-feature keyer (no memory).



$199.95*
CK-2 Contest Keyer

- 10 soft-partioned™ memories.
- Automatic serial number.
- Stepped variable speed.
- Two speed memories.



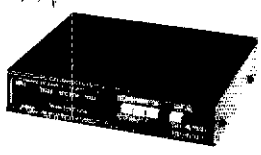
$229.95*
MM-2 MorseMatic™

- Memory keyer.
- Auto serial number.
- Proficiency trainer.

All AEA Keyers operate from 9-15 VDC (power supply not included) and offer many more advanced features than can be listed here. It is no accident that AEA keyers are regarded as the best in the world.

NEW!

MP-1 MICROPATCH™ $159.95*



- Morse/Baudot/ASCII/AMTOR
- Use any AEA software
- Compact
- Economical

NEW!

ATU-1000 ADVANCED TERMINAL UNIT

$1195*

- World's most advanced terminal unit/computer interface
- 32 poles, active filtering
- Set filters & AFSK tones to one Hertz
- TTL, RS-232, loop keyer incl

NEW!

CP-100 COMPUTER PATCH™ $369.95*

- 170/425/850 or variable shift
- Front-panel squelch
- Built-in monitor speaker
- Discriminator-style tuning for AMTOR

Unmatched Software For C-64 And VIC-20 Computers

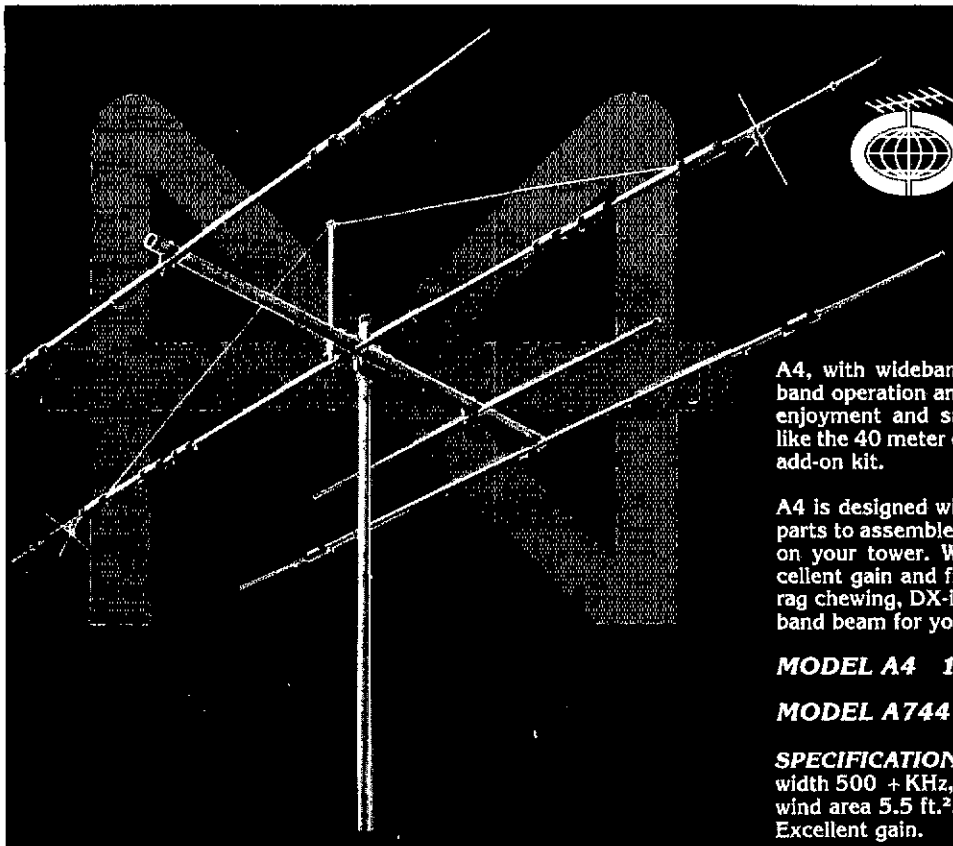
MBA-TOR™—The most advanced software written for Morse-Baudot-ASCII AMTOR including mail drop
MARSTEXT™—A special Morse Baudot-ASCII package written especially for MARS and other traffic operators
SWLTEXT™—The most sophisticated software available for the shortwave listening enthusiast. Automatic data analysis: Morse, Baudot, ASCII, AMTOR and SITOR.

AEA also offers Morse, Baudot, and ASCII software for the following computers: Apple II, II +, IIe; IBM-PC.

*Retail Prices

Advanced Electronic Applications, Inc.
P.O. BOX C-2160 • LYNNWOOD, WA 98036
(206) 775-7373 • TELEX: 152571 AEA INTL

AEA Brings you the Breakthrough!



cushcraft
CORPORATION

A4, with wideband performance, easy installation, 4 band operation and moderate price will give you more enjoyment and satisfaction from your hobby. You'll like the 40 meter operating possibilities with the A744 add-on kit.

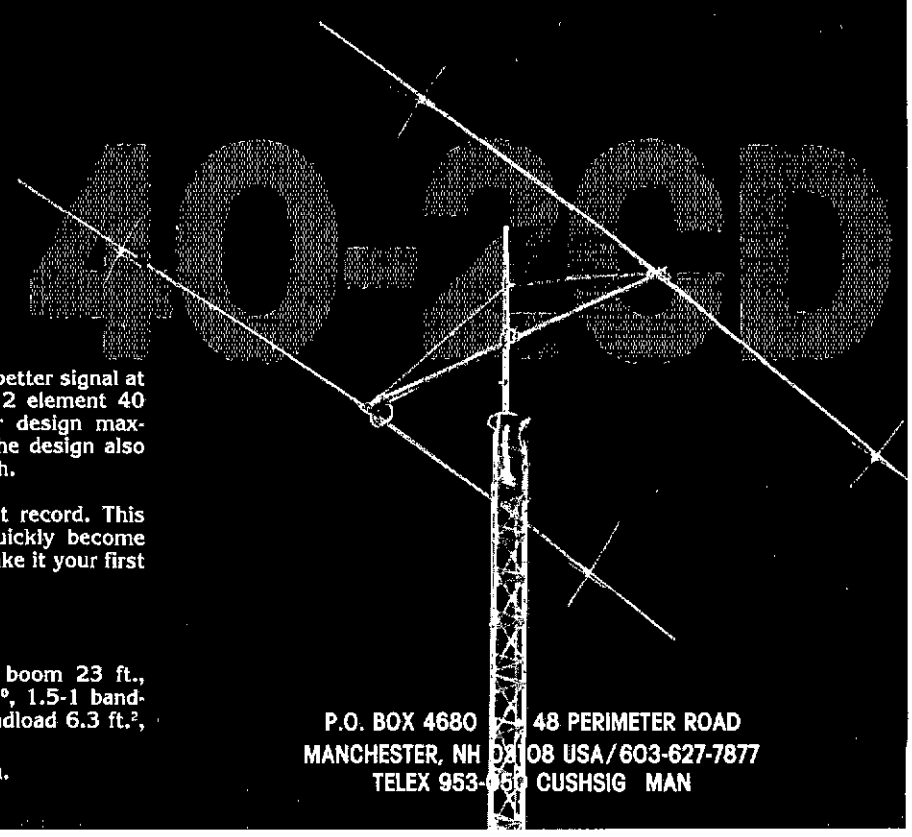
A4 is designed with you in mind because it has fewer parts to assemble, less weight and minimum wind load on your tower. With the 18 ft. boom, A4 gives excellent gain and front-to-back ratio. If your interest is rag chewing, DX-ing or contesting, A4 is the perfect 4 band beam for you.

MODEL A4 10, 15, 20 METERS

MODEL A744 40 METER ADD ON KIT

SPECIFICATIONS SWR 1.2-1 bandwidth 500 + KHz, boom 18 ft., longest element 32 ft., wind area 5.5 ft.², turn radius 18.4 ft., weight 37 lbs. Excellent gain.

MORE CONTACTS, MORE SATISFACTION WITH *CUSHCRAFT BEAMS*



More contacts, less interference and a better signal at the receiving end are yours with this 2 element 40 meter Skywalker Yagi. The computer design maximizes gain and reduces side lobes. The design also gives low SWR with excellent bandwidth.

Holder of the North American contact record. This compact two element antenna has quickly become "the most wanted" 40 meter beam. Make it your first choice.

MODEL 40-2CD 40 METERS

SPECIFICATIONS boom 23 ft., longest element 42 ft., beamwidth 70°, 1.5-1 bandwidth 180 KHz, turn radius 24 ft., windload 6.3 ft.², weight 40.7 lbs. Excellent gain.

P.O. BOX 4680 48 PERIMETER ROAD
MANCHESTER, NH 03108 USA/603-627-7877
TELEX 953-050 CUSHSIG MAN

KENWOOD

...pacesetter in Amateur radio

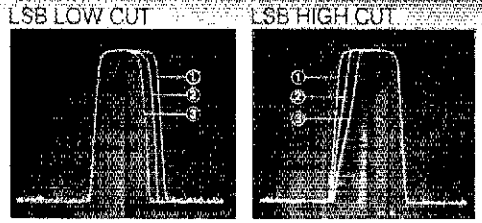
"DX-traordinary"

TS-930S

All band HF transceiver/ general coverage receiver.

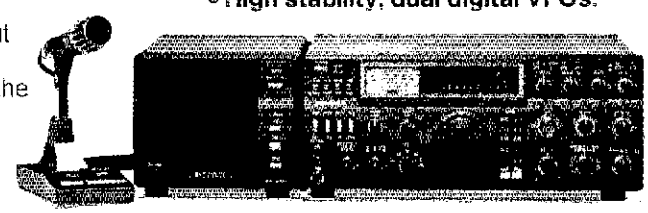
The TS-930S (with or without automatic antenna tuner) is a high performance DX and contest transceiver delivering superior features and field-proven performance. Compare the TS-930S with other HF rigs in its price class and see why no other rig comes close!

- **160-10 meters, with 150 kHz-30 MHz general coverage receiver.**
  A innovative, quadruple "UP" conversion digital PLL synthesized circuit provides superior frequency accuracy, stability, and greatly enhanced selectivity.
- **Easily modified for HF MARS and CAP operation.**
- **Excellent receiver dynamic range.**
- **All solid state, 28 volt final amplifier for lowest intermodulation distortion.**
- **Power input rated at 250 watts on SSB, CW, FSK, and 80 watts on AM.**
- **Full break-in or semi-break-in CW.**
- **CW VBT and pitch controls.**
  CW Variable Bandwidth Tuning control tunes out interfering signals. The CW pitch control shifts the IF passband and simultaneously changes the beat frequency pitch.



SSB SLOPE TUNE

- **SSB slope tuning—Another Kenwood First!**
  Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection.
- **IF notch filter.**
- **Tunable audio filter built in.**
- **Dual mode noise blanker ("pulse" or "woodpecker") with threshold control.**
- **Eight memory channels.**
  The VFO-MEMO switch allows use of each memory as an independent VFO or as a fixed frequency.
- **RF speech processor.**
- **High stability, dual digital VFOs.**



- **AC power supply built in.**
- **Fluorescent tube digital display.**
  Separate two digit indication of RIT frequency shift.
- **One year limited warranty on parts and labor.**

Optional accessories:

- AT-930 automatic antenna tuner
- SP-930 external speaker, with selectable audio filters
- YG-455C-1 (500 Hz) CW filter
- YG-455CN-1 (250 Hz) CW filter
- YK-88C-1 (500 Hz) CW filter
- YK-88A-1 (6 kHz) AM filter (all plug-in type)
- SO-1 commercial stability TCXO
- MC-60A deluxe desk microphone
- MC-80 desk microphone
- MC-85 multi-function desk microphone
- MC-42S mobile hand microphone
- TL-922A linear amplifier (not for CW QSK)
- SM-220 station monitor
- PC-1A phone patch
- SW-2000 SWR/power meter, 160-6 m
- SW-200A SWR/power meter
- SW-100A SWR/power/volt meter 160-2 m
- HS-4, HS-5, HS-6, and HS-7 headphones.
- LF-30A low-pass filter

More TS-930S information is available from authorized Kenwood dealers

KENWOOD

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

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

KENWOOD

...pacesetter in Amateur radio

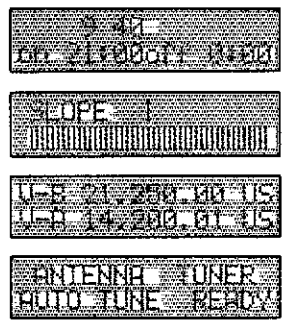
NEW!

"DX-cellence!"

TS-940S

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

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **Programmable scanning.**
- **Semi or full break-in (QSK) CW.**
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**



Optional accessories:

• AT-940 full range (160-10 m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-42S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First.

More TS-940S information is available from authorized Kenwood dealers.

KENWOOD

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

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

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 (601-435-5544)

Vice Director: Robert P. Schmidt, W5GHP, 5100 Press Dr., New Orleans, LA 70126

Great Lakes Division

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

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

Hudson Division

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

Vice Director: Stephen A. Mendelsohn, WA2DHF, 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

TOM FRENAYE, K1KI, 23 Pinehurst Rd., Box 62, Unionville, CT 06085 (203-673-5429)

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

Pacific Division

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

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

Roanoke Division

GAY E. MILIUS, JR., W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454 (804-481-5095)

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

Rocky Mountain Division

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

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

Southeastern Division

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

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

Southwestern Division

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

Vice Director: Wayne Overbeck, N6NB, 11552 Gail La., Garden Grove, CA 92640

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 (409-693-1181)

*Executive Committee Member

Section Managers of the ARRL

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

Canada

Alberta — 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 — Jack Adams, VE4AJE, 227 Davidson Ave. E., Dauphin R7N 2Z4 (204-638-9270)
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 — John D. Hartman, WA3ZBI, 32 Nanticoke Cir., Seaford 19973 (302-629-2686)
Eastern Pennsylvania — James B. Post, KA3A, 15 Monarch Rd., Wilkes-Barre 18702 (717-825-3940)
Maryland-DC — 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 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 (317-251-5608)
Wisconsin — Richard R. Regent, K9GDF, 5003 South 26th St., Milwaukee 53221 (414-282-0312)

Dakota Division

Minnesota — George E. Frederickson, KCØT, RR #2—Box 352, South Haven 55382 (612-558-6312)
North Dakota — Joseph M. Gregg, KNØA, R #1—Box 31, Horace 58047
South Dakota — Fredric Stephan, KCØOO, Box 771—Wind Cave Ranch, Hot Springs 57747 (605-745-6667)

Delta Division

Arkansas — Joel M. Harrison, Sr., WB5IGF, 1403 Forrest Dr., Searcy 72143 (501-268-9540)
Louisiana — John M. Wondergem, K5KR, 600 Smith Dr., Metairie 70005 (504-837-1485)
Mississippi — Paul Kemp, KW5T, 3581 Beaumont Dr., Pearl 39208 (601-939-7612)
Tennessee — John C. Brown, NO4Q, P.O. Box 37, Eva 38333 (901-584-7531)

Great Lakes Division

Kentucky — Rose Marie Percifull, KA4SAA, P.O.B. 30, Big Hill 40405 (606-986-9640)
Michigan — James R. Seeley, WB8MTD, 21615-29½ Mile Rd., Springport 49284 (517-857-2013)
Ohio — Jeffrey A. Maass, K8ND, 9256 Concord Rd., Powell 43065 (614-873-3234)

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, 103 Godwin Ave., Midland Park 07432-0060 (201-891-3084)

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, 3301 Sinclair, Rte. 3, Box 196-A, Columbia 65203
Nebraska — Vern J. Wirka, WBØGQM, Rural Route, 81 Capehart Rd., Papillion 68133

New England Division

Connecticut — Robert Koczur, K1WGO, Whetstone Rd., Harwinton 06791 (203-485-0338)
Eastern Massachusetts — Luck Hurder, KY1T, P.O. Box LL, North Eastham 02651 (617-255-2029)
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 — Ralph T. Stetson, III, KD1R, P.O. Box 123, Milton 05468 (802-893-4856)
Western Massachusetts — R. Donald Haney, KA1T, RD 1—Box 237, Myrick La., Harvard 01451 (617-772-4126)

Northwestern Division

Alaska — David W. Stevens, KL7EB, POB 103421, Anchorage 99510 (907-274-3051)
Idaho — Lemuel H. Allen, W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
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 (801-586-9859)
Pacific — James F. Wakefield, AH6CO, 647 Kunawai La., #201, Honolulu, HI 96817 (808-524-0050)
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 — Rodney J. Stafford, KB6ZV, 5155 Shadow Estates, San Jose, CA 95135 (408-274-0492)

Roanoke Division

North Carolina — Rae Everhart, K4SWN, P.O. Box 41, Lexington 27293-0041 (704-249-8734)
South Carolina — James G. Walker, WD4HLZ, Rte. 1, Box 5395, Marion 29571 (803-423-3645)
Virginia — Claude E. Feigley, W3ATQ, 135 The Main—RR #1, Williamsburg 23185 (804-253-0658)
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado — William "Bill" Sheffield, KQ0J, 1444 Roslyn St., Denver 80220 (303-355-2488)
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — James R. Brown, NA7G, 865 Manchester Rd., Kaysville 84037
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 (205-424-4866)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Phillip O'Dwyer, WF4X, 543 Mooney Rd., N.E., Fort Walton Beach 32548 (904-862-2353)
Southern Florida — Richard D. Hill, WA4PFK, 3800 S.W. 11th St., Ft. Lauderdale 33312 (305-583-6932)
West Indies — Carlos Flores, NP4KA, 2 Monserrate Towers, Apt. 1804, Carolina, PR 00630 (809-757-1564)

Southwestern Division

Arizona — James E. Swafford, W7FF, 5906 W. Miramar Dr., Tucson 85715 (602-298-7793)
Los Angeles — John V. Walsh, N6UK, 1260 E. Sierra Madre, Glendora, CA 91740 (818-335-0036)
Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Byron W. Looney, K6FI, 6540 Buckley Dr., Cambria 93428 (805-927-8733)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate La., Lewisville 75067 (214-221-2222)
Oklahoma — Dave Cox, NB5N, 1812 S. Umbrella Ct., Broken Arrow 74012 (918-250-2285)
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, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

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

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

All membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA
Telephone: 203-666-1541
Telex: 650215-5052 MCI.
MCI MAIL (electronic mail system) ID: 215-5052 (user name: ARRL)

"It Seems to Us . . ."

A Tale of Two Cities

Local radio clubs are very much on the minds of League volunteers and staff these days, because they are so important to the future of Amateur Radio. So many of our problems and opportunities have a local focus: antenna restrictions, cable television and other interference, community-service communications projects, and the recruitment and training of new hams are but a few examples.

Just as Amateur Radio needs an effective national organization to ensure its continued existence, it requires a host of effective local clubs to protect our interests. It was with this in mind that the League began a couple of years ago to concentrate on supplying services and support to those affiliated clubs who strive to be full-service representatives of Amateur Radio in their communities: the Special Service Clubs, of which there are 142 listed in the new edition of the *Repeater Directory*. Of course, there are many other good local clubs that haven't gone through the SSC procedures but are doing an equally effective job. Ideally, there would be a Special Service Club in every community in the country.

How are our local clubs doing? In talking with club officers around the country in recent months, we've asked that question a lot and have gotten widely varying responses. Two of them, from two of our favorite clubs, stand out because they paint such contrasting pictures. These are real clubs, not a writer's invention.

Our first club is flourishing. Every meeting sees more people in attendance; every exam session they sponsor has more applicants and higher pass rates; every club activity (and there are dozens during the year) has full participation; and the club has a prominent and positive profile in the community. The per-capita ham population in the area is well above the national average; a majority of the hams in the area are club members (and most turn out for meetings); the average age is somewhere in the 30's; and while there's currently no special effort underway to recruit young people, they're showing up anyway in increasing numbers.

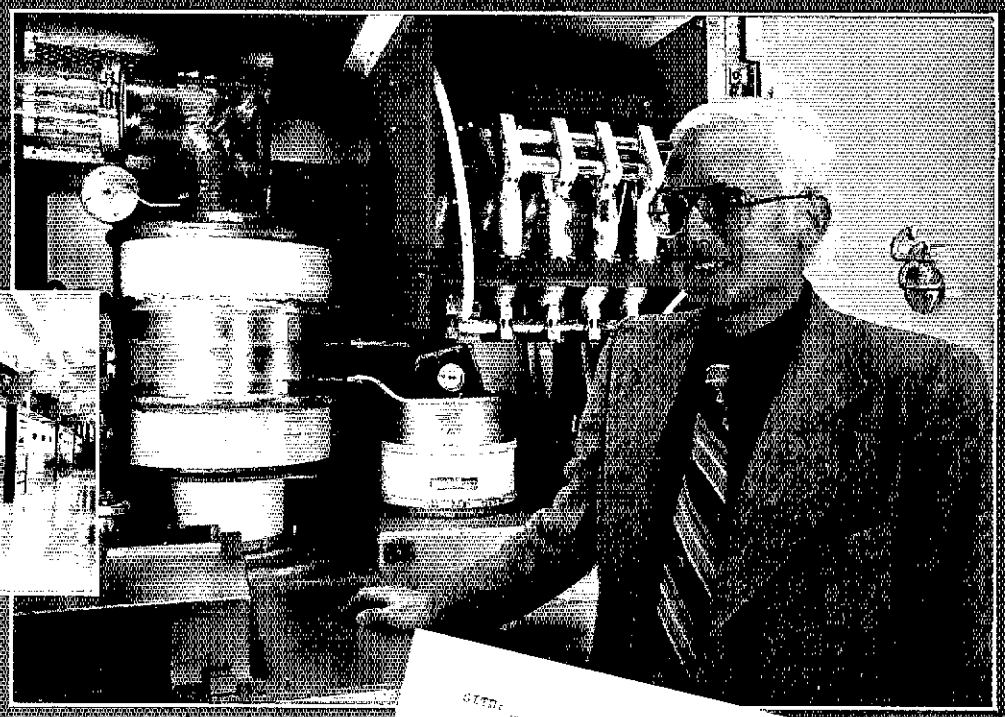
Our second club has a proud history, but some of the officers and members feel it's in trouble. Its membership, while large by many standards, is just a fraction of the local amateur population; most members don't attend meetings regularly; jobs go unfilled; new members are hard to come by. Yet, the club officers recognize they have a problem and are trying to do something about it—which puts them a big step ahead of many other clubs that could be described similarly.

What's caused these two clubs to be so different? Why is one so successful, while so many others are languishing? In the words of the club president, "It took us five years to figure out the answer to that one. It turned out that there was nothing magical about it; we had simply recognized at the very start that the club was a social organization first and foremost, and that what worked for social organizations outside of Amateur Radio would work for us." The club gives members countless opportunities to *do* things and to *have fun* doing them. The meetings don't get bogged down with business because most of it is taken care of by the Executive Board. But the direction comes from the membership, not the Board; members are always welcome at Executive Board meetings, and suggestions made to Board members are dealt with quickly, which encourages more suggestions and inspires confidence in the club's leadership. The focus at meetings is on conveying information, and the fact that a bit of entertainment and showmanship helps lubricate the information-transfer machinery is not overlooked. Volunteers to take on assignments for the club are never asked to commit themselves on the spur of the moment, in the middle of the meeting, but are invited to make themselves known afterwards and find out more about the job. The meetings start promptly at 7 P.M., so there's plenty of time left for socializing at the end of the evening.

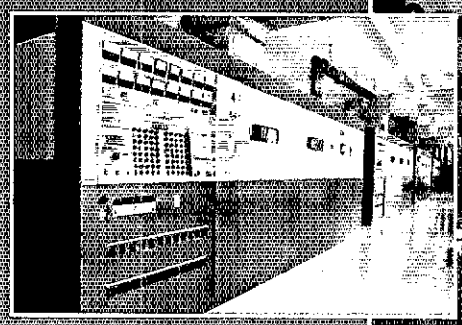
The results speak for themselves. Membership is growing, fueled by friends of club members and by people moving into the area who find that the club provides the social contacts they need in their new community. For many it's a family activity, complementing other interests instead of competing with them. Licensing classes that are promoted just by word-of-mouth are filled to capacity immediately.

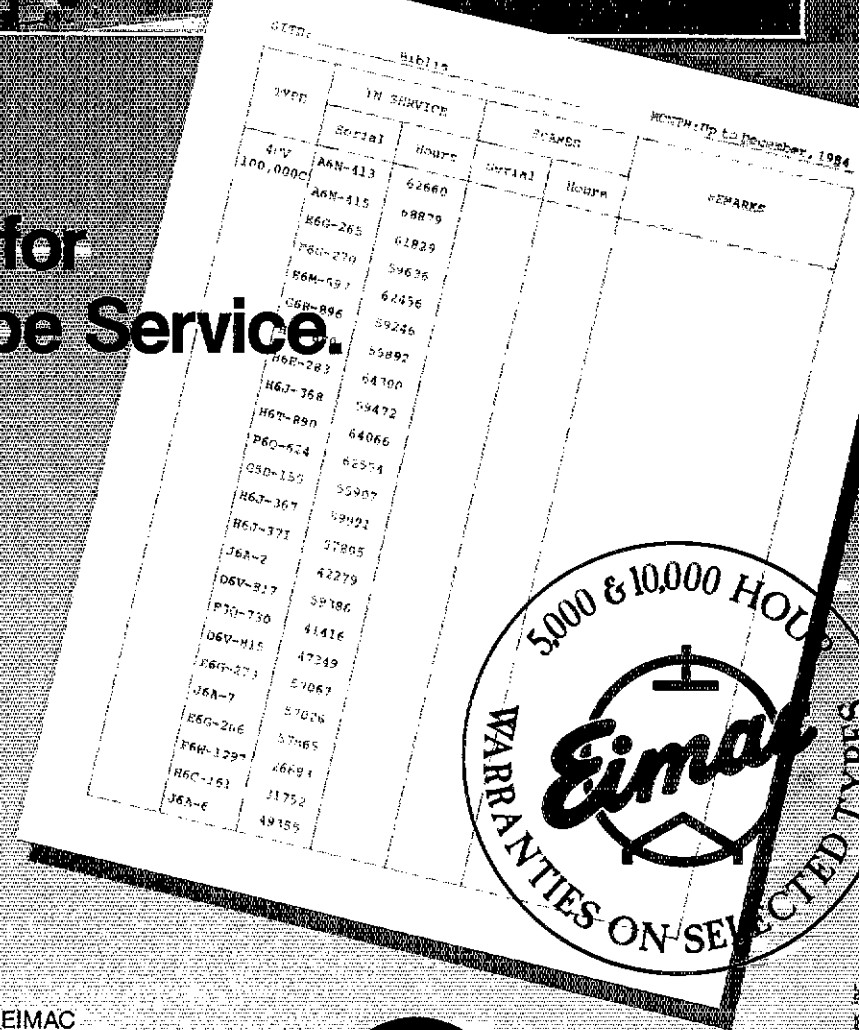
The club president would deny it, but of course his leadership has a lot to do with the success of the group. His pet peeve? "Negativism. We've pretty much managed to avoid it in the club, but it's all too common in Amateur Radio. There's so much to do as a ham, I can't imagine anyone running out of interesting things to try. It's silly to waste time griping about things that happened 20 years ago, or criticizing hams who happen to have interests different from our own. When it comes to attracting new people into Amateur Radio or the League, sometimes we're our own worst enemy."

Much to our delight, this club president, having sown the seeds in his own community, is about to go on to bigger and better things as a Section Manager. He's Bill Burden, WB1BRE, of Nashua, New Hampshire. There are a number of affiliated clubs around the country that are equally successful, but his happens to be the Nashua Area Radio Club. If you happen to be in Nashua on the first Monday of the month, drop by the Nashua Public Library and say hello. Tell 'em Dave sent you.—*David Sumner, K1ZZ*



Hugh Fallis, VP Engineering, Radio Free Europe, Munich, stands beside CE 100 kW HF transmitter using EIMAC 4CV100,000C tube.





EIMAC tubes provide long life for Radio Free Europe Service.

Radio Free Europe transmitters in Biblis and Lampertheim, West Germany, use EIMAC 4CV100,000C power tubes in 12 Continental Electronics 100 kW HF transmitters.

The station logbook shows most tubes have over 50,000 hours of service, and many tubes logged over 60,000 hours! And EIMAC tubes are still running strong—that's long life!

These figures are representative of the long life EIMAC tubes log in a variety of high power broadcast applications.

Take advantage of proven reliability, longest warranty in the industry and 50-year expertise. Choose EIMAC, the world's foremost manufacturer of high power broadcast tubes.

Call Varian EIMAC or contact any Electron Device Group sales organization worldwide.

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

Varian AG
Steinhauserstrasse
CH-6300 Zug, Switzerland
Telephone: 042 • 23 25 75

varian

UP FRONT in QST

Countdown to Increased Amateur Privileges

Later this month, the following operating privileges officially go into effect:

• On June 17, amateurs will be authorized to use **RTTY, FAX and SSTV on the 160-meter band,** 1800 to 2000 kHz. The FCC has released a Report and Order in Docket 84-959 that finalizes the process that began when the ARRL asked the Commission to authorize RTTY on 160 meters last year.

• The 12-meter band (24.890-24.990 MHz) will be released to U.S. amateurs General class and above at 0001Z June 22. The 30-meter band (10.1-10.15 MHz) becomes permanent at the same time. Both bands are exclusive in the U.S., but amateurs must avoid interfering with stations outside the U.S. in the Fixed Service. Full power will be permitted in the 12-meter band; at 30 meters, power continues to be restricted to 200-W PEP. Mode subbands will be as shown in December 1984 *QST*, page 61.

More than a year after the First Ham in Space mission, the exploits of Owen Garriott, W5LFL, aboard the Space Shuttle *Columbia* continue to play well with the public. Recently, *Amateur Radio's Newest Frontier,* the League videotape documenting the historic flight, was shown twice to viewers statewide over Connecticut Public Television. Instrumental in getting the program aired were Fairfield ARA members John Ronan, K3ZJJ (left), and Don Rosati, K1NGL, shown here discussing the broadcast with Mercer Field of CPTV. Yes, that's W5LFL in the monitors in the background.

Youth Column Premieres

Exciting news for young radio amateurs on page 60 of this issue: Making Waves, a column by 15-year-old Scott Springate, N7DDM, makes its debut. This installment, Scott features three families who have become Amateur Radio-active—and are having more fun together than ever. If you're doing something noteworthy and want to share it with others in this column, tell Scott about it (his address appears at the top of his column). Who knows, maybe next time you'll be the one Making Waves.

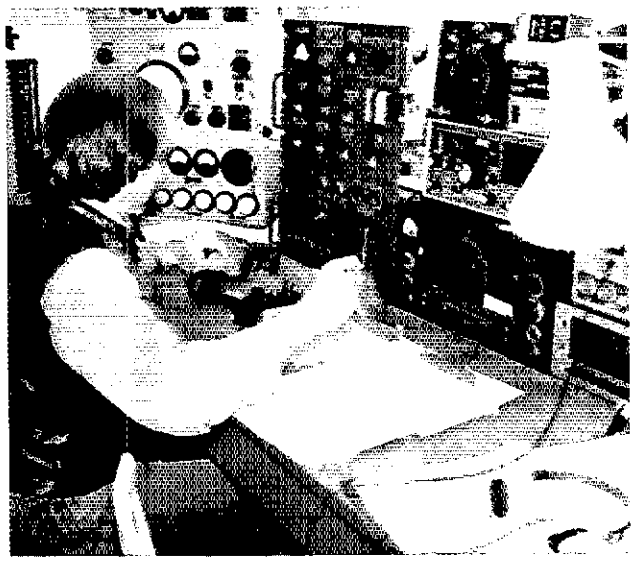
Automatic Control on VHF Proposed

In response to a specific request from the ARRL, the FCC has proposed to allow **automatic control for all amateur operations above 29.5 MHz.** Last November, the League had requested that automatic control be extended to digital communications above 30 MHz, to allow for greater use of and experimentation with computer bulletin boards and packet radio communications. Unfortunately, the FCC proposal does not extend to third-party traffic. See this month's Happenings for details.

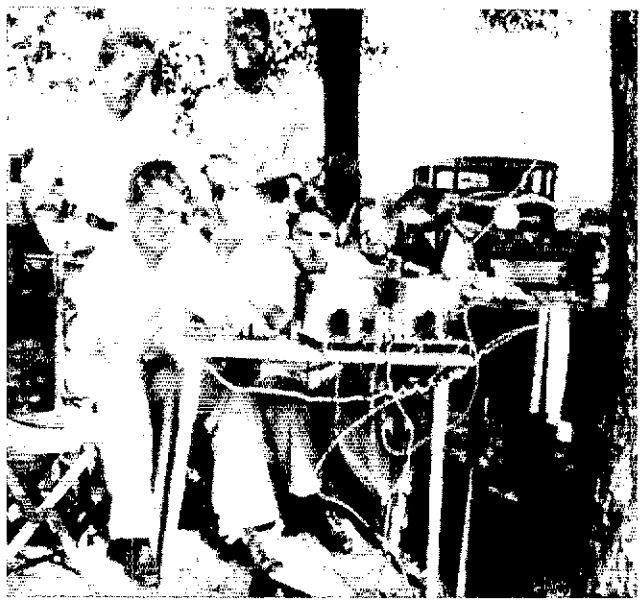
The national Amateur Radio society of Sweden, Foreningen Sveriges Sandareamatorer (SSA), was honored by an invitation to meet King Hussein of Jordan, JY1, during his recent stay at the Royal Palace in Stockholm. The photos show JY1 operating 2-meter FM (left) and being presented with a lapel pin by SSA Secretary Stig Johansson, SMØCWC. *(SMØCOP photos, courtesy SM4GL)*

First Teacher in Space a Ham?

Jeanine Duane, WB2MBW, of Long Valley, New Jersey, **has a shot at becoming the first teacher** to be invited **aboard a Space Shuttle mission.** An elementary school teacher, Jeanine is one of two educators from her state and among 118 nationwide being considered out of the more than 10,000 who initially applied for the spot. As part of her application, Jeanine submitted an in-flight project in which she would make scheduled 2-meter two-ways with amateurs stationed at schools across the country, and later deliver QSLs in person. The field of applicants will be narrowed to 10 sometime later this year, from which the crew member and a backup will be chosen.



Life at Gardskagi Lighthouse, on the southwest coast of Iceland, could be awfully lonely, but Martin Berkofsky, TF3XUU/8, has plenty of friends on the air to keep him company. Mostly built from converted antiques, Martin's station includes a Heathkit Cheyenne and long wire, for 10, 15, 20 and 40 meters; a Pedersen ship-to-shore rack, for 80 and 160 meters; and an RCA VHF transmitter with an 829-B final, salvaged from the Reykjavik airport, for RS satellite 2-meter uplinks. During his stay, until February 1986, he would be happy to make skeds with U.S. hams on 160 meters, 1830-1850 kHz. Recently, Martin passed his U.S. Advanced class exam and received the call KC3RE.



This month, on the 22nd and 23rd, amateurs across the country will be adding their own special adventures to the annals of Field Day. For these earnest-looking high school students in south Kansas City, Missouri, though, Field Day has held a special place in their hearts and minds for over half a century! Operating W9NFV at a country club golf course, they placed fifth in club scores in the first Field Day, in 1933. Taking part in the operation were (seated, l-r) W9AIW (now WØAR) and W9KGX (now KA1UP), and (standing, l-r) W9LPZ (now W4DT) and W9LXG (not presently licensed).

OSCAR for Beginners on TRN

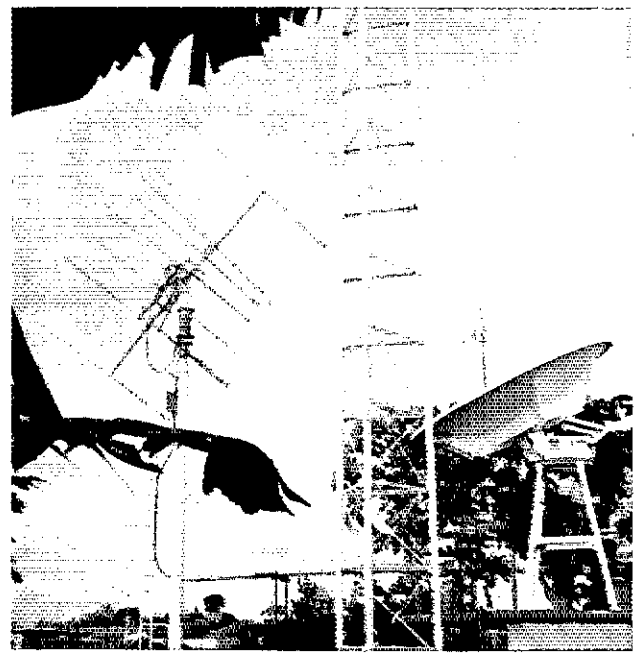
Are you interested in satellite communications, but can't tell the difference between your uplink and your downlink? The North American Teleconference Radio Net presentation at 0100Z June 14 may provide just the help you're looking for. A panel of AMSAT specialists will be on hand to discuss many aspects of the Amateur Satellite program, including how to get started, how a satellite can be used for QSOs, and future satellite activities. For information on linking your repeater into the net, send an s.a.s.e. to TRN Manager Timothy Lowenstein, WAØIVW, c/o Midway ARC, P.O. Box 1231, Kearney, NE 68847-1231.

A Golden Packet Opportunity

If you're involved in breaking new ground in long-distance packet communications, there may be a little something extra in it for you. To encourage the completion of the first terrestrial transcontinental packet network link, the Pacific Packet Radio Society has established a unique award, **the Golden Packet**, to be given to all stations participating in the link. The system used must consist of fixed terrestrial digital store-and-forward radio links using VHF (above 144.1 MHz), UHF or microwave frequencies. For more information, contact the Pacific Packet Radio Society, P.O. Box 51562, Palo Alto, CA 94303.

Call for Satellite Papers

Have you done some **original work and/or have some significant findings to report** in the areas of low-cost satellite engineering, space communications or a related subject? The Radio Amateur Satellite Corporation (AMSAT) may be interested in publishing it in the premiere edition of the *AMSAT Technical Journal*, to be published later this year. **Papers are due by August 1**, and should be mailed to AMSAT Technical Journal, P.O. Box 27, Washington, DC 20044.



Luciano Bertucci, TR8BL, enjoys satellite communications in a big way, as evidenced by this OSCAR 10 antenna system he built at his station in Libreville, Gabon. The dish is 2 meters in diameter and provides 26-dB gain on 1260 MHz. The 145- and 435-MHz antennas are crossed Yagis with 9 and 19 elements, respectively, fed with hardline. Preamplifiers are mounted at the antennas.

League Lines

Ham-in-Space planners announce that a frequency of 145.55 MHz will be the primary downlink for the amateur station on Shuttle flight 51-F. Verbal word from NASA in Houston still sets the launch for July 15, with the first amateur operations as early as the second half of day 2. Early transmissions from astronaut Tony England, WØORE, are likely to be slow-scan television rather than voice. The limited opportunity for two-way contacts will be used to fulfill Tony's primary interest: working youth groups paired with ham clubs. Local Amateur Radio clubs meeting certain guidelines will be able to get a list of special, non published uplink frequencies to be used for this purpose. Application forms are now available for qualified groups. Requests should be sent to ARRL Hq. in Newington, attention: HAM-IN-SPACE MISSION.

The 24-MHz band will be released to U.S. amateurs at 0001 UTC on June 22. The standing Board policy of no contest credit or awards on the WARC bands will apply to Field Day, unless a decision to the contrary is reached at the May 18 meeting of the ARRL Executive Committee. Check WIAW bulletins and the ARRL Letter for late-breaking news. More information on the 24-MHz band appears in Up Front in QST, in this issue.

The results of the postcard survey asking ARRL members' opinion on SSB subbands in the U.S. 40 meter band are as follows:

8788	(44.2%)	In favor of phone expansion on the U.S. 40-meter band
10640	(53.6%)	Not in favor of phone expansion on the U.S. 40-meter band
434	(2.2%)	No opinion
19862		Total number of cards

The survey was mailed with the January 1985 QST, and a facsimile of the postcard can be found on page 69 of that issue. Our special thanks go out to Jim and Andrea Parker, K1VII and K1WLX, who compiled the report. A cross tabulation to age and years licensed will be published in a future issue of QST.

The ARRL/VEC has coordinated nearly two-thirds of all test activity in the nation so far in 1985. VE Teams working with the League have administered close to 10,000 examinations! Many thanks to all of the hard-working Volunteer Examiners who are making this possible. More details appear elsewhere in this issue of QST.

ARRL is now accepting applications for the VUCC award for the microwave bands. Individual band awards are now available with the minimum number of grid squares to qualify as follows: 2.3 GHz, 10 squares; 3.4 GHz, 5 squares; 5.7 GHz, 5 squares and 10 GHz, 5 squares. Contacts made after January 1, 1983 count for award credit, and endorsements are to be offered in increments of 5. Contacts must be made from a single location, defined as within a 300-meter-diameter circle. The first three qualifiers on each band will receive their certificates mounted on walnut plaques. Application information, and the name of the closest awards manager who will process applications, is available from Dept. 63 at ARRL Hq. for an s.a.s.e.

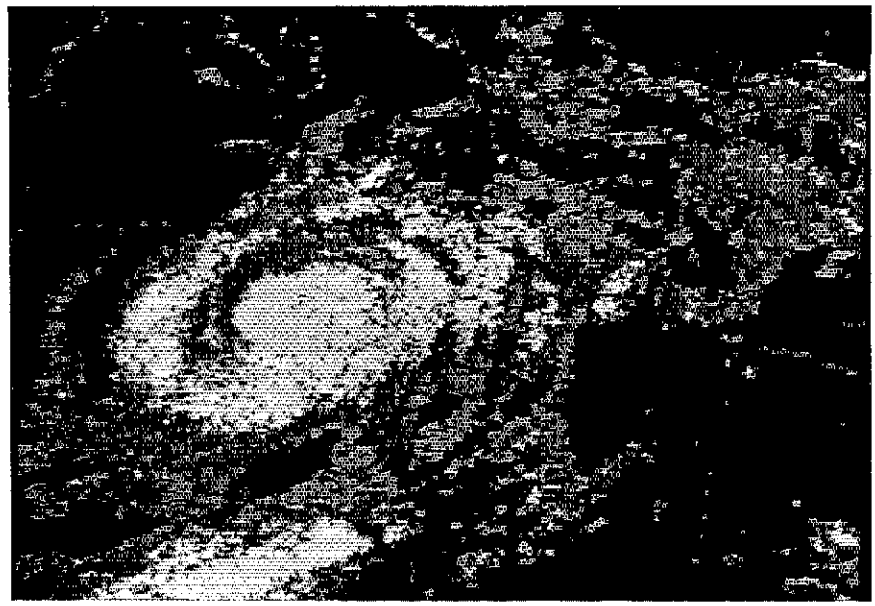
Want to know more about amateur satellites? Check out the Teleconference Radio Net on June 14. Details appear in Up Front in QST, this issue.

There is an opening on the staff here in Newington. Primary responsibilty is editing the Repeater Directory, with additional responsibilities as staff resource person regarding repeater coordination and FCC Rules as they affect repeater operation. Candidates should have a Technician class (or higher) amateur license, good oral and written communications skills and a familiarity with repeater operation and coordination. If you are interested in working on the ARRL Hq. staff in Newington, contact Bruce Hale, KB1MW, Manager, Regulatory Information Branch, ARRL Hq.

We are closing out our supply of the 1984-85 ARRL Amateur Radio Call Directory. Special price while they last: (in U.S. funds) $10 in the U.S., $14 in Canada and elsewhere. See page 136 to order.

The new ARRL Operating Manual will be out early in June. Check page 116 for details.

WEFAX Pictures on Your IBM PC



Exciting color WEFAX pictures can be yours. You can even magnify picture areas from four to 16 times normal size.

By Elmer W. Schwittek,* K2LAF
and William*G. Schwittek**

Many articles have been written about receiving and recording weather-facsimile (WEFAX) signals. If your interest in this subject is new, it will help you to read the articles listed as references. This presentation is limited to that part of the system following detection of the video signal from the 2400-Hz AM carrier. We'll discuss the electronics needed to convert the analog video signal to a digital form to send to the personal computer (PC), two computer programs and how the system works to produce a weather picture.

Outline

The facsimile (FAX) machine is used by most WEFAX enthusiasts to obtain black-and-white (B&W) weather pictures from a geostationary orbiting earth satellite (GOES). But how we envy the "living color" WEFAX pictures shown on the televised weather shows! The method we're presenting here produces four-color WEFAX pictures of reasonable quality on the screen of an RGB (red, green, blue) color monitor used with an IBM® PC. A composite-video color monitor may also be used, but the resolution will not be as good. The WEFAX picture may be stored on disk, and a printer may be used to obtain hard copies in four shades of gray.

The System

This WEFAX picture-reproduction method uses the medium-resolution, four-color mode of the IBM PC. Four colors replace the shades of gray produced by the FAX method in response to the instantaneous amplitude of the video signal (Fig. 1). To accomplish this, the A/D (analog-to-digital) converter (Figs. 2 and 3) sorts the analog video signal into four amplitude ranges, assigns a two-digit binary number to each range (Ø0, Ø1, 10 or 11) and delivers the number to the computer game port. Thus, as the video-signal amplitude varies with picture content, the computer sees one of four binary numbers, depending on the instantaneous amplitude of that video signal. The computer interprets each of the four binary numbers as a different color. To a limited extent, the colors are software selectable.

REALTIME.BAS

To gain some familiarity with the software, use the REALTIME program first.[1] It causes the computer to sample the binary number present at its game port (two bits) and to move this information, one byte at a time, to the memory addresses of the color screen. The program requires no unusual amount of computer memory, and the picture is painted on the monitor in real time, so you can make equipment adjustments and observe the result instantly. An example of the output of REALTIME is shown in Fig. 4. Compare it with Fig. 5, a simultaneously produced FAX copy. The color photograph was taken directly from the color monitor screen using a 200-mm lens to minimize distortion from the shape of the screen.[2]

To understand what REALTIME does, you must recall that the WEFAX picture transmission is composed of 900 lines, each ¼ second in length, of which fewer than 800 lines are useful picture information. This system has been designed to record and display 800 lines, and the time required to do this is 200 seconds (800 lines × ¼ second).

If you assume, as a first approximation, that the horizontal and vertical details are equal, the picture could be shown in all of its detail if the PC were capable of displaying 800 × 800 lines, or 640,000 pixels (picture elements), on the monitor. The

[1]Notes appear on page 18.

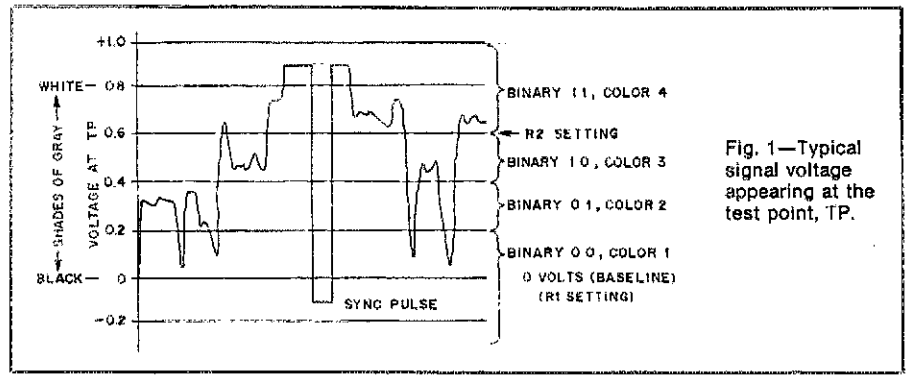


Fig. 1—Typical signal voltage appearing at the test point, TP.

*429 N. Country Club Dr., Atlantis, FL 33462
**Rollin Irish Rd., RFD 2, Milton, VT 05468

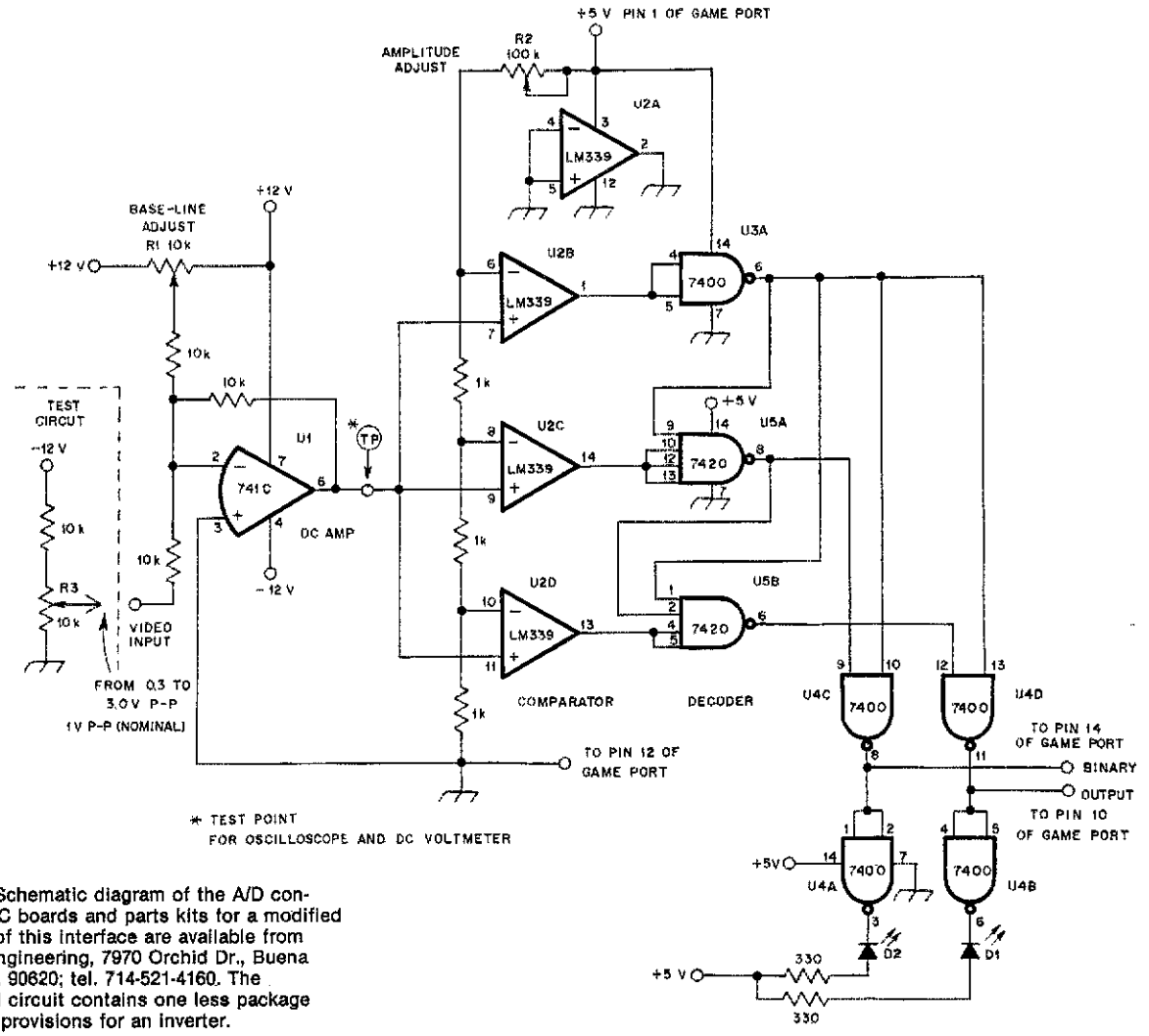


Fig. 2—Schematic diagram of the A/D converter. PC boards and parts kits for a modified version of this interface are available from A & A Engineering, 7970 Orchid Dr., Buena Park, CA 90620; tel. 714-521-4160. The modified circuit contains one less package and has provisions for an inverter.

four-color, medium-resolution screen provides only 200 lines with 320 pixels per line, or 64,000 pixels. REALTIME samples the game port 320 times during a picture line, but samples are taken during only *one out of four lines.* Thus, ¾ of the vertical information and 480/800 of the horizontal information contained in the transmitted signal are wasted in order to fit the full picture on the screen (compare the printing at the top of Figs. 4 and 5). If, on the other hand, you are willing to display a *part* of the WEFAX picture, that part can be displayed in greater detail. This is the difference between REALTIME and MAGNIFY.

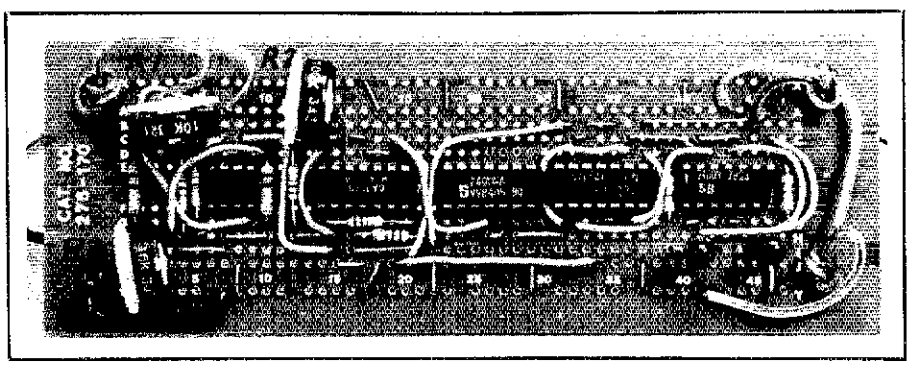


Fig. 3—The authors' A/D converter is constructed on a Radio Shack prototyping board (RS 276-170). Since the photo was taken, the trimmer potentiometers were changed to panel-mount types so that knobs could be attached for ease of adjustment.

MAGNIFY.BAS

MAGNIFY functions much like REALTIME, but allows you to select how much of the total picture you wish to view. You may choose the entire picture, any quarter (Fig. 6) or any sixteenth (Fig. 7). When less than the full picture is chosen, that part is displayed over the entire screen and in greater detail. MAGNIFY does not require you to make your choice of view before you begin recording the picture. It samples the game port 1,024,000 times (1280 times along each of the 800 lines) during the 200-second transmission time, stores *all* of these samples in 256 kbytes of computer memory (2 bits per sample, 4 samples per byte), and permits the display of samples you select. With the total view, the samples that were used in REALTIME are selected. As the area of view is restricted, MAGNIFY selects the most appropriate 64,000 samples from which to compose that view, thus yielding greater detail in exchange.

Note that MAGNIFY does not provide real-time viewing. All data is sampled prior to view selection. With MAGNIFY, you first examine the total view to see the general weather situation. Then, depending

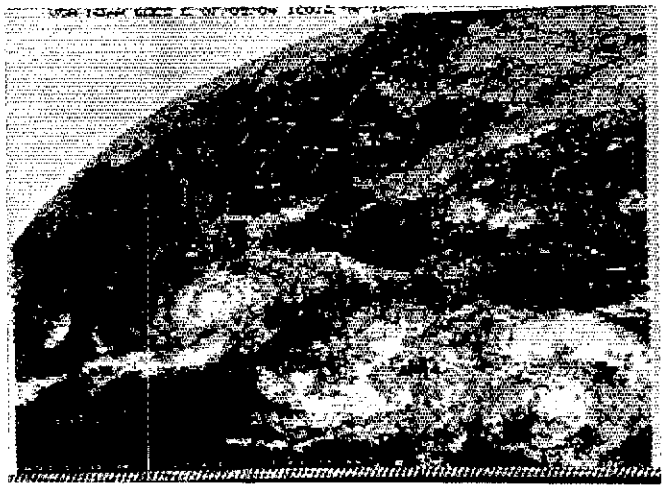


Fig. 4—WEFAX picture obtained using REALTIME.BAS or MAGNIFY.BAS. All pictures shown were recorded at K2LAF on July 5, 1984. Note hurricane Genevieve in the lower-left quadrant of this picture. MAGNIFY was used to zero in on the hurricane areas shown in Figs. 6 and 7 and in the title photograph. The title photo shows how dramatically the color palette choices affect the resulting picture.

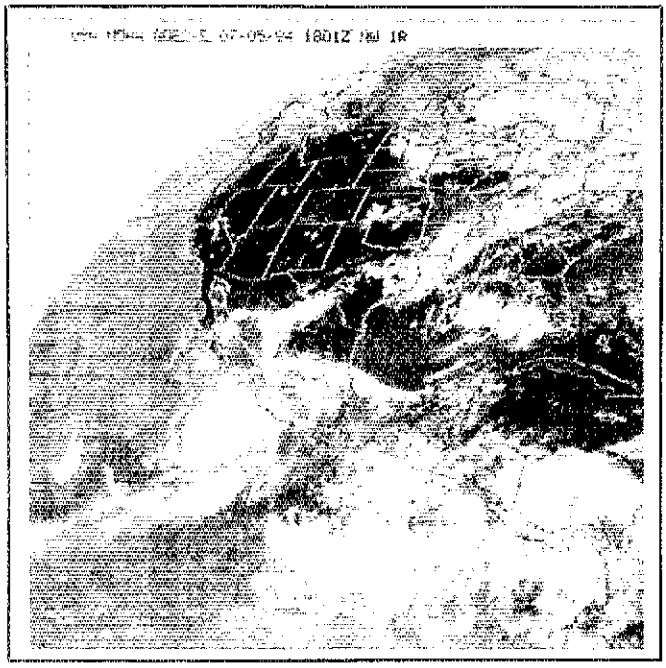


Fig. 5—A B & W FAX recording produced simultaneously with the picture shown in Fig. 4.

Fig. 6—This 4× view of the information appearing in Fig. 3 was produced using MAGNIFY.BAS, effectively zooming in on hurricane Genevieve.

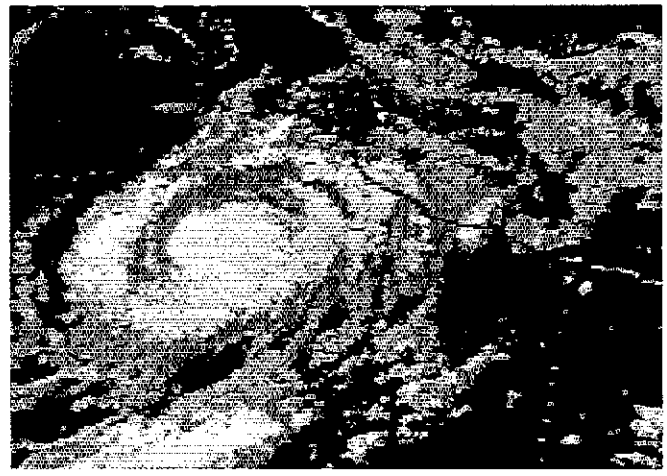


Fig. 7—An even closer look at the hurricane. This time, MAGNIFY was used with a magnification factor of 16.

on the picture content and the degree of detail desired, a multiplication factor of 4 or 16 can be made for closer, more detailed viewing. The detail in the 16× view is approximately equal to that of the original transmission. The price you pay for greater detail in viewing is the requirement of more computer memory.

Color Selection

The programs allow selection of the background color from a group of 16. The remaining colors may be chosen from two standard groups of three-color palettes. Avoid choosing one of the palette colors for the background color.

Memory Requirements

The programs require a minimal amount of memory. Both are loaded in a part of the BASIC workspace that has been size restricted by the CLEAR command to 20,480 bytes. Both programs load their high-speed subroutines beginning at that point in memory. The storage of WEFAX data, however, is a different matter.

While in REALTIME, the 16 kbytes of data (64,000 pixels) that are taken from the game port are stored directly in the color screen memory; this is not the case with MAGNIFY. In MAGNIFY, the program stores all data (256 kbytes) in four contiguous memory segments (&H4000 to &H7000), and selects, as required, appropriate data for placement in the color screen memory. You must have four empty contiguous segments available in your PC for MAGNIFY, though they need not be &H4000 to &H7000.

If the four segments are located differently in your PC, you must modify MAGNIFY.BAS by changing any reference to the RANGE (&H4000 to &H7000) to the four-segment range that you have available. Lines 720, 780, 840-870, 1630-1660, 1950 (&H40) and 2100 (&H70) of MAGNIFY are affected.

Picture Synchronization

The frequency standards in the satellite and in the IBM PC are sufficiently stable so that synchronization, once established, is maintained. When you first record WEFAX video, either program will begin the picture properly at the upper left-hand

corner of the screen, but the sides of the picture may not be vertical because of slight variations in the time base of each PC. A constant has been provided in the programs to trim the timing to match your computer. Once this adjustment has been made properly, further change is seldom necessary.

Storing Picture Data

On Disk

Using either program, you may save on disk any view seen on the screen at a cost of 16 kbytes of disk space per view. With MAGNIFY, the entire 256 kbytes of sample data may also be saved on disk, from which 21 different views may be obtained.

Hard Copy

Using the IBM graphics printer and the DOS 2.0 program called GRAPHICS.COM, you may save any view on paper, but in four shades of gray instead of four colors (see Fig. 8). Load GRAPHICS.COM right after booting up the PC, and press the SHIFT (UP-ARROW)/PRTSC keys when you want a hard copy of the graphics screen.

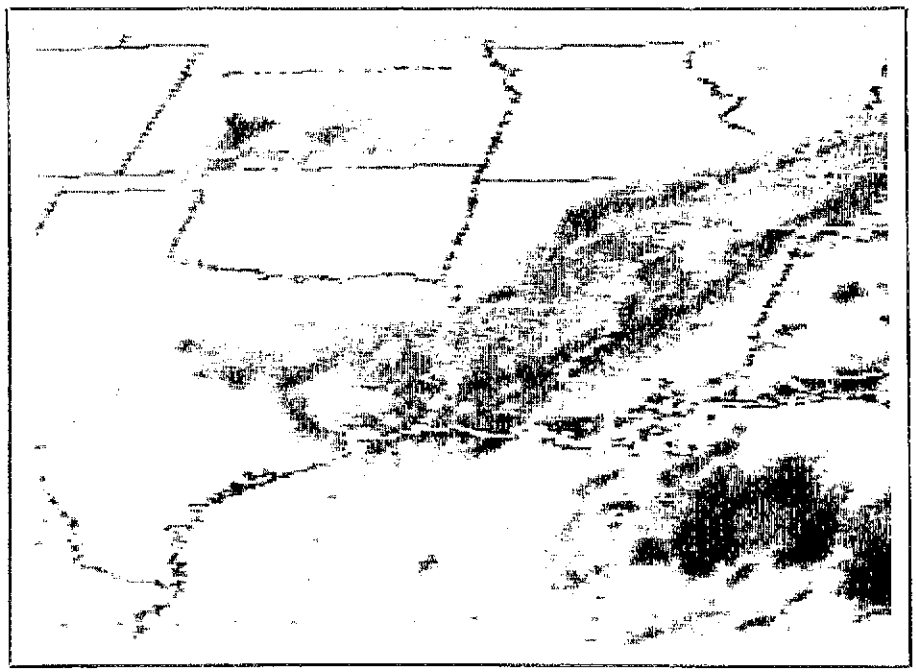


Fig. 8—A printer-produced hard copy of a magnified view of the Gulf area shown in Figs. 4 and 5.

The Hardware

The A/D converter can and should be tested prior to any connection to the computer. As shown in Fig. 2, the +5-V supply will eventually be derived from the computer power supply, but any +5-V source will suffice for test purposes.

The first stage of the A/D converter is a dc amplifier with unity gain. It provides a way to establish a proper dc baseline. The video signal you will eventually connect to the video input is a variable dc voltage with some sort of dc baseline, which will probably be incorrect for our purpose. R1 allows you to reestablish that baseline relative to the video signal so that it is approximately as shown in Fig. 1.

A comparator in the second stage works in conjunction with the voltage divider made up of R2 and three 1-kilohm resistors; these serve to sort the video signal into one of four amplitude ranges. R2 is adjusted so that the sorting ranges are compatible with the video signal level available at the video input. The remaining stages decode the comparator output so that the 2-bit binary number corresponding to the input signal level is present at the LED indicators.

Test the A/D converter as follows: Adjust R3 (test circuit) so that the simulated video input is zero (video input at ground); set R1 at midrange and apply ±12 V and +5 V to the board. Adjust R2 so the voltage at pin 6 of U2 is about 0.6-V dc. Connect a dc voltmeter to TP. Adjust R1 so the voltage at TP is zero (midway). Both LEDs should be off, indicating a ØØ binary output.

Gradually increase the negative voltage at the video input by adjusting R3. Note that the four binary conditions are sequentially indicated on the LEDs with ØØ between 0 and 0.2-V dc at TP, Ø1 from 0.2 to 0.4 V, 1Ø from 0.4 to 0.6 V, and 11 above 0.6 V (the voltage set by R2). You can see that R2 acts as a gain control. For example, with R2 set as described, a 1-V P-P video signal would be proper (see Fig. 1). It is normal to allow the maximum white and maximum black picture levels associated with the sync pulse to spill over somewhat.

Getting the Picture with REALTIME

To gain experience with this system, it is best to start with REALTIME. If you enter the REALTIME.BAS listing from the keyboard, save it to a disk that also contains IBM PC DOS 2.0, BASIC.COM and GRAPHICS.COM. With the computer off, connect the A/D converter to the computer game port with an appropriate connector and four-wire cable as shown in Fig. 2. Continuing to use the test circuit, turn on the computer and determine that the LEDs operate properly as R3 is varied. Then set R3 so that the LEDs indicate Ø1.

Run REALTIME.BAS. Select blue for a background color, and the green, red and brown palette. Choose "Record new data," and reply "N" when asked if you desire to save the picture to disk. REALTIME will request a keypress to start recording on the next sync pulse (binary ØØ on the data lines). Press any key, and simulate a sync pulse by setting R3 to yield a momentary ØØ indication. Then adjust R3 to produce various binary numbers, and notice the color scanning on the monitor. You may re-run the program to show that you can save the "picture" on disk, or make a hard copy using the printer.

At this point, you have proved that your system functions. All that remains is to apply a video signal in place of the test signal. It is apparent that the system described has a negative-going video signal from its detector; this produces the positive-going video signal at TP. If your video signal is of opposite polarity, you must invert it by passing it through an inverting amplifier or by revising the do amplifier of Fig. 2 so it becomes noninverting. The video-signal level presented to the A/D converter is not critical, as long as it falls within the range that the comparator can handle by adjustment of R2.

To record video, run the program to the point where it requests a keypress to begin recording at the next sync pulse. Then, while monitoring the audio at the start of a new picture, let the 5-second tone burst pass without doing anything. Waste the next 18 to 20 seconds of the FAX sync period, and then press any key to start recording. Recording begins the first time the video signal goes to ØØ after you press any key to start the process. If you are already into picture data before pressing a key, the picture will not synchronize.

Do some experimentation with the settings of R1 and R2 while observing the picture as well as with an oscilloscope connected to TP. This is a good way to become familiar with the recording technique.

To correct for nonvertical picture sides, REALTIME contains a number in the data section that must be modified. In REALTIME, this number is located in two adjacent words beginning with the last word of line 13ØØ (&H32 and &H3C). This

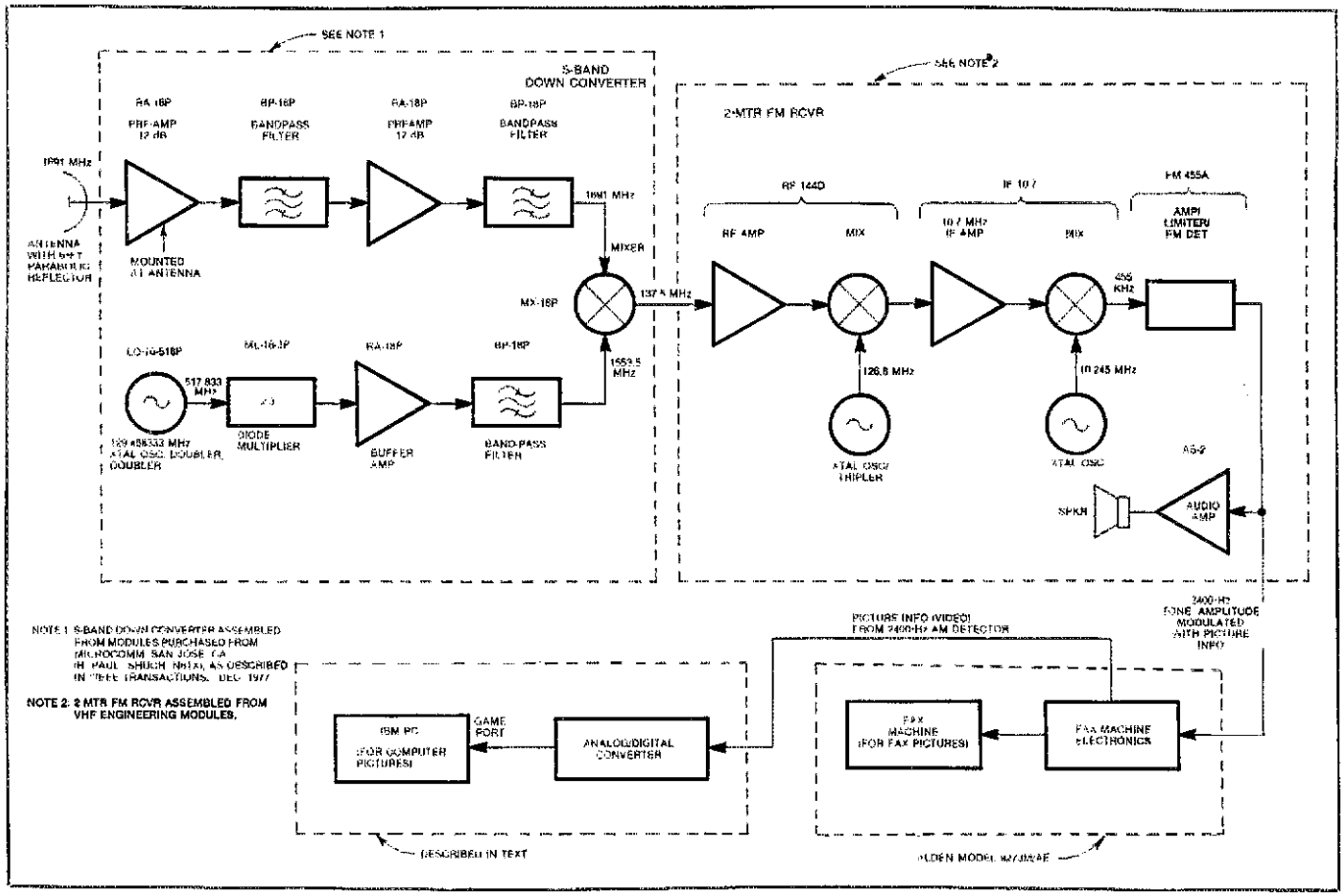


Fig. 9—A block diagram of the WEFAX receiving and recording system used at K2LAF. Output of the Alden Recorder is fed to the A/D converter input so that simultaneous FAX and computer recordings can be made. There is no requirement for using that particular detector, however. Any AM detector designed for detecting the WEFAX signal from its 2400-Hz carrier will suffice.

stands for the number $3C32 (15,410 decimal). Small changes are made by varying &H32 a few counts.

Getting the Picture from MAGNIFY

The same checkout procedure works for MAGNIFY. The only difference is that the display is not in real time, so you will not be able to view the results until after the 200-second period is completed. To adjust for vertical picture sides, the same number appears twice in the program, and *both* locations must be altered. The number is located in adjacent data words in lines 1980 and 2070—&H05 and &H04; this equates to $0405 (1029 decimal). If large changes are required, *both numbers* have to be changed in *both lines*. For small changes, only &H05 is varied *in both lines*.

Final Remarks

Both programs include a data-checking feature that gives some assurance that the DATA lines are typed correctly. When you first run REALTIME, type "RUN 1010," so the quantity and sum of DATA terms will be verified. For MAGNIFY, type "RUN 1830."

For those of you interested in programming, some program improvements are suggested. Real-time viewing could be added to MAGNIFY so you're not looking at an inactive screen while a picture is being recorded. Also, since the WEFAX picture is square, the scan rate could be altered to give a square picture on the monitor as well. Try reversing the data lines from the A/D converter to the computer. The colors will not change, but they will be associated with different video levels.

We're grateful to David E. Schwittek, WB2LMU, for his advice during the early work on MAGNIFY. We hope this project will provide you—as it has us—with hours of interesting and informative WEFAX-picture viewing.

References

Anderson, W. G., "Amateur Reception of Weather Satellite Picture Transmissions." *QST*, Nov. 1965.
Emiliani, G. and M. Righini, "An S-band Receiving System for Weather Satellites." *QST*, Aug. 1980.
Emiliani and Righini, "Printing Pictures from 'Your' Weather Geostationary Satellite." *QST*, April 1981.
Taggart, R. E., *The Weather Satellite Handbook*. Peterborough, NH: 73, Inc.
Taggart, "Predict the Weather—A Complete Satellite Receiver." *73*, May 1977, p. 48.

Notes

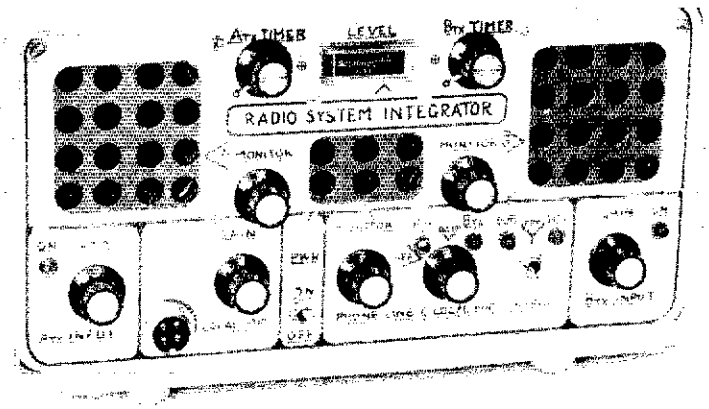
[1]Copies of the programs are available on disk from Elmer Schwittek for $5. A single sheet of instructions is included with the disk. (The ARRL and *QST* in no way warrant this offer.) The program listings for REALTIME.BAS and MAGNIFY.BAS are too long to be reproduced in *QST*. Program listings are available for $1.50 and a large s.a.s.e. Please clearly identify the program listings as WEFAX 6/85 in your request.

[2]William Schwittek took the pictures from the screen of a 19-inch Sony Profeel RGB monitor. He used a Canon F1 35-mm single-lens reflex camera equipped with a Tokina 50 to 250-mm zoom lens set at 200 mm; exposure time, 1/15 s at f8; distance to screen, approximately 12 feet. Kodak VR400 color-print film was used; pictures were printed using the Kodak Ektaflex process.

Elmer Schwittek was first licensed as W9FUO in 1939. Since then, he has held WØFUO and his present call, K2LAF. He graduated from the University of Minnesota in 1948 with a bachelor's degree in electrical engineering, and went to work for Collins Radio, Cedar Rapids, Iowa until 1957. In 1957, Elmer moved to Rochester, New York and worked for the Electronics Division of General Dynamics until 1961. With three others, he founded RF Communications, Inc. where he held the positions of Executive Vice President and then President. RF Communications was sold to the Harris Corporation in 1969, and Elmer left the firm in 1970 to become a farmer. After nine years of farming in Victor, New York, he retired to Florida. Elmer is now president of the Palm Beach Habilitation Center, Inc., which trains handicapped people for employment. He's also the Vice Mayor of Atlantis, Florida.

William Schwittek graduated from the Rensselaer Polytechnic Institute in 1970 with a master's degree in electrical engineering. He is presently employed as an Advisory Engineer by IBM in Burlington, Vermont. Both William and Elmer are pilots; they flew across the Atlantic in 1978 in a single-engine aircraft.

The Radio System Integrator



You'll enjoy building this project! When you're finished, you'll have a useful and versatile radio-control system, too.

By Ki Negoro,* WA6QJP

The East Whittier Radio Club often provides communications for crowd control and medical monitors during parades, marathon runs and other public events. About half of the amateur operators use 10-meter SSB (converted CB) radios, while others run 2-meter FM gear. Communications within each group works well, but some time ago each group asked: "What's happening on the other band?"

Necessity, Mother of Invention

We needed a dual cross-band repeater control unit. The unit had to provide a "repeat" output for the other band. That way, each operating group could hear the activity on the other band. A net-control facility would provide overall system monitoring. The late Robert N. Dyruff, W6POU, suggested the addition of an optional telephone-line interface for possible use in emergency communications.[1] Thus, the Radio System Integrator was conceived.

The Integrator is a versatile combiner of audio signals and controls between any two transmitter/receiver systems and a normal telephone line. Audio signals of any mode (AM, SSB, FM, RTTY and data transmissions) are handled automatically after the routing procedures are set by net control.

The Integrator is an ideal construction project for clubs as well as individuals. It can be used for setting up a "quickie" repeater at a club picnic or swap meet, to provide communications for public events or for emergency communications when conventional systems are overloaded or fail. The unit might also find use in automatic control of OSCAR and packet-radio gateway stations.

Development

A predesign search of my "Interesting—for future use" files brought up "The Porta Peater—The Instant Communicator," by Mike Strange, WA2BHB.[2] The general design was modified so that two sets of controls could be hooked up in a cross-connected arrangement to control two radios. The received audio signal from one radio is fed into the box, which senses its presence, operates the PTT line and routes the audio signal to the input of the second radio. Similarly, an audio signal from the second radio operates the first radio.

A safety circuit avoids lockups by providing priority status to one of the radios. The LOCAL MIC operator (net control) has total control of routing and operating order of all signals entering and leaving the Integrator. The power-supply filter and voltage-regulator unit requires an input of 12- to 16-V dc at 180 mA. Batteries, a standard 12-V dc wall transformer or other such power sources will suffice.

The optional telephone-line interface includes:

- An IC equivalent of hybrid balanced-line transformers.
- Additional circuits to drive a monitor speaker and PTT control.
- An active notch filter for long-distance line operations.
- A VU meter circuit to monitor audio levels.

Circuit Description

Main Board

Refer to Fig. 1. The received audio signal from Radio A is fed to R6, R7 and T1. R6 controls the volume of the A MONITOR speaker. R7 sets the level of the audio signal fed through the switch U1A and into the common signal line, SL. Audio signal level is indicated on the VU meter. The audio signal on SL terminates at R33 and R32, which are adjusted to suit input requirements of Radio A and Radio B, respectively.

The ac output of T1 is rectified and stored in C5. This potential is compared with the slightly positive state of the inverted input of U2A. Thus, the output is triggered to an ON or OFF state, controlling U1A. Output of U2A also triggers timer U3 to the ON state, activating K1,

[1]Notes appear on page 24.

*1315 Beverly Blvd., Montebello, CA 90640

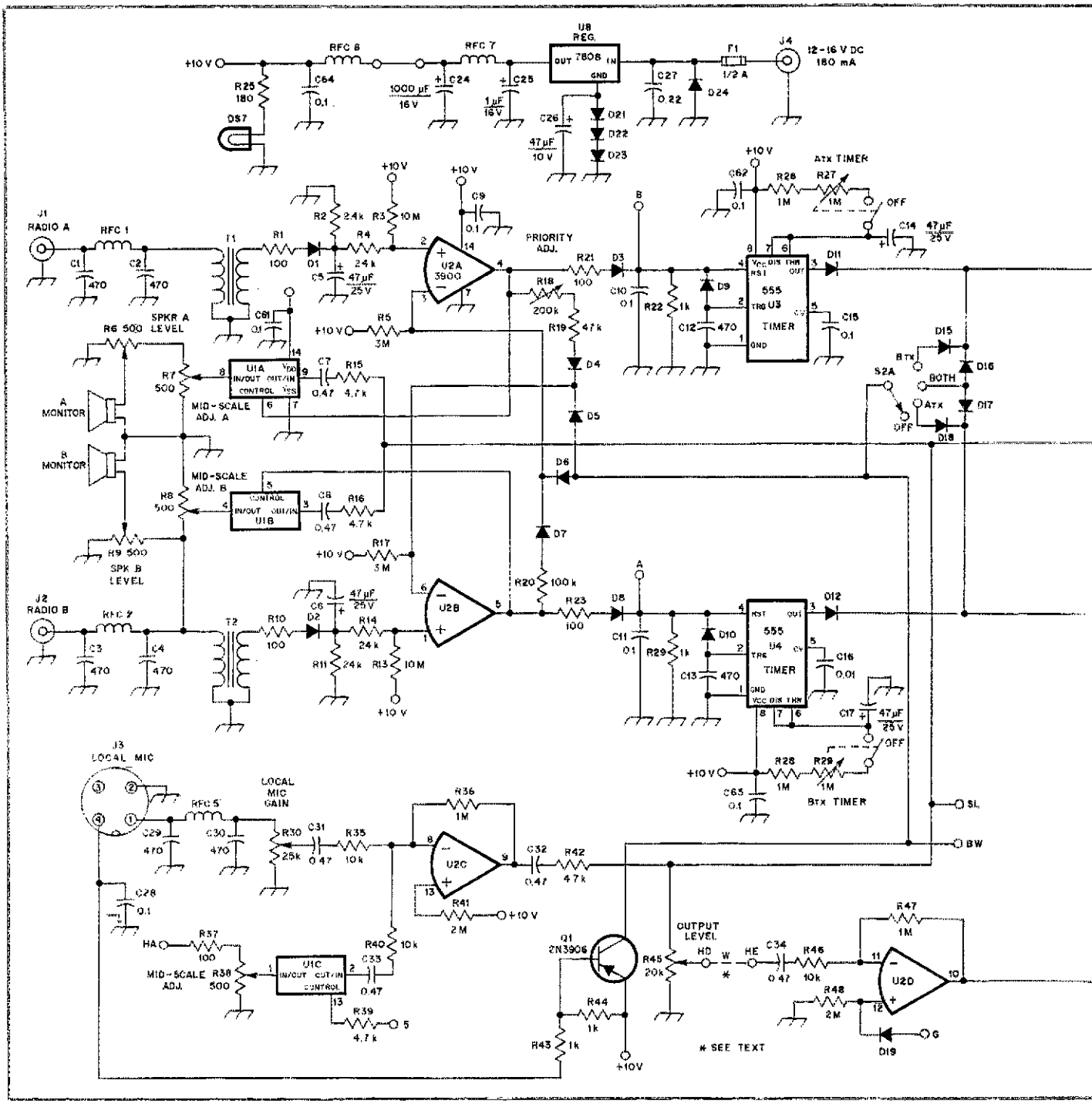
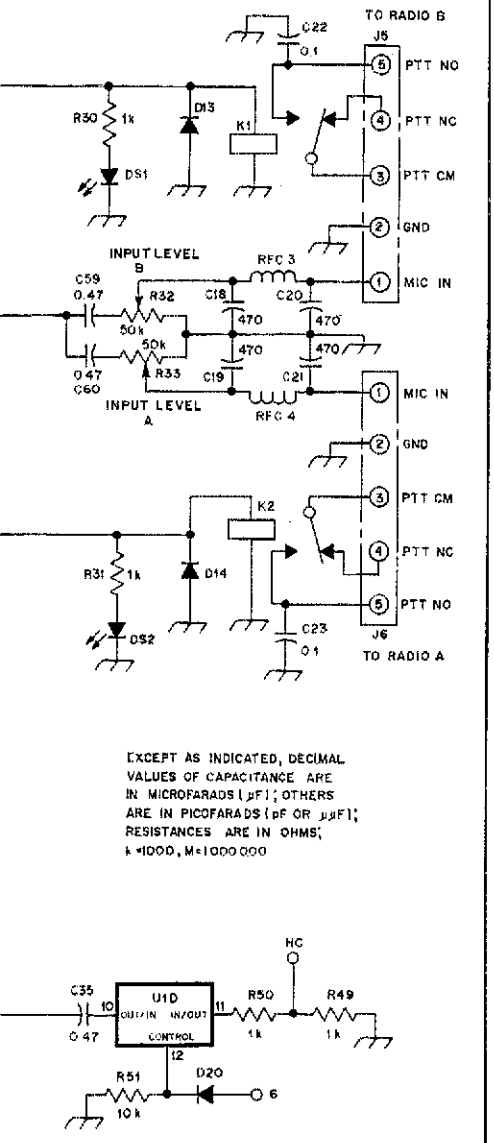


Fig. 1—Schematic diagram of the main and power-supply boards.

DS1, DS2—Red and yellow LEDs, respectively.
R6, R9—500-Ω linear-taper potentiometer, panel mount.
R7, R8, R38—3/8-in square, 500-Ω trimmer potentiometer.
R18—200-kΩ, 3/8-in square trimmer potentiometer.
R27, R29—1-MΩ panel-mount potentiometer with SPST switch.
R32, R33—50-kΩ panel-mount potentiometer.
R34—25-kΩ panel-mount potentiometer.
RFC1-5, RFC8—0.47 µH, 100 mA.
RFC7—0.22 µH, 200 mA.
T1, T2—Miniature audio transformer, 1.2 kΩ:8 Ω
U1—4066 quad bilateral switch.

the PTT relay for Radio B. When the inverted input is driven high, U2A output goes low. This feature is used in the priority circuit (R18, R19, D4, D7 and R20) coupling the output of U2A to cut off U2B, which cuts off U2A. By varying R18, you set the priority condition. Two such circuits exist: Input from Radio A controls Radio B, and input from Radio B controls Radio A.

D5 and D6 are nonconducting when reverse biased. When the PTT line (pin 4 of the LOCAL MIC socket) is grounded, Q1 conducts. This causes the inverting inputs of both comparators to go high, cutting off both audio switches and dropping both relays. The position of S2A determines if one or both relays should close. The local operator can route commands as desired. Voice signals from the local microphone are conditioned by U2C and passed to the



U2—LM3900 quad amplifier.
U3, U4—555 timer.
U8—7808 voltage regulator.
Misc.—Heat sink for U8, 1 × 2 × ¾ in.

SL. Audio from auxiliary systems is sent to U1C. Outgoing audio signals from the signal line are conditioned by U2D, and controlled by U1D.

Telephone-Line Interface

Refer to Fig. 2. Incoming phone-line signals are fed through T4 to the inverting input of U5A. The noninverting input is biased through R55. U5A output is attenuated by R62 and fed to U6, an audio power amplifier. Output from U6 drives the MONITOR speaker and T3. U5C controls automatic keying of the radios. The output of U6 is routed to U1C, U2C and SL.

The optional telephone-line interface is inserted at points HD and HE of Fig. 1 after removing the jumper, W. Outgoing signals from the signal line, level-adjusted by R45, are fed through the notch filter, U7A and U7B. The filter sharply attenuates 2600 Hz while passing all other audio signals. This filter is a requirement when connecting to long-distance telephone lines.[3,4]

After the notch filter, the audio signal is conditioned by U2D, controlled by U1D, and fed to one fixed (R59/R60) and one adjustable (R61) voltage divider. The reduced-amplitude audio signal from R59/R60 is amplified by U5B. U5B output (via C37/R53) feeds T4 and enters the telephone line. The junction of T4 and C37 feeds through C36/R52 to the inverting input of U5A. At the same time, the variable divider is adjusted to feed an equal level and phase to the noninverting input of U5A. This makes U5A unresponsive to audio from SL, but allows it to respond to audio from the telephone line.

VU Meter

Audio signals on line SL are processed by U5D and associated circuitry to drive the VU meter in the peak-averaging mode. R85 is chosen to provide a midscale indication on the meter with 0.5 V of audio signal on the line.

Assembly

Amateurs with radio-equipment-building experience can use perf boards for this project. Careful circuit layout is required to minimize unwanted coupling. I suggest the purchase of a main PC board and a power-supply board.[5] The optional telephone-line interface board can be added later. To save time and labor, I'd also recommend buying a commercial cabinet such as the LMB CO-4 chassis/cabinet combination I used.

I've prepared a plastic laminated sheet with full-size drawings of the front and rear panels (see note 5). The drawings are designed to be used as drilling templates as well as escutcheons for the finished panels.

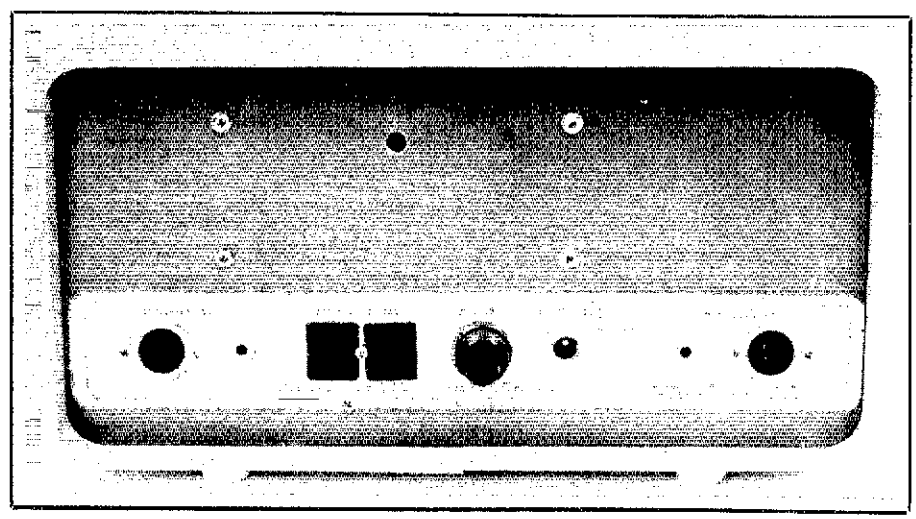
Front-Panel Preparation

Cut out the front panel drawing on the outer template line. The dimensions should be 4-7/8 × 9-13/16 inches. Do not cut out any openings at this time! Arrange the template to match the panel outlines, and center punch through the template at the cross marks at each hole. Read the instructions in the margins between panels for drill-size identification. Some of the 3/8-inch-diameter holes are only partially drawn, but centers are shown and full-size holes will be drilled. There are 30 3/8-inch-diameter holes and 32 holes of other sizes on the front panel.

Center punch the corner points of the meter rectangle located under the LEVEL label. Remove the template and connect the points with a scribed line. Cut out the rectangle by drilling several holes and filing to the scribed lines or use a nibbling tool. Carefully remove burrs on all edges.

Place the template on a backing of newspapers or similar material, and carefully cut out all the cross-marked circles, the rectangular cutout for the VU meter and the three speaker openings. To make the cutouts, a new, single-edged razor blade or an X-acto® knife is recommended.

Apply a small amount of white glue in a ¼-inch-wide band around the front-panel perimeter, and allow it to dry until tacky. Place the template—now an escutcheon—on the panel, aligning the holes and edges.



Rear view of the Integrator. The rear- and front-panel (see title photo) escutcheons serve as drilling templates during construction.

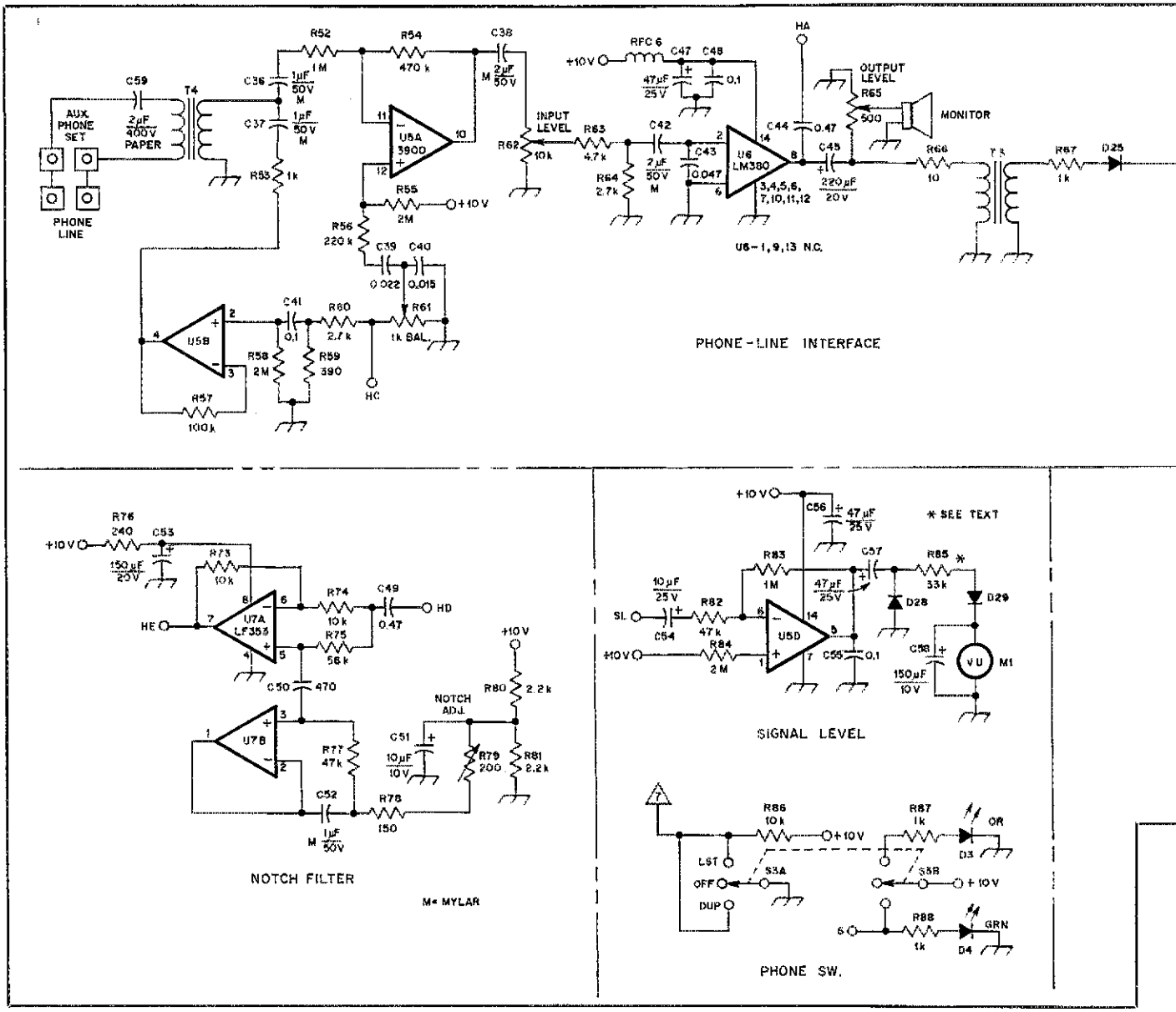


Fig. 2—Telephone-line interface and switching circuits.
DS3-DS6, incl.—Orange, green, red and yellow T-1¾ LEDs, respectively.
M1—VU meter with pilot light, 200 μA.
R61—1-kΩ, 10-turn trimmer potentiometer.
R62—10-kΩ trimmer potentiometer.
R65—500-Ω panel-mount potentiometer.
R79—200-Ω, 10-turn trimmer potentiometer.
S2—3P4T, nonshorting rotary switch, panel-mount type.
S3—2P3T, center-off miniature toggle switch.
T3—Miniature audio transformer, 1.2 kΩ:8 Ω.
T4—Miniature audio transformer, 600 Ω:600 Ω.

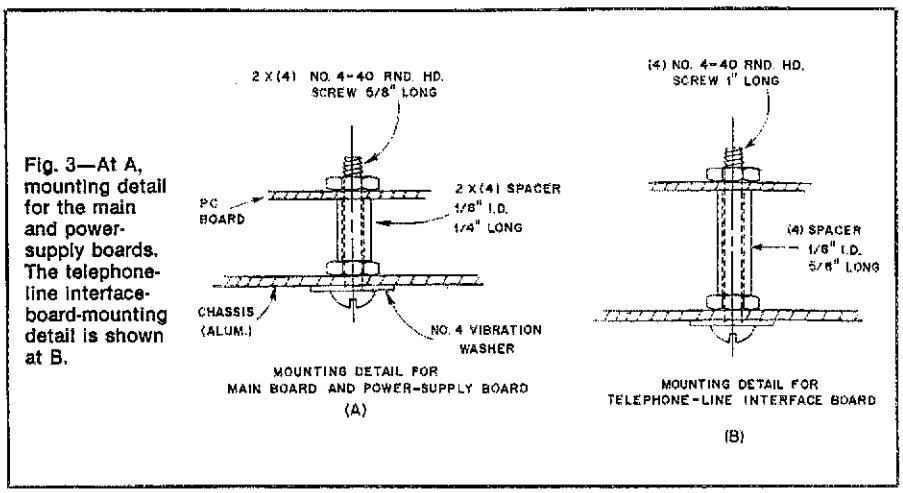


Fig. 3—At A, mounting detail for the main and power-supply boards. The telephone-line interface-board-mounting detail is shown at B.

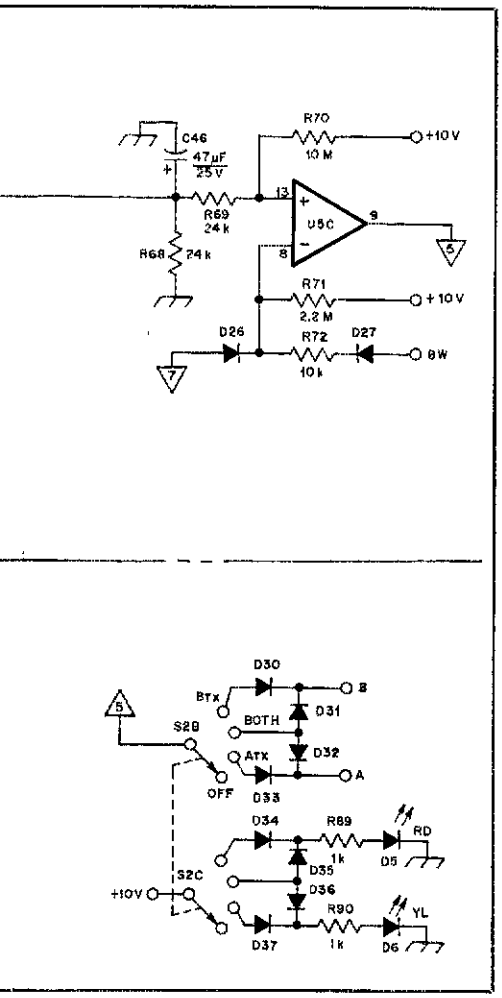
Press firmly around the edges to securely attach the escutcheon to the panel.

Rear-Panel Preparation

Follow the instructions given earlier for front-panel preparation. Place the template ½ inch above the bottom edge of the rear panel. Use white glue to attach the strip.

Main PC-Board Mounting Location

Place the chassis upside-down, and temporarily insert the fuse holder and modular telephone jacks into their rear-panel openings. Position the main PC board on the chassis pan, leaving a 1/8-inch clearance between the board and the fuse holder and modular sockets. Mark the PC-board mounting-hole locations and drill



U5—LM3900 quad amplifier.
U6—LM380 audio power amplifier.
U7—LF353 wide-bandwidth, dual-JFET-input op amp.

four 1/8-inch-diameter holes. Mounting screw details are shown in Fig. 3; other required holes are shown in Fig. 4.

Front-Panel Assembly

Attach R86 and one end each of R87 and R88 to S3A/S3B. Solder 2-inch-long flexible leads to R87 and R88. Mount the switch assembly on the panel.

Solder the 12 diodes (D15-D18, D30-D33 and D34-D37) to the terminals of S2A, S2B and S2C. Attach one end of R89 and R90 to the junctions of the diodes as shown.

Check the LEDs for lead identification and bend the leads as shown in Fig. 5. As viewed from the front and progressing left to right, mount the LEDs in this order: yellow, yellow, red, green, orange and red.

Install all front-panel parts. All speaker terminals point downward. The potentiometer lugs point away from the chassis pan, except for the two TIMER controls. S3 is indexed so it toggles horizontally.

Use no. 20 tinned copper wire to connect all grounds. Plan for possible future replacement needs by properly routing the ground wire, and form short hairpin shapes in the wire for soldering to the back plates of the potentiometers. Be sure to include grounding for all the LEDs.

Using good RF wiring techniques, attach C1-C4, C18-C23 and RFC1-4, inclusive, as close as possible to the terminals on the jacks and sockets; short terminal lug strips are useful as mechanical tie-downs. C58 is mounted directly across the meter terminals.

Rear-Panel Assembly

Install the two modular telephone jacks using no. 4-40 × 3/8-inch round-head screws. You may have to use a file to reduce the size of the no. 4-40 hex nuts. Next, install the remaining parts. Center punch a spot directly above the center of the POWER IN socket at a point 2½ inches from the bottom of the panel. Using the power-supply board as a template, drill four 1/8-inch holes. Refer to Fig. 4 for details.

Telephone-Line Interface Board

Use the empty interface board as a template. Locate the board 1 inch from the left edge of the chassis pan and 2 inches from the front panel. Locate and drill the four required 1/8-inch mounting holes (see Fig. 3B).

PC-Board Assembly

Install the parts on the main PC board and the power-supply board. (Follow the instructions and diagrams furnished in the PC board package, if you've purchased one.) All audio signal leads between the PC boards and their control devices, and interconnects between boards, must be shielded. I used RG-174 coaxial cable; it is inexpensive and easy to handle. Stranded flexible hookup wire is used for the other leads.

Start the shielded leads with the center conductor passed through the PC board from the ground-plane side; solder the center conductors to the pads provided on the circuit side. Tie down the shield braid by forming it into a short pigtail and soldering it to the ground plane. Lay all leads loosely outside the board edges, allowing slack so that the board can be moved to an upright position without straining the leads. The same lead trim is used on all boards to allow access for tests or repairs without disconnecting leads.

Circuit-Alignment Procedure

Voltage checks should precede IC installation. A current-regulated power supply is helpful during these tests. Set the output voltage to 13, and set the current limiting at 100 mA; adjust the current limit to 10% above the point where current-limiting begins. As current requirements increase as additional circuits are activated, increase the limit to maintain the 10% value. The entire system should not draw more than 180 mA.

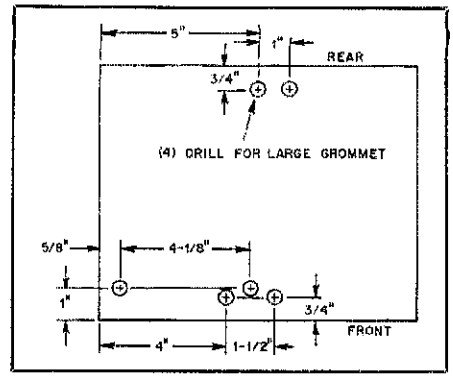


Fig. 4—Top view of the chassis showing the required holes.

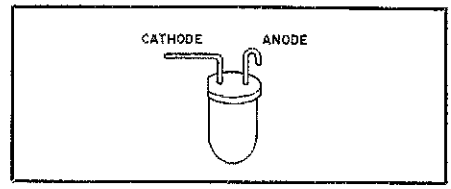


Fig. 5—LED lead identification and bending.

Place the PWR switch in the ON position. Set the A_{TX} TIMER and B_{TX} TIMER controls to their full counterclockwise position (0). Connect an oscilloscope to pin 1 of the RADIO B DIN socket. Attach an audio signal generator to the signal line (SL). Adjust the generator output to produce a 0.5-V P-P, 800-1200 Hz sine wave. The VU meter should show a midscale reading. Adjust the value of R85 as necessary to calibrate the meter.

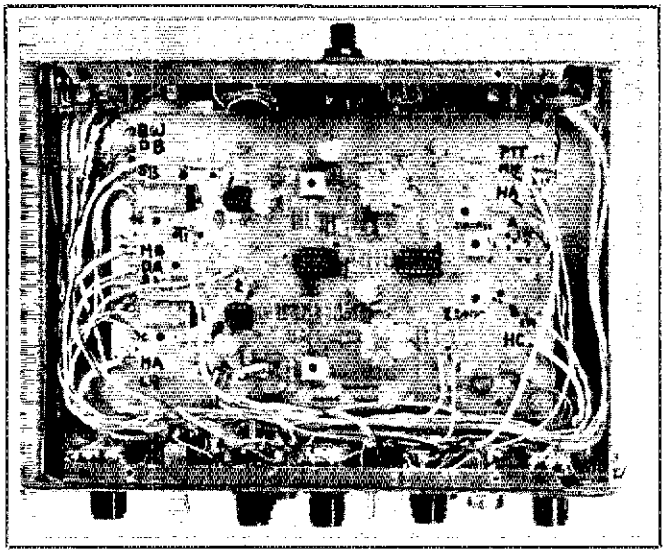
Feed the audio signal to the RADIO A jack. Increase the signal amplitude until the red LED at the right edge of the front panel lights. Adjust R7 for a midscale reading (0.5 V) on the VU meter. Use the same procedure for the Radio B channel. Adjust R8 to obtain the midscale VU-meter reading. Disconnect the audio generator.

Set the DUP/OFF/LIST switch to the OFF position. Place the PHONE LINE/LOCAL MIC switch in the BOTH position; the yellow and red LEDs next to and above the switch should light.

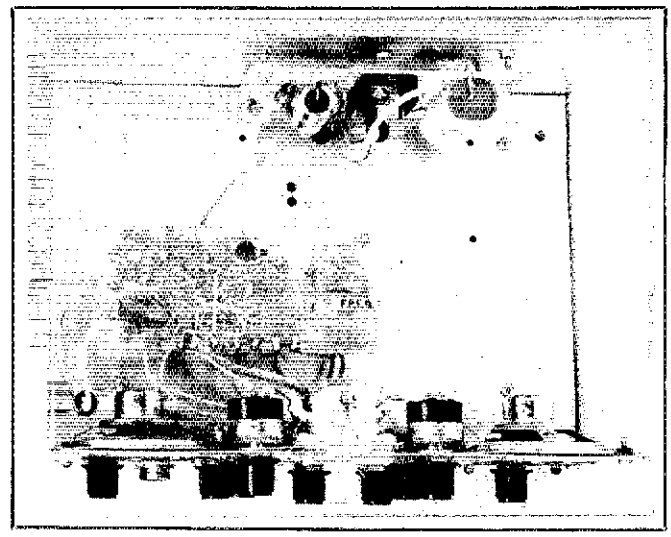
Attach a microphone to the LOCAL MIC jack. Press the PTT switch, and while speaking into the microphone at a normal voice level, adjust the LOCAL MIC GAIN control for a mid-scale reading on the VU meter. Make note of the control position for later reference.

Telephone-Line Interface Adjustments

Prepare a mock phone-line pair by connecting the low-impedance output of the audio generator to the two terminals on the modular socket. Insert a 680-ohm (¼ W or more) resistor in the hot lead of the generator. Adjust the generator to output a 0.5-V P-P, 800-1200 Hz sine wave. Set the PHONE LINE/LOCAL MIC switch to the



Bottom view of the control system with a top view of the main PC board. A neatly done piece of work!



Top inside view. The power-supply board is mounted on the rear panel. Near the front panel is the optional telephone-line interface of Fig. 2, bottom-side up. Perf board was used for both boards in this prototype.

BOTH position. Place the DUP/OFF/LIST switch in the LIST position. The orange LED should light.

Adjust R62 from low (ccw) to high until the yellow and red LEDs at both ends of the front panel are lit. Check for presence of the audio signal by switching to the MONITOR position.

Now adjust R38 for a midscale reading on the VU meter. Remove the line pair from the audio generator and place a 680-ohm resistor across the leads. Connect an oscilloscope across the resistor. Reset the DUP/OFF/LIST switch to the DUP position; the green LED should light. Reconnect the audio generator to the RADIO A jack. Adjust R45 for a 0.5-V P-P indication on the scope. To balance the inputs to U5A, adjust R61. No hint of self-oscillation, audio tones or other noises should be heard in the MONITOR speaker with the volume control fully clockwise. R45 and R61 are interactive, and adjustments are critical, even with a 10-turn potentiometer. Because of component tolerances, R61 might show a balanced condition near extremes of adjustment. Change the value of R59 to move the balance point nearer the center of the range of R61.

Finishing Touches

Mike Strange (see note 2) described a novel design providing a universal connector scheme for the DIN terminated input cables. I believe each Integrator should include two such cables. Several audio output cables are also needed. A 3.5-mm plug terminates one end; the other end is fitted with plugs to mate with the assorted external-speaker jacks on different radios. Another pair of output cables should be fitted with alligator clips (see Fig. 6) for use as a universal connector.

That's it! I'm sure you'll enjoy building the Radio System Integrator and benefit from its versatility.

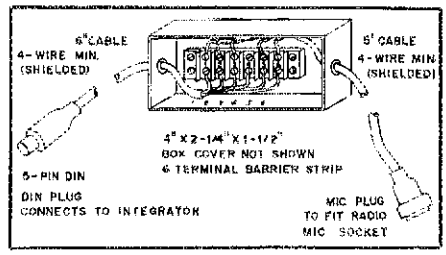


Fig. 6—The DIN plug cable is permanently wired to a barrier strip. The no. 1 DIN plug pin is connected to the no. 1 terminal, and so on. Wire the microphone cable to the appropriate barrier-strip terminals. See Fig. 1 for DIN-plug pin-outs. Two remote-speaker cables (not shown) are used. Each is made of shielded two-conductor flexible cable approximately 5 feet long. Both cables are fitted with a 3.5-mm plug at one end to mate with the Integrator. A universal connector is made by equipping one opposite cable end with alligator clips. The other cable has a suitable plug or socket attached to it that mates with a rig of your choice.

Acknowledgments

My thanks to members of the East Whittier Radio Club who assisted in developing this project. Rod Chandler, W6VB, the club president, prepared designs and masks for the PC boards. Larry Clark, K6TEE, assembled the club prototype and demonstrated it at the State Emergency Communications Services convention. Jim Farley, WB6NSM, fabricated the club prototype chassis/cabinet and other mechanical parts. Dave Haring, KE6FW, club net operator and net control for club volunteer operations, provided the operator's input.

Notes

[1]FCC Part 68 rules apply. These rules were amended March 31, 1980. See also, G. Orelli, "Phone-Patch Rules, 1976 Style," *QST*, June 1976, pp. 47-48.

[2]M. Strange, "The Porta-Peater—The Instant Communicator," *73 Magazine*, March 1982.

[3]E. V. Poirer, P.O. Box 53, Charlo, NB E0B 1M0, Canada. No reference to source available; possibly *73 Magazine*.

[4]J. Pepper, "The Magical Audio Filter," *73 Magazine*, Nov. 1983.

[5]The parts package includes the main, power-supply and telephone-line interface PC boards; parts-location diagrams and special instructions; plastic-laminated template/escutcheon cutouts for the front and rear panels; and a plastic-laminated Operating Manual and Front-Panel Description sheet for the equipment carrying case. For information, send an s.a.s.e. to the East Whittier Radio Club, P.O. Box 5054, Whittier, CA 90607. (The ARRL and *QST* in no way warrant this offer.)

Strays

THE LONG AND SHORT OF OUR METRICS POLICY

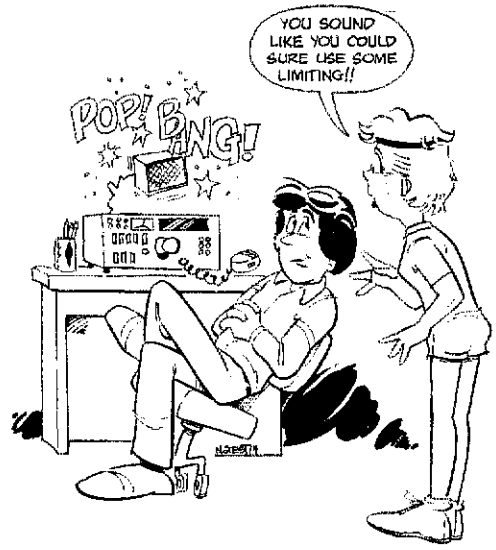
QST and other League publications no longer routinely use metric equivalents. When a dimension is more naturally expressed in metrics, we use that system. For most dimensions, however, we use the U.S. Customary system. A complete conversion table appears in *The 1985 ARRL Handbook for the Radio Amateur.*

I would like to get in touch with...

☐ anyone with a schematic diagram or operator's manual for an Abbott DK-3 transceiver. Gordon E. Hopper, W1MEG, 75 Kendall Ave., Framingham, MA 01701.

☐ anyone with schematics or manuals for a Morrow MB-565 transmitter or an MB-5 receiver. Kevin M. Foster, N7GVQ, 11013 SE 256th Pl., N103, Kent, WA 98031.

Understanding FM Receivers



Part 18: FM receivers aren't much different from AM or CW/SSB receivers. But portions of the circuit are called upon to perform special functions that aren't necessary in other types of receivers.

By Doug DeMaw,* W1FB

"Why won't my SSB receiver decipher FM? All I'm getting is gibberish!" Another query could be made: "How come I can't receive CW or SSB on my FM receiver?" The answer is that the method of detecting the various kinds of signals is different. This is necessary because the transmitted signals are processed differently before they are routed to the transmitting antenna. We learned last month how an FM transmitter creates an FM signal, so you are probably aware that the transmitter output energy is varied above and below the carrier frequency during modulation. This means that a special receiver detector is needed to change the incoming FM signal to comprehensible audio-frequency energy. Generally speaking, the FM receiver circuits ahead of the detector are pretty much the same as those in other types of receivers. That is, we have RF amplifiers, mixers, oscillators and IF amplifiers. The audio chain is the same, also. That much said, let's learn how an FM receiver operates.

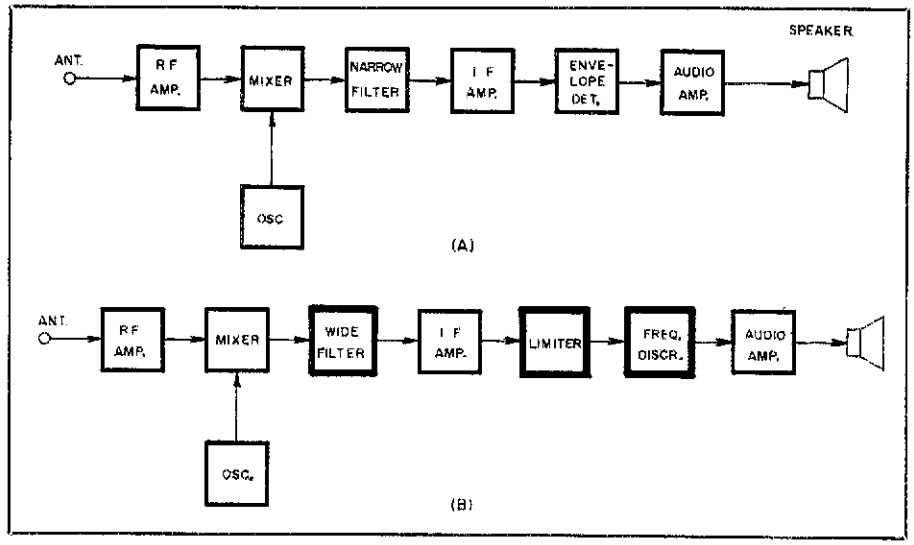


Fig. 1—Block diagram showing the fundamental difference between an AM and FM receiver. The AM version is shown at A; to make it a CW/SSB receiver, change the detector to a product type, then add a BFO that feeds an injection voltage (at the intermediate frequency) to the product detector. Illustration B shows how an FM receiver would be configured.

Comparing Circuits

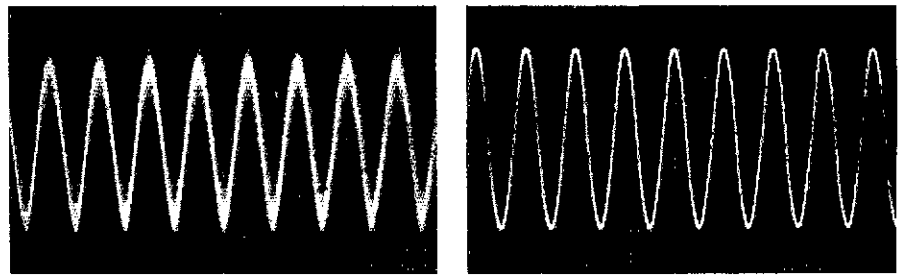
A block diagram (Fig. 1) illustrates how a CW/SSB receiver compares to an FM radio. The circuits through and including the IF amplifier are identical, except for the effective bandwidth (passband) of the IF filter: A wider filter is needed for FM reception. For example, a 2.4-kHz-wide filter might be used for SSB reception, a 500-Hz filter could be employed for CW work, and a 16-kHz filter might be used in an FM receiver. The filter need only be wide enough to accommodate the bandwidth of the transmitted signal. If the filter has a substantially wider response than the incoming signal bandwidth, unwanted signals (QRM) and noise will be passed along to the detector and audio amplifier.

Both receivers in Fig. 1 are superheterodyne types. A lot of overall receiver gain is needed to ensure high receiver sensitivity. Specifically, an FM receiver needs a gain of more than 1 million to enable us to copy a weak signal that is 1 microvolt (μV) or less at the antenna. I have seen well designed FM receivers that could make an 0.18-μV signal plainly readable above the noise generated *within* the receiver. Most commercial amateur FM receivers are rated at approximately 0.4 μV for what is called "20 dB of quieting," or 20 dBQ. This measurement is made with an audio power meter, calibrated in decibels. The instrument is attached to the receiver output (an 8-ohm resistor replaces the speaker as a dummy load), and audio power is measured across the dummy load. With no signal entering the receiver at the antenna terminal, the audio-gain control is advanced until the audio meter reads, say, 30 dB. Then, a signal generator is fed into the receiver input, and the incoming signal is increased in level until the audio-meter reading drops 20 dB, or to +10 dB on the

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

Need a Copy of This Article or a Previous Installment?

Although each issue of *QST* is protected by copyright, we would like to make it as easy as possible for readers to obtain copies of each installment of First Steps in Radio. Provided that copies are made *for the personal use of an individual, or of a Novice class,* ARRL hereby grants permission for photocopies to be made of any article in this series. If your club plans to teach a Novice class, feel free to make a sufficient number of copies for students' personal use. If you are missing one or more installments, back issues are available for $2.75 apiece from the Circulation Department, ARRL Hq., 225 Main St., Newington, CT 06111.



(A) (B)

Fig. 2—Waveforms of an FM signal before passing through a limiter stage (A), and after it has been cleaned up to remove noise and other AM energy by action of the limiter (B). See text.

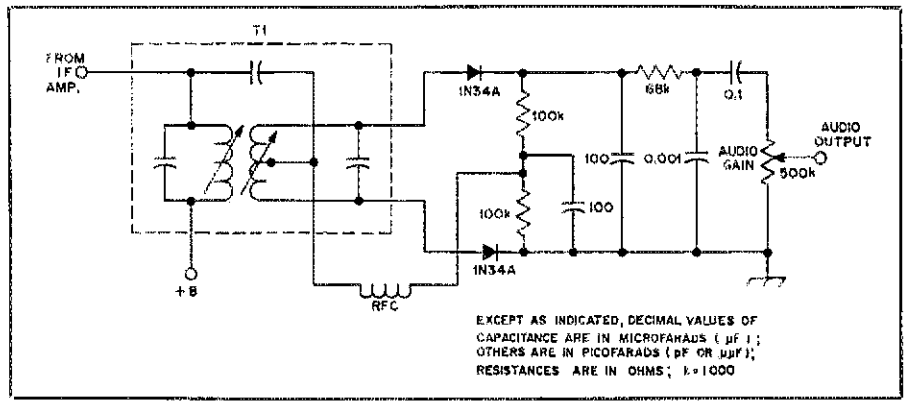


Fig. 3—Typical frequency discriminator circuit that follows a limiter in an FM receiver. This circuit is discussed in the text.

meter scale. The level of signal coming from the signal generator is noted, and that is the signal required for 20 dB of quieting. The lower the level of the input signal, the more sensitive the FM receiver is. A different measuring technique is used with CW/SSB or AM receivers.

Major Circuit Differences

You will notice that in Fig. 1B there is a stage immediately after the IF amplifier that is labeled "limiter." This part of the FM receiver is used to "sanitize" or "launder" the FM signal before it reaches the detector. It saturates (stops providing gain) in the presence of strong signals from the IF amplifier. When this happens, the signal is clipped on both the positive and negative peaks, as would be the case if diodes, reverse-connected, were placed in shunt with the signal path.

Why would we want this to occur? It is vital to take advantage of the limiting feature in order to clip high noise peaks (such as auto-ignition pulses) or any amplitude-modulated energy from other sources. We want only the FM signal to reach the detector. Fig. 2 shows a noisy FM signal (A) entering a limiter, and the cleaned-up signal (B) after leaving the limiter.

A great deal of gain (amplification) is needed ahead of the limiter because it should start functioning as a clipper at 0.2 μV or less. As soon as sufficient signal reaches the limiter, the receiver output (noise) starts quieting. The point on the limiter response curve where limiting action commences is called the "limiting knee." It is at this point that the limiter collector current no longer increases with any buildup in signal amplitude. Modern receivers have ICs rather than individual transistors or tubes in the limiter circuit. An IC may contain several transistor stages; this yields the high gain needed for proper limiter action. If tubes or transistors are used, we might find it necessary to have several such stages in cascade to achieve suitable gain.

FM Detection

There are numerous FM detectors in use today. Among them are the *discriminator, ratio detector, quadrature detector* and *crystal discriminator.* Each has its particular virtues and limitations. The objective in designing an FM detector is to have it respond to FM rather than AM energy. The exact nature of how these detectors operate is rather complex. Detailed information on the subject is contained in *The ARRL Handbook.*

The circuit for a discriminator is given in Fig. 3. The FM signal is changed to AM by means of T1. The T1 secondary *voltage* is 90 degrees out of phase with the *current* in the T1 primary. The signal from the primary winding is routed to the center tap of the secondary winding by means of a coupling capacitor. Next, the secondary voltage combines on each side of the center tap so that the voltage on one side *leads* the primary signal while the other side *lags* by an equivalent amount. When this energy is rectified (changed to dc) by the two diodes of Fig. 3, the two voltages are equal and of opposite polarity. This results in no (zero) output voltage. When voice energy is applied to an FM transmitter, there will be a shift in the received signal frequency, which will lead to a shift in phase at the detector. This phase shift causes an increase in output amplitude on one side of the T1 secondary, along with a corresponding decrease in the other half of the secondary. These differences in the pair of changing voltages (after rectification) create audio output.

Ratio Detector

Fig. 4 illustrates the workings of a ratio detector. You will see some similarity between this circuit and that of Fig. 3. The ratio detector divides the dc voltage into a ratio equal to the ratio of the amplitudes from the two halves of a discriminator transformer secondary winding. The required dc voltage in this circuit is developed across two load resistors, and there is an electrolytic capacitor in shunt across the resistors, as in Fig. 4. The sensitivity of the ratio detector is half that of the discriminator. This is a minor consideration and does not require special attention when the receiver is designed. Ratio detectors are most popular in entertainment FM receivers, whereas discriminators are more common in amateur and commercial land-mobile FM receivers.

Other Considerations

FM receivers do not have automatic gain control (AGC) circuits, but most SSB/CW and AM receivers do. For all practical purposes, the FM limiter acts as an AGC circuit to level the receiver gain after a certain input-signal level is reached. Also, most

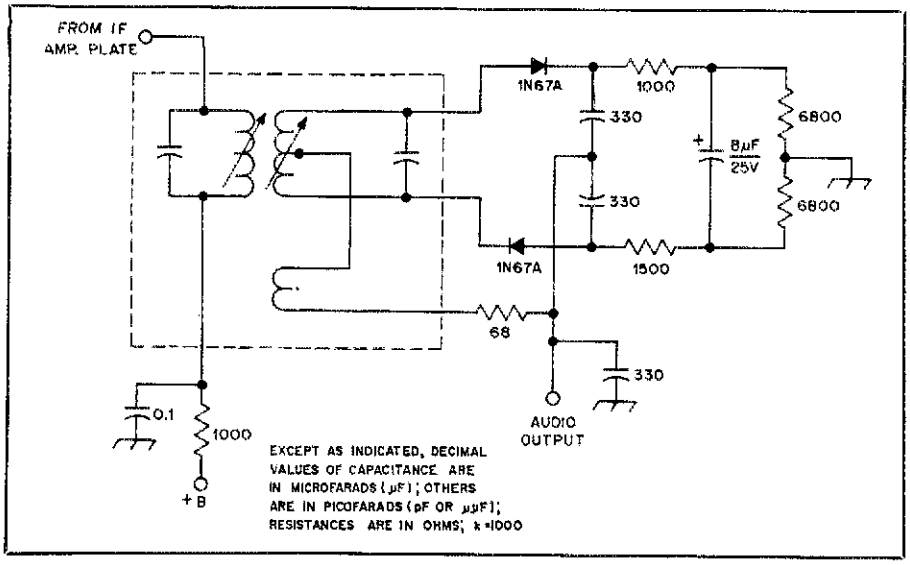


Fig. 4—An FM ratio detector of the type mentioned in the text. It is similar to the discriminator of Fig. 3, but operates in a different manner. Notice that the detector diodes in both circuits are connected in a different polarity arrangement.

amateur FM receivers do not feature continuous-tuning capabilities from the front panel. Rather, a given FM amateur band is covered by means of crystal-controlled frequencies (channels, as some call them) via a frequency-selector switch, or through the use of a synthesizer that tunes in specific frequency increments. Selected frequencies are placed in a memory for instant recall, thereby making it unnecessary to "dial up" a repeater or simplex frequency for day-to-day operation. There is no reason, however, why an amateur FM receiver cannot be made completely tunable for the purpose of covering every kilohertz of a given amateur FM band.

In Summary

We have learned that FM receivers are similar to other types of superheterodyne receivers. The major difference is that FM receivers need a limiter and a special kind of detector. FM now plays a major role in Amateur Radio, so you will certainly become involved with this mode at some point in your amateur career.

Glossary

crystal discriminator—a type of FM detector containing a quartz crystal that replaces the tuned transformer in conventional discriminators.

discriminator—a circuit or device in which amplitude variations are derived from frequency or phase variations. The circuit has many uses, but is popular as a detector in FM receivers.

limiter—in an FM receiver, located immediately ahead of a discriminator or ratio detector to clip AM energy and generally clean up a noisy FM signal.

ratio detector—a type of FM detector that relies on the ratios of voltage and current in the circuit to produce a dc output that can be used as audio-frequency energy.

repeater—a remotely controlled, unmanned (normally) transmitter and receiver that receives signals and retransmits them at high power to extend the effective range of a base station, mobile unit or portable hand-held transceiver.

simplex—as applied to FM operation, direct communications without operating through a repeater. Both stations receive and transmit on the same frequency.

synthesizer—a complex digital circuit that generates precise, very temperature-stable frequencies. It is used as a replacement for conventional VFOs and crystal oscillators.

quadrature detector—an FM detector that depends on the relationship between two periodic functions when the phase difference between them is one-fourth of a period.

New Products

COMMUNICATIONS SPECIALISTS RB-1

☐ Communications Specialists has introduced the RB-1, a reverse-burst accessory. The RB-1 eliminates the long squelch tail heard with some reed-type and other subaudible-tone decoders. When used in conjunction with decoders offering squelch-tail elimination, the RB-1 will delay the transmitter turn-off time and reverse the phase of the encoded tone. This immediately stops the decoder and eliminates the squelch tail. Price class: $15.

For more information, contact Communications Specialists, Inc., 426 West Taft Ave., Orange, CA 92665-4296, tel. 800-854-0547 and 714-998-3021. — *Paul K. Pagel, N1FB*

STOP SCAN

☐ Stop Scan provides Kenwood TS-430S transceiver owners with an adjustable scanning pause when using the scan and programmed-scan features of the transceiver. Deriving its input from the squelch circuit, Stop Scan freezes the scan the moment the squelch is broken, regardless of operating mode. When the squelch closes, scanning resumes after an operator-selected preset time delay. Should you desire to remain on the received frequency, you can override Stop Scan with the TS-430S HOLD button.

Available in kit form or wired and tested, Stop Scan is assembled on a single-sided, glass-epoxy PC board measuring approximately 2 × 1¾ inches. The board holds two ICs (a 555 and a 74LS02), one trimmer potentiometer, and several resistors and capacitors. No IC sockets are supplied, but I had some on hand so I used them. Assembly instructions are concise, but sufficient for anyone who has some kit-building experience. Make sure you follow the layout shown in the parts-placement drawing. On the unit I assembled, the Q1 collector hole was marked with a "B" on the foil side of the board; don't let that confuse you. Also, the board was not drilled out for pin 8 of U2—that was easily remedied.

Instructions for wiring the Stop Scan board to the TS-430S circuitry are accompanied by drawings to aid you in locating the proper connection points. The drawings are good enough so there is no need to reference the Kenwood manuals. Only six wires need be attached to the '430: Four wires plug into existing plugs, and two are soldered to board traces. No other alterations are necessary.

Where you place the board and how (or if) you decide to mount it is left up to you. In any case, make sure the board doesn't flop around and short-circuit something. (You could mount the board on a bracket attached to the TS-430 framework behind the upper-right-hand side of the front panel.)

Stop Scan is available from Jabco, RR 1, Box 386, Alexandria, IN 46001. Price classes: kit, $25; assembled and tested unit, $35.—*Paul K. Pagel, N1FB*

Radial Systems for Ground-Mounted Vertical Antennas

Thinking about putting up a vertical antenna? This modern Numerical Electromagnetic Code-Method of Moments computer study will give you an idea how many radials to put under it, and how long they should be.

By Brian Edward,* N2MF

Ground-mounted vertical antennas are a popular choice for amateur communications, particularly on the lower HF bands. There are many reasons for their popularity. These antennas are simple to erect, easy to tune, are relatively unobtrusive and produce low-angle radiation. Vertical antennas seem to appeal especially to two groups of amateurs: the newcomer and the low-band DXer. The newcomer appreciates the first three traits of these antennas, while the DXer recognizes the potential of the antenna for providing competitive performance on long-haul contacts, particularly when employed as an element in an array.[1]

For the ground-mounted vertical antenna to perform properly, it must be used in conjunction with a counterpoise in which the antenna image currents flow. This counterpoise usually consists of an arrangement of radial wires in combination with the surface of the earth. The question arises as to how many radial wires are needed and what length they should be. A common answer is, "The more the better, and make them as long as you can." A little research into this topic, however, reveals that there is a trade-off between the number of radials and the radial length. If only a few radials are going to be used, they need not be very long. If more radials are added, the length of all radials should be extended in order to obtain the full performance potential of the antenna system.

A Study of Radial Systems

John O. Stanley has written an excellent article giving design information for radial ground systems.[2] He suggested radial lengths to be used for a given number of radial wires. An extensive experimental study on this topic was also performed by Brown and others. Their work was documented as early as 1937.[3] I studied this subject using the Numerical Electromagnetic Code (NEC)-Method of Moments computer program.[4] NEC is a powerful program that allows you to analyze wire antennas in the presence of actual ground conditions. Through this study, I was able to determine the performance of various radial systems in combination with different earth electrical characteristics. The program calculates relative gain for each system studied, along with the elevation angle (measured from the horizon) at which maximum radiation occurs.

My study was performed with radial wire numbers (N) of 4, 12, 24, 48, 96 and 120. The radial lengths for each system ranged from 0.05 to 0.6 wavelength (λ). As a first case, I selected a system with four radial wires, considered to be what the typical amateur might choose as a starting point for a vertical-antenna ground system. The case with 120 radials (at lengths of 0.5 λ) is considered the optimum arrangement for medium-frequency broadcast-station antennas.

Each radial system was studied in combination with earth characteristics that may be considered poor, good and very good. These characteristics are determined by the soil conductivity σ, in siemens/meter, and the relative dielectric constant, ϵ_r. Typical values for these parameters are given in Table 1. It turns out that the ratio of conductivity to frequency is the first parameter of importance. For the results reported in this article, the ratio is given by $X = \sigma/f$, where f is the frequency in megahertz. The three earth characteristics were then nominally chosen to correspond to the values shown in Table 2.

By comparison to Table 1, you may note that the conditions that are often called poor earth characteristics are not all that far removed from the average soil characteristics where many of us live. I should also point out that earth characteristics often vary widely over distances of a few feet and over a period of several months.[5] It could be interesting to measure the actual soil conductivity in the vicinity of your antenna site at different times of the year.

My study was performed for the sky-wave component of the antenna radiation

Table 1
Typical Earth Electrical Characteristics†

Terrain	*Conductivity (Siemens/ Meter)*	*Relative Dielectric Constant (ϵ_r)*
Seawater	5	80
Fresh Water	0.008	80
Dry, sandy, flat coastal land	0.002	10
Marshy, forested flat land	0.008	12
Rich agricultural land, low hills	0.01	15
Pastoral land, medium hills and forestation	0.005	13
Rocky land, steep hills	0.002	10
Mountainous	0.001	5
Cities, residential areas	0.002	5
Cities, industrial areas	0.001	3

†Information adapted from *Reference Data for Radio Engineers* (Indianapolis: Howard W. Sams & Co., 1979, p. 28-3.

[1]Notes appear on page 30.

*100 Bradford Heights Rd., Syracuse, NY 13224

Table 2
Ground Characteristics Used for Study

Ground	$X \left\lvert \frac{\text{Siemens/Meter}}{\text{MHz}} \right\rvert$	ϵ_r
Poor	0.0001	7
Good	0.001	15
Very good	0.01	30

as opposed to the ground- or surface-wave component. The sky wave is the component of interest to amateurs communicating via the ionosphere, while medium-frequency broadcasters are more interested in the surface-wave component. I used a quarter-wavelength-long resonant structure as the vertical radiating element. The radials were no. 12 wire, although the actual wire size is of little importance (see note 3).

Results

The results of my study are presented in graphical form. Figs. 1, 2 and 3 show the gain of the antenna systems (the gain of a half-wavelength dipole in free space is 2.15 dB, with respect to an isotropic radiator) for the various radial configurations operating in combination with poor, good and very good earth characteristics. Don't become too concerned with the actual gain numbers. Instead, examine the relative gains provided by the different ground systems. You can see that for all cases, if relatively short radials are to be used, there is no need to use many of them. For example, with poor earth, if the radial length must be restricted to 0.1 λ, then 24 wires is the maximum that need to be used. Alternatively, if a large number of radials is to be used, they should be long in order to realize the maximum antenna-system performance. These results agree with those presented by Stanley and by Brown, Lewis and Epstein. Although the graphs present results for specific numbers of radials and specific earth characteristics, you should be able to interpolate for other radial numbers and earth characteristics.

You can also see that for very good earth electrical characteristics (Fig. 3), it doesn't take very many radial wires to obtain good performance. This has been proven by the big signals emanating from the Caribbean by suitcase DX peditioners operating on the beach with simple vertical antennas.

Figs. 4, 5 and 6 show the elevation angles for maximum radiation with the various radial configurations and earth characteristics. This elevation angle is determined largely by the earth characteristics a wavelength or more beyond the vertical radiator—in other words, beyond the typical radial system. This shows up in the plots where the lowest elevation angles correspond to the best earth characteristics. The elevation angle can be lowered somewhat when poorer earth characteristics are present by employing an extensive radial system. If a perfectly conducting, infinite-size ground plane were available, the elevation angle of maximum radiation would be zero degrees (at the horizon).

The graphs of Figs. 1 through 3, corresponding to the three earth characteristics studied, were used to determine a sufficient radial length for a given number of radial wires. Two similar criteria were used to determine the optimum lengths. The first specifies a radial length for a given number of wires when the system gain is within 0.1 dB of the maximum gain possible with that number of wires and earth characteristics. The second criterion specifies a radial length for which the gain is within 0.2 dB of the maximum value for that number of wires and earth characteristics. When these radial lengths were tabulated and compared for the three earth characteristics studied, I found that the lengths for a given number of radial wires are not strongly dependent on the earth characteristics. This, of course, does not imply that a given radial system performs the same when used in combination with different earth characteristics. A poorer earth must be compensated for with

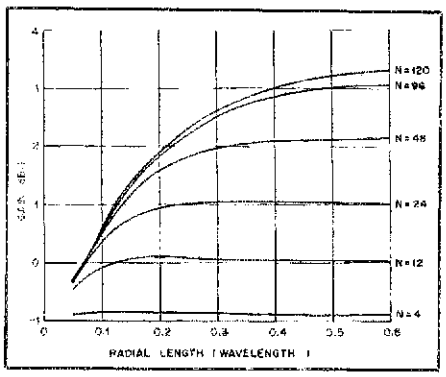


Fig. 1—Gain vs. radial number and length for poor earth conditions (X = 0.0001, ϵ_r = 7).

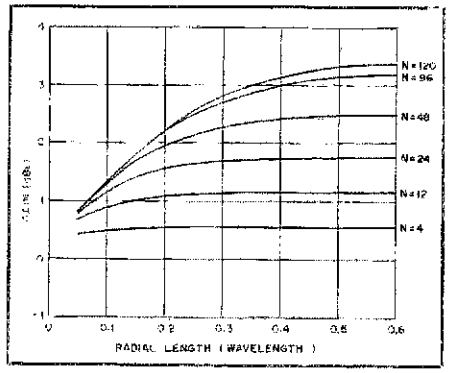


Fig. 2—Gain vs. radial number and length for good earth conditions (X = 0.001, ϵ_r = 15).

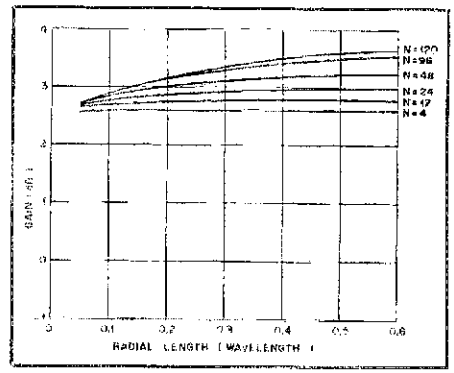


Fig. 3—Gain vs. radial number and length for very good earth conditions (X = 0.01, ϵ_r = 30).

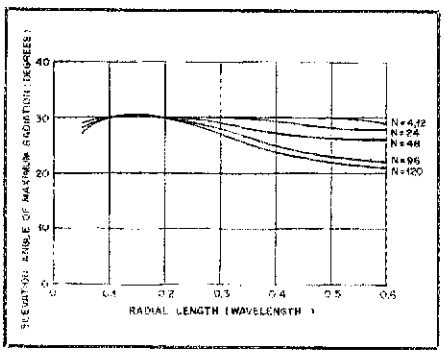


Fig. 4—Elevation angle vs. radial number and length for poor earth conditions (X = 0.0001, ϵ_r = 7).

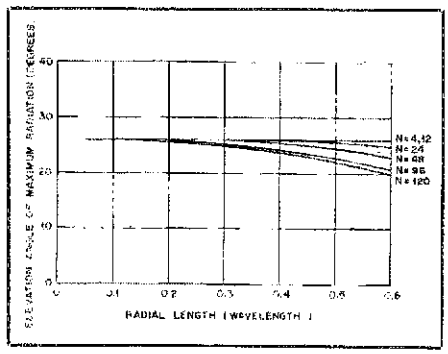


Fig. 5—Elevation angle vs. radial number and length for good earth conditions (X = 0.001, ϵ_r = 15).

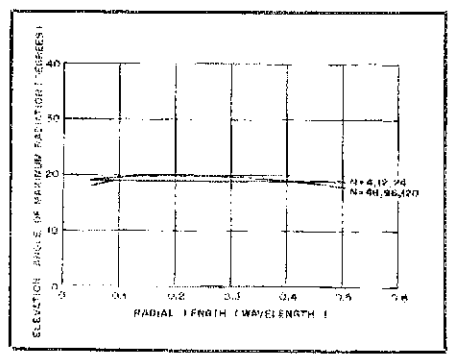


Fig. 6—Elevation angle vs. radial number and length for very good earth conditions (X = 0.01, ϵ_r = 30).

more and longer radials to equal the performance of a less extensive system over good earth.

A sufficient wire length for a given number of radials is plotted in Fig. 7. The two upper curves correspond to the criteria explained above. The lower curve is the radial wire lengths given by Stanley. (See note 2.) His radial lengths are somewhat shorter than the ones I found. Possibly, the criteria he used for choosing the lengths were not as well defined as mine. It might also be possible that his data was for a surface-wave study, which would be of more interest to medium-frequency broadcasters than would a sky-wave study. You may also note that there is an apparant discontinuity between his second-to-last data point, which is for 90 radial wires, and his last point, which is for 120 wires.

As stated earlier, the ground systems studied were operating in conjunction with a quarter-wavelength-long vertical radiator. The gains given by Figs. 1 through 3 will essentially hold for vertical-antenna lengths down to approximately an eighth of a wavelength. For even shorter antennas, the gains will tend to decrease. Therefore, with short verticals, more extensive ground systems should be employed to maximize the system performance.

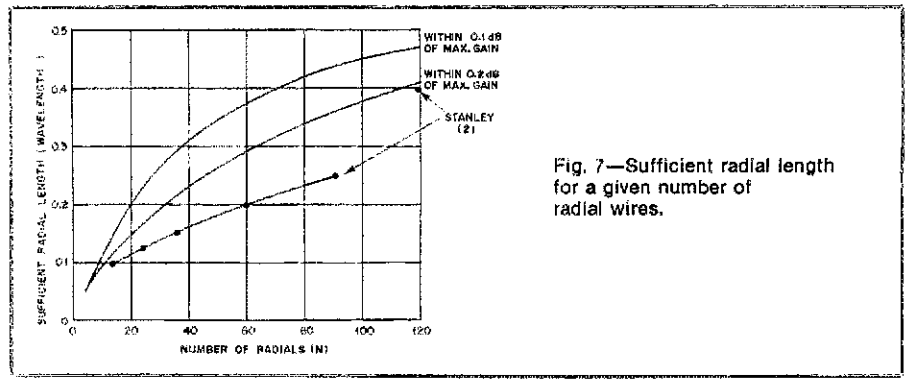


Fig. 7—Sufficient radial length for a given number of radial wires.

Conclusions

The performance of a vertical antenna operating in conjunction with a radial ground system has been studied. The effect of a number of radial wires, wire length, and the electrical characteristics of the earth on the relative gain of an antenna system and the elevation angle at which the maximum gain occurs has been determined. For a given number of radial wires, there is a corresponding sufficient wire length, which is, surprisingly, independent of the earth characteristics. Extending the radials beyond this sufficient length without adding additional radials will yield no substantial performance improvement.

This study has also shown that the elevation angle of maximum gain is largely determined by the electrical characteristics of the earth surrounding the antenna system. This elevation angle can be lowered somewhat by employing more extensive radial systems.

For a given number of radial wires, the sufficient length may be determined by using the graph in Fig. 7. Then, by measuring or estimating (from Table 1) the earth's electrical characteristics and calculating the parameter X for the operating frequency, you can determine the performance of the vertical antenna with the radial ground system using Figs. 1 through 6.

Notes

[1]J. C. Rautio, "The Effect of Real Ground on Antennas," Parts 1-5, *QST*, Feb., April, June, Aug. and Nov. 1984.
[2]J. O. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, Dec. 1976, pp. 13-15.
[3]Brown, Lewis and Epstein, "Ground Systems as a Factor in Antenna Efficiency," *Proc. of the IRE*, June 1937.
[4]Numerical Electromagnetics Code-Method of Moments, Developed by Burke and Poggio, Lawrence Livermore Laboratory.
[5]A. C. Doty, J. A. Frey and H. J. Mills, "Efficient Ground Systems for Vertical Antennas," *QST*, Feb. 1983, pp. 20-25.

Brian Edward, N2MF, received his first amateur license when he was a high-school freshman, in 1971. He upgraded to Advanced class the following year, and to Extra Class in 1978. His current operating activities include DXing and contesting. Brian received a BSEE degree in 1978 from SUNY at Buffalo and an MSEE in 1981 from Syracuse University. Employed by the General Electric Company Electronics Laboratory, where he is involved in the development of microwave circuitry and antenna systems, Brian is a member of the ARRL and the IEEE.

New Books

COMPUTER PROGRAMS FOR AMATEUR RADIO

by Wayne Overbeck, N6NB, and James A. Steffen, KC6A. Published by Hayden Book Company, Hasbrouck Heights, NJ 07604. First edition, 1984. Soft-bound, 9-3/4 × 6-7/8 inches, 328 pages including index. $16.95.

Each day, the number of amateurs who own computers increases. Naturally, there is a tendency to want to couple the use of the computer with Amateur Radio-related activities. In order to do that, you need software. If you're one of many amateurs who've been searching for a bundle of ready-to-use software, you should take a look at this book and software-on-disk offer.

The 23 BASIC programs included in the book are aimed at users of Apple® II, IBM® PC, Commodore 64™ and TRS-80® microcomputers or any computer that operates under CP/M® and Microsoft® BASIC. Commodore VIC 20™ and Timex/Sinclair computer owners can also run a number of the programs. For you to fully enjoy the programs, your system should include 48 kbytes of RAM and a disk drive. Although a printer is optional, one sure comes in handy when you want hard copy!

The disk contains 19 programs and data files from the book, and is accompanied by two pages of printed instructional information. Some of the shorter programs appearing in the book were not placed on disk because of lack of room. These shorter programs, however, can be entered easily from the keyboard and saved to another disk. The authors solicit your comments and improvements for the programs. As there is minimal error trapping and little "window dressing" in the programs (screen presentations are relatively simple), I'm sure at least a few who use the programs will attempt to enhance them.

Initially, the book appeared without the software on disk, but the book/disk package is now sold for $29.95; it's available from the Ham Radio Publishing Group. For those who may have purchased the book only, a disk is available separately for $19.95. Contact James A. Steffen, KC6A, 6831 Espanita St., Long Beach, CA 90815.

There are programs for use in virtually every facet of Amateur Radio: contesting, DXing, antenna work, EME, and so on. But the book is not just a compilation of programs. You're also given a brief history of computers, and an explanation of the hardware and philosophy of computers. All in all, this is a well-rounded presentation.

In a telephone conversation with Wayne Overbeck, I was told there apparently is a timing problem with certain Apple II computers that manifests itself as a bug in the Logbook program. If a run of that program issues a RETURN WITHOUT GOSUB error for line 3090, insert a REM or PRINT statement in any line between 220 and 230 (i.e., 222 REM). The addition of this statement will cure the problem. Wayne reports that not all Apples issue this error indication, and the code has been repeatedly checked and verified as being correct. [Editor's Note: This problem may be the one addressed by Rod and Valerie Floeter in the December 1984 issue of *Nibble* magazine. See "Applesoft FOR-NEXT Problem," p. 109.]

This book is written in a light-hearted, easy-to-understand manner. Because the programs are written in BASIC, their construction should be grasped easily and perhaps converted for use on a wider range of computers. I believe you'll find the book to be enjoyable and informative reading; the programs will provide hours of interesting and productive fun time. Once you have a handle on how the programs work, you can be off and modifying them to suit your personal tastes or using them as a foundation to write your own Amateur Radio-related software.—*Paul K. Pagel, N1FB*

Designing a 2-Meter Portable Yagi

A new approach to an old idea creates a different breed of antenna. This inexpensive portable Yagi can get through where most omnidirectional antennas won't, and can be constructed for weak-signal work.

By Mark Bacon,* KZ9J

My interest in the 2-meter band began abruptly a year ago when I repaired a transceiver for a friend. The night I tested the radio happened to be one of the best for tropospheric bending. Repeaters from 250 miles away were coming in with full-quieting signals on a makeshift antenna. I broke into one of the more interesting QSOs and received a warm welcome. That was the first of many ragchews that night. I went to bed much too late, my head still swirling with 2-meter FM fun.

The bug was biting hard. I converted a retired commercial high-band hand-held rig to 2-meters and hung a discone antenna from my second-story ceiling. The discone, described in recent editions of *The ARRL Antenna Book,* has been a most effective antenna for both simplex and repeater communication within a 40-mile radius.[1]

As my initial fondness for 2-meter FM grew into an abiding affection, the need arose for a portable, directional antenna with more "oomph" than a mobile whip. I wanted an antenna I could take camping so I could stay in touch with the gang or make new friends using a 3-W, battery-powered rig. It had to be easy to build (I am not a machinist!), quick to set up, convenient to store when not in use, and not so fragile that the first breeze would reduce it to the parts from which it came. In addition, I wanted an antenna that would get through during an emergency, when a "no-gain" vertical might not make it. Being competitive in the club's next fox hunt was also in the back of my mind.

The Antenna Takes Shape

My first inclination was to duplicate a published design for a portable quad or Yagi.[2,3] Then I took a long, hard look at Lawson's definitive series on Yagi design.[4]

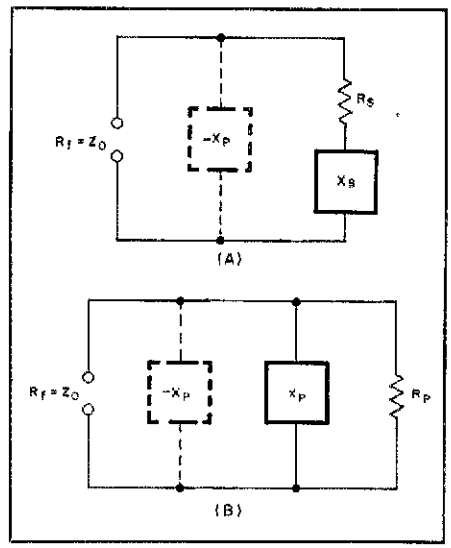


Fig.1—Equivalent circuit of an antenna (A), and its parallel-equivalent counterpart (B).

Why not come up with a compact Yagi that could be readily optimized for either gain or front-to-back ratio? Lawson's data indicate that an optimized, three-element Yagi built on a 0.35-λ boom will have a calculated gain within 1 dB of a four-element beam with a 0.6-λ boom. In fact, the data show that a 0.75-λ boom is needed to realize the potential gain of a four-element Yagi.

A 6-foot boom seemed a little long for a compact, portable antenna. I decided to develop a three-element Yagi with nearly optimum gain consistent with adequate front-to-back ratio (15 to 20 dB), based on a 3-foot or shorter boom. The elements and feed line were to be readily detachable for storage when the antenna was not in use.

Matching System

An impedance-matching network that would not compromise the portability or ruggedness of the beam was called for. The usual T and gamma matches were ruled out as being too cumbersome. The parallel-equivalent matching arrangement for verticals described in *The ARRL Antenna Book* appeared tailor-made for my Yagi.[5] This matching network is easy to install and adjust, efficient, inherently balanced and ideally suited to feed-point resistances of 15 to 40 ohms, the range most Yagis exhibit. The only disadvantage of parallel-equivalent matching for all-metal arrays is that the driven element must be split at the center and insulated from the boom. This is a minor shortcoming for small, light Yagis.

To understand how parallel-equivalent matching works for this application, refer to Fig. 1A, the equivalent circuit for an antenna. R_s is the equivalent series antenna resistance; X_s is the antenna reactance; X_p is the parallel reactance placed across the feed point to accomplish the match; R_f is the feed-point resistance; and Z_0 is the characteristic feed-line impedance. X_p is shown in dashed lines because it's not actually a part of the equivalent circuit. The minus sign signifies that X_p will always be of the opposite sign from X_s. In other words, if X_s is inductive, then X_p will be capacitive, and vice versa.

The goal of this, or any, matching arrangement is to make $R_f = Z_0$. To determine what X_p is needed to accomplish this goal, we transform the series circuit of Fig. 1A to an equivalent parallel circuit (Fig. 1B). To analyze a parallel circuit, we usually convert to conductances, susceptances and admittance. Fortunately, the analysis has been done previously, allowing us to make use of the results.

To implement parallel-equivalent matching, we first estimate R_s. In the absence of ohmic losses, $R_s = R_r$, the radiation resistance. For example, in the antenna I am about to describe, a three-element Yagi with 0.175-λ driven element-to-parasitic element spacing, R_f is 23

[1]Notes appear on page 35.
*2205 File Dr., Decatur, IL 62521

ohms.[6] We can calculate X_s from the formula:

$$X_s = \pm\sqrt{R_f (Z_0 - R_f)}$$
$$= \pm\sqrt{23\ \Omega\ (50\ \Omega - 23\ \Omega)}$$
$$= \pm 24.9\ \Omega \qquad \text{(Eq. 1)}$$

This assumes the feed line is a 50-ohm coaxial cable. The "±" signifies that the match can be accomplished by making X_s either capacitive or inductive. If we choose $X_s > 0$ (inductive), then a paralleled capacitor will be used for X_p, our matching element. Otherwise, X_p will be an inductor. What value of X_p is called for when $X_s = +24.9$ ohms (inductive)? To find out, we use the series-to-parallel-equivalent conversion formula:

$$X_p = -\frac{R_f \times Z_0}{X_s} = -\frac{(23\ \Omega)\ (50\ \Omega)}{24.9}$$
$$= 46.2\ \Omega\ \text{(capacitive)} \qquad \text{(Eq. 2)}$$

The final step is to find what value of parallel capacitance C_p is needed to get a resonance at the center frequency of 146.65 MHz:

$$C_p = -\frac{1}{2\pi f X_p}$$
$$= -\frac{1}{2\pi\ (146.65 \times 10^6\ \text{Hz})\ (-46.2\ \Omega)}$$
$$= 23.5\ \text{pF} \qquad \text{(Eq. 3)}$$

A 24-pF capacitor placed across the antenna terminals will lead to a good match. I use small air or mica trimmer capacitors to fine tune the match for an SWR of 1:1.

One point needs a little elaboration. How do you make $X_s = 24.9$ ohms? Small loading coils inserted between the feed line and antenna will do, but there's a much more elegant and efficient way to adjust X_s: Simply introduce inductive reactance by making the driven element longer than resonance, then shorten the element a little at a time while tuning C_p for a 1:1 SWR.

Element Lengths

Lawson has left the Yagi designer with a valuable legacy. His computer-generated, frequency-swept plots of gain and front-to-back ratio allow you to choose boom and element lengths to optimize the gain or front-to-back ratio, or find a suitable compromise between these parameters. Information is also provided for relating tapered or "bumpy" elements to cylindrical elements.

Two three-element Yagis have been built during this project. The first was designed to test Lawson's model for the mechanical arrangement under consideration—elements that attach to the boom with BNC connectors. The boom length was 0.4 λ with equal spacing between the driven and parasitic elements. The element lengths were chosen to give a calculated gain of 7.4 dBd (nearly maximum for a three-element Yagi), and a front-to-back ratio of about 10 dB. The elements were highly tapered (inner sections AWG 6 copper wire and outer sections AWG 10 wire). Measurements indicated that the performance predicted by Lawson's model had been achieved.

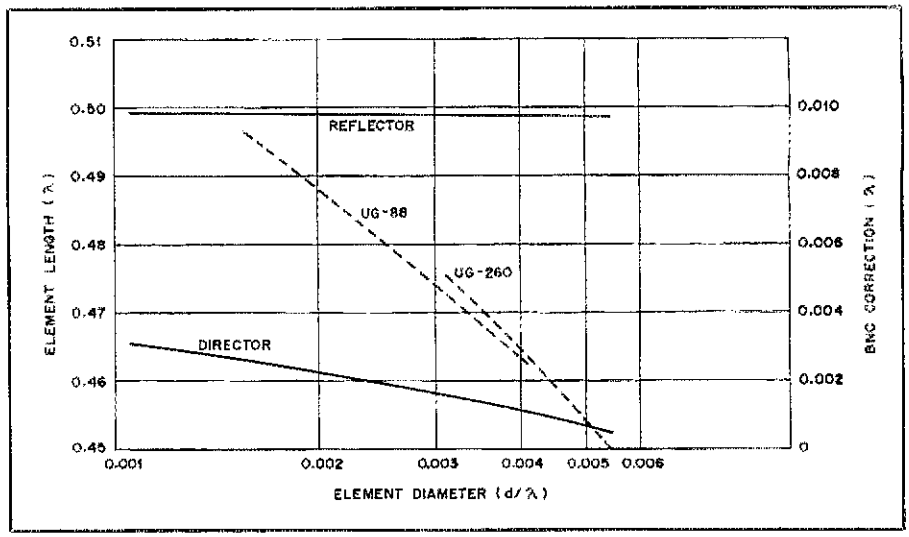


Fig. 2—Curves showing the variation of parasitic element lengths and BNC correction factors (all in units of λ), as a function of element diameter-to-wavelength ratio (d/λ). Top and bottom solid curves are for reflector and director respectively. Intermediate dashed curves are for element BNCs. The BNC corrections are valid only near the design frequency, 146.65 MHz.

This prototype beam opened the way to my antenna design described here. A better front-to-back ratio was desired, consistent with high gain. I chose a 0.35-λ boom with equally spaced, 0.25-inch-OD elements. Lawson's data indicate that the shorter boom gives a 5- to 8-dB better front-to-back ratio with virtually no sacrifice of gain. Reflector and director lengths were chosen to offer a calculated gain of 6.9 dBd and a front-to-back ratio of 17 dB. Fatter elements mean a wider bandwidth over which these figures hold up.

These lengths are represented in the curves of Fig. 2. Here, we have plotted director and reflector lengths (λ) versus the element diameter-to-wavelength ratio (d/λ). Lawson's model was used to calculate the element lengths (see the Appendix). These graphs give a range of element diameters over which the antenna will deliver the performance for which it was designed. The format of Fig. 2 allows these dimensions to be compared at a glance with the NBS Yagi dimensions summarized by Lusis.[7]

Since our antenna has elements attached to the boom with BNC hardware, the range of d/λ reflects element diameters compatible with standard UG-88 and UG-260 male BNC connectors. The BNCs introduce electrical "bumps" in the elements, which must be corrected for by *lengthening* the elements relative to smooth cylinders. The calculated length corrections, the same value up to ±0.01 inch for the director and reflector, are also plotted in Fig. 2. While the plots of element lengths are applicable to all frequencies, note that the BNC corrections are valid only near the design frequency of 146.65 MHz.

Because the elements pass through the metal boom in this design, an additional correction—the boom-lengthening effect—must be applied. This lengthening results from the relatively small effective inductance of the boom section through which the element passes. I used 7/8- × 9/16-inch aluminum angle stock for my booms. The boom lengthening can be estimated by finding the diameter of a round boom having the same cross-sectional area as the rectangular cross section of the channel stock. The cross-sectional area is:

$$A = 0.875\ \text{in} \times 0.5625\ \text{in} = 0.4922\ \text{in}^2 \qquad \text{(Eq. 4)}$$

Then, since $A = \pi r^2$

$$r = \sqrt{\frac{A}{\pi}}$$
$$= \sqrt{\frac{0.4922\ \text{in}^2}{3.1416}} = 0.3958\ \text{in} \qquad \text{(Eq. 5)}$$

Thus, the diameter of the equivalent round boom is 2 × 0.3958 or 0.7916 inch. For a center frequency of 146.65 MHz, the wavelength is:

$$\lambda = c/v = \frac{2.9979 \times 10^8\ \text{m/s}}{146.65 \times 10^6\ \text{Hz}}$$
$$= 2.044\ \text{m} = 80.483\ \text{in} \qquad \text{(Eq. 6)}$$

where c is the speed of light. The equivalent

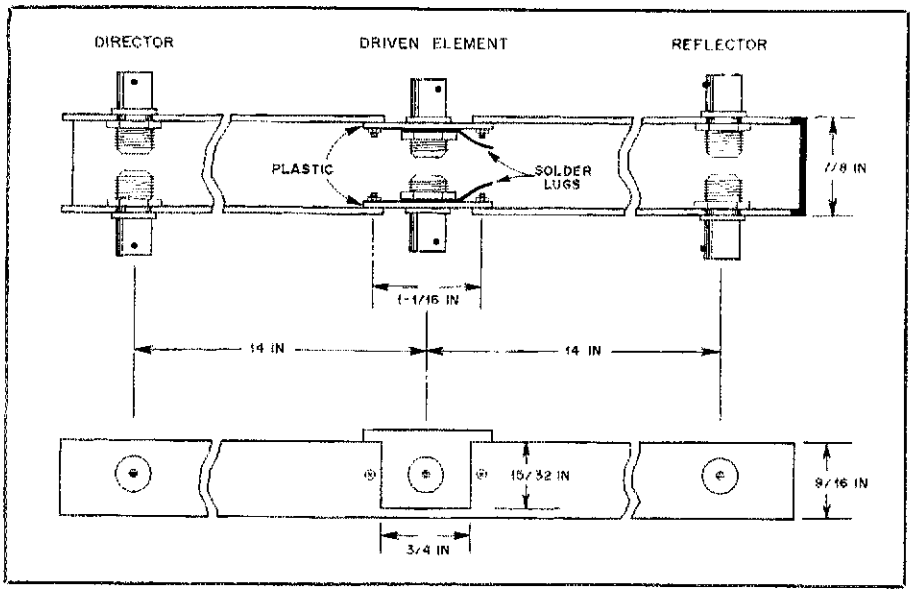


Fig. 3—The boom assembly, viewed from an edge (top) and from the channel side (bottom).

diameter in d/λ units is:

$$d/\lambda = \frac{0.7916 \text{ in}}{80.483 \text{ in}} = 0.00984 \qquad \text{(Eq. 7)}$$

From Fig. 3 of Lusis's article, the increase in element length, because of the boom, is 0.00665 λ for the boom diameter mentioned above.

With this information, it's a simple matter to determine the element lengths corrected for BNCs and a metal boom. First, read the uncorrected element lengths for your d/λ from the left ordinate of Fig. 2. Read the BNC correction for the type you're using from the right ordinate. Now, simply add the BNC and boom corrections to your uncorrected element lengths. For example, for 0.25-inch-diameter elements, UG-260 BNCs and a center frequency of 146.65 MHz:

Element diameter (d/λ) =

$$\frac{0.25 \text{ in}}{80.483 \text{ in}} = 0.00311 \qquad \text{(Eq. 8)}$$

Reflector length =
(0.4989 λ + 0.00509 λ + 0.00665 λ × 80.483 in/λ)
= 41.10 in (Eq. 9)

Director length =
(0.4577 λ + 0.00509 λ + 0.00665 λ) × 80.483 in/λ
= 37.78 in (Eq. 10)

The driven-element length can be determined in the same way, but a more precise match is possible by making this element longer than the model calls for. Trimming and tuning for the best match is described below.

Boom Assembly

The 7/8- × 9/16-inch aluminum channel stock for the boom is available at building supply or hardware stores. Cut a piece 30 inches long. Now, cut a 3/4-inch-long by 15/32-inch-wide section out of each side at the center of the boom to accommodate the driven element. A jeweler's saw with a fine-toothed blade makes the cutting an easy task.

Six UG-657 female bulkhead BNCs are modified by removing the ends beyond the threaded portion. Drill two pairs of mounting holes in the sides of the boom 14 inches (0.175 λ) either side of center, and mount four BNCs for the reflector and director, as shown in Fig. 3.

The BNCs for the driven element are insulated by mounting them with solder lugs on 1½- × 9/16-inch pieces of 1/8-inch-thick scrap plastic. (Just about any kind of rigid, insulating material will do.) Mount the insulated BNCs in the cutouts made in the boom with no. 2-56 hardware, as shown in Fig. 3.

The feed line and matching capacitor are soldered to the feed-point lugs. The feed line is a 20-inch piece of subminiature coaxial cable, run out the reflector end of the boom, with a BNC for attachment of the main transmission line linking radio and antenna. (Use of RG-58A or larger 50-ohm cable is recommended for this link to avoid heavy losses.) Although I used exotic RG-188 Teflon®-insulated cable for the feed line, readily available RG-174 works fine for power levels of up to 50 W. A "poor man's balun" is fashioned by holding a 5/8-in loop in place in the feed line with a small ferrite sleeve. (Mine was salvaged from a defunct discriminator coil.) Fig. 4 shows the feed system. Initial tests without feed-line decoupling revealed the pattern distortion and touchiness characteristic of antenna currents flowing on the outside of the coaxial cable. The poor-man's balun serves to choke off these currents. The matching capacitor can be either a mica trimmer or a miniature air variable with a maximum capacitance of 35 to 40 pF.

The mast clamps to the boom with a single U bolt and wing nuts. A nonmetallic mast is recommended. A broomstick makes an excellent mast for this antenna.

Element Construction

The element halves are made of soft-copper tubing with male BNC connectors soldered to one end (Fig. 5). A UG-88 BNC (used with RG-58A coax) is a good match for 3/16-inch or smaller tubing, while a UG-260 (a standard RG-59 connector) mates nicely with ¼-inch tubing. Diameters d/λ somewhat beyond the BNC correction curves in Fig. 2 can be accommodated by extrapolation. However, it's hard to find BNCs that will mate with elements much beyond the d/λ interval of the curves. The element assembly to be described is based on ¼-inch tubing and UG-260 BNCs. Other tubing diameters or BNCs may require a few alterations in the procedure.

Cut a piece of tubing 2 inches shorter than your final element, then cut it exactly in half. File the ends to square them and remove burrs. Sand the final inch of one end of each element half to ensure easy soldering. Tin these ends with an even, thin coat of solder. A 150-W, or larger, soldering gun is recommended. Slip on the BNC nut and fit the braid-clamp ferrule over the tinned end, as in Fig. 5. (The other BNC hardware, including the center conductor assembly, isn't used.) Notice that the ferrule is inverted from its normal orientation when used with coaxial cable. It won't go on the tubing or stay in place the other way. Position the nut 1/32 inch above the flanged end of the ferrule. Being careful not to disturb the assembly, apply heat just above the nut and flow solder evenly, first into the junction between the nut and tubing, then into the space between the nut and ferrule. Thin (0.031-inch-diameter) solder is almost a must. When the assembly cools, thread the nut into the body of the BNC and tighten. Voila! A half-element — much easier to make than to describe!

Mount the complete element (both halves) on the boom, measure from tip to tip, and cut the element to the length deter-

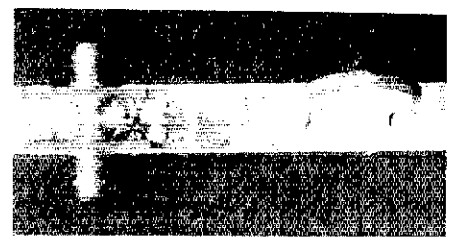


Fig. 4—The feed system, viewed from the channel side of the boom. The plastic driven element insulators, impedance-matching capacitor, and feed line with the poor-man's balun, are shown.

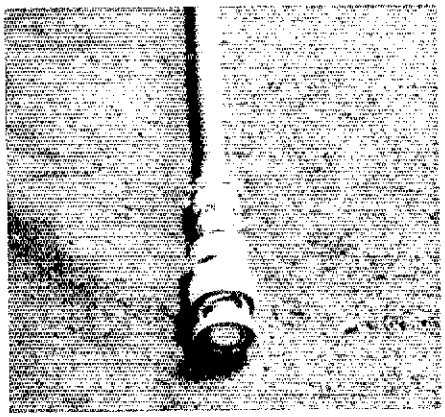


Fig. 5—An element BNC (UG-260) ready for assembly.

mined above—41.1 inch for the reflector, and 37.78 inch for the director. The lengths of the reflector and director should be accurate to 1/10 inch to assure the specified performance. Make the driven element 1 inch (0.50 inch per section) shorter than the reflector. The final length will be determined during the tune-up procedure. The length, measured from nut-to-nut, of the BNC assemblies should be within 1/16 inch of 3.5 inches for UG-260 and 3.34 inch for UG-88 (Fig. 6). I have color-coded my elements with different shades of fingernail polish. Matching dots applied to the boom at the element junctures eliminate guesswork when I assemble the antenna.

Tuning and Testing

Set up the antenna in the clear. A 5-foot tripod makes a convenient support for a portable beam. My completed antenna is shown in Fig. 7. Apply low power and tune the matching capacitor for minimum SWR. Trim 1/16 inch from each driven element half. Retune the capacitor; the SWR should decrease. (If it increases, your driven element is already too short!) Continue alternately trimming and tuning until the SWR is 1:1. Don't settle for a 1.5:1 SWR; a little extra effort will earn you a virtually perfect match.

You can get an idea of the gain of your antenna if you have a receiver with a calibrated signal-strength indicator and a step attenuator. Remove the parasitic elements and retune the matching capacitor for minimum SWR. Insert the attenuator in the transmission line and have a friend send a steady carrier. Note the signal strength. Now replace the reflector and director and retune the antenna. (Remove the attenuator first if it's a low-power type!) With the attenuator in, while monitoring the carrier, set it for the same signal strength as you observed with the driven element alone. The difference in attenuator readings is the approximate gain of your Yagi. If all is well, you should see 6 to 7 dB of apparent gain. Rotating the antenna while receiving a steady signal should reveal a clean, symmetrical pattern with 15 dB or more of front-to-back ratio and at least 25 dB of side rejection. (Don't take these gain and front-to-back measurements too seriously; you have to go to some lengths to get "quotable" figures.)[8]

The final test is to use the antenna. I assembled mine next to the car at a recent Field Day excursion and compared it with a well-matched 5/8-λ mobile whip. The Yagi brought up several repeaters that the vertical could not access.

Some Further Ideas

If you are a devotee of NBS Yagis, the dimensions given by Lusis (Fig. 2 of note 7) can be used with this design. Simply substitute the reflector and director dimensions from his Fig. 2. The BNC and boom corrections remain the same.

This design offers a fine approach to testing various combinations of parasitic element dimensions and spacings. If a deeper piece of channel stock is used for the boom, the female BNCs for the reflector and director can be mounted in slots several inches long. This modification allows for easy element-spacing changes. The element lengths can be changed readily by trimming or soldering on extensions. Or, you may prefer to make up several sets of elements for instant changeover. The driven-element length will not require changing unless the other dimensions are altered drastically.

A word on antenna measurements. Getting reliable figures for gain and front-to-back ratio is somewhat like tiptoeing through a mine field. If you've planned the venture in advance and watch where you're going, you'll come through with flying colors. Note 8 offers valuable, easy-to-follow guidelines for dealing with the vagaries of vertical polarization.

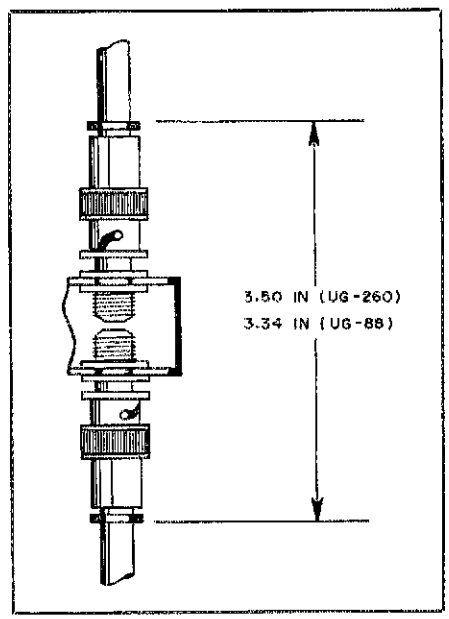


Fig. 6—Detail of a parasitic element-to-boom assembly, showing measurement of total BNC length.

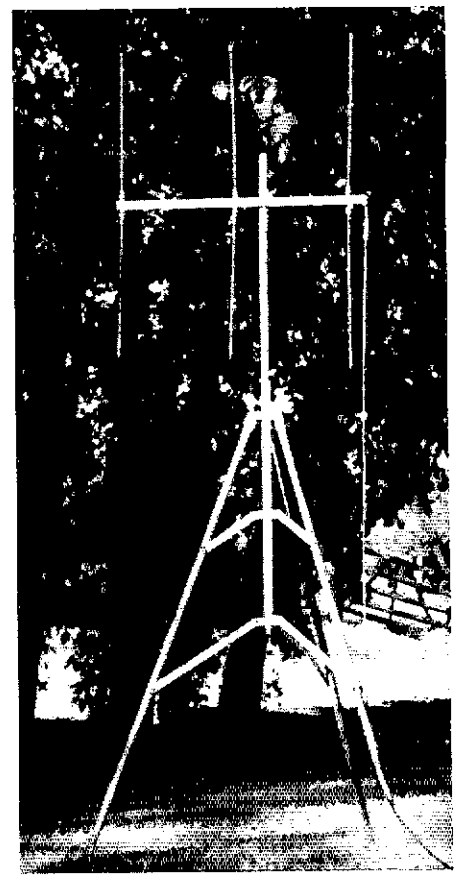


Fig. 7—View of the completed antenna in operating position.

This antenna can easily be adapted to horizontal polarization and the CW/SSB portion of 2 meters. Mountaintoppers take note: For weak-signal work, I recommend adding a second director and lengthening the boom to 0.75 λ (all elements equally spaced). Element lengths remain the same. Although this complicates the design, the reward is a full 2 dB of calculated gain over the three-element version. The boom can be hinged near the center and folded for portability. The antenna will then be suitable for backpacking up your favorite mountain. I haven't calculated BNC lengthening factors for the low end of 2 meters, but I would expect them to remain the same within experimental error.

Conclusion

For a few dollars and an evening or two at the workbench, you can have a 2-meter antenna that can be easily stored and gets through where most verticals won't. It might even make the difference between no communication and solid copy in an emergency.

My thanks to Dick Coombe, K9VPK, for his excellent photography and his gentle prodding to start me on 2 meters. Thanks also go to my XYL, Chery, for the artwork

and her patience—not necessarily in that order!

APPENDIX

The BNCs lengthening effects were calculated by adapting Lawson's perturbation method for tapered elements.[9] The calculation is a two-part process. The first part determines the length of a scaled-diameter cylindrical element having the same impedance at the design frequency as the standard cylindrical element on which Lawson's model is based. The diameter of the scaled element is chosen to be the diameter of the tubing beyond the BNC. Since the radiation resistances of the standard and scaled elements are nearly the same, the scaling becomes a matter of equating the reactances, since $Z = R + jX$. The scaled reflector and director lengths are plotted as a function of effective diameter in Fig. 2.

The second part of the element-length calculation is to apply a correction for the impedance perturbation caused by the attached BNC assemblies. We start with the scaled element defined above and replace the center portion with the larger-diameter BNC assembly. On the assumption that the effective Q and sinusoidal current distribution are essentially unchanged by the BNCs, we calculate the equivalent electrical length of the BNC assembly, referred to as the diameter of the scaled cylinder. Adding this equivalent length to the length of the cylinders beyond the BNCs gives us the total length of a modified element that will have the same electrical characteristics as the original, standard cylindrical element.

The potential sources of error are the following: (1) Assume the radiation resistance of the modified element is the same as the original standard cylinder. Since the resistance of a relatively fat element changes rather slowly with length, this source of error is probably insignificant. (2) Assume the current distribution along the element remains sinusoidal with the BNCs in place of the cylindrical section. Since the current near the center is large and changing rather slowly with distance from the center, this source of error, though significant, probably is 5% or less. (3) Assume the effective Q of the modified element is the same as the scaled cylindrical element. Since the BNCs account for less than 10% of the total length of the element, this source of error is also, at most, a few percent. Fortunately, since the calculated net length increase (because of the presence of BNCs) is at most 2% of the total element length, a 10% error in estimating the length increase translates to $0.02 \times 0.1 \times 100 = 0.2\%$ of the element length. This is well within experimental uncertainty.

There is, incidentally, a simple physical explanation for both the boom- and BNC-lengthening effects. Near the center of an element, where the current is highest, an element section is mainly inductive. If a section near the center is replaced with a piece having smaller unit inductance (a boom or fatter BNC assembly), the element must be lengthened to make the total inductance, hence the current distribution, the same as before. Since a section near the end of the element is mainly capacitive, and fatter sections have more capacitance per unit length, the shortest unloaded elements will be "reverse-tapered"—skinnier near the center and fatter toward the ends.

Notes

[1]G. Hall, ed., *The ARRL Antenna Book*, 14th edition (Newington: ARRL, 1982), p. 11-24.
[2]Hall, p. 13-13.
[3]P. Zander, "Handi-Antennas," *Ham Radio*, May 1983, p. 42.
[4]J. Lawson, "Yagi Antenna Design," *Ham Radio*, May 1980, p. 18; Dec. 1980, p. 30.
[5]Hall, pp. 5-21, 13-4, 13-5.
[6]Hall, Fig. 9(D), p. 9-5.
[7]D. Lusis, "Go for the Gain, NBS Style," *QST*, Aug. 1982, p. 34.
[8]F. Brown, "Antenna Gain Measurements—Part 1," *QST*, Nov. 1982, p. 35.
[9]Lawson, Dec. 1980, pp. 31-35.

Mark Bacon, KZ9J, was first licensed in 1958. The project of repairing an old RCA Victor console to tune in the signals of the first Sputnik on 20 MHz sparked his interest in Amateur Radio. He worked Adak Island with an ugly little 807 rig while on the air for the first time. Mark acquired his Extra Class license in the late 1960s, but let it lapse until 10 years later, when he retook, and passed, the Novice exam. As an Extra Class licensee once again, he enjoys ragchewing on 40 CW, designing and building antennas, and occasionally chasing DX. Other hobbies include cooking, fiddle playing, and spending time with his wife and two-year-old daughter. Mark holds degrees in chemistry, but is presently employed in the communications industry.

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 May issue were:

- G. W. Horn, I4MK, asking, "Testing Audio-Frequency Phase Quadrature: Is Your Circle Truly a Circle?"
- Joseph Fleagle, WØFY, helping readers determine grid locations in "BASIC Maidenhead."
- A preview of the 1985 IEEE Conference to be held in Chicago, in the BITS column.

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

ANTENNA-DESIGN PROGRAM AVAILABLE

☐ A modified version of the Isely/Smith helical antenna design program (*QST*, Dec. 1984) is available from ARRL Hq. for an s.a.s.e. This version is meant to be used for frequencies above 1000 MHz. Please identify your request as "Isely/Smith 1000 MHz," and address it to the Technical Department Secretary.

I would like to get in touch with...

☐ anyone having a technical manual for the RCA WO 33A oscilloscope with a WG 349A probe. Earl H. Selover, W4LPF, 1200 Fordyce Dr., Chesapeake, VA 23320.

☐ anyone having an instruction manual for an Azden PCS 2800 transceiver. John W. Sherman, W6KAS, 5301 Demaret, No. 11, Bakersfield, CA 93309.

☐ anyone with a manual for testing tubes on a Mercury Model 201 tube tester. Ralph Gibbs, KA1DXL, 13 Spring St., Portland, CT 06480.

☐ anyone with a schematic diagram or instruction manual for a Hammarlund HQ-129X receiver. Woody Fugate, W4JDU, Rte. 3, Box 252, Catlettsburg, KY 41129.

Next Month In *QST*

You've heard about it for a while now, but you probably don't know as much as you'd like to about packet radio. What's all the racket about packet? A July article with that title explains it all. No experience necessary!

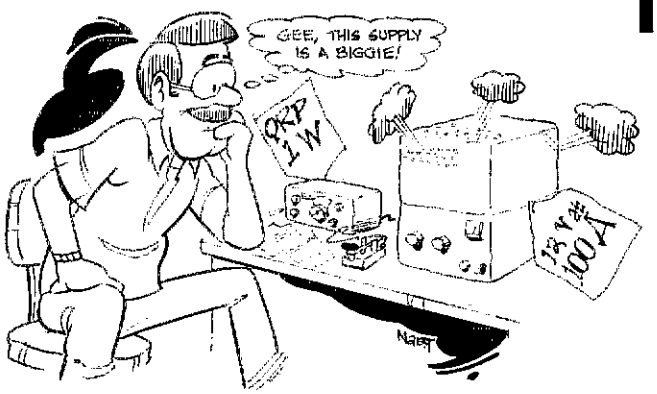
If the article should leave you thirsting for more, two separate columns will discuss different aspects of this exciting mode.

Also on the July agenda are the final First Steps in Radio installment, this one showing how to equip your first station, and a plain-language explanation of QSK. And, for those whose interest in space communications is being piqued by the upcoming second ham-in-space mission, there's a basic approach to moonbounce.

Please note: If the item you're particularly interested in doesn't appear "next month," it most likely will be in the following month's issue.

• *Beginner's Bench*

Plug-in Wall Transformers—A Super Bargain!



Some projects don't need big dc power supplies. The surplus market offers all manner of small plug-in transformers. They may be just right for your next workshop venture.

By Doug DeMaw,* W1FB

"Where can I get an inexpensive, small power supply for my low-power project?" That is not an unusual question today. All too often we tend to use a large dc power supply—perhaps one that delivers 12 V at 2 or 3 A—to power a homemade item that requires a minimum amount of current. It's somewhat like the "tail that wagged the dog" when we connect a tiny unit to a monstrous power supply! But, it is understandable that an amateur would rather follow that course than purchase a smaller power unit for each project. After all, dollars for hobby items are not always easy to justify.

A recent letter from one of our *QST* readers suggested that I write an article about what is inside wall transformers. He suggested further that I explain how they can be used in amateur work. I was somewhat amazed that so common an item had escaped my attention. Perhaps I took these units for granted, since it seemed that everyone in the electronics hobby field should be aware of their availability and use. So, for those of you who may not have worked with these bargain-price modules, let's look at them and point out their good and not-so-good features.

Power Module Types

If we examine the pages of surplus flyers and catalogs we will see all types of plug-in transformers. Some provide a dc output voltage, while others are made for ac-voltage output only. They may carry VA (volt-ampere) ratings along with the output voltage figure, or they may be rated for dc milliamperes and dc output voltage. Some modules are large; others are rather tiny. Most of the plug-in power supplies have no ac cords, but do include output-voltage cables. Some units have screw terminals for connecting the output line to the equipment by means of homemade cords (Fig. 1). Despite this assortment of form factors and ratings, the unit price is usually quite modest compared to buying separate transformers, power cords, connectors and enclosures.

All of the outboard power modules are housed in plastic cases. Nearly all of them are UL approved or UL listed, which is comforting to know. But some bear warnings that they are for indoor use only. This is because the plastic case is not weatherproof. For most amateur use, this is not a significant consideration, but Field Day operators should be aware that rain and unprotected power modules present a hazard to the person using them in connection with an ac-power generator.

Advantages of Plug-in Supplies

The advantages of using wall modules are obvious: They can be used for more than one project, and they are outboard from the equipment. The latter consideration helps to keep the equipment compact and lightweight. It also keeps the ac field of the transformer away from critical circuits within the equipment being powered by the module. This can be especially important when high-gain audio circuits are

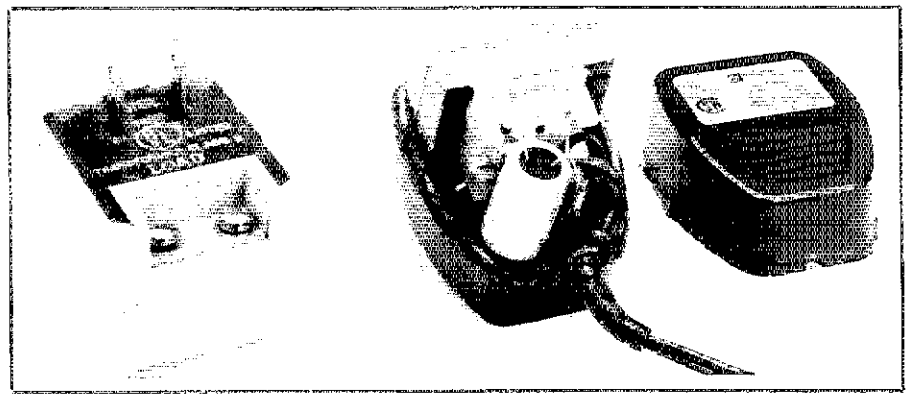


Fig 1—Two plug-in power units. The one at the left is a 19-V ac, 2.25 VA unit that has screw terminals for the output connection. The broken-down unit at the right is a dc-power unit that delivers 9 V at 100 mA, dc unregulated. It was opened to show the internal structure of a plug-in wall unit.

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

involved, particularly if audio transformers are used in the circuit.

I have seen audio filters and transformers in receivers that were sensitive to nearby ac fields, and caused loud hum in the receiver output. An example is the Heath HW-7 QRP transceiver, which contains an audio-filter choke with a powdered-iron outer covering. I noticed that while testing the HW-7 on my bench in the ARRL lab, there were times when hum was present. Other times I could detect no hum. I learned that when the rig was in one position, the hum vanished. It turned out that a nearby fluorescent light (with transformer) was the culprit. Maximum coupling between the light transformer and the audio choke occurred only when the fields of the two units were aligned. I dread to contemplate the hum level, had there been an ac transformer mounted *within* the HW-7! Most direct-conversion receivers (the HW-7 and HW-8, for example) need 80 to 100 dB of audio gain after the detector. Therefore, the slightest hum pickup at the head end of the audio chain will be amplified tremendously.

Ac Plug-in Units

There are many ac-output plug-in transformers on the surplus market. They are generally rated in VA, as we learned earlier. How does this translate to useful current capability for our project? We can get a close approximation by considering the VA to be equivalent to the E × I product of the transformer secondary winding. For example, if the transformer delivered 18 V ac at 125 mA, the VA rating would be 2.25, based on a 60-Hz line frequency (18 × 0.125 A = 2.25). The VA matter is commonplace, but seldom is discussed in handbooks and other technical literature. It goes somewhat deeper in concept than this discussion permits, but it concerns reactance, apparent power and line frequency. Our EI calculation versus VA will certainly suffice for the purpose we have in mind for these little transformers.

Dc Plug-in Power Units

We enter into a different situation when selecting and using dc wall units. The question arises: "How good is the regulation?" We may also wonder if the dc output is really pure, or "clean." These are valid considerations, and they deserve some discussion. Take, for example, the power unit shown in Fig. 1. It was pulled apart to show the interior. The unit, Model DC-920, is made by National Semiconductor Corp. I bought it for 75 cents (new) at a discount store. It is rated for 117-V ac input, 60 Hz. The output is rated at 9-V dc, 100 mA. Although we may conclude that this power unit is just right for many small circuits we might tack together, certain restrictions exist. Among them are (1) How much ripple can our circuit tolerate? and (2) How good must the voltage regulation be under varying load?

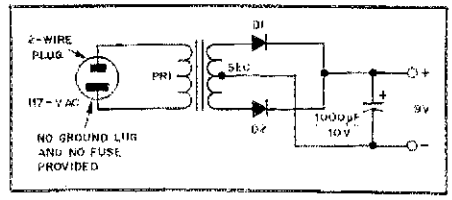


Fig. 2—The schematic diagram of the dc wall unit of Fig. 1. Filtering is minimal, and there is no regulator. The 117-V ac line is unbypassed, and no fuse has been included.

The schematic diagram for the unit is shown in Fig. 2. Note the simplicity of the design. There is no provision for voltage regulation and little filtering. The power unit would be fine for a calculator or transistor AM-band radio, assuming the peak current did not exceed, say, 70 mA. The greater the current demand of the unit being powered, however, the greater the ripple and the greater the sag in output voltage. This would be unsuitable for powering a VFO, a high-gain audio strip or some other critical circuit that did not contain suitable ripple filtering and voltage regulation.

I have opened a number of the commonly available dc-power units and have learned that they follow the general design seen in Fig. 2. There is nothing we can do to provide regulation of the output voltage if our equipment requires the 9 V that is available from the power module. We could, on the other hand, feed the 9 V into a 5-V regulator and use the system for powering a 5-V circuit. This is because a regulator, in order to function, must have a greater input voltage than it delivers as output. If we needed 9 V regulated, we would have to purchase a plug-in dc module that could supply at least 12 V. A three-terminal regulator is suitable for our job. The dc current available for our equipment would, of course, be less than the value specified for the plug-in unit. This is because the regulator consumes power in the process of providing regulation. All of these factors must be taken into account. Fig. 3 shows how we might obtain an 8-V, 100-mA regulated dc operating voltage from a 12-V, 200-mA wall unit. We have added a three-terminal regulator and a couple of 0.1-µF bypass capacitors.

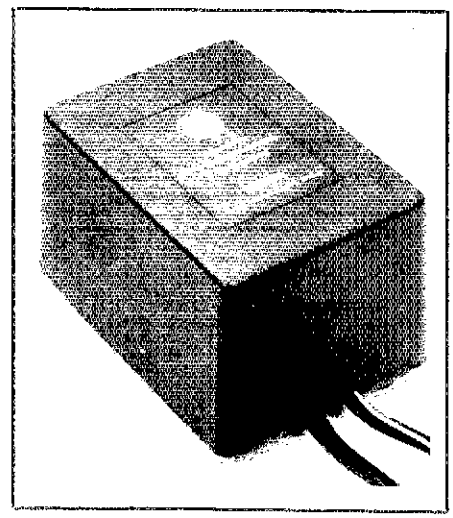


Fig. 4—A large plug-in ac transformer bought for $3.50 from a surplus dealer. It provides an output of 16.5-V ac at 1 A.

The primary inconvenience in using wall transformers is that there is no on/off switch to control the ac input. We must either unplug the unit from the wall when the equipment is to be turned off, or leave it plugged in and turn off the dc voltage by means of a switch in the equipment box. Additionally, the ac input to the wall unit has no fuse or ac-line bypass capacitors inside the plastic case. It is good practice to bypass the ac line near the transformer when possible. This helps to keep RF energy out of the power unit and the ac line. I usually install a fuse in the dc line between the power module and the equipment: The usual cause for overloading can be found in the equipment rather than in the power module.

Obtaining Plug-in Units at Low Cost

Fig. 4 shows a fairly hefty ac wall transformer I purchased from All Electronics Corp. about a year ago for $3.50.[1] The output is 16.5-V ac at 1 A. I have used it as the basis for an 800-mA, 12-V dc power supply. It was made by American Telecommunications, and the part no. is

[1]Notes appear on page 38.

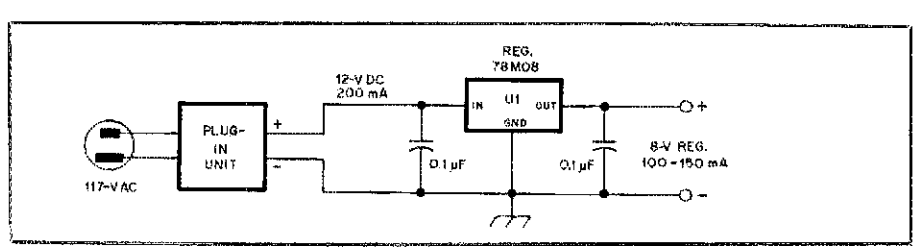


Fig. 3—A method for adding a voltage regulator to the output of a dc wall transformer power unit. U1 and two 0.1-µF capacitors have been added external to the plug-in module.

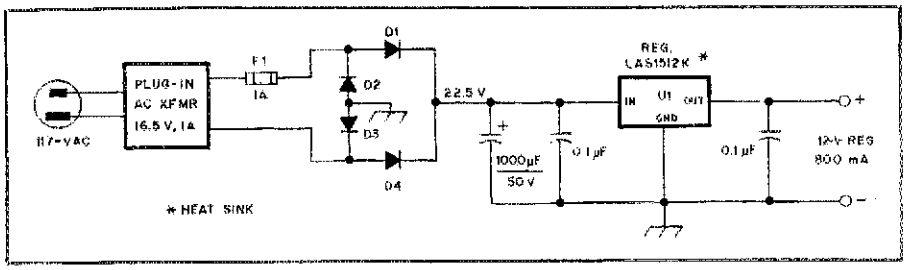


Fig. 5—Schematic diagram of the rectifier, filter and regulator used with the transformer of Fig. 4. D1, D2, D3 and D4 are 2-A, 50-PRV rectifier diodes. F1 is a slow-blow fuse. VR1 is a 1.5-A, three-terminal regulator with a fairly large heat sink added. The dc from this system is very clean, from a ripple and noise standpoint, even at loads in excess of 0.5 A. U1 was purchased from BCD Electro, Richardson, TX 75083-0119, for $1.50. It is in a TO-3 style of case.

719030-01. I no longer find it listed in the All Electronics catalog, but there is a similar unit (no. WTS-170) that sells for $4. It is rated at 17.5-V ac, center tapped, 500 mA. The rectifier, filtering and regulator circuit I use is shown in Fig. 5.

All Electronics also lists a 9-V ac, 1-A wall transformer (WT-9100) at $3. This would be a fine unit for use with a voltage-doubler circuit and a three-terminal regulator to provide 9- or 12-V dc at 300 or 400 mA. If you wish to get fancy with wall transformers, you might be interested in an item sold by Mouser Electronics in California.[2] It is offered as item no. 41AC116 for $6.59 in single quantity. The output is dc at 300 mA. Various voltages are available (3, 4.5, 6, 9 and 12). The output cable is terminated in a molded four-way plug that mates with most of the common jacks in use today. Furthermore, the primary is switchable for 117 or 234 V, 50/60 Hz. There is no mention of the output being regulated, but that should be a simple matter for us hams to deal with by installing a three-terminal regulator inside the equipment box.

Another vendor that sells surplus wall transformers is Marlin P. Jones & Associates.[3] You may obtain a 14-V dc wall unit that delivers 500 mA (no. TR-1260) for only $4. It comes with a 7-foot cord that ends in a mini phone plug.

Nearly all surplus dealers sell a variety of plug-in power units. For the most part, the prices are quite attractive with respect to the individual cost for power transformers. The use of wall transformers is one way for you to shave costs when building homemade gear. Certainly, QRP enthusiasts should find many uses for plug-in wall types of power supplies.

Notes

[1]905 S. Vermont Ave., Los Angeles, CA 90006, tel. 213-380-8000.
[2]11433 Woodside Ave., Santee, CA 92071, tel. 619-449-2222.
[3]P.O. Box 12685, Lake Park, FL 33403, tel. 305-848-8236.

New Products

CONNECT SYSTEMS, INC. MODEL CS-16 DECODER

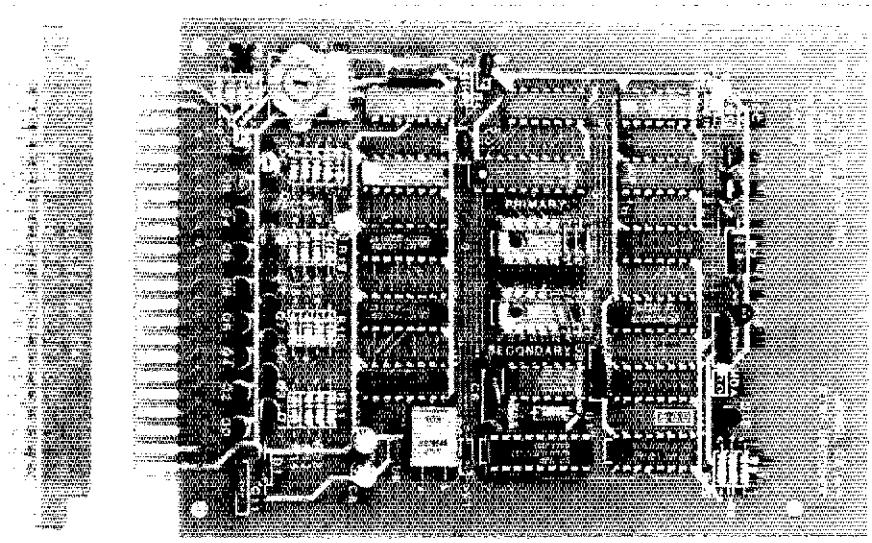
☐ The CS-16 is a 16-function DTMF decoder board designed to securely control virtually any apparatus via radio or line. The decoder may be used to control various repeater on/off functions.

A unique feature of the CS-16 is dual password control. Two separate, user-programmable, three-digit passwords create hierarchical control capability. The primary control password can access all 16 of the available functions. The secondary password accesses only eight of the 16 functions. Additionally, a special primary password command that can enable or disable secondary password access is available. The CS-16 provides such a high degree of multilevel security that control can be accomplished directly on voice channels, eliminating the need for separate control frequencies.

Each of the 16 functions is provided with an open-collector and 5-V CMOS logic output. A strobe output is also made available in open-collector and logic format. This output can be used to gate repeated audio so that DTMF control commands are not retransmitted.

A power-up reset feature places all outputs in the off state. An audio preamplifier with level control permits the crystal-controlled tone decoder to operate over the wide input range of 10 mV to 2 V. A strobe LED lights when any of the 16 buttons on a pad is pressed. (The CS-16 can also be used with 12-button pads.) An on-board voltage regulator permits operation with a 10-25 V dc power source. The CS-16 incorporates reverse-polarity protection, and draws less than 20 mA from the supply.

Each CS-16 is constructed on a top-quality glass board with plated-through holes. The board is reflow soldered and machine trimmed. The 44-pin edge connector is gold plated for reliability. Each CS-16 is supplied with a mating connector, a manual and a limited six-month warranty. Price class: $150. For more information contact Connect Systems Inc., 23731 Madison St., Torrance, CA 90505; tel. 213-373-6803.—*Paul K. Pagel, N1FB*



Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

SLIDE MOUNT YOUR KEYBOARD

☐ My operating table became crowded when I added a computer and monitor to my station. A keyboard saves the effort of switching between my separate CW transmit and receive programs during computer-CW operation. The keyboard remained on the table top for a short while, but the awkward typing height and disorderly wiring set me to thinking about a better arrangement. I was at a loss for a new keyboard location. An 18-inch drawer slide and some scrap lumber were my answer. This simple installation places the keyboard at a proper height for fatigue-free typing, yet allows me to simply slide it out of my way when not in use.

This description covers the details of my arrangement. The dimensions of various parts must be chosen to fit each station. Feel free to tailor the idea for your own shack.

Fig. 1 shows the general layout of the drop-mounted keyboard scheme. The opening required for the keyboard is 1 inch wider than the keyboard case: 13.5 inches. Adjust the side-support height so that the key tops will be about 26 inches above the floor (an ideal typing height). If the table is 30 inches high, a drop of about 7 inches is satisfactory.

Fig. 2 shows the construction details of one side support and slide mount. Fasten the drawer slides to the keyboard with any convenient screws. Mount the mating section of the slide even with the bottom of the side support and about 1 inch behind the support front edge. This ensures that the knobs do not project beyond the table front when the keyboard is retracted. Dress the keyboard leads to the rear, under the table, with enough slack to allow for keyboard movement. Install a lock pin on one of the slides to prevent movement when the keyboard is in use. This system has worked very well for me. —*"Sal" Salzano, N2CPM, Bronx, New York*

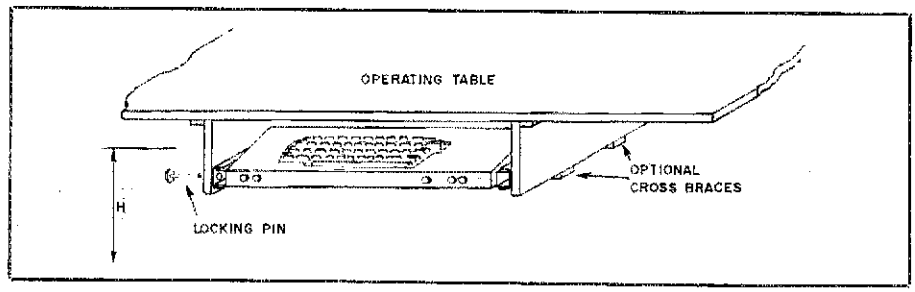


Fig. 1—A keyboard installation under an operating table. The distance, H, from the keys to the floor should be approximately 26 inches. Separate the side supports by the width of the keyboard plus the width of the slides. Cross braces may be necessary at the lower edge of the side supports if the supports or their connections to the table are not solid.

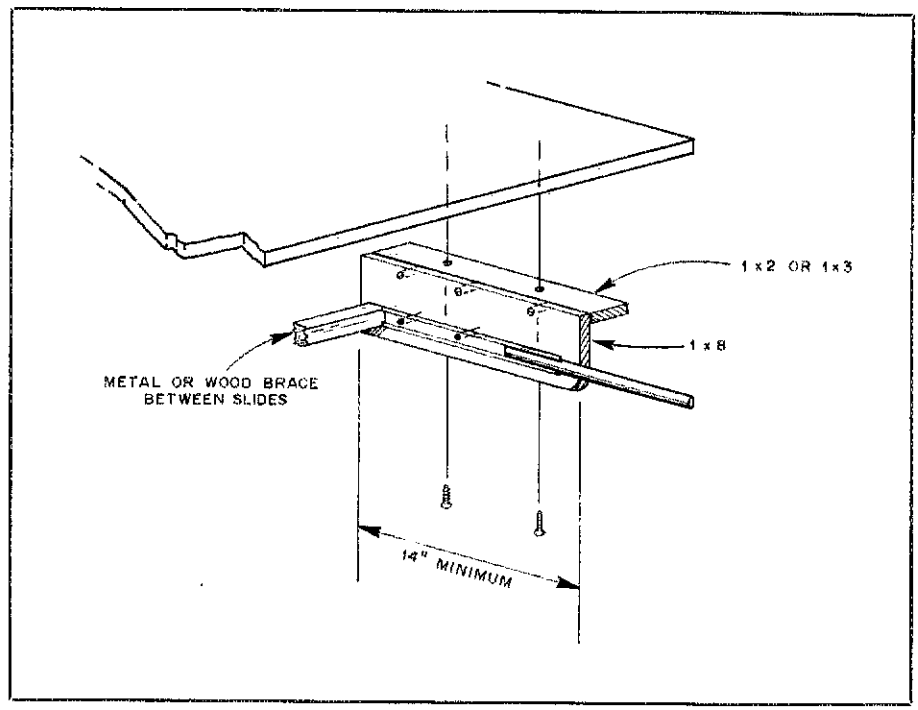


Fig. 2—Construction and mounting details of a side-support and drawer-slide assembly. Dimensions and materials shown are those used by the author and are not critical.

A THUMBWHEEL-FREQUENCY-CONTROL AID FOR SIGHTLESS HAMS

☐ The following modification gives a tactile zero reference on various models of VHF/UHF hand-held transceivers that use thumbwheel frequency control. First, set all of the thumbwheel switches to zero. Then, use a razor knife or file to remove one of the tabs from each thumbwheel section. This provides an indentation that can be felt when each section is set at zero. The operating frequency can then be set by counting switch positions from the notch on each switch section. This modification has merit for visually impaired hams, but sighted hams can also benefit because it allows tactile frequency selection when operating while driving or in the dark.—*Mark A. Cobbeldick, KB4CVN, Fort Payne, Alabama*

AN ACCURATE, INEXPENSIVE FREQUENCY MARKER

☐ A highly accurate series oscillator can be constructed from seven components for about $10. The marker is based on the model CX-1H quartz crystal, which is a tuning-fork

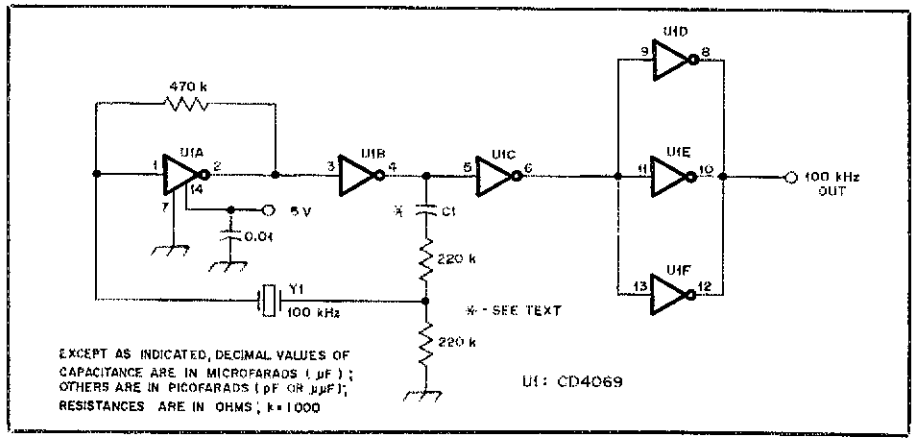


Fig. 3—A schematic for the frequency marker. U1 is a CD4069, or equivalent, CMOS hex inverting buffer. Y1 is a 100-kHz CX-1H crystal from Statek.

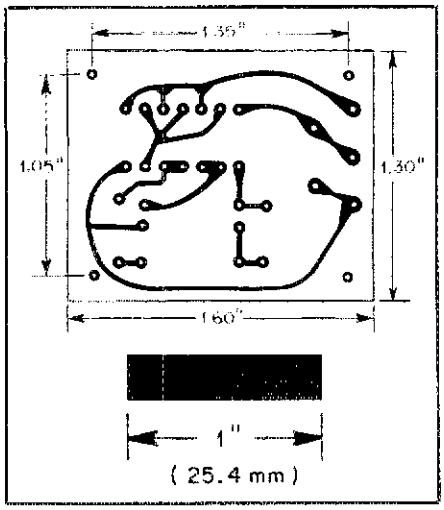


Fig. 4—Full-size circuit-board etching pattern for the frequency marker, shown from the foil side. Black areas represent unetched copper.

resonator manufactured by the Statek Corporation.[1] Statek produces these crystals for use in quartz watches and they have a frequency tolerance of ±0.005% at 25° Celsius. The modules cost about $6 each.

A schematic of the frequency-marker circuit is shown in Fig. 3. It consists of three cascaded inverters and three parallel buffer inverters. The entire circuit can be etched on a 1.6- × 1.3-inch board, as shown in Fig. 4. (Fig. 5 is a parts-placement diagram for the circuit.) I used the components specified by Statek and the marker oscillated at 100.0015 kHz. [Larry Wolfgang, WA3VIL, used a "gimmick" capacitor for C1 in the frequency marker he built in the ARRL lab. The gimmick is two wires of a no. 24 AWG ribbon cable. Start with the wire somewhat longer than 3½ inches, connect the output of the frequency marker to a frequency counter, and trim the gimmick wires until the marker is on frequency.—Ed.] Since the nominal frequency of the crystal is 100.00 kHz, the measured frequency is within the quoted tolerances.

The oscillator provides an ideal frequency check for the Argonaut and other radios that lack an internal frequency marker. Statek manufactures the CX-1H crystals and provides circuit component values for frequencies from 10 to 600 kHz. Thus, most HF receiver calibration can be accomplished with this inexpensive and easy-to-build circuit. *—Michael C. Schell, KC3PE, Gaithersburg, Maryland*

AN AID FOR DRIVING GROUND RODS

☐ We all know the importance of a good ground system. It not only protects equipment and people from lightning, but it is vital to effective station operation. This is why the arduous task of driving ground rods into the earth is necessary. How many of us, though, have missed a swing and struck a glancing blow, or hit a friend or ourself?

Motivated by self-induced pain and the desire to have a good ground system for the shack (I use four ground rods, connected in parallel), I looked for a better way to drive ground rods safely. Since striking the small area on an 8-foot rod is rather difficult and hazardous, it would be a great improvement to increase the striking area of the rod. The simple rod cap shown in Fig. 6 increases the striking area to a 4-inch-diameter circle. It is easier and safer to drive a ground rod with this tool.

As shown in the figure, the cap consists of a 6-inch-long by 9/16-inch (inside) diameter pipe welded to a 4-inch-diameter, ½-inch-thick steel plate. The dimensions are not critical, but this cap has served me well. The steel striking plate has proved strong enough to take a pounding and big enough to provide an easy target for any size sledge hammer. I selected the pipe length so it would give good stability and a straight driving force, while serving as a guide to leave 6 inches of the ground rod exposed after it is driven. Use a pipe large enough to fit loosely over the ground rod. I have driven many ground rods with this driving cap, and found it to be efficient and safe.—*Jim Headstream, KE5NQ/G4VSM, Chillesford, Suffolk, England*

[1]The CX-1H is available from Statek Corp., 512 N. Main St., Orange, CA 92668, tel. 714-639-7810.

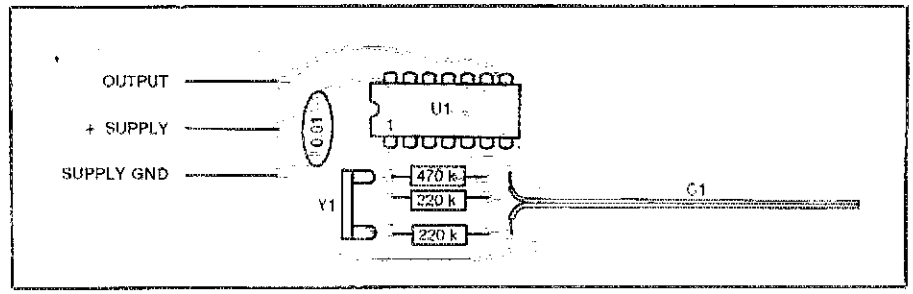


Fig. 5—A parts-placement diagram, shown from the component side of the board. Gray areas show an X-ray view of the copper pattern.

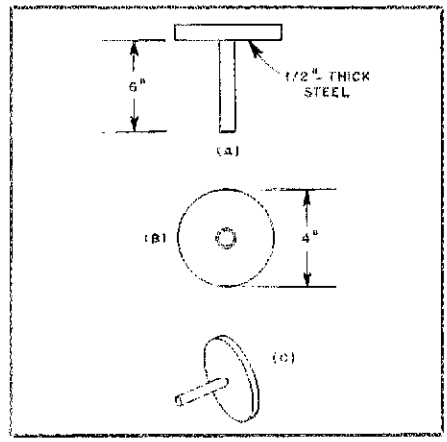


Fig. 6—A side view (A), bottom view (B) and oblique view (C) of the ground-rod driving cap.

TR-2400 12-V POWER CORRECTION

☐ Craig Martin, KR6T, the Customer Service Manager of Trio-Kenwood Communications, has brought to my attention a possible misinterpretation of "12-V Operation for the TR-2400" (Hints and Kinks, April 1985 *QST*). The article shows how to connect an external 9.6-V dc supply to the transceiver without disabling the external microphone or tone circuitry. The modification does not convert the TR-2400 for operation from 12-V dc.

In the first paragraph of the April article, Mr. Zak mentions that the radio requires 9.4-V dc (the correct figure is 9.6 V), rather than 12-V dc. Do not overlook that statement: *Damage is likely if the radio is connected to a potential exceeding 11.04 V dc.* A suitable mobile power supply (from "The Perfect 10: A Power Supply for FM Portables," March 1984 *QST*) is shown in Fig. 7.—*Bob Schetgen, KU7G, Assistant Technical Editor*

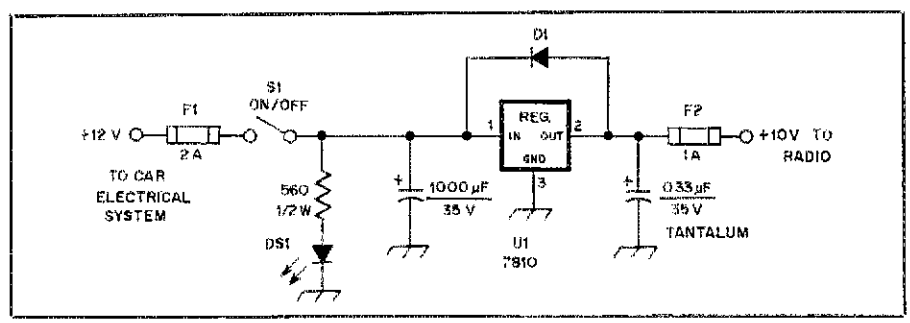


Fig. 7—Schematic diagram of the regulator circuit. The resistor is a carbon-composition type. Capacitance is in microfarads. The input capacitor is electrolytic. Parts numbers in parentheses are from Radio Shack.

D1—Silicon power diode, 1N4001 or equiv.
DS1—Green LED (276-022).
F1,F2—Fast-acting fuse, 1 A (270-1273).
S1—SPST toggle (275-602).
U1—10-V, 1-A, three-terminal regulator, Texas Instruments 7810 or equiv. (available from Active Electronic Sales Corp., Box 1035, Framingham, MA 01701, tel. 617-366-0500).

Technical Correspondence

Conducted By Jerry Hall, K1TD
Associate Technical Editor

ICOM BACKUP BATTERIES

☐ *Warning:* If you own an ICOM R71, 751, 271 or 471, don't disconnect the lithium battery on the memory board! All these models use a common memory plug-in board that contains two ICs and a lithium battery.

A friend of mine wanted to experiment with the memory circuit, so he disconnected the battery in order to install a socket for the RAM. His radio didn't work when he reconnected everything, and his call to ICOM confirmed that the RAM contains the microcode that gives each model radio its own personality. His board is on its way back to ICOM for reprogramming, which can't be done at the dealer's. For ICOM owners, this means that when the lithium battery runs down (seven-year life), the memory board must be sent in for reprogramming.—*Robert S. Parnass, AJ9S, ARRL Technical Adviser, 530 Kiowa, Naperville, IL 60565.*

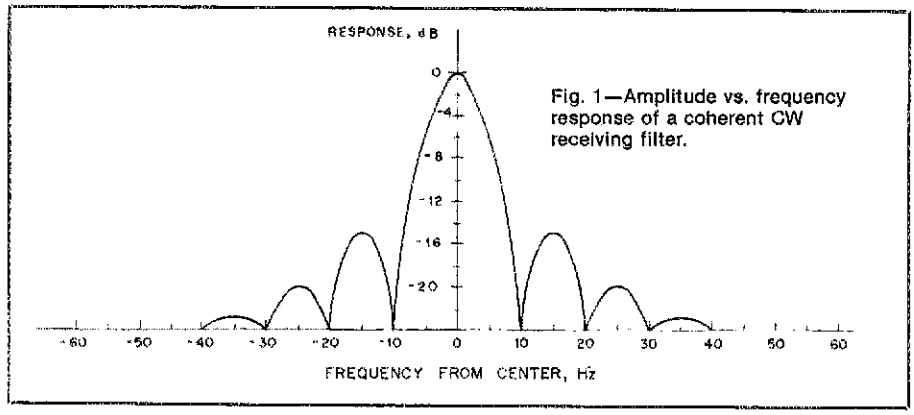


Fig. 1—Amplitude vs. frequency response of a coherent CW receiving filter.

DATA TRANSMISSION VIA AMATEUR RADIO

☐ With the growing availability of microprocessors to the radio amateur, it is time to launch a drive to encourage experimentation and investigation into ways to apply this new technology so as to improve basic radio communication. Modern, synthesized, solid-state transceivers have found their way into most ham shacks, and there is an ever-growing segment of our hobby concerned with "non-voice" communications. Examples would be digitized SSTV, RTTY (in its various forms), packet radio and, of course, CW.

Transmitting data by radio, as opposed to voice, is *the* area in which the amateur community will find the best opportunities to make significant contributions to the state of the art in upcoming years. For instance, by synchronizing the transmitter and receiver and employing digital-signal processing at both ends, it is possible to improve message reliability, reduce bandwidth and power requirements, and realize a virtual immunity from adjacent-channel interference—all at the same time.

My interest was sparked by a two-part article in *QST* on coherent CW by Charles Woodson, W6NEY.[1] I got in touch with Bert de Kat, VE3DPB, who had been working with CCW for several years. From Bert's records, I was able to review what has been done to date. The breakthrough was Ray Petit's "integrate and dump" analog filter, which has been used by all experimenters in this field. The trend in industry lately has been to replace analog filtering with digital-signal processing, so I set about to develop a digital sampling filter for CCW use. This microprocessor-based machine works by sampling the received audio waveform at high speed and converting the instantaneous voltage values to numbers. The numbers are stored in computer memory and then treated mathematically to produce the desired narrowband filter response. I also devised a way for the computer to synchronize itself automatically with the transmitted signal. It is possible for the computer to recover the intelligence in a CW signal that is so weak it cannot even be heard in the headphones. Unlike the integrate-and-dump filters, the new system is also useful for enhancing weak "noncoherent" (ordinary) CW signals (if the transmitter has good frequency stability).

The algorithm works by "least-squares" fitting a sine-wave curve onto the sampled data points. The frequency of this sine wave is selected by the operator and is the filter center frequency. The filter bandwidth is determined by the run-length of circular memory buffers that are used to hold the sample values. This bandwidth is adjustable by the operator and may range all the way down to only 1 Hz wide.

There is a figure in *The ARRL Handbook* that illustrates the general response characteristics of such a filter, reproduced here as Fig. 1.[2] In addition to the main response at the center frequency, there are infinitely deep nulls or notches that occur every 10 Hz on either side of the center frequency. If we had only 1 kHz of spectrum to work with, and if stations agreed to operate on frequencies that were exact multiples of 10 Hz, we could have 100 simultaneous QSOs in that 1 kHz with almost no possibility of QRM. Each filter would neatly notch out every other channel except the one we wanted to receive. By contrast, consider trying to run 100 simultaneous QSOs in a 1-kHz-wide part of the 80-meter phone band using SSB!

Turning to RTTY, current amateur practice is to transmit at 45.45 bauds using a shift of 170 Hz. If we narrowed the shift to only 45.45 Hz, the RTTY signal could be recovered "optimally" by using two such sampling filters spaced 45.45 Hz apart with a simple comparator at their outputs. To run the two filters on different frequencies, the hardware could be just the same as for CCW, except we would need one extra sample-and-hold network and one extra programmable divider to synthesize another set of sampling strobes. If we changed the standards slightly again and went to 110 bauds and a 110-Hz shift, RTTY transmissions could coexist very nicely with the 10-Hz-wide channel spacing of CCW.

The sampling filter technique can also be used very effectively to demodulate MSK (minimum-shift-keying) transmissions. This would find application in the optimum recovery of high-speed packet data transmissions. It seems sensible to use digital signal processing to compensate for the channel effects encountered when sending packets via satellite. Indeed, such an adaptive channel equalization system may well turn out to be the only practical way to obtain reliable packet communications via satellite.

The point is that many already-existing facets of Amateur Radio seem to be converging on the use of coherent signaling with digital processing. We have the spectrum allocations, we have the transceivers, and we have the growing number of hams who are becoming involved with computers. I believe that in order to encourage further experimentation and innovation in this exceptionally fertile field, we must get many more coherent signaling stations operating; in order to do this, we must create a surge of interest and enthusiasm within the amateur fraternity.

Use of available media channels is one way to do this. As *The ARRL Handbook* says, "It's an idea whose time has come." I would like to see much more space in *QST* given to construction projects in this field, or a separate book on the subject. I hope the League members will get behind this in a big way and push hard to learn coherent signaling concepts and to encourage further development and experimentation.—*Bill de Carle, VE3OBE, 235 Baythorn Dr., Apt. 301, Thornhill, ON L3T 3V6*

[Editor's Note: The editors of *QST* invite participation toward meeting this challenge, and especially invite material for publication about these techniques and activities.]

[1] C. Woodson, "Coherent CW—Part 1, The Concept," *QST*, May 1981, p. 11, and "Coherent CW—Part 2, The Practical Aspects," *QST*, June 1981, p. 18.

[2] C. L. Hutchinson, ed., *The 1985 ARRL Handbook* (Newington: ARRL, 1984), Fig. 17, p. 21-11. [A complete section on coherent CW is contained in *The ARRL Handbook*, p. 21-9.—Ed.]

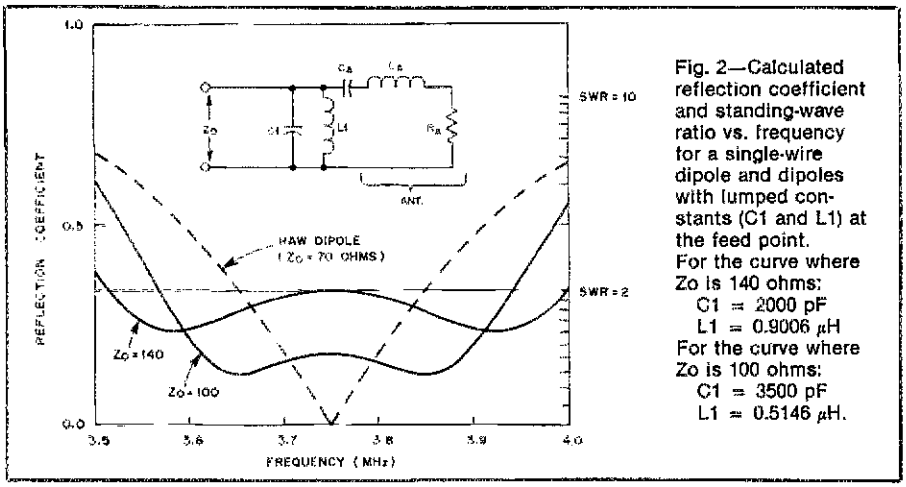


Fig. 2—Calculated reflection coefficient and standing-wave ratio vs. frequency for a single-wire dipole and dipoles with lumped constants (C1 and L1) at the feed point.
For the curve where Zo is 140 ohms:
C1 = 2000 pF
L1 = 0.9006 μH
For the curve where Zo is 100 ohms:
C1 = 3500 pF
L1 = 0.5146 μH.

ONCE MORE WITH THE 80-METER BROADBAND DIPOLE

☐ With reference to earlier items by K1TD and W7ZOI in *QST*, it *is* possible to design a simple, adjustment-free matching network that will make an 80-meter dipole have a reasonable SWR across the band.[3,4] When using Hayward's RLC model of the dipole, a simple parallel-tuned circuit across the antenna feed point gives less than 2:1 SWR across all but the bottom 10- to 20-kHz of the band, as shown in Fig. 2.

This method *does* require a source impedance of 140 ohms, so a broadband matching transformer will be needed at the input. I see no reason why you couldn't just tap the input down on L1 and use L1 as an autotransformer to accomplish the impedance-matching function. In fact, although I have not tried it, it may be possible to include the balanced-to-unbalanced transformation in the same coil, as shown in Fig. 3. To tune this network, use a dip meter with no antenna connected. Then install the network on the antenna and adjust the input tap for the best compromise SWR across the band.

By choosing a lower characteristic impedance, you can get much better SWR over a narrower bandwidth (Fig. 2). Retune both the antenna and the network to center the response on either the phone or CW portion of the band.

You can get better SWR in both the full-band and narrow-band case by adding a series-tuned circuit to the input (Fig. 4). The improvement is marginal, however, and complicates the impedance step-up arrangement, so it is probably not worth the effort. It would be better to take Hayward's suggestion and make the antenna itself inherently more broadband. One method is to "fatten" the elements by using a wire cage arrangement or similar. Of course this would change the values of Zo, L1 and C1.

[3]J. Hall, "The Search for a Simple, Broadband: 80-Meter Dipole," *QST*, April 1983, p. 22.
[4]W. Hayward, "Limitations to Broadband Impedance Matching," Technical Correspondence, *QST*, July 1984, p. 45.

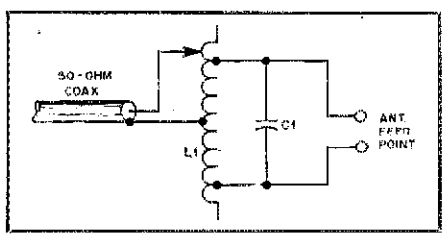


Fig. 3—Proposed method of feeding a balanced antenna with unbalanced line. The shielded conductor of the coax line must be connected at the exact center of the coil, which is an electrically neutral point in the antenna system.

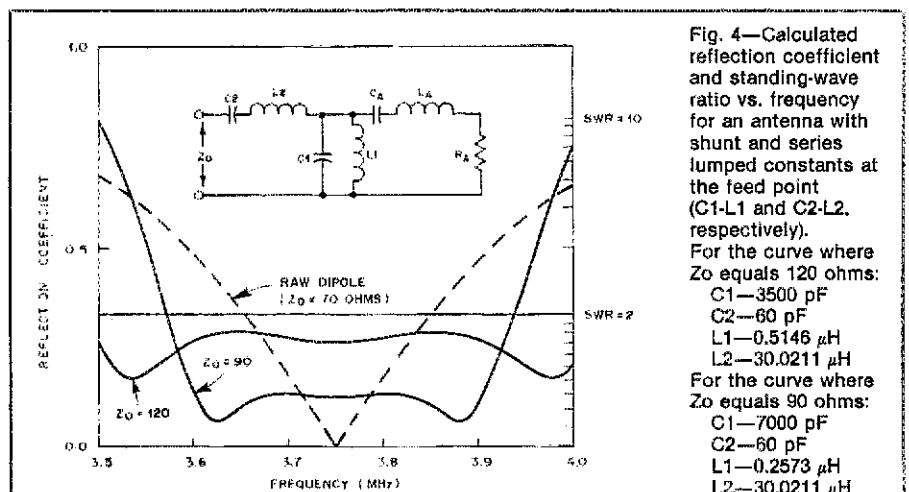


Fig. 4—Calculated reflection coefficient and standing-wave ratio vs. frequency for an antenna with shunt and series lumped constants at the feed point (C1-L1 and C2-L2, respectively).
For the curve where Zo equals 120 ohms:
C1—3500 pF
C2—60 pF
L1—0.5146 μH
L2—30.0211 μH
For the curve where Zo equals 90 ohms:
C1—7000 pF
C2—60 pF
L1—0.2573 μH
L2—30.0211 μH

The original graphs for Figs. 2 and 4 were drawn with an HP-87. I would be happy to send a copy of the program to anyone who sends me an s.a.s.e.—*Alan Bloom, N1AL, 260 Arata Ln., Windsor, CA 95492*

ANTENNA CURRENT

☐ Some points in the letter from John Belrose, VE2CV, need clarification.[5] "The larger the radiator current, the greater the power radiated" is not an accurate statement unless current is the *only* parameter changed. An antenna with low currents can and usually does radiate power with higher efficiencies than high-current antennas.

An example would be comparing an end-fire array having ¼-wave spacing to one with 1/16-wave spacing. The current is certainly much higher in the close-spaced array, but the radiating efficiency is much lower!

Two statements seem to contradict themselves in the text regarding the phase of the currents. First it is stated that the phase of the current is constant over a current loop. In the next paragraph it is stated the voltage and current are 90° out of phase in a resonant radiator. This would mean a resonant dipole is a pure reactance. In resonant dipoles the current and voltage are in phase at any point in the antenna; only the ratios change.

A final point is that an antenna does not have to be "resonant" to receive or radiate effectively. Terminated rhombics are fairly efficient examples of nonresonant antennas. "Resonance" has nothing to do with efficiency. Efficiency is determined solely by the ratio of the loss and the radiation resistance.—*Tom Rauch, W8JI, 9805 Walford Ave., Cleveland, OH 44102*

[5]J. S. Belrose, "How *Does* a Transmatch Work?" Technical Correspondence, *QST*, March 1985, p. 46.

Feedback

☐ In the April 1985 Product Review of the Kenwood TH-21AT transceiver, p. 47, the term CTCSS should have been used instead of "tone-burst generator." Further, the battery-holder identifier is EB-2, not BB-2.

☐ Leo Younger, N6KKR, has found an error in "Coaxial Cables: Their Construction and Use" (Nov. 1984 *QST*). The equation shown in Fig. 4 on page 21 should read:

$$\text{Attn} = 10 \log \frac{P1}{P2} \text{ dB}$$

☐ Check Fig. 3 of "A Power-Supply Performance Tester," p. 39, April 1985 *QST*. To avoid a safety hazard, the line switch S1 should be shown in series with and to the right of F1 in the "hot" side of the line, and not in the neutral leg as shown.

☐ An erroneous reference to an equation number appears in the notes at the end of Technical Correspondence, March 1985 *QST*, p. 46. Note 5 should reference Fig. 9, plot of Eq. *12*.

☐ In Fig. 4 of "A Simple 435-MHz Transmitter," May 1985 *QST*, p. 16, breaks should be shown in the striplines beneath C16 and C19. This is properly shown beneath C25 and C26 (p. 17).

New Books

THERMAL COMPUTATIONS FOR ELECTRONIC EQUIPMENT

by Gordon N. Ellison. Published by Van Nostrand Reinhold Company, 135 W. 50th St., New York, NY 10020. First Edition, 1984. Hard-bound, 7¼ × 10¼ inches, 397 pages including index. $34.50.

Reviewing a book recalled memories of my high school years, when such a task was considered drudgery. Later, my experience with professional technical texts was that they are b-o-r-i-n-g. Both of these presumptions turned out to be highly inaccurate with this text. I found it different; not heavy in style, nor overpowering in mathematics. I have to confess that authors who try to impress me with their mathematical prowess do not keep my interest, but Ellison has turned the tables with an interesting and understandable text; you can follow the material without requiring a college mathematics refresher course. Ellison notes that "designers with only a precalculus background have been successfully taught the use of most of the techniques contained in the book." You should have a background in some form of physical theory (physics, or mechanical or electrical engineering), but you're not expected to have any formal training in heat-transfer techniques.

This book covers those areas that are most important to amateur electronic-equipment heat-transfer computations. It does so in an understandable manner with meaningful examples. Material on heat pipes, thermoelectric coolers, liquid cooling and so forth is not included. The book deals with aspects of heat transfer in electronic equipment, which the author applies to practical design problems: conduction, radiation and convection by natural or forced air flows.

Descriptions of heat-transfer processes are presented clearly; numerous practical examples are shown. Convective heat transfer is a complex subject, but Ellison lucidly highlights the important parameters.

Another area that is very well presented is radiative heat transfer. This mode is usually glossed over in many texts or is presented in a manner that does not relate to the principal thrust of the text. Ellison's excellent presentation of the "geometry" (geometric shape factors) of radiative heat transfer makes the subject understandable. With illustrations, he identifies the useful contribution of radiative heat transfer to the rating of a naturally convection-cooled transistor heat exchanger. Thorough discussions of other heat-sink factors are also presented. These include items such as optimum fin spacing and conduction effects. You're provided with sufficient information to evaluate accurately and analytically any heat sink in natural convection — the quiet, "no-moving-parts" mode of heat transfer.

When dealing with convective air flow, Ellison discusses both forced and natural convection flows. He includes an interesting presentation that determines the buoyant air flow of natural convection, an approach I've not seen before. Step-by-step iterative procedures are presented to allow any reader to duplicate the air flow computations.

The author states that "Chapters 1 through 6 are intended to give the reader a solid foundation (for electronic equipment heat transfer) and provide the self-confidence that is associated with independence from a large computing facility. Unfortunately, the time comes when the arithmetic chores are exceedingly formidable, and satisfactorily accurate temperature predictions are impossible without digital computation aids." The remainder of the book presents two interesting computer programs written in ANSI FORTRAN IV, along with operating instructions and illustrative examples for both programs.

Fortunately, 99% of the thermal-design problems that will be encountered with Amateur Radio equipment do not require the use of the powerful computer tools presented here. You should, however, read and understand enough of the program descriptions to be familiar with the advantages and requirements of numerical analyses that are higher-powered than those provided by the pocket calculator.

One difficulty with Ellison's presentation is his choice of units of measure of physical processes and materials. Traditionally in the U.S., the "engineering units" of heat transfer have been the BTU/hour/1b/foot system, which are somewhat incompatible with electrical functions where energy is expressed in joules, power in watts and time in seconds. Fundamentally, electrical terms are in SI or metric units, and persons dealing with electronic heat transfer must resort to handling both systems of units. This can be achieved by converting electrical terms to Btu or converting Btu data to watt-second terms. My opinion (based on 25 years in the business) is that it is far better to do all of the computations in metric terms, converting only input physical-length units from inches and feet to millimeters and meters. In that manner, we are able to communicate more easily with our electronic brethren.

Ellison uses some strange physical properties units, e.g., gm/in^3. Mixing metric and English units is poor at best; misusing metric units is awful. The metric unit of mass is the gram, and is properly abbreviated "g", not "gm"! In addition, the use of CGS system energy notation "cal." (for calorie) is bad, as the author does use the watt for power, and the natural expression for energy is the joule (watt-second). In the chapter on airflow, the author pays the price for using clumsy English engineering units in dealing with airflow continuity. In my metrically jaundiced opinion, the volumetric airflow of cubic-foot-per-minute should be directly converted to metric mass flow terms, dispensing with some of the messy in-process conversions.

Criticisms aside, I wish to thank Gordon Ellison for giving us such a useful text. It is one I can feel proud to present to my electronics friends (e.g., W1FB), and know that there is a reasonable chance that even they will understand heat-transfer principles. — *Dick Jansson, WD4FAB, ARRL TA*

SYNCHRONOUS PACKET RADIO USING THE SOFTWARE APPROACH

by Robert M. Richardson, W4UCH. Published by Richcraft Engineering Ltd., 1 Wahmeda Industrial Park, Chautauqua, NY 14722, tel. 716-753-2654. First edition, 1984. Spiral-bound, 8½ × 11 inches, 253 pages. $22. Program disk for TRS-80® microcomputer Model 1 or III, $29.

Here is a fascinating new approach to 1200-baud packet radio using the AX.25 protocol and the TRS-80 microcomputer. The author uses software to replace the hardware found in the Tucson and Vancouver terminal node controller (TNC). Items replaced include the microprocessor, the expensive SDLC/HDLC controller, extensive EPROM, dynamic RAM, RS-232-C UART and ancillary support chips. Also, the program uses Port Ø for input and output, so an expensive RS-232-C interface is not required on the host microcomputer.

The software is written in Z80® assembly language, so knowing that language is a considerable advantage to the reader. If you're unfamiliar with assembly language, Chapter 12 tells you how to modify the program using the built-in edit/modify mode to place your own call sign and prepared messages on disk.

This book is an encyclopedia of synchronous packet-radio information for the newcomer and old-timer alike. My only criticism is that the author goes too deeply into the finer points at times. But since the book is for newcomers as well as experienced packeteers, this criticism may not be deserved. Richardson's sense of humor creeps through occasionally, which makes otherwise dry and difficult material a pleasure to read. I found myself looking forward to the next chapter as I finished reading each one. I suggest that this book is a "must" for every present or future packeteer who wishes to understand the AX.25 protocol thoroughly, whether they choose to implement the hardware approach, the software approach, or both, as I did. I compliment Bob Richardson on this significant contribution to Amateur Radio.—*Dr. William M. Laird, W2CIX*

Strays

I would like to get in touch with...

☐ anyone with an owner's or service manual for a Regency HR 212 2-meter transceiver. James Lee, WB4GWX, 5004 Ridge View Court, Fort Worth, TX 76118.

☐ anyone who has a schematic diagram and FM modifications for the Lafayette HA-144 2-meter portable transceiver. Steven J. Robeson, KC8M, MAG-49, 4th MAW, Naval Air Stn., Willow Grove, PA 19090-5010.

The ARRL/VEC: A Progress Report

A no-nonsense look at what has been accomplished, and what you can expect from the ARRL/VEC in the future.

By Curtis R. Holsopple,* K9CH and Jim Clary,** WB9IHH

The Volunteer Examiners in Laramie, Wyoming, conducted a test session that could well be used as a model for all other test sites. The Laramie and Cheyenne VEs were professional, courteous, very friendly and supportive, and performed in such a manner as to win the confidence of any doubter of the new ARRL Volunteer Examiner Program.—Duane Shillinger, WB7NHR.

"I feel that the procedure followed and the atmosphere provided were excellent. Also, the convenience of being tested on a weekend was a real plus. The examiners were helpful and honest, and the test site was comfortable and accessible."—Larry W. Garens, KC5OQ

"The warmth and care expressed by the VEs were definite factors contributing to our confidence before the code test. Congratulations to the hams at the Charleston, West Virginia, Amateur Radio Club who made our upgrade trip a memorable and happy experience!—Steve Litwins, NJ8N

The above are typical letters from persons who have been tested by VE Teams working with the ARRL/VEC. Not only are they happy with how the program is working, they took exams at locations the FCC rarely, if ever, had the time to visit. The ARRL Volunteer Examiner Program works! It works well, thanks to the thousands of ARRL-accredited Volunteer Examiners who were equal to the challenge. We have about 20 file boxes and drawers full of test results and letters at Hq. to back up that claim!

Testing Activity Is High

The FCC test-results data show that the ARRL/VEC is coordinating the majority of all testing. ARRL-accredited VE Teams have given tests in 49 states plus Guam and Puerto Rico, Iceland, Japan, Germany, Saudi Arabia and the Pacific island of Kwajalein (if you can't find that one, it's north of the Marshall Islands). We're coordinating more than 150 test sessions *each month.* We expect to serve about 30,000 candidates in 1985—that's more than the FCC handled during their last 12 months of Field Office testing.

Before the VE Program began, we wondered what the pattern of test activity would be. We phased the ARRL/VEC program in by supporting sessions held at conventions and hamfests only. Over the past seven months, however, the trend has clearly moved away from a few large test sessions to many small sessions (an average of 16 candidates each) sponsored by clubs.

Many metropolitan areas have unexpectedly benefited from the VE Program: Neighboring Amateur Radio clubs that have competed (even feuded) in years past are working together to serve their communities with convenient schedules of examinations. Some club groups contribute VEs to a central testing site on a rotating basis, while other areas rotate the test site itself around a given metropolitan area. Still others work more independently, but communicate with each other so that test dates are distributed evenly throughout the year.

The foreign test sessions usually occur at military bases overseas, where U.S. licensees are stationed for military, diplomatic or commercial reasons. As they received little service from the FCC in the past, we are pleased to provide an opportunity for them to upgrade their licenses. (Note: Overseas VE testing is intended only for U.S. citizens and persons who will be traveling to the USA.)

The ARRL/VEC Coordinates Local Activity

One of the hallmarks of the ARRL/VEC is that we do *not* march out from Newington, Connecticut, dictating when and where tests are to be held. Scheduling tests is *entirely* up to the needs, desires and convenience of local Volunteer Examiners. We register the locally scheduled dates and provide the VE Teams with the support necessary to make the test sessions a success.

Any candidate or VE Team who wants to know what tests are scheduled in a given state can send us a request with an s.a.s.e. We'll send, at no charge, the current printout of upcoming sessions. We'll even include listings of sessions scheduled by some other VEC organizations.

Our purpose as a VEC is to provide a consistent and fair *national* testing program that is convenient for the candidates. This is in harmony with the ARRL's overall goal to help the Amateur Radio Service grow in both size and quality, a course charted for us over seven decades ago.

Some Statistics

Each dot on the accompanying map (Fig. 1) represents a site where an ARRL/VEC Team has given a test. By comparison, the map in Fig. 2 shows where the FCC gave tests in 1983. As you can see, ARRL-accredited Volunteer Examiners are providing you with a massive improvement in service! We applaud these volunteers for their hard work.

Table 1 shows the number of test elements administered, the pass rates and the number of license upgrades resulting from our test sessions. Note that the pass rate is running somewhat above 50%. By comparison, the FCC's pass rate back in 1981 was 43%. The mail we get explains the rise in pass rates clearly: Candidates are more relaxed!

We wanted to remove "test shock" factors caused by travel to unfamiliar places and missed work or school days. It's working! The candidates are getting a fair (and honest) chance to demonstrate their knowledge of Amateur Radio. Once again, the doom-and-gloom gang's assertion that the Volunteer Examiner Program would be characterized by confusion and misinformation has proven incorrect. If the VE Program were chaotic, why is it that the ARRL/VEC and ARRL VE Teams are

*Manager, ARRL/VEC Department
**Assistant Manager, ARRL/VEC Department

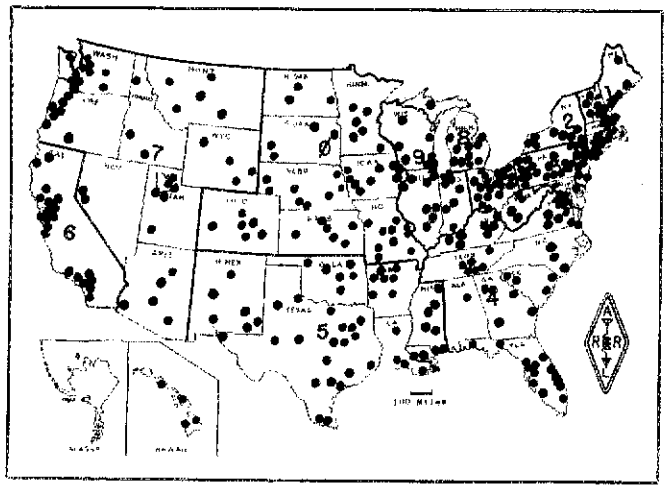


Fig. 1—Test sessions coordinated by the ARRL from September 1984 to June 1985. Each black dot represents one or more sessions held at a given location.

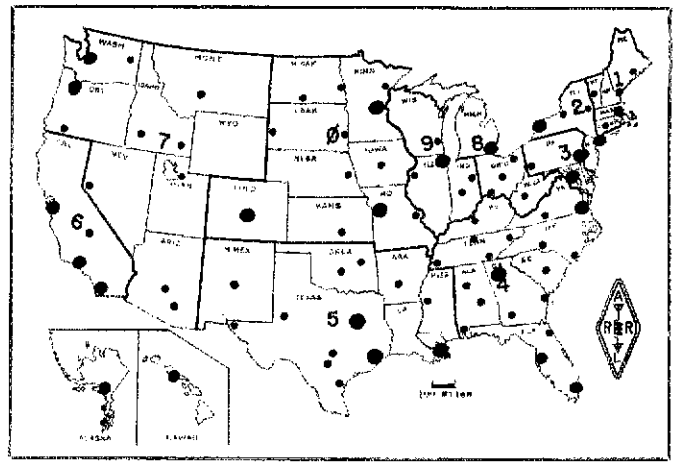


Fig. 2—Test sessions held by the FCC Field Offices in 1983. Large dots are the FCC Field Offices where exams were held at least twice a month. Small dots are the remote sites where exams were held once or twice a year.

already serving *more* candidates than the FCC did in recent years?

How to Locate a Test Near You

Test sessions may be scheduled with us 30 days or more in advance. Some teams register sessions as much as a year in advance. Most candidates find out about test sessions through local Amateur Radio clubs. Announcements made in club meetings plus printed notices in club newsletters are the most effective ways of advertising an upcoming session. Frequent announcements on local repeaters do the trick. Many radio and TV stations and cable broadcasting outlets also offer community bulletin-board services at no cost.

If you are not affiliated with any Amateur Radio clubs, write to the ARRL/VEC at ARRL Hq. We'll send you a list of test sessions scheduled in your state.

It is not practical to list test sessions in *QST*. Many sessions are registered only 30 to 60 days in advance, not enough lead time for publication. In addition, if we printed all of the test sessions we have registered, it would take about eight pages of Ham-Ad-sized print. A candidate would be faced with wading through listings for all 50 states—most of which would be of no use or interest to most readers.

It is more cost-effective for us and useful to you if we send out current and accurate listings upon request. Also, clubs and VE Teams are welcome to request listings of sessions in their areas—just send us a letter asking for a printout of test sessions and include an s.a.s.e.

It's Not A Simple Program

When we first sent our 96-page *VE Manual* to each of our 6000 prospective Volunteer Examiners last summer, the ARRL/VEC office received several letters complaining that we had taken a simple concept and turned it into a bureaucratic nightmare. Now that VE teams have had actual experience in conducting test sessions, we have received many letters and phone calls from these same people—now they're *glad* we provided thorough instructions. In fact, more often than not, they are asking for additional guidance!

We now have well over 5000 accredited VEs. (One out of every 10 Extra Class licensees is an ARRL-accredited Volunteer Examiner.) These dedicated volunteers have received a heavily revised second edition of the ARRL's *VE Manual*. We believe in providing our VE Teams with the resources they need to do a good job. The ARRL/VEC provides all of the forms, test materials and even postage necessary for the VE Team to conduct a successful test session. We also provide extensive data processing of the test results and screen each FCC Form 610 application before it goes on to the FCC's Gettysburg Licensing Division.

Problems and Solutions

Like anything new, in the early months the VE Program experienced some glitches. We're working hard to solve these problems and to minimize the difficulties caused to some VEs and test candidates. Here are some examples of what concerns keep our phone lines busy from dawn to dusk.

Delayed Accreditations

Around October 1, 1984, we ran out of accreditation materials. We knew at that point that an all-new *VE Manual* was necessary because of the many changes that had occurred in only the first few months of operation. The ARRL/VEC office was *swamped* with work necessary to support the already-scheduled test sessions. We were forced to delay the accreditations of about 1600 new prospective VEs while we got the program up and running. And, as icing on the cake, the new accreditation materials were delayed in printing. We thank you *all* sincerely for your patience in the face of the inconvenience caused by the delay.

Table 1
ARRL/VEC Test Sessions Summary—September 1, 1984-March 31, 1985
Results of All ARRL/VEC Sessions by Element

	1A 5 WPM	*1B 13 WPM*	*1C 20 WPM*	*2 Novice*	*3 Tech/Gen*	*4A Adv*	*4B Extra*	*Total*
Passed	404	1846	843	478	2518	1004	512	7605
Given	605	4518	1376	540	4379	2134	922	14,474
Pass Rate	66%	40%	61%	88%	57%	47%	55%	52.54%

Tally of Sessions Completed by ARRL/VEC Teams

Call Area	1	2	3	4	5	6	7	8	9	0	*AK* 11	*Crbn* 12	*Pcfc* 13	*Overseas*
	57	41	32	70	75	37	47	59	35	66		5	7	2

Tally of License Upgrades in ARRL/VEC Sessions

Technician	1235
General	1022
Advanced	655
Extra	402
Total Upgrades	3314

Statistical Summary

Total Candidates Served by ARRL/VEC:	6309
Total ARRL/VEC Sessions Completed:	533
Average Number of Candidates/Session:	11

By mid-April 1985, we had processed most of the backlog of VE accreditations. More than 7000 second-edition *VE Manuals* are in circulation, and the VE Teams are quickly gaining experience. The start-up hump seems to be about over.

Regulatory Changes

Another area that required a lot of extra effort was late-breaking regulatory adjustments made by the FCC. We anticipated that the Commission would need to modify some of the rules relevant to the VE Program. These midstream course changes may have caused a few problems in keeping the VEs and candidates informed, but were necessary to make the testing procedure run more smoothly in the long run.

One major sticking point has been the interpretation of Rule 97.25. This rule permits VE Teams to provide for "instant upgrading" and code-credit certificates. We were all caught by surprise, however, when the FCC notifed the ARRL/VEC that this "Certificate of Successful Completion" could not be used as proof that a candidate had passed the *written test elements* indicated by the upgrade certificate. In late December 1984, the FCC informed the ARRL/VEC that *only* the actual license issued by the FCC can be treated as valid proof that written test elements have been passed. The "Certificate" (unlike the FCC's old Interim Operating Permit) is valid for code credit and proof of new operating privileges earned. This situation even caught the Field Offices by surprise because their old Interim Operating Permits were valid for both code and written element credits.

The rulemakers at the FCC advised us that, for example, someone who held a Novice class license and upgraded to General should wait until receipt of the actual General class ticket from the FCC before trying to upgrade further. The ARRL vehemently opposes this situation, but we must abide by the wording of FCC Rule 97.25 until such time as the rule is changed.

The FCC Rules are made in Washington, DC, not at the Field Offices around the country. We have no choice but to abide by rules as written and interpreted *in Washington*. In mid-April, the FCC's Gettysburg Licensing Division sent a memo through channels to all Field Offices straightening out the confusion.

Check League Lines and Happenings in *QST* and *The ARRL Letter* for the latest information on this problem. Things may have changed from the time this article was written to the time you read it.

QST Articles Related to the VE Program

"ARRL Asks FCC to Clarify VEC 'Successful Completion' Rules," May 1985, p. 49.

N. Friedman, "Amateur Radio Licensing: A Seven-Decade Overview," March 1985, p. 47.

L. Wolfgang, "Announcing the All-New ARRL License Manual Series," Feb. 1985, p. 51.

"License Renewal Information," Jan. 1985, p. 45.

R. Palm, "FCC's New Form 610: A *QST* Interview," Dec. 1984, p. 59.

"Licensing: The First Step," Washington Mailbox, Dec. 1984, p. 60.

"League Opposes Seven-Day Re-examination Petition," Happenings, Nov. 1984, p. 65.

"Volunteer-Examining Rules Update," Happenings, Oct. 1984, p. 49.

"Exams for Persons with Disabilities," Washington Mailbox, Oct. 1984, p. 58.

C. Holsopple, "Taking a Test Under the ARRL Volunteer Examiner Program," Sept. 1984, p. 42.

"ARRL Now 13-Region VEC," Happenings, Sept. 1984, p. 47.

"Volunteer Examining—At Last," It Seems to Us, Aug. 1984, p. 9.

More to Come

We've only scratched the surface in describing the VE Program to you. In coming months, we'll take you for a close-up view of a test session, as well as for a tour of the ARRL/VEC office. Many people are curious about the procedures used by both the VE Teams and the VEC Department staff at Newington. We'll even take a tour of the FCC's famous Gettysburg address, and show you what goes on there.

We're grateful for the many phone calls and letters from people who appreciate what a huge undertaking the VE Program is. The ARRL has served the Amateur Radio Community for a long time—longer than the FCC itself! A staff of six people in Newington is charged with the task of accrediting over 5000 Volunteer Examiners and handling an estimated annual workload of 2000 test sessions generating 30,000 application forms. We appreciate your suggestions for improvements, and hope you will continue to be patient with us if it takes us a little time to make suggested changes.

Meantime, good luck to those of you who plan to take an exam soon—we think you'll have a good experience. Thanks again to the hard-working Volunteer Examiners who make this possible. We'll do our best to keep all of you informed in the coming months.

New Books

THE COMPLETE DX'ER

by Bob Locher, W9KNI. Drawings by Wayne T. Pierce, K3SUK. Published by Idiom Press, P.O. Box 583, Deerfield, IL 60015. Soft-bound, 6 × 12 inches, 187 pages. $10.95 plus $2 postage and handling. Now available from ARRL Hq. for $10.

This book is a must for every ham who wants to work DX. In the author's words, "It is designed to help the reader learn how to attain [DX] success, and get to the DXCC Honor Roll, whether he has just started to chase DX or is already well on his way to the top." I believe the design goal has indeed been met.

Don't expect a book full of charts and graphs of information such as international postal rates and the like. That stuff goes out of date; this book will not. Locher's conversational style is easy to read and understand. You get the feeling of being in his shack sharing a cup of coffee and discussing DX as you tune the band together and he shares his DXing methods.

By the author's own admission, *The Complete DX'er* is written for the CW operator. Locher is well qualified to write this. Elsewhere in this issue, he is shown in first place in the CW-DXCC listing with 319 countries credited to his account. Some of the skills and techniques described apply to phone operation; others do not. But the book is useful to the phone as well as the CW operator.

The book's 24 chapters and an appendix are devoted mostly to operating techniques—techniques that can be described as a DXer's secrets. For DX success, you will need listening skills. Locher devotes three chapters to that very important topic. Getting through the pileups, using a second language and calling CQ are other operating topics. Sure you know how to call CQ, but read what he has to say about happy surprises that may result from a CQ call.

You will find chapters on equipment and accessories, choosing a location and where to find DX information. (Just a reminder: WIAW airs a DX bulletin on Fridays UTC.) Antennas and towers are covered in five pages. That means you can't expect a lot of detail. What you will find is good advice on sound engineering, appropriate hardware and proper installation.

Don't expect to read the book "once over lightly" to understand the concepts Locher presents. You are rightly instructed to read a chapter (two at the most) at one time, taking time to practice before going on. Think about what has been said—consider it from your perspective and from the perspective of the DX station. Look for ways to improve your operating skills. Be patient. The author has packed years of experience into a few pages.

Chapter 21, "Winning, Losing, and Playing the Game" is one of the more important chapters. In it, Locher reveals his philosophy of DX chasing—a healthy philosophy for DX in general and the DXer in particular. Throughout the entire book Locher displays a respect for engineering laws, competition rules and operating ethics.

Will this book be what you need to make it on the DXCC Honor Roll? I'm sure that like chicken soup—it can't hurt!—*Chuck Hutchinson, K8CH*

Whatever Happened to Esperanto?

By Ed Lindberg,* W2CIL

Author W2CIL (left) visiting the QTH of Rudi Bartosch, OE3RU, in northern Austria. On August 5, 1968, Ed and Rudi made what they believe to be the first contact in Esperanto between Europe and North America. *(photo courtesy W2CIL)*

Back in 1924, the ARRL gave some thought to a universal language and decided to recommend Esperanto as the official international language of Amateur Radio. In September of that year, *QST* Editor K. B. Warner suggested that radio amateurs learn the language as a means of developing "a world-wide vehicle of expression."

Hams who come across one of our Esperanto nets today frequently ask, "What is Esperanto?" or, if they have heard of it, "What became of it?" Esperanto never died out. In fact, it has been around for 100 years, and has been used on amateur bands since the early '20s. But it has taken a long time to achieve acceptance among hams.

Intended as a second language to improve understanding and communications among hams worldwide, Esperanto can be learned through self-study. I began studying the language in 1925, from lessons in *Radio News* magazine. I got my amateur license (W8CIL) in 1930, and soon thereafter it occurred to me that the two activities were meant for each other. ARRL SCM John Blum ran a brief mention of my interest in Esperanto in the W-NY Divisional reports in August 1932 *QST*. As a result, I received many letters from other interested hams, with whom I established regular skeds. Other duties and economic demands of the Depression put that activity on hold.

In 1962, my interest in Esperanto surfaced again when I saw an article by W7LLV in a national Esperanto magazine. He was too busy to continue locating other amateurs, so he turned his list (of 8 active hams) over to me. I started sending out a regular bulletin. Some of the group knew of other hams who were interested, and so the numbers grew.

One of the early members was Rudi Bartosch, OE3RU, of northern Austria. A retired professional photographer and an organizer, Rudi urged that we form a group he called ILERA, which in both Esperanto and English stands for International League of Esperanto-speaking Radio Amateurs. The new association was formally organized in Vienna in August 1970. I was honored to chair the meeting, and was elected the first president.

I continued to write and publish the bulletin, *ILERA Bulteno,* for about 20 years. Then I got some help in the form of three other editor-publishers, so we are able to publish four issues per year, one edition from each of four continents. We now have hundreds of members from 25 countries and about 100 additional interested persons on our mailing list.

We also have quite a few "local" nets worldwide, but we don't have a common sked for the whole world because of time differences. The one exception is our annual contest, held on the second weekend in November. Contacts are attempted on any ILERA frequency during the 10 minutes following the hour and half hour from 0000Z Saturday to 0000Z Monday, wholly in Esperanto. This contest sparks interest, but there have been many more informal Esperanto QSOs among members' stations. Among those who have over 1000 contacts in Esperanto are KH6GT, G4MR, F9ED, DJ4PG and F5RC (YL).

The North American Esperanto Net meets every Saturday and Sunday at the following times (EST/EDT) and frequencies:

1-1:15 P.M.	3566 kHz	CW
1:30-1:45	3866 kHz	SSB
2-2:15	7066 kHz	CW
2:30-2:45	7266 kHz	SSB
3-3:15	14,066 kHz	CW
3:30-3:45	14,266 kHz	SSB
4-4:15	21,066 kHz	CW
4:30-4:45	21,266 kHz	SSB
5-5:15	7066 kHz	CW
5:30-5:45	7266 kHz	SSB
6-6:15	3566 kHz	CW
6:30-6:45	3866 kHz	SSB

If you are interested in more information, write to the Esperanto League for North America, Box 1129, El Cerrito, CA 94530. They have language-learning tapes available and a free correspondence course.

I have had a lot of fun using Esperanto on the bands, and have had the opportunity to meet many of my on-the-air contacts in person. During one eyeball QSO in Paris, I said to Andre, F8MD: "I'm glad you speak Esperanto. I doubt if I know 50 words in French." "If you know 50 words you have me beat," he answered. "I'm sure I don't know 50 words in English!"

It's a great experience being able to communicate with other hams worldwide using the common language of Esperanto.

Esperanto in a Nutshell

The language is strictly phonetic: There is only one sound for each letter. Here are some guidelines for learning and using the language.

- Vowels are sounded as in car, men, machine, for, tune.
- Consonants are much the same as in English, and the accent is on the next-to-last syllable.
- Common nouns end in "o"; *arbo* (tree), *anteno* (antenna), *ondo* (wave).
- Adjectives end in "a"; *alta* (high), *bona* (good), *forta* (strong).
- Plurals are formed by adding "j" to the noun (and to the adjective that agrees with the noun): *bona doma* becomes *bonaj domoj* (aj as in "eye," oj as "oy" in boy).

Words are made by adding sounds to root words, so you can build a vocabulary quickly.

- *mal* means opposite: *malbona* (bad) is the opposite of *bona* (good).
- *eg* is an intensifier: *varma* (warm) becomes *varmega* (hot).
- *ar* denotes a collection: *drato* (wire) becomes *drataro* (array of wires).

Here are some Esperanto sentences with their English translation:

- *Mia anteno estas longa kaj alta* (My antenna is long and high).
- *Via signalo estas forta sed fadas* (Your signal is strong but fades).
- *Mia anteno pendas de du altaj arboj* (My antenna hangs from two tall trees).

*113 Maple Dr., Bowmansville, NY 14026

Selling the Amateur Service

Getting government officials to recognize Amateur Radio as a vital part of their emergency-preparedness plans can pay large dividends.

By Jerry Boyd,* KG6LF

Two previous articles in *QST* have focused on the topic of aligning amateur operators with those agencies that provide emergency/disaster response. The purpose of this article is to outline a game plan for selling the involvement of our hobby to government officials. The approach to be suggested herein works! It has resulted in many cities, counties and states officially recognizing and including Amateur Radio as a vital, viable and integral part of emergency plans and operations. Readers are referred to January 1982 and February 1983 *QST* for a review of the basic premises upon which this game plan rests.

The initial approach to any government agency that has not yet approved the involvement of Amateur Radio operators in emergencies should be made by an official or small group of officials representing the American Radio Relay League. The Section Manager and Section Emergency Coordinator should be included in this group. The meeting with the local Disaster Preparedness Coordinator, police chief, sheriff or fire chief should be requested by the League official who will serve as principal spokesperson.

The purpose of the meeting should be clearly stated. "X number of qualified, trained and organized local citizens stand ready to provide, without cost to the government, efficient and effective communications support for public-safety agencies during time of emergency." If the emphasis on *qualified* and *without cost* volunteers does not engender a positive response, most of us in public safety would be very surprised.

A maximum of three ARRL officials should attend, with one as principal spokesperson. Two should be dressed in appropriate business attire consistent with local standards and custom. The third (or second, depending on the number attending) should wear a windbreaker or jumpsuit and cap to typify the response uniform of local amateurs in an emergency or disaster. As noted in previous articles, the response attire should be clean, professional looking and uncluttered, and should contribute to ready identification of the wearer as a competent adjunct to local emergency operations.

Most public service agencies need and want your services.

At the onset of the meeting, the chief ARRL/ARES spokesperson should, after introductions are made, state the purpose for which the meeting was requested and note the resources the spokesperson represents. Example: "As emergency coordinator for XYZ County, I represent 50 qualified Amateur Radio operators, all of whom are trained and equipped to assist your department with supplemental communications during an emergency." Then, directing attention to the amateur attired in the response uniform, a statement similar to the following should be made: "If your Department requests our services, our volunteers can generally arrive within X minutes. They will be clearly identifiable because of this attire. Their vehicles will have this decal displayed, and they will have this type of identification card in their possession." (Display the ARES decal and ARES identification card.)

Next, emphasize the communications capability your group represents. This is best accomplished by having one of the amateurs involved in the meeting equipped with a VHF/UHF hand-held radio ready to activate on a local repeater. Prestaged ARES members should be deployed throughout the geographic area served by the agency official. A brief (1-3 minute) demonstration of the clarity and coverage of ARES communications should be provided. Some research prior to the meeting should disclose areas from which local public-safety communications are marginal. If amateur communications from those same areas are clear and reliable (with the spectrum available to us, that should be possible), the brief demonstration should be persuasive.

Following the demonstration, a brief recap of the formal agreements the ARRL has with various groups, agencies and organizations should be presented. ARRL/ARES is formally associated with FEMA (Federal Emergency Management Agency), APCO (National Association of Public Safety Communications Officers—police, fire, emergency medical), the American National Red Cross, the National Weather Service (through local groups such as SKYWARN), and state, county and local emergency-service providers.

Look to your own state for the primary examples. If you cannot document such alignments within your state, look to adjacent states. In California, for example, ARRL/ARES is now a formal auxiliary of the State of California Office of Emergency Services, the Disaster Preparedness Offices of most counties and many cities.

The next step is to provide the official with whom you are meeting a "call-up tree" of Amateur Radio operators within the jurisdiction. If the call-up list is computer generated and the official can be assured of receiving periodic updates, all the better. A sample policy/procedure for use of ARES personnel, a sample of the ARES identification card and a sample decal would be helpful. If the official is convinced that with minimal expense and effort he/she can capture and retain the services of the group you represent, and if you have already done most of the organizational work, you will soon find yourselves aligned with the agency.

In conclusion, most public-safety agencies need and want your services. Most will be receptive to your "sales pitch" if it follows the game plan suggested in this article. The potential for success is there, but you, as a concerned amateur involved in public-safety support, must be committed to aligning your group with local emergency services. There are no money-back guarantees with this approach, but you'll find that it's successful far more often than not.

Jerry Boyd, KG6LF, who has written many articles on the importance of amateurs' involvement in public service, is Chief of Police in Coronado, California, and an ARRL Public Information Officer for the San Diego Section of the Southwestern Division.

*P.O. Box 1234, Coronado, CA 92118

Happenings

Conducted By Bruce S. Hale, KB1MW
Manager, Regulatory Information Branch

- *ARRL Says No to Cable-Leakage Increase*
- *FCC Opens Door to Federal Preemption*
- *40-Meter Phone-Band Expansion in the Caribbean?*

Automatic Control For All Amateur Stations Above 29.5 MHz?

In an NPRM (Notice of Proposed Rulemaking) in PR Docket 85-105, the Commission proposes to allow automatic control for all amateur stations operating above 29.5 MHz. Computer-based message systems (CBMS) were cited as one of the justifications for this NPRM. Automatic control is defined in Part 97 as "The use of devices and procedures for control so that a control operator does not have to be present at the control point at all times."

In November 1984, the ARRL filed a Petition for Rulemaking (RM 4879) requesting that the FCC authorize automatic control for digital communications above 30 MHz. The ARRL request was very specific, and stated that "the level of amateur experimentation with digital communications has progressed to the point that automatic control of digital communications is both feasible and necessary to facilitate further development of such experimentation." For more on the ARRL request, see the November 20, 1984, issue of the *ARRL Letter* and Happenings, January 1985 *QST*.

The FCC proposes to take the ARRL request a step further and permit automatic control for *all* amateur operation above 29.5 MHz. The Commission states, "We believe that now may be the appropriate time to expand automatic control to all amateur operations, prohibiting its use only in those situations where there is a justifiable reason why automatic control should not be allowed." The FCC proposes to prohibit automatic control operation when a station is transmitting third-party traffic. The Commission states that this prohibition is in accord with Section 97.79(d) of the amateur rules, which specifies that a control operator must always be present when a third party is participating in Amateur Radio communications.

The FCC notes that they do not want to introduce any innovations that would significantly change the character of the Amateur Service. The Commission invites amateurs, particularly those with automatic control experience, to submit comments documenting any problems that may arise from authorizing automatic control for all amateur operations above 29.5 MHz. Comments are due by June 25, 1985, reply comments by July 25. Formal comment requires the filing of an original and five copies to The Secretary, FCC, Washington, DC 20554. Copies of the NPRM are available from ARRL Hq. for an s.a.s.e. with 39 cents postage affixed.

FCC OPENS DOOR TO FEDERAL PREEMPTION

"Despite the strong and traditionally local nature of zoning power, it is our tentative conclusion that the Commission does have the authority to preempt zoning regulations when they act as obstacles to the Federal objective ... It is within our authority to issue guidelines to insure that Federal communications objectives are not frustrated ..."

So saying, the Federal Communications Commission adopted, on March 28, a Notice of Proposed Rulemaking in Docket 85-87, which would establish Federal preemption over satellite receive-only antennas, the "dish antennas" consumers use for home reception of various satellite programming signals. Jurisdiction over the antennas would be preempted by FCC unless the local regulations "... have a direct and tangible relationship to reasonable, valid, demonstrable and clearly articulated health, safety or aesthetic objectives and constitute the least restrictive method available to accomplish such objectives." Comment deadline was May 8, and reply deadline was May 23.

Of course, this rulemaking proceeding does not directly affect amateurs. Indeed, the Commission elected not to consolidate ARRL's request for preemption with that of United Satellite Communications, Inc. (USCI), which led to this docket. Nevertheless, the principles expressed here seem equally applicable to the Amateur Service and bode well for a successful outcome to PRB-1 later this spring.—*Perry Williams, W1UED*

ARRL SAYS NO TO INCREASED CABLE SIGNAL LEAKAGE LEVELS

On March 29, ARRL filed its comments in opposition to an FCC NPRM in Mass Media Docket 85-38. This proposal, if adopted, would delete quality-performance standards for cable television systems and increase permissible signal leakage levels in the 54-216 MHz band.

The League's comments stated that an increase in signal leakage levels would send the wrong message to those cable companies that are not in compliance with the present rules. A 1984 field exercise conducted in Leesburg, Virginia, by representatives of the joint ARRL/NCTA (National Cable Television Association) committee revealed that "Cable leakage is primarily traceable to mechanical failure, sloppy installation, defective connectors and a lack of periodic maintenance schedules, rather than any design inability to maintain leakage levels below 20 microvolts." Additionally, the League pointed out that maximum signal leakage levels for cable systems operating in Canada is *only* 10 microvolts per meter at 3 meters in the 108-174 MHz band. The League thus concluded that the proposed increase in signal-leakage levels is unnecessary and would benefit only those cable companies that are not in compliance with the Commission's present rules.

ARRL is on record with a petition requesting that the FCC ban cable TV operation on amateur frequencies (RM-4040). In dismissing this petition, the FCC placed great faith in the ARRL and NCTA's ability to cooperatively resolve interference problems; however, League comments presented statistical evidence of the joint ARRL/NCTA committee's limited success in resolving complaints of harmful interference. ARRL comments also cited a case wherein an amateur in Georgia was ordered not to operate on amateur VHF frequencies by an FCC field office because of interference from his operations to cable television subscribers in his area.

ARRL's comments take exception to the Commission's analogy of CATV emissions to

RF emissions from Class B computers and other incidental radiation devices covered under Part 15 of the Commission's rules. While computers may be switched off, cable leakage is constant. Computers are "point-source" radiators, while cable systems are distributive in nature. Computers are used indoors where they benefit from the attenuation provided by walls and roofs; cables are often run on telephone poles high above the ground, where there is less attenuation provided by trees and buildings. Emissions from computers do not increase as the equipment ages. As cable systems age and deteriorate, the signal leakage increases.

Copies of ARRL's comments in this proceeding are available from Hq. for a large s.a.s.e. with 56 cents postage affixed. Reply comments were due by May 15, after an extension of time requested by NCTA. —*Katherine Hevener, WB8TDA*

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 has initiated 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.

If you live in one of the following ARRL Sections, your legal experience is especially needed: North and South Dakota, Arkansas, Mississippi, Maine, Rhode Island, Alaska, Idaho, Montana, Nevada, North and South Carolina, West Virginia, Utah and North Florida.

NORTH CAROLINA AMATEURS DEFEAT ZONING ORDINANCE AMENDMENT

Strength in numbers and the power of an organized opposition were recently demonstrated in Fayetteville, North Carolina, when more than 100 amateurs and other concerned citizens turned out to protest a proposed amendment to the zoning ordinance there. The amendment, which was approved by the Cumberland County Joint Planning Board, would have required permits for satellite dishes greater than 42 inches in diameter and limited their placement to rear yards. It would also have prohibited installation of dishes greater than 12 feet in diameter and required that satellite dishes be placed at least 10 feet from lot lines.

Bert VanderClute, N4ERM, who spoke for the Cape Fear Amateur Radio Society, pointed out that some amateur operators use antennas that are very similar to satellite dish antennas, and that amateurs have contributed greatly to technological advances. N4ERM reminded those in attendance of the public service contribution made by Amateur Radio operators in times of crisis, such as the tornadoes that devastated the area a year before. When the Zoning Commission Chairman tried to call time on VanderClute, other amateurs in the audience yielded their speaking time to him so he could continue his presentation. Supporters of the zoning amendment were overwhelmed by the negative response and, when the vote was taken, the measure was defeated 4 to 1.

ARRL REQUESTS EXTENSION IN REPEATER DOCKET

The League has filed for an extension of time to file comments in the repeater coordination Docket, PR Docket 85-22. The ARRL request states that the Board of Directors will be receiving substantial input from amateur constituents on this issue, and that the League cannot prepare substantial, thoughtful Comments that reflect the overall needs of its membership and the amateur community without an in-person meeting of the Board to formulate policy. The next meeting of the ARRL Board of Directors is scheduled for July 25 and 26, after the present comment deadline. The ARRL therefore requested an extension of 45 days, to and including August 15, 1985, in which Comments may be filed in this proceeding.

FCC-LICENSED BROADCAST STATIONS AUTHORIZED 40-METER FREQUENCIES IN THE PACIFIC

FCC has issued a Report and Order in Mass Media Docket 84-706 authorizing the use of the frequency segment 7100-7300 kHz by broadcast stations licensed by the FCC in the Pacific outside ITU Region 2. ITU Region 2 includes North America, South America and Greenland. For more on the original proposal, see Happenings, September and December 1984.

The ARRL filed comments in opposition to this proposal, citing possible interference to amateurs in Region 2, and suggesting that it might be more appropriate to specify hours of frequency use, rather than follow the Commission proposal to limit the radiation patterns of broadcast stations in the Pacific. Far East Broadcasting replied that this would open the way for other international broadcasters not licensed by the FCC to occupy the frequencies during the "quiet periods."

The Commission worked out a compromise in the Report and Order—the new rule has two parts. First, none of the affected stations may operate at any time with antennas oriented toward Region 2. Second, during the hours of 0800 to 1600 UTC, radiation in any easterly direction that would intersect any area in Region 2 shall be limited to at least 12 dB below the maximum radiation in the major lobe for antennas with gains greater than 15 dB, and at least 6 dB below the maximum radiation in the major lobe for antennas with gains of 15 dB or less. ARRL staff is studying the rule to determine just how much protection it will actually afford.

NEW 40-METER PHONE FREQUENCIES IN THE CARIBBEAN?

FCC-licensed amateurs outside the 48 contiguous states may soon be authorized to use phone in the frequency segment 7075 to 7100 kHz. Amateurs in Alaska and Hawaii were already authorized phone privileges in this segment in the Second Report and Order in Docket 82-83, released July 31, 1984. Now, in a Notice of Proposed Rulemaking in Docket 85-104, the FCC proposes to amend Section 97.61 to authorize use of the frequency segment 7075 to 7100 kHz by amateur operators with General class licenses or higher transmitting from any location other than the 48 contiguous states.

This NPRM comes as a result of a petition filed by David Novoa, KP4AM. In his request for these phone privileges, Novoa argued that the Caribbean is now the only area outside the continental U.S. where U.S. amateurs are not authorized to operate phone in the 7075 to 7100 kHz segment. Novoa also claimed that interference from broadcast stations makes the band segment above 7100 kHz almost useless, especially at night. Novoa argued that the use of this frequency segment in the Caribbean would promote international goodwill and would not cause detrimental interference to CW operators in the continental U.S. because of the limited number of potential users.

The Commission received nine comments on the petition, all in support of the request. Many commentors agreed that U.S. amateur phone privileges in the proposed segment would promote international goodwill. Isaac Novoa and the Puerto Rico Amateur Radio Club both suggested that the privileges be limited to Advanced and Amateur Extra Class licensees.

In response to the Petition, and the comments discussed above, the Commission proposes to amend Section 97.61 paragraph (b) subparagraph (1) to read, "The use of A3E and F3E in this band is limited to amateur radio stations transmitting from any location other than the forty-eight contiguous states." The FCC requests comments on this proposal and on the suggestion that the privileges be limited to higher-class licensees. Comments in this proceeding are due by June 17, 1985, replies by July 17. Formal comment requires the filing of an original and five copies, but a single copy will be considered informally. Comments should be sent to: The Secretary, FCC, Washington, DC 20554. Copies of the NPRM are available from ARRL Headquarters for an s.a.s.e. with 56 cents postage affixed.

FCC AMENDS PART 97 AGAIN

More amendments to Part 97 have been made by the FCC. An Order, released March 29, arranges the frequency and emission tables "in more usable formats." Until now, Part 97 has specified the frequencies authorized for most types of amateur use in one place, Section 97.61. RACES and satellite operation were allocated frequencies in separate subparts. The allocations for different classes of license were covered by Section 97.7, where exclusive allocations for Advanced and Amateur Extra Class licensees were listed, with the notation that General class amateurs could use all frequencies *other* than those authorized exclusively to the higher classes of license.

The Order places a detailed list of frequency allocations for each class of license in Section 97.7. The new Section 97.61 specifies the types of emissions authorized for

amateurs, using the new 3-character emission designators adopted at WARC '79. More on the new emission designators appears in Chapter 9 of *The 1985 ARRL Handbook for the Radio Amateur*. Only the format of these Sections is changed; no frequencies are added or deleted, but the new tables take up seven typewritten pages in the Order. The Fourth edition of *The FCC Rule Book* will contain the modified Sections.

The Order also adds the lists of frequencies authorized for repeater, auxiliary and beacon operation to the Sections of Part 97 that give the other rules for these types of operation. This eliminates the confusion caused by referring these Sections to Section 97.61 for the authorized frequencies. Previously, all the authorized frequencies were listed in Section 97.61, and the Order now makes it possible to find more of the Rules that pertain to a particular type of operation in one place in Part 97.

To update your copy of Part 97, add a new paragraph (h) to Section 97.85 to read:

> (h) All amateur frequency bands above 29.5 MHz are available for repeater operation, except 50.0-52.0 MHz, 144.0-144.5 MHz, 145.5-146.0 MHz, 220.00-220.5 MHz, 431.0-433.0 MHz, and 435.0-438.0 MHz. Both the input (receiving) and output (transmitting) frequency of a station in repeater operation shall be frequencies available for repeater operation.

Add a new paragraph (d) to Section 97.86 to read:

> (d) All amateur frequency bands above 220.5 MHz, except 431-433 MHz and 435-438 MHz, are available for auxiliary operation.

Add a new paragraph (e) to Section 97.87 to read:

> (e) The following amateur frequency bands and emissions are available for automatically-controlled beacon operation: 28.20-28.30 MHz, 50.06-50.08 MHz, 144.05-144.06 MHz, 220.05-220.06 MHz, 222.05-222.06 MHz, and 432.07-432.08 MHz using type NØN, A1A, F1B or J2A emissions (when type F1B or J2A emissions are employed in these bands, the radio or audio frequency shift, as appropriate, shall not exceed 1000 Hz). Additionally, all amateur frequency bands above 450 MHz are available for automatically-controlled beacon operation using emission types authorized under Section 97.61, provided that the licensee is authorized to operate on the frequency under Section 97.7.

Subparagraphs (2) and (3) of Section 97.95 are removed and reserved. Subparagraph (3) of paragraph (c) of Section 97.69 is removed and reserved.

QUALITY CONTROL FOR VECs

The FCC is ready to begin a "quality control" program for Volunteer Examiner Coordinators. The Commission will keep track of the percentage of defective applications each VEC forwards to the FCC. The first time a mistake occurs, the FCC will correct it and notify the VEC. The next time, the application will be returned without action. As an FCC official put it, "Every dog is allowed one bite."

Be a Contributor to the Goldwater Scholarship Fund

Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution *now*.

If your contribution is $25 or more, we will list your name and call in *QST*. If your contribution is $100 or more, in addition to your name and call appearing in *QST*, you will receive a signed photograph of the Senator, suitable for display in your ham shack. And for contributions of $1000 or more, in addition to the above, we'll put your photo in *QST*.

We welcome all contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being? Please make your check payable to the ARRL Foundation Goldwater Scholarship Fund, and send to ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent contributors of $25 or more include Kenneth M. Miller, K6IR; Chelsea Communications Club; Mr. & Mrs. Leslie L. Sterling, K7GL; Kenneth I. Orcutt, W1RJP; Rockwell International Manufacturing and Engineering, in memory of Harold Layher, WA0PCC.

NORTH DAKOTA GETS NEW CABLE THEFT BILL

North Dakota has a new "theft of services" bill, and amateurs can thank Mike Mankey, WBØTEE, and Art Ekblad, KØQQ, for specific exemptions for the sale and use of amateur microwave equipment.

When the bill first appeared in January, it proposed stiff penalties for anyone who obtained cable television service by any means without payment to the cable company. The bill also prohibited the sale, import or possession for sale of any equipment designed to decode or descramble cable signals. There was no exemption of any type for amateur microwave equipment, which can sometimes be confused with equipment used to intercept MDS (multipoint distribution service) television signals in the 2150-2160 MHz band. The bill was worded so that interference to a cable system was a Class B misdemeanor carrying a $1000 fine.

Ekblad, the ARRL State Government Liaison for North Dakota, and Mankey, who did the legwork in Bismarck, the state capitol, went to work on the bill with the assistance of W. Dale Clift, WA3NLO, ARRL Executive Associate. In its final form, the bill still provides for penalties up to $10,000 for sale of descrambling equipment, but it now contains an exemption for "the manufacture, importation, distribution, sale, or advertisement for sale, any device plan or kit for a device, or printed circuit, used by federally-licensed amateur radio (ham) operators for amateur radio communications." The words "interferes with" are replaced with "diverts from" in the revised bill, which could now serve as a model for other states wishing to adopt such legislation.

CORONADO, CALIFORNIA, ADOPTS NEW ANTENNA ORDINANCE

At a meeting on March 5, 1985, the City Council of the City of Coronado, California, adopted an antenna and tower ordinance that may be used as a benchmark by other cities in San Diego County. The process began when members of the City Planning Commission proposed an antenna ordinance that, had it been adopted, would have required a $500 Special Use Permit before any amateur antenna could be erected. Following initial comments by local Amateur Radio operators, the City Council refused to pass the proposed ordinance. Instead, the Council directed that a study committee, including several local amateurs, be formed to consider alternatives to the initial proposal.

Over a period of months, John Baker, N6ATV, and Bill Miller, K6DQ, devoted many hours to the process of educating fellow study committee members on the technical aspects of antennas and towers. They dispelled many myths and rumors about Amateur Radio, including those circulating among city hall staff.

The final product, which became local law on March 5, is, in fact, a compromise, but it is far better than the original proposal. Coronado's new ordinance allows antennas/towers up to a height of 66 feet, with only the usual building permits required. Structures in excess of 66 feet are allowed and will require only a "minor" Special Use Permit at a cost of $50 as opposed to the regular $500 fee. N6ATV and K6DQ deserve thanks for a negotiating and education job well done. Without their efforts, what is now an acceptable piece of legislation would have been anything but.

SECTION MANAGER APPOINTMENT

In the Utah Section, James R. Brown, NA7G, has been appointed to complete the term (until June 30, 1985) of Ron Todd, K3FR (resigned).

AIRS UPDATE

The ARRL Interference Reporting System submitted data gathered in February to the FCC on the following signals: 7008 kHz (F1A, F1B emissions, UMS?); 7018 kHz (F1A, A1A emissions, UMS); 7048 kHz (F1A, F1B emissions, UHF3); 7214 kHz (FXX, F3C? emissions, No ID); 14,074 kHz (F1B emission, No ID); 14,080 kHz (A1A emission, C5? RRQ? LNQ?).

The latest AIRS Alerts are for 14,160 and 14,169 kHz.

Correspondence

Conducted By Bruce Kampe, WA1POI
Information Services Assistant

FOR VEs EVERYWHERE

☐ Last weekend, I was a VE at the FCC exams in Wiesbaden, West Germany, and I want to let you know my reactions to my first experience in helping to conduct a test session.

Without a doubt, doing the VE work is one of the most rewarding experiences I have encountered in ham radio. Sure, public service and helping in emergencies, for example, are rewarding, but somehow the "VE feeling" is different. The ARRL is to be commended for setting up a good, solid implementation of the VE program.—*John Oakberg, NK4N/OE3ZOC, Vienna, Austria*

☐ Well, today is a banner day! My ARRL membership arrived in the mail *and* I took the exams for the General ticket, then took the Advanced written and passed that, too!

I realize people do this as a matter of course to advance up the ranks of Amateur Radio, but I did this after being absent from the hobby for 20 years (I'm ex-K1EGB).

I owe it all to the ARRL, without whose assistance I might have struggled through only the Novice ticket. At age 43, the brain is beginning to slow down, so without W1AW code practice, two of your code tapes, the new License Manual plus the 1985 *Handbook* I never would have made it.

I must also congratulate the VE team in Presque Isle, Maine, for putting on a professionally run exam session. It was their first one, and proves that the VE program coupled with the ARRL is a winning situation.

I look forward to receiving my new call and seeing if the rig can raise someone outside the state of Maine. In the meantime, I'm anxiously awaiting the first copy of *QST*. Keep up the great work. 73.—*Jim Andem, Bridgewater, Maine*

MORE ABOUT GROWTH

☐ Some thoughts on the problem of the declining number of teenager hams.

First, the obvious—the average potential adolescent ham nowadays has grown up surrounded by advanced electronics from CB to computers, video recorders to wristwatches that do everything but feed the cat. To them, hands-on contact with a very broad variety of electronics is routine. Granted, ham radio offers much greater variety, but it doesn't seem to be magnetizing them.

Yet, many simple old pleasures, like playing baseball with the gang down at the park, aren't declining so drastically in popularity among today's kids. Evidently pushing buttons and twisting dials to accomplish electronic magic is often less personally satisfying then hitting a home run or even a good base hit. How come?

It seems the League could use the feedback cards shipped with *QST* to find out valuable insight into this problem. Members who got into the game as teenagers could write, as best they could remember, what appealed to them about Amateur Radio. Perhaps strong basic motivations can be identified and correlated with a declining source-of-such-motivations-in-Amateur Radio over the past couple of decades.

I think I understand why some kids with a personality similar to mine when I was a kid aren't quite so magnetized by radio today. For other personality types I can't offer much insight, but when I got licensed at age 12 in 1960, I was a kid with a strong sensitivity for "I" can do that—"I" can build a radio "all by myself" that will let "me" make contact with others. "I" can get a homerun with "my" bat.

Back in those days, some friends of my parents demonstrated CB radio to us. It was interesting, but seeing them operate the commercially made gear just didn't capture my imagination. What had really gotten me hooked at age nine was a picture of a young boy wearing a headset connected to a simple homemade crystal radio with mountains in the distant background. My comprehension was instantaneous—I knew I could wind a coil of wire all by myself, mount it along with some other parts on a piece of wood, string up a wire to a tree and hear voices from the other side of those mountains. It was an irresistible thing to get to the point of finally hearing some sound in the headset—I could show it off to my parents and friends to boot! "Hey, Mom, guess what? I hit a home run! And I did it all by myself!"

Three years later, I had progressed to sending signals from my own homebuilt rig. The absolute thrill of that first contact, the astonishment of grandparents, the praise of the family and the status among my friends was just exactly the kind of food my young ego thrived on. The key to it all was that *I'd done it myself* from raiding old parts out of garbage cans behind TV repair shops to stringing the antenna. I don't believe today's youngster would amaze himself, his parents and his friends all that much by firing up a new storebought appliance and promptly making a DX contact.

When I started as a Novice, there was an unwritten rule that no matter how easily you could afford commercially made gear, you built your first transmitter and, perhaps, even a simple receiver. Only after having made contacts with your own homemade rig were you considered to be truly initiated into the fraternity as a "real" radioman.

I don't for a minute advocate reversing the progress in commercially made rigs. I've operated my share of appliances and will continue to. The modern store-bought "wonderboxes" have their place in the game. But as for selling the appeal that making contacts with such rigs is somehow irresistibly challenging and exciting to today's teenager computer veterans, I doubt it.

Of course, *QST* has kept the game honest through Doug DeMaw's excellent articles and the works of other authors who present simple construction projects for beginners. But in my opinion, and granted I'm long out of my teens, there is something missing in today's beginner's projects. I think today's projects lack appeal in "the way they look." Cold, purely functional and utilitarian, the solid-state projects excite no romantic magnetism at all.

We need to reintroduce the ethic of building your first rig—of rising to the challenge of creating your first signal by your own hands. We need to revive the beauty and wonder of radios constructed from a few simple old parts and much ingenuity. And we need to let the kids know that we are mighty proud of them for having done it all on their own.—*B. N. Ensanian, KI3U, Eldred, Pennsylvania*

MAXCOM RESPONDS

☐ As manufacturer of the Maxcom Antenna Matcher, I feel I must respond to a published letter in your "Technical Correspondence" column by Mort Slavin, K3FGB appearing in your April 1985 issue of *QST*.

Mr. Slavin intimates that the Maxcom Matcher is merely a dummy dipole, consisting of a resistive load at the input of the device. This is not true and would be misleading to your readers.

A report on the Maxcom Matcher appeared in the November 1984 issue of *QST* and your x-ray pictures clearly showed that an intricate ferrite transformer is connected directly to the SO-239 input.

The x-rays also showed resistors in the unit but they are connected to the output of the transformer to create additional R.F. loading, causing more efficiency across the transformer and in addition solving the resonant frequency problem associated with this type of coupling device.

Many thousands of hours were involved in testing various types of ferrite materials, the correct winding program, type of wires, types of insulation, and the proper resistor network that culminated in the 3100 series Maxcom.

As an addendum to your November 1984 article, you might like to know that the 2000 series 2 kW model shown in that issue, I believe, was stolen from our sales office and was one of a few units constructed with dummy circuit boards. These units were to be sent to individuals and firms that we thought might try to violate the epoxy sealant. We have replaced most of these Maxcoms with later series units. Legitimately purchased units do not have dummy circuit boards installed, as your x-ray picture of the 3100 Series 200 Watt model in your November 1984 article also clearly shows, although your reviewer failed to point this out.

If any 2000 Series Matchers are inadvertently in the hands of users we will be happy to exchange them for current production models FREE OF CHARGE.

Please contact our distributor: Magnum Distributors, Inc., 1831 S. Dixie Hwy., Pompano Beach, Florida 33060, tel. 305-785-2002.—*Sonny Irons, President, Maxcom Inc.*

Conducted By Ellen White, W1YL/4
19620 SW 234 St., Homestead, FL 33031

Big-Time Low-Band DXing from Europe

OH1RY's cover letter accompanying these fantastic photos (on his 75-meter 3-element monster array) arrived as winter was departing the U.S. mainland scene. However, if you plan to emulate Pekka's success, you really ought to start building right now!

How Did All This Happen?

It was Spring of 1983, and a group of us were chewing the rag regarding element lengths for a 40-meter beam. This was a hot item. Was it possible that the driver could be longer than 0.5 λ? I have to confess that I became angry and said, "I will make a beam with high-tapered elements and a split-driven element to measure the resonant frequency. You will see that the length will be *over* 0.5 λ!"-The resultant was a 3-element 7-MHz beam with very good characteristics, with the driven element *over* 0.5 λ.

I was encouraged to go a step further (interpret this as one band lower). While I had a full-size, 75-meter 3-element beam on my mind, I also had a strong belief that it would be possible to calculate the dimensions at ground level using the knowledge derived from my 40-meter beam. The calculations for 3800 kHz were: reflector, 43.36 meters; driver, 41.30 meters; director, 39.23 meters. Many of my ham friends said that ½ wavelength on 3800 kHz is 39.50 meters. A driven element of 41.30 meters was impossible. I claimed that tapering of the elements is responsible. I also referred my friends to W2PV's fine article (*Ham Radio*, Dec. 1980). Despite the doubts of my friends, I started the project.

Building the Monster

If you think a 40-meter beam is large, you probably haven't seen an 80-meter array. (My wife was less than thrilled by my constructing the elements in the front yard, making it impossible to do any other kind of work there!)

For the boom, I chose my old 22-meter tower. I first installed the guying supports on the tips and on the center of the boom. All elements are guyed from the top and both sides. The guying point is on the half-element length. The driven element is insulated from the boom with 30-mm-thick PVC plastic bolted to a frame on the boom.

My initial idea was to lift the beam up in "small" pieces (first the boom, then driver and, finally, the parasitic elements). I was wise enough to reject this idea, however, and decided to lift the beam with a mobile crane. The beam was assembled on three trestles in a wheat field. (When constructing this kind of antenna, you have a really big problem because none of the parts can be moved by only one person. It took four men to carry the elements!)

The assembly work went along very nicely; in a couple of days, the neighbors could note and wonder at the huge "spider" on the field. But, troubles began when we were ready to lift the monster up. The summer of '84 had been very rainy, and the field was wet and soft. Only one type of mobile crane was able to handle the job, but it wasn't available at that particular time. The weather became fine, but still no crane. Autumn and the autumn rains came closer. The wheat-field farmer wanted to plow his field. To add to all the anxiety, my wife was a month away from having our baby!

Up It Goes

On September 9, the crane was able to arrive, and the weather conditions were good. It had to be done now! While I was looking at the crane, it occurred to me that it would be very nice to have owned one, for the convenience of lifting any size beams, adjusting the angle of radiation, etc. Even rotating a 160-meter antenna wouldn't be a problem! But, enough of dreams. I awakened rapidly when I had to climb up the tower to bolt the beam to it. The feeling was unique when I stepped onto the boom and let loose the crane hook!

The evening was calm and clear when I looked at the horizon (and nearly *saw* the DX!). The tower had been locked at the base, and the beam was headed toward Japan. I attached the feed line and Q-match to the driver. The biggest screws looked miniscule compared to the 6-inch tubing. After sealing the connections with silicon, I climbed down. The big event became very close!

A New Band Was Found

I thumbed the VFO to 3799 and depressed the PTT. The needle on the Bird clicked to the right. With shaking hands, I turned to the REF position and pushed again. No indication on the meter! Yippee! My calculations had turned out to be right!

Everything looked good. The band sounded quiet—few Europeans and those with weak signals. The beam sounded like a dummy load. I tried a short *"CQ DX."* No reply. A tuning signal and then a *very* loud signal saying "this is JA6IEF over." I was about to fall out of my chair. Was this some nearby amateur joking with me? I answered the call and got a report of 5 9+. It was then I noticed that I was running barefoot!

I had these types of experiences the first few days using the 80-meter beam. It was really amazing. The beam opened up a new band for me: no QRM, just DX stations. During the first six months, my country total increased from 170 to 220 on 80-meter sideband.

The best qualities of the beam show up when I listen to the Far East. European QRM goes down about 25 dB; at the same time, signals from that direction come up about 10 dB. It made DXing very pleasant on this band because listening became so very much better.

I Learned How to Do Antennas

This two-year project taught me at least one thing: If you are making a low-band antenna, don't take the element lengths from a formula! Also, if possible, use a split driven element and Q-match. The formulas are not telling the truth when you have high tapering aluminum elements.

Impedances are also very easy to measure with a cut driven element. If you want to optimize the beam, you first have to tune the driver alone. Then, add the parasitic elements to the system and tune again. The final tuning should be for the best F/B ratio. That can be done with a nearby amateur having a calibrated attenuator in front of his receiver. (You can also measure the

80-Meter DXing

OH1RY bedazzles you with his monster array, featured this month in the lead material to this column. Pekka also has some random thoughts about low-band operating techniques, garnered from six months of sitting on 3795 kHz under the big beam.

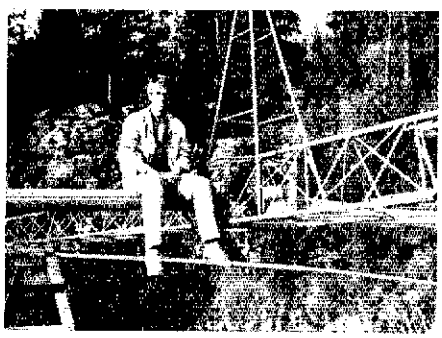
1) Learn more English (for non-English speakers, of course). Even if you are afraid to speak it, it is important that you *understand* it.

2) *Listen* to the DX station. Do what he is saying. Do what he asks! When, for example, he calls for number ones, *only* number ones should come back. In Europe, this doesn't necessarily happen! The reason may well be the inability to understand the language (although I find this hard to believe!).

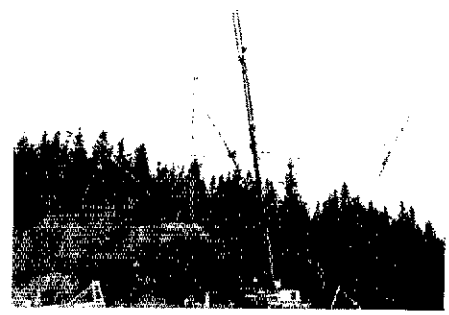
3) The basic truth remains: If you are not reading the station, you cannot work it. (With list operation, this truth sometimes isn't a truth at all these days!).

4) If you're copying the DX station and going to call him do it fast. Many times I've already finished the QSO when someone is still sending his call letters!

5) Re list operation: Don't relay the reports. The minimum requirement for a QSO should be for the station to get his report. Don't you agree?



The driven element of OH1RY's 80-meter monster is more than sufficient to bear his weight. This close-up gives you a real feeling for the dimensions involved!



"Up she goes," said OH1RY, feeling very tiny indeed at this point! (Those with superior eyesight will be able to see *people* at the bottom of the photo.)

impedance, which should be around 18 ohms, if the beam is going to be okay.)

All this tuning and measuring was made with the 40-meter, three-element array by lifting the beam up and down some 24 times! I finally optimized the F/B ratio by moving the driver 0.5 meter toward the reflector. By using these experiences, I calculated the dimensions for 80 meters. They appeared to be right.

Happy Ending

Going back to the time we lifted the beam, and then adding four days, I was in QSO with JAØYMH and had to tell him, "Sorry, I have to QRT now." Only two hours later my wife gave birth to a healthy boy. Perfect timing! For good help and encouragement, many thanks to OHs 1BV 1LW 1LQ 1MA 1NX 1RV 1VK 1XN 1ZZ 3CV 3KM and 3KR, K6SSJ, for good hints and encouragement, and to my wife, who put up with me during this difficult period for her.—*Pekka Kolehmainen, OH1RY*

INTERNATIONAL TRAVEL HOST EXCHANGE PROGRAM

In cooperation with some of its sister societies, ARRL has successfully launched the International Travel Host Exchange (ITHE) program. As of April, about 80 amateurs in 15 countries including 25 states were enrolled, indicating their willingness to promote international goodwill and friendship by helping visitors to their countries.

ARRL has about 200 informational packages to instruct its members how to operate at any place in the world. Each package comprises a general information packet for operating overseas, an information sheet explaining how to be licensed in a particular country and (if available) a specific application form. The information sheet now contains a list of the ITHE participants if there are any in that country.

ARRL also has a form letter to aid foreign amateurs vis-ã-vis the procedures necessary for operating in the United States. Typical questions (with answers supplied by ARRL Hq.) asked by foreign amateurs include: May I operate in the U.S.? (A list of the countries with which a reciprocal-operating agreement exists is furnished.) How do I apply? I'm a U.S. citizen living overseas. Can I obtain a reciprocal permit for operating in the U.S.? How will I identify on the air? What frequencies/power will I be permitted? For how long will my permit be valid? How can I locate American amateurs who would be willing to meet me, let me visit them and possibly accommodate me?

ARRL's Information Services Department is pleased to be of service, and can help you with information on operating both overseas and within the United States. Please enclose an s.a.s.e. with your request.

THE CIRCUIT

☐ **China:** Look for DK7PE from BY1PK 80/40 CW mid-month.

☐ **V2ACW:** KA2DIB/V2A is using this new call on 160-10 meters. Grant now lives on Antigua and continues to use WB4OSN as his QSL Mgr.

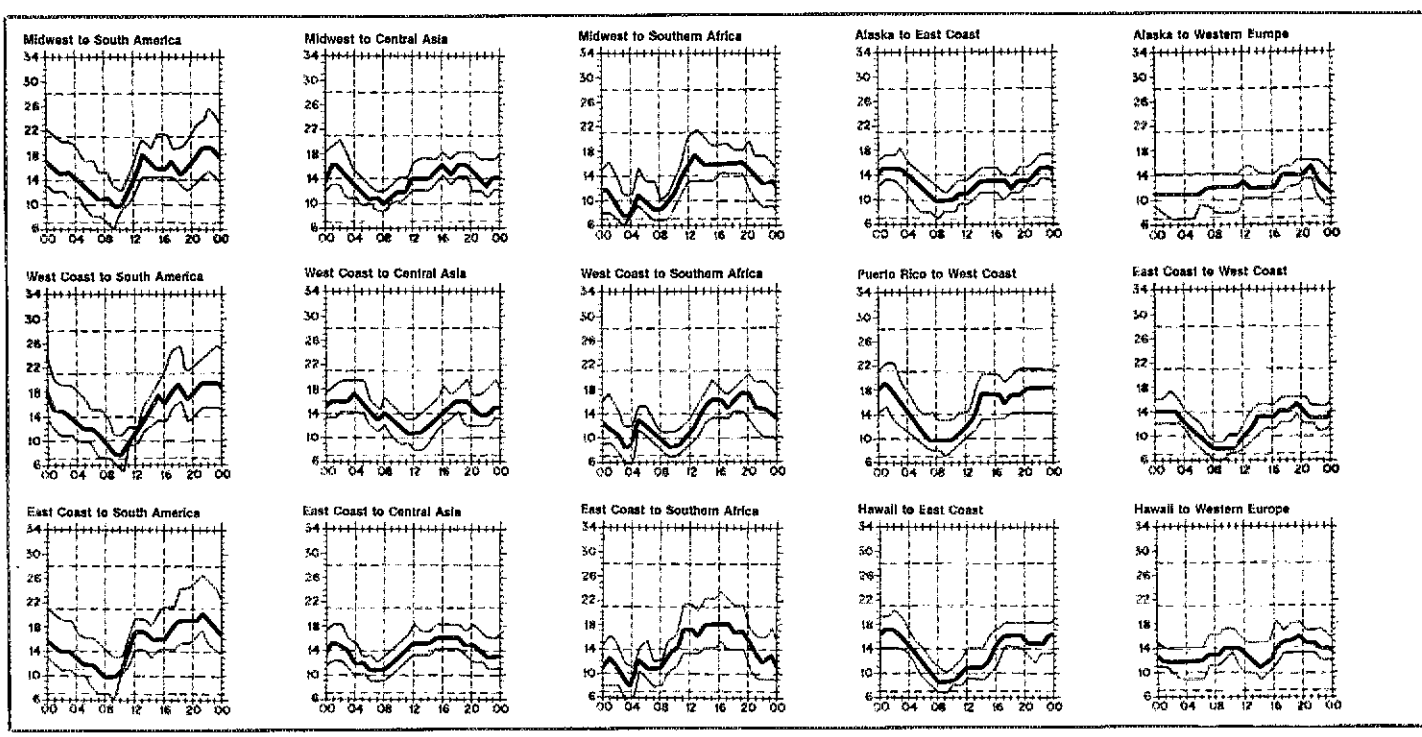
☐ **DXer's Aid:** A "loyal column reader" alerts us to the availability of *The World Factbook*, an annual publication of the Central Intelligence Agency. It is a 274-page book with a page or so of information and maps on each country, from Abu Dhabi to Zimbabwe. At the end of the book are 12 full-color maps of each continent. It is an excellent source of information on each country, great to use while in QSO. The book costs a modest $11 and is available to the public from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20401; Stock Number 041-015-00157-4.

☐ **Call Signs:** From *Carascope* (April) and editor W8ZCQ comes our latest chuckle: "One of the worst things that happened to Amateur Radio was when FCC laid off all those employees. They seem to have scattered all over the world. Some went to work for the Russians and fouled up the Russian calls as they had with the American calls. Others have now gone to work for France. You haven't the foggiest idea where the French stations are located!"

☐ **8J1XPO:** A special station is in operation at the Tsukuba Science Exhibition '85, to run for a half year in Tsukuba, near Mito City, Ibaraki Prefecture, in the equivalent of the JA Silicon Valley. Tsukuba Science City is about 25 miles northwest of Narita Airport (new Tokyo International) and about 30 miles northeast of Tokyo. QSL cards to 8J1XPO go via the JARL bureau. The station will be in operation till mid-September. If you plan to go there and hope to operate the station, take your ham license; any licensed amateur may operate the station without individual authorization by the Japanese government. The station is QRV 80-10 meters, with maximum output of a half kW. Transmissions may be made on CW, sideband, RTTY, FAX and SSTV. Note that the shack is located near Shueisha Pavilion in Block G. Unfortunately, you can't see the large antennas because none are *there!* You remotely control the transmitter several miles away. If you need further information, contact the Japan Amateur Radio League, 1-14-2 Sugamo, Toshima, Tokyo 170, Japan, tel. 03-947-8221, telex 23868 JAPRETAR.

☐ **DX Intelligence:** For an s.a.s.e., *QRZ DX* Editor W5KNE will be happy to furnish you his *DX Intelligence for the New and Born-Again DXer*. This compilation was prepared for last year's Ham-Com DX Forum, and is a handy, concise listing of items you might want to consider for your DX library—periodicals, newsletters, propagation forecasts, nets, record-keeping tips, operating aids, QSL services, etc.

☐ **Club Programs:** The Kansas City DX Club has a number of attractive items to plan an "operating" program around. Why not set up



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

a reservation for your club for the coming season? Shows include: (1) Contest Night Live, a 30-minute VHS parody on contesting; (2) Tonganoxie Island, Country No. 318, a 30-minute parody on DXpedition shows; (3) 1983 V3 operation by the club—slides/audio cassette; (4) 1984 XX9 DXpedition by KØCS and crew—slides/audio cassette; (5) 1983 Pacific Islands DXpeditions by KØCS—slides/audio cassette. To obtain the programs, write to John Chass, WØJLC, Rte. 27, Box 2877, Parkville, MO 64152. If you know of an interesting operating production other clubs might enjoy, why not share it with *QST*'s readership via this column?

☐ **FOØXX:** Operating with a careful flair, the Clipperton group rolled up mega-QSOs the second week in April. In particular, their style of handling the pileups was admirable: clearly identifying, making *very* sure of the station being worked, etc. Cards go via Yasme, Box 2025, Castro Valley, CA 94546. More next issue. ☐

QSL Corner

Administered By Joanna Hushin, KA1IFO

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearinghouses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free, and ARRL membership is not required.

How It Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL-Membership Overseas QSL Service. Members send cards to their outgoing bureau, where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus, where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

Claiming Your QSLs

1) Send a 5- × 7½-in s.a.s.e. to the bureau serving your district.

2) Neatly print your call sign in the upper left-hand corner of the envelope.

3) A preferred way to send envelopes is to affix a 22-cent stamp. If you expect to receive more than 1 oz of cards, please affix postage accordingly.

4) When requesting *any information* from the bureau serving your district, always include an s.a.s.e. for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of six to eight months, or longer, may take place before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- × 7½-in envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of First Class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs is the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade. Please send envelopes with new call, in addition to envelopes with old call. Please put only one call on an envelope.

Do include an s.a.s.e. with any information request to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

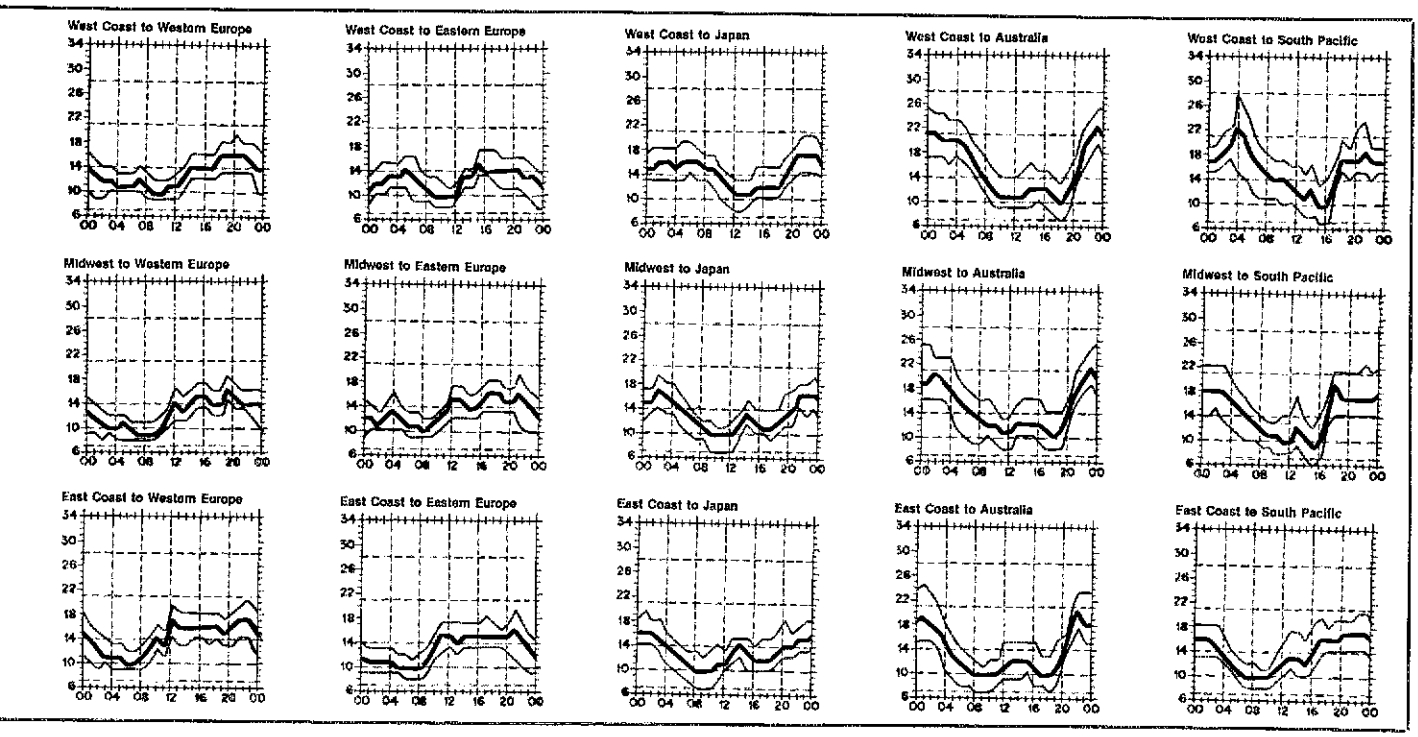
DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QSL Service" in this column in March 1985 *QST.*)

Don't send envelopes to your "portable"

(continued on page 86)



the 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 June 15 to July 15, 1985, assume a sunspot number of 23, which corresponds to a 2800-MHz solar flux of 81.

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 March 1 through March 31, 1985. An s.a.s.e will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

CX4GL/119	G3SWO/128	JE7BEX/160	OH3JG/109	YU1NHG/129	AJ2C/100	K4NTY/105	K7RIE/108	W8KDL/101
DFØDA/116	GM3BQA/333	JH8NQV/110	ON4ABT/100	YU1NR/240	N2BHP/116	KB4MD/102	KA7DNJ/106	N9CIQ/100
DKØUU/109	HB9AQA/308	LA6LX/104	VE7FKZ/103	4X6KA/193	WB2STV/100	WD4CHR/211	N7FAK/125	W9OTE/105
DL2GBM/122	HC1SK/104	LA7QW/112	VK5WO/334	KA1CRP/100	KN3P/246	WD4KQD/103	N8BEF/113	WB9EIE/101
F6DHT/106	JH4ELD/123	OA8CW/101	YCØDNK/108	KA1KWD/102	AA4DO/102	WB5HSB/100	N8BRQ/111	WD9FEN/123
G3KLL/270	JA7DQS/107	OH3BU/156	YO3TU/107	KA2AOT/106	AA4DU/181	N6HYK/104	NI8W/100	WBØERN/101

Radiotelephone

A4XYQ/101	EA5BRE/110	I3ZSX/182	PA3BVU/105	4X6KA/193	K3SEW/258	WA4GOX/119	WB5ZKR/254	W8KDL/101
DJ2BA/113	EA5BYP/131	IV3UT/161	PY4OD/277	KD2GC/103	AA4DU/178	WA4OBR/110	WA5PIE/108	K9FD/144
DKØUU/103	F8HB/EA6/112	JA3FYC/196	SV2UA/108	N2DXQ/106	KB4MD/101	WD4CHR/208	KD7UZ/104	KC9XF/232
EA1ATQ/137	HB9AQA/108	JR4QZH/156	VE3FWQ/200	WA2OYK/100	KF4NO/223	WT4Z/100	N8BEF/112	WD9FEN/120
EA3AEA/281	HB9CFV/102	JE7BEX/156	VK5WO/324	AJ3K/106	N4DDZ/147	KA5GHR/115	N8BRQ/105	WØJM/102
EA4CDZ/218	HK6BDX/178							

CW

DL4NN/104	G4GBG/104	LA6LX/100	OK2PFN/101	KA1T/101	N3DLZ/106	WB5TKO/102	K7DV/117	K9FD/154
DL9XM/101	JA2KPV/128	LU4FDM/109	PY4OD/222	W1WAI/185	K4MF/126	WB5ZKR/213	K7RIE/104	KF9E/240
EA8ZS/105	JA7DQS/105	OH3BU/138	AK1L/182	KN3P/110	NU4B/100	WB6AFJ/103	KC8UR/101	KAØOMX/100
G3SWO/108	JH8NQV/107							

RTTY

W2FXA/100	W4UG/101	AE5H/100						

160 Meters

DJ8FW/102	JA1GTF/107	JA5DQH/100	4X4NJ/101	N1ACH/102	K2VV/100	W2SM/101	K4PI/101	W4MGN/106
DL1RK/100	JA2GQO/103	PA3BFM/104						

5BDXCC

K9VAL	SP9HWN	N8BKF	K9SM	N4OI	I4WZK	N4RI	EA8VV	K4AEB
UA4CDC	F6DYK	RA3EA	W2TA	W4UNP	WB7CLU	KS1L	OE3WWB	PA3AXU
FY7AN	RT5UO	W9CRN	TI2HP	JA8DWR	W1ENE	N9AW	DK6NP	

Endorsement

Mixed

A22ME/158	JR4QZH/158	W1ICV/293	WA3FWA/251	N4DAZ/295	WA4WPN/306	WA5HOD/230	KM7L/138	KC9XF/235
CT4YN/252	OH3RF/251	K1KOB/272	K4AOH/188	N4ENX/197	WA4YOM/292	WA5IGD/300	W7OEV/301	KM9L/296
DJ5GG/289	OH3TQ/303	W1JNN/250	K4LRX/305	N4SR/315	WB4ZNH/309	K6HLR/235	WB7VNY/236	KQ9O/151
DK5JI/270	OZ8WH/230	W1YY/320	K4NYV/304	NF4Z/200	WD4AFY/150	K6XZ/129	AB8K/313	KR9O/304
DL4FL/301	SMØCCM/308	WA1UDH/225	K4SE/308	NG4W/137	WD4LOK/129	N6CR/313	K8AC/254	N9ANR/280
DL7CW/329	VE3CPU/300	K2NJ/310	K4YI/209	NM4L/274	WJ4T/260	N6YI/287	KA8IIC/226	N9BUS/234
F6GXB/274	VE7ZX/256	N2EDF/201	KB4FQ/303	NN4Q/305	WX4A/308	W6CSI/250	KC8CK/200	N9CHN/217
HB9AWS/126	VK2AYK/135	W2ELH/280	KB4IL/299	W4EJH/271	AD5N/333	W6FAY/228	KC8YW/227	N9EAJ/146
HB9BZA/290	XE1XF/277	W2MPI/307	KF4BA/125	W4FNS/263	AI5I/303	W6UZ/272	N8ZA/309	WA9LEY/271
I4EAT/306	YU3AW/310	K3SEW/277	KT4G/305	W4LZW/225	KD5VU/200	WB6DXU/317	W8NPF/318	WA9VGY/305
I4FGG/202	ZS2RM/310	N3CW/215	KX4R/310	W4UCF/153	KV5F/125	WB6OTB/211	W8QID/224	KØVZR/263
IKØCAJ/159	K1JIU/175	W3EEK/209	KZ4Z/138	WA4BEC/303	W5KNE/254	K7SPJ/177	W8UVZ/315	WØCJZ/332
JH1FDP/280	KA1EJ/125	W3KH/291	N4AVV/302	WA4OBO/306	W5LFK/320	KB7HH/252	WD8NBD/286	WØNB/312
JA3FYC/316	KA1X/244	W3SOH/310	N4CID/289	WA4SKE/300				

Radiotelephone

A22ME/153	JA1PCY/309	SV8CS/271	N2LM/310	KD4OM/175	W4JZ/254	WD4AFY/150	K7UT/317	N9BUS/232
CT4RH/251	JA1WSK/312	XE1XF/274	W2ELH/271	KD4RH/228	W4LVM/303	WJ4T/235	KC7TO/295	N9CHN/216
CX2CS/250	JH1EIG/323	YCØDPO/126	W2HTW/190	KE4FW/231	W4PKM/278	K5CTG/264	KM7L/132	W9HJ/315
DF4PL/279	JA3GM/315	YU1NR/231	W2IJB/306	KE4VU/217	W4RNZ/295	K5TGE/277	W7EDA/285	W9LNQ/294
DJ5JH/300	JE6WVT/153	ZP5RS/270	W2MPI/306	KT4G/303	W4UNP/297	KB5KA/202	W7OEV/279	WA9VGY/300
DL6QW/310	JA7PL/312	AJ1L/278	W2SM/296	N4AVV/299	W4WMQ/306	KE5KK/222	WA7KNK/304	WB9EBO/315
EA5AYD/178	JAØGZZ/310	K1IK/308	WA2JUN/306	N4BYU/294	WA4BEC/302	W5LFK/302	WB7VNY/221	WD9FOE/275
F6GXB/250	LA9TCA/226	K1KOB/248	WA2POW/150	N4CID/286	WA4BRM/125	K6EDA/305	KB8KW/305	KØCL/279
G3KLL/270	LU2AH/312	W1AB/270	WB2SZH/290	N4ENX/193	WA4CNZ/283	N6CR/313	KJ8G/307	KØIFL/305
I1HAG/312	LU3AJW/311	W1ICV/293	N3UN/310	N4JF/315	WA4OBO/300	W6OMR/311	W8UVZ/289	KØVZR/261
IV3VER/307	LU7MAJ/293	W1DOH/210	W3WFM/200	N4NX/313	WA4PLR/298	WA6OGW/313	K9VTD/123	NØDWU/151
I4CSP/271	OE3KTA/293	W1JNN/217	AA4M/290	N4SR/312	WA4UNZ/254	WA6TLA/229	KD9CN/158	NAØY/336
I5ZGQ/306	PY4VX/317	W1KSZ/307	K4BVQ/332	N4ZC/322	WA4YOM/272	WB6RSE/280	KD9EB/178	WØCD/316
I6GAS/275	PY5OC/270	W1MGP/151	K4MEZ/319	NA4M/316	WB4JLO/300	WD6AFC/182	KM9L/292	WØNB/288
IC8EGO/309	PY5WD/307	W1QJI/125	K4SE/305	NN4Q/300	WB4QNP/312	WD6EAW/155	KR9O/303	WØRAO/294
JA1FNA/316	SM6VR/324	W1RR/310	KB4FQ/302	NO4N/204	WB4ZIM/267	K7SPJ/175	N9ANR/277	WBØCIW/304
JA1GTF/305	SV1MO/184	K2NJ/265	KB4QR/155					

CW

DJ1XP/294	JA1FNA/290	JA5PUL/267	SMØCCM/265	WA1ZIC/130	AF3E/149	NO4N/133	KB7HH/237	K9GX/271
DL1ES/256	JA1GTF/305	JA7PL/280	AK1E/126	AG2C/125	K4SE/299	W4LVM/271	W7EDA/277	KM9L/248
DL6QW/255	JA1HGY/273	JAØZO/297	K1IK/266	K2NJ/231	N4JF/276	WB4STU/180	W7IUV/295	KR9O/226
F6GXB/232	JH1EIG/282	OH3RF/226	K1SA/269	K2OWE/260	N4JJ/271	K5KR/285	KJ8G/228	W9LNQ/269
G4IJW/152	JA3ARM/151	OK1MG/294	W1AB/280	W2ELH/149	N4KG/299	W5OB/222	W8GKM/263	W9PEL/156
I4EAT/210	JA3BQE/301	PT2ACZ/205	W1KSZ/270	W2HN/225	N4MM/304	W5VGX/160	W8UVZ/304	KØVZR/126
IT9GLJ/203	JA3GM/300	PY5WD/294	W1LQQ/266	W2LZX/288	N4RI/243	K6HLR/191	WA8YTM/174	WØNB/265
JA1BWA/305	JA4LXY/282	SM5CCT/151	W1RR/271	W2SM/301	NN4Q/281	K7ZR/293		

160 Meters

N4JJ/139								

DXCC Honor Roll

Administered by Don Search, W3AZD

The DXCC Honor Roll is comprised of those call signs that have been credited with at least 306 of the 315 current countries on the DXCC list. Total DXCC credits given, including deleted countries, are shown after each call sign. The large, boldface numbers indicate total DXCC credits not including deleted countries.

Mixed

315

DJ1XP/337
DJ2BW/358
DJ7ZG/342
DL1BO/357
DL1HH/350
DL1JW/353
DL1KB/361
DL3BK/353
DL3RK/358
DL6EN/356
DL7AA/362
DL7AP/354
DL7EN/357
DL7FT/342
DL7HU/350
DL8NU/337
DL9OH/352
F9RM/350
G3AAE/360
G3FKM/358
G3FXB/358
G3HCT/352
GI3IVJ/355
GM3ITN/349
GW3AHN/360
HB9DX/348
HB9MQ/358
HB9PL/350
HB9TL/357
I2KMG/341
IT9TAI/357
IT9ZGY/356
IØAMU/359
JA1BKJ/348
JA1BRK/344
JA1MCU/337
JA4ZA/342
LU4DMG/356
LU5DO/355
LU6DJX/365
OE1ER/363
OE1LO/345
OH2BC/342
OH2BH/343
OH2BZ/342
OH2QQ/353
OH2QV/346
OH4NS/341
OH5UQ/341
OK1ADM/346
OK1FF/359
ON4DM/357
ON4NC/361
ON4QJ/344
OZ3Y/355
PAØLOU/353
PY1HX/354
PY2BKO/341
PY2CK/364
PY2PA/342
PY2PE/342
PT7YS/351
SM3BIZ/358
SM7ANB/351
SMØAJU/353
VE3MJ/339
VE5RU/353
ZS6LW/354
4X4DK/359
4X4FQ/347
4X4JU/356
W1AA/354
W1AFF/347
W1AXA/357
W1BIH/364
W1CKA/351
W1DGJ/346
W1DK/359
W1FZ/359
W1GKK/367
W1HH/352
W1HX/361
W1HZ/359
W1JNV/356
W1JR/357
W1NU/355
W1OO/340
W1UU/347
K2BK/355
K2BS/342
K2BZT/358
K2FB/348
K2FL/357
K2LWR/355
K2MUB/338
K2PXX/345
K2TQC/348
K2YLM/341
W2AG/361
W2AGW/365
W2AO/358
W2AYJ/359
W2BHM/354
W2BMK/352
W2BOK/357
W2BXA/365
W2CP/346
W2FXA/353
W2FZY/354
W2GK/342
W2GKZ/343
W2GT/359
W2HTI/357
W2HZ/337
W2JVU/362
W2LPE/358
W2LV/360
W2NC/341
W2OKM/359
W2QHH/361
W2QM/356
W2SSC/357
W2TP/350
W2TQC/354
W2UE/356
W2YY/349
WA2DIG/350
K3GL/359
K3II/355
K3MO/354
W3AFM/354
W3CWG/357
W3DJZ/347
W3EVW/361
W3GH/356
W3GRS/353
W3MP/363
K4CEB/335
K4DJ/338
K4EZ/347
K4ID/343
K4IKR/339
K4JC/346
K4KQ/359
K4LNM/355
K4PDV/358
K4RPK/349
K4XO/334
K4YR/357
K4YYL/341
N4EA/337
N4JF/336
N4SU/362
W4AAV/362
W4AIT/364
W4BBP/347
W4BFR/349
W4BQY/363
W4DR/357
W4EEE/357
W4EX/365
W4GD/361
W4IF/352
W4MGN/349
W4NL/336
W4OM/362
W4QM/348
W4QQN/342
W4SSU/348
W4UG/343
W4VQ/345
W4WV/352
W4YJ/361
W4ZD/351
K5FJ/353
K5LIL/335
K5YY/338
KE5CK/347
W5AQ/352
W5HE/342
W5HJA/349
W5IO/359
W5KC/364
W5LCI/351
W5NUT/354
W5PQA/359
W5QK/352
W5RDA/347
K6DC/359
K6EV/347
K6GA/349
K6JG/341
K6KII/353
K6LGF/353
K6OJ/363
K6RF/349
K6RN/349
K6RQ/351
K6WR/346
K6YRA/341
K6ZM/346
K6ZO/365
N6AR/345
N6AV/342
N6CW/338
N6FX/348
N6GM/344
W6AM/366
W6BZE/361
W6CF/342
W6EE/362
W6EL/346
W6EUF/340
W6ET/353
W6FW/345
W6ISQ/348
W6KG/352
W6KNH/336
W6KZL/357
W6ONZ/352
W6PT/358
W6QNM/350
W6REH/347
W6RGG/341
W6RJ/344
W6RT/358
W6YA/346
W6YK/358
W6ZM/351
W6ZO/362
WA6OET/340
W7AQB/353
W7CB/335
W7CG/357
W7DX/349
W7GN/357
W7IR/360
W7KH/364
W7MB/365
W7OF/358
W7PHO/359
W7QK/354
K8DR/352
K8DYZ/341
K8FF/345
K8FL/342
K8QHG/345
K8ONV/349
KD8VM/358
W8AH/357
W8BF/362
W8CUT/348
W8DMD/362
W8GT/364
W8GZ/364
W8JBI/359
W8JIN/365
W8KPU/357
W8LKH/360
W8MPW/359
W8NGO/357
W8OK/352
W8PHZ/356
W8PR/343
W8QY/354
W8RSW/342
W8RT/359
W8ZOQ/354
K9AB/354
K9ECE/350
K9RJ/338
W9CH/348
W9DWQ/354
W9DY/353
W9GIL/358
W9JUV/359
W9NDA/364
W9RCJ/353
W9SFR/356
W9ZM/364
WØAIH/356
WØAX/362
WØBW/362
WØDU/363
WØELA/364
WØLWG/352
WØMLY/362
WØPGI/357
WØQGI/357
WØSYK/359

314

DJ5DA/341
DJ5JH/334
DJ6RX/335
DJ9KQ/341
DL1CF/344
DL7HZ/346
F3AT/351
F8RU/334
F9GL/347
F9IE/336
G2FSP/351
G3JAG/335
G3KMA/314
G4CP/361
G5VT/359
HB9MX/350
I1ZL/352
I8AA/338
I8KDB/353
JA1BN/345
JA1BWA/340
JA1DM/354
JA1IBX/339
JA1JRK/333
JA1MIN/337
JA2JW/350
JA8ADQ/338
JA8ZO/336
LA1KI/339
LA9CE/335
OH2NB/361
OK1MP/345
OK3MM/354
OZ1LO/337
OZ6MI/334
PY1APS/336
PY3CB/335
SM3CXS/335
SM5BBC/334
SM5BHW/337
SM5CZY/314
SM6AFH/335
SM6CKS/336
SM6CWK/337
SM6DHU/334
SP7HT/337
UA1CK/345
VE2NV/357
VE7GI/363
VE7IG/335
VE7SV/339
VK4QM/363
YU2DX/335
YU3EY/333
YV5ANF/345
ZL1AJU/346
ZL1AV/341
ZL1HY/364
ZL3IS/353
ZS6RM/352
K1DFC/335
K1DRN/338
K1RM/335
K1YZW/338
KA1QY/353
N1XX/339
W1MIJ/347
W1OT/332
W1SD/346
W1WY/352
W1YRC/334
K2CL/335
K2JMY/342
K2LE/340
W2AX/355
W2CR/357
W2GC/354
W2GW/358
W2NUT/356
W2PN/341
W2VJN/343
W2XN/354
K3KP/339
K3RS/331
AA4MM/335
AA4S/330
K4AIM/350
K4CIA/340
K4DY/336
K4MQG/344
K4MZU/337
N4PN/325
N4WW/336
W4DRK/345
W4EO/354
W4GTS/336
W4HR/350
W4JVU/338
W4NKI/338
W4OO/350
WA4WIP/339
WB4OSS/333
K5DX/356
K5RC/337
W5GO/353
W5IR/334
W5KGX/356
W5MMK/361
W5SJ/335
W5UN/354
WA5IEV/334
K6EC/354
K6PU/342
K6QH/340
W6BA/359
W6BS/357
W6BSY/356
W6BVM/354
W6CHV/359
W6FSJ/356
W6GMF/348
W6GR/337
W6HYG/352
W6KH/352
W6KUT/359
W6QL/338
W6RKP/355
W6TZD/360
WA6GFE/339
K7ABV/338
N7EB/352
N7RO/329
W7CMO/350
W7DY/339
W7JYZ/348
W7LDC/358
K8EJ/339
W8ARH/343
W8DCH/337
W8QFR/334
W8YGR/344
K9CJK/339
K9KA/334
K9MM/334
K9PPY/332
K9RA/333
N9AB/332
W9AQ/340
W9BW/344
W9DC/337
W9FKC/359
W9GU/350
W9HB/354
W9KNI/346
W9KQD/338
W9LT/347
W9RKP/356
W9TKD/349
W9ZR/332
W9ZRX/333
WØDEI/351
WØSD/334

313

CT2AK/333
DJ2AA/346
DJ7CX/340
DJ7CY/339
DL1DC/351
DL8CM/347
F5II/334
G2FYT/349
G5RP/340
HB9AHA/335
HB9IK/342
I2LAG/332
I5FLN/330
I8JX/333
JA1AAT/333
JA1FHK/334
JA1MJ/336
JA1UQP/332
JA2AN/333
JA3DY/347
JA4AFT/331
JA8JL/335
JA8MS/330
KP4RK/349
LA8LF/342
OE1FT/349
OE8RT/334
OH2VB/334
OH3SR/333
OK2RZ/332
ON4IZ/344
ON4UN/335
ON5KL/331
ON8XA/334
PY1HQ/354
PY2DFR/333
SM1CXE/340
SM5FC/331
SM6AOU/343
SM6CVX/332
SM6EOC/330
VE2WA/347
VE3BX/337
VE3CTX/330
VE3GMT/333
VE3HD/352
VE3NE/336
VE3WT/340
VE3WW/336
VE7AAQ/350
XE1AE/348
YS1O/353
YU7BCD/342
YV5AIP/348
Z24JS/335
ZL1ARY/338
ZL4BO/346
ZS6IW/345
4X4NJ/332
K1NA/338
W1KG/325
W1NG/331
W1RLQ/346
W1SP/348
K2CM/332
W2FG/336
W2GLF/352
W2JB/324
W2MJ/349
W2PPG/334
K3NL/331
K3ZR/330
W3AP/330
W3GG/331
AE4X/351
K4FJ/341
K4HJE/333
K4KG/341
K4RA/328
K4SM/357
K4SMX/327
N4MM/335
N4TO/338
N4ZC/336
W4AXR/353
W4BAA/355
W4BRE/337
W4EEU/340
W4FX/349
W4JD/329
W4ORT/334
W4VPD/354
W4XR/332
K5OS/331
K5UC/359
K5UR/333
N5AR/342
N5RR/333
W5AL/358
W5EJT/344
W5MQ/332
W5MUG/335
W5NW/356
W5OB/349
W5QOU/341
W5TO/338
K6KA/334
K6MA/342
K6OZL/332
K6XP/332
N6UC/332
W6FET/336
W6FF/352
W6HFL/344
W6KYJ/336
W6MUR/351
W6SC/339
W6SQP/355
W6YB/340
W6YO/337
K7KG/334
W7ADS/357
W7AO/354
W7CNL/325
W7CSW/345
W7ETZ/329
W7JFO/333
W7RV/336
K8IFF/333
K8MFO/335
W8CNL/333
W8GKM/332
W8JQ/339
W8TA/331
W8YA/331
W8ZET/344
WB8EUN/331
W9BM/350
W9HLY/346
W9RN/328
W9TKV/354
W9WY/331
W9YSX/351
KØCD/348
KØGVB/331
KØIEA/328
WØGKL/350
WØPAH/335
WØUD/335
WØZV/347
WAØOAH/333

312

DJ2TI/325
DJ4PI/332
DJ9UJ/326
DK3PO/332
DK5PR/325
DL3OH/334
DL3ZI/346
DL8FL/329
EA3NC/333
EI8H/329
G3LQP/330
G3UML/336
HB9KB/351
I1APQ/328
I1RBJ/334
IV3PPK/332
I7HH/329
I7WL/332
I8YRK/335
JA1ADN/344
JA1ELY/324
JA1EOD/332
JA1OCA/331
JA2AAQ/333
JA3BQE/327
KH6CD/360
KV4FZ/332
OE3WWB/328
OZ3PO/339
OZ8BZ/330
PY1DH/346
PT2BW/328
PY2ELV/331
PY4OD/348
PY5ATL/328
SM2EKM/328
SM5API/334
SM6AEK/337
SM7DMN/323
SM7EXE/330
VE3AAZ/350
VE3BWY/350
VE3GCO/332
VE4OX/340
VE7BD/326
YO3AC/331
YO3JU/333
YU1EXY/330
YU4HA/340
YV5BZ/346
ZS6YQ/347
4Z4DX/321
K1BW/328
K1KI/325
W1AB/343
W1AX/360
W1DA/326
W1GX/335
W1JZ/332
W1PM/352
K2AGZ/334
K2BT/332
K2SHZ/349

K2VV/327
W2FP/332
W2IRV/353
W2SAW/354
W2VUF/335
W2ZZ/333
WA2CBB/334
K3HPG/331
W3AC/339
W3LB/330
W3LPL/332
W3XM/337
WA3HUP/333
AB4H/328
K4ISV/336
K4LSP/326
K4MPE/337
K4XG/332
N4CC/327
N4KE/325
N4KG/333
N4SA/328
N4WF/332
N4XO/344
W4AVY/349
W4FLA/327
W4FPW/330
W4OEL/335
W4ZR/343
WA4QBX/327
K5AAD/341
K5BZU/325
N5AU/328
N5DX/336
W5DOZ/317
W5FFW/353
W5GJ/345
W5JW/334
W5MMD/357
W5UR/344
K6CH/356
K6DT/340
K6EXO/336
K6OJO/328
N6AW/330
N6EA/350
W6AE/330
W6BJH/327
W6ERS/342
W6GC/328
W6ID/357
W6LQC/329
W6MI/338
W6SN/351
W6TWZ/345
W6UQQ/350
W6XI/331
K7NN/329
N7NG/336
W7BGH/347
W7KR/342
W7LFA/332
W7OM/333
K8LJG/325
W8BKP/351
W8KR/335
W8RCM/333
W8ZD/344
K9AWK/335
K9GM/331
K9RF/327
N9AF/334
N9ZN/343
W9HJ/347
W9NA/348
W9OA/337
W9RF/331
W9WM/343
WA9NUQ/335
AJØX/334
KØBS/330
KØBUR/334
WØBN/342
WØCD/331
WØWW/340

311

DJ4AX/336
DJ5AI/328
DJ5LA/338
DJ5VQ/339
DJ6TK/329
DJ8MKA/326
DJ9RQ/320
EA1BC/347
F5VU/327
G3KDB/327
G3HTA/333
G3JEC/334
I2VGU/323
I4MKN/330
I5ARS/342
I7ZPB/343
JA1CRR/333
JA1GTF/327
JA1IFP/331
JA1JAN/329
JH1GZE/322
JA2ADH/331
JA2JKV/330
JA3APL/330
JA3BG/335
JA3EMU/324
JA3GM/324
JA3MNP/323
JA4BJO/338
JA7AD/347
JA7HZ/325
JA8EAT/323
JA8KB/327
LA3XI/322
LA5HE/348
OE2EGL/333
OK1MG/338
OK1TA/331
ON4PA/348
ON5KD/329
OZ7YY/323
PY2CQ/338
PY2SO/338
PP5UG/334
PY7ZZ/323
SM3RL/328
SM5AQB/335
SM5DQC/327
UB5WF/350
YV5BBU/334
KINJE/327
K2LGJ/335
N2SS/330
W2LNB/340
W2MZV/337
W2SUA/331
WB2YQH/329
K3AV/343
K3TUP/328
W3EYF/343
W3PVZ/332
WA3ATP/333
WA3IKK/331
K4BBF/331
K4EWG/330
KE4I/329
N4XX/329
W4AUH/331
W4KN/342
W4MJ/356
W4WG/329
WA4CXZ/320
K5GO/328
K5VT/322
KD5RP/330
W5LZZ/335
K6AO/337
K6LEB/340
K6XT/325
N6MU/326
W6JZU/327
W6KPC/336
W6KZS/339
W6PN/339
W6QNA/346
W6UY/326
W6XP/327
W6ZYC/329
W7EKM/325
W7ORH/329
W7TE/325
WA7BEV/329
K8CH/330
K8PYD/328
K8RA/325
K8ZR/322
KN8Z/330
N8DX/331
W8DA/346
W8ILC/333
W8QWI/334
K9JF/329
W9AZP/342
W9PN/343
KØYRX/328
NØRR/325
WØBL/332
WØBTD/349

310

DJ6KH/325
DK3SF/320
DK9FB/325
DL1PM/339
DL6MK/341
DL7BK/345
F2BS/338
F2IU/334
G3IOR/345
G3RCA/316
G3RUX/326
G3ZAY/323
GI3OQR/339
GM3BQA/333
I2DEZ/330
I2LLD/322
I2ZZZ/325
I3VRV/325
JA1NRH/317
JA1ZZ/335
JH1EIG/329
JH1IFS/324
JA2AH/328
JA2AIR/331
JA2BHG/330
JA2HNP/330
JA3CMD/319
JA4CQS/320
JA4RF/323
JA6BSM/326
JA7MA/330
JA8BMK/322
KH6IJ/355
LA7JO/319
LA8CJ/318
OE1FF/347
OE1UZ/333
OH2BAD/330
OH2BCV/325
OH2BGD/327
OH2LU/325
OH8SR/326
ON5NT/324
OZ8SS/347
PAØFX/355
PAØTAU/338
SM4EAC/329
SM6CST/325
SMØCCE/350
SMØKV/351
SP6RT/330
UB5WE/324
UR2AR/347
VE1KG/331
VE3FRA/320
VK3YLJ/347
YO3JW/320
YU1AM/326
YU1DZ/319
YV5DFI/326
ZL1AMO/332
ZS4MG/338
K1JO/326
K1TN/322
W1FJ/339
W1JBW/334
W1KGH/333
W1RR/321
K2KGB/329
K2OF/328
K2UU/324
KM2P/328
KY2Q/336
N2AP/325
W2AZX/342
W2SM/322
WB2HXD/336
WB2NYM/328
K3SGE/329
K3UA/319
W3BTX/324
W3SO/328
AB4D/330
AA4CJ/324
K4AUL/331
K4BVQ/343
K4UEE/323
K4YT/325
N4RA/326
N4UH/333
W4PZV/329
W4YN/338
W4YV/329
WA4JTI/319
K5GH/325
K5JW/330
W5EDX/331
W5GC/343
W5HDS/348
W5JC/337
K6IR/325
K6SVL/326
K6XW/338
KD6PY/322
N6ET/330
N6QR/322
N6RJ/325
W6BFW/336
W6BYH/337
W6DN/326
W6HX/359
W6MUM/335
W6OMR/328
W6YHT/328
W6YMV/341
WA6DUG/332
K7AA/331
W7EDA/328
W7KSG/329
W7LLC/346
K8CW/327
K8IP/333
K8RWL/328
K8ST/325
N8AA/332
W8AD/328
W8CFG/328
W8DAW/359
W8EWS/359
K9BG/318
K9FN/324
K9KU/323
K9SM/340
W9EB/341
W9GRF/342
W9HZ/342
W9SS/325
W9TKR/331
KØAB/338
KØALL/322
WØHZ/340
WØIZ/327
WØMYN/329
WØPT/340
WØSR/322

309

DJ8FW/319
DL6KG/331
DL6QW/330
F9YZ/328
G3GIQ/335
G3SJH/321
HB9AMO/323
I1RB/340
I5UA/349
I7TGT/320
JA1DFQ/332
JA1GO/321
JA1GV/332
JA1HGY/325
JA1PCY/319
JA1PNA/321
JF1PJK/321
JA2KLT/326
JA3AAW/332
JA3AQ/328
JA3HZT/321
JA7BJS/317
JA8AYN/325
JA8BIO/323
JA8DNZ/318
JA8IXM/318
JA9BJ/329
LA1K/342
OZ5DX/332
SM3EVR/317
SM4DHF/324
SM5CAK/331
SM6CMU/320
SM7ASN/330
SM7BBV/321
SM7BIP/327
UA9VB/341
VE4SK/326
XE1KS/329
YU1DD/320
K1CC/321
K1HS/317
K1UO/316
W1AM/325
W1FTX/343
W1GG/332
W1HGA/329
W1LQQ/331
WA1AER/318
K2KER/333
K2XA/323
KM2V/326
N2LM/332
W2GA/325
W2IYX/321
W2LL/342
W2LZX/317
W2RS/323
W2SY/327
W2YD/326
AF3E/322
K3NN/322
K3WS/321
N3II/321
W3CGS/353
W3EKN/333
W3VRT/319
K4AFR/319
K4AEB/321
K4CEF/328
K4IR/328
K4LTA/331
K4MG/324
K4RD/320
K4RZ/320
K4XP/317
N4WB/324
W4NNH/347
W4OTX/328
W4XJ/337
WA4DRU/326
WA4FFW/328
WR4K/324
K5AQ/330
K5JM/320
K5KLA/320
K5LM/326
K5OR/318
K5RJ/325
N5NW/335
W5NO/345
K6PZ/326
N6MG/322
W6EJJ/332
W6TC/324
W6TXL/341
W6US/322
WB6APX/325
W7NCO/331
W7XA/323
AC8K/322
K8NN/319
W8GS/318
W8ZCK/338
K9IL/319
K9XJ/323
W9DE/325
W9HK/345
W9KB/328
W9NGA/321
W9RY/323
WA9WJE/326
WB9EBO/325
WØTJ/353

308

DJ3NW/318
DJ8CR/325
DK3GI/325
DK3KD/314
DL3ZA/331
DL7NB/322
EA4MY/319
F6BWJ/315
G2BOZ/351
G3ALI/326
G3TOE/320
HB9AHL/319
I2PJA/319
I3EVK/331
JA1HYF/324
JA1OYY/317
JH1QOJ/321
JA2MGE/319
JA4LXY/318
JA5EN/325
JA5PUL/315
JA6BVU/319
JA7GLB/318
JA7ZF/321
JA8CDT/320
JA9CXA/322
OH2BR/330
OZ4RT/340
PY2TM/317
PY5WD/316
SM5AZU/337
SM7QY/351
SP9AI/323
SP9PT/326
T77C/312
UWØMF/316
VE1YX/317
VE3CVZ/321
VE7HP/324
YS1RRD/320
YU2CBM/319
YU4TU/316
K1MEM/320
K1ST/315
W1ELR/344
W1EOA/327
W1ER/327
W1GDQ/324
W1GL/323
W1NHJ/339
W1OHA/336
W1QJR/343
K2AGJ/324
K2DSV/324
K2LQ/319
K2NY/325
K2SB/327
W2BAI/324
W2MIG/320
W2REH/325
K3ND/320
N3ED/327
W3TV/341
W3ZN/325
K4EEK/327
K4GLA/328
K4PI/318
K4TO/324
K4XH/324
K4XI/321
N4JJ/319
N4OM/315
W4BYU/351
W4CPZ/328
W4FDA/330
W4GXB/354
W4VZB/327
W4WD/331
W4YA/327
WB4QNP/322
K5KX/325
K5OA/322
K5YCP/322
N5OK/319
N5UD/320
W5SP/326
W5ZWX/326
K6AC/315
K6CBL/318
K6JAD/321
K6LQA/326
K6UD/318
N6DX/340
N6JV/319
N6MM/322
N6OC/314
NS6C/318
W6PLK/338
WA6WZO/316
K7OXB/321
K7RLS/319
KG8V/325
KJ8G/316
W8BE/332
AB9E/311
K9AJ/320
K9BWQ/321
K9QVB/314
N9MM/320
W9FD/347
W9GB/341
W9GW/327
KØIF/327
NAØY/345
KØLUZ/319
WØGKE/324
WØOQK/332

307

DJ1CG/326
DK3FD/318
DK8NG/315
DL1RB/316
DL1YD/319
DL8UI/321
F2VX/322
FY7AN/313
G2DMR/328
G3DOG/330
G4DYO/313
HB9AIJ/325
HB9AQW/321
HB9MO/346
HB9RX/324
HKØBKX/322
IØDUD/314
JA1AG/344
JA1FNA/320
JA1WSK/318
JK1OPL/320
JR1FYS/315
JA2JSF/318
JA6CNL/320
JA7EHU/326
JA7PL/318
JA8FKO/314
JA8XJF/314
JA9AA/338
OE6MKG/319
PY2BW/324
SM6CTQ/318
SM6DYK/313
SM6VR/333
VE3LGQ/338
VE5YA/316
VE6VM/317
YU2YM/313
YV5AHR/334
YV5BX/346
YV5CWO/320
ZL4AW/320
9H4G/320
K1BV/326
K1IK/316
K1SA/312
K1ZSI/327
W1GME/343
W1IAS/348
W1JJ/313
W1UN/324
W1VV/320
WA1EOT/315
K2UO/314
K2UR/333
K2UVU/343
N2OO/316
W2PSU/321
WA2JBV/328
K3FN/314
N3UN/315
W3YX/321
AA4V/320
K4GJD/319
K4II/334
K4KC/334
K4UTE/326
K4ZYU/323
KN4B/316
N4NX/316
N4OL/321
N4VZ/317
N4WJ/321
NA4M/320
W4CZU/316
W4DHZ/343
W4LVM/318
W4OWJ/338
WW4E/316
WB4NDX/317
K5KR/316
K5NW/318
N5EA/324
W5CKT/337
W5GEL/348
W5IRG/318
W5ROI/330
W5XJ/325
AA6G/314
K6AAW/320
K6AXC/319
K6JR/328
K6LM/312
K6LU/339
K6RK/320
N6AN/328
N6HR/328
W6ABA/335
W6GPB/354
W6VBI/325
K7LAY/315
K7UR/322
W7IYW/320
W7JYX/339
WB7ABK/336
K8RD/315
K8TL/329
K8VUR/333
W8KCJ/323
WA8PYL/322
AI9J/336
K9CT/321
K9OTB/335
KB9EZ/322
W9DH/336
W9LNQ/333
W9VNE/327
KØCL/320
WAØKDI/327

306

DK4BW/315
DL1LD/332
DL7SY/312
F6DCQ/313
F6DHB/311
G3MCS/322
I2VDX/316
IT9PUG/316
JA1CJF/324
JH1CJQ/325
JA2APA/314
JA2DJH/317
JA3BXF/319
JA4FHE/319
JA6EYD/317
JA6GXP/315
JA6HUG/311
JA7FS/323
JR7TEQ/312
JAØGZZ/315
JAØSZ/327
KH6CF/315
LA5UF/323
LA5YJ/317
OE7UDH/329
OH6RA/334
ON6HE/310
OZ7JZ/324
OZ7OP/324
SM4CTT/314
SP3DOI/326
UK2BAS/313
VE3II/315
VE7DP/315
YO4WU/318
YU2TW/317
K1MM/316
K1ZZ/318
N1GL/330
W1BR/325
K2UFM/320
KZ2I/318
W2GZZ/336
W2MP/321
W2QK/336
W2QL/314
WA2JUN/310
WB2AIO/318
WB2QMU/318
AE3T/321
K3KA/311
N3US/314
W3CV/340
W3GOH/310
W3NF/313
W3PN/342
AE4Z/316
AA4A/321
K4XU/336
KA4S/315
N4HH/314
N4NO/326
W4RIM/322
W4RJC/321
WB4RUA/313
WB4TDH/314
K5VNJ/313
N5FW/314
N5UR/318
W5DL/338
W5DV/318
W5FT/348
W5IJW/322
W5UP/323
W5VJP/316
W5VT/323
W5ZPA/312
K6SMF/317
K6WC/321
N6ND/315
N6VR/318
NN6R/316
W6JRY/321
WA6OGW/315
K7BR/321
K7SP/315
K7UT/318
K7ZR/325
N7US/317
W7DQ/317
W7EOI/319
W7IUV/312
W7LZF/325
K8NA/314
K8NW/312
KK8J/324
N8TN/322
W8CT/335
W8ELE/325
W8HN/340
K9HMB/315
K9IUF/328
K9PQG/321
K9UWA/316
W9AMM/323
W9EQP/317
W9FR/320
W9IU/345
W9LF/317
KØZZ/315
WØAUB/339
WØNVZ/344
WØWP/314
WAØTKJ/317

Phone

315

CT1BH/332
DJ2BW/351
DL6EN/354
DL9OH/352
F9RM/350
G3FKM/354
IØAMU/359
IØZV/347
LU4DMG/356
ON4DH/356
ON4DM/357
OZ3Y/348
PY2CK/363
PY2PA/342
PY2PE/342
PY4TK/356
TI2HP/363
VE3MJ/339
VE3MR/343
VE3QA/355
VE5RU/352
ZS6LW/353
4X4JU/352
4X4DK/359
W1AA/354
W1AFF/347
W1DGJ/346
W1FZ/352
W1HX/353
W1JFG/356
W1JWX/339
W1ONK/356
K2BZT/351
K2FL/348
KS2I/340
W2BXA/363
W2HTI/356
W2OKM/357
W2TP/347
W2YY/344
W3CWG/355
W3DHM/355
W3DKZ/346
W3GH/350
K4JC/342
W4DR/353
W4EEE/357
W4EX/363
W4UG/342
W4UWC/343
W4YJ/358
KSYY/337
W5ACE/354
W5IO/358
W5JWM/351
W5LZW/348
W5PQA/355
K6WR/346
W6AM/364
W6EUF/339
W6GVM/362
W6KNH/336
W6REH/343
W6ZM/346
KW7DX/345
W7GN/347
W7PHO/359
K8DYZ/341
K8VUR/331
KD8VM/357
W8AH/357
W8BF/362
W8GZ/364
K9ECE/349
W9RNX/356
W9WHM/358
W9ZM/352
WØBW/356
WØCM/358
WØMLY/353
WØPGI/347

314

DJ7ZG/341
DL1KB/352
EA4JL/334
F8RU/334
G5VT/359
HB9TL/355
I2KMG/338
I4ZSQ/334
I5WT/342
I6FLD/346
I8AA/338
I8KDB/353
JA1BK/345
LU9DAH/351
OK1ADM/340
ON4SZ/353
PY2PC/338
PY4KL/347
SM5CZY/343
VK5MS/359
VK6RU/362
YV5ABF/345
ZL1HY/363
ZP5CF/356
K1DRN/338
W1CKA/342
K2JMY/342
W2LV/350
W2YYL/345
W3AZD/343
W3JK/338
W3MP/340
AA4MM/335
K4AIM/350
K4HEF/359
K4YYL/338
W4LMX/350
W4NKI/338
W4PDL/349
WA4WIP/339
K5DX/351
W5KGX/352
W5SZ/338
K6CCY/344
K6YRA/340
W6BAF/350
W6EL/343
W6FW/343
W6GR/337
W6HYG/348
W6KTE/342
W6RGG/338
W6RKP/349
W7JYZ/348
K8CFU/347
W8MPW/349
W9DWQ/343
W9JT/339
W9NDA/359
W9NZM/344
W9SFR/346
WØGAA/343

313

DL7FT/340
DL7HU/346
EA2HX/343
EA4LH/333
EA8JJ/331
F5II/334
F9IE/334
G3NLY/337
G3TJW/330
GI3IVJ/351
HB9AAA/333
I2LAG/332
I4LCK/331
I5FLN/330
I5TDJ/342
IT9GAI/335
JA1BRK/336
JA1JRK/331
JA1MIN/336
JA4ZA/338
OA4OS/333
OE1LO/340
ON4UN/335
ON5KL/327
ON8XA/334
OZ3SK/344
PY3BXW/333
SM5FC/331
SM6CKS/335
VE3GMT/333
VE3WW/336
XE1AE/348
YV1KZ/332
YV5AIP/348
ZL3NS/339
ZS6RM/346
W1GKK/350
W1ICU/333
W1SP/347
W2GK/339
W2GLF/352
W2NUT/341
WB2VEG/330
W3EVW/345
K4HJE/333
K4MQG/339
W4DPS/333
W4EPZ/336
W4JVU/337
W4MGN/339
W4OM/354
W4QAW/333
W4SKO/353
K5UC/354
W5HE/337
W5MQ/332
W5UAW/335
WA5IEV/333
K6JG/336
K6LGF/348
N6AR/337
N6UC/332
W6CHV/351
W6HFL/344
W6KOE/332
W6PT/343
W6ZKM/335
W7ADS/352
W7CMO/341
W7JFO/333
K8DR/337
W8CUO/343
W8JIN/353
W8JTD/334
W8ZET/344
K9AB/336
K9KA/332
K9LKA/335
W9DC/333
W9HPS/341
WØGKL/349
WØQGI/345
WØSFU/338
WAØOAH/333

312

DJ1XP/326
DJ9ZB/327
DK2BL/330
EA4DO/334
F2MO/341
F3DJ/346
G3UML/336
F9GL/341
I1APQ/328
I1RBJ/334
IV3PRK/332
I7HH/329
IT9JT/334
IT9ZGY/341
IØJX/332
JA1BN/334
JA1IBX/335
JA8ADQ/332
OE3WWB/328
KH6BB/336
OH3SR/332
OK1MP/338
OZ3PZ/326
PAØHBO/353
PT7YS/348
SM3BIZ/354
SMØAJU/339
VE3WT/338
VK4QM/347
YO3JU/333
YS1O/345
YV5AJK/345
YV5AXQ/340
ZL1AAS/327
ZS6JM/353
6W1DY/331
W1FXD/332
W1MMV/354
K2BS/339
W2FGD/338
W2GKZ/339
W2QWS/341
W2XN/348
W3GG/328
K4JRB/341
N4WF/332
W4BRE/334
W4SSU/342
W4ZR/343
K5UR/330
K6GA/332
N6NA/341
W6BSY/349
W6CCB/330
W6ISQ/338
W6LQC/329
WA6AHF/331
W7EPA/338
W7KR/341
W7LFA/332
W7UPF/333
W8GKM/331
K9MM/332
W9BW/336
W9TKD/337
W9YSX/349
W9ZR/328
WA9NUQ/335
AJØX/334
KØBS/330
KØCD/330

311

CT1FL/331
DJ8NKA/326
DJØUJ/325
DK6XR/319
DL8FL/327
DL8NU/333
F5VU/327
F6AOI/329
G3JEC/334
G5AFA/329
IX1BGJ/328
I2LPA/327
I2VGU/323
I2YBC/322
I7SCA/335
I8YRK/334
JA1ADN/336
JA1ELY/322
JA1EOD/331
JA1UQP/330
JA2ADH/331
JA2JW/337
JA3BQE/325
JA4AFT/328
LA8LF/336
LU3YU/W4/321
PY2CYK/335
PY2ED/329
PY3CB/331
SM5BHW/331
VE3GCO/331
VE7WJ/322
VO1CU/322
YV5BBU/334
ZL1ARY/330
ZL3QN/329
ZS6YQ/345
W1SEB/331
K2TQC/323
W2FP/328
W3XM/336
K4BBF/331
K4LSP/325
K4PDV/340
K4PQV/327
N4MM/331
N4WW/329
KJ5OS/329
K5OVC/330
W5LZZ/335
K6EC/333
K6OJO/327
N6AW/329
W6ARJ/331
W6KUT/341
W6KPC/335
W6XP/327
K7NN/328
N7RO/325
W7EZ/325
W7QK/335
K8IFF/331
K8LJG/324
W8CNL/328
W8VHY/331
W9LQ/333
KØBUR/333
KØEPE/333
WØCSZ/340
WØYDB/328

310

CT1RM/321
DJ4PT/327
DJ9RQ/319
DK9KX/317
DL1HH/335
DL9DY/331
EA3NC/326
F2BS/336
F9MD/338
G3ZBA/327
GM3BQA/333
HB9AHA/330
I1GEA/326
I2AT/333
I3VRV/325
IØMPF/318
JA1AAT/330
JA1MCU/326
JA1OCA/327
JA2AAQ/331
JA7HZ/324
KH6OR/346
KV4FZ/328
LA3XI/321
OE2EGL/332
ON5NT/324
PY2BU/325
PP5UG/333
SM4EAC/329
SM5DQC/326
SM6EOC/326
UB5WF/333
VE3BX/326
VE3CTX/330
VE3NE/332
VE7AAQ/331
YV5DFI/326
W1DNZ/326
W1NG/323
K2KGB/326
N2SS/329
W2MPK/326
W2SUA/329
W2VO/325
W3RX/330
WA3ATP/331
WA3IKK/330
K4IKR/333
K4XO/328
KE4I/327
N4KE/323
N4KG/321
W4EEU/335
W4VQ/324
WA4CXZ/319
WA4MMO/323
W5GC/343
W5HJA/343
W5QOU/334
W5RNG/337
W5UR/331
K6IR/325
K6SVL/326
W6YMV/340
W7EKM/324
KN8Z/329
W8COG/327
W8KST/333
WA8AJI/337
WB8EUN/327
N9AF/331
W9SS/325
WØMYN/329

309

EA1IY/325
F6AJA/325
G3KMA/327
G3RCA/315
G3SJH/321
I1RB/340
I1YG/324
I2SLA/325
I5UA/349
I7TGT/320
I8JN/323
JA1BWA/326
JA1JAN/325
JH1IFS/323
JA2AH/326
JA3APL/327
JA3MNP/321
JA6BSM/324
JA7MA/329
KP4CL/338
LU1BR/323
OZ5EV/319
PY2DSC/327
PY5GA/326
UA1CK/340
UB5WE/323
XE1KS/329
ZL1AV/326
K1NJE/325
K1QMV/326
W1DO/329
W1HGA/329
WA1AER/318
K2UU/323
KM2V/325
W2FXA/332
W3AC/335
K4FJ/331
W4OTX/328
K5GH/324
K5JEA/342
W5SJ/330
W5TIX/333
W6KZS/331
W6YB/331
WA6RTA/326
WA7DRP/321
W8JXM/330
K9RF/323
W9GU/326
W9LA/329
W9ZRX/328
NØRR/320

308

DJ2YI/348
DJ6VM/325
DK3HL/319
DK3PO/328
DK3SF/317
DL1JW/336
DL6KG/328
EA7GF/339
G3TOE/320
I1UW/323
I2ZGC/316
I3ADI/323
JA1OYY/317
JH1GZE/319
JA3CMD/316
JA9BJ/327
LA5HE/343
PY2TM/312
SM2EKM/324
SM5AZU/334
SM6AEK/329
UW4NH/311
VE1YX/317
VE3MC/317
VK6LK/325
VK6HD/327
XE3EB/327
YS1RRD/320
K1LHT/326
K1RAW/320
K1UO/315
KM2P/325
W2IYX/320
WB2NYM/326
K4MG/323
K4SM/344
K4XG/324
K4YT/323
W4AVY/330
W4BBL/330
WB4OSS/325
K5JW/328
N5AN/320
W5JJA/338
NS6C/318
WA6WZO/316
K8PYD/324
K8SQE/321
K8ZR/319
W8CFG/325
W8ILC/328
K9BWQ/321
W9DNE/329
W9BEK/336
W9HB/346

307

CT1UE/324
D4CBS/324
DJ5LA/333
DJ5VQ/324
DL7AA/343
DL8KS/317
EA4JF/324
EA7IR/328
F5JA/321
I2BOX/322
I2PJA/317
IØDUD/314
IØOLK/327
JA7JH/322
JA8BIO/321
JA8ZO/325
KP4CK/334
LA1ZI/322
LA8CJ/314
OK2RZ/322
PT2BW/321
YV5AHR/334
YV5CWO/320
9H4G/320
K1CMI/317
W1JJ/313
W1LQQ/322
W1SD/333
K2YLM/332
W2FG/329
W2GBC/331
WA2VEG/325
WB2HXD/333
W3AP/317
W3FWD/338
K4AEB/319
K4GJD/319
N4CC/320
N4XX/324
W4AXR/337
W4NYN/335
W4PZV/326
WA4JTI/315
WB4NDX/317
K5OA/321
W5EDX/328
W5RO/330
K6DT/320
K6JAD/320
K6JR/328
N6OC/313
W6AXH/320
W6KON/323
W6UY/322
W7JYX/339
K8LZ/319
W8NGO/345
W8NXF/332
K9FN/320
W9AMM/322
W9HZ/337
W9ILW/338
WØQLX/322

306

EA3OJ/319
EA8LD/311
F5OK/310
G3ZAY/319
G4DYO/312
I1FNX/312
I2DEZ/326
I8ACB/313
I8SAT/316
JF1PJK/317
JA2APA/314
JA5PUL/313
JA7GLB/316
JA8BAR/319
JA8IXM/314
JA8XJF/313
OA4JR/323
UR2AR/335
UWØMF/314
XE1J/321
K1MM/313
K2GPL/321
K2UO/313
W2QK/333
K3SGE/324
KB3PJ/319
K4KC/332
K4XH/322
W4BFR/323
WA4OPW/320
WA4QBX/321
W5RRK/325
W5VJP/316
K6AXC/318
K6EXO/330
W6GTL/319
K6XJ/321
W6ZYC/323
K7IRO/317
W7DQ/317
W7EOI/319
W7KH/339
K8NN/316
W8GMF/336
K9DXO/317
K9HMB/314
W9BVX/343
W9KQD/318
WØSR/317

CW

311

W9KNI/319

309

K2TQC/313
K6GA/316

308

DL6EN/314
N4WW/316
K9MM/314

307

K3FN/312
W8AH/313

306

ON5NT/311
W1DA/312
K2FL/311
K4PI/312
K5VT/311

305

DL8AN/310
PY2TM/309
W1NG/309
AA6AA/307
W6PT/312
K9QVB/309

304

DJ2BW/310
JA1JRK/312
JA3FYC/309
OZ1LO/310
OZ7BW/308
SM3EVR/310
K4XO/308
N4RJ/310
K5UR/310
K8MFO/309

303

JA1MCU/309
SMØAJU/309
TG9NX/306
WA6TLA/308
W9DWQ/308
W9ZM/308
WØWP/308

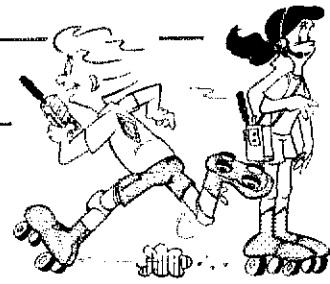
302

JA1ELY/308
K1MM/306
K2UO/306
K8DYZ/305
W9BW/307
NØRR/307

301

F3AT/306
JR1FYS/305
JA8EAT/306
JA8JU/306
K1MEM/305
W2FP/306
W4VQ/306
N4NX/305
N5JR/305
K8CW/306
K8WW/305
K9AJ/306
W9SFR/305
W9ZR/305

Making Waves



Conducted By Scott Springate, N7DDM
2095 Broadview, Eugene, OR 97404

HAM FAMILIES

Families are a wonderful way to enter the exciting realm of Amateur Radio. Working together can inspire the young members as well as the older ones to new heights. As a family you can bounce ideas off each other and straighten out problems that could only be corrected as a team. But perhaps the best thing about a family is that the other members will always be there to encourage you and answer any questions you may have. Such is the case for three families that have sent us their stories.

A Family Affair

There is a family in Orange City, Florida, that fits the "ham family" description. It started with Mr. Willard Bryan, Jr., becoming interested in Amateur Radio and having one of his daughters, Josephine, help him learn his code and theory. After he got his Novice license, he coaxed Josephine into getting hers, which she did in February of 1983. Having two hams in the family stirred up more interest, and soon Josephine's mother was off to get her Novice ticket, but ended up leaving with her Technician. They all wanted to go further, and after much studying, Mr. and Mrs. Bryan and Josephine upgraded to their Generals. At the same time, Josephine's sister, Mary, got her first ticket, also a General.

Does your family fit the description of the Bryan "ham family" of Orange City, Florida? Left to right are N4JSY, AA4CU, N4JLZ and N4JSX. Two brothers have yet to get their tickets, but the hams are working on it.

Mr. Bryan's call is AA4CU; Mrs. Bryan's call is N4JSX; Josephine's call is N4JSV; and Mary's call is N4JLZ. But the story may not end there. Josephine has two brothers who have yet to get their tickets, but if they ever want to try, there will be plenty of family members eager to help them.

Father and Son ... and Mom

Sometimes, with the help of a family, a person is more likely to excel than someone who does not have the help and encouragement a family provides. The following story illustrates this point.

In the city of Beloit, Ohio, Larry Hillier, N8EWV, helped his son, 9-year-old Alan, to earn his Novice ticket. Alan's call, KA8RQY, was heard all across the country as he worked toward his WAS on CW. After only 10 weeks as a Novice, Mr. Hillier flew Alan to New York's field office in Buffalo, where he passed his General exam and gained the call N8EZO.

Studying along with Alan was his 13-year-old cousin, Eric Zines, who was recently upgraded to Advanced class and the call KD8IZ. Alan's sister, Diana, N4IYN, who is away at college, keeps in touch with her family via ham radio. Alan's mother, Patti, became inspired along with the rest of the family and added another ticket to the collection. This time it was a Technician and call N8FVU.

Aside from ham radio, Alan is currently active in scouting, basketball and football. His early start in Amateur Radio will also pave the way for a fulfilling hobby for the rest of his life.

Four Generations

It is not unusual for a young ham to have gotten a start in the hobby from a parent or even an aunt, uncle or cousin. But how often is it that the tradition of ham radio is passed through *four* generations?

There is a ham in Menasha, Wisconsin, who has had the hobby passed all the way down from his great-grandfather. This ham is Brian Burger, KA9SNP, age 10. His great-grandfather, Samuel Levelle, was a ham before Ws were used in call signs! He carried the calls 1CC and 2EO. Mr. Levelle passed the hobby to his daughter and her husband, Brian's grandparents. His grandmother is no longer a ham, but his grandfather is. His call is W1SE, and he is an Extra. From there it was passed on to Brian's mother, aunt and uncle. His mother and aunt have let their tickets lapse, but his uncle is still active and holds a General class ticket with the call K3QAF. With all of those hams in the family it's no wonder Brian got bitten by the ham radio bug!

Brian's equipment reflects his past. His rig is a Heathkit HW-16 once used by his grandfather. But once away from the radio, Brian likes playing soccer and his electric guitar, and programming his MC-10 computer. Will Brian carry on the "tradition" and help raise a *fifth*-generation ham? Judging from past history, we'd have to say, "Why not!"

Fourth-generation ham Brian Burger, KA9SNP, operates a rig once used by his grandfather.

Strays

I would like to get in touch with...

☐ other hams paralyzed from a spinal cord injury. Mel Klimas, KA9RXI, 4449 S. Sawyer Ave., Chicago, IL 60632.

☐ radio amateurs who are also Legionnaires. Orval Wright, W7YAI, 890 S. Peach Ave., Hurricane, UT 84737.

☐ any amateur who was a radioman aboard the *USS Joseph T. Dickman* in WW II. G. T. Karalow, W4JBD, 660 Americana Dr., Annapolis, MD 21403.

☐ other CCW enthusiasts interested in setting up a sked. Bill deCarle, VE3OBE, 235 Baythorn Dr., Apt. 301, Thornhill, ON L3T 3V6, Canada.

☐ any middle and high school teachers interested in participating in a student net. Charles Traynor, KA4YZY, 415 Parkdale Dr., Apt. 3A, Charleston, SC 29407.

☐ former members of the U.S. Army Special Engineer Detachment, Los Alamos, New Mexico, 1944-1946. Robert P. Hunter, W3GA, 225 Circle Dr., State College, PA 16801.

☐ anyone who does not own a television. G. Robbie Cave, KA5UZJ, P.O. Box 928, Princeton, TX 75077-0928.

☐ amateurs involved in an astronomy net. Robert Grubic, NC6Q, 14893 Marigold Ave., Gardena, CA 90249.

***QST* congratulates...**

☐ the following radio amateurs on receiving the 1984 IEEE Centennial Medal:

- Clayton Clark, AV7O, of Logan, Utah
- Arthur S. Westneat, W1AM, of Newmarket, New Hampshire

☐ John D. Kraus, W8JK, of Delaware, Ohio, on being named outstanding man of the month by the Columbus Section IEEE.

☐ Lt. Col. Leroy V. Swift, KNØY, on his retirement from the Kansas City, Missouri, Police Department.

☐ Frank M. Koval, W8RSW, of Cincinnati, Ohio, on being inducted into the Greater Cincinnati Amateur Radio Hall of Fame.

Conducted By Bob Atkins, KA1GT
103 Division Ave., Millington, NJ 07946

24-GHz Path Loss

Propagation at 24 GHz is different from that at lower frequencies because there is significant attenuation of signals due to absorption of energy by both oxygen and water vapor. Absorption due to oxygen rises slowly from a value of 0.004 dB/km at 1 GHz to 0.03 dB/km at 30 GHz. Above 30 GHz, there is a sharp peak at 60 GHz, where attenuation rises to 15 dB/km. At 24 GHz, attenuation by atmospheric oxygen is approximately 0.0235 dB/km at a barometric pressure of 760-mm Hg and a temperature of 20 °C.

Absorption due to water vapor is considerably higher than that due to oxygen at 24 GHz; in fact, 24 GHz is close to a peak in the water spectrum. At a water concentration of 10 g/m^3 (corresponding to 54% relative humidity at 20 °C), attenuation is approximately 0.175 dB/km. Attenuation due to water vapor is a strong function of temperature and humidity, as can be seen from Fig. 1. Over a long path of several hundred kilometers, there can be a difference of as much as 100 dB in path loss between a hot, humid day and a cold, dry day. Thus, there is an additional element involved in planning DX contacts on 24 GHz: Not only must the path be considered, but weather may also play an important part in making a contact.

As an example, consider a pair of stations on 24 GHz using 10-mW Gunnplexers and 2-ft parabolic dish antennas. What is the maximum path they can work? First, assumptions must be made about the equipment. A noise figure of 13 dB will be assumed for the receivers with an IF bandwidth of 100 kHz—typical values for a wideband FM system with no image frequency rejection. A 13-dB noise figure corresponds to a noise temperature of about 5500 K, which, combined with a 100-kHz receiver bandwidth, leads to a receiver sensitivity of around −141 dBW. (For details on how this calculation is performed, see *The 1985 ARRL Handbook*, p. 12-2, and The New Frontier, *QST*, Dec. 1980, p. 74.) Assuming the parabolic antennas are 50% efficient, they will show a gain of 40.7 dB. A 10-mW transmitter has a power output of −20 dBW. For a wideband FM system, let's assume that a received signal-to-noise ratio of 10 dB will be required for a readable signal. It follows that the path loss for a successful contact is given by

$$\text{Path loss} < \text{Tp} + \text{G} - \text{Rs} - \text{SNR} \quad \text{(Eq. 1)}$$

where
Tp is the transmitter power
G is the combined antenna gains
Rs is the receiver sensitivity
SNR is the minimum signal-to-noise ratio required

In this case, a path-loss capability of about 192 dB is indicated for the equipment discussed above. If there were no atmospheric absorption, this would give a path capability of almost 4000 km line of sight (if such a path could be found!). Note that free-space path loss is given by

$$\text{F. S. Path Loss} = 32.45 + 20 \log f + 20 \log d \quad \text{(Eq. 2)}$$

where
f is the frequency in megahertz
d is the path length in kilometers

When atmospheric absorption if taken into account, the range of the equipment is considerably reduced. Take, for example, conditions of 20 °C and 50% relative humidity. From Fig. 1, it can be seen that this corresponds to about 0.165-dB/km attenuation due to water vapor and 0.0235 dB/km due to oxygen. With a path loss capability of 192 dB, this gives a range of about 150 km. At this range, the free-space path loss is 164 dB, the loss due to water vapor attenuation is 24.75 dB and the loss due to oxygen attenuation is 3.5 dB—giving a total of 192.25 dB. Quite a difference from the 4000-km-range line of sight without atmospheric attenuation! If the relative humidity fell from 50% to 25%, the path capability would increase from 150 km to about 250 km. It is clear that there is more to 24-GHz operation than might at first be thought by those used to operation on the lower bands, and choosing a day with the right weather can make quite a difference in signal strength.

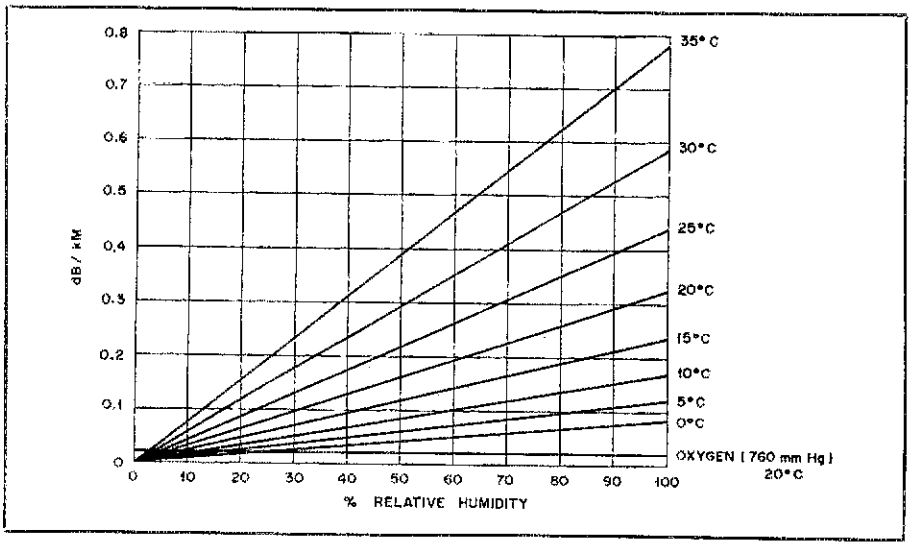


Fig. 1—Attenuation at 24 GHz due to water vapor and oxygen.

2304 NEWS

Dave Hackford, N3CX, has written with details of some of the 2304-MHz operation happening in the Philadelphia area. His station consists of a TX/RX interdigital mixer that on transmit feeds a solid-state amplifier chain (1.5 W out) that, in turn, feeds a 7289 TRC29 amplifier putting out about 30 W to an array of 4- × 45-element loop Yagis at 65 ft. On receive, he has GaAsFET preamps (MGF 1412-11-10) feeding the converter with 144-MHz output. Also on the air are WA3AXV (30 W to 2- × 45-element loop Yagis), WB2YEH (1 W to 4-ft dish), NF2P (1 W to 2-ft dish), WB2NPE (10 W, xtal-controlled to 4-ft dish), WA3LBI (20 W to 4-ft dish), WA3JUF (20 W to 4-ft dish) and WB3ESS (75 W). Dave comments that all are active and looking for skeds, so if you're on the band and looking for someone to work, get in touch.

900-MHz AMPLIFIER

Though not strictly in "the world above 1 GHz," readers of this column might be interested in a design for a 900-950 MHz solid-state amplifier from Motorola. In the April 1985 issue of *RF Design* magazine (pp. 28-32) a 14-W two-transistor amplifier with 14.5-dB gain is described. The amplifier uses MRF839 and MRF843 transistors in a stripline circuit, has a claimed efficiency of about 50%, and can withstand an output VSWR of 20:1.

Strays

LINCOLN A. CUNDALL, W2LC

☐ Antique Wireless Association cofounder Lincoln A. Cundall, W2LC, is a Silent Key. In 1952, along with W2GB and W2ICE, "Linc" helped establish the AWA, and later the organization's museum. First licensed in 1916, as 8ADI, Linc remained active in the AWA and Amateur Radio in general until his death in late February.

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
163 Meridene Crescent West,
London, ON N5X 1G3, Tel. 519-433-1198

A Modest Proposal

The following is a proposal. It's not our proposal, and it's not CRRL's proposal. It's Al Leith's (VE3FRA) proposal. According to Al, one of these days soon we're going to run out of VE3 call signs. One of these days, we're even going to run out of call signs for the other Canadian call areas. Then some decisions will have to be made. Personally, we have a bit of trouble with Al's proposal. We're just too sentimentally attached to our VE call sign. However, we're open-minded, and we do like to keep the pot stirred up. So here's Al's proposal.

Sometime in the forseeable future, Canada's third call area will run out of call signs. In time, other call areas will also run out of call signs. That being the case, now might be a good time to assess the situation and make some plans.

There will be considerable opposition to the system proposed below. There was considerable opposition in the Maritimes a few years ago when amateurs were asked to drop VE and adopt a distinctive prefix for each Maritime province. However, Newfoundland, Labrador and the Yukon do not use VE. When VY was assigned to the Yukon, there was no great fuss. Both the USSR and East Germany have adopted new call sign systems in recent years. Portugal is considering changes that will likely go into effect later this year. So has Brazil.

The system we are proposing would provide a distinctive prefix for each Canadian call area. All prefixes would come from the VA-VG, VO, VX and VY blocks. Prefixes from the CF-CK and XJ-XO blocks would continue to be available for commemorations and special events.

Under this system, the letter V for Canada would be followed by a distinctive *letter* that would identify each call area, a number from Ø to 9, and a one, two or three-letter suffix. The Maritimes would become VAØ-9; Quebec, VBØ-9; Ontario, VCØ-9; repeaters anywhere in Canada (for social reasons better left imagined than described), VDØ-9; Manitoba, VEØ-9; Saskatchewan, VFØ-9; Alberta, VGØ-9; and British Columbia, VXØ-9. The VY block would be divided. The Yukon would become VY1A-VY3ZZZ; the Northwest Territories, VY4A-VY6ZZZ (this could be further divided in event of political change); Atlantic Marine Mobile, VY7A-VY7ZZZ; Pacific Marine Mobile, VY8A-VY8ZZZ; the DXCC country of Saint Paul's Island, VY9A-VY9ZZZ; and the DXCC country of Sable Island, VYØA-VYØZZZ.

How would the system be implemented? Arbitrary dates would be set for the change. Stations licensed before 1950 would get first crack at new calls. The owner of VE3ZZ, for instance, would have several options. He could keep the 3 and his ZZ suffix and become VC3ZZ—not much change at all. Or he could choose from any call signs in the VC block assigned to Ontario and become VC1A, VC3G, VC7WW or VCØZZZ. Once the old-timers had chosen their calls, the others would follow. Recent amateurs would choose their call signs last.

Benefits? Lots of call signs. In each call area, this system would offer 260 call signs with single-letter suffixes, 6760 call signs with two-letter suffixes and tens of thousands of call signs with three-letter suffixes. And it would allow amateurs sentimentally attached to their present call sign to retain most of it. Only one letter, the letter that would replace the E, the letter that would identify each call area, would have to be changed. In Newfoundland, Labrador, Manitoba and the Yukon, not even that would be necessary.

Still, many would not like this system. Very few would be ready to give up a VE prefix. However, when people are *told* to do something, they usually comply. And if DOC administrators, looking for a solution to the problem of no more call signs available, see the logic and simplicity of this system, you may very well end up sporting nothing more than a new prefix. Or you may end up choosing an exotic call sign like VG9H, VF6D or VXØJ. Think of the fun you'll have collecting new prefixes on 75 or 2—or the pileups you'll create on 20 CW!

(Al Leith, VE3FRA, is a well-known DXer and editor of the DX Report. *He is interested in your comments. Write to him at 10 Fairington Cr., St. Catharines, ON L2N 5W3.)*

CRRL NEWS

☐ What's new from CRRL? A CRRL *Logbook*, similar in size, quality, format and even price to the popular ARRL *Logbook*. Price is $3.25 plus $1 for shipping; Ontario residents add 7% sales tax. A CRRL *Code Course* by Ralph Zbarsky, VE7BTG. Five cassette tapes, tested and proven effective, take beginners from zero to 12 words per minute. Price is $38 plus $1 for shipping; Ontario residents add 7% sales tax. And finally, *PX Programs*, the same programs offered every month in Stan Horzepa's (WA1LOU) *QST* On Line column. They're free for a self-addressed, stamped envelope. For longer programs or for several programs, a donation of 50 cents per program would help with the cost of printing. Order any or all from the CRRL Headquarters office in London, Ontario.

☐ Those special prefixes issued by DOC can cause problems. Sometimes prefixes are issued by regional or even district offices of DOC. Sometimes two or more offices issue prefixes for the same event. Getting correct, up-to-date information becomes very difficult. Sometimes, a prefix is reissued too soon after it has been used before. And sometimes, a particular prefix causes concern. VO3, recently issued for an Ontario event, would be an example. What's the solution? More amateur input. CRRL has asked DOC to adopt a policy whereby all applications for special prefixes would be directed to a committee of amateurs appointed by CRRL and CARF. This committee would review all applications and make recommendations to DOC. DOC would issue only the special prefixes approved by the committee. Early indications are that DOC likes the idea. More later.

☐ Representatives of CRRL and CARF have met and are working together to review new questions for the DOC questions bank. Most of the questions are multiple-choice. Look for multiple-choice questions on the "theory" portions of DOC exams as early as next year.

NATIONAL PARKS 100 AWARD

To help publicize the 100th Anniversary of Parks Canada, CRRL is sponsoring a National Parks 100 Award. The idea is to earn 100 points by working Canadian stations during this anniversary year. For Canadian stations, contacts with most Canadian stations count for 1 point; contacts with Canadian stations using special prefixes count for 5 points; and contacts with Canadian stations operating from Parks Canada sites count for 10 points. For U.S. and DX stations, the points are doubled. To receive the award, send a copy of your log, certified by yourself and two other amateurs, to CRRL National Parks 100 Award Manager Garry Hammond, VE3XC, 5 McLaren Ave., Listowel, ON N4W 3K1. Please include $1 or 5 IRCs to help with the cost of printing and mailing the award.

NOTES FROM ALL OVER

☐ At press time, DOC was negotiating a reciprocal-operating agreement with Spain.

☐ Congratulations to

- Devere Worral, VE3AJN, who was recently elected Manager of IATN, the International Assistance and Traffic Net. IATN meets daily, handling third-party traffic from amateurs in all parts of the world.
- David Toth, VE3GYQ, who was recently appointed Vice Chairman of the ARRL Repeater Advisory Committee.
- Richard Miller, VE3CIE, who was recently awarded a *QST* Cover Plaque Award for his fine article in January *QST*, "Radio Aurora." Read it again. It's a classic.

☐ Registration forms for RSO-CRRL '85, to be held in London, Ontario, on September 27-29, are now available. Write to RSO-CRRL '85, Box 73, Hyde Park, ON NØM 1ZØ.

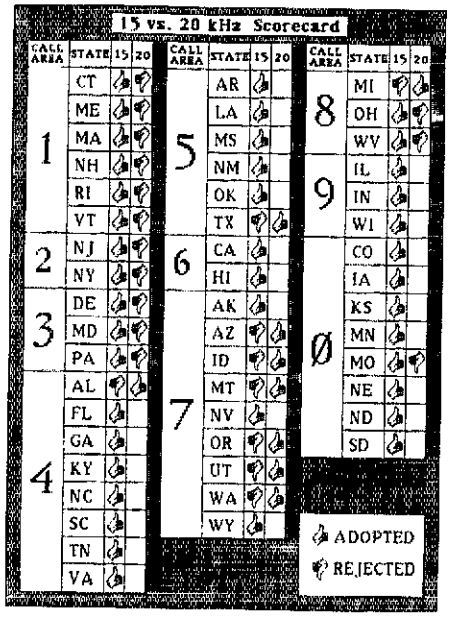
FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr., Wolcott, CT 06716
CompuServe ID no. 70645,247

What's the Score?

During the past few months, a lot of space in this column has been devoted to the ongoing debate as to whether 15-kHz or 20-kHz spacing between repeaters on adjacent channels is better. During the debate, some states have been swayed by the arguments in favor of 20-kHz spacing, while others have remained steadfast in their belief that 15-kHz spacing is superior. The accompanying chart illustrates the state of the debate as of mid-April. The chart indicates which states have adopted and rejected 15- and 20-kHz band plans. Where the chart indicates that a state has adopted one plan but has not rejected the other plan, that state may or may not be considering the adoption (or rejection) of the alternative plan. This column will try to keep score of the debate as it develops.

Enough from me. I will now turn this month's column over to Lew Collins, W1GXT, and Clay Freinwald, K7CR. Both gentlemen have been involved with the ARRL VHF Repeater Advisory Committee (VRAC), and have been involved with repeaters a lot longer than most of the rest of us. They represent opposite sides of the 15- vs. 20-kHz debate.



K7CR for 20-kHz Spacing

I have been quoted as being the father of the 20-kHz plan; this is good and bad, depending on whom you talk to ... the 20-kHz band plan is being used in a number of areas as an alternative to 15-kHz splinters in order to make better use of the spectrum.

The argument used by the 15-kHz lobby—that their band plan will permit more repeaters—is just not quite always the case. It is common to take a mathematical approach to band planning; that is, take 2 MHz of spectrum and divide by 15 to get X, then take the same amount of spectrum and divide by 20 to get Y, then conclude that X is greater than Y; therefore, you can get more repeaters on by dividing by 15 kHz. These folks are ignoring one very basic and simple factor: If you wish to have some protection from adjacent-channel QRM, you must space the 15-kHz adjacent machines physically apart (30 to 75 miles, depending on which coordinating body does the coordinating). This spacing is the big difference between the two systems (aside from the adjacent-channel QRM issue). With 20-kHz spacing, you can place adjacent-channel repeaters in the same town without regard to physical placement.

In the case of the Portland, Oregon, area, more repeaters could be placed on the air using 20-kHz spacing than by using 15-kHz spacing (source: Oregon Region Relay Council/Dale Justice, K7WWR). In a recent case, Dallas/Fort Worth had been unable to coordinate any more repeaters. Their usable 15-kHz channels had been all used up for some time. With 20-kHz spacing, they actually had channels left over (source: Texas VHF-FM Society president Chuck Adams, WB5WWR).

W1GXT for 15-kHz Spacing

The arguments for 20-kHz spacing are appealing, but I hasten to point out that if one is in agreement with all the points that have been made by the proponents of 20 kHz; I conclude that 30-kHz channel spacing is superior to 20 kHz; so we should change our band plans for all of the VHF and UHF bands to 30-kHz spacing!

The successful use of 15-kHz channel spacing requires careful attention to frequency, deviation and coordination, none of which is beyond the current amateur state of the art. We have been using 15-kHz channel spacing successfully in New England for perhaps 10 years, and probably have had no more than 10 instances of adjacent-channel interference—all of which were cleared up by the involved parties getting together to set up their equipment properly.

It is my observation that in some parts of the country, the average frequency deviation in use by amateurs is well in excess of ±5 kHz, which is destined to make the use of 15-kHz channel spacing (or 20-kHz, for that matter) fail.

The most important point, from the view of those of us who live in the densely populated Northeast corridor, is that there simply are not enough frequencies available to accommodate the existing repeaters, should we go to the 20-kHz band plan. We looked at this some years ago and identified perhaps 30 repeaters that would have to leave the air in order to accommodate the wider channel spacing. Would you like the job of deciding whose repeaters should shut down, and then telling them the bad news?

The second point most people overlook is that the use of 20-kHz spacing encourages the appearance of noncoordinated repeaters in the "cracks" between channels. We have approximately three of these currently operational in New England in the 144.5-145.5 MHz band segment.

MISSOURI AND NORTHEAST: NO; ALABAMA: YES

As the debate continues, Missouri and the Northeast have rejected 20-kHz channel spacing, while Alabama has adopted it.

At its February 17 meeting, the Missouri Repeater Council voted unanimously to reject the 20-kHz band plan for 146 through 148 MHz, and reaffirmed its support for the 15-kHz band plan now in use throughout the state. The main reason for rejecting 20-kHz spacing was the potential loss of repeater pairs in St. Louis and Kansas City.

On March 2, a meeting of representatives from the frequency coordinating bodies of 12 Northeast states resulted in unanimous rejection of 20-kHz channel spacing. The representatives felt that 15-kHz spacing is today's state of the art; adopting 20-kHz spacing would be a step back to 1975 standards. The representatives also formed a subcommittee to study switching the channel spacing of the repeater pairs below 146 MHz from 20 kHz to 15 kHz. (The New England states, New York, New Jersey, eastern Pennsylvania, Maryland, Delaware and eastern West Virginia were represented at this meeting.)

Also on March 2, the board of directors of the Alabama UHF-UHF Council voted to adopt the 20-kHz band plan, and have informed all Alabama repeater owners that they must comply with the new plan by July 1, 1985 or they will be considered uncoordinated and their frequencies will be reassigned.

REPEATER LOG

According to reports received in the month of March, repeaters were involved in the following public-service events: 15 weather emergencies, 1 criminal emergency, 10 medical emergencies, 158 vehicular emergencies, 5 fire emergencies, 12 public service events, 24 drills/alerts and 2 power failures.

The following repeaters were involved (followed by the number of events): WA1DGW 21, K1FFK 1, W2VL 17, WB2WPA 1, WA2ZWP 1, W3AVK 1, W3VRZ 4, WA4GIC 1, K4GSO 1, WA5LVT 1, W5NS 1, W5RVT 1, KH6AH 1, WD6EJF 1, KH6H 1, WA6OYF 1, W7EX 141, N8CDN 1, K8DDG 9, K9DGS 1, WD8DRZ 1, W8EWD 1, WD8IEL 6, W8LBZ 1, NC8V 1, W8VTD 6, WØILO 1, WØMXW 1, WBØSBH 2.

Strays

I would like to get in touch with...

☐ birdwatcher hams to set up a net. Richard P. Guthrie, KA2JKA, P.O. Box 46, New Baltimore, NY 12124.

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to P.O. Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

Extending a Helping Hand to Newcomers

If VHF/UHF and, indeed, Amateur Radio itself is to survive and grow in the years to come, there must be a steady influx of recruits—new amateurs and converts to the world above 50 MHz. We, who are already dedicated citizens of that world, can and must do our part to ensure that those who do venture into our portion of the spectrum are encouraged rather than turned away by techniques and operating conventions they do not yet understand, or by what they perceive as cold shoulders from us. One way we can help them is by providing straight, easy-to-understand information about operation and equipment on the various VHF and UHF bands. In doing this, we should try (although human nature makes it difficult) not to color our counsel with individual preferences; or, at least if we do, we should clearly label our remarks as such.

One who has come up with a good idea for helping hams just venturing into VHF is Duane Grotophorst, KA9HKL. Duane has published a set of succinct dos and don'ts, which he has been providing to those he works or has heard about. I thought it would be useful to reproduce these guidelines, as he wrote them, for use by experienced VHFers in helping newcomers, and for those readers who may have just gotten on or are contemplating operation on one of the VHF bands. Although KA9HKL's comments are specifically aimed at 2-meter SSB and CW operation, many of the principles cited are applicable to other VHF and UHF bands as well.

1) Use the best feed line you can find or afford. Don't use cheap cable because the losses at higher frequencies are too high and will degrade your station performance on both transmit and receive. A rule of thumb is that big-diameter cable is better than small-diameter cable; RG-58-size cable is practically a dummy load at VHF and above. RG-8 or, preferably, RG-213 or other noncontaminating jacket-type cable is okay for runs of 100 ft or less on 2 meters. Hardline is best, but not always practical, for runs of 50 ft or less.

2) Most receivers on 2 meters need a preamplifier; a good preamp is one that has a low noise figure (NF) of 1 dB or less on 2 meters and a gain of 10-20 dB. Noise figure is a more important concern than gain when choosing a preamp.

3) Antenna orientation must be horizontal (elements parallel with the horizon) for successful SSB or CW 2-meter work; cross-polarization can cause a loss of 20 dB or more in signal strength (like going from 100 W to 1 W). Cross-polarization is probably the leading reason for newcomers becoming discouraged with 2-meter SSB/CW.

4) Antenna selection is important; again, bigger is better, but a beam of 12 ft or more of boom length is a good start, and is effective. Element count is not a good indication of antenna gain (boom length is a better indication of gain). Antennas should be high enough to clear local obstructions (objects within a few hundred feet).

5) Power amplifiers are very helpful for day-to-day operating, and I suggest that you plan on adding one sometime in the future (improve your feed line and antenna first). Many solid-state "brick" amplifiers include a preamp and are good choices, or you may want to buy, build or scrounge a tube-type amp. Be sure to improve your receiver sensitivity if you add a power amp (nobody likes an alligator).

6) The 100-200 W power level with a good antenna system and preamp will provide excellent results, although 10 or 25 W can still be a lot of fun.

You may be able to think of additions to this list. Supplement KA9HKL's thoughts with your own. The important thing is to welcome newcomers to VHF and to be ready to provide answers to their questions and to steer them in the direction of the most enjoyment from their newfound interest. By extending our hands now, we are helping to ensure the survival of our kind of Amateur Radio in the years ahead.

ON THE BANDS

6 Meters—Despite the fact that this is the low part of the solar cycle, scattered reports of north-south DX continue to filter in. The most recent comes from W5DZF/4 Miami, Florida. Scotty says HC2FG was heard beginning just after 2100Z Saturday, March 23. The Ecuadoran station was in for over an hour, and at times peaked well over S9. In addition to himself, W5DZF says that HC2FG also worked XE1GE and several stations in Louisiana. From his new QTH in Spring Hill, Florida, this column's originator, W1HDQ, reports that he also worked HC2FG that afternoon. Ed also attests to the loud signal from the station, which he characterized as up to "40 over 9." He notes that, at his home station, HC2FG runs 150 W to a six-element Yagi. As Ed notes, "He has what it takes." By contrast, the HC2FG beacon runs about 5 W, apparently to an omni antenna. W1HDQ observed its signal to be only 5 × 5. Apparently, things have been happening on the other side of the world as well. JA1VOK writes that on March 2, he worked DU1GF for the first time in a year. It is encouraging to learn that there is still 6-meter activity from the Philippines.

Not too many reports came in regarding tropo propagation on our lowest-frequency VHF band. Although that mode affects a broad range of frequencies, it is generally understood to be more pronounced on the higher bands. However, one account of 6-meter tropo is submitted by WA5UFH Westlake, Louisiana. On March 2, Randy says he worked KA5CPS Wimberly, Texas, located between San Antonio and Austin—first on 2 meters and then on 50 MHz, indicating that tropo was responsible. Six-meter signals ran 5 × 7. A second occasion occurred when WA5UFH hooked up with WB5QBV San Antonio on March 23.

The 1985 sporadic-E season should be well underway by the time you read this. This is always a good time to review the proper use of calling frequencies. We should remember to make our initial calls, be they CQs or to a specific station, on the appropriate calling frequency. As soon as the contact is established, we should move off, preferably 30 kHz or more. QSYing only a few kilohertz merely causes splatter to others still monitoring the calling frequency. And, let's not forget that 50.110 is the DX calling frequency, with 50.2 to be used for local and single-hop E_s work. While this specific use of 50.110 is still not yet as widespread as it should be by now, there is progress each year toward use of the higher part of the band.

A good catch on 6 meters during the 1981/82 F2 seasons was Cyprus station 5B4AZ. Nick used the 30-W 6146 CW transmitter he is holding. He was restricted to operating only on 50.110 MHz. *(JA1VOK photo)*

Just because it is the low ebb of the solar cycle, don't conclude there will be no DX. Europeans have been worked from the East Coast every summer for the past four or five years. Japan was worked from the West Coast in June 1977, well before Cycle 21 approached its peak. Single- and double-hop E_s can bring many interesting contacts from the Caribbean and northern South America. Several DXpeditions have been promised. For one, W6JKV is planning trips to Desecheo Is. (KP5) and Belize (V3) in June. The chance for DX does exist, even in 1985. It would be a shame if anyone lost out on making a rare contact because of strong stateside QRM around the part of the band where the DX is normally found. Fifty or 100 kHz higher gets through just as well for single-hop domestic work, and there is much less QRM in that lofty part of the band.

Many 6-meter operators will remember W7KMA. Tom was very active from Phoenix until about two years ago, when he began traveling the world in connection with work ac-

tivities. His most recent QTH is Korea, where he signs HL9TM. He says U.S. citizens are not normally allowed 6-meter operation in that country, but that he has applied for special permission and hopes to be on until mid-July. At that time, he returns to Germany, where he will, of course, be confined to other bands.

2 Meters—Since the VUCC Award was announced in January 1983, "grid expeditions" have become increasingly popular. One that has recently come to attention is to be staged by WBØSIL during the June VHF QSO Party. Mike will be on 2 meters and 70 cm from EM46, a grid square that does not appear to have any resident activity. Speaking of grid squares, two readers have sent along samples of computer aids for use with the grid system. One by K4GOK determines the distance and bearing to any grid in the U.S. from a particular location. Marion believes this helps aim the beam in the correct direction in these days of 7s operating in Maryland and 2s emanating from Montana, etc. He will be happy to send a printout for $2 to cover his costs. Please include your own grid or preferably your latitude and longitude. For those giving only their grid, he will assume its center. Address is Marion Kitchens, 2709 Colt Run Rd., Oakton, VA 22124. The other, called "The Grid Chase," is from N8CKH assisted by WB8KAY. It lists active stations on the various VHF bands for a large and expanding list of grids. Bill will send a copy to anyone forwarding 73 cents in stamps to Box 204, Westland, MI 48185.

From Argentina, LU4EJU reports a contact between his QTH in Mar del Plata, near Buenos Aires, and LU2WM Trelew, in the state of Patagonia, approximately 545 miles to the southwest. This is believed to be the first 2-meter work between these parts of the country. Equipment at LU4EJU is an IC-260A into a Mirage 80-W amplifier and an 11-element Yagi. LU2WM uses a Yaesu FT-480 with 10 W out and a five-element array. LU4EJU was one of those who, several years ago, benefited from trans-equatorial propagation, working such stations as YV6BKS and KV4FZ. He has also made FM contacts with stations in Uruguay and Brazil. I am happy to see that VHF interest remains alive in that part of the world.

A regular set of translations from Russian radio journals done for the IARU by Dexter Anderson, W4KM, affords some interesting VHF news from a part of the world with which most of us have little contact. From a recent issue of the magazine *Radio* comes information on Soviet EME activity. UA1ZCL is reported as having completed 18 2-meter EME QSOs during January, including IV3HWT, UR2RQT, LA9FY, OZ1ASL, LX1GR and UA9FAD. In a single week, from February 11 to 19, another operator, UG6AD, made seven contacts, including UA1ZCL, F6CJG, K1WHS, W5UN and SM2GGF. The notable fact about this is that UG6AD has only a single 16-element Yagi! Also using a single Yagi, UD6DFD was active, working SM2GGF during February. His antenna is 24 elements on a 16-meter (50-foot) boom! UR2RQT is another active Russian moonbouncer. Using an array of eight 16-element Yagis, he was averaging one to three contacts per day over the period covered in the report. UA3TCF recently added several new stations to his roster, including GM4IPK, HB9QQ, WA7BBM, F6CJG and VE1UT. The first SSB EME QSO from the country took place back in December, when collective station UK5JAX, operated by UB5JIN, worked K1WHS after first establishing contact on CW. The station reports 67 EME QSOs in 16 countries over a three-month period. All but 13 of these were without prearranged schedules. The report notes that there is now EME activity from 21 Oblasts (political subdivisions of the Soviet Union).

The portable 13-cm station used by N4MW to help boost state totals for WA4HGN (recently deceased) and W4HHK. Output power is 5 W. *(W4HHK photo)*

1¼ Meters—Or is it 1.35? Maybe it's 135 cm! Most refer to it as 220. Various people, including W1JR and K2QR, who likes "1.3 meters" because it is so easy on CW, have offered suggestions for a new handle for this band. Why not simply call it "220"? I have generally shied away from referring to the various bands by their megahertz designations, partly to avoid advertising the fact that we VHFers do not recognize all of them by their lowest-frequency band edge. I have always been concerned that consistently calling attention to this fact—by using the commonly accepted names for some of the bands—might be used against us by those constantly searching for "unused" frequencies. On the other hand, references to 420 or 1240 might confuse those accustomed to "432" and "1296." How would one handle 13 cm, which is now divided into two segments, 2300-2310 and 2390-2450? The name "13 cm" seems to fill the bill. Does anyone have an opinion on this weighty issue, especially what to call our 220-225 MHz assignment?

WD4MBK passes along a detailed description of how to use an IC-551 or IC-551D in conjunction with a VE3CRU version of the Microwave Modules transverter (MMT-220) to get full coverage of the 220-225 MHz band. I will gladly furnish a reprint of this to anyone forwarding an s.a.s.e. Speaking of commercial equipment for the band, NI4Z writes that he has had several telephone conversations with Evelyn Garrison of Icom. From them, he has received the strong impression that the company may be considering the production of an all-mode 220-225 MHz rig. He believes that an expression of interest might well lead to a favorable decision. All who think that the availability of such a piece of equipment would be beneficial are urged to write to Ms. Garrison, Icom America, 2380 116th Ave., NE, Bellevue, WA 98004.

N6EKS writes from the Los Angeles area that he is very active on 1¼ meters, and expresses his concern over threats to the band. He stresses the high level of activity in Southern California and offers any help he can muster in defense of our allocation in this part of the spectrum. All are reminded to watch the monthly *QST* column Happenings and *The ARRL Letter* for late news and recommendations on what we can do, at various times, to protect our frequencies.

The Higher Bands—WD4MBK wonders what difficulty, in the restricted areas surrounding Pave Paws installations, some may be having in obtaining approval from the Air Force for operation up to the maximum authorized amateur power level. Without such approval, 70-cm power in these regions is limited to 50 W. Apparently, in his part of the country, where the installation at Warner Robins AFB Georgia is under construction, permits have been forthcoming within a few weeks after applications to the designated Air Force authority. In other areas, results have not been so speedy. Charles reports that AJ6T in northern California tells him that his application has been on file for over a year with no action. Do others have similar tales of woe?

Several reports have arrived relating excellent tropo along the Gulf Coast on all bands during the closing days of March. One of the most intriguing concerns a 1040-mile 23-cm contact between WA4OFS St. Cloud, Florida, and W5VY San Antonio, Texas. WA4OFS runs 100 W to a single 45-element loop Yagi, while W5VY uses about 50 W to four 23-element F9FT Yagis. KN5X Missouri City, Texas, says that on March 24, 70-cm repeaters from Houston to Florida were workable from his QTH for about an hour. He particularly notes that those with antennas at moderate heights were able to get into the duct, but that one Houston-area repeater, which has an antenna at 1500 feet, was not in on the fun.

From another area famous for producing long-haul tropo propagation, "the Great Australian Bight," comes an account of the first 70-cm QSOs to have ever taken place between Perth, on the lower west coast of the subcontinent, and Adelaide, in the south-central part of the country. According to VK5LP's column, "VHF UHF, An Expanding World," which appears monthly in the Australian magazine *Amateur Radio*, VK6KRC and VK5KBU were the first to cover the 1335 miles on 70 cm after first working on 2 meters. Reports ran 5 × 9 in one direction and 5 × 3 in the other. Their QSO was soon followed by one between VK6KZ and two other Adelaide stations, VK5ZRO and VK5ZTS. These contacts took place during the morning hours of January 10, which is early in the summer Down Under.

Inadvertently omitted from the 13-cm Standings carried in the April column was W4HHK, who should have been listed as having 7 states, 5 call areas, 2 countries and 8 grid squares. Paul's best terrestrial DX on the band is 582 miles to W8YIO. On EME, he has worked W3GKP in 1970 and OE9XXI late last year. Sorry for the oversight, Paul. Also in 13-cm news, Philadelphia-area station N3CX says that he now has 35-W output to an array of four loop Yagis at 65 feet. Others nearby who are also active include WA3JUF, WA3AXV, WB2NPE, NF2P, WA3LBI and WB2YEH. Dave would like to hear from anyone who would like to try skeds. Address is Dave Hackford, Box 138, RD 2, Pennsburg, PA 18073.

Strays

QSL HINT

☐ Since I often get QSL cards I can't acknowledge immediately, I have devised a system to ensure that I respond to all QSLs. I place a check mark in the corner after answering a QSL card, enabling me to quickly identify any QSLs needing a response.—*Leonard Nathanson, W8RC*

YL News and Views

Conducted By Jean Peacor, K1IJV
Country Club Dr., Monson, MA 01057

Good in Any Language

Picture a very beautiful emerald atoll, 2 km of white beaches, radio gear and a rare call sign to go with it—and only one other radio operator on the island. 'Tis the dream of many a ham. The dream came true for a group of Japanese YLs last February.

Several members of the Japanese Ladies' Radio Society (JLRS) realized that many of the organization's YLs had never attempted DX QSOs. They also realized that the reason was a hesitancy to speak English. All licensed YLs had rigs and antennas, all had studied English in school, and many knew that studying a language and putting it to common use were two entirely different things. What better way to jump this hurdle than with a DXpedition!

The basic premise was to become a rare DX station, and to speak Japanese during their initial contacts with home stations in Japan. Then, when other countries were contacted, language would take care of itself. It was time to ask for volunteers. Nine YLs and five of their OMs, who acted as advisors, stepped forward.

Planning began in October 1984. The YLs focused their attention on the Maldives, in the Indian Ocean, where they knew there was only one Amateur Radio operator, Captain Noel, 8Q7AV. Application for permission to operate and for a Maldives call sign was sent to the Director of Department of Posts and Telecommunications there. Since many DXers had recommended the island of Medhufinolhu for operation, the group set that site as their goal. Many necessary, time-consuming arrangements followed. Both Captain Noel and Ernest, 4S7EA, in Sri Lanka, contributed greatly to the fact that when their departure date arrived on February 11, 1985, just five months later, all the preliminaries were completed. This included having the call 8Q7YL in hand as they left the Tokyo airport.

JLRS members and others on the way to being rare DX.

Fumi, JA1AEQ (left), and Nozomi, JH3SQN, operating as 8Q7YL.

The trip included 10 hours of flight time, followed by a three-hour boat trip to reach Medhufinolhu. The excited members of the group included YLs JA1AEQ, JA1EYL, JF1IZM, JF1WMY, JL1OZH, JA2BBH, JH3SQN, JR6XIX, JHØKSW and OMS JA1PK, JA1BHJ, JA2BL, JA3SQM, JHØJMI.

Upon arrival, the groups wasted no time in setting up three operating stations with a doublet, long wire and a WHS-32 antenna for satellite operation. During the next four days, the group contacted 2107 stations in 68 different countries on 1.9, 7, 14, 21 and 28 MHz. A successful QSO was also made to Japan by FAX (facsimile). Unfortunately, band conditions limited the number of contacts made with stations in the United States.

Was their goal to accustom Japanese YLs to the DX bands accomplished? Absolutely! They enjoyed operating from the Maldives, are now filled with enthusiasm as operators using their home calls, and look forward to their next opportunity to operate in other countries. Theirs was a most successful DXpedition in proving that Amateur Radio is *good in any language.*

JUNE 7-9—YL FIELD DAY IN FINLAND

OH5-land YLs plan to operate from several stations for their YL Field Day, June 7-9, using the call OH5YLS. SSB frequencies—any ending in 88; CW frequencies—any ending in 33. An opportunity to earn a special OH5YLS QSL card. Further information: Tuija Paalanen, OH5MX, Lansikyla, SF-49860, Kiamila, Finland.

YLRL ANNIVERSARY PARTY RESULTS

CW		*SSB*
K4AOH	Gold Cup	DJØEK
WD8MEV	Second Place	WD4NKP
KM8E	Third Place	K4AOH

CW Scores—K4AOH, 971*; WD8MEV, 866*; KM8E, 750*; KA6SOC, 675*; K5AVX, 672; WD5FQX, 540*; KA5GIS/7, 460*; N7DHA, 420*; W8YL, 375*; VE1BWP, 358*; WA9TVM, 336; KA5TCG, 163*; W3CDQ, 99; VE3KTX, 79*; KD7YB, 70*; KL7KD, 3*; CT1YH, 720*; DF6UI, 700*; DF2SL, 348*; JA1AEQ, 90*; VK3KS, 40*; JJ1LQI, 18.

Scores—WD4NKP, 8456*; K4AOH, 8064; VE1BWP, 7013*; KØEPE, 6949*; KM8E, 5880*; WD5FQX, 5635*; VE7YL, 5111*; WA3HUP, 5029; WD8MEV, 4715*; WA1UVJ, 3895*; K6KCI, 3800*; W2GLB/7, 3698; WU7F, 3650*; KD5MD, 3432; K6INK, 3075; KA5TCG, 2756*; KA5ONE, 1763*; WA1JYO, 1721*; WD5CPO, 1418*; K4LMB, 1247; WBØZQZ, 1320*; KA6SOC, 2288*; NS5H, 1125*; KD7YB, 761*; NAØV, 618*; N7DHA, 475; W2EEO, 469; KC9V, 240*; AL7FG, 96; DJØEK, 11776; I1IEP, 6300*; EA3VM, 5460; OX3ZM, 4830*; CT1YH, 4223; 4X6DW, 2970*; ZS1YL, 2170*; EL2EF, 1377; DK9ZL, 1351*; DF2SL, 1320*; HB9ACO, 978*; VK3KS, 831*; ZS2AA, 784*; DF1LV, 595*; VK4BSQ, 488*; DK1HH, 465*; PA3CEB, 438*; JJ1LQI, 423*; SMØHNV, 213*; DF6UI, 203*; JA1AEQ, 191*; G8LY, 169*; ON4AYL, 158*.

*low-power multiplier

Stockholm, Sweden, is the scene of an active 2-meter YL net each Sunday morning. Shown at a gathering of net members are (l-r) SMØNWU with her son, SWL SM7277, SMØPRA, SMØGYG, SMØOTG, SMØOYG and (foreground, l-r) SMØHNV and SMØOYL.

Strays

I would like to get in touch with...

☐ military personnel who have experienced difficulties with military housing offices on the placement of antennas or operation of an Amateur Radio station in the U.S. MM1 (ss) Robert Vandevender II, KR2K, U.S. Navy, P.O. Box 573, Kittery, ME 03904.

☐ anyone from the 473rd Infantry who was in Italy during WW II. Bill Stofer, WBØVUA, 6740 S. Delaware St., Littleton, CO 80120.

Coming Conventions

GEORGIA STATE CONVENTION
July 6-7, Atlanta

The 1985 Georgia State Convention/Atlanta HamFestival moves to new and more spacious quarters at the Georgia World Congress Center. Exhibits and flea market are all indoors in the country's second largest convention center.

Featured is the Dr. DX World Championship, sponsored by AEA; forums by Lew McCoy, Don Search, Bob Halprin and dozens of other informative speakers. ARRL forum with President Larry Price, packet radio, RTTY, computers and beginning Amateur Radio will be featured. Upgrade exams both days. At midnight Saturday, there's the Wouff Hong ceremony.

Hq. hotel is the adjacent Omni International, at $55, single and double. Write to Atlanta Radio Club, P.O. Box 77171, Atlanta, GA 30357, for a brochure and reservation card.

How to Register for Upcoming Exams

August 9-11, Southwestern Division Convention (Long Beach, California): Amateur exams will be given Saturday, August 10. Technician through Extra Class. Walk-ins if space available. Send completed Form 610 and check for $4 (payable to ARRL/VEC) to Ham-Con, P.O. Box 91313, Long Beach, CA 90809.

†May 31-June 2—Northwestern Division, Seaside, OR

May 31-June 2—Texas State, Dallas

July 5-7—Dakota Division, Rapid City, SD

July 6-7—Georgia State, Atlanta

July 13-14—Indiana State, Indianapolis

July 19-21—Iowa State, Des Moines

August 2-4—Rocky Mountain Division, Jackson, WY

August 3-4—North Florida Section, Jacksonville

†August 9-11—Southwestern Division, Long Beach, CA

August 25—Illinois State, St. Charles

September 6-8—Melbourne, FL

September 6-8—Midwest Division, Omaha, NE

September 6-8—West Gulf Division, San Angelo, TX

September 21-22—Virginia State, Virginia Beach

September 27-28—CRRL, London, Ontario, Canada

ARRL NATIONAL CONVENTIONS

October 4-6, 1985—Louisville, Kentucky

September 5-7, 1986—San Diego, California

July 10-12, 1987—Atlanta, Georgia

†At press time, Amateur Radio exams are scheduled to be given at these conventions. For other exam opportunities see Hamfest Calendar.

Hamfest Calendar

Administered By Marjorie C. Tenney, WB1FSN
Convention/Travel Coordinator

[Attention: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

British Columbia (Maple Ridge)—July 13-14: The Maple Ridge Hamfest will be held at St. Patrick's Center, 22589 - 121st Ave. Admission: hams, $5; nonhams, $2. Food, swap and shop, commercial displays, bunny hunt and nonham programs. Close to swimming and shopping. Camper space, no hookups. Talk-in on 3.758, 20/80 and 34/94. For info and preregistration (20% off gate admission), contact Maple Ridge ARC, Box 292, Maple Ridge, BC V2X 7G2, Canada.

California (Santa Maria)—June 16: The Satellite ARC annual swapfest and Santa Maria Barbeque will be held at the Union Oil Picnic Grounds, just south of Santa Maria on Sunday (Father's Day). General admission at 9 A.M.; barbecue served at 1 P.M. Dinner tickets: Adults, $7.95; children (6-12), $3.50; children under 6, free. Swap spaces (approximately 2 ft. × 6 ft) each $3.50. For further information and to order tickets or reserve swap tables, write to Satellite ARC Swapfest, P.O. Box 1753, Santa Maria, CA 93456.

Colorado (Loveland)—June 1: The Northern Colorado ARC will hold SUPERFEST VII on Saturday at the McMillen Bldg., Larimer County Fairground. Admission, $3. Events include a code contest and packet radio demo. FCC exams will be given; walk-ins accepted. Completed Form 610 and check for $4 (payable to ARRL/VEC) should be sent to Debby Glasscock, NØFCP, 3942 E. Co. Road 16, Loveland, CO 80537, tel. 303-667-8584. Doors open at 8:30 A.M. Commercial exhibitors. Food available. Talk-in on 25/85 and 795/195. For more information, contact Rick Hubbard, WAØDDC, tel. 303-353-8366 or Gus Fox, WØEE, tel. 303-330-9012.

†ARRL Hamfest

†Georgia (Ft. Oglethorpe)—June 8-9: The John Ross ARC will hold its annual hamfest at a new location, the Lakeview-Ft. Oglethorpe High School in Ft. Oglethorpe, located on Hwy. 2A, Exit 141, 4 miles off I-75. Inside air-conditioned dealer spaces; also inside or outside flea-market spaces. Tables available. FCC exams both days; refreshments and plenty of free parking. Talk-in on 145.35/4.75. For reservations and information, write to JRARC, P.O. Box 853, Rossville, GA 30741, tel. 404-861-5610.

Idaho (Coeur D'Alene)—June 8: The Kootenai ARS will sponsor Hamfest '85 on Saturday from 8 A.M. at the Kootenai County Fairgrounds. Admission and swap tables are free; setup at 7:30 A.M. Plenty of free parking, RVs welcome. Food available. Exams will be given. Talk-in on 38/98. For tickets or more information, contact Jim Monroe, N7ESU, W. 2455 Hidden Valley Rd., Rathdrum, ID 83858, tel. 208-687-0136.

Idaho (Twin Falls)—June 15: The Magic Valley Chapter of the Idaho Society of Radio Amateurs will host a swap meet on Saturday, from 9 A.M. to 5 P.M., at the Moose Lodge, 835 Falls Ave. Free admission; swap tables $2; all indoors. FCC exams and ARRL representatives. Talk-in on 16/76. For further info, write to P.O. Box 294, Twin Falls, ID 83303.

†Illinois (Granite City)—June 9: The Egyptian Radio Club will hold its annual hamfest, from 8 A.M. to 3 P.M., at the club house and grounds. Flea market spaces available on a first-come basis; first space free (approx. 10 ft); additional spaces, $5. Food stand and soft drinks available. Free parking. Tickets: $1 in advance; $2 each or 3 tickets for $5 at the hamfest. Directions: I-270 to IL Rte. 3 South. Turn right at Chain of Rocks Rd., then follow signs. Talk-in on 16/76 or 52. For more information, please send an s.a.s.e. to Egyptian Radio Club, P.O. Box 562, Granite City, IL 62040.

†Indiana (Muncie)—June 9: The Muncie Area ARC (MAARC) will hold its annual hamfest at the Delaware County Fairgrounds from 8 A.M. to 3 P.M. Sunday. Admission: in advance, $2; at the door, $3. All indoors; tables $5 each; some power hookups available. Overnight camping, water, dump station and electricity; $5 per space. Amateur upgrade test will be given at a nearby location; walk-ins from 9 A.M. to 10 A.M. only. Free parking, food available and security on site at all times. For more info, tickets or tables, contact Charles Stanley, WB9BSE, 3609 N. New York, Muncie, IN 47304, tel. 317-282-9738.

Indiana (Crown Point)—June 16: The Lake County ARC will sponsor its 13th annual Father's Day Hamfest on Sunday at the Lake County Fairgrounds Industrial Bldg., located just inside the east gate. Free parking. Tables available. General admission $2.50; no advance sales. Setup at 6 A.M.. Hours are from 8 A.M. to 2 P.M. MARS, ARRL/ARES tables and computer demonstration. Refreshments available. Overnight accommodations close by. For information, write to Gene Hunkins, KC9LH, P.O. Box 1909, Gary, IN 46409, or call 312-821-3210 (days) and 219-937-9652 (evenings). Talk-in on 84/24 or 52.

Kentucky (Bowling Green)—June 8: The Kentucky Colonels ARC will hold their annual hamfest at the Jaycee Pavilion (inside ac) on the So. Kentucky Fairgrounds, just off U.S. 231 north, at 8 A.M. Admission is $2 at gate and $2 for inside tables. Outside setup is free. Food and drink available. Talk-in on 85/25. For further info, write to Ed Gann, N4HID, 445 Elrod Rd., Bowling Green, KY 42101, tel. 502-843-8911.

†Kentucky (Erlanger)—June 15-16: The Northern Kentucky ARC announces Hamorama '85 to be held at the 15,000-square-foot Best Western Vegas Convention Center, I-75 to Exit 184B (Rte. 236), 8 miles south of Cincinnati, Ohio. Completely indoors and air-conditioned; free parking. Major vendor setup after 6 A.M. Saturday and Sunday. General public admission

at 8 A.M. Food and drink available. Admission for both days is $5 each person; entire family for $8. Children under 16 free. Flea market tables provided, and are $5 each for entire weekend. Contact Best Western Motel at 606-342-6200 and mention "Hamorama" to receive reduced room rates. Talk-in on 86/26 or 975/375. For additional information or questions, contact John A. Thernes, WM4T, 60 Locust Ave., Covington, KY 41017, tel. 513-397-7425 (days) and 606-331-0331 (nights).

†**Louisiana (Alexandria)—June 8-9:** The Central Louisiana ARC (CLARC) will sponsor a hamfest on Saturday and Sunday at the Bolton Avenue Community Center, 315 Bolton Ave. Free admission. Swap tables available. VEC exams. Talk-in on 93/33 or 04/64. For more information, write to CLARC, P.O. Box 7772, Alexandria, LA 71306.

†**Maine (Kingfield)—June 27-30:** The YL International Sideband System's annual convention will be held at Sugarloaf/USA, near Kingfield. Accommodations are available at reasonable rates. RV parking. Business meetings, DX forum, tour of the Rangeley Lakes and tour of Sugarloaf/USA with lunch at the top of the mountain. For complete details and registration packet, please send a business-size s.a.s.e. (with 39 cents postage) to Phyllis Davis, KA1IJC, P.O. Box 805, Presque Isle, ME 04769.

†**Maryland (Frederick)—June 16:** The Frederick ARC will hold its 8th annual hamfest at the Frederick Fairgrounds, from 8 A.M. to 4 P.M. Admission $3; ladies and children free. Tailgaters, extra $2. Gates open for exhibitors at 8 P.M., June 15, with overnight security provided. Overnight parking welcome. Exhibitor tables: first $10; each extra table only $5 each. For additional information, write to Jim Kasunic, KA3LPC, 9419 Highlander Ct., Walkersville, MD 21793.

†**Massachusetts (Topsfield)—July 20-21:** The first Heavy Hitters Hamfest will be held at the Topsfield Fairgrounds, U.S. Rte. 1 (8 miles north of Rte. 128). Giant flea market (ample indoor space available in case of rain), food concessions and commercial exhibitors (9 A.M.-4 P.M. both days). Flea market sellers admitted at 6 A.M. Saturday. Program includes: ARRL, AMSAT, ATV and packet demos, traffic-handlers rap session and a musical coffeehouse (BYO instruments). Alternative activities: sports, local guided hike, a game of trivia and a first-aid lesson. License exams held at nearby school. For exam reservations, send a completed Form 610, $4 check payable to ARRL/VEC, photocopy of current license and an s.a.s.e. for confirmation to Topsfield Exams, c/o P.O. Box 71, Hanover, MA 02339, by June 21. Sorry—no Novice exams. Free Saturday night camping for tents and self-contained RVs. Hotels nearby. Advance tickets, $3; at the door, $4. Non-ham spouses and children admitted free. Send check and s.a.s.e. to Heavy Hitters Hamfest, P.O. Box 411, Waltham, MA 02254. Talk-in on 146.64 and 147.285. For more information, contact Russ Corkum, WA1TTV, 21 Thorndike St., Arlington, MA 02174.

Massachusetts (Yarmouth)—June 23: The Yarmouth Repeater Assn. will hold their Cape Cod Amateur Radio and computer flea market and auction at the Mattacheese School, from 9 A.M. to 4 P.M., with giant auction from 1 P.M. to 3 P.M. Excellent buys in used equipment; refreshments and free parking. General admission $1; children under 12 free. Tailgaters: $2 per car and $8 per table. Talk-in on 645/045. For more info, contact Bob Baker, KQ1K, 2 High Grove Rd., S. Yarmouth, MA 02664.

Michigan (Monroe)—June 9: The Monroe County Radio Communications Assn. (MCRCA) hamfest will be held at the Monroe County Community College, Raisinville Rd., just off M50 west of Monroe. Contests, food and trunk sales. Table space is 50¢ per ft, 8 ft minimum. To reserve tables or for information, send an s.a.s.e. with request to Hamfest, Box 237, Monroe, MI 48161, or call Dennis, N8GAI, at 313-291-3534. Talk-in on 13/73, 144.71/5.31 and 52.

Montana (Glendive)—June 16: The LYARS of Eastern Montana will hold the annual Father's Day Picnic at the National Guard Armory at the Fairgrounds. Registration starts at 8 A.M., with potluck at 1 P.M.. Licensing exams are tentative pending interest. Camping hookups are available. For more information, contact Dave Brueni, KC7AA, 215 3rd St. H.P., Glendive, MT 59330.

Nevada (Las Vegas)—June 20-23: The Young Ladies Relay League's (YLRL) 10th International Convention will be held at the Sahara Hotel. Deluxe accommodations and RV parking are available for very reasonable rates. Activities include a Hoover Dam tour, gala stage show, cocktail party, luncheon buffet and awards banquet in addition to a DX YL show, slide shows and business meetings. A convention station will be operating on 14.288 MHz and other frequencies. Registration forms are in recent issues of *Harmonics*. For complete details and information packet, send a business-sized s.a.s.e. with 39¢ postage to Jan Weaver, N7YL, 2195 East Camero Ave., Las Vegas, NV 89123.

New Hampshire (Manchester)—June 29: Fly in to New Hampshire's second largest Amateur Radio/Electronic Flea Market, to be held at the Manchester Municipal Airport, sponsored by the New Hampshire FM Assn. Rain date—Sunday, June 30. Starting time is 9 A.M.. General admission, $1 per person; sellers, $5. Sellers should bring own tables, or tailgate. Commercial displays welcome. Refreshments available. Preregistration to 123 Woodlawn Cir., Portsmouth, NH 03801. Talk-in on 52. For further information, contact Doug Aiken, K1WPM, tel. 603-622-0831, or Pete Henriksen, WA1RCF, 123 Woodlawn Cir., Portsmouth, NH 03801, tel. 603-431-5432.

New Jersey (Dunellen)—June 15: The Raritan Valley RC will hold its 14th annual hamfest on Saturday at Columbia Park. Gates open at 8:30 A.M. Sellers' spots are $5 each; no tables supplied. Lookers are $2 donation. Food and drink available. Advance tickets may be purchased from any club member. Talk-in on 025/625 and 52. Further information from any club member or by calling Jack, W2IWK, at 201-756-2546 or Ted, WB2TKU, at 201-725-3481, between 10 A.M. and 10 P.M.

New York (St. Albans)—June 2: The Ebonaire ARS will conduct their annual hamfest on Sunday, from 9 A.M. to 3 P.M., at the Southern Queens Park, former site of the St. Albans Naval Hospital. Entrance at 119-09 Merrick Blvd. Additional information from either Vince, KA2CPA, at 718-528-0416, or Art, WA2VYG, at 718-523-2319.

New York (Grand Island)—June 6-8: The First International Antique Radio Conference of the Antique Radio Club of America will be hosted by the Niagara Frontier Wireless Assn. at the Holiday Inn, Whitehaven Rd. Events will include talks, flea market and swap meet, auction of antique radios and equipment, antique radio display, tours of local attractions and banquet. For more information, contact The Niagara Frontier Wireless Assn., P.O. Box 68, Central Park Station, Buffalo, NY 14215.

†**Ohio (Akron)—June 9:** The Goodyear ARC 18th annual hamfest will be held at Wingfoot Lake Park, from 7 A.M. until 5 P.M. Family admission is $3 in advance, $4 at the gate. Flea market (outside), $2 per space. Dealers (inside shelter), $5 per table. Reservations sug-

W1AW Schedule

April 28 — October 27, 1985 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300; 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000, TTh: 0200, 1300; TThSSn: 2300, S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M.; 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	CW Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Teleprinter Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CDT	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M.; 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	CW Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Teleprinter Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
MDT	Slow Code Practice	MWF: 7 A.M., 5 P.M.; TThSSn: 2 P.M., 8 P.M.
	Fast Code Practice	MWF: 2 P.M., 8 P.M.; TTh: 7 A.M.; TThSSn: 5 P.M.
	CW Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Teleprinter Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Voice Bulletins	Dy: 7:30 P.M., 10:30 P.M.
PDT	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M.; 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	CW Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	Teleprinter Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1985 *QST*, pages 9 and 77" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 77.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Wednesdays at 2230 UTC, an IARU Region 2 bulletin in English and Spanish on 45.45-baud Baudot is sent on the regular teleprinter frequencies, beamed to Central and South America.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, when the satellite is within range. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on TThFSSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 A.M. to 1 A.M. EDT and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on July 4 and September 2.

gested. For tickets and information, contact Don Rodgers, WA8SXJ, 161 S. Hawkins Ave., Akron, OH 44313 (include s.a.s.e.), tel. 216-864-3665. Talk-in on 04/64. Park is located near U.S. 224 and SR-43, 5 miles east of Akron.

†**Ohio (Louisville)—July 14:** The 11th Annual Hall of Fame Hamfest will be presented by the Tusco ARC, W8ZX and the Canton ARC, W8AL, at the Nimishillen Grange, 64461 Easton St. Talk-in on 72/12 and 52. Registration is $2.50 in advance and $3 at the gate. Tables available for rental at $5 each on a reserved basis only (30 in × 96 in). Deadline for table reservations is July 1. Plenty of food, large flea market and forums. For more information and/or reservations, contact Butch Lebold, WA8SHP, 10877 Hazelview Ave., Alliance, OH 44601, tel. 216-821-8794.

†**Pennsylvania (Drexel Hill)—June 2:** The Delaware County ARC Hamfest will be held at the Drexel Hill Middle School at Penn Avenue and State Road, from 8 A.M. until late afternoon. Set-up at 7 A.M. Inside table space $8; tailgate space $3. Talk-in on 147.36 and 146.52. Admission $3; spouses and children under 16 free. For more information, contact David Tatum, WB3KTQ, tel. 215-644-1549.

Pennsylvania (Winfield)—June 9: The Milton ARC will hold their 14th Annual Hamfest on Sunday, from 8 A.M. to 5 P.M., rain or shine, at the Winfield Fire Hall Grounds on Rte. 15, south of Lewisburg, 8 miles south of Exit 31, on I-80. Registration is $3; women and children admitted free. There will be a flea market, auction and contest. Talk-in on 37/97 and 025/625. For further details, write or call Jerry Williamson, 10 Old Farm Ln., Milton, PA 17847, tel. 717-742-3027.

Pennsylvania (Harrisburg)—July 4: The Annual Firecracker Hamfest is sponsored by the Harrisburg RAC at the Bressler Fire Co. picnic grounds, near Exit 1 of I-283 at Rte. 441 (follow signs to Bressler). Motels and restaurants in area. Shade trees and large pavilion available with tables. Tailgating at no charge. Admission $3; women and children free. A test session open to all hams who wish to upgrade will be held nearby. Send check for $4, payable to ARRL/VEC, with FCC Form 610. Limited walk-in tests. For additional details and table reservations, contact Dave, KC3MG, 131 Livingston St., Swatara, PA 17113, tel. 717-939-4957.

Pennsylvania (Kingston)—July 7: The Murgas ARC (K3YTL) will sponsor the annual Wilkes-Barre Hamfest on Sunday, at the 109th FA Armory, Market St. (across the river from Wilkes-Barre). Setup only at 6 A.M.; general admission at 8 A.M. Registration is $3; women and children under 16 free. Tailgating, $2 per space. Tables and commercial power available. Rain or shine, indoor/outdoor tailgating. Talk-in on 01/61 and 52. For further information, write to Hamfest Committee P.O. Box 1094, Wilkes-Barre, PA 18703, or call 717-388-6863.

†**Virginia (Manassas)—June 2:** The 11th annual Manassas Hamfest sponsored by the Ole Virginia Hams ARC, Inc. will be held at the Prince William County Fairgrounds, VA Rte. 234, ½ mile south of Manassas. Tailgate setup, 7 A.M.; general admission, 8 A.M. Admission $4 per person (under 12 free); no advance sales. Activities: 25 acres for tailgating; indoor commercial exhibitors; breakfast and lunch menus on grounds; women's program; CW-proficiency awards. For further information, contact Art Whittum, W1CRO, General Chairman, Manassas Hamfest, c/o Ole Virginia Hams ARC, Inc., P.O. Box 1255, Manassas, VA 22110, tel. 703-361-4819.

Washington (Wenatchee)—June 8: The Apple City Radio Club's annual hamfest will be at Rocky Reach Dam, 7 miles north of Wenatchee on Hwy. 97. Registration is $5. June 9 banquet reservation deadline is June 3. Free camp trailer space. Talk-in on 07/67. Write Merton Hiatt, Secretary, 1002 North Surry Rd., Wenatchee, WA 98801.

†**Wisconsin (Sheboygan)—July 13:** The Sixth Annual Sheboygan County ARC Lakeshore Swapfest and Brat Fry will be held at the Wilson Town Hall, south of Sheboygan, from 10 A.M. to 4 P.M. Plenty of gear, good food. Tables are free, and camping is available at Terry Andre State Park. For a flyer and other information, call 414-457-3366 after 5 P.M. CDT, or write to KR9S, 6400 Hawthorn Rd., Sheboygan, WI 53081. Adult admission, $3; in advance $2.50; children under 12 w/family free. Talk-in on 66/06 and 52.

[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.]

In Training

Conducted By John Foss, W7KQW
Training Manager, ARRL

COLLEGE SCHOLARSHIPS FOR HAMS

How important to Amateur Radio is education? In a word, extremely. Think for a moment of our basis and purpose under Section 97.1 of the FCC Rules: to provide emergency communications, to advance the radio art, to advance communication and technical skills, to expand the number of trained operators and electronics experts, and to promote international goodwill.

Without a solid education, it would be difficult, if not impossible, to fulfill any of these. Yet, if we can't, there is no justification for the Amateur Radio Service! In short, Amateur Radio needs educated hams, whether they obtain that education through attending college or otherwise.

Should a ham decide to seek that education on a college campus, most will need all the encouragement—and financial aid—they can find. Money, lots of it, is available for just that purpose. It is available because someone understood the importance of higher education and put his/her money into a scholarship for hams seeking a college education.

Hundreds of hams have heard about, have applied for and have gratefully accepted the help offered them. But some who could have benefited from this scholarship money received none of it; they didn't know the money was there.

Many scholarships are available for and restricted to hams. Some are small, but others, if used over four years, involve thousands of dollars. Some are restricted as to what major subjects the recipients may choose. Others are entirely open in this respect. A few are restricted to certain colleges or universities, or to residents of certain areas. Others may be used at any accredited institution by residents of any area.

Hams anxious to attend college should check out these scholarships. They also should ask the financial-aid officer at the college of their choice if other aid is available. Several books listing all kinds of scholarships are available. Copies can be purchased at almost any large bookstore, or consulted in most large (and in many small) libraries. But even these books are incomplete. A scholarship might have been established half an hour after the book went to press.

How can hams determine if they qualify for a college scholarship?

- Write for information about the several scholarships administered by the ARRL Foundation, 225 Main St., Newington, CT 06111. These include the Paul and Helen L. Grauer scholarship, the Perry F. Hadlock Memorial Scholarship and the Goldwater Scholarship. Announcements about these and other scholarships appear regularly in the Happenings column. (Note: Deadline dates vary; if you've missed a deadline, be sure to apply in plenty of time for next year's scholarship.)

- Look into the variety of scholarships offered by the Foundation for Amateur Radio, Inc. (6903 Rhode Island Ave., College Park, MD 20740, tel. 301-927-1797). For details, see Happenings, April *QST;* the inquiry deadline for the 1985-86 academic year is May 31.

- Pursue the scholarships offered by clubs, such as The Atlanta Radio Club (Scholarship Committee, P.O. Box 77171, Atlanta, GA 30357), the Gulf Coast ARC (P.O. Box 595, New Port Richey, FL 33552), the Radio Club of Tacoma (1220 S. Ninth St., Tacoma, WA 98405) and the Greater Cincinnati Amateur Radio Association (c/o John Bruning, W8DSR, 6307 Fairhurst Ave., Cincinnati, OH 45213).

Strays

***QST* congratulates...**

☐ Fred Berge, KD6LY, of Woodland Hills, California, on receiving a commendation from the Los Angeles Police Department for his assistance during an investigation.

I would like to get in touch with...

☐ hams teaching Amateur Radio in summer camp who are interested in forming a net. Joel Colman, N8EDI, Camp Maas Amateur Radio, 22167 Cascade La., Novi, MI 48050.

Former ARRL President Carl L. Smith, WØBWJ (right), was among the many well-wishers greeting Capt. Ace Avakian, NDØK, upon arrival of his last flight before retiring from Frontier Airlines. The two first met in the early '50s, when Carl was a "very junior captain" for Western Airlines and Ace (then WØFHD) was a newly hired copilot for Frontier.

Silent Keys

Administered By Marvis Bogatz

It is with deep regret that we record the passing of these amateurs:

N1BZX, George J. Sanders, Waldoboro, ME
W1CLS, Ashley A. Farrar, Amherst, NH
W1CNC, Henry G. Bendett, Mystic, CT
WA1FBM, James J. O'Donnell, Westfield, MA
W1GWO, Herbert O. Schramm, Sr., Southbury, CT
KA1IVU, Richard D. Bronson, Groton, CT
W1JF, Richard R. Schellenbach, Reading, MA
*K1OCD, Thomas F. Cook, Jr., Pleasant Hill, CA
WA1OUO, Clayton Bailwitz, Haverhill, NH
W1RTI, Maurice A. Smith, Niantic, CT
KA2DWK, David Jones, Jr., Elmont, NY
N2FBC, Anthony C. Davino, Brooklyn, NY
WB2JIZ, Frederick J. Coons, Nobleboro, ME
W2KND, Kyle C. Bonifield, Asbury Park, NJ
W2KXN, Frank A. Linder, Jr., Fanwood, NJ
W2KZ, Howard A. Seyse, Depew, NY
W2LC, Lincoln A. Cundall, Rochester, NY
WB2LXF, Robert W. Kennedy, Fayetteville, NY
K2NY, Richard M. Pitzeruse, Sr., Syracuse, NY
KA2OKW, Howard J. Kallmann, Center Moriches, NY
KC2PV, Gaetano T. Orefice, Yonkers, NY
W2RID, John F. Rider, Bay Harbor Island, FL
W2ZYD, Karl O. Breed, Watertown, NY
N3AWQ, Ralph L. Bush, Kane, PA
K3HID, Robert P. Pfeifer, State College, PA
W3KHO, William H. Freeman, Havertown, PA
W3LRN, Joseph S. Barnocky, McKeesport, PA
W3MT, Frank W. Noble, Bethesda, MD
W3NKN, Walter Young, Philadelphia, PA
K3PFZ, Ralph H. Applegate, Donora, PA
K4AB, Robert W. M. Weir, Williamsburg, VA
NN4C, Gurdon K. Begeal, Port Charlotte, FL
WA4CJQ, Elbert Orr, Rome, GA
W4DST, Charles W. Boyles, Charlotte, NC
WB4EHK, Wilbur L. Clark, Johnson City, TN
KD4FT, James M. Rosenbalm, Jefferson City, TN
W4GAK, Paul B. Hames, Hapeville, GA
W4GBA, William A. Krape, Rome, GA
*W4LDB, Lorimer Clayton, Jr., Stone Mountain, GA
W4MIN, Donald L. Schaefer, Arcadia, FL
W4MNA, Vincent J. Belken, Fort Walton Beach, FL
K4OI, Ivan B. Mayfield, Murray, KY
WB4PAB, William R. Henry, Huntsville, AL
W4PDM, Clyde J. Burdette, Tryon, NC
K4PYV, Kinsman G. Boso, Deltona, FL
KB4PZ, Ernest T. Fruhner, Naples, FL
W4RF, William H. Trogdon, Denton, NC
K4RO, George K. Thompson, Mays Landing, NJ
W4TYZ, Francis E. "Frank" Ferris, Warner Robins, GA
K4UWV, Joseph T. Summers, Princeton, KY
WA4VOO, Walter H. Leveille, Saint Petersburg, FL
WB4YWR, Walter R. Davidson, Venice, FL
W5BFK, Samuel R. Colwell, Lubbock, TX
N5CIP, Ed Langston, Lufkin, TX
*KT5E, Charles W. Grimes, II, Tulsa, OK
N5FWQ, John E. Crossno, Zwolle, LA
K5GZS, Billy J. "Jack" Springwater, Tulsa, OK
W5KIC, William M. "Bud" Malone, Natchitoches, LA
W5OTD, Angelo R. Cortese, Crystal Springs, MS
K6JQ, Zachary Rosenman, Palo Alto, CA
*K6KGB, Carl F. Strahm, San Pablo, CA
W6MAC, Cyril B. "Bix" Melter, Paradise, CA
KA6NSL, Lawrence J. Backe, Jr., Chula Vista, CA
W6OSK, Lloyd S. Huntsman, Lafayette, CA
*W6POU, Robert N. Dyruff, Santa Barbara, CA
K6QIX, Norman J. Weigand, San Diego, CA
K6RBR, Kenneth H. Thompson, Calimesa, CA
K6RU, Cameron G. Pierce, Menlo Park, CA
K6UBT, Harold Riesen, Los Angeles, CA
KD6WC, Wayne L. Berthold, Folsom, CA
K6ZAJ, Wilbur C. White, Sr., Anaheim, CA
WA6ZCL, Terry B. Leal, Fresno, CA
W6ZMI, Eric G. Ketley, Riverside, CA
W7BYF, Everett G. Taylor, Davis, CA
WB7BYU, Glenneweir R. Rowden, Butte Falls, OR
W7EAJ, William P. Reed, Seattle, WA
KD7JI, Daryl L. Grove, Sun City West, AZ
W7LSP, Otis T. Kingsbury, Sr., Phoenix, AZ
KA7MMZ, E. Jack Bengert, Phoenix, AZ
K7RZM, Garrett S. Carson, Ridgefield, WA
WB7VBQ, Steven K. Trosin, Carson City, NV
W7WNC, Paul E. Glaubke, Globe, AZ
WB7WPU, Thomas A. Temby, Eugene, OR
K8CDM, Everett "Lee" Hamilton, Eaton Rapids, MI
W8CJG, Frank R. Mathews, North Fort Myers, FL
K8DBA, William F. Boylan, Monroe, MI
W8GP, Charles T. Wycoff, Lewiston, MI
WB8KKW, Harry E. Ryan, Weirton, WV
K8OGO, William A. Eggerding, Cincinnati, OH
K8OHP, Marcellus D. Allen, Mio, MI
W9EGV, John T. Frye, Logansport, IN
KA9EHC, Ervin A. Kobb, Cudahy, WI
KA9FJA, Lawrence A. Joseph, Elgin, IL
W9FLZ, Robert F. Minor, Moweaqua, IL
W9FWJ, Arthur F. Hall, South Roxana, IL
WD9GSK, William D. Michael, Centralia, IL
W9LYB, Stanley F. Dutkiewicz, Fort Wayne, IN
WB9TYV, Alfred E. DeAmico, Wauwatosa, WI
WB9VIH, Harry L. Jones, Seymour, IN
WA9WGX, James W. Jacobus, DeKalb, IL
KØACU, Elmer I. Carriker, Baldwin City, KS
WØBVQ, Alton L. Dale, Wichita, KS
WØIPL, David F. Danser, Parker, CO
WØMAL, Arietta M. Creviston, Anderson, MO
WØMQL, Donald E. Pratt, Webster Groves, MO
WØMQT, Otis A. Bergvall, International Falls, MN
WØNTK, John W. Albert, Des Moines, IA
WAØPPE, Arthur O. Williams, Belleville, KS
VE1RO, Camille Maillet, Halifax, NS
VE4CL, Wally W. Schultz, Winnipeg, MB
VE6VN, E. Leonard Groves, Lethbridge, AB

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

50 Years Ago

June 1935

☐ Hams in certain districts of New York, Chicago and other cities served by 110-v. *d.c.* mains need no separate power supply if they build W1GBE's and W2ICU's 20-watt 'phone rig. The new RK-100 gas triode, seven of which are used in the design, is the secret; even the filament is fed simply through a dropping resistor.

☐ Analysis of results of the Hartford-Boston 5-meter links active during the past several months has enabled Ross Hull to prepare a treatise, "Air-Mass Conditions and the Bending of Ultra-High Frequency Waves." (It will become a classic.) Further experimentation will continue, for comparison with changing weather conditions.

☐ The subbands for voice and c.w. were a hot subject during the annual League Board meeting. Directors had made extensive surveys of their constituents, and the decisions were against expansion of 'phone in any band. FCC is being requested to adopt a rule controlling overmodulation.

☐ There are rumors that commercial broadcasters are going to take over our 160-meter band. No truth at all, says the Editor.

☐ National Geographic Society and the Army Air Corps are sponsoring a stratosphere balloon flight to drop 55- and 108-Mc. transmitters from parachutes. Amateurs are requested to monitor and report intercepts.

☐ TETFATETE and JINRIKISHA were two of many examples of "alphabet soup" transmitted as the A.R.R.L. Copying Bee of last December got under way. Only three—W5ESK, W6ZG and W9AIN—made perfect copy.

☐ Did you blow a Type 210 amplifier when the oscillator inadvertently quit? We are reminded that bias voltage from a grid leak disappears with no excitation, letting the tube run wild. So use cathode bias, even if it slightly reduces effective plate voltage.

☐ Another, and important, Board action is the creation of a "Cairo Committee" to lay plans for securing additional amateur band space when world radio regulators meet in that city in 1937.

☐ League Trunk Lines have been doing a good job in handling the major traffic flow, and are now moving to single-frequency operation rather than individual schedules as in the past. W3EZ describes Trunk Line C as a typical new setup.

☐ F.C.C.'s schedule of exams for the summer shows a variance from daily availability in Boston to "by appointment" in Galveston and other cities. The quarterly exam points visited by a traveling inspector are also listed.

☐ Another new tube is the 838, particularly interesting as a Class B zero-bias modulator.

25 Years Ago

June 1960

☐ This is a special issue commemorating 100 years of Army signaling development. W2TBZ, Chief Army MARS, describes the beginning, in 1860, as sign language based on communication between deaf people, with history right up to today's satellite circuits.

☐ So as not to neglect the newcomer choosing the Technician route, Dutch Uncle W1ICP describes a complete band-switching 50- and 144-Mc. transmitter.

☐ World War II surplus still offers opportunities for economical construction of ham gear. W1TUW assembled a complete 80-meter rig from ARC-5 components.

☐ Getting a lower s.w.r. at u.h.f. is made easier with W8FKC's design of a coax balanced bridge using a parallel-line balun with a movable short to adjust to resonant frequency (between 200 and 1300 Mc.).

☐ Diminishing sunspot activity produces more interest in lower bands. Having limited space for 80- and 40-meter antennas, W9ERU applied a gamma match and fed his grounded beam-supporting towers as radiators.

☐ So we can get in on the current fad of 75-meter transmitter hunts, VE4CX shows us his simple loop with aluminum-foil shield and a system of mounting it on the car window for ease of operation.

☐ A new headquarters office to be constructed in Newington was okayed by the Board of Directors at its May meeting. After 37 years of dedicated service, A. L. Budlong has resigned as Secretary and General Manager, effective the end of the year; W1LVQ will take over the post.

☐ W6ISQ was convinced by W6MBA to take down his beam for inspection after several years' service. John was startled by the corrosion (congealed smog?), rusted bolts and aluminum pitting so much that he relates for us procedures to get a beam back in tip-top shape.

☐ After two years of "administrative procedures," FCC has agreed to set aside two 100-kc. segments for c.w. DX work only—at the bottom end of 50 Mc. and the top end of 144.

☐ A couple of high-school juniors in Illinois were electrocuted while attempting to erect an antenna over a high-voltage power line. The Editor uses the incident to caution us all, once again, about good safety procedures.

☐ W1YYM tabulates the 'phone results in last autumn's Sweepstakes. K5MDX made top national score; Potomac Valley Radio Club once again outscored Frankford; and 15 participants worked all sections.

☐ "Quist Quiz" is a popular puzzle feature in *QST* to test your technical mettle. K2OAW illustrates some of the tricks of *E*, *I* and *R* network analysis by showing six different approaches to solving a recent problem. —*W1RW*

Amateur Satellite Communications

Conducted By
Vern "Rip" Riportella, WA2LQQ
P.O. Box 177, Warwick, NY 10990

[Beginning with this installment, this column takes on a new conductor and a slightly new direction. In the coming months, Rip will be exploring the many opportunities available to the beginner as well as the experienced radio amateur in the ever-changing world of satellite communications. This column will not appear in July and August, but will resume a regular monthly schedule in September.—Ed.]

AMATEUR RADIO'S HIGH GROUND

What is it about space that summons adventure in us? Is it the longing to shed earthly bonds; to soar as the birds but farther? Is it the lure of the unknown, that mystical frontier? Who can say for certain?

What seems certain, however, is that in Amateur Radio, to soar is to know and operate satellites. If proponents are to be believed, satellites today are Amateur Radio's "High Ground".[1] Here we find many of hamdom's highest aspirations played out on a stage as wide as the cosmos.

Example? Many of Amateur Radio's leading-edge technologies are developed and find immediate, general application in the space context. Packet radio, ACSSB, computers, low-noise preamps, UHF antennas and other key technologies are part of the satellite scene today. Similarly, we find a broad spectrum of operating modes and practices such as DXing, ragchewing and even certificate chasing on the satellites.[2] SSB, CW, RTTY, SSTV and packet QSOs pass from earth to space and back, thousands of times a day.

This column is about high ground—aspirations. Plying space near earth are more than a dozen satellites built by amateurs for use by amateurs. Some have long since gasped their last dit-dah. Others, like AMSAT-OSCAR 10, have not even reached midlife. Together they paint a brilliant portrait of what Amateur Radio can do in its finest form, its highest plateau.

This column is also about you. You may be reading this as an experienced satellite user. Perhaps you've only heard of OSCAR and harbor a natural curiosity. Or maybe you were unaware that Amateur Radio's final frontier extends beyond earth itself. In any case, we have a dual aim here. First, we aim to illuminate what may have been perceived a remote, difficult branch of Amateur Radio. So we seek to demystify satellites. Second, by providing insight into the necessary techniques and tools, we aim to encourage all who harbor a sincere desire to get to know OSCAR "From The Ground Up" to do precisely that![3]

Many optimists assert a world-girding system of satellites providing flexible, reliable communications is but a few years away. Others see packet networks enmeshing the globe in a vast, super-net using satellites as a major conduit. Still others forecast that global communications through gateway repeaters and satellites will afford amateurs capabilities generally undreamt even now. "Can it be true," some ask, "that soon we'll be using hemispheric-coverage satellites for bulletins and emergency broadcasts to hundreds of repeaters?" Not a pipe dream nor a turn-of-the-century fantasy, these concepts are now on the drawing board being designed into real systems.

"How do we get from here to there?" you might ask.

It might help to understand where "here" really is before we try to understand where it is we are going. A baseline of knowledge, a perspective, will prove helpful in learning what OSCARs are, how they work and, most significantly, how *you*, too, can soon stand on Amateur Radio's High Ground.

Virtually every amateur soon learns radio waves travel in straight lines. So when it comes to antennas, the higher the better is normally the rule. Repeaters are often placed on mountain tops so they can relay signals between all those within line of sight of the repeater. A communications satellite carries the concept to the practical extreme. If you put a repeater high enough, you have a very-wide-coverage repeater![4]

In 1945, Arthur C. Clarke, writing in *Wireless World*, suggested that an artificial earth-satellite radio relay could enable coverage of very broad areas.[5] Twelve years later, Sputnik was launched, and the satellite age began. Four years after Sputnik, OSCAR 1, the first Amateur Radio satellite, was born. It was 1961, and the Space Age had opened to amateurs!

An OSCAR (Orbiting Satellite Carrying Amateur Radio) is a self-contained radio repeater. In space jargon, it's called a transponder. It contains a transmitter, receiver, antennas and power supply. Recent OSCARs also contain a control mechanism that permits receiving and executing commands sent from earth via radio signals on command links. The command might be as simple as "turn the transmitter on at 0130 UTC" or as complex as a computer program to orient the satellite properly with respect to the sun.

Power comes from the sun in the form of light. Hundreds of solar cells convert sunlight into electrical power. This power is stored for later use in one or more rechargeable batteries, such as ones made of numerous nickel-cadmium cells. The transponder itself is a transmitter and receiver combined in such a way as to form a repeater. Usually, the transponder input (uplink) frequency is widely separated from the output (downlink). Most often, it is in a completely different band. For example, the very popular Mode B type transponders use an uplink in the range of 435 MHz. Signals are then regenerated and transmitted on the downlink in the 145-MHz range. Wide frequency separation is necessary to avoid desensitizing the receiver.

One difference between normal terrestrial repeaters and OSCAR transponders is that the former normally carry just one QSO at a time. The repeater is adjusted to accommodate a single FM signal with less than 5-kHz deviation. On the other hand, OSCAR transponders have very wide passbands, or "channels." AMSAT-OSCAR 10 (AO-10), for example, has two transponders. The Mode B transponder has 180 kHz of bandwidth. That's enough for perhaps 100 simultaneous users, assuming a normal mix of SSB, CW and roundtable QSOs.[6] But hold on. AO-10's Mode L has 800 kHz of bandwidth. That's equivalent to the 20- and 15-meter bands combined. How many QSOs and users could Mode L accommodate? Make your own calculations!

So part of the lure of OSCAR lies in range (coverage area) and another part in capacity (bandwidth). Further interest arises because OSCAR is often usable when the ionosphere will not support over-the-horizon HF communications. So, when 15 meters is stone dead, communications on AO-10 can proceed totally unimpaired. This fact becomes especially relevant as we endure the minimum of this solar cycle.

Whether it is the challenge of being part of Amateur Radio's leading edge or the romance of the Space Age sampled through Amateur Radio, "Space is the Place!" And we suggest you may want to be a part of the excitement. If so, you may find future installments of this column helpful in your trek to the high ground. We would be gratified if you saw this column as your stepping stone, your "launching pad" as it were.

There will be new areas to explore. We'll steer you in directions where you'll find the information you need to advance. Meanwhile, you're invited to suggest topics for discussion in future columns. Although direct responses to all questions will not be possible, we'll try to address common themes and questions as space allows. Write to the address given at the top of the page. Meanwhile, you may want to brush up on some fundamentals on your own or tune in one of the several on-the-air nets available.[7,8] Current news is provided in various publications.[9] We think being an AMSAT member is a notable advantage.[10]

Notes

[1] A phrase, in the author's experience, first applied to Amateur Radio satellites by AMSAT Chairman John Browning, W6SP.

[2] The ARRL's DXCC Award will soon be available with a satellite endorsement to include all satellites, including AO-10. In addition, AMSAT has recently unveiled a comprehensive Technical Achievement Awards Program. The first component of this program, The ZRO Memorial Station Engineering Award competition, is open to all who demonstrate certain satellite-receive performance levels. Details from AMSAT.

[3] A watershed series of articles entitled "Getting to Know OSCAR—From the Ground Up" by J. P. Kleinman and C. J. Harris appeared in *QST*, beginning in January 1977.

[4] For obvious geometric reasons, a single satellite's coverage can only approach, and never attain, one-half earth coverage.

[5] A. C. Clarke, "Extra-Terrestrial Relays," *Wireless World*, Vol. 51, No. 303, Oct. 1945, Chapter 3.

[6] For reasons of efficiency, voice FM on OSCAR is discouraged. FSK modulation, while not ideally suited to satellite operation, is tolerable. FSK RTTY users are encouraged to buffer (pre-can) messages and to reduce idle time associated with low average transmission rates. Users are encouraged to experiment with advanced, efficient modulation schemes, such as PSK (phase-shift keying), which offer substantial improvements over all others.

[7] The best all-around book in the field is certainly ARRL's recently revised *The Satellite Experimenter's Handbook* by Martin Davidoff, K2UBC. Available from ARRL.

[8] AMSAT, The Radio Amateur Satellite Corporation, is a nonprofit scientific/educational organization. It builds and operates Amateur Radio satellites. Though associated with ARRL, it is not a part of ARRL. AMSAT provides several on-the-air nets on the HF bands and on AO-10. Regularly scheduled HF nets are as follows: Tuesday 75-meter regional nets: 9 P.M. Eastern, East Coast 75-Meter AMSAT Net, NCS WA2LQQ; 9 P.M. Central, Mid-America AMSAT Net, NCS W0CY; 8 P.M. Pacific, West Coast AMSAT Net, NCS N6TE. International Nets meet on Sundays: 15-meter net on 21.280 MHz at 1800 UTC; 20-meter Net on 14.282 MHz at 1900 UTC, NCSs W8GQW, N4HY or WD0HHU; Southwest Pacific Net: Saturday, 2200 UTC on 21.280 MHz, NCS W7FF and W6SP. Other regional and local nets also meet. Ask your local Area Coordinator (name and address from AMSAT).

[9] *Amateur Satellite Report* (ASR) is recognized by ARRL and AMSAT as the special-interest newsletter of the Radio Amateur Satellite Program. It is available by subscription. Business-size s.a.s.e. for sample to ASR, P.O. Box 177Q, Warwick, NY 10990.

[10] AMSAT membership open to all applicants. Information at AMSAT, P.O. Box 27, Washington, DC 20044, tel. 301-589-6062. The bimonthly magazine, *Satellite Journal*, is provided to AMSAT members.

Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN
Club Program Manager, ARRL

CLUB PROGRAM IDEAS

Here are a few "tried and true" activities for your club meetings. These programs work; I've gleaned them from the hundreds of club newsletters arriving monthly at Hq.

1) Demonstrate "Dr. DX."

2) Invite the local Disaster Services Director to speak. Contact your local Red Cross chapter.

3) Visit a local high-tech company during the weekend (the San Gabriel Valley Radio Club, Inc.).

4) Hold a tune-up party—check the deviation of FM transmitters (the San Gabriel Valley Radio Club, Inc.).

5) Organize an overview of cellular radio telephone technology—contact the local company for a speaker (L'Anse Creuse Amateur Radio Club).

6) Have a representative from the local Civil Defense agency explain how amateurs could help in a government-declared emergency (New Hampshire Amateur Radio Association).

7) Invite a Volunteer Examiner team to speak on their experiences and the Volunteer Examiner program (Chehalis Valley Amateur Radio Society).

8) Present an RTTY module on a VIC 20 computer; show how easy it is to get on RTTY these days (L'Anse Creuse Amateur Radio Club).

9) Hold an annual club auction.

10) Have a pilot talk about the VOR (VHF Omnidirectional Radio) navigation system: the type of equipment used, the frequencies and the system's usefulness to VHF operators as dependable beacons (Greater Lawrence Amateur Radio Fellowship).

11) Invite a physicist from the local university to speak about radioastronomy (Nashua Area Radio Club).

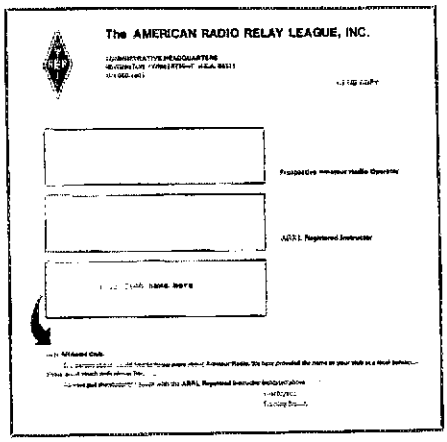
12) Have a member of a DXpedition give a slide show and talk on his/her experiences (Central Vermont Amateur Radio Club).

More next month.

PROSPECTIVE AMATEUR RADIO OPERATORS

A new dimension of our referral program began in February. When prospective Amateur Radio operators ask Hq. for information about our hobby, we send the name of a nearby affiliated club. A local registered instructor is also identified. The club is sent their own copy of the same information (see the form below).

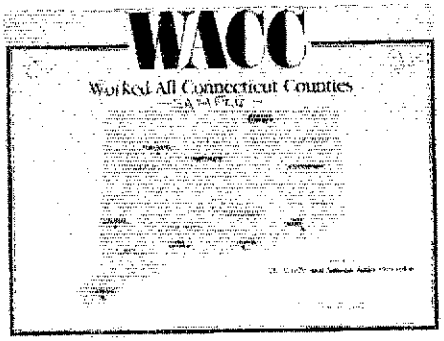
This referral program presents an ideal opportunity for you, an ARRL-affiliated club, to expand your membership base, and to introduce people to Amateur Radio at the same time. All you have to do is call prospective hams. Invite them to your meeting or to a licensing class. Make a special effort to accommodate the prospective hams at that meeting. QST


The AMERICAN RADIO RELAY LEAGUE, INC.

Newest Affiliated Clubs

Welcome to our newest affiliated clubs, whose applications were approved by the ARRL Executive Committee in March:

Allen County Team for Interference Verification, Ft. Wayne, IN
Anchor Bay Amateur Radio Club, Gualala, CA
Chico State Amateur Radio Society, Chico, CA
Condor Repeater Association, Thousand Oaks, CA
Eastern Michigan Contest Club, Adrian, MI
Electchester VHF Club, Inc., Bayside, NY
Laurel Amateur Radio Club, Laurel, MS
Oklahoma Independent Amateur Radio Club, Ponca City, OK
Radio Amateur Service Club, Baton Rouge, LA
St. Barnabas Amateur Radio Club, Livingston, NJ
St. Croix Amateur Radio Club, St. Croix, VI
Short Mountain Repeater Club, Inc., McMinnville, TN
67 Repeater Group, Gadsden, AL
Southeast Missouri Amateur Radio Club, Jackson, MO
Treasure Coasters Repeater Association, Inc., Vero Beach, FL
Ukiah Amateur Radio Club, Ukiah, CA
West Central Louisiana Amateur Radio Club, Leesville, LA
Zygo Amateur Radio Club, Middlefield, CT



The Candlewood ARA, in Bethel, Connecticut, sponsors the Worked All Connecticut Counties Award (WACC), available to amateurs who contact stations in each of the eight Connecticut counties, on any band using any mode (repeater contacts are not allowed). For more information, contact the WACC Manager, Candlewood ARA, P.O. Box 143, Bethel, CT 06801.

The South Milwaukee (Wisconsin) ARC, a 100% club, recently contributed $3200 worth of video equipment to its local fire departments for training firefighters, teaching children, and for arson and fire investigation. SMARC has made contributions to various organizations for the past 15 years—an enviable record! Shown are (l-r) WA9RDH, WD9CPT, N9BVD, Harvey Fullington, Treasurer WA9AXK, Secretary WB9TIK, WB9EQA, President W9RYA, KA9MKV and K9EVH. To the right are the chiefs of the Cudahy, South Milwaukee and Oak Creek Fire Departments.

Strays

***QST* congratulates...**

☐ Lt. Blair F. Fulton, K4KNI, of Roanoke, Virginia, on being elected commander-in-chief of the Military Order of the World Wars.

I would like to get in touch with...

☐ other amateurs who are orthodontists. Dr. Paul Supan, WB4JCY, EDC Ortho Dept., 625 Elmwood Ave., Rochester, NY 14620.

☐ Third- (or more) generation Amateur Radio operators. Tom Aughenbaugh, NY6Q, M6-59, Big Bear Lake, CA 92315.

☐ anyone interested in forming a free-thinker discussion net. Shawn Sabo, KB4KGB, 1555 Mill Run Ct., Lawrenceville, GA 30245.

☐ any amateur who served as Radar Tech. in the Fourth Marine Air Wing on Peleliu during WW II. Garland C. Baker, NY6N, 25890 Warwick Rd., Sun City, CA 92381.

Conducted By Michael R. Riley, KX1B
Public Service Manager, ARRL

Communications Guidelines for Outdoor Athletic Events

As the season for various outdoor sporting events draws near, thousands of Amateur Radio operators will be called upon to use their unique communications skills to help coordinate these activities. The following is a series of guidelines to help the public service oriented ham plan and integrate radio communications into various types of activities such as triathlons, bicycle races and foot races. We have kept this text as general as possible to enable the amateur to utilize this information on anything from a 5-kilometer footrace to a marathon involving hundreds of participants.

Planning is absolutely essential if radio amateurs are to establish smooth communications for any public service event. Such planning should consist of at least one meeting with event officials, law enforcement officers, medical and first aid personnel, and fellow radio amateurs intending to participate.

Discussions with race officials should consist of determining the exact route of the event by map study, followed by an actual tour of the course. Several things such as the possibility of inadvertent detours by participants, estimated size and location of concentrations of spectators, dangerous spots in terms of traffic, sharp turns and slippery surfaces, poor visibility, location of first aid and medical facilities, and a specific location for each Amateur Radio operator can all be determined during the tour. Radio frequencies to be utilized should also be considered during this meeting.

Race officials should be informed that amateurs are skilled communicators and should not be used as parking-lot attendants or for crowd control. Traffic control along the course is best handled by police. Each policeman should have an amateur assigned to him for communications, as the normal police frequencies may not be available for this type of work. The police may wish to establish their own command post to facilitate the flow of information from police to amateurs and vice versa. This would eliminate the assignment of an amateur to each policeman.

Identification of radio operators and their vehicles so they may enter traffic-restricted areas is most important and can be accomplished by the issuance of a recognizable pass, such as a streamer for the car antenna or a placard placed in the window of the vehicle. A placard offers the opportunity to get some valuable publicity for Amateur Radio and, therefore, is our preferred method.

Event officials should coordinate the times when communicators must be "on station," keeping in mind that it is unnecessary to keep personnel waiting for extended periods before an event.

Emergency medical care vehicles should be centrally located along the course. In many situations, only minimal medical facilities will be available. In order to make the best use of limited resources, we suggest that an amateur with hand-held radio capability be assigned to stay with the medical team for the duration of the event. When possible, a specific medical frequency should be assigned, to ensure that net control can monitor the status of all emergency vehicles without disrupting the other event communications. This is best accomplished by gaining the permission of a local repeater group and using the extended coverage of a repeater to communicate with an ambulance, which may have to take someone to a medical-treatment facility. If only one medical-support vehicle is available to the net control, quick recall through the on-board radio amateur could mean valuable seconds to an injured participant on the event course.

Coordination with law-enforcement officials is suggested during events that require alteration of traffic flow or complete road blocks. This is especially helpful if a medical emergency might require immediate response of an ambulance during the event.

Alterations of course maps have been necessary in every event that our group has participated in during the past three years. Most maps have many different symbols and landmarks for easy recognition by event participants; however, we have found that these maps (in most cases) contain information that is not essential to the amateur operator. We have modified these maps accordingly to show all communications, law enforcement and medical-support vehicle positions along the course, as well as frequencies utilized by amateurs during the event.

We have found that only one meeting with amateur operators participating in the event is needed. It should be held as close to the actual event date as possible. Each operator should be taken to his respective position following a detailed explanation of the course.

After each member understands his position and function, prerace coordination and "time on frequency" is outlined. All maps should be completed with updated information including call signs, names and frequencies. These maps should be distributed to all communicators, race officials, and medical-support and law-enforcement groups.

On the day of the event, all participating amateur operators may proceed directly to their positions, which will eliminate any last-minute confusion. A brief roll call should commence 10 minutes prior to the start of the event to assure all personnel are "on station."

Our experience in the Wilmington, Delaware, area is quite varied because of the many different requirements of local organizations. We have utilized the above guidelines exclusively, and have received many letters of commendation from local, state and national organizations. We sincerely hope that this brief article will assist amateur communicators during similiar events to maintain a high level of professionalism as reflected in our hobby, and enable those participants to enjoy a day of alternative public service communication as ambassadors of Amateur Radio.—*Bob Pegritz, N3DIP, and Mel Leibowitz, W3KET*

COMMUNICATIONS SERVICE OF THE MONTH

Greeneville, Tennesee—February 2

At approximately 3:30 P.M., a single-engine aircraft carrying two people crashed into a remote, heavily forested mountainside in eastern Tennessee. The pilot, Larry Hunt, WB4AYI, and his wife, Judy, survived the crash. Both, however, had numerous cuts and bruises, and Larry had internal injuries. The airplane was totally demolished. After pulling themselves free of the wreckage and gathering their thoughts, Larry remembered he had brought along his 2-meter hand-held radio. Finding the hand-held, he began searching for local repeaters. The first repeater he accessed was WB4IOB/R in Knoxville. He began calling "Mayday" in hopes that someone would reply. Eddie Palmer, K4LSP, responded to the distress call. After getting an approximate location of WB4AYI, Eddie directed Larry to access the WB4TUO repeater near Greeneville. Now that a reliable repeater for communications had been found, the business of locating the downed pilot and his wife began.

Matters were complicated when it was realized that the ELT (Emergency Locator Transmitter) was not working. Evening was approaching, the temperature was near freezing, and the aircraft wreckage afforded no protection from the elements. Larry and his wife decided to leave the aircraft and search for help, shelter or a landmark that would allow rescuers to find them before nightfall. To make matters worse, the battery of Larry's hand-held radio was showing signs of dying. Schedules of short transmissions

every 15 minutes were arranged between Larry and K4LSP. By this time, authorities and amateurs throughout eastern Tennessee were monitoring WB4TUO/R (which has a seven-state coverage area). The amateurs offered assistance when requested, but kept the repeater frequency clear during the scheduled transmissions by WB4AYI.

After walking well over one mile, Larry and Judy found a small clearing with two small, unoccupied trailers (similar to a hunter's retreat). One of the trailers had electricity from a commercial main and an electric stove. By this time, Larry's internal injuries were becoming a factor. Larry decided that he could walk no farther, as his breathing was becoming labored. Judy, this time, made the schedule with Dave Powell, WA4QIC, who had assumed emergency net control duties, reported finding the trailers and on Larry's condition. Medical advice was given to Judy by Dr. Robert Lash of the University of Tennessee Hospital in Knoxville. Authorities, apprised of the situation, told the couple to break into the trailer, which would give them shelter. Since the trailer had commercial electricity, she was requested to find the electric meter and report any numbers on the meter. The numbers would allow the electric company to pinpoint the location of the trailer.

Judy was back on the air shortly, reading the numbers she had found on the meter. Steve Slagle, N4KCY, contacted the Greeneville Light and Power Company, informed them of the emergency and asked for the location of the meter.

Within minutes, Steve had the information he needed. He broadcast the location of the trailer to the hundreds of listeners on WB4TUO/R, hoping that a listener could reach the couple quickly. Meanwhile Steve's wife was on the telephone with the owners of the trailer, informing them of the situation. At this time, the battery on Larry's hand-held radio was almost dead. Only a few words of each transmission were readable. Judy was informed that progress had been made in locating them, and help would be on the way shortly.

The owners of the trailer told Steve's wife that Mr. and Mrs. Danny Rollins lived near their trailer. Mr. and Mrs. Rollins were contacted immediately and informed that injured survivors of a plane crash were nearby.

Within minutes, Mr. and Mrs. Rollins arrived at the trailer. The four-hour ordeal of Larry and Judy Hunt was over. They were transported down the mountain to a hospital by ambulance. [Did Amateur Radio save the lives of Larry and Judy Hunt? I think that question can best be answered by the fact that the story of this emergency in the Greeneville, Tennessee, newspaper was accompanied by a photograph of Larry and Judy in Larry's hospital room. Larry's hand-held radio was prominently displayed in the foreground of the photo. — Ed.] *— Eddie Palmer, K4LSP, EC Greene County, and Jack Archer, WB4TUO*

IN SERVICE ...

☐ February 5-11—Suffolk and Nassau Counties, New York—Flooding and freezing rain were the cause of two auto accidents and four mechanical breakdowns during this six-day period. Amateurs participating were: K2AEX, W2DUK, KA2RGI, WB2COO and WA2SUB. (William C. Query, K2AEX, EC TOBARES)

☐ February 12-17—Athens County, Ohio. Heavy, wet snow, ice and high winds struck Ohio, knocking out commercial power and telephone service in some areas. In Athens County, emergency net operations commenced Tuesday evening and continued five days until normal

The New Hampshire Chapter of the March of Dimes and the New Hampshire Amateur Radio Association signed a Memorandum of Understanding establishing Amateur Radio support of Walkathons held by the March of Dimes. Brad Tifton, Executive Director of the Chapter, March of Dimes, signs the Memorandum as Peter Cantara, KI1M, President, New Hampshire ARA, looks on. *(photo courtesy WB1BRE)*

public services were restored. Amateurs provided communications during evacuations and emergency fuel/medical runs. Three repeaters were utilized, with the primary repeater operating on emergency power at times. A total of 27 amateurs responded during this extended emergency with KA8NIE and WD8EMS deserving special recognition. (Ted Jacobson, W8KVK, EC Athens County)

☐ March 22—Brooklyn Park, Maryland. An early morning leak of over 100 gallons of methyl acrylate forced the evacuation of approximately 1000 residents from their homes to nearby schools. The Anne Arundel ARES provided communications for the local Red Cross and Office of Emergency Management. W3VVN, WA3TOY, KC3GY, N3DEV, WA3VPL and AB3F responded. (Kurt R. Fritsch, WA3TOY—EC Anne Arundel Co.)

☐ March 23—South Central Ohio. Members of the Central Ohio ARES provided communications during a 200-mile road rally through the Tar Hollow and Zaleski State Forests. Administrative liaison communications for race officials and participants were provided during the 12 stages of the race. A total of 27 amateurs were involved. (Robert R. Adams, W8BKO, DEC COARES)

☐ March 23—New Port Richey, Florida. Amateurs provided communications during the annual Chasco Parade. AA4FG and WD8DWJ served as net controls on the simplex frequency with KE8O and N4DWY providing the same service on the repeater frequency. A total of 23 amateurs participated with N4DWY coordinating the effort. (Harry Matus, N4DWY, EC West Pasco County)

☐ March 23—Mount Hood, Washington. Radio amateurs of Vancouver, Washington, and Beaverton, Oregon, provided communications for officials and timers during the Special Winter Olympics. The Olympics included slalom, giant slalom and downhill and cross-country races. Handicapped youth from Washington State participated. Eight amateurs assisted on the ski slopes and in the lodge during the events, and provided links between four school buses used for transportation between Mt. Hood and Vancouver. (Ty Kearney, W7WFO)

☐ April 5—Monroe County, Michigan. Amateurs participated with flood-damage assessment teams surveying damage to residental areas following high winds and heavy flooding. KA8NCR, KD8LD, N8AEM, KA8DSO, N8GBB, N8FZJ and WA8EFK provided communications. (Dale R. Williams, WA8EFK, EC Monroe County)

YOUR CONDUCTOR'S CABOOSE

Monthly reports, apparently omitted in the following statistics were not received in the Public Service Branch at ARRL Hq. by April 17. The deadline for these reports, as always, is the 12th of the month.

ARRL SECTION EMERGENCY COORDINATOR REPORTS

For March, 36 SEC reports were received, denoting a total ARES membership of 17,156. Sections reporting were: ALB, AK, AZ, CO, EMA, ENY, EPA, ID, KS, MDC, ME, MI, MN, MS, NE, NFL, NYC, OH, OK, PAC, SDG, SFL, SJV, SNJ, SV, SC, TN, UT, VA, WA, WI, WMA, WNY, WPA, WV.

Reports were not received by the following Section Emergency Coordinators: BC, MAN, MAR/NFD, QUE, SASK, DE, IL, IN, ND, SD, AR, LA, KY, NNJ, IA, MO, CT, NH, RI, VT, MT, OR, EBAY, NV, SF, NC, NM, WY, AL, GA, WIN, LA, ORG, SB, NTX, STX.

SEC monthly reports for June should be received at ARRL Hq. no later than July 12. Reports received after the 12th will be entered as time permits.

National Traffic System March Reports

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	1026	33.2	.642	93.0	
CAN	31	723	23.3	.457	100.0	
PAN*	62	492	8.8	.369	81.1	
Region Nets						
1RN	62	626	10.1	.442	97.5	100.0
2RN	60	410	6.8	.360	85.2	100.0
3RN	31	328	10.6	.500	95.0	100.0
4RN	62	826	13.3	.498	79.0	100.0
RN5	62	856	13.8	.509	95.8	100.0
RN6	60	312	5.2	.318	100.0	82.3
RN7	62	495	8.0	.419	86.4	82.3
8RN	No Report Received					100.0
9RN	62	388	5.9	.284	96.0	100.0
TEN	62	456	7.4	.365	87.8	100.0
ECN	No Report Received					100.0
TWN	56	291	5.2	.313	80.0	79.0
TCC						
TCC Eastern	117	932				
TCC Central	91	816				
TCC Pacific						
Cycle Three						
Area Net						
EAN	31	384	12.4	.683	85.5	
Region Nets						
1RN	30	107	3.6	.280	97.0	87.0
2RN	31	197	6.4	.448	83.9	61.3
3RN	No Report Received					100.0
4RN	No Report Received					70.9
8RN	No Report Received					96.7
ECN	No Report Received					96.7

Cycle Four

Area Nets

EAN	31	1773	57.2	1.40	94.1
CAN	31	828	26.7	1.04	99.4
PAN	No Report Received				

Region Nets

1RN	No Report Received					
2RN	56	372	6.6	.518	85.0	
3RN	No Report Received					
4RN	No Report Received					
RN5	No Report Received					100.0
RN6	62	564	9.1	.657	97.9	
RN7	62	399	6.4	.693	92.0	
8RN	No Report Received					
9RN	62	480	7.7	.480	96.0	98.4
TEN	62	314	5.1	.331	77.6	100.0
ECN	No Report Received					
TWN	62	446	7.2	.377	85.0	

TCC

TCC Eastern	155	1459
TCC Central	62	629
TCC Pacific	No Report Received	

Sections*	5076	29,464	5.8
Summary	6243	42,246	6.8
Record	12,111	56,408	18.1

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (230): ATNM WA3N AENB AENK AEND AENZ AENX AENY (AL), BCEN (BC), SCN/1 SCN/2 SCN/V RTTY/V NCTN SCN/SB (CA), DTN DEPN SEN (DE), CFRN GN GCVTN LSTTN NFPN QFNS SVTN TPTN VEN QFN FMSN FMTN FPTN FAST FPON SEFTN SWFTN PEN PRVAN SPARC PBTN ENMC (FA), GSN GCN GSBN (GA), PTN (HI), ICN I75MNN I75MEN TLCN ITWN (IA), ITN ISN ILN (IL), QIN ITN IRN (IN), KSBN KPN KWN KMWN CSTN QKS QKS-SS KS-RTTY (KS), TSTMN WTEN 3ARES MKPN KTN KYN KNTN BARES CARN NKARC 7ARES 11ARES (KY), NCVHFTN SCVHFTN NLI- CW BAVHFTN (LI), LTN (LA), AEN MPSN PTN RACES SGN YEAR (ME), MEPN, (MD), EMRI EMRIPN EMRISS EM2MN HHTN CITN NEEPN WMN WMFN WMTN (MA/RI), MITN MACS UPN MNN QMN (MI), MSN/1 MSN/2 MSSN MSN/RTTY MSPN/N MSPN/E MNAMWXNT PAW (MN), CVE MON MOSSB MEOW MTTN ZAEN HBN PND (MO), MTN (MT), NEMP PVARC2 NESN MARES2 MARES220 ENE2ARES NCW NNN NE160 CC2 NE40 SBARES6 MNARES PVARES NEC NE75 BRARES BVARES WN (NE), WNARES (NV), NHN GSPN MCEN GSFM MSOVTP (NH), MCN NJN/E NJN/L SJVN/220 SJVN SWARN NJSN NJM OBTTN NJN NJPN (NJ), CNTN PCTN RA2MN NC/E NC/M CN CSN (NC), STN OPEN OLZ OTWN ONON QCWA-63 OCWN EATN NON (OK), OPN ODN OSND OSN2 OLN KTN TIN (ONT), WCN OSN OHNN THN OARES PTTN BSN PDXARES LBLARES SOFM (OR), EPA EPAEPTN PTTN ATN D3ARES D5ARES D6ESN PWA/ARES MAR C/ARES MARCTN (PA), QSN (QUE), SCSSBN CN CSN CNN LC2MN GPD2MN BR2MN (SC), TNCW TNPN TNVH (TN), TEX TTN TSN NET DFW (TX), BUN UCN (UT), VSN VTN (VT), EWTN NTN PSTS NWSSBN WARTS WSN (WA), WINC WINS (WI), WINC (WIN).

Transcontinental Corps March Reports

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TCC FUNCTION TRAFFIC HANDLED
5 — TOTAL TRAFFIC HANDLED

1	2	3	4	5
Cycle Two				
TCC Eastern	117	86.0	932	458
TCC Central	91	97.8	816	391
TCC Pacific	No Report Received			
Summary	91	97.8	816	391
Cycle Four				
TCC Eastern	155	92.3	1459	732
TCC Central	62	91.9	629	305
TCC Pacific	No Report Received			
Summary	217	92.1	2088	1037

TCC Roster

W4JL, W4JTE, WF4X, N5AM, N5AMK, N5BT, W5CTZ, W5KLV, KD5KQ, WB5OXE, K5UPN, KW9J, W9JUJ, W9NXG, KAØEPY, N5BB, WB5CIC, W5GHP, K5GM, K5OAF, N5TC, K5TL, KV5K, KW9J, WB9NVN, WB9UYU, KB9X, W6HI, KSØU, W1EFW, WA1FCD, W1ISO, KN1K, WINJM, N1NH, W1QYY, KA1T, KW1U, WA2FJJ, W2FR, W2GKZ, KB2HM, W2RQ, W2XD, K2ZM, W3ATQ, M3COY, WB3GZU, W3PQ, K3RZR, KQ3T, AA4AT, WA4CCK, WD4FTK, N4GHI, AA4GL, N4KB, WB4PNY, WB4UHC, W4UQ, K4ZK, W8PMJ, W8QHB, N8XX, VE3AWE, N1BHH, KA8CPS, KK3F, KB2HM, K8OZ, W8PMJ, KT1Q, KB3UD, AF8V, N2XJ, WB8YDZ.

TCC Certificates Issued This Month

W4JL, WA4JTE, WF4X, N5BT, W5CTZ, W5KLV, KD5KQ, WB5OXE, K5UPN, KW9J, W9JUJ, KAØEPY.

TCC Talk

AF8V deserves special commendation for holding down two OSCAR skeds this month. We still seek a regular Friday station.

WA4CCK resigned as IATN coordinator March 31. N4GHI took over April 1. Our thanks go to Warren for a job well done. (Robert Weinstock, KN1K, Director TCC E/c4)

Public Service Honor Roll March 1985

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following 9 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, no max.; (9) Participating in a public service event, 5 points, no max.

This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from Hq.

June reports submitted for this column should be received at ARRL Hq. no later than July 12. PSHR reports should be listed separately from Section News reports.

272
KAØARP
212
KC9CJ
195
WB5SRX
194
K7VW
164
K4SCL
157
KK3F
156
W7LRB
WB7WOW
150
VE7BNI
148
KD8KY
K4ZK
KBØZ
137
WD8MIO
135
KA3DLY
134
WB2OWO
131
KAØEPY
130
WA4QXT
W7JMH
128
AF8V
126
KA8CPS
127
WF4X
KJ3T
125
WA4EIC
124
WX4H
123
WD4KBW
120
K5CXP
118
WA2ERT
117
N4PL
KV5X
116
WA2FJJ
KD7ME
W4PIM
115
WB1HIH
114
KD8RD
W9YCV
113
VE2CP
WB1GXZ
WB2IDS

112
KD8VF
VE4AJE
111
N4EXQ
110
KA1EXJ
AL7W
WA4PFK
WA4CCK
N4GHI
K4JST
AA4AT
109
K5OAF
KA8OMM
WF6O
W7VSE
W2MTA
KB4WT
108
KC3Y
WB4WYG
107
WD5GKH
N1CPX
WØOYH
KA4SAA
106
KA1KPS
105
KC4VK
KW1U
W9FZW
W4ANK
VE7EDN
K7GXZ
104
W3YVQ
WY4T
103
W9JUJ
AIØO
KB4OZ
VE3BDM
N5AMK
102
WB4WII
101
KT5Y
KZ8Q
AG9B
WA4JDH
WA6ZUD
100
KØSI
N8AEH
WA7MEL
99
KS5V
N9BDL
WA1FCD
N4KFU
98
N7CSP
K4NLK
KA1GWE
97
AK1E

96
WB8JGW
KA6BNW
KB1AF
KC3LY
N1DBH
WØIKT
WD4ALY
95
K8CMR
KB4GPN
WD8OUO
94
KJ3E
WBØTED
93
KB7FE
W4CKS
KD7EY
92
WF4Y
N2AKZ
VE4LB
N6CVF
90
AE5I
VE3DPO
KB9LT
WD8KCQ
N6AWH
WB6QBZ
K3JL
NT4S
WB4FDT
89
WAØTFC
KA4BCM
88
KA2UBX
KA2BHR
KBØD
NDØN
KF8J
KA4RSC
87
KJ9J
W9DM
AA4HT
K2YAI
WB2RBA
KR7L
86
WB2UVB
KA4GUS
KD5FR
KA4EYE
WX4I
KA5SPT
85
W5CTZ
WA1YNZ
N8EVC
WB4HRR
84
KA9FFO
N3COY
KAØBWM
WØKK
K4VMX
83
WD9IID

KB5UL
82
WA7VTD
WØFRC
81
K7OVK
NØCLS
KD4KK
80
N8EFB
WB4VMX
79
WB4ADL
K8ND
78
WB4YQP
W2DBQ
WDØBOX
KA4MTX
KØGP
77
KA1T
KB4IVV
W2GJ
75
WA1DXT
KA2DQA
N4KSO
74
W1TN
WBØWNJ
KL7IJG
WA8GMT
WD9FRI
KA5AZK
73
KY1E
N7BGW
KY4U
K4ZN
W8QHB
KAØBCB
72
VE3WM
N2CER
VE4IX
71
N1BJW
N4JRE
NØDSA
KG2D
VE2FMQ
70
KB4LB
WA1TBY
69
N2FKA
WB5YDD
KCØOO
68
WA3UNX
WB1GLH
N5DFO
W5KLV
WD9DNQ
KN1K
KB1PA
KB5EK
WA4RNP

67
NIØR
W1RWG
KA4YEA
ND2S
K8JDI
VE2EDO
WØMDT
66
WDØGUF
KG9B
WA6QCA
WD8RHU
W7LNE
NCØR
KR4V
65
WA2KOJ
WD6BZQ
WA6WJZ

VE3KK
KØPCK
KC3AV
W4FMZ
64
W4HON
WD8KBW
K3NNI
KA1KTH
KB4BZA
WD4BSC
63
AF8S
NØEVC
WD8EIB
WD4PBF
KA4SKV
KA4IUM
AA4GL
62
VE3GT
KA8KHS
KX2T

N1BYS
WD4NYL
WA8DHB
K4KDJ
61
WØOUD
N1BGW
K4IWW
WD8EIB
WD4PBF
KA4SKV
KA4IUM
AA4GL
60
WB4TZR
WA4MNR
59
W1YOL/T
57
K4WWQ/T

56
KA6HJK/T
53
N4LFZ/T
52
WD5EEH/T
49
KA1HPO/T
47
WB1CBP/N
43
N9EJO/T
KA8GGZ/T
41
KA9RII/T
40
KA1BBU/T

Brass Pounders League March 1985

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 hour of receipt in the standard ARRL form.

June reports submitted for this column should be received at ARRL Hq. no later than July 12. BPL reports should be listed separately from Section Traffic reports.

Call	*Orig.*	*Rcvd.*	*Sent*	*Dlvd.*	*Total*
W3CUL	862	912	152	996	3399
KA9CPA	20	978	84	839	1921
KAØCZW	31	830	62	861	1784
WF4XI	13	687	559	26	1285
WD4KBW	492	561	59	17	1149
WX4H	1	540	550	16	1107
WD4IIO	433	107	457	73	1070
W9JUJ	1	506	514	2	1023
WA4JDH	2	519	452	0	973
W3VR	331	226	341	23	921
K6UYK	82	393	325	5	805
KW1U	0	456	330	4	790
K4EUK	27	363	372	15	777
N4PL	112	257	335	63	767
WD8MIO	67	379	213	38	687
KF4JA	152	183	303	24	662
WDØBAC	0	506	100	5	611
WA4QXT	18	256	290	29	593
N5AK	1	325	257	2	585
AF8V	39	224	267	35	565
W7VSE	0	284	268	8	560
W8BO	0	251	301	8	560
K6YBV	55	222	271	2	550
WB4ADL	34	247	222	20	523
WB2OWO	22	233	233	33	521
WB7WOW	0	307	207	6	520
KA8CPS	15	216	243	42	516
WF4Y	5	248	247	6	506
N7CSP	0	236	267	2	505
W4NFK	26	217	236	22	501

BPL for 100 or more originations plus deliveries:

KD8KY	115
W4NVU	470
WB5SRX	153
KH6B	216
W1FYR	113
VE7BNI	102
WB2IDS	102

Independent Nets

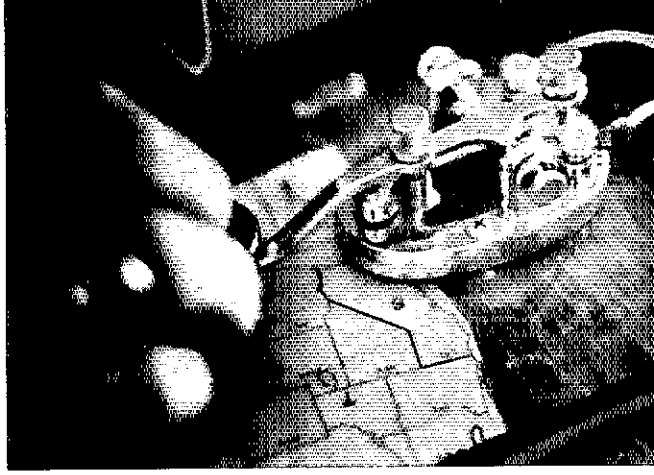
June reports submitted for this column should be received at ARRL Hq. no later than July 12.

March 1985

1 — NET NAME
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

1	2	3	4
Amateur Radio Telegraph Society Clearing House Net	62	497	374
Early Bird Net	31	—	1507
Empire Slow Speed	29	67	463
Golden Bear Amateur Radio Net	31	83	1872
IMRA	26	882	1662
Interstate SSB Traffic Net	28	1441	588
Midwest RTTY Net	49	47	276
Mission Trail Net	31	126	1135
North American SSB	23	75	218
NYSPTEN	31	68	639
West Coast Slow Speed	31	246	437
75-Meter Interstate SB Net	31	451	1200
7290 Traffic Net	47	624	2905

Results, Novice Roundup 1985



By Michael B. Kaczynski,* W1OD

As was reported in the results for the 1980 ARRL Novice Roundup, things have changed quite a bit since the premiere NR of 1952. Back then, Novices were a different breed: Their licenses weren't renewable and were valid for only one year. Their transmitters were crystal controlled, with power input limited to 75 W. These restrictions on Novice class operators made contesting a real challenge for NR competitors. Results from the 1952 event echoed this challenge: Of the 92 Novice participants, only five bested the 100-QSO plateau, even though 40 hours of operating time were permitted.

Today, long after one-year, *non*renewable tickets and most rock-bound 6L6 transmitters have gone by the wayside, Novice Roundup is still an operating challenge. The number of operating hours has been reduced to 30, while the number of QSOs required to obtain a participation certificate has doubled. Nevertheless, exactly 50% of this year's 242 Novice class entrants surpassed the 200-QSO plateau.

Why do they do it? For some operators, NR is an opportunity to increase code proficiency while on the road to the sought-after General class license. For others, it's a chance to renew past aquaintances or work toward the Worked All States (WAS) or DX Century Club (DXCC) awards. Wherever your Amateur Radio operating interests lie, Novice Roundup week fits the bill. A sincere thanks goes out to the 68 higher-class licensees who participated, (hopefully) showing us the right way to make CW QSOs.

Four of last year's top 10 finishers made it to this year's Top Ten box. Only KA3EEO/T, last year's number five Technician class finisher, bested his last year's effort, to remain number five. From the Novice side, KA7*H*BK/N moved from number six to number one, while KA8*J*BK/N (whew!) went from number 10 to number two. Last year's number five KB4DOV/N slipped to number six. Thanks to the 310 participants who sent in some type of entry and made this year's Novice Roundup an unqualified success.

Certificates are in the works, and will be mailed shortly. CU in NR '86!

Top 10

Novice		*Technician*	
KA7HBK	40,964	WB8NEE	30,870
KA8JBK	39,384	N4HOE	25,071
KA7TNN	38,480	KA1HYU	24,568
KA7UCW	35,910	KA5SPO	24,320
KA7ICF	33,592	KA3EEO	23,912
KB4DOV	31,330	KA5UPB	22,908
KB4LRX	29,250	KA7SRD	21,861
KA3MIF	27,470	KA9ORN	17,956
KA5QMO	26,928	KA1JKU	17,066
KA1LZR	26,730	KA9RFR	16,107

Division Leaders

Novice	*Division*	*Technician*
KA3MIF	Atlantic	KA3EED
KA9MSR	Central	KA9ORN
KAØRVX	Dakota	NØEQZ
KA5QMO	Delta	N4ENO
KA8JBK	Great Lakes	WB8NEE
KA2UGR	Hudson	KA2RZZ
KAØTNT	Midwest	KAØSQW
KA1LZR	New England	KA1HYU
KA7HBK	Northwestern	KA7TVE
KA7ICF	Pacific	KA6IXG
KB4IRS	Roanoke	N4HOE
KAØTVT	Rocky Mountain	KAØTON
KB4LRX	Southeastern	N4KKX
KA7TNN	Southwestern	KA7SRD
KA5QGK	West Gulf	KA5SPO

Six-year-old Matt, KB6HKG/N, used this station to place number one in the Santa Barbara Section. Matt's dad is WB6L.

SOAPBOX

It was a pleasure working in my second Novice Roundup. Everyone who was in the contest did a very good job. I hope that next year at this time I'll have upgraded. Even if I do, I'll work NR anyway (KA9PUZ). Thanks for another fun Novice Roundup. Too bad more people didn't get on 15 meters. The band was open many days with little use. The 40-meter band was crowded to the "max" (N9DMG). I was surprised how fast the bands faded in and out here. I didn't hear a "peep" on 10 meters, where I had expected a few Pacific DX contacts. Thanks to the upper-class operators who participated, especially the Extras; they really added spice and excitement (KA7HBK/N). This was my second try at NR. My only comment is to suggest that the "Hams" slow down a bit. It's especially difficult to copy the QTH (for me at least) (KA8RLD). Tnx for a great contest. My state total went from 15 to 45. Age is 11. Surprised not to work NFL, SFL and STX. I did get some hard ones, though (KA9SLM). The contest gave a new meaning to QRM. I improved my code speed a lot. It was more fun than doing homework (KA9RFR/T). (1) Where are all these people the rest of the year? (2) Where was 4-land? Still down South? (3) If I had any more fun I would have hurt myself! (KAØSQY). Testing my CW sending skills with a good friend convinced me to join NR '85 to harvest, if nothing else, a maximum of new states. It was a great experience. Starting at 5 WPM December 28 and coming out of NR clocked at 12 WPM by WØBKS/MN. Thanks for the opportunity and the fun! (KAØTVS). All in all, I had so much fun I'm already looking for another contest! Many thanks for an enjoyable (mostly), exasperating (frequently), exhilarating (occasionally) and fun (entirely) contest (KA1KDL). How can participation in an event be exhausting

KB4LED/N, from Tennessee, was one of the 121 entries who made more than 200 QSOs during NR week.

Greta, KA9SMY/N, placed number three in Illinois in NR '85.

*Contest Manager, ARRL

and refreshing at the same time? I thoroughly enjoyed the NR (KB4IRP). Novice/Tech fists get faster and cleaner each roundup. Delete the use of the word "in" between RST and Section. It's unnecessary, confusing (as in Indiana's abbreviation) and slows the ops down a bit. Just exchange RST and Section (no word "in" in between) (KO1R). I enjoyed my first contest. Especially, 73 to Generals, Advanceds and Extras who were willing to pitch in and help with crisp CW. At my QSO rate, they were a big help (KB4LSE). This completes my 29th NR. This year, with the extremely poor band conditions, I found it increasingly difficult to make QSOs with Novices/Techs because of the higher-class licensees calling "CQ NR" constantly. Looks as if you're going to have to put some "teeth" in your NR rules or this FB activity will be ruined. Please give this some consideration. Tnx and CU next year (K4EJQ).

FEEDBACK

Please refer to June 1984 *QST*, page 87, for the following correction: The third-place Novice finisher was KA2*KGD*/N.

Score Listings

Score listings indicate call sign, score, number of QSOs, multipliers (number of ARRL Sections + DXCC countries) and total hours.

1

Connecticut

KA1LZR/N 26,730-405-66-30
KA1LQR/N 14,200-264-50-26
KA1LSE/N 10,780-210-49-19
KA1LLX/N 7995-205-39-30
KA1LVC/N 3192-84-38-13
KA1LYO/N 2720-85-32-24
KA1LZV/T 1275-51-25-11
KA1MAD/N 627-33-19-
KA1LHJ/N 76-4-4-2

Eastern Massachusetts

KA1LOA/N 15,512-267-56-30
KA1MNL/N 8652-206-42-20
KA1KDL/T 1100-50-22-15

Maine

KA1DOD/N 16,399-261-59-22
N1CUE/T 12,064-232-52-30
KA1IEL/T 9196-209-44-20
KA1LHS/N 1100-55-20-9

New Hampshire

KA1HYU/T 24,568-296-83-29
KA1LBM/N 20,160-320-63-30
KA1JKU/T 17,066-322-53-30
KA1IXM/N 6601-161-41-24
KA1LDS/N 270-18-15-5

Rhode Island

KA1MFA/N 19,647-333-59-30
KA1JXH/N 3502-103-34-16
KA1KQQ/N 1300-52-25-15

Vermont

KA9GHV/1T 4-2-2-1

Western Massachusetts

KA1MCA/N 216-18-12-2

2

Eastern New York

KA2RZZ/T 14,300-325-44-26
KA2KRT/N 11,782-274-43-30

New York City-Long Island

N2FBR/T 10,756-219-45-26
KA2JJJ/T 4248-118-38-20
KA2TJN/T 3444-84-41-8
KA2RYI/T 3220-92-35-27
KA2TQV/N 2940-84-35-15

Northern New Jersey

KA2UGR/N 12,189-229-51-30
KA2TFV/N 10,080-210-48-26
KA2WFO/T 6580-140-47-19
KA2UHS/N 1700-68-25-29
KA2PZD/N 814-37-22-11

Southern New Jersey

KA2VHY/N 14,868-252-59-

Western New York

N2EXK/T 12,095-205-59-30
N2CZL/T 11,475-225-51-29

3

Delaware

KA3MIF/N 27,470-410-67-30
KA3LNA/N 21,775-310-67-30
KA3NFC/N 18,460-274-65-26
WA3BZT/T 987-37-21-5

Eastern Pennsylvania

KA3EEO/T 23,912-417-56-29
KA3MMB/N 22,833-387-59-30
KA3JHZ/N 20,050-401-50-30
KA3NAE/N 17,263-283-61-22
KA3JZS/N 14,476-288-45-24
KA3LVS/N 13,216-236-56-21
KA3IUF/T 12,601-241-51-25
KA3MJQ/N 11,008-258-43-29
KA3NED/T 6566-119-49-14
KA3NHK/N 3813-93-41-14
KA3IYW/N 3668-94-40-13
KA3MUH/N 2835-81-35-15
KA2WFT/3N 612-34-18-19
KA3NDF (+ K3QQ) 2688-84-32-10

Maryland-D.C.

KA3MGZ/N 13,440-240-56-26
KA3LOJ/N 1450-50-29-9
N3DTF/T 558-31-18-16

Western Pennsylvania

KA3MLJ/N 22,380-373-60-30
KA3MGV/N 19,050-381-50-
KA3DEN/N 17,922-309-58-30
KA3LHP/N 12,264-219-56-22
KA3KQH/N 6812-121-52-24
KA3MUJ/N 1272-53-24-

4

Alabama

KB4EXX/N 26,427-383-69-21
KB4LEL/N 15,022-259-58-27
KB4KKG/N 10,105-225-43-30
KB4LSE/N 1126-45-25-7
KB4LFH/N 608-32-19-4

Georgia

N4KKX/T 15,183-241-63-30
KB4LFW/N 12,948-249-52-19
KB4LLZ/N 3168-99-32-22
KB4LYU/N 1-1-1-1

Kentucky

KB4DOV/N 31,330-482-65-28
N4EGK/T 10,058-214-47-16
N4LGX/T 7568-176-43-22
KB4ELF/T 150-15-10-12

North Carolina

N4HOE/T 25,071-411-61-30
KA4EDF/N 13,019-267-47-20
KA4TLC/N 7029-213-33-

Northern Florida

KB4LRX/N 29,250-390-75-30
N0EDA/4T 7250-130-50-20
N4JEL/T 2040-60-34-16
KA4ZKD/N 663-29-17-7

South Carolina

KB4IRS/N 20,520-360-57-27

Southern Florida

KB4ELG/N 2960-74-40-13
KA8TDI/4N 880-40-22-21

Tennessee

KB4MKY/N 18,240-304-60-24
KA4IPH/N 12,768-228-56-22
N4ENO/T 12,412-214-58-30
KB4DMI/N 11,844-188-60-11
KB4LED/N 11,200-200-56-13
KA8OGM/N 9944-226-44-25

Virginia

KB4FAS/N 11,123-217-49-30
KA8LXJ/4N 10,251-201-51-11
KB4IRP/N 8901-207-43-28
KB4EUZ/T 4416-96-46-29
KB4DSB/T 3876-114-34-24
N9KRV/4T 3220-92-35-30
KA4SZF/N 2080-55-32-29
KB4KEM/N 1161-43-27-21

5

Arkansas

KA5PIH/N 12,320-224-55-22

Louisiana

KA5QMO/N 26,928-381-68-30
KA5UVA/N 5160-120-43-20
N5GDC/T 756-36-21-14

Mississippi

KA5UBK/N 15,072-314-48-29
KA5UQK/N 6612-174-38-29

New Mexico

KA5SUN/N 2686-79-34-20
KA5UYS/T 2622-69-38-21

Northern Texas

KA5SPO/T 24,320-380-64-29
KA5PVB/N 12,818-221-58-30
N5JHY/T 4560-110-38-16
KA5UBH/N 2800-80-35-17
KA5VAP/T 130-13-10-8

Oklahoma

KA5QGK/N 17,100-300-57-23
KA5UOI/N 16,794-311-54-29
KA5IFE/N 15,860-229-65-19
KA5SAN/T 12,264-219-54-12
KA5PNF/T 11,495-209-55-17
KA5UUU/N 11,424-204-55-22
KA5QFB/N 10,759-203-53-27
N5HOX/T 3010-86-35-15

Southern Texas

KA5UPB/T 22,908-332-69-28
KA4ZSM/5N 2720-68-40-12
KA9RAD/5N 900-36-25-15
N5HPD/T 598-26-23-19

6

East Bay

KA6IXG/T 1148-41-28-30

Los Angeles

KA6SJJ/T 10,251-201-51-29
K6AA (N6GYY, KA8ZOO, oprs.) 4494-107-42-14

Orange

KA6TNN/N 12,744-218-54-23
KB6ANC/N 10,528-188-56-30

Sacramento Valley

KB6DRW/N 7482-174-43-26
KB6HLB/N 3827-89-43-24

San Francisco

N6IIY/T 330-30-11-16

San Joaquin Valley

KA8UOC/6N 5040-120-42-18

San Diego

KB6FJQ/N 9-3-3-2

Santa Barbara

KB6HKG/N 4000-100-40-19

Santa Clara Valley

KB6BPM/N 1536-64-24-6
KB6HOK/N 609-29-19-7

7

Arizona

KA7TNN/N 38,480-495-74-27
KA7UCW/N 35,910-513-70-30
KA7SRD/T 21,861-347-63-25
KA7TVV/N 2730-81-30-14

Idaho

KA7NOC/N 10,638-197-54-21

Montana

KA7HBK/N 40,964-514-76-29
KA7QVN/N 14,823-243-61-28
KA7SME/N 1388-57-24-9

Nevada

KA7ICF/N 33,592-474-68-30

Oregon

KA7TDV/N 1944-54-36-6
KA7TDU/N 1040-40-26-4

Utah

KA7QHY/N 2380-68-35-16

Washington

KA7RCE/N 17,520-292-60-30
KA7TVE/T 14,575-265-55-25

Wyoming

KA7SQK/N 12,934-223-58-21

Alaska

KL7YY/T 135-15-9-1

8

Michigan

KA8JBK/N 39,384-532-72-30
KA8GIG/N 12,900-215-60-30
KA8UTO/N 17,536-274-63-30
KA8USK/T 12,540-228-55-27
KA8VLI/N 12,430-226-55-24
KA8VDX/N 11,395-207-55-23
KA8UEW/N 8862-211-42-30
KA8PLH/T 8736-182-48-19
KA8SOF/N 8342-194-43-30
KA8UIM/N 4305-105-41-11
KA8UXX/N 1239-59-21-

Ohio

WB8NEE/T 30,870-421-70-20
KA8SDE/T 12,141-213-57-30
KA8UFG/N 10,660-205-52-14
KA8POR/N 10,305-229-45-19
KA8SGB/N 8775-195-45-27
N8FVL/T 6392-136-47-25
KA8KSO/N 5180-140-37-25
WA8IMF/T 4223-103-41-22
KA8TNT/N 4160-104-40-18
KA8UGN/N 3328-104-32-28
KA8VAL/N 1357-59-23-14
KA8TWK/N 400-30-10-8
KA8UEQ/N 130-13-10-2
N8EUV/T 120-12-10-9

West Virginia

KA8OOD/N 18,638-328-56-30
KA8RLD/N 15,600-290-52-30
KA8JVJ/T 10,127-247-41-20
KA8TRL/T 8170-190-43-22
WD8QNT/T 6888-168-41-26

9

Illinois

KA9LAO/N 23,142-389-58-30
KA9PUZ/N 15,162-266-57-30
KA9NFJ/N 11,610-215-54-27
N9EWE/T 11,550-210-55-19
KA9BQA/T 11,515-225-49-18
KA9KOB/T 11,024-212-52-27
KA9GWM/T 10,608-221-48-23
KA9SFH/N 8632-156-52-16
KA9SMY/N 8424-162-52-15
KA9SBS/N 6576-137-48-28
WD9HSH/T 6016-128-47-23
WD9JHP/T 5852-154-38-24
KA9SLM/N 5244-114-46-11
KA9PHQ/T 4100-100-41-8
KA9SEL/N 3198-82-39-20
KA9SRK/N 2697-87-31-12

Indiana

KA9ORN/T 17,956-268-67-25
KA9LJO/N 14,340-239-60-19
KA9IWP/T 13,821-257-53-28
KA9PJL/N 9660-210-46-24
KA9SKB/N 8526-203-42-26
KA9QWG/N 7830-145-54-30

Wisconsin

KA9MSR/N 25,280-380-64-24
KA9RFR/T 16,107-273-59-29
KA9NBU/N 13,509-237-57-30
N9DMG/T 12,141-213-57-28
KA9SMD/N 9292-202-46-22
N9EKC/T 5328-111-48-27
KA9NZD/T 627-57-11-12

0

Colorado

KA0TVT/N 17,889-267-67-29
WB0VNN/N 17,344-271-64-18
KA0TON/T 8946-213-42-29
WD6HFC/0N 7200-134-50-14
KA0SQY/N 2448-72-34-29

Iowa

KA0GWK/N 6860-130-49-19
KA0TUV/N 184-23-8-6

Kansas

KA0TNT/N 24,256-379-64-30
KA0ITA/N 15,344-274-56-30
KA0SIX/N 10,980-244-45-24
KA0SQW/T 5625-125-45-30
KA0PUH/N 1947-59-33-11

Minnesota

KA0RVX/N 19,848-307-64-29
KA0SXW/N 13,939-253-53-30
KA0TVS/N 11,024-208-53-30
KA0TQY/N 3404-92-37-18
KA0TOP/T 1127-49-23-17

Missouri

KA0FSY/N 7448-152-49-19

Nebraska

KA0TFS/N 7156-159-45-18
KA0THZ/N 6808-148-46-24

North Dakota

KA7SCX/0N 19,272-264-73-28
N0EQZ/T 6380-145-44-30

South Dakota

KA0MEI/N 5198-113-46-10

Non-Novices

AI7B/E 12,720, KA2PGY/3 12,690, N6HC/E 12,204, K3TX 9708, KV8Q 7603, KA2KGP/G 7650, K4JM/E 7406, W9MP 7040, WA9JWL 6424, WA2EPK/A 6109, N5JB 6016, KC8UR 5280, W8VUV 4800, K9GXU/E 4216, N9EXY/G 4140, WA5CAC/E 3696, KO1R/E 3500, KA1CRP/G 3458, KA5GIS/7 3321, KD6GC 3300, W6PRI/G 3230, W9LHG 3204, W3IMN 2584, KA2UJH 2325, K1KI 1944, N1DGM 1742, AA3B 1679, WD8DZE/G 1652, W1FM/E 1288, WB6QLM/A 1188, KA8ODQ 1140, N3DPV 1026, KA3CHY/G 525, N5AF 684, WB4YQQ/G 682, KA0RDM/A 589, WA8LLY/6 500, KA3KAP/G 468, WB8BHF/E 462, K3ZNV 391, WB5HLB 340, KA4RLP 312, N8YE 160, WA2HSQ 144, VE7ETW 132, WB2CGI 117, KA5GVW 80, N9EQA 63, WN6AOH 35, N9ERK 16, N1CZC 1

Checklogs

W8PA, WA8NUH, WA8DDL, K8VIX/E, KV8U, K8LWP/G, KZ7V, KA7HRH/E, N4HLU/G, WU4E, VE4AAU, W3QEI/E, W3ARK, KA2NKW/G, KA2JLC/A, KA1KVQ/T KA3NHE/N, *KG6LV, KR8U*, N8FMR, KE5CP, KA1EAP/G, K4EJQ, WA9BXB/A, W3SDH, W2KTF, W8IZV, W3ADE/E

Results, 1984 Simulated Emergency Test

Compiled by Michael R. Riley, KX1B* and Mary L. Davis**

During the month of October, thousands of amateurs throughout North America "geared up" for disasters, then "got going" on a moment's notice. One can only wonder what a visitor from another planet would have thought while scanning the radio spectrum! Tornadoes, floods, chemical spills, major fires, earthquakes ... and those were only in one county! Amateurs, it seems, were actively engaged in one-upsmanship with their counterparts in nearby areas.

"Expected disasters were obviously considered, unusual disasters were, in many instances, included. So let's have them all happen at once—or maybe twice in the same day." This seemed to be the goal of many Emergency Coordinators!

An excellent case in point is the following scenario, which attests to the creativity and dedication of amateurs in Campbell County, California:

> Major flooding occurred on San Tomas Creek in the vicinity of Harriet Avenue with the Harriet Avenue bridge being washed out. Ten families were evacuated to Campbell Union High School (CUHS) shelter. Supplies for the shelter, including emergency power, were coordinated through San Jose Red Cross. Two Dept. of Public Works employees were washed into the creek, one being rescued and one lost and presumed dead. This incident was coordinated as a result of amateur personnel maintaining a "creek watch." Minor flooding of percolation ponds on Los Gatos Creek resulted in some flooded property.
>
> Severe wind caused damage to upper six floors of the Pruneyard Tower no. 1 resulting in two deaths and 17 injuries. Five of the injured were dispatched to O'Connor Hospital West and five to another local hospital. Seven were treated on the scene and released to the CUHS shelter for food and rest. Severe looting began within the Pruneyard complex, resulting in one Campbell police officer being shot and critically wounded. San Jose police and Campbell County fire personnel coordinated at the scene to provide security. The wounded officer was transported to a local medical center.
>
> A semi-trailer jackknifed on Highway 17 at the Campbell Avenue overcrossing, with two cars involved. Highway 17 southbound as well as Campbell Ave. were closed since the truck was hanging over the edge of the overcrossing. A two-vehicle accident occurred on Bascome Ave., southbound at Hamilton Ave. A small fire was reported at a local mall.

... Not bad for a day's work! The amateurs participating in these exercises were WB6KEQ, N6FKR, WA6PWT and K6ILN, Campbell County Emergency Coordinator and the "force" behind these fiascos.

A RACES station was in operation at the Texas Department of Safety Regional Office in Garland. WA5MWD and WD5JYE operate HF RTTY while NN5G and KA5IRG watch. *(WD5JYE photo)*

Monroe County (Pennsylvania) ARES members coordinated the efforts of several city and county agencies during their SET. *(photo courtesy WA3ZMC)*

SET SUMMARY

W7BGG enclosed his summary of operations along with his SET report. Since this summary is "generic" in nature, those of you who did not critique your efforts this past year may wish to consider these following areas (and work toward improvement in 1985).

1) Not enough information or details of the emergency were given at the start of the exercise. Clear, precise instructions are needed.

2) Net Control Station (NCS) did not have enough initial information.

3) Once NCS, always net control. The NCS should have at least two people at that location: one to operate, the other to log info. NCS should not be at the disaster site.

4) Too much unnecessary traffic was transmitted. NCS should keep complete control of the emergency net. Too many transmissions were made without going through the NCS.

5) NCS MUST give clear instructions of what he wants the operators to do (e.g., assignments to locations).

6) In passing medical information, operators should be apprised of the general phraseology for handling casualties to avoid the possibility of a misunderstanding when working alongside medical professionals.

7) Priorities were not given in the correct sequence.

8) Always carry spare batteries for hand-held radios and extra equipment for mobiles, such as mag-mount antennas.

How did your group compare? It's not too soon to begin planning your most creative disaster, or disasters, for the 1985 SET!

The Denver County (CO) ARES planned their response ...

... then responded. *(photos courtesy KCØVD)*

*Public Service Manager, ARRL
**Public Service Assistant

National Traffic System Area and Region Nets

Cycles One and Two

Net	Reporter	Total Points	Last Year's Total Points
Eastern Area	WB4PNY	285	656
Central Area	W5KLV	188	419
Pacific Area	KF7R	88	546
1st Region	WB1GXZ	183	394
2nd Region	W2XD	104	226
3rd Region			
4th Region	WA4CCK	320	347
5th Region	WB5YDD	341	594
6th Region	K6UYK	114	387
7th Region			
8th Region			
9th Region			
10th Region	KB0MB	239	480
12th Region			

Cycles Three and Four

Eastern Area			
Central Area	W0HI	421	419
Pacific Area	W7EP	288	545
1st Region			
2nd Region	W2MTA	144	268
3rd Region	W3NEM	120	195
4th Region			
5th Region			
6th Region	W6IPL	174	121
7th Region			
8th Region			
9th Region			
10th Region	W0SS	193	285
12th Region			

Section/Local Nets

Net	Reporter	Total Points	Last Year's Total Points
Alabama			
Alabama Traffic M	WO4E	692	775
Alberta			
Rose City ARC 2 Meter	VE6AMM	42	0
Arkansas			
Baxter Co. Weather	KE5ON	73	0
California			
Baning/Beaumont ARES/RACES/VIP	WA6HFE	47	0
Southern California SCN/CW	AI6E	124	167
Southern Solano Co. ARES/RACES	KE6IA	106	0
Sun City	K6WX	83	0
Tuolumne Co. Rptr. Assn.	W6FEJ	302	0
VHF RTTY Traffic	KA6HJK	119	100
Colorado			
CC 2 Meter FM Emergency	KA2OOA	59	0
Clear Creek ARES	WA6REX	19	0
Columbine	WARYL	96	0
High Plains ARC	WD0HDR	41	0
Northern Colorado Traffic	WD0AIT	241	0
Southern Colorado Traffic	WD0AIT	50	0
Colorado/Wyoming			
Colorado/Wyoming	WD0AIT	141	171
Connecticut			
Connecticut Phone	KA1BHT	141	187
Northwest Connecticut ARES	W1UWV	138	116
Western Connecticut	WB1GXZ	270	212
Delaware			
Delaware Valley SKYWARN	W3KET	428	0
Florida			
ARES	W8FKC	323	0
ARES	WB4TPG	164	0
Florida Medium Speed	AA4BN	114	132
Florida Midday Traffic	WB4AID	570	945
Gator	KF4U	92	0
Lee Co. ARES	WB2OUK	130	275
Manatee Co. ARES/RACES	WT4B	267	0
Martin Co Emergency	K4ZK	160	227
Okaloosa Co. Emergency	WB4PGQ	525	0
Pinellas Co. ARES/RACES	W4GPL	1632	178
Polk County ARES	WT4F	165	0
Seminole Co. ARES	WD4HBP	216	0
South Brevard Emergency	KA4ZPM	626	765
Tropical Phone Traffic	WA4OXT	147	375
W. Pasco Co. ARES	N4DWY	177	164
Gwinnett Emergency	WA4URT	75	0
Hawaii			
Kauai ARC VHF	KH6S	0	0
Illinois			
Christian Co. ARES & NCFN	W9HLX	53	21
Illinois Section CW	KW9J	294	122
Illinois Sideband	KA9AZS	274	147
Illinois Training	K9OED	71	0
Madison Co. ARES	NA9X	30	0
Piatt Co. ARES	WD9EED	187	0
W9VEY Memorial	WA9RUM	0	38
Wabash Co. RADIO	WA9THM	44	0
Indiana			
Clinton Co. ARES	K9DFK	0	0
East Central IN Rpt. Assn.	N9DGQ	49	0
Fountain Co. Storm & Emerg.	K9FAR	45	0
Hancock ARC ARES/RACES	WB9IGY	66	148
Huntington Co. ARES	WA9DRI	106	58
Indiana Fone Traffic	KD9DU	19	0
Indiana Traffic	KD9DU	246	1412
Indiana Traffic (P)	KD9DU	1245	1412
Kosciusko Co. Emergency	W9ENU	66	0
Lake Co. Indiana ARES	N9DYC	193	0
Marion ARES	N9AJM	368	315
Marshall Co.	KB9DE	18	20
Monroe Co. ARES	KA9FJS	135	121
Pike Co. ARC	WB9NCE	153	102
Porter and Lake Co. ARES	KA9LAU	386	302
Ripley Co. Repeater Assn.	KA9OAC	135	0
South Central Area	W9SID	109	80
TARS	KA9FFO	195	0
Wabash Valley Emerg. Service	N9CXI	59	178
Whitley Co. ARES Group	KA9JJB	100	60
Iowa			
75 Meter Phone	WB0AVW	375	0
Don E. Boyvey	KD0BG	114	0
Henry Co. 2 Meter	KA0BTE	37	0
Iowa Code	KQ0I	28	0
Iowa Traffic/ Emergency	W0YLS	89	0
Lee Co. Medical	WB0VYG	71	46
Ragbrai	K0IGH	536	0
South Iowa ARC	KV0H	192	0
Southwestern Iowa ARES	N0FBC	150	0
Tall Corn	W0YLS	103	0
Kansas			
Kansas Sideband	W0FRC	374	0
Zone 12 ARES	K0EQH	116	69
Kentucky			
District 6 ARES	WD4OEF	228	116
Kentucky Novice Traffic	KB4OZ	67	402
Trimble Co. ARES	WB9PFZ	0	0
Wilderness Trail ARC	WD4IXS	67	0
Louisiana			
Louisiana Traffic	N5ANH	76	111
Maine			
Aroostook Emergency	WA1YNZ	101	161
Maine Public Service	KL7IJG	164	103
Oxford Co. RACES	W1RWG	35	0
York Co. ARES/RACES	W1RWG	700	101
Maryland			
Washington Co. 2 Meter	KC3DW	75	0
Wicomico Co. ARES	KA3HUT	37	0
Mass/RI			
Aqidneck Island Comm.	W1JFF	110	79
Massachusetts			
Bellingham ARES	W1XA	58	60
Eastern Mass 2 Meter	KA1AMR	176	350
Western Mass SET	WB1DBN	209	199
Michigan			
Action 2 M	KC8SE	215	0
Holland Emerg./ N. Ottawa 2M	WB8BZF	196	124
Ionia Co. ARES	KA8PTB	71	104
Michigan Amateur Comm. System	K8LNE	246	389
Michigan Traffic	WD8EIB	151	0
Monroe Co. ARES	WA8EFK	121	229
Oakland CO. ARPSC	N8DEI	78	155
Clair Co. ARPSC	KB8TD	309	0
Top of Michigan 2M ARES	WB8POL	63	77
Washtenaw Co. ARES	KT8K	586	0
Minnesota			
Carver/Scott Co. ARES	KB0CQ	60	50
Marshall Area Emergency	WD0BZU	119	0
Minnesota Section/2	KA0EPY	57	64
Northern St. Lewis Co. ARES	WD0GUF	73	0
Rochester ARES	K0TS	136	69
Missouri			
Indian Foothills ARC	WB0SZI	100	0
CMEN	K0PCK	63	0
Cooper County Emergency	WB0ROT	30	0
Lake of the Ozarks	WB0RHC	114	0
Missouri SSB	KT5Y	109	214
Morgan Co. ARES	N0AYI	14	0
PHD Amateur Radio	WA0KUH	198	177
Special Earthquake	WB0TOK	162	0
Zero-Beaters/ARES Emergency	K9OCU	122	0
Montana			
Capital City ARES	N7DKL	41	0
Flathead Valley ARES	KA7LLI	87	0
Havre ARES	W7IDU	40	0
Nebraska			
Blue Valley ARES	WA0BOK	108	0
Cheyenne Co. 2 Meter	KA0AND	148	125
Eastern Nebraska 2 Meter	KQ0K	37	0
Midlands ARES	WD0EWH	94	0
Nebraska Cornhusker	WB0GMQ	3	0
Scotts Bluff	KA0CRI	8	0
Trails End	WB0DCD	0	0
Nevada			
Pleasants Co. Emergency	K8KXE	35	0
Western Nevada ARES	K7HRW	82	0
New Hampshire			
Coos Co. Emergency	K1OIQ	64	88
Granite State FM	KI1M	160	267
New Hampshire	NINH	55	0
Sea Coast Emergency	K1AGL	70	0
New Jersey			
Hudson Co. Area Traffic/Emerg.	WA2FPO	198	57
Hunterdon Co. Traffic & Emerg.	NE2P	103	0
Mercer Co. Traffic	W2INL	92	61
Moorestown Severe Weatherwatch	WB2UVB	48	49
New Jersey Morning CW	N2XJ	60	65
New Jersey Phone	W2CC	100	159
Severe Weather ARN	WB2UVB	211	0
South Jersey VHF	WB2UVB	196	217
South Jersey VHF NET 220 MHz	WB2UVB	36	0
New York			
CNYTN/OCREN	WA2PUU	140	160
Oneida Co. Traffic & Emerg.	WB2HLY	290	308
St. Lawrence Co. ARES	WB2NAO	35	52
Western District	WB2OWO	318	470
North Carolina			
ARES of Forsyth Co.	WA4TCR	61	148
Davidson Co. ARES	K4SWN	234	81
North Carolina Emergency	WB4HRR	249	0
Piedmont Emergency/ Traffic	WB4HRR	68	133
Rowan Co. Emergency	WB4AQK	76	0
Wilkes Co. ARES/RACES	WD4SCH	97	0
Ohio			
Athens Co. Emergency Comm.	W8KVK	111	257
Auglaize Co. SET	K8LMN	94	87
Buckeye	WD8KEN	70	0
Buckeye RTTY	W8EK	600	0
Buckeye SSB	N8AKS	175	227
Burning River Traffic	N8AKS	148	219
CLARC-ARES	KH6JCT	144	220
Central Ohio Traffic	KD8KY	354	0
Eastern Ohio Amateur Wireless	W8WPO	133	80
Firelands ARA	WD8PHL	59	52
Maser	KBERV	207	226
Medina Co. Traffic	KA8DJZ	75	43
North Coast Traffic Watch	WB8RSM	140	0
Ohio Slow	N8AEH	93	90
Ottawa Area Radio Club	WB8SGL	51	0
Ottawa Co. ARES	WA8HGH	56	0
Reservoir ARA	WA8MRL	94	0
Switzerland of Ohio ARES	KA8SQY	22	0
Tri-State 2 Meter	KZ8Q	103	0
Tuscarawas Co. Emergency	KA8HGU	154	0
W8SWS Service Net	WD8AJO	94	0
Warren Co. Disaster SVCS.	K8IOW	33	204
Wayne Co. Traffic	KA8CGF	88	0
Williams Co. ARC	KD8IC	25	47
X-WARN	KA8BCD	39	0
Ontario			
OSN 2	VE3KK	78	0
Oregon			
Bill McKeever	W8HSW	243	0
Lake Co. ARES	WA7OYC	59	0
Pennsylvania			
Armstrong County ARES	N3DOL	185	82
District 5 Emergency Services	N3BFL	75	0
Eastern Pennsylvania CW	AA3B	82	0
Erie Co. ARES	WA3HJC	124	0
Western PA CW	WA3UNX	102	132
Western PA Phone & Traffic	KC3JQ	120	184
Saskatchewan			
Rock Point ARC	VE5AES	19	0
South Carolina			
Anderson 2 Meter	WD4BUH	303	0
South Dakota			
Walworth Co. Emergency	W0YMB	15	46
Tennessee			
Blount Co. ARES	N4AOX	87	0
East TN Hospital	WA4LIJ	57	0
Knox Co. ARES	WA4LIJ	97	0
Utah			
Beehive Utah	NA7G	223	521
Davis County ARES Emergency	KA7GYW	120	58
Utah Co. ARES	KF8Q	140	0
Weber County Emergency	W7GPN	46	0
Virginia			
Eshares	WA4TVS	92	0
South Tidewater ARES	KI4LO	70	99
Southampton Co. ARES	WB4ZNB	57	0
Virginia Net	K4JST	48	0
Virginia Capital District	N4EXQ	197	0
Virginia Late	KA4IUM	67	125
Washington			
Kitsap Emergency	KC7FA	205	214
Leeny Ryerson	KA7EOV	52	0
Mason Co. ARES	KN7D	47	0
Okanogan Co. ARES	WA7ZEV	69	72
West Virginia			
Hampshire Co. Emergency	W8FZP	20	0
Kanawha ARES/ RACES	WD8AEW	103	0
Marshall Co. ARES	WD8BYXS	127	0
West Virginan ARES/ RACES	K8QED	43	164
Wisconsin			
Badger Emergency	WB9ESM	311	299
Green Ox ARES	KB9WC	65	0
Sheboygan Co. ARC	KR9R	41	0
Wisconsin Slow Speed	KC9CJ	39	0

Local Activity

Area	Total Points	Reported By	Total Points Last Year
VE			
Alberta			
Calgary	71	VE6AFO	1745
Camrose AREA	75	VE6AMM	0
Ontario			
Northwest Ontario	191	VE3JJA	301
Peterborough	150	VE3KXB	72
Saskatchewan			
Lucky Lake	61	VE5TT	0
1			
Connecticut			
Bethany	177	KA1EKC	0
District 1	175	KU1Q	0
District 6	169	KA1BRD	0
Glastonbury	90	K1SSO	0
Goshen	65	KA1JVN	41
Eastern Massachusetts			
Bellingham	108	W1XA	88
Dukes	54	KA1DJV	0
Falmouth	218	N1CLC	0
Maine			
Aroostook	134	WA1YNZ	754
York	597	WB1FBE	99
New Hampshire			
Coos	72	K1OIQ	86
Strafford	161	WA1PEL	203

Rhode Island

Newport	89	W1JFF	168

Western Massachusetts

Berkshire	423	WB1DBN	248

2

Eastern New York

Orange	125	WB2SON	178
Rensselaer	152	WB2JJE	63
Schenectady	122	N2AIG	163

Northern New Jersey

Bergen	63	W2CC	24
Hudson	220	W2KB	90
Hunterdon	318	NE2P	0
Morris	101	WB2VUF	0
Sommerville Borough	93	KA2OEE	0

Southern New Jersey

Camden	89	WB2UVB	0

Western New York

Chautauqua	141	KA2OOA	0
Delaware	58	W2TFL	67
Lewis	82	WA2OEP	85
Monroe	424	N2EH	307
Oneida	420	KB2DP	508
Onondaga	199	WA2PUU	154
Oswego	56	KY2F	0
St. Lawrence	40	KA2CNQ	64
Yates	9	WA2UKX	0

3

Delaware

Delaware	779	N3DIP	0

Eastern Pennsylvania

District 5	245	N3BFL	0

Maryland/DC

Wiconico	63	KA3HUT	0
Allegany	219	W3DFW	0
Calvert	101	W3ZNW	55
St. Marys	211	WA5UNR	0

Western Pennsylvania

Allegheny	102	N3BPB	0
Armstrong	184	N3DOL	97
Erie	209	WA3HJC	0

4

Alabama

Macon	99	K4HJX	28
Morgan	111	W4MOI	0
Tuscaloosa	115	KF4VQ	30

Georgia

Gwinnett	128	KC4LU	0

Kentucky

Bullitt	168	KA4MIU	0
District 3	176	WB4NHO	443
District 6	274	K4KWN	273
Madison	111	KI4B	0
Trimble	40	WB9PFZ	0

North Carolina

Catawba, Burke & Caldwell	123	WB4HRR	185
Davidson	219	WB4UJH	92
District E	430	WB4HRR	0
Forsyth	101	WA4TCR	200
Robson	71	WV4Z	0
Rowan	107	WB4AQK	0
Vance	113	AK4X	0
Wilkes	124	N4BEX	0

Northern Florida

Citrus	98	KD4FG	0
Hernando	299	WB4TPG	0
Marion	300	WD4RJI	442
Okaloosa	480	WB4PGQ	0
Seminole	242	W4FI	0
West Pasco	290	N4DWY	185

South Carolina

Anderson	296	W4FEV	0
Horry	484	WB8QYN	0

Southern Florida

Dade	428	W4ILT	599
Hardee	103	WD4KBW	125
Hendry & Glades	130	AA4BN	99
Highlands	83	WB4WDK	125
Hillsborough	220	KR4X	487
Manatee	277	WT4B	273
Martin	173	K4ZK	236
Palm Beach	131	KE4VR	196
Pinellas	1020	W4GPL	1156
Polk	262	WT4F	144
Sarasota	399	N4EWR	0
South Brevard	655	KA4ZPM	1032

Tennessee

Anderson	98	KY4L	58
Blount	163	N4AOX	102
Cabarous	0	N4JEX	0
Coffee	156	WB4FUR	159
Knox	227	WA4LIJ	0
West Sullivan	140	AA4DL	86

Virginia

Accomac & Northampton	122	WA4TVS	0
Capitol District	274	N4EXQ	0
Portsmouth	123	N4FTN	0
Smyth	135	KM4X	0
Southampton	80	WB4ZNB	0
Virginia Beach	90	WA4TCJ	129
Williamsburg, Charles City and James City	105	K4JST	0

5

Arkansas

Arkansas SEC	101	N5BPU	0
Baxter	157	WB5GQH	0
Bradley	66	WB5RUA	0
Cleburne	32	KA5PMW	0
Union	54	N5AHH	0

Northern Texas

Childress	18	N5CAN	77
Ellis	182	K5ASU	174
Howard	77	WD5EFJ	0
Hunt	148	K2SCU	76
McLennan	169	W5TAH	117
Morris	0	WB5QMZ	0
Northeast Dallas	233	W5BJ	0
Scurry & Borden	10	N5HFF	3
Wichita	330	WA5UTA	0

Oklahoma

Oklahoma City	0	N5PT	0
Rogers	82	N5OK	0

Southern Texas

Bexar	305	WA5RNV	400
Brazos	112	N5ETD	273
Fort Bend	148	W5WVX	114
South Texas DEC	141	W5CKC	0

6

East Bay

Benicia & Rio Vista	171	KE6IA	0

Orange

Hospital Support	246	WA6OPS	0
Liaison ARES	134	W6RE	0
N. Orange	262	WB6GUC	0
Orange	587	WB6JBI	0
Riberside	224	W6LKN	0
Riverside ARC	68	WA6KOM	66
Riverside Dist. 3	143	WA6HFE	70
Riverside Dist. 4	221	WA6PHX	399
Riverside Dist. 9	123	K6WX	0
Riberside Rgr. Unit	178	WA6FIE	0
San Bernardino	228	WD6CHR	0
San Bernardino Dist. 7	102	WD6BNG	0
San Bernardino Dist. 9	158	W6PZD	0

Pacific

Island of Hawaii	223	AH6P	0
Kauai	124	KH6S	121
Maui	144	KH6H	129

Sacramento Valley

Butte & Glenn	165	KE6EP	237
Nevada	150	N6AX	0
Placer	90	K6DMF	0
Sacramento	580	K6QIF	608
Shasta	111	KX6Q	0

San Francisco

Western Sonoma	176	W6DTV	0

Santa Barbara

Division 2	87	K6CAB	5

Santa Clara Valley

Campbell	116	K6ILN	0
Monterey	375	WD6EKR	0
Palo Alto	133	WA6NIL	0
Palo Alto RC	166	WB5VUL	0
San Jose	166	N6FBA	0
San Mateo	204	K6ITL	0
Santa Clara	182	KA6TGE	0
Santa Cruz	264	WA6OCV	0
Saratoga	159	WB6OML	0
Sunnyvale	119	WA6BAX	0

7

Idaho

Ada	124	K7CXG	0
Boise ARC Liaison	111	W7IWU	0

Montana

Flathead Valley	82	KA7LLI	0
Hill	111	W7IDK	0
Lewis & Clark	93	KS7R	0
Missoula	148	KC7HP	247

Oregon

Jackson	64	KD7DE	81
Klamath	433	W6HSW	338
Yamhill	566	W7LRB	0

Utah

Davis	123	WA7JJL	148
Utah	236	WB7RPF	0
Weber	70	WA7BVI	0

Washington

Benton & Franklin	116	KC7SZ	0
Cowlitz & Wahklakum	150	N7CFA	0
Island	137	W7GHT	215
Kitsap	284	KC7FR	274
Lewis	82	KA7EQV	0
Mason	26	KN7D	0
Okanogan	124	W7LUP	103
Skagit	187	KE7AN	0
Spokane	173	KA7CSP	294

8

Michigan

Gogebic	0	K8GXV	0
Ingham & Clinton	288	WA8BAP	191
Ionia	207	W8LCW	0
Jackson	259	KC8SE	0
Kalamazoo	99	K8OQB	117
Monroe	256	WA8EFK	362
Montcalm	241	WB8VWK	0
Ostego & Osceola	149	WB8POL	0
Oakland	767	N8DEI	811
St. Clair	234	KB8TD	507
Tuscola	88	WB8WJV	0
Washtenaw	945	N8DKM	215
Wayne	0	W8JEJ	0

Ohio

Ashtabula	95	KB8IZ	114
Athens	139	W8KVK	323
Auglaize	160	K8LMN	93
Belmont	151	K8IP	110
Brown	0	K8YGV	0
Butler	113	KR8I	92
Central Ohio	675	W8BKO	1174
Champaign & Logan	214	KC8NM	305
Clermont	497	WA8TSX	520
Columbiana	0	K8SDI	175
Crawford	83	KZ8P	0
Erie & Huron	102	WD8CHL	0
Fayette	104	WD8PHL	99
Greene	76	KA8BCD	87
Guernsey & Noble	0	WB8TRK	114
Hamilton	2178	K8JE	1443
Hancock	89	N8AEH	50
Hardin	191	W8OQL	200
Harrison	31	KD8AV	0
Highland	0	K8CKY	0
Hocking	12	N8AAW	15
Jefferson	108	WD8SAB	128
Knox	195	W8NLQ	249
Lake	137	WB8PHI	0
Mahoning	0	WB8EHS	0
Marion	425	WD8NEE	0
Medina	59	KA8DJZ	29
Mercer	160	W8DN	40
Miami	116	KS8Z	160
Monroe	81	KA8SQY	0
Montgomery & Greebe	348	W8ILC	87
Ottawa	68	WA8HGH	0
Portage	55	WD8MPV	97
Preble	140	WD8DJR	232
Putnam	172	WB8SGL	211
Richland	259	WB8GGR	0
Sandusky	113	WB8KWD	0
Scioto	4	WA8NRC	52
Seneca	154	W8MVE	152
Stark & Carroll	870	WD8AYE	1085
Summit	147	WB8HFZ	110
Trumbull	167	WB8BWY	70
Tuscarawas	121	KA8HGU	0
Van Wert	0	W8SGX	0
Warren	72	K8IOW	0
Washington	94	WB8UHP	79
Williams	133	KA8OFE	52
Wyandot	0	KA8EEH	0

West Virginia

Brooke	55	WD8MJE	66
Hampshire & Dist.	6	W8FZP	18
Kanawha	115	KB8ZM	0
Marshall	133	WD8BXS	0
Pleasants	83	K8KXE	8
Zone 1	92	K8QEW	0
Zone 5	26	WD8LKT	0
Zone 8	223	WD8SEN	0

9

Illinois

Champaign	77	KA9MNX	0
Christian	63	W9HLX	22
Du Page	218	KW9T	0
Kane	23	AA9D	0
Lake	758	KA9JMG	576
Madison	118	NA9X	0
McLean	110	K9ORP	0
Montgomery	0	WA9RUM	73
Northwest Cook	138	WB9URA	0
Platt	159	WD9EED	122
Wabash	124	AI9H	137

Indiana

Bartholomew	169	W9SIO	170
Carrol & White	345	KA9FFO	0
Clinton	0	K9DFK	0
De Kalb	168	W9QWI	127
Decatur	156	W9PRD	74
Floyd & Clark	758	KA9FDF	0
Fountain	20	K9FAR	0
Franklin	14	KW9D	27
Hancock	124	K9BRF	227
Hendricks	37	W9TIZ	109
Huntington	165	WB9EBI	0
Jackson	272	W9RTH	0
Kosciusko	81	W9ENU	0
Marion	216	N9AYM	224
Marshall	98	KB9DE	27
Monroe	209	WD9EVK	174
Owen	62	WD9BKA	57
Pike	303	WB9NCE	256
Porter & Lake	873	N9CQD	705
Randolph	118	W9VJX	122
Ripley	168	KA9OAC	85
Rush	143	N9GDQ	148
Vigo	107	N9CXI	264
Washington	18	N9DER	0
Whitley	114	WB9UNL	100

Wisconsin

Calumet	143	KN9P	0
Green Lake	92	KB9WC	0
Sheboygan	83	KR9R	0

0

Colorado

Adams	109	WB0OFR	0
Clear Creek	29	WA0REX	0
Denver	120	KC0UD	38
District 11	178	WB0EID	0
District 15	114	WA7NYU	146
District 22	218	KA0JMB	76
Jefferson	207	WA0FSZ	134
Logan, Sedgwick & Phillips	117	WD0HDR	0
Mesa	133	KD7EY	0
Morgan & Washington	46	WD0AUN	33
Pitkin	118	K0YBX	0

Iowa

Adair	275	N0FBC	0
Buchanan	65	KC0QX	0
Butler	0	WB0HNB	0
Cass	16	K0ZQ	201
Crawford	148	K0CNM	127
Harrison	148	N0AHP	101
Henry	173	KA0STE	0
Johnson	8	WB0MCX	67
Lee	187	WB0VYG	78
Mills	80	W0NRR	0
Page	0	WB0IGI	56
Plymouth	116	WD0FOY	0
Polk	184	KD0BG	106
Pottawattanie	173	KS0L	128
Scott & Dist. 6	203	K0MST	0
Wapello	276	KB0GH	0
Woodbury	116	WB0YOW	0

Kansas

Leavenworth & Atchison	123	W0NYG	0
Zone 12	137	K0EQH	172
Zone 3	167	W0PBV	185
Zone 4A	169	WB0YJT	339

Minnesota

Beltrami	168	KA0KWM	0
Blue Earth	74	WB0ZQN	0
Brown	31	WB0QFN	0
Carver & Scott	141	NI0X	105
Northern St. Louis	94	WD0GUF	68
Olmsted	233	K0TS	110
Penville	0	KA0DPY	0
Red River Valley	0	WB0BIN	0
Sioux District	193	WD0BZU	0
Wadena	64	KA0KHT	0
Watonwan	51	N0DSJ	0

Missouri

Barry	380	WB0SNG	17
Clay & Platte	126	WA0KUH	266
Cooper Franklin	77	WB0ROT	0
Gasconade, Montgomery & Warren	221	K9OCU	0
Jasper	194	KD0GU	0
Kaclude, Camden & Morgan	115	WB0RHC	0
Missouri SEC	254	WB0TOK	0
Morgan	4	N0AYI	0
Saline	104	K0GI	0

Nebraska

Central Counties	150	AJ0A	0
Cheyenne & Duel	170	WA0OQX	196
Dakota	111	NF0N	0
Douglas	191	N0AZF	305
Harlan	8	WB0GMQ	0
Keith	0	WB0DCD	0
Lancaster	102	WD0DMS	99
Scotts Bluff, Morrill & Banner	13	WD0BQM	0
York & Polk	107	WA0BOK	16

South Dakota

Walworth	57	W0YMP	67

Results, 38th ARRL VHF Sweepstakes

The January VHF Sweepstakes tradition continues . . .

By Edith Holsopple,* N1CZC and Mike Kaczynski,** W1OD

From shorter operations like those of WB2ALW, a New Yorker who took time out from the flu to get a few points, to the all-encompassing efforts of some of the bigger guns, VHF signals were out in force like ants at a picnic.

Grid squares were used as multipliers for the first time in the 1985 January VHF Sweepstakes, but the players and scores retained approximately the same relationships as before. WA3AXV is again the number-one single operator; ditto for W1VD in the multioperator category.

Activity was terrific! We received 880 entries from the January 18 and 19 contest. There are nearly 100 more entries than last year crammed into our file cabinets.

Like two-headed monsters, some of those who worked more than one band found themselves torn by indecision. Although some great meteor scatter and a short opening to Bermuda from the East Coast were reported on six meters, conditions were pretty much lukewarm on all the bands. Propagation didn't affect band choice much, but, of course, it is better to be where everyone else is—144 MHz. Of the 880 entries received here, 93.97% had spent some time on the 2-meter band. The 220-MHz band was definitely the less-traveled road.

Operating was rough on the West Coast. N6ENU said that he " . . . packed up the 4-wheel drive for two days, grabbed WA6PZL and headed for CM94, one of the most sought grid squares on the West Coast. CM94 has virtually no accessible peaks, and only a small portion is actually land. The weather was lousy with 80-mi/h winds on Saturday. No one from Los Angeles was on the air until Sunday afternoon, when the wind actually forced us off our little mound of mud. The folks were too busy picking up their roofs from their neighbors' yards to operate. The majority of our QSOs were 300 miles further away near San Francisco and Sacramento. It sure is funny what the weather can do, considering that Los Angeles was virtually line-of-sight."

Because of slight changes in the rules, this was a benchmark year, and maybe we can't compare it, score for score, with the last VHF SS; however, one can always compare number of QSOs and call sign standings. There were lots of relatively new faces on the top 10 single op list this time. King Ron, WA3AXV, led the parade again, but the neutral band conditions forced his QSO totals all across the board to slip down this year from last. In spite of more stations being active, QSO totals took a little dip, compared with last year. K3HP clambered his way to the number five slot nationally, up from ninth last year. WB2WIK single-mindedly (as opposed to going multiop as he did last year) pursued a spot on the top 10 list, reaching second place in the nation. WA3YUE followed suit to fill the eighth place. On the multiop scene, group stations W1VD, N2SB and WA2OMY graced the same positions, numbers one, two and three respectively, as they did last year. The N2BOW group moved up to fourth from fifth, and WB3CZG raced into fifth place to fill the gap. Congratulations to all those who sweated blood and tears to make the top 10, whether they made it or not.

The Mt. Airy VHF RC, more commonly known as the Pack Rats, took the unlimited class again this year. Ho hum, so what's new? Now they have an even two dozen straight wins. Their strategic location on the northeastern corridor gives them a geographical as well as a population advantage, which, when coupled with enthusiasm and hard work, turns out phenomenal results. The Delaware Valley VHF Society went charging up from their first place in the local category last year to take first place in the medium class this time around. Good work, team. The Murgas ARC zoomed into the top local category spot from fourth in '84. They deserve a pat on the back.

Viva la VHF! There is something exhilarating about VHFing that supersedes the run-of-the-mill contest operating. Something about being on the skyscraper edge of one of Amateur Radio's experimental frontiers and meeting some of Amateur Radio's most interesting proponents. This makes up for the bands' hard knocks that the VHF operator accepts as part of the game. The words of WB9ZAI sum it up nicely: "This was my first VHF competition as well as my first exposure to SSB VHF operation. The contest represented a microcosm of my Amateur Radio experiences: Homebrew converters and anten-

Top Ten

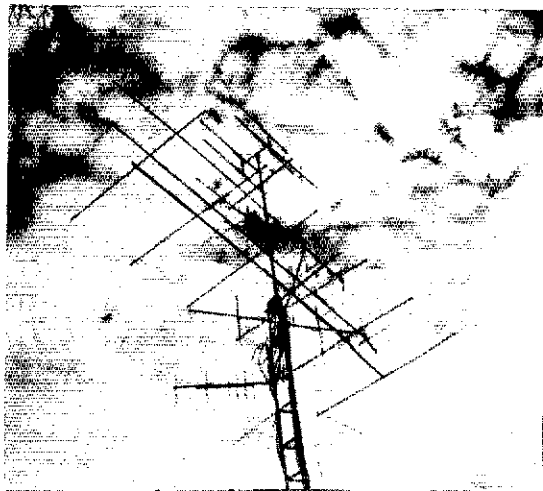
Single Operator		*Multioperator*	
WA3AXV	235,776	W1VD	614,208
WB2WIK	179,712	N2SB	583,186
KC2PX	127,848	WA2OMY	304,152
W3HFY	115,672	N2BOW	250,632
K3HP	106,020	WB3CZG	224,256
WB2YEH	103,448	W2SZ	167,628
WA2TEO	100,116	WD8ISK	155,946
WB3JYO	97,350	W3KKN	155,700
WA3YUE	92,512	W1QK	148,092
N2BJ	90,090	VE3LNX	120,064

Division Leaders

Single Op			*Multioperator*	
WA3AXV	235,776	Atlantic	N2SB	583,186
VE3ASO	40,500	Canadian	VE3LNX	120,064
W9OEH	73,124	Central	N9EDT	7236
WØXG	23,040	Dakota	KAØCRO	44
WB4JGG	23,450	Delta	WD4DGF	10,200
WB8BKC	61,380	Great Lakes	WD8ISK	155,946
WB2WIK	179,712	Hudson	N2BOW	250,632
WØRWH	25,488	Midwest	KFØM	43,862
W1JR	53,436	New England	W1VD	614,208
W7TYR	3864	Northwestern	K7NTW	80
W6RXQ	28,764	Pacific	NU6S	75,520
K2UOP/4	34,770	Roanoke	W4BFB	43,000
KC7QJ	11,280	Rocky Mountain	—	—
WA4NJP	74,936	Southeastern	KX4R	24,072
K6PVS	13,790	Southwestern	N6ENU	21,200
WA5VJB	37,560	West Gulf	—	—

WB2WIK (FN20) was kept hopping during the SS. Band changing meant chair changing, and there was lots of exercise for Steve. He climbed into second place nationally.

This is one of the two VHF antenna towers at WB2WIK. It supports a total of 171 elements for four bands.



*Assistant Contest Manager, ARRL
**Contest Manager, ARRL

Affiliated-Club Competition

Club Name	Score	Entries	Single-Op Winner
Unlimited Category			
Mt. Airy VHF Radio Club	2,617,828	66	WA3AXV
Rochester VHF Group (NY)	767,060	83	K8ZES/2
Medium Category			
Delaware Valley VHF Society	506,306	17	K3HP
Suburban ARC	340,950	16	WB2YEH
Hampden County RA	192,556	43	K1FO
Warminster ARC	157,440	26	N3DQZ
South Jersey RA	150,020	20	N2FY
Potomac Area VHF Society	136,290	6	W3ZZ
Ramapo Mountain ARC	115,996	5	WB2OOQ
West Jersey Radio Amateurs	71,246	12	KX2W
Drumlins ARC	48,232	13	KC2GZ
Six-Meter Club of Chicago	45,388	16	WD9EXD
Rochester ARC (MN)	21,970	59	WØVB
W6TRW ARC	7604	11	WA2KDL
Mobile Sixers RC	7502	14	W3AWA
Huber Heights ARC	4434	13	N8CCC
Local Category			
Murgas ARC	318,546	9	KB3EZ
S.C.O.R.E.	273,896	5	WB2WIK
Crystal RC	92,324	4	N2BJ
Mitre-Bedford ARC	58,864	4	W1JR
Wheaton Community RA	41,392	9	KR9K
Murphy's Marauders	30,126	4	K1EM
Granite State ARA	18,662	6	AC1J
Utica ARC	12,292	3	WB2SZY
Potomac Valley RC	9044	3	N3AM
Falmouth ARA	3694	3	K1AIK

Single Operator Call Area Leaders—QSOs per Band

Call	50 MHz	144 MHz	220 MHz	432 MHz	1296 & up
W1JR	36	84	52	75	16
WB2WIK	210	302	75	65	18
WA3AXV	163	335	116	125	32
WA4NJP	69	116	15	44	5
WA5VJB	34	93	23	36	12
W6RXQ	32	118	9	45	12
W7TYR	6	28	9	9	5
WB8BKC	40	105	19	65	5
W9OEH	104	136	11	46	2
WØRWH	—	119	—	29	—
VE3ASO	21	167	14	19	4

Multioperator Call Area Leaders—QSOs per Band

Call	50 MHz	144 MHz	220 MHz	432 MHz	1296 & up
W1VD	368	702	111	220	21
N2SB	298	687	153	213	51
WA2OMY	206	424	144	132	29
W4BFB	84	130	—	18	—
N5BHO	—	51	3	17	—
NU6S	52	144	53	80	11
K7NTW	5	5	—	—	—
WD8ISK	110	243	26	70	2
N9EDT	28	48	18	12	—
KFØM	26	113	10	41	—
VE3LNX	81	235	32	56	10

The hard work of the W1QK crew made them ninth in the nation. (Clockwise from upper left) N1ABY, KF6AJ and KA1TD operated 50 MHz; W1NG kept 144 MHz on the air; W1QK operated 220 MHz; and WA1WXV kept 432 and 1296 MHz alive.

Multiplier Leaders By Band

50 MHz		432 MHz	
W1VD*	60	VE3CRU	38
N2BOW*	58	K1FO	35
N2SB*	51	W1VD*	32
W2SZ/2*	48	K8WW	31
W4BFB*	44	WA3FYJ	31
WD8ISK*	42	K2RIW	30
W1NY*	41	WD8ISK*	28
K2GMZ	40	K8DIO	28
K1TOL*	40	N2SB*	28
144 MHz		**1296 MHz**	
K9AKS	58	VE3LNX*	7
WD8ISK*	58	WA3JUF	7
K9MRI	51	WB3ESS	7
K2LWR	50	WA3AXV	7
W8ULC	50	N3CX	6
WØRWH	50	N2SB*	6
KA8IFC	48	WA1JOF	6
W1VD*	45	WB3CZG*	6
K4MSK	45		
WA4MJP	45		
220 MHz			
W1VD*	24		
WB3CZG*	23		
WAØDCB*	20		
W2SZ/2*	20		
VE3LNX*	18		
N2SB*	18		
WA2OMY*	17		
WB2WIK	17		

*Multioperator Station

nas competing equally, through persistence and good operating, with powerful stations (1 kW+) and massive antenna arrays; old tube equipment (like mine) surfacing on the band alongside the latest solid-state and digital gear; reacquaintances with old friends for a casual QSO, and new grid squares from distant corners; and after the contest, of course, talking amongst friends about that QSO that "got away." I like it. I think I'll stay!" See you next time.

SOAPBOX

Wow, new grid squares doubled my multipliers (KAØGAD). Despite the low score, I enjoyed every minute of it (VE3IHS). I thought conditions were okay for this time of year. However, 2, 220 and 432 sounded like aurora from all the phase noise generated by the new multimode transceivers (W1JR). This was my first contest. Next project—a cure for hoarseness (VE3MWM). Perhaps the next contest will bring random 10 GHz and 2304 contacts (WA3TXR). Murphy almost got me. One of the mast clamps on my rotator broke just before the contest, and I had to stand on an icy roof in 20° F just to fix the thing (KA1IOR) ... even the 220 transverter seems to have survived the 100 W drive I applied to it. Thank God for tubes! (WA1TFH). When searching for other stations, analog tuning (the old way) seems more effective than digital tuning (AC1J). Conditions on 432 were up and down like a yo-yo (W1RIL). The contest was enjoyable between loads of laundry, cooking, baking cookies, playing checkers with Sarah, etc. etc. (KA1MEW). The power supply for the 2-meter and 220 rigs would trip if my transmission was longer than 10 seconds ... it definitely helped keep exchanges short (N1SR). Conditions were okay for January, but windstorms just prior to the contest blew in a lot of line noise by loosening up the neighborhood insulators. Six meters in particular was very noisy (K3ZO). Next year, I need a motorized crank to do the chores! I can't work CW after my hands get numb from cranking in subfreezing temperatures (WB3LNZ). Best 432 DX was WA4ZIA, EM-95, 541 airline statute miles. No band opening, just good equipment on both ends (K2RIW). Anyone have a better way to dupe the AA-AL and KA-KZ? It is a pain to write out the complete call now that they're so common (KE2N). What happened to old-fashioned courtesy? There were some awfully wide amplifiers on frequency. It is nice to see more activity from WPA and WNY (KC2TJ). My 220-MHz XVTR was determined to self-destruct during the contest. After 20+ years of VHF contests, I always take time to chat for a few with the usual contest regulars. Enough of low-power contest operating. Next contest, more power on all bands. My QRP phase has ended (WA2UDT). It was nice to see all the VEs this year, tnx (N2BOW). Everything was fine until my 100th contact on 2 meters. That's when the dupe sheet caught on fire, and I had to rewrite it (KA2JKI). Three watts was quite a challenge ... humbling, too (W3IFM). Noise, noise, noise, but fun, fun, fun (WA3FYJ). The high point of the contest was VP9GE on 6 meters (WB4NJG). I thought they

evacuated the EM nineties. We paid for the Sept test! (K2UVG). Roses are red, violets are blue. Sure needed a rig for 432 (KX4R). After years of trying, I've finally come up with an antenna system that has competitive performance, is easy to erect single handedly, will fit in my Mustang and can be stored in my apartment (AA4ZZ). The contest was great here in Central USA. I was surprised at the activity. I had more QSOs and more grids than the Sept. test! I feel overall interest in VHF/UHF is on the upswing (K5YY).

FEEDBACK

The following are corrections to the 1984 January VHS SS Results in June 1984 *QST*, pp. 83-86. In the Local Category club competition, Suburban should be second with a score of 138,944. The top operator was K3MTK and there were eight entries. Murgas ARC was fourth place with a total of 95,152 points. Their top operator was KQ3R, and they had five entries. In the score listings, WB3JYD should be WB3JYO, and KB9QL should be K9BQL. WA2VYA and KA2NYF should have been listed with N2SB.

Scores

Call, score, QSOs, multiplier, bands operated (A = 50 MHz; B = 144 MHz; C = 220 MHz; D = 432 MHz; E = 1296 MHz; F = 2.3 GHz; H = 5.7 GHz; I = 10 GHz). Bold denotes single-band winners.

1

Connecticut

K1FO 32,620- 233- 35-D
K1EM 29,842- 312- 43-ABCD
WA1EHL 24,850- 281- 35-ABCD
KA1BXB 23,392- 246- 43-ABCDE
W1XX 16,440- 246- 30-BD
WB1BXS 12,264- 292- 21-B
K1GX 12,240- 197- 30-ABD
AB1U 8950- 157- 25-BCD
W1FAJ 8528- 134- 26-ABCD
N1CGP 7410- 195- 19-B
WA1CVN 6612- 122- 23-AB
WA1ZNT 2072- 74- 14-AB
WA1HYN 1820- 91- 10-B
W1CNU 1116- 62- 9-B
WA1GTP 480- 30- 8-AB
K1IN 210- 35- 3-B
K1WVX 184- 46- 2-B
N1JW 72- 18- 2-B
WA3VIL 4- 2- 1-B
W1WEF/M 2- 1- 1-B
W1VD (+ K1JX, KA1GD, WA1STO) 614,208-1422-168-ABCDEIJ
W1QK (+ KA1s ECL, TD, KF6AJ, N1ABY, W1NG, WA1WXV) 148,092- 681- 86-ABCDE

Eastern Massachusetts

W1JR 53,436- 263- 61-ABCDE
WA1JOF 24,948- 184- 42-BCDE
WA3TXR 24,024- 191- 42-ABCDEI
W1GXT 14,208- 148- 32-ABCDE
K1SRZ 8760- 165- 20-ABCD
WB1FKF 7896- 105- 21-BCDE
AJ1E 6468- 127- 21-BD
KB1KM 5814- 126- 19-ABD
KX1C 5160- 100- 20-ABCD
KA1OHO 4826- 101- 19-ABCDE
W1FM 4788- 101- 19-ABD
W1TR 3390- 113- 15-AB
K1DAT 2340- 90- 13-A
K1AIK 1898- 73- 13-B
N1CPK 1400- 52- 10-ABD
W1FJ 1392- 58- 12-B
KA1IOR 1220- 61- 10-B
W1AX 1056- 48- 11-B
W1JOT 1022- 49- 7-BDE
K1CHY 624- 38- 8-ABC
K1VZI 612- 35- 6-AC
K5MA 576- 32- 9-B
WA1YFZ 378- 27- 7-B
N1CKO 16- 8- 1-B
WA1MZG (+ K1KEC, KV1E, KV1J, N1BRM) 24,800- 259- 40-ABCD
W1XM (KA9IGZ, N1CPK, W1XG, oprs.) 12,366- 139- 27-ABCDE

Maine

K1TOL 7440- 93- 40-A
W3HQT/1 6240- 92- 26-BDE

New Hampshire

WA1OUB 51,912- 412- 63-AB
AF1T 35,148- 231- 58-ABCDEI
WA1TTH 29,640- 323- 40-ABCE
AC1J 15,444- 200- 33-ABCD
W1JSM 5922- 134- 21-BD
W1QWJ 3128- 92- 17-AB
W1ENE 1452- 66- 11-B
KB1QV 936- 52- 9-B
KA1XD 510- 51- 5-B
WB1ADF 300- 25- 6-B
KA1JDJ 20- 5- 2-B

Rhode Island

K9SB/1 2492- 89- 14-B
K1DS 280- 26- 5-ABC

Vermont

W1AIM 9288- 94- 43-ABCD
WA1ZOJ 3040- 76- 20-B

Western Massachusetts

W1RIL 19,680- 244- 30-BDE
WA1MBA 19,158- 249- 31-BDE
K1ISW 16,170- 209- 33-ABCD
K1SND 5544- 142- 18-ABD
WA1UZX 5032- 148- 17-BC
N1PF 3604- 100- 17-ABD
W1JP 3146- 121- 13-B
KA1CRX 2912- 112- 13-AB
WB1APD 2400- 100- 12-B
WB1HAB 2106- 117- 9-B
KA1CTM 2100- 105- 10-AB
WB1FIP 2002- 91- 11-B
WB1EHS 1958- 89- 11-B
WA3EEC 1704- 71- 12-AB
KA1KRJ 1572- 131- 6-B
KA1MEW 1400- 100- 7-B
W1CJK 990- 47- 9-BD
WB1CXC 900- 50- 9-B
K1JDL 800- 80- 5-B
K1GXU 720- 45- 8-AB
WB1GLZ 648- 54- 6-AB
AC1T 630- 45- 7-B
KB1MU 624- 78- 4-B
N1SR 600- 49- 6-ABC
W1RED 570- 57- 5-B
W1ALL 376- 47- 4-B
N1CRO 348- 58- 3-B
W1KK 340- 34- 5-B
K1MAL 308- 77- 2-B
WB1DLH 284- 71- 2-B
KB1Y 282- 47- 3-B
KA1DNX 272- 34- 4-B
K1BUB 228- 38- 3-B
WA1EYF 208- 52- 2-B
W1UWX 200- 23- 4-BC
KA1CAX 186- 31- 3-B
W1DGJ 152- 38- 2-B
KA1CQL 152- 38- 2-B
KA1KPH 148- 37- 2-B
W1JWV 148- 37- 2-B
WA1VHU 148- 37- 2-B
K1JG 120- 12- 5-B
WB1GLX 88- 22- 2-B
KA1JDY 80- 20- 2-B
WA1LES 30- 15- 1-B
W1NY (AC1T, K1DFC, KA1s APR, KPH, MCA, W1KK, WA1UQC, WB1CAC, oprs.) 110,544- 579- 84-ABCD
K1TR (+ K1s BA, EA, IO, N1BEM, N2FU, WA1s ONB, PBU, VFJ) 97,104- 558- 68-ABCDE
K1BE (+ KA1DNX, WA1PUX) 7350- 163- 21-ABD
WB1ETS (+ N1AEH) 2808- 108- 13-B

2

Eastern New York

WA2TEO 100,116- 502- 81-ABCDEF
N2BJ 90,090- 507- 65-ABCDE
WA2TIF 52,624- 415- 52-BD
KA2JUV 6480- 135- 24-B
WB2IAE 5544- 126- 22-AB
WA8TTS/2 3780- 45- 21-D
KG2H 2652- 78- 17-B
W2AWF 2006- 59- 17-B
NB2R 1820- 70- 13-B
W2AWX 1710- 49- 15-ABD
KA2O 1440- 44- 15-BD
W2YJO 1274- 49- 13-B
WA2MEE 996- 83- 6-B
NC2R 756- 63- 6-B
N2DLL 742- 53- 7-AB
WA2RUW 728- 26- 7-C
WB2NEC 496- 18- 8-BDE
KD2IX 360- 30- 6-B
W2SZ (KA1DZV, K2TR, KA2JUV, NF2B, W2ARQ, WA2AAQ, WA2SPL, WB2KMY, oprs.) 167,628- 582-122-ABCD
KA2AMO (+ KA2s CCH, NBA) 5040- 105- 24-B

New York City & Long Island

K2RIW 20,400- 170- 30-D
K2QVS 18,056- 217- 37-ABD
KE2N 11,950- 239- 25-B
KC2GI 8028- 223- 18-B
WA2EUS 1200- 51- 10-BD
WB2ENW 1122- 51- 11-B
WB2ALW 984- 37- 12-ABCD

Northern New Jersey

WB2WIK 179,712- 870-104-ABCDE
KC2PX 127,848- 569- 84-ABCDE
KT2B 35,904- 816- 44-ABCDE
WB2QOQ 32,042- 433- 37-B
KC2TJ 24,960- 282- 40-ABD
W2RS 19,170- 355- 27-B
N2AAZ 18,360- 255- 36-AB
N2BMN 15,336- 204- 36-ABE
WA2JSW 14,756- 238- 31-AB
WA2FGK (K2LNS, oprs.) 13,984- 152- 23-D
WA2UDT 10,212- 187- 23-ABCD
WB2HVF 6150- 105- 15-B
WB2DGJ 5096- 144- 13-BD
WB2ONA 4140- 84- 15-BCDE
N2EJO 3864- 138- 14-B
WA2ALM 3810- 127- 15-B
KA2KWS 3312- 129- 12-BD
K4BNC 3264- 102- 16-AB
WB2BPY 3080- 110- 14-B
N2BOW (N2CEI, N2EOC, WB2ULI, oprs.) 250,632- 860-118-ABCDEI
N2WM (+ N2s CJS, ERH, EWV, WA3WUD) 41,830- 383- 47-ABCD
K2BJG (+ WB2RFB) 31,668- 232- 42-ABCDE
WA2VUN (+ W2HWG) 25,370- 268- 43-ABCD
K3QM (+ KA3ETI, WB2INB, WB2BHC) 18,140- 302- 29-ABD
WB2PSD (+ KC2GE) 13,770- 215- 27-BD

Southern New Jersey

WB2YEH 103,448- 524- 67-ABCDEF
W2EIF 58,384- 458- 41-ABCDE
N2FY 45,006- 426- 39-ABCD
KA2JKI 37,506- 271- 47-ABCDE
K3GYS 32,538- 354- 33-ABCDE
KS2T 31,332- 303- 42-ABCD
W2HRW 30,448- 332- 44-ABD
WA2GTJ 29,214- 437- 27-ABCD
W2PAU 28,544- 386- 32-ABD
K2TXB 27,864- 387- 36-B
KX2W 25,200- 350- 36-AB
K2SQS 23,622- 381- 31-AB
WB2VLA 23,312- 318- 31-ABC
N2AHN 21,728- 324- 28-BD
K1TQ 20,196- 284- 27-ABCD
KA2RWA 18,630- 304- 27-ABD
WA2ONK 17,342- 299- 29-B
WB2ALQ 10,360- 259- 20-AB
W2BV 9200- 200- 23-AB
K2EVW 8400- 162- 15-BCDE
W2BLV 6480- 180- 18-B
W2EKB 5654- 217- 11-BCD
AB2Y 4830- 131- 15-BD
W2EA 3750- 125- 15-B
N2CLX 3432- 134- 13-AB
W2SPV 2730- 79- 12-ABC
KD2O 2620- 131- 10-B
W2FGY 2400- 120- 10-B
WA2NPL 2328- 85- 12-AC
W3ORA 1854- 103- 9-AB
WA2EMB 1820- 65- 14-B
N2RF 1638- 91- 9-B
W2GGB 1456- 134- 4-BC
W2FFU 896- 56- 8-B
WA2WJL 890- 89- 5-B
N2EWW 892- 173- 2-B
KD2AE 648- 54- 6-AB
N2FET 560- 28- 5-D
WB2OEF 480- 37- 3-CF
WA2AWS 448- 112- 2-B
KA2KFO 400- 100- 2-B
KM2C 384- 96- 2-B
K2KMO 384- 96- 2-B
WA2KCE 352- 88- 2-B
KA2DGF 336- 42- 2-C
N2ADX 232- 58- 2-B
N2AWC 164- 41- 2-B
N2BGE 140- 35- 2-B
WA2RHJ 28- 7- 2-B
W2AXU 4- 1- 1-C
N2SB (+ WA2VYA, WB2s NPE, RVX, WB8ZAR) 583,186-1402-149-ABCDEF
K2AA (KA2BEW, W9NJV, WA2s ONM, RCB, WB2s NPY, QNH, oprs.) 12,978- 273- 21-ABD
W2JUG (WA2RHJ, WB2KKS, oprs.) 5908- 211- 14-AB

Western New York

W9IP/2 78,612- 290-107-ABCDE
K8ZES/2 55,616- 283- 88-ABCD
K2YCO 51,120- 303- 71-ABCDE
K2AN 41,610- 318- 57-ABCD
WB2ELB 36,332- 248- 62-ABCD
K2QS 24,360- 290- 42-B
KC2GZ 23,584- 268- 44-AB
K2LWR 21,700- 217- 50-B
WA2ZNC 17,754- 248- 33-ABCD
AF2K 15,872- 256- 31-AB
W2UAD 14,528- 227- 32-B
K2LZF 14,288- 143- 47-ABC
WB2JFL 13,600- 200- 34-AB
KA2ENE 13,364- 230- 26-ABD
WB2ODH 11,814- 179- 33-B
WA2MSA 10,304- 203- 23-ABD
WA2YMC 10,292- 165- 31-ABD
WA2YTM 10,230- 143- 33-ABCDE
W2EBF 10,128- 211- 24-AB
KA2OQZ 9720- 162- 30-B
K2MP 9632- 168- 28-ABD
KA2DQA 8316- 198- 17-AB
WB2MKN 8262- 144- 27-ABD
WB2SZY 8062- 139- 29-B
KA2DBD 6916- 123- 26-BD
WA2CBU 6204- 141- 22-B
KA1YE 6120- 153- 20-B
KB2WN 6120- 150- 20-ABD
WA2ALW 5396- 142- 19-AB
W2SN1 5202- 150- 17-ABD
W2EQW 5160- 172- 15-AB
K2KWK 5112- 142- 18-B
N2BNE 4160- 160- 13-AB
N2TW 3968- 124- 16-AB
NA2A 3960- 99- 20-B
W2OWF 3916- 89- 22-AB
WB2JSB 3852- 107- 18-B
K2GMZ 3750- 125- 15-AB
KA2J 3744- 126- 13-ABCD
WB2YJH 3456- 144- 12-AB
KA2KFV 3388- 150- 11-ABC
WB2FNF 3270- 109- 15-AB
W2XG 2912- 112- 13-B
KA2KDA 2856- 116- 12-BC
K2QR 2856- 34- 21-CD
W2DUC 2800- 100- 14-AB
WA2EKK 2790- 78- 15-ABCD
WA2EKT 2784- 181- 8-BD
K2JJT 2296- 82- 14-B
WB2HJV 2016- 144- 7-B
K2JA 2002- 91- 11-AB
WA2YPT 2002- 91- 11-AB
K2BCL 1890- 135- 7-B
KS2Z 1694- 113- 7-BD
KB2NU 1680- 140- 6-B
KA2JRK 1666- 109- 7-BD
W2VVG 1560- 65- 12-A
N2CSY 1512- 108- 7-B
K2OEQ 1512- 74- 9-ABD
KC2AW 1496- 68- 11-AB
WB2DSR 1488- 82- 8-ABCD
N2FBN 1484- 106- 7-AB
WA2ENW 1408- 64- 11-A
WB2GNR (N2TW, oprs.) 1400- 100- 7-B
KA2OMX 1372- 94- 7-BC
WA2UBD 1358- 97- 7-AB
W2SNF 1344- 90- 8-BD
KA2Y 1296- 100- 6-BD
AG2A 1260- 105- 6-B
KC2BS 1240- 62- 10-AB
KC2BT 1240- 62- 10-AB
W2DHV 1210- 121- 5-B
KB2XI 1200- 100- 6-B
WA2SQR 1200- 100- 6-B
N2COJ 1144- 52- 11-B
N2EYL 1050- 75- 7-AB
W2PHT 1044- 87- 6-B
N2EVG 1000- 100- 5-B
K2SPO 954- 61- 9-BD
WA2MYG 912- 47- 6-BCD
N3CKH 900- 90- 5-B
WB2CBX 890- 89- 5-B
KA2IEL 876- 73- 6-B
KA2POD 856- 107- 4-B
N2FHH 792- 99- 4-B
KA2UDH 784- 49- 8-AB
WA2HVT 736- 92- 4-B
KB2UN 728- 91- 4-B
N2JC 690- 69- 5-B
WB2UTX 660- 33- 10-AB
WB2ZJY 632- 79- 4-B
WA2FGW 560- 56- 5-B
WB2UTM 486- 27- 9-B
AB2F 392- 49- 4-B
KA2VZC 360- 60- 3-B
KU2A 270- 13- 9-ABD
WA2AIV 120- 15- 4-B
WB2JOR 84- 42- 1-B
WA2SOR 60- 10- 3-A
WB2PSI (K2s MP, OEQ, OS, RJ, SPO, KA2KGM, KG2F, KS2Z, W2s AV, IOG, WA1GHG, WA2s JTA, YHZ, YMS, ZKD, WB2s BYP, DYJ, FCR, KAO, QCJ, oprs.) 112,312- 427-101-ABCDEFGI
N2WK (+ KA2s HSK, MRP, KX2J, WA2s LAQ, SHN) 78,692- 376- 83-ABCD
NA2O (+ WB2IEY) 30,508- 218- 58-ABCD
WA2FQE (+ KA2OMQ) 4384- 127- 16-ABD
KW2T (+ KA2SJU) 3600- 116- 15-ABD
WB1GVL (+ KA1YE) 1584- 71- 11-ABD
WA2AAZ (AB2F, KA2s JQV, UXM, KD2CO, KX2T, WA2SOK, oprs.) 1404- 78- 9-AB

3

Delaware

KB3QM 12,702- 208- 29-ABD
K4CHE/3 3486- 83- 21-ABCD
KA3IJO 2520- 90- 14-B
W3BDP 2424- 101- 12-B
WB3ILM 2278- 67- 17-AB
K3SXA 820- 37- 10-BD

Eastern Pennsylvania

WA3AXV 235,776- 791- 96-ABCDEF
W3HFY 115,672- 581- 76-ABCD
K3HP 106,020- 632- 62-ABCDE
WB3JYO 97,350- 588- 59-ABCDE
WA3YUE 92,512- 576- 56-ABCDE
WA3LBI 87,670- 518- 55-ABCDE
N3DQZ 68,306- 527- 49-ABCD
AK3O 67,774- 487- 47-ABCDE
WB3ESS 57,800- 281- 50-BCDEF
N3BBI 56,816- 399- 67-ABD
WA3AAJ 55,796- 529- 37-ABCDE
WA3NUF 54,684- 440- 42-ABCDE
K3IUV 53,276- 454- 38-ABCDE
WA3JUF 50,616- 343- 38-BCDEF
N3CX 47,282- 234- 47-BCDEF
WA3NWL 47,280- 400- 40-ABCDE
K3LOM 41,340- 475- 39-ABC
KB3HE 35,496- 391- 36-ABCD
WA3IAO 35,328- 448- 32-ABCD
W3CL 33,418- 390- 31-ABCD
K3ACR 32,320- 424- 32-ABC
W3IIT 31,726- 416- 29-ABCD
WB3LNZ 28,770- 338- 35-ABD
KB3IB 26,530- 320- 35-ABD
WA3AQA 26,160- 319- 30-ABCD
W3CXU 21,700- 204- 31-ABCDE
N3BHS 21,438- 297- 27-ABCD
KB3EZ 21,420- 306- 35-B
WA3YON 20,800- 157- 50-ABCDE
N3ADC 20,522- 284- 31-ABD
K3DMA 19,536- 315- 24-ABCD
WA3PUL 18,438- 315- 22-ABCD
WB3EPU 17,172- 280- 27-BC
KA3FBP 13,908- 261- 19-BCD
K3JJZ 13,856- 316- 18-ABCD
KB3ZS 13,772- 262- 22-BD
WB3DNI 12,800- 236- 20-BCD
N3AOG 12,384- 276- 16-BCD
WB3FKQ 12,110- 132- 35-ABCD
K3MTK (WA3KPP, opr.) 11,658- 201- 29-A
KB3YY 11,172- 266- 21-B
W3HK 11,124- 224- 18-ABCD
KU3A 10,920- 227- 21-ABD
K3NHX 10,710- 244- 17-ABCD
K3MXM 9536- 245- 16-ABC
WB3IGR 9516- 293- 13-BC
WA3YDZ 9240- 180- 20-BD
K3GAS 9150- 221- 15-ABCDE
KM3T 7808- 244- 16-AB
K3VYG 7784- 213- 14-ABC
WA3TEM 7640- 257- 10-BCD
K3HIN 7350- 245- 15-AB
N3EBV 7344- 157- 17-ABCD
N3CFE 7224- 180- 14-BCD
KE3BZ 6768- 199- 17-AB
WA3VVG 5888- 151- 16-BCD
N3AAY (N3DCR, opr.) 5694- 195- 13-BC
WB3EMG 5428- 95- 23-ABCD
K3LYB 5270- 155- 17-A
WB2BJH 5216- 163- 16-B
K3ZMA 5184- 144- 12-ABCDE
WA3BIE 5122- 147- 13-ABC
KA3EEO 4914- 72- 27-ABCDE
AA3B 4512- 188- 12-B
W3NSI 4304- 183- 8-BCD
WB2GEZ 4170- 122- 15-ABC
WA3IWT 3408- 99- 12-ABCD
K3EPB 3072- 152- 8-ABC
W3GJC 3000- 150- 10-B
W3GPY 2520- 45- 14-C
W3AWA (WA3KFT, opr.) 2376- 130- 9-ABC
K3VIT 2336- 100- 8-BCD
WA3WAK 2222- 101- 11-AB
WB3HHO 2200- 164- 5-BC
WA3JMM 1980- 136- 5-ABC
K3PHY 1920- 194- 4-BC
N3AHP 1712- 84- 8-ABC
W3ZAA 1700- 170- 5-B
WA3IMT 1600- 100- 8-AB
K3BPP 1584- 54- 8-ACE
W3GAD 1264- 158- 4-AB
W3FQD 1240- 100- 5-ABC
WA3HIT 1144- 96- 4-BC
WA3TYF 1080- 135- 4-B

WA3ADI 1008- 62- 6-AC
KB3QI 864- 48- 9-AB
KA3ILE 702- 39- 9-A
WB2EFL 686- 49- 7-AB
KD6KD 624- 68- 4-BC
KB3GL 500- 100- 3-B
K3KMN 584- 49- 4-BC
K3QXC 548- 137- 2-B
W3AJF 462- 75- 2-BC
KA3FQQ 436- 109- 2-B
W3HMU 430- 32- 5-ABC
K3DLS 408- 51- 2-C
N3CJH 408- 45- 4-BD
W3QFI 404- 101- 2-B
KA3GJT 352- 88- 2-B
W3MXN 320- 80- 2-B
WA3NAY 336- 42- 2-C
N3BPJ 288- 72- 2-B
N3DKD 288- 72- 2-B
WA3TQJ 288- 74- 2-B
KC3GQ 160- 40- 2-B
W3KOC 160- 40- 2-B
K3RTU 120- 30- 2-AB
WA3NAO 120- 20- 3-AB
W3ESH 104- 26- 2-B
WA3HFJ 68- 17- 2-AB
K3VEQ 64- 16- 2-B
K3GFF 60- 8- 3-BC
KN3W 52- 13- 2-B
KB3ZY 36- 18- 1-B
AE3J 36- 6- 3-AB
WA3KRS 22- 11- 1-A
N3CWE 18- 9- 1-B
WA3JOM 14- 7- 1-A
WA3JNF 10- 5- 1-A
WA2OMY (+ AA2Z, net)
304,152- 935-114-ABCDEFI
WB3CZG (+ K2JIQ, K3MKZ, KS3Y, N2HR, N3AVC, WA3NVS, WB3a CAI, FAA, FET, FYT, IWZ)
224,256- 711-128-ABCDE
W3KKN (+ K3KMN)
155,700- 785- 75-ABCDE
KA3HTY (+ KA2TIB)
80,242- 617- 63-ABCD
W3LP (W3JUZ, WA3CUQ, WA3JXW, oprs.) 27,864- 319- 36-ABD
KQ3R (+ KF3Y, N3DPN)
25,362- 205- 49-ABCD
W3CCX (K3DLS, WA3FQF, oprs.)
26,028- 406- 27-ABC
K3QQ (+ KA3NDF)
14,782- 303- 19-ABC
WB3IND (+ W3KM)
13,200- 245- 24-ABC
W3HZU (K3GDI, N3BOU, W3SST, oprs.) 3996- 74- 27-AB
WA3GOV (+ WA2RUG)
3504- 120- 12-BD

Maryland & District of Columbia

K3HZO 66,360- 320- 70-BCDE
W3ZZ 45,820- 320- 58-ABCD
K3ZO 27,348- 318- 43-AB
WA3UJE 13,992- 168- 33-ABCD
WB2DNE 11,656- 201- 29-AB
K3NXH 10,650- 213- 25-B
K3AKR 8400- 124- 28-ABCD
W3KO 8112- 126- 24-ABCD
WA3EOQ 6288- 121- 24-ABCD
K3TC 5320- 133- 20-B
N3AM 4256- 152- 14-B
N3DOU 4218- 117- 17-BC
K3TG 3780- 95- 14-BD
W3IFM 2414- 71- 17-A
W3MSN 1612- 49- 13-ABD
W3GN 1008- 37- 12-ABD
N3DUE 960- 60- 8-B
K3ONW (+ WB3JJK)
64,200- 312- 75-ABCD
K3IVO (K3TNM, N3CBJ, N3DCI, W10GA, W3FG, W3IP, WA3TID, WB3EVS, WB6VGI, oprs.) 22,632- 251- 41-ABCDE
W3PGA (K3FRX, K3PHH, KB3EL, KO3K, N3EDJ, W3JDF, W3VRD, WA3LAW, WB3BIT, oprs.)
9098- 142- 32-AB
W3AUN (+ N3DUE, WA3FAE)
6512- 146- 22-B

Western Pennsylvania

WA3FYJ 85,172- 332-107-ABCD
WA3TTS 24,600- 162- 80-ABD
KR3C 2480- 62- 20-A
WA3YGQ 1260- 31- 18-BD
W3KJM 520- 26- 10-A

4

Alabama

WB4NJG 7872- 96- 41-AB
WB4GFO 4800- 80- 30-B
W4CNQ 1548- 37- 18-BD
N4IGR 1520- 40- 19-B
WA4VUG 16- 4- 2-B

Georgia

WA4NJP 74,938- 249-116-ABCDE
N3AHI 9114- 83- 49-ABD
N4JK 6798- 85- 33-ABD
K4HAV 2400- 42- 25-ABD
WB4SLM 2350- 34- 25-ABCD
W4ISS 2200- 38- 22-BD
W3EP/4 2156- 49- 22-B
K2UVG 2016- 48- 21-B
WD4JQV 2016- 35- 18-ABDE
WD4MBK 1170- 25- 13-BCDE
K4LFF 48- 6- 4-B
KX4R (+ K4CKS,WD4JLI)
24,072- 167- 68-ABC
WB4F (+ WB4NMA)
17,556- 113- 57-ABCDE

Kentucky

N4ELQ 18,912- 131- 56-ABD
WB4NXY 13,824- 106- 54-ABD
NA4D 504- 18- 14-B

N4IQX (+ KA4s APL, ZFY, KB4s GEJ, GNP, KJ4OE, NU4O)
2208- 46- 24-B

North Carolina

K4CAW 18,700- 127- 55-BD
K4MSK 15,390- 171- 45-B
WD4ODS 690- 23- 15-AB
W4BFB (+ K4LVV, KA4WYC, KS4S, KU4V, WA4s UNZ, VCC, WB4s PCS, TLX, oprs.)
43,000- 232- 86-ABD

Northern Florida

W4OOW 17,760- 110- 60-ABCDE
KL7JGI/4 4620- 56- 30-BD
K4RZB 2750- 46- 25-ABD
W4ZGS 754- 29- 13-AB

South Carolina

N4DT 4736- 59- 32-ABCD
KB4DVN 3016- 48- 26-ABD
NB4S 2496- 52- 24-B
WA4LDU 530- 21- 15-BD

Southern Florida

KC3CL 4588- 64- 31-ABCD
WA4OFS 4212- 58- 26-ABD
K4DZP 910- 26- 13-BCD
WD4AHZ 580- 24- 10-BD

Tennessee

WB4JGG 23,450- 175- 67-AB
WA4QYK 6560- 64- 41-ABCD
WA4GBE 540- 21- 10-D
AD4F 72- 9- 4-A
WD4DGF (+ N4VG,WB4KNF)
10,200- 91- 51-ABC

Virginia

K2UOP/4 34,770- 237- 67-ABCDE
K4HWG 24,244- 273- 38-ABD
K3ICH 23,660- 322- 35-BC
K4LHB 17,640- 168- 42-ABCD
N4RA 11,346- 142- 31-ABCD
K4FTO 10,150- 152- 29-ABD
WD4GXN 8658- 98- 37-ABD
AA4ZZ 7552- 118- 32-B
WA4SBC 6284- 75- 32-ABCD
WA4MMP 5350- 92- 26-ABD
N4MM 3450- 75- 23-AB
KB4DFK 3024- 44- 28-ABD
K9OYD/4 1740- 52- 16-BD
KB4EUZ 910- 49- 7-BD
KB4CMF 774- 43- 9-B

5

Arkansas

K5YY 18,000- 119- 60-BD
WB5JAR 1440- 36- 20-AB
NR5A 220- 11- 10-AB

Louisiana

W5FYZ 1962- 49- 20-B
WB5NAA 1152- 24- 24-B
KC5WA 48- 6- 3-B
KA5IXE 8- 4- 1-B
N5BHO (+ W5EWI)
5370- 71- 35-BCD

New Mexico

W5FF 1520- 40- 19-AB
W5RK$ 744- 27- 12-ABD
N5EZA 560- 29- 8-ABD

Northern Texas

WA5VJB 37,560- 198- 60-ABCDEFI
KE5EP 25,288- 161- 58-ABCDE
K5IS 2350- 35- 25-ABCD
WB5AFY 1248- 24- 13-D
KB5RA 1054- 31- 17-B
WB5KYK 572- 22- 13-B

Oklahoma

K5SW 21,888- 115- 72-ABCD
K7QW 15,800- 116- 50-ABD
W5NZS 15,052- 100- 53-ABCDE
WA5WCP 14,872- 100- 52-ABCDE
WD5AGO 8096- 86- 46-AB
AB5T 3618- 67- 27-B
WB5DSH 2900- 50- 29-A

Southern Texas

WB5RUS 5628- 85- 29-ABD
WA5IYX 198- 11- 9-A

6

East Bay

NR6E 3680- 61- 20-BCDE
KN6S 660- 33- 10-A

Los Angeles

WA2KDL 5280- 129- 16-BD
N3EG 3502- 82- 17-ABCD
W6GPL 2964- 114- 13-B
N6KN 2884- 75- 14-BD
WA6HXM 1768- 68- 13-B
W6PFE 1736- 52- 14-ABCD
WB6FCS 1404- 39- 9-D
N6KAW 1232- 77- 8-B
N6NS 264- 22- 6-B
K6AWO 200- 25- 4-B
K6YQ 180- 18- 5-B
WA6OTU 154- 11- 7-B
W6ZVM 136- 17- 4-B
N6HC 120- 20- 3-B
W6NWP 72- 12- 3-B
N6DZM 66- 11- 3-B
N6JLS 42- 7- 3-B

Orange

K6PVS 13,790- 130- 35-ABDEI
W6OUU 3696- 61- 22-BDEI

K6IBY 2560- 55- 16-BCD
K6PFW 1632- 54- 12-BD
KG6CR 90- 15- 3-B
K7JAJ 42- 7- 3-B

Santa Barbara

WD6BCN 1558- 35- 19-ABD
KP6NX 630- 35- 9-B
WA6IJZ 540- 27- 10-B
W6HDO 396- 22- 9-B
N6ENU (+ K6LMN,WA6PZL)
21,200- 174- 50-ABCD

Santa Clara Valley

W6RXQ 28,764- 216- 47-ABCDE
WA6QAK 15,552- 115- 36-ABCDE
KA6ING 700- 33- 10-ABD
WA6NYB 504- 28- 9-B
AI6A/6 180- 20- 4-B
NU6S (+ K6GSS, KA6IRT, KE6ZE, WA6AZP,WB6KBZ)
75,520- 424- 64-ABCDE
KG6MW (+ NU6P, W6YLL)
3712- 79- 16-BCDE

San Diego

N6DG 7168- 94- 28-BCD
WA6BNH 6000- 95- 24-BCD

San Francisco

WA6KLK 3784- 71- 22-ABCD

San Joaquin Valley

WB6WLE 3212- 73- 22-AB
K6JKQ 2964- 44- 19-ABCDE
WB6COT 2916- 81- 18-B
KD6XG 864- 36- 12-B
WB6KLL 644- 23- 14-AB
WB6ITM 18- 3- 3-A

Sacramento Valley

WA6IKE (+ WA6s PTT, ZNM)
21,328- 197- 43-ABCDE
AI6U (+ N6IGA)
8116- 115- 22-ABC

Pacific

W1QXX/KH6 20- 5- 2-B

7

Arizona

WB7OHF 2268- 49- 21-ABD
N7BUP 996- 32- 14-AB
WA7JTM 520- 26- 10-A

Nevada

WA7JUO 1404- 45- 13-ABD
WA0YPL/7 250- 25- 5-AB

Oregon

W7TYR 3864- 59- 21-ABCDE
W7IXU 2752- 77- 16-ABD
K7HSJ 1872- 45- 13-BCE
W7UDM 1860- 52- 15-ABCD
N7DB 256- 16- 8-AB

Utah

WA4GPM 288- 15- 9-ABD

Washington

KB7LQ 476- 34- 7-B
WB7ATP 180- 18- 5-B
W7IDZ 100- 5- 5-ABCD
K7NTW (+ WB7BOQ)
80- 10- 4-AB

Wyoming

WA7KYM 1560- 41- 15-ABCD
W6SII/7 960- 40- 12-B

8

Michigan

WB8BXC 61,380- 234- 93-ABCDE
KU8P 42,198- 247- 77-ABD
N8CKH 13,120- 164- 40-B
W8CAP 8816- 91- 38-BD
KM8U 8000- 125- 32-B
K8NTK 6426- 119- 27-B
WA8TVZ 4964- 89- 28-B
N8DEJ 4620- 77- 30-B
AC8W 3294- 61- 27-B

Ohio

W8ULC 52,800- 264- 88-ABCD
K8DIG 40,320- 185- 80-BCD
WD8CTX 32,234- 216- 71-ABC
KA8IFC 22,176- 231- 48-B
W8AC 20,520- 135- 57-BD
K8TL 17,702- 121- 53-BDE
NI8O 17,100- 154- 45-BD
N8BJN 14,240- 144- 40-BCD
K8WW 8640- 82- 34-DE
WB8TCZ 7920- 102- 33-BD
WB8FWQ 7632- 92- 36-ABD
W8HBG 6292- 121- 26-B
WA8TJL 5760- 77- 36-ABD
KA8HOK 5184- 81- 32-B
K8GQB 5148- 78- 33-A
K8YAH 5096- 68- 28-ABDE
N8FFE 5022- 93- 27-B
WB8DCL 4176- 72- 29-B
KC8UR 3740- 85- 22-B
N8CCC 2890- 69- 17-ABCD
WA8SVV 2800- 57- 20-ABCD
WA8RCN 1326- 39- 17-AB
W8ML 304- 31- 4-BC
WB8SWJ 240- 24- 4-BC
KC8OZ 160- 20- 4-B
N8FJH 138- 23- 3-B
W8FPA 138- 23- 3-B
N8EHY 132- 22- 3-B
KA8IPO 96- 16- 3-B
KC8CF 92- 23- 2-B

W8WYH 80- 20- 2-B
W8XB 72- 18- 2-B
KA8IAL 60- 15- 2-B
KA8OKC 32- 16- 1-B
WD8ISK (KC8RD, N8s ASZ, BPB, ECH, WA8OGS oprs.)
155,946- 451-141-ABCDE
K8CQA (+ WB8s JAY, TEI)
5970- 82- 41-ABD

West Virginia

W8LSC 11,286- 83- 57-ABD
KT8W 5220- 87- 30-B
N8DKL 2132- 41- 26-AB
N8CMH (+ W8JJG, WD8CDT)
18,800- 136- 58-ABCD

9

Illinois

W9UD 70,200- 270-108-ABCDE
KR9K 29,430- 261- 45-ABCD
N9KC 25,200- 215- 50-BD
AA9U 22,848- 192- 48-ABCD
K9AKS 22,504- 194- 58-B
WD9EXD 18,048- 229- 32-ABCD
WB9WMM 17,812- 134- 61-ABD
KA9LDS 17,296- 184- 47-AB
KB9QC 16,680- 211- 40-B
KD9JQ 15,440- 193- 40-B
WA9FIH 11,850- 197- 25-ABCD
K9PW 7908- 123- 24-ABD
WB9MSV 7000- 70- 25-D
WD9ARK 6728- 105- 28-BC
WD9FXC 5256- 119- 18-BC
W9JGV 5130- 95- 27-B
WB9NEY 4992- 78- 32-B
N9EMV 3600- 72- 25-B
W9IVI 3564- 70- 27-ABD
WD9GJK 3360- 130- 13-AB
KD4PS/9 3328- 60- 26-BD
W2DEG 3090- 103- 15-B
KA9QIK 2604- 62- 21-B
WB9ZAI 2304- 72- 16-B
K9ZWU 2016- 114- 8-ABC
K9ZWV 2016- 114- 8-ABC
KA9MGR 1620- 45- 18-A
WD8LLR (KB8AC, opr.)
1560- 65- 12-B
KA9QPG 1560- 60- 13-B
K9IOG 1428- 102- 7-AB
KA9LFD 1308- 109- 6-BD
K9QYT 1296- 101- 6-BD
K9ENZ 1232- 88- 7-AB
KA9CLP 1080- 55- 9-BC
KD9IL 1048- 131- 4-B
N9DUW 880- 110- 4-B
KS9V 840- 60- 6-BC
W9NHX 760- 95- 4-B
K9USW 732- 61- 6-AB
K9KPM 588- 49- 6-B
NA9K 512- 64- 4-B
W9XK 496- 62- 4-B
W9RVG 392- 20- 7-ABCD
W9ABA 330- 33- 5-B
KK9J 324- 18- 9-B
WA9RIJ 312- 39- 4-B
WA9WXC 300- 21- 6-BC
N9DEX/M 240- 40- 3-B
WA9CJZ 222- 37- 3-B
WA9CCQ 156- 39- 2-B
N9EDT (+ KA9JYI, KA9MLM)
7236- 104- 27-ABCD

Indiana

W9OEH 73,124- 299-101-ABCDE
W9SR 32,760- 174- 70-ABCD
WB9NTL 25,830- 171- 63-ABCD
KA8MRI/9 33,098- 224- 67-ABCD
K9MRI 22,746- 223- 51-B
KA8HPK/9 17,360- 122- 62-ABCD
KA9JDN 12,136- 148- 41-B
KA9QFL 10,948- 117- 46-ABD
K9DZS 7220- 84- 38-ABC
K8UIF 5200- 50- 26-D
WA9PKL 1976- 43- 23-A
W9VBJ 1904- 56- 17-B
W8UT 1482- 26- 19-BD
WB9PUJ 840- 27- 15-ABC
K9UNM 320- 16- 10-B

Wisconsin

W8UC/9 12,890- 119- 47-ABD
KB9NM 11,790- 107- 45-ABD
WA1IED 9432- 124- 38-BC
KA9HKL 8680- 124- 35-B
N9TD 6550- 79- 25-BD
WA9KVS 2650- 53- 25-AB
W9YCV 2438- 50- 23-BD
WA9OKB 680- 30- 11-A
N9DWL 208- 13- 8-A
K9GDF 72- 12- 3-B
N9DIJ 6- 3- 1-B

0

Colorado

KC7QJ 11,280- 150- 30-ABDE
W0ETT 8370- 115- 31-ABD
KD0GT 3990- 95- 19-ABD
W0KJY 3864- 68- 23-ABCD
W0OZL 2772- 63- 18-ABD
N0TK 476- 34- 7-B
KA0PJD 2- 1- 1-B

Iowa

WB0YWW 21,594- 143- 61-BD
K8OAS 15,048- 98- 57-ABCD
WB0ZKG 14,896- 133- 56-AB
N8EKT 7740- 90- 43-AB
WD8FOY 6068- 74- 41-AB
WA9RJT 4698- 81- 29-B
W8RAP 2852- 31- 23-D
K8JJA 648- 18- 12-ABD
WA8DCB (+ N8CIH, WD9FSA)
41,870- 233- 79-ABCD
KA0GOA (+ N0EYO, NE0P)
1760- 55- 16-B

Kansas

N0LL 17,640- 126- 70-AB
W0FIT 10,656- 90- 48-BD
K0VUA 3192- 57- 28-B
KF0M (+ KB0DW, W0PLZ, WA0VJF)
43,662- 190- 91-ABCD
WB0DRL (+ WA0TKJ)
28,490- 147- 77-ABDE

Minnesota

W0XG 23,040- 138- 72-ABCD
W0VB 7316- 116- 31-B
WD0GBU 4488- 102- 22-B
KC0ZC 2080- 80- 13-B
KC0P 1298- 59- 11-B
W0OHU 968- 38- 11-BD
K0TS 648- 53- 6-BD
WD0HEB 432- 53- 4-BD
KB0S 294- 49- 3-B
WB0HOX 252- 47- 3-B
NB0VB 258- 43- 3-B
KC0RV 252- 42- 3-B
K0KTY 184- 46- 2-B
KC0A 156- 39- 2-B
WD0GNK (K9OKA, opr.)
150- 15- 5-B
K0IYXT 132- 33- 2-B
K0KL 128- 32- 2-B
KB0IYI 128- 32- 2-B
K0SIR 116- 29- 2-B
KA0PIC 116- 29- 2-B
WA0EWJ 116- 29- 2-B
WA0WTV 100- 25- 2-B
KC0Z 88- 22- 2-B
N0DOS 88- 22- 2-B
KA0CAD 84- 21- 2-B
W0XS 84- 21- 2-B
KB0NT 80- 20- 2-B
N0BTU 76- 19- 2-B
W0MN 72- 12- 3-B
KA0TGP 68- 17- 2-B
W0NK 68- 17- 2-B
KD0QJ 64- 16- 2-B
N0EVC 64- 16- 2-B
W0RGU 64- 16- 2-B
KD0FU 60- 15- 2-B
WB0YEE 60- 15- 2-B
WB0LSQ 56- 14- 2-B
WD0EOI 52- 13- 2-B
KD0AB 44- 11- 2-B
WB7NRX 44- 11- 2-B
N0EKL 28- 7- 2-B
WD0EIH 28- 7- 2-B
KA0KAW 26- 13- 1-B
KB0VG 26- 13- 1-B
N0FWI 24- 12- 1-B
N0BSG 24- 6- 2-B
N0FOW 24- 6- 2-B
KA0TAT 20- 10- 1-B
WD0FFB 20- 5- 2-B
N0FSI 16- 8- 1-B
KA0OHU 10- 5- 1-B
N0BGA 10- 5- 1-B
WD0ETA 8- 4- 1-B
N0EMZ 6- 3- 1-B
NC0E 6- 3- 1-B
N0DJB 2- 1- 1-B
N0DJC 4- 2- 1-B
KA0CRO (+ KC0P)
44- 11- 2-B

Missouri

W0RWH 25,488- 148- 72-BD
WA0NOK 20,196- 127- 66-ABCD
K0TLM 8722- 70- 49-ABCD
W0URP 6182- 68- 39-ABD
WB0LPV 4268- 79- 27-B
K0GOB 1976- 55- 13-ABCD
WB0IIS 1170- 35- 15-BC

Nebraska

KC0QR 20,640- 134- 80-ABCD
WB0OGF 10,922- 108- 43-ABD
N0AJU 10,080- 114- 45-AB
WB0YZN 6450- 78- 43-AB
N0BTN 3268- 56- 18-BC
KA0CRI 868- 31- 14-AB
WD0BQM 832- 28- 13-ABD

South Dakota

WB0HHM 1520- 40- 19-B

VE

Quebec

VE2FUT 9856- 80- 44-ABCD
VE2DUB 2232- 62- 18-B
VE2BHH 378- 27- 7-B
VE2CUA (VE2s EWH, HAK, oprs.)
2200- 46- 22-ABC

Ontario

VE3ASO 40,500- 225- 75-ABCDE
VE3CDN 28,680- 178- 60-ABCDE
VE3CRU 16,720- 112- 40-D
VE3AOG 6322- 109- 29-B
VE3BYO 4746- 102- 21-BD
VE3AUI 3900- 65- 30-B
VE2BTW/3 3002- 73- 19-BD
VE3MWM 1230- 26- 15-BDE
VE3IHS 780- 38- 10-B
VE2BBK/3 700- 31- 10-ABD
VE3LQS 504- 21- 12-AB
VE3DJ 308- 13- 7-BD
VE3LNX (+ VE3s ADJ, NSC)
120,064- 414-112-ABCDEF
VE3SRL (VE3s BFM, FGN, VA, oprs.)
84,630- 351- 83-ABCDEI

Alberta

VE6AFO 616- 36- 7-BD

British Columbia

VE7ASI 1728- 48- 18-ABCD

Checklogs

KA2MOH KB4CRT N7BSN

Contest Corral

Conducted By Edith Holsopple, N1CZC
Assistant Contest Manager, ARRL

JUNE

1

New York State QSO Party, see May *QST,* page 87, for details.

Hootowl Sprint, May *QST,* page 87.

4

West Coast Qualifying Run, 10-35 WPM, at 0400Z June 5 (9 P.M. PDT June 4). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline 1 minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award or endorsement.

8-9

World Wide South America Contest, May *QST,* page 88.

GARTG-RTTY Contest, May *QST,* page 88.

VK/ZL RTTY DX Contest, May *QST,* page 88.

ARRL June VHF QSO Party, May *QST,* page 83.

13

W1AW Qualifying Run, 10-40 WPM, at 0200Z June 14 (10 P.M. EDT June 13). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See June 4 listing for more details.

15-16

9-Land CW Contest, sponsored by the Joliet ARS, from 1700Z June 15 until 1700Z June 16. Everyone works everyone. Work stations once per band. Entry classes: single op, single transmitter; multiop, single transmitter; multiop portable, maximum two transmitters. Exchange serial number and QTH (state for W stations; province for VE stations; country name for others). Suggested frequencies: 1.805 and 60 kHz up from lower band edges of 80, 40, 20, 15 and 10 meters. Novices: 25 kHz up from lower band edges. Count 2 points per 9-land QSO (IL/IN/WI), 1 point for others. Multiply by total states, provinces and countries worked. Add one bonus multiplier for each group of 20 9-land stations worked. Awards. Mail logs by July 20 (include large s.a.s.e. for results) to Paula Franke, WB9TBU, P.O. Box 873, Beecher, IL 60401.

All Asian DX Contest, phone, sponsored by the Japan Amateur Radio League, from 0000Z June 15 until 2400Z June 16. (CW contest will be August 24-25). 160 through 10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No crossband QSOs. Single ops may have only one transmitted signal at any given time. Multiops may have a maximum of one signal per band. Exchange signal report and a two-digit number denoting the operator's age. YL stations may send 00. Count 1 point per QSO with Asian stations on 7 through 28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by the number of different Asian prefixes (WPX Rules) worked per band. Note: JD1 stations only on Ogasawara count for Asia. Use separate logs for each band. Mark multipliers the first time worked. Provide a complete summary. JARL Asian Countries list: A4 A5 A6 A7 A9 AP BV BY EP HL/HM HS HZ/7Z JA-JS JD1 JT JY OD S2 TA UA/UN/UV/UW-UZ/RA/RN/RV-RW/RZ9-0 UD UF UG UH UI UJ UL UM V85 VS9M/8Q VU XU XV 3W XW XX9 XZ YA YI YK ZC4 5B4 1S 4S 4W 4X/4Z 7O 9K 9M2 9N 9V and Abu Ail. Enclose s.a.s.e. and IRC for results. Mail logs to arrive by Sept. 30 (Nov. 30 for CW) to JARL, POB 377, Tokyo Central, Japan.

22-23

Field Day, see May *QST,* page 81, for rules. Please note: Field Day is the *fourth* full weekend in June.

25

W1AW Qualifying Run, 10-35 WPM, at 1300Z (9 A.M. EDT). See June 4 and 13 listings for more details.

28-30

Summer SMIRK Party, sponsored by the Six Meter International Radio Klub, from 0000Z June 29 until 2400Z June 30. 50 MHz only. No crossband or one-way QSOs. Single operator only. Exchange SMIRK number and QTH (ARRL Section or Washington, DC for U.S. stations; country or province for others). Count 2 points for each QSO with a SMIRK member, 1 point for non-SMIRK QSOs. Multipliers are as follows: ARRL Sections in the 48 contiguous states; KH6 and KL7; Washington, DC; VE provinces; foreign states, provinces, prefectures or countries. Entries must be submitted on official forms, available for an s.a.s.e. from sponsor. Mail logs by July 31 to Mark S. Anderson, WB5NPK, 8932 Saddle Trail, San Antonio, TX 78255.

JULY

1

Canada Day Contest, sponsored by the Canadian Amateur Radio Federation, 0000Z-2400Z July 1. Everybody works everybody. 160-2 meters, phone and CW. Entry classes: single op, all bands; single op, single band; multioperator. Work stations once per mode on each band. No crossmode contacts. Exchange RS(T), serial number starting with 001, and province/state/country. VE1 stations must also send their province. Count 10 points per VE QSO, 4 points for other countries. VEØ counts as Canada and 1 multiplier. 20-point bonus for working any CARF stations using TCA or VCA suffix. Multiply by total VE provinces worked per band on each mode (VO1/VO2 VE1-PEI VE1-NB VE1-NS VE2-8 VEØ VY1; max. 26/band, both modes). Suggested frequencies: 1.810/1.840 3.525/3.775 7.025/7.070/7.155 14.025/14.150 21.025/21.250 28.025/28.500 50.040/50.110 144.090/146.520 MHz. Suggest phone on the hour and CW on the half hour. Awards. Summary sheets available for an s.a.s.e. Mail logs within 30 days (include an s.a.s.e. or s.a.e/IRC for results) to CARF Contest, c/o N. Waltho, VE6VW, Box 1890, Morinville, AB T0G 1P0 Canada.

3

West Coast Qualifying Run, 10-35 WPM, at 0400Z July 4 (9 P.M. PDT July 3). See June 4 listing for more details.

4-5

Six Meter Invitational Net Activity Day, sponsored by the Colorado S.I.N., from July 4 until 0300Z July 5. 50 MHz only. Exchange signal report, state and name. S.I.N. members also send membership number. QSOs with S.I.N. members count 3 points each; others count 2 points each. Multiply by number of states for final score. Mail logs within 30 days to WØETT, P.O. Box 6602, Denver, CO 80206.

12

W1AW Qualifying Run, 35-10 WPM, at 0200Z July 13 (10 P.M. EDT July 12). See June 4 and 13 listings for more details.

13-14

West Coast 160 Bulletin Summer SSB Contest, from 0000Z July 13 until 2400 July 14. Single operators only, subscribers and nonsubscribers. Exchange signal report and QTH. Count 20 points per QSO and multiply by the total states, VE provinces and countries worked. Categories for various PEP ratings: 3 kW, 2 kW, 1 kW, 250 W and QRP. To calculate PEP rating, multiply output power by 2. Send logs to R. Koziomkowski, KA1SR, 5 Watson Dr., Portsmouth, RI 02871.

IARU Radiosport Championship, May *QST,* page 82.

Colombian Independence Contest, sponsored by the Liga Colombiana de Radioaficionados, from 0000Z July 13 until 2400Z July 14. 160-10 meters, phone or CW. Categories: single operator, single band and mode (operators on 14 MHz compete only within this category); single operator, multiband, single mode; multioperator, single transmitter, multiband, single mode; multioperator, multitransmitter, multiband, single mode. Work stations once per band. No crossband or cross-mode QSOs allowed. Exchange signal reports and three-digit serial numbers. Count 10 points for QSOs with HK stations, 5 points for QSOs with other DX stations, 1 point for QSOs within your country (HK stations count 10 points with non-HK stations and 5 points with other HK stations); multiply total QSO points by the sum of countries worked on each band added to the sum of HK districts worked on each band. Logs and summary sheet should include all data. Participation certificates for minimum of 50 QSOs (at least 10 of which are with HK stations for phone entries, or 5 for CW). Mail logs no later than August 30 to LCRA, c/o Direccion de Concursos y Diplomas, Apartado Aereo 584, Bogota, Colombia.

19-21

CQ World Wide VHF Prefix Contest

QRP Summer Contest

24

W1AW Qualifying Run

27-29

County Hunters CW Contest

Armadillo Run

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 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, cross-mode 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 generally offer to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

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.*

Affiliated-Club Coordinators	May 1985, p. 71
Club Contest Rules	Jan. 1985, p. 72
Field Day Rules	May 1985, p. 81
IARU Radiosport Rules	May 1985, p. 82
License Renewal Information	Jan. 1985, p. 45
Major ARRL Operating Events and Conventions — 1985	Jan. 1985, p. 46
MARS Information	April 1984, p. 86
QSL Bureaus	
Incoming	This issue, p. 55
Outgoing	March 1985, p. 61
QST Abbreviations List	Jan. 1984, p. 53
Third-Party-Traffic Countries	Oct. 1984, p. 73
U.S. Amateur Frequency and Mode Allocations	Jan. 1985, p. 45
VHF QSO Party Rules	May 1985, p. 83

Special Events

Conducted By Edith Holsopple, N1CZC
Assistant Contest Manager, ARRL

Detroit, Michigan: Hazel Park ARC will operate W8JXU on **June 1** from the Detroit Zoo. Operation will be 10 kHz above lower General and Novice class band edges. Certificate via W8JXU, P.O. Box 368, Hazel Park, MI 48030.

Charlestown, New Hampshire: Station W1GUA will be active from Fort No. 4 to celebrate New Hampshire/Vermont Neighbors Day, **June 1**. The group will operate from 1400 to 2100Z, 25 kHz up from the bottom of the General portions of 80, 40 and 15, CW and phone, 2-meter simplex and a packet-radio station. Send an s.a.s.e. and your QSL for a commemorative QSL to Rudy Adler, W1GUA, Dodge Hollow Rd., Lempster, NH 03605, or to WB1GXM, P.O. Box 428, Claremont, NH 03743.

Madison, Ohio: The Wireless Institute of Northern Ohio and the Lake County ARA will operate KO8O from a local winery from 2300Z **June 1** until 0300Z **June 2** on 3.860 and 7.235 MHz, and 1500-1900Z **June 2** on 7.235 and 14.235 MHz, to commemorate Ohio Wine Month. Certificate via KO8O—WINO Weekend, 7126 Andover Dr., Mentor, OH 44060.

Grandview, Missouri: The Southside ARC will operate NØEWP from 1700Z **June 1** until 0400Z **June 2**, and 1700-2200Z **June 2** in honor of President Harry S. Truman's 101st birthday. Operation will be from near the old Truman farm home on around 7.235 and 14.235 MHz during the annual "Harry's Heydays" celebration. A commemorative certificate is available for a large s.a.s.e. QSL to Southside ARC, P.O. Box 412, Grandview, MO 64030.

Normandy, France: The Association Des Radio-Amateurs De La Manche will operate TV6JUN from Utah Beach to commemorate the June 6 landing anniversary. Operation will be **June 2-9** on 80, 40, 20 and 10 meters, CW and phone. QSL via F6EYM, 14 Rue des Troenes, 50000 St-Lo, France.

Richland, Washington: Tri-City ARC will operate W7VPA from Ice Harbor Dam, the highest lift navigable locks in the U.S. Operation will be **June 8** from 1700Z to 2400Z, on the low end of the General phone portions of 80-10 meters. Special QSL for an s.a.s.e. to W7VPA, P.O. Box 73, Richland, WA 99352.

Chicago, Illinois: The Chicago Suburban RA will operate N9BAT from Brookfield Zoo in conjunction with a Scout-O-Rama celebrating the 75th anniversary of Boy Scouts of America. Phone operation will be from 1500-2300Z **June 8** and **9** on 7.250 and 14.250 MHz. A special "Eagle" QSL card will be available for your QSL card and a no. 10 s.a.s.e. via N9BAT Special Event, P.O. Box 88, Lyons, IL 60534.

Fulda, W. Germany: The Deutscher ARC, district Hessen, will operate stations DLØJRH and DLØIYY (International Youth Year) during a youth camp on Maulkuppe Mountain. Operation will be **June 14-17** on all bands plus 2 meters. QSL via Bernd Och, DL6FBL, Hammelburger Str. 10, D-6400 Fulda, Fed. Rep. of Germany.

Spivey's Corner, North Carolina: The Cape Fear ARS will operate WB4YZF on **June 15** from the 17th annual National Hollerin' Contest. Operation will be from 1200 to 2100Z on or near 7.235 MHz. For a certificate, send your QSL and QSO information to Hollerin', WA4LZD, P.O. Box 332, Dunn, NC 28334.

North Platte, Nebraska: The North Platte ARC will operate WØCXH from 1700 to 2300Z **June 15** and **June 16** during Nebraska Land Days. Operation will be from the home of "Buffalo Bill" Cody on the following frequencies: CW—7.125 MHz; phone—7.250 14.290 21.400. Certificate via NPARC, Box 994, North Platte, NE 69103.

Cobb Island, Maryland: The Bowie ARC will operate N3GR from Cobb Island, where Fessenden and Very sent and received intelligible speech by electromagnetic waves in 1900. Operation will be from 1400Z **June 15** until 1400Z **June 16**. Phone and CW operation in General band segments of 80-15 meters, CW 30 kHz up from lower edge and Novice portion, and continuous operation on 7.250 MHz. Certificate for an s.a.s.e. to N3GR.

Lebanon, Missouri: The Lebanon ARC will operate WBØSSB at Bennett Springs State Trout Fishing Park during Hillbilly Days. Operation will be from 1700Z **June 15** until 0300Z **June 16**. Frequencies: phone—3.963 7.250-7.275 14.255-14.285 MHz; CW—7.125 14.060 MHz.

Klamath Falls, Oregon: The Mercury ARA will operate W7UFM in conjunction with the MARA convention at Camp Ester Applegate. Operation will be from 2000Z **June 20** until 2400Z **June 22**. Approximate frequencies: phone—3.875 7.275 14.325 21.425 28.525 MHz; CW—3.575 7.115 14.075 21.115 28.115. For a commemorative QSL, send a large s.a.s.e. to MARA, c/o Jack Jakoubek, KD7EZ, 477 Deep Creek Rd., Chehalis, WA 98532.

Macomb, Illinois: Members of the Lamoine Emergency ARC will operate WB9TEA in celebration of Macomb Heritage Days from 1500 to 2300Z each day, **June 22-23**. Phone frequencies—3.860 7.235 14.235 MHz. Certificate for your QSL and an s.a.s.e. to LEARC, Dave Nissen, N9DZP, RR 4, Box 210, Macomb, IL 61455.

Anaheim, California: The Nazarene AR Fellowship will operate WAØHPW/6 to commemorate the 25th anniversary of this organization in conjunction with the Church of the Nazarene General Assembly. Operation will be **June 22** to **June 29** during daylight hours on 14.280, 14.305, 21.385 and some 40-meter activity. For a special QSL card, send an s.a.s.e. to Robert Buck, WB6UCO, 5162 W. Ave. L 12, Quartz Hill, CA 93534.

Muscle Shoals, Alabama: The Tuscumbia ARC will operate W4JNB from 1600 to 2300Z **June 29** from the Helen Keller Festival. Operation will be on the Novice and General portions of 80, 40 and 20 meters. Certificate for an s.a.s.e. to P.O. Box 2745, Muscle Shoals, AL 35662-2745.

Abilene, Texas: The Key City ARC will operate AB1B to commemorate the arrival of the B1-B to Dyers AFB. Operation will be from 1400Z **June 29** until 1400Z **June 30**. Frequencies: CW—3.550 3.745 7.055 7.125 14.055 21.055 MHz; phone—3.855 7.235 14.235 21.335 MHz. For certificate, send a large s.a.s.e. to KCARC, Box 2722, Abilene, TX 79604.

Bolivar, Ohio: The Tusco ARC, W8ZX, will operate from the Fort Laurens State Memorial in conjunction with the Brigade of the American Revolution's reenactment of the 18th Century militia. Operation will be from 1400Z **June 29** until 2200Z **June 30** on the lower 25 kHz of the General class bands, 80-10 meters, phone and CW; Novice on 7.130 and 21.150 MHz. Commemorative confirmation for no. 10 s.a.s.e. and QSO info to William K. MacNealy, WD8LFM, RR 1 DTSQ, Bolivar, OH 44612.

Winnipeg, Manitoba, Canada: In celebration of the Parks' Centennial, XJ4RMP will be operated from Riding Mountain National Park on the HF bands. Other stations will be operating using the XJ4 prefix, including XJ4AEX on CW near 14.012 MHz. Operation will be from **June 29** through **August 29**. To QSL, send an s.a.s.e. to VE4AKN, 15 Jupiter Bay, Winnipeg, MB R3T 0W5, Canada.

Note: The deadline for *receipt* of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by June 15 to make the August issue. Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special Events Stations: To get your QSL or certificate from any of the special-events stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a stamped, self-addressed envelope. If sending for a certificate, use a 9- × 12-in envelope if you want an unfolded certificate, or a no. 10 sized envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your s.a.s.e. to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-events stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

(continued from page 55)

bureau. For example, WB8TDA/1 sends envelopes to the W8 bureau, *not* the W1 bureau.

ARRL DX QSL BUREAU SYSTEM

First Call Area: all calls*—Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls*—NJDXA, P.O. Box 599, Morris Plains, NJ 07950.

Third Call Area: all calls—C-C.A.R.S., P.O. Box 448, New Kingston, PA 17072-0448.

Fourth Call Area: single-letter prefixes—Mecklenburg ARS, P.O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes—Sterling Park Amateur Radio Club, Call Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls*—ARRL W5 QSL Bureau, P.O. Box 44246, Oklahoma City, OK 73144.

Sixth Call Area: all calls*—ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls—Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls—Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls*—Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls*—WØ QSL Bureau, Ak-Sar-Ben Radio Club, P.O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls*—Radio Club de Puerto Rico, P.O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls—Virgin Islands ARC, GPO Box 11360, Charlotte Amalie, St. Thomas, VI 00801.

Hawaiian Islands: all calls*—John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls*—Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls—MARC, Box 445, Agana, GU 96910.

SWL—Mike Witkowski, WDX9JFT, 4206 Nebel St., Stevens Point, WI 54481.

CRRL DX QSL BUREAU SYSTEM

QSL Cards for Canada (VE, VO and VY) may be sent to CRRL Central Incoming QSL Bureau, Box 51, St. John, NB E2L 3X1. Or, QSL cards may be sent to the individual CRRL Incoming QSL bureaus.

VE1*—L. J. Fader, VE1FQ, P.O. Box 663, Halifax, NS B3J 2T3.

VE2—A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3—The Ontario Trilliums, P.O. Box 157, Downsview, ON M3M 3A3.

VE4*—Larry R. Lazar, VE4SL, 30 Bathgate Bay, Winnipeg, MB R3T 0L2.

VE5—B. J. Madsen, VE5ADA, 739 Washington Dr., Weyburn, SK S4H 2S4

VE6*—N. F. Waltho, VE6VW, General Delivery, 9714-94th St., Morinville, AB T0G 1P0

VE7*—Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8*—Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2—Roland Peddle, VO1BD, P.O. Box 6, St. John's, NF A1C 5H5.

VY1—ARRL QSL Bureau, W. L. Champagne, VY1AU, P.O. Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, E. Roy Ellis, VE6XC—A/SM: VE6AMM. SEC: VE6XS, STM/NM/DEC: VE6ABC. March found us with our old prairie director, VE6AW, gone east but now we find the office held down by that energetic VE6ABC. Best to both men. Membership in clubs throughout the prov seems to be suffering. What can we do about it? Computer problems seem to be holding up the new call plate lic plates — maybe we should go back to the old reliable ways. Traffic: VE6CHK 237, VE6CPE 35, VE6ABC 15. (Feb.) VE6CHK 154, VE6CPE 28, VE6ABC 16.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—This is a sad month for British Columbia Public Service Net: Syl Shaw, VE7QC, became a Silent Key. He had suffered a long and difficult illness for many years. Which his retirement hasn't been a pleasure to enjoy, yet he really never showed it on net. Syl took over as Net Manager 1951 and ran it till his passing. We all will miss him for ever for his devotion to the net. Ford VE7DDF Assistant Net manager is carrying the load till the net appoints a Net Manager. BCPSC net report average 192.5 - Hi 250 - Lo 153 - Total 5972. BCEN is doing better with check-ins by running two sessions at 0100Z and 0300Z till conditions improve. QNIs 1058 QTCs 199. VE7ERQ Bob in Strong's Rehabilitation and wishing visitors. Pacific North-West Radio Amateurs, Chinese Gourmet Banquet and Dance was a great success and prizes galore (even lots of cash prizes). 73. Traffic: VE7BNI 340, VE7CDF 106, VE7FB 26, VE7CCJ 24, VE7EIR 13, VE7XA 16, VE7EGM 13, VE7FSP 10, VE7BZI 6.

MANITOBA: SM, Jack Adams, VE4AJE—SEC: VE4FK. NMs VE4LB, VE4AFO, VE4TE, VE4VJ, VE4ANR. Propagation improved slightly compared with February. QRM from U.S. stations has been heavy at times, on the net freq (3765). Check-ins increased by approx. 20% while formal traffic decreased slightly. Bob, VE4RO, will be laid up for a while due to an operation in Brandon General. Nets and traffic reports; MEPN QNI 1246, Sessions 31, QTC 9; MMN QNI 587, sessions 30, QTC 40; MBSSB (144.250) QNI 9, session 4, QTC nil. Thanks to Bill, VE4CR for his dedicated secretarial work for the MEPN. As well many thanks to the other net managers and NC stns. WRS QNI 319, sessions 9, QTC nil. Traffic: VE4AJE 65, VE4AFO 37, VE4TE 34, VE4LB 34, VE4IX 18, VE4AAD 17, VE4FK 10, VE4BI 7, VE4OT 6, VE4AEA 4, VE4DS 4, VE4ADS 2, VE4AMC 2, VE4HK 2.

MARITIME-NEWFOUNDLAND: SM, D. R. Welling, VE1WF—ASM: VE1OC. Aaron, VE1OC, has accepted the appointment of Assistant Section Manager and will be writing the monthly column in the coming months. His report is as follows: Congrats White Cane Contest Winner VE1UV. VE-1 Contest winners: CW—VE1ZL, phone—VE1RV. Coming events: Naval Communications Reunion, Halifax, N.S., June 21-23. Bicentennial Hamfest, St. John, N.B., Oct. 18-20. D.O.C. Exams, June 19 and Oct. 16. Silent Keys: VE1AD, VE1RO/VE1LCR, VE1ZP, FP8AP, VO1BG.

ONTARIO: SM, Larry Thivierge, VE3GT—BM: VE3LST. PGL: VE3AR. SEC: VE3GV. STM: VE3BDM. TC: VE3EGO. NMs: VE3AJN VE3BDM VE3CYR VE3FGU VE3GFN VE3KK. After a unanimous vote, VE3AJN was appointed to the post of Net Manager of the International Assistance and Traffic Net (IATN). As many know, she is very active in traffic activities and is the myl of VE3GNW. Congratulations Devere. During the recent Ontario Winter Games held in St. Catharines, members of the Niagara Peninsula ARC passed over 2000 pieces of games related traffic for officials. Amateurs in the USSR have a new allocation on 160 meters. The allocation is shared territory from 1830 to 1930 kHz, with cw only from 1830 to 1860 kHz. It is with regret that I report VE3NO has become a Silent Key. Bruce was a long time NCS on ONTARS and was well known throughout the Section. Scarborough ARC's Technical Achievement Award was won by VE3ODS at a recent home brew night. VE3GOG is now VE3FM. New members of the Oakville ARC are VE3CQV and VE3ELY. VE3BRO is working on new technology with his RTTY activities. VE3GFN contemplating "retirement" after 10 years of co-radio classes. Maybe he will have changed his mind after a month long holiday in Greece. VE3PQ and VE3EJW together with a lot of helpers recently ran the communications for the Canadian Winter Rally which was a great success. Brent has taken on the job of Rallymaster for the past few years and integrates the whole affair around the ham radio communications. A far cry from a decade ago when our initial efforts were "tacked on" to the organization. Upgrades to advanced; VE3IHS VE3OLJ. If your club or group is participating in Field Day this month, an easy 100 bonus points can be earned for originating a message to me during the event. Please see the rules. VE3WV spoke to the York Region ARC on the merits of the NTS. Traffic: VE3DPO 157, VE3KK 155, VE3BDM 127, VE3GT 116, VE3CYR 113, VE3GNW 109, VE3AWE 63, VE3GOL 60, VE3KCZ 49, VE3JSM 48, VE3AJN 46, VE3FGU 46, VE3WV 27, VE3BUO 25, VE3MCO 16, VE3BAJ 15, VE3EWD 15, VE3EST 14, VE3KLX 10, VE3WG 10, VE3WM 9, VE3EHL 5, VE3IFP 4, VE3OER 3. (Feb.) VE3GOL 30, VE3BAJ 11.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. PIO: VE2YW. TC: VE2ED. NM: VE2EDO. If your club has a newsletter, I would like to be put on your mailing list. Before planning your vacations, remember that the RSO/CRRL convention will be held in London, Ontario on the 27-29 September, 1985. Felicitations a Georges, VE2GMO, le nouveau president elu de VE2MO (Trois-Rivieres). La cotisation a RAQI est maintenant $25.00 pour membre ordinaire ou handicape. Traffic: VE2CP 115, VE2EDO 89, VE2EC 46, VE2BP 44, VE2EKC 38.

SASKATCHEWAN: SM, W. C. Munday, VE5WM—SEC: VE5CU. STM: VE5HG. TC: VE5GF. OBS: VE5JA. BM: VE5WM. NMs: VE5EX, VE5NJ, VE5AEM, VE5AEJ, VE5BAF. Net reports: MJARC-2 meter 30 sessions, 228 QNI; RARA-2 meter 31 sessions, 626 QNI, 3 QTC; PWXN 31 sessions, 673 QNI; SK Phone 30 sessions, 1461 QNI, 34 QTC. Amateur Radio assistance was provided to the Saskatoon Chilean Community Group following an earthquake which devastated parts of Chile in March. The following stations were involved in handling health and welfare traffic: VE5s BAF, BDI, BEL, BEO, GK, HG, VL, WG, ZJ, ZO. Amateurs from Saskatoon, Rosthern and Prince Albert SK areas provided communications for SK Ski 60 cross country ski event. Traffic: VE5BEL 146, VE5BAF 86, VE5UX 17, VE5WM 10, VE5AGM 8.

ATLANTIC DIVISION

DELAWARE: SM, John Hartman, WA3ZBI—STM: W3DKX. SEC: W3PQ. PIO: W3PQ. PIO: N3DIP. PSHR: K3JL. Congratulations to Donna and Lars, KA3CDF, on their marriage. We wish them many years of happiness. Also congratulations to Joe, KA3IXU, on upgrading to Tech. The SARA Club has unanimously voted to be a part of "SKYWARN" net. DTN QNI 389, QTC 41 time 536 Min. In 21 sessions DEPN QNI 89, QTC 26 time 157 Min. In 5 sessions. SEN QNI 40, QTC 4 time 84 Min. In 4 sessions. Traffic: W3PQ 124, W3QQ 121, WB3DUG 52, WA3WIY 44, W3DKX 35, K3JL 26, WA3ZBI 25, N3AXH 12, WA3DUM 9, KA3IXV 8, W3FEG 8, K3ZXP 8, KC3JM 8, KC3FW 6.

MARYLAND — DC: SM, Karl R. Medrow, W3FA—KJ3E will be looking for your reports from 1 July. ACC is KA3DRO - my typo last time. The MEPN is our base net 3920 kHz nightly at 1800 local time and during emergencies—try it! OOs KA3R and K3CHP sent reports. W3IK just back from a month on the west coast. W3ICM, off the air recently is writing "Spectrum Management and Engineering" soon to be published by the IEEE Press. Look for him in the pileups! KA3DUE W3OYY WB3BFK KJ3E KA3HUT KC3DW W3YVQ and KC3Y are all net managers. WA2ERT's scouting trips are starting early this year. EC WA3TOY W3VVN KC3GY N3DEV WA3VPL and AB3F were manned for a real chemical spill March 22. KK3F is working hard for BPL. KC3AV is busier than ever as an ex-net manager. W3DQI is MEPN's busiest director. KA3EWV would like a little improvement in conditions. WB3FUE is part of the new Eastern Shore activity. KA3IID gets to hamfests — so does W3DFW. W3LDD's new toy is a 2-meter set. K3NNI had one more by-pass than I thought — five! K3MR is a late session man. W3FZV is anticipating a whole month off! W3YVQ reports on the readiness of the weather net. N3DE is quite an instructor. N3EBQ swapped NCS jobs with WA2ERT. MEPN Net Certificates to N3AGM, K3GUX, K3ORW and KB3NL Congrats. MEPN Picnic Taneytown 7 July hosts K3ORW and KB3NL. Washington Area IBM, LARC Feedback, GSFC, FAR minutes, Delmarva ARC and CBRA newsletters are appreciated. KA3DXZ is advanced Congrats and look for a new call! With the Nets: Net/Manager Sessions/Traffic/Avg QNI. Prince George's ARES/KA3DUE 4/14/23. Wicomico ARES/KA3HUT 3/1/23. WC 2 Mtr Net/KC3DW 4/0/16.5. MDC PON/W3OYY 4/4/12.3. WR PON/WB3BFK 22/19/12.4. MSN/KC3Y 31/65/13. MEPN/KJ3E 28/145/30. Top Ten: WA2ERT KK3F KJ3E N3EBQ W3LDD K3ORW W3YVQ KA3CDQ W3HTB and WA3DUM. MDD/W3PQ Feb 55/244/9.7. March 61/274/9.1. Top Brass foth W3QQ W3FA and KK3F. Traffic: KK3F 327, KC3Y 204, KJ3E 179, KC3DW 154, W3FA 129, WA2ERT 127, KC3AV 101, K3NNI 83, W3YVQ 82, N3DE 81, KA3EWV 79, W3DQI 39, WB3RUE 16, KA3IID 12, K3MR 12, W3FZV 12, N3EBQ 11, K3ORW 10, WB3BFK 9, W3LDD 6.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: W2IJX. SGL: W2XQ. PIO: VACANT. BM: WB2UVB. OOC: KB2MY. Since there wasn't enough room in last month's column, I couldn't mention the fact that Robert Armbruster, KB2MY of Toms River has become our Official Observer Coordinator. It's hard to believe, but Field Day is upon us once again. Your group can earn the easiest 100 points of the contest by having your club president or Field Day group leader send a radiogram to me during contest period telling me your club or group's name, number of operators, field location and the number of ARES members participating. For the first time in FD's illustrious history, an additional 100 bonus points can be earned by completing one or more QSOs via packet radio. For detailed information, please see May's QST. Good luck and have fun. BCNU FD! In April's QST you may have read the article about the new section position, Assistant Technical Coordinator. I'm particularly interested in anyone interested in becoming an ATC for TVI matters. If you are interested, please contact me. Tnx. 73. Traffic: WB2UVB 169, N2CER 100, W2IML 40, KA2CQX 23, WA2MGV 18, WA2HEB 100, WA2CUW 1.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—SEC: W2BCH. ACC: N2EH. BM: W2GLH. PIO: WA2PUU. OOC: W2AET. TC: K2QR. SGL: KO2X. STM: OPEN. HAMFEST CALENDAR: Rome JUN 2, Cortland JUN 15, Batavia JUL 14, Newark Valley TFC PICNIC AUG 10, Trumansburg AUG 24, HAM-O-RAMA SEP 14, Elmira SEP 28, Syracuse OCT 5. Appointments: (NM) WA2PUU, WB2HLY, (ORS) KG2D, K2DNN, VE2FMQ, WB2IDS, WB2OWO, KU2N, WB2RBA, KC2SJ, W2ZGJ. WNY Certified OO stations W2AET, WA2KJR, N2NW, K2UCO; others interested in the Official Observer program please write to OOC, W2AET. OBS reports: WB2DSR, WA2ZPE, K2KWK with bulletins on 146.79 or 88 Sundays at 2045 local, plus Tuesdays at 1930 on 145.31. PSHR: KA2BHR KG2D KA2DQA WA2FJJ VE2FMQ W2GJ WB2IDS W2MTA WB2OWO WB2RBA ND2S KX2T KA2UBX K2YAI.

NYS/1*	3677	1000/Dy	WB2EAG	372	261	31
WDN/M*	04/64	1100/Dy	WB2OWO	274	077	31
Mike Farad	3925	1300/Dy	VE2FMQ	273	058	31
NYPON*	3913	1700/Dy	WA2KOJ	751	356	31
NYSPTEN	3925	1800/Dy	W2MTA	639	068	31
ESS	3590	1800/Dy	W2WSS	495	073	31
OCTEN/E*	34/94	1830/Dy	WB2HLY	753	096	31
Q Net	31/91	1830/Dy	KA2CMQ	423	006	31
WDN/E*	04/64	1830/Dy	WB2OWO	593	152	31
Blue Line	93/33	1900/Dy	WA2SEP	266	018	31
NYS/4*	3677	1900/Dy	WB2MCO	474	236	31
JCARCN	10/70	2000/Dy	WA2WAX			
OARCN	25/85	2000/Wd	K2VTT	050	001	04
BRVSN	055/655	2100/Dy	WB2OFU	324	005	31
CNYTN*	90/30+	2115/Dy	WA2PUU	291	037	31
OCTEN/L*	28/88	2130/Dy	WB2HLY	326	036	30
STAR*	99/39	2130/Sa	TBA	017	002	05
WDN/L*	04/64	2130/Dy	WB2OWO	500	122	31
NYS/5*	3677	2200/Dy	WB2MCO	387	265	31

*NTS Net. BPL: WB2IDS WB2OWO. ARES Nets: Lewis Co. Sun. 1800 147.615/015; Saint Lawrence Valley Mon. 1930; Western New York third Sunday 2000 on 3955 kHz. Forty counties of Western New York have over 10,000 licensed radio amateurs with over 1,000 in Rochester alone ... that's two hams for every thousand people average. A.R.E.S. still needs Emergency Coordinators in Herkimer, Montgomery, Schoharie, Schuyler, Steuben and Wyoming counties; interested? Write to SEC W2BCH. Have a great Field Day June 22-23 and a FB Summer! Traffic: WB2OWO 521, WB2IDS 419, VE2FMQ 316, WA2FJJ 309, W2MTA 256, K2YAI 227, WB2QIX 177, W2YGW 173, KA2BHR 106, ND2S 91, KG2D 84, W2HYM 82, KA2DQA 81, KA2UBX 79, KX2T 77, W2GJ 59, WA2KOJ 54, WB2RBA 49, KA2DBD 38, W2FR 36, N2EVG 35, AF2K 34, W2ZOJ 31, W2TZ 27, K2GXT 22, K2IUT 18, N2EZY 17, W2PPS 12, WA2OEP 6, WA2RXO 6, KC2SJ 5, WB2NAO 4, WB3CUF 3. (Feb.) W2MVH 4.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—STM: AC3N. SEC: WA3UFN. PIO: WB3IZJ. SGL: K3HWL. TC: K3LR. OO COOR: KJ3Q. BM: WN3VAW.

Net	QNI	QTC	Sess.	KHz	T/D	Mgr.
WPACW	340	155	31	3585	7:00P/D	WA3UNX
WPAPTN	680	149	31	3983	6:00P/D	KC3JQ
WPA2MTN	485	53	31	146.28/88	8:00P/D	W3MML
NWPA2MTN	530	3	30	145.13/53	1400 UTC	KC3NY
PFN	153	63	31	3958	5:00P/D	WA3THT

I would like to announce the appointment of WN3VAW as Assistant SM. He will still be the Bulletin Manager. He is an Extra and has attended Penn State. He will be employed at Radio Station WSHB in Pgh. New novices are KA3NTM, KA3NTN, KA3MZE, upgrade to Tech KA3KJL & KA3NTA. WA3ZSC to Advanced, congrats to all. WB3BRY now KC3RJ, WA3IZH now KV3L, W3NVS is celebrating 50 years as an amateur. W3OKN has received his 50 year QCWA gold cert. and QCWA 50 year continuous license certificate. KA3JGN has taken over the editor responsibility for the ICARC Sine of The Times newsletter. He will need the help of the club members to make it as good as it was. 1985 officers for the Crawford ARS are Pres. N3DLN, V.P. K3SYP, Sec. KL7IK, Treas. KA3IPM Directors WA3ZSC & KF3F. Have you renewed your ARRL membership? To hold appointments, you must be a member. N3AWQ (formerly W8NM & W3NQ) is a Silent Key; he will be missed by his friends. Interested in Packet Radio—contact N3CVL and WA3HGW, they will be glad to help. Remember WB3IZJ is PIO for the WPA Section; please alert him of any newsworthy events. Traffic: W3EGK 384, KA3ETC 256, KQ3T 168, W3OKN 152, W3NGO 103, WA3QNT 93, W3RUL 92, K3SMB 72, W3KMZ 60, N3FM 60, WA3UNX 57, KC3JQ 49, K3NPW 41, WA3DBW 41, W3KUN 38, KQ3M 35, KB3DT 33, AC3N 31, WN3VAW 30, K3LTV 23, W3MML 17, KA3LGU 17, KR3P 14, KB3NV 13, N3CYV 13, KN3B 12, KA3EGE 9, WB3GUK 8, KC3HR 4.

CENTRAL DIVISION

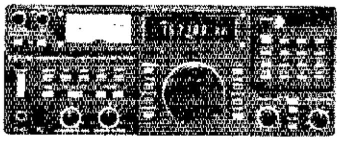
ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: KB9X. OOC: W9TT. BM: K9ZDN. SGL: W9KPT. ACC: WB9SFT. TC: N9RF. ASM: K9ORP.

Net	Freq.	Times (Z WIN)	QNI	QTC	Sess.
ILN	3690	0030/0400 Dy	619	173	61
ITN	3705	0100 Dy	338	81	31
ILPN	3915	2230 Dy (X SN)	—	—	—
NCPN	3915	1300 Dy (X SN)	429	78	26
NCPN	7270	1815 Dy (X SN)	284	60	26
IEN	3940	1500 SN	112	0	5
IARES	3915	2230 1+3 SN	74	0	2
ISN	3905	0000 Dy	603	130	31

Illinois was represented 98% to 9RN by stations K9AZS WA9BFV N9DR KA9EWN K9GMZ KZ9I W9INZ KW9J KD9K WB9NVN W9NXG KA9PKG K9QEW WB8RFB N9TN KB9X and KC9YN. Illinois was represented 100% to D9RN by stations W9NXG W9HOT WD0AHO W9HLX KW9J K9AZS WB8RFB and WB9NVN. D9RN was represented 100% to CAND. Illinois stations were W9HOT K9AZS W9NXG WB8RFB and KW9J. It is with sadness that I report the passing of Louie Fieg, WB9ODN of Lagrange Park. Louie was an inspiration to all who knew him. He was active on the Illinois Phone Net, the Northeast Illinois Emergency Net, D9RN, and MIDCARS, and was NCS for the Lagrange Park Civil Defense Net. His familiar voice and the call WB9-OOOOOO-DN will be missed. EC WB9CWE reports that Logan Co. ESDA Director WB9QMO and area amateurs involved in SKYWARN activities attended a severe weather spotters seminar ... and five hours later were on the scene rendering assistance in tornado stricken Emden IL. New Will Co. EC N9DIX will be starting a Will Co. ARES net on the BARS 147.93/33 repeater on the list and 3rd Sunday of each month at 1530 local time. All amateurs are invited to check in. Many ECs reported the participation of their groups in the Illinois Statewide Tornado Drill on March 5th. While interest and participation was up in some areas, it was down overall. MANY THANKS AND CONGRATS FOR A GOOD JOB to ISN NM K9AZS (who has been NM for ISN since its inception) and to K9QEW NM for ITN, both of whom are 'retiring' from yeoman NM service as of March 31. WELCOME AND GL to their replacements, KC9YN will be the new NM for ISN and WB8RFB will assume NM for ITN. GOOD IDEA DEPT: WA9BFV is putting up posters explaining the free message service of amateur radio as well as message forms and collection boxes in the local senior citizens center and area nursing homes. New TC N9RF is already hard at it! He gave a talk to about 30 crime prevention officers on how burglar alarms can be set off by nearby transmitters, and also alerted them to the TVI that some types of burglar alarms can generate. He is also working on a presentation on TVI for area clubs, which will demonstrate his 'standard TV set' and a home brew spectrum analyzer. If the Technical end of Amateur Radio is your forte, contact N9RF regarding one of the newly created ATC appointments. Traffic: WA9BFV 245, W9HLX 202, WB8RFB 161, W9NXG 156, W9HOT 118, KB9X 65, KD9K 59, KA9EWN 47, K9QEW 41, WD0AHO 38, ND9V 34, KA9BBV 32, KC9YN 28, KZ9I 22, NC9T 22, W9LNO 21, WB9TVD 12, KB9QX 11, K9KR 10, WD9CJB 9, K9WMP 7,

6 STORE BUYING POWER

ICOM R-71A



SUPERIOR GRADE GENERAL COVERAGE RECEIVER

REGULAR $799

SALE! $629.95

PLUS FREE UPS

ICOM IC-37A

220 MHz's BEST BUY!

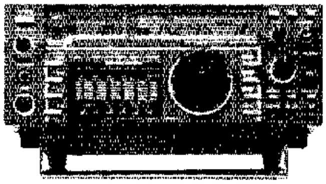
REGULAR $449

SALE! $299.95

PLUS FREE UPS

ICOM IC-735

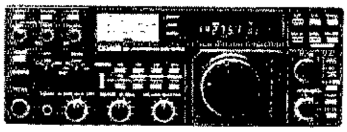
A BRAND NEW HF TRANSCEIVER



WITH ALL THE FEATURES THAT MAKE IT A TRULY OUTSTANDING B U Y!

CALL FOR PRICE AND INFORMATION

ICOM IC-751



TODAY'S MOST ADVANCED TRANSCEIVER

REGULAR $1399 **SALE!** *CALL FOR SPECIAL PRICE*

ICOM *HAND-HELDS*

AT GREAT LOW SUMMER PRICES

IC-02AT
IC-04AT

IC-2AT
IC-4AT

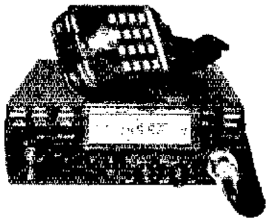
IC-3AT

CALL NOW!

LATEST ICOM *EDITION*

IC-3200A DUAL BANDER

COVERS BOTH 2 METERS and 70CM



NEW!

CALL FOR PRICE AND INFORMATION

PERSONALIZED SERVICE

BOB FERRERO, W6RJ *President*
JIM RAFFERTY, N6RJ *VP So. Calif. Div., Anaheim*
Managers
GEORGE, WB6DSV, *Burlingame*
DON, N6IPE, *Oakland*
BOB, K7RDH, *Phoenix*
GLENN, K6NA, *San Diego*
AL, K6YRA, *Van Nuys*
and other active amateurs to serve you

FREE SHIPMENT

UPS SURFACE (Continental U.S.) (MOST ITEMS)

TOLL-FREE PHONE

INCLUDING ALASKA AND HAWAII

800-854-6046

CALIF. AND ARIZONA CUSTOMERS CALL OR VISIT NEAREST STORE

PHONE HOURS: 9:30AM to 5:30PM PACIFIC TIME.
STORE HOURS: 10AM to 5:30PM Mon. through Sat.

HAM RADIO OUTLET

VISA

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033, (213) 860-2040,
Between Disneyland & Knotts Berry Farm.

OAKLAND, CA 94609
2811 Telegraph Ave.,
(415) 451-5757,
Highway 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road,
(619) 560-4900,
Highway 163 and Clairemont Mesa Boulevard.

BURLINGAME, CA 94010
999 Howard Ave
(415) 342-5757,
5 miles south on 101 from San Francisco Airport.

PHOENIX, AZ 85015
1702 W. Camelback Road,
(602) 242-3515,
East of Highway 17.

VAN NUYS, CA 91401
6265 Sepulveda Blvd.
(818) 988-2212
San Diego Freeway at Victory Boulevard

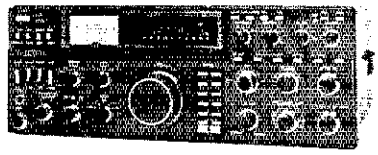
MasterCard

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ANTENNA SPECIALISTS • ARRL • ASTRON • BASH • BELDEN • BENCHER • BIRD • BUTTERNUT • B & W • CALLBOOK • CENTURIAN • COLLINS • COLUMBIA • CURTIS • CUSHCRAFT • DAIWA • DRAKE • EIMAC • HAL • HUSTLER • HY-GAIN • ICOM • J. W. MILLER • KANTRONICS • KENWOOD • KLM • LARSEN • LUNAR • METZ • MFJ • MICROLOG • MINI PRODUCTS • MIRAGE • NYE • PALOMAR • ROHN • SHURE • SIGNAL ONE • STONER • TEMPO • TEN-TEC • TRISTAO • TRI-EX • VAN GORDON • VOCOM • WEST • YAESU and more

Prices, specifications, descriptions subject to change without notice. Calif. and Arizona residents please add sales tax.

6 STORE BUYING POWER

KENWOOD TS-930S



PAY NEW REDUCED PRICE OF ~~$1699~~ $1449

RECEIVE FREE AT-930 ANTENNA TUNER Reg. $199.95 and MC-60A MICROPHONE Reg. $79.95

PLUS FREE UPS

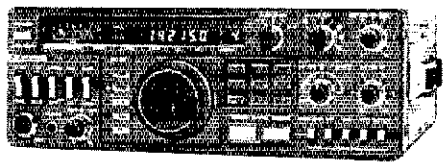
KENWOOD HAND-HELDS

TR-2600A Deserves its well-earned reputation as the leading HT

TH-21AT/41AT
COMPACT!
Only 2.4"W, 4.72"H, 1.1"D
Outstanding performers in an ideal package size.

CALL FOR PRICE

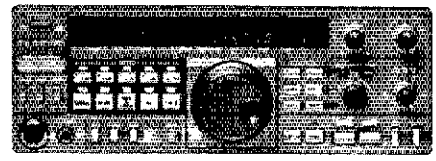
KENWOOD TS-430S



The highly popular general coverage HF transceiver. A top seller.

CALL FOR SPECIAL PRICE

KENWOOD TS-711A/TS-811A



Ideal VHF/UHF base stations for 2M/70CM transceive operation.

GREAT PRICES. CALL

KENWOOD TW-4000A

PAY REGULAR PRICE OF **$599.95**

RECEIVE FREE

THE FOLLOWING

1) **VS-1 VOICE SYNTHESIZER** $39.95 VALUE
2) **TU4-C SUB-AUDIBLE** $39.95 VALUE
3) **MA-4000 DUO-BAND MOBILE ANTENNA.** $44.95 VALUE

PLUS FREE UPS

NEW! KENWOOD TS-940S

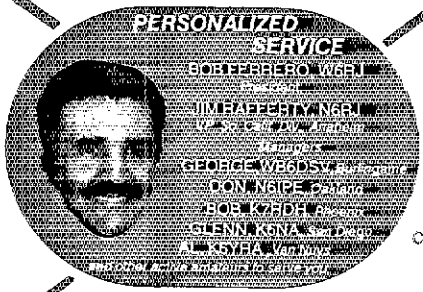
TOP-OF-THE-LINE HF TRANSCEIVER

- General coverage receiver.
- 40 memories.
- 250W pep. Runs cooler, longer.
- Additional LCD readout.
- Optional ant. tuner, 160 thru 10M.
- Plus, plus, plus.

NEW!

CALL FOR PRICE AND INFORMATION

FREE UPS



FREE SHIPMENT

UPS SURFACE (Continental U.S.) (MOST ITEMS)

TOLL-FREE PHONE

INCLUDING ALASKA AND HAWAII

800-854-6046

CALIF. AND ARIZONA CUSTOMERS CALL OR VISIT NEAREST STORE

PHONE HOURS: 9:30 AM to 5:30 PM PACIFIC TIME.
STORE HOURS: 10 AM to 5:30 PM Mon. through Sat.

HAM RADIO OUTLET

VISA

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033, (213) 860-2040,
Between Disneyland & Knotts Berry Farm.

OAKLAND, CA 94609
2811 Telegraph Ave.,
(415) 451-5757,
Highway 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road,
(619) 560-4900,
Highway 163 and Clairemont Mesa Boulevard.

MasterCard

BURLINGAME, CA 94010
999 Howard Ave.
(415) 342-5757,
5 miles south on 101 from San Francisco Airport.

PHOENIX, AZ 85015
1702 W. Camelback Road,
(602) 242-3515,
East of Highway 17.

VAN NUYS, CA 91401
6265 Sepulveda Blvd.
(818) 988-2212
San Diego Freeway at Victory Boulevard

ADI • ALLIANCE • ALPHA • AMECO • AMPHENOL • ANDREW • ANTENNA SPECIALISTS • ARRL • ASTRON • BASH • BELDEN • BENCHER • BIRD • BUTTERNUT • CDE • CENTURION • COLLINS • COLUMBIA • CURTIS • CUSHCRAFT • DAIWA • DRAKE • DX EDGE • EIMAC • G.E. • G.W. MILLER • KANTRONICS • KENWOOD • KIM • LARSEN • LUNAR • METZ • MFJ • MICROLOG • MINI PRODUCTS • MIRAGE • NYE • PALOMAR • ROHN • SHURE • SIGNAL ONE • STONER • TEMPO TEN TEC • TRISTAO • UNIVERSAL WIRE • VECTRON • VIBROPLEX • WELZ • YAESU and more

Prices, specifications, descriptions subject to change without notice. Calif. and Arizona residents, please add sales tax.

N9CLB 7, W9KPI 7, W9VEY/M 7, N9EWT 6, W9DBO 6, ND9S 4, WA9RUM 4, K9BED 3, W9RTD 3, WD9HQW 3, N9ELU 2.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: *WB9ZQE*. STM: W9JUJ. SACC: K9TUS. STC: K9PS. SGLC: WA9VQO. SOBC: KC9TA. SPIO: K9DIY. SRC: N9WB. SHC: WA9FUD. SOOC: KJ9G. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, IRN KB9SU, VHF W9PMT, IWN KA9ERC. March Net Reports:

Net	Freq.	Time Daily UCT	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	3599	414	2548	93
QIN	3656	1430/0000/0300	656	359	1844	91
ICN	3708	2315	169	30	766	29
IRN	3629	0000	208	162	1289	30
IWN	3910	1310	1791	0	453	31
IWN	VHF	Bloomington	1141	0	310	31
IWN	VHF	Kokomo	1085	0	198	31

Hoosier VHF Nets for March QNI 5616, QTC 158, Bulletins 483, QTR 9642 in 192 sessions for 22 nets. 9RN cycle four QNI 383, QTC 480, QTR 997, sess. 62 IN 100% Stns. W9EI W9FC N9HZ KJ9J W9JUJ WA9QCF WB9UYU K9WWJ. D9RN 599 messages in 1371 minutes. IN. 100% Stns. K9CGS, W9JUJ, N9DWU. CAND 723 messages in 31 sessions. D9RN 100%. Stns. N9DWU, W9JUJ, K9CGS. Appointments: Emergency Coordinator N9ASR for Jefferson County, KA9RBY for Howard County, WB9ZHC for Green County, WD9IZA for Grant County, WB9UNL for Whitley County WB9RWB for Vandenburg County, N9DGQ for Rush County, WA9NOH for DeMotte County, WD9GXG for Posey County, WD9EVK for Monroe County, N9CLV for LaPorte County, WB9EBI for Huntington County, N9AIR for Cass County, WB9KLV for Boone County, DEC KA9FFO. OBS W9JUJ WD9GET WA9OKK W9PMT K9PQP W9CNE WD9DRM W9EPT. ORS N9DTG K9JDF. ACC K9TUS, GL WA9VQO, OO/AA KJ9G, STM W9JUJ, PIO K9DIY. ATC KB9C N9WB W9DUU. Silent Keys: K9MOM Wallace In. W9LWE Muncie In. W9RTH has resigned as an EC after 27 years as an EC because of eyesight. It surely must be a record. A big vote of thanks for a wonderful service. Congratulations to WB9QFE for being chosen outstanding Amateur of the year by the WVARA. Thanks to Fort Wayne Hams for their manning the telephones for one part of the Easter Seal telethon. W9PMT is an outstanding example of the courage and ability of the handicapped. Thanks to Elkhart Red Cross ARC for their display booth at the Maple Syrup Festival. Traffic: W9JUJ 1023, KJ9J 302, W9CNE 248, KB9HH 140, KA9FFO 108, WA9QCF 104, WB9UYU 96, W9EI 87, KW9C 65, WD9HII 56, K9DFK 54, K9KTB 51, W9UMH 45, KW9D 39, WD9DWD 32, WD9JAA 32, W9PMT 32, KA9EIV 26, W9JZV 24, KD9ER 24, WB9PFZ 23, N9DYC 23, K9PS 22, W9QYY 20, KI9R 17, WA9OKK 16, WB9AWI 15, K9BRF 13, W9BTZ 12, WA9AXF 10, W9URS 9, WD9ART 8, K9TKE 8, N9DGQ 8, AB9A 8, W9EHY 8, K9SBW 8, K9DIY 8, K9OUP 7, W9XD 6, WA9CHY 6, WB9OZZ 6, WB9IHR 6, W9ZGC 4, WB9VPG 4, N9DHX 4, WD9GWM 3, WB9OFG 2, W9BDP 2, KD9DU 1, KB9SU 1, KM9B 1, N9AEI 1, W9HZ 1, WB9ZQE.

WISCONSIN: SM, Richard R. Regent, K9GDF—ACC: KA9FOZ. BM: KA9CPA. OO/RFI: NC9G. PIO: K9ZZ. SEC: W9OAK. SGL: AG9V. STM: K9UTQ. TC: K9GDF. John Leekley, WB9SMM, EC for Milwaukee County and DEC for SE Wisconsin, received special Certificate of Merit at Milwaukee RAC from K9GDF on behalf of ARRL for his volunteer work in organizing emergency communications over the years, including public service work like the City of Festivals Parades. John thanks all amateurs who participate in those activities. You can join ARRL or renew membership at most Wisconsin Hamfests/Swapfests, just look for me at the ARRL table. Your SM sold thousands of dollars worth of ARRL publications so far this year, thanks to all who have helped. Sorry to report W9VLB is Silent Key and was QCWA member. Correction to last months news, KC9CJ substituted for W9YCV at last minute for traffic training program in Racine. K9GDF was welcomed back to Racine Megacycle Club on May 13th to give VEP talk. Riverland ARC applied to become a Special Service Club. Wisconsin Chapter QCWA meeting in beautiful Wisconsin Rapids, June 1st. Milwaukee ARES meeting on packet radio and Milwaukee RAC exams, both on June 4th. Wisconsin Nets Association meeting June 15th at WB9ICH's QTH. Central Wisconsin Radio Amateurs will have Swapfest, Family Picnic, and Raffle on June 16th at Bukolt Park, Stevens Point, ARRL/VEC exams at 9 A.M. Communicators needed for City of Festivals Parade June 22nd, contact WB9SMM. Good luck on Field Day, June 22 and 23, remember bonus points for handling traffic and for message to SM. South Milwaukee ARC Swapfest, American Legion Post in Oak Creek; Eau Claire ARC Hamfest, 4H Barns on Fairfax Street; and Sheboygan County ARC Swapfest at Wilson Town Hall, all on July 13th. Tri-County ARC will have exams on July 14th, contact KW9W. New swap net from Wausau 146.22/82 MHz, Sundays at 9 P.M. BPL to KA9CPA and KC9CJ. The future is that time when you'll wish you'd done what you aren't doing now.

Net	Freq.	Time	Mgr.	QNI/QTC/Sess.
BWN	3984	6 A.M.	WD9IID	1233-1418-26
BEN	3985	Noon	WB9ESM	733-205-31
WSBN	3985	5:30 P.M.	WA9ZTY	931-269-31
WNN	3723	6 P.M.	KA9OBP	140-39-27
WSSN	3645	6:30 P.M.	N9BDL	159-53-31
WIN-E	3662	7 P.M.	WB9ICH	281-187-0
WIN-L	3662	10 P.M.	KC9CJ	140-59-31
XPO	3925	12:31 P.M.	WA9YVC	275-22-20
NWTN	34/94	6:30 P.M.	W9JSF	429-82-31
WCWTN	31/91	6:00 P.M.	N9DHT	601-49-31

Traffic: KA9CPA 1921, KC9CJ 464, K9GDF 309, W9CBE 275, WA9WYS 268, WD9IID 238, KA9BHI, 172, N9BDL 125, WB9YPY 121, W9IHW 108, W9YCV 107, W9UCL 105, WB9ICH 99, W9JSF 96, N9DHT 94, AG9G 93, K9AKG 87, W9LDO 85, KG9B 75, K9UTQ 67, W9ODV 67, W9DND 62, WA9ZTY 56, WD9FRI 54, N9BCX 50, KA9RII 45, WB9ESM 44, WB9JSW 42, KA9BHK 40, KA9JJY 39, KA9OBP 34, K9JPS 32, K9FHI 30, N9DCF 26, WD9DNQ 23, KY9P 21, W9IEM 21, WB9NRK 20, W9JDT 17, WA9DYL 16, KA9KEQ 11, KV9U 10, W9UW 8, W9NGP 6. (Feb.) WB9YPY 161, KY9P 14.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KCØT—SEC: KAØARP. STM: KDØCI. March certainly started out with a roar, with the worst winter storm of the season. During the storm period of March 3-4, the Minnesota Emergency Net was activated with a very pleasing response. Amateurs reported in from all corners of the state as well as surrounding states affected by the storm. Another on-the-air event worth noting was the ARRL Dakota Division Forum held the afternoon of March 23. This forum gave amateurs within the three state division a chance to address issues concerning this hobby with the Dakota Division leadership, as well as with Section officials. Response was very positive and indications are there will be another forum, perhaps this coming fall. I urge you to

listen for future announcements on any future forums. Official bulletin sources include MSPN/E, MSN/1 and the MSO. NET NEWS: WAØLUT has named NØEKA to assist him in managing the MSN/RTTY Net. This net has certainly become active and prospects for expansion look good. WDØBAC will be resigning as mgr of the MNAMWXNT when the net shuts down beginning in June. It appears that KAØIZA is the heir apparent for WX net mgr, and will assume it in September. Recent upgrades reported to me include KAØNLS from Tech to General, and KDØBA from Advanced to Extra. Congrats to all upgrades. The "Ham of the Month" award for March goes to NØEWA of Iron. The St. Paul RC reports the passing of WØJT. His noteworthy achievements include designing and installing the 5kW phone and CW stations with rhombic antenna that provided communication along the Alcan Highway and out to the Aleutian Islands during WW2. Our sympathy to his family and friends. Also our best wishes to KAØKHT and WØQMC who have been ill recently. In conclusion, I wish to report on KAØEPY and his efforts to develop a comprehensive section newsletter. His efforts in this endeavor are to be commended, a newsletter of this magnitude is not an easy task. We are anxious to see the finished product as I'm sure it will be as interesting as the predecessor was. This newsletter will be a quarterly publication and input for it is solicited. For more info, contact KAØEPY or others in the section leadership. 73 de KDØCI.

Net	Freq.	Time	Mgr.	QNI/QTC/Sess.
MSN/1	3685	6:30P	WØEHI	324/97/31
MSN/2	3685	10:00P	KAØEPY	204/41/31
MSSN	3710	6:00P	KAØODQ	267/15/27
MSN/RTTY	3929	7:00P	WAØLUT	92/13/14
MSPN/N	3929	12:00P	WBØWNJ	655/117/31
MSPN/E	3929	5:30P	WDØBGS	1236/205/31
MNAMWXNT	3929	6:15P	WDØBAC	442/276/25
PICONET	3925	9:00A	WDØBAC	397/432/167
ARES*	3929	Special	KAØARP	239/7/1

Traffic: WDØBAC 611, WAØTFC 346, KAØEPY 279, WBØWNJ 233, WØEHI 191, KAØARP 179, KTØI 129, KDØCI 112, KCØT 93, WDØHDD 91, NØCLS 78, KAØODQ 53, KTØR 53, KBØWV 43, KN9U 42, KØOGI 39, NØBEI 34, WDØBGS 32, WDØGUF 30, WØHZU 24, WØKYG 23, WBØUKI 23, NØEWA 21, KØCVD 19, NGØY 18, KAØAJF 16, KAØEFP 16, W9DM 15, NEØD 10, WAØONJ 10, WAØFFU 8, KØCSE 7, KBØRW 7, KBØCD 5, NØFKU 5, NFØK 4. (Feb.) KTØR 44.

SOUTH DAKOTA: SM, Fredric J. Stephan, KCØOO—The SO. DAK. Section Public Service Award for March was awarded to WØYMB—one of our most helpful and involved volunteers ever. Send your nominations to the SM for the selection committee's decision and final choice for the next award. The DAKOTA DIVISION CONVENTION and PICNIC will be held in the beautiful Black Hills of Western South Dakota during first week of July. The usual forums, tests, contests, speeches, foxhunts, exhibits, flea markets, ragchews, lunches, banquets, code contests, antennae displays and commercial exhibits will amaze you. Will there be a Wouff Hong this time? Will there be Helen Fong available? Come to the convention to find out. Write early for your pre-registration forms and other info. KBØMB and KØTO or other experts will direct the forum on traffic, traffic nets and net participation. Other forums will abound to fill you on the latest developments. Reports this month came in from WAØVRE WBØOMF NBØD WØYMB WBØLTV NØEEH NØABE. Nets reporting were BHN, NJQ, CCEN, Walworth County Emergency net and the Buffalo Chip net. SDEEN will start up again with return of summer interest. KAØUIT is new ham in state. Mobridge ARC attended meeting of Aberdeen ARC recently. A fresh Novice Class has started at Mobridge with good turnout. See you on the net or at the upcoming CONVENTION. Best of DX and good hunting.

DELTA DIVISION

ARKANSAS: SM: Joel M. Harrison, WB5IGF—SEC: N5BPU. STM: AE5L. TC: W5FD. ACC: AD5M. PIO: K5DW. SGL: W5LCI. Repeater Coordinator: WB5FDP. I think that our volunteer examiners in Arkansas deserve some recognition for the hard work that has been put into our program. Since the first of the year I have been receiving tests reports with pass rates in the upper 70 and 80 percent range. Congratulations to those who have passed and thank you to those who offer their time and assistance for this very important task. Field Day time is almost here and I will be looking forward to visiting your site this year. If you would like a list of upcoming volunteer exam sites, please contact me. K5MEA MSO is now on the 147.81/21 repeater in Jonesboro. Contact K5MEA on 3937 for details.

LOUISIANA: SM, J. "Wondy" Wondergem, K5KR—SEC: KA5PFB. ACC: K5DPG. SGL: KD5SL. TC: N5JM. OO: WB5TPG. La. Council of Amateur Radio Clubs election: Chairman: Al - K5DPG. Vice Chairman: Sam-KB5VC. Sec-Treas: Al - W5OVV. The SOWELA ARC (Southwest La.) is coordinating the effort to allow call letters on handicap or disabled vet license plates. Many of our disabled hams are deeply involved in emergency and public service communications and desire to have the hard-earned privilege of call letters on license plates that provide access to handicap parking and facilities. The LARC has appointed Phil, WD5DWP, as chairman for this effort to enact a legislative change. For more details on how you can help contact Kim, KA5OAF, secretary of SOWELA ARC, 2336 Acadienne Dr., Sulphur, LA 70663. MTA ARC (New Orleans) election: Pres: Sam-KB5VC. V.P.: Dwight-K5HAN. Sec: Charles-WB5RNN. Treas: Mary-WB5IOE. Is your local repeater coordinated? The La. coordinated repeaters will have first rights in any future frequency disputes or directed frequency plans. Guidelines and application forms can be obtained from Al, K5DPG, Star Rt. A Box 185E, New Iberia, LA 70560. DN5 report: La 98% by WB5NCM, KE5PP, K5WOD, WA5LHL, WA5WBZ, K5ABD de WB5YDD DN5 mgr.

MISSISSIPPI: SM, Paul Kemp, KW5T—SEC: AL7GQ. VHF COORD: NF5Q. STM: KB5W. ACC: KC5VD. VARC graduated 9 new Novices, tnx to WB5YKR, K5VXV, WB5SXK. K5GVR back in Hattisburg and on the air. Tupelo and Jackson Clubs are planning test sessions once each quarter. Active HF Nets we need to support are listed below:

Net	Freq.	Time	Sched.
MTN	3665 kHz	2345Z	DAILY
MSBN	3862.5 kHz	2315Z	DAILY
MMN	3862.5 kHz	1100Z	DAILY
GCSSB	3925 kHz	2330Z	DAILY
MSN	3733 kHz	0000Z	DAILY

CAND (W5KLV) sess 31 QTC 723. MTN (K5OAF) sess 31 QNI 161 QTC 76. DRN5 (WB5YDD) sess 31 QTC 856. MSBN (KW5T) sess 31 QNI 2318 QTC 74. MMN (WB5RMW) sess 31 QNI 657 QTC 13. MLEN (KE5WP) sess 5 QNI 94 QTC 0. Traffic: N5AMK 585, K5OAF 224, KT5Z 106, W5WZ 64, W5LSG 47. KW5T 17.

TENNESSEE: SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS, OO/AA: W9FZW. PIO: WK4V. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J TC: W4HHK. I mentioned last month that the RFI portion of the OO job has been transferred to the Section TC. If you are so inclined in that area, you might contact the TC about getting on board as an assistant TC. Your SM had an opportunity to work on a VE team since last report. All things were as would be expected except one person came in as a walkin and left as an Advanced operator. His name is Max Patterson from Tullahoma. I understand he was talked into trying the tests while on a visit in West Tennessee. His interim card did not really give him anything as he did not have a call in the first place. Congratulations to him and all the other operators and potential operators for working to do so. Anyone with a happening like this needs to pass it along so that we can include it in the activities. Been getting reports of a lot of new rigs and equipment. Congrats to all and that includes your SM. Now maybe he can get on frequency for a change, HA. We are starting to get some of the severe summer weather and we need to keep a close watch and assist the weather service when we can with timely reports and assistance. Want to ask for the station activity reports to keep coming in also as we start the summer activity. We want to include your activity. Section traffic activity for this period is as follows-LF-Sessions 98, QNI-4236, QTC-195; VHF-Sessions-83, QNI-3100, QTC-637; TNCW-Sessions-45, QNI-252, QTC-87; RTTY-Sessions-18, QNI-83 and QTC-3. The CW Honor Roll includes K9MI. Congrats to him. Individual station activity for the period follows. I note that there are several calls missing in this report. What say about calling a message to the SM so your station activity can be included. Sure would like too. Traffic: KA4RSC 166, W9FZW 165, W4DDK 106, K4WWO 83, K4WOP 56, NN4S 22, W4TYV 19, W4PFP 16, WB4YPO 16, KB4QV 10, W4EWR 10, KE4LS 9, K4JGW 7, W3HET 6, W4PSN 4 and N4KQX 3.

GREAT LAKES DIVISION

KENTUCKY: SM, Rosie Perciful, KA4SAA—New appointments: Asst SM, Dale Bennet, WA4JTE, of Columbia and STM, Ray Smith, WB4ZDU, of Louisville. Lexington's Bluegrass ARC has joined the VE Program as will the Big Sandy ARC of Pikeville with their May 5 test. Please notify the SM of test dates for broadest publicity. EARTHQUAKE: The Paducah Conference revealed new probabilities. These are 50% in 25 years and 90% in 50 years for a 6.5 Richter. Probabilities drop considerably for more severe quakes. 6.5 quakes or greater were recorded in 1811, 1843 and 1895 so it appears we are overdue. However, a quake of this magnitude would not be as severe as those previously predicted for the New Madrid Fault, intense damage being fairly local to the epicenter rather than on a regional scale. Clubs and ARES units should still establish Jump Teams for participation in this or other emergencies. Contact WA4JAV, SEC, for more information. Traffic: KA4SAA 223, WA4JTE 196, WD4IYI 93, KB4QZ 70, KA4BCM 56, KA4SKV 38, WD4IXS 36, K4MHL 33, W4WQV 26, WB4ZDU 19, KA4GBZ 17, KC4WN 16, KA4MTX 13, WD4CQF 11, WD4PBF 10, WA4YPQ 10, K4HOE 9, WA4NOG 8, WA4SWF 8, W4PKX 7, WD4CJQ 6, N4LAF 3, WD4IYH 1, W4TPB 1.

MICHIGAN: SM, James R. Seeley, WB8MTD—ASM: WA8DHB. SEC: WB8BGY. STM: WD8RHU. ACC: K8SB. PIO: KC8K. SGL: N8CNY. TC: W8YZ.

Net	Freq.	Time	QNI	Tfc	Sess.	Mgr.
MITN*	3953	1900	699	305	31	WD8EIB
QMN*	3663	1800**	841	261	86	W8UE
MACS*	3953	1100**	606	152	31	K8LNE
UBN*	3922	1700	1193	92	36	WA8DHB
MNN*	3722	1730**	216	82	61	WD8OUO
GLETN	3932	2030	637	41	27	WB8AXI
WSSBN	3935	1900	1260	35	31	WB8EYM
VHF nets		11 rpts	875	26	61	W8CUP

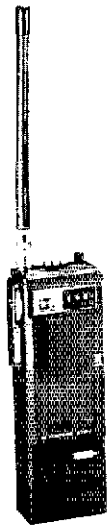
*NTS nets. Times local. **QMN late, 2200; MNN late, 2000; MACS Su. 1300, ARES Net, Su, 3932, 1730. ARRL Info/Traffic Workshop, Su, 3953, 1600. 3932 is MI HF emer. freq., 1932 alt. Silent Keys, with deep regret: KA8EFK, WD8MEX. The state convention, back in Muskegon again this year, was, as always, an enjoyable time for me. KD8IX and company are to be commended for bringing off another good one. Many thanks to Vice Dir. AB8P for joining us and adding his special blend of enthusiasm and broad knowledge. MNN is back among the living, as you can see in the net activity summary above, thanks in large measure to the work of interim manager WD8OUO. With lengthened daylight giving improved 75- and 80-meter conditions in the evenings, the MI Thumb 160 meter net has signed off "... until we are needed in the fall," according to manager WB8EMV. However, central MI stations will continue to be heard on 1950 kHz throughout the summer. Welcome to the field leadership ranks to new Kent Co. EC, Bill Woolf, KB8GO. And thanks for time spent and a good effort to N8CHI who has resigned as EC for Mason Co. Here's a reminder about the U.P. Hamfest for all you trolls (if you don't know what that is in U.P. parlance, you probably are one!): July 27-28 in Mantistique. Back to two days again for what I've heard called MI's "other convention," and with a really super fish fry on tap for the Friday evening before. Why not try Superiorland's brand of hospitality this year—it's super! Traffic: AF8V 585, KA8CPS 516, W8QHB 411, WD8KQC 232, WD8OUO 142, K8GXV 86, W8RNQ 85, WB8YDZ 77, WA8DHB 73, WA6YMH 72, K8OCP 70, WD8MJB 59, N8CNY 59, WB8MTD 58, KA8SOF 51, W8VIZ 46, W8YY 41, KA8VOZ 40, W8SCW 40, WD8EIB 39, K8UPE 38, WD8RHU 35, K6HAP 31, NJ8R 23, W8YIQ 22, W8URM 21, W8CUP 20, WB8WJV 14, KV8U 12, KI8Q 10, K8ZJU 10, WD8PAF 8, W8YZ 8, KB8TD 3. (Feb.) WB8YDZ 20, KB8TD 6.

OHIO: SM, Jeffrey A. Maass, K8ND—ASM: KF8J. SEC: K8AN. STM: WB8MZZ. ACC: K8US, BM: W8ZM. TC: KB8MU. OOC: AD8I. PIO & SGL: N8CVK.

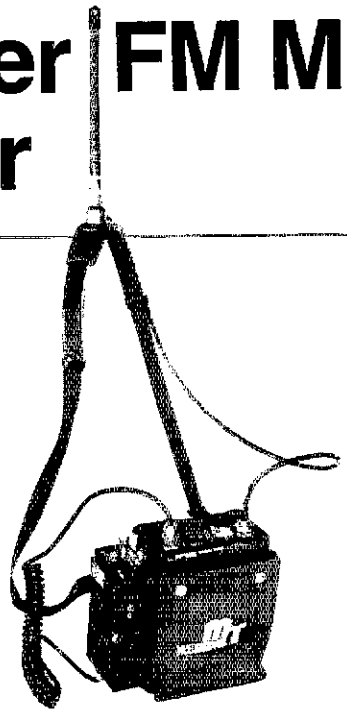
Net	QNI	QTC	Sess.	Time(Local)	Freq.	Mgr
BN	339	202	59	1845, 2200	3.577	WD8KFN
BNR	278	96	31	1800	3.605	W8EK
BSSN	398	276	59	0945, 1915	3.685	N8AKS
ONN	169	17	28	1830	3.708	KD8VF
OSN	333	113	31	1810	3.577	N8AEH
OSSBN	2548	848	93	1030, 1615, & 1845	3.9725	WB8MZZ
OSSN	211	155	31	0646	3.577	KA8GJV
O6MN	305	11	31	2100	50.16	WD8CTX

Hamfests: Columbus, June 2; Bellefontaine June 9; Akron June 9. Don't forget Field Day, June 22-23. This event is the high point of club unity for many groups; for some it retains some of it's original function of testing our readiness to provide emergency communications from remote locations. Why not stress the "readiness test" part this year? I attended the First Annual Lucas County ARES Banquet with Vice Director Severson, and I'm impressed again by their dedication and range of activities! WB8HHZ was presented the 1984 Lucas County Ham of the Year award. George will also be assuming the EC post, as

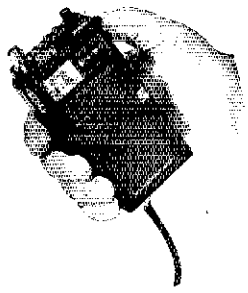
New 2 Meter FM Multipurpose Transceiver



Hand held MT-20A unit for Hi/Low 1.5/150 mW use with BA-2 Nicad Rechargeable Battery.



MULTIPURPOSE TRANSCEIVER



Portable transceiver puts out 10 Watts...Ideal for amateur participation events such as emergencies ...athletic events...marathons.

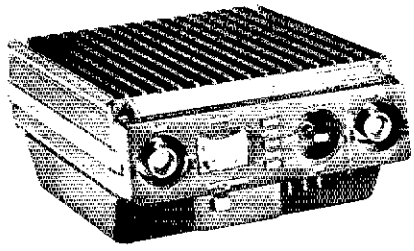
The new MT-20A transceiver can be used as a 10 W portable unit with carrying case, LA-20 Linear Amplifier and rechargeable Nicad Battery.

Easy to read thumbwheel digital switches provide complete coverage of the 2 meter band in 5 kHz steps.

In **mobile** operation, the MT-20A transceiver provides 20 W output when used with the LA-20 Linear Amplifier and plugged into the vehicle cigarette lighter through an SD-1 adapter.

Use hand held transceiver for all functions... Thumbwheel Frequency Selector...Built-in S Meter ...Microphone...Speaker.

For **base** operation, the MT-20A transceiver provides 20 W output with the LA-20A Linear Amplifier, or can be used with any linear amplifier connected through the SD-1 Adapter.



MT-20A **SPECIFICATIONS**

■ General

Frequency	: 144-148 MHz in 5 kHz steps
Emission type	: (FM)
RF output impedance:	50ohm unbalanced (BNC socket)
Power source	: 8.4V DC (5.5-11V DC)
Current drain	: 150mA Max. on reception 25mA on reception with no input signal 550mA Max. on transmission
Dimensions/weight	: Main unit (without battery pack) 118mm(H) x 60mm(W) x 38mm(D)/250g Battery pack (Model BA-2) 40mm(H) x 60mm(W) x 33mm(D)/120g
Repeater device	: Built-in : – 600kHz transmit down shift switch + 600kHz transmit up shift switch
Illuminated Dial	

■ Receiver

Circuitry	: Double-conversion Superheterodyne
Sensitivity	; Better than 1μV for 30dB S/N
Selectivity	: Greater than ± 7.5kHz/ – 6dB Greater than ± 15kHz/ – 60dB
Image rejection	: Better than – 60dB
Audio output	: 200mW (8 ohms)

■ Transmitter

RF output power	: High 1.5W Low 150mW
Modulation	(FM)
Spurious emission	: Better than – 60dB
Microphone	: Electret condenser Microphone, built-in (impedance 2K ohm)

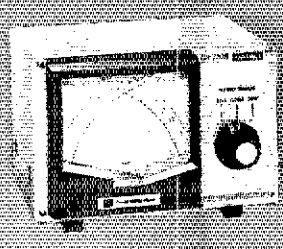
The new LA-20 2 meter linear amplifier provide 20 W (at 13.8 VDC) of stable transmitting powe using high performance transistors.

LA-20 SPECIFICATIONS

■ General

RF output power	: 20W (13.8V DC – 1.5W Input) 10W (9.6V DC or Nicad – 1.5W Input)
Power source	: 13.8V DC—DC power supply 9.6V DC—Nicad battery, Model BA-4/BA-5 (Optional)
Dimensions/weight	: 53mm(H) x 100mm(W) x 140mm(D) 550g (Without Nicad battery)

SWR & POWER CROSS NEEDLE METERS



Top Quality

CN-720B
Frequency Range: 1.8-150MHz
Power: 3 Ranges (Forward: 20/200/2000 W) (Reflected: 4/40/400 W)

CN-620B
Frequency Range: 1.8-150 MHz
Power: 3 Ranges (Forward: 20/200/2000 W) (Reflected: 4/40/400 W)

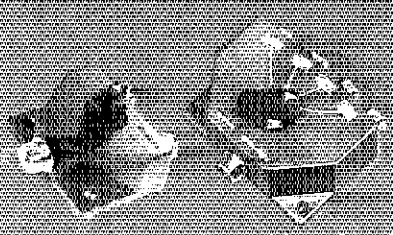
CN-630
Frequency Range: 140-450 MHz
Power: 2 Ranges (Forward: 20/200 W) (Reflected: 4/40 W)

	CN-410M	CN-460M	CN-465M
Frequency Range:	3.5-150MHz	140-450 MHz	140-450 MHz
Power Range: Forward	15 W/150 W	15 W/150 W	15 W/75 W
Reflected	5 W/50 W	5 W/50 W	5 W/25 W

All Models Back Lit, with mobile bracket.

	CN-520	CN-540	CN-550
Frequency Range:	1.8-60 MHz	50-150 MHz	144-250 MHz
Power Range:	200/2000 W	20/200 W	20/200 W

COAXIAL SWITCHES
PAT. No. 59-000803



	CS-201	CS-201G	CS-401	CS-401G	CS-4
	2position	2position	4position	4position	4position
Frequency:	600 MHz	1.3 GHz	600 MHz	1.3GHz	1.3 GHz
Connectors:	SO-239	N type	SO-239	N type	BNC type
VSWR:	Below 1.1.2				
Insertion Loss:	Less than 0.2 dB				

POWER SUPPLIES

PS-310M	Max 8A Continuous 24A 3 VDC-14.6 VDC Variable
PS-310MD	Max 31A/24A Continuous 13.8 VDC Fixed Plus sub-DC outlets Max 5.6A/5A Continuous 3 VDC-14.8 VDC
PS-560MD	Max 50A/44A Continuous Plus sub-DC outlets 10.6/10A 1 VDC-15 VDC

Advanced Multi Torque Antenna Rotator

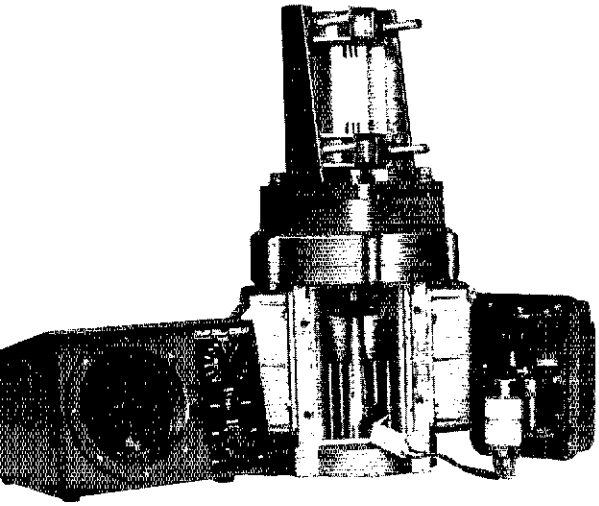
MULTI TORQUE ROTATOR

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

The main frame and reduction gear train have been designed to withstand maximum wind loading.

Maximum brake power is 18,300 lbs/in when 4 motors are installed.

Low voltage (24 VAC) motors... Low cost 6-wire control cable.



The rotator frame can house up to 4 motors to increase torque and load capacity.

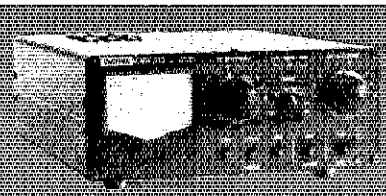
Specifications

■ Rotator Unit

		MR-750E/PE	MR-300E
Rotation time	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
	50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)
Output torque Brake power	1 motor	610 lbs/inch (700 kg/cm) 5,200 lbs/inch (6,000 kg/cm)	220 lbs/inch (250 kg/cm) 1,700 lbs/inch (2,000 kg/cm)
	2 motor	1,200 lbs/inch (1,400 kg/cm) 9,600 lbs/inch (11,000 kg/cm)	440 lbs/inch (500 kg/cm) 3,500 lbs/inch (4,000 kg/cm)
	3 motor	1,800 lbs/inch (2,100 kg/cm) 13,900 lbs/inch (16,000 kg/cm)	650 lbs/inch (750 kg/cm) 5,200 lbs/inch (6,000 kg/cm)
	4 motor	2,400 lbs/inch (2,800 kg/cm) 18,300 lbs/inch (21,000 kg/cm)	870 lbs/inch (1,000 kg/cm) 7,000 lbs/inch (8,000 kg/cm)
Rotation angle		375 degrees	
Permissible mast size		1½ ~ 2½ inch (38 ~ 63 mm) < diameter >	
Control cable		6-wire cable 0.5sq—1.25sq (AWG16/18/20 etc.)	
Continuous running		5 minutes Max. permissible	
Unit weight		16.5 lbs (7.5 kg) < with 1 motor unit fitted >	

■ Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	180 mm (W) x 125 mm (H) x 175 mm (D)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set



ANTENNA TUNERS

	CNW-518	CNW-419	CL-880 [no metering]
Frequency Range:	3.5-30 MHz (8 bands)	1.8-30 MHz (17 bands)	(1.8-30 MHz (17 bands)
Power Rating:	1 kW CW (50% duty)	200 W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)	200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz)
Output impedance:	10-250/25-100 ohm (On 3.5 MHz)	10-250 ohm	10-250 ohm

AUDIO FILTERS

AF-606K & AF-406K

Four stages of filtering... variable bandwidth over broad range... razor sharp CW reception... built-in speaker.

The AF-606K adds PLL Tone Decoder circuitry. PLL locks onto the desired CW signal and reproduces it with utmost clarity.

ELECTRONIC KEYER DK-210

Sharpen your "fist" with Daiwa precision!

POWER AMPLIFIERS

Band:	LA-2035 144-148 MHz	LA-2035R 144-148 MHz	LA-2065R 144-148 MHz
Input Power:	0.5-3 W	0.5-3 W	0.5-5 W
Max. Output Power:	30 W plus	30 W plus	60 W plus

Please call or write for technical literature.

Dealer inquiries invited.

DAIWA® U.S.A. INC.,
1908A Del Amo Blvd.
Torrance, CA 90501
(213) 212-6057 TELEX 887631

MADE BY DAIWA INDUSTRY CO., LTD. TOKYO, JAPAN

WD8DYW is stepping down after two excellent years of service. Many SKYWARN and Weather Watch groups participated in drills on VHF on March 27 (during Tornado Awareness Week), and had a chance to put their skills to test on March 29 and 30, with several actual Tornado Watches and Warnings declared by the NWS statewide. New officers for 1985: Madison County ARC—Pres: KA8MYW, VP WD8QXT, Sec./Treas. WB8JGW, Activities Mgr. WB8IUH. Tuscarawas County ARC - Pres. NI8Q, VP WD8CKK, Secretary KC8QK, Treasurer KA8DGF. WD8RGS (now KD8XL) reports that the Jackson County ARC will host a NTS local net daily at 6 P.M. on the 146.79 repeater. If you are in range of a local traffic net, join in and learn about traffic handling first hand! Shannon, KD8VF, just earned his Extra class license, is an Official Relay Station and Net Manager, and is only 14 years old! Thought for the month, from the IARC/MASER Newsletter and KA8KXE: "In any organization, and ham radio is no exception, there will be disagreements. Let's try our best not to let those disagreements interfere with our friendships and the club organization." Amen! Special congratulations to the Reservoir ARA on achieving the status of Special Service Club (SSC). New ARRL appointments—ORS: NF8B, KD8VF; ATC: K8LMN: OBS: NJ8L; OO, PIA, and ATC: WB8UQA. Congratulations all! CU FD!

Local Nets	QNI	QTC	Sess.
ALERT	131	6	5
BRTN	220	96	31
COARES	100	5	3
COTN	353	275	31
DAEN	353	88	29
Highland ARA	80	20	4
Lucas County	359	98	31
MASER	192	7	7
Medina County	313	55	31
NOARC/ET	63	0	3
RARA	51	0	4
Seneca City ARES	72	4	5
TSRAC	995	96	38
Tristate	459	98	31
Van Wert AEN	46	4	5
WCTN	225	32	31
Wood City ARC	18	2	3

Traffic: WD8MIO 687, W8BO 560, W8PMJ 398, KD8KY 362, W8JMD 328, K8OZ 299, K8JDI 287, WD8KFN 199, K8ND 182, WB8MEK 174, W8QZK 153, WB8MZZ 151, WB8JGW 145, KD8VF 143, WD8RAO 125, WA8GMT 119, N8AKS 116, K8TVG 103, N8EVC 101, N8AEH 96, N8XX 93, W8EK 90, WB8KWD 90, WA8SSI 89, KA8CGF 87, KA8KHS 85, WD8KBW 83, WB8DMF 82, N8EFB 74, KF8J 74, NE8X 68, NJ8P 64, K3RC 59, K8AN 58, NC8Q 53, WD8RIB 51, N9EJO 50, WB8HHZ 50, KD8IC 48, WB8BWY 41, K8CMR 41, KA8OQF 39, KD8SS 38, K8LQM 32, NK8B 31, WD8EMS 27, WB8NHV 27, NF8B 26, K8DXZ 26, WA8HED 26, WD8CSP 25, KA8GJV 24, K8NIO 24, KD8UW 24, K8DHD 23, K8VOY 23, K8EF 22, WB8MRL 22, W8WEG 22, K8CKY 21, W8BHL 20, NK8C 19, W8ZOL 19, N8FPH 18, WD8JYE 18, WB8RSM 17, KA8TXJ 17, WD8OYK 16, WB8PIY 16, KA8SAC 16, N8EEK 15, WD8IKC 15, W8ZM 15, KA8JTT 14, K8NJQ 14, N8CJS 13, N8GIM 13, KA8GGZ 13, WD8EKI 12, W8FUP 12, WD8JAW 12, AB8P 12, KC8WH 12, KC8YV 12, WD8CTX 11, N8CW 11, N2NS 11, W8RG 11, WD8RGS 11, KA8RJY 10, N8DGO 9, KA8ICB 9, N8AJU 7, K8DL 7, N8ESS 6, KD8KU 6, WB8NTR 6, KA8RBQ 6, WB8GXT 5, WD8NED 5, KR8B 4, W8KN 4, WB8TRK 4, KA8MFG 3, WB8MRU 3, N8CDN 2, W8OQL 2, KA8RIX 2, KA8MFH 1. (Feb.) N8XX 82, KV8Q 41. (Jan.) N8XX 103.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—STM: WB2MCO. SEC: AK2E. ACC & SC: N2BFG. BM: WB2EAG. SGL: KB2HQ. TC: KC2ZO. ATC: WA2VGM. ASM: K2ZM. NETS: AESN: QNI-51; CDN: QNI-700 QTC-71; ESS: QNI-477 QTC-68; NYPON: QNI-751 QTC-356; NYS/E: QNI-474 QTC-236; NYS/L: QNI-387 QTC-265; NYS/M: QNI-372 QTC-271; SDN: QNI-288 QTC-119; Ulster RACES: QNI-42 QTC-5. No reports from HVN or SCRN! CLUB NEWS: Schenectady ARA had "Test your ham gear night" April meeting. Albany ARA had WA2ANU a TA speak in April. Their annual dinner was May 10. Also new member KA2OWW CCNR had slide show on ARRL Hq. Rip Van Winkle ARS had training session on SKYWARN. WECA had Phil Karn, KA9Q, speak on Packet Radio. If nothing on your club appears here, I am not getting your newsletter. W2WSS makes some very important points in the ESS bulletin on what message texts should and should not contain. Attention all ENY staff, clubs, members—the ENY newsletter will be coming out shortly! If you have anything you want to see going to all ENY ARRL members, get it to me or to N2BFG ASAP! AK2E, SEC reports only 5 EC/DEC reports this month. Let's get those reports in. Congrats to AK2E and XYL-harmonic born 21 Mar. All affiliated clubs received N2BFG's letter with upcoming events—if you have any you want included contact N2BFG. March BPL-WB2EAG. Mar. PSHR: WB3EAG K2ZM WB2MCO KA2MYJ WB2VUK K2ZVI W2BIW KC2TF W2PKY N2BFG AK2E K2HNW KA2OPG(T). Traffic: WB2EAG 556, K2ZM 345, W2PKY 253, WB2MCO 155, WB2VUK 132, KA2MYJ 127, KC2TF 124, K2ZVI 110, W2BIW 55, K2HNW 49, WA2YBM 34, N2BFG 28, N2AWI 26, AK2E 18, KA2OPG 18, AA2Y 17.

NEW YORK CITY-LONG ISLAND: SM, John H. Smale, K2IZ—ASM/ACC: WB2IAP. SEC: KA2RGI. OOC: NB2T. TC/RFI: W2JUP. STM: WA2ARC. PIO: W2IYX. The following are traffic nets in and around the section:

NLI CW*	3630 kHz	1900/2200	N2AKZ mgr
NCVHF	6.745 rpt	1930 M-F	K2MT mgr
BAVHF	6.67 rpt	2000 M-F	WB2BNA mgr
SCVHF	5.37 rpt	2030 M-F	W2GZD mgr
ESS	3590 kHz	1800	W2WSS mgr
NYS/M	3677 kHz	1000	WB2EAG mgr
NYS	3677 kHz	1900/2000	WB2EAG mgr

*Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARC will sponsor exams on the second Sat. of each month at the N.Y. Inst. of Technology, Route 25A, Old Westbury, for further info contact Bob Reed WB2DIN, 2970 Valentine Pl. Wantagh, NY 11793. Don't forget Field Day is June 22nd and 23rd. It is with deep regret that we list Arnold Linzner, WA2ZHA, as a Silent Key. Arnold had served as Pres. of Tu-Buro ARC, Rockaway ARC and Hall of Science ARC. LIMARC "Roasted" George Diehl W2IHA, past Director of the Hudson Div., at their April meeting, among the many guests in attendance were W2HD, WA2DHF, K2IZ. I'm starting to get a lot of letters concerning "illegal" activity on 10 and violations on 75, if you have any info that can be used, please forward it to me or NB2T, if you are interested in the OO or volunteer monitoring program please contact me or NB2T. Grumman ARC is discussing the possibility (probably a fact by the time this is printed) of setting up a Technical assistance group, more details as they become available. WB2IAP spent 2 weeks in sunny and warm Fla. in April. A lot of club newsletters are starting to make people aware of the shrinking number of licensed amateurs and the lack of young people becoming involved in amateur radio, we are looking for people that would be interested in demonstrating all parts of amateur radio to local schools and other groups, if you have any ideas or are interested please contact K2IZ or WB2IAP. Traffic: N2AKZ 211, K2YQK 162, W2GKZ 61, W2DBQ 44.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY—SEC: WA4VWV. STM: KAØX. ACC: WBØQAM. TC: KØDAS. SGL: AKØQ. BM: KØIR. OOC: KDØRT. Welcome KDØRT as the new OO Coordinator. KØRW will be the first ATC. New OBS stations are now NØCKD, KAØPJX, thanks for your interest and participation. State Convention planning going well, hope to see you in DSM July 19-21. The Iowa QSO Party was a grand success and kudos to the category winners: WA4VWV, NØCKN, WØAK and K5MAT. A good time was had by all, and looking forward to next year. I hope you are all primed for the RAGBRAI Message Relay for this year, it will be bigger and better, thanks in advance. New Officers in Jones County are KCØBQ, KAØEIY, NØCWP. The only 100% club in Iowa, EIDXA, has new officers: KØVZR, WØEJ, KØGT.

Net	Freq.	UTC	QNI	QTC	Mgr.
75 Mtr Phone	3970	1730-0000	2109	154	WBØAVW
TLCN CW	3560	0300-0030	304-	151	WØYLS
ICN CW	3713	7 P.M.(MWF)	81	37	NCØR

Check 3636 kHz at 0300Z Sunday for local RTTY activity, new packet digipeater up in IACY, should have total state coverage now. Special event station in Ottumwa Balloon Races in July. Watch for new dates on the CVARC Hamfest, Old Threshers is scheduled for September 30. (Mow the yard, Max). Traffic: WAØAUX 232, WØSS 131, KAØADF 105, WØYLS 102, WDØFWB 74, KØGP 73, KAØX 56, KØCY 51, KCØXL 47, KØBRE 47, WØHTP 42, NCØR 42, W4JL 39, WBØAVW 35, WØBW 18, KØIPT 16, WBØJFF 16, NØETQ 11, NØEFG 10, KDØBG 8, NEØP 6.

KANSAS: Robert M. Summers, KØBXF—A hearty welcome to KA1DH, Don Vik now assigned to Ft. Leavenworth. WØPB reporting an increasing interest in upgrading licenses in the Hiawatha area. KAØE reporting that KAØE/R, 222.94/222.54 now used as backup/primary for SKYWARN in KC area. WØKL says only 8 EC made reports this past month. Tornado season is upon us so let us not forget to get with our EC and sink a spur where it counts. Nominations for the KANSAS Amateur of the Year award sponsored by the Kansas-Nebraska Radio Club are now due. Nominations and qualifications should be sent to the committee prior to June 1, 1985 via WØTQ. By the way there will be a Ks Conv. this year Oct. 12th and 13th at the Cloud County Community College, Concordia Flea Mkt, VEC Exams, Seminars, MARS, 2 mtr Repeater Council Meeting, Banquet and a free noon lunch Sunday. NET reports for the month of MARCH—Net/QNI/QTC/MGR. KSBN/1241/77/WØFRC. KPN/417/22/WØFRC. KWN/1005/750/WAØLBB. CSTN 2087/76/WØDE. QKS 310/98/WBØZEN. QKS-SS 46/16/WØMYM. KS RTTY 24/16/ACØE. Don't forget, you RTTYers, the net has moved to 3610 at one P.M. Sundays while the ole sunspots have us blocked out on 40. Stations now QNI are ACØE, WØROY, KSØU, WØCHJ, WØQBK, KAØCUF, KAØJRQ, WDØEUF, WØQEK, KCØWO and NØFWX. DO NOT FORGET TO RENEW YOUR HAM TICKET!!!! EVEN if it is still a few months away, it's not too early to get another 10 years. Traffic: WØFRC 250, WØQBK 206, WØKL 172, WØFIR 172, ACØE 147, WØHI 135, KSØU 88, WØOYH 81, WØFDJ 74, WBØZEN 50, KØBXF 50, NBØZ 19, WØMYM 16, WØPB 12, KAØE 11, WØRBO 10, NØBDG 10, WØCHJ 6.

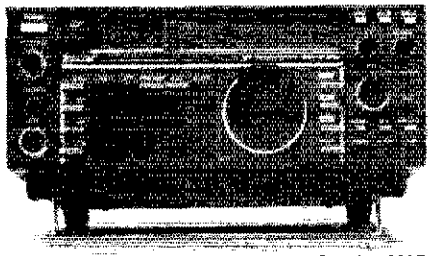
NEBRASKA: SM, Vern Wirka, WBØGQM—SEC: NØAIH, Jim Sanford. STM: WDØEGK, Jerry Kohn. The Pine Ridge Amateur Radio Club of Chadron will handle communications for the Chadron Saddle Club commemorative reenactment of the 1893 one-thousand mile horse race. The schedule calls for a caravan of horse trailers, campers and a club communications vehicle to depart Chadron for Chicago June 28. Starting July 1 the group will return to Chadron via U.S. Highway 20 stopping to ride into each 1893 checkpoint for joint commemorative ceremonies. Arrival in Chadron is scheduled for July 12 to kick-off the Chadron centennial. Local communications will be handled on 2 meters with schedules to be set on 20, 40 and 80 for reports back to Chadron. WAØWRI, Joe Eisenberg, of Lincoln, is now an Assistant Technical Coordinator for the Nebraska section. Joe is very busy with his duties with the ARRL VHF Advisory Committee but Joe will continue to serve as Nebraska frequency coordinator. AJØA, Ken Noel, is the Grand Island Amateur Radio Society "Ham of the Year." The Midlands ARES organization has expanded its severe weather reporting responsibilities. Midlands ARES members will provide a communications link between the National Weather Service and Omaha television station KMTV. This communications link will provide the weather service with reports from the KMTV doppler radar. Midlands ARES will continue to provide severe weather reports from spotters in the area covered by the Omaha Weather Service office in eastern Nebraska and western Iowa. Now is the time to pre-register for the 1985 ARRL Midwest Division Convention in Omaha September 6, 7 & 8 at the 72nd & Grover Holiday Inn. Net Managers please include the number of sessions, number of messages handled and the number of check-ins in your monthly report to the Section Traffic Manager, WDØEGK Jerry Kohn. Some Net Managers have not been providing all of the information which means our section records are incomplete and not showing the true amount of activity in the various nets. Traffic: WBØTED 141, KØDKM 91, WØKK 76, KØIXY 27, WAØBOK 22, WDØEGK 20, KAØBCB 16, KAØBWM 11, WBØGMQ 9, WDØBOX 9, WBØGQM 6, KAØJLH 4, KØFRU 2, WØNIK 2.

NEW ENGLAND DIVISION

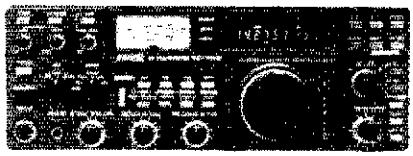
CONNECTICUT: SM, Robert J. Koczur, K1WGO—STM: K1EIC. SEC: KA1ECL. BM: K3ZJJ. ACC: KG1M. OO/RFI: KA1ML. TC: W1HAD. PIO: KX1B. SGL: K1AH.

Net	Freq.	Local/Time	QTC	QNI	NM
CN	3640	1900/2200	209	321	K1EIR
CPN	3965	1800M-S/1000SN	146	386	KA1BHT
WCN	78/18	2030	152	526	WB1GXZ
RTN	13/73	2100	46	194	KA1JAN
NVTN	22/88	2130	50	134	WA1EMI

HAPPY spring to all. The new ARRL Repeater Directory should be available as of the end of April. There are 9,351 listings in the new directory, up 14% from the last printing, an outstanding increase. The CQ Radio Club held its first VEC exam on Saturday, April 13. The NW Conn ARES Net operates on Wed. evenings at 8:30 P.M. local time on 146.955. Additional participation is welcome on this very



HF Equipment	Regular	SALE
IC-735 Xcvr/SW rcvr/mic	849.00	749.95
PS-55 Power supply	TBA	
AT-120 Automatic antenna tuner	TBA	
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
IC-730 8-band 200w PEP xcvr w/mic	829.00	569.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44A 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 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band xcvr/.1-30 MHz rcvr	1349.00	799.95
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
SM-5 8-pin electret desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band xcvr w/.1-30 Mhz rcvr	999.00	779.95
PS-35 Internal power supply	160.00	144.95
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
HM-10 Scanning mobile microphone	39.50	
SM-6 Desk microphone	39.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	19.50	



IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	1199
PS-35 Internal power supply	160.00	144.95
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-33 AM filter	31.50	
FL-70 2.8 Khz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	39.00	
CR-64 High stability reference xtal	56.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	

Options: 720/730/745/751	Regular	SALE
PS-15 20A external power supply	149.00	134.95
EX-144 Adaptor for CF-1/PS-15	6.50	

ICOM

Options - continued	Regular	SALE
CF-1 Cooling fan for PS-15	45.00	
EX-310 Voice synth for 751, R-71A	39.95	
SP-3 External base station speaker	49.50	
Speaker/Phone patch - specify radio	139.00	129.95
BC-10A Memory back-up	8.50	
EX-2 Relay box with 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
AH-1 5-band mobile antenna w/tuner	289.00	259.95
PS-30 Systems p/s w/cord, 6-pin plug	259.95	234.95
OPC Optional cord, specify 2 or 4-pin	5.50	
GC-4 World clock (Closeout!)	99.95	79.95

HF linear amplifier	Regular	SALE
IC-2KL w/ps 160-15m solid state amp	1795.00	1299

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80 Watt 6m transceiver	699.00	599.95
EX-106 FM option	125.00	112.95
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271A 25w 2m FM/SSB/CW xcvr	699.00	569.95
AG-20 Internal preamplifier*	56.95	
IC-271H 100w 2m FM/SSB/CW xcvr	899.00	759.95
AG-25 Mast mounted preamplifier*	84.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted preamplifier*	89.00	
IC-471H 75w 430-450 SSB/CW/FM xcvr	1099.00	969.95
AG-35 Mast mounted preamplifier*	84.95	

For a Limited time!
With the purchase of IC-271A/H or IC-471A/H get the matching Preamp* for just $1.00 extra.

Common accessories for 271A/H and 471A/H		
PS-25 Internal power supply for (A)	99.00	89.95
PS-35 Internal power supply for (H)	160.00	144.95
PS-15 External power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for PS-15/CF-1	6.50	
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	479.95
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	579.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25w 2m FM w/TTP mic	369.00	319.95
IC-27H Compact 45w 2m FM w/TTP mic	409.00	359.95
IC-37A Compact 25w 220 FM, TTP mic	449.00	299.95
IC-47A Compact 25w 440 FM, TTP mic	469.00	419.95
UT-16/EX-388 Voice synthesizer	29.95	
IC-3200A 25w 2m/440 MHz FM xcvr	549.00	489.95
IC-120 1w 1.2 GHz FM transceiver	499.00	449.95
ML-12 10w amplifier	339.00	299.95

6m portable	Regular	SALE
IC-505 3/10w 6m port. SSB/CW xcvr	449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	289.95
IC-04AT for 440 MHz	379.00	289.95
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	189.95
IC-2AT with TTP	269.50	199.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	69.00
BC-60 6-position gang charger, all batts	SALE 359.95
BC-16U Wall charger for BP7/BP8	10.00
LC-11 Vinyl case	17.95
LC-14 Vinyl case for Dlx using BP-7/8	17.95
LC-02AT Leather case for Dlx models w/BP-7/8	39.95

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-2AT Leather case for standard models	34.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95
SS-32M Commspec 32-tone encoder	29.95

Shortwave receiver	Regular	SALE
R-71A 100 kHz-30 Mhz digital receiver	$799.00	659.95
RC-11 Wireless remote controller	59.95	49.95
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	39.95	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
MB-12 Mobile mount	19.50	

MasterCard VISA

Order Toll Free - Use your Credit Card!

HOURS ● Mon. thru Fri. 9-5:30; Sat. 9-3
Milwaukee **WATS** line: **1-800-558-0411** answered evenings until 8:00 pm Monday thru Thursday.
Please use WATS lines for Ordering
use Regular lines for other Info and Service dept.

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

active net. Tks to FARA for the work done in presenting on public TV channels 24, 49, 53 and 65, Dr. Owen Garriott as the first Amateur Radio Operator to make contacts from space from his station in the space shuttle Columbia. This was broadcast on 3/27/85. Another 100% record for the month was reported by Mary, WB1GXZ for representation to 1RM. Nice job Mary, do you think we can get a 1 year 100%? Congrats to the following upgrades, Extra Class Pete, KA1KD; Tech. KA1LUT, KA1MFS, KA1MFO and KA1MFM. I received the new emergency plan from Steve Ames, N1SA, EC for Southington, Conn. My congrats to Steve for an excellent plan which coordinates the local ARES with the Town Manager, Red Cross, Chief of Police, etc. The Southington ARES under Steve's command has been very active and has demonstrated to the community the importance of Amateur Radio and our field organization. Keep up the good work. Congrats to the ZYGD ARC now an affiliated ARRL radio club. 73's. Traffic: WB1GXZ 350, KA1KPS 157, KA1GWE 108, KA1KTH 97, N1DBH 79, KA1BHT 76, K1AQE 76, KA1EGE 74, W1YOL 49, W1BDN 47, N1BOW 42, W1DPR 40, W1GUH 14, K3ZJJ 9, WA1NLD 6, W1QV 1.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASMs: K9HI & N1BBT. SEC: W1IAY. STM: KW1U. AA: KA1KF. TC: KA1IU. ACC: K1AZE. PIO: WA1IDA

Net	Mgr	Freq	Time(Loc)/Dy	QTC	QNI
EMRI	N1AJJ	3658	1900/2200/Dy	322	332
EMRIPN	N1BGW	3880	1730/Dy	283	312
EM2MN	KA1AMR	63/23	2000/Dy	136	424
NEEPN	K1BZD	3945	0830/Sn	10	74
HHTN	WB1CMQ	04/64	2230/Dy	137	447
EMRISS	KA1EXJ	3715	1600/2030/Dy	135	244
CI2MN	N1BYS	645/045	1930/Dy	115	295

As you can see from the above figures & also fm the station totals below, EMASS does a I-o-t of public service communicating! Our hats are off to all. Even those of you who handle only a few messages a month perform a great service & are much in demand. Another group that doesn't get much praise (but certainly deserves it!) is the emergency preparedness gang. We know you're all out there acting as DECS, ECS, and ARES members, quietly working behind the scenes. Tks to N1BBT for assisting with ASM functions along with K9HI. Tks also to the many clubs sending in such great newsletters! My favorite this month had to be the Billerica club's newsletter—very impressive indeed. Busy times for TC KA1IU, who is working on the new RFI and technical assistance program. Any of you who feel comfortable answering questions from EMASS hams about even one topic should contact KA1IU or me for an Assistant Technical coordinator Appointment asap. We also need people with media contacts to act as Public Info. Assistants. Do the whole section a favor—put your talents to good use! KA1KF reports on all time high of 20 members of the FCC Amateur Auxiliary. The AUX. had a 2nd formal meeting in March with the FCC to hammer out some final details of the working agreement on the division level. The FCC is making it clear to all that they trust us without own self testing and maintenance monitoring programs. Contact me for any further details. Have you expressed your opinions to your SM or Division Director lately? Traffic: KW1U 790, KN1K 428, N1BGW 379, KA1EXJ 362, K1GRP 286, WA1FCD 203, N1AJJ 176, WA1TBY 168, KB1AF 159, WA1DXT 138, KY1T 119, KA1AMR 81, K1BA 74, KA1EID 70, N1BYS 55, KO1O 54, W1CE 50, KB1PA 42, K1ABO 32, N1DDC 29, K1BZD 26, WA1FNM 25, W1ZHC 24, W1QLL 21, KA1BBU 16, WA1SNH 16, K1LCQ 15, KY1B 11, N1CKN 8, KA1KCU 4.

MAINE: SM, Cliff Laverty, W1RWG—SEC: KL7IJG. STM: AK1W. ACC: KY1C. BM: W1JTH. OOC: W1KX. PIO: KY1E. SGLs: K1NIT. TC: K1PV. New officers for Aroostook ARA include: KA1KME, pres; KA1HIW, VP; KA1KAO, secy; KA1ENL, treas; KA1CQX, tech mgr. A new club, Bass Hill Repeater Group, has been formed with KY1E, pres; KY1C, sec; K1PV, trustee, and 100% ARRL membership. VE exams being conducted all over state. Check bulletins on NTS nets and repeaters. "Irv and Bonnie Grant" Hamfest definitely on for August 10/11 at St. Albans Snowmobile Club. Looking for assistant TCs all over the state. Contact K1PV or W1RWG info. Net reports will be reported here quarterly as requested by ARRL. Next month, three-month report. PSHR: WA1YNZ 85, KL7IJG 74, KY1E 73, N1BJW 71, WB1GLH 68, W1RWG 67, WB1CBP 47 (Novice). Traffic: WB1BYR 166, W1ISO 110, KA1JOJ 109, W1NV 101, WB1CBP 88, W1RWG 60, WB1GLH 55, AK1W 51, KL7IJG 50, N1BLZ 44, W1BMX 44, KA1AVU 41, KA1JPR 40, N1BJW 39, W1JTH 36, WA1YNZ 35, W1KX 34, KY1E 27, W1GCB 26, W1VEH 19, KB1PB 10, KA1FTL 8, KA1ENL 7, N1BME 5, W1AHM 3.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH—STM: W1TN. Next North Country ham exams will be in Whitefield June 16. Walk-ins accepted, but best to get paperwork in before May 16. Contact W1LQQ, KS1S or KT1A. NH Packet BBSs on 145.010 KA1LEO, KE1G and WB1DSW. All OO appointments have been cancelled. Only qualified OOs are W1TN and W1NH. The new OO program now in action. It is sad to report Bud, K1KVZ, a Silent Key. KA1FPT received Nashua Club's outstanding "Beans ala Kommode" award. K1WHS won the 144 MHz EME competition. Markem Amateur Radio Club officers: Pres, KA1BFT; VP KA1HZF; Treas, KA1DWZ; Sec, KA1MOB. Seen on highways and byways K1MFQ, W1UN, K1OX, WA1UXA and W1LQQ. Spring is here at last. Get ready for Field Day and other exciting summer activities. Traffic: N1NH 387, N1CPX 315, AK1E 193, W1FYR 181, W1TN 94, KK1E 74, K1UWB 57, W1MHX 56, N1BVI 48, K1TQY 44, WB1GXM 43, K6UXO 40, W1ALE 37, N1ALM 35, N1AKS 29, K1IM 25, KU1S/4 23, K1HPO 17, KA1HRH 2. (Feb.) KI1M 43, K6UXO 31, N4KMW/1 13.

VERMONT: SM, Ralph Stetson, KD1R—Congratulations to the new officers for Central VT ARC Pres. K1KMB; Vice-Pres WB1AJG; Treas. N1CPO; Sec. KA1MNH; Dir. N1BRT, elected at CVARC Annual meeting on April 6, 1985. My apologies for not being more available this past month, have been busy with a job change plus preparing to relocate, more about that next month. Let's make it a point to participate with your local ARC or just get a group together for FIELD DAY "85." Will be looking for your traffic, best outlet to get traffic to KD1R or AE1T is thru either VTN or VT2FMN on Mt. Mansfield. For those of you who let me know your groups whereabouts I will try and get by to see your set up and meet those present. VTN annual picnic is to be JULY 27th, at the QTH of W1KRV. KRV says come early and stay for a special good time. A special welcome back to all our "SNOW BIRDS"; hope you all had good healthy winter. Sorry to report that Gerry, KA1AKI, must resign as ACC due to job pressures, thanks Gerry for your great help, you'll be missed. NETS VTN 31/155/92, VSSN 10/18/3, VSSB 32/461/91, VTRFD 5/71/16, CAR 26/768/30, VTPN 5/92/7, GMN 26/368/7, CVFM 5/70/4. Traffic: KT1Q 377, W1KRV 134, AE1T 93, N1ARI 70, N1COB 65, W1OAK 29.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T—PIO/ACC: K1BE. SEC/SGL: WB1HIH. OO/RFI: N1CM. STM: W1UD. TC: KA1JJM. New appointments—K1BE Public Info Officer and Affiliated Club Coord, WA1WEJ as EC Hampshire County, and WB1HIH as State Govt Liaison. Mt. Tom ARA again provides fine comms for Holyoke St. Patrick's Day parade. Central Mass ARA working on repeaters for 220 and 440. Also sponsoring Boy Scout Explorer Post. KA1MBK demos at Oxford HS to get young people into ham radio. HCRA looking for HF rigs for new Novices graduating from class. And W1NY will try for first transatlantic QSO on 144 MHz in August. Montachusett ARA getting support from Leominster CD for Field Day. Will you be out for Field Day? Will be looking for you. PSHR: WB1HIH, KA1T. Traffic: KA1T 291, W1UD 136, WB1HIH 91, W1SJV 89, W1KK 68, K1PUG 54, WA1OPN 16, WB1FSV 15, K1JHC 7, KB1W 5, W1ZPB 5.

NORTHWESTERN DIVISION

IDAHO: SM, Lem Allen, W7JMH—SEC: KD7HZ. STM: W7GHT. PIO: WB7PFQ. OO: KU7Y.

NET REPORTS	Fq.	Time	Sess.	QNI	QTC
FARM	3937	0200Z Da	31	1919	36
NW TFC	146.38/98	0230Z Da	31	840	13
ID CD	3990	1510Z M-F	21	926	5
IMN	3635	0300Z M-F	21	204	73
TV EMG	145.44/44	0400Z Su	5	200	15
SW ID 2M	146.34/94	0330Z Su	5	239	5

CLUB NEWS: KARS (Coeur d'Alene) furnished 2M Comm. for the FUN RUN—8 hams participated. KARS is sponsoring a hamfest June 8 at the Coeur d'Alene County Fairgrounds. Twin Falls Club is sponsoring a SWAPFEST June 15 at the Moose Hall, with VE Exams available (walk-ins allowed). Mark you Calendar. PEOPLE AND THINGS: About 300 people were at the Walla Walla Swapfest, many of them from Idaho. W7JMH and N7DYU attended on their way to visit friends and relatives on Oregon Coast—home Apr. 5. About 50% of examinees came away with upgrades at the last VE Exam in Boise on Apr. 6: New Teks KA7UIK, KA7UTC, KA7SNJ; new Gen: KA7KGF; new Adv: N7GIV, N7FDW, N7GQW, Carl Peterson; New Extra: K7CXG; New 20: WA7TXB—Congratulations all, and hope to see the rest of you again soon—don't give up! GENERAL: Many interesting events are coming up this summer. Be sure to check often on 2 meters when you travel—you never know when you or someone on the road may need help. Try some different mode to increase your knowledge and skill. Traffic: W7GHT 85, W7JMH 26, KA7IHO 18, K7JD 9, K7TM 6, WB7DZX 5.

MONTANA: SM, Les Belyea, N7AIK—1985 officers for the Butte ARC are—Pres-K7TIM, VP-WA7FOB, Sec'y-N7GYN, Treas-K7KCR. The annual Fathers Day picnic will be held at the Dawson County fairgrounds in Glendive on June 16th, for more info, ctc WA7GVT. Lots of upgrades reported: to Extra-KD7LY, N7CUP, KA7QPA, KD7YA, WA7GQO (our PIO), N7FUB (SM's wife) and N7FLT. To Adv.-WB7WCM, N7GDN, KA7UVD (from no license). To Gen.-W7MAD, KA7PSK, KA7TVT, KA7TUI, KA7DCM, KA7IPQ, KA7SHP and KA7OTD. To Tech-KA7TTO, KA7UUG, KA7SJY, KA7SJS, KA7SJX, KB6FQK, KA7IPR, KA7SJT and KA7SJW. Congrats to all. New ATCs are N7AD from Great Falls and KB7KB from Bozeman. Am happy to announce that the new Montana Bulletin Manager is K7KCR from Butte. June 15th will be a VE session in Butte, ctc K7KCR. Hope everyone has a fun Field Day. PSHR - WB7WVD, WA7GQO, N7GXP, KF7R.

Net	Sess.	QNI	QTC	Mgr.
MSN	5	102	0	K0PP
MTN	31	1699	163	WA7GQO
IMN	21	204	76	OPEN

Traffic: KF7R 64, WB7WVD 50, WA7GQO 39, N7AIK 26, W7DB 14, WA7TUW 4.

OREGON: SM, William R. Shrader, W7QMU—STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. STC: N7ENI. ATC: AK7T. OO: N7SC. Upgrades: KA7UFI (Novice): KA7TAC, KA7TIN, KA7UBA, KA7UFG (Technician): WA7BGF, KA7TIV, K7ZJJ (General): N7GQX, W6POH, W7SNY, KE7CF, N7FCA (Advanced): N7EYS, KE7BP, KA7GUE, KA7LRC (Extra). Lots of calls this month, that's good news. N7DCQ and N7FVH are the proud parents of a new son, Robert. NB7Y was the first to receive all the DR DX awards from AEA. W7FSO celebrated a 25th Wedding Anniversary. A hearty congratulations to all. New Hoodview ARC officers are W7TWL, Pres.; KE7CR, V. Pres.; KA7RCZ, Sec.; and NA7H, Treasurer. The Salem Ham Fair was a big success thanks to a lot of hard work by the group. W7LP is a Silent Key, one of the real "old timers," we'll miss him. A real big THANK YOU goes out to all the guys and gals who helped with communications for the "Man in Motion," Rick Hansen, on the first part of his 25,000 mile journey around the world pushing a wheelchair down the highways and byways raising support for spinal research. I can assure you that Rick and the team have nice things to say about the amateurs of OREGON. Traffic: W7VSE 560, W7LRB 170, N7FLC 161, K7OVK 148, W7ZB 128, AL7W 114, N7BGW 63, N7FAP 50, WA7VTD 46, WB7OEX 42, W7FDU 35, KA7AID 26, W7LNE 11. (Feb.) W7ZB 135.

WASHINGTON: SM, Joe Winter, WA7RWK—STM: K7GXZ. SEC: W6IIH, BM: N7IL. TC: K7UU. PIO/SGL: W7CKZ. OO/RFI COORD: KC7FA. ACC: KD7G.

Net	Freq.	Time(Z)	QNI	QTC	Mgr.
EWTN	146.64/	0030/0430	75	86	WA7CBN
NTN	3970	1900	1158	113	W7UU
NWSSB	3945	0130	730	42	W7HFN
PSTS	145.33	0030/0430	171	113	W7IEU
WARTS	3970	0100	3685	159	W7SF
WSN	3590	0145/0445	329	140	W7GB
WARN5	3940	0200	NEWS NET		W7CKZ

HAMFESTS: May 31, June 1-2, ARRL NWDiv./OR. ST. Convention Seaside OR.; Wenatchee HF on the same weekend. Aug. 17-18, Tacoma Hamfair; Sept. 21-22, Walla Walla HF. FIELD DAY: Always on the 4th weekend! Date is June 22-23. If you are not ready better hurry just a few more days! Wash. Sect. Organizational change. KD7G is the new ACC replacing WB7QNS who resigned. Eve had just started as ACC when husband Ken WB7QNT underwent heart surgery. Our tnx to Eve for her willingness to serve and our best to Ken on his continued good recovery. N7IL is the new Bulletin Mgr. filling the position held by KD7G. Gene is working with two clubs on affiliating and becoming Special Service Clubs. SSCs are committed to the highest ideals of Amateur Radio and they actively promote Amateur Radio and build a strong image of Public Service. How about your Club? Contact KD7G and he will assist the Club to become an SSC. Ivan, N7IL, needs more

PACKET MADE *Easy*

Kantronics Packet Communicator™

Kantronics wants you to join one of the fastest growing segments of Amateur Radio today . . . Packet Radio. With the Kantronics Packet Communicator we've made getting on Packet as easy as getting on RTTY.

1 Ready to Use

The Kantronics Packet Communicator is a fully assembled and programmed terminal node controller ready for operation. Simply connect the Packet Communicator to the Serial TTL or RS232 port of your computer, and the microphone and external speaker jacks of your transceiver. The power supply, cables, and most connectors are included.

2 Easy to Operate

Because the Kantronics Packet Communicator uses internal microprocessors for protocol and signal processing, the operator simply follows procedures and commands outlined in the operators manual.

Any communications or terminal program, like those used with telephone modems, can be used to set up the computer to communicate with the Packet Communicator. Special Packet Terminal (PacTerm™) programs for many popular personal computers will be available soon from Kantronics.

3 Compatibility Plus

The Kantronics Packet Communicator has both the AX.25 and Vancouver protocols, making it compatible with most existing Packet terminal node controllers. Added features include both Bell 103 and 202 tones, and the ability to use the unit as a 1200 baud radio modem without special protocols.

Error free data communication via computer makes Packet Radio technology exciting, and the Kantronics Packet Communicator lets you get in on the action.

For more information contact your local Kantronics dealer, or write Kantronics.

Kantronics
1202 E. 23rd Street (913) 842-7745
Lawrence, Kansas 66046

WHAT'S FAIR DINKUM VALUE?

OPENING SPECIAL

QUALITY

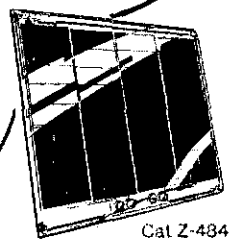
NI-CAD Rechargeable Batteries

From $1.49 ea (10 up price of AA)

AMAZING VALUE

NI-Cads work out much cheaper in the long run, especially if you buy them from Dick Smith Electronics.

Type	Cat No.	Price each
AA	S-3300	1.99
AAA	S-3305	1.95
C	S-3301	2.95
D	S-3003	2.95



HIGH OUTPUT SOLAR PANEL $149

Cat Z-4845

Calling all boat owners, amateur operators, technicians and anyone else who's ever had to keep a 12V battery charged in an out-of-the-way place.

- ☐ 2 x 10V @ 450mA (20V @ 450mA or 10V @ 900mA)
- ☐ Diode protected

HAM BATTERIES

At last! 'No leak' Rechargeable

12V 3 Ah Gel Cell

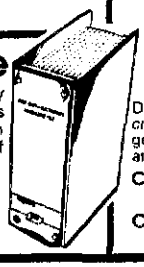
IDEAL FOR PORTABLE OPS

Designed especially for 'trickle charge' circuits such as burglar alarms and emergency supplies. Sealed to prevent leaks and mess.

Cat S-3315 12V 1.2Ah $6.95 each WILL BE $9.95 each

Cat S-3320 12V 3Ah $12.95 each WILL BE $17.95

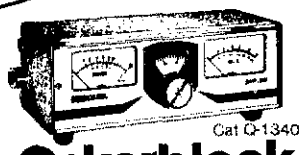
Magazine File



A magazine binder, ideal for any magazines that cover 12 issues in one year. Hard spine with metal rods for placement of the magazines. Cat B-4045

VALUE $3.95

SWR/ Power Meter



Cat Q-1340

Oskerblock SWR200 $89.95

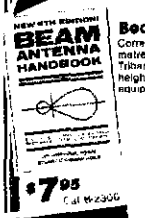
Incredibly popular with the keen amateur. Uses Directional Coupler and Through Line principles for minimum loss, covers 3 to 200MHz (guaranteed!) and suits both 50 & 75 ohm lines. PL259 Connections

When Australians say 'Fair Dinkum' about something, they mean; that's it, the genuine article, true blue, ridgy didge, absolutely true. It could refer to a story, or a person; like a 'fair dinkum mate' is a true friend or, as in our case, the value you get when you buy from Dick Smith Electronics. Fair dinkum value because:

- You will be served by dedicated *electronics enthusiasts*
- We buy directly from the manufacturer so save agents' and middle-man commissions.
- We have thousands of exciting new and unique products
- We keep our overhead costs down and pass it on in lower prices to you

FAIR DINKUM VALUE!

TOP HAM VALUE BOOKS



Beam Antenna Handbook

Correct beam dimensions 6 to 40 metres. Are 40 metre beams worth the effort? Construction of Tribeam and compact beams, the truth about height/matching systems, baluns and test equipment.

All About Cubical Quad Antennas $6.95

112 pages

The world famous classic on *Quads* gives new dimensions, revised gain data, Quad V Yagi, Mini Quad and Monster Quad construction. Correct dimensions given for 6 to 80 metres. Cat B-2304

$7.95 Cat B-2306

Radio Communications Handbook Vols 1 & 2 combined

Covers RTTY, propagation, aerials, mobile & portable equip, everything including satellite communications. Cat B-2033

$24.95 Cat B-2033

Wire Antennas for Radio Amateurs

192 pages

How to build efficient horizontal, vertical, multiband, trap and beam antennas from 2-160 metres. Invisible antennas for difficult QTH's. 2 and 6M quickie beams, towers, baluns, etc. Cat B-2307

$7.95

The Confidential Frequency List

Want to know the frequencies used by the US President in Air Force One? The Soviet Embassy in Dublin? They're all here, from 4000Hz to 27 999MHz. Buy the book then ask about a scanner Cat B-9402

$13.95

FREE MINI CATALOG

We will be glad to send you our 16 page mini-catalog on request. **PLUS** *reserve your copy of our giant 132 page catalog, due out in June, by sending $2 plus $1 shipping and handling*

OR

RESERVE ONE FREE BY PLACING AN ORDER TODAY!

Antenna Balun Kit $5.50

Contains ferrite ring, enamelled copper wire and winding details for 1:1, to 1:9 ratio. Input power 2kW PEP and frequency range 3 – 30MHz Cat D-5350

RAK BL-50A Balun $29.95

T shape design for use as a centre support for dipoles or yagi antennas. I/P 52 ohms unbalanced. O/P 52 ohms balanced. Input RF power 1 kW with an insertion loss of less than 1 dB and frequency range of 3 – 30MHz. Cat D-5310

MINIATURE SOLDERING IRON

ONLY $9.95

TINY IS TREMENDOUS

This is a high precision soldering iron manufactured in Japan for the dedicated PCB constructor. If you find it difficult soldering narrow pin spaced IC's (or 64 pin chips!) this is the iron for you. Solves difficult soldering problems without the messy results that a standard iron creates. You will find this iron quick and efficient and a good friend when making up your next board.

Operates on any 12V source – coated copper tip lasts many 1000's of joints. ● Spare tips available – T-1921 wedge tip (as supplied with iron) $1.95 and T-1922 Conical tip (great for really confined spaces) $1.95.

Cat T-1920

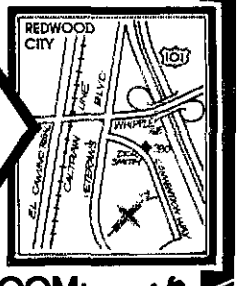
LOOK AT THIS PRICE FOR A 2M LINEAR!

2 Metre **ONLY**

Linear Amplifier $59.00

Don't pay $120 or more! This amp does a better job and will cost you less. This is an all mode, high efficiency linear amplifier for 2 metres. 30 watts output with only 3 watts in. 13.8 volt DC supply makes it perfect for mobile use. Dual time constant for SSB or FM operation. Reverse polarity protection too. Works great with our FT290R and FT208R or any 2M transceiver with up to 3 watts out. Cat D-2546

Here's how to find us



EVERYTHING FOR THE ELECTRONICS ENTHUSIAST

DICK SMITH ELECTRONICS

INCORPORATED IN THE STATE OF CALIFORNIA

MAIL ORDER CENTER AND SHOWROOM:
390 Convention Way, Redwood City CA 94063
PO Box 2249, Redwood City CA 94063
Telephone: (415) 368 8844
Order Hotline: (415) 368 1066

HANDLING – ALL ORDERS $1.00 PLUS SHIPPING
INSIDE USA 5% OF ORDER TOTAL (MIN $1.50)
OUTSIDE USA 10% OF ORDER TOTAL (MIN $3.00)
Californian residents add 6.½%

ORDER NOW (415) 368 1066

DICK SMITH ELECTRONICS
60 STORES IN 3 COUNTRIES
NOW OPEN IN REDWOOD C

Introducing The New LK-500Z "B"

Legal Limit Amplifier

Thinking of buying a linear amplifier? You owe it to yourself to check out the new LK-500ZB.

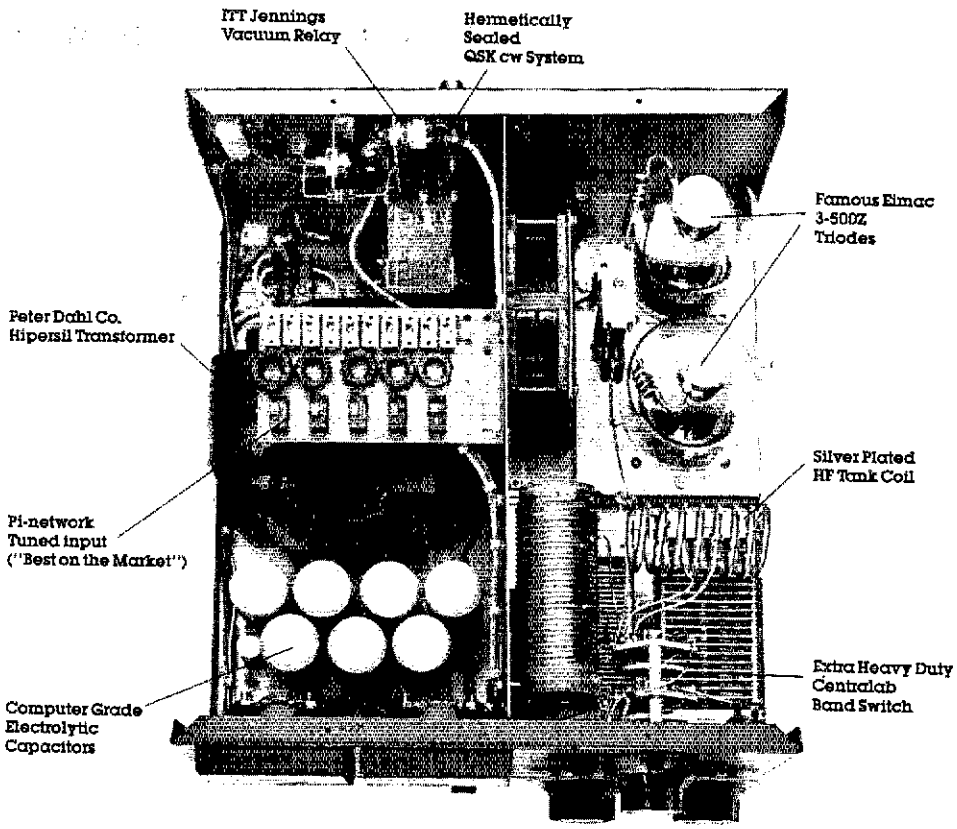
The LK-500Z series of amplifiers were created to offer the best value you can buy in HF linears covering 160-15 meters. Last year, it was demonstratively the best value. It was the lowest priced, full feature pair of 3-500Z's on the market. It had the longest warranty and the only amplifier with a money-back guarantee. It's not surprising that the LK-500ZA, both the standard and "hipersil" version, became one of the most popular amplifiers on the ham bands.

Now, for 1985, Amp Supply engineers have taken this durable, dependable "rock crusher," fantastically improved it, and called it the LK-500Z "B" version.

Improvements include an ITT Jennings vacuum antenna changeover relay with a companion sealed relay QSK system which eliminates any signal attenuation between CW characters. The silver-plated HF tank coil and the extra heavy duty silver-plated Centralab bandswitch are the finest available.

The LK-500Z "B" version has all the outstanding standard features of the LK-500ZA; such as the Peter Dahl Hipersil power transformer, and a full-wave bridge rectifier system (we will not produce amplifiers using weak voltage doublers). Computer grade electrolytic capacitors are standard and the low-pass pi-network tuned input is the absolute best on the market. Oh yes, we only use Eimac 3-500Z triode tubes in the LK-500Z amplifiers.

Amp Supply Co. has been a pioneer in manufacturing quality amateur radio products, providing service to back them up and selling at low prices. The people of Amp Supply Co. have been designing and manufacturing amplifiers since 1974, and we challenge any competition to match our total amateur HF amplifier production — 17,678 amplifiers in eleven years. You don't manufacture and



supply that many amplifiers unless you have first-rate products and service. Join the thousands of satisfied radio amateurs who have come to the people at Amp Supply Co. for their amplifier needs. We believe good service starts with answering your questions and needs before and after you buy.

All Amp Supply amplifiers carry a two year warranty. Ask our competitors what theirs is!

Our price is the whole price. LK500Z "B" version: $1295.00 includes UPS surface charges and insurance in the continental USA. In a hurry? Two day UPS air service is just $20.00.

The LK-500Z "B" version is clearly a progressive, new amplifier, a leader in its field; but what else would you expect from a company called Amp Supply?

Thank you for purchasing an Amp Supply Co. product.

Denny K8KXK

NO RISK GUARANTEE

If you are not completely satisfied with the performance of your new LK-500ZB you may return it within ten days for a refund less shipping and repackaging. If you can get any of our competitors to give you the same guarantee, buy both and return the one you don't like. We know which one you'll keep.

LK-500ZB	$1295.00
LK-500NT-B No-Tune-Up	$1595.00
LK-500-ZA	$1099.50

Order Today.

For fastest delivery, send cashiers check, money order, or order by credit card. Personal checks, allow 18 days to clear. North Carolina residents, add 4½% sales tax. Hours: Monday-Friday 9:00 a.m.-5:00 p.m. E.S.T.

VISA MasterCard

Call 919-821-5518

Amp Supply Co.

208 Snow Ave., P.O. Box 147
Raleigh, North Carolina 27602
919-821-5518

G·COM

KENWOOD

NEW

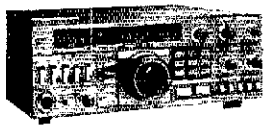
TR 2600A

2M FM handheld with Kenwood's innovative DCS system. Many features.

Sug. Retail $339.95

Call for YOUR Low Price!

KENWOOD



TS 430S

Now a general coverage receiver/ham band transceiver at an affordable price. Ideal for mobile, and portable use.

Sug. Retail $899.95

Call for Low, Low Price!

KENWOOD

NEW

TM211A/411A

Ultra compact FM mobile transceivers featuring Kenwood's innovative DCS system. 25 watts with many features.

TM211A 2M . . . Sug. Ret. $369.95
TM411A 450MHz Sug. Ret. $449.95

Call for YOUR Low Price!

KENWOOD

TR 7950

45 Watts! Multi-Featured. Kenwood's Most Popular 2 Meter FM Rig.

Call for YOUR Low Price!

KENWOOD

HANDHELD ACCESSORIES

VB-2530 25W Amp	$99.95
HMC-1 Headset w/VOX	39.95
SMC-30 Speaker mic	34.95
ST-2 Base Charger for TR2600	69.95
MS-1 Mobile Charger for TR2600	42.95
DC-26 DC-DC Conv. for TR2600	19.95
PB-26 Ni-Cd Batt. for TR2600	34.95
TU-35B Encoder for TR2600	34.95
LH-3 Leather Case for TR2600	37.95
SC-9 Soft Case for TR2600	19.95
EB-3 Ext. Batt. Case for TR2600	14.95
BT-3 Batt. Case for TR2600	11.95
AX-2 Shoulder Strap w/Antenna Base for TR2600	29.95
PB-21 Ni-Cd Batt. for TH21/41	17.95
DC-21 DC-DC Conv. for TH21/41	19.95
BT-2 Batt. Case for TH21/41	7.95
EB-2 Ext. Batt. Case for TH21/41	14.95
SC-8T Soft Case for TH21AT/41AT	9.95
TU-6 Encoder for TH21/41	24.95
AJ-3 BNC Adapter for TH21/41	6.49

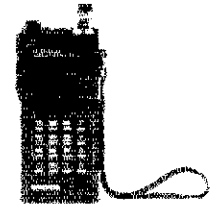
KENWOOD

TS 930S

Still a very popular top-of- the-line transceiver.

Available at Reduced Price!

KENWOOD



TH-21A/AT & TH-41A/AT

Pocket size performers. Measures only 2.24"(W) x 4.72"(H) x 1.1"(D).

TH-21A . . . . . Sug. Ret. $199.95
TH-21AT . . . . . Sug. Ret. $229.95
TH-41A . . . . . Sug. Ret. $209.95
TH-41AT . . . . . Sug. Ret. $239.95

Call for YOUR Low Price!

AEA

CP1

Computer Patch™ Interface. The AEA CP1 Interface, a striking combination of performance, quality and value.

Your Cost $189.95

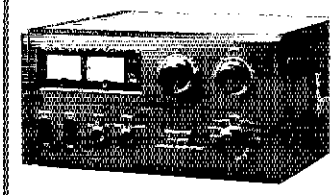
Save even more on package with MBA text for VIC20 or Commodore 64.

MIRAGE

State-of-the-art amplifiers.

	Your Price
B23A 2M 2W In 30W Out $105.00	**$87.95**
B3016 2M 30W In 160W Out 253.00	**209.95**
D1010 450MHz 10W In 100W Out 337.00	**281.95**
D1010N 450MHz 10W In 100W Out with N connectors 347.00	**289.95**

KENWOOD

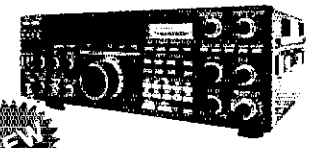


TL922A

160-15M linear amplifier using popular 3-500Z's!

Special Low Price!!!

KENWOOD



NEW

TS-940S

Serious radio for the serious operator. Many new features.

Call To Place Your Order.

ASTRON POWER SUPPLIES

High quality at an attractive price. Output voltage 13.8VDC.

Model	Cont. Duty Amps	ICS Amps	Net Cost	Your Cost
RS-7A	5	7	$ 64.95	$ 49.95
RS-10A	7.5	10	79.95	59.95
RS-12A	9	12	89.95	69.95
RS-12M	RS-12A w/switchable volt and Amp meter		111.95	85.95
RS-20A	16	20	115.95	89.95
RS-20M	RS-20A w/switchable volt and Amp meter		137.95	109.95
RS-35A	25	35	174.95	139.95
RS-35M	RS-35A w/switchable volt and Amp meter		194.95	159.95
RS-50A	37	50	253.95	199.95
RS-50M	RS-50A w/switchable volt and Amp meter		288.95	229.95

Other models also available.

ICOM

IC-751
PACKAGE DEAL

Order your IC-751 with: ICOM PS-35 internal power supply installed, ICOM FL-52A 500Hz CW filter installed and SM-8 desk mic.

All for $1489

You Save $236!

ICOM

HANDHELD ACCESSORIES

LC-14 Vinyl Case for IC-02AT	$17.95
BC-35 Drop In-Charger	69.00
BP-2 425mA 7.2V NICAD Battery	39.50
BP-3 250mA 8.4V NICAD Battery	29.50
BP-4 Alkaline Battery Case	12.50
BP-5 425mA 10.8V Battery	49.50
BP-7 425mA 13.2V NICAD Battery	67.50
BP-8 800mA 8.4V NICAD Battery	62.50
HM-9 Speaker Mic	34.50
CP-1 Cigarette Lighter Cord	9.50
DC-1 DC OP Pack	17.50
Leather Case for IC-2AT	34.95
HS10 Headset for HTs	19.50
HS10SA VOX Unit for IC-02AT	19.50
HS10SB PTT Switch Box	19.50

ICOM

IC-02AT IC-04AT

New full-featured 2M, and 440MHz handhelds! Scanning, 10 memories and programmable subaudible tones are just a few of the MANY features of these terrific new radios. AND THEY ARE COMPATIBLE WITH ALL ICOM HT ACCESSORIES!

IC-02AT Sug. Ret. $349
IC-04AT Sug. Ret. $379

Available at Reduced Price!

Now Offering Free U.P.S. Ground Service!

Most Items

ICOM

IC-745
PACKAGE DEAL

Order your IC-745 with: Astron RS20A 20A power supply, ICOM SM-6 desk mic and ICOM FL-52A, 500Hz CW filter installed.

A Super Buy at $979

You Save $245!

ICOM

IC-2AT/ 3AT/4AT

Still the most popular, low cost/top performing handhelds around.

IC-2AT SALE PRICED	$199.95
IC-3AT SALE PRICED	$239.95
IC-4AT SALE PRICED	$239.95

Call to Place Your Order!

ICOM

NEW

IC-735

New compact general coverage receiver/ham band transceiver.

Call to Place Your Order

ICOM

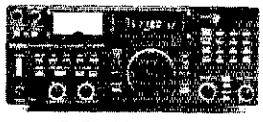
NEW

IC-3200A

Dual bander 2M and 70CM. Many features. Sug. Ret. $549.00

Call for YOUR Low Price!

ICOM



IC-R71A

Perhaps the best receiver at any price! Sug. Retail $799

Call for YOUR Low Price!

ICOM

IC-271A/H

2 meter all mode with many new features. Available with higher power.

IC-271A ..... Sug. Ret. $699
IC-271H ..... Sug. Ret. $89

Call for Your Low Price!

ICOM

IC-471A/H

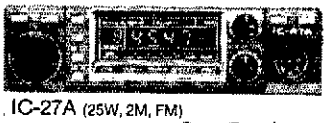
All mode, 430 – 450MHz continuous coverage. Now available with higher power.

IC-471A ..... Sug. Ret. $799
IC-471H ..... Sug. Ret. $1099

Call for Low, Low Price!

ICOM

NEW ICOM VHF/ UHF MOBILES



IC-27A (25W, 2M, FM) ..... Sug. Ret. $369
IC-27H (45W, 2M, FM) ..... Sug. Ret. $409
IC-37A (25W, 220MHz, FM) ..... Sug. Ret. $449
IC-47A (25W, 70cm, FM) ..... Sug. Ret. $469

Call for YOUR Low Price!

800-426-6528

TOLL FREE – Including Alaska and Hawaii.

Washington Residents: Call (206) 784-7337

All prices, specifications and availability subject to change without notice. Washington residents add applicable sales tax. Free UPS Ground Service applies to most transceivers with related accessories excluding antennas.

Dale, Frank, Bob, and other knowledgeable professionals are willing to help you.

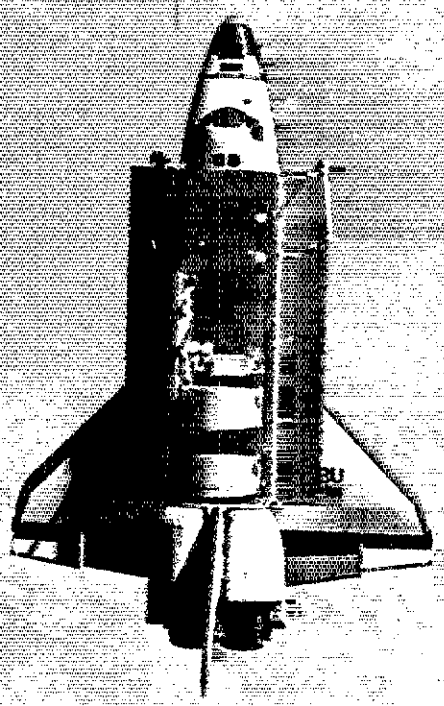
6115 15th Ave. N.W.
Seattle, WA 98107
(206) 784-7337

STORE HOURS:
Mon. thru Sat.
9:00am — 5:30pm

VISA

C·COMM

THE ULTIMATE CONTACT . . .
MAKE IT WITH ROBOT™ COLOR SSTV



ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, California 92111
Phone (619) 279-9430

Step aboard the Shuttle from your shack with the world's most advanced slow scan video system!

☐ **YES!** **Tell me about how I can participate in SSTV aboard the Space Shuttle.**

NAME _____ CALL _____

ADDRESS _____

CITY/STATE _____ ZIP _____

Official Bulletin Stations to get out the latest news bulletins in your area. Contact him to get started. West Seattle ARC is proud of the 15 novices they have taught. A program on Packet Radio was presented by N7BTI. Packet Radio is growing very fast across the nation. For information in Washington write Northwest Amateur Packet Radio Assoc. (NAPRA) c/o John Gates, N7BTI, 750 Northstream Ln., Edmonds, WA 98020. Radio Club/Tacoma W7AZI was out for members bloodi Roy had the bloodmobile brought to the clubhouse where 14 pints were donated. An additional 10 pints were added to the account totaling 24 for a successful drive. W7BUN reports the March 30th VE Exams went very well. 49 were tested with a total of 83 elements. The average passing rate was 65%. The next exam is June 29th at the RCT clubhouse. A big step was taken to purchase the adjacent property for future clubhouse expansion and parking. The club is financing the investment by borrowing the money from its members. In another action the members approved the purchase of the 147.98/.38 repeater operating on Sparpole Hill in Pierce Co. Additional equipment was bought to upgrade this wide area repeater according to repeater chr'm WA7FUS. I have just been informed by WA7RDJ of the Olympia ARS that they have been coordinating the freq's. of 147.96/.36 for their second rptr. The other is on 220 MHz. 73, Good haming, Joe WA7RWK. Traffic: WB7WOW 520, N7CSP 505, KD7ME 393, KR7L 308, K7GXZ 196, W7GB 110, KR7F 74, W7IEU 47, KD7G 9, KD7TJ 23, N7FXM 13, K7OXL 10.

PACIFIC DIVISION

NEVADA: SM, L. M. Norman, W7PBV—SEC: K7HRW. STM: W7BS. TC: K7ICW. PIO: KD7BT. OO/RFI: AD7K. "SQUEAK" is out of hospital doing FB, may be allowed to work one day a week. NX8W reports those passing the VE test getting FCC license in approximately six weeks. WA9PPD new trustee for LCRAC repeater. WB7UTM volunteered to assist anyone with an antenna problem. K7GD is compiling a file on antennas so check his library if you need details on a new antenna. W7KYT is custodian of repeater auto-patch. AD7K reports the following repeaters in the area: .84/- Montezuma Peak 20 W of Goldfied, .82/- Onyz Peak near Plam Springs, .82/- St. George, UT, .85/- Crestline, .91/- Logandale- Lake Mead, .97/- Logandale with autopatch, .12/ + Christmas Tree Pass, Spirit Mtn. near Search Light, NV. Traffic: W7PBV 4.

PACIFIC: SM, James F. Wakefield, AH6CO—Marathons are the thing this time of the year. 17 Maui members participated in the Maui Marathon and Kauai members provided communications for the Carol Kai Bed Race. West Big Island members are lined up for the Kam Day parade in June. WH6ASO upped from Tech to General and WH6AGA and WH6BBW made it to General from Novice. Waimea Hi School Radio Club owns a new TS-430S. Low end of 40 is good for DX say KH6B, KH6AFS and KH6IJ. Waiakea High School Ham class produced seven Novices. Traffic is up with change of condx so contact KH6HIJ and line up on a net.

SACRAMENTO VALLEY: SM, Ron Menet, N6AUB—ASM: W6RFF. OO: NY6Z. SEC: WA6ZUD. STM: WA6WJZ. The news this month is UP-GRADES: General, N6LGG KB6HLB KB6EHC KB6FRH; Advanced, KA6ZMP N6GEK KA6TFC K6IOS; Technician, KB6EHF KB6FOT KB6EHB KB6CFX. Congratulations to each of you and to those about whom we have not yet heard. The VEC program is growing in the Section with more and more VE teams being formed. This should mean that one should be able to take an examination just about any weekend, somewhere in the Section. Thanks to all of you dedicated amateurs who are making this possible. We hope that the numbers of under-45-year-old exam takers is also growing. ASM Jettie Hill, W6RFF, has announced his desire to run for the position of Section Manager. I am circulating a nominating petition for him. One last upgrade: WF6J, to Extra. Traffic: N6CVF 334, WA6WJZ 191, WD6BZQ 72, K6SRF 56, KA6PDG 16, WA6ZUD 10, WB6SRQ 9, WA6ERZ 1.

SAN FRANCISCO: SM, Robert Odell Smith, NA6T—Thanks for all the contacts during WPX from the section when I was KH4 from Midway Island. I really enjoyed my 20 days stay on the island. Interested in AMSAT? Join the 147.33 Net Wed. night at 8 P.M. in the San Francisco Bay area. HARC has their second testing session scheduled for June. SCRA will be testing in September at their annual fleamarket in Sebastapol. Don't miss this one. It's like wine: better and better with age. VOMARC participated as a club at Skaggs Island during Armed Forces Day this year. They will also host their first hamfest at Sonoma Community Center on Sunday, Aug. 11. SFRC is into TX hunts, QRP back-packing, etc. Interested? Contact Bill, K9AT, for information. DNARC has submitted final paper work for their repeater and should be installing it soon. GSLPRC has found another use for their "Beep Ball Van" used in providing emergency communications. This makes three EC vans for Amateur use in the section, VOMARC, SCRA, GSLPRC. Any more news? Traffic: W6IPL 343, W6NL 252, W6RNL 182, N6FWG 66, KK1A 12.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WA6YAB. STM: N6AWH. TC: WA6EXV. ACC: N6ECH. Asst. SMs W6TRP and K6YK. New officers of Central Cal. Amateur Comm., Inc. are Pres WB6FWO, VP WB6C, Sec WB6JIT, Treas WA6JII. The club operates 146.79 and 444.25 MHz repeaters. The meetings are the 2nd Monday of each month in Fresno. KA6YZU is N6LSE. Congratulations to the following upgrades: Extra—KE6SH; Advanced—WA6KSF. KB6AMM, and WD6AFC; General—N6JQX; Technician-KB6FFM, KB6GXX, and KB6AMY. KA6GCF has a FT 726. WB6KCE has an IC 271H. WA6BUH has an IC 37A. KG6FX has an IC 3AT. N6DYJ has a TR 22. N6INT has an Azden PCS 2000. N6BLE and WB6QDK have TH 21ATs. KD6LO has a TR 2600A. Traffic: N6AWH 145, WA6YAB 12, W6DPD 11, K6PMG 8, W6SX 8.

SANTA CLARA VALLEY: SM, Rod Stafford, KB6ZV—BM: W6BCY. PIO: N6BIS. TC: K6HLE. SEC: K6ITL. ACC: W6MKM. ASM: NS6N. STM: W6PHT. I am sorry to report that Cam Pierce, K6RU, passed away recently. Cam was very active in amateur activities in the SCV Section including NCDXC, NCCC, PAARA and the NCDX Foundation. This was the first time that I have been able to attend the International DX Convention. A really good lineup of well-known DXers gave talks and presented forums at the Fresno event in April. I have heard about a number of these individuals and even heard some of them on the air. Enjoyed the chance to meet some of them in person. Palo Alto area amateurs once again participated in a public service event, a half marathon event on and about the Stanford Univ. campus. W6SZ was in charge of communications. Radio operators included: WA6AOD K6MTZ WA6NIL WB6RAG WB6RHE W6RVY KW6S N6VT and

KENWOOD

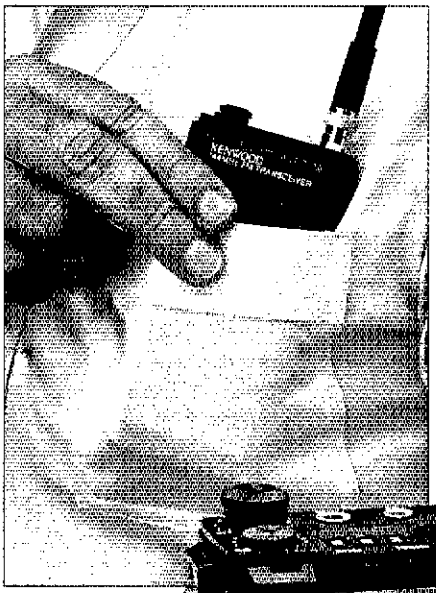
...pacesetter in Amateur radio.

NOW 220 MHz!

The Smallest HT!

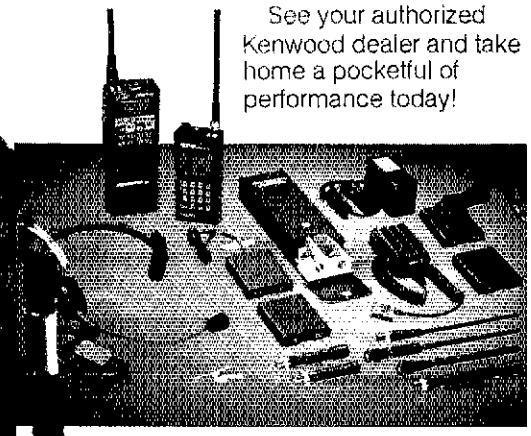
Kenwood's advanced technology brings you a new standard in pocket/handheld transceivers!

- **High or low power.** Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!** Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) **with batteries!**
- **Expanded frequency coverage (TH-21AT/A).** Covers 141.000-150.995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.
  TH-31AT/A: 220.000-224.995 MHz in 5 kHz steps.
  TH-41AT/A: 440.000-449.995 MHz in 5 kHz steps.



- **Repeater offset switch.**
  TH-21AT/A: ±600 kHz, simplex.
  TH-31AT/A: −1.6 MHz, reverse, simplex.
  TH-41AT/A: ±5 MHz, simplex.
- **Standard accessories:** Rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery pack, wrist strap.
- **Quick change, locking battery case.** The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.
- **Rugged, high impact molded case.** The high impact case is scuff resistant, to retain its attractive styling, even with hard use.

See your authorized Kenwood dealer and take home a pocketful of performance today!



- **Easy-to-operate, functional design.** Three digit thumbwheel frequency selection and handy top-mounted controls increase operating ease.

Optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8** soft case for TH-21A/31A/41A
- **SC-8T** soft case for TH-21AT/31AT/41AT
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **Service manual**

More information on the TH-series HTs is available from authorized Kenwood dealers.

KENWOOD

Note: Specifications guaranteed for the 144.000-148.000 MHz Amateur band only. TH-21AT shown. Standard versions TH-21A/31A/41A without DTMF pad also available. Specifications and prices are subject to change without notice or obligation.

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

Our numbers talk

42 4B

SUCCESS

BOOMERS WIN
1983 Central States VHF Conference, Antenna Contest

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

BOOMERS WIN AGAIN
1983 EME CONTEST WA1JXN
1st PLACE 2 METERS
WITH 12 X 32-19
PLUS
1st TO WORK SPACE SHUTTLE

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

THREE EXCITING NEW BOOMERS

HIGHEST GAIN BOOMER XL

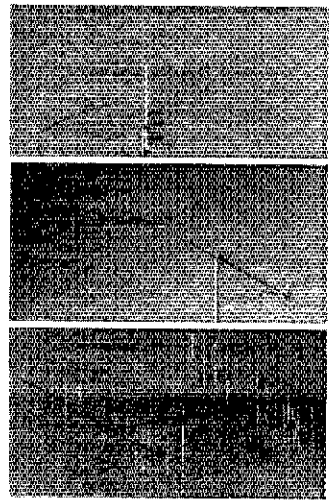
Boomer XL is "the antenna for 2 meter DX" with higher gain and cleaner pattern this antenna is designed to perform and survive in harsh environments. It has 18 elements on a 28.8 ft. 8.8 m tapered boom.
MODEL 4218XL 144-145 MHz

WIDEBAND BOOMER 215WB

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

FM BOOMER POWER PACK

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



OSCAR BOOMERS

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

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

cushcraft
CORPORATION

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

Yaesu has serious listeners for the serious listener.

Yaesu's serious about giving you better ways to tune in the world around you.

And whether it's for local action or worldwide DX, you'll find our VHF/UHF and HF receivers are the superior match for all your listening needs.

The FRG-9600. A premium VHF/UHF scanning communications receiver. The 9600 is no typical scanner. And it's easy to see why.

You won't miss any local action with continuous coverage from 60 to 905 MHz.

You have more operating modes to listen in on: upper or lower sideband, CW, AM wide or narrow, and FM wide or narrow.

You can even watch television programs by plugging in a video monitor into the optional video output.

Scan in steps of 5, 10, 12½, 25 and 100 KHz. Store any frequency and related operating mode into any of the 99 memories. Scan the memories. Or in between them. Or simply "dial up" any frequency with the frequency entry pad.

Plus there's much more, including a 24-hour clock, multiplexed output, LCD readout, signal strength graph, and an AC power adapter.

The FRG-8800 HF communications receiver. A better way to listen to the world. If you want a complete communications package, the FRG-8800 is just right for you.

You get continuous worldwide coverage from 150 KHz to 30 MHz. And local coverage from 118 to 174 MHz with an optional VHF converter.

Listen in on any mode: upper and lower sideband, CW, AM wide or narrow, and FM.

Store frequencies and operating modes into any of the twelve channels for instant recall.

Scan the airwaves with a number of programmable scanning functions.

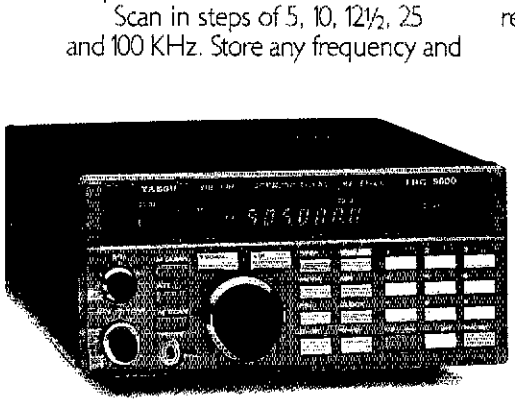
Plus you get keyboard frequency entry. An LCD display for easy readout. A SINPO signal graph. Computer interface capability for advanced listening functions. Two 24 hour clocks. Recording functions. And much more to make your listening station complete.

Listen in. When you want more from your VHF/UHF or HF receivers, just look to Yaesu. We take your listening seriously.

YAESU

Yaesu Electronics Corporation
6851 Walthall Way, Paramount, CA 90723
(213) 633-4007

Yaesu Cincinnati Service Center
9070 Gold Park Drive, Hamilton, OH 45011
(513) 874-3100



Dealer inquiries invited.

Prices and specifications subject to change without notice.
FRG-9600 SSB coverage: 60 to 460 MHz.

KENWOOD

...pacesetter in Amateur radio

Handy Handful...

TR-2600A/3600A

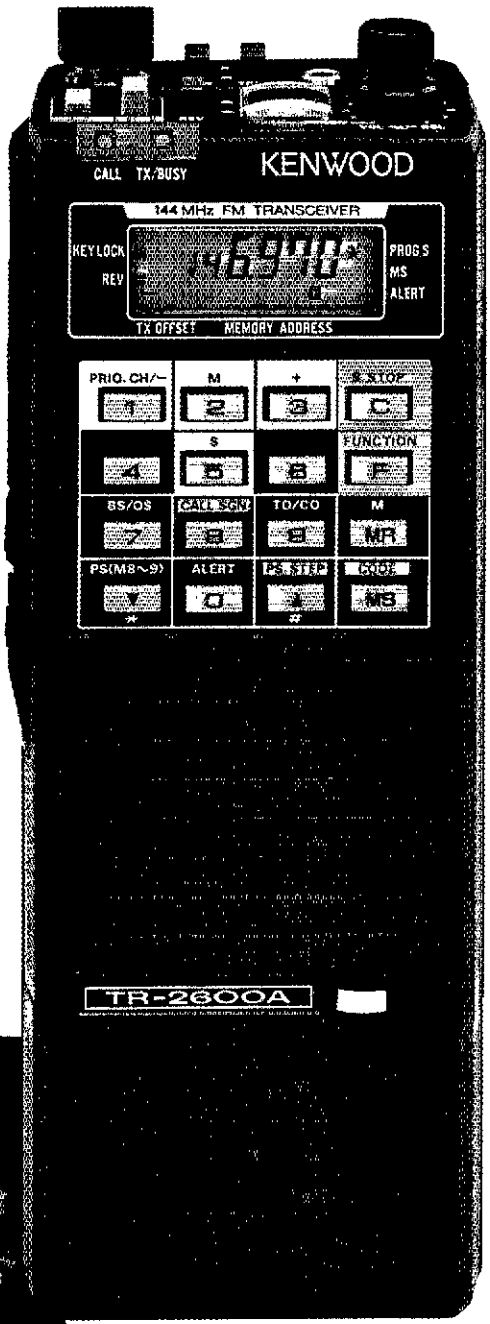
Kenwood's TR-2600A and TR-3600A feature DCS (Digital Code Squelch), a new signalling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different DCS combinations possible.

The Kenwood TR-2600A and the TR-3600A pack "big rig" features into the palm of your hand. It's really a "handy handfull"!

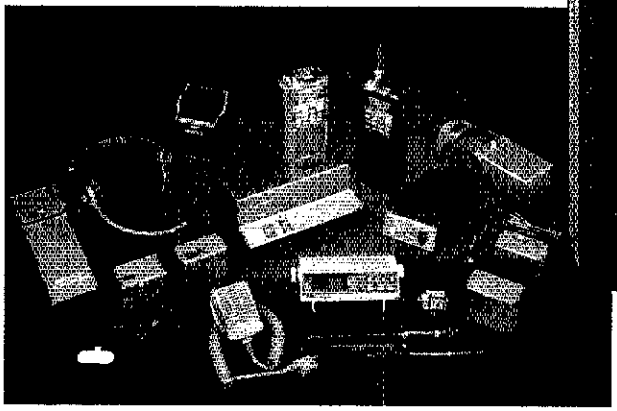
Optional accessories:

- TU-35B built in programmable sub-tone encoder
- ST-2 base stand
- MS-1 mobile stand
- PB-26 Ni-Cd battery
- DC-26 DC-DC converter
- HMC-1 headset with VOX
- SMC-30 speaker microphone
- LH-3 deluxe leather case
- SC-9 soft case with belt hook
- BT-3 AA manganese/alkaline battery case
- EB-3 external C manganese/ alkaline battery case
- RA-3 telescoping antenna
- RA-5 2-m/70-cm telescoping antenna
- CD-10 call sign display
- BH-2A belt hook

More TR-2600A and TR-3600A information is available from authorized Kenwood dealers.



- **Simple to operate**
  Functional design is "user friendly." Built-in 16-key autopatch encoder, TX STOP switch, REVerse switch, KEYboard LOCK switch, high efficiency speaker.
- **Large LCD**
  Easy to read in direct sunlight or in the dark with convenient dial light that also illuminates the top panel S-meter.
- **Extended frequency coverage**
  Allows operation on most MARS and CAP frequencies. Receive frequency range is 140-160 MHz; transmit capability is 142-149 MHz, (TR-3600A covers 440-450 MHz).
- **Programmable scan**
  Channel scan or band scan, search for open or busy channels.
- **SLIDE-LOC battery case**
- **10 Channels**
  10 memories, one for non-standard repeater offsets.
- **2.5 watts high power, 350 mW low**
  TR-3600A has 1.5 watts high or 300 mW low.



KENWOOD

TR-2600A shown. TR-3600A is available for 70 cm operation.

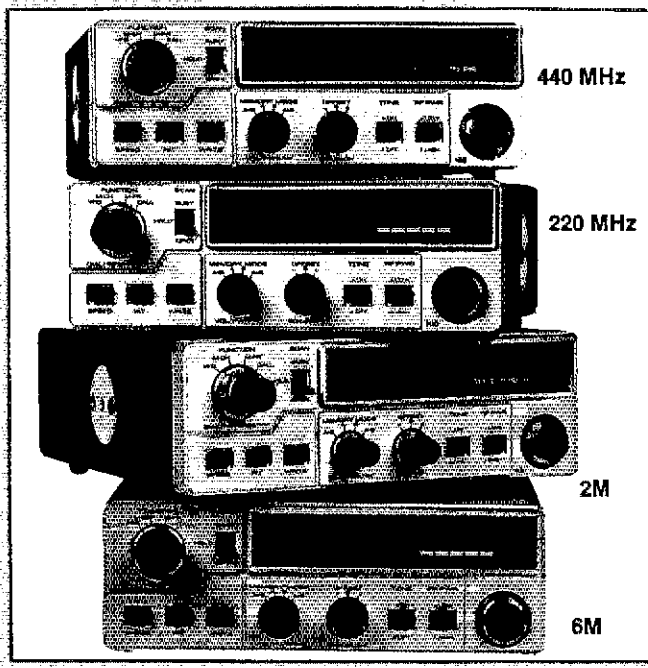
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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

KDK

[illegible]

Well . . . they might not last forever. However, there are certainly many older model KDKs out there in 'Ham Radio-land' just chuggin away. Every day calls come from all over asking for information and advice on care and feeding of an FM-144sx or a '2015 and there are even a few older than that but some of them seem to be in disguise. That's a tribute to the folks who design and make the KDK. They care about building a radio to last longer because their name and their pride are on the front of each one. BUT . . . What we are really getting to is we would really like for all you folks who have known and loved your KDK's all these years to go and update yourselves by purchasing a newer KDK, one like, say, the FM-2033 or maybe an FM-7033 UHF. That way you can start your own collection of heirloom KDK radios. Right there in your own hometown. Take a look at the chart of available models and visit your nearest KDK dealer and check them out. We think you will drive home with one.



MAXPAC STACK

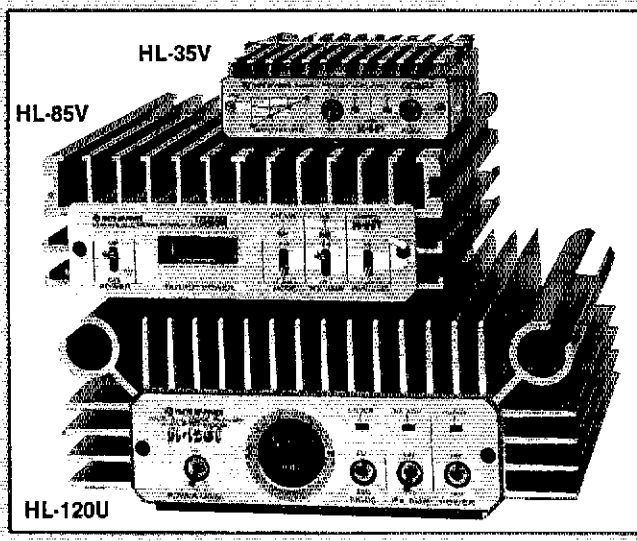
SPECIFICATION	FM-2033 144 MHZ	FM-4033 220 MHZ	FM-7033 440 MHZ	FM-6033 50 MHZ
NUMBER OF MEMORIES	10 Memories + CALL CHANNEL organized as two banks of 5 channels each. (CH 1-5, CH 6-10, CALL.)			
MEMORY SCANNING	Memories may be scanned A(1-5), B(6-10), A+B(1-10) or A×B(1-5)			
BAND SCANNING	Programmable band scan between values loaded into memories 5 and 10, step size set in INIT module.			
FREQUENCY RANGE	142.000-149.995 MHZ	220-224.995 MHZ	440-449.975 MHZ	50.00-53.995 MHZ
OUTPUT POWER HI/LO	25/2.5 Watts	25/2.5 Watts	10/2 Watts	10/2 Watts
REPEATER OFFSET	600 kHZ UP or Down	1.6 MHZ UP or Down	5 MHZ UP or Down	600 kHZ UP or Down
SUB AUDIBLE TONE	103.5 @ 500 Hz Dev	103.5 @ 500 Hz Dev	Dipswitch Select	103.5 @ 500 Hz
SENSITIVITY	0.2 uV @ 12dB SINAD	0.35 uV @ 12 dB SINAD	0.4 dB @ 12 dB SINAD	0.2 uV @ 12 dB SINAD
BANDWIDTH	±5 kHZ @ −6 dB	±5 kHZ @ −6 dB	±5 kHZ @ −6 dB	±5 kHZ @ −6 dB
SELECTIVITY	±12.5 kHZ @ −60 dB	±12.5 kHZ @ −60 dB	±12.5 kHZ @ −60 dB	±12.5 kHZ @ −60 dB

THL CORP.

AMPLIFIERS • PREAMPS • COUPLERS

[illegible]

TEAM THL brings competition class performance to everyday operation. Whether you're looking for a little more performance or a "super-charger" boost, TEAM THL products can get you out of the pits and back in the race better and faster almost every time. Three different power performance classes in either VHF or UHF band capability give the TEAM THL a broad spectrum of performance options. So remember the next time you get beat in the race, soup-up yourself with a product from TEAM THL.



Specifications	HL-30V	HL-35V	HL-35VL	HL-85V	HL-110V	HL-160V	HL-160V25	HL-20U	HL-30U	HL-60U	HL-120U
Pre-Amp Type	N/A	Gaas-FET	Gaas-FET	Gaas-FET	Gaas-FET	MOS-FET	MOS-FET	N/A	Gaas-FET	Gaas-FET	Gaas-FET
Power Metering	N/A	LED	LED	Meter	Meter	Meter	Meter	N/A	LED	Meter	Meter
Input (Watts)	.25-5	.25-5	.25-5	10-14	3-14	3-14	20-30	.1-4	1-4	8-14	8-14
Output (Watts)	2.5-30	2.5-30	2.5-30	70-90	90-110	140-160	140-160	18-22	25-30	45-60	90-110
SSB Mode	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES
Sugg. Retail	$69.95	$79.95	$89.95	$169.95	$239.95	$349.95	$299.95	$114.95	$129.95	$229.95	$379.95

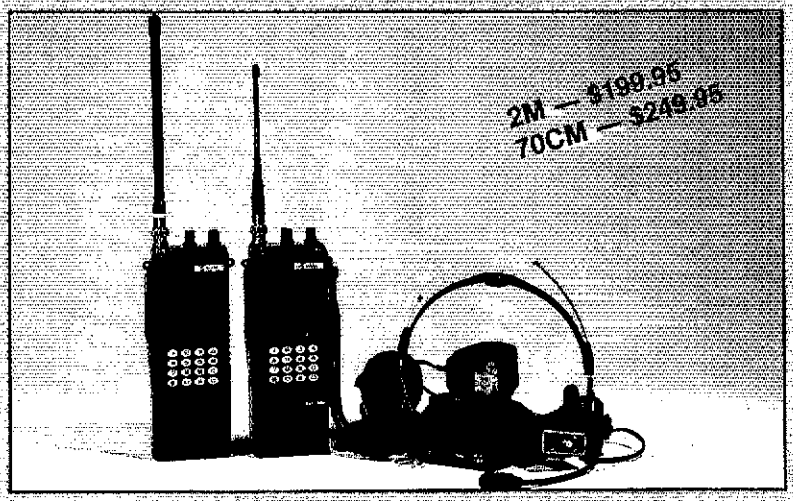
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

SANTEC®

2M ST-200ET
70CM ST-400ET

Priced at a level to make your budget smile, the ST-200ET and the ST-400ET are direct hardware replacements for the famous ICOM* series of thumbwheel switched band held radios. Present accessories for the 2AT and the 4AT should work on the ST-200ET (VHF) and ST-400ET (UHF) with no modifications.** Same slip off battery pack style and the same mic and speaker jack arrangements provide as much compatibility as possible.

These units are made in Japan and sold by SANTEC and backed by the famous Encomm **TWO YEAR EXTENDED SERVICE PLAN** and Encomm service facilities located in Plano, Texas. Priced at $199.95 for the ST-200ET (VHF) and $249.95 for the ST-400ET (UHF). No it's not a misprint. Those are the Suggested retail prices. Now smile. Please see your favorite SANTEC dealer for his best price.



SPECIFICATION	ST-200ET	ST-400ET
GENERAL		
Frequency Range	144-147.995	440-449.995
Battery Pack (V/mAHr)	8.4/250	8.4/250
Receive Squelched Norm	18 mA	22 mA
RX At Full Volume	130 mA	130 mA
Transmit (Low Power)	220 mA	300 mA
Transmit (High Power)	550 mA	700 mA
Dimensions mm	60 × 170 × 40	60 × 170 × 40
Weight (with Battery)	490 gms	490 gms
TRANSMITTER		
Output Pwr. (Hi, Lo)	1.5W, 0.15W	1.5W, 0.15W
Spurious Transmitted	< −60dBc	< −60dBc
Deviation Limit	5 kHz	5 kHz
Pickup Device	Condenser Mic	Condenser Mic
RECEIVER		
Receiving System	Dbl. Superhet.	Dbl. Superhet.
I.F. Frequencies	10.695 1st 455 kHz 2nd	21.6 1st 455 kHz 2nd
Receive Sensitivity	< 0.25 uV @ 12dB	< 0.35 uV @12 dB
I.F. Bandwidth	30 kHz @ −60dB	30 kHz @ −60 dB
Operating Temp	−10-+60 C	−10-+60 C

ACCESSORIES

SKT-BA Battery Case	HSA-1/HBM-1 Headset/Mic
SKT-PA DC/DC Conv.	STK-BP Battery Pack
ST-MC Mobile Charger	STK-BC Battery Charger
SKT-LC Leatherette Case	

NOTICE: These specifications are typical unless stated otherwise. They may be changed in the future without notice or obligation. Conditions of measurement may be obtained from Encomm, Inc.

* ICOM is a registered trademark of ICOM, INC of JAPAN.
** ST-200ET/400ET Batteries are not fully compatible with BC-30/35 drop in chargers.

WELZ CORP.

SUPERIOR ACCESSORIES

PEP POWER/VSWR COMPACTS

SP-122 HF PEP HOLD
SP-220 HF PEP MONITOR
SP-420 VHF/UHF PEP MONITOR

These new compact HF/VHF/UHF meters from WELZ provide multi-mode operation in auto or home station. Utilizing the WELZ toroidal core based wide-band sensor technology, these VSWR/POWER meters are the next generation of accuracy and reliability. Pictured here is the model SP-420 covering the VHF/UHF band from 140-525 MHz. In addition there is the SP-220 covering 1.8 to 200 MHz and the SP-122 covering 1.6-60 MHz with PEP peak hold mode. All three of these new models are ready for PEP output measurement with either the "PEP Monitor" function or the "Instantaneous PEP HOLD" function, back-lighted easy-to-read meters, high sensitivity and very attractive styling. Check your favorite dealer and check out the new WELZ COMPACT VSWR/POWER meters.

MODEL	SP-122	SP-220	SP-420	SP-230	SP-430
Freq. Range	1.6-60MHZ	1.8 ~ 200MHZ	140 ~ 525MHZ	1.8 ~ 150MHZ	140 ~ 500MHZ
Sensor Mnt.	FIXED	FIXED	FIXED	DETACHABLE	DETACHABLE
Pwr Ranges	20/200/2KW	2/20/200	2/20/200	15W/150W	5W/60W
No. Meters	1	1	1	1	1
Peak Mode?	YES + HOLD	YES	YES	NO	NO
Impedance	50 OHMS	50 OHMS	50 OHMS	50 OHMS	50 OHMS
Functions	PWR/VSWR PEP + HOLD	PWR/VSWR PEP	PWR/VSWR PEP	PWR/VSWR CAR VOLTS	PWR/VSWR CAR VOLTS
Accuracy	10% READING	10% READING	5% READING	5% F.S.	5% F.S.

ENCOMM
2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

KENWOOD

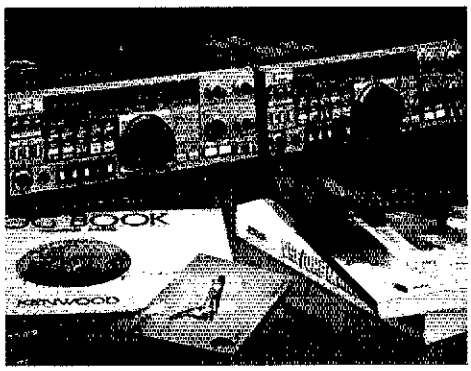
...pacesetter in Amateur radio

Matching Pair

TS-711A/TS-811A VHF/UHF all-mode base stations.

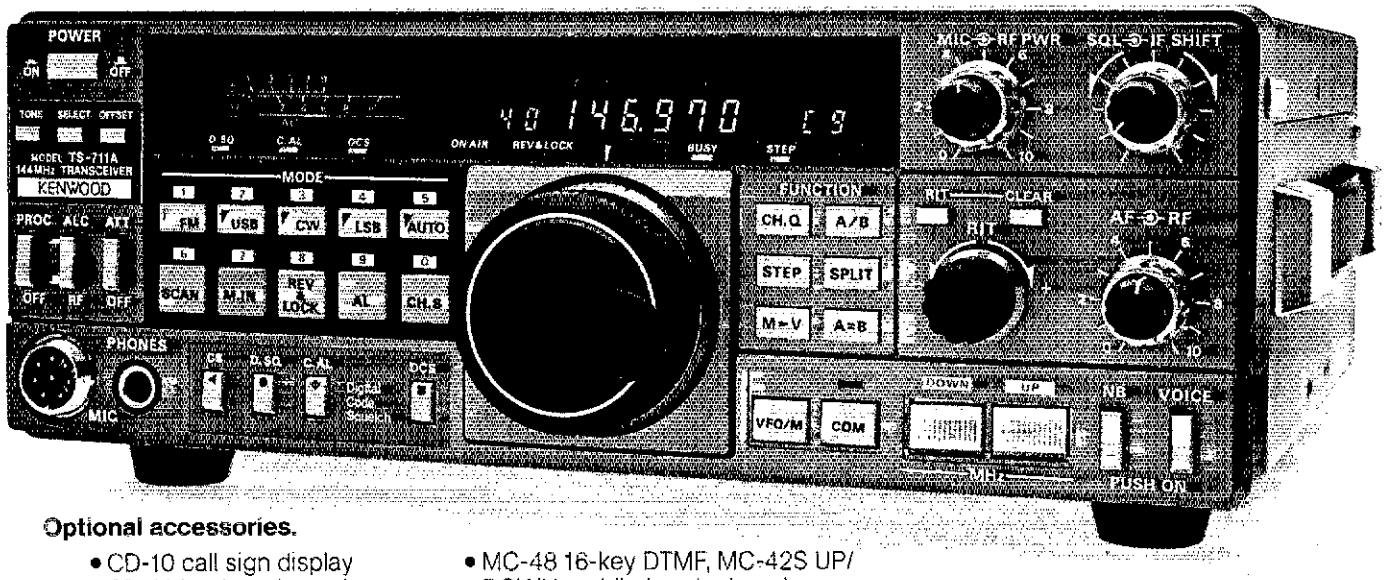
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.** Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.** For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.** Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **Optional voice synthesizer**

More TS-711A/TS-811A information is available from authorized Kenwood dealers.



Optional accessories.

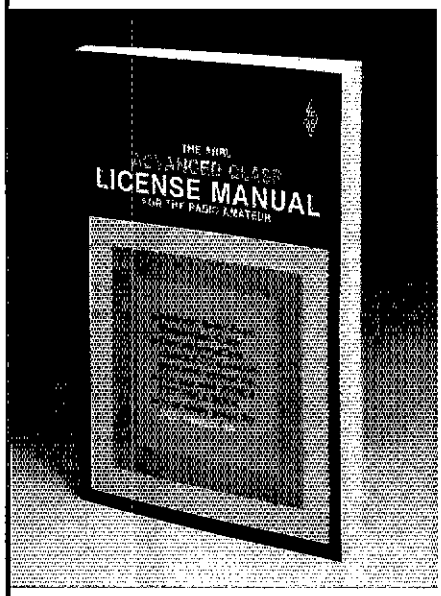
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- PG-2J DC power cable
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48 16-key DTMF, MC-42S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters: SW-200A 1.8-150 MHz; SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner

KENWOOD

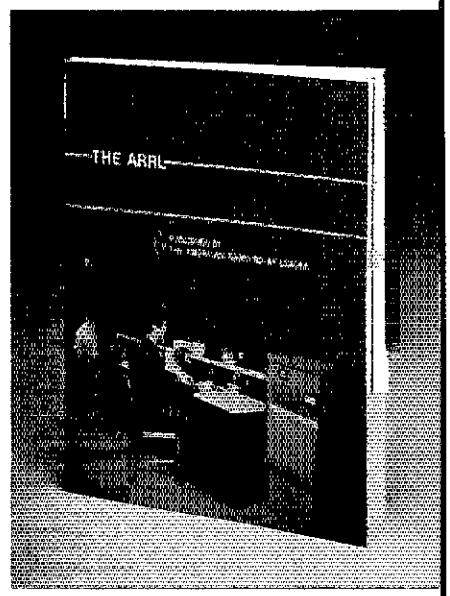
TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

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

NEW NEW NEW!



Two new ARRL publications! *The ARRL Advanced Class License Manual* is the second of our new Licensing Series. It is written for study with *The FCC Rule Book* and has the latest 500 question and answer pool. *The 2nd Edition of the ARRL Operating Manual* is heavily revised! It presents up-to-date operating trends and techniques. Both books should be available in mid-June.



SEE PAGE 136 TO ORDER

FIELD DAY!

Help make your field day a success with ARRL publications and supplies. Are you up-to-date on the FCC regulations? The *FCC Rule Book* has them. Need a good antenna? Check out the *Antenna Book*. Proper message format and procedures? The *ARRL Operating Manual* is just the ticket. Don't forget the latest copy of the *Handbook* which has solutions to many of the technical problems that crop up on Field Day. Don't forget your *ARRL flag*. Check out your ARRL dealer or order directly from ARRL.

ICOM 440MHz

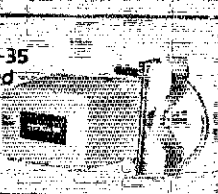
For a Total UHF System, Choose ICOM

ICOM offers a variety of UHF gear to meet your operating requirements... the IC-471H base station transceiver; IC-47A compact mobile; IC-04AT or IC-4AT handheld transceivers, and the RP-3010 crystal controlled repeater.

The IC-471H all mode 430–450MHz base station transceiver provides 10 to 75 watts of adjustable power. With 32 full-function memories, 32 PL tones, memory scan, mode scan and programmable band scan, the IC-471H provides maximum UHF base station performance. The IC-471A 25 watt version is also available.

The IC-47A 25 watt 440–449.995MHz ultra-compact FM mobile provides superb performance in the mobile environment. Measuring only 5½" wide by 1½" high by 9" deep, the IC-47A also features nine full-function memories, 32 built-in PL tones and a complete scanning system. Each unit comes standard with an HM-23 mic with up/down scan and a mobile mounting bracket.

Optional AG-35 Mast Mounted GaAsFET Preamplifier for IC-471H



The IC-04AT top-of-the-line UHF handheld features DTMF direct keyboard entry, LED readout, 32 PL tones, 3 watts standard (5 watts optional) and 10 memories which store duplex offset and PL tone.

The IC-4AT handheld features 440–449.995MHz coverage, a DTMF pad, 1.5 watts output and thumbwheel frequency selection.

The IC-04AT and IC-4AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. PLUS a wide variety of slide-on battery packs and accessories are available.

The RP-3010 crystal controlled UHF repeater covers from 430–450MHz and includes CTCSS, 3 digit DTMF decoder and C.W. ID'er.

See ICOM's full line of UHF gear at your local ICOM dealer.

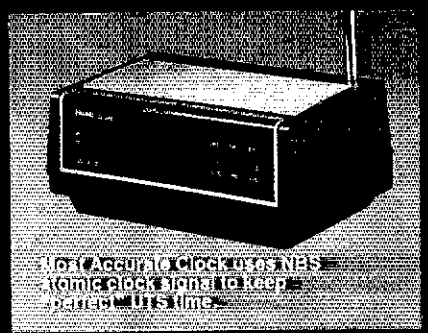
ICOM

First in Communications

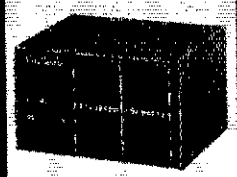
ICOM America, Inc. 2380–116th Ave NE, Bellevue, WA 98005 / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234

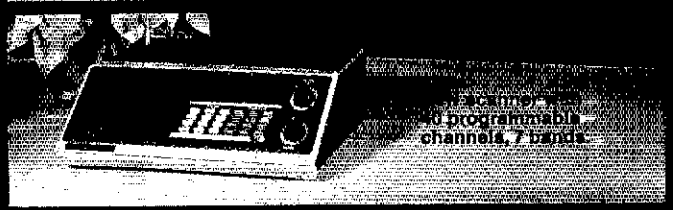
All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 471H1184

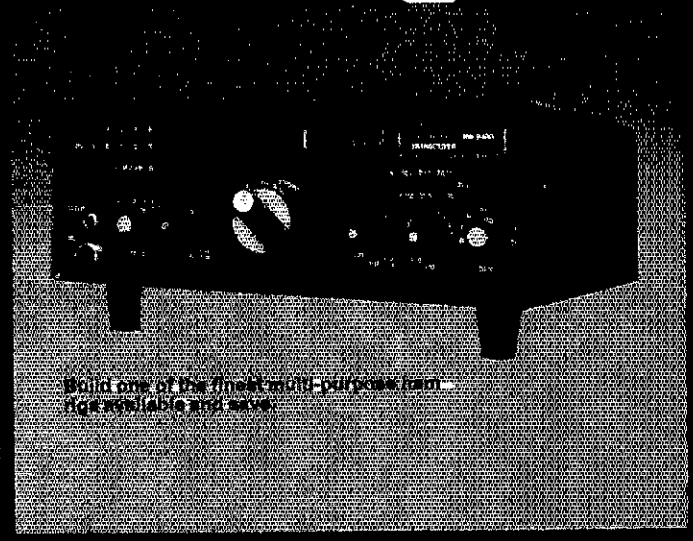
FREE high tech catalog



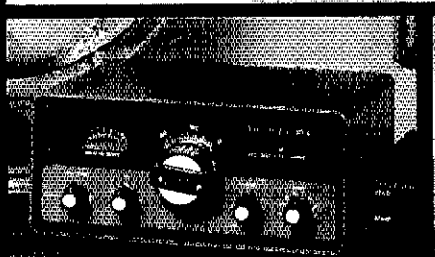
Crossfire Visual tuning indicator tunes RTTY transmissions fast.





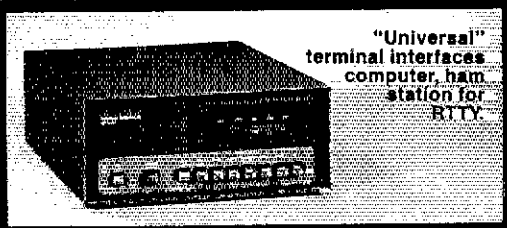


Build one of the finest multi-purpose test tools available anywhere.

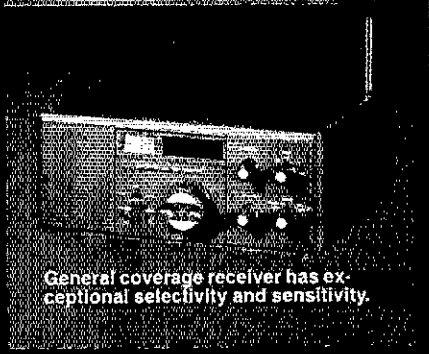


Microelectronics make the new HW-9 QRP CW transceiver small and light.

World's first low-cost hand-held, microprocessor-controlled Real Time Spectrum Analyzer.

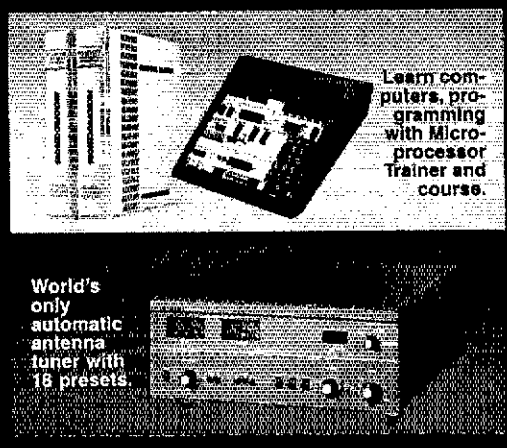


"Universal" terminal interfaces computer, ham station for RTTY.



General coverage receiver has exceptional selectivity and sensitivity.

Triple-trace oscilloscope speeds troubleshooting.



Learn computers, programming with Microprocessor Trainer and course.

World's only automatic antenna tuner with 18 presets.

More than just a catalog, a trustworthy guide to what's new in electronics and computers

News about important product innovations is packed into every page of the quarterly, full-color Heathkit catalog. For many years, the illustrated Heathkit Catalog has been a guide to new and exciting kit products for people like you to build. To enjoy and learn from them, while saving money in the process. What sets the Heathkit catalog apart is its range of high quality products and accurate information to help make your buying decisions easy.

All you have to do is fill out the coupon to get your copy.

Heath Company
Dept. 009-304
Benton Harbor, Michigan 49022

YES! Please send me a copy of the all-new **FREE** Heathkit Catalog.

Name _____

Address _____

City _____ State _____

AM-444B Zip _____

Heathkit®

Heath Company

A subsidiary of Zenith Electronics Corporation

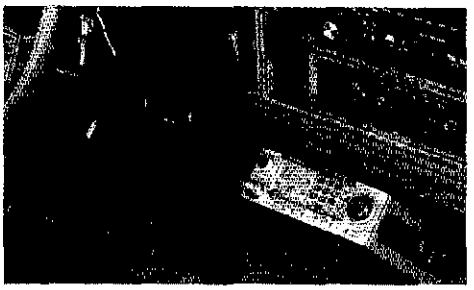
KENWOOD

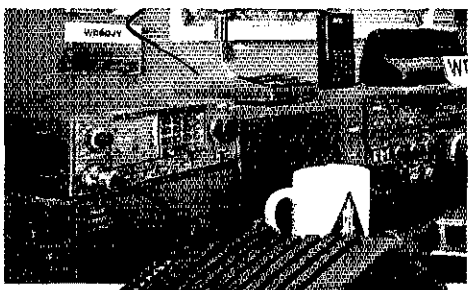
...pacesetter in Amateur radio

Up Front and Center!

TR-7950/7930

The exceptional front-end selectivity and sensitivity, coupled with Kenwood's excellent audio section, gives you lots to hear! Compact design makes this transceiver at home in the shack or on the go!





- **Large, easy-to-read backlighted LCD readout.** Indicates receive/transmit frequency, frequency offset, sub-tone selection, memory status. An LED readout indicates S & RF units, REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **Programmable scanning, with center-stop tuning.** Microprocessor technology allows you to scan the entire 2 meter band, or just a small portion of it. Scanning stops on the center frequency during band scan—**a Kenwood exclusive!**
- **21 Multi-function memory channels.** The TR-7950/7930 "remembers" frequency offset, and optional subtone channels. Memories 1-15 are for simplex and "normal" repeater operation. Memory pairs 16/17 and 18/19 are for "odd-ball" splits. Memories "A" and "B" store upper and lower band scan limits. The radio "beeps" when memory channel 1 is selected.
- **Extended frequency coverage.** Covers 142.000-148.995 MHz in 5-kHz steps. Repeater offsets are automatically selected in accordance with the ARRL 2 meter band plan. The front panel "OS" key may be used to allow manual changes in offset.
- **Multi-function keyboard.** The 16-key DTMF pad can also be used for direct frequency entry, subtone selection, memory address and scan programming. The keyboard is illuminated for night time use.

TR-7950 optional accessories:

- TU-79 three frequency tone unit
- PS-430 power supply
- KPS-12 fixed-station power supply for the TR-7950
- KPS-7A fixed-station power supply for the TR-7930
- SP-40 mobile speaker
- SP-50 mobile speaker
- MC-55 mobile microphone
- MC-46 16-key autopatch UP/DOWN microphone
- SWT-1 2 m, 100 W antenna tuner
- SW-100A/B power meters
- PG-3A noise filter

Model TR-7950 (45 watts) shown. TR-7930 is identical, but with 25 watts output.

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

More TR-7950/7930 information is available from authorized Kenwood dealers.

KENWOOD

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

KT6W. There are a number of antenna problems going on in the section currently. Menlo Park has been working on an antenna ordinance for some time that may have an effect on amateurs. Most recently, Los Altos Hills and Sunnyvale have joined the cities or towns that are considering restrictive ordinances. AJ6V recently became involved in a controversy with a neighbor who complained about his antenna system. About 25 amateurs appeared at the Los Altos Hills Planning Commission meeting to express support for a more liberal antenna ordinance than the one that currently exists. Actually, there should have been many more amateurs present. When you hear that there is going to be some type of hearing or meeting dealing with restrictive antenna ordinances, please make all efforts to be present at the event. If nothing else, numbers of supporters sometimes have an effect on the council or commission members. Listen in on the Section Manager's Net on Tuesday evenings at 9:00 pm on WB6OQS (146.76) for announcements about public hearings dealing with this very important matter. WD6GYH is progressing well on his project to install 2 meter antennas on many of the schools in the San Jose area. If you're interested in helping on this project, give 'GYH a call on 224.46 or 443.125. The ARRL/VEC program is going very well in the Section. ASM NS6N and AE6Z have established a VEC Hotline for anyone wanting information about examination sessions within the Pacific Division. The 24-hour number is 408-984-8353 for test info. STM W6PHT gave a talk to the City of Santa Clara ARES/Races group about traffic handling and how to effectively interface with the National Traffic System. Talking about traffic handling, KH6PP has been net control for the Santa Cruz County ARC Traffic and Emergency Training net for the last 6 months and has done an excellent job in training the ARES group in that area in traffic handling. Although their ARES group is not large, they handle a large amount of traffic, both real and simulated, just to keep in practice for any real emergency that may come up. Santa Cruz County EC WA6OCV keeps her AECs and ARES members on their toes with drills or exercises frequently. If you are interested in improving your code speed, listen in on the K6FB/R (145.45) on Tuesday and Thursday evenings at 6:30 pm for code practice sessions. Salinas Valley EC WD6EKR and KD6FI recently presented a demonstration of amateur radio at a public library in Salinas. They set up 2 meter radios and an HF station for the demo and handed out information about amateur radio. A VCR and TV were used to show ARRL movies. Good job by WD6EKR and KD6FI. The Garlic Valley VHF Society gets together frequently for a Saturday morning breakfast at a restaurant in Gilroy. If you want to join them, give a call on K6THR/R (147.825) for details on the next breakfast. I had the opportunity to recently speak to the Memorex ARC, the West Valley ARA and the Sylvania-GTE ARC about what's happening with the ARRL reorganization, section structure and other items of interest to amateurs. If your club is looking for a speaker for your meeting, don't overlook your SM and the other section level appointees listed at the top of this column. Traffic: W6YBV 166, KA6CVM 106, W6KZJ 85, W6ZRJ 14, W6PHT 4.

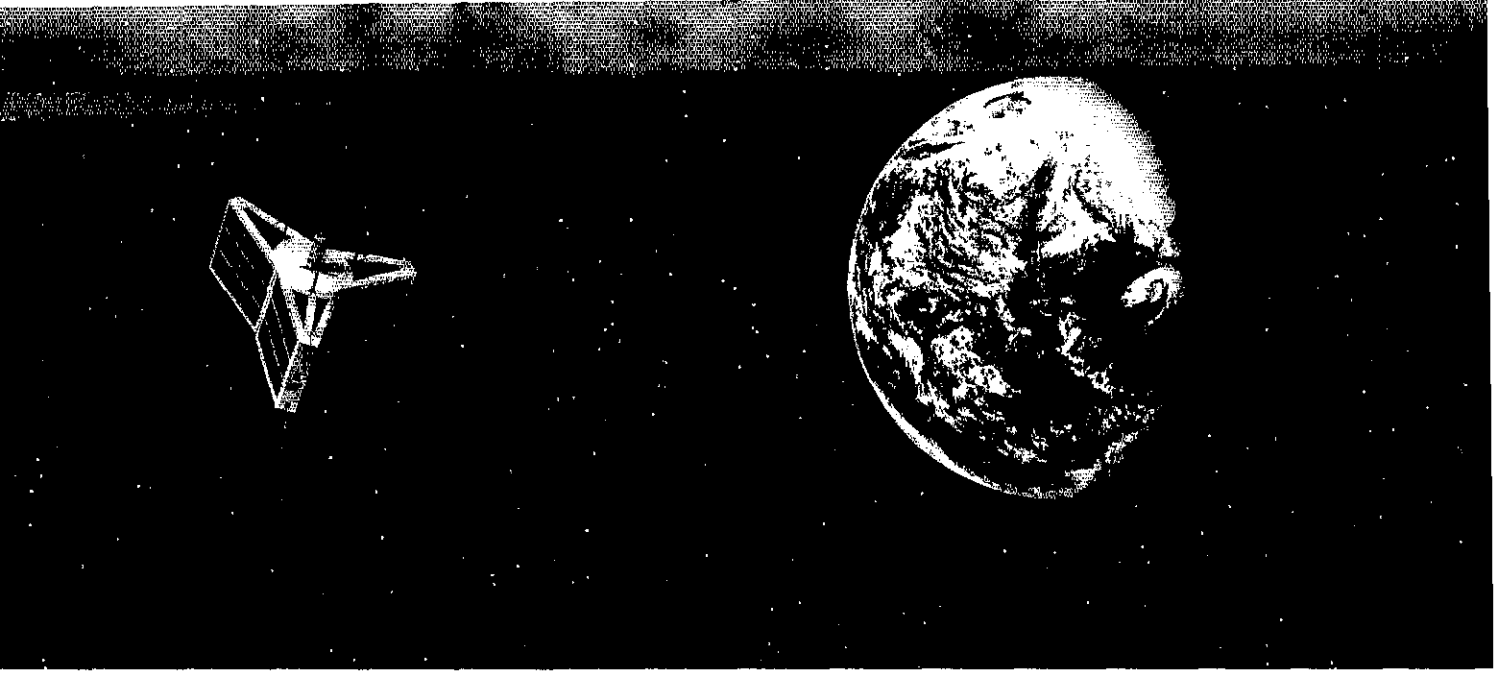
ROANOKE DIVISION

NORTH CAROLINA: Rae Everhart, K4SWN—SEC: AB4W. STM: K4NLK. BM: K4IWW. ACC: WC4T. PIO: WA4OBR. SGL: AB4W. TC: K4ITL. Enjoyed meeting everyone at the Division Convention. Congratulations to K4EG, our newest Special Service Club. Want to become an SSC? Contact WC4T. WA4OBR needs Public Information Assistants. Your club should have one. Contact him. Congrats to new upgrades: KI4LN, KB4MTS, KB4MZS, KB4MXZ, KB4NAS; to K4ITL our new SECTION TECHNICAL COORDINATOR. He is highly versed in electronics and is the father of the linked repeater system in NC. If you have a technical question or problem, check with K4ITL. Welcome aboard. To W4RXG on his appointment as Western NC Frequency Coordinator for CVRA-SERA. VECs reporting lots of exams underway. If you want exams in your area, contact ARRL/VEC or other VECs in 4th Call area. This is the month for the ARRL VHF Contest. Find a high mountaintop and lets have high participation. Field Day is this month. Set up a station and operate under emergency conditions. Radiogram me a message for extra credit on your scores. Send newspaper clippings and write-ups. Put extra push on publicity this year. Get the word about amateur radio out. I hope to operate from W4PAR. Novice/Techs don't forget the CSN at 6:00 P.M. daily will be on 7115 kHz this summer. Contact W0IKT details. NC amateurs were asked to help with the forest fire emergency in many counties across state. SEC AB4W contacted STM K4NLK and activated the necessary nets to handle the communications. Governor dropped by while amateur radio was in service. Well done—THANKS to all who participated. Schools are now out so drive carefully and take the mobile rig with you for some summer fun. Mark your calendar now for the big fall event this year—The QCWA National Convention in Winston-Salem, HYATT House. Contact K4JO for details. September 27-29. Thanks to all newcomers to traffic for a fine report this month. Traffic: K4NLK 402, KA4EYF 220, WB4WII 179, NJ4L 175, WD4LRG 142, N4JRE 119, WB4HRR 115, WB4N 106, NT4K 81, KB4IVV 74, KA4YMY 66, K4SWN 63, WA4OBR 62, N4LFX 57, WA4ONO 55, WA4SRD 50, K4COG 46, K4YJB 39, NE4J 34, K4GI 32, WB4DAR 31, WA4MNR 29, WD4EQK 28, K4IWW 27, N4JEO 23, KF4R 22, N4CJJ 21, WB4CYN 20, KU4W 14, K4AUI 12, NV4F 12, N4UE 12, N4KYD 11, WR4E 8, W2JDB 7, KB4IRR 6, K4QXA 6.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—By the time you read this most of your plans will have been made for Field Day on June 22-23. Have you included coverage of your activities by the local news media? Write or call ARRL and request several 'Press Kits.' The kits contain definitions and explanations of terms and activities concerning amateur radio. It is a 'ready' reference for anyone doing an article or story on your activities. All that needs to be included is a description of your club or organization. In addition, you may want to include a copy of the PROCLAMATION BY THE GOVERNOR ON AMATEUR RADIO WEEK which will be observed June 17-24. Plans are to have the 'signing' 1-2 weeks prior so that originals can be distributed to clubs and organizations before Field Day weekend. Make plans to attend. Traffic: K4ZN 265, W4ANK 200, W0IKT 193, KB4BZA 72, W4FMZ 57, W4NTO 53, K4FRX 31, KA4LRM 30, WB4UDK 28, WD4FJP 25, WV4B 17, WA4JWS 12, W4DRF 8, K4LYU 7, KA4YEA 7.

VIRGINIA: SM, Claude Feigley, W3ATO—STM: WD4ALY. SEC: WB4UHC. ACC: WD4KQJ. OO: W4HU. BM: AB4U. SGL: W4THV.

VTN	1 PM	3907	AA4AT
VSBN	6 PM	3947	K4VWK
VSN	6:30 PM	3670	KB4WT
VN (EARLY)	7 PM	3670	KR4V



The DX is better out here. Ask anyone who owns an FT-726R.

It's true. Linking up to OSCAR 10 is the one sure way to bring the world into your ham shack. No matter where your shack is.

FT-726R owners know. You'll find them working the world from their apartments. Attics. And from their antenna-restricted neighborhoods.

They'll even boast of a signal quality and DX potential that would make any 20-meter operator envious. Regardless of where we are in the sunspot cycle.

In fact, the FT-726R is the world's most popular link to OSCAR 10.

And for good reason. This 2-meter, 10-watt rig gives you full cross-band duplex capability. Simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You can set up your earth station just about anywhere. All you need is the 726 and two Yagi antennas: 435-MHz for transmit and 2-meters for receive.

Even as a conventional base station, the FT-726R is a real standout.

You can choose from three operating modes: SSB, FM or CW. Expand to three-band operation with your choice of optional modules for 10 meters, 6 meters, 430-440 MHz and 440-450 MHz.

Then store your preferred frequencies and modes into the eleven memories for instant recall. With pushbutton transfer capability to either of two VFO registers. And versatile scanning functions you'd expect from a Yaesu radio.

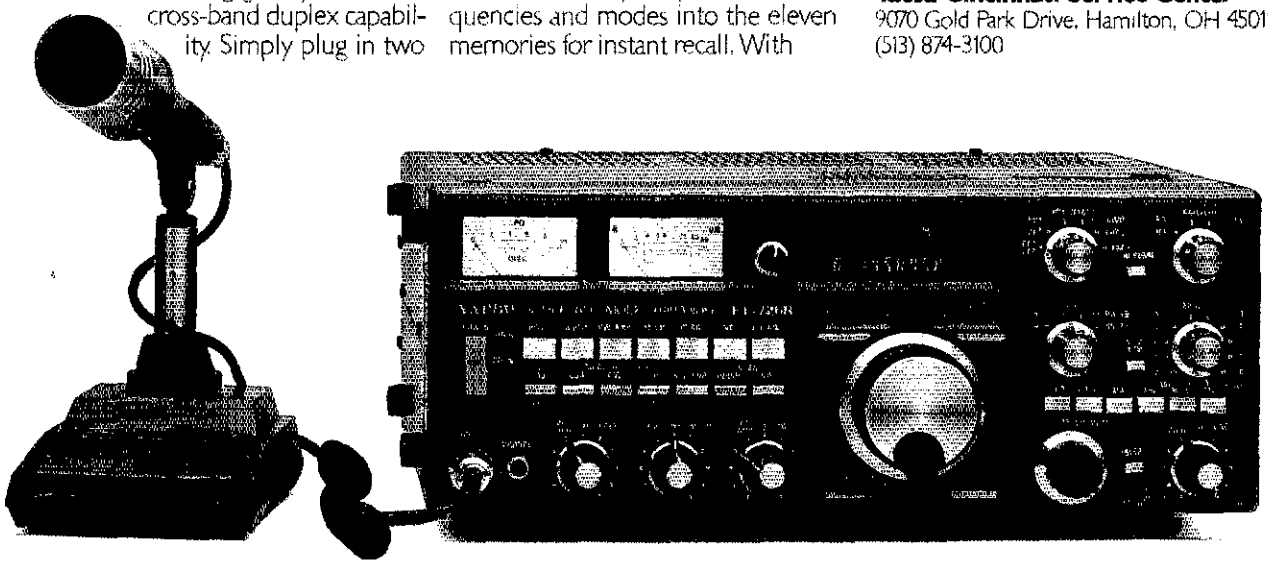
Plus you get a lot more extras, including a built-in speech processor, all-mode squelch and a noise blanker.

So no matter where your shack is, let Yaesu's FT-726R introduce you to OSCAR 10. The world is waiting.

YAESU

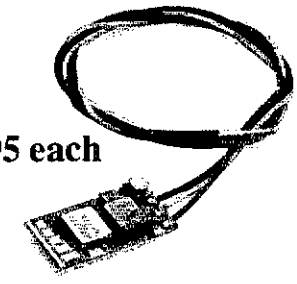
Yaesu Electronics Corporation
6851 Walthall Way, Paramount, CA 90723
(213) 633-4007

Yaesu Cincinnati Service Center
9070 Gold Park Drive, Hamilton, OH 45011
(513) 874-3100



Prices and specifications subject to change without notice.

The Nicest Things Come In Small Packages.



$29.95 each

The SS-32HB is a new hybrid sub-audible encoder plucked from Communications Specialists' Hothouse. It has grown through a cross of the time tested SS-32, the subminiature SS-32M and space age micro circuitry. This programmable 32 tone encoder measures a scant .5 x 1.0 x .15 inches; no small wonder it allows the addition of continuous tone control to a bunch of hand held transceivers that lack space.

Why not snip your problems in the bud, with our fast, one day delivery and attractive one year warranty.

COMMUNICATIONS SPECIALISTS
426 W. Taft Ave., Orange, CA 92665-4296
Local (714) 998-3021 • FAX (714) 974-3420
Entire U.S.A. 1-800-854-0547

VISA

KENWOOD

...pacesetter in Amateur radio

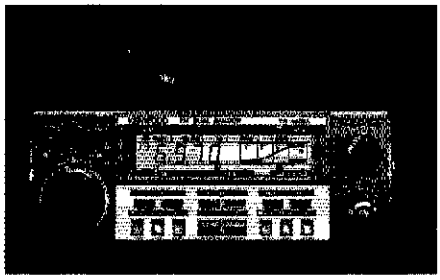
"Dual-Band" Leader!

TW-4000A

2-m/70-cm FM transceiver.

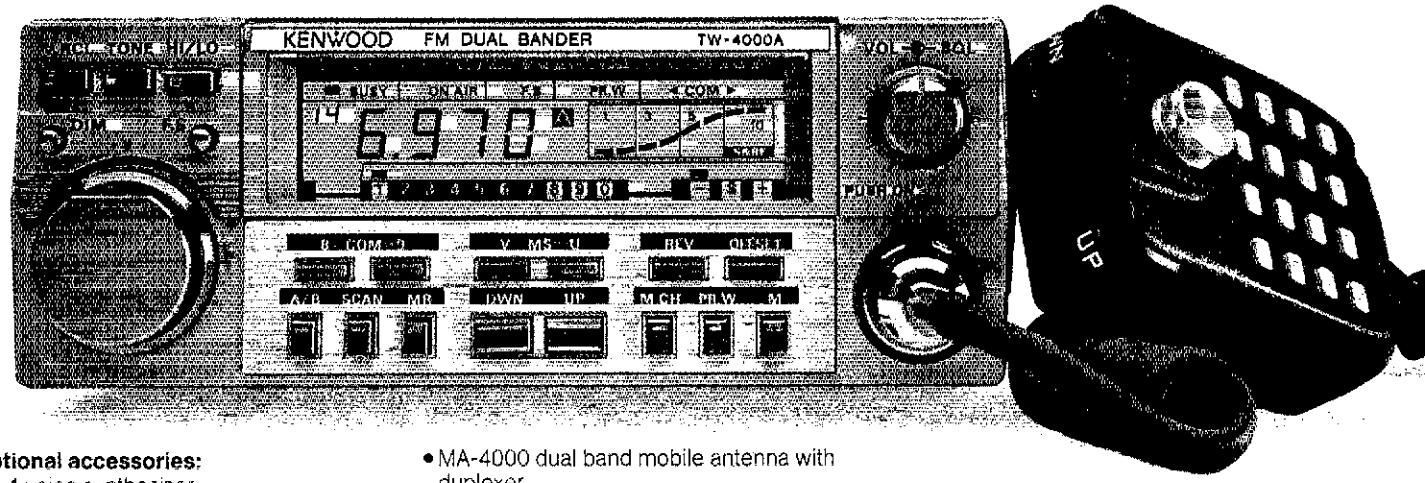
The first is still the best! The original FM "Dual Bander." TW-4000A delivers 25 watts output on both VHF and UHF in a single compact package.

- **2 m and 70 cm FM in a compact package.**
  Covers the 2 m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70 cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Single-function keys allow easy operation.**
- **Two separate antenna ports.**
  Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.
- **10 memories with offset recall and lithium battery backup.**
  Stores frequency, band, and repeater offset. Memory 0 stores receive and transmit frequencies independently for odd repeater offsets, or cross-band operation.



- **Large, easy-to-read LCD display.**
  A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, "S" or "RF" level, VFO A/B, scan, busy, and "ON AIR." Dimmer switch.
- **Front panel illumination.**
- **Programmable memory scan with channel lock-out.**
  Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.
- **Band scan in selected 1-MHz segments.**
  Scans within the chosen 1-MHz segment (i.e., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction may be reversed by pressing either the "UP" or "DOWN" buttons on the microphone.
- **Priority watch function.**
  Unit switches to memory 1 for 1 second each 10 seconds, to monitor the activity on the priority channel.
- **Common channel scan.**
  Memory 8 and 9 are alternately scanned every 5 seconds. Either channel may be recalled instantly.
- **High performance receiver/transmitter.**
  GaAs FET RF amplifiers on both 2 m and 70 cm, high performance MCF's in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Optional "voice synthesizer unit."**
  Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Rugged die-cast chassis.**
- **Repeater reverse switch.**

More TW-4000A information is available from authorized Kenwood dealers.



Optional accessories:

- VS-1 voice synthesizer
- TU-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- MB-4000 extra mounting bracket
- KPS-7A fixed station power supply
- SP-40 compact mobile speaker
- SP-50 mobile speaker
- MA-4000 dual band mobile antenna with duplexer
- MC-42 UP/DOWN microphone
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories
Specifications and prices are subject to change without notice or obligation
Antenna mag mount is not Kenwood supplied.

KENWOOD

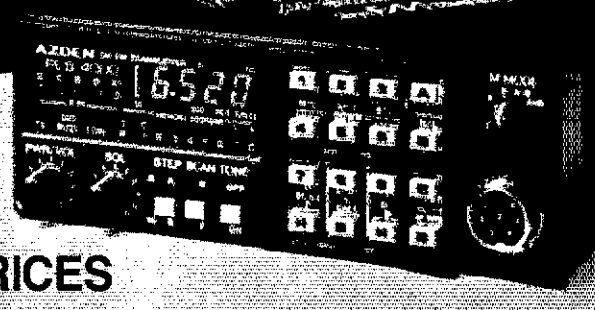
TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

JPC/AZDEN®

4000 SERIES
FM TRANSCEIVERS
10 METERS & DOWN

New!

PLEASE CALL FOR SPECIAL PRICE



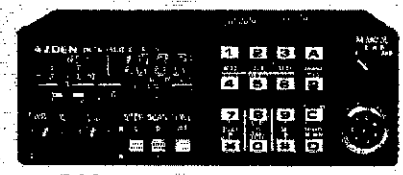
PCS-4000
2-m FM Transceiver

COMMERCIAL-GRADE QUALITY AT AMATEUR PRICES

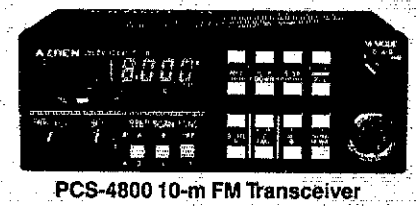
EXCLUSIVE 1 YEAR LIMITED WARRANTY! *COMPARE*

THE 4000 SERIES

PCS-4300 70-cm FM Transceiver



PCS-4500 6-m FM Transceiver



PCS-4800 10-m FM Transceiver

- **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.
- **TINYSIZE:** 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; autoresume can be overridden if desired. Vacant scanning stops on unoccupied frequencies.
- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency, no matter what the offset.
- **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.
- **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

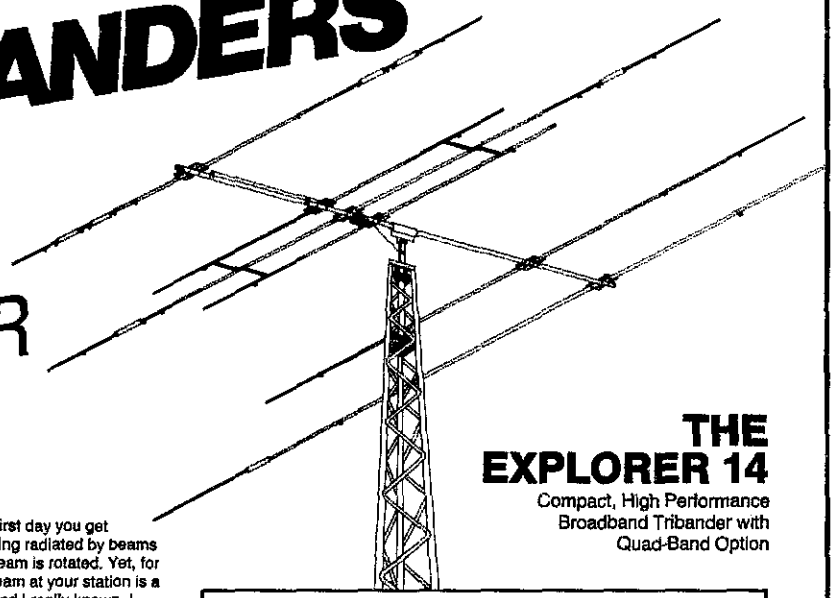
JPC AZDEN — **JAPAN PIEZO CO., LTD.**

1-12-17 Kamirenjaku, Mitaka, Tokyo, 181 Japan — Telex: 781-2822452

hy-gain®

BROADBANDERS

MAXIMIZE THE POTENTIAL OF YOUR HAM GEAR



There is nothing like a beam!

You hear about the importance of the antenna system from the first day you get involved in amateur radio. You hear the big signals on the air being radiated by beams and you hear those same signals virtually disappear when the beam is rotated. Yet, for whatever the reason, getting on the air for the first time with a beam at your station is a down-right exhilarating experience. The universal reaction is "Had I really known, I would have installed a beam years ago".

The gain of a beam multiplies the effective radiated power of your transmitter just like an amplifier. More importantly, it amplifies the signal from the station being beamed. Off the sides and back of the antenna, the effective radiated power of those kilowatts on/near your frequency are reduced to manageable QRP levels.

A well-designed beam is by far the best performance buy you can make and it doesn't use any electricity. Further, if you buy a good one, it will last longer than some of the electronics gear in your shack. In terms of cost per hour of enjoyment, a beam antenna is among the least expensive major station components.

As sunspot cycle 21 winds down over the next few years the priority for a good beam shifts from "great to have" to "essential!" To maximize your station capability on the high bands choose one of these super broadband arrays.

THE EXPLORER 14

The same compact size as the well-known TH3Mk3 it replaces. The driven element uses an open sleeve dipole which is a concept that we call PARA-SLEEVE (Patent Pending). The para-sleeve design achieves the broadband performance objective. The forward gain and front to back ratio is very impressive, especially when compared with other antenna designs in the same size class. 43 lbs. (19.5 kg) of superb performance on a 14 ft. (4.3 m) boom. Turning radius 17 ft. (5.3 m) and 7.5 sq. ft. (.69 m²) of surface area. The EX 14 is the ideal choice where space is limited. Great for roof mount or on smaller towers. Optional QK7-10 kit adds your choice of either 30 or 40 meters to the driven element.

FIVE ELEMENT THUNDERBIRD TH5Mk2

Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. 72 lbs. (32 kg) of rugged antenna with 7.4 sq. ft. (.68 m²) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).

SEVEN ELEMENT THUNDERBIRD TH7DX

This is a broadband successor to the legendary TH6DXX. Five active elements on 10 meters and four elements on both 15-20 meters. The TH7DX represents the ultimate in high-performance arrays whether you're comparing other large tribander's or stacked monobander's. 76 lbs. (35 kg) with a surface area of 9.4 sq. ft. (.87 m), a 24 ft. (7.3 m) boom and a turning radius of 20 ft. (6.1 m). If you own a TH6DXX, a conversion kit is available which includes the second driven element, the completely new matching system, a full set of stainless steel hardware, and of course, step by step instructions. After conversion, your TH6DXX is a TH7DX, exactly.

FEATURES COMMON TO EX 14, TH5Mk2, and TH7DX:

- Separate Hy-Q traps for each frequency. Factory assembled and individually resonated to insure uniform performance.
- Handles maximum legal power with a respectable margin of safety.
- Unique broadband beta match assures efficient energy transfer and places the entire antenna structure at dc ground.
- BN 86 balun supplied as standard.
- Top quality stainless steel hardware supplied at no added cost.
- Super strong, taper swaged 6063-T832 thick-wall aluminum tubing used throughout.
- Unique Hy-Gain die cast aluminum boom to mast bracket. Accepts mast diameters up to 2½" (63 mm).
- Twist and slip proof die formed heavy gauge aluminum element to boom brackets.
- All tubing deburred and cleaned for ease of assembly.
- Only one set of dimensions for complete coverage of all three bands below 2:1 SWR.
- Designed to survive winds of 100 mph (160 km/hr).

THE EXPLORER 14

Compact, High Performance
Broadband Tribander with
Quad-Band Option

The value of a Directional Antenna was one of my early "discoveries". Over the years, I have built or bought numerous Quads and Yagis. I have never been so impressed as I am with my TH7DX. I enjoy QRP but now have a problem convincing folks that I am only running 5 watts! The TH7DX is a superb antenna, both from a performance and a structural point of view.

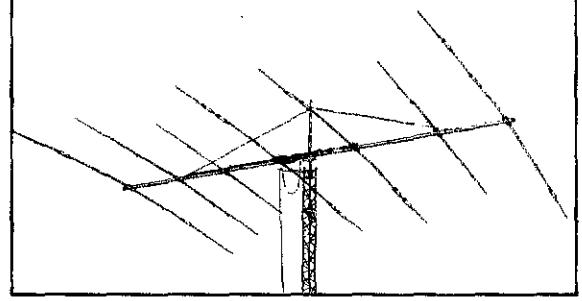
Congratulations!

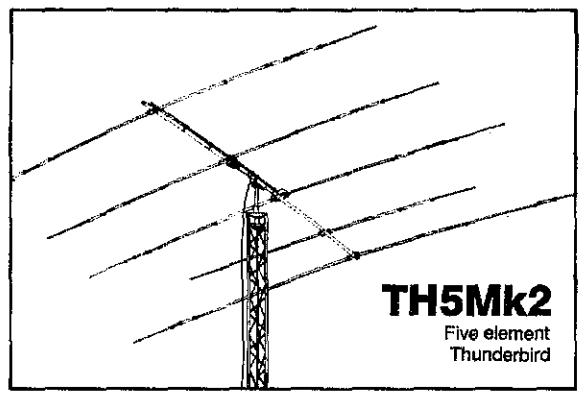
Jack Falker
W8KR

(W8KR has worked all countries but two!)

TH7DX

Seven element
Thunderbird





TH5Mk2

Five element
Thunderbird

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.

KENWOOD

...pacesetter in Amateur radio

NEW! 1.2 GHz transceiver TR-50

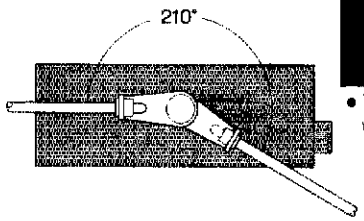
Reach Higher...

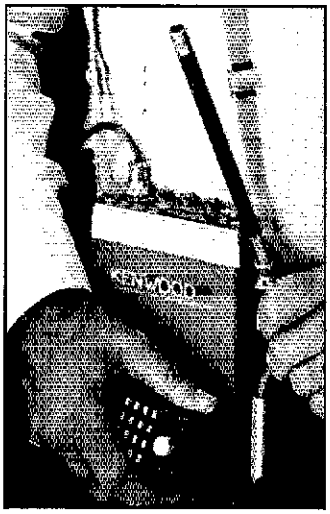
TR-50

1.2 GHz FM transceiver.

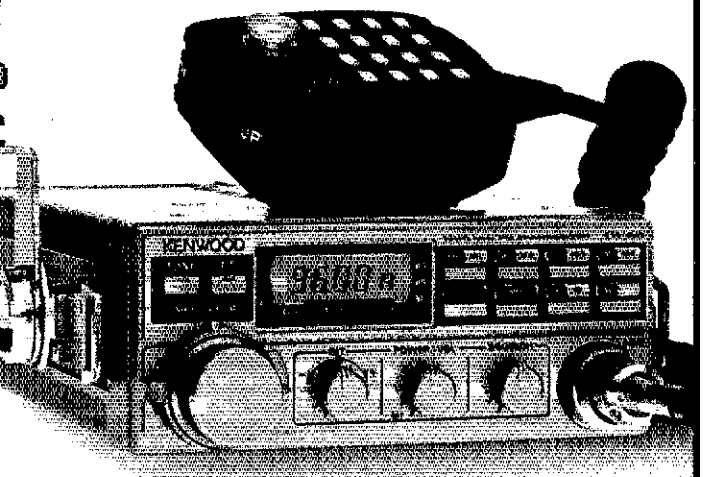
As the Amateur bands become more and more crowded, hams seek higher and higher frequencies to "get away from it all." Here's a chance to experience "something different"—1200 MHz!

- LCD frequency readout with S/RF/battery check bar meter
- Battery set and charger
- External power cable for base or mobile operation
- 1 watt output
- 5 memory channels
- Odd-split operation on memory channel 5
- Programmable scanning
- 16-key DTMF hand microphone
- 1/4-wave sleeve antenna on an 8-position adjustable mount
- Offset reverse switch
- RIT
- Repeater offset switch (−20 MHz)





- The perfect portable for microwave mountain-topping!



Optional accessories:

- VB-50 Power amplifier (10 watts)
- MB-3 Mobile mounting bracket
- PB-16 NiCd battery set
- TU-6 Sub-tone unit
- MC-55 (8-pin) Mobile microphone with time-out timer
- SWC-4 1.2 GHz directional coupler for SW-200A/200B and SW-2000 meters
- SC-10 soft case

Ultra-Compact

TM-201A

2-m FM transceiver.

The Kenwood TM-201A 2-meter transceiver is the smallest and lightest FM unit available!

- 25-watt output, with HI/LO power switch
- Dual digital VFOs
- 5 memories plus "COM" channel, with lithium battery back-up
- Memory scan/programmable band scan
- Priority alert scan
- Highly visible yellow LED frequency display
- High performance receive/transmit
- External high quality speaker supplied
- 16-key autopatch UP/DOWN microphone
- Repeater offset (±600 kHz and simplex) and reverse switch

Optional accessories:

- TU-3 programmable CTCSS encoder
- KPS-7A fixed station power supply
- MC-55 (8-pin) mobile microphone with time-out timer
- SP-40 compact mobile speaker
- SW-100A/B SWR/power meter
- SW-200A/B SWR/power meter
- SWT-1 2-m antenna tuner

Optional FC-10 frequency controller
May be easily connected to the TM-201A. 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.

More information on the TR-50 and TM-201A is available from authorized Kenwood dealers.

KENWOOD

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

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

VN (LATE) 10 PM 3670 N4GHI
VLN 10:15 PM 3947 KA4IUM

After many months of faithful service WB2OMZ has resigned as NM of VSBN and Scott, K4VWK, has taken over as Net Manager. Also please note the other NM changes that have taken placed over the past months. We are sorry to announce that W4ZYE and WA4FGC are Silent Keys. All past "OO" appointments have been reviewed and those who have not passed the Amateur Auxillary Station exam have been dropped. Section OO/Amateur Auxillary stations are: W4HU WA4PGM WB4J KE4EQ WB4CGI K4JDJ KB4WT and W8IRT. Stns interested in this important activity contact W4HU or the SM. The "VE" exam program continues to be very active. The Richmond group had a 51% passing rate at their latest exam. They have exams scheduled for July 20 and Sept. 28. The Winchester club held their first exam in April. KA4ERP has a mailbox station operational on 3612 KHz with checkins from WA4TVS KB4WT K4JST N4WB KB4XF WB4PNY and K4VWK. The Sterling Park ARC newsletter "The Sparc Gap" won the Division newsletter competition in the Category 1, Class A group. The Section needs additional stations to fill appointments as Bulletin stations, Asst. Technical Coordinators and Public Information Assistants. If interested contact the SM. WB4FDT has mailed another issue of the "Virginia Ham"— contact him to get on the mailing list. N4DW has gone to Texas; he was a former RM for the VN. Hamfest reminders: Manassas June 2, Berryville Aug. 4 and Va. State Convention Virginia Beach Sept. 21/22. Is your club taking advantage of the ARRL program which gives your club a $5.00 refund on each new membership to ARRL? Contact ACC/WD4KOJ or the SM for details. Are you ready for Field Day, June 22- 23? Traffic: N4GHI 807, N4EXO 629, AA4AT 526, WD4FTK 327, WD4OCW 241, WA4CCK 237, KB4WT 228, K4JST 223, WB4PNY 207, KR4V 207, AA4GL 172, WB4FDT 157, WY4T 148, WD4ALY 147, K4AXF 141, W3ATQ 136, KA4IUM 118, K4KDJ 100, NT5S 73, K4JM 66, K4GR 65, K3RZR 63, K4MTX 52, KB4PW 51, K4MLC 49, WB4VMX 45, K4JUM 45, N4KSO 43, K4VWK 40, K4BGZ 30, WA4TVS 15, WB4EDB 15, KA4ERP 15, WB4UHC 14, N4FNT 13, WB4KIT 11, W4TZC 7, WB4DQZ 7, WB4ZNB 4, W4PVA 4, W4LXB 4, WA1VRL 3, W4YE 2, N4LE 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: KD8G. SGL: K8BS. ACC: WA8CTQ. TC: K8CG. Rpt Coord: WD4KHL. N8AJC has resigned as WVFN Mgr. W8YP is filling his unexpired term. Election of new Mgr. will be held at net mtg on Jul 8 at Jax Mill. Best wishes to W8HZA for a speedy recovery. Due to band conditions, the WVMD may be held on 3865 on some days. C U at the Mill!

Net	Freq	Time	QNI	QTC	Sess	NM
WVFN	3865	6:00	1104	167	31	W8YP
WVN	3567	7:00	226	148	31	W8LYV
WVRN	3639	6:30	358	124	34	KD8RD
WVMD	7235	11:45	989	97	30	W8FZP
WVNN	3730	5:30	87	24	29	KD8RD
Hillbilly	14290	Noon	171	24	5	W8YP

Traffic: KD8RD 291, K8TPF 244, W8YPP 222, K8UQY 203, W8FZP 164, N8EMQ 155, WA3NUI 125, KA8OMM 123, W8JWX 76, N8FXC 50, KA8OGF 45, K8QEW 41, NC8G 39, K8KT 38, KD8G 28, WA8KCJ 27, W8CAL 6.

ROCKY MOUNTAIN DIVISION

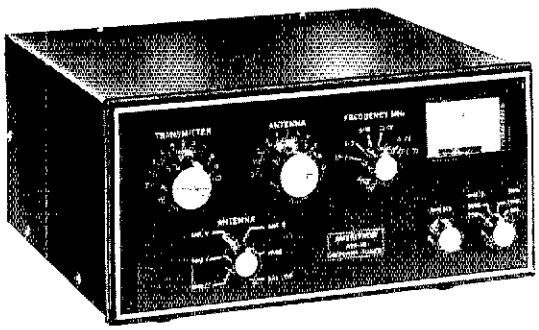
COLORADO: SM, Bill Sheffield, KQ0J—SEC: WB0FQB. STM: WD0AIT. OO/AA: NC0F. ACC: WB0DUV. PIO: KA0PYH. SGL: WD0GQL. TC: KO0P. BM: W0MDT. DECs: WB0TUB & KC0WR. The State Convention sponsored by the ARA showed over 1400 in attendance. Our tnx to W4RI who represented the League & for the first time in many a year that 0 Land QSL bureau was in attendance. Tnx Charlie from Colorado Hams who had an opportunity to sign up with the bureau. June brings us Field Day with many clubs, groups & individuals gearing up. Remember your messages to the SM or SEC for bonus pts. A note from KR0U (RMPRA) Field Day would be a good time to demo packet radio, this is a great idea since a packet station does not count as an additional transmitter & one or more QSO's are 100 bonus points, also the repeater rule is waived for packet QSO's. Gd luck to all participants. June VE Tests: June 1st CRA-Denver. Contact W0IJR. June 17th, BARC-Boulder Contact N0BWS. Superfest VII sponsored by NCARC will be June 1st in Loveland. Always a good fest so plan to attend. Name droppers: N0DZA, WD0BSZ, KD0RW. 73, KQ0J. NETS: Col: QNI 1037, QTC 77-Inf 168, Time 1041, 26 sess. CWN: QNI 134, QTC 84, Time 577, 30 sess. CWXN: Time 2790, 31 sess. HNN: QNI 1859, QTC 101-Inf 307, Time 1505, 31 sess. NCTN: QNI 293, QTC 87, Time 331, 28 sess. SCTN: QNI 27, QTC 7, Time 85, 6 sess. Traffic: KA0CZW 1784, WA0OYI 320, KB0Z 206, N0DZA 137, WD0BSZ 137, W0MDT 116, KD7EY 114, W0LAE 102, WD0AIT 42, AI0W 28, W0NFW 10, W0LQ 9.

NEW MEXICO: SM, Joe T. Knight, W5PDY— ASM: W5HD. DEC: KB5XD. STM: ND5T. NMs: WA5UNO K5LL W5VFQ. TC: W8GY. ACC: W5HD. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 180 msgs with 178 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 70 msgs with 1249 stations in. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 84 msgs with 1009 stations in. Yucca 2-mtr Net 78/18 & 93/33 handled 16 msgs with 390 checkins. Caravan Club 2-mtr Net 66/06 handled 11 msgs with 156 checkins. SCAT 2-mtr Net 66/06 handled 8 msgs with 595 checkins. Vy sorry to report the passing of W5FMK and KA5QXU. Congrats to W5VIJ & XYL on their 49th wedding anny. Good newsletters from Mesilla Valley ARC, Eastern NM ARC, and Eastern Ariz ARS. Traffic: W5DAD 168, W5ENI 117, N5EXC 32.

UTAH: SM, Ron Todd, K3FR—STM: W7OCX. SEC: NA7G. BM: WA7MEL. OO/VM: KD7FL. ACC: KB7XO. PIO: N7BHC. TC/RFI: K7RJ. EXAMS: N7IE. Beehive Net now has 84 members with 4 new this month. K7CKF and WA7MEL active in Army MARS. WA7MEL really active on 160 if you want UT on that band; he has 45 states in 2 months. Good luck all in Field Day. WIMU is division convention for 85, looks like a real good time coming again on Aug. 2-4 in Jackson, WY. W6KP getting up on packet in the Ogden area using software approach. Traffic: K7HLR 366, WA7WIB 160, WA7KHE 72, WA7MEL 41, WA7JJL 39, W7OCX 7.

WYOMING: SM, Dick Wunder, WA7WFO—Asst. Section Manager—KA7AWS, Steve Cochrane, Sect. Emergency Coordinator—W7TVK, Jim Anderson. Wyoming Hamfest is July 13 & 14 at the Wyoming State Fairgrounds in Douglas, Wyoming. Looking forward to seeing you there. The Cheyenne Club hosted an Amateur Radio booth at Frontier Mall on March 23 with very good results according to comments from the public. Recent upgrades include KD7PV to Extra, W7JIL to ADV, KA7UTU to ADV, KA7MRC to TECH & KA7UTV to Novice. I would like to

AMERITRON ANTENNA TUNERS



The **Ameritron ATR-10** has a unique bandpass network that provides superior harmonic suppression and image rejection.

It will safely handle 900 watts of envelope power from 160 through 10 meters and match impedances between 20 and 800 ohms to a 50 ohm source.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

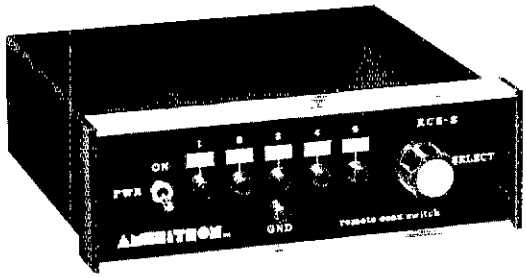
A peak reading wattmeter and SWR bridge is standard in the **ATR-10**. It accurately reads envelope powers up to 2KW.

The **Ameritron ATR-15** is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

A peak reading wattmeter and SWR bridge is standard in the **ATR-15**. It accurately reads envelope powers up to 2KW.

RCS-8 REMOTE COAX SWITCH



The **Ameritron RCS-8** is a remote controlled coaxial RF switch that allows you to operate up to five separate antennas with only one coax feed line.

Loss at 50 MHz less than .2 dB VSWR under 30 MHz is 1.1:1 or less. Power capability is 4000 watts PEP. Impedance is 50-75 ohms.

The switching box can be tower or mast mounted and the control console is located at your operating station. They are interconnected by an inexpensive 5 conductor cable of any length. 240 volt export model available.

Available at your dealer — Send for a catalog of the complete AMERITRON line.

AMERITRON, Division of Prime Instruments, Inc.
9805 Walford Avenue • Cleveland, Ohio 44102 • (216) 651-1740

CODE ★ STAR--PRICED FROM $129.00

- ★ Ideal for Novices, SWL's and seasoned amateurs
- ★ Built-in code practice oscillator & speaker
- ★ 12 VDC Operation or 120 VAC with adapter provided
- ★ Optional serial/parallel ASCII output port

- ★ Copies Morse, Baudot & ASCII codes
- ★ Two optimized Morse ranges
- ★ Digital & Analog filtering with 16 db AGC
- ★ Automatic speed tracking 3 – 70 WPM

More Features Per Dollar Than Anything Else! Copies code from your receiver! Improves your code speed too! Large LEDs. Easy to connect and operate. Compact. 2lbs. Connect computer like VIC-20/printer with optional ASCII output port.

CODE ★ STAR™ Kit . . . CS-K $129.00 — CODE ★ STAR Wired . . . CSF $169.00
ASCII Port Kit . . . CS-IK $49.95 — ASCII Port Wired . . . CSIF $69.95
Add $5.00 shipping and handling for continental U.S. Send check or money order. Use VISA or MasterCard
Call or write for FREE brochure. Factory Direct – WE'RE AS NEAR AS YOUR PHONE!

Microcraft Corporation — Telephone: (414) 241-8144
P. O. Box 513Q, Thiensville, Wisconsin 53092

RDC

THIS MONTHS GOODIE FROM THE CANDY STORE - KENWOOD TS-940S/AT UNDER $1700.00 LTO

OVER 6500 HAM RELATED ITEMS IN STOCK.
Send SASE, Call letters, name & phone # for NEW HF list

ROSS DISTRIBUTING COMPANY
78 South State Street, Preston, Idaho 83263
Telephone (203) 852-0830 Close at 2:00 MON. & SAT.

UR TRIPOLE ANTENNA

The TRIPOLE™ covers the 160-8 m bands, including new bands, without retuning. No taps, no traps, no coils, built-in balun. A best choice for an all-around amateur antenna. Guaranteed. Kit T80-K $74.95, Assembled T80-A $84.95. Prices postpaid cash. TX residents add 5% sales tax.

UNIVERSAL RADIO CO. — VISA or MasterCard
Dept. Q1 P.O. Box 26041 El Paso, Texas 79926 (915) 592-1910

extend my condolences to the family and friends of W7YWW who became a Silent Key on 3-20-85. KC7AR reports the Wyo. Cowboy Net held 21 sessions with 855 QNI & 18 QTC. See you at the Wyoming Hamfest. Traffic: WB7NHR 229.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, Jr., WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OO/RFI: K4ELV. Well it's time for the annual test of endurance, capability, and dedication that is known as Field Day; the event will occur on the 22nd and 23rd, and I hope each of you will be involved in some way. I will be available at W4CUE B'ham for your bonus pts mess to the SM. (See May QST for full rules and other details). Here are three Silent Keys; W4RKG, Henry T. Williams, Jr. of Selma, KB4EXT, Morgan H. Gravlee of Anniston, and WA4IIB, Gilbert C. Yarbrough of Oneonta. The Cullman Club reports these new officers: President KB4ACR, Al; V Pres W7FXH, Steve; Secretary N4IDB, Alvin. We have a new Emergency Coordinator for Mobile Co. in the person of KA4AKD, Joe. Some recent upgrades include N4KHJ to Gen, N4LJO and KB4JRS to Adv, and K4EYM to Extra. Traffic for March: CAND reports 723 messages passed in 31 sessions with Alabama rep 100% by NW4X, WX4I and W4CKS. DRN5 reports 856 messages in 62 sessions with AL rep by W4CKS, WA4JDH, WB4IXA, NW4X, W4WJF, WX4I, KC4GS, and W4IBU. BPL: WA4JDH; PSHR: WA4JDH, W4CKS, KB4GPN, WX4I, WD4NYL and WA4RNP. Very seven three Joe. Traffic: WA4JDH 973, W4CKS 106, WX4I 100, K4AOZ 86, W4ZJY 76, KB4GPN 74, WB4IXA 62, WD4NYL 52, WA4RNP 32, NW4X 26, KB4GAP 25, WD4DGH 14, W4WJF 10, WB4TVY 4.

GEORGIA: SM: Eddy Kosobucki, K4JNL—SEC: WB4ABY. STM: K4VHC. ACC: WA4ABY. BM: W4BIA. OO/RFI: W4RZI. PIO: WA4PNY. SGL: W4BTZ. TC: K4UDR. NWS: WA4PZD. By the time u read this all of the listed Repeater sponsors, etc, should have received a letter from me regarding the meeting in Atlanta during the HamFestival. Tentatively it is scheduled for 4 P.M. on Sat., July 6th in a meeting room to be announced later. This meeting is of vital importance as we will be discussing Repeater Coordination, a Georgia Repeater Council & many vitally important matters that have arisen. Please check with ur local group & check to see if they have been informed. If not please contact me ASAP. The attendance at the Columbus Hamfest set a new record. We hope that u will help support the others in the Ga section. Apr. 5th brought our first nasty WX of the season. Many tnx to all the VE's & Instructors in the section who are devoting their time to further advance Amateur Radio. With the many scheduled test sessions each month there should be no problem to anyone who wants to up-grade or take any tests. I don't think there is a section in all of the 73 that has clubs & groups that produce any finer Newsletters than the devoted writers in this section. Many hours of time are taken to produce a FB copy. Hats off to all of u who have anything to do in putting words into print. W4PIM is continuously looking for old & new blood for GSN which meets twice each night on 3595 kHz at 1900 & 2200. Tnx to all at Gwinett County ARS who weathered the storm & for their hospitality shown me during my March visit. If u sight up a new ARRL member for ur club, the club gets $5.00, $2.00 for a renewal. This can help the club treasury. Ole Timers the QCWA net gathers each Sat morn on 3832 at 9 A.M. Traffic: W4PIM 262, W4WXA 149, AA4TT 53, WD4NGI 53, K4EV 36, K4VHC 33, W9NXC 24, N9ECB 23, W4HON 18, KF4FG 17, K4NM 14, K4BAI 10, N4UZ 8, KA4ATM 5, N1BKC 2.

NORTHERN FLORIDA: SM, Phil O'Dwyer, WF4X—ACC: N4ADI, SEC: WA4PUP. STM: WB4GHU. PIO: WA4PUO. SGL: KC4N. BM: KB4LB. OO: K4JJE. With all the Fairs, Festivals, etc., this month should be close to December in the amount of traffic passed, and a hearty well done to all the nets and traffic handlers. The folks at Cloverleaf Farms (WD4IIO) are deservedly proud of the six operators upgrading to EXTRA class this month, and I think that they and the Pasco county people (especially AA4FG and NY4E) have the right track going to keep traffic handlers from becoming a dying breed as suggested by KR7L in the April issue of QST! i.e., give them the training and motivation at the same time your training classes are in session and show them how easy it is as well as how much fun it can be! Our very first ATC (assistant technical coordinator) is Larry Goosby, KA4YIW, in Jacksonville—clubs interested in nominating an ATC to help their members are invited to send nominations to me. Please join me in congratulating Clyde Lee, N4PL on 50 years of ARRL membership! Field Day the fourth weekend in June, the 23rd and 24th so time to start lineups of stations and equipment. Rudy, WA4PUP, asks us to join him in welcoming new Emergency Coordinators WG4X, WA4ZIM, N4DY, K4AJN and KA4CNH. Traffic: WF4X 1285, WX4H 1107, WD4IIO 1070, N4PL 767, WA4QXT 593, WB4ADL 523, WF4Y 506, KB9LT 347, WA4NDA 346, KC4VK 226, KD4KK 219, WA4EYU 173, AA4FG 158, WD4MLQ 136, KB4LB 120, K4VND 102, N4DY 90, NF4O 87, W4MGO 85, W4KIX 78, AA4HT 76, WD4IUI 76, N4JAQ 72, N4EDH 72, N2AMG 70, KC4FL 67, WB4YQP 65, WD4HBP 61, NY4E 52, KF4TM 40, WB4TZR 40, WA4PUP 35, N4ADI 34, WD4JDU 32, WA4SXW 27, WB4AWG 26, KI4CO 26, KF4U 24, W8IM 23, WA4VLX 22, N4ENL 21, NS4C 20, WB4FJY 15, WD4EQB 13, NQ4P 13, N4IIP 11, WA4PUO 11, KF4GY 10, N4JHI 9, WD4BTO 8, KB4LHP 6, NA4F 3, KE4PO 2, K4YBB 2.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WA4EIC. PIO: W4WYR. SGL: KC4N. OO: W4SS. WA4EIC reports total bulletin activity of 162 bulletins received and transmitted this month. Bulletin stations reporting were WA4EIC 56, WD4KBW 19, K4IEK 35, AA4BN 12, KA4GUS 20 and AA4MI 20. N4KNP, EC of Collier County and other hams were busy again during February with another outbreak of forest and brush fires there. Hams assisting were WB8PSS KA4EGP W9OAO KB4OA WD8BVV W4VQE KM1W WB8RAZ KB4ALZ W2YEW N4KB WD8AQW N8DIQ and N4KNP. Congrats to the Treasure Coasters Repeater Assn., Inc., Vero Beach which was approved as an affiliated club. W4JM reports 35 candidates were at the VE session sponsored by the Lakeland ARC and that a goodly number passed. K4SCL, former SCM for the SFla section, has retired from his City of St. Petersburg Communications supervisor job and plans to travel abroad. K4SCL also reported that for the St. Petersburg Festival of States that 28 amateurs were active for the night parade and that 36 assisted with the day parade. Amateurs helping in one or both of these parades were: WB4AIZ W4APV K9BSL W4CF KA4CRS KA4CYA WA4DNU W4EGM WD9EJT K4EPH WA4FEN WB4FVN W4GPL KA4HWY KA3IFY K5IHH WA4IIT W1ION K4ITR KI4IY N4JLN W4JNE ND4K WD4KGY N4KHG N4KII K4KXC KB4LAE WB4LXH K2OHW KA4MWM WB4PEL K4RBJ WD4RQK WD4SCD K4SCL KA4UAN W1UEF KA4UPD WA4WOU WB4ZPU. WB2OUK reports that Lee County ARES and the Red Cross are providing communications for the 1985 March of Dimes Marathon. Joel Kandel, KI4T, Technical Coordinator has written a paper for the Fourth ARRL Amateur Radio Computer Networking Conference—"Packet Radio and the National Hurricane Center." Official Relay Stations mail me your certificate for endorsement, or send me a radiogram requesting a new certificate. Any traffic handlers interested in becoming an ORS should read the requirements in "Operating an Amateur Radio Station" and send me an application. N4KB said that W1NJM is on the way back to Connecticut. 73 de WA4PFK. Traffic: W3CUL 3399, WD4KBW 1149, W3VR 921, K4EUK 777, KF4JA 662, W4NFK 501, W4NVU 470, K4SCL 433, WA4EIC 401, WA4PFK 391, KJ3T 373, K4ZK 353, KY8Y 302, WD9AEP 262, WB2NVJ 256, W4PKP 237, KA4GUS 220, N4KFU 207, K4JLL 176, WB4WYG 169, K4IA 161, KA4NXF 145, W4YCL 138, KF4RL 113, KI4ZW 104, N4KB 96, KM4Y 88, AF3S 86, WA4HXU 85, W4WYR 81, KB4KB 71, KA4YHS 70, W3TLV 65, WD4MCC 63, KY4U 61, KA4FZI 51, W4LLA 50, AA4BN 46, KB4EWO 44, WA4HDH 40, K4FQU 40, W4SME 38, K5IHH 34, W4ESH 34, N4HAS 32, K9ALX 29, K9EHP 28, AA4MI 22, KA9AKY 21, KA4SIH 20, K8BXT 16, KD4GR 13, K4IRT 12, WB4AID 11, WD4NXK 11, N4ILN 10, K4OVC 8, KA4GDU 8, KD4KDD 7, W4MFD 6, K4BLN 6, KB4ABT 6, WA4VND 6, KB4ELQ 5, W4MPV 5, W4UIO 5, WA4YNO 5, WK4F 4, N4KNP 2, WV4F 2, KE4O 2, KA4EBO 1. (Feb.) KB4EWO 6, K8BXT 5.

WEST INDIES: SM, Carlos Flores, NP4KA—West Indies Net Slow (WINS) Daily 7 P.M. (2300 UTC) on 3.710 MHz. West Indies Net Central (WINC) Daily 6:30 P.M. (2230 UTC) on 146.94-600 MHz. "Hello" friends, I am the new SM for this section and eager to serve W.I. actively. For the first time try to bring Puerto Rico, St. Thomas, St. Croix and unite them to work as one. I congratulate St. Croix for their new affiliation with the League. Both islands (St. Thomas and St. Croix) have talked with me on the rep. and are anxious to start organizing activities. During the month of March, Mr. David Cruz, WD4DSG, a handicap, successfully passed his General exam given by the VEs in Rio Piedras. At the VE test site in Manati, other upgrades were NP4HS, Gen.; KP4EKG, Adv.; KP4HC, KP4ARY, NP4KA, Extra. On the local 146.49 MHz freq., there is a big epidemic of extra class licensees, but not to worry—it's only local. KP4BZ and NP4CC have been making fine scores in the ARRL, CQ contests in the past 3 years with help from the "group." Very active VHF/OSCAR operators now in P.R. are KP4EOR, KP4EKG and his cousin NP4GD. Our NM KP4DJ reports the following for WINS: QND 236, QTC 3, QNI 66, 29 Sess. Hasta Luego. Traffic: KP4DJ 26.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K6LL, KA7HEV and WB7CAG. Glad to be aboard as your new SM. This is my first report. State Senate Bill 1346 that would have severely restricted mobile radio operations was killed in Committee. Thanks to all who joined the lobby campaign and helped to defeat it. W5LFL of space shuttle fame was in Tucson and spoke to 75 members of the OPRC about his ham radio operations on STS-9. Heard the ARCA Spring Swapfest sponsored by Scottsdale ARC was another great success. Have started receiving club bulletins from several clubs. Please put me on your mailing list for future club bulletins. OPRC reports their recent VE exams produced a 63 per cent success rate. Your SM currently has section level leadership appointments open for SEC, ACC, PIO and TC. Would like to hear from interested volunteers. Fort Tuthill Hamfest will be July 26, 27 & 28 in Flagstaff. Also the HAMCON ARRL SOUTHWESTERN DIV. CONVENTION aboard the R.M.S. Queen Mary, Long Beach, CA is August 9, 10 & 11. Notables on the program include K7UGA, K6DUE, W6AM, W6AQ, W1ICP, K1ZZ and N3AKD. Hope to meet many of you at either of the above events. By the time you read this, the COCHISE ARA Hamfest will have been held at their new dedicated site near Sierra Vista. The Superstition ARC members turned out to provide emergency communications in Feb. to Mesa Lutheran Hospital during a local in-house telephone failure lasting some eight hours. Well done. KB7FE made PSHR again in March. Congrats. ATEN: QNI 1169, QTC 159; SWN: QNI 140, QTC 140; Cactus Net: QNI 662, QTC 84. Traffic: KB7FE 268, W7EP 166, W7LVB 79, K6LL 78, KA7HEV 41, WB7CAG 22, W7OIF 19, K7JKM 17, K7NMQ 17, WA7KQE 14, W7KXE 14, K7POF 14, WB3LQQ 7, WA7NXL 1.

LOS ANGELES: John Walsh, N6UK—ASM: N6ZH. SEC: N6UK. ACC: KX7Q. OO/RFI: K6BMG. Our sincere thanks to all who responded to the first call for support for the new LA County Fire Dept activity. We hoped for 20 and got 56 for the signup and briefing. There are still some organizational rough spots but it is coming together. First trial was scheduled for the April 18th Quake 85 exercise. Volunteers for this countrywide operation included WA6LAU WA6ZOW N6ORD W6NAZ W6GVQ KB6GSA N6KKE NN6Q KB6GVF W6TNB WA6JOB WD6BLI K6YMS WB6MHF K6HD KA6WDQ KB6CYQ KA6GSE N6KWS W6LPJ N6UK KD6CY KD6BX WA6HGE AK6Y WD6EGS N6CMR WB6TKR W6UPN WA6JTM and K6IYK. Regrets if we missed anyone. Will complete the list next month. Thanks to all. Fire Department officials are encouraged by this radio amateur response. On March 22 amateurs and wives from the Long Beach area traveled to the Paramount Movie Ranch to provide communications for a fifty-mile by the Malibu Equestrian Riding Club. They used 147.225 and 224.36 repeaters for emergencies. Four horses, overcome by heat and terrain, were trailered out. For the radio operators it was a chance to gain more experience with mountain and hill communications. All were well fed with a Friday Pot Luck and a Saturday BBQ. On Sunday KD6BX responded to a motorcycle accident by summoning paramedics. Unfortunately the rider expired from injuries sustained. Special thanks and gratitude to the operators: KD6BX, NCS; AK6Y WD6ERM K6BQZ N6IGZ N6CMR WB6YYT WB6SZK WA6MED WB6AXE and guest op WB3LQQ. Thanks to KD6BX, EC, for the info. Southwestern Division Convention aboard the RMS Queen Mary happens Aug. 9, 10 and 11 at Long Beach. Early bird registration closes May 31 and advanced closes on July 15. Contact Hamcon, P.O. Box 91313 Long Beach 90809. W6INH informs us K6UYK has been recommended for appointment to A-1 Operators club. Traffic: K6UYK 805, K6YBV 550, W6INH 288, WA6OCM 84, N6ORF 16, W6NKE 14, WD6FWZ 13. (Feb.) K6UYK 720.

ORANGE: SM, Joe Brown, W6UBQ — ASM: N6BVU, SEC: AE6N. ATM: WA6QCA. ACC: KA6NLY. BM: W6DXL. OO Coord: W6RE. PIO: NS6W. SGL: N6HIQ. TC: AA6DD. Appts: EC, NR6P Coachella Valley, EC, KA6IYS Palm Springs. EC, KA6RON Hemet/San Jacinto. EC, WA6TIJ

Lake Elsinore. ORS, N6LNI. Congratulations to Don WB6TIF SCN/1 and SCN/2 on upgrade to Extra, new call WF6O. Congratulations to EC April WA6OPS for heading an extremely successful HDSCS Group Officers San Bernardino Microwave Society, President WA6QYR REC SEC, K6HIJ Correspondence Secretary WA6EEV, Treasurer WB6WMF. PSHR—WF6O KA6BNW WB6QBZ WA6QCA KA6HJK/T. Section Traffic Net Activity.

Net	Freq.	Time	QNI	QGT	NM
SCN/1	3598	7:00 PM	310	200	WF6O
SCN/2	3598	8:15 PM	208	56	WF6O
SCN/V(FM)	146.645	9:00 PM	405	303	WA6QCA
RTTY/VHF	145.12	9:00 AM	452	148	KA6HJK

Wish to thank the amateur community for the fine cooperation I have received during my tour as SEC Orange, with the staff of appointed officials I have inherited from Sandy WA6WZN. I know that as SM we will be able to effectively carry out the plans and programs of the ARRL field organization. These are exciting times in amateur radio. Traffic: WA6QCA 245, WF6O 233, KA6HJK 175, K6GGS 104, N6GOT 66, WB6QBZ 56, KA6JGE 54, KA6BNW 53, K6ZCE 40, AD0A 40, W6CPB 28, KB6CYD 27, W6NTN 24, N6LNI 8, W6TKV 5.

SAN DIEGO: SM, Arthur R. Smith, W6INI—TC: N6NR. BM: WA6HJJ. STM: N6GW. SEC: W6INI. PIO: KG6LF. ACC: WA6COE. Plan to spend your 1986 vacation in San Diego, host to the ARRL 1986 National Convention, Sept. 5-7. New club officers: 220 Club of San Diego Pres W6INI, VP W6PDA, Sec N6ELP, Treas W6UZL; Convair ARC Pres WB9COY, VP K6DBJ, Sec KB6DEO, Treas K6QJP. Commodore 64 users can find a user's group net on 145.535 most any time of day or evening. Electronics/computer swap meet first Saturday each month at San Diego Stadium. Time: 0700. WB5PMF is new EC for Imperial County. Contact him for membership info on 145.67(-). Thanks to WA6LAW, retiring EC, for his many years of service. Activity on 220 MHz has increased with advent of the IC-37A. Clubs interested in program on Civil Air Patrol should contact N6ERN at 270-4535. ARES breakfast & meeting on 2nd Sat. each month. Bkfst at 0800-0845, meeting at 0900. Location: Normal Heights United Methodist Church, 4650 Mansfield, near 35th and Adams. New appts: KA6YJH ORS, N6BWM OBS, N7PF PIA, N6JZE OO, WA6CFM Asst TC, K6DQ Asst TC. Traffic: N6GW 34, KM6I 3.

SANTA BARBARA: SM, Byron Looney, K6FI—Due to business pressure, WB6HJW has resigned as your SM. Good luck, Ernie. Santa Barbara ARC reports ARES Van rapidly taking shape. It was dedicated to W6POU. Well done, fellows. Bob will be greatly missed. Santa Luisa Club sponsoring one amateur in each of the Emergency Management, Earthquake classes at CSTI next year. If you are EC or AEC and can spare a week, contact K6FI. VEs in Santa Barbara, Santa Maria, Los Osos have conducted exam sessions. Conejo Valley will sponsor a May exam. W6KFV has become the first ATC in the section. Many jobs open in the section, why not try one? You'll get more out of amateur radio if you put more of yourself in. Paso Robles "out for blood" on FD. How about you? Traffic: N6HYM 32.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM/ACC: NI5V. STM: AE5I. RFI: WB5JBP. SGL: W5UXP. PIO: N5FDL. BM: W5QXK. Lots of ARES news from the panhandle! The Potter/Randall Co. ARES group is the proud owner of a Communications Van, which will be in service for the tornado season. WA5ZKL/EC sent a nice report on ARES activity; repeaters in Amarillo, Borger, and Pampa now linked. The City of Amarillo has purchased a new rig for the EOC for spotter use during wx nets. Mack is also computerizing the ARES roster and other data for easy access. Nice report from out Greenville way from K2SCU/EC/00. Jim has computerized his 00 monitoring activities and also reports several SKYWARN Nets active in March, with some damage. The hams in Greenville also nipped a tower ordinance in the bud with fast action and help from served agencies. It was dropped before it appeared on the agenda! W5MVJ/DEC Dist. 1 reports that NG5T and his fine ARES group is playing an important role in EOC operations in Borger. Hope to see you all at HamCom '85 June 1 in Dallas! PSHR for March: KA5SPT KA5AZK WD5EEH KB5UL AE5I and KD5FR. Traffic: N5BT 186, KA5AZK 164, KB5UL 126, W9OYL 111, WB4HML 109, KD5FR 98, AE5I 89, KA5SPT 82, AC5Z 43, WB5VIH 36, NI5V 22, W5ERT 18, WD5EEH 16, NJ5Q 14, KE5WL 13, K5PC 7, KD5RC 6, N5GZE 6, KB5UQ 5.

OKLAHOMA: SM, Dave Cox, NB5N—ASM: K5WG. SEC: W5ZTN. STM: KV5X. ACC: NJ5Y. BM: W5AS. PIO: WD5IFB. OOC: K5WG. SGL: W5NZS. TC: W5QMJ. Congratulations to the Great Plains ARC for another excellent eyeball and swapfest this year, complete with amateur exams by ARRL VE Team. The Oklahoma Independent ARC of Ponca City was presented their Certificate of ARRL Affiliation at their meeting April 12. As you have heard by now, the OO program has changed considerably. OOs not certified into the Amateur Auxiliary have been dropped. Consequently we are in dire need of new OO/AAs. If interested, contact K5WG. It's not too late to make the Green Country Hamfest, May 25-26, BE THERE. Also make your plans now for Ham Holiday/ARRL State Convention, July 26-28. Everyone get plans set for Field Day, June 22-23. Anyone wishing to send radiogram to SM, for extra points, can do so on STN, at 1730 local, on 3850 kHz, Saturday the 22nd. APPOINTMENTS: Assistant SM-K5WG; PIA-KA5UEA; OES-KA5UEA. Traffic: WB5SRX 383, W5AS 205, KV5X 135, K5CXP 123, KB5EK 119, W5REC 95, WD5IFB 87, KD5SO 82, WA5OUV 78, W5VXU 75, WD5JCE 71, W5RB 66, WB5LSW 62, KA5FUU 58, KC5OU 55, NR5L 46, NB5N 39, NG5O 32, W5VOR 30, K5CAY 28, K5GBN 28, W5VLW 27, WA5ZOO 26, WA5OGC 25, K5ENA 14, N5PT 13, ND5S 6, KE5W 5, W5JJ 2, KA5TTH 2.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR—STM: K5OEW. ASM: N5TC. SEC: KA5KRI. ACC: KA5KRI, TSARC, Harlingen, KD5IU coordinating, had plenty of help at the Rio Grande Valley Stock Show at Mercedes; 36 Amateurs gave 84 man-hours of public service in the four days of the event. CHARRO, W6GUR coordinating, had good help at the Brownsville/South Padre Island AIRFIESTA; 16 Amateurs gave 26 man(woman)-hours of public service. Austin ARC, WB5KXK coordinating, provided public service communications at National Bicycle Assn. Olympic team pre-trials at City Park March 27 and Decker Lake March 29; K3AHS installed new RC-85 controller at the AARC rptr; WB5SUR working on a new 220 rptr. Beaumont ARC celebrated 5 years of a good club bulletin with its Feb. issue; WA5VUX received an award at the Energy Sources Workshop in Dallas for his work as technical workshop developer. K5OWK will be trailering around the USA for the next year or so. Cameron County VE team held a successful test session; of 30 applicants, four passed tests for license, 11 upgraded as follows: Novice to Technician, KA8RDS, KA5TBS, KA9NLS; Novice to General, KA5NTW, KA8PJA; Tech to General, KA5GSF;

General to Advanced. WD5GLS, WD5FBY; General to Extra, N5DRK, W5KR. WA5UZB reports that the Houston ECHO Soc. has executed an agreement to provide emergency communications for American Red Cross, Houston. OO K5VRF reports El Paso Amateurs have incorporated an ELT receiver in the 146.28/.88 machine which will alert Amateurs and Civil Air Patrol when an ELT alarm is heard. Williamson County ARC editor N5AKJ reports N5ALS is on cloud 9 about his new grandson, S. Texas Am Rptr Soc, Hartlingen, reports a total of 112 members, 56 of whom are STARCOM qualified. KA5PEX reports from Seguin that W5UPS has dusted off his commercial ticket and is back with KWED/AM; W5EWC cleared out his shack for the San Antonio swaptest; KA5PEX is Monday TSN liaison to TEX; W5TUK and others concentrating on 7290 Traffic Net picnic in Kerrville. OBS W5KLV rprts 8 ARRL bulletins, 5 DX bulletins, 5 CRRL bulletins, 30 satellite bulletins given 149 readings on 7 nets. DRN5 Mgr WB5YDD rprts STX represented 100% by N5DFO W5CTZ WB5EPA WB5FQU W5KLV KD5KQ W5URN N5EFG N5AMH N5GKM N5CRU KD5CB WB5YDD. CAND Mgr W5KLV rprts DRN5 represented 100%. STX stations KD6KQ W5KLV WB5FQU WB5YDD WB5EPA N5EFG N5DFO N5CRU N5AMH helped make it so. OBS N5DFO rprts 4 ARRL bulletins, 4 DX bulletins, 8 satellite bulletins given 33 readings on 8 nets. Traffic: W5CTZ 372, W5KLV 274, WB5YDD 239, KS5V 211, N5GKM 142, N5DFO 124, WB5EPA 110, WD5GKH 65, NS5J 65, WB5FQU 26. (Feb.) W5BGE 42, W5AC 20.

ORDER FORM

THE 1985 RADIO AMATEUR'S HANDBOOK
☐ SOFT COVER
$15.00 U.S.
$16.00 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 Amateur Radio Call Directory. U.S. listings $10.00 U.S., $14.75 Elsewhere.
☐ ARRL CODE KIT $8.00
☐ AX.25 AMATEUR PACKET RADIO LINK LAYER PROTOCOL
$8.00 in U.S., $9.00 in Canada and elsewhere.

COMPUTER NETWORKING CONFERENCE PROCEEDINGS
☐ FIRST $8.00
☐ SECOND $9.00
☐ THIRD $10.00
☐ FOURTH $10.00

☐ 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 (See page 51, Feb. QST)
☐ 80th Edition $4.00 U.S., $4.50 elsewhere
☐ Technician/General Class License Manual 1st ed. $5.00 U.S., $6.00 Elsewhere
☐ Advanced Class License Manual 1st ed. $5.00 U.S., $6.00 elsewhere.
☐ Instructor Guide - Novice $3.00
☐ OPERATING MANUAL
New edition available in mid June. $5.00 U.S., $5.50 elsewhere.

☐ OSCARLOCATOR $8.50 U.S., $9.50 elsewhere.

☐ RADIO FREQUENCY INTERFERENCE $3.00 U.S., $3.50 Elsewhere
☐ 1985 REPEATER DIRECTORY $3.00
☐ THE SATELLITE EXPERIMENTER'S HANDBOOK, $10 U.S., $11 Elsewhere
☐ SOLID STATE DESIGN FOR THE RADIO AMATEUR $7.00 U.S., $8.00 Elsewhere
☐ Instructor Guide - Technician/General $5.00
☐ 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

RSGB PUBLICATIONS
☐ RSGB RADIO COMMUNICATIONS HANDBOOK 5th Ed. $22.00
☐ VHF-UHF MANUAL $17.50

☐ TELEPRINTER HANDBOOK
Covers mechanical teleprinters $21.00
☐ TEST EQUIPMENT $11.00
☐ HF ANTENNAS for all LOCATIONS $12.00
☐ AMATEUR RADIO OPERATING MANUAL $10.00
☐ MICROWAVE NEWSLETTER TECHNICAL COLLECTION $10.00

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.

☐ DXCC LIST (NEW EDITION) $1.00

THE ARRL FLAG
☐ 3' x 5' cloth flag $21.00
☐ Pin $2.50
☐ License Plate $5.00
☐ Cloth Patch $5.00

☐ HOLA CQ Learn to communicate with Spanish-speaking amateurs. Cassette and 16 page text. $7.00

Amateur Radio Emergency Service
Specify color: Red, White and Blue or Black and Gold
☐ Sticker _____ 2/$0.50
☐ Decal _____ 5/$1.00
☐ Patch _____ $2.50
☐ Member or Life Member Decal 2/$0.50

CLOTH PATCHES (washable)
☐ 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 Appointee _____ $2.50
Title

LEAGUE EMBLEM CHARM
☐ Membership $2.50
☐ League Appointee _____ $2.50
Title
☐ 14" x 16" LEAGUE EMBLEM BANNER $7.50
☐ Replacement Pin for Life Members $2.50
☐ LIFE MEMBERSHIP PLAQUE (for replacement—allow 8 wks. delivery) $25.00

LOG BOOKS
☐ 8½ x 11 Spiral $2.50 U.S., $3.50 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
☐ Grid Locator $1.00
☐ Polar (for OSCAR) $1.00

☐ MESSAGE DELIVERY CARDS 10 for $0.50

MESSAGE PADS 70 sheets each
☐ SINGLE PAD $1.00
☐ 3 PADS $2.50

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

QST BINDERS
☐ 6½ x 9½ (U.S. and Canada only) $9.00
☐ 8½ x 11 (U.S. and Canada only) $10.00
☐ Blue Tie $12.00
☐ Maroon Tie $12.00
☐ SCARF $6.00

AMATEUR RADIO IN SPACE
☐ 3" Cloth Patch $3.00
☐ 3" Stickers 5 for $1.00

"AMATEUR RADIO'S NEWEST FRONTIER"
☐ VHS Video Tape $25.00
☐ U-matic Video Tape $35.00

MEMBERSHIP

☐ ARRL see page 115
☐ RSGB with subscription to Radio Communication for one year $23.00

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.
ALLOW 3-4 WEEKS FOR DELIVERY.

PAYMENT MUST BE IN U.S. FUNDS
$1.00 PER TITLE FOR POSTAGE AND HANDLING 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

6/85

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 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 firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 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. 1417 Stoneybrook, Mamaroneck, NY 10543.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FIND OUT what else you can hear on your general coverage transceiver or receiver. Complete information on major North American radio listening clubs. Send 25¢ and S.A.S.E. Association of North American Radio Clubs, 1500 Bunbury Drive, Whittier, CA 90601.

THANK YOU for attending Warren, Ohio Hamfest. See you August 18, 1985.

ATTENTION MORSE Telegraphers - Join Morse Telegraph Club. Meet old friends, swap experiences. Morse Telegraph Club is national. There is a Chapter near you. When and where do we meet? Contact John Holman, W3INV, 1 Beth Circle, Malvern, PA 19355. 215-644-2471.

ATLAS 350XL Owners Group. Free newsletter. Send QSL with rig s/n and SASE. Know people who repair them? Information to share? Questions? Rod Sharp, N5NM, Box 2169, Santa Fe, NM 87501.

THE FLORIDA Amateur Digital Communications Association (FADCA) publishes a monthly newsletter, the FADCA Beacon, about Packet Radio. Write for a sample copy, FADCA, 812 Childers Loop, Brandon, FL 33511.

FREE QRP Info Kit. Send S.A.S.E. with two first-class stamps (U.S.) or three IRCs (DX) to: ARP ARCI, P.O. Box 354, Carlisle, PA 17013.

CQ CONTEST: VHF'ers please note! The first annual CQ World Wide VHF WPX Contest is July 20-22, 50 thru 1296 MHz. For details, logsheets, etc., write to SCORE, P.O. Box 1161, Denville, NJ 07834 or to CQ Magazine. We need your entry to make this a success!

NORTHERN NEW JERSEY - Sussex County ARC Hamfest, July 20. Sussex County Fairgrounds, Augusta, NJ. 8:00 AM. Indoor/Outdoor space. Acres of parking. Refreshments. Talk-in 147.90/30 and 146.52. For information call Donald Stickle, K2OX, 201-663-0677.

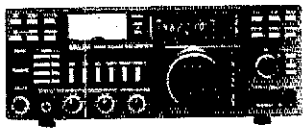
TNT RADIO SALES INC.

TNT Gives More "Bang for Your Buck" with...

ICOM

IC-751 . . . CALL

IC-745 . . . CALL



IC-271A . . . CALL
IC-271H . . . CALL

IC-471A . . . CALL

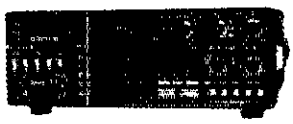
IC-2AT
IC-3AT
IC-4AT
. . . CALL

IC-02AT
IC-04AT
. . . CALL

IC-2KL . . . CALL

IC-27A IC-37A IC-47A

KENWOOD



TS-430S . . . CALL

TS-530SP . . . CALL

TS-930S . . . CALL

TR-2600
CALL

TH-21AT/
TH-41AT
CALL

R-600, R-1000, R-2000

TR-7950 . . . CALL

TM-211A/ TM-411A . . . CALL

SPECIAL! KENWOOD TS-430S WITH EITHER HUSTLER OR KENWOOD 5-BAND H.F. ANTENNA PACKAGE $799

CALL NOW FOR PREVIOUSLY OWNED BENCH-TESTED EQUIPMENT

ICOM		KENWOOD		OTHER		TENTEC OMNI C (LOADED)	$769.00
IC 251A	$329.00	TS520	$369.00	SB220 W/10M	$529.00	TENTEC CENTURY 21	$225.00
IC 740 (LOADED)	$759.00	TS820S	$429.00	ST 142	$219.00	SWAN 350 (MINT)	$329.00
IC 751 (LOADED)	$999.00	TS120S	$369.00	TR4C	$359.00	TR 7930	$249.00
IC 730 W/CW FIL	$489.00	TS-830S W/CW FIL	$659.00	TS-700A	$295.00	TR 7625	$159.00
IC 25A	$195.00	R1000	$289.00	IC 211	$295.00	TR 7800	$189.00
IC 255A	$169.00	TR2500	$195.00	IC 451	$439.00		
IC 02AT	$229.00	TS-930S W/AT	$1175.00				

■KENWOOD ■ICOM ■MIRAGE ■AEA ■KANTRONICS
■SANTEC ■KDK ■AZDEN ■NYE VIKING ■MFJ
■TELEX HY-GAIN ■HUSTLER ■KLM ■ROHN ■HEIL
■AMERITRON ■WELZ ■LARSEN ■BUTTERNUT ■BENCHER
■AVANTI ■CALLBOOK ■ARRL BOOKS ■CABLE ■CONNECTORS

VISA/MASTER CARD
FREE SHIPPING
ON MOST RIGS FOR CASH!

VISA MasterCard

S.A.S.E. FOR OUR
"BENCH-TESTED"
USED EQUIPMENT LISTING

MON-FRI 9 AM - 6 PM CENTRAL TIME
SATURDAY 9 AM - 5 PM

4124 West Broadway,
Robbinsdale, MN 55422 (Mpls./St. Paul)

1-612-535-5050
(IN MINNESOTA CALL
TNT COLLECT)

1-800-328-0250
TOLL FREE QUOTES

FIRECRACKER HAMFEST - The 11th Annual North West Pennsylvania Hamfest in Crawford County will change its date this year. The Hamfest will be held on Sunday, July 7, 1985, 8:00 AM to 4:00 PM, at the Crawford County Fairgrounds, Meadville, PA. Come spend the holiday with us in Crawford County. For more information, write to the Hamfest Committee in care of Crawford Amateur Radio Society, P.O. Box 653, Meadville, PA 16335.

ARRL LONG ISLAND Hamfair sponsored by LIMARC will be held on Sunday, June 9, 1985 at the Electricians Hall, 41 Pinelawn Road, Melville, Long Island. Hours are from 9:00 AM to 4:00 PM. General admission is $3 per person. $2 after 1 PM. Table space sold only in advance from Hank Wener, WB2ALW, 53 Sherrard St., East Hills, NY 11577-1712. 4' x 6' table space available at $10 or your own for $6. Contact Hank at 516-484-4322 at nite to 11:30 PM.

Atlanta Ham Festival - July 6 and 7. New location - Georgia World Congress Center in Atlanta. Everything inside including fleamarket. All Totally Air Conditioned!!! Lots of Forums, exhibitors, even the Braves will be in town. Write Atlanta Ham Festival, P.O. Box 77171, Atlanta, GA 30357 for further information.

FLEA MARKET & FCC Examinations. June 8, July 13, August 10 & September 14. Novice thru Extra exams given, information call 408-255-9000. Foothill College, Los Altos, CA W6NLG.

WHEELING WV Hamfest & Computer Fair, Wheeling Park, Sunday, July 21. Dealers most welcome, all under roof. 5 acres Flea Market. ARRL, AMSAT, SWOT, SMIRK Booths. Park family activities available. Admission $3. To reserve space, contact Jay Paulovicks, KD8GL, RD 3, Box 238, Wheeling, WV 26003, 304-232-6796 or TSRAC, Box 240, RD 1, Adena, OH 43901, 614-546-3930.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill, NY 12198.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin, TX 78766.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

CADILLAC of QSLs — Completely different! Samples $1, (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs — 1) Famous KØAAB custom collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple callsigns. 5) Ham "business cards." State your sample wants. 39¢ self addressed business size envelope required. Marv Mahre, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs Samples 40¢ (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 $285. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, NY 11778 516-744-6260.

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 or black ink art work. 500 $22; 1000 $32.50. 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.

FULL COLOR QSL from your slides, $84.75 single thousand. 250b/w $25. Subject to discount. Samples. Picturecards, Box 5471, Amarillo, TX 79117 806-383-8347.

QSL's — since 1956, free samples, Rusprint, Box 7575, Kansas City, MO 64116.

QSL samples — 25¢ Samcards — 48 Monte Carlo Dr., Pittsburgh, PA 15239.

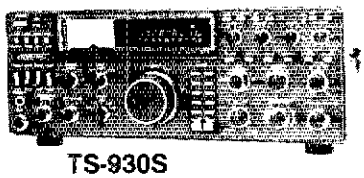
RUBBER STAMPS and Ultragraved Business Cards. QSL card brings Free Literature! J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

FREE, 100 QSLs with first order. Samples 50¢. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

ENGRAVING. CALLSIGN/name badges by WØLQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CUSTOM REPORTS, QSLs and Adv. Labels. Stamp brings circular. LABELCRAFT, P.O. Box 412, W. Sand Lake, NY 12196.

KENWOOD SALE!



TS-930S

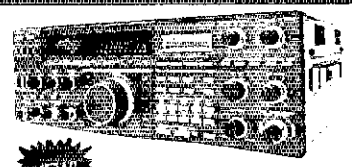
- General Coverage Receiver
- Superior Dynamic Range
- All Solid State—28 VDC Final
- QSK CW
- Optional Automatic Antenna Tuner
- Dual VFO w/8 Memories
- Dual Mode Noise Blanker
- RF Speech Processor
- Built-In AC Power Supply
- MUCH, MUCH MORE

TS-930S w/Antenna Tuner List $1799
TS-930S w/o Antenna Tuner List $1599

CALL FOR SPECIAL SALE PRICES!

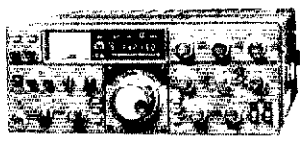
List Price TS-940S
$1999.00 w/Antenna Tuner
$1799.00 w/o Antenna Tuner
CALL FOR PRICE

- TOP of the Line HF Transceiver
- Same Features as TS930S PLUS:
- Optional Full Coverage Automatic Antenna Tuner (160 Meter Through 10 Meters)



NEW

- Graphic LCD Display of Operating Features
- 100% Duty Cycle (1 Hour) Full Output All Bands



TS-830S—TS-530S 160-10 Meter HF Transceivers

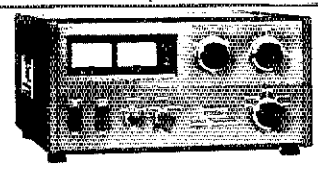
- All Solid State Except Driver and Final Amplifier
- Wide Dynamic Range
- Variable Bandwidth Tuning (TS-830)
- IF Shift
- RF Speech Processor
- Adjustable Noise Blanker
- Full Selection of Optional Crystal Filters
- Built-In AC Power Supply

TS-830-S List $949.95 TS-530S List $739.95
CALL FOR SPECIAL SALE PRICES!

TS-430S Most Advanced, Compact HF Transceiver $899.95

- General Coverage Receiver
- USB/LSB/CW/AM/ Optional FM
- 10Hz Dual Step Digital VFO
- Eight Memories w/Lithium Back-up
- Memory and Band Scan
- IF Shift—Notch Filter
- Speech Processor
- Narrow/Wide Filter Selection
- IF Shift

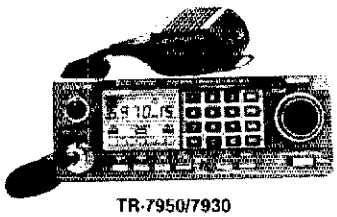
CALL FOR SPECIAL SALE PRICE!



TL-922A Linear Amplifier

- 160-15 Meters
- 2KW PEP Input Power
- Pair of Rugged 3-500Z Tubes Included
- Compatible with all Kenwood Transceivers and Many Others
- Built-In 110V-220 VAC Power Supply

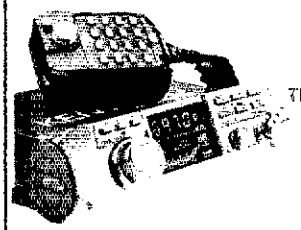
TL-922A List $1229.95
CALL FOR SPECIAL SALE PRICES!



TR-7950/7930

- Large LCD Readout
- 21 Multi-Function Memory
- Lithium Back-up
- 45 Watts (TR-7950) 25 Watts (TR-7930)
- Automatic Offset
- Built-In Encoder
- Memory or Band Scan
- MUCH, MUCH MORE!

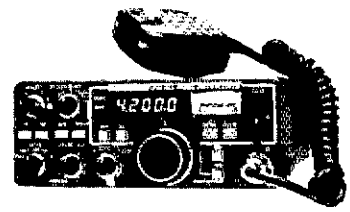
TR-7950 List $399.95 TR-7930 List $359.95
CALL FOR SPECIAL SALE PRICES!



TM-211A/TM-411A 2m/70cm FM Transceiver

- 25W Output
- Priority Watch
- Ultra Compact
- Dual VFO—5 Memories
- GaAs FET Front End
- Tone Encoder/Mic
- Band/Memory Scan

TM-211A List $369.95 TM-411A List $449.95
CALL FOR SPECIAL SALE PRICES!



TR-9130 2 Meter All-Mode Transceiver

- 25W Output—All Modes
- Six Memories—with Battery Back-up
- Memory and Band Scan
- Dual VFO
- Hi-Lo Power Switch
- High Performance Noise Blanker

TR-9130 List $529.95
CALL FOR SPECIAL SALE PRICES

TR-2600A
New High Tech Compact 2m HT

- LCD Readout
- 10 Memories w/Lithium Backup
- Band And Memory Scan
- Built-In 16 Key Tone Pad
- Extended 140 000-148.995 Frequency Coverage

List $329.95
CALL FOR SPECIAL PRICE!

TW-4000A Dual Bander
2m and 70cm FM in One Compact Package!

- Big LCD Readout
- 25W Output—Both Bands
- 10 Memories w/Scan and Back-up
- Dual VFO
- GaAs FET Front End
- 16 Key Up/Down Mic

VS-1 Voice Synthesizer and Other Accessories in Stock—CALL FOR SPECIAL PRICES!

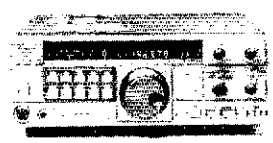
R-2000 Receiver
R-600—R-100S—R-2000 Receivers in Stock!
CALL FOR SPECIAL SALE PRICES—SAVE $$

TH-21AT/41AT
New Pocket Size 2m/70cm HT

- 1W Output
- 16 Key Tone Pad
- Optional Headset Available

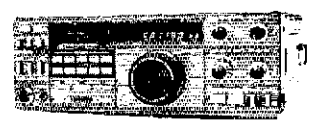
List $229.95 (2m) $239.95 (70cm)
CALL FOR SPECIAL PRICES!

TS-711A (2m)
TS-811A (70cm)
All-Mode, Multi-Function Transceiver



- Dual VFO
- 40 Memories
- Memory & Band Scan
- 25W Output
- Built-In 120 VAC Power Supply
- Nose Blanker

TS-711A List $699.95 TS-811A List $899.95
CALL FOR SPECIAL SALE PRICES



TS-670 Quad Bander—All-Mode Transceiver
6m, 10m, 15m, and 40 m

- Dual VFO
- IF Shift
- 10W Output
- 80 Memories
- Noise Blanker
- VOX, Narrow Filters, AC Supply and Other Accessories Available

TS-670 List $699.95
CALL FOR SPECIAL SALES PRICES!

IMPORTANT—Prices shown are suggested by the Manufacturer. You can Save Money with a Big Texas Towers Discount! Call today for our Special KENWOOD Sale Prices and Save $$$!!

TEXAS TOWERS

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

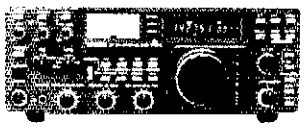
Telephone (214) 422-7306

Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm

(Prices & Availability Subject To Change Without Notice)

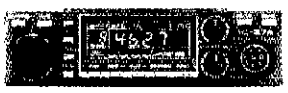
VISA MasterCard

ICOM SPECIALS



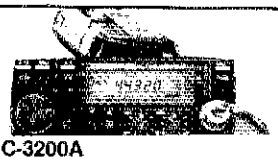
IC-751
Plus 2 Bonus Items
- PS-35 Internal AC Supply
- SM-6 Desk Microphone

Regular $1598.50
$1399 Save $199.50



IC-27A, IC-27H,
IC-37A, IC-47A
All Now Available
Call For Special Sale Prices!
Save $$$!

IC271A/H 2 mtrs
IC471A/H 70 cm
Perfect Oscar Equipment
Call For Special Prices!



IC-3200A
- Compact Dual Bander
- 2 Meter (140/150 MHz) & 70 cm (440/450 MHz)
- 25 Watts • 10 Memories

List Price $549 CALL FOR PRICE

IC-2AT $219
IC-3AT $239
IC-4AT $239

All Accessories In Stock!

BP2 Battery Pack	$39.50
BP3 Battery Pack	$29.50
BP4 Battery Case	$12.50
BP5 Battery Pack	$49.50
BC35 Base Charger	$69.00
CP1 Lighter Cord	$9.50
DC1 DC Cord	$17.50
HM9 Speaker/Mic	$34.50
LC10 Leather Case	$34.95

IC-745
List Price $999
Compact General-Coverage
Full-Feature HF Transceiver
Call For Special Low Price!

IC730 80-10m mobile unit
Special Price $589

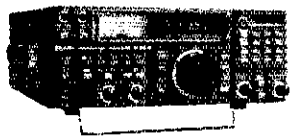
IC505
6m multimode
List $449
Call For Special Price

IC-290H 2 mtrs
IC-490A 70 cm
All-Mode Transceiver
Call For Special Price

IC-02AT
New 2m HT

Call! For Your Special Price!

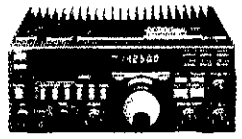
IC-120 1200 MHz Receiver
List $499 Call For Price



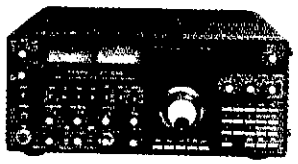
R71 Receiver
Call For Special Price

YAESU SPECIALS

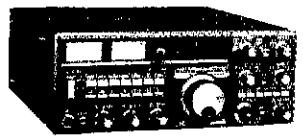
FT980 CAT SYSTEM
AC Power Supply, Full Break-in CW, SSB/AM/FM/FSK, RF Speech Processor
List Price $1659
CALL FOR SPECIAL PRICE



FT757GX
with General Coverage RCVR
Includes CW keyer, AM/FM, CW filter
List Price $859
CALL FOR SPECIAL PRICE

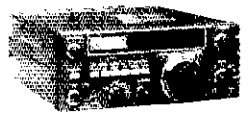


FT-ONE
With Four Free Filters
List Price $3074
Call For Your Special Sale Price



FT726R
(Optional modules for 6m, 430, 440 MHz)
Great for Satellite Work
List $899.00
CALL FOR SPECIAL PRICE

FT-270RH
New 45 watt 2M mobile.
List $439
Call For Your Special Sale Price



FT-77
Perfect Mobile Rig
List $599
CALL FOR SPECIAL PRICE

FT-230R 2mtr FM . . . List $359
FT-730R 440 MHz FM. . . List $399
- 10 Memories • Two VFO's
- LCD Readout • 25W Out
- Memory of Up/Down Scan

Call today for Special Discount Price & Save $$

VHF/UHF Multimode Portables

FT-690R 50MHz. . . List $379
FT-290R 144MHz. . . List $399
FT-790R 430MHz. . . List $399

Call today for Special Discount Price & Save $$

FT-209RH
NEW High Tech
2mtr HT
5 Watt Output
NOW IN STOCK
CALL FOR YOUR SPECIAL PRICE

FT-2700RH
- Dual Band 2 Mtr & 440 MHz
- Compact Size
- 25 Watts
- Crossband Full-Duplex Capability

List Price $579
CALL FOR PRICE

TEXAS TOWERS

Telephone
(214) 422-7306

VISA MasterCard

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm

(Prices & Availability Subject To Change Without Notice)

OTHER SPECIALS

MIRAGE AMPLIFIER SALE!

B1016 $249

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
A1015	6M	Yes	10W	150W	20A	$249
B21	2M	No	2W	90W	18A	$ 79
B215	2M	Yes	2W	150W	22A	$299
B108	2M	Yes	10W	80W	16A	$159
B1016	2M	Yes	10W	160W	30A	$249
B1016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	90W	16A	$ 79
C106	220	Yes	10W	60W	10A	$179
L1012	902	Yes	10W	120W	24A	$259
D24	440	No	2W	40W	8A	$179
D1010N	440	No	10W	100W	20A	$289

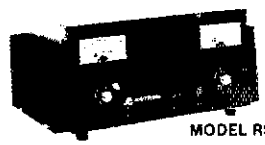
RC 1 Remote Control for Mirage Amplifiers $24
MP 1 and MP 2 Peak Reading Wattmeter $99

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	59
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

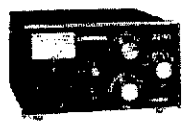
CP-1 COMPUTER PATCH
List $239.95 SALE $189.95!

CP1-20 . $219 CP1-64 . $219
MP-20 . $129.95 MP-64 $129.95
VIC-20 MBAText $79 C-64 MBAText $79

All AEA Keyers, Antennas & Accessories In Stock!

AMERITRON

AL-80A
SALE $679



AL-80A 1000W Output (single 3-500Z)	$679
AL-84 600W PEP Output (4-6MJ6 Tubes)	$379
AL-1200 1500W Output (3CX-1200 tube)	$1399
RCS-8 5 Pos Remote Antenna Switch	$119
ATR-15 1500W Antenna Tuner	$289

KANTRONICS

The Interface Reg $169.95 Sale $129.95
The Interface II Reg $269.95 Sale $239.95

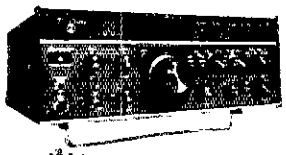
CHALLENGER $89.95 UNIVERSAL TU $189.95

Apple Amtor Soft/Hamtext	$39	VIC-20 Hamsoft	49
VIC-20 Amtor Soft	89	Hamtext VIC-20	99
Model 64 Amtor Soft	89	Hamtext Model-64	99
Apple Hamsoft	29	Atari Hamsoft	49
		TRS-80C Hamsoft	59

HAL SALE!
NEW RTTY/CW COMPUTER INTERFACES

CRI-100 List $249 SALE $229.95!
CRI-200 List $299 SALE $269.95!

TEN-TEC SALE!



CORSAIR II
Call For Information And Price

425 Titan New 3KW amplifier in stock-only $2195!

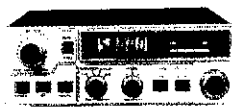
TEN-TEC
New 2M HT
Full Featured!
List $319 Sale $279.95!

4229 2KW Tuner Kit $189.95!

SANTEC

ST142 $249
ST222 $279
ST442 $289
LS202 $229

KDK FM2033
List $339 Sale $299



MFJ 1224 COMPUTER INTERFACE $89.95
MFJ-1229 COMPUTER INTERFACE $159.95

202B Noise Bridge	$59.95
250 2KW Oil Load	$35.95
422 Keyer/Paddle	$89.95
901 300W Tuner	$59.95
941D 300 W Tuner	$99.95
989 Deluxe 2KW	$299.95

OSCAR/VHF DX EQUIPMENT

TRANSCEIVERS

KENWOOD	
TR9130 2m All Mode 25W	$CALL
TR711A 2m Base 25W	$CALL
TR9500 70cm All Mode	$CALL
TR811A 70cm Base 25W	$CALL
ICOM	
IC290H 2m All Mode 25W	$469
IC271A 2m Base 25W	$599
IC271H 2m Base 100W	$789
IC490A 70cm All Mode 10W	$579
IC471A 70cm Base 25W	$689
IC471H 70cm Base 75W	$949
YAESU	
FT290R 2m All Mode 2W	$349
FT726R Triband All Mode	$779
726/70 70cm module	$269
726/SU Duplex Module	$95
FT790R 70cm All Mode 1W	$349
TEN-TEC	
2510 Satellite Station	$439
ROTORS	
Ken Pro KR500 Elev Rotor	$189
Ken Pro KR400 Azim Rotor	$149
Alliance HD73 Azim Rotor	$99
Hy-Gain Ham 4 Azim Rotor	$219

AMPLIFIERS

MIRAGE	
B108 2m 80W out/10W in	$159
B1016 2m 160W out/10W in	$249
B3016 2m 160W out/30W in	$199
D24 70cm 40W out/2W in	$179
D1010N 70cm 100W out/10W in	$289
THL CORP.	
HL110V 2m 100W out/3-10W in	$219
HL160/25 2m 160W out 25W in	$269
HL160V 2m 160W out/3-10W in	$289
HL45U 70cm 45W out/10W in	$179
HL90U 70cm 90W out/10W in	$319

ANTENNAS

CUSHCRAFT	
A144-20T 2m 20el cir pol	$75
416TB 70cm cir pol	$59
PS4 70cm Circularity Switch	$69
AOP1 2m/70cm Oscar Pack	$149
KLM	
2m-14c 14el 2m w/cir switch	$89
2m-22C 22el 2m w/cir switch	$119
435-18C 70cm w/cir switch	$119
HARDLINE & HELIAX	
½" Aluminum Hardline	$.79/ft
½" LDF-50 Heliax	$1.69/ft

OSCAR PACKAGE DEALS

PACKAGE #1

Ten-Tec 2510 Satellite Station	List $489
THL HL45U 70cm 45W Amplifier	List $199
THL HRA-2 2m Mast Mount Preamp	List $159
Cushcraft AOP-1 Antenna Package	List $219
Ken-Pro KR500 Elevation Rotor	List $189
Alliance HD73 Azimuth Rotor	List $219
South River 10ft Boot Tripod	List $59
TOTAL LIST PRICE	**$1533**

PACKAGE PRICE—ONLY $1249 DELIVERED!
SAVE OVER $300!!

PACKAGE #2

Yaesu FT290R 2m Transceiver	List $399
Yaesu FT790R 70cm Transceiver	List $399
Mirage D24 70cm 40W Amplifier	List $210
THL HRA-2 2m Mast Mount Preamp	List $159
Cushcraft AOP-1 Antenna Package	List $219
Ken-Pro KR500 Elevation Rotor	List $189
Alliance HD73 Azimuth Rotor	List $219
South River 10ft Boot Tripod	List $59
TOTAL LIST PRICE	**$1853**

PACKAGE PRICE—ONLY $1499 DELIVERED!
SAVE OVER $375!!

PACKAGE #3

Kenwood TR9130 or Icom IC290H	List $549
Kenwood TR9500 or Icom IC490A	List $649
Mirage D1010N 70cm 100W Amplifier	List $347
THL HRA-2 2m Mast Mount Preamp	List $159
KLM 2M-14C 14el 2m Satellite Ant	List $112
KLM 435-18C 70cm Satellite Ant	List $145
Ken-Pro KR500 Elevation Rotor	List $189
Alliance HD73 Azimuth Rotor	List $219
South River 10ft Boot Tripod	List $59
TOTAL LIST PRICE	**$2428**

PACKAGE PRICE—ONLY $1999 DELIVERED!
SAVE OVER $450!!

PACKAGE #4

Yaesu FT726R VHF/UHF Duplex Xcvr	List $899
430/726 70cm Module	List $289
SU/726 Sat Duplex Unit	List $109
Mirage D1010N 70cm 100W Amplifier	List $347
THL HRA-2 2m Mast Mount Preamp	List $159
KLM 2M-14C 14el 2m Satellite Ant	List $112
KLM 435-18C 70cm Satellite Ant	List $145
Ken-Pro KR500 Elevation Rotor	List $189
Alliance HD73 Azimuth Rotor	List $219
South River 10ft Boot Tripod	List $59
TOTAL LIST PRICE	**$2527**

PACKAGE PRICE—ONLY $2125 DELIVERED!
SAVE OVER $425!!

Select Low Loss Transmission Line, Coax, Rotor Cable and Power Supplies from Listing in our other advertisements.

We can substitute items and make any changes needed to fit your requirements. Please call for our Special Sale Prices and SAVE $$$.

TEXAS TOWERS

VISA MasterCard

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Telephone
(214) 422-7306
Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm

(Prices & Availability Subject To Change Without Notice)

THE NEW, IMPROVED, MADISON AD.

New rigs and old favorites, plus the best essential accessories for the amateur.

EQUIPMENT

KENWOOD

TH21AT, 2 Mtr HT, shirt pocket size..... In Stock
TH41AT 70 Cm HT,
Companion to TH21AT ..... In Stock
Accessories for TH21 & TH41..... In Stock
TS711A, 2m, All Mode 25 Watt ..... Call
SM220 Station Monitor..... Call
TR7930, TR7950..... Call
TM211A, TM411A..... Call
R1000, R2000 Gen. Cov. Receivers ..... Call
TR2600A, Spare PB26,
Battery Pack free w/Purchase..... Call
HMC-1 Headset, with TR2600A only 19.95

OTHER EQUIPMENT

ICOM R71A..... 649.00
ICOM IC02AT..... 299.95
Tentec 2591..... 269.00
Mirage amps ..... less 12%
Ameritron RCS-8 remote coax switch.... 119.00
Dentron GLT1000C Tuner, 1KW, PEP.... 175.00
YAESU FT203R..... Call

SERVICES

Alignment, any late model rig..... 50.00
Flat Fee Collins rebuild..... Call

ACCESSORIES

HEIL HC3/HC4/HC5 .. ..Stock
HEIL SS-2 Powered Spkr 49.50
HEIL BM10-Boom Mike/Headset 53.95
HEIL HCS Control Box/Interface 89.95
CES 510 Smart Patch..... 349.00
FLUKE 77
auto-ranging digital multimeter..... 115.00
Alpha Delta MACC-8 Surge Protector 73.00
Nye 8 wire phone patch 82.00
Shure 444D Mic..... 49.95
Bird 43 Wattmeter + accessories ..... In stock
Bird 4240-300 Adaptor/Connector Kit..... 70.00
Daiwa CN620B, 20-200, 2000W 109.95
Tripplite PR25 Regulated PS,
25A/16A Continuous 99.95
Tripplite PR40 25A Continuous..... 149.95
Gordon West Code Tapes 9.95
Collins 500Hz Filter, F455J05, new..... 95.00
Sanyo AA Nicads..... 2.00

KEYS

Bencher & Vibroplex ..... Less 10%

AEA

New Products In Stock
MP-1 CW-RTTY-AMTOR Interface..... 134.95
CP-100 (More features than CP-1)..... 319.95
ATU-1000
Military/Commercial Interface 1199.95
Dr. DX 89.95
Dr. QSO 79.95

AEA PACKAGES

MP-1 Interface..... 159.95
MBA-Text for Vic-20, C-64 ..... 109.95
AC-1 Power Supply..... 19.95
4 or 8 Pin Connector..... 4.95

TOTAL 294.80

Sales price, save $90..... $204.99

OPTIONS

MBA-TOR (Includes Amtor & features)..... 30.00
SWL Text (Special SWL Software) 30.00
TI-I Tuning Indicator..... 84.00

BOOKS

Hayden, Computer Programming
for Amateur Radio..... 16.95

TUBES

GE6146B..... 11.95
GE572B..... 62.00
Eimac 3-500Z..... 99.95
GE Industrial Tubes..... Call
GE 12BY7A..... 6.00

ANTENNAS

AR2XB, V2S, 2MCV-5, ISOPOLE..... 44.95
A3..... 219.95
A4..... 289.95
402CD..... 279.95
Omni 2J,
2M 1/2 Wave Mobile/Portable 39.95
Omni 400 1/2 Wave Mobile/Portable..... 39.95
Hustler 6BTV..... 129.95
G7-144..... 119.95
Cushcraft A147-11..... 49.95
215WB New, 15M, 2L Beam 79.95
A147-4..... 29.95
AOP-1, Complete Oscar Antenna..... 149.95
Butternut HF6V, 80-10 Vertical 125.00
HF2V, 80 & 40 Vertical 125.00

BARKER & WILLIAMSON

All Band B & W Dipoles..... Less 10%

HY-GAIN

HG52SS..... 1099
Ham 4 Rotator..... 219.95
Ham T2X..... 269.95
HY-Gain accessories shipped prepaid from the factory with tower orders.

KLM

KT34A..... 349.95
JV2X 2 Meter Vertical..... 32.00
2M13LBA..... 79.95
2M14C..... 88.00
2M22C..... 119.95
2M16LBX..... 99.95
432-30LBX..... 96.00
435-18C..Incl. CS-2..... 116.95
435-40X..... 159.95
432-16LB..... 68.00
HF World Class Series Antennas..... Call Don

OTHER ANTENNAS

Larsen Kulduck..... 17.00
Larsen Cellular Antenna .....Stock
Valor 75-10M complete mobil antenna 79.95
Avanti ASP151 3G thru glass 2M 33.00
Anteco 2M, 5/8, Mag. Mount, Comp..... 25.00
Metz SW-1, SWL Ant. 5Hz, ~54Mhz. 59.95

SURPLUS

CDE 2 Pole DT Relay,
10 Amp. Enclosed (New)..... 5.00
2.5A/1000PIV
Epoxy diode ..... 29c. Each or 19.00/1000

CELLULAR PHONES

EF Johnson US Made, excellent..... 1795.00

BELDEN

9913 low loss, solid center,
foil/braid shield ..... 50c/ft.
8214 RG8 Foam..... 43c/ft.
8237 RG8 ..... 40c/ft.
8267 RG213 ..... 52c/ft.
8000 14Ga stranded copper ant. wire.... 13c/ft.
8448 8 conductor rotor cable..... 31c/ft.
9405 Heavy duty, 2-16 Ga. 6-18 Ga. ..... 52c/ft.
9258 RG8x..... 19c/ft.
8403 Mic Cable, 3 condctr & shield..... 80c/ft.
100 Feet 8214 w/ends installed..... 45.00

ROHN

FK2548, 48ft, with guy bracket, rotor shelf,
eave bracket and M200H mast. 999.00
1/4" E.H.S. Guy cable,
Rohn US, 1000 ft..... 250.00
3/16" E.H.S. cable 210.00
1/4" Guy Cable, 6100# 7x7 strand..... 15c/ft
3/16 Guy Cable, 3700# 7x7 strand..... 12c/ft
Premax Ground Rods, Heavy Copper Plating,
3/8, 1/2, 5/8, 3/4 Inches dia.
4-8 ft. in Length..... Stock
3/8 x 6 E&J Turnbuckle..... 7.95
3/16" Wire Rope Clips..... .40
1/4" wire clips ..... .50
Porcelain 500D Guy Insulator (3/16)..... 1.69
Porcelain 502 Guy Insulators (1/4) 2.99

USED EQUIPMENT

All equipment, used, clean, with 90 day warranty and 30 day trial. Six months full trade against new equipment. Sales price refunded if not satisfied. Always Excellent Used Collins.

POLICIES.

Minimum order $10.00. Mastercharge, VISA, or C.O.D. All prices FOB Houston, except as noted. Prices subject to change without notice. Items subject to prior sale. Call anytime to check the status of your order. Texas residents add sales tax. D'ats all, folks.

DON'S CORNER

Effective with the July issue of QST, Madison will begin the operation of a dedicated MADISON computer bulletin board, the MADISON/LINE, operating over the phone lines at 300 and 1200 baud. MADISON/LINE will contain the latest pricing information on amateur equipment and accessories, staff-written equipment reviews, DX information, and other electronic goodies. You will be able to place orders with Madison through the MADISON/LINE computer using your computer and modem. Complete information on phone numbers, and modem communications parameters will be published in Don's Corner in the next issue of QST.

73 & Good DX,

DON

MADISON
Electronics Supply

3621 FANNIN
HOUSTON, TEXAS 77004
CALL FOR QUOTES **1-800-231-3057**

OLD TEXAS NUMBER: **1-713-658-0268**

NEW TEXAS NUMBER: **1-713-520-7300**
(AFTER JUNE 1)

ege, inc. Once in a Blue

13646 Jefferson Davis Highway
Woodbridge, Virginia 22191
Information & Service: (703) 643-1063

Store Hours: MTT: 10 a.m.—6 p.m.
WF: 10 a.m.—8 p.m.
Sat. 10 a.m.—4 p.m.

Order Hours: M-F 9 a.m.-7 p.m.
Sat 10 a.m.-4 p.m.

Send 3 22¢ stamps for a flyer.
Dealer Inquiries Invited

LACOMBE DISTRIBUTORS

Our associate store
Davis & Jackson Road, P.O. Box 293
Lacombe, Louisiana 70445
Information & Service: (504) 882-5355

VISA MasterCard

Terms: *No personal checks accepted. Prices do not include shipping. UPS COD fee, $2.35 per package. Prices are subject to change without notice or obligation. Products are not sold for evaluation. Authorized returns are subject to a 15% restocking and handling fee and credit will be issued for use on your next purchase. EGE supports the manufacturers' warranties. To get a copy of a warranty prior to purchase, call customer service at 703-643-1063 and it will be furnished at no cost.*

Hard to get through on our 800 number?

Call before 10 a.m. or after 5 p.m., or call one of our regular numbers. If you pay for the call and order, we'll credit your order with $1.

AT&T PHONE CENTER

Ask us about AT&T telephones, answering machines, business systems, medic alerts, and smoke alarms.

Ask about our

NEW SERVICE DEPARTMENT

In-store repairs on major brands

RADIO PACKAGE SPECIALS

Prices include UPS brown shipping in continental US

KENWOOD

TS940 with built-in antenna tuner, SP940 speaker, MC60A mic, and YK88C-1 and YK88A-1 filters
Save $289 . . . . . **$1999.00**

TS930 with built-in antenna tuner, SP930 speaker, MC60A mic, and 2 filters—YK-88C-1 and YK-88A-1
Save $290 . . . . . **$1799.00**

TS-430S with FM board, PS-430 power supply, and MC-42 mic
Save $230 . . . . . **$899.95**

ICOM

IC 751 HF XCVR with SM6 mic, FL-52A cw filter, PS-35 built-in power supply, and HM-12 hand mic
Save $270 . . . **$1435.00**

IC 745 HF XCVR with PS-15 power supply, SM6 mic, and HM-12 hand mic
Save $250 . . . . **$939.00**

IC 271A with PS-25 power supply and HM-12 hand mic
Save $110 . . . **$680.00**

YAESU

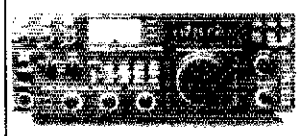
FT 757 GX HG XCVR with MD1B8 desk mic, MH1B8 mobile mic, FP 757 GX Power Supply
Save $247 . . . . **$899.95**

FT 726R SU 726 with 430 module, MD1B8 disk mic
Save $179 . . . . **$1199.00**

ICOM

HF TRANSCEIVERS

IC 745 769.95
HF XCVR/Gen Cov RCVR



IC 751 HF XCVR/Gen Cov RCVR 1179.00
With PS35 installed 1299.00

VHF/UHF

IC 271A all-mode 2m XCVR . . 599.00
NEW IC 3200 2m/440 . . . . . CALL
IC 271H 100-watt 2m XCVR . . 732.95
IC 27A 25-watt 2m tiny mobile 319.95
IC 27H 45-watt 2m tiny mobile . 359.95
IC 290H 2m XCVR 25w all-mode 479.95
IC 3200 mobile 2m/440 duoband 489.95

IC 471A all-mode 430-450 . . 689.95
IC 471H all-mode 75-watts out . . . CALL
IC 490A all-mode 430-40 XCVR. . 575.95
IC 47A 430-440 25-watt compact 415.95

REPEATERS

RP 3010 440 MHz 899.00
RP 1210 1.2 GHz . . . . . CALL
Call for repeater-mobile unit special packages

COMMERCIAL LAND MOBILE AUTHORIZED DEALER

Call for information

HANDHELDS

IC 02AT CALL
2m Handheld
10 Memories
Battery backup
Scanning; LCD readout
Offset in memory
Keyboard select PL tones
Uses 2AT accessories

IC 04A1 for 440. . . . 309.95

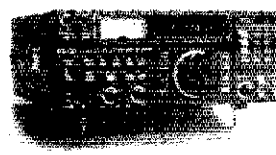
IC 2AT 2m HT/Touchtone 199.95
IC 3AT 220 MHz HT/Touchtone . 229.95
IC 4AT 440 MHz HT/Touchtone . 229.95

NEW ICOM

IC 735 HF Compact XCVR . . . CALL
Includes General Coverage
Available in May

MARINE

M12 12-ch Programmable HT . . 219.95
M2 76-channel Synthesized HT . 261.95
M80 25-watt all-channel Scanner 387.26
M80C Commerical M80 . . . . 429.95
M5 all-channel HT 325.95



SWL RECEIVERS

R71 . . . Limited Quantities 599.95
General Coverage Receiver

ACCESSORIES

Complete line of accessories in stock.
Call for our prices.

KENWOOD

HF TRANSCEIVERS

TS-940S HF Transceiver . . . CALL
With General Coverage Receiver
Available in May

TS-930S HF Transceiver . . . CALL
With General Coverage Receiver
Optional Automatic Antenna Tuner

TS-430S HF TransceiverSUPER SPECIAL
With General Coverage Reciever

TS-830S Transceiver . . . CALL
160-10 Meter With Power Supply

TS-530SP Transceiver 160-10 M . . CALL
With Power Supply & Notch Filter

RECEIVERS

R-2000, R-600, R-1000, R-11 . . CALL
General Coverage Receivers

VHF/UHF

TR-7950/7930 . . . . . CALL
2-meter Mobile Units, 45 or 25 Watts

TR-9130 2m all-mode 25W . . . CALL

TM-211A or TM-411A . . . . . CALL
2m or 70cm FM Mobile Transceivers

TM-201A 2m, 25-watt . . . . . CALL

TM-4000A . . . . . CALL
Dual Band 2m/70cm FM, 25 Watts

TS-711A or TS-811A . . . . . CALL
2m or 70cm All-mode Transceivers
Useable as mobile or base station

HANDHELDS

TR-2600A 2m FM Transceiver . . . CALL
With memories, LCD, scan

TH-21A, 21AT/TH-41A, 41AT. . . CALL
2m or 70cm Ultra-compact FM XCVRs
Pocket size. Optional touchtone pad

BEARCAT

260 16-ch mobile 259.95
201 16-channel/aircraft . . . 179.95
180 8-band/16-ch 164.00
3020 40-ch/aircraft 289.95
210XL 199.95
300 50-ch scanner/aircraft . . 347.00

UNIDEN

Radar Detectors . . . . . Call
CB Radios . . . . . Call

SONY

2002 SWL Receiver 209.95
NEW 2010 SWL Receiver . . . 279.95
4800 SWL Receiver 66.00
7600A SWL Receiver 139.95

PANASONIC

RF 3100 SWL Receiver 268.00
RF 9 SWL Receiver 79.95
RFB 300 SWL Receiver 194.95

HAL

ST 6000 RTTY Demodulator . . . 895.50
CT 2200 Communications Term . . 799.95
KB 2100 Keyboard for CT 2200 . . 145.95
CWR 6850 Telereader 749.95
CRI 100 RTTY/CW Interface . . 214.95
CRI 200 RTTY/CW Interface . . 259.95

PACKET

AEA PKT1 Packet Controller . . 459.95
Kantronics Packet Commander . . 339.95

HARDWARE

MFJ 1224 with MFJ C-64/V-20 Soft 179.95
MFJ New 1229 . . . . . 159.95
Kantronics Challenger Interface . 89.95
Kantronics Interface II . . . 210.95
Kantronics UTU Interface . . . 169.95
AEA CP-1 Interface 179.95
AEA CP-100 Interface 284.95
AEA MP1 Micropatch 119.95

SOFTWARE

Kantronics Hamtext
Vic-20, C-64, Apple, Atari . . Call

Kantronics Hamsoft
Vic-20, Apple, Atari, TRS-80C, TI-99 Call

Kantronics Hamsoft/Amtor
Vic-20, C-64, TRS-80 color, Atari 69.95

Kantronics Amtorsoft
Vic-20, C-64 . . . . . 79.95
Apple 119.95

Microlog Air Disk
Vic-20 and C-64 Disk 39.95
Cartridge 56.95

AEA
MBA Text Vic-20 or C-64 . . . 79.95
MBA-for 64 . . . . . 89.95
Marstext Vic-20 or C-64 . . . 79.95
SWLText C-64 . . . . . 83.95

Dr. DX By AEA 99.95

PACKAGES

Microlog AIR-1 Vic-20/C-64 . . 179.95
AEA CP1 for Vic-20/C-64 . . . 209.95
AEA Micropatch for Vic-20/C-64 . 129.95
AEA Microamtor Patch MAP-64 . 119.95

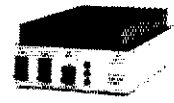
HELP WANTED

Sales Manager. Must be licensed Ham. Washington, D.C. area. Salary plus commission and fringe benefits. Send resume, job experience, and salary requirements.

TE SYSTEMS

RF AMPLIFIERS

With receive
GaAs FET Preamplifier
for superior weak signal reception with improved strong signal intermod rejection.



1410G 2m Amp 10W in-160 out . 309.00
1412G 2m Amp 30W in-160 out . 269.00
4410G 440 Amp 10W in-100 out . 309.00
4412G 440 Amp 30W in-100 out . 309.00

ege, inc.

For Orders and Quotes Call Toll Free: 800-336-4799
Virginia Orders and Quotes Call Toll Free: 800-572-4201

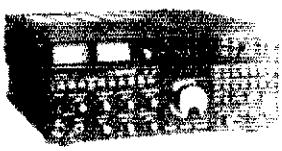
Moonbounce

YAESU

HF TRANSCEIVERS

NEW FT 757 HF XCVR with mic . . 699.95
with General Coverage RCVR
includes CW keyer, AM/FM, CW filter

FT 77 with mic . . . . . SPECIAL 510.95
Compact HF XCVR



FT 980 CAT System . SPECIAL 1439.95
AC Power Supply, Full Break-in CW,
SSB/AM/FM/FSK, Speech Processor

HANDHELDS

FT 209RH 2m Handheld . . Special 299.95
FT 203 2m HT with TTP, VOX . . 229.95
FT 203 2m HT with VOX 199.95
All accessories in stock including:
speaker mike, leather case, extra battery
pack, base charger, & mobile charger

VHF/UHF

NEW FT 2700 2m/440 duo-band . 519.95
NEW FT 270RH 2m FM mobile . . 379.95

FT 726R For 2m 779.95
(Optional modules for 6m, 430, 440 MHz)
Great for Satellite Work

SWL RECEIVER

NEW FRG 8800 SWL Receiver . 519.95
VHF Converters, Active Antennas available

COMMERCIAL LAND MOBILE AUTHORIZED DEALER
Call for information

SANTEC

ST-142
Handheld . . . 249.95
STLC Leather Case with Strap . . . 34.95
SM3 Speaker Mic 34.50
New ST-400ET 440 MHz HT . . 213.95
New ST-200ET 220 MHz HT . . 275.95

KDK

NEW FM2033 2m 25-watt 259.95

Complete Line of Accessories in Stock
—Call for Quotes—

WELZ

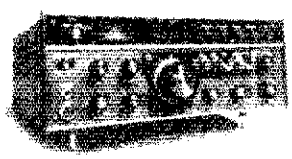
TP5X Handheld watt meter 18.95
SP10X 1.8-150MHz Watt Meter . 32.95
SP250 1.6-60MHz Watt Meter . . 65.00
SP600 1.6-500MHz Watt Meter . 139.95

TOKYO HY-POWER AMPLIFIERS AND TUNERS

HL30V 2m Amp 2-30 FM . . . 59.95
HL32V 2m all-mode Amp 2-30 . . 74.95
HL82V 2m Amp & Preamp 10-80 . 139.95
HL160V 2m 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
HC200 300-watt, Meter/Switch . . 86.95
HC2000 2000-wt, Meters/Switch . 295.95

TEN-TEC

2591 2m Synthesized Handheld . 259.95
Century 22 CW Xcvr 350.00
2510 Model B 410.95
Satellite Station for Oscar 10
TITON 425 HF Amp 1.5 kW . . . CALL
225 Argosy Power Supply . . . 179.00
260 Power Supply for Corsair . . 173.50
229 1kW Tuner/Meter 249.95
4229 1kW Tuner Kit 179.95
425 HF 1.5kW Amp . . . . . CALL
2991 Battery Pack for 2591 . . . 39.00
2700 Speaker Mic for 2591 . . . 39.00
—All Accessories in Stock—



CORSAIR

Model 560—999.95

Full line of accessories in stock
for Corsair and Argosy, power supplies,
VFOs, and filters. Call for Quotes

DIGITAL ARGOSY II

MODEL 525D—519.95

Regency®

SCANNERS

HX1000 20-ch
Handheld . 215.95

NEW HX2000
Handheld . 359.00
800-900 MHz

New MX4000 mobile 30-900 MHz . . Call
R1050 10-ch, 6-band . . **Special** 99.95
MX3000 30-ch, 6-band mobile . 189.95
MX5000 20-ch 25-512 MHz cont. 357.95
MX7000 25 MHz-1.2 GHz 445.00
Z30 30-ch, 6-band 159.95
Z10 10-ch, 6-band 136.95

POLARIS® MARINE ELECTRONICS

Marine VHF Radios
Now in stock . . . . . CALL

ANTENNAS & TOWERS

CUSHCRAFT

A3 3-element 10-15-20m . . . 205.00
A4 4-element 10-15-20m . . . 264.95
R3 10-15-20m Vertical 256.95
214B SSB/215WB FM 2m Boomers 73.00
AHX-2B 2m Ringo Ranger . . . 34.95
A3219 2m Boomer 88.00
10-4CD 4-element 10m 104.95
15-4CD 4-element 15m 118.95
40-2CD 2-element 40m 274.95
Other Cushcraft models available . CALL

KLM

KT34A 4-element 10-15-20m . . 334.95
KT34XA 6-element 10-15-20m . . 479.95
2m-11X 11-element 2m 59.95
2m-16LBX 16-element 2m . . . 91.95

MOSLEY

CL-33 3-element Triband Beam . 265.95
TA-33 3-element 10-15-20m . . 239.95
Pro 37 7-element 10-15-20m . . 465.95

HUSTLER

6-BTV 10-80m Vertical with 30m . 128.95
5-BTV 10-80m Vertical 108.95
4-BTV 10-40m Vertical 87.95
G6-440 440 MHz Base Vertical . . 99.95
G7-144 2-meter Base Vertical . . 115.95
G6-440 440 MHz Base Vertical . . 96.95
MO-1/MO-2 Masts 21.50
BM-1 Bumper Mount 14.95

MOBILE RESONATORS	Standard	Super
10 and 15 meter	11.95	17.95
20 meters	15.50	21.85
30 and 40 meters	17.95	25.95
75 meters	19.95	36.95

HY-GAIN ANTENNAS

391S TH7DX 7-ele 10-15-20m . . 445.00
393S TH5DX 5-ele 10-15-20m . . 406.95
395S Explorer 14 10-15-20m . . 305.00
203S 3-element 2-meter Beam . . 21.95
208S 8-element 2-meter Beam . . 37.95
214S 14-element 2-meter Beam . . 46.95
BN86 Beam Balun 21.95
V2S 2-meter Vertical 46.95
V4S 440 MHz Vertical 53.95

AEA ISOPOLES

144 2-meter Antenna 41.95
220 220 MHz Vertical 41.95
440 440 MHz Vertical 57.95

ANTENNAS FOR OSCAR

Cushcraft 416TB Twist 58.95
Cushcraft A14410T 10-ele . . . 46.95
Cushcraft A14420T 20-ele . . . 64.95
Cushcraft AOP1 Package . . . 137.95
KLM 2m-14C 2m 14-ele Circular . 88.95
KLM 435-18C 18-ele Circ Polar . 111.19
KLM 2m-22C 22-ele Circ 2m . . 109.00

MORE ANTENNAS

AVANTI HM 151.3G 2m On-glass . 30.95
LARSEN LM-150 5/8 Mag Mount . 38.95
MINIQUAD HQ-1 . . . . . 144.95
BUTTERNUT HF6V 10-80m Vert . 114.95
BUTTERNUT 2MCV5 2m 37.50
VOCOM 5/8-wave 2m Handheld . 14.95

Cablewave Hardline . . . CALL

Unarco-Rohn

Self-supporting towers:

HBX40 40-feet with Base . . 198.00
HBX48 48-feet with Base . . 264.00
HBX56 56-feet with Base . . 335.00
HDBX40 Higher load with Base . 248.00
HDBX48 Higher load with Base . 325.00
Other BX, HBX, HDBX in stock

Guyed foldover towers:

FK2558 58-feet, 25G 940.00
FK4554 54-feet, 45G . . . 1296.00
Other sizes at similar savings
Foldovers shipped freight paid.
10% higher west of the Rockies.

Straight Sections:

20G Straight Section 36.50
25G Straight Section 48.95
45G Straight Section 109.00

Complete Tower Packages:

	25G	45G
40'	499.95	875.95
50'	549.95	989.95
60'	599.95	1099.95

Each package includes top section, mid section, base, rotor shelf, guy brackets, guy wire, turnbuckles, equalizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse.

HY-GAIN TOWERS

HG37SS 37-feet tall 737.95
HG52SS 52-feet tall 1075.00
HG54HD 54-feet/higher load . . 1675.00
HG70HD 60-feet/higher load . . 2675.00
Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all

Tri-Ex

W36 36-feet tall 549.00
WT51 51-feet tall 929.00
LM354 54-feet/higher load . . 1575.00
DX86 86-feet/motor/highest load . Call
Shipping not included. Shipped direct from factory to save you money

CABLE BY SAXTON

RB213 Mil Spec . . . . . 29¢/ft
RG8/U Foam 95% Shield . . . 25¢/ft
8-wire Rotator 2 #18, 6 #22 . . 17¢/ft
Mini-8 95% Shield . . . . . 13¢/ft

ROTATORS

Alliance HD73 . . . . . 96.95
Hy-Gain CD45 II 145.95
Hy-Gain Ham IV 229.95
Hy-Gain Tailtwister T2X . . . 269.95
Hy-Gain Heavy-duty 300 . . . 515.95
Kenpro KR500 Elevation Rotator . 169.95

MIRAGE

B23A 2m Amplifier 2-30 . . . . 84.95
B1016 2m Amplifier 10-160 . . 242.95
B3016 2m Amplifier 30-160 . . 199.95
D1010 10-100 Amp for 430-50 . 269.95
D1010N UHF Amp/N connectors . 279.95
B215 2m Amp: 2 in, 150 out . . 245.95
A1015 6m Amp: 10 in, 150 out . 242.95

AMERITRON HF AMPS

ATR15 Ant Tuner 1500 watt . . 289.95
ATR10 Ant Tuner 1 kW 242.95
RCS8 Remote Coax Switch . . . 113.95
NEW AL1200 1.5 kW Amp . . . 1399.95
AL80 1200 watt Amp 589.95
AL84 HF Amp 160-15 . . . . . 389.95

AMP SUPPLY

LA 1000A 160-15m Amp . . . 389.95
LK 500NT HF Amp no tune . . 1185.00
AT 1200A 1200 PEP Tuner . . 169.95
LK 500ZA 2.5 kW hipersil . . . 999.00

This is a partial list—
IF YOU DON'T SEE WHAT YOU WANT...CALL

DAIWA

LA-2035 2m Amplifier, 2 in, 30 out 68.95
LA-2035R 2m Amp with preAmp . 74.95

VOCOM AMPLIFIERS

2 watts in, 30 watts out 2m Amp . 69.95
2 watts in, 60 watts out 2m Amp . 109.95
2 watts in, 120 watts out 2m Amp 169.95
200mW in, 30 watts out 2m Amp . 84.95

KENWOOD TL922 2kW . . . CALL

ASTRON POWER SUPPLIES

RS7A	49.95	RS20M	104.95
RS12A	69.95	RS35M	149.95
RS20A	88.95	VS20M	124.95
RS35A	132.95	VS35M	169.95
RS50A	189.95	RS50M	209.95

BEN MICHAEL CLOCKS

173B 24-hour Digital 30.95
173C 24-hour Digital 24.95
963A 10" 24-hour Wall Clock . . 29.95
973A 12" 24-hour Wall Clock . . 38.95

B & W

375 6-position Coax Switch . . 22.50
376 5-position Coax Switch . . . 22.50
425 1 kW Low Pass Filter . . . 25.95
593 3-position Coax Switch . . . 24.75
595 6-position Coax Switch . . . 28.95
AP-10 5-band Apartment Antenna . 39.95
370-15 All-band Dipole Antenna . 129.95

DAIWA/MCM/J.W. MILLER

CN-520/CN-540 Meters . 59.95/69.95
CN-620B Meters 106.00
CN-630 Meter 126.00
CN-720B 2kW HF Watt Meter . . 120.00
CNW-419 Antenna Tuner 500 W . 174.95
CNW-518 Antenna Tuner 2.5 kW 279.95

BENCHER PADDLES

Black/Chrome 37.95/47.95

AEA KEYERS

CK-2 Contest Keyer 146.95
BT-1 Morse Trainer 79.95
KT-2 Trainer/Keyer 114.95
KT-3 Trainer/Keyer 114.95
MM-2 Morsematic Keyer 172.95

TELEX HEADPHONES

Procom 250 Headset/Mic . . 99.95
Procom 450 Headset/Mic . . . 49.95

MFJ PRODUCTS

989 3 kW Antenna Tuner . . . 285.95
962 1.5 kW Tuner switch/meter 185.95
949B 300-watt Deluxe Tuner . . 122.00
941D 300-watt Tuner swch/meter 89.95
1020A Active Antenna 69.95
202 Noise Bridge 48.95
752B Dual Tunable SSB/CW Filter 79.95
Keyers—407, 422, 484 . . . . CALL
Other MFJ products in stock . CALL

AMPHENOL CONNECTORS

83-1SP PL259 silver	1.10
83-1SP 1050 Nickel PL259	0.75
8261 Type N RG8	2.50
2900 SO239-BNC	2.99
3112 BNC RG59	1.35
312 BNC RG58	1.25
83-1RB Reducer RG58	0.25
83-1RB8 Reducer RG59/mini 8	0.25
83-1R UHF panel	0.79

Special discounts on 100-piece purchases

B&K PRECISION

TEST EQUIPMENT

Oscilloscopes
Digital Multi Meters
Telephone Test Equipment
Function Generators
Now in stock . . . . . CALL

For Orders and Quotes Call Toll Free: 800-336-4799
Virginia Orders and Quotes Call Toll Free: 800-572-4201

ege, inc.

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.**

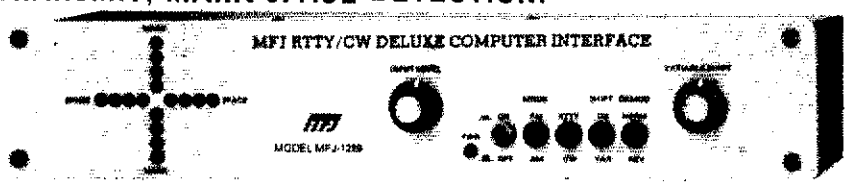
MFJ ENTERPRISES, INC.
Box 494, Mississippi State, MS 39762

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

NEW FROM MFJ

MFJ'S MOST ADVANCED RTTY/ASCII/AMTOR/CW COMPUTER INTERFACE HAS FM, AM MODES, LED TUNING ARRAY, RS-232 INTERFACE, VARIABLE SHIFT TUNING, 170/850 Hz TRANSMIT, MARK-SPACE DETECTION.



MFJ RTTY/ASCII/CW software on tape, cables for C-64/VIC-20.

MFJ-1229
$179.95

Engineering, performance, value and features sets MFJ's most advanced RTTY/ASCII/AMTOR/CW computer interface apart from others.

FM (limiting) mode gives easy, trouble-free operation. Best for general use, off-shift copy, drifting signals, and moderate signal and QRM levels.

AM (non-limiting) mode gives superior performance under weak signal conditions or when there are strong nearby stations.

Crosshair mark-space LED tuning array simulates scope ellipse for easy, accurate tuning even under poor signal-to-noise conditions. Mark and space outputs for true scope tuning.

Transmits on both 170 Hz and 850 Hz shift.

Built-in RS-232 interface, no extra cost.

Variable shift tuning lets you copy any shift between 100 and 1000 Hz and any speed (5-100 WPM RTTY/CW and up to 300 baud ASCII). Push button for 170 Hz shift.

Sharp multi-pole mark and space filters give true mark-space detection. Ganged pots give space passband tuning with constant bandwidth. Factory adjusted trim pots for optimum filter performance.

Multi-pole active filters are used for pre-limiter, mark, space and post detection filtering. Has automatic threshold correction. This advanced design gives good copy under QRM, weak signals and selective fading.

Has front panel sensitivity control.

Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output.

Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground.

FSK keying for transceivers with FSK input.

Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack.

Kantronics software compatible socket.

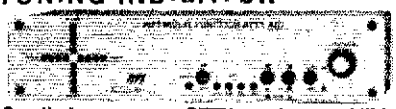
Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch.

Metal cabinet. Brushed aluminum front. 12½x2½x6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, $9.95.

Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ MULTI-FUNCTION TUNING INDICATOR

MFJ-1221
$79.95



Greatly improve your RTTY copying capabilities. Add a crosshair LED Tuning Indicator that makes tuning quick, easy with pin-point accuracy. **Add** mark and space outputs for scope tuning. **Add** LEDs that indicate 170, 425, 850 Hz shifts. Great for copying RTTY outside ham bands. **Add** sharp mark and space filters to improve copy under crowded/weak conditions. 170, 425, 850 Hz shifts. **Add** Normal/Reverse switch to check for inverted RTTY without retuning. **Add** output level control to adjust signal into your terminal unit. **Add** a limiter to even out signal variation for smoother copy.

Unit plugs between your tuner and receiver. Mark is 2125 Hz, space is 2295, 2550 or 2975 Hz. Measures 10x2x6 in. and uses floating 18 VDC or 110 VAC with AC adapter, MFJ-1312, $9.95.

24/12 HOUR CLOCK/ID TIMER

MFJ-106
$19.95

Switch to 24 hour UTC or 12 hour format! Battery backup. ID timer alerts every 9 minutes after reset. Red .6 in. LEDs. Synchronizable to WWV. Alarm, Snooze function, PM, alarm on indicators. Gray/Black cabinet. 110 VAC, 60 Hz.

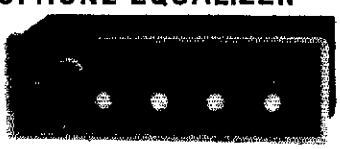
MFJ ELECTRONIC KEYER

MFJ-407
$69.95

MFJ-407 Deluxe Electronic Keyer sends iambic, automatic, semi-auto or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8 to 50 WPM. Speed, weight, tone, volume controls. On/Off, Tune, Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery, 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

MICROPHONE EQUALIZER

MFJ-550
$49.95



Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ±12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches. 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ ANTENNA BRIDGE

MFJ-204
$79.95

Trim your antenna for optimum performance quickly and easily. Read antenna resistance up to 500 ohms. Covers all ham bands below 30 MHz. Measure resonant frequency of antenna. Easy to use, connect antenna, set frequency, adjust bridge for meter null and read antenna resistance. Has frequency counter jack. Use as signal generator. Portable, self-contained. 4x2x2 in. 9 V battery or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ PORTABLE ANTENNA

MFJ's Portable Antenna lets you operate 40, 30, 20, 15, 10 meters from apartments, motels, camp sites, vacation spots, nearly any electrically clear location where space for a full size antenna is a problem.

A telescoping whip (extends to 54 in.) is mounted on self-standing 5½x6¾x2¼ inch Phenolic case. Built-in antenna tuner, field strenght meter, 50 feet RG-58 coax. Complete multi-band portable antenna system that you can use nearly anywhere. Up to 300 watts PEP.

MFJ-1621
$79.95

MFJ 24 HOUR LCD CLOCKS

$19.95 **MFJ-108**

$9.95 **MFJ-107**

Huge 5/8 inch bold black LCD numerals make these two 24 Hour clocks a must for your shack. Choose from a dual clock that features seperate UTC and local time display or a single clock that displays 24 Hour time. **Mounted in a brushed aluminum frame,** these clocks feature huge 5/8 inch LCD numerals and a sloped face for across the room viewing. Easy set month, day, hour, minute and second function. Clocks can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

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

NEW 3-D designs, including Space Shuttle, samples 50¢, 3-D QSL Co., P.O. Box D, Bondsville, MA 01009.

QSL's $12.95 UP, WA4PRE, Jim's Printing Service, 2155 Young, Memphis, TN 38104 S.A.S.E.

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.

STAMP brings QSL catalog of new designs and samples, from $7 up. 22 years custom printing. WA6SOK, 4056 Acacia, Riverside, CA 92503.

BUTTONS. Your name and call: $2 ppd. SASE for quote on custom/quality orders. T. Fletcher, POB 1354, Pearl City, HI 96782.

PERSONALIZED "Ham Shack" Memo Pads - Cheap as paper. Free information. McNichols, Dept. Q-1, 35 E. Golf Terrace, Arlington Heights, IL 60005.

QUALITY QSLs, Samples 50¢. OLDE PRESS, WB9MPP, Box 1252, Kankakee, Illinois 60901.

ANTIQUE-VINTAGE-CLASSIC

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels, "Skyrider Commercial," early transmitters — HT-1, HT-2, HT-8, etc., other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell, Austin, TX 78745.

WANTED; old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

MANUALS for most Ham gear made 1937/1972, plus Kenwood. Our 1985 catalog is $1 USA and required for ordering. Over 2,000 models listed. HI-MANUALS, P.O. Box E802, 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.

WANTED: PRE-1923 radios, pre 1940 T.V. Entire collections bought. Top cash paid immediately. Phil Weingarten, 67-61 Alderton St., Flushing, NY 11374, 718-896-3545.

WANTED: radios, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201. 818-242-8961.

MICROPHONES used in radio/TV broadcasting prior to 1960 wanted for archive. Write: James Steele, NAB, Box 39190, Washington, DC 20016.

WANTED: EARLY telegraph instruments for my collection. Landline keys, spark keys, miniature keys, call boxes, sounders, meters, etc. Any instruments made in California. Pre-1910 books, catalogs, and franks. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

SCHEMATICS: Radio receivers 1920's/60's. Send Brandname, Model No., SASE. Scaramella, Box 1, Woonsocket, R.I. 02895-0001.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

WANTED: OLD tubes, amplifiers, speakers, Western Electric, RCA, Cunningham, DeForest, McIntosh, Marantz. 713-728-4343. Maury, 11122 Atwell, Houston, TX 77096.

WANTED: COMMERCIAL amateur equipment made before 1940. Especially Collins 30A/B/G transmitters. National SW2/5, AGS/X. State cost and condition. Buehlmann, N4IQA, 1314 Chaney Road, Raleigh, NC 27606.

NCL-2000 LAST PRODUCTION parts, tank coils, bandswitches, relays, switches, matched 8122s, etc. SASE for price list. Maximillan Associates, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: INVADER; HT-32B; HX-500; GSB-100; GSB-101. Must be mint without mods. K9ZTV. 709 S. College, Aledo, IL 61231.

FROM THE ESTATE of George Grammer, W1DF: QST for Dec. 1915 (Vol. 1 No. 1) Oct. 1916, May 1917, June 1917, July 1917, August 1917, June 1919, July 1919 and 1961 through 1975. QST hardbound copies 1920 through 1967. ARRL Handbooks 1940 through 1964. Proceedings of the IEEE 1931 through 1965. Prefer to dispose in lots rather than single issues. LC c/o ARRL, 225 Main St., Newington CT 06111. Make offer.

NEED COLLINS Parts: kc dials for 32V and 75A-2; kc dial for KW-1. Mine have discoloured. 353C-31 and 353C-14 mechanical filter plug-ins for 75A-1; 35C-2 LPF; spinner knob for 75A-4 (don't need the 4-1 reduction gear); skirted knob for 62S-1 freq. select control; 55G-1 preselector; F455FA08 or F455FA05 filters; want original and unmodified 310B-3 exciter, looking for 32V-2 transmitter in good shape for local (more or less) pickup within an hour's drive of Hartford or ??? Have you anything to trade? Contact AC1Y c/o ARRL Hq. or call 203-667-2494 days 8-4.

WANTED: RADIOS, tubes pre-1937 for my collection. KC5PC, HCR-3, Box 418, Deer River, MN 56636.

NATIONAL and RME early equipment wanted. Also looking for early Amateur Transmitters. AD1E, Box 73, Kennebunk, ME 04043. 207-985-7243.

WANTED: EACH MAKE and model of Bug manufactured before 1935. Vibroplex, Martin, Boulter, MacDonald, etc. Also all spark and Boston key models. Need pre-1900 telegraph keys, sounders, etc. Neal McEwen, 1128 Midway, Richardson, Tx 75081. Visitors welcome. 73 de K5RW.

WANTED: 1924 RADIOLA Model 111A, RCA microphone, 77-DX, for nostalgia only. Not for collection but preservation. KA6BYK, Smith, 400 Caudill Rd., Watsonville, CA 95076. 408-724-4311.

WANTED: HALLICRAFTER, working condition. PS 150-120 AC, Leon, K3ZKQ.

SELL: HAMMARLUND Super-Pro SX-200 with original speaker and power supply - about 40 years old. Looks and works great. Also Hallicrafters SX-117, National NC-173 and RME VHF-152A. Best offer. Bill, W9VA, 312-945-1564.

SELL: HALLICRAFTERS SX-73, Hammarlund SP-600-JX working receivers, parts and rebuildable receivers. Heath/ES-400 analog computer. Wanted: BC-939 antenna tuner, manuals, vacuum capacitor for BC-610G transmitter. Hallicrafters SX-73 band 1-5-6 parts. Peripheral and ham accessories for HP-85 computer. Tektronics 555 Supply. Schott. KA9IMZ, 2203 Montague Rd., Rockford, IL 61102, 815-968-4060.

SELL: SX-111. Manual. W4LBQ, 402-572-6143.

NEED HALLICRAFTERS SX-28 or SX-28A. Will pay $100 if in good working condition. Dr. Martin, 98-427 Kilihea Way, Aiea, HI 97601.

38 RADIO and QST Magazines, '36-'47. Make offer. N6AYT, 10200 Silver Knolls, Reno, NV 89506. 702-972-4019.

COLLINS 75A-4 with 0.5 and 2.5 kHz filters and KWS-1 (late model) both excellent condx $285 and $325 respectively. Both with spinner knob, manuals, cabling AF6Z, 319 1/2 W. Sola St., Santa Barbara, CA 93101. 805-962-2998.

COLLINS 75A-4 and KWS-1 with power supply in mint condition. You pay shipping. $650. KA0FXH, Ted Ayres, 303-779-8553.

WANTED: Western Electric D.B. carbon microphone model 600A, 600B or 387W complete with ring and spring desk stand with or without covers. Universal D.B. carbon microphone "Stretched Diaphragm Type" Cr. 1930-38 Model "X" or Model "BB" or Model "KK" or Broadcast model with ring and spring desk stand, and a D.B. microphone transformer to match above. W. H. Martin, W8MHO, Rt. 1 - Box 1030, Harpers Ferry, WV 25425.

KELLOGG, WORLD, A-K 42 sets, others. Parts. No dealers, no shipping. Chapdelaine, W1ZPA, 603-622-4271.

HAMMARLUND SUPER PRO Model 600. Needs fixing but at $75 a bargain! Norman Lambert - 617-272-2547.

FOR SALE: HALLICRAFTERS SX-100 communication receiver. Collectors item. Good condition. $139. W4NEX, G. E. Nemetz, 8202 Beechwood Dr., Lynchburg, VA 25402, 804-239-7789.

WANTED: HAMMARLUND HQ-170, 3400-3600 Volt transformer. Marine Radio, Heathkit Amplifier. KA9ISA, 1830 - 46 St., Moline, IL 61265, 309-797-3332.

I AM LOOKING for the Hallicrafters Model #SR-400A Cyclone II with A.C. and D.C. power supply and mobile rack for SR-400A transceiver. And Hallicrafters Model 7" T.V. Set, TU-7 made in 1964 or before? Same cabinet as a SX-101A. Tnx - 73 - K9TYX, Safet Delkic, 4300 W. Lake Ave., Glenview, IL 60025. Ph. 729-5006.

WANTED: Pre-WWII AM transmitter, commercial or homebrew, approximately 1-kW: also non-inductive power resistors for 50 ohms balanced load, 1-kW minimum. Nagle, 12330 Lawyers, Herndon, VA 22071.

COLLECTORS: SCHEMATICS and repair info for most commercial receivers, test equipment, phonographs manufactured 1919-1949. Don Weems, K5BJN, Route One, Box 695, Eureka Springs, AR 72632.

General

ROCKWELL-COLLINS 437B-1 UHF Antenna 225-400 MHz 1 kW new unused, 2/3 off Collins price. $1000. Sid Lipkowitz, VE4ZS/3, 12 Westgate Blvd., #1, Downsview Ont. CANADA M3H1NG 1-416-633-4931.

COMMERCIAL 10 kW linear amplifier 2-30 MHz Racal model TA184C uses 4CX10000D, manual or automatic tune with USB/LSB/AFSK/AM/CW exciter Racal model MA228F including RACAL MA250G3 digital frequency synthesizer. Very impressive setup, original cost over $100,000. VE3KHB, 613-283-0637.

ALPHA 77SX $4,500. Call VE3UH Mon-Tue after 1900 Hrs. 416-659-7770.

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.

HAM TRADER Yellow Sheets, in our 23rd year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate — no long wait for results! SASE for sample copy. $10 for one year (24 issues). P.O.B. 356Q, Wheaton, IL 60189.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

UHF AMPLIFIERS (432 MHz) 1500 Watts output. Parts or custom built. W2GN, 518-477-4990. Note: ARCOS UHF/VHF amplifier kits and parts available from Harold "Connie" Bramstedt, 6104 Egg Lake Road, Hugo, MN 55038. 612-429-9397.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

MOBILE Ignition Shielding gives more range, no noise. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

HOSS-TRADER, Ed Says. Shop Around for the best price then telephone the Hoss last, for the best deal.
New Display Kenwood 430-S transceiver $639. New Display ICOM IC-2AT $169. Display Azden PCS-4000 $259. New Display ICOM-730 transceiver regular $829, cash $499. New Display ICOM-751 transceiver regular $1379, cash $1095. New Display ICOM-745 transceiver regular $999, cash $695. New Display ICOM 02-AT regular $349, cash $268. New Display Kenwood TS-530-SP transceiver $579. New Displayed MB-VA 3 kW Nye Viking Antenna Tuner, regular $585, cash $438. New 2500 Watt Amp Supply linear with tubes/Hypersil transformer regular $1099, cash $879. VISA/Master Card Accepted !!! Moory Electronics Company, P.O. Box 506, DeWitt, ARK 72042, 501-946-2820.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

THE DX BULLETIN — America's Oldest Weekly Amateur Radio Publication. Large S.A.S.E. for samples. Box DX, Andover, CT 06232.

FAST, ACCURATE, readable, nonsensational — The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send $19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

KEYER KITS, $15. SASE for information MSC, 1304 Toney Drive, Huntsville, AL 35802.

EIMAC-3-500Z's. New-very limited quantity! $85 each, cash, COD, MO. Add $3.50 per tube for shipping and handling. I pay cash or trade for all types of transmitting or special purpose tubes - Mike Forman, 3740 Randolph, Oakland, CA 94602 415-530-8840.

AMRAD (Amateur Radio Research and Development Corporation) is a nonprofit organization of experimenters in packet radio, spread spectrum and digital communications. Monthly newsletter. Mail $15 to AMRAD, 5829 Parakeet Drive, Burke, VA 22015. Add $2 for Canada, Mexico; $8 overseas air, $2.30 surface.

QRZ DX weekly newsletter. DX Tips For Big Guns And Little Pistols. Send 20c stamp for sample. P.O. Box 834072-Q, Richardson, TX 75083.

TOWER ACCESSORIES - Stock items include Standoff Brackets SO-1 $34.50, SO-2 $64.50 and new SO-3 for Business Band verticals $79.50. PO-1 Pully, $8.50. Mast Adapters MA-2 $22.50 and new MA-3 $29.50. New Yagi end-mount bracket BM-1 $34.50. Ginpole Kits GP-81 $129.50, GP-51S $139.50, BG-18 Laddermast $249.50. Hot Dipped Galvanizing, free U.P.S. Request Catalog VISA/MASTERCARD. IIX Equipment Ltd., P.O. Box 9, Oaklawn, IL 60454, 312-423-0605.

SOLAR ELECTRIC panels, components, inverters. $3 catalogs, technical information, price lists. SPECS Inc. P.O. 155, Montrose, CA 91020.

MAGICOM RF Speech Processors for selected Kenwood, Drake and Yaesu equipment. Excellent speech quality — 6dB added average output. Affordable prices! SASE for data and cost. MAGICOM, P.O. Box 6552, Bellevue, WA 98007.

TI99/4A Ham Computer Programs. Write Sam Moore, AC5D, Box 368, Stigler, OK 74462.

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.

EXPERT 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.

TENNATEST - Antenna noise bridge out-performs others, accurate, cost less, satisfaction guaranteed, $41. Send stamp for details, W8URR, 1025 Wildwood Rd., Quincy, MI 49082.

RTTY HEADQUARTERS: Authorized Dealers for "Hal" and "Info-Tech" products. You can't beat our prices! Call or write Dialta Amateur Radio Supply, 212-48th Street, Rapid City, SD 57702. 605-343-6127.

CX7 SERVICE. KN5S, 415-549-9210.

PROTECT your Bencher key. Rigid plexiglas cover $9.95. George Chambers, KØBEJ, 302 S. Glendale Ave., Coffeyville, KS 67337.

ROTOR RELIEF: The "D-LAY-5" brake delay works on CDE/Hy-Gain Ham II, Ham III, Ham IV, and Tailtwister models. Refer to April 83 QST product review. Still only $19.95 postpaid. Lance Johnson Engineering, Box 7363, Kansas City, MO 64116.

TOWER CLIMBING Safety Belts and accessories. Free specifications. Avatar (W9JVF) 1147 N. Emerson, Room 10. Indianapolis, IN 46219.

APPLE COMPUTER program "Hamlog," 15 modules; logs, auto-sorts 7-band WAS/DXCC. Full feature editing. Much more. $14.95. KA1AWH, PB 2015, Peabody, MA 01960.

QRPers/BUILDERS: New-parts bargains! S.A.S.E. for flyer. W1FB, Box 249, Luther, MI 49656.

MOTOROLA: RADIOS, pagers, parts, PL reeds 1 channel elements wanted. Will swap same. Charlie, N2HA, 1-718-268-6535 evenings.

CHASSIS & CABINET Kits, 5120 Harmony Grove Rd., Dover, PA 17315 SASE K3IWK.

23 CM "READY-TO-GO" 100+ watt linears and 2C39 amplifier cavities. Hi-Spec, Box 387, Jupiter, FL 33468.

COCO USERS - Free software and hardware catalogue for the Radio Shack Color Computer. Coconuts, POB9866, San Jose, CA 95157-0866.

QUAD KITS. Tribander $45. Box 927, Cary, NC 27511.

DIGITAL LCD Indoor/Outdoor Thermometer/12/24 hr. Clock plus Alarm. Continuous display for 2 yrs on (1) AA battery. 1 yr. Warranty-Prompt Refund if not delighted in 10 days (less S&H). $39.95 + $2 S&H. TELTEMP - E, 16109 Longfellow-Spokane, WA 99216 (K7EYT).

FREE SUBSCRIPTION — That's Right. We will send you a Free one year subscription to "The Swap List" . . . The national publication where you can sell your used equipment Fast. To get your Free Subscription just send us an ad of 30 words or more selling used Radio, Computer, or Electronic Equipment. Personal ads are 25¢ a word; Business ads are 50¢ a word. Mail to: The Swap List, Box 988-Q, Evergreen, CO 80439.

WANTED: IC-202, 402. Yaesu FT-290. Also need all types of microwave components. Contact Microwave Book Editor, ARRL Headquarters.

SALE - SWAN 100MXA, Kenwood R-1000, TR-7400A, Tektronics, Eimac, K5SBR, 713-520-8531.

ONV Safety Belts $69.95 + $3 handling. Box 886, Saddle Brook, NJ 07662, 201-368-3655 anytime UPI Communication.

NEW COMMODORE Gear for trade; WA5BQA.

F.C.C. COMMERCIAL General Radiotelephone License. Electronics Home Study. Fast, inexpensive! "Free" details. COMMAND, D-170, Box 2223, San Francisco 94126.

SOFTWARE for IBM-PC, PCjr. and compatibles. "FIELD DAY," fast dupe checking and checksheets, $19.95. "PC-CONTEST," all purpose contest dupe checking and checksheets, $19.95. "PC-LOCATE," antenna headings and distances from any location to over 400 locations worldwide, $15.95. Special, all three programs $45. J. R. Hendricks, KF4KS, 1204 Oxford Place, Cary, NC 27511.

GRID-SQUARE BEARINGS printout, 1100 grid squares computed from your QTH. Contains Grid, Bearing, Distance, Reciprocal Bearing. $5.50. Send your latitude and longitude to KD8SI, 2648 North Aragon Ave., Kettering, OH 45420.

WANTED: LIKE-NEW 810 and 4-1000A transmitting tubes. Description, history, and price to Charles Frodsham, KØAYS, P.O. Box 7, Beloit, KS 67420.

WANTED: PANASONIC multiband radio RF-2200 KBØW 916-272-7203 days.

FOR SALE: R-392 surplus receiver. Excellent mechanical and electrical condition. $175 plus shipping. Excess tubes also. Send for list. Joseph Pinner, 1500 Goodyear Blvd., Picayune, MS 39466.

WANTED: DRAKE RV-75 VFO have RV-7 and $100 or? WB4ZCD, 606-441-9684 weekends.

COMMODORE 64 PROGRAM turns computer into sophisticated memory keyer. See March QST ad for more details. Send for complete description or $15 for cassette and interfacing directions. K4OAQ, 120 Elk Rd., Bristol, TN 37620.

FOUR ANTENNAS for sale, all for pick-up only. Southern New Jersey area. 3 element Kirk helically wound 40 meter beam, cost over $600 new. Never assembled, $400. Hy-Gain 402BA 2 element 40 meter beam, $135. Wilson 4 element 20 Meter Monobander, $125. Home Brew 5 element on 15 meters, 4 element on 10 meters, on common 30 foot boom. Works great. $100. Also for sale, Collins 75S3-B receiver with 200 Hz. CW filter, Excellent condition: $500. Rycom 2174A-610 VLF receiver, range 0-290 kHz.: $125. Call John Hill, K2YY, 609-235-2777 or 212-683-2273.

COLLINS WANTED: 55G-1 preselector for 51S-1; F455FA08 or F455FA05 filter; 310B-3 in good condition, unmodified; 32V-2 transmitter in good condition (pickup within appx. one hour's drive of Hartford, CT); SM-1, SM-2 and MM-2 mics; round emblem 302C-3 wattmeter; multimeter for 30L-1; skirted tuning knob for 62S-1 transverter; knob for multimeter switch on 30L-1; 35U-1 LPF for 75A-4. Anyone have info on SC-301 station control which was designed for the S-Line, mid-1960's?? Please contact AC1Y c/o ARRL Hq. or 203-667-2494 days 8-4.

WANTED: MCINTOSH and Marantz tube-type audio equipment, parts, accessories and literature, for personal collection. 100% reply. Marcus Frisch, WA9IXP, Box 385, Elm Grove, WI 53122-0385 414-475-5356.

GUNNPLEXERS AND Gunn Oscillators wanted. Seeking used oscillators for both 10- and 24-GHz bands. What have you? Contact Microwave Book Editor at ARRL Hq., Ext. 296.

160 METER TOP-LOADED Verticals Perform! We manufacture the strongest, best performing top loading sections available anywhere for 160 and 80 M. Free information: Wavemaker Products, Rt. 5, Box 614, Crestview, FL 32536.

RADIO SHACK equipment-supplies, mail-UPS. Most credit cards. Lasky Radio, R/S Dealer, W6TD, Box B, Lone Pine, CA 93545. 619-876-4440.

QST's, HR's, CQ's, 30's $4.00 ea., 40's $10/yr, 50's $5/yr, '60 thru '82 $1.20/yr, 83&4 $10/yr, singles a little more, plus shipping. W6XI, 8241 Hudson Dr., San Diego, CA 92119.

antennas

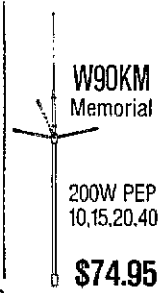
H. C. Van Valzah Co.
Downers Grove, IL 312/852-0472

H F MOBILE

HUSTLER

System 400W **$109.95**,
System 1000W **$149.95**
Systems include:
BM-1 bumper mount,
RSS-2 resonator spring,
resonator adapter and
10,15,20,40,75m. resonators
and M02 mast

600 Watt Mobile Amplifier
15,20,40,75m. Metron **$879.00**



W90KM
Memorial

200W PEP
10,15,20,40

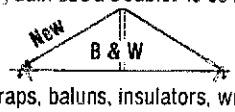
$74.95

H F CONDO ANTENNAS

Cushcraft 10,15,20m., R-3 ..... **$255.00**
Mark Helically Wound Dipoles:
10m. 8' **70.00** 20m. 12' **85.00**
15m. 12' **75.00** 40m. 16' **110.00**
B & W Window 2—40m. **$43.75**
Slinky Dipole **$65.00**

WIRE ANTENNAS

Dipole kits with wire, center and end insulators,
14 Ga. or 18 Ga. Copperweld
40/14 **$11.95** 80/14 **$15.95**
40/18 **$9.65** 80/18 **$12.95**
Unadilla W2AU/W2VS
10-80 1 trap **$65.00**
HyGain 5BDQ Doublet 10-80 ..... **$149.95**



1.8-30 MHz at
2:1 or less
$149.50

Traps, baluns, insulators, wire etc. **Ask.**

TEST INSTRUMENTS

MFJ
202B Noise Bridge **$53.95**
812 VHF SWR Meter **$26.95**
814 HF SWR Meter **$49.95**

Coaxial Dynamics
RF power meter **$147.00**
Elements (interchangeable
with BIRD) **$53.00**
Dummy loads, N connectors,
adapters ..... **Ask.**

Parts

Popular parts in stock for:
Hustler, HyGain, Mosley, Cushcraft, Avanti,
Larsen, KLM, Stainless steel hardware.
Prompt service, courteous help. *$3.00 handling charge on all parts orders.*

SUPER SPECIALS

While they last!
UHF Mobiles by D.B. Products & KLM
Maximizer ..... 40% off
DXK-140 for stacking two DX 120's **$55.00**
Hole Mount Mobiles for Land-Mobile
Frequencies ..... 50% off
HyGain CB six element Duo Beam **$225.00**
Avanti two position coaxial switch—
100 Watts **$4.95**

CB & Scanner mobiles and bases at super low prices.

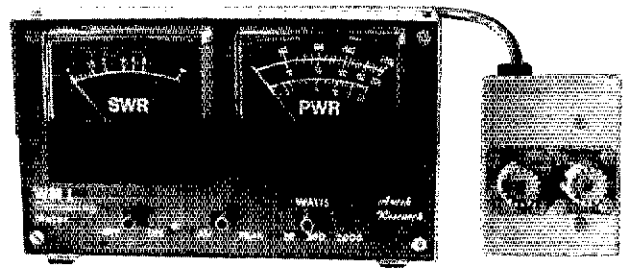
Check our low prices on all nationally advertised antennas and accessories. Send 50¢ for antenna catalog—48 pages.

TO ORDER CALL:

1-800-HAM 0073

H. C. Van Valzah Co.
1140 Hickory Trail
Downers Grove, IL 60515
Satisfaction Guaranteed

COMPUTING SWR & WATTMETER



NEW!
Model WM1
$89.00 (Includes AC Supply)

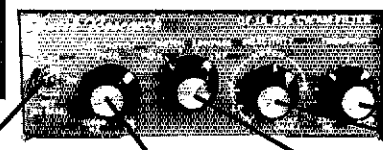
- **AUTOMATICALLY COMPUTES SWR.** No adjustments needed!
- **READS SWR DIRECTLY.** Even when you're talking on SSB!
- **GREATLY SIMPLIFIES TUNER ADJUSTMENT.** SWR reading not affected by forward power. No confusing readings.
- **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.
- **AVERAGE & PEP READING.** Allows compliance with latest FCC rules.
- **THREE RANGE SCALES.** 2000, 200, 20 watts. Usable to less than 1 watt.
- **TWO TOP-QUALITY METERS.** Large 2⅜" meters.

1.5-30 MHz 5% F.S. Accuracy. Uses 8-18 VDC or 115 VAC. 5¼"x3½"x2¾". Attractive light/dark grey styling.

WHY PUT UP WITH AN INFERIOR METER OURS DOES IT ALL — AUTOMATICALLY!

THE AUTEK "QRM ELIMINATOR"

Also reduces errors in computer CW/RTTY copy!



Model QF-1A
For SSB & CW
$73.00 (Includes AC supply)

115 VAC supply built-in. Filter by-passed when off. | **Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.** | **Four main filter modes for any QRM situation.** | **Continuously variable main selectivity (to an incredible 20 Hz!)** | **Continuously variable main frequency. (250 to 2500 Hz)**

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will due to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply. 6½x5x2½. Two-tone grey styling. Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig—Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

Autek Research
BOX 302 DEPT J
ODESSA, FLORIDA 33556 • (813) 920-4349

NO LONG DELAYS. WE SHIP 95% OF ORDERS FROM STOCK

We sell only factory direct. No dealer markup in our price. Order with check, M.O., VISA, MC. We pay shipping in 48 states. Add 5% tax in Fla. Add $3 to Canada, Hi., Ak. Add $18 each elsewhere. (Shipped air.)

TIRED OF CRANKING?

Motorize Your Tower With Our Electric Hoist/Winch

- STURDY — RELIABLE — EASILY INSTALLED
- IN USE ON E-Z WAY, HEIGHTS, TRI-EX, TRISTAO, ROHN, ALUMA, VERSATOWER, WILSON, TEL-TOW'R, PIPES, ETC.

SALE
$350
+Freight
$375 after
July 31st.

TOWTEC CORP.
118 ROSEDALE RD., YONKERS, N.Y. 10710 **Tel. (914) 779-4142**

HI-VOLTAGE RECTIFIERS

14,000 VOLTS - 1 AMPERE

REPLACES
866-872
3B28 ETC.

IDEAL FOR 2 KW.
LINEARS
250A. SURGE

4 FOR $20.00 POSTPAID

K2AW's "SILICON ALLEY"
175 FRIENDS LANE WESTBURY, N.Y. 11590

DRAKE R-4/T-4X OWNERS AVOID OBSOLESENCE

PLUG-IN SOLID STATE TUBES!
Get state-of-the art performance! Most types available
INSTALL KITS TO UPGRADE PERFORMANCE!
BASIC IMPROVEMENT
AUDIO BAND PASS FILTER
AUDIO IC AMPLIFIER

SARTORI ASSOCIATES, W5DA
BOX 832085
RICHARDSON, TX 75083
214-494-3093

TUBES $23 PPD
KITS $25 PPD

FOR SALE: Unused Drake L-7 2 kW linear, 160-15 meters, less tubes and PS, asking $550. K4PFK, Roger Smith, 4920 Lifes Rd., Raleigh, NC 27606.

LEARN MORSE CODE on your IBM/compatible with "MORIS," The Perfect Keyer. It's easy to operate. You select the code speed, sending duration, tone, and character set. It will even send random words if you like! Moris also has a memory option so that incorrect entries typed on your keyboard are preferentially sent more often as the practice proceeds. Other features include automatic evaluation, clock, and keyboard entry option. Send $16.95 (Maryland residents add 5% sales tax) to Customized Software Services, 6308 George Washington Drive, Temple Hills, MD 20748 to receive this software package. No-risk money-back guarantee.

DXPEDITION TO MONTSERRAT only $250/week. Details: VP2ML, Box 4881, Santa Rosa, CA 95402.

SELL COLLINS: 30S-1 in good condx, w/manual. $1500, pick-up only, near Hartford, CT. Want Collins gear: 55G-1 w/manual; filters F455FA05, F455FA60, F455BO5 and F455B60; Mics SM-1, SM-2, MM-1 and MM-2. Contact AC1Y, callbook address.

"FREE PRE-TESTING" ICOM, Kenwood, Yaesu, Sony, Bearcat, Regency, MFJ, Antennas, CW/RTTY Decoders, Much More!! Free UPS Shipping & Insurance To 48 States. 25 Page Picture Catalog $1 (refundable) Galaxy Electronics, Box 1202, 67 Eber Ave., Akron, OH 44309, 216-376-2402, 9-5 PM EST.

SELL: ICOM R-70; Ten-Tec Corsair with 260 P.S. for information write Harry Rosenbloom, NE8Y, 178 E. Silver Lake Drive, Iron River, MI 49935.

SELL: COLLINS equipment, plus some filters, cabinets, panels, etc., send s.a.s.e. Roderick, Box 1463, Little Rock, AR 72203.

COLLINS 204F-1 Reconditioned - Spare parts new 4CX1000A's. Call evens. 715-425-0356. T. J. Petersen.

MADISON USED Guaranteed: Kenwood TS930S/AT $1000; TS830S $600; TS820S/CW $495; TS520S $429; TS520SE $469; TS530S $529; TS520 $395; R820/CW $495, Collins 51S-1 (Rockwell) $800; 32S-1/AC, clean, $295; 75S3 $295; 32S3/AC $395; 30L1 $450; 312B4 $125; MM1 $25; MM281 $40; Alpha 70V $1800. Call HF items not listed. Prices FOB Houston, guaranteed 90 days, full trade six months new; Sales price refunded if not satisfied. Madison Electronics, new address 3621 Fannin Street, Houston, TX 77004. 1-800-231-3057 (US) 1-713-520-7300, old 1-713-658-0268.

SALE - SB-104A, SB-644A, SB-604 working fine $375, buyer pays shipping. W5UOM, 405-794-2341.

DRAKE L-4 Amplifier and Power Supply plus 3-500Z's. Has 10 meters. $645. W4YHB.

TRADE-NEW $300. Marine R.D.F. radio, for Kenwood, Yaesu, transceiver. K6KZT, 2255 Alexander, Los Osos, CA 93402. 805-528-3181.

SALE: TR7 with filters and WARC board, PS7, MS7, P75 phone patch, and D104-C mike. $800. Mint condition. Fred Hammersand, 5980 Leebel Rd., East Petersburg, PA 17520. 717-569-1471.

DRAKE TR7 Digital Transceiver, 10-80 bands, PS7 supply, random wire antenna tuner, Drake filter, manuals. All $850. Will prepay shipping. Frank, W9PEB, 303-545-0301.

BUSINESS FOR SALE: E-Z Way Ham Tower Product Line - jigs, fixtures, Engineering Drawings. P.O. Box 11535, Tampa, FL 33680. Ph. 813-677-7144.

FOR SALE: Realistic Quartz Synthesized All Band Receiver. The DX300 model $150. Call Bob, 1-904-677-8434, W2GSQ.

HEATHKIT SB-221 linear amplifier. Good condition $400. Cushcraft A3 triband 10, 15, 20 meter antenna $100. Good condition. Don Kadish, 135 Barbara Rd., Waltham, MA 02154. 617-891-5287.

JUNE IS HERE but September is just around the corner. Help us get off to a super start with the incoming rookies at Junior High School 22 on Manhattan's Lower East Side. We need your unwanted ham equipment. Contact WB2JKJ.

WANTED CROSLEY 51 or "Pup". K4NBN "No Bad News".

RAMS NEW HM6116P-3, $4-10/$35; HM6264P-15, $20-10/$175. WD9HZK, R2 Box 131, Varna, IL 61375.

FOR SALE: Drake Transcv. TR4CW 500 Hz filter noise blanker RIT AC/DC PS xtra 10 m crystal Drake MC4 mobile console (spkr wattmeter) $525 will ship. ICOM 230 2-meter transcv. w/split freq. crystals $75. CB rig converted to 10 m FM $50. Datong audio filter FL1 $75. HAL ST-6 RTTY terminal unit 170 850 425 shifts $175. Jay WA3IFY 215-289-4531.

YAESU FTDX401 SSB 560W 80/10 xcvr. Inoperable but complete with SP400 mic and manuals. Best offer. W2DGG, 56 Circle Blvd., Newfoundland, NJ 07435.

WARC-READY DRAKE TR/DR-7, 4 filters, aux., fan, service manual, PS-7, excellent shape. $595. Steve, KK5V, 512-258-3583 evenings.

NATIONAL NCX5 transceiver. Excellent condition. $275. A. Lanze, 7 Courtenay Cir., Pittsford, NY 14534. 716-385-2339.

SALE TEN-TEC Argonaut 505, 405 100 watt linear, 250 power supply, mike $200. Yaesu FT-202R 2 meter HT, base charger, speaker mike $100. WB2FTX, 201-838-9093.

WANTED: COLLINS DL-1. Drake C-4, 7075, RV-4C. Hallicrafters S-40B, S-38C. Heathkit AT-1. K8DEW, 272 Donnalee, Lebanon, MO 65536. 417-532-7710.

BEAM HEADINGS! The Best! DX (including longpath) and USA headings customized for your QTH. Shows mileage to target area. $6 postpaid. T. Fleming, 1634 Baywinds Lane, Sarasota, FL 33581.

LAST CHANCE this term to try for our QSL Of The Week Award. Send your card today to WB2JKJ and the Crew at Junior High School 22.

ODDS 'N ENDS: Equipment; parts; periodicals. Stamp for list. W4LBQ, 6401 Redick, Omaha, NE 68152.

WANTED ELEMENTS for 1, 2, 3 Radiotelegraph Licenses. Write NA2F, 121 Hedden Terrace, N. Arlington, NJ 07032.

FOR SALE: Heath SB-301, SB-401, the pair $100. SB-650, $50. HO-13, $25. W8YMB, 101 Brookgate, Myrtle Beach, SC 29577.

HEATH HW-101, HP-23 a.c. power supply, SB-600 speaker. All in mint condition, $350. WB7AWA.

MOVING TO HOUSTON? QTH of WB5FII for sale with complete Kenwood radio station to 1 kW (SB-220). Multiple antenna systems 80M thru 2M (no 6M) and W-51 tower. Brick home on spacious lot, fenced. Excellent neighborhood. 3 bedroom, 2 bath, 2 car attached garage. Appliances. Close to schools, bus, shopping. 713-661-7397.

WANTED: SWAN Model 210 External VFO for Swan 250-C six meter transceiver. State condition and price. George T. Mitchell, K6ZE, 1901 50th St., San Diego, CA 92192, 619-262-7957.

FOR SALE: Midland VHF-FM 2-meter mobile transceiver, model 13-510 $125; ICOM '2AT hand-held 2 meter FM, battery pack BP4, BP8, belt clip, leather case, drop-in charger BC-35 $350; Kenwood phone patch PC-1A $40; MFJ active antenna $30; Heathkit DX-60B with VFO HG-10B $100; Realistic solid state communications receiver DX-160; Regency 10 channel scanner E-106 with crystal $60. Will ship UPS. Don Bowman, N3ZDG, RD #5, Box 11, Uniontown, PA 15401.

REALISTIC SSB, CB. TRC-458 with base mike 6 yrs. old excellent condition. $125. Call evenings 516-325-8610 KA2GRH.

NOSTALGIC O.M. looking for mint condx Hallicrafter SX-88 pr SX-62 and mint Johnson Viking 500 transmitter. National NC-400 would also be nice. If not up to snuff electrically it can be fixed but if not mint cosmetically the XYL throws me and the "junk" out of the house. Will pay your fair price and give it a good home. Contact Eric Polk, WA1YIW, 9400 Ridge Rd., Seminole, FL 33542.

WILSON UHF hand-held transceiver HH-464-C with two-tone encoding and charger/battery pack. 454-459 MHz. $400. Dennis Bird, 90 Brooklawn Ave., Bridgeport, CT 06604-2010.

SELL HEATH Transceiver SB-104A, SB-604 Pwr Supply & Speaker, SB-634 Station Console, SB-644A VFO, Autek QF-1A Filter. New condx-you ship-N4JDV. 704-541-3368. $500 pkg. only.

COLLINS 30S-1 for sale, $1,000. Elmer Stidham, Miamisburg, OH 513-866-8751.

CUSHCRAFT R-3 vertical, $125. HyGain 3el 10M beam, $35. W8KV, 614-775-6026.

KENWOOD TS-180S/DFC, SSB/CW filters, PS30, MC50 excel $495. TS-930S w/CW/SSB/AM filters $1495. ICOM IC-551D $455. IC-290H $375. IC-255A $145. 2M kW 4CX1500B extra tube 1500W out like W6PO $750. 2M kW AM494 w/supply (made by Motorola) Pr. 4CX250B $450. K2RIW, 432 MHz kW built by K1WHS, $450. 10-80 kW 4CX1500B 1500 W out w/PS $1500. Mirage B3016 160W solid-state FM/CW/SSB $180. Kenwood TV502S 2m xverter $150. Yaesu YO-100 Scope $145. AEA CK-2 w/Bencher $110. Microwave Modules MMT-144/28 2M $160. MMT-432/28 432 MHz $199. KLM EL3000 Elevation Rotor $365. Tail Twister $230. Rohn 25G $38 sect. Other stuff too, send for list. Dave, K1KA, Box 555, Amherst, NH 03031, 603-673-4014.

HW-12A with built in AC supply, Micro phone $150. Waters Phone Patch $30. HAL RTTY station with manuals cost $2220. Will take $950. 703-343-1362. Earl, WA4HYA.

ROBOT-800: Add your HF transceiver and get on RTTY, includes manual and cables; $275. Kantronics Hamsoft (RTTY) for TI-99; $50. Jerry, NC7U, 206-692-5142.

WANTED - GOOD 10BP4, 16KP4. WB2ICN.

HAMSWAP NEWSLETTER - Buy/Sell/Trade. Plus equipment discounts. Now taking free ads. Must include phone. 12 issues $9. Ham Swap, P.O. Box 420171, Sacramento, CA 95842.

DRAKE R4C, T4XC, AC4, DC4 and MS4 $495; C4 console w/o power and antenna boxes $195; UV3 head, new $75. HAL: ST6000 $395; DS2000 $250; DKB1015 and RVD1005 $150. All mint with manuals. Lee, WB6SSW, 714-598-5942.

SELL DRAKE T4XC, R4C, 500C CW filter, AC4, MS-4 $450 pp USA W1RQ, 11 Singingwood Drive, Haverhill, MA 01830, 617-372-8707.

YAESU '101 EE, mint condition with mic. $400 firm. C.W. filter, KT9F, Ph. 812-874-3530.

ABSOLUTELY MINT, 2 weeks old! HAL CWR-6850 RTTY/CW unit, with original guarantee card. $500, and I will pay UPS air mail shipping. Call for information, or 1st certified check or money order gets it. Ed, K2RCO, 28 Orchid Road, Levittown, NY 11756. 516-796-8825.

KT5B ANTENNA 160M-10M no traps! $59.95. Weather Boot Kit $8.95. Open-wire, Roller-inductor, Antenna Accessories and much more! Kilo-Tec, P.O. Box 1001, Oak View, CA 93022. Tel: 805-646-9645.

FOR SALE: MMT 144-28 $100. MMT 50-144 $100. Lunar 6M10-120P $150. Kantronics II Interface $150. HamText for C64 $60. WA9CUH, 715-886-4111.

FOR SALE - Swan 250, power supply, speaker and microphone. Good shape. Make offer, W6BA, HC 01, Box 7010, 29 Palms, CA 92277.

WANTED: DENTRON MT-3000A, W70M.

NYE VIKING MB5-A (new model) antenna tuner, one week old $375. Daiwa CN-720B SWR meters $85 each. Brand new Hy-Gain Explorer 14, three element tri-bander, with 40 meter element (in unopened cartons) $275. I will pay shipping on all except the beam. K2RCO, Ed Schneider, 28 Orchid Road, Levittown, NY 11756, 516-796-8825.

KENWOOD TS-930S $1200 WB6FCR 415-848-8371.

MADISON-REPAIR. 90-day guarantee. We can fix 1960-1980's gear with schematic. Five techs; Lots test gear. Madison Electronics, new address 3621 Fannin Street, Houston, TX 77004. 1-713-520-7300. Old 1-713-658-0268. Mastercard/Visa/COD.

CLEANING SHACK: Station, equipment, courses. Mostly Heathkit. Send SASE. KY6P.

KENWOOD TS-520S, CW filter, MC-35S, and DS-1A; $380. ICOM IC-701, IC-PS20, SM-2 mic, and two DC cables; $500. Collins 32RS-1 marine SSB transceiver; $200. All radios are absolutely mint. You pay shipping. KAØFXH, Ted Ayres, 303-779-8553.

DRAKE TR-3, P.S. mic, manuals, extra tubes. Ameco rf preamp. All o.k. $185. $150 w/o preamp. N1BHM. 207-743-6690, 13 Maple St., Norway, ME 04268.

MINT DRAKE C-Line twins, Noise Blanker, two CW, filters, one A.M., accessory crystals, spare tubes. $550; sets of new C-Line tubes, $40; FS-4 general coverage for R-4C, $150; mint Kantronics Interface, $50; Dentron GLA-1000B, spare tubes, $250; Hallicrafters HT-33A 1 kW linear, spare tubes, antenna relay, $300 (heavy-duty). Ship UPS, except HT-33A. W2MV; Alan Burg, 3320 Bainbridge Avenue, Bronx, NY 10467, 212-655-4977.

POWER TRANSFORMER, 110/230V primary, 2,800V 600 mA secondary, weighs 107 pounds $85, Two 4-250A's, brand new, $35 each, RCA WV87B Master Voltohmyst, $25. Buyer pays shipping. PH 702-456-9048. K7GFL.

KENWOOD TS-120S xcvr 5-band 100W $399, PS-30 AC supply $99, MC-35S mic $25, K2SQZ, Frank 716-297-6990.

SYNCHROS, many types, excellent beam position indicators. SSAE, W6NPB, 2157 Braemar, Oakland, CA 94602.

FOR SALE: Drake TR-4C, AC-4, manual, excellent condition, $225. WBØMRX, 913-776-0260.

KENWOOD TS-120S $325; PS-30 $95, KA9JYO, 219-326-8648.

HEATH TWINS SB301/401 SSB-CW package. $350 takes all including cables, books and speaker plus crystal package. MFJ CW filter, Skip Jack, 48B CW keyboard and Johnson TR switch. Deliver within 200 miles, else UPS my expense. Details? Write or call W8OM, 606-277-9788.

WANTED DEAD or ALIVE: VIC 20 or Commodore 64 computers. State condition and price. WA6LUO, P.O. Box 2375, Dublin, CA 94568.

KLM SALE: Multi-2700 all-mode two-meter base station transceiver. Excellent condition. $250. Contact WB2JXY, AC 718-224-2448.

WANTED: COLLINS 75S?, 32S?, 516F2. Dick, WA2TEW, 518-673-2338 evenings.

ROSS $$$$ Used June Specials: (over 200 used items in stock) Kenwood TS-130S $469, TR-2400 $169.90, TS-180S $429, TR-9500 $459, Drake TR-7A $769, Robot 800 $299, Yaesu FT-301D $339.90, FT-101ZD $459, FT-620B $279, ICOM IC-245 $169, IC-551D/w FM $579.90, IC-701 $389.90. If this month's special is not what you are looking for send SASE. Call Letters, name & phone # for used list. Over 6,500 NEW ham related items in stock. Mention ad. Prices cash, FOB Preston. We close at 2:00 on Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

SELL HEATH Station: SB303 receiver, SB401 transmitter, SB600 spkr all $300. SB630 console $70. SB620 scan $80. SB220 amplifier $475. Filters for SB/HW: Heath 3.75 kHz $15. Heath 500 Hz $20. Fox-Tango 250 Hz $35. Viking kW Matchbox with SWR $80. 10 day money back gty. W4UKU, Jerry, 803-278-0984 or Callbook.

CRYSTALS: FT-243's, made to ordered frequency. See March classified. 160M $3.95, 80M, 30M fundamentals $2.95. 4001 to 8700 kilocycles, Novice General, including 40M and multipliers from 40M - $2.50. Sockets 60¢. Postage-airmail 30¢ per crystal. Antique 203-A's, unused $14.95 + $2.50. "Crystals Since 1933." WØLPS. Stamp or long SASE for 1700-60,000 listings-circuits. C-W Crystals. Marshfield, MO 65706.

SB-104A, CW filter, Blanker, HP-1144A, SB-604, SB644. All modifications per Aug. '79 QST. Like-new condition. Works great - used to make DXCC Honor Roll. Asking $450. WØMYN, 303-989-2700.

CLEANING SHACK - Kenwood TS-180S with WARC bands, mic, CW/SSB filters, PS-30 supply, $600. Heathkit SB201 linear with 10 meters, $425. HM-102 SWR/PWR meter, $25. Cantenna, coax switch, TVI filter, MFJ-752 Dual Tunable Filter, MFJ-104 clock. Ham-Key HK-3M. Alliance HD-73 rotor & cable. South River 15 ft. Tripod. Cushcraft A3 (new). Butternut HV-6 (new) RG-213 coax (2-80 ft 1-30 ft). Headphones. Interested: Call Larry Davies, KSØV, 503-626-6198 after 5 P.M. PST.

SALE DRAKE TR7: power supply, speakers, Aux. 7, WARC, MARS, CW filters, SSB filters, speech processor, microphone, N.B., fan, latest factory updates, absolutely mint, service manuals. I ship. $795. Dr. H. Berk, KA6DNA, 927 Deep Valley Est., Palos Verdes, CA 90274, 213-377-5566.

FOR SALE: Azden 2000 with Touch Tone mike $100. N2AO, 315-446-6388.

DRAKE R4C T4XC PS Sherwood Speech Compressor, late serial numbers and all Sartori mods installed. J. Malone, WA3LBI, Hm 215-345-5143, Wk 215-581-5597.

NOW FACTORY DIRECT!!!

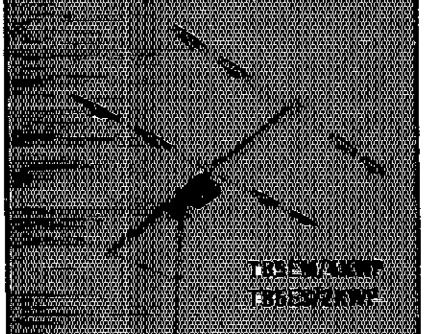
STEP UP TO

TELREX

ANTENNAS

ANTENNA SYSTEMS

"INVEST" in a Telrex antenna!



Some of the WORLD'S finest.

TB4EC 10, 15, 20 Mtr.	$245.00
TB5ES 10, 15, 20 Mtr.	$359.00
TB5EM 10, 15, 20 Mtr.	$495.00
TB6EM 10, 15, 20 Mtr.	$595.00
20M326 3 elem. 20 Mtr.	$345.00
20M536 5 elem. 20 Mtr.	$585.00
20M646 6 elem. 20 Mtr.	$995.00
15M532 5 elem. 15 Mtr.	$485.00
15M845 8 elem. 15 Mtr.	$975.00
10M523 5 elem. 10 Mtr.	$315.00
10M636 6 elem. 10 Mtr.	$675.00
2MVS814, 2 Mtr. phased	$225.00

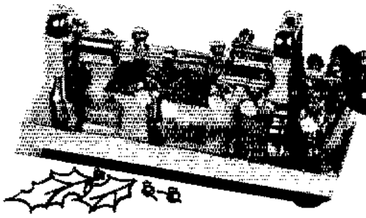
Telrex P.O. Box 879

NOW ORDER TOLL-FREE!
DIAL 1-800-AMATEUR

Give a piece of history,
give....

VIBROPLEX®

"the oldest name in amateur radio"



Hear what experienced operators say about Vibroplex

Ken Johnson W6NKE
"PLEASE never stop making the grand glorious and historical "bug" that has been my friend and companion for fifty years both ham and commercial... My wife says I will be buried with it clutched in my hand and I can't think of much better."

Walter L. Bourgeois W5VB
"...I purchased a Vibroplex "Original" during WW-II and have been using it continuously for 43 years..."

Now that you have their word on it, take our word. Vibroplex guarantees satisfaction. Order your key today. Also available: carrying cases and other key gifts.

See your dealer or write for an illustrated catalog detailing our world famous products to: **The Vibroplex Company, Inc. P.O. Box 598 DTS 476 Fore St. Portland, Maine 04112**

CALL TOLL FREE 1-800-238-6168

(In Tennessee, call 901-683-9125)

For The Deal You Want—On The Brands You Know!

Authorized dealer for:
KENWOOD, ICOM, DRAKE, TEN-TEC, HUSTLER, MIRAGE, MFJ, AEA, B&W, ASTRON, CUSHCRAFT, LARSEN, HI-GAIN & MORE! Also many fine used rigs, too! CALL FOR DETAILS.

WE TRADE!
Call & Ask For
- MARSHALL-KU40
- BILL - W4TNP

HOURS: Mon.-Fri. 9 to 5
Sat. - 9 to noon
(central time)

MEMPHIS AMATEUR ELECTRONICS, INC.

1465 Wells Station Rd., Memphis, TN 38108

ALL BAND "SLOPER" TRAP ANTENNAS!

PRETUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 7 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS - LIGHT - STRONG - ALMOST INVISIBLE!

FOR ALL MAKES & MODELS OF AMATEUR TRANSCEIVERS - TRANSMITTERS - GUARANTEED FOR 2000 WATTS SSB 1000 WATTS CW. INPUT FOR NOVICE AND ALL CLASS AMATEURS! IMPROVED DESIGN!

COMPLETE with 50 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 15 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof resonant traps 1"X6" - you just switch to band desired for excellent worldwide operation - transmitting and receiving!

Low SWR over all bands - Tuners usually NOT NEEDED! Can be used as Vertical or any any angle to 30 degrees SLOPE. Attach to ground rod or water faucet - No radials needed! Attach top end to tree, buildings etc. The ONLY ANTENNA YOU WILL EVER NEED FOR ALL DESIRED BANDS - WITH ANY TRANSCEIVER - NEW - EXCLUSIVE!

No. 1080S - 80-40-20-15-10 - 1 trap 49 ft. ---- $49.95
No. 1040S --- 40-20-15-10 --- 1 trap 26 ft. ---- $48.95
No. 1020S ----- 20-15-10 ----- 1 trap 13 ft. ---- $47.95

SEND FULL PRICE FOR POSTPAID INSURED DEL. IN USA. (Canada is $10.00 extra for postage - clerical - customs etc.) or order using VISA - MASTER CARD - AMER. EXPRESS. Give number and ex. date. PH 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ORDER NOW! All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFORMATION AVAILABLE ONLY FROM WESTERN ELECTRONICS Dept. AQ-6 Kearney, Nebraska, 68847

HEATHKITS WANTED: HP-23 series power supply, SB-600 speaker. Contact G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

ROSS $$$$ NEW June Specials: If this month's special is not what you are looking for send Call Letters name & phone # for personal price quote. Over 6,500 ham related items in stock. ICOM # IC-735 $Phone, IC-45A $299.90, IC-745 $768.90, IC-04AT $309.90, IC-02AT $284.90, Kenwood # TS-940S/w AT $1699.90, TH-21AT $194.90, + PB-21 $0.10, TR-8400 $379.90, TR-7950 $356.90, TS-430S $667.90, TR-2600A $286.90 + PB-26 $0.10, VFO-240 $139.90, TW-4000A $489. TS-780 $759.90, Yaesu # FT-208R $219.90, FT-757GX $779.90, FT-708R $219.90, FRG-7700 $369.90, FRG-8800 $589.90, FRG-7 $239.90. All major lines stocked, L.T.O. Mention ad. Prices cash, FOB Preston. We close at 2:00 on Saturdays & Mondays. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

3-1000Z HOMEBREW amplifier, 80-10 M. Full legal power. Asking $850. Pick-up only. WØMYN, 303-989-2700.

EIGHT FIBERGLASS arms for Quad with mounting hardware. N2AO, 315-446-6388.

WANTED: MICROCRAFT Videoscan 1000 SSTV Converter, Bob Staunton, KI4ZX, 300 Kelsey Dr., Kingston, TN 37763, 615-376-4148.

SELL FT101E $350, FR101 $300 or take both for $600. MLA2500 $425, MT3000A 2 kW tuner $225. Mosely TA36 6-el. Triband $125. Call Fred W. Ring, W1NMS, 456 Sportsmans Rd., Orange, CT 06477, 203-795-5478.

EQUIPMENT DONATIONS to support Spinal Injury Cure Development Research. Pse help by cleaning out ur shack es donating ur gear. Send for details or send donated equipment directly to KA9RXI, 4449 S. Sawyer Ave., Chicago, IL 60632.

160/40/15 METER dipole, 115 feet, coax-fed. No Tuning, $49.50 postpaid. Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

ESTATE SALE: IC-720A, TR-2600A, TS-820, Santec HT-1200. W2KK, 301-854-6014.

SELL DRAKE T4XC, AC4 pwr supply and R4C with 1.5 and 0.5 kHz CW filters. Recently realigned by Drake. $500. W3AP, 215-678-4310.

WANTED: ALPHA Vapor amplifier, vapor tubes, good or bad. Don Payne, K4ID, Box 100, Springfield, TN 37172, 615-384-2224.

CLEGG APOLLO 6m Amplifier 675W input $225. KLM 2m Amplifier 140W output $160. Heathkit SB-104A, SB-604 $340. N3BBI, 717-325-3580.

KENWOOD R2000 with VHF Converter, like new in original packing $450. M. Fein, 132 Locust Lane, Irvington, NY 10533. 914-472-1100 9 to 5.

COLLINS S-Line: 75S3B, 32S3, 312B-4, 516F-2, SM-3, all round emblem with 500 Hz and 200 Hz filters. $1100. W3MA, 7 Greentree Road, RD #2, Malvern, PA 19355, 215-644-0806.

KENWOOD TS520 transceiver, CW filter, MC-50 microphone. Excellent condition $450. W4MGG, 919-924-0934.

EZ WAY 50' motorized tower with ground post, KLM 34A Antenna, Ham M 4 Rotator. Let's negotiate. KI4ON, B. Grossman, 1705 Westminster Dr., Greensboro, NC 27410, 919-299-1298 evenings.

ORBIT Back Issues 3 and 5 wanted. Also A.S.R. past 6 months back issues. Zack Schindler, N8FNR, 113 West Barrett, Mad. Hgts., MI 48071.

SELL 1984 DX and US Callbooks. $19 for both. Lowry, 3 Darlin Drive, Reading, PA 19609.

ICOM IC-720A with FL-32 CW filter, mike, manual, PS-20 power supply, original boxes. Mint, $725. Kenwood SP-820 speaker. Excellent, $35. AEA WB-1C Moscow Muffler. Mint, $85. MFJ-482 Grandmaster memory keyer. Like new, $50. DSI 500 MHz frequency counter, $35. Nye-Viking 330-001 Master Key, $15. KA7BMB, 602-298-4820.

ESTATE SWAN: 500CX/SS-16B, 117-XC, offer; 14A(dc), $25. Yaesu FRG-7700/MU, $335. Drake #1A receiver, $50. Kenwood BS-5, new, $30. U-ship. AA6EE, 619-789-3674.

FLUKE 1920A Frequency Counter (0.5 kHz-1 GHz) as new, $450 or offer, N6KBN, 805-481-1213.

TEN TEC CENTURY 21 and antenna tuner 277 now operating $150. KA2GIJ, 609-678-5592.

DRAKE DSR1 Digital Professional communication receiver, 10 kHz/30 MHz, all filters, manual, mint $485; Kenwood TS900, VFO 900, ps/spkr, excellent condx, manuals $465; Dentron MLA2500B linear 2 kW PEP, mint $465. W6NFV, 24023 Bessemer, Woodland Hills, CA 91367, 818-346-8951.

FOR SALE: Hy-Gain THK3-MK3 three-element tri-band antenna with manual, first class condition. $125. Heard Lowry, 915 Madison St., Manchester, TN 37355.

SELL 2-METER Station. Kenwood TR-2500, ST-2 base stand, Mirage B23 amplifier. I ship. First $200 cashier's check. Dr. Martin, 98-427 Kilihea Way, Aiea, HI 96701.

FREE SHIPPING, Continental USA. Mini-Products HQ-1's $139.95, Butternut HF6V/HF2V's $106.50, Mosley TA33's $239.95, Amp-Supply LA-1000A's $379.95, Nye MB-V-A's $468. Quality dipole kits, stamp for flyer. Don, Hart Eastern Communications, 1444 Darlington Drive, Derby, NY 14047 (near Buffalo) 716-947-4840.

ICOM WANTED: IC-251A 2 meter and IC-451A 430 MHz all-mode VHF transceivers. Contact G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

2-METER GEAR - IC-260A SSB/FM scvr $200, Kenwood 2400 Handi with extra battery $100; Yaesu 203R Handi $125; Sony 2002 digital SWL - rcvr $125; all with boxes and manuals. Ron, KT2R, 201-825-2557.

SELL: NEW VFO-240 $125. Heathkit HW-12, HW-22, PS-$45 each. Yaesu YP-150-$50. 10-420 MHz signal generator $35. Nice ME-26 multimeter $25. SP-600 with speaker and extra SP-600 for parts, nice condition $200. Brad Hyde, N5CCX callbook or 817-699-7817.

ICOM '730 transceiver, mike, mobile bracket, manual. Excellent condition. $400 with Astron 20A power supply, $475. KB8RK, 313-669-2014.

FOR SALE: Kenwood TS-430S, PS-430 and AT-250. Mint condition. $1,000. Craig Larson, KØNR, 301-871-7735.

DIGITAL AUTOMATIC DISPLAYS. All transceivers. Six ½" digits. 5" wide by 1¼" by 9" cabinet. Send $1 for information. Grand Systems, POB 3377, Blaine, WA 98230. Canadians VE7LB.

JENNINGS UCSL-1000 Vacuum Variable Capacitors 10 thru 1000 mmFd at 5000V with gear drive train and mounting bracket. Ideal for that linear amplifier or tuner, brand new $59.50, plus $3 UPS. Military TV-2/U dynamic Mutual Conductance portable late type Vietnam Vintage lab quality metered tube tester $75, plus $14 UPS. SG-1041/URM-191 late model solid-state portable military signal generator, digital read-out 10 kHz thru 50 MHz $375, plus $12 UPS. Have good stock, M/C, VISA or check. Phone 704-524-7519, Step Electronics Company, Highway 441, Otto, NC 28763.

ESTATE SALE: Following bench-checked okay, excellent appearance, with manuals. Collins 75S-1 $150; 32S-1 $175; 32S-1 with 516F-2 $295; 30L-1 w/spare tubes $495; CC-2 $85; 75A-4 #3710 w/spinner knob, 3.1 and 2.1 filters $315. Drake R-7 with 1.8 filter, AUX-7 board $450. Azden PCS-3000 w/TT kit, up-dn mike, absolutely mint w/manual, warranty card $175. Misc amateur, test equipment, send SASE for list. WØUDZ, 25 Briarcrest, Colo Springs, CO 80906. 303-576-8844.

IC-2AT, $165; TR-9130, $360; Yaesu FTV-650 6M transceiver, $125; MMT-432/144 transverter, $165; T4XC, AC-4, $275. Wanted: 6M transceiver, MFJ-484. Paul Husby, WØUC, 1697-C Fulham, Lauderdale, MN 55113. 612-642-1559.

COLLINS GEAR: KWM-2, 516F2/ps, 312B-4 control, 62S-1 VHF Converter, 516E-1 12 Volt DC/ps, 351D-2 mobil mount. $700. W8QJY, Jack, 1-216-942-6995.

SATELLITE TRACKING PROGRAM: Fast, colorful, easy to use and update. Displays world map w/blinking satellite location - operates in real time showing bearing and elevation from your QTH for C-64, VIC-20 and T/S 1000 - 16K $19.95, add $2 S&H. Disk, $24.95. Full details & orders to: Spectrum West, 5717 NE 56th, Seattle, WA 98105. 206-641-7461.

IBM-PC RTTY/CW: CompRtty II is the complete RTTY/CW program for the IBM-PC and compatibles. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! 10,000 character transmit/receive buffers! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages. Now with WRU (simple mailbox). Ideal for MARS and traffic handling. Requires 128k PC or 256k PCjr, PC-DOS, serial port, RS-232C TU. $65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 7373 Jessica Drive, North Syracuse, NY 13212.

ENHANCE YOUR Amateur license exam study with 25 topical unit printed tests with PC software. The tests deal with basic electronics and much of the basic radiotelephone technical matter. Tests plus C60 tape or diskette $12.50 postpaid. Software grades your unit tests, indicates the correct answer, and asks you to review missed questions. Tape only: TI99/4 - Tape or diskette: VIC 20/64, TRS80 III/IV/COCO - Diskette only Apple II/III3, IBM PC/JR and compatibles. Don Middleton, WØNIT, 920 W. Adams, Pueblo, CO 81004.

Jobs for Hams

ENGINEERING, TECHNICAL and PROFESSIONALS needed in Maine. Maine Professional Engineering Group, 1 Long Point Road, Belgrade Lakes, Maine 04918.

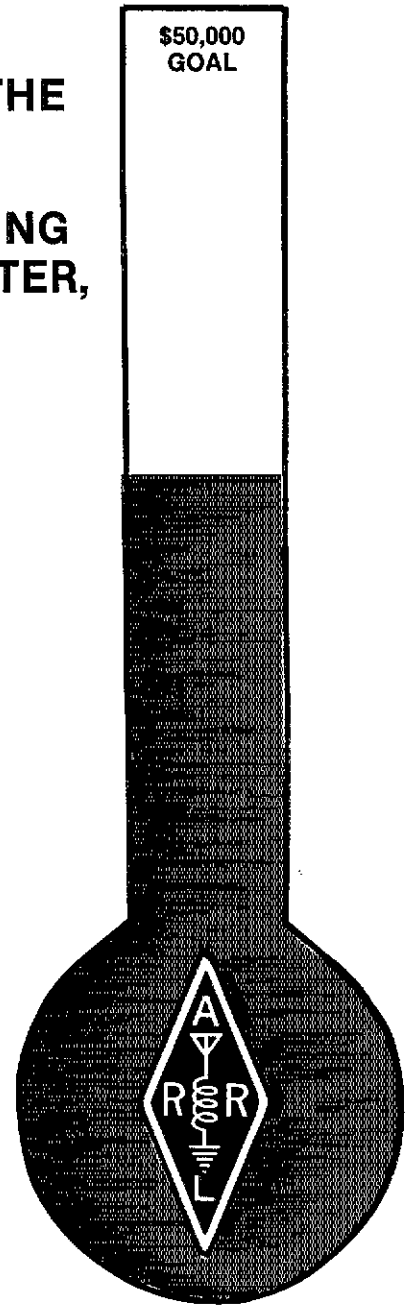
HELP US HONOR A GREAT AMERICAN

MAKE YOUR DONATION TO THE

ARRL SCHOLARSHIP HONORING SENATOR BARRY M. GOLDWATER,

K7UGA

Thanks Barry



MAKE CHECKS PAYABLE TO:
ARRL FOUNDATION
225 MAIN STREET
NEWINGTON, CT 06111

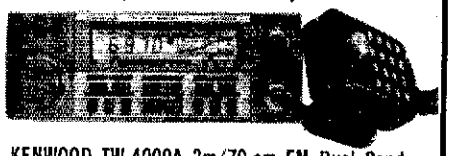
SAVE on these AES/KENWOOD Specials!

FREE FM Unit!

KENWOOD TS-430S HF TRANSCEIVER
For a limited time - purchase a TS-430S at our normal Low Sale Price and receive the optional FM-430 FM unit **FREE!**. The FM-430 provides HF FM transmit/receive on bands where authorized .. **CALL for Sale Price.**

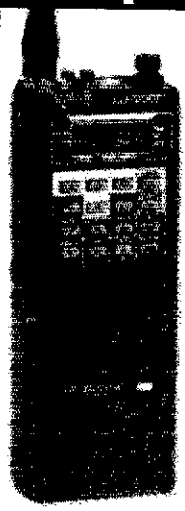
FREE ANTENNA!

*Purchase a **KENWOOD TW-4000A** at our **Low Sale Price** and get a **MA-4000** 2m/440 MHz mobile antenna **($44.95 Value) • FREE!**



KENWOOD TW-4000A 2m/70-cm FM Dual Bander: Covers 142-148.995 MHz and 440-449.995 MHz with 25W out. GaAs FET RF amplifiers, dual digital VFO'S, LCD display, 10 memories w/offset recall, scan & lithium battery back-up. Band & common channel scan, priority watch. 16-key Autopatch UP/DN microphone & mobile mount. 13.8V DC @ 7.5A, 6⅜"h×2⅜"d×8⅜", 4.4 lbs. List $599.95 • **CALL for SALE PRICE.**

The **FREE* MA-4000** is a dual-band, 2m/70-cm mobile antenna only, with duplexer (no mount). Use **LARSEN PO-K** Roof mt, **$20.00**; **PO-TLM** Trunk-lip mt, **$20.18** or **PO-MM** Magnetic mount, **$19.63**



FREE Extra Battery!

For a Limited time!

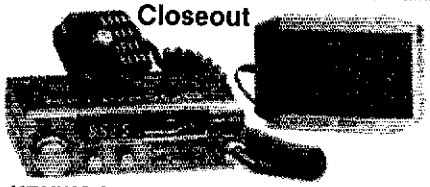
Purchase a **TR-2600A** *(shown)* at our normal Low Sale Price and receive an extra **PB-26** battery - **FREE!**

or

Purchase a **TH-21A/AT** or **TH-41A/AT** at our normal Low Sale Price and receive an extra **PB-21** battery - **FREE!**

Call for Sale Prices

Closeout



KENWOOD TM-401A 440 MHz FM Xcvr
Ultra compact! Covers 440-449.975 MHz in 25 kHz steps. 12W out. GaAs FET RF amplifier, dual digital VFO'S, 5 memories plus "com" channel w/back-up. Priority alert scan, memory and programmable band scan. Yellow LED display, LED S/RF meter, Ext. spkr. 16-key TTP UP/DN mic, mobile mt. 5⅝"w×1⅝"h×7¾"d, 2.8 lbs. List $399.95 .. **CLOSEOUT $299.95**

KENWOOD Receivers

Limited Time Special Prices now being offered on

R-11 • R-600 • R-1000 • R-2000

Call for Prices!

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 - Phone (414) 442-4200

AES BRANCH STORES

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 33575
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

Associate Store
CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
15 min. from O'Hare!

Please use WATS lines for Ordering and Price Checks. For other Info and Service Dept. please use our Regular lines.

Contact AES®
for all of your KENWOOD needs!

★ Low Prices ★ Large Stocks ★ Fast Service
★ Top Trades ★ Toll Free Ordering Line
★ **AES®** Ships Coast to Coast

HOURS: Mon. thru Fri. 9-5:30; Sat 9-3

MasterCard **USE YOUR CREDIT CARD** VISA

Note: Our **TOLL FREE** Ordering line **1-800-558-0411** is answered until 8 pm CST Monday thru Thursday.

Clip out this handy Coupon and Mail Today!

TO: AMATEUR ELECTRONIC SUPPLY®
4828 W. Fond du Lac Avenue
Milwaukee, WI 53216

I am interested in the following new KENWOOD equipment:

_____

_____

I have the following to Trade: (What's your Deal?)

_____

_____

Rush me your quote - I understand that I am under no obligation.

Name _____

Address _____

City/State _____ Zip _____

ADVERTISING DEPARTMENT STAFF

Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Deputy Adv. Mgr.
Lindy Messmer, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

ANTENNA/TOWER SALE!

hy-gain

CRANKUP SALE!

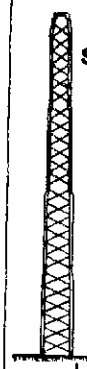
All Models Shipped Factory Direct—Freight Paid*!

Check these features:

- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$749
HG52SS	52 ft	9 sq ft	$1099
HG54HD	54 ft	16 sq ft	$1699
HG70HD	70 ft	16 sq ft	$2699

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	164	$329
HBX48	48 ft	10 sq ft	303	$429
HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

*Your Total Delivered Price Anywhere In Continental 48 States. Antenna Load Based on 70 MPH Wind.

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 Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$899
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM4700 (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$3199
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

BUTTERNUT ELECTRONICS CO.

HF6V $129 Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
- Optional Roof Mounting Kit Model RMK II $49 (Includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160HD $49

New 80/40 Meter Vertical Antenna HF2V $129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160S $49

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)

RG-213U

$.29/ft $279/1000 ft

Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket
- Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	50MHz	150MHz	450MHz
RG-213/U	50	6	9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
⅛" Alum	50	3	5	12	22
½" Heliax	50	2	4	9	16
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™ $1.69/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	$1.75	UG23D N Female	$2.95
UG21B N Male	$2.95		

ANTENNA WIRE & ACCESSORIES

14 Ga. Stranded Copperweld	$.10/ft
450 Ohm H.D. Line	$.16/ft
18 Ga. Copper coated steel wire ¼ mile long	$30
H.D. End Insulators	$2/ea
Van Gorden 1:1 Balun	$11
Van Gorden Center Insulator	$6

HUSTLER

6BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $89 5BTV 80-10 mtr Vert $109
G6-144B 2-mtr Base $89 G7-144 2-mtr Base $119

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

MULTI-BAND HF ANTENNAS

A3 3-el Tribander $219 A4 4-el Tribander $289
R3 20/15/10mtr Vert $279 A743/A744 40mtr Kit $75

HF MONO-BAND ANTENNAS

10-3CD	$ 95	10-4CD	$109
15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

VHF/UHF BEAMS

A50-5	$ 79	617B	$199
214B	$ 79	3219	$ 95
220B	$ 95	4248	$ 79

OSCAR/TWIST ANTENNAS

A144-10T	$ 52	A144-20T	$ 79
A147-20T	$ 63	416TB	$ 59
A14TMB	$ 29	PS4	$ 69

VHF/UHF FM ANTENNAS

A147-4	$ 29	A147-11	$ 49
214FB	$ 79	228FB	$219
A449-6	$ 29	ARX2B	$ 39

MINI-PRODUCTS HQ-1

LIST $182.50 SALE $159

- Wing Span - 11 ft
- Wind Area - 1.5 sq ft
- Boom - 54 in. long
- 1200W P.E.P. Input

ALPHA DELTA COMMUNICATIONS

Transi-Trap™ Surge Protectors—In Stock Now!

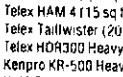
Model LT 200W UHF Type	$19
Model HT 2KW UHF Type	$29
RT 200W Deluxe UHF Type	$29
RT/N 200W Deluxe N Type	$32
HV 2KW Deluxe UHF Type	$32
HV/N 2KW Deluxe N Type	$35

KLM

KT34A 4-el Broad Band Triband Beam	$339
KT34XA 6-el Broad Band Triband Beam	$489
40m-1 40-mtr Rotatable Dipole	$179
40m-2 2-el 40-mtr Beam	$309
40m-3 3-el 40-mtr Beam	$459
40m-4 4-el 40-mtr Beam	$649
2m-13LBA 13-el 2-mtr Beam	$79
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m-22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna w/CS-2	$119
432-16LB 16-el 432 MHz Beam	$69
435-40DX 435 MHz Satellite Antenna w/CS-2	$159

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating)	$109
Alliance U110 (3 sq ft rating)	$49
Telex HAM 4 (15 sq ft rating)	$219
Telex Tailtwister (20 sq ft rating)	$269
Telex HDR300 Heavy Duty (25 sq ft rating)	$519
Kenpro KR-500 Heavy duty elevation rotor	$189
KLM EL-3000 Moon Tracker Elevation Rotator	$369



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)

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

HY-GAIN

Discoverer 2-el 40-mtr Beam	**$319**
Discoverer 3-el Conversion Kit	**$199**
EXPLORER-14 SUPER SPECIAL	**$309**
QK710 30/40 mtr Add-On-Kit	$79
V2S 2 mtr Base Vertical	$49
TH5MK2S Broad Band 5-el Triband Beam	$389
TH7DXS 7-el Triband Beam	$439
TH3JRS 3-el Triband Beam	$189
TH2MK3S 2-el Triband Beam	$179
205BAS 5-el 20-mtr Beam	$349
155BAS 5-el 15-mtr Beam	$199
105BAS 5-el 10-mtr Beam	$129
204BAS 4-el 20-mtr Beam	$259
64BS 4-el 6-mtr Beam	$69
66BS 6-el 6-mtr Beam	$139
18HTS 80-10 mtr Hy-Tower Vertical	$439
LC-160 160-mtr Coil Kit for 18HTS	$49
214BS 14-el 2-mtr Beam	$49
2BDQ 80/40 mtr Trap Dipole	$69
5BDQ 80-10 mtr Trap Dipole	$129
BN86 80-10 mtr KW Balun W/Coax Seal	$22

MOSLEY

Pro37 7-el Triband Beam	$469
CL-33 6-el Triband Beam	$279
TA-33 3-el Triband Beam	$249
TA-33JR 3-el Triband Beam	$189
TA40KR 40 mtr Kit for TA33	$119

ROHN GUYED TOWERS

10 ft Stack Sections

20G $39.50 25G $49.50
45G $112.50 55G $134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	$899
	FK2558	58 ft	13.3 sq ft	$949
	FK2568	68 ft	11.7 sq ft	$999
	FK4544	44 ft	34.8 sq ft	$1199
	FK4554	54 ft	29.1 sq ft	$1299
	FK4564	64 ft	28.4 sq ft	$1399
	25G Foldover Double Guy Kit			$219
	45G Foldover Double Guy Kit			$249

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex

TOWER/GUY HARDWARE

3/16" EHS Guywire (3990 lb rating)	$.15/ft
1/4" EHS Guywire (6000 lb rating)	$.18/ft
5/32" 7 x 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$.45
1/4" CCM Cable Clamp (1/4" Cable)	$.55
1/4" TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2" EE (1/2" Eye & Eye Turnbuckle)	$9.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle)	$10.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam. - 4 ft Long Earth Screw Anchor	$14.95
5000 Guy Insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam. - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$7.95
9902LD Cable End (for 6700 cable)	$8.95
Socketfast Potting Compound	$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$59	$79
18 in Wall	$39	$69	$99	$129
25 in Wall	$69	$129	$189	$249

TEXAS TOWERS

Telephone (214) 422-7306

VISA MasterCard

Div. of Texas RF Distributors Inc.
1108 Summit Ave., Suite 4 • Plano, Texas 75074

Store Hours: Mon-Fri: 9am - 5pm
Sat: 9am - 1pm

(Prices & Availability Subject To Change Without Notice)

MISSOURI RADIO CENTER

KENWOOD

TS-430S Most Advanced, Compact HF Transceiver

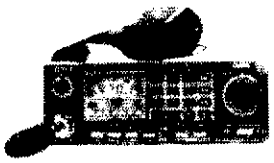
- General Coverage Receiver
- USB/LSB/CW/AM/Optional FM • 10Hz Dual Step Digital VFO • Eight Memories w/Lithium Back-up • Memory and Band Scan

KENWOOD

TS-930S Top of the Line HF Transceiver

- General Coverage Receiver • Superior Dynamic Range • All Solid State—28 VDC Final • QSK CW • Optional Automatic Antenna Tuner • Dual VFO w/8 Memories • Dual Mode Noise Blanker

KENWOOD



TR-7950/7930

- Large LCD Readout • 21 Multi-Function Memory • Lithium Back-up • Automatic Offset • Built-in Encoder • Memory or Band Scan

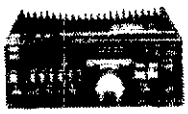
KENWOOD

TR-2600

2.5W/300 mW (Switchable) 2 Meter Handheld Transceiver

- LCD Readout • Ten Memories w/Lithium Back-up • Band and Memory Scan • Built in Sub tone Encoder

YAESU

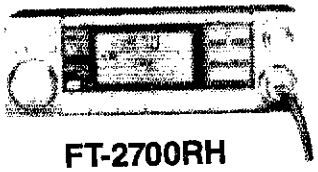


FT-757 GX

Compact General-Coverage Receiver

- General-Coverage Receiver
- USB/LSB/CW/AM/FM • Dual VFOs
- Memory/Band Scan • Speech Processor • CW Filter and CW Keyer included

YAESU



FT-2700RH

Dual Bander

- VA/HF FM
- 144/430 MHZ
- 25 WATTS

YAESU

FT-209RH

- 5 Watts
- 10 Memories
- LCD
- Compact

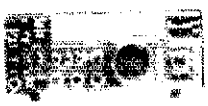
YAESU

FT980

CAT SYSTEM—ComputerAided Transceiver

- Wide Dynamic Range • General Coverage • Low Noise Front End • 10 Hz Digital Readout • All Mode Transceive—CW/SSB/AM/FM/FSK!

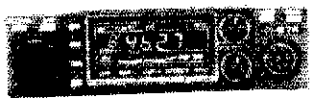
ICOM



IC-745 HF Base

All ham band HF transceiver. 16 memories. 100KHz to 30 MHz general coverage receiver and adjustable noise blanker and AGC

ICOM



IC-27A Compact Mobile

A breakthrough in 2-meter mobile communications! Most compact on the market (5¼" x 1½" Hx7" D). contains internal speaker for easy mounting. 25 watts. 32 PL frequencies. 9 memories. scanning and touchtone mic

ICOM

IC-02AT

The IC-02AT 2-meter LCD readout handheld features 10 memories, 32 PL tones, scanning, keyboard frequency entry, dial lock, 3W std., 5W opt. DTMF

ICOM

IC-R71A General Coverage Receiver

The IC-R71A 100KHz - 30 MHz superior-grade general coverage receiver features keyboard frequency entry, 32 memories, SSB/AM/RTTY/CW, selectable AGC and noise blanker, and wireless remote controller (optional)

NEW

OUR ASSOCIATE STORE IN THE ST. LOUIS AREA

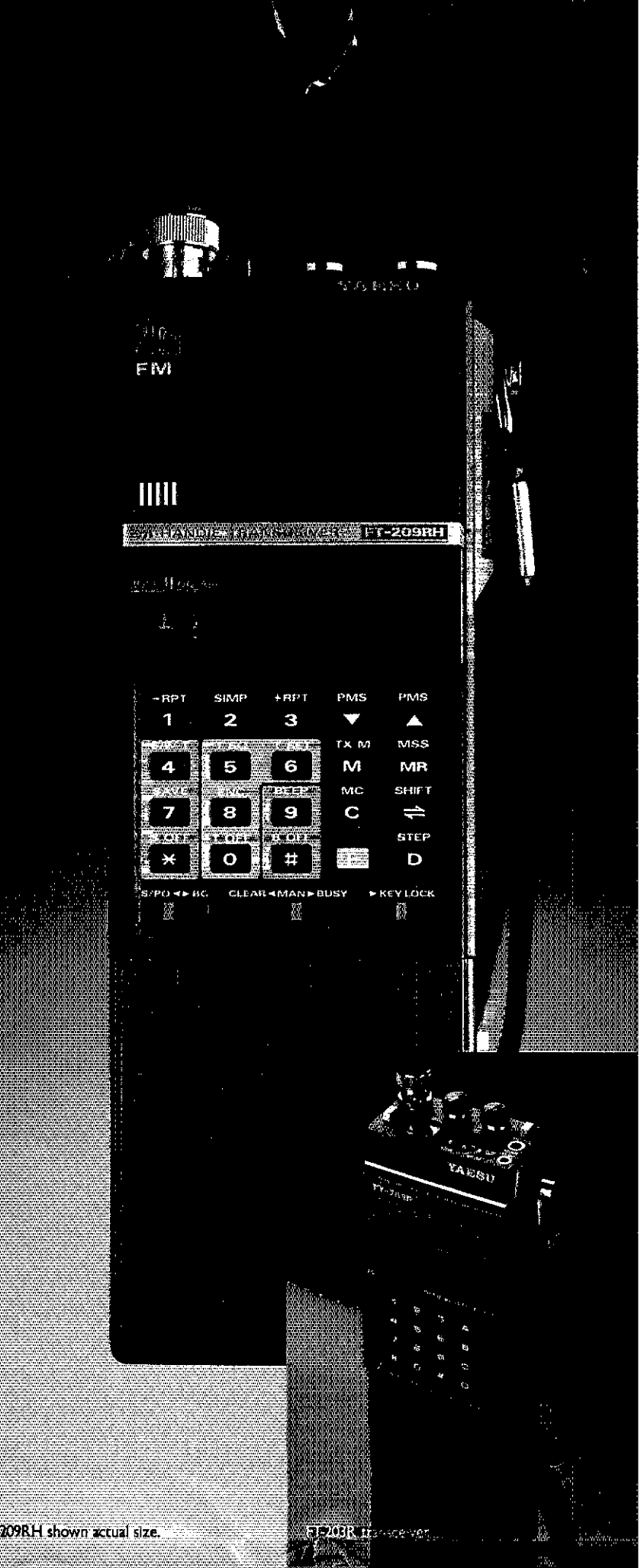
FLOYD ELECTRONICS
2213 VANDALIA COLLINSVILLE, ILL 62234
CALL 618-345-6448

CALL FOR SPECIAL SALE PRICES

- AEA
- ASTRON
- AVANTI
- AZDEN
- B & W
- BEARCAT
- BENCHER
- BUTTERNUT
- CENTURION
- CES
- COMM SPEC
- CUSHCRAFT
- DAIWA
- HUSTLER
- HYGAIN
- ICOM
- KANTRONICS
- KENWOOD
- KLM
- LARSEN
- MFJ
- MICROLOG
- MIRAGE
- SANTEC
- VANGORDON
- WELZ
- YAESU

CALL TOLL FREE 1-800-821-7323
MASTERCARD, VISA & C.O.D.'s WELCOME

2900 N.W. VIVION RD.
KANSAS CITY, MISSOURI 64150
816-741-8118



209RH shown actual size.

The Yaesu FT-209RH. 5 watts that your batteries can live with.

Have the power you need when you need it with Yaesu's new 5-watt, 2-meter handheld. Power to get out in situations where ordinary HTs just won't make it.

We designed our HT with a unique user-programmable Power Saver that puts the rig to "sleep" while you're monitoring and "wakes it up" when the squelch breaks. So you can listen for hours and still have plenty of power to hit those hard-to-reach repeaters when you need to.

With the FT-209RH there's no need to fiddle with knobs when you change from one memory channel to another. That's because you can independently store everything you need in each of the ten memories: receive frequency, standard or non-standard offset, even tone encode/decode with an optional module. And then recall any channel at the touch of a button.

It's easy to hear what's happening on your favorite repeaters or simplex frequencies. Just touch a button and scan all memory channels, or selected ones. Or all frequencies between any two adjacent memories. Use the priority feature to return automatically to your special frequency when it becomes active.

Bring up controlled-access machines with the optional plug-in subaudible tone encoder/decoder, independently programmed from the keyboard for each channel. Listen for tone-encoded signals on selected channels — without having to hear a bunch of chatter — by enabling the decode function.

The FT-209RH, which covers 10 MHz for CAP and MARS use, comes complete with a 500-mAh battery, charger and soft case.

For those who want a basic radio without the bells and whistles, consider the compact, lightweight FT-203R. This economical HT features 2.5 watts of power and an optional DTMF keypad. Most all the accessories for the 209 work with the 203, including an optional VOX headset that gives you hands-free operation that's perfect for public service events.

So when you visit your dealer, let him know you won't settle for anything but the best. A radio built by Yaesu.

YAESU

Yaesu Electronics Corporation
6851 Walthall Way, Paramount, CA 90723
(213) 633-4007.

Yaesu Cincinnati Service Center
9070 Gold Park Drive, Hamilton, OH 45011
(513) 874-3100.

Prices and specifications subject to change without notice.

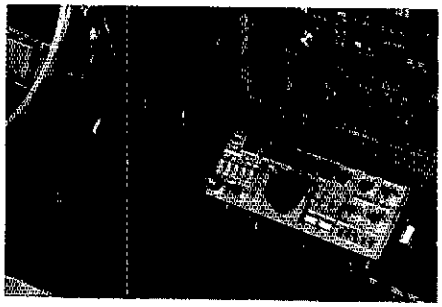
KENWOOD

...pacesetter in Amateur radio

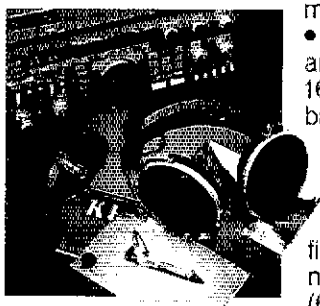
"Digital DX-terity!"

TS-430S

Digital DX-terity—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!

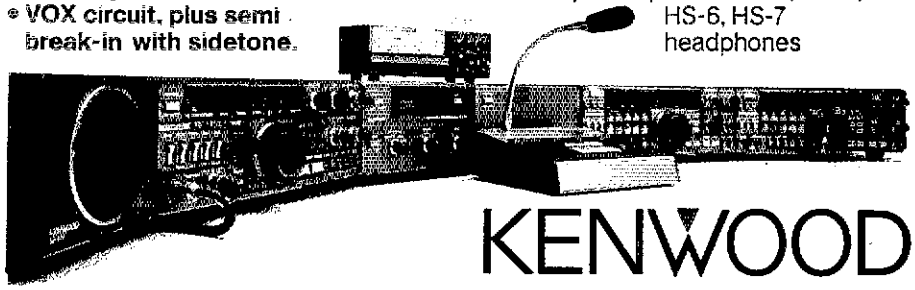


- **Covers all Amateur bands** 160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction** Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker supresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.
- **Reliable, all solid state design.** Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.** Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.



- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

Optional accessories:
- PS-430 compact AC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands
- AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands
- AT-230 base station antenna tuner
- 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 mic.
- MC-60A deluxe desk mic., with UP/DOWN switch
- SW-2000 SWR/power meter
- SW-100A SWR/power/volt meter
- PC-1A phone patch
- HS-4, HS-5, HS-6, HS-7 headphones



KENWOOD

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

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