QST

September 1981 $2.50

devoted entirely to Amateur Radio

EME, with gusto!

Pages 54 and 81

3K Classic

Is this the world's finest Amateur linear amplifier?

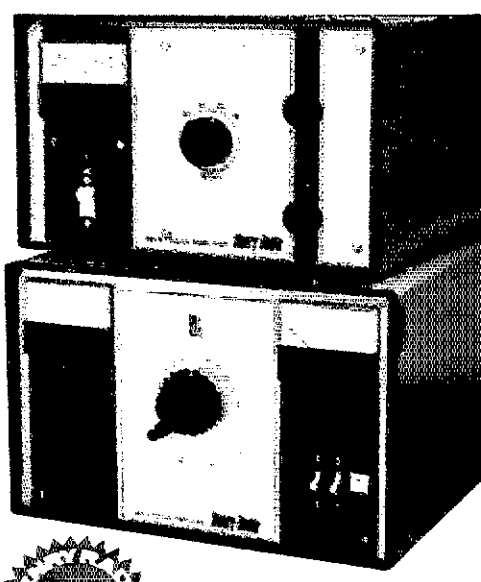
We think it is...and we think you'll agree with us.

3K Classic and 3K Classic pictured above

Ever since we made our first Amateur amplifier almost 20 years ago, our goal has been to make the finest, most rugged and reliable amplifier possible. Now with the 3K Classic we have accomplished this. It contains all of the famous Henry amplifier features plus the magnificent 8877 tube, rugged heavy duty power supply components and advanced antenna switch relay for semi break-in on CW. This is the amplifier of every Amateur's dreams! *Subject to FCC type acceptance*

The 3K Classic/X with heavy duty power supply and 10 meter operation is available for sale outside the USA where FCC type acceptance is not required.

The 2K Classic The 2K Classic represents the culmination of years of experience in developing, manufacturing and improving the 2K series. It remains as always a "workhorse", engineered and built to loaf along at full legal power for days or weeks without rest. A look inside shows why! It is truly a "Classic" amateur amplifier. Heavy duty, top quality components along with its rugged construction assures you trouble free operation. It will put your signal on the air with greater strength and clarity than you ever dreamed possible. The 2K Classic operates on all Amateur bands, 80 through 15 meters (export models include 10 meters). Price $1295.00



The 1KD-5 ...Another fine member of the famous Henry Radio family of superior amplifiers. And we're still convinced that it's the world's finest linear in its class. The 1KD-5 was designed for the amateur who wants the quality and dependability of the 2KD-5 and 2K-4, who may prefer the smaller size, lighter weight and lower price and who will settle for a little less power. But make no mistake, the 1KD-5 is no slouch. Its 1200 watt PEP input (700 watt PEP nominal output) along with its superb operating characteristics will still punch out clean powerful signals...signals you'll be proud of. Compare its specifications, its features and its fine components and we're sure you will agree that the 1KD-5 is a superb value at only $695.

The 2KD-5 We have been suggesting that you look inside any amplifier before you buy it. We hope that you will. If you "lift the lid" on a 2KD-5 you will see only the highest quality, heavy duty components and careful workmanship...attributes that promise a long life of continous operation in any mode at full legal power. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. It operates with two Eimac 3-500Z glass envelope triodes and a PI-L plate circuit with a rotary silver plated tank coil. Price $945.

Henry amateur amplifiers are available from select dealers throughout the U.S. And don't forget the rest of the Henry family of amateur amplifiers...the Tempo 2002 high power VHF amplifier and the broad line of top quality solid state amplifiers. Henry Radio also offers the 4K-Ultra and 3K Classic/X superb high power H.F. amplifiers and a broad line of commercial FCC type accepted amplifiers for two way FM communications covering the range to 500MHz.

53 YEARS OF SERVICE

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

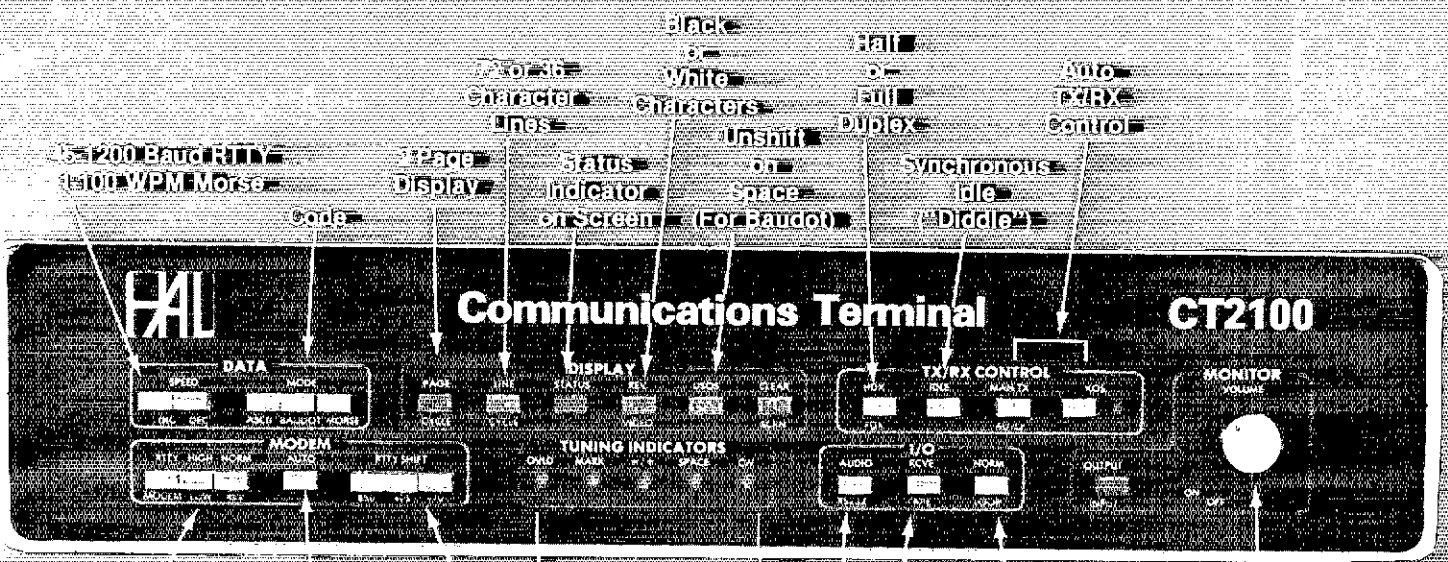
TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

Henry Radio

Prices subject to change without notice

CT2100

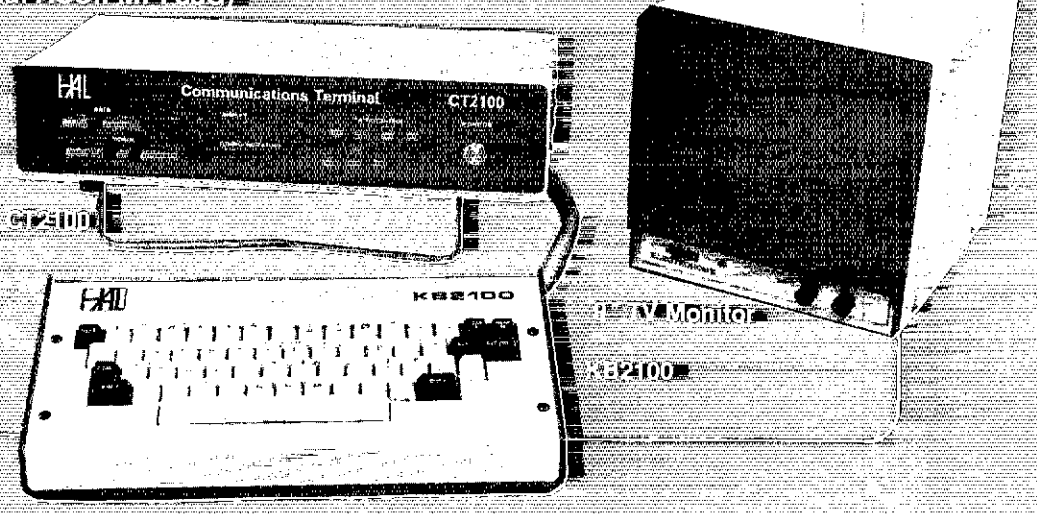
HAL Puts MORE Behind The Buttons



- 45-200 Baud RTTY
- 5-100 WPM Morse Code
- 24 Page Display
- 16 to 36 Character Lines
- Status Indicator On Screen
- Black or White Characters
- Unshift On Space (For Baudot)
- Half or Full Duplex
- Synchronous Idle "Diddle"
- Auto or CRX Control
- Four Internal RTTY Demodulators
- High Tones (U.S. Standard)
- Low Tones (ARU Standard)
- 103 Modem (1070/1270 Hz)
- 202 Modem (1200/2200 Hz)
- Auto Mark Hold
- Auto RTTY Shifts
- High or Low Tones
- LED Tuning Indicators Plus On Screen Tuning Bar Plus Ext. Scope Connections
- Audio or RS232 Data
- Transmit and Receive With RTTY Loop Devices
- Input Audio From Receiver or Tape
- Audio Monitor For Either Input or Output Signals Internal Speaker Plus External Output

CT2100 System

- CT2100 Communications Terminal
- KB2100 Keyboard
- Video Monitor
- Printer 300Bd Serial ASCII MPI 88G
- HM2100 Rack Adapter
- MSG2100 2000 Character "Brag Tape" ROM



- 24 Line Display
- 2 Pages of 72 Character Lines Plus 2 Pages of 36 Character Lines Split Screen With KB2100
- CT2100
- TV Monitor
- KB2100

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
217/367-7454

NOW HAL Equipment Is In Stock at Leading Amateur Dealers. See page 96 for the location of your nearest dealer.

ICOM Presents the Minicom IC-25A

Imagine...25 watts/5 memories/2 scanner systems in a 2"H x 5½"W x 7"D 2 meter transceiver!

A very small package with a 25 watt punch, the IC-25A is a full featured FM transceiver for the space conscientious operator. Nearly the same size as an automotive AM radio, the IC-25A will fit in places usually considered impossible for a one piece 2 meter transceiver. The IC-25A is no lightweight when it comes to features:

- 5 memories. Store your favorite frequencies.
- Priority channel. Monitor your most important frequency.
- 25 watts high/1 watt battery saving low power.
- Touchtone™ mic standard, no extra cost, to work your favorite autopatch repeater.
- Full band scan/programmable scan (set your own limits)/memory scan...all with automatic resume after preset delay or carrier drop.
- 2 VFOs with data transfer standard.
- 2 tuning rates 5KHz (A VFO) or 15 KHz (B VFO).
- Nor/Rev switch for instant monitoring of repeater inputs.
- Memory back up power supply option holds memory when attached.

Actual Size...

(Clip this actual photo out and try it in your car.)

2112-116th Avenue NE, Bellevue, WA 98004
3331 Towerwood Drive, Suite 307, Dallas, TX 75234

ICOM

September 1981 *Volume LXV Number 9*

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 Street
Newington, CT 06111 Tel: 203-666-1541

Member of the Audit Bureau of Circulations

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

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

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

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

THE COVER

The 336-element (count 'em!) array at K1WHS was good for 90 QSOs during the last EME Contest. Complete results appear on p. 81. One man's view of the art of moon-bouncing is on p. 54. *(photo courtesy Dave Olsen, K1WHS)*

Contents

Technical

Basic Amateur Radio

General

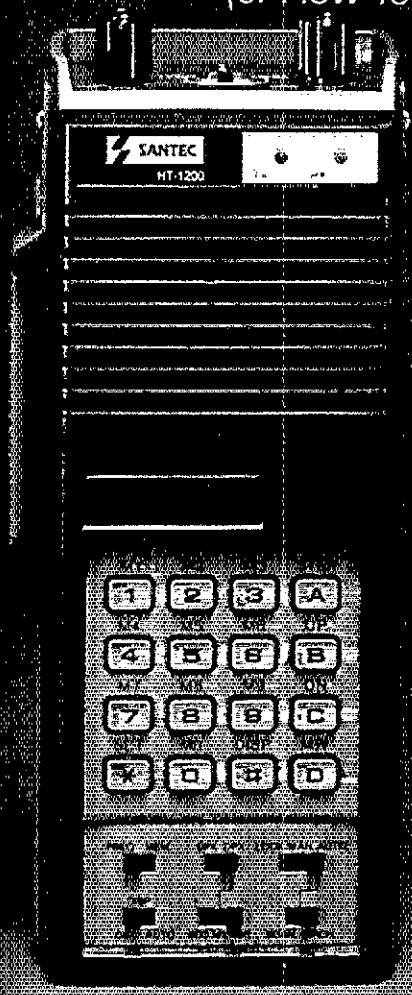
Operating

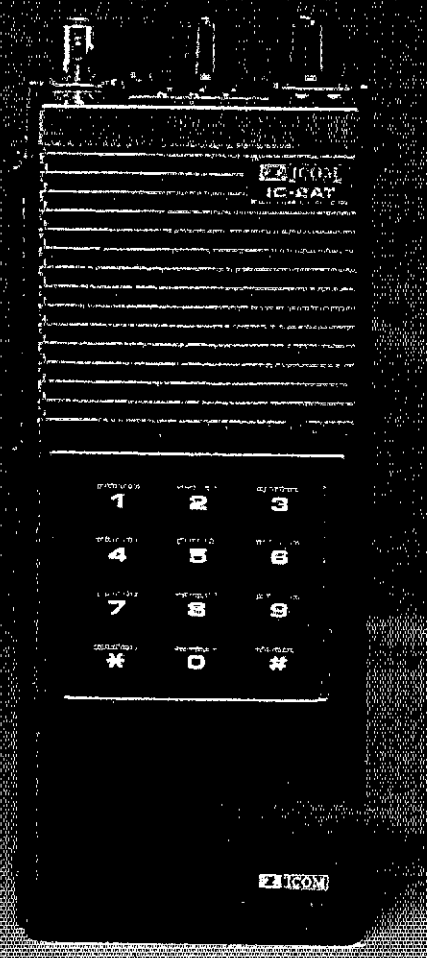
Organizational and Regulatory

Departments

Santec Makes an Unfair Comparison

(or How You Can Get More for Less.)





It's a little unfair to compare the features of the ICOM IC-2AT to those of the SANTEC HT-1200: the ICOM doesn't even claim to offer the big rig features that are packed into the SANTEC. This is really like comparing apples and oranges, but a quick match-up of features may surprise you if your biggest concern is cost. If you like the little extras you can buy for the IC-2AT, you'll love the SANTEC ... it actually delivers more for less.

Compare these two "uncomparable" units for yourself; and while you're making your unfair comparison, think of everything you want your handy to do for you ... more or less.

	SANTEC HT-1200	ICOM IC-2AT
BASIC RADIO	$ 379.00	$ 269.95
SCAN	no charge	not available
SEARCH	no charge	not available
10 MEMORIES	no charge	not available
HIGH POWER 3.5W OUTPUT	no charge	$ 47.95*
CHARGER	no charge	$ 69.95**
TOTAL COST	$ 379.00	$ 387.85

* The IC-2AT requires a larger battery for 3.5W output.

** The IC-2AT requires a special charger for the larger battery.

SANTEC

The SANTEC HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214)423-0024 • INTL TLX 203920 ENCOM UR

Encomm, Inc.
2000 Avenue G
Suite 800
Plano, TX 75074

☐ Please send me more information about the Santec HT-1200 and a list of Authorized Santec Dealers.

NAME

CALL

ADDRESS

CITY

STATE ZIP

YOU MAY SEND A DUPLICATE OF THIS FORM.

DX

1,500 CONTACTS

120 COUNTRIES

IN 2 DAYS

A4

SPECTACULAR PERFORMER

Top performance, easy installation, 4 band operation, and moderate price are yours with Cushcraft's new A4, 4 element beam. A4 operates on 10-15-20 meters. A74 add-on kit expands operation to either 40 meters or the new 30 meter WARC band. New engineering gives better performance through improved trap design with fewer parts, less installed weight and greater strength. You too can experience exciting DX contacts with

"I used your new A4 during the 1981 Phone ARRL DX contest. It was dynamite!! In 24 hours I had worked 99 countries. After 48 hours my total was 125. The A74 add-on kit allowed me to work 28 countries on 40 meters alone. It added new versatility to my 40 meter activity. By the end of 48 hours I had worked almost 1500 contacts with 285 multipliers. Thank you for making my operating more fun." ART HAMBLETON, K1LL.

cushcraft
CORPORATION

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

Dyna-"mite."

Miniaturized, 5 memories, memory/band scan

TR-7730

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-meter FM mobile transceiver with five memories, memory scan, automatic band scan, UP/DOWN manual scan from the microphone, and other convenient operating features.

TR-7730 FEATURES:

- **Smallest ever Kenwood mobile**
  Measures only 5-3/4 inches wide, 2 inches high, and 7-3/4 inches deep, and weighs only 3.3 pounds. Mounts even in the smallest subcompact car, and is an ideal combination with the equally compact TR-8400 synthesized 70-cm FM mobile transceiver.
- **25 watts RF output power**
  Even though the TR-7730 is so compact, it still produces 25 watts output for reliable mobile communications. HI/LOW power switch selects 25-W or 5-W output.
- **Five memories**
  May be operated in simplex mode or repeater mode with the transmit frequency offset ±600 kHz. The fifth memory stores both receive and transmit frequency independently, to allow operation on repeaters with nonstandard splits. Memory backup terminal on rear panel.
- **Memory scan**
  Automatically locks on busy memory channel and resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **Extended frequency coverage**
  Covers 143.900-148.995 MHz in switchable 5-kHz or 10-kHz steps, allowing simplex and repeater operation on some MARS and CAP frequencies.
- **Automatic band scan**
  Scans entire band in 5-kHz or 10-kHz steps and locks on busy channel. Scan resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **UP/DOWN manual scan**
  With UP/DOWN microphone provided, manually scans entire band in 5-kHz or 10-kHz steps.
- **Offset switch**
  Allows VFO and four of five memory frequencies to be offset ±600 kHz for repeater access (or to be operated simplex) during transmit mode.
- **Four-digit LED frequency display**
  Indicates receive and transmit frequency during simplex or repeater-offset operation.
- **S/RF bar meter and LED indicators**
  Bar meter of multicolor LEDs shows relative receive and transmit signal levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.
- **Tone switch**
  Activates internal subaudible tone encoder (not Kenwood-supplied).

Optional accessories:

- **MC-46** 16-button autopatch (DTMF) UP/DOWN microphone
- **SP-40** compact mobile speaker
- **KPS-7** fixed-station power supply

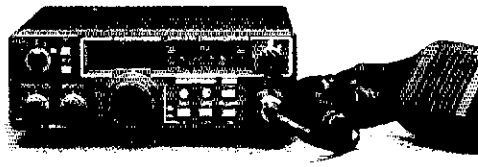
More information on the TR-7730 and TR-8400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Synthesized 70-cm FM mobile rig

TR-8400

- **Synthesized coverage of 440-450 MHz**
  Covers upper 10 MHz of 70-cm band in 25-kHz steps, with two VFOs.
- **Offset switch**
  For +5 MHz transmit offset on both VFOs and four of five memories, as well as simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.
- **DTMF autopatch terminal**
  On rear panel, for connecting DTMF (dual-tone multifrequency) touch pad (for accessing autopatches) or other tone-signaling device.
- **HI/LOW RF output power switch**
  Selects 10 watts or 1 watt output.
- **Virtually same size as TR-7730**
  Perfect companion for TR-7730 in a compact mobile arrangement.
- **Other features similar to TR-7730**
  Five memories, memory scan, automatic band scan (in 25-kHz steps), UP/DOWN manual scan, four-digit LED receive frequency display (also shows transmit frequency in memory 5), S/RF bar meter and LED indicators, tone switch, and same optional accessories.



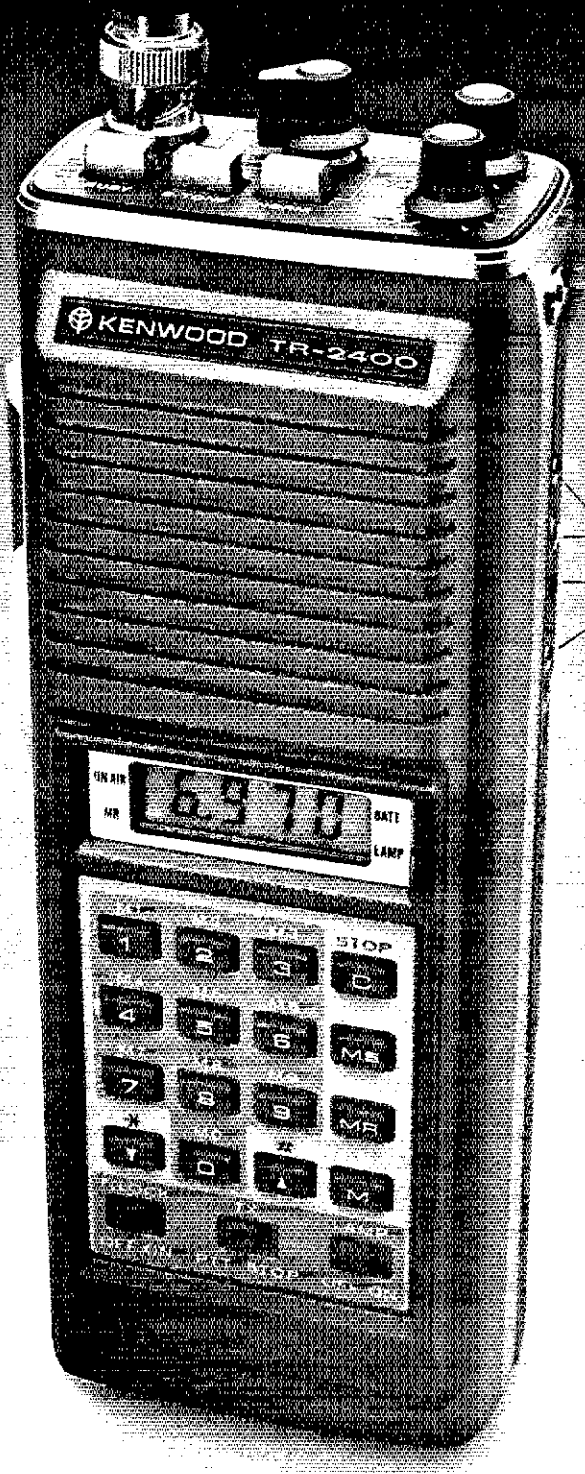
Specifications and prices are subject to change without notice or obligation

Hand-shack.

ynthesized, ig LCD, 10 memories, scanning, DTMF

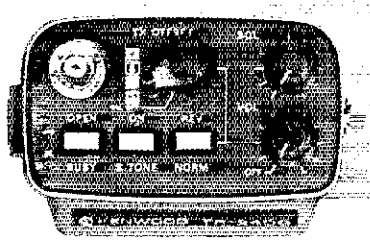
TR-2400

Put a ham shack in your hand. The TR-2400 is the ideal hand-held for meters FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-kHz-step PLL synthesized operation, 10-channel memory, scanning, and 16-button autopatch DTMF encoder.



Large LCD digital readout
Readable in direct sunlight (better than LEDs). Readable in the dark (with lamp switch). Virtually no current drain (much less than LEDs) and display stays on. Rugged and dependable in hot or cold temperature ranges. Shows receive and transmit frequencies and memory channel.

5-kHz-step frequency selection
PLL synthesized keyboard channel selection system. No "5 up" switch needed. Selects from 144.000 to 147.995 MHz.



CONVENIENT TOP CONTROLS

UP/DOWN manual scan
Single or fast continuous 5-kHz steps from 143.900 to 148.495 MHz for Amateur and MARS or CAP simplex or repeater operation.

10 memories
Retained with battery backup (only 2.0 mA). "M0" memory may be used to shift the transmit frequency any desired amount to operate on repeaters with nonstandard split frequencies.

Built-in autopatch DTMF encoder
All 16 buttons of keyboard provide telephone dual-tones while transmitting.

Automatic memory scan
Checks all 10 memory channels. Programmable to lock automatically on either BUSY (signal present) or OPEN (no signal) channels.

Repeater or simplex operation
Convenient mode switch shifts transmit frequency +600 kHz or -600 kHz or to the frequency stored in "M0" memory.

Optional accessories:
- ST-1 base stand (shown) which charges to 90% (to protect battery) in 1.5 hours, with 4-pin connector for dynamic microphone and SO-239 antenna connector
- BC-5 DC quick (90%) charger
- SMC-24 speaker/microphone
- LH-1 deluxe leather case (top-grain cowhide)
- PB-24 extra battery pack with charger adapter
- BH-1 belt hook

Subtone switch
Activates subaudible tone encoder (not Kenwood-supplied).

Extended operating time
With LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output), for longer operating time between charges.

Two lock switches
Prevent accidental frequency change and accidental transmission.

Reverse operation
Push-button switch shifts receiver to transmit frequency and transmitter to receive frequency.

BNC antenna connector
Easy to connect external antenna.

LCD "arrow" indicators
Show "ON AIR" "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.

High-impact case and zinc die-cast frame
Extremely rugged with antenna counterpoise.

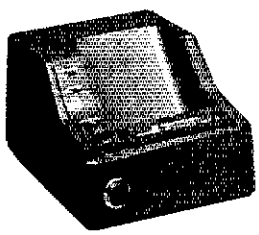
External PTT microphone and earphone connectors
Easily accessible on right side of transceiver.

Compact and lightweight
Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

Standard accessories included:
- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- External-microphone plug
- AC charger • Hand strap
- Earphone

More information on the TR-2400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio



Directors

Canada

MITCH POWELL,* VE3OT, 782 North Mile Rd., London, ON N6H 2X8 (519-471-6853)

Vice Director: Frederick H. Towner, VE6XX, 123 Rundleridge Close, N.E., Calgary, AB T1Y 2L2 (403-280-0074)

Atlantic Division

JESSE BIEBERMAN, W3KT, RD 1 — Box 66, Valley Hill Rd., Malvern, PA 19355 (215-827-7426)

Vice Director: Hugh A. Turnbull, W3ABC, 6903 Rhode Island Ave., College Park, MD 20740 (301-927-1797)

Central Division

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

Vice Director: Kenneth A. Ebneter, K9EN, 822 Wanona Trail, Portage, WI 53901

Dakota Division

GARFIELD A. ANDERSON,* KØGA, 5820 Chowen Ave. South, Minneapolis, MN 55410 (612-922-1160)

Vice Director: Tod Olson, KØTO 292 Heather Lane, Long Lake, MN 55356

Delta Division

LIONEL A. OUBRE, K5DPG, Star Route A — Box 185-E, New Iberia, LA 70560 (318-367-3901)

Vice Director: O. D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory, TN 37138 (615-758-2329)

Great Lakes Division

LEONARD M. NATHANSON, W8RC, 20840 Southfield Rd., Suite 240, Southfield, MI 48075 (313-569-3191)

Vice Director: George H. Goldstone, W8AP 1010 Burnham Rd., Bloomfield Hills, MI 48013

Hudson Division

STAN ZAK,* K2SJO, 13 Jennifer Lane, Port Chester, NY 10573 (914-939-6681)

Vice Director: Linda S. Ferdinand, N2YL, Sunset Trail, Clinton Corners, NY 12514 (914-266-5398)

Midwest Division

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

Vice Director: Claire Richard Dyas, WØJCP 2933 Dudley St., Lincoln, NE 68503 (402-476-2438)

New England Division

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

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

Northwestern Division

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

Vice Director: Mel C. Ellis, K7AOZ, S. 4302 Altamont, Spokane, WA 99203 (509-448-0595)

Pacific Division

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

Vice Director: Ross W. Forbes, WB6GFJ, P.O. Box 1, Los Altos, CA 94022 (408-948-5193)

Roanoke Division

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

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

Rocky Mountain Division

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

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

Southeastern Division

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

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

Southwestern Division

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

Vice Director: Peter F. Matthews, WB6UIA, 3403 S. Walker Ave., San Pedro, CA 90731 (213-547-5816)

West Gulf Division

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

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

*Executive Committee Member

Section Communications Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station,* free to members.

Canadian Division

Alberta — E. Roy Ellis, VE6XC, P. O. Box 2, RR 1, Fort Saskatchewan T8L 2N7
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba — Peter Guenther, VE4PG, Box 178, Morris R0G 1K0 (204-746-2218)
Maritime-Nfld — Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot JØH 1Y0 (514-798-2173)
Saskatchewan — W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

Atlantic Division

Delaware — Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720 (302-328-0581)
Eastern Pennsylvania — Karl W. Pfeil, W3VA, 211 Schuylkill Ave., Tamaqua 18252 (717-668-3533)
Maryland-D.C. — Karl R. Medrow, W3FA, 718 W. Central Ave., Davidsonville, MD 21035 (301-261-4008)
Southern New Jersey — William C. Luebkemann, Jr., WB2LCC, 116 Country Farms Rd., Marlton 08053 (609-983-8844)
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 — Larry M. Keeran, K9ORP, 706 East Fremont, Bloomington 61701 (309-829-7389)
Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin — Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

Dakota Division

Minnesota — Helen Haynes, WBØHOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota — Lois A. Jorgensen, WAØRWM, Box 55, Abercrombie 58001 (701-553-8724)
South Dakota — Erwin C. Heimbuck, Jr., KØOTZ, 3312 Parkview, Rapid City 57701 (605-348-5433)

Delta Division

Arkansas — Dale E. Temple, W5RXU, 1620 Tarrytown Rd., Little Rock 72207
Louisiana — James R. Giammanco, N5IB, 9451 Corsica Ave., Baton Rouge 70810 (504-766-5583)
Mississippi — Paul C. Kemp, WB5SNB, 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 — David L. Vest, KZ4G, 2314 Oak St., Flatwoods 41139 (606-836-4116)
Michigan — James R. Seeley, WB8MTD, 14630 Clinton Rd., Springport 49284 (517-569-2411)
Ohio — Allan L. Severson, AB8P, 1275 Ethel Ave., Lakewood 44107 (216-521-1565)

Hudson Division

Eastern New York — Paul S. Vydareny, WB2VUK, 259 N. Washington, North Tarrytown 10591 (914-631-7424)
N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Coplague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa — Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scotts Bluff 69361 (308-632-4337)

New England Division

Connecticut — Stanley Horzepa, WA1LOU, 72 Stiles St., Waterbury 06706 (203-755-1516)
Eastern Massachusetts — Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — Gordon F. Fox, W1YNE, 13 York Dr., Coventry 02816 (401-828-6045)
Vermont — Robert L. Scott, W1RNA, 9 Large St., Swanton 05488 (802-868-4944)
Western Massachusetts — Arthur Zavarella, W1KK, 1702 Main St., Agawam 01001 (413-786-9115)

Northwestern Division

Alaska — Fred S. Wegmer, KL7HFM, 1910 Rosemary St., Anchorage 99504 (907-274-3464)
Idaho — Lemuel H. Allen, Jr., 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 — Robert L. Klepper, W7IEU, 7027 51st NE, Marysville 98270 (206-659-3005)

Pacific Division

East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
Pacific — J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Arthur P. Samuelson, W6VV, 440 Davis Ct. #811, San Francisco, CA 94111 (415-986-3129)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

Roanoke Division

North Carolina — Ed Stephenson, AB4S, 700 Madison Ave., Cary 27511 (919-467-6832)
South Carolina — Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia — Byron C. "Luck" Hurder, WA4STO, Box 167, Seven Fountains 22653
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado — Lawrence E. Steimel, WØACD, 1750 Roslyn St., Denver 80220
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Leonard M. Norman, W7PBV, 933 South Cedar Knolls, Cedar City 84720 (801-586-9859)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)

Southeastern Division

Alabama — James M. Bonner, K4UMD, Rte. 15 — Box 246, Birmingham 35224 (205-788-2003)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies — Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8978)
Los Angeles — Stanley S. Broki, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fred Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Roger D. Coday, N5FN, 213 Ave. G, RFD 4, Brazoria 77422 (713-798-7970)

THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us . . ."

RFI

The FCC's three-year-old inquiry into the problem of radio frequency interference, or RFI, is heading in what could be a very dangerous direction for Amateur Radio and other long-time users of the radio spectrum.

For decades, the Commission's approach to resolving interference problems has been based on the sensible doctrine that interference should be eliminated by correcting the *technical inadequacies in the equipment.* If the transmitter is radiating harmonic energy that causes television interference (TVI), fix the transmitter; if the problem is inadequate selectivity or shielding in the TV receiver, fix the TV set. Under this doctrine, interference to stereo systems, smoke detectors and other devices not intended to intercept rf radiation clearly is the responsibility of the manufacturer of that equipment, *not* of the transmitter operator who is unlucky enough to be nearby. When the roof leaks you don't blame the clouds, nor is the solution to legislate against rain.

Over the past several decades, thousands of grateful U.S. amateurs have had their right to operate defended by the agency that granted their licenses: the Federal Communications Commission. The Commission's engineers have a fine record of coming to the aid of amateurs wrongly accused of being the source of their neighbors' problems. While the growth of CB-related interference has made it impossible for the FCC to provide the individual attention it once did, the Commission's staff has continued its efforts to educate the public as to the true nature of RFI and the shortcomings of consumer-electronic devices. For example, more than 240,000 copies of the excellent FCC booklet, "How to Identify and Resolve Radio-TV Interference Problems," have been distributed since 1977. By contrast, the response of the industry responsible for the existence of the problem, the companies that reap millions of dollars in profits from the sale of RFI "time bombs" to unsuspecting consumers, has been to deny that a problem exists. Had the industry spent as much on engineers as it has on lawyers and lobbyists, that booklet would be much less in demand.

When it opened Docket 78-369 with a Notice of Inquiry in 1978 (see March, 1979, *QST*), the FCC said it wanted to examine in detail every aspect of RFI. It posed a massive set of questions to which answers were sought, dealing with consumer issues, engineering issues, and the experience of other government agencies. Unfortunately, a whole category of potential questions somehow was overlooked: questions which might have sought information from the operators of Commission-licensed transmitters. Even so, the response was such that it took more than two years for the Commission to analyze it and issue a Further Notice of Inquiry (see "Happenings" this month).

The Further Notice is encouraging on several counts. It is clear that the Commission does not buy industry arguments that a problem does not exist, and that it recognizes the danger in the increasing presence of microprocessors in everyday life — microprocessors that not only may be susceptible to RFI, but may even *generate* enough rf to cause interference. There is even some cause for optimism on the TVI front, according to the Commission, because the Electronic Industries Association (EIA) has published a bulletin which suggests procedures for testing the susceptibility of TV tuners to front-end overload and which contains a recommended level of performance. Unfortuantely, the bulletin ". . . is not an EIA recommended standard and manufacturers are under no obligation to adopt its suggestions." Furthermore, it does not address the problem of interference that enters the TV set via a path other than the antenna terminals. Still, it is a start, and some television manufacturers are making a good-faith effort to comply with the EIA bulletin despite the fact that their cut-rate competition is not obliged to follow suit. Of course, this does nothing to solve other RFI problems, such as audio rectification.

What is troubling about the Further Notice is that in outlining its policy options, the Commission appears all too willing to sacrifice the mandate of the Communications Act, that the FCC is to ". . . generally encourage the larger and more effective use of radio in the public interest . . .", on the altar of short-term economic expediency. Some of the options apparently under consideration (otherwise, why publish them?) would place burdens on the operators of radio transmitters that are simply indefensible on technical grounds, and the choice of options apparently is to be based on economic, not engineering, considerations.

The most offensive policy option would make operators of radio transmitters responsible for resolving interference problems, *regardless of technical fault.* The supporting rationale is that this would ". . . shift the responsibility for interference control from the government to the affected parties . . ." and would provide an ". . . incentive [to] those transmitting interfering signals to avoid interference." (Of course, where the transmitter is radiating spurious emissions that "incentive" already exists.) Elsewhere, the Commission's report provides an eloquent argument *against* this particular option:

> The incentive of equipment manufacturers to redesign their equipment is weakened or eliminated if, as interference problems arise, the Commission moves to eliminate the interference in other ways, for example, by placing responsibility on the transmitter. . . . Not only is the incentive to manufacturers reduced but such action may inhibit the fullest possible use of the spectrum.

The logic of this argument is unassailable, and if the Commission's deeds matched these words we would have little to worry about. However, in at least *three recent cases* the FCC has acted in violation of that logic. Paging services operating near 43 MHz are not being granted permanent authorizations to operate because of *poorly shielded i-f stages in home television receivers.* Expansion of noncommercial fm service is being inhibited because of *inadequate adjacent band selectivity in TV sets* tuned to channel 6. Inland waterways operators adjacent to TV channel 13 will be fully responsible for TVI that results from the same cause.

It's time for the FCC to abandon this stopgap, ill-advised approach that results in vast amounts of spectrum being held hostage to inadequate receiver design. It's time for the consumer-electronics manufacturers, who sell their equipment on the promise that it will give good performance to the purchaser, to accept responsibility if that performance is not delivered. If the responsibility is not assumed voluntarily, it's time it was made a condition of doing business in the electronic marketplace.
— *David Sumner, K1ZZ*

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

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

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

League Lines...

ARRL President Dannals has been asked by the Board of Directors to form an ad hoc committee to recommend standards for digital communications in the Amateur Radio Service. The objective is not to hamper experimentation with different techniques, but to make sure that digital networks developed by amateurs are able to communicate with one another in the future. Interested? Send a statement of background and qualifications to President Dannals, c/o ARRL Hq.

Robert Forbes, VE3ATU, has successfully appealed his conviction of violating a Mississauga, Ontario "anti-noise" by-law arising out of the operation of his amateur station. The complaint was brought by a neighbor who received "noises on her clock radio and high-fidelity stereo." Bob's station had been checked out and given a clean bill of health by the Department of Communications (DOC). The neighbor refused all offers of assistance for getting repairs made to the home-entertainment equipment to eliminate the interference, and also refused to take any action recommended to her by the DOC. The judge who heard the appeal quashed the conviction and held that a ham radio was not an "auditory signalling device" covered by the by-law. His Honour then proceeded to state that in his opinion even if the ham radio were to be an auditory signalling device, the regulation thereof was within the exclusive jurisdiction of the Parliament of Canada.

Attention repeater enthusiasts! Work has begun on the next edition of the ARRL Repeater Directory. The deadline for registering your repeater is November 1, 1981. Please register your repeater on form CD-240 (available for an s.a.s.e.) to ensure the accuracy of the next edition. Repeaters must be registered annually to be included! All information should be sent to the Communications Department at Hq.

This spring, the ARRL Insurance Administrator sent notices to members urging that they sign up for the League's Ham Radio Equipment Insurance Program before a June 1, 1981 deadline. You may still apply for enrollment after the deadline. The June 1 deadline was the end of a special enrollment period during which the Insurance Administrator would accept any ARRL member into the program regardless of any previous loss experience. After June 1, acceptance into the program is no longer guaranteed. Our apologies to those who thought we were no longer accepting applications.

The ARRL Ad Hoc Committee for VHF/UHF Contesting has been selected. Members are: KA1GT/2, WA5VJB, N3AHI, K1KA, WD4MBK, N6NB, KCØW, WA8ONQ, W3XO, CAC Liaison WØSD, VUAC Liaison W1JR, Chairman W1XX. The work of this committee is described in August QST, page 80. Membership suggestions for improving the ARRL contest program will be distributed to all committee members. Address your comments to ARRL Ad Hoc VHF/UHF Contest Committee, c/o ARRL Hq.

Teleprompter Cable Communications Corporation, whose CATV interference to amateur operations in Richland, Washington drew fire from the League (see April 1981 QST, page 69), was issued a Notice of Apparent Liability for Forfeiture in the amount of $2500 by the FCC. Under the Commission's Rules, Teleprompter must either pay the forfeiture or explain why the forfeiture should be reduced or not paid. The City of Richland had also complained to the FCC that Teleprompter was violating the Commission's Rules by inaugurating its new, expanded frequency configuration without proper FCC authority. After reviewing the case and finding no explanation for Teleprompter's violation of its rules, the Commission concluded that a $2500 forfeiture was warranted for violations occurring from December 8, 1980 until July 28, 1981.

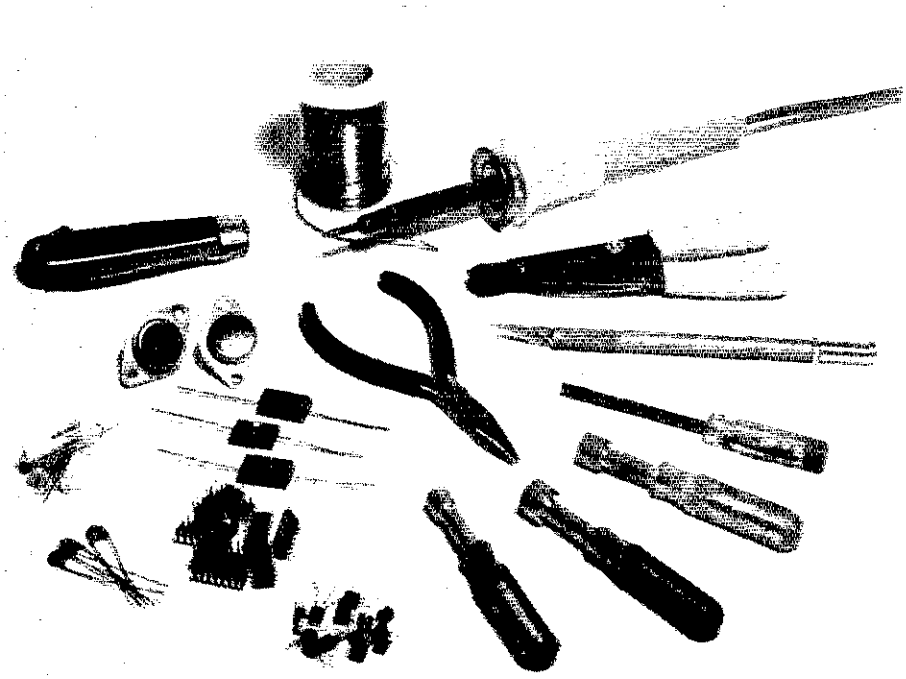
The FCC's action in the Teleprompter Cable Communications case is only the latest in a recent round of actions taken by the FCC against cable television companies. Earlier this year the Commission notified Comcast Cablevision Corporation, operator of a cable television system serving Flint, Michigan; Telesystems Corporation, doing business as Cox Cable St. Clair Shores, St. Clair Shores, Michigan; and American Cablevision of Carolina, Inc. (Berks TV Cable Co.), Reading, Pennsylvania of their apparent liabilities for forfeitures for improperly using aeronautical frequency bands for transmitting signals over their cable systems. Comcast incurred a $20,000 forfeiture, Cox Cable $10,000, and Berks $7500.

• *Basic Amateur Radio*

Experimenting for the Beginner

Experimenting is half the fun of Amateur Radio! QRP (low power) gear is great for the newcomer to this fine art. Here's how to get started.

By Doug DeMaw,* W1FB



What's this? You've never built a piece of amateur equipment? You don't know anything about circuits, so you just operate? Well, if this description fits you, at least half the thrill of being a ham has eluded you! For many of us the greatest excitement in amateur work came from building and using that first transmitter. There's a special feeling connected with telling the other guy or gal, "The rig here is homemade." If you haven't been able to make this statement over the air, perhaps it's time you did!

Most experimenters start out with relatively simple projects, and rightfully so. In the old days some of us tinkerers enjoyed building one-tube transmitters. Often, the name of the game was "power output." That is, we tried to extract more output power from a single oscillator than the tube was designed to deliver. A number of popular transmitters of this type were described in *QST* by F. Sutter.[1] But today it's prudent to use transistors and to operate them within their safe maximum ratings. QRP equipment (generally 5 watts or less of rf output power) can provide many interesting and exciting hours of operation, and it's easy and inexpensive to build. Therefore, QRP is the theme of our article this month on basic radio learning.

How to Experiment

We need not have college degrees in engineering to conduct experiments in nonprofessional electronics work. We can assemble suggested circuits, test them, learn their characteristics, and then make changes and observe the results. Familiarity with fundamental circuits can lead to circuit improvements and innovations, and perhaps later to some original design work. Many of the early-day inventors of electrical and electronic devices and systems followed this approach, which supports the validity of the precept, "Learn by doing."

We amateurs have the advantage of trying our ideas at home rather than at work. So, if the circuit is a flop, no need to contemplate the unemployment line! Furthermore, if the equipment is a transmitter for one of the amateur bands, we are licensed to put it on the air and to give it a true "environmental test," an advantage not enjoyed by many engineers and technicians.

The simplest approach we can take to experimenting is to adopt the breadboarding technique.[2] This allows us to tack a test circuit together quickly and easily. In the process we cut down on expense and eliminate the chore of laying out and etching a circuit board. The final product may not look like a work of art, but it can be used on the air just as effectively as a commercial-looking version of the same circuit.

Bargain-bag assortments of 1/4- and 1/2-watt resistors are a vital part of the experimenter's workshop. Likewise with assortments of disc ceramic capacitors, trimmer capacitors, volume controls and small electrolytic capacitors. Of course, we need a small pencil type of soldering iron (40 watts), some solder and a few feet of light-gauge, insulated hookup wire. Bargain assortments are often available from Radio Shack, Poly Paks and other prominent vendors. The best deals are often available at Amateur Radio flea markets, so we must be on the alert when browsing at hamfests and conventions.

An important item in our workshop is a VOM (volt/ohm/milliampere meter). Even a low-cost imported instrument will suffice if cost is an important consideration. For rf measurements it is wise to have a VOM that can be used with a

[1]Notes appear on page 15.
*Senior *QST* Technical Editor

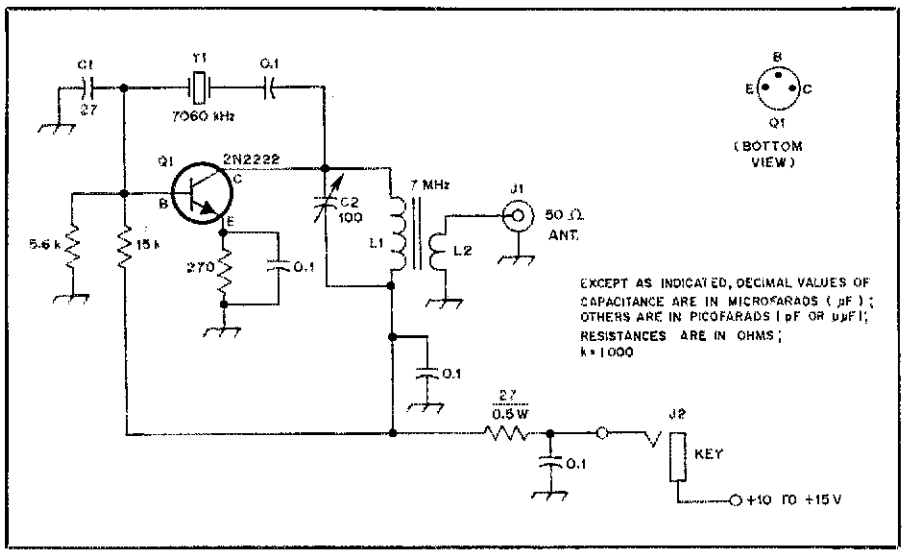


Fig. 1 — Circuit of a one-transistor QRP transmitter. Fixed-value capacitors are disc ceramic, 50 volts or greater. Resistors are 1/4- or 1/2-watt composition, 10% tolerance. C1 described in text. C2 is a 100-pF mica trimmer. L1 is a 6-μH winding of 34 turns of no. 26 enam. wire on an Amidon or Palomar T50-2 toroid core. L2 is 6 turns of no. 26 enam. wire, wound over L1 winding (see text). J1 is a phono jack, and J2 is a 2-circuit phone jack. Y1 is a fundamental surplus or new crystal for the standard 40-meter QRP frequency (7060 kHz).

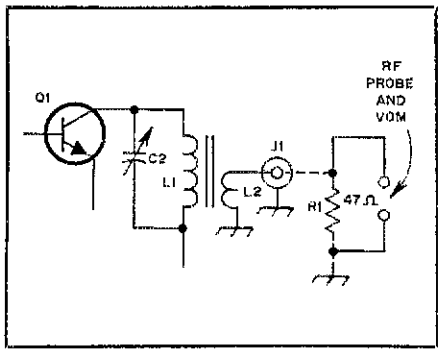


Fig. 2 — Details for measuring transmitter output power with a dummy load (R1), an rf probe and a VOM (see text).

homemade rf probe.[3] This will permit us to measure rf voltages in oscillators and transmitters when performing initial checkout or debugging. A frequency counter is very useful to the experimenter, and should be acquired if the expense can be justified.

We will need a dc power supply for our workbench, and for most of our experiments we can manage nicely with a 12-volt, 1-ampere regulated supply.[4] If the output voltage can be made variable, so much the better.

Bargain assortments of transistors, ICs and diodes aren't likely to be of much use to us unless we have a way to locate the defective ones: Most "bargains" of this type contain manufacturer's rejects, and 50% or more of the semiconductors in a bag are often open, shorted or leaky. Therefore, we're better off to buy parts of known quality for each of our experiments. This practice will help us to avoid confusion and despair.

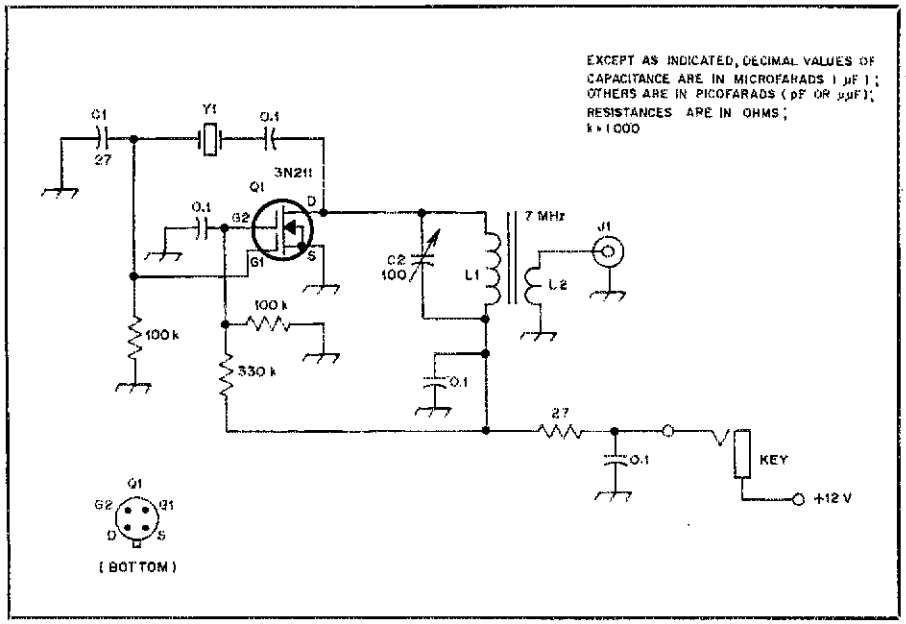


Fig. 3 — Same circuit as Fig. 1 except that an FET is used at Q1.

The Simplest Transmitter

How uncomplicated can a transmitter be for experimental work? Factually, a one-transistor oscillator qualifies as a transmitter. Many beginners have had exciting results with such a circuit while operating with only 50 milliwatts (0.05 watt!) of power output. For example, the circuit in Fig. 1 was tacked together one lunch hour in the ARRL lab and was connected to a 28-foot (8.5-m) base-loaded vertical antenna with buried radials. On the third CQ an answer came from a W8 in Ohio. A signal report of RST 569 was received for our 50-mW signal on 7060 kHz. A second QSO with a W2 station in New Jersey netted an RST 589 report!

Y1 of Fig. 1 determines the operating frequency. C2 tunes L1 to the approximate frequency of Y1. If it is set for resonance at exactly 7060 kHz in this example, the cw signal may become chirpy. With this type of oscillator it is best to tune the C2/L2 circuit for the best sounding note consistent with reasonable power output. Maximum power will not coincide with the cleanest cw note when connecting an antenna to this type of oscillator unless very light coupling is used (L2) between the tuned circuit and the antenna. The lighter coupling will, in itself, reduce the available power to the antenna.

The circuit of Fig. 1 can be used on 160, 80, 40 or 20 meters by using a fundamental-cut crystal for the desired frequency. C1 is part of the feedback network and will have to be chosen for the crystal we use. This is because some crystals are more active than others. The more sluggish a crystal is, the greater the feedback voltage required to make the circuit oscillate reliably. Values between 15 and 100 pF are typical for use at C1 in this particular circuit. We can experiment with the number of turns in L2 to extract maximum rf power output from the circuit.

Fig. 2 shows how we can use a 47-ohm resistor as a dummy load to measure the output power. An rf probe (mentioned earlier) and VOM are connected across R1 with the key closed. Output power can be calculated from:

$$P = E^2/R$$

where P is in watts, E is in rms volts and R is in ohms. Therefore, if we measured 1.53 volts across R1, we would have an output power of 50 milliwatts (0.05 W). The accuracy of our measurement depends on the purity of the sine wave from the transmitter. A distorted waveform will

yield only approximate power-output readings on the VOM. A 51-ohm resistor could be used at R1, but that is a 5% tolerance (gold-band) value, and would cost more than a silver-band (10% tolerance) resistor. So, we can use a 47- or 56-ohm resistor. Either value is close enough to 50 ohms for our purposes. Here again is an example of the joy of *experimenting* versus designing!

We can also use field-effect transistors as oscillators of the kind illustrated in Fig. 1. The version seen in Fig. 3 contains a dual-gate MOSFET. Output power from this circuit will be somewhat lower than that from the bipolar-transistor oscillator of Fig. 1, but plenty of QSOs can be had with this simple transmitter. Other dual-gate MOSFETs could be used in place of the 3N211, such as a 40673.

If we decided to use a VFO to control the operating frequency of the transmitter in Fig. 1, we could make the modifications shown in Fig. 4. Y1 and C1 are removed to prevent oscillation at the crystal frequency. A dc-blocking capacitor (C3) is added as shown. The rf voltage (rms) developed from the base of Q1 to ground (with the VFO connected and operating) should be between 1 and 3 volts for best results. This shows just another way we can experiment with simple circuits.

Additional experiments can be conducted with the one-transistor transmitters by trying various types of transistors in the basic circuits of Figs. 1 and 3. One important transistor characteristic is the maximum operating voltage (V_{ce}), which should never be rated less than two times the supply voltage for cw work. This will allow for the voltage swing (peak to peak) during the rf sine-wave cycle at the collector or drain. If the voltage is allowed to rise beyond the specified safe value, the transistor can "go away" instantly! We must be concerned also with the upper frequency rating of the semiconductor. This is usually specified as f_T. A good rule of thumb for obtaining maximum oscillator or amplifier performance is to use a transistor that has an f_T at least five times higher than the chosen operating frequency. Thus, for 7-MHz operation the f_T should be 35 MHz or higher. Most FETs are rated for a maximum upper frequency in terms of gain. Generally, they are good from audio frequencies up to that limit for amateur experiments.

The maximum safe current of a transistor is important to us also. This is specified as I_c (collector current) for bipolar transistors, and as I_d (drain current) for FETs. At no time should we allow the transistor to draw more current than the specified safe value. In fact, it's wise to operate the device somewhat below (25% or more) that maximum value. This will help to prevent failures from excessive heating of the transistor junction.

A good safety rule is to do all initial circuit testing at reduced operating voltage. For a 12-volt circuit we might want to start our testing at 6 or 8 volts until we were certain that there were no wiring errors. If things seem to be working normally, we can increase the supply voltage to 12.

An "Experimenter's Special"

Thus far we've discussed two rather unprofound transmitter circuits. Once we've finished tinkering with them we may want to move ahead to something more spectacular in simple circuitry. Fig. 5 shows the circuit of a two-stage, solid-state QRP transmitter that was designed by Wes Hayward, W7ZOI.[5] Some modifications have been made for this article, but the circuit is essentially as he designed it. This experiment should give us hours, weeks or even months of fun in the workshop and on the air. It delivers slightly more than 1 watt of output to a 50-ohm antenna, and can be made to operate on any band from 160 to 10 meters by using the parts values specified in Table 1. Actually, this is a three-transistor circuit if we count the keying transistor, Q3. But, there are so few parts in the circuit that we can assemble it in short order.

Q1 is a tuned-collector crystal oscillator. Its output energy is fed to the base of Q2, which operates as a Class C amplifier. A pi network (C3, L3 and C4) serves as a harmonic filter (low pass) rather than as an impedance-transformation network, as is more often the case with tube and transistor output amplifiers.

Q3 functions as an electronic switch. When its base resistor is grounded by the cw key it conducts and allows the dc to reach the amplifier stage, Q2. This method helps to reduce the possibility of shorting out the 12-volt supply accidentally, as could happen with the circuits of Fig. 1 and 3 where J1 is in the 12-volt line.

Fundamental crystals are used on 160, 80, 40 and 20 meters. For operation on 15 and 10 meters we will need to use third-overtone crystals at Y1. The oscillator is permitted to run continuously, and keying is applied only to the amplifier, Q2. This prevents chirp on 15 and 10 meters, which would occur if the oscillator stage were keyed.

Feedback capacitor C5 is used only on 160 and 80 meters. All of the component values are the same for 10 and 15 meters: Oscillator trimmer C1 has ample range to provide resonance on both bands.

Construction Thoughts

Experimentation can continue after the transmitter is built and tested — we may want to try our skills at cabinet making, or the unit can be enclosed in a small commercial case, such as one finds at Radio Shack stores. But we can use pieces of double- or single-sided circuit board to fashion a homemade cabinet. We can flow a continuous bead of solder (darned expensive stuff these days!) along the inside seams (corners) of the box to join the side and bottom walls. The lid can be a U-shaped piece of metal (furnace ducting or aluminum). Spray paint or contact paper may be applied to the outer surfaces

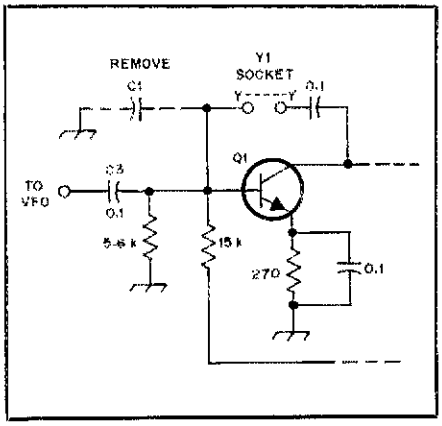


Fig. 4 — Method for attaching a VFO to the circuits of Fig. 1 and Fig. 3. Q1 is thus changed from an oscillator to an amplifier.

Table 1

Fig. 5 Circuit Component Values for Various Bands

	C1 (pF)	C2 (pF)	C3 (pF)	C4 (pF)	C5 (pF)	L1	L2	L3	R1	RFC1
160 m	400	1800	1800	1800	360	73 t No. 28 T50-2	8 t	30 t No. 26 T50-2	18 Ω	30 t No. 28 FT-37-61 (50 μH)
80 m	400	100	750	750	200	43 t No. 26 T50-2	5 t	21 t No. 22 T50-2	39 Ω	21 t No. 28 FT-37-61 (25 μH)
40 m	180	100	470	470	—	35 t No. 26 T50-2	4 t	14 t No. 22 T50-2	39 Ω	30 t No. 28 FT-37-63 (15 μH)
20 m	60	33	210	210	—	27 t No. 24 T50-6	3 t	12 t No. 22 T50-6	47 Ω	30 t No. 28 FT-37-63 (15 μH)
15/10 m	60	33	105	130	—	17 t No. 24 T50-6	3 t	9 t No. 22 T50-6	47 Ω	30 t No. 28 FT-37-63 (15 μH)

Toroid cores are used in L1, L2 and L3. These are powdered-iron cores available from Amidon Associates and Palomar Engineers (T50-2, etc.). RFC1 is wound on a small ferrite core (FT-37-67), and so on), available from same suppliers. The letter "t" signifies the number of wire turns in the winding.

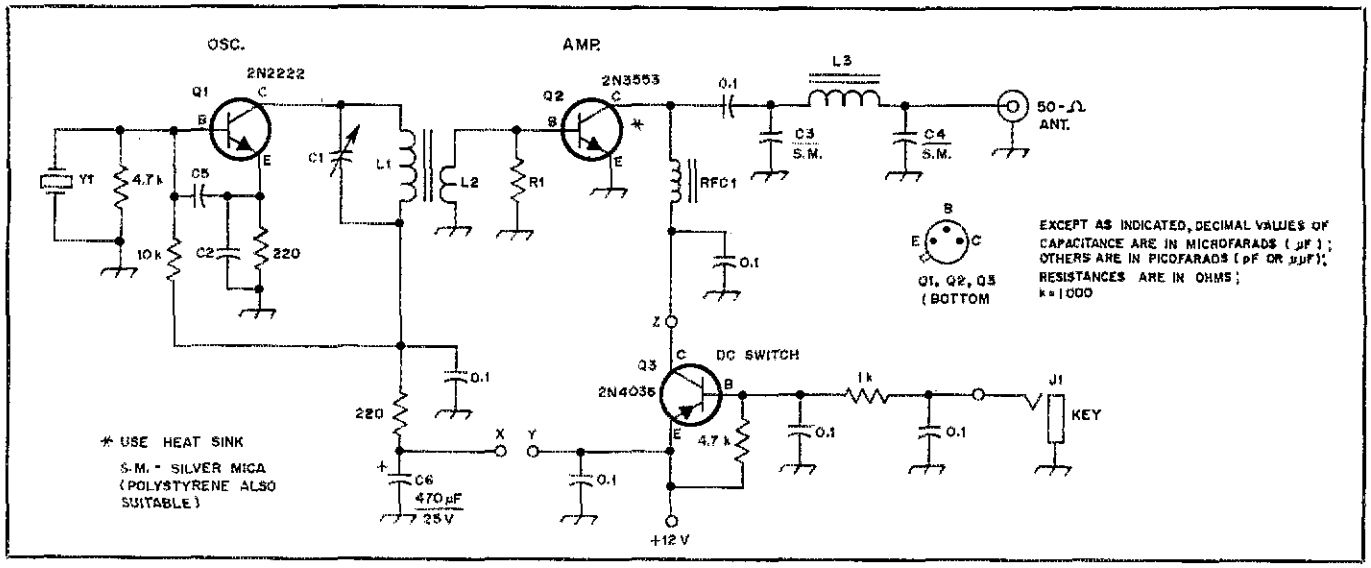


Fig. 5 — Circuit of the W7ZOI "Universal QRP Transmitter." It can provide up to 1.5 watts of rf output when using a 12- to 14-volt dc supply. Fixed-value capacitors are disc ceramic unless otherwise indicated. Resitors are 1/4- or 1/2-watt composition, 10% tolerance. Values not given are listed in Table 1. C6 is electrolytic or tantalum. C1 is a mica trimmer. Q2 is a Motorola transistor, but other brands and numbers with equivalent characteristics can be used.

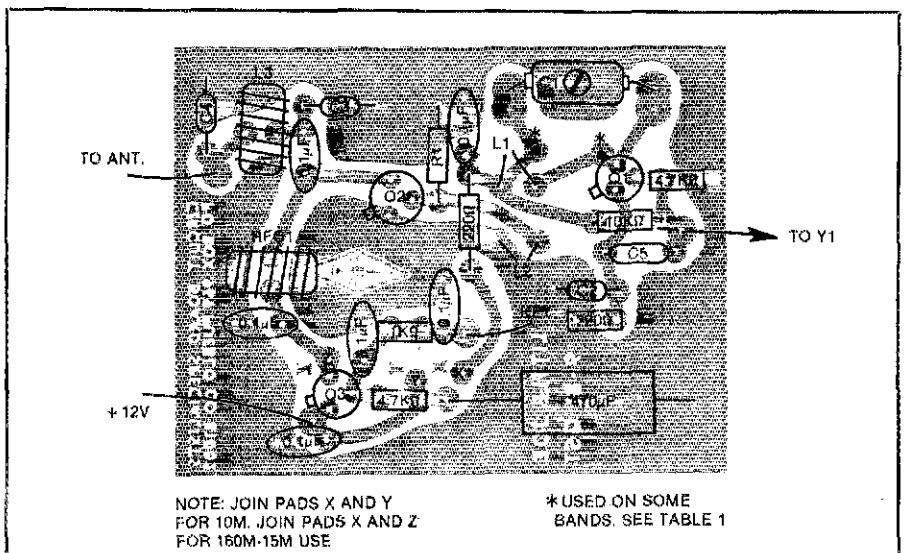


Fig. 6 — Parts-placement guide for the circuit of Fig. 5. The shaded areas represent an X-ray view of the etched side of the board.

of the box to impart that professional look some of us prefer. Press-on decals are excellent for labeling the controls, but Dymo tape labels are suitable also, especially if they are the same color as the panel.

The circuit of Fig. 5 can be assembled on a sheet of pc board using the type of point-to-point wiring described in an earlier *QST* article[4] if a "masterpiece" is not essential to our purpose. But, if pc-board construction of the classic style is preferred we can duplicate the pattern shown in Fig. 6 and in the Hints & Kinks section of this issue.[5] If point-to-point breadboard assembly is our choice we must be careful to keep the input and output components of amplifier Q2 (Fig. 5) separated from one another. Straight-line wiring (not bunched up) is preferable to achieve this: Too-close spacing can cause unwanted feedback and amplifier instability. All of the rf leads in the circuit need to be kept as short and direct as possible. This is especially important when installing the bypass and coupling capacitors.

Caution: When applying operating voltage to the circuits in this article, *check the polarity!* There is no more effective way to send our transistors and electrolytic capacitors on a permanent leave of absence than cross-polarizing the dc voltage connections! Once you have the misfortune of becoming a member of "Junction Busters, Amalgamated," you'll never repeat your mistake!

A Word About QRP Operation

The 1-watt transmitter of Fig. 5 will be 20 dB weaker in signal strength than your transceiver that delivers 100 watts of output. So if you would be heard at 30 dB over S9 with your 100 watts, you will be only 10 dB over S9 with the QRP rig. Or assume your bigger rig was being heard S9 by the other operator. When you switched to the QRP transmitter your signal would drop to roughly S5 or S5-1/2, depending on the accuracy of the S meter (assuming 6 dB per S unit). So you could still be heard well enough under quiet band conditions to be copied "Q5."

Patience and tenacity are the better virtues we can adopt when running low power. Find clear frequencies on which to call CQ. Don't expect answers from stations with weak or marginal signals, unless they are also using QRP. Unless you're a super operator, it's unlikely that you'll fare very well in DX pileups.

Good antennas are important in successful QRP work. Many first-time QRPers capitulate after a few days of poor results when using mediocre antennas. Erect the antenna high and in the clear, and use a directional, gain type of antenna (beam) on 20, 15 and 10 meters, if you have one available. A good antenna will help to make up for the deficiency in power when using QRP equipment.

The ARRL would welcome clear photographs and reports of the best DX worked with the circuits of Fig. 1 and Fig. 3. Perhaps if we can get enough input on this subject we can run a page of photos, calls and DX records in an issue of *QST*. We

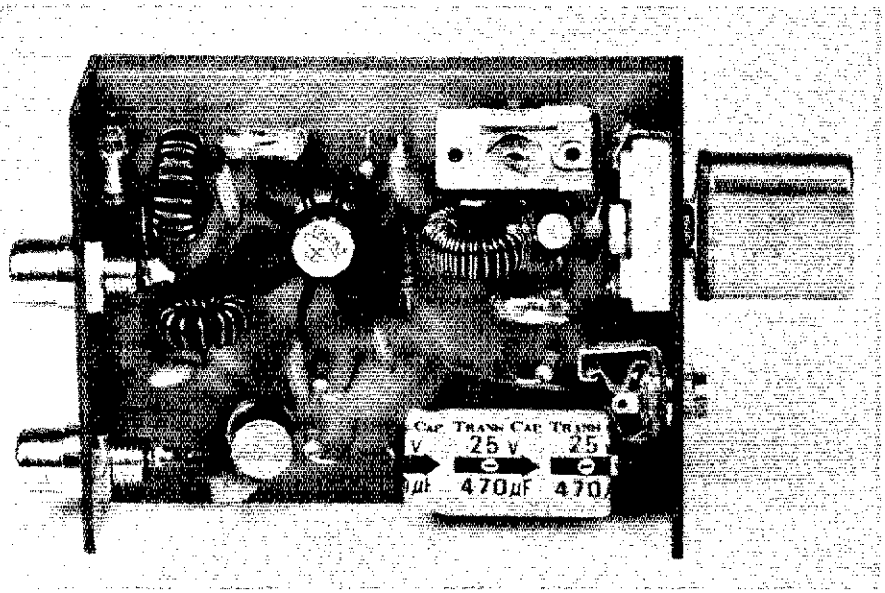


Fig. 7 — Photograph of the assembled kit version (note 7) of the W7ZOI QRP transmitter, as laid out and built by WAØUZO. The panels are made from pieces of double-sided pc board. The dimensions (HWD) are 7/8 × 2-1/4 × 3 inches (22 × 57 × 76 mm).

hope you will soon be able to say, "I've built my first piece of amateur gear, and it works great!"

Notes

[1]F. Sutter, " 'The Runt Sixty' and the 'QSL Sixty,' " *QST*, Sept. 1939, p. 50.

[2]The expression "breadboard" has confused some newcomers to Amateur Radio. It originated in the early days of the amateur service when hams built their transmitters on wooden foundations, such as the ends from orange crates. The kitchen breadboard became popular for that purpose, and thereafter any wooden chassis base was called a breadboard.

[3]Details for building a simple diode rf probe can be found in the measurements chapter of the past several editions of *The Radio Amateur's Handbook*.

[4]D. DeMaw and R. Shriner, "A Simple Utility Power Supply," *QST*, Nov. 1979. Parts kits available from supplier in note 7.

[5]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*, (Newington, CT: American Radio Relay League, Inc., 1977). ch. 2, p. 26. This publication is recommended for experimenters because it contains a wealth of basic theory and many practical examples of simple transmitters, receivers and test equipment.

[6]D. DeMaw, "Quick and Easy Circuit Boards for the Beginner," *QST*, Sept. 1979, p. 30.

[7]Etched and drilled circuit boards for the transmitter are available from Circuit Board Specialists, Box 969, Pueblo, CO 81002.

New Products

SILICON MICROWAVE TUNING VARACTORS

☐ Microwave Associates, Inc., has announced the development of a new series of silicon abrupt-junction microwave tuning varactors designed to obtain the highest Q possible. According to the manufacturer, each device in the series has a high-density silicon dioxide passivation which results in exceptionally low leakage currents and low post-tuning drift.

The silicon tuning diodes are ideally suited for frequency-tuning applications at vhf through K bands. These devices are designed for use in solid-state electronic tuning of transistor, Gunn and IMPATT oscillators. They may also be used in tunable filters, phase shifters, up/down converters and low-order multipliers. For additional information and complete specifications, request bulletin no. 4603 from Microwave Associates, Inc., South Ave., Burlington, MA 01803.

NPN SILICON PLANAR TRANSISTORS

☐ Microwave Associates, Inc. has announced the MA-42000 series of npn silicon planar transistors. These devices are designed to provide minimal noise figures (0.8 dB typical at 60 MHz according to the manufacturer) at frequencies from 10 to 700 MHz. Moreover, they feature a low noise figure as a function of current, which results in an extremely quiet transistor exhibiting a wide dynamic range — typically +25 dBm at the 1-dB compression point. The If noise level is also low; 1.0 dB is typical at 10 kHz. Such low noise specifications make them ideal for use as i-f, TV, vhf, uhf and rf amplifiers.

For additional information, including complete specifications, request bulletin no. 5211 from Microwave Associates, Inc., South Ave., Burlington, MA 01803.

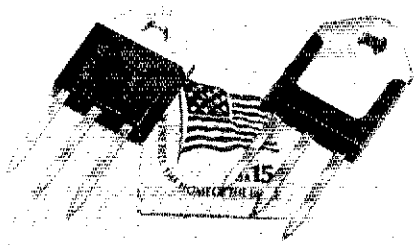
MOTOROLA MEDIUM-POWER DARLINGTONS

☐ A series of complementary TO-92 Darlington transistors has been announced recently by Motorola. These units are designed specifically for preamplifier applications that require a high dc current gain and an input impedance of several megohms. The manufacturer claims excellent current-gain linearity from 1 mA to 100 mA for these units. They are plastic-packaged types and are available with breakdown voltage ratings of 40, 50 and 60 volts, with a dc current gain of 10,000.

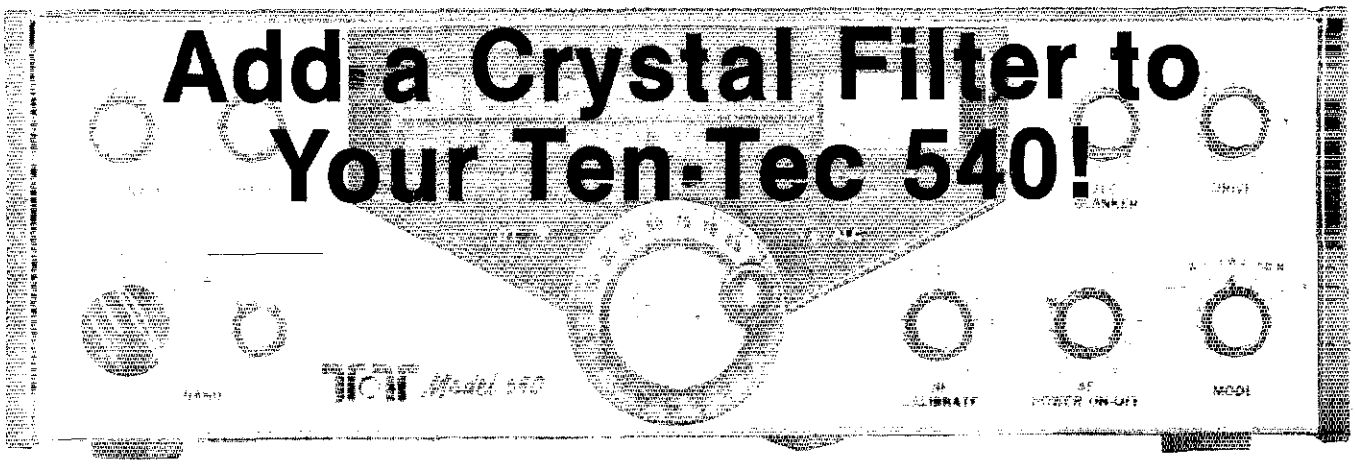
Npn device types are the MPS-A25, -A26 and -A27; pnp types are the MPS-A75, -A76 and -A77 in ascending order of breakdown voltage. Immediate delivery may be obtained from OEM and authorized Motorola distributor stocks.

PLASTIC HIGH-VOLTAGE POWER TRANSISTORS

☐ The Motorola MJE4340 and MJE4350 series of plastic-packaged transistors are complementary types with a continuous collector current rating of 10 A, V_{CEO} ratings from 100 to 160 V and power dissipation ratings of 125 W. These devices are available in the JEDEC TO-218AC plastic package which has a large die-mount and heat-sink area. This packaging, similar to the smaller TO-220 style, offers the convenience of single-sided mounting. Available through OEM and authorized Motorola distributors, further information may be obtained from Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB*



Add a Crystal Filter to Your Ten-Tec 540!



This "no-holes" modification provides an easy way to sharpen the cw and ssb selectivity of a popular rig.

By Steven E. Mann,* N4EY

I've been happy with the Ten-Tec equipment I've owned: an Argonaut 505 and the Model 540, formerly known as the Triton IV. Happy in all respects that is, save one — cw selectivity! Audio filters are used to obtain the required degree of cw selectivity. This method is effective under average band conditions, but, during contests and other heavy QRM situations, better skirt selectivity is needed. The ssb i-f passband, which is 2.5 kHz wide, allows too many unwanted signals to be amplified before they reach the audio filter during cw reception. Better skirt selectivity is obtained when a filter does its job *before* unwanted signals have been amplified, as when the filter is located *before* the i-f amplifier.

Adding An I-F Filter

My decision to install a crystal filter in the '540 i-f strip was followed by a call to Ten-Tec. Dick Frey, Ten-Tec's chief engineer, suggested I use the Model 217 filter. This unit is a 500-Hz, 8-pole crystal filter designed for the OMNI transceiver, but compatible with the '540. My own research indicates that this filter may also be used with the various Argonaut and Triton models.

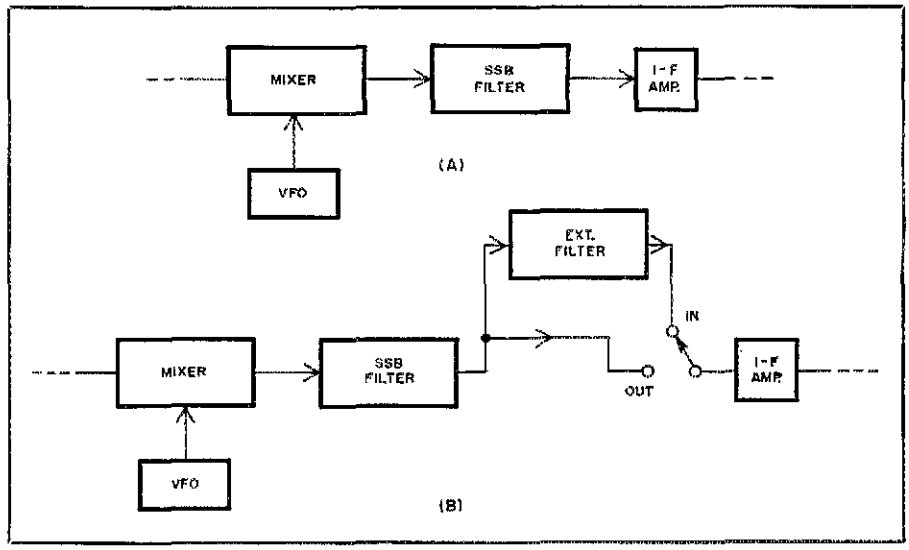


Fig. 1 — At A, a block diagram of the unmodified Ten-Tec 540. The modified circuit, incorporating the added crystal filter, is shown at B.

I purchased a filter and designed an amplifier to compensate for the insertion loss of the additional filter, and to provide isolation. The application scheme is shown in block-diagram form in Fig. 1, and the schematic may be seen in Fig. 2. Note that the transmitted signal does not pass through the new filter because it is inserted in the *receiver* i-f signal path only.

Some '540 owners might wish to increase the receiver selectivity for ssb operation. The circuit of Fig. 2B may be employed with the Ten-Tec Model 218 filter, which, according to manufacturer's specifications, is 1.8 kHz wide at the −6 dB points. It has a shape factor of 1.8:1, measured at the −6/−60 dB points.

Modification is accomplished without drilling additional holes in the '540 cabinet. The new filter(s), amplifier and

*P.O. Box 141, Burlington, NC 27215

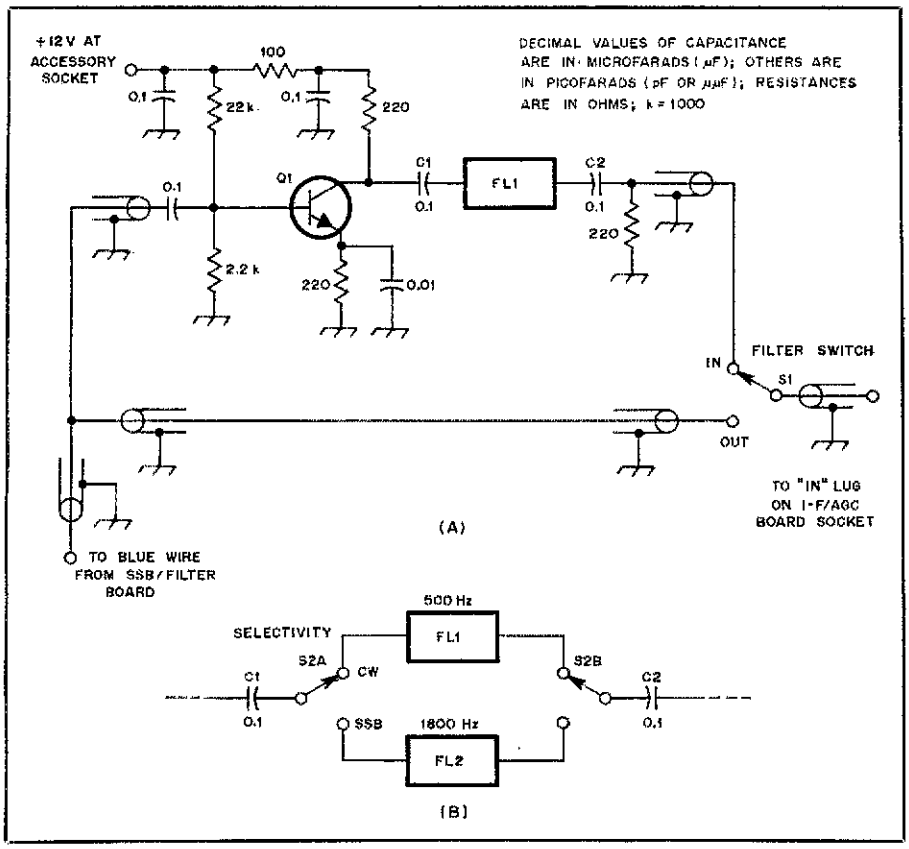


Fig. 2 — Schematic diagram of the filter-modification circuit. Be sure to connect the appropriate points of the filter to chassis ground. Q1 is an amplifier that is used to compensate for the signal loss created by the addition of FL1. The circuit at B may be used to add cw and ssb filters.

FL1 — Ten-Tec model 217, 500-Hz crystal filter. Available from Ten-Tec, Inc., Sevierville, TN 37862.

FL2 — Ten-Tec Model 218, 1.8-kHz crystal filter.

Q1 — Silicon, npn, general-purpose, 350-mW transistor, Radio Shack 276-2013 or equiv.

S1 — Spdt toggle switch.

S2 — Dpdt toggle switch.

switch(s) are mounted in a shielded external enclosure. Connections between the two units are made with RG-174/U coaxial cable. Power for the amplifier in the filter unit is obtained from the transceiver AUX 12 V DC jack.

Internal changes to the '540 are few and simple. The two shielded interconnection cables are passed into the transceiver cabinet through the centers of the PTT and SIDETONE accessory phono jacks. (There are no wiring changes made to the jacks.) Unplug the I-F/AGC board from its socket. Disconnect the wire from the SSB GENERATOR/FILTER board that was connected to the IN lug of the socket; in my unit this was a blue wire. The shielded lead to the filter-unit input is connected to the blue wire and insulated with tape. Connect the output of the filter unit to the IN lug on the socket. The shield braids from both cables are connected to a nearby ground lug. (Refer to the Ten-Tec owner's manual for additional information on socket connections.) Finally, the I-F/AGC board is replaced, and the rig is ready to go.

Summary

The combination of the added cw crystal filter and the standard RC active audio cw filter provides excellent cw selectivity. In today's crowded bands the sharper ssb selectivity is most welcome!

I would appreciate hearing from others who make these modifications or who have other modifications to use with Ten-Tec gear. An s.a.s.e. would be appreciated.

Strays

☐ We are pleased to introduce one of our mountaineering ARRL Technical Advisors, John Grebenkemper, KA3BLO. (W7ZOI and W6JTH are also climbers.) John has climbed extensively in the mountains of the western United States and in Peru. His areas of expertise are solar activity and microwave communications (earth-based and earth-satellite systems.)

First licensed in 1961, John currently holds an Advanced class license. His main operating interest is in QRP hf-band communications. He has worked numerous Field Day operations from the summits of the highest mountains in California, Nevada and other states.

John received his PhD in Electrical Engineering from Stanford University, where he did research in radio astronomy. He participated in the construction of a five-antenna interferometer, which operated at a frequency of 10.69 GHz. Each antenna was 60 feet in diameter. He then used this interferometer to study radio emissions from solar-active regions and solar flares.

TA KA3BLO on his way to the top of 14,018-foot Mt. Tyndall for Field Day.

Residing in Palo Alto, California, John works in the area of microwave radio receivers and microwave communications systems. He has published many articles in *QST* and other journals. — *Marian Anderson, WB1FSB*

I would like to get in touch with . . .

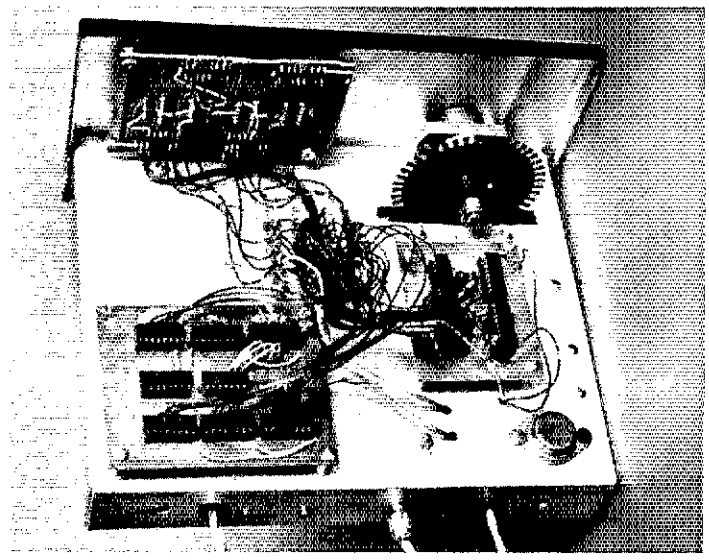
☐ anyone who could send me a copy of manuals for the SG RF Signal Generator and T-3 Visual-aural Signal Tracer by Heath. W. P. Champlin, WD6FUZ, 4603 Darien St., Torrance, CA 90503.

☐ amateurs interested in forming a net to discuss the construction of composite aircraft. Rick Gentz, WBØNPM, 9523 Yorkshire La., Eden Prairie, MN 55344.

The Universal Synthesizer

Planning to use synthesis in your next transmitter or receiver project? Try this dual-modulus divider and prescaler circuit to provide frequency coverage beyond 500 MHz.

By Al Helfrick,* K2BLA



This "universal synthesizer" is the result of a design effort to produce a synthesizer system for amateur use that would have flexibility and adaptability to many frequency ranges and resolutions. Printed circuit boards can be fabricated for common parts such as the programmable divider and the reference divider. These can be programmed via jumpers for the divisions necessary.

The synthesizer chosen for this task is the dual-modulus divider that uses low-power Schottky TTL logic. A more elegant system could have been constructed around some of the newer LSI synthesizer chips, which owe their flexibility to the use of a microcomputer for programming. Hard-wired logic is used in this design because many amateurs do not have access to microprogramming equipment. In the programmable divider, both the main counter and the auxiliary counter may be programmed either from a frequency-selection device (such as thumb-wheel switches) or a shaft-encoder system. Permanent receiver i-f offset programming may be obtained through use of jumper wires.

Circuit Details

The universal synthesizer (Fig. 1) has a dual-modulus programmable divider for all frequency ranges. Aside from offering flexibility, the dual-modulus divider offers high-frequency capability. The divider will operate up to 150 MHz with a 10/11 prescaler. Use of other prescalers, such as 20/21 and 40/41, can increase the frequency range of the programmable divider beyond 500 MHz. All of the universal-synthesizer schemes are single-loop systems with the VCO operating in the vhf region. The vhf synthesizers generate the desired output directly, while the high-frequency synthesizers produce a signal with a frequency in the vhf region. It is divided by digital logic down to the desired hf range.

A 50-MHz VCO is presented in this article. It is built into the 6-meter and 5-MHz versions of the synthesizer. The VCO described in the September 1980 *QST* article, "A High-Performance Synthesized Two-Meter Transmitter,"[1] is suitable for the 2-meter version of the synthesizer. VCOs for other frequency ranges can be made by changing the values for the tuned circuit or by adapting circuits from other sources. The VCO should supply about 400 mV, peak-to-peak, for the programmable divider and should have at least two stages of buffer/amplifier to isolate the VCO from the digital logic. The VCO should be capable of driving two ECL dividers when used in hf-band synthesizers. The VCO is required to cover the desired tuning range with a control voltage of 3 to 10.

The reference-frequency generator consists of a single IC oscillator/divider. Any crystal frequency up to several megahertz may be used and divided by powers of two. Practically any reference frequency can be programmed by selecting a crystal frequency and the appropriate power of two. Selecting a crystal frequency above 3 MHz is desirable. Crystals for frequencies higher than 3 MHz tend to be less expensive.

Another subsystem of the universal synthesizer is the loop amplifier — an op amp that can be constructed with practically any value of feedback components. The loop filter is a simple lead-lag filter that will handle numerous values of natural frequencies and damping factors. Other breakpoints, usually well above the natural frequency, may be connected at the VCO.

This article is not aimed at the beginning amateur nor is it intended as a step-by-step construction project. The synthesizer described here is an example of the type that is suitable for a universal synthesizer. It would be impractical to provide construction data for every application. The dual-modulus divider, frequency-division technique for obtaining a fast lock-up time and the method of reference pulling, plus other techniques, are presented as an aid in applying these ideas to various synthesizers.

Synthesizer Considerations for HF Communications Equipment

Synthesizers for hf transmitting and receiving equipment are used for ssb, cw, SSTV and RTTY. When a builder is planning a synthesizer, thought must be given to the following stipulations.

Resolution: All of the modes indicated in the foregoing text require high-resolution synthesizers. The maximum frequency step acceptable for ssb and cw operation is about 100 Hz. This will produce a definite less-than-perfect tuning for ssb, but will be adequate for cw with

*RD 1, Box 87, Boonton, NJ 07005

[1]Notes appear on page 23.

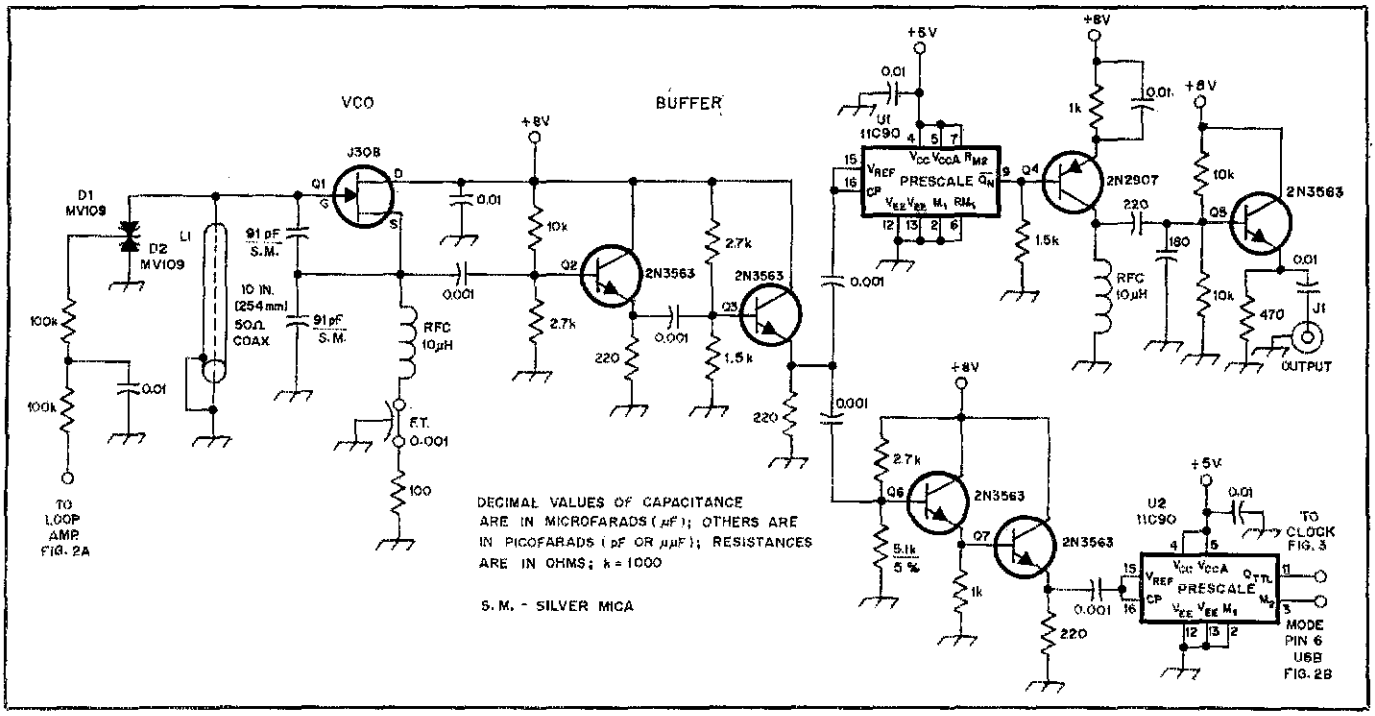


Fig. 1 — Circuit diagram for the Universal Synthesizer.
D1, D2 — Varactor diode, Motorola Epicap MV109 or equiv.
L1 — 10-in. (254-mm) length of 50-ohm coaxial cable.
Q1 — N-channel JFET rf amplifier, Siliconix type J308 or equiv.
Q2, Q3, Q5, Q6, Q7 — Npn silicon rf/i-f amplifier, type 2N3563.
Q4 — Pnp silicon af preamplifier/driver, type 2N2907.
U1, U2 — ECL 650-MHz dual-modulus prescaler, Fairchild 11C90 or equiv.

filters in the 300- to 500-Hz bandwidth range. A clarifier control is required for the best ssb reception; it is absolutely necessary for RTTY and SSTV operation! Fifty-hertz steps will be sufficiently small for all but the narrowest of cw filters, and will provide good ssb performance. For RTTY, it is debatable that even a 50-Hz resolution is sufficient. A 10-Hz step is adequate for all applications, but has significant design problems associated with it. Providing 10-Hz steps requires a large number of synthesizer steps per revolution of the tuning dial if an acceptable tuning rate is to be attained. Some type of dual-rate tuning system must be used. Furthermore, constructing a 10-Hz-step synthesizer with an acceptable lock-up time is difficult. For amateur operation, synthesizer steps between 25 and 50 Hz represent a compromise between adequate resolution and circuit complexity.

Lock-up Time: Another consideration, important with the hf synthesizer but not so much for the vhf synthesizer, is lock-up time. Vhf synthesizers usually are programmed to a frequency and are left alone, whereas hf radio equipment is tuned constantly. An excessive lock-up time can be an annoyance. In addition, the damping of the loop can have a pronounced effect on the tunability. The underdamped loop can accentuate the digital nature of the loop, whereas an overdamped loop will have considerable time lag between the programmed frequency and the actual operating frequency. A good compromise is an overdamped loop with a dual time constant, using diodes that temporarily change the damping when the difference between the programmed frequency and the actual operating frequency becomes large.

Spurious Signals: Spurious output is another consideration for hf synthesizers. Of course, spurious outputs are undesirable in any synthesizer, but they are more likely to occur in hf synthesizers because these designs often use multiple loops and mixing. Spurious output can be generated by noise sidebands, reference sidebands, sidebands caused by microphonics and other internal signals from the mixing and logic circuits. These spurious signals will cause undesired responses in a receiver and will cause emission of spurious energy when the synthesizer is used to control the transmitter. The amount of spurious-response reduction for a transmitter signal would be about 60 dB in order to reduce the spurious output level to the legal limit. However, for receivers of high dynamic range, the reduction should be on the order of 80 to 90 dB. Lowering the spurious-response level to this value is difficult. If a synthesizer were constructed to provide 100-Hz steps, the 3-dB frequency of the loop filter would have to be very low in order to suppress adequately the reference sidebands if a 100-Hz reference were used. This would, undoubtedly, produce an excessively long lock-up time. In addition, the very low loop bandwidth would not allow for elimination of microphonics or low-frequency noise.

Frequency Division: The most effective method of achieving narrow frequency steps without a long lock-up time (or excessive noise) is to operate the phase-locked loop at a very high frequency and to divide the frequency down to the desired range with high-speed digital dividers. The frequency division will reduce the actual operating frequency, the frequency steps and the noise. For example, the 5-MHz version of the universal synthesizer uses a 50-MHz VCO and divides the frequency to 5 MHz with a high-speed, divide-by-10 chip. A 1-kHz reference is divided into 100-Hz steps at 5 MHz. Additionally, any noise becomes reduced by a factor of 10. The lock-up time is under 100 ms, which corresponds to a natural loop frequency of less than 100 Hz, with a damping factor of 7. If a 5-MHz VCO were used with a 100-Hz reference, the lock-up time would be about one second with the same order of sideband suppression. Even with a reduction of noise from the 50-MHz VCO, the relatively sharp 100-Hz bandwidth requires that the VCO be as free of microphonics as possible.

Another method of increasing the resolution of a synthesizer, without increasing the lock-up time or adding excessive noise to the system, is to use the technique of *reference pulling*. This involves slightly pulling the reference-frequency crystal so that the output moves an amount equal to the smallest synthesizer step. In the case of our 5-MHz synthesizer, the reference crystal is pulled

an amount equal to 50 Hz at the output.

This technique does not provide the same frequency shift on all channels. If the shift is selected to be exact at the center of the tuning range, the shifted frequency will be low at the lower band edge and too high at the upper edge of the synthesizer range. The error will be slight if the number of channels divided by the value of the programmable divider is small. In the case of the 5.05- to 5.55-MHz synthesizer, the 50-Hz step is in error a maximum of 2.5 Hz at the band edges.

Tuning: Tuning the hf synthesizer requires more than just selector switches. Because of the popular method for tuning hf radio systems, some form of up/down counter and switches (or a shaft encoder) must be used. Among the schemes invented for tuning an hf synthesizer, the incremental shaft encoder most closely resembles the tuning characteristics of a conventional VFO, and is the easiest to use. This is an encoder that causes a counter to count up when rotated clockwise and down when rotated counterclockwise. The number of segments on the shaft encoder and the step size will determine the tuning rate. For a step size of 50 Hz, which is considered to be a reasonable compromise for amateur use, about 200 steps are required to have a tuning rate of 10 kHz per revolution (also acceptable for amateur use).

Synthesizer Considerations for VHF Communication Equipment

Most vhf-equipment synthesizers will be used in channelized fm communications where channel spacing is from 15 to 30 kHz. The vhf synthesizer requires a 5-kHz reference because of the arrangement of most channels. Unlike the hf synthesizer, the vhf unit will be programmed with selector switches or a computer, then left on one frequency. There are exceptions, specifically in the case of a scanning receiver, but these are not common. Therefore, lock-up time in the vhf synthesizer is not an important parameter. Noise and spurious outputs should, however, be reduced to a minimum. Spurious output can cause spurious responses in the receiver and cause emission of spurious energy from the transmitter. Noise in the VCO will be heard on incoming signals, and will appear as modulation on the transmitted fm signal. Since many vhf transceivers are used in mobile applications, freedom from microphonics is also important. Reference sidebands are particularly detrimental. This is because reference sidebands that are even as much as 60 dB down can cause out-of-band spurious signals when the transmitter is operating near the band edge.

Some spurious receiver responses are the result of signals being radiated from the logic elements in the synthesizer. In the synthesizer any energy that is a fraction of the operating frequency of the receiver, or a fraction of the i-f, can become an interfering signal. The solution is thorough shielding of the entire synthesizer.

Synthesizers used in transceivers often are required to shift the frequency as much as 10.7 MHz (or more) between transmit and receive. Such large frequency excursions require a well controlled lock-up time. Overshoot and time lag can be controlled to an extent by switching a fixed-value reactance (usually a capacitor) in or out of the VCO. This reduces the amount of frequency shift that has to be generated solely by the phase-locked loop. Nominally, the switched reactance will provide a 10.7-MHz shift with only small corrections from the phase-locked loop.

In addition to the i-f shift, vhf synthesizers are often required to provide a frequency shift for repeater offset. In general, the vhf synthesizer will seldom provide the frequency set on the programming switches. Repeater offsets, i-f offsets and the like are almost always involved. Many schemes are used to provide the necessary arithmetic required to provide the proper local-oscillator frequency from the synthesizer. The dual-modulus synthesizer allows offset frequencies to be programmed into the main counter, while the auxiliary counter is used for normal frequency programming. For synthesizers using a 10/11 prescaler and a 10-kHz reference, offset frequencies may be programmed with 100-kHz resolution, which takes care of all the standard i-fs and repeater offsets.

Making an Adaptable Synthesizer

The universal synthesizer implies that the programmable divider and the reference source be adaptable to practically any amateur application. With this goal in mind, the dual-modulus programmable divider was chosen as the technique. The design provides for up to four counters in both the main counter and the auxiliary counter. A standard 74LS series up/down counter was chosen for the individual counters. This chip, the 74LS168/9, is available as a decade counter (74LS168) or a four-bit binary counter (74LS169). A large variety of divisions and programming formats are available by mixing binary and decade counters in the programmable divider. In a synthesizer for a 2-meter receiver, for example, the first counter would be a binary counter programmed for 13, which would be the tens of megahertz for 130 MHz. The remaining counters would be normal decade counters.

The division of the programmable divider using a 10/11 prescaler is given by:

$$\text{division} = 10M + N$$

where M is the number programmed into the main counter, and N is the number programmed into the auxiliary counter. The only restrictions on M and N are that the counters be capable of achieving the count, and that M is greater than N. Channeling of the synthesizer can be accomplished by changing M, N or both. Table 1 shows the programming arrangements of some of the synthesizer applications. In some cases the tuning is done strictly with the N counter. This usually is done when an i-f offset is programmed into the main counter.

Programming Circuits

The programmable divider of the universal synthesizer requires TTL-compatible BCD information. This is typically either logic or switch closures where the switch is closed when a logic 0 is required and open when a logic 1 is needed. The inputs to the programmable divider are pulled up to the 5-volt supply with 10-kΩ resistors. When a logic element such as an up/down counter is used to program the divider, the connections are direct without any resistors.

The programming circuits used with the universal synthesizer shown in Fig. 2 are diagrammed in Fig. 3. An incremental shaft encoder using a serrated disc from a junked facsimile machine is used to increment or decrement an up/down counter. The counter provides information for the readouts on the front panel as well as the programmable divider. The digits read from 000.0 to 499.9, which corresponds to 5.0500 to 5.4999 MHz for use with a

Table 1.

Possible Universal Synthesizer

Frequency Ranges and Resolutions

Synthesizer Frequency (MHz)	*VCO Frequency (MHz)*	*Resolution*	*Readout*	*Crystal Freq. Ref. Divider*	*Notes*
5.0-5.5	50-55	50 Hz	100 Hz	$2.048/2^{11}$	Ssb transceiver
5.05-5.55	50.5-55.5	50 Hz	100 Hz	$2.048/2^{11}$	Drake TR7
7.0-7.5	70-75	50 Hz	100 Hz	$2.048/2^{11}$	40-m xmtr
7.455-7.955	74.55-79.55	50 Hz	100 Hz	$2.048/2^{11}$	40-m rcvr
50-54	50-54	10 kHz	10 kHz	$5.12/2^{9}$	6-m xmtr
60.7-64.7	60.7-64.7	10 kHz	10 kHz	$5.12/2^{9}$	6-m rcvr
133.3-137.3	133.3-137.3	5 kHz	5 kHz	$5.12/2^{9}$	2-m rcvr
144.0-148.0	144.0-148.0	5 kHz	5 kHz	$5.12/2^{9}$	2-m xmtr

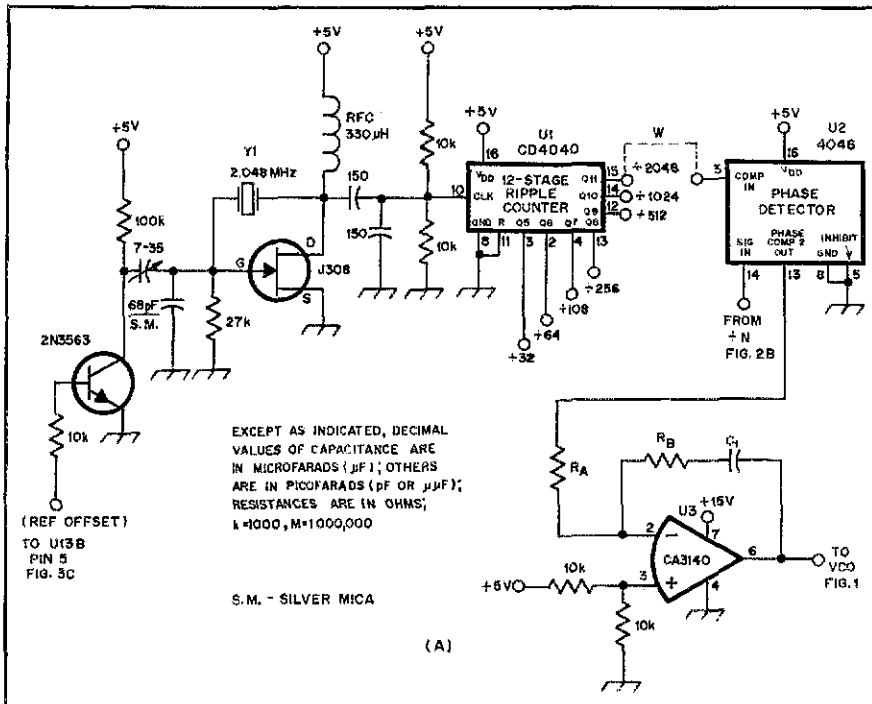
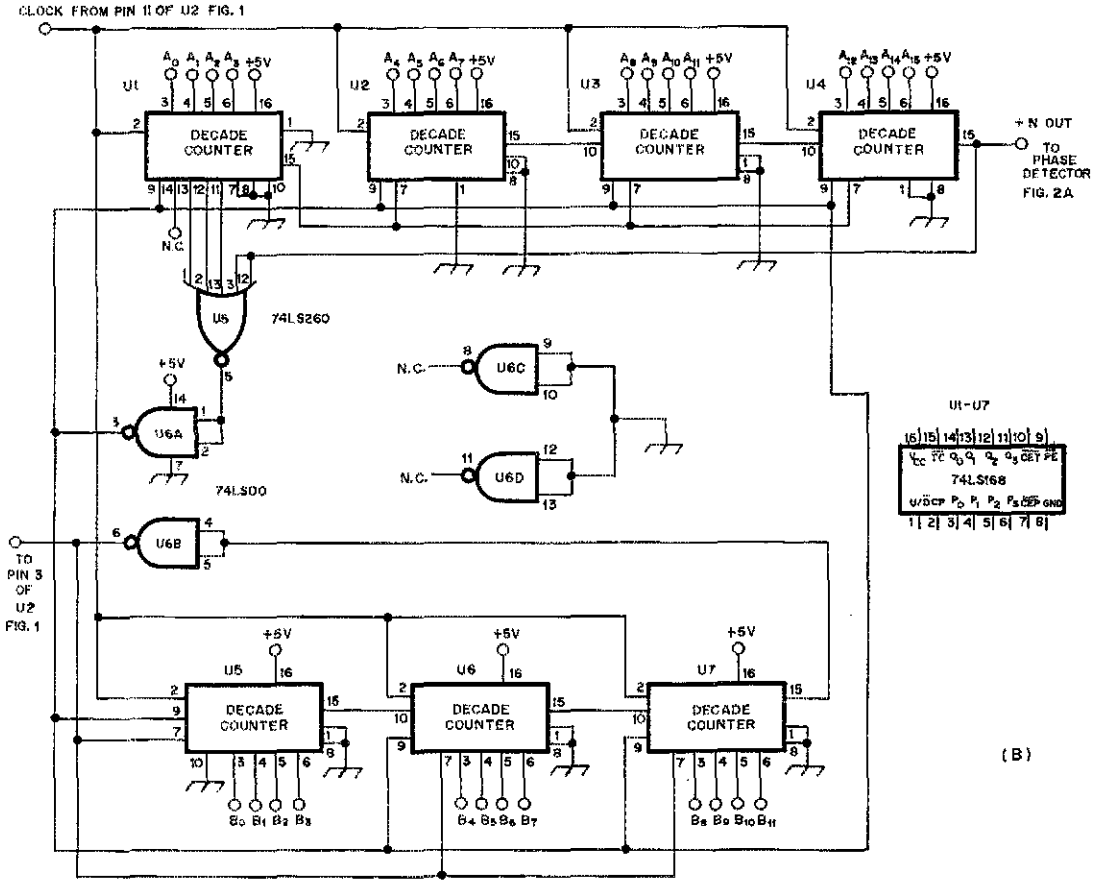


Fig. 2A — Frequency reference and phase detector for the universal synthesizer. R_A, R_B and C1 are to be determined.[3]
Q1 — Npn silicon rf/i-f amplifier, type 2N3563.
Q2 — N-channel JFET rf amplifier, Siliconix type J308 or equiv.
U1 — CMOS 12-stage ripple counter IC, type CD4040.
U2 — CMOS PLL, type 4046.
U3 — MOS operational amplifier, type CA3140.
Y1 — 2.048-MHz xtal.

Fig. 2B — Programmable divider for the synthesizer.
U1-U4, incl. — TTL synchronous bidirectional BCD decade counter IC type 74LS168.
U — TTL dual five-input NOR gate IC, type 74LS260.
U6 — TTL quad two-input NAND gate IC, type 74LS00.
U7-U9, incl. — TTL synchronous bidirectional BCD decade counter IC, type 74LS168.



Drake TR-7 transceiver. For further information on programming circuits, the reader is referred to C. B. Opal's article, "Rotary Dial Mechanism for Digitally Tuned Transceivers."[2]

Synthesizer Construction

The synthesizer is logically divided into three sections. Programming electronics and the readout, if they are used, comprise the first section. This section does not have to be shielded from any receiver or transmitter stages since the logic is purely static. The programmable divider consists of another section, and should be shielded from the rest of the circuits because of the many high-speed waveforms capable of causing interference to communications equipment. The VCO constitutes the third section, and must be shielded from the other stages because of the sensitivity of the VCO to noise. In order to achieve a low-noise synthesizer, the VCO must not be allowed to pick up extraneous signals from any source. In some cases it is useful to add the dual-modulus prescaler from

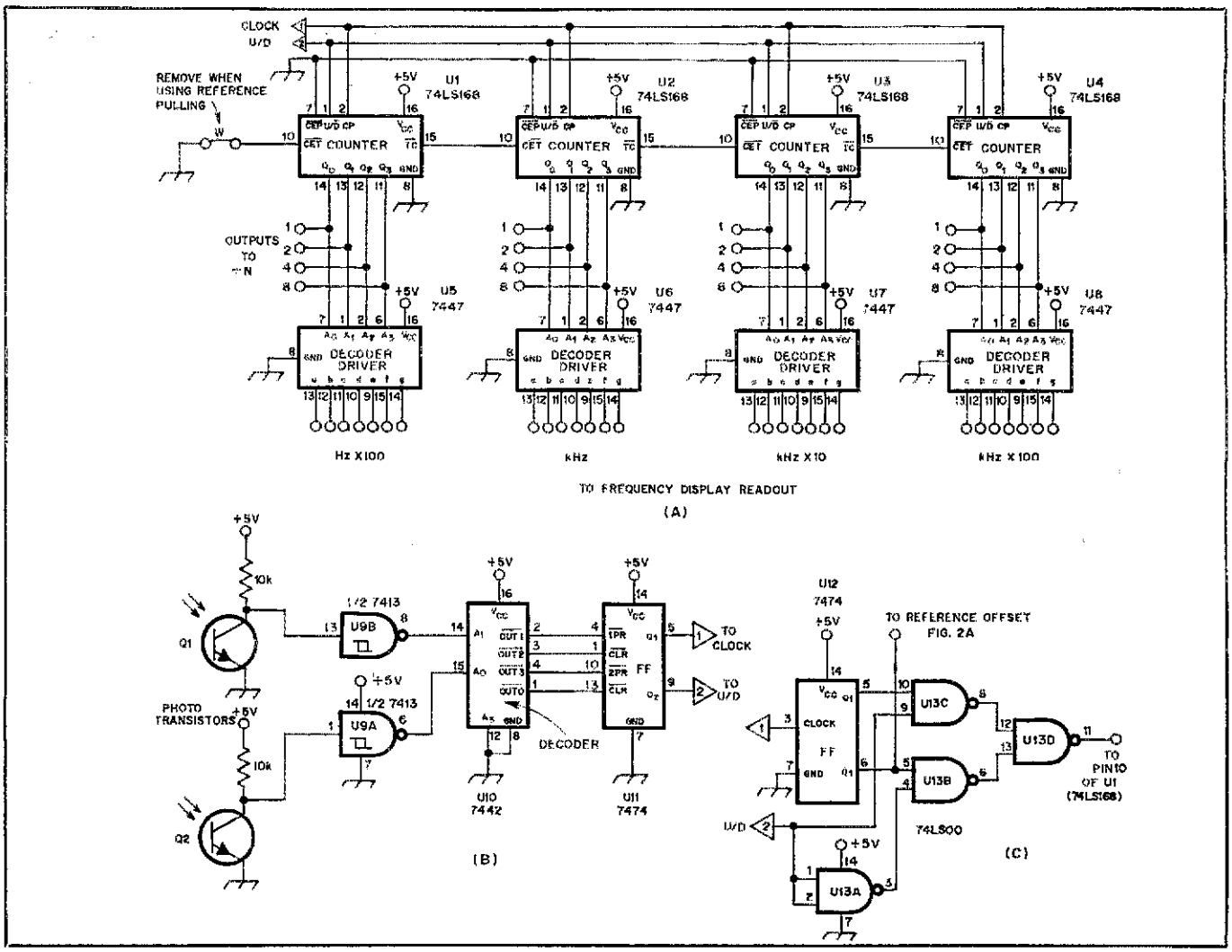


Fig. 3 — Programming circuits using up/down counters and incremental shaft encoder.
Q1, Q2 — Phototransistor.
U1-U4, incl. — TTL synchronous, bidirectional BCD decade-counter IC, type 74LS168.
U5-U8, incl. — TTL BCD to seven-segment decoder/driver IC, type 7447.
U9 — TTL dual Schmitt trigger IC, type 7413
U10 — TTL decoder IC, type 7442.
U11, U12 — TTL dual FF IC, type 7474.
U13 — TTL quad dual-input NAND gate IC, type 74LS00.

the programmable divider in the VCO shield.

Intended to be used as a part of a transmitter or receiver, the universal synthesizer should be built into the equipment rather than to stand alone. There are no special precautions other than those pertaining to shielding. Be sure, however, that the power supplies are free from noise and ripple. Power supplies that will operate an rf power amplifier reliably may not be suitable for a synthesizer. An isolated power supply, for *only* the synthesizer, is the best solution.

Several versions of the universal synthesizer have been constructed by the author. The lead photo and Fig. 1 show the 5.05- to 5.55-MHz version made to complement a Drake TR-7. In this case, the synthesizer is tuned with an up/down counter, and uses incandescent readouts. The entire synthesizer is contained in the 9- × 4-1/2- × 7-in. (229 × 114 × 178 mm) box except for the power supply, which is mounted remotely. Most of the shielding of this synthesizer is obtained by mounting the VCO and prescalers within the attached chassis. With this arrangement, spurious output is on the order of 80 dB down, as shown in the spectrum analyzer photo (Fig. 4).

The 2-meter version was used in the transmitter described in September 1980 *QST*.[4] In this case, since the synthesizer was being used in a transmitter, very little shielding was used, with the transmitter case providing most of it.

The chart in Table 2 can serve as a guide to program the synthesizer for other frequency ranges. The first column indicates the frequency range of the synthesizer output. This is not necessarily the frequency range of the VCO. In Table 1, the two 5 -MHz ranges have VCOs operating at 10 times the output frequency, and they are divided down. The second column indicates the proper connections for the MHz switch. The third column indicates the connections for the 100-kHz switch, and so on. Connections are made to + 5 volts and ground, as indicated in columns 7 and 8.

The values for the loop amplifier depend on the lock-up time and spectral purity required. Synthesizer builders are advised to consult *Phaselock Techniques*, by F. M. Gardner,[5] for the proper loop-constant formula.

Spectrum Analysis of the 5-MHz Synthesizer

The spectral purity of the 5-MHz example synthesizer is shown in photos 4A, 4B and 4C. Photo 4A shows the noise and sideband spectrum out to 2500 Hz from the carrier. This is a major area of concern for communications equipment, since this is the area occupied by a typical ssb signal. As can be seen in the photo, the noise contained in the 50-Hz analyzer bandwidth is more than 70 dB down, greater than 500 Hz from the carrier. Photo 4B shows a very narrow sweep with a 5-Hz filter, in which a pair of sidebands at ± 60 Hz are visible. These sidebands are more than 50 dB down. Noise and sideband energy over 2.5 kHz removed from the carrier can cause reciprocal mixing and can reduce

Table 2

Guide for Using the Synthesizer for Other Frequencies

Switch Connections

Synthesizer Output Frequency Range	*MHz*	*100 kHz*	*10 kHz*	*kHz*	*100 Hz*	*Connnect to +5 V*	*Connect to Ground*
5.0-5.5		A8,9,10,11	B8,9,10,11	B4,5,6,7	B0,1,2,3,	A12,14	A13,15,4,5,6,, A7,0,1,2,3,
5.05-5.55		A8,9,10,11	B8,9,10,11	B4,5,6,7	B0,1,2,3,	A12,14,4,6	A13,15,5,7,0,1 A2,3
50-54	A4,5,6,7,	A0,1,2,3	B0,1,2,3			A8,10	A9,11
60.7-64.7	A4,5,6,7,	B4,5,6,7	B0,1,2,3			A9,10,0,1,2	A8,11,3
133.3-137.3	B8,9,10,11	B4,5,6,7	B0,1,2,3			A11,10,8,5 A0,3	A9,2,3,6,7,4 A2,1
144-148	B8,9,10,11	B4,5,6,7	B0,1,2,3			A11,10,9,6	A8,4,5,7,0,1,2 A3

If none of the programming pins of a divider IC is assigned, then that chip is not required and may be deleted. Both 2-meter synthesizers use reference pulling for generating 5-kHz steps. U3 in both 2-meter synthesizers is a 74LS169 IC.

the sensitivity of a receiver. Photo 4C shows the noise and sideband energy that *is up to 50 kHz away from the carrier.* This photo shows the noise dropping to 74 dB below the carrier at 10 kHz from the carrier. It drops to 80 dB below the carrier at ±50 kHz.

Establishing certain limitations of the analyzer is important whenever a spectrum analyzer is used for wide dynamic-range measurements. When spectrum photograph 4C was taken, the input signal was removed to determine the analyzer noise floor. The display level with no input signal was more than 80 dB below the analyzer reference. This does not represent the actual noise level of the analyzer. Because of reciprocal mixing in the spectrum analyzer, the actual noise floor of the analyzer will be a combination of the noise level observed when there is no input signal and of the noise of the local oscillator of the analyzer. The real noise floor of the analyzer may be determined by inserting a low-noise signal at the maximum imput level and by observing the noise level. The spectrum analyzer 10-MHz crystal calibrator was used for this check, and the resultant spectrum is shown in photo 4D. As may be seen, the noise floor of the spectrum analyzer is only 70 dB down near the carrier, and slowly decreases to near 80 dB down. In fact, the spectrum of the crystal oscillator appears to have more noise than the synthesizer. This may not be the case. The crystal oscillator operates at 10 MHz, and the synthesizer output is at 5 MHz. Possibly, the synthesizer in the spectrum analyzer, which is the most likely noise contributor, has slightly different noise characteristics at these frequencies. As a result of the limitations of the spectrum analyzers used for tests, some comments are in order concerning noise and sidebands of the synthesizer. The noise level shown in photo 4C does not show the noise level of the synthesizer. The actual noise level of the synthesizer is better than the 70 dB shown. From experience with the unit and some other tests, the noise level in a 50-Hz Gaussian bandwidth is estimated to be more than 80 dB below the carrier.

As previously mentioned, there is discussion among designers concerning what constitutes acceptable noise and sideband performance of a synthesizer used for hf receivers. This synthesizer has been in operation for more than a year (transmitting and receiving) during casual activity and contests. Comparisons have been made with a conventional PTO, and no significant differences have been noted. The 60-Hz sidebands, aside from being relatively far down in level, cannot be heard. Many amateur transmitters, and especially those that overdrive a linear amplifier, contain some 60-Hz sideband energy. This is usually the only 60 Hz component that is noticeable on received signals.

Although the entire sideband/noise story of the synthesizer is not known, the performance of the unit is sufficient for all but the most critical communications receiver or transmitter application. The vhf versions of the synthesizer are also being used on the air with excellent results. It is hoped that amateurs will use the universal synthesizer in new designs, improve the performance to suit their application and pass along the information to others.

There are many possibilities for the basic synthesizer design. Adapting the synthesizer to other frequencies will not be difficult if the builder has a good understanding of the principles involved. For a discussion of the dual-modulus synthesizer, see the article, "A High-Performance Synthesized Two-Meter Transmitter."[6]

Notes

[1]A. Helfrick, "A High-Performance Synthesized Two-Meter Transmitter," *QST*, Sept. 1980, pp. 17-21.

[2]C. Opal, "Rotary Dial Mechanism for Digitally Tuned Transceivers," *Ham Radio*, July 1980, pp. 14-17.

[3]F. Gardner, *Phaselock Techniques* (New York: John Wiley and Sons, 1966).

[4]See note 1.

[5]See note 3.

[6]See note 1.

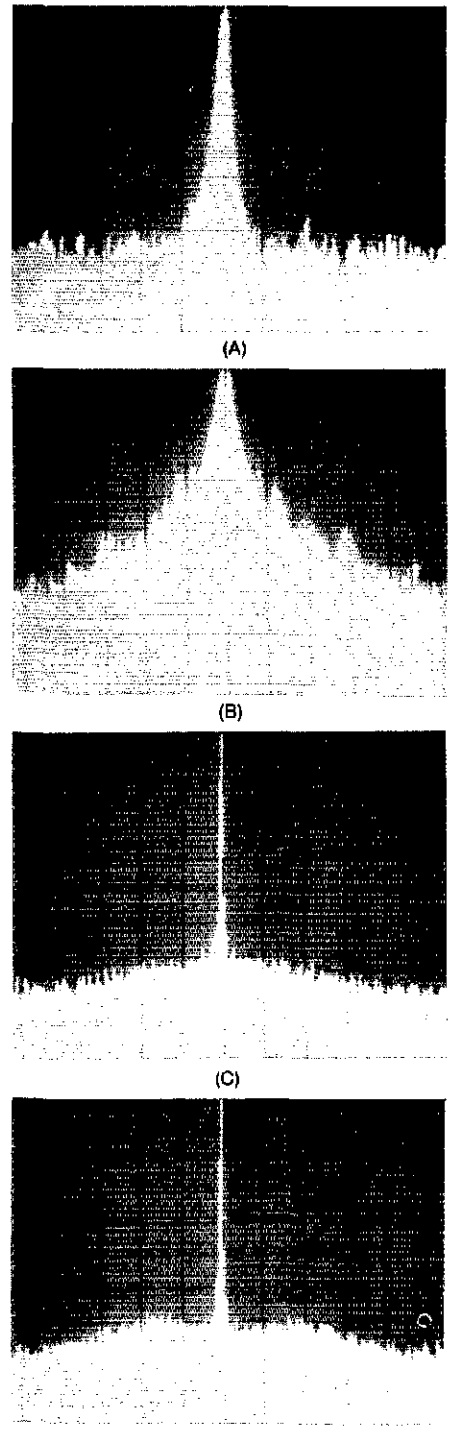


Fig. 4 — Spectral purity of the 5-MHz synthesizer is shown in photographs A, B and C. The noise and sideband spectrum out to 2500 Hz from the carrier appears at A. Each division represents 500 Hz and 10 dB for a 50-Hz filter. B shows the spectrum with a very narrow sweep with a 5-Hz filter in which a pair of sidebands at ±60 Hz are visible. These sidebands are greater than 50 dB down. Each division represents 20 Hz and 10 dB for a 5-Hz filter. Noise and sideband energy, to 50 kHz removed from the carrier, is shown at C. This photograph also indicates the noise dropping to near 74 dB, 10 kHz removed from the carrier, and reducing to 80 dB at ±50 kHz. Here each division represents 10 Hz and 10 dB with a 50-Hz filter. The internal 10-MHz crystal calibrator in the spectrum analyzer was used for making photo D (see text). In this case each division represents 100 Hz and 10 dB with a 50-Hz filter.

Variations in a Single-Loop Frequency Synthesizer

Planning to use frequency synthesis in your next transmitter or receiver? Here is some pertinent plain-language information, plus suggestions for design variations.

By Wes Hayward,* W7ZOI

Frequency synthesis is not new to the radio amateur. It has been used in 2-meter equipment for years. Recently, there has been commercial use of synthesis in amateur transceivers. The performance demands are more severe, although it appears that few manufacturers have met the challenge adequately.

The purpose of this article is to examine the fundamental concepts of a single-loop synthesizer; a complete analysis is not sought. Rather, the loop is examined with possible variations in mind. While the departures suggested are not offered as an ultimate solution to synthesizer problems, they may offer interesting, and perhaps unusual, avenues to the experimenter. We assume the reader is familiar with the basic concepts of the phase-locked loop (PLL) synthesizer. Details can be found in the references listed at the end of this article.

The traditional, single-loop, divide-by-N synthesizer is shown in Fig. 1. Output from a voltage-controlled oscillator (VCO) is applied to a frequency divider, usually programmable, with the result applied to a phase-frequency detector. The phase-detector reference comes from a crystal oscillator that is divided by a factor M. Detector output is filtered in the so-called H(s) or loop filter and then routed to the VCO for control. The system is described by:

$$f_v = f_x \frac{N}{M} \qquad \text{(Eq. 1)}$$

where the VCO frequency is f_v and the crystal oscillator is at f_x. M is usually a fixed integer. The spacing between VCO frequencies (the resolution) is determined by:

$$\Delta f_v = f_x\left(\frac{N+1}{M}\right) - f_x \frac{N}{M} = \frac{f_x}{M} \qquad \text{(Eq. 2)}$$

This is also f_r, the reference frequency at the phase detector if M is constant. Herein lies a major problem with the usual loop synthesizer. The reference frequency must be low if closely spaced channels are desired.

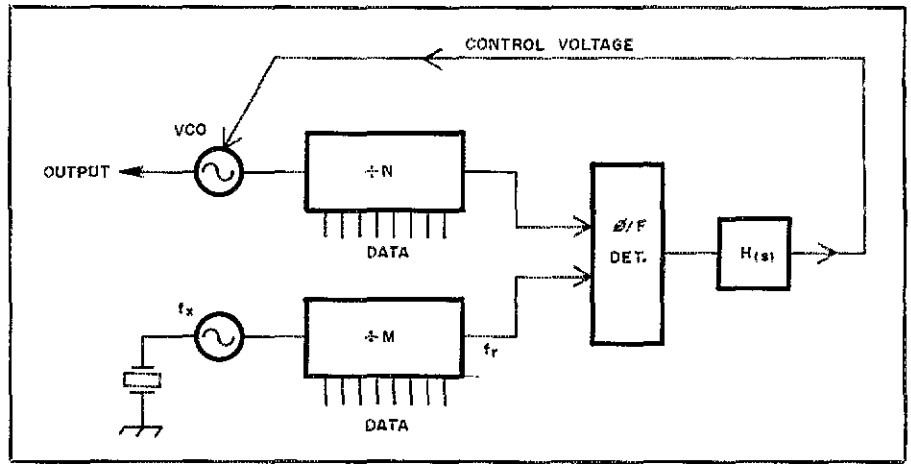


Fig. 1 — A simple, single-loop frequency synthesizer using a phase-locked loop.

An Example

Consider a numerical example, a 5- to 5.5-MHz synthesizer with a resolution of 100 Hz. The crystal oscillator operates at 1 MHz. Hence, M = 10,000, and N will range from 50,000 to 55,000. The loop filter must be configured so that the overall PLL has unity gain, usually termed the "loop bandwidth," at well below 100 Hz. This system might have a loop bandwidth of 3 Hz. Response time is severely restricted. Very careful design must be employed to suppress the reference sidebands (spurious VCO outputs) occurring at a separation equal to the 0.1-kHz reference frequency.

A common method for reducing the problem outlined is to operate the VCO at 50 to 55 MHz, with a 1-kHz reference frequency. Loop bandwidth may be correspondingly larger, allowing for an improved response time. The VCO output is divided by 10 before being used.

Although vhf operation is popular, it is only an initial step in the process. Ideally, a reference frequency of 10 kHz or higher is preferred. Most modern synthesizers use several PLLs with a combination of mixing, division and filtering to achieve satisfactory performance. While excellent performance may be obtained, this is not typical of amateur equipment. Multiple-

*7700 S.W. Danielle Ave., Beaverton, OR 97005

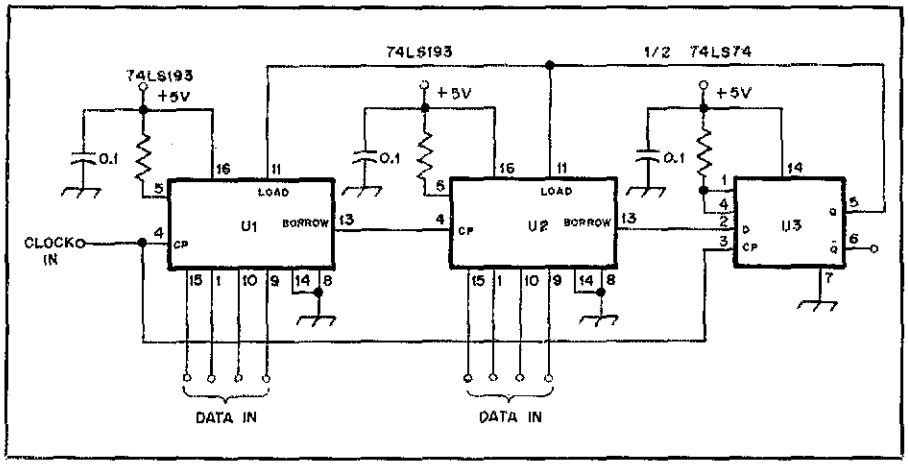


Fig. 2 — A simple, high-speed programmable divider using TTL or LS-TTL logic.

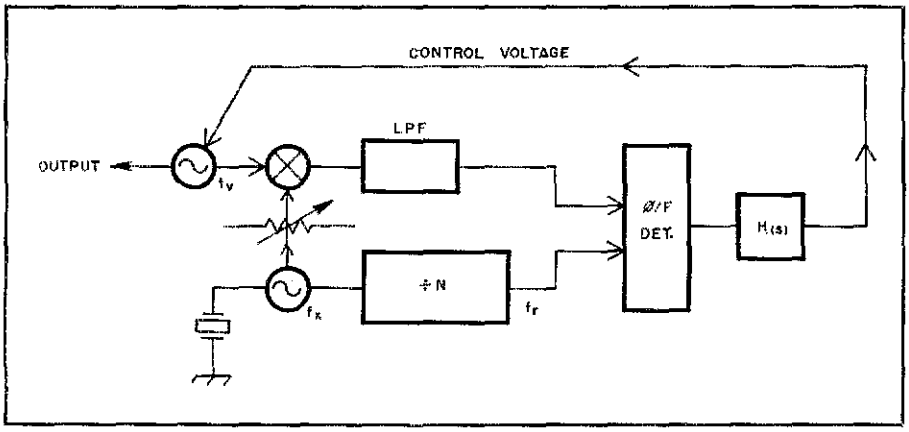


Fig. 3 — A simple synthesizer offering high resolution and a high reference frequency at the phase detector.

loop systems are complicated and costly.

Variations

Owing to the difficulties outlined, it is natural to consider design variations. There is no firm need for a synthesizer to produce frequencies that are separated by a fixed increment, neglecting traditional vhf fm applications. The major requirement is that the channel spacing be sufficiently small. The reference frequency must still be as high as possible.

These seemingly inconsistent goals, high resolution with a high reference, are possible if M of Fig. 1 becomes a variable. There are many ways that M could be controlled. One approach allows M to be simply related to N. Specifically, let N = M + K where K is a relatively small integer. Then, using equation 1,

$$f_v = f_x\left(1 + \frac{K}{M}\right) \qquad \text{(Eq. 3)}$$

The channel spacing or resolution is given by:

$$\Delta f_v = f_x\left(1 + \frac{K}{M+1}\right) - f_x\left(1 + \frac{K}{M}\right) \approx \frac{f_x K}{M^2} \qquad \text{(Eq. 4)}$$

The reference frequency is:

$$f_r = \frac{f_x}{M} \qquad \text{(Eq. 5)}$$

Two programmable dividers are required for this system. They are, however, simple and virtually identical. The implications are evident from the equations. The reference frequency is related to 1/M, but the channel spacing is proportional to $1/M^2$!

Consider an example. M varies from 128 to 256, and f_x is set at 4980.5 kHz. K is set at 1. Then, the VCO output will vary from 5000 kHz (M = 256) to 5019.5 kHz (M = 128). In spite of the close channel spacing, the reference frequency will be high, ranging from 19.5 kHz at M = 256, to 38.9 kHz at M = 128. A high loop bandwidth is now practical, providing improved transient response. Gaps between channels are filled in easily with VXO action applied to the crystal oscillator. Additional flexibility results from the programming of K.

Practical Details

A simple programmable divider is shown in Fig. 2. The 74LS193 four-bit binary counter operates in the down-count mode with two stages used in the example. The U2 "borrow" output drives a D flip-flop, U3, operated as a single stage shift register. The U3 output, which is one full clock cycle in length, actuates the "load" inputs of U1 and U2. The U3 output is synchronous with the high-speed clock, reducing phase-jitter problems that might result from variations in divider propagation delay. The division ratio is N + 2 where N is the data programmed into the divider.

The M, M + K synthesizer is easily constructed with dividers like those in Fig. 2. The M divider is the one shown. The M + K divider uses K more stages in the shift register. The same programming is then applied to both.

Other systems may be used to achieve similar results. For example, only one programmable divider is required if K = 1. This system is shown in Fig. 3. Analysis shows that:

$$f_v = f_x\left(1 + \frac{1}{N}\right)$$

This simple form might be especially attractive for portable applications where power consumption is critical.

A synthesizer of the M, M + K type is now in the writer's home receiver. M varies from 513 to 1025, while K is set at 23. Shift registers replace the D flip-flop of Fig. 2. The VCO operates at 10 MHz, while the crystal is in a voltage controlled crystal-oscillator circuit at 9.77 MHz, providing extra resolution. The 10-MHz output is divided to 5 MHz for use in the receiver. The loop is configured for a gain crossover of approximately 100 Hz.

The performance has been entirely satisfactory. Reference-sideband suppression exceeds 100 dB, while the phase noise is −145 dBc/Hz at a 10-kHz spacing from the carrier.

VXO Operation

It was mentioned earlier that a VXO could replace the crystal oscillator in Fig. 1. There will be a slight compromise in stability if this is done, but the usual VXO is still much more stable than a free-running LC oscillator. Once a VXO-based synthesizer is considered, the question arises as to what the proper N and M values should be.

A graph is presented in Fig. 4 to illustrate the problem. A VXO tuning range is shown. A desired operating-frequency range is also shown above the VXO span. This will be divided into sub-bands corresponding to changes in N or M. Three possible situations are presented. The curves at A show tuning segments that overlap. Plots at B present the opposite extreme — adjoining segments with gaps. The plots at C show the desired condition, exactly adjoining the ranges.

The equations that define N and M for the desired, exactly adjacent ranges or sub-bands are easily derived with results

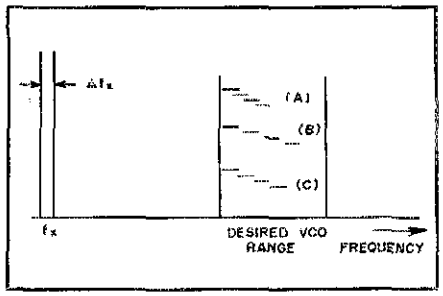


Fig. 4 — Horizontal lines within the VCO range represent sub-bands resulting from tuning the VXO over its range. Different sub-bands arise from changes in the M and N parameters of the synthesizer.

that are surprisingly practical. The minimum N value is given in terms of the VXO parameters by:

$$N_{min} = \frac{f_x}{\Delta f_x} \qquad \text{(Eq. 6)}$$

The required M value for a desired output frequency, f_v, is then:

$$M = \frac{f_x N_{min}}{f_v} \qquad \text{(Eq. 7)}$$

The most significant detail is found in Eq. 7. The minimum N is not a function of the output frequency, f_v. The equations will generally predict irrational numbers for both N_{min} and M. They must be rounded off to integers for simple synthesizes.

Consider a numerical example — a transceiver using a 9-MHz i-f that should operate in the 7- and 21-MHz ranges. The LO (VCO) required will then operate at 16 and 12 MHz. Assume the VXO has a lower frequency of 11 MHz and a range of Δf_x = 11 kHz. This is reasonable performance; the tuning range is only 0.1%. Eq. 6 shows that N_{min} = 1000. Integer approximations of Eq. 7 show that M should be 688 for f_v = 16 MHz, and 917 for f_v = 12 MHz. Results for changing N are shown in the table.

An overlap between tuning segments appears as N increases beyond N_{min}. It is, however, small. This synthesizer could be especially practical. M is chosen for a particular band. Tuning within the band is then realized by moving the VXO and by changing the N value over a small range that does not depend upon the band. The tuning rate will change with band changes — the penalty for this simplicity. Examination suggests that this system would be practical even if used without a digital readout.

Concluding Remarks

This paper presents some ideas that were used experimentally by the writer. Clearly, the goal has not been to present construction information; rather, it has been to communicate details of possible simplifications. It is practical to achieve reasonable performance, even with a single-loop synthesizer, if some of the traditional requirements are ignored.

Table 1
Example of a VXO-Based Synthesizer

M	N	f_{lower} (kHz)	f_{upper} (kHz)
688	1000	15,988.37	16,004.36
688	1001	16,004.36	16,020.36
688	1002	16,020.35	16,036.37
688	1003	16,036.34	16,052.37
917	1000	11,995.64	12,007.63
917	1001	12,007.63	12,019.64
917	1002	12,019.63	12,031.65
917	1003	12,031.62	12,043.66
917	1010	12,115.59	12,127.71
917	1011	12,127.59	12,139.72

f_{lower} and f_{upper} for a given set of N and M values show the frequency range realized by VXO tuning.

Even greater flexibility is offered by multiple-loop designs.

Topics not covered are the design of the VCO and of the loop filter. Both are vital in the design of systems with good suppression of reference sidebands and low phase noise.

References

[1]R. Petit, "Frequency-Synthesized Local-Oscillator System," *Ham Radio*, Oct. 1978. (A good example of a carefully designed traditional synthesizer.)
[2]Manassewitsch, *Frequency Synthesizers, Theory and Design* (New York: John Wiley and Sons, 1976).
[3]W. Hayward, *An Introduction to Radio-Frequency Design*, Prentice-Hall, Inc., tentative publication in 1982. See ch. 7, Oscillators and Frequency Synthesizers.

Strays

"CQ, calling CQ, Maritime Mobile, Region 2 aboard the 'Love Boat' . . ." A mid-March cruise on the *Island Princess*, of TV's "Love Boat" fame, was combined with an operating event for seven California, and one Irish, amateurs. Enjoying the balmy weather and the DX are (l-r) Dick Brinkman, N6AYV; Gene Clark, W6DQH; and Jim Walden, W6ESJ. Approximately 1500 contacts, and unknown quantities of tanning lotion, were enjoyed on the voyage from San Juan, Puerto Rico, to Los Angeles, via the Panama Canal. *(photo courtesy W6CFK)*

CODE IN CAPTIVITY

☐ In a much-publicized incident during the Vietnam military actions, former POW Jeremiah A. Denton, Jr., now a U.S. Senator from Alabama, blinked out the word "torture" with his eyelids during a forced TV interview during his captivity. In response to a letter I wrote, Senator Denton declares that he is wholeheartedly in favor of keeping the code requirements for Amateur Radio. "In my particular case," he states, "had I not known the Morse code, I would have been denied the one viable option of communication open to me, while a prisoner of war. I am definitely in favor of it." — *Russell Crom, AG9N, Mt. Prospect, Illinois*

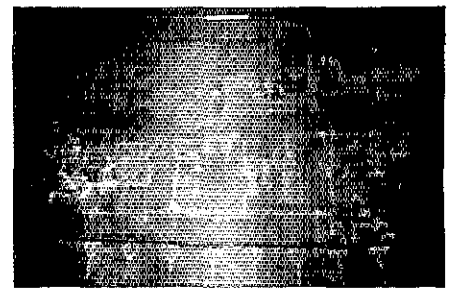
QST congratulates . . .

☐ John W. Ferguson, WØQWS, of Independence, Missouri, who was named Director of Libraries by the trustees of the Mid-Continent Public Library.

☐ D. R. Allen, K4HJM, who was named "Southern Section Country Cousin of the Year" for his contributions to the net, which is dedicated to "the service and help for all mankind."

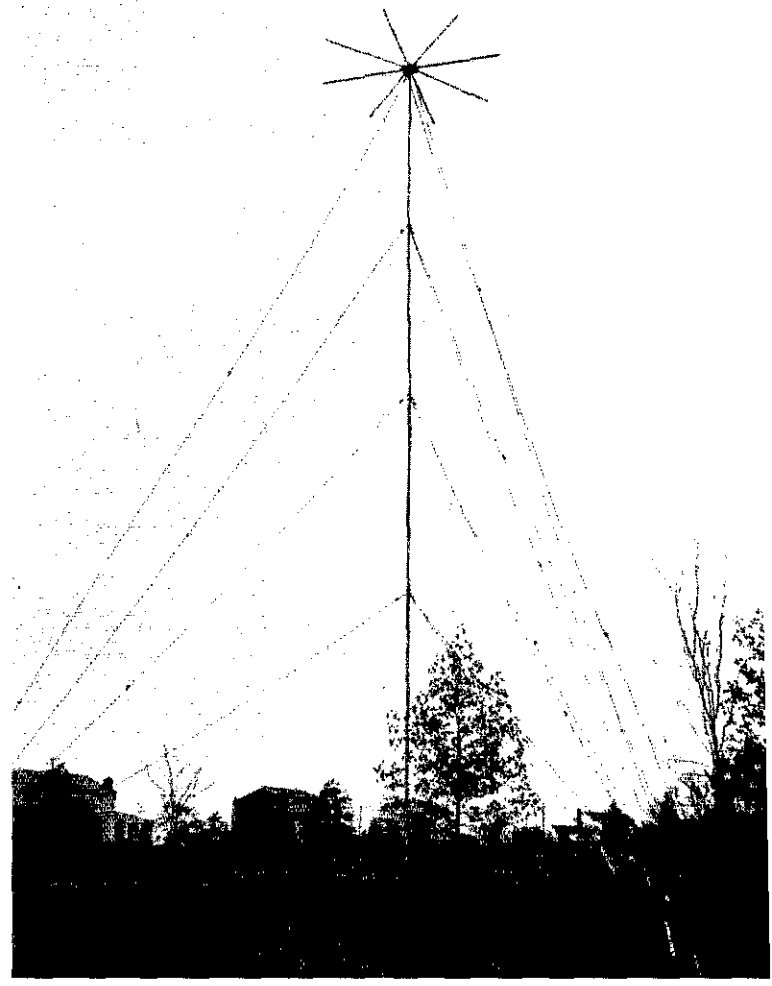
JOURNEY INTO SPACE

☐ The Club and Training Department announces the addition of a new NASA slide show to the library. *NASA: Journey Into Space* contains 80 slides and is 30 minutes long. Quantities are limited, so please list alternate dates. — *Joyce Martin, Club and Training Dept.*



Cortland E. Richmond, KA5S/DA1GI, will never forget his first radio, a two-tube regenerative receiver featured in *How to Become A Radio Amateur* almost 25 years ago. His mother, Jinx, hooked this rug using his radio's circuit diagram for a pattern; she later even included the power supply in the design. *(photo courtesy KA5S/DA1GI)*

A Modest 45-Foot DX Vertical for 160, 80, 40 and 30 Meters



If it's DX you want, this low-angle radiator will put it in your lap! Build it now and collect DX dividends this winter.

By Wayne H. Sandford, Jr.,* K3EQ

Twenty years is a long time to be away from Amateur Radio! But, fortunately, when I returned to the airwaves in December 1975, the season for working distant stations had arrived. The allure of finding signals from other continents became almost magnetic, and before long, the DX bug had clearly bitten me again. With a 120-watt homemade cw rig and a 120-ft end-fed wire strung 28 ft above the ground,[1] I worked what countries I could while being constrained by the nature of this "sky wire." Without question, a better antenna was needed for my DXing efforts. What to do?

Improvements began with the construction of a 36-ft wooden tower I built to support a 2-element quad for 10, 15 and 20 meters. From the top of this tower, I hung a 40-meter vertical antenna, followed by the installation of twenty-four 50-ft radials. DXing on 40 meters improved noticeably as a result of this effort.

*P.O. Box 395, Warrington, PA 18976

[1]Notes appear on page 31.

For awhile I was satisfied to leave my 80-meter inverted L alone. It was strung between the quad tower and a mast supporting one end of my end-fed wire. Admittedly, results with this antenna were mediocre. During the winter of 1979-80, as I approached the requirements for Five-Band DXCC on all bands except 80 meters (only 50 confirmed), I began to think about better DX antennas for the lower frequencies.

Research

I looked through back issues of *QST* and other publications for antenna articles: A *QST* article by Hollander[2] triggered thoughts of constructing a multiband vertical antenna. Radiation patterns of 1/8-, 1/4-, 1/2- and 5/8-wavelength vertical antennas indicate that an antenna having this configuration would give low-angle radiation on four bands. Calculations indicated these fractional lengths could be applied to 160-, 80-, 40- and the new 30-meter band that will become available sometime during 1982. A 5/8-wavelength vertical antenna for 30 meters is nearly 60 ft high. A half wavelength for 40 meters is 70 ft; 1/4 wavelength for 80 meters is 70 ft; and 1/8 wavelength on 160 meters is 68 ft. Therefore, if a pole 60 ft high were used, series inductance could be added to obtain the required electrical length on all four bands. But as much as I desired to have a vertical antenna 60 ft tall or greater, I decided to see if an antenna as short as 40 ft would serve my purpose. Furthermore, although not too much has been said by the neighbors about the 2-element quad, I feared that a 60-ft vertical antenna might stimulate a barrage of adverse comments!

After pondering the matter for some time and studying radiation resistance and reactance plots for vertical antennas,[3] the solution of the problem came into focus. For an antenna shorter than 60 ft some form of loading was needed. A "top hat" provides an efficient means for doing this.[4]

This multiband antenna should first be calculated for 5/8 wavelength on 30 meters. It will give an almost perfect match to a 50-ohm line by adding a small

Table 1

Dimensions for Optimum Height of the Vertical Radiator

Radiator Height (ft)	Top-hat dia (ft)	Calculated Heights for 10.125 MHz (Deg.) (Sum = 225 Deg.)		Calculated Heights for 7.025 MHz (Deg.)			Calculated Heights for 3.525 MHz (Deg.)			Calculated Heights for 1.8125 MHz (Deg.)		
		Height	Top Loading	Height +	Top Loading	= Sum	Height +	Top Loading	= Sum	Height +	Top Loading	= Sum
43	11	159.5	65.5	110.6	56.7	167.3	55.5	37.4	92.9	28.5	21.4	49.9
44	9.6	163	62	113.2	52.6	165.8	56.8	33.2	90	29.2	18.6	47.8
45	8.2	166.9	58.1	115.8	48.1	163.9	58.1	29.2	87.3	29.9	16	45.9

Meters = feet x 0.3048

Table 2

How Top-Hat Loading is More Effective on Lower Bands in Increasing Effective Height

F (MHz)	Top Loading (Deg.)	Top Loading (ft)	Ant. Effect. Height (ft)	Ant. Effect. Height (λ)
1.8125	18.6	28	72	0.133
3.525	33.2	25.7	69.7	0.249
7.025	52.6	20.5	64.5	0.456
10.125	62	16.7	60.7	0.625

Meters = feet x 0.3048

inductance in series with the antenna at the feed point, then tuning out the capacitive reactance with a shunt inductor. If the antenna is a half-wavelength long at 40 meters (the length at which reactance is zero), it could be adjusted easily by using a parallel-tuned tank in series with the ground lead, and by tapping the feed line at a point on the tank just a few turns up from the ground end. The tap and tuning adjustments are arranged to give the best match. It seemed that if the antenna were 1/4 wavelength long at 80 meters, it could be increased in length to provide a 50-ohm feed point by means of a small series inductor and a shunt capacitor to tune out the reactance. In addition, since it would be considerably shorter than 1/4 wavelength on 160 meters (on the order of 1/8 wavelength) it could be made to look like a 1/4-wavelength antenna by adding series inductance to ground. Matching could be effected by tapping the line a few turns up on the coil. Many dyed-in-the-wool DXers would not consider a 1/8-wavelength vertical antenna, but Sevick[5] has shown that this can be an efficient radiator when used with an effective ground system and a low-loss, base-loading inductor.

Design Procedure

I could not remember having seen details of vertical antennas that explained how to calculate the effect of the "top hat." But in past issues of *QST* I found an article by Schulz,[6] which was just what I needed. Although his design was for a 1/4-wavelength antenna, the equations are presumed applicable for calculating the "top-hat" effects on 1/2- and 5/8-wavelength antennas. Calculations with his equations indicated that a 44-ft vertical antenna loaded by a 9.6-ft diameter "top hat" would give the results I wanted. My aim was to have a vertical antenna that would be 5/8 wavelength on 30 meters, 1/2 wavelength on 40 meters, 1/4 wavelength on 80 meters and 1/8 wavelength on 160 meters. Table 1 shows calculated electrical lengths and required "top-hat" diameters for vertical radiators from 43 to 45 ft high, showing that the 44-ft height is about right to give the required four-band performance. Table 2 shows that the "top hat" is more effective in increasing the length of the radiator as the frequency goes down.

Since this design promised a high degree of success, the preliminary circuit (Fig. 1) was prepared. A parts list was compiled (Table 3), and material collection was begun.

Construction

Purchases for the project included a 40-ft telescoping TV mast (its extended length turned out to be 38.5 ft) and a 6-ft galvanized fence post, which would just fit inside the lower mast section. With 6 in. of the post telescoped inside the mast,[7] the overall length was the required 44 ft. To secure the mast to the fence post, two slits were made in the lower section of the mast with the aid of a hacksaw. A stainless-steel radiator hose clamp and a 1/4-20 bolt, 2-1/2 in. long, were used to clamp the mast firmly to the fence post.

The eight-spoke "top-hat" is constructed in a manner similar to that used by Hollander.[8] There are eight 5-ft lengths of 1/2-in. diameter conduit fastened to an 11-in. square, 1/8-in. thick aluminum plate. The spokes are held firmly against the plate by means of 6-32 stainless-steel hardware. Aluminum angle stock is used to fasten the plate to the top of the upper mast section. This stock, which is 1/8 in. thick by 1-1/2 in. wide, is cut into four 1-in. lengths. Two 1/4-20 stainless-steel bolts, 2 in. long, are used to fasten the angles to the upper mast section. I suggest the use of lock washers in all cases where the bolts are used. Good electrical contact can be assured by connecting all "top-hat" radials together and to the mast with 1/4-in. wide braid using stainless-steel, self-tapping screws. Three 48-in. long heavy-duty, screw-in steel anchors are used for the guy points. They are located 25 ft from the tower base. Four sets of guys are used. They are made from no. 12-1/2-gauge steel wire. A total of 42 egg insulators are installed to break the guys into lengths no longer than 19 ft. The base of the mast sits on a 7-in high, heavy-duty standoff insulator, which in turn rests on a 6-in. diameter concrete base that is 3 ft deep, with 4 in. protruding above ground.

Installation of the Mast

First, stand the mast upright and attach the lower set of guys to the anchors. The three top sections of the mast are pushed up from a ladder resting against the mast. Proceed by attaching the next set of guy wires to the anchors. The ladder is then extended to the second guy level, and the upper section is pushed up next. A piece of 1/4-in. braid is fastened across the joint between the top and second section of the mast, using self-tapping, stainless-steel screws. Follow this by pushing the second and top sections up together. Next, a strap is connected across the other two joints to ensure good electrical contact. Complete this part of the installation by connecting all guys to the mast, then adjust them so that the mast stands vertically.

All tuning components are mounted in a fiberglass box. Fig. 2 shows the open tuning box and components. Fig. 3, a photograph of the base of the antenna, shows how the box is attached to the 3/4-in. galvanized water pipe ground rod, and how the radial wires are terminated on a square aluminum plate (similar to the method used by Sevick).[9] The plate is fastened to the ground rod with aluminum angle brackets, stainless-steel hardware

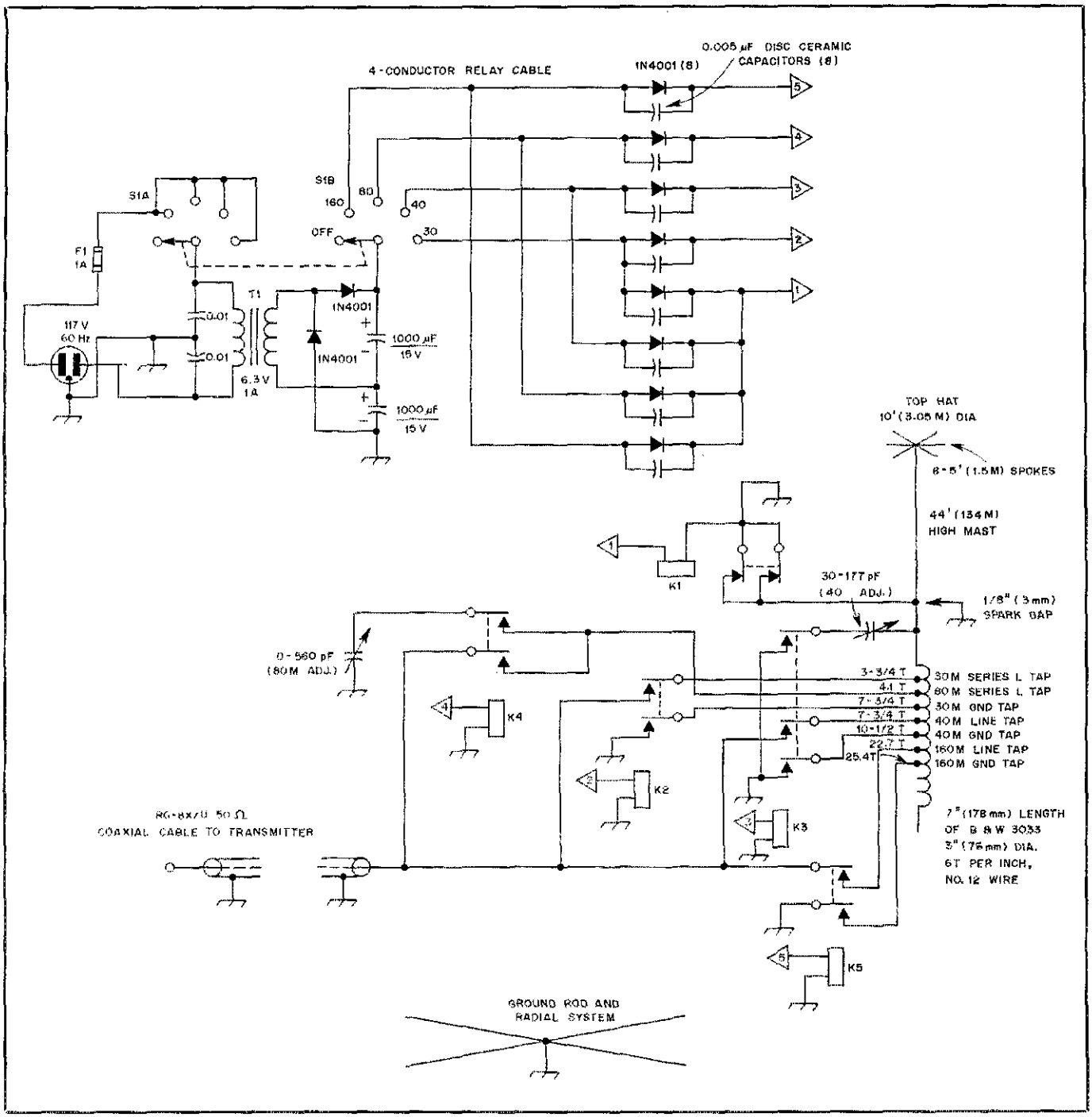


Fig. 1 — Schematic diagram for the K3EQ 160-, 80-, 40- and 30-meter vertical antenna. The circuit for remote band switching is included. There are 52 radials and a ground rod in the system. Low-angle radiation makes this an effective DX antenna.

and a stainless-steel hose clamp. All four corners of the aluminum plate are connected to the ground feedthrough in the bottom of the tuning unit with heavy copper braid. This insulator, as well as the one for the lead going to the base of the mast, is sealed against moisture by applying silicone compound. The relay control cable and the 50-ohm coaxial line enter the bottom of the tuning box through small holes that ensure a snug fit. The completed antenna, as shown in the photograph, has the capacitance hat resting atop the mast. The mast is stabilized by careful positioning of the guy wires. A wooden fence is placed around the base of the mast to help protect people and animals from possible rf burns.

Radial System

Installation of the mast took place during the driest Pennsylvania summer in 15 years. As fall approached, the soil was still too hard to bury the radials, so they were laid on the surface. Each wire was stretched tightly and fastened with several 6-in. lengths of heavy bus wire, which had been formed into hooks. When rain eventually fell, the radials were buried 2 to 3 in. in the ground.

All radials are 100 ft long except those toward the sides of the lot (which is only 150 ft wide). One side has 70-ft radials, while the other has 80-ft radials. Some 4800 ft of wire makes up the 52 radials. I used insulated hookup wire, but aluminum clothesline[10] or galvanized electric fence wire is satisfactory.

According to Stanley,[11] the efficiency

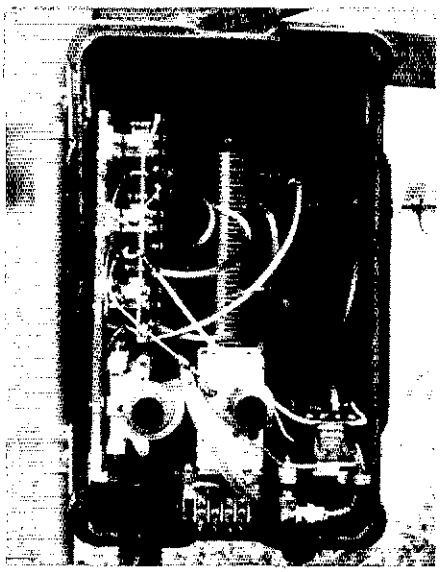


Fig. 2 — A view of the vertical antenna tuning network. Components are mounted on a framework of 1/4-in. thick Plexiglas, which slides into the fiberglass box.

Table 3

Shopping List

1 — telescoping TV mast, 40 ft long, Montgomery Ward no. 63A19735R, $39.95.
1 — galvanized fence post, 6 ft long, 2-in. dia., $6.
4 — lengths of thin-wall conduit, 10 ft long, 1/2-in. dia. Each length is to be cut into 5-ft sections. Montgomery Ward no. Z83A1004R, size no. 2, $1.89 ea.
1 — length of 3/4-in. galvanized water pipe for ground rod, 10 ft long, Montgomery Ward no. 81A40103R, $12.
2 — rolls of no. 12-1/2 gauge galvanized steel wire for guys, Sears no. 32H10125, $6.29 ea.
3 — earth anchors, screw type, 48-in. long, Sears no. 32H21946C, $7. ea.
42 — strain insulators for guy wires, Radio Shack no. 270-1518. Price with 10% quantity discount, $13.04.
120 ft (36.5m) RG8X-50 coaxial cable available from Texas Towers, Plano, Texas, $18.
120 ft four-conductor control cable for relay circuit, gray vinyl jacket. Sold by Fair Radio Sales, Lima, Ohio, $14.40. A substitute would be TV rotator cable, Sears no. 57H6732, 10¢ per foot.
5000 ft no. 18 vinyl-covered hook-up wire for radials, sold by Fair Radio Sales, $75. A less expensive (but less durable) substitute is no. 17 gauge galvanized steel wire. This is available from Sears, no. 32H22056C, at $16 per roll. Each roll has 2640 ft of wire.
1 — B & W coil no. 3033, 10 in. long, 3-in. dia, no. 12 wire, 6 tpi, available from Barker and Williamson, 10 Canal St., Bristol, PA 19007, $7.97.
1— fiberglass case, 14-1/2 × 14 × 4-1/4 in., available from Fair Radio Sales, $5.
5 — relays, dpdt plus spst; N.O., 12 V dc, Leach no. 1077, available from Fair Radio Sales, $2 each.
1 — variable capacitor, 30-177 pF with both sections in parallel, 0.094-in. air gap. Fair Radio Sales, no. C-221/T-195, $3.95.
1 — variable capacitor, 0-563 pF, 0.03-in. air gap, Fair Radio Sales, no. 76348-C, $2.95.
2 — cone-style feedthrough insulators, Fair Radio Sales, no. 3G584IN-84, 25¢ each.
1 — standoff insulator, 7-in. × 1-1/4 in. dia, Fair Radio Sales, no 5970-405-8992, $4.

Miscellaneous: parts for control box purchased from Radio Shack, $20.
Stainless-steel hardware from Elwick Supply Co., Somerdale, New Jersey, $12.
Aluminum angle stock and 1/8-in. aluminum plates from local metal suppliers, hose clamps, ready-mix concrete, copper shielding and braid, $10.

Note: The total cost was approximately $300 at the time the antenna was built. It is reasonable to expect the present costs to be about 10% higher. By "scrounging" parts from your junk box, and from friends and flea markets, the cost can be reduced.

of a 160-meter antenna might be improved by using more or longer radials. For the other bands, however, not much improvement is likely to be achieved by increasing the lengths or adding radials. For 160 meters, the radials are only 0.184 wavelength, but for 80 meters they are a respectable 0.352 wavelength long. Ground losses are probably on the order of 2 dB on 40 meters and about double that on 160 meters. Table 4 is a chart of the wavelengths of the 100-ft radials versus frequency.

Tuning

Tune-up is done on 160 meters first, then progressively on the higher bands. I used the K4KI[2] tune-up bridge and a dummy load at the base of the antenna to make the adjustments. My transmitter was in the second-floor shack. I should have carried it to the base of the antenna to make the matching process easier. Finding the correct coil taps for 160 meters while using the bridge seemed almost impossible. By tightly coupling a grid-dip oscillator to a two-turn link in the ground lead, the correct ground tap point was located. The line tap was then positioned properly with the aid of the tune-up bridge. Adjustments for the other bands followed without difficulty. The required inductances were close to the calculated values. Fig. 4 shows an SWR plot for the antenna. Refer also to Table 5.

This data was obtained in the shack at the end of the 120-ft length of RG-8X coaxial feed line. The SWR might be brought closer to 1:1 on 30 meters by further adjustments for that band. After the tap points on the coil were found, I soldered miniature alligator clips to the coil. A purist might prefer to remove the

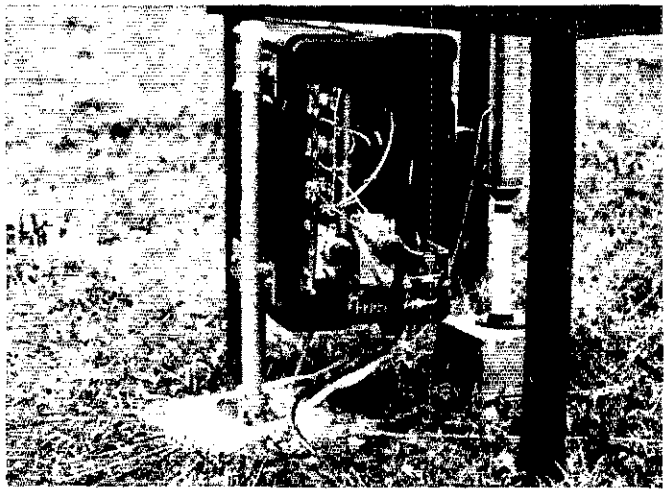


Fig. 3 — Base of the vertical antenna with the tuning-component box mounted on the ground rod. The radials terminate on a square aluminum plate.

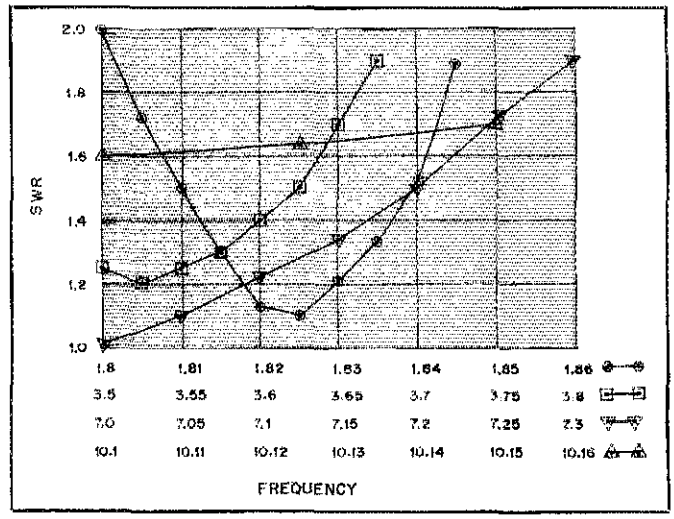


Fig. 4 — SWR curves for the K3EQ vertical antenna. See Table 5 for related information.

clips and solder the braid directly on the coil. I left the clips there to facilitate future adjustments.

The antenna is resonant outside the low ends of the 30- and 40-meter bands. This apparently results from the extra foot or so of wire from the base of the mast to the tuning box and ground. Additionally, I did not cut the "top hat" to the calculated 9.6-ft diameter, but left it at 10 ft. Shortening the mast 1 foot should bring the resonant points within the 30- and 40-meter bands. If additional correction is needed, then remove 2.5 in. from each of the "top-hat" spokes. This change may require repositioning of the taps from the points indicated on the schematic diagram (Fig. 1).

Afterthoughts

Phone operators may think this article has nothing to offer them. Therefore, I went through an exercise to determine the optimum configuration to cover the new 30-meter band and the 160-meter band, and also to allow adjustment for the lowest SWR at the center of the 40- and 75-meter phone bands. To accomplish this, the mast must be lengthened to 47.5 ft, and the top-hat diameter reduced to 5.8 ft. Table 6 charts the calculations that lead to this conclusion.

Of course the tuning network would allow this configuration to be tuned to the 40- and 80-meter cw bands by those operators who might like to tune the antenna to any part of these bands. For 80-meter cw, more series inductance would be needed for the 44-ft version. For 40-meter cw, some series inductance would have to be inserted between the mast base and the parallel-tuned tank. This requires only moving all three 40-meter coil taps down the coil a few turns. Proper adjustment for operation anywhere in the 40- or 80-meter bands can be made with this configuration.

The full 40-meter band could be covered with an SWR of 1.4:1 or less if this matching network is tuned for the lowest SWR at 7.15 MHz. This can be verified by extrapolating the SWR curves of Fig. 4. Likewise, it appears that if the configuration were tuned for the lowest SWR at 3.8875 MHz, all of the 75-meter phone band could be covered with an SWR of 1.7:1 or less.

Conditions were not favorable for evaluating its DX qualifications when I conducted tests with this antenna. Results obtained were nevertheless gratifying. Europe and South America have been worked with very good reports on 80 and 40 meters. On 160 meters, with 100-watts input to a TX4C, I received an RST 589 report from KP2A followed by a 549 from VP9KA. To the west, my circle of contacts has been from Minnesota (559) through Wisconsin (579), Iowa (559), Kansas (539) and Arkansas (559). A 339 report came from New Mexico, and a station in Florida gave me a 579. All of these contacts were made in the early evening.

I have shown none of the math calculations; only the results in the form of tables. Amateurs who desire a copy of these calculations should send a request to the ARRL Technical Department. Enclose an s.a.s.e. and $1.

If you wish to enhance your DX capabilities on the lower bands without erecting a "monster antenna," to be prepared for the new 30-meter band when it becomes available or to try the recently expanded "top band" for the first time, then this may be just the antenna for you. Build it, and you'll be ready for some good DXing!

Table 4

Length of Ground Radials in Wavelengths Versus Frequency

F (MHz)	*100-ft (30-m) Radials (length in λ)*
1.8125	0.184
3.525	0.357
7.025	0.712
10.125	1.029

Notes

[1]meters = feet × 0.3048.
[2]D. Hollander, "A Big Signal from a Small Lot," *QST*, April 1979, pp. 32-34.
[3]Editors of *73 Magazine, The Giant Book of Amateur Radio Antennas* (Summit, PA: Tab Books).
[4]J. Sevick, "The W2FMI Ground-Mounted Short Vertical," *QST*, March 1973, pp. 13-18, et al.
[5]J. Sevick, "Short Ground-Radial Systems for Short Verticals," *QST*, April 1978, pp. 30-33.
[6]W. Schulz, "Designing a Vertical Antenna," *QST*, Sept. 1978, pp. 19-21.
[7]millimeters = inches × 25.4.
[8]See note 2.
[9]See note 4.
[10][Editor's Note: In regions where the soil has a high acid or alkaline content, rapid disintegration of aluminum wire will occur, sometimes within a few months. Neoprene-jacketed no. 8 aluminum wire (sold by Sears as overhead power wiring for outdoor applications) is relatively inexpensive and is highly resistive to corrosion.]
[11]J. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, Dec. 1976, pp. 13-15.
[12]W. Vissers, "Tune Up Swiftly, Silently and Safely," *QST*, Dec. 1979, pp. 42-43.

Table 5

Data for SWR Curves in Fig. 4

Frequency (MHz)	*SWR*
1.8	2.0
1.805	1.72
1.81	1.5
1.815	1.3
1.82	1.13
1.825	1.1
1.83	1.21
1.835	1.33
1.84	1.52
1.845	1.89
3.5	1.25
3.525	1.2
3.55	1.25
3.575	1.3
3.6	1.4
3.625	1.5
3.65	1.7
3.675	1.9
7.0	1.01
7.05	1.1
7.1	1.22
7.15	1.34
7.2	1.5
7.25	1.72
7.3	1.9
10.1	1.6
10.125	1.64
10.15	1.7

Table 6

Chart for Selecting Optimum Radiator for Phone Bands (7.225 and 3.8875 MHz)

Radiator Height (ft)	*Top Hat Cap (pF)*	*Top Hat Dia (ft)*	*Calculated Heights for 10.125 MHz (Deg.) Sum — 225 Deg.*		*Calculated Heights for 7.225 MHz (Deg.)*			*Calculated Heights for 3.8875 MHz (Deg.)*			*Calculated Heights for 1.8125 MHz (Deg.)*		
			Height	Top Loading	Height	Top Loading	Sum	Height	Top Loading	Sum	Height	Top Loading	Sum
47	49	6	174.3	50.7	124.39	41.08	165.47	66.93	25.13	92.06	31.2	12.27	43.47
47.5	46	5.8	176.17	48.83	125.7	39.2	164.9	67.64	23.69	91.33	31.54	11.56	43.1
48	43	5.3	178.02	46.98	127	37.36	164.36	68.35	22.33	90.68	31.87	10.84	42.7
49	37.7	4.75	181.73	43.27	129.68	33.88	163.56	69.78	19.86	89.64	32.53	9.56	42.09

Note: Subtract length of lead into tuning unit plus ground lead from calculated radiator height.

A Phase-Locked-Loop Demodulator and Modulator

Out of phase with today's trends? Locked into a loop with your computer? Get back on the air with this simple project!

By Rodney A. Colton,* WA1SXW

When the FCC approved the use of ASCII on the amateur bands, I searched for a quick and inexpensive method of interfacing my computer and transceiver. I chose the simple PLL circuit in Fig. 1. It decodes an audio signal (tones) into TTL-compatible bits. All one needs to do is feed the data stream to a computer, and half the system is operating! The simple VCO circuit in Fig. 2 converts the data stream at the output of the computer into tones. One can inject the tones into the microphone jack of a transceiver, and the complete system is operating. Both the modulator and the demodulator could be implemented with the same VCO. ICs are inexpensive, however, and I wanted to reduce the switching requirements. This makes the alignment and testing easier, also.

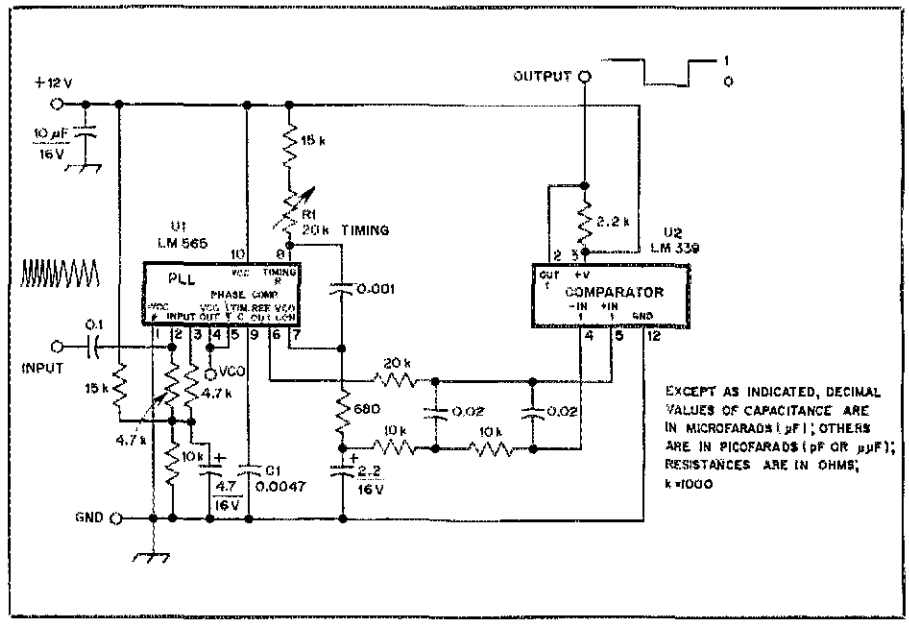


Fig. 1 — Schematic diagram of the demodulator circuit. Resistors are 1/4-watt or 1/2-watt carbon-composition type. Capacitors are disc ceramic. Component numbers not appearing in parts list are for identification purposes only.

R1 — Linear-taper, 10-turn potentiometer, 20 kΩ.

U1 — Phase-locked-loop IC, TTL compatible, type 565 or equivalent.

U2 — Voltage comparator IC, TTL compatible, type LM339 or equivalent.

Circuit Operation

With no signal at the input of the circuit in Fig. 1, adjust the timing resistor (R1) so that the free-running VCO frequency is between the fsk mark and space frequencies. The VCO control voltage at pin 7, generated by the comparator, is the same as the reference voltage at pin 6 when there is no input signal. The output of the comparator circuit may be either a mark or space.

If a mark signal (higher tone) is applied to the input, the control voltage (pin 7) goes lower than the reference voltage (pin 6). This causes the comparator output to go high. If a lower tone appears at the input of the PLL, the voltage at pin 7 swings in the other direction, and a low appears at the comparator output.

This circuit works well with various common values of frequency shift at rates up to 300 bits per second. If the data stream is inverted, insert an inverter between the demodulator output and the computer input, or use the computer to make the conversion once the data has been loaded. (Computers are very efficient at making conversions involving Baudot, ASCII, parity bits and so forth.)

Modulator Circuit

The heart of the circuit in Fig. 2 is the LM566 VCO. Timing-capacitor (C1) and

*5629 Dovekie Ave., Ewa Beach, HI 96706

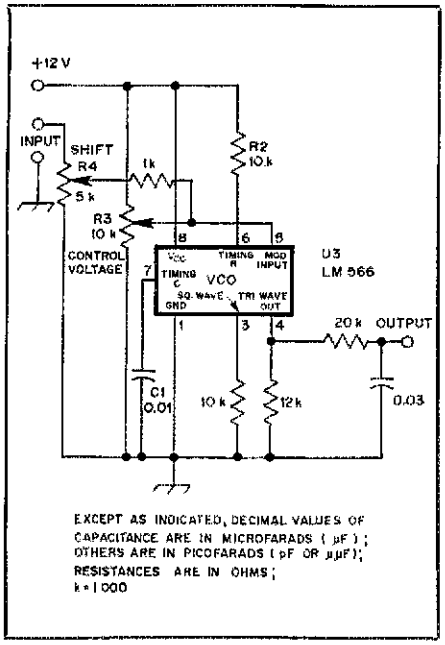


Fig. 2 — Schematic diagram of the modulator circuit. Resistors are 1/4-watt or 1/2-watt carbon-composition type. Capacitors are disc ceramic. Component numbers not appearing in parts list are for identification purposes only.
R3 — Linear-taper, pc-board style potentiometer, 10 kΩ.
R4 — Linear-taper, pc-board style potentiometer, 5 kΩ.
U3 — Voltage-controlled oscillator IC, TTL compatible, type LM566 or equivalent.

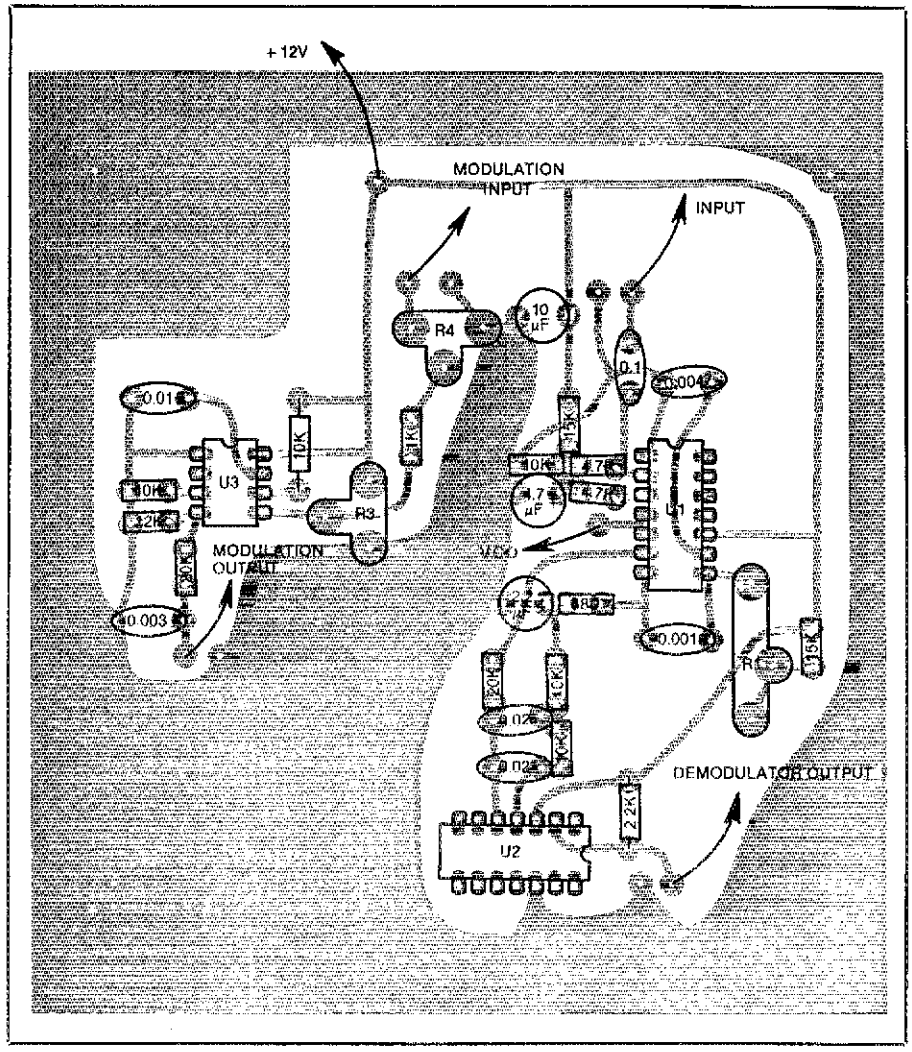


Fig. 3 — Parts-placement guide for the demodulator and modulator. Parts are placed on the non-foil side of the board; the shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the Hints and Kinks section of this issue.) Resistances are in ohms; k = 1000. Capacitors with whole-number values are in picofarads. Capacitors with decimal-value numbers are in microfarads.

timing-resistor (R2) values establish the free-running frequency range of the VCO. Operating voltage at pin 5 also affects the VCO frequency. The control voltage and the free-running frequency can be adjusted by means of R3.

The TTL data stream is injected at the input (R4). Adjusting R4 changes the effect that each bit (high or low) has on the voltage at pin 5. The number of hertz shift between mark and space will vary with changes in the R4 setting. Adjusting the mark and space frequencies is an iterative process because of the interaction of R3 and R4.

The output of the VCO is a square wave at pin 3 and a triangular wave at pin 4. The harmonic content of a triangular wave is lower than that of a square wave. Because it is easier to filter, the triangular wave is used to drive the transmitter. A low-pass filter between the output of the VCO and the input of the transmitter removes the harmonics.

Construction

I developed the prototypes of these circuits on breadboards. After testing for proper demodulator operation, I transferred the circuit to a pre-etched, predrilled circuit board (Radio Shack 276-170). Once the component values of the modulator were verified experimentally on the breadboard, I transferred this circuit to an etched circuit board. I mounted both boards in a small aluminum box. An etching pattern for a circuit board (with both circuits on it) is included in the Hints and Kinks section of this issue. Fig. 3 provides a parts-placement guide for this board. I installed banana jacks for the input and output ports and also added two jacks for monitoring the VCO and TTL data streams.

Operation

Connect the demodulator input directly to the speaker terminals of the receiver. Adjust the volume control of the receiver for a normal listening level. Set the VCO (U1) free-running frequency to midrange. Tune the receiver so that the VCO frequency falls midway between the mark and space frequencies. Fine tune the unit by "tweaking" the receiver frequency or the free-running VCO frequency (R1). Verify proper tuning by attaching a monitor scope to the output and by observing equal numbers of marks and spaces.

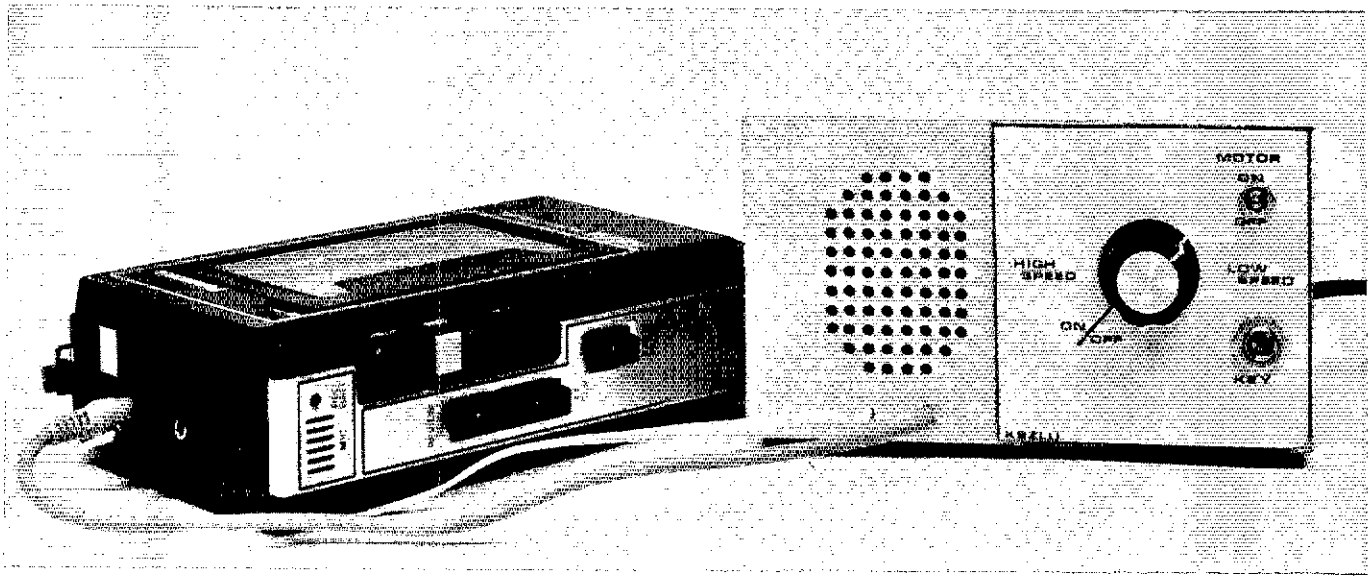
Connect the modulator input to the computer output and the modulator output to the microphone input of the transmitter. Adjust audio and/or drive gain to prevent over-driving the transmitter.

Refinements

Some predetection filtering before the demodulator in the form of a band-pass filter should increase the effective signal-to-noise ratio and should improve system performance. The output of the demodulator could easily be adapted to drive a current-loop Teletype system with a peripheral driver, such as the Motorola MC75461 or MC75462.

This is a quick and easy way to interface your computer with your station. Here's your chance to get in on the exciting new world of over-the-air ASCII transmissions!

A Variable-Speed Code-Study Program



Take those code-practice tapes, speed 'em up, slow 'em down, record "clean" off-the-air copy and more — inexpensively!

By Robert H. Luetzow,* K9ZLU

Using cassette tapes for code practice can be frustrating when the practice tapes are too fast to copy or too slow to be challenging. The code-practice system described here can help those who are attempting to increase their code-copying proficiency. It enables one to slow the speed of fast code tapes, increase the speed of slow tapes and produce code tapes at speeds up to 45 wpm. An optional relay circuit also permits keying a transmitter with the control unit while using prerecorded code tapes or a key. The complete unit can be built for about $25 ($30 with the relay option) if all new parts must be purchased. Almost any of the currently available cassette recorders are suitable for use with the unit.

Builder's Dream

This is the kind of project that is almost ... intoxicating! To some readers it will have immediate appeal; to others, the attractions will be hidden until applications other than the original one come to mind. How about — just building the speed controlling section, using the unit as a memory keyer, employing the audio section to regenerate received cw signals directly ...? Build it and see what you can do! — *Ed.*

Recorder Requirements

The cassette recorder must meet two important requirements to be compatible with this system. First, the recorder needs to have a remote-control jack. Second, the audio amplifier of the recorder must not be connected to the remote-control circuit. In some of the less expensive cassette recorders that have been tried with this system, the audio amplifier circuit is connected in parallel with the motor. When you try to slow the motor speed, the audio amplifier stops working. This problem can be overcome by rewiring the remote-control circuit so it cannot interrupt the operation of the audio amplifier.

Circuit Description

Refer to Figs. 1 and 2. Two basic circuits are included in the system-control unit shown in Fig. 1. One is the motor-control circuit, which employs Q1 and Q3. The transistors are connected as a Darlington pair and are used as a series voltage regulator, which controls the voltage applied to the cassette-recorder

*1327 Grayston Ave., Huntington, IN 46750

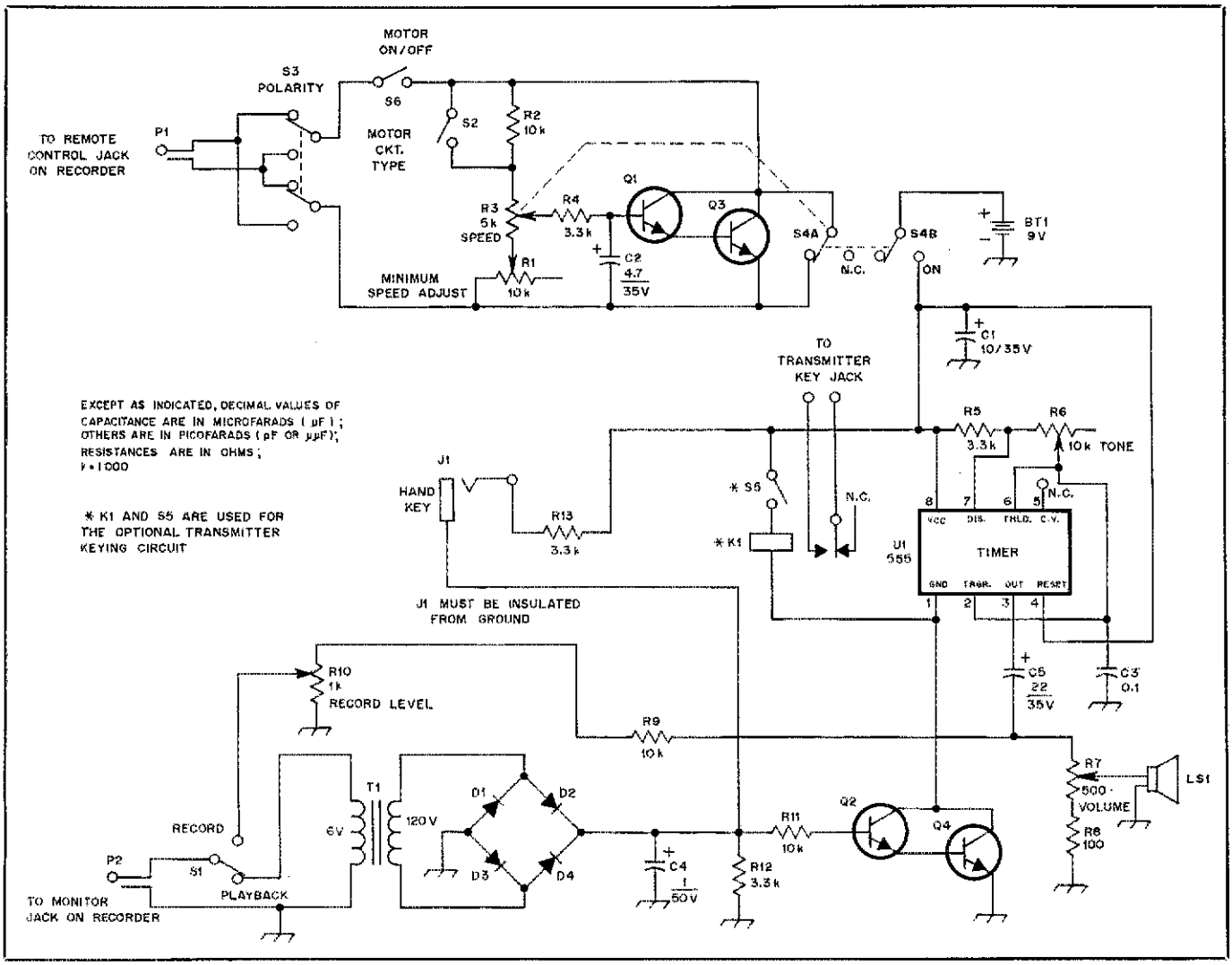


Fig. 1 — Schematic diagram of the code-study-system control unit. Note the isolation between the speed-controlling section and the audio section; a common ground does not exist.

motor. Because all recorder remote-control circuits are not wired similarly, S3 is used to select the proper voltage polarity.

Cassette recorder motor circuits are generally connected in one of two ways as shown in Fig. 2. When wired as in 2A, S2 (Fig. 1) must be closed; if as in Fig. 2B, S2 must be open.

R3 functions as the SPEED control and ON/OFF switch; S4 is part of R3. S4A shorts Q3 when it is in the OFF position, so you can rewind the tape at full speed. S4B interrupts the 9-V supply in the OFF position. R1 sets the minimum motor speed allowed.

The second portion of the circuit of Fig. 1 is that of a keyed oscillator. Transistors Q2 and Q4 comprise an audio-keyed switching circuit, and U1, a 555 timer IC, operates as an audio oscillator. U1 is keyed by applying an audio voltage from the cassette recorder monitor output to the keying circuit, through P2. Incoming audio voltage is stepped up via T1, rectified and filtered. The resulting dc voltage forward biases Q2/Q4, which in turn keys U1. For sending practice, a hand key may be plugged into J1; a positive voltage is supplied to the transistor switching circuit when the key is closed.

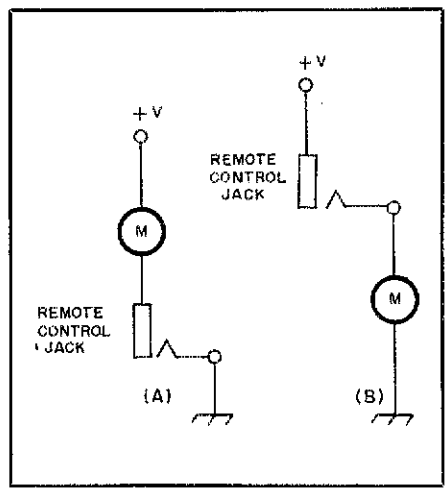


Fig. 2 — Two possible ways in which the remote-control circuit of the cassette recorder may be wired. The text explains another difference that may exist.

R6 varies the tone of the oscillator while R7 controls the speaker volume. A wide range of pitch is available, and the volume is sufficient to fill a small room. S1 selects PLAYBACK or RECORD modes. R10 sets the record output signal level.

S5 and K1 may be included if the transmitter keying option is desired. Precautions should be taken to ensure the transmitter keying circuit voltage and current requirements are within the contact ratings of the relay used. For most

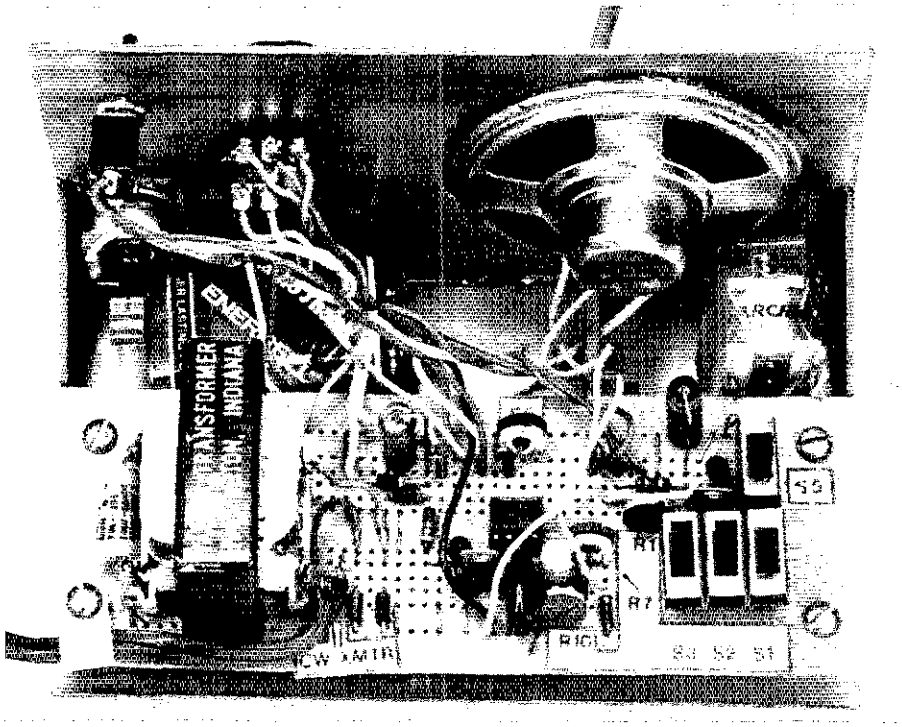


Fig. 3 — A close-up of the component layout. The components should be identified easily in the schematic, with a bit of study.

modern transceivers, the relay specified should suffice.

Construction and Testing

The control system is built on an experimenter's circuit board (Radio Shack 276-170), which is mounted on an L-shaped frame assembly made from pc-board material.[1] A 3-3/8 × 6-inch front panel is soldered to a 3-5/16 × 6-inch bottom panel and braced with triangular-shaped pieces of board material.[2] Speaker holes are drilled at the left side of the front panel. If the layout shown here is followed, the templates of Fig. 4 may be used conveniently. LS1, R3/S4 and J1 are attached to the front panel of the unit. Component placement is not critical. If the layout shown in Fig. 3 is followed, some of the circuit-board pads will have to be cut; a sharp knife will suffice. Pads are removed easily, so be careful not to be hasty. Although some switch sections need not be used (as for S2 and S3), you might wire the terminals of these dpdt switches in parallel to provide extra tie points. Short lengths of wire are attached to each switch lug, are passed through holes in the perf board and are soldered to foil pads. Soldering all lugs of the switches to foil pads provides additional mechanical rigidity.

It's a good idea (especially if this is the first time you have used an experimenter's circuit board) to build the individual circuit sections one at a time and test each one as you progress. Care should be taken not to short the cassette recorder remote-control-jack voltage to the common of the code-oscillator circuit because there is no fuse in the recorder and one can "smoke" the power supply.

First construct the motor-control circuit. When it is completed, set R1 at full resistance and the SPEED control (R3) to the OFF position. Start the cassette recorder and insert P1 into the REMOTE control jack. At this time, the recorder should function as if nothing had changed. Next, rotate the SPEED control to the ON position. If the cassette motor stops, change the position of the POLARITY switch (S3); the motor should restart. If the motor will not run at full speed, change the position of S2. Finally, turn the SPEED control to the LOW setting and adjust R1 for the minimum motor speed desired.

Wire the code oscillator circuit next. Test the operation of the oscillator by grounding pin 1 of U1. An audio tone should be heard in the control-unit speaker. Once the oscillator is functioning properly, construct the audio keying circuit. It is checked by plugging a hand key into J1 and keying the oscillator. Then, place a prerecorded code tape in the recorder. Set the recorder VOLUME control to midrange and depress the PLAY button. Insert P2 into the MONITOR jack of the cassette unit, and you should hear the regenerated code through the control-system speaker with S1 in the PLAYBACK position.

To check the record function, close the hand key and adjust R6 for a desired tone from the speaker. Insert P2 into the MICROPHONE jack of the recorder and place the recorder in the RECORD mode. With S1 in the RECORD position and the oscillator keyed, adjust R10 for the proper recording level, as indicated on the cassette-recorder meter, or until the recorded tones sound good during playback.

Operation

All you need do is place a code tape into the cassette recorder, insert P1 into the cassette REMOTE jack and P2 into the MONITOR output jack. When the system is working properly you should be able to slow the tape speed to less than half the fast speed. You'll note that insertion of P1 causes an immediate 1- to 2-wpm loss of speed, but this should not present a problem.

In addition to slowing the speed of a replayed code tape, you can also speed up

[1]Notes appear on page 37.

Table 1

Code-Study System Shopping List

Note: Part numbers in parentheses are Radio Shack.
BT1 — 9-V battery (23-553).
C1 — 10 μF, 35 V electrolytic (272-1013).
C2 — 4.7 μF, 35 V electrolytic (272-1012).
C3 — 0.1 μF, 50 V (272-1069).
C4 — 1 μF, 50 V (272-996).
C5 — 22 μF, 35 V (272-1014).
D1-D4, incl. — Silicon diode, 100 PIV, 1 A (276-1102).
J1 — 1/4-inch phone jack (274-280 or 274-252).
K1 — Spdt high-sensitivity relay, 6-9 V dc, 500-Ω coil, 12 mA (275-004).
LS1 — 8-Ω speaker (40-245/246/247 or 40-262).
P1 — 3/32-inch (2.4-mm) phone plug (274-290 or 274-291).
P2 — 1/8-inch (3.2-mm) phone plug (274-286 or 274-287).
Q1, Q2 — Npn silicon, general purpose, high-gain transistor (h_{FE} = 250), 360 mW, 2N2484 or equiv. (276-2010).
Q3, Q4 — Npn silicon power transistor, 40 W, TIP 29 or equiv. (276-2018).
R1, R6 — 10-kΩ, pc-mount potentiometer (271-218 or 271-335).
R2, R9, R11 — 10-kΩ, 1/4-W resistor (271-1335).
R3 — 5-kΩ miniature potentiometer with dpdt switch (271-214).
R4, R5, R12, R13 — 3.3-kΩ, 1/4-W resistor (271-1328).
R7 — 500-Ω pc-mount potentiometer (271-226).
R8 — 100-Ω, 1/4-W resistor (271-1311).
R10 — 1-kΩ, pc-mount potentiometer (271-227 or 271-333).
S1-S3, incl., S5 — Dpdt slide switch (275-407).
S4 — Dpdt switch. Part of R3.
S6 — Spst switch (275-324).
T1 — Power transformer, 120 V pri., 6.3 V sec., 300 mA (273-1384).
U1 — 555 timer IC (276-1723).
Miscellaneous: Battery connector (270-325), experimenter's circuit board (276-170), pc board (276-1587, two required), knob (274-415).

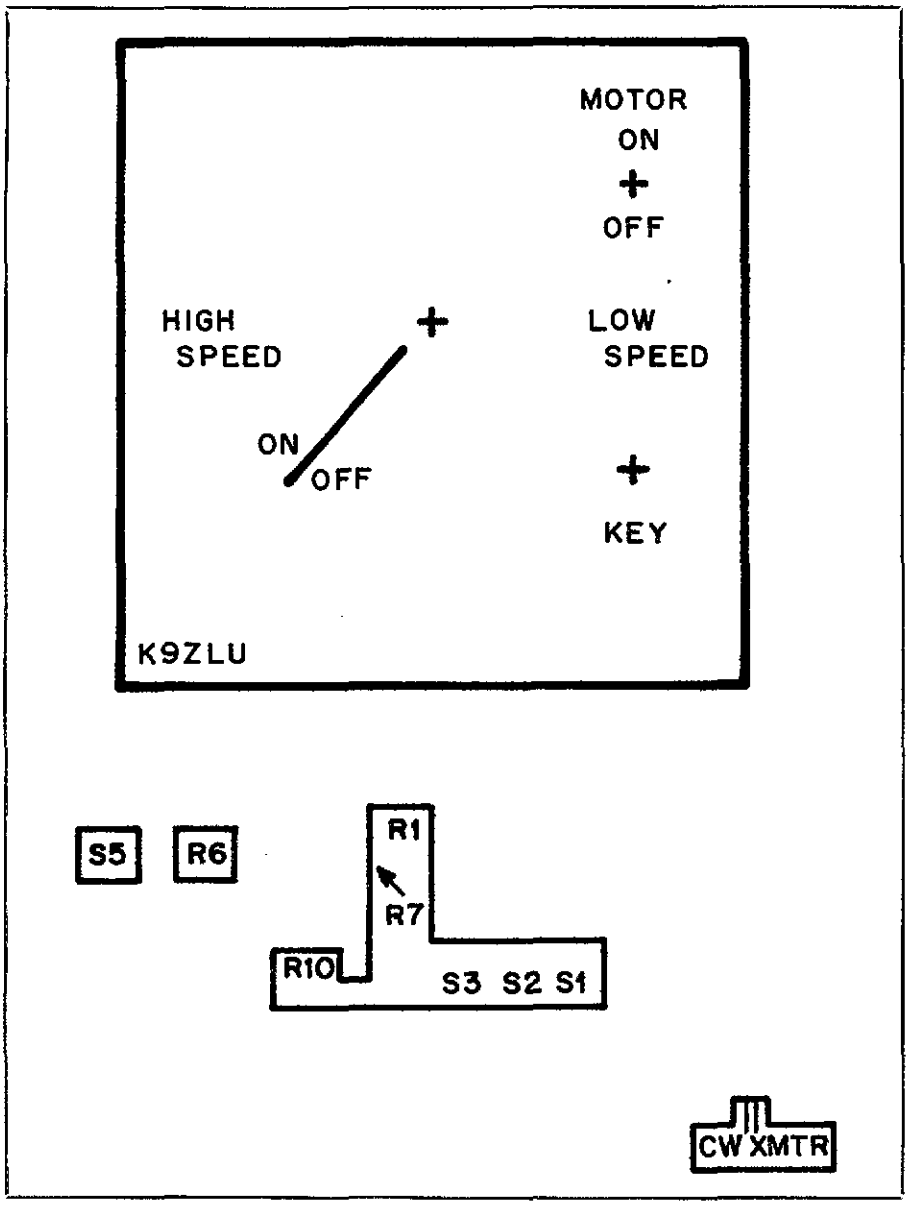


Fig. 4 — These templates may be used if the layout employed by the author is followed. Templates are shown full size.

a tape or record your own tapes. To record, insert P2 into the MICROPHONE jack of the recorder and place S1 in the RECORD position. Adjust the SPEED control so the cassette motor runs at approximately two-thirds speed and place the recorder in the RECORD mode. You can now send code at that slower speed for which your "fist" is perfect (at least nearly so!). When the tape is played back at full speed you'll have a perfectly challenging code tape!

You will need two cassette recorders to speed up a prerecorded code tape. Place the code tape to be speeded up in recorder A and a blank tape in recorder B. Plug recorder A into the audio-keyed code oscillator and adjust the tone of the oscillator to about half the frequency of the code-tape tone, as heard in the cassette speaker. Recorder B is plugged into the speed-control circuit, and the tape speed is reduced to half speed. Position recorder B so that its microphone is close to the control-unit speaker and place recorder B in RECORD. Start recorder A and play it through to the end of the tape. When the new tape from recorder B is played back at full speed, you'll have a code tape that is twice as fast as the original. If you record a W1AW code transmission, the recorded tape will play back on the system without all the QRM and QRN you'd normally hear.

You can use prerecorded tapes to play back selected information and key your transmitter — much like using a memory keyer. Cassette recorders with turns counters make the job easier. Have fun! I'll listen for you between 7.0 and 7.025 MHz.

Notes

[1]A pc board is available from Daytapro Electronics, Inc., 3029 N. Wilshire La., Arlington Heights, IL 60004.

[2]mm = inches × 25.4

Strays

NEED 88-mH TOROID COILS?

☐ If you've had difficulty finding 88-mH telephone toroids for your passive audio filters, get in touch with ARRL Technical Advisor Ed Wetherhold, W3NQN. He has these inductors available in Amateur Radio filtering circuits. Ed is supplying these coils at no charge other than the shipping expenses — he is merely serving as liaison between the Chesapeake and Potomac Telephone Co. of Maryland and *QST* readers.

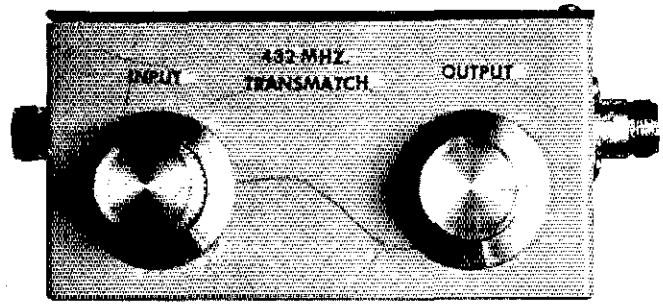
Articles describing filters in which these toroids are used can be found in December 1980 *QST* and in April 1981 *Ham Radio*. Those desiring the toroids are asked to drop a line to Ed, explaining their need and the proposed application. An s.a.s.e. must be included with the letter of inquiry. W3NQN's address is 102 Archwood Ave., Annapolis, MD 21401. — *Doug DeMaw, W1FB*

EASTERN STATES EXPOSITION

☐ The Mount Tom (MA) Repeater Association will have an Amateur Radio exhibit at the Eastern States Exposition in West Springfield, Massachusetts, from Sept. 16-27. The booth and station, WA1KGR, will be in the New England (formerly Youthrama) Building. Amateur Radio will be displayed for the first time at the "Big E," perhaps the biggest event of its kind in New England. — *Larry Soltz, WB1CJH, Longmeadow, Massachusetts*

Gary Owens (right), popular television and radio personality, receives an ARRL plaque for his recording of a public service announcement on behalf of Amateur Radio. Presenting the plaque, which even includes a brass key, is Loyd Sigman, W6LQ, who had been manager of station KMPC (Hollywood) where Gary's career began. *(photo by Bob Jensen, W6VGQ)*

A Transmatch for 432 MHz — Why Not!



Have you been looking for a way to use 75-ohm CATV hardline in your 50-ohm, 432-MHz system? Or is a fussy solid-state rig giving you headaches? This neat little Transmatch will solve both problems.

By Carmen F. Moretti,* W2AIH

The Transmatch described here can solve a number of problems confronting the 432-MHz enthusiast. Not only will matching your amplifier to the transmission line make the final amplifier "happy," the added selectivity provided by the tuner will aid in suppressing unwanted signals in your receiving system. At the author's location a harmonic from a nearby fm broadcast station was heard in the 432-MHz band. The installation of the uhf Transmatch eliminated the unwanted signal.

I developed this circuit after discovering the SWR at my amplifier was higher than I cared to have it be. The Transmatch will cancel the reactance at the transmitter end of the feed line, and can also provide an impedance transformation. Many hams still lean toward the idea that a "match box" or Transmatch is a cure-all for every antenna problem. It is not! This belief is fostered in part by the appearance of a large number of Transmatches on the amateur market. These units range from simple, inexpensive tuners to sophisticated "ultra tuners" costing hundreds of dollars. No matter how expensive, a Transmatch cannot correct a mismatch between the antenna and the transmission line.

Circuit Description

Unlike low-frequency antenna tuners that use large-value capacitors and rotary inductors, the 432-MHz Transmatch had to be approached using uhf techniques. Fig. 1A shows the circuit of the Ultimate Transmatch as described by McCoy.[1] Fig. 1B is the author's uhf version. Note that the Ultimate circuit has the bottom, or "cold" end, of C_{in} and L grounded and uses direct coupling between the input and output circuits. In the uhf version C1 is floating and L1 is tapped at the desired point to ground. Furthermore, inductive rather than direct coupling is used between the input and output circuits.

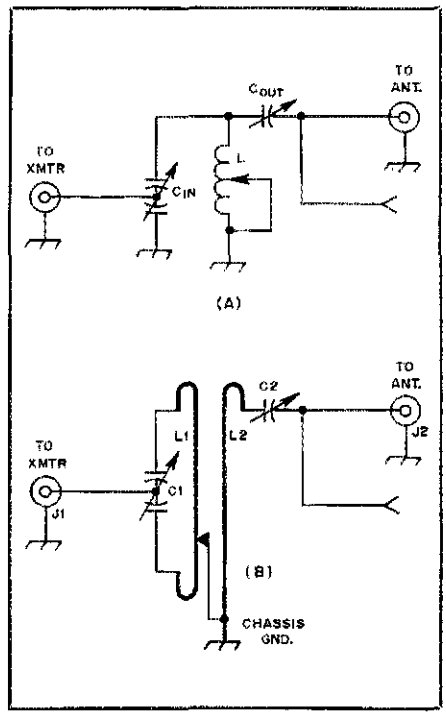


Fig. 1 — Circuit diagram of the popular Ultimate Transmatch (A) and the uhf version covering 420 to 450 MHz (B).
C1 — Dual-section variable capacitor (Johnson 167-0051-001 or equiv., with all but two stator and two rotor plates removed).
C2 — 2- to 15-pF variable capacitor (Johnson 148-1 or equiv.).
J1, J2 — Type N coaxial chassis connector.
L1 — Copper strap, 5-1/8 × 9/16 × 0.052 inches (126 × 14 × 1.3 mm) formed as shown in Fig. 2.
L2 — Copper strap, 5-3/8 × 9/16 × 0.052 inches (132 × 14 × 1.3 mm) formed as shown in Fig. 2.

Construction

Construction details are shown in Figs. 2 and 3. The input and output capacitors and associated copper-strap inductors are mounted on a 3-7/8 × 4-7/8 × 1/4-inch (95 × 119 × 6-mm) piece of Plexiglas, which is fastened inside a 4 × 5 × 2-1/2-inch (98 × 123 × 61-mm) metal enclosure. Do not make the enclosure smaller than this. I made the mistake of using a smaller box, only to discover that the input circuit wanted to function as a resonant cavity. If you do not wish to fabricate your own box, a Bud type CU-500A Minibox can, with a little ingenuity, be adapted.

To assemble the Transmatch, first form L1 as shown in Fig. 2 and solder it to the stator sections of C1. Next, form L2 and solder the "hot" end to the stator of C2, leaving the ground end unattached. Fasten the two capacitors and their inductors to the Plexiglas base, leaving a

*1619 Boulevard, Peekskill, NY 10566

[1] L. G. McCoy, "The Ultimate Transmatch," *QST*, July 1970, p. 24.

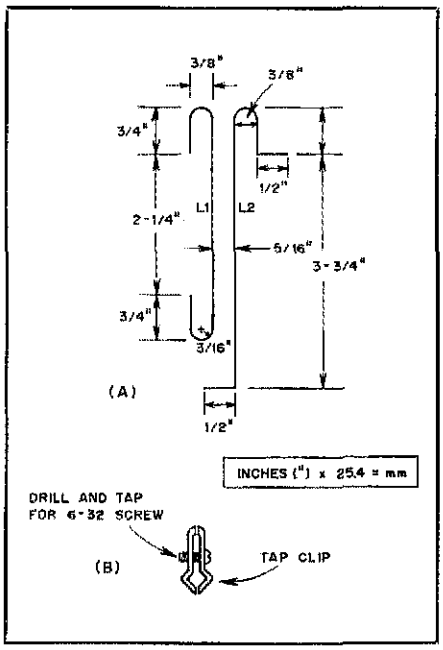


Fig. 2 — At A, the formation details for the copper-strap inductors. The tap clip, used to make the ground connection to L1, is shown at B. It is made from 3/32-inch (2.3-mm) brass stock, 1/4 × 5/8 inches (6 × 15 mm), formed as shown.

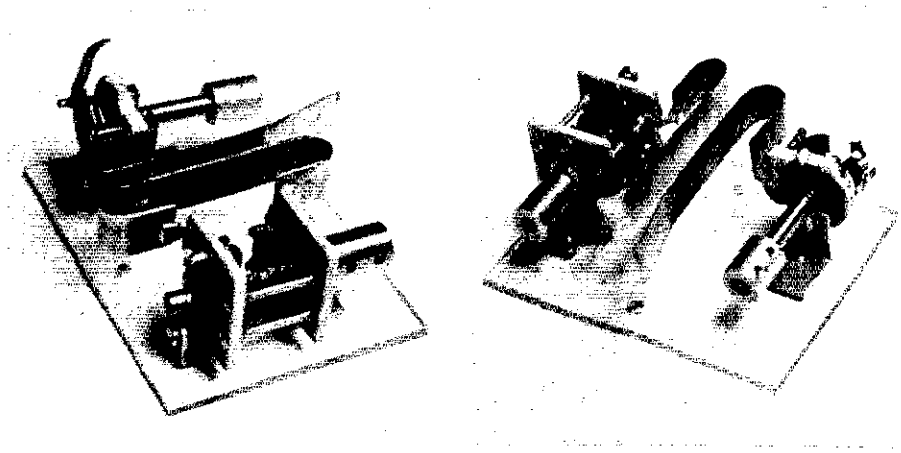


Fig. 3 — Interior views of the uhf Transmatch showing the strap inductors, L1 and L2, connected to the input and output capacitors, C1 and C2.

5/16-inch (8-mm) space between L1 and L2 (see Fig. 3). After mounting J1 and J2, the completed subassembly can be mounted on the inside bottom of the enclosure. Fasten or solder the ground end of L2 and the tap lead for L1 to the chassis. Make the connections to J1 and J2. Run two pieces of insulating rod from the capacitors to the front-panel knobs. This completes the Transmatch.

Adjusting the Transmatch

Once the construction is complete, connect the antenna feed line to J2. Connect the transmitter output, through an SWR indicator, to J1. Remove the cover from the unit and set C1 and C2 at maximum capacitance. Start with the tap on L1 set near the end closest to the grounded end of L2. Apply enough power to obtain an SWR reading and adjust C1 and C2 for minimum SWR. By moving the tap on L1 and readjusting the capacitors you should be able to obtain a proper match. With the unit adjusted you can now apply full power; this Transmatch will handle 200 to 300 watts safely. If higher power levels are desired, the plate spacing of C1 and C2 can be increased accordingly.

You will find that the input circuit tunes rather sharply while the tuning of the output circuit is quite broad. In fact, C2 could be eliminated if the coupling between L1 and L2 could be made adjustable. Because this is not very practical, I chose to use the variable capacitor. Nothing is more effective than having a proper match between your antenna and the transmission line. But let's face it: There are going to be times when the match is not exact, or the transmission line is of an impedance other than that for which the transmitter was designed. So when you don't have that proper match in your 432-MHz setup, use the uhf Transmatch. Not only will you like it, but so will your final amplifier!

Strays

TIS DO'S AND DON'TS

☐ The ARRL Technical Information Service is offered free to members. Although we are eager to help newly licensed amateurs with technical problems, in fairness to members we cannot respond to continuing requests for assistance from those who choose not to join the League.

For us to respond promptly to your inquiries we must have: (1) your name, (2) your amateur call and license class (tell us if you're not licensed), (3) your membership expiration date, and (4) a stamped, business-size envelope bearing your mailing address for our reply (IRCs acceptable from outside the U.S.).

When writing, we ask that you observe the following guidelines so we may provide the best possible service to the greatest number.

1) Before writing for technical assistance, search your files of *QST* and other ARRL publications. The answer you need may be there, available immediately. Consult the annual index of articles in each December issue.

2) Please do not ask for comparisons between commercial products. Choice of equipment is largely a matter of personal preference. Consult Product Review information in *QST*; compare manufacturers' specifications in their brochures.

Do not ask for information on articles published in other magazines. Write to the editor or author of that article.

Do not request custom designs for amateur gear.

Do not ask advice on nonamateur matters. We cannot respond to questions about CB, marine radio, hi-fi, etc. (unless they concern interference caused by amateur gear).

3) Use a typewriter when possible; otherwise, write or print *clearly*. Please be reasonable in the number of questions you ask; try to limit your questions to three per letter.

4) When writing, please come right to the point, and be sure to share with us whatever experience you have had with the problem in question. This will avoid our reply covering ground you've already been over.

5) Address all technical questions to: Technical Information Service, American Radio Relay League, 225 Main St., Newington, CT 06111. — *Mike Kaczynski, W1OD*

QST congratulates . . .

☐ Perry Brittain, W5STI, who was recently elected president of the Texas Utilities Company of Dallas.

☐ Richard Cyril Kirby, WØLCT, recipient of the 1981 IEEE Award in International Communications. The award is presented "for sustained leadership in the development and management of international radio communications." Mr. Kirby is Director, CCIR, ITU, Geneva, Switzerland.

• *Basic Amateur Radio*

Meet the Friendly Oscilloscope!

Give an orphan a home, have fun doing it, and learn more about electronics! How? Quite simple . . .

By Julian N. Jablin,* W9IWI

At the next hamfest or club auction, buy an oscilloscope. I don't mean a shiny new solid-state version with dual trace and triggered sweep. I have in mind a 1950-60 vintage instrument, which will probably have a round 5-inch (127-mm) CRT face on the front panel. It may weigh about 25 pounds (11 kg), and may be painted gray or brown. It will be rather ugly and unwanted by today's standards.

Does It Work?

You will have to use your own criteria for determining this. Having an experienced ham friend along will help, and knowing the seller can be an advantage. I bought my oscilloscope through a newspaper advertisement. When I went to see it, the owner obligingly fed an audio signal into it, so I saw the sine wave on the screen. Try to find a scope with a manual, of course. An instrument made from a kit is okay, but because you may have extensive rebuilding or troubleshooting to do, the manual will be important.

It is impossible to tell exactly how much money to spend or which models to buy. I would look in the $30-or-less price class. Chapter 16 of the 1981 *Radio Amateur's Handbook* contains a section on oscilloscopes that will provide valuable background information. I've noticed several "How To . . ." books on scopes written in the 1950s and '60s. These can often be found at hamfests at low cost, and will quickly pay for themselves if it is necessary to troubleshoot your scope.

What Does An Oscilloscope Do?

Basically, an oscilloscope displays an image on a CRT (cathode-ray tube) that permits you to observe alternating or pulsed-voltage waveforms. Because it can respond rapidly, it is more useful in some situations than an analog meter (VOM or VTVM) or a digital voltmeter. It can be calibrated approximately, but it will not give you the resolution or accuracy that many meters provide.

Many modern oscilloscopes will respond to voltages from dc to at least 10 MHz. Typically, the older, inexpensive variety will respond to ac ranging in frequency from 5 Hz to about 5 MHz. This is a restricted, but useful, range.

Power Up

Having read the instruction manual, chapter 16 of the *Handbook* and, perhaps, a text on oscilloscopes, you are ready to turn on your new "toy." Your scope may not have the same control labels that I use, but don't worry. Most scopes have controls that fulfill these functions, and many will have *similar* if not identical, nomenclature.

Do not advance the INTENSITY control (which may include the ON/OFF switch) too far. The trace should be bright enough to be seen, but not so bright that it harms the coating inside the CRT. Once the tubes have warmed up, adjust the INTENSITY for the desired trace brightness.

If you have a test lead plugged into the vertical input jack and everything is

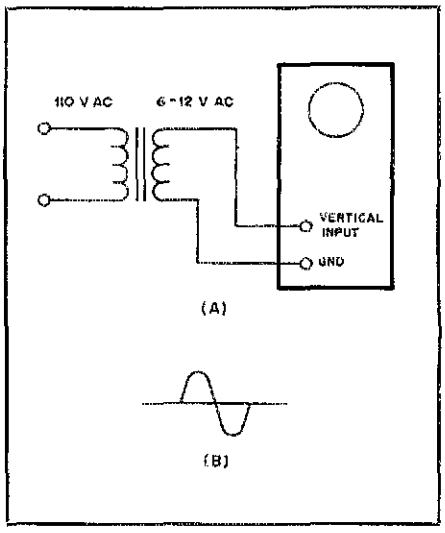


Fig. 1 — At A, test setup for verifying that oscilloscope is functioning normally. At B, simulated display of 1 cycle of a sine wave.

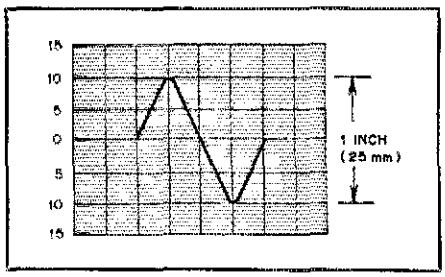


Fig. 2 — Calibrating an oscilloscope with a sine wave having a known pk-pk (peak to peak) value. For instance, the sine wave shown on the display is known to have a pk-pk value of 10 V. Therefore, the scope is calibrated for 10 V per inch.

*9124 Crawford Ave., Skokie, IL 60076

working well, you will probably see a sine wave on the display (face of the CRT). The test leads act as antennas, and the scope "receives" the 60-Hz signal radiated by the house wiring. When you attach the test probe to a circuit, this image should disappear.

If the scope is not working, you must troubleshoot it. Here, the instruction manual (construction manual, if your scope was a kit) will be invaluable. One of the most likely sources of difficulty in this vintage equipment is tube failure. Test and replace any tubes that seem to be weak, shorted or dead. Clean the switches and potentiometers with electronic contact cleaner. Look for broken wires or damaged components (for example, the charred remains of a power resistor).

Be Cautious!

High voltages (high enough to kill you) can be found inside most scopes. Do not apply line voltage with the case open! Watch for previous repairs that did more harm than good. A friend noticed that the power transformer on his used oscilloscope was mounted on insulators. This was the former owner's way of "fixing" a transformer with an internal short to the core. The transformer core was at a potential several hundred volts above chassis ground!

An even more insidious danger lurks inside the scope cabinet. There is a vacuum inside the CRT. A bump or scratch could cause the envelope to implode, hurling sharp glass fragments in all directions. Protect your eyes: Wear safety glasses!

Let's Play

I do mean *play*. There is nothing serious at this stage. See what happens when ac voltages are fed into the scope. Connect the secondary of a 6- to 12-volt transformer to the vertical input and ground jacks (Fig. 1A). Adjust the controls until you have a display of one cycle of the 60-Hz sine wave (Fig. 1B). Set the VERTICAL ATTENUATION and/or the VERTICAL GAIN to provide a 2-inch (50-mm) high trace. The SYNC SELECTOR should be in the INTERNAL or LINE position. Work with the HORIZONTAL SWEEP and SYNC LOCK controls until you have one cycle standing still in the center of the screen. You can put the trace exactly where you want it with the HORIZONTAL GAIN, HORIZONTAL POSITION and VERTICAL POSITION controls. Advance the HORIZONTAL SWEEP SELECTOR clockwise, step by step, and see what this does to the pattern.

Calibration

If you know the pk-pk output of your transformer under a no-load condition, you can use this information to calibrate your scope (Fig. 2). Don't be misled by the markings on the transformer; the actual no-load voltage will vary considerably from one transformer to the next! If your scope has an input for dc voltages, you can calibrate it with standard zinc-carbon cells. Fresh, *unused* zinc-carbon cells have a no-load voltage of 1.54 V. Four of these in series will give you approximately 6 V, which is as accurate as necessary in this situation. Refer to your instruction manual for the manufacturer's suggested calibration method.

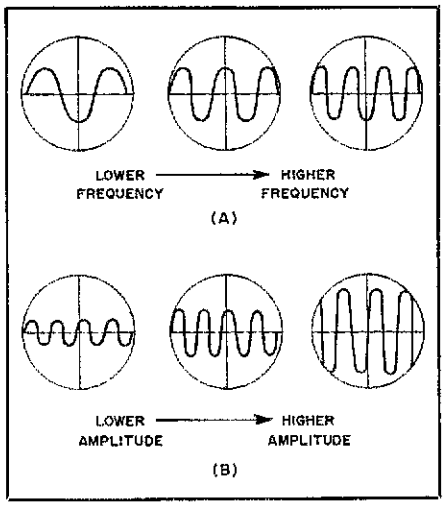


Fig. 3 — At A, representation of the changes in the display as the frequency of the input signal is increased. The amplitude is held constant. At B, the frequency is held constant, and the amplitude of the signal is increased. In both cases the control settings of the oscilloscope are held constant.

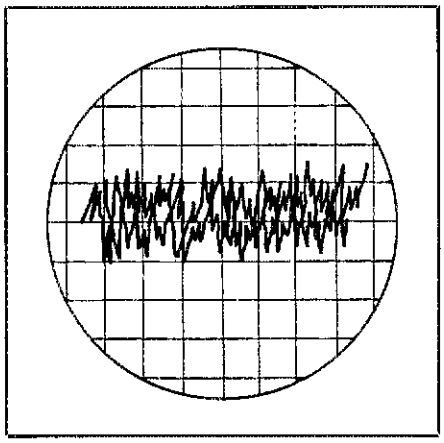


Fig. 4 — Typical complex waveform obtained by coupling oscilloscope to phonograph or other musical source.

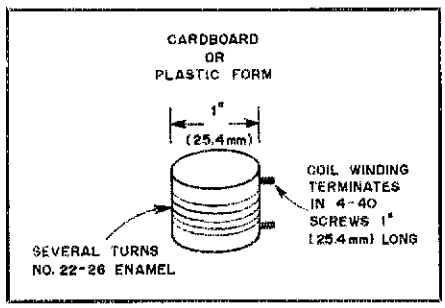


Fig. 5 — Simple rf probe for use with oscilloscope. See text for construction details.

Some of the low-priced oscilloscopes (mine, for example) have no calibration grid on the face of the CRT. I used a china marker pencil to draw my reference marks. The markings can be removed easily should I ever decide to sell it.

Down to Brass Tacks

If you have a variable-frequency audio generator, you can demonstrate the response of the oscilloscope. Connect it to the vertical input jacks. While you are adjusting the generator from a lower to a higher frequency, note the sine wave becoming "tighter" (Fig. 3A). Increase the amplitude of the signal, and watch the height of the trace increase correspondingly (Fig. 3B).

Tune your station receiver to WWV. Connect the test probes to the speaker. You should be able to identify an audio sine wave at 440, 500 or 600 Hz, a pulse as the timing ticks are transmitted and a complex audio pattern during voice announcements. The chart of the WWV broadcast format in the measurements chapter of *The Radio Amateur's Handbook* will help you recognize what you are seeing.

Connect the probes to the speaker of a broadcast-band receiver or phonograph. Before you switch anything on, set the VERTICAL ATTENUATOR for maximum attentuation and the VERTICAL GAIN for minimum gain. Without these precautions, you could damage the scope amplifier by overloading the input. Turn on the device, and adjust the controls. With music playing, you will see rapidly changing complex waveforms similar to those depicted in Fig. 4. Play with the controls, and note the changes obtained in the display.

Accessories

The device detailed in Fig. 5 acts as an rf "pickup" for my scope. It is simply six turns of insulated wire (size not critical) wound on a 1-inch (25-mm) cardboard (or plastic) form. The ends are terminated in 1-inch (25-mm), 4-40 machine screws, which makes connection to the test probes simple. Recently, I used this rf probe to determine if an oscillator under construction was actually oscillating. I knew rf was present when a broad envelope pattern replaced the solid green line on the face of the CRT.

The circuit shown in Fig. 6 is an example of a low-capacitance probe, which is useful in testing high-impedance or high-frequency circuits. The 10-pF capacitor provides frequency compensation and reduces the overall input capacitance. Typically, the capacitor will be a variable one that permits the probe to be adjusted for optimum response. The two resistors

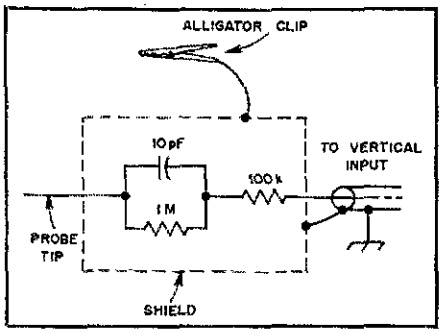


Fig. 6 — Typical low-capacitance probe for use with oscilloscope. The 10-pF disc capacitor can be replaced by a trimmer, permitting the user to adjust precisely the frequency compensation network. The shielded enclosure (broken lines) is insulated from the probe tip and components.

form a voltage-divider network that attenuates the signal by a factor of 10 to 1.

Practical Use

The more familiar you become with your scope, the more uses you will find for it. You can monitor your transmitter for key clicks, IMD products, "flat-topping" and other problems. You can check for ripple on the output of a power supply.

Your oscilloscope will be indispensable for working with digital circuits. Many construction articles give timing charts that show patterns to be expected at specific IC pins. If you have a digital circuit available, probe the various points in the circuit where timing pulses should be found. What do they look like?

The scope can show what happens when a square wave is processed to have a peak on the leading edge (which is required in some circuits). It can illustrate graphically the difference between frequency and duty cycle.

The shortcomings of your older instrument will become apparent in this kind of service. IC switching-circuit frequencies quickly approach the upper limit of the amplifiers in the oscilloscopes. Keeping a steady, single trace on the CRT display will be more difficult than it is with audio sine waves. The most important lesson that you can learn from this is how to get the most out of what is available.

You may be surprised at how much can be done with a "$25 orphan." Of course, you will never know until you try it!

Editor's Note: Oscilloscopes are designed for a specific *bandwidth*. This means that they will respond accurately to ac voltages up to a certain maximum frequency. Most of the older scopes were rated from dc to 3 MHz, while others had a 5-MHz bandwidth, or upper frequency. Beyond the design bandwidth of the instrument, it may be impossible to get a clear waveform. Also, the amount of deflection on the face of the CRT will be less than it would be on a scope that was designed for the particular operating frequency. Modern scopes have bandwidths as great as 1000 MHz.

New Products

SILICONIX 12-V VMOS POWER FETs

☐ It finally happened! Someone developed a 12-V power FET. Heretofore, these excellent components were aimed at the 24-V and higher applications market. This did not make them especially suitable for amateur work, where 11 to 14 V has been the standard during the past decade. The earlier power FETs were certainly ideal for the aircraft market, and were entirely suitable for use in ac-operated equipment. The shortfall was seen by amateurs and the commercial land-mobile market.

There are a number of 12-V FETs available from Siliconix Inc., but this review will treat only two of the low-power components. Information concerning the other transistors in this line can be obtained from the manufacturer.

The DV1202S and DV1205S devices are quite similar except for power rating. The minimum output power for the DV1202S is rated at 2.5 W at 175 MHz. This is specified for an operating voltage of 12.5, a drain current of 250 mA and a driving power (at the gate) of 0.25 W. The maximum device dissipation at a case temperature of 25° C is 10 W. This suggests that in intermittent amateur service it should be possible to obtain up to 5 W of power output without harming the FET. This assumption is based on the premise that excellent heat sinking is used. This would require a perfectly flat heat-sink surface and the use of heat-conducting grease.

The small-signal noise figure for the DV1202S is rated at 7 dB at 175 MHz. Transconductance is 100,000 μ siemens, and the drain efficiency is specified as 60%. Output capacitance is 20 pF, input capacitance is 14 pF and the drain-gate capacitance (C_{rss}) is 2 pF. The DV1202S and DV1205S parts are available in 0.380 SOE flange or C-220 packages.

The DV1205S FET has a 20-W maximum dissipation rating and a transconductance of 200,000 μ siemens. Its noise figure is also listed as 7 dB at 175 MHz for small-signal applications. The output capacitance is 38 pF, the input capacitance is 26 pF and the C_{rss} is 4 pF.

VMOS power FETs are of the enhancement-mode type. This means that forward gate voltage is required to turn them on. The same is not true of most small-signal MOSFETs, which are of the depletion-mode family. VMOS power FETs can be thought of as triode vacuum tubes that are capable of handling power. Apart from their being solid-state components rather than tubes, the major dissimilarity is that the output impedance is low ($V_{DD}^2/2P_o$ ohms). This aids stability and eliminates the need for a neutralizing circuit. Conversely, the input impedance is very high and can be used to advantage when necessary.

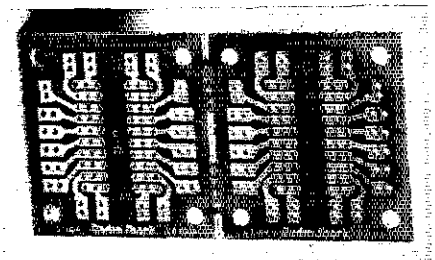
VMOS FETs are relatively immune to damage. They are not subject to thermal runaway and will not self-destruct in the presence of high values of VSWR. They are sensitive, however, to over-voltage (notably spikes and self-oscillation damage) and excessive gate current. Good layout is needed to prevent hf and vhf parasitic oscillations, owing to the high transconductance and upper frequency ratings.

These FETs are well suited to Class A, AB, B and C operation. They have high dynamic range and are excellent in broadband circuits. Price class: DV1202W, 1-24 lot, $8.02 each; DV1205W, 1-24 lot, $11.08 each. The manufacturer is Siliconix Inc., 2201 Laurelwood Rd., Santa Clara, CA 95054, tel. 408-988-8000. — *Doug DeMaw, W1FB*

RADIO SHACK DUAL IC BOARD

☐ Radio Shack has introduced an Experimenter's Dual IC Board (276-159) to their line of pre-etched, predrilled circuit boards for general applications. Each of these new boards is actually two boards in one; each side of the board provides pads suitable for mounting one 8- to 20-pin DIP IC. Multiple connection points are provided for each lead from the DIPs. Perforated down the middle between the two "sockets," the board can be snapped in two for those applications involving only one IC.

The board is a copper-clad phenolic material; the copper has not been silver plated or tinned. This board should prove to be more than adequate for all but the most demanding projects. Price class is $1.50. — *Peter O'Dell, KB1N*



Hints and Kinks

Conducted By Stuart Leland,* W1JEC

A COMPACT TRANSISTORIZED DIP OSCILLATOR

☐ The dip oscillator I built (Fig. 1) is a cross between the Heath and Kenwood designs. My arrangement is well suited for compact construction and low current drain (10 mA). Compactness results from the use of an LED indicator instead of a meter. Space is also saved by the use of a General Electric no. RT6748 midget variable capacitor (110 pF per section). This capacitor was purchased from Gateway Electronics, 8123 Page Blvd., St. Louis, MO 63130, for only $1. The LED (Radio Shack no. 276-041 or equivalent) is an extremely good indicator. In most cases the LED is completely extinguished at resonance when placed within 1/4 in. of the coils being checked.

Adjust the Trimpot and trimmer capacitor so that all coils perform properly before calibration. My unit has six coils that cover from 3 to 190 MHz. These are constructed from 3/8-in. plastic tubing that was obtained from the plumbing department of a hardware store. Melt the tubing over an RCA type of plug and cement these together with "five-minute epoxy." Two 9-V batteries are required. Although the device will function with one battery, the longevity will be poor. At least eight volts is needed for the dipper to oscillate. This requirement may vary with different transistors. One transistor I used came from a Zenith uhf tuner. The other was a high dc-beta unit that would detect all frequencies, but did not seem critical. Both are silicon npn devices, and may be of the builder's choice. — *Hal Vitrey, WØMSF, St. Louis, Missouri*

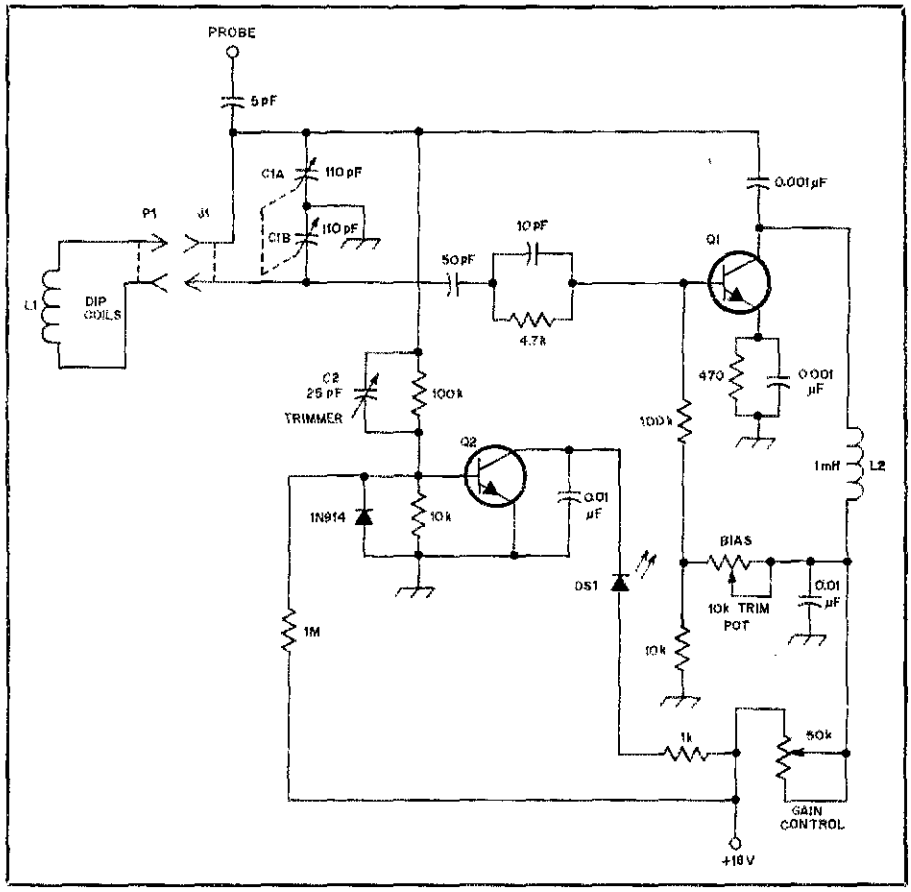


Fig. 1 — The WØMSF transistorized dip-oscillator circuit. Six coils provide coverage from 3 to 190 MHz. Two 9-V batteries furnish the required power. The LED (D1) serves as the dip indicator. Resistance values are in ohms.
C1 — Miniature variable, 110 pF per section. General Electric no. RT6748 or equiv.
C2 — 25-pF trimmer.
DS1 — LED.
J1 — RCA phono jack.
L2 — 1000 µH.
P1 — RCA phono plug.
Q1, Q2 — Silicon npn rf amplifier transistor, 2N3904, ECG-108 or equiv.

OPERATION OF THE VE3TIV REPEATER-CONTROL SYSTEM I-D

☐ When our club repeater is timed out, the autocode i-d will operate before the repeater shuts down. In normal operation, the signal from the control board is 0. When the repeater is timed out, this signal becomes a 1. See Fig. 2. It is fed to one of the inputs of a NOR gate, U1A, and its output now becomes 0. This signal goes through a capacitor, and a negative pulse is fed to the start pin on the i-d timer, the output of which now goes positive for seven seconds.

In normal operation the i-d will be transmitted only once every 3 minutes at the end of the transmission in progress; or, if the repeater has not been turned on for at least three minutes, the i-d will come on at the end of the first transmission. For the automatic i-d system to function, all inputs to U2 must be 0. The input from the COS I-D REQUEST is normally 1. When a carrier is received by the repeater, this signal becomes a 0 for a short period of time and then returns to 1. It again becomes 0 when the carrier being received drops out.

The input from U4 pin 10 is normally 0, but when a carrier is received by the repeater the input becomes 1 until the carrier drops out. At that time it returns to 0. Normally, while the timer is counting out the 3 minutes, the input from the i-d timer is normally 1 until the carrier

Table 1

Coil Information

Freq. (MHz)	Turns	Wire Size	µH	Notes
75-190 COIL A	1	no. 12	0.04	Wire spaced out whole length of coil form with starting lead coming straight up through center of coil.
45-92 COIL B	3-1/2	no. 20	0.15	Wire spaced out to fit 1/4" length. Adjust turns spacing for proper inductance before lacquer coating.
22-47 COIL C	9-1/2	no. 20	0.64	Close wound with allowance to spread out to 3/8" length if needed to adjust inductance before lacquer coating.
11.3-23 COIL D	18-1/2	no. 32	2.6	Close wound, but allow 5/16" space to adjust inductance before lacquer coating.
5.6-11.5 COIL E	45-1/2	no. 32	10.2	Close wound, but allow 5/8" length to adjust before lacquer coating.
2.8-5.8 COIL F	125	no. 36	44	Close wound, but allow 1" for adjusting inductance before lacquer coating.

Plastic portion of coil is 1-1/8" long on all coils but F, which is 1-3/8" long to allow more room for winding. All coils start with lead coming straight up through center of coil. Top of plastic tube is slotted 1/8". Hook wire through this slot, and start winding. End winding at proper length by drilling two holes 1/4" apart. Feed wire in one hole and out the other, and end coil by running this wire straight down and by soldering to outside of RCA plug. Coil adjustment would be less critical by using seven coils, thus having more overlap.
Inches (") × 25.4 = mm.

*Assistant Technical Editor

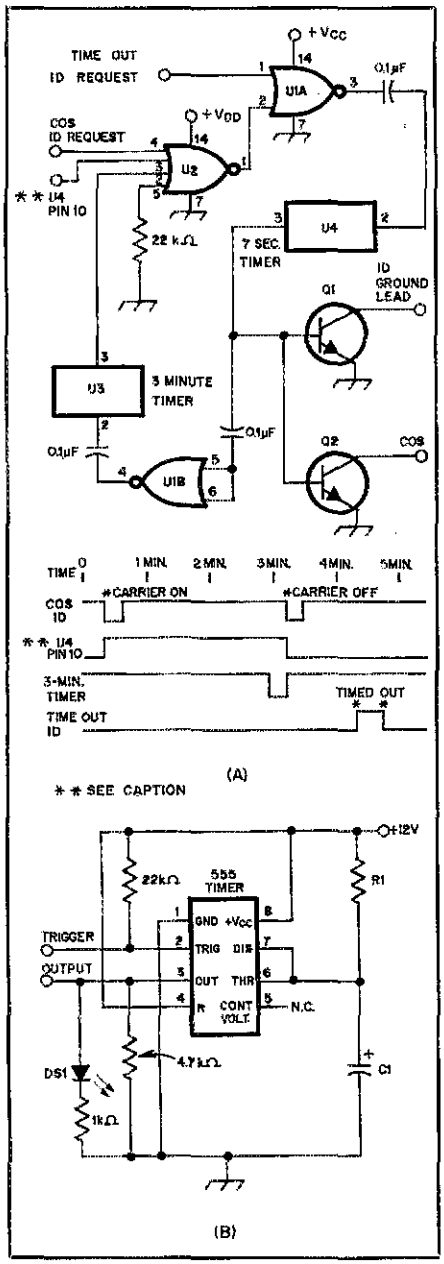


Fig. 2 — The VE3TIV i-d control system. The basic circuit is shown at A with the associated waveform. Details of the timing circuits designed around ICs U3 and U4 (the ubiquitous 555) are shown at B. Unused CMOS gate inputs must be tied together and grounded. **See U4 of diagram on p. 17, March 1979 *QST*.

C1 — 6.8 μF tantalum for the 7-second timer and 10 μF tantalum for the 3-minute timer.

Q1, Q2 — Germanium npn switching transistor, *Radio Shack no. 2001 or equiv.*

R1 — A 39-kΩ resistor coupled with a 400-kΩ potentiometer in series for the seven-second timer. For the 3-minute timer, use a 15-mΩ, fixed-value resistor.

U1 — CMOS quad two-input NOR gate, 4001.

U2 — CMOS dual four-input NOR gate, 4002.

U3, U4 — Timer, 555.

drops out. At the end of 3 minutes, the input drops to 0. The fourth input to U2 is held permanently at 0.

The only times that all four inputs to U2 are 0 are when time-out has occurred after 3 minutes, and when a carrier has just dropped out. The output of U2 will then become 1, and it is fed to one of the inputs of U1A causing the output of U1A to become 0. That turns on the 7-second timer.

At the moment the 7-second timer is turned on, the positive output of the timer is fed through a capacitor to U1B. The output of U1B is then pulsed negative. In turn, this negative pulse is fed through another capacitor to the start pin of the 3-minute timer. This restarts the 3-minute timer causing the output to go to 1. That resets the output of U2 to 0, ready for the next time the i-d is activated. — *Rick Gibson, VE3ASH, Kincardine, Ontario*

SWITCHING 40-METER PHASED VERTICAL ANTENNAS

☐ During one of our QSOs, Dick Evans, VE6XW, of Millet, Alberta, explained the antenna-switching arrangement he has for his 40-meter phased vertical antennas. The method he devised stems from his vocation and expertise as an electrician. He pointed out that his research led him to believe that at least some parts of his design have not been presented by technical writers in Amateur Radio publications.

His system (Fig. 3) provides six end-fire unidirectional selections for 40 meters. It consists of three identical base-loaded vertical radiators. Dick suggests the use of 5/8-wavelength antennas, but points out that 30-foot (9-meter) elements with loading coils are satisfactory. He used a design frequency of 7.100 MHz.

Feed lines W1, W2 and W3, connecting the switch (S1) with the antennas, have identical lengths of 52-ohm coaxial cable. Cables W4, W5 and W6 are each 22 feet, 10 inches (7 m) long. They are neatly coiled indoors. Direction changes are accomplished by a six-position isolated double-pole switch (S1) located at the operating desk. For QRP transmitters, a Radio Shack no. 275-1386 switch is satisfactory; for higher power, a Millen transmitting type of switch (or equivalent) is suggested.

A minimal radial system would consist of four 1/4-wavelengths of wire for each vertical, but 10 to 20 radials per vertical would be better. With this system, excellent DX results can be expected.

Dick has agreed that he would like to share this information with other amateurs. I wish to thank him for letting me present this to *QST*. — *Chuck Coleman, K6ZUR, Santa Rosa, California*

[Editor's Note: For information on Millen equipment, contact Caywood Electronics, 67 Maple Ave., Malden, MA 02148.]

LUBRICATION FOR CRANK-UP TOWERS

☐ After an extended period, the working mechanism of towers tends to become corroded. I have found that a liberal coating of

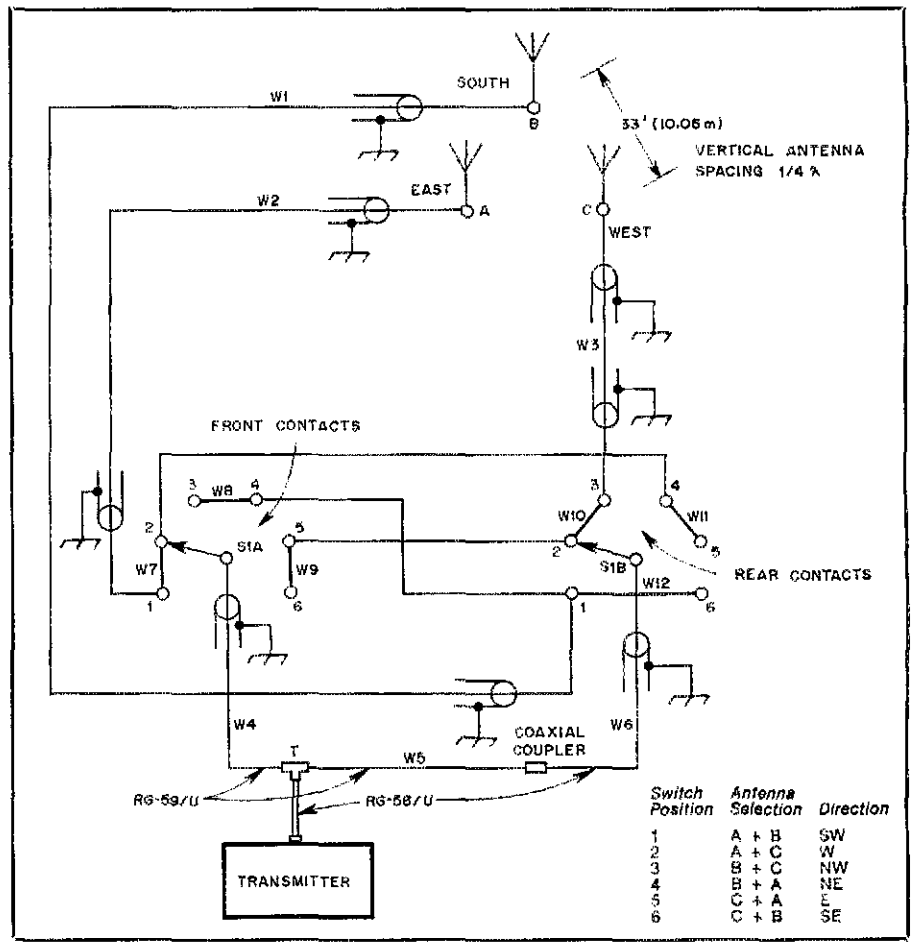
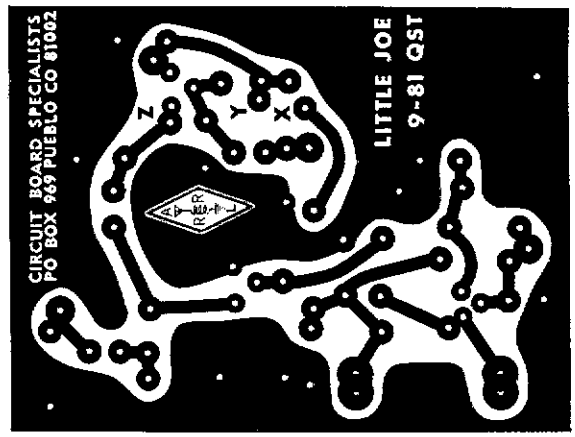


Fig. 3 — This antenna-switching arrangement used by Dick Evans, VE6XW, provides six end-fire unidirectional antenna selections for his phased vertical antenna array. Although it is designed for use on 40 meters, it can be adapted to other bands and broadside arrays. Jumper wires and connecting cables in the drawing are identified by the letter W.

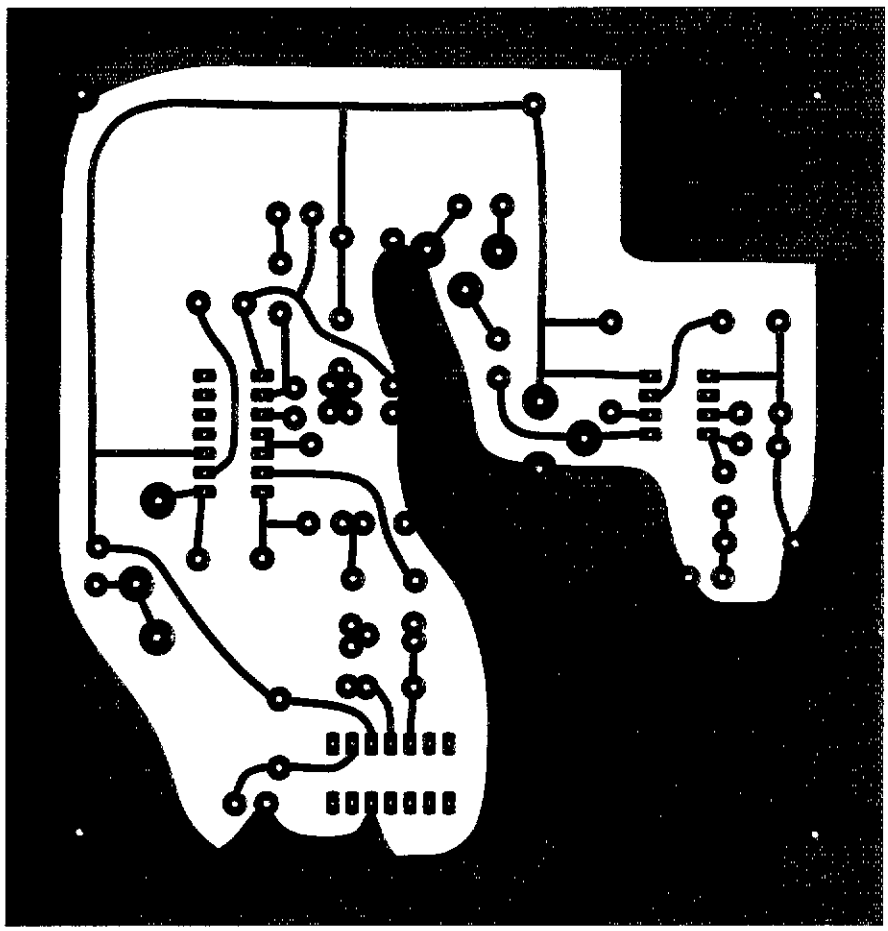
motorcycle chain lube protects and lubricates the winch, pulleys and cables. This lubricant seems to resist extreme weather conditions. Spray all moving surfaces when the tower is down. When you crank the tower up, spray the cable as it is wound onto the winch. — *Steven M. Simons, WA3WAS, Syntonic Technology, North Hills, Pennsylvania*

LUBRICATION FOR SLOW-TURNING ROTATORS

☐ I read in a 1979 issue of *QST* that the Canadian amateurs have used snowmobile grease on their antenna rotators to avoid slow turning in cold weather. I believe I have found something better! After several tests at −12° F, I found that speedometer cable grease maintained its viscosity at low temperatures, while snowmobile grease tended to get thicker. Other amateurs in my area have complained about their slow-moving rotators when the mercury dropped below zero, but my rotator turned as fast and smooth as it does in July's heat. — *Earl P. Anderson, WD9DID, Milwaukee, Wisconsin*



Etching pattern for the Universal QRP Transmitter. Black represents copper. The pattern is shown actual size from the foil side of the board.



Circuit-board etching pattern for the demodulator and modulator. Black represents copper. The pattern is shown at actual size from the foil side of the circuit board.

Product Review

Conducted By Paul K. Pagel,* N1FB

Kenwood TR-7800 2-Meter FM Transceiver

At first glance, one wonders if an FAA license is required to operate Kenwood's new TR-7800 2-meter fm transceiver. After a few minutes of twiddling knobs and pushing buttons, however, it becomes apparent that the TR-7800 design promotes ease and convenience of operation rather than complexity. Many seem to feel that mobile-style fm rigs are going the way of the dinosaur — a solid-state manifestation of Darwinism. Certainly, synthesized "handi-talkies" offer greater utility, right? Sure, "handi-talkies" are the ultimate in portability, but have you seen one that produces a 25-watt punch? Or one that has 15 memory channels and permits scanning the entire band or only the memories? Or one with a priority channel that can be monitored while listening to another frequency and an invert function that allows the operator to monitor the input frequency of a repeater at the touch of a button? I'd like to see an HT that *could* do all these things. No, mobile-style fm rigs will not be the study of paleontologists for quite some time to come!

Installation and Operation at K1CE

The review unit shipped to ARRL Hq. was first installed at my station for base-operation testing. The antenna used was a Cushcraft Ringo Ranger perched at a lofty 75 feet[1] above Talcott Mountain in Connecticut. Several contacts were made using area repeaters and simplex channels. The TR-7800 was put through its paces, and performed well. Every function, every operational nook and cranny was explored during the several-month review period, and all received consistently high marks for reliability.

Audio reports were solicited from amateurs on many *different* repeaters (repeaters vary greatly respective to audio quality) and simplex frequencies. In *all* cases, audio reports received were similar to: "Sounds clean and full," "Takes full advantage of the superior audio quality of fm," and from a young woman "You sound very nice" (I think she meant the rig!).

Mobile Installation and Operation

It's one thing to operate a rig in a warm, stable location such as a ham shack, but quite another to ask it to perform to the same standards in a hostile environment. Could the TR-7800 endure severe cold, bumps, grinds and jolts? To find out, I subjected it to these conditions by installing the unit in my 1972 Volkswagen "bug." If the TR-7800 could survive in my car, it could survive just about anywhere! Installation was simple. A slide-in mobile bracket bolts easily to the underdash. A 5/8-wavelength whip antenna was chosen for the mobile application — a good, standard aerial used by many 2-meter enthusiasts. Again, the rig performed superbly, this time while operating during countless excursions on Connecticut's highways (some say the nation's worst roads). The only difficulty I experienced occurred when driving at night — the keyboard used for frequency entry is difficult to read because it is unlighted. The problem is easily circumvented by programming your set of frequencies into the memories *prior* to departure or while stopped at a rest area: It'll keep you from driving off the road. The digital readouts, however, are bright and easy to read except under conditions of high ambient light, a problem shared by other rigs employing such readouts.

I found on several occasions that the 25 (plus) watts was a boon to establishing reliable communications through distant repeaters. In fact, I used the rig to check into my favorite vhf traffic net, which used a Boston repeater almost 100 miles (160 km) away.

Features and Controls

All of the TR-7800's operating controls are conveniently located on the front panel. The ON/OFF switch is incorporated in the VOL/SQL control. Power output is switchable, HI/LOW. Low power output is adjustable up to 5 watts.[2] The keyboard (4 × 4 matrix) is used to enter operating frequencies, initiate the scanning function, select transmitter offset frequencies and program the memories. The keyboard also operates as a Touch-Tone pad for use with autopatch and other repeater functions. The KEY/M. SEL is a two-position push switch that engages either the keyboard or the memory channel selector for use in selecting the method of frequency call up. The REV switch is used to allow the operator to listen to the input frequency of a repeater without a time-consuming effort. This is a particularly useful feature in that the operator can determine instantly whether or not a transmitting station is within simplex range. A STEP switch determines the steps, 10 kHz or 5 kHz, during automatic scan and frequency selection. The memory-channel selector is used to select the desired memory channel, and the CH indicator displays the channel number.

There are 15 memory channels. Of these, channels 1 through 13 store frequencies with simplex or ± 600-kHz shift. The remaining two channels, 0 and 14, are "odd" split channels for storing transmit and receive frequencies, which are entered individually. Channel 0 is the priority channel. The PRIORITY ALERT switch is used to check the priority 0 channel. When the switch is depressed, the priority channel will be checked at about four-second intervals, regardless of the KEY/M. SEL switch position; a tone sounds when the priority channel is in use. A PRIORITY OPER switch is used to call up the priority 0 channel.

An LED display indicates the operating frequency in four digits: For example, 146.940 MHz is indicated as 6.940. Replacing the traditional S/RF meter is an LED level meter that indicates transmitter output and received signal strength. The greater number of LEDs that are illuminated, the higher the indicated level — this took a little getting used to. But once the rig was in operation for a few days, reading the meter became second nature. In fact, the aesthetics of the display are quite appealing —

[1]meters = feet × 0.3048.

*Assistant Technical Editor

[2]ARRL lab tests showed the TR-7800 "sweeps hot" from the receive to transmit frequency. The microprocessor does not have a transmit-delay circuit.

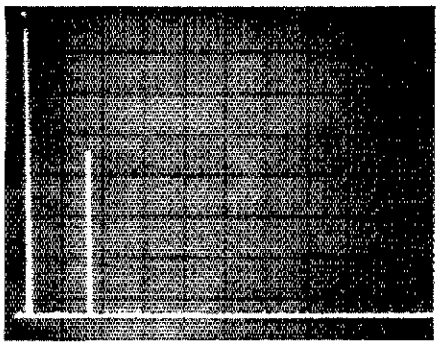


Fig. 1 — Spectral display of the TR-7800 transmitter output. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The fundamental has been reduced in amplitude approximately 33 dB by means of notch cavities; this prevents analyzer overload. Power output is 30 watts at a frequency of 146.52 MHz. A similar test at a power output of 4.4 watts also resulted in a clean spectral display. Tests were performed in the ARRL lab. The TR-7800 complies with current FCC specifications for spectral purity.

Kenwood TR-7800 Serial No. 010149

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144.000-147.995 MHz.	Readout: 143.900-148.995.
Mode of operation: Fm (F3).	As specified.
Current drain: 0.4 A in receive mode — no input signal; 6 A in HI transmit mode; 2.5 A in LO transmit mode.	Not measured.
Size (HWD): 2-1/2 × 6-7/8 × 8-1/16 in.	
Weight: 4.63 lb.	
Transmitter power output (at 13.8 V, 50-ohm load): HI, 25 watts; LO, 5 watts (adjustable).	HI, 35 watts; LO, 5 watts (adjustable).
Spurious suppression: HI, −60 dB; LO, −53 dB.	HI, −75 dB; LO, −53 dB.
Receiver i-f: 1st i-f, 10.695 MHz; 2nd i-f, 455 kHz.	
Receiver sensitivity: Better than 0.5 μV for 30 dB S/N; better than 0.2 μV for 12 dB SINAD.	0.13 μV/20 dB quieting.
Squelch sensitivity: 0.16 μV (threshold)	0.06 μV.
Audio output (8-ohm load), more than 2 watts.	1.5 watts.
Meter: Red LED.	Red LED, 5/16 in.
Sensitivity (μV/S9): Not specified.	2 μV.

Note: mm = inches × 25.4, kg = pounds × 0.4536.

the meter lends an avionics look to the rig. The TONE switch is for control of a user-supplied tone generator. On the rear panel are the SO-239 antenna connector, dc power input terminal, an external backup power input connection used for retaining memories (for internal memory retention power, four AA NiCad batteries must be user supplied and installed in the battery holder), external speaker jack and final-amplifier heat sink. On the microphone are three switches: The DWN switch steps both the keyboard and the memory frequencies (to the next lower frequency), while the UP switch operates in a similar fashion stepping the frequency or memory channel. The PTT switch also acts to disengage the scan function. Extended frequency coverage is included (143.9 to 148.995 MHz) for those of the "MARSian" persuasion. An AUTOSCAN function allows the operator to scan the entire band or just the preprogrammed memory channels.

The transmitter finals are protected by VSWR sampling circuitry. As reflected power increases (higher SWR), transmitter drive is reduced, thus decreasing input to the final amplifier. This in turn protects the final transistors. The sensitive receiver is a benefit when listening for weak signals.

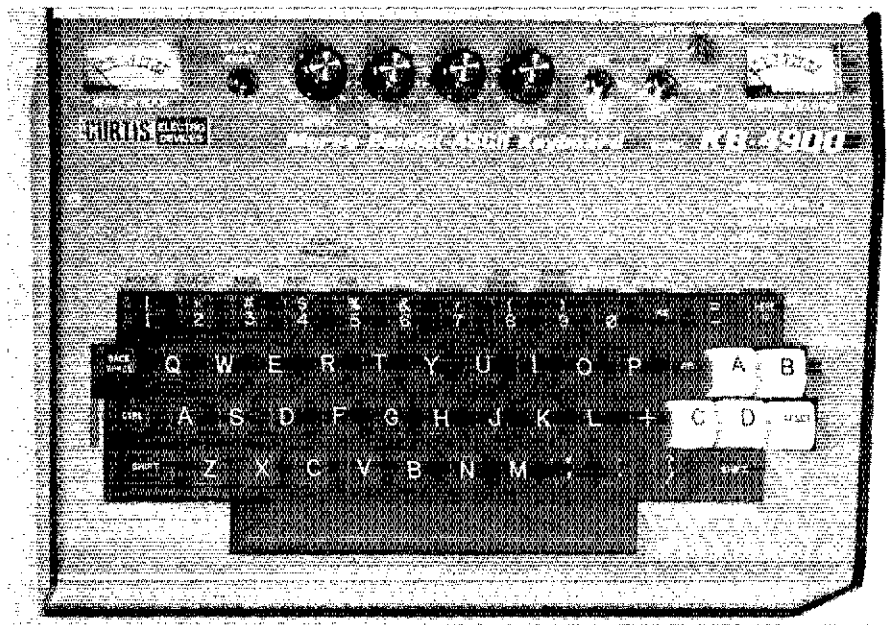
A complete and easy-to-understand instruction booklet describes the TR-7800's operation in detail. The unit itself comes packaged with microphone, mobile mounting bracket, dc power cord, spare fuse, miniature external speaker plug, warranty card and manual. Optional accessories include a matching dc power supply KPS-7, external speaker SP-40 and charger BC-1, which is used as a memory backup power supply when the main power supply is off for extended periods.

I have owned and operated a number of different 2-meter fm transceivers produced by various manufacturers, and I'd recommend the TR-7800 to any amateur looking for a 2-meter rig with more than "bare bones." I think every amateur enjoys a few "bells and whistles" occasionally if only to "keep up with the Joneses." The TR-7800 is a product of Trio-Kenwood Communications, Inc., 1111 West Walnut St., Compton, CA 90220. Price class: $400. — *Richard Palm, K1CE*

CURTIS KB-4900 KEYBOARD KEYER

☐ Some say that an amateur is "cheating" if he or she sends cw by means of a KB (keyboard keyer). Others have been known to say, "I wouldn't be caught dead using a keyboard." This reviewer has made similar statements on a couple of occasions! But, is it a cheating game to use a KB? Definitely not, and here's why. Take, for example, the case of an individual who can copy Morse at, say, 50 wpm, but lacks the dexterity or brain/hand coordination to send *good* (that's the key word here) cw at more than 25 or 30 wpm. The change from a bug or paddle to a KB can remedy the situation almost instantly, allowing for a period of off-the-air familiarization and practice with the new keyboard unit. It isn't necessary to be a touch typist: Many "hunt-and-peck" typists can easily grind out 50-wpm text on a keyboard. If the KB data is buffered (stored), proper spacing is assured, and perfect cw can be possible! The name of the game *should* be "good cw," and by whatever means practical: The cleaner the cw, the easier and more accurately it can be copied. Nothing is more frustrating than trying to copy at moderate or high speeds when the other guy or gal is sending with a "banana-boat swing" (NN GT = CQ), running the characters and sentences together, using excessive weighting or forming the dashes too long with respect to the dots. Cw "butchery" is rampant, even though there is widespread use of keyers and paddles. A keyboard keyer can be used to correct these problems. It must be said, however, that many paddle users can send cw that sounds as good as that from a keyboard!

The Curtis KB-4900 has a multitude of useful "bells and whistles." It provides Morse (5 to 80 wpm), Baudot (45.45 baud/60 wpm) and ASCII (110 baud) output. The buffer and memory will accommodate 256 key strokes with the memory soft-partitioned into four sections. These sections are available to the operator as memory keys (white) A, B, C and D at the lower right of the keyboard. For example, one could program memory A to read CQ CQ CQ de W1AW K. Memory B might contain DE W1AW K for tailending, with QRZ DE W1AW stored in memory C and so on. The memories, plus the built-in incrementing serialization feature (0 to 9999), would enable the amateur to operate an entire cw contest without using



the main part of the keyboard for any function other than inserting the call letters of the station worked. The time saved would be used for logging and "dupe" checking.

Other Features

Morse practice is available from the KB-4900. In practice-mode 1 there are random-length groups of random characters generated and sent in a never-repeating sequence. The desired speed can be chosen by adjusting the speed control. Practice-mode 2 delivers pseudo-random, five-character groups of Morse. These groups are always the same, and answer lists are contained in the owner's manual. The eight lists are available from the keyboard by inserting the numbers 1 through 8 in message memory A. In both modes the operator can insert extra space between the letters by pressing the CTRL key, followed by the 5 key. Also, the numbers and punctuation can be eliminated in either mode by placing an "N" after the "R" (or numbers 1 through 8) in message memory "A."

A standard paddle or bug type of key can be plugged into the KB-4900 to permit sending *conventionally,* if indeed that is a proper term for it today! Break-in operation is thus available by employing the BUFFER HOLD function of the keyboard.

PTT control is included for transmitter switching in all modes. The PTT release time is 0.5 seconds. Analog controls are provided for sidetone pitch, sidetone volume, weighting and speed. Also, analog meter readout (separate meters) is included for monitoring the Morse speed from 5 to 80 wpm and for observing the amount of data contained in the buffer (0 to 256 key strokes). A buffer-overflow warning light is located adjacent to the buffer meter.

Special prosigns $\overline{AS}$, $\overline{SK}$, $\overline{BT}$, $\overline{AA}$, $\overline{KN}$ and $\overline{KA}$ are included on the KB. Most of the European and commercial prosigns are also provided.

Another feature is a built-in, 24-hour clock that permits transmitting the time in Morse, Baudot or ASCII. In Morse, for example, the output would be 22R18, whereas on ASCII or Baudot it would be 22:18 for the same hour and minutes. This real-time clock is an optional accessory.

Inputs and Outputs

The KB-4900 contains a sidetone oscillator and speaker. The speaker can be used to monitor the output from a receiver by routing it to the audio input jack (8 ohms) of the KB. There is a jack for single- or twin-lever paddles and another for a manual "straight key." These inputs are optically isolated. A 12-volt dc input is available to permit battery connection. This prevents erasure of the memories during interruptions of the power service.

Keyboard outputs are provided for the key line (300 V, 500 mA max., mercury relay), PTT (same ratings) and the loop (same ratings, but optically isolated). There is a TTL TTY output (TTL level, sink or source 5 mA) and a speaker/headphone jack (8 ohms). The 117-volt ac line connects at the rear of the KB by means of a TV "cheater cord."

Some Final Comments

There are many subtle "goodies" associated with this unit, but descriptions are beyond the scope of this review. Additional information is available from the manufacturer.

The reviewer's KB-4900 has been in daily operation from 160 through 10 meters, with dc power input to the transmitter as great as 1 kW from 80 through 10 meters. At no time was there evidence of rf getting into the KB and disturbing the performance. No functional glitches have been observed in the overall performance of the keyboard, and on-the-air signal reports have yielded many compliments about the "perfect cw" generated by the KB-4900 (operator typos excepted, of course!).

An interesting psychological advantage seems available to this reviewer when using a keyboard, and others have reported similar experiences: Seldom-used, long words are much easier to spell on a KB than when sending them with a bug or paddle at the higher speeds. This may result from having the letters be visible to the operator when the word is formed. Poor spellers won't benefit from this phenomenon, however! In summary, the reviewer gives the KB-4900 a four-star rating. — *Doug DeMaw, W1FB*

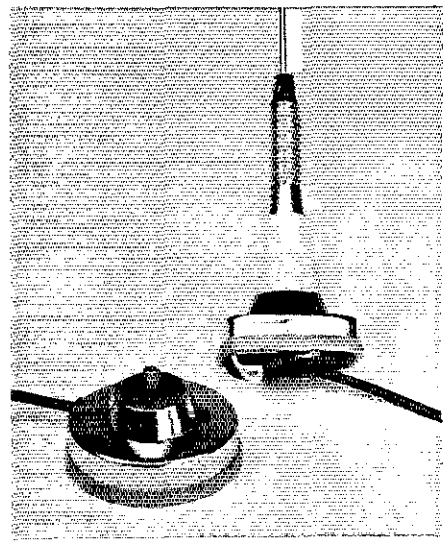
DECIBEL PRODUCTS DB702 2-METER ANTENNA

☐Another Decibel Products contribution to the array of 2-meter mobile whip antennas is the DB702, a 5/8-wavelength aerial that offers a choice of mounting arrangements. Should you prefer a permanent through-the-roof mount, the DB702E-11 is available. For those not willing to drill holes in their 1937 Bentley, a magnetic mount unit (DB702E-17) or a "no-holes" trunk-lip mount (DB702E-16) may be purchased. The ease with which the magnetic mount antenna can be removed and replaced makes it a good choice if you don't wish to have the antenna vanish under mysterious circumstances!

Antenna assembly is simple: screw the coil, whip and spring onto the mount of your choice. A length of coaxial cable with a PL-259 connector already attached is supplied for use with most contemporary 2-meter rigs.

The antenna was road tested with the "mag" mount and did not detach from the vehicle at highway speeds. It is aesthetically appealing and appears to be ruggedly constructed. An easy-to-read instruction manual and a chart to be used for cutting the whip to size are included. It's good practice to start a bit long and cut off a small piece of the whip at a time until the best SWR is achieved.

The DB702 series is a product of Decibel Products, Inc., P.O. Box 47128, Dallas, TX 75427. Price class: DB702E-11, $45; DB702E-16, $53; DB702E-17, $55. — *Richard Palm, K1CE*



Curtis Electro Devices KB-4900 Keyboard Keyer Serial No. 1026C

Manufacturer's Claimed Specifications

Speed: Morse, 5 through 80 wpm; Baudot, 45.45 baud (60 wpm); ASCII, 110 baud.
Buffer and memory: 256 key strokes.
Keyboard: 54 key alphanumeric plus space bar, punctuation and prosigns $\overline{AA}$, $\overline{KN}$, $\overline{BT}$, $\overline{AR}$, $\overline{AS}$, $\overline{SK}$ and $\overline{KA}$. Also includes European and commercial prosigns. Individually replaceable, gold-inlaid key contacts. Debounced and two-key lockout feature.
Other keying: Manual "straight key" or external paddle (iambic with dot and dash memories).
Size (HWD) and weight: 4-1/2 × 12 × 8-1/2 in., 5.5 lb.
Colors: Light gray panel, black side panels, lettering in white, yellow and red.
Power requirements: 117 V ac at 50-60 Hz or 12 V dc at 500 mA; 234 V ac at 50-60 Hz avail. on order.
Price class: $400.
Manufacturer: Curtis Electro Devices Inc., Box 4090, Mountain View, CA 94040, tel. 415-494-7223.

Note: mm = inches × 25.4; kg = lb × 0.4536.

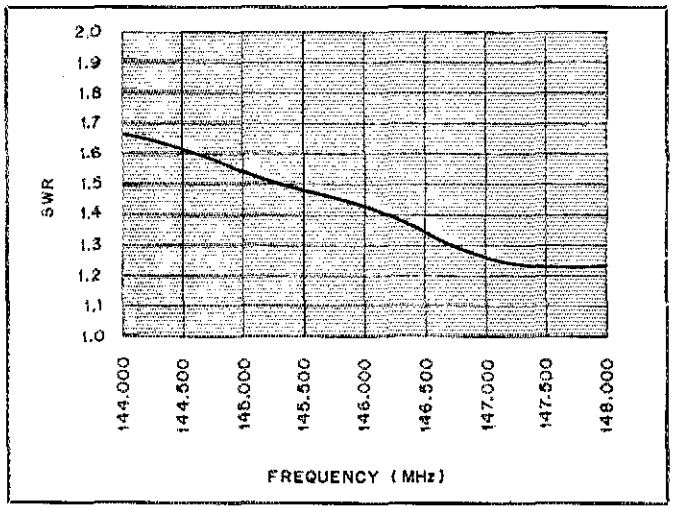


Fig. 2 — SWR curve for the DB702E-17 antenna.

GC ELECTRONICS LIFT-IT TRANSFER SHEETS

☐ Are you one of the many would-be "homebrewers"? Does the absence of a readily available pc board prevent you from undertaking a project you'd otherwise attack with enthusiasm? Sure, the pattern reproductions are nice, but photographing them is a step and expense you don't want to bother with. If only you could produce the required positive or negative from the pattern in the book. . . . Well, now you have no excuse! This easy-to-use method will lift the artwork and will make your pc-board reproductions more convenient and less costly.

One package of the GC Electronics Lift-It Transfer Sheets (catalog no. 22-288) contains two 8-1/2 × 11 inch[3] transfer sheets and one similar size Mylar exposing mask. This is enough material to make a number of boards, depending on their individual sizes.

To lift the pattern from the printed page, simply cut the transfer film to a size slightly larger than the desired pc pattern, peel away the protective backing and apply the film directly to the paper. Take care to place the transfer film correctly the first time because once the film touches the paper, it cannot be lifted — they're bonded for life! I found that it's a good idea to tape the desired pattern or page so that it cannot be moved as the film is being applied. This prevents the pattern from jumping up to meet the film (because of static electricity) as the film is brought closer to the paper.

Once the film is in contact, a smooth, blunt instrument (I used the back of a tablespoon) is used to burnish it in place and to force out any air bubbles from between the paper and film. Then place the pattern/film sandwich in a dish of warm, soapy water for 15 or 20 minutes. This causes the paper to absorb the water and to become crumbly when rubbed between your fingers. Don't use any abrasives — just your fingers. Let the film dry, and apply a piece of the Mylar backing to it. There you have it, a proper pc pattern positive that you can use with either the positive or negative pc board processing methods. Easy, isn't it?

If you'd like to preserve your *QST* copies or other publications and hate to take a pair of scissors to the page or otherwise alter it, you might photocopy the desired artwork. Good "lifts" can be made from photocopy paper. In fact, the density of the resulting positive might be somewhat better than that from the publication page depending on the papers used, photocopier reproduction density and so on.

Lift-It Transfer Sheets are available from your local GC Electronics distributor. If there's no distributor near you, contact GC Electronics, 400 S. Wyman St., Rockford, IL 61101. — *Paul K. Pagel, N1FB*

VOCOM TELESCOPING 5/8-λ ANTENNA FOR 2-METER PORTABLES

☐ "So, what is that? A 5/8-wave antenna for a hand-held?" I asked Sandy when he brought it in for advertising-acceptance examination. He smiled and said that I was correct! Correct, heck: I was being a smart aleck. Wisecracks flew back and forth around the office that day about the absurdity of putting such a large antenna on a hand-held. Then we tested it with an IC-2A. The performance was amazing. We were able to make contacts through repeaters that couldn't even be keyed with the "rubber duck," and we got good signal reports, too! Results of informal tests with various radios were consistent with the initial check.

We do not have facilities for testing and measuring antenna patterns accurately, but we did make a few informal observations about relative field strength. We used a receiver with an S-meter that was connected to a step attenuator through double-shielded cable. A 2-meter "rubber duck" was attached to the input of the attenuator. Another operator with an IC-2A was stationed about 200 yards away. The second operator made three transmissions with the IC2-A: first, with a "rubber duck"; second, a quarter-wavelength whip and third, the VoCom. We observed a 3-dB increase in field strength from the "rubber duck" to the quarter-wavelength whip. We observed a 6-dB increase from the quarter-wavelength whip to the VoCom. That is 9 dB from the "rubber duck" to the VoCom! Keep in mind that these are merely rough comparisons of the antennas. Nevertheless, these measurements are consistent with my on-the-air impressions of the difference in performance. VoCom has made a believer out of a skeptic in my case!

A fundamental rule of the universe is, "There ain't no such thing as a free lunch." Most modern portables are quite small and lightweight. The extra gain of the VoCom has its price — the length of the antenna and, consequently, the convenience of operation. Instead of 6 to 19 inches (152 to 483 mm), the full length of the antenna is 47 inches (1190 mm). This results in a package that can be unwieldy at times. Additionally, in an average room, it may be impossible to stand with the portable near your mouth while the antenna is fully extended. The leverage of the fully extended whip against the base of a female BNC connector (only one model has a male BNC connector) on a radio could be enough to damage the case after prolonged abuse. To some extent, the spring in the base of the VoCom will absorb this pressure. As far as I can tell, these are the only drawbacks to the antenna.

My opinion is that the VoCom antenna can be a useful tool for the 2-meter fm operator. Some care should be exercised in its use. If you happen to be about as graceful as a wounded rhino, and as clumsy as a New Year's Eve reveler, then you should stay with your "rubber duck" for safety's sake. If, however, you are on the fringe area of your favorite repeater, you may want to consider the VoCom. Used selectively and judiciously, this antenna shouldn't harm your radio, while at the same time it will extend the range of your portable. Price class is $25. Additional information may be obtained from VoCom Products Corp., 65 E. Palatine Rd., Suite 111, Prospect Heights, IL 60070. — *Peter O'Dell, KB1N*

[3]mm = inches × 25.4.

MACROTRONICS M8000 RTTY SYSTEM

☐Macrotronics' M8000 is a disc-based RTTY system for the Radio Shack TRS-80 computer. It utilizes fully the capabilities of the disc-driven computer, providing features that the serious RTTY operator requires and desires.

More than 50 commands and subcommands provide versatile system configuration and operation. To configure the system, the user may select ASCII at 110 baud or the Baudot code at 60, 66, 75 or 100 wpm. He or she may vary the rate of transmission to simulate UT-4 operation, choose to ignore returns to conserve the display space on the CRT, vary the carriage width from 15 to 72 characters per line, enter the time and date and enable the automatic 10-minute identifier and select fast, slow or no sync idle (diddles). Other functions include automatic line numbering, line labeling, narrow or wide shift for the cw identifier and the ability to create three canned messages that may be saved on disc.

The operations commands are more numerous. To transfer between the transmit and receive modes, simply press the CLEAR key. Not only will the program change modes, but your ham radio equipment will also be switched between modes. While the system is in the receive mode, the user may be typing a response into the buffer, which is displayed below the received text on the CRT. If the transmitting station asks a question requiring an instant response, the user may stop typing into the buffer, answer the question and resume buffer typing without losing the text previously buffered.

At any time, the user may transmit a "quick brown fox" message, a line of CQs, the time and date, the station identification in RTTY and/or cw and any of the canned messages saved on disc. Disc-based commands include displaying the disc directory, saving and playing back received, previously transmitted or keyboard-created messages and sending and receiving disc files in hex format. A word processor such as Electric Pencil or Scripsit may be used to edit or create M8000 messages on disc. The M8000 also includes an extensive subprogram that allows the user to set up an "electric mailbox" with WRU capabilities.

Performance

The M8000 performed flawlessly during two months of on-the-air testing on both 20 meters and a 2-meter RTTY-bent repeater. Documentation includes a command summary chart and with it at hand, it did not take long to master the numerous commands.

One program quirk involved the use of the IGNORE RETURN command. My line printer (an IDS 440 Paper Tiger) must receive a line return before it will print a line. With IGNORE RETURN enabled, the line printer will not print automatically. To obtain hard copy, the user must disable the IGNORE RETURN function or switch to the transmit mode and send a line return.

Each M8000 sold is personalized with the purchaser's call sign and/or name (48 characters maximum). This serves two objectives — the user's call is included in the program for all station identification functions and personalized software will not likely be stolen.

The minimum hardware requirements for the M8000 are a TRS-80 computer (Model I or III) with 32 k of RAM, one disc drive, TRSDOS 2.3 and a Macrotronics interface (M80, CM80, or TM80) or an RS-232C interface. With some radio equipment, an afsk generator and an RTTY demodulator may be necessary or desirable.

The M8000 package includes one discette containing a personalized copy of the M8000 software, a module that is installed on a Macrotronics interface to make it M8000-compatible and a three-ring binder containing full documentation. The package costs $150 and may be obtained from Macrotronics, Inc., 1125 North Golden State Blvd., Suite G, Turlock, CA 95380. — *Stan Horzepa, WA1LOU.*

Technical Correspondence

Conducted By
Gerald L. Hall,* K1TD

SPREAD SPECTRUM TECHNIQUES

☐ The article on spread spectrum Amateur Radio in November 1980 *QST*[1] was very interesting. Author Paul Rinaldo, W4RI, is to be commended for discussion an extensive subject with such a concise treatment. The essential features and characteristics of spread spectrum were mentioned. However, there are some potential misconceptions.

In the article Rinaldo mentions that spread spectrum signals can be overlaid on top of existing operating frequencies and states, "If this is done with care, the preexisting users wouldn't even detect the presence of the SS overlay." As Rinaldo implies, under the proper circumstances this is completely true. However, if the spread-spectrum transmitter is close to a conventional receiving station, that receiving station will certainly be jammed on all channels in that band! On the converse, when the spread-spectrum station is receiving and the nearby conventional station is transmitting, the reverse will occur: The spread-spectrum station will experience severe bleed-through of the undesired signal. This arises from using limited bandwidth spreading ratios. The equation for jamming rejection is:

$$\text{Jamming rejection} = 10 \log (\text{bandwidth ratio}) \quad \text{(Eq. 1)}$$

where bandwidth ratio is the rf bandwidth divided by the information (audio) bandwidth.

Jamming rejection is the amount of suppression of undesired signals in the spread-spectrum receiver. Eq. 1 also holds true for the degree of covertness (noninterference with conventional receivers) when the spread-spectrum station is transmitting. As can be seen, the amount of bandwidth spreading required for modest rejection is significant: For 30 dB of rejection a 1000:1 spread would be required, and for 40 dB, 10,000:1. A 1000:1 spread of filtered audio is 2.5 to 3 MHz of rf bandwidth, and that only gives 30 dB of dynamic range. But it is common for signal strengths to exceed a dynamic range of 80 dB when considering in-band transmitters within a couple of miles of a receiving station. The author gives typical values of 10 to 100 for spreading ratios. These are clearly inadequate.

The author also states that changing the code allows another private channel. Again, this is completely true under the proper circumstances. Here, there is a better relationship for off-channel rejection:

$$\text{Channel rejection} = 20 \log (\text{bandwidth ratio}) \quad \text{(Eq. 2)}$$

Since this is a 20-dB-per-decade relationship, the channel rejection builds up at a faster rate than jamming rejection. For the same 2.5 MHz, 1000:1 spread spectrum voice signal, 60 dB of off-channel rejection is possible. But that is with a very limited number of codes; with a wider choice, the channel rejection falls short by several decibels.

In addition, the suggestion of spread spectrum for the Amateur Radio Service is not new. J. P. Costas, W2CRR, proposed it back in the 1950s, just when ssb was in its infancy.[2] Costas contributed a circuit, the Costas loop demodulator, which is very valuable to many spread-spectrum systems today. It was designed to demodulate double-sideband suppressed carrier (usually abbreviated dsb) transmissions. Dsb is the simplest spread-spectrum signal, with a spreading ratio of 2. Dsb also has some significant advantages over ssb.[3] The most notable is that the transmitter peak-to-average power requirements for nonsinusoidal modulating signals is much tamer. For example, according to the reference,[4] if a square wave is transmitted with ssb, the peak-to-average power requirement of the transmitter approaches infinity, but for dsb the peak-to-average power requirement is 1:1. For a sine wave, the peak-to-average requirement for both ssb and dsb is 2:1. In the 1950s it was quite difficult to make good ssb transmitters, even compared to the added complexity of the Costas loop demodulator needed for a dsb receiver. Even today this is a significant problem with speech processors being used to help alleviate the wild peak-to-average requirements of nonsinusoidal (voice) modulation. Even with these significant disadvantages, ssb became the standard modulation format. There is a simple reason for ssb winning out over dsb: adjacent-channel rejection. It is easier to increase adjacent-channel rejection to the levels needed (80 dB and greater) with fancy receiver filters than it is to spread the bandwidth of the transmission.

I don't want to sound like a conservative who doesn't want change. Actually I would like to see more experimentation with advanced modulation techniques. It is with the kind of exposure that Rinaldo is giving that this can take place. However, I would not like to see significant misconceptions spoil it by creating distrust between various groups of amateurs. That isn't likely if the fine details are understood in advance. Then the problem becomes (as it is in the military), "Where can enough available spectrum be found for such a service?" Perhaps the answer is at 900 MHz, as suggested by Rinaldo.

Incidentally, the article by J. P. Costas makes very interesting reading. Even though it was published in the IRE literature, it is still readable by persons without a PhD in mathematics, with only a couple of equations per page. Moreover, it reads as if it were written in 1979, rather than 20 years earlier. His comments about congestion and solutions are very perceptive, if not prophetic. Of particular interest are his evaluations of ssb versus spread-spectrum performance in congested conditions. "As the congestion becomes worse it will be impossible to avoid reducing the data rate per circuit. The important point here is that the broad-band philosophy ACCEPTS INTERFERENCE AS A FACT OF LIFE and an attempt is made to do the best that is possible under the circumstances. The narrow-band philosophy essentially denies the existence of interference, since there is an implied assumption that the narrow-band signals can be placed in non-overlapping frequency bands and thereby prevent interference." It is my perception that this philosophy remains prevalent today. — *Ken Wetzel, WA6CAY, 731 Fendrick Circle, Ridgecrest, CA 93555*

[1] P. L. Rinaldo, "Spread Spectrum and the Radio Amateur," *QST*, Nov. 1980, p. 15.

*Associate Technical Editor

[2] J. P. Costas, "Poisson, Shannon, and the Radio Amateur," *Proceedings of the IRE*, Dec. 1959, pp. 2058-2068.

[3] J. P. Costas, "D.S.B. vs. S.S.B.," Technical Correspondence, *QST*, May 1957, p. 42.

[4] *Reference Data For Radio Engineers*, Fifth Ed., p. 21-5.

TELEPHONE INTERCONNECTIONS

☐ August 1977 *QST* Technical Correspondence contains information that I prepared on the subject of telephone interconnection arrangements.[5] The new arrangement described there is designated QKP, shown in Fig. 1. Your readers will most likely not find it possible to obtain the QKP interconnection arrangement at their local telephone stores.

The position of the telephone company on interconnection arrangements includes the following:

1) As the result of "registration" under the FCC rules, Part 68, telephone companies have "frozen" some interconnection arrangements. This means that no new installations will be made of the arrangements that are frozen; existing installations may continue in place.

2) Protective connecting arrangements (PCA) are never sold. The QKP contains a PCA, so it will not be available for sale.

3) Many hams will have to buy some kind of device from a manufacturer who is willing to spend the money to register it.

4) Look for a new offering designated POP, which covers only the voice coupler as used with the QKT arrangement. A telephone

[5] G. Schleicher, "New Telephone Interconnection Arrangements," Technical Correspondence, *QST*, Aug. 1977, p. 42.

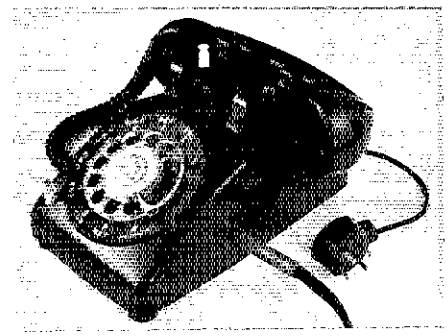


Fig. 1 — The QKP "interconnection" instrument. It contains voice coupler circuitry inside the case, and accepts a standard 1/4-inch plug.

company instrument (priced separately) having an exclusion key must be used with the coupler. The portable QKP is now frozen; it will be available only if some independent maker of telephones decides to market one.

As I see it, the FCC's registration program has made interconnection more difficult for the ham who is not an "appliance operator." — *George Schleicher, W9NLT, 1535 Dartmouth La., Deerfield, IL 60015*

BEVERAGE ANTENNAS FOR AMATEUR COMMUNICATIONS

☐ Questions are often raised about the use of Beverage antennas for 160-m reception. In the mid-1970s, our laboratory carried out an extensive study of Beverage antennas for hf communications, direction finding and over-the-horizon radars. The study included both theoretical and experimental work. In general, there was fair agreement between experiment and theory, and since theory better reveals the design trends because operating parameters can be readily varied, the following remarks are based on theoretical analysis.

1) For frequencies of about 2 MHz, a Beverage antenna has better performance when the ground conductivity beneath it is poor. The calculated gains for an antenna 100 meters long and 1 meter above the ground are −9.3, −12 and −15 dBi for poor, average dry and good ground. At 25 MHz, these gains are −1.3, −0.5 and +1.5 dBi respectively, i.e., the opposite trend with change in conductivity.

2) The gain increases with the length of the antenna. For a frequency of 2 MHz and for an antenna 1 meter above average dry ground, the theoretical gains are −12, −8.5, −7.5 and −7 dBi for antenna lengths of 100, 200, 300 and 400 meters.

3) The gain increases with increases in the height of the antenna above ground, but the change is not large. Again for a frequency of 2 MHz and a 100-meter antenna over average dry ground, the theoretical gains are −12.7, −12, −11 and −10.7 dBi for antenna heights of 0.3, 1, 2 and 3 meters.

4) For a 2-MHz operating frequency and an antenna 100 meters long, 1 meter above the ground, the azimuthal beamwidth is about 77°, the vertical beamwidth is 60° and the take-off angle about 42°.

With this information you can extrapolate to a length to fit your property and estimate the expected (theoretical) gain. However, if you want to cover all azimuths, you will need a rosette of Beverages (comprising at least six), and hence a large amount of land.

The characteristic impedance of the Beverage is about 500 ohms, so the antenna should be terminated at its far end in a resistance of that value, via a resistor and a ground screen. The received signal is taken from the other end through a transformer, with one primary lead connected to ground via another ground screen. The transformer must match the 500-ohm antenna impedance to 50 ohms. — *John S. Belrose, VE2CE, Communications Research Centre, P.O. Box 11490, Station "H," Ottawa, ON K2H 8S2*

INCREASING THE OUTPUT VOLTAGE FROM FIXED-VOLTAGE REGULATORS

☐ Now that you have exposed the poor practice of using diodes to raise the output of regulator chips, I think you would do the amateur community an even bigger service by correcting the egregious error printed in May 1981 *QST*.[6]

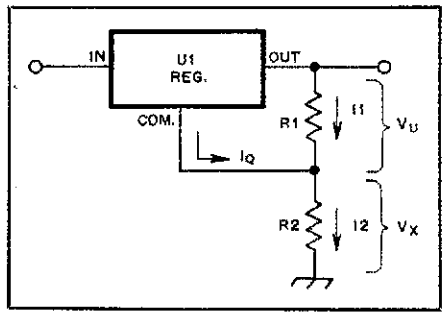


Fig. 2 — Circuit for increasing the voltage output from a fixed-voltage regulator IC.

While observing Fig. 2, note the following analysis:

$$I1 + I_Q = I2 \qquad \text{(Eq. 1)}$$

$$V_u = I1 \times R1 \qquad \text{(Eq. 2)}$$

$$V_x = I2 \times R2 \qquad \text{(Eq. 3)}$$

Therefore, $V_x = (I1 + I_Q) \times R2$. Using the example in the Technical Correspondence letter: $V_u = 12$, $V_x = 1.8$ and $R1 = 560$. Then,

$$I1 = \frac{V_u}{R1} = \frac{12}{560} = 0.0214 \text{ ampere.}$$

Therefore,

$$R2 = \frac{V_x}{I1 + I_Q}$$

The quiescent current, I_Q, for the μA78H12 regulator is 0.010 ampere.[7] From this, $R2 = 1.8/(0.0214 + 0.010) = 57.3$ ohms, as opposed to 84 ohms from calculations presented in the Technical Correspondence letter. This circuit will give close to the desired output, but only because the quiescent current is relatively constant throughout the normal current range of the device. None of these circuits will regulate as well as the device by itself.

As you can see, the error in the method presented in May *QST* will be even worse if someone were to try to raise the device even farther above ground. Incidentally, let me point out that the quiescent current is different for just about every regulator.

Using the practical value of 82 ohms suggested for the 84-ohm resistor, someone is going to end up with about 14.6 volts instead of 13.8; not too bad, but only a small error because of the particular case that was chosen. I feel that the technical editors of *QST* should catch such obvious errors and thus stem the flow of misinformation. — *Ronald J. Whitsel, WA3AXV, 209 Frog Hollow Rd., Churchville, PA 18966*

ADDITIONAL INFORMATION ON AMTOR

☐ I thank *QST* for helping to bring AMTOR to the attention of readers with the publication of my article, "Amtor, an Improved Error-Free RTTY System," in June 1981 *QST*. The introductory comments under the title may be a little misleading, however. For all practical purposes, SITOR, SPECTOR, MICROTOR and AMTOR are *identical*, not merely similar. Contacts can (and have) taken place between equipment operating on AMTOR and any of the others. The fact that all these equipment types meet CCIR recommendation 476 defines them as interworkable.

Ref. 2 of the article, "Amtor, The Easy Way," was printed in RSGB *Radio Communication*, June-July 1980. The *QST* article, page 27, center column, near the top, contains a sentence beginning, "This is done by operator intervention . . ." Unfortunately, this does not reflect the meaning of the original manuscript, which reads, "This can be done by operator intervention to start again as if commencing a new QSO, but the usual procedure is that when both stations have been receiving errors or requests for repeat for 32 blocks, then they both automatically drop back to the synchronization procedure, with the sending station retaining any unsent message in a buffer."

For information, there are, as of May 1981, some 40 amateur stations operational on AMTOR, in eight countries worldwide. At the recent International Amateur Radio Union Region 1 conference, it was recommended that member societies should press for permission to use AMTOR in their countries. — *J. Peter Martinez, G3PLX, 11 Marchwood Ct., Broadsands Dr., Gosport, Hants, England*

[6]P. O'Dell and B. Shriner, "A 5-A Loafer Feedback and Update," Technical Correspondence, May 1981 *QST*, p. 42.

[7]*Fairchild Voltage Regulator Handbook*, 1978 ed.

Feedback

☐ Author Ruh points out a typographical error in "All About Amateur Television," in June 1981 *QST*. The gain figure for the MBM-48 antenna should be 15.5 dB, not 5.5. Ruh also mentions that most U.S. ATV in-band repeaters now use the 4.5-MHz sound subcarrier input/output for normal audio signals, with the on-carrier sound input being reserved for data and other nonvoice signals. Amateurs searching for low-cost hardline for ATV or other uhf applications should contact Sierra Western Electric Cable Co., Box 23872, Oakland, CA 94632, tel. 415-832-3527. (The ARRL and *QST* in no way warrant this offer.)

☐ Colin Dickman, author of "The ZS6U Minishack Special," mentions that the errors in Figs. 1 and 2 of the version of his article appearing in *Radio ZS* were faithfully reproduced when the information was adapted for April 1981 *QST*. The numbers associated with the inductor windings refer to the tap points, not to the number of turns between taps. For example, Fig. 1, p. 32 of the *QST* article, should show a 20-turn coil with taps at 3-1/2, 5-1/4 and 8 turns from the right-hand end. Similarly, Fig. 2 should show a 34-turn coil with intermediate taps. Dickman's current address is 41 Eden Rd., Bramley, 2090 Tvl., Republic of South Africa.

☐ The August 1981 *QST* Product Review column incorrectly listed the Radio Shack DX-302 receiver sensitivity as 0.03 μV for 10 dB S/N. It should have been stated as 0.3 μV.

Your Outgoing QSL Bureau

An outstanding benefit of League membership is the right to use the ARRL Outgoing QSL Bureau. The potential savings to you is equal to many times the price of your annual dues.

By R. L. White,* W1CW/4

Since the ARRL Outgoing QSL Service was founded November 1, 1976, thousands of League members have taken advantage of this service to send their DX QSLs overseas. We're surprised that even more people don't use the Bureau, as it is a membership benefit par excellence. Bob White, W1CW/4, former assistant communications manager for DXCC and the original manager of the League's Outgoing QSL Bureau, wrote the following article to announce the opening of the Outgoing Bureau. It has been updated where appropriate by Hal Steinman, K1FHN, manager of the Membership Services Department.

TNX QSO OM — PSE QSL VIA BURO . . .

"I've done it! I've finally worked some real DX! And will I QSL? You better believe it, especially for a country all the way across the ocean. But 'via Buro'? We've landed men on the moon and a vehicle on Mars and this guy thinks we're still using animals to carry the mail?

"Anyway, I'll send him a card direct with an envelope made out to me with a stamp on the envelope, just as I do when I work a new state. If I tell him he's my very first QSO with his country, that should get to him and he's sure to QSL. Let me see now, I'll need to borrow a foreign *Callbook*; my U.S. one won't help much. And I guess my putting a U.S. stamp on the s.a.s.e. won't do him any good either. Maybe I could send him a dollar bill, but I heard that some foreign countries come down hard when they find someone with foreign money. Sure don't want to get him in trouble; he might not QSL. Got it! I'll send him some International Reply Coupons. According to the fine print on them, each one can be exchanged for the postage required to mail a first-class letter to almost any country in the world.

"The *Callbook* has a listing of the number of IRCs needed to equal what an airmail reply for my card will cost him. But wait just a doggone minute. I heard a fellow on the air just the other day saying that he'd gone to the post office to get some IRCs and they now cost 65¢ each! Let me see now, two IRCs, two envelopes, my airmail postage to send him my card and the IRCs and envelope . . . that's almost $2 for a single QSL! I'll go broke before I get halfway to making my DXCC. There just has to be a cheaper way. . . ."

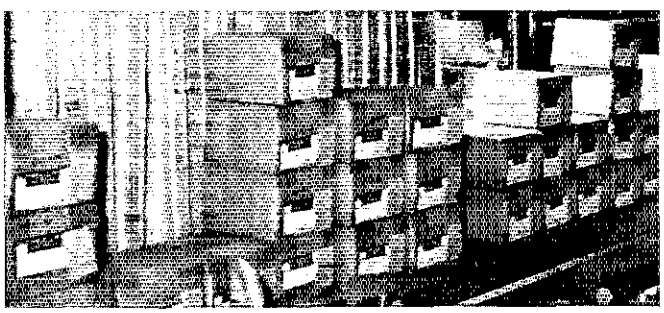
Don't go broke. There is indeed a cheaper way, and the DX station said it: via the QSL bureau.

To some amateurs QSL cards are a hobby in themselves. The colors, the pictures, the handwriting and the names of countries stir the mind to visions of faraway places and recollections of past contacts. Some people can blow their minds and trip out just going through a batch of QSLs. Then there are those to whom a QSL is a means to an end, the achievement of a goal or an award.

Some amateurs "brag" about never having sent out any QSLs but who claim to have received enough QSLs to make DXCC. The percentages don't favor that

*225 Main St., Newington, CT 06111

QSL Bureau Manager Joan Becker sorts cards at ARRL Hq. She and her assistants, Gail Paul and Denise Piscottano, ensure that members' cards are sent overseas promptly.



The large number of packages awaiting shipment to QSL bureaus around the world attests to the volume of cards that pass through Hq. Packages are mailed once each week.

Requirements for Using the ARRL Outgoing Bureau

(1) Presort your DX QSLs alphabetically by call-sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2 and so on).

(2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member.

Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Blind members who do not receive *QST* should indicate that the QSLs are from a "blind member."

ARRL affiliated club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

In addition to sending club station QSLs through the Bureau, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. For example, if 25 members of your club wish to send cards to the Outgoing QSL Bureau during a particular month, and each has less than a pound of cards, the fee would be $1 each, or $25, if each member sent his or her cards individually. Each member would have to pay postage, also. Alternatively, these club members who are also League members can send their cards through the club, and the club would pay a fee (which would no doubt be considerably less than $25) based on the total weight of the cards. The club would then charge each member on a pro rata basis, or reimburse itself from club dues, or whatever it chooses. Cards should be sorted "en masse" by prefix, and *QST* labels enclosed for each ARRL member sending cards. ARRL Hq. is able to offer this discount as a benefit to affiliated clubs because it reduces the amount of time spent opening mail and sorting QSL cards by the QSL bureau.

3) Enclose payment of $1 per pound of cards or portion thereof (there are approximately 155 cards in a pound) in the form of a check or money order. Cash is not recommended. Please write your call on check.

happening. For an amateur in the U.S. or Canada who wants to *get* QSLs (for whatever reason), that amateur should be prepared to *send* QSLs.

But, the filling out of QSLs, finding addresses, addressing envelopes, stuffing envelopes and mailing become unpleasant chores that take time that could be spent operating. Thus, to support the objective of keeping amateurs on the air, the ARRL-Membership Outgoing QSL Service was established. The object: to allow an ARRL member to send DX cards with a minimum of cost and work on behalf of the individual member.

Here's How It Works

Each month, every member of the ARRL (except family and blind members) is mailed a copy of *QST*. The address label on the wrapper of *QST* is the member's "ticket" for use of the Outgoing QSL Service. Twelve times per year, an ARRL member may send as many QSL cards as he or she wants for amateurs overseas in the countries shown in Table 1. With each mailing the member must include the address label from *QST* and $1, check or money order, per pound of cards or portion thereof (there are approximately 155 cards in a pound). QSLs must be presorted by prefix. Nothing but the cards, address label and remittance may be included in the package. Wrap the package securely and address it to ARRL Membership Outgoing QSL Service, 225 Main St., Newington, CT 06111.

ARRL family members (only one copy of *QST* is sent per family) may send cards in the same package but must include remittance for each member sending cards and indicate that the *QST* address label includes a "family membership."

Blind members, who do not receive a copy of *QST*, need only include the appropriate fee with a note indicating that the cards are from a blind member. Associate (unlicensed) members may use the Outgoing QSL Service to send SWL reports to overseas *amateur* stations in the countries shown in Table 1. No cards will be sent to individual QSL managers.

Your cards are "turned around" quickly by the Bureau, and are on their way overseas usually within a week of their arrival at ARRL Hq. Obviously, considerable time is necessary for the cards to make the journey. Add to that the time needed for the card from the DX station to make its way to you via the ARRL Incoming QSL Bureau,[1] and a delay of many months is not unusual. What you sacrifice in speed, you gain in convenience and savings. Of course, you may still wish to QSL individually in certain cases.

Headquarters sincerely hopes that this membership service will be fully used. Keep us busy serving you!

[1]See "Your Incoming QSL Bureau," *QST*, Nov. 1980, p. 54.

Recommended QSL-Card Dimensions

The efficient operation of the worldwide system of QSL bureaus requires that cards be easy to handle and sort. Cards of unusual dimensions, either much larger or much smaller than normal, slow the work of the bureaus, most of which is done by unpaid volunteers. A review of the cards received by the ARRL bureau indicates that most fall in the following range:
Height = 2-3/4 to 4-1/4 in. (70 to 110 mm)
Width = 4-3/4 to 6-1/4 in. (120 to 160 mm).
Cards in this range can be easily sorted, stacked and packaged. Cards outside this range create problems; in particular, the larger cards often cannot be handled without folding or otherwise damaging them. In the interest of efficient operation of the worldwide QSL bureau system, it is recommended that cards entering the system be limited to the range of dimensions given.

Table 1

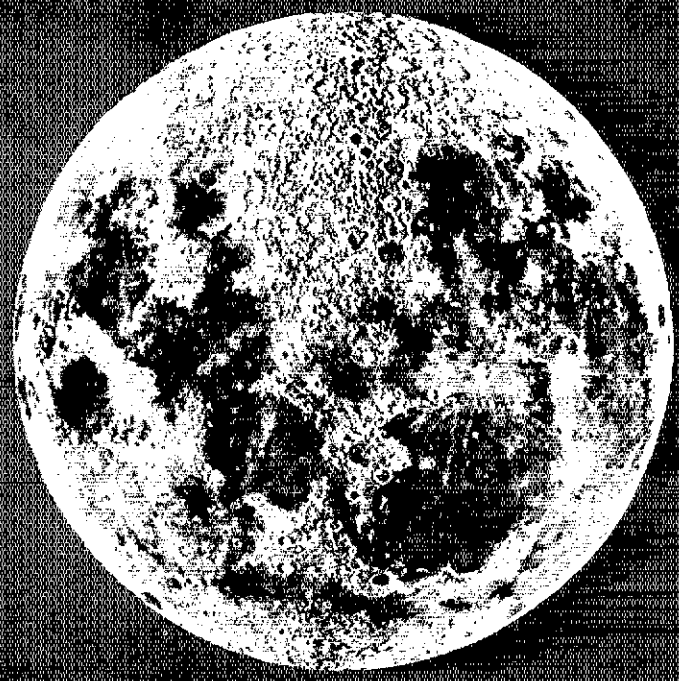
Countries for Which the ARRL-Membership Outgoing QSL Service May Be Used

Afghanistan
Alaska
Algeria
Angola
Antarctica
Antigua
Argentina
Ascension Island
Austral/French Antarctic Lands
Australia
Austria
Azores
Bahama Islands
Bahrain
Barbados
Belgium
Bermuda
Bolivia
Brazil
Bulgaria
Canada
Cape Verde Islands
Cayman Island
Chile
Colombia
Cook Islands
Costa Rica
Cuba
Cyprus
Czechoslovakia
Denmark
Dominica
Dominican Rep.
Ecuador
Egypt
El Salvador
Ethiopia
Falkland Islands
Faroe Islands
Fiji Islands
Finland
France
French Guiana
French Oceania
German Dem. Rep.
Germany, Fed. Rep. of
Ghana
Gibraltar
Grenada
Great Britain (or British Commonwealth)
Greece
Greenland
Guadaloupe
Guam
Guantanamo Bay
Guatemala
Guyana
Haiti
Hawaiian Islands
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
ITU-Geneva
Ivory Coast
Jamaica
Jan Mayen
Japan
Johnston Island
Jordan
Kenya
Korea
Kuwait
Lesotho
Liberia
Liechtenstein
Luxembourg
Madeira Islands
Malagasy Republic
Malawi
Malaysia
Maldives
Malta
Mariana Islands
Marshall Islands
Mauritius
Mexico
Midway Islands
Monaco
Mongolia
Morocco
Nauru
Netherlands
Netherlands Antilles
New Caledonia
New Zealand
Nicaragua
Nigeria
Northern Ireland
Norway
Oman
Pakistan
Panama
Papua New Guinea
Paraguay
Peru
Philippine Islands
Poland
Portugal
Puerto Rico
Republic of China
Romania
Rwanda
Somoa (American)
San Marino
Scotland
Senegal
Seychelles
Seirra Leone
Singapore
South Africa
Spain
Sri Lanka
St. Helena
St. Lucia
St. Vincent
Surinam
Svalbard
Swaziland
Sweden
Switzerland
Syria
Thailand
Togo
Tonga
Transkei
Trinidad and Tobago
Turkey
Uruguay
USSR
Vatican
Venezuela
Virgin Islands
Wales
Western Somoa
Yugoslavia
Zaire
Zambia
Zimbabwe

Wednesday, 3 A.M.

Not everyone sleeps peacefully through the night, especially "moonstruck" amateurs searching for that unforgettable EME QSO.

By Jim Stewart,* WA4MVI



Photograph is from the book, *A Field Guide to the Stars and Planets*, by Donald H. Menzel, published by Houghton Mifflin Co. Copyright © 1964 by Donald H. Menzel.

The alarm clock is ringing: It's 2:55 A.M. What fool's idea was this to get up at this time of night? . . . one brown sock, one black, who cares? I'm falling out of bed still only half awake. As I glance out of the window at the sleeping countryside, no one would ever suspect where I'm bound. On down to the shack, my "mad scientist's haven." Tonight, at this unlikely hour, I am about to attempt a strange adventure, a journey out into space and the unknown. Most of the preparation and preflight checks were complete last night.

As I get ready for the half-million-mile round trip, I wonder if this attempt will succeed or fail. The equipment is responding now — red and green lights, dials and meters, strange noises here and there. Operating parameters are coming into range, the necessary switches are "on," Zulu clock is checked and calibrated, recorders are on, controls are set and the checklist is complete. I won't need a seatbelt or "No Smoking" sign for this flight. Now to line up on target. The giant monolith of space-age technology (and my vehicle), the 144-MHz array, comes around into position, dimly visible in the moonlight.

*317 Wooddale Dr., Hendersonville, NC 28739

No, I'm not actually going myself, but in a few seconds I will press a switch that will send my radio signal on its way into space. The goal this time is our nearest neighbor, the moon. That signal, however, will continue on past Tranquility base, the craters of Copernicus and other lunar landscapes, into the depths of the cosmos. Will someone, someday, demodulate this tiny token of mankind?

It's 3 A.M., and there it goes. I transmit for 2 minutes, then listen for the same amount of time. Nothing heard. I transmit again at 3:04: Maybe I'll hear my echo return from the moon this time. Okay, there it is, barely discernible, but there nevertheless. It's a little noisy behind the moon tonight — probably from some galaxy thousands of light years distant.

A minute splattering of signal has returned and stimulated my receiver ever so slightly. Wait — what was that? A signal? There it is again, and it is not my signal this time. The timing is all wrong, and besides, I haven't transmitted for at least a minute. At the moon's distance tonight, my signal's round trip takes only several seconds. That is definitely another station transmitting! It's slow Morse . . . VK5? Impossible — that's Australia. Should I wake the household, maybe call the ARRL? The White House will probably want to know. Someone else must hear this for verification. Will they believe my tapes?

VK5MC . . . I must confess, I knew he might be on the air tonight. His antenna is fixed on the horizon and has a very narrow beam. Only a few times each month does the moon pass that magic point in the sky, and then only for a few brief minutes. Not much time left — reports exchanged and acknowledged, and our rendezvous has passed. It certainly went by fast: elapsed time — 8 minutes. Well, it's done . . . probably the most satisfying QSO of my experience. Australia on 2 meters — months, years of work!

Back down to Earth, everything is secure. The night air in the backyard smells good tonight, and the full moon in the southwestern sky looks brighter than on most nights. The air is bringing sleep to my eyes again. Maybe the "window" in the sky will occur at a more civil hour next month.

As I'm off to work later, it's not "just another day." The local repeater is unusually quiet this morning. There's just time for a short ragchew. I sure hope somebody asks me what I've been hearing on the bands lately . . . oh, they'd never believe me anyway! QST

Moved and Seconded

LIFE MEMBER APPLICANTS
June 20, 1981

Paul R. Aaron, WD8JJC; Terry D. Allison, WB5AZI; Taylor D. Ames, K3VBD; Donald W. Anderson, WA2OUE; Raymond D. Anderson, WB7ASZ; Timothy C. Armagost, WBØTUB; Eileen S. Armagost, WDØDGL; Milton C. Armstrong, WA4JYI; Jim Baker, KAØCCW; Lawrence M. Bargebuhr, W1GUW; Joseph James Barrett, KAØICU; Kay M. Barrow, WB4OSD; Norman R. Barton, VE1BZC; Gail Doreen Barton, VE1BJL; Richard M. Bash, KL7IHP; John M. Benker, Jr., WB1FTC; Otis C. Benoist, WD5KEC; David A. Bixler, WØCH; B. Neil Black, WB7SGK; Thomas M. Bland, Jr.; Richard Lee Boyd, WA3DSD; Norman H. Bracken, WA9JFS; Sherwood H. Brantley, KC5GC; Thomas Brosamle, WBØYNX; Edward C. Brostek, N4QU; Gerald R. Brunk, K4RBZ; Joseph F. Bruno, WB3FFL; Charles J. Buresh, WBØFNM; John M. Burrows, K9PRB; Edna C. Carlen, WA4JGD; Mike Carter, WB9TLN; Charles Chadwick, K8AXL; William P. Champlin, WD6FUZ; Frederick R. Claus, III, W3QM; Donald D. Cockroft, KA8DGI; Thomas M. Conner, Jr., N9CT; Dave J. Cook, W9ODL; Howard C. Crawford, WA3WUD; Leon H. Crouch, W5SQN; James S. Cude, WDØCBU; Victor I. Culver, K4JNM; Robert A. Cunningham, K1XR; Edward J. Dabrowski, WB9NLO; John Daraklis, WA2VHR; Robert H. Dargel, KA1BB; John G. David, KB1T; Milton W. Davis, KA8CCC; Ermanno DiLorenzo, WA3WMO; Marie E. Ditmore, KA5KNL; Jim Dixon, WD9JCX; Dwight David Donovan, WD8INN; W. J. Duncan, WD8JNQ; Michael J. Earnest, WAØARS; Billy Edwards, K4BWC; Cecilia H. Edwards, KA6ERE; Mary Ann Emely, KA1GKI; Dave Espasandin, WD8MOV; Ronald E. Etzweiler, WA3MKV; Robert Evans, WBØIQT; Floyd L. Forrest, Jr., AE4D; David J. Foster, N8CIV; Christopher J. Frechette; Marvin D. Friar, AF8D; Paul E. Galster; Larry Galvin, K8BYY; William M. Gentile, K8MG; Alan N. Gibbs, WB1FEU; Michael N. Gilbertsen, WØCYS; William B. Gillette, WB2KIW; James H. Gilliam, WD6EXX; Frances M. Gilliam, KA6AXH; E. A. Gloor, KA5AQQ; Hilliard J. Goldman, KAØBIZ; Michael W. Gravot, N2CHC; Richard T. Green, N8BJX; Robert Grochowsky, KØQLC; Robert J. Groth, WA2PRB; Don Wayne Grubb, WA4BZO; Benjamin J. Gruda, WB2NAO; Peter Guerlain, WA1VMI; Jack M. Gutzeit, W2LZX; Jeannine E. Hahn, KAØJWW; Eleanor J. Hammonds, W3BIW; Christine D. Harger, NM4C; Keith E. Harpold, WØRDC; John Hasselback, WA2DRG; Herbert W. Hatton, WA4BWZ; David L. Hawkins, WB5THE; Robert J. Hendrickson, AG3U; Jim Hill, N7AMV; John R. Hock, AGØE; Gregory D. Hodsdon, K7KJM; Ted Holt, K1TH; William A. Houser, WB4OKG; Dick Isard, WBØVVZ; James D. Jacks, KA4EDV; Richard M. Jansson, WD4FAB; Stephen A. Jensen, W6RHM; Norman E. Jeweler, K3LYW; Robert L. Johnsen, WB7CDU; Burton W. Johnson, KA2DHH; Roger E. Jorgensen, WDØBPC; Jefferson Joseph, WA2FUB; Edward Y. Kawane, KH6IM; Gary D. Kent, KA7IRJ; Leonard J. Kleiman, W6KGP; John A. Klobuchar, W1BZT; John W. Kmet, WA4ZTK; Donald M. Koch, WBØQOH; Phillip I. Koch, K3UA; Larry D. Kottke, WB7OUU; Reed O. Krenn, WA3JBQ; Janet K. Lane, WD9FIC; Harry W. Larsen, Jr., AF9K; Charles C. Larson, WBØTAL; R. Laskovich, VE5LY; Frederick L. Laube, AK8X; Dennis G. Lauby, Sr., WB7UFR; Shirley J. Layton, KA6COJ; R. Kent Leonard; Joseph R. Lewis, WB4WPP; Ron S. Libengood, W3DGK; Stephen A. Licht, WB2CZC; Gary C. Lizalek, WB9WPM; John D. Lock, WB5WOQ; Patrick A. Lorey, WA7NOD; Mary L. Lowe, KAØDSH; Charles A. Lukas, Jr., W1DOH; David S. Luker, KB4QF; Howard W. Lyon, WB3KFZ; Lewis A. Malchick, N2RQ; Richard S. Mann, KB4HF; Frederick Maseizik, K1SU; Luis D. Matho, CX1EK; Richard A. Mattner, WA2NCT; W. P. Maund, K5LTS; Daniel F. McConnell, AJ7K; Lauren P. McGavran, KQ5D; Gail P. Mendoza, WD6FCM; Ronald T. Menet, N6AUB; Robert G. Merchen, WBØPYL; William F. Mercure, WA4OMI; Christopher Milewski, WA8YWC; Mark Leroy Miller, WB3KIS; Wilson L. Miller, KA4HRJ; James H. Mims, W3IRV; Cornell L. Morgan, Jr., K2JHV; James V. Morgan, Jr., WB4QEB; Fernand Morizot, F6AST; Bruce A. Morris, WB3CLO; Leon M. Morrison, WA4IYH; Elvin T. Myers, KA4FPR; Joseph D. Naylor, K3MNT/N7XX; James F. Ness, AD3U; Gerald W. O'Harrow, WBØPPF; Karen A. O'Larey, KL7BN; Ronald Ochoa, WB6FRV; Duane Olexa, WD8OYF; William T. Pace, KB8ZM; Betty H. Pace; John L. Parker, WD6CZJ; John W. Parker, WB4UHC; Rulon L. Passey, W7EQC; James S. Payne, WA4CHL; Charles F. Pennington, K3NMF; Timothy J. Petersen, KØMTY; Herbert C. Petty, W3IVE; Earl E. Pfettscher, WN9HRB; Joseph L. Picior, WB4OSN; Edwin L. Pierce, II, WA6IEN; Lawrence A. Pierson, WD4CEB; Bruce R. Porter, N7AOD; Ken Prevo, KB9EU; Joe Prine, N4BU; Lawrence Purcell, N1AS; John C. Regner, Jr., N2AQR; George W. Reiland, N4APD; John I. Richardson, Jr., KB4AQ; Jeffrey M. Rinehart, WB4PJW; James Roach, WB6WVT; Richard K. Roth, WA1VSY; Ruel Samuels, 6Y5RS; Joel N. Schreibman, WA2UFU; Paul Thomas Schrum, Jr., WD4HBB; Jay Aron Schwartz, WB8SBI; David C. Sharpe, WA2VUC; Larry E. Sheridan, WB8WIM; Wayne D. Shipferling, AEØO; William D. J. Shinko, WB8KTA; Edwin L. Sidders, K1VGF/WA1VCE; Stephen M. Sirota, WB9IIT; Howard I. Smith, WB3CIW; Howard L. Soule, K1CZ/WA1MEY; David Southern, KA9EUL; Russell W. Spittler, KA6OUJ; Bill Spoto, WD6BFR; K. David Spotswood, WB3DTS; Preston Spruance, Jr., WB6IHU; Scott J. Stangler, WAØPLR; H. Gordon Steane, VE3BMG; Mitchell Stern, WB2JSJ; Timothy W. Stookey, N8AHK; Robert S. Sull, WA8IMO; Fred Swiatlowski, KA2BKN; J. E. Tamm, WB4TJZ; W. Lane Tarleton, KC4CD; Donald R. Tasson, WD9HDD; Robert F. Teitel, W3IDT; Rolland Jay Thomas, NL7L; Ronald N. Thompson, WD4KKH; Glen O. Timmerman, WA7ZNT; Robert Jay Tolotti, KC8W; Doris K. Tompkins, N7BOU; Harold D. Tutor, KK5K; Richard Ulrich, K2KOQ; Ike Van Artsdalen, WBØAAQ; Mark A. Vander Zanden, KB9TO; Laurence E. Vrooman, WB9DFD; Robert T. Wade, Jr., WA9NFO; Henry Wall, Jr., WØCZE; Peter P. Walter, K9PW; David E. Warnick, WA3MKB; James H. Watson, ABØY; Kirk Weatherman, AG6T; Richard M. Weaver, AB7PRC; Adam W. Weiss, WA1WMZ; Bill West, KA4GDV; Roger H. Wester, N6AVH; Mark Joseph Wilson, AA2Z; C. R. Whetstone, WA3YOH; John M. White, WB3DRE; Gary Wigle, KBØNI; George B. Wissing; James R. Wylder, WB6SDL; Nelson A. Zierold, WA6UPR; Edward W. Zobac, WA9BBN.

Bradley C. Algeo, Jr., W3EM; Robert J. Allen, WBØFVK; Thomas B. Arciero, WA2OHD; Steven Andrew Avritch, WB1EOB; Donald E. Baker, W7EQK; F. R. Barton, WD5EYA; Tommie E. Batchelor, KA5GIR; Robert E. Bauer, KC4HM; Charles G. Benn, WB2SNN; Larry J. Boggs, WB8SJD; Donald L. Biever, N4EBA; Jennifer Braithwood, KA2GOY; Jeanette Bronson, WB7QMU; R. W. Brostek, KE2L; Kathryn Inez Brown, WB3KTK; Charles Brown, WB3LCJ; Bill Bruno, KB2RC; Ronald Jay Buikema, KA9IJF; John C. Carmody, KØOAM/DJØTC; Frank R. Carmichael, Jr., WB5ASB; Lee F. Carroll, W1ZME; Robert L. Cecil, Sr., AB5W; Michael A. Chepponis, K3MC; Frank Christensen, WA9TRG; Roy G. Clay, III, WB5HVS; Jack E. Clark, W9HJM; Chris C. Cote, WB1EUK; Theodore J. Conway, W4EII; Phyllis M. Coreyll, WA6JBR; W. D. Cothren, W5BXJ; Charles L. Croatman, Jr., WB2ZKS; Richard O. Crosmer, W6ENZ; John A. Cummings, N4BKN; Paul T. Cummings, KA8AYG; Thomas R. Daniels, W1EOH; Robert B. Donaldson, WØGOR; James Dresbach; George S. Dubovsky, N4UA; Dan Dudley, Jr., K5LBX; Larry C. Earle, WD4LXC; Martha H. Felton; John R. Finn, WA1VUU; Ralph Flint, N2AHL; Roy Patterson Foote, N7AIF; Albert E. Fowerbaugh, KA8FCF; Robert W. Freyman, W5VO; Ralph E. Funkhouser, WB7VLW; Gerald J. Furman, KB3HI; Charles T. Geib, WD4GCK; James Goehrs, W7YMX; Barry L. Gold, N9BS; David M. Goldhaber, KB3EP; William M. Graham, WB7PMS; Grattan Gray, K8WXO; Don Greenwood; Marleen E. Grefer, N7CIN; Carl D. Gregory, K8CG; John E. Grimes, WA9JBM; Irving Gutin, WD2DXB; William L. Haas, W2GMY; M. A. Hall, WB9GAY; Ilene J. Hammack, K5IH; John H. Henning; A. B. Herman, KA7AHU; Jettie B. Hill, W6RFF; Herman F. Hoch, K1BHJ; Ian D. Howard, NE4D; John B. Huntington, WA6WVT; E. R. Ingraham, AEØF; R. W. Ingraham, W4UIO; Mike Jackson, N4AYO; Henry H. Jordan, Jr., WA4JXK; Morton B. Kahn, W2KR/K4KR; Gilbert Kauffman, K3ZTJ; John Martyn Keegan, WB6HMS; Kermit W. Landers, WD0GYZ; James B. Lawrence, Jr., N5CT; Dayle R. LeBeau, W4MUV; Jerry K. Liley, KØGUG; Philip A. Litchfield, WA1OFP; Tom M. Lott, KE4E; Robert O. Loving, Jr., K9JU; Murray Lycan, VE7EWG; Dean W. Manley, KH6B; William E. Martin, WB4KSP; Frederick Marvin, WA6BXJ; James A. Masterson, W7PSO; James D. Mayberry, KD9N; Kenneth Mark McGavran; Mark E. McMillan, KA7BTQ; Robert L. Mead, W8PPS; W. G. Messer, WB6VSA; Michael Metzler, WA6SOU; Norvel R. Moore, WD4ARQ; Larry B. Newton, N8BGJ; Calvin L. Nichols, WB2OFW; Bill J. O'Kain, K4LTA; John A. Oakberg, WA4EWN; Robert F. Orr, WB7AZW; Edward M. Oscarson, WA1TWX; Jerry Overman, KA4FRE; Stanley L. Palmer, KAØJHT; Woody Peitzer, AK2F; J. E. Percy, Jr., W5CWN; Sharon E. Pfeiffer; Carl Piepora, KA1EBN; Becky P. Pomfret, N2BHN; Charles S. Pulliam, WDØGCW; Spelman Prentice; Ted Rast, W6SMU; Robert B. Ravenscroft, W7IQD; Keith Ray, KN4C; John L. Rehak, N6HI; Art Richardson, KA3FJC; Lloyd B. Roach, K3QNT; James T. Ross, KAØFEW; Thomas A. Ross, K9GTQ; P. Terry Sabro, W7OLW; Dieter K. Schliemann, KX4Y; Tom Schreckengost, KA4TXH; Barbara Lou Schuyler, KA9KBH; Charles W. Schwartz, N5CTG; Richard T. Shankle, N5KV; Agnes S. Sheldon, KØKLQ; Phyllis A. Siegel, N6EJA; Kenneth E. Simpson, KA6CKN; Matthew W. Sirrine, WB7PMG; Gerald D. Skloot, KE2N; James L. Slater, WD8ILW; Michael H. Smith, WD4EMP; Terry T. Smith; Robert W. Soelch, W6KLQ; R. A. Spindler, KA9IUV; Thomas D. Stanley, Jr., KX4M; Richard Steele, WA6KQZ; David W. Stevens, KL7EB; Alyson C. Tanner, AD2B; David E. Tanner, W2DT; Michael D. Tanner, AD2C; Frank Tate, WB7RYC; James E. Thill, WD6EGS; James F. Townsend, KB4OW; Leonard L. Vander Esch, KB8TD; Leonidas Vasios, AI8B; Charles L. Wappner, WD8IYC; Joseph E. Warden, W8LNO; Dave Warner, Sr., N7COJ; Richard Wayne, W4CBG; William W. Webster, WB5PNX; Richard A. Wejmar, AF6T; Dennis E. Welch, WB7VUM; Robert A. Welzbacker, WA7IZU; John P. Wendler, N5CQU; Ellwood C. Wilder, Jr., WH6AFY; Raymond A. Williams, Jr., Carolyn R. Wilson, WB6TKD; James L. Winter, W4CMX; Robert A. Woolsey, KL7ENP.

Strays

I would like to get in touch with . . .

☐ former New York City residents who would like to form a net. L. Diamond, K2GFN, 320 W. 89th St., New York, NY 10024.

☐ anyone who served with the U.S. Armed Forces in Vietnam, to start a Vietnam veterans of America net. Ron Valastin, WB2TCQ, 207 Eastwood Ave., Deer Park, NY 11729.

☐ amateurs who served with the Second Air Division (all B-24 "Liberator" Bomb Groups) in England during WW II and who are interested in forming a net. Charles Weiss, W5SEH, 21 Moran Dr., Waldorf, MD 20601.

☐ anyone knowing of any books, fiction or personal accounts, which use Amateur Radio in their plots. Randy Powell, WAØQZW/6, 2644 Highland Ave., Santa Monica, CA 90405.

☐ amateurs who are rail fans. Bruce Fingerhood, KA7I, 1122 Trumbull Corners Rd., Newfield, NY 14867.

☐ hams who also collect minerals. Roger Kuchera, K1TG, 270 Tawny Thrush Rd., Naugatuck, CT 06770.

Happenings

Conducted By W. Dale Clift,* WA3NLO

ARRL Comments on Proposed VHF/UHF Changes Based on WARC-79 Results

The League has filed comments on the FCC's proposal to make several far-reaching changes in amateur frequency allocations at vhf and uhf. The proposed changes are a result of the Final Acts of the World Administrative Radio Conference (WARC) held in Geneva, Switzerland, in 1979. The FCC proposal, the Second Notice of Inquiry (NOI) in Docket 80-739, deals with all frequencies from 28 to 1215 MHz. The Second NOI was announced to the ARRL membership in last month's "Happenings," and can be summed up as follows:

28.0-29.7 MHz — No change.

50.0-54.0 MHz — No change.

144.0-148.0 MHz — Addition of Footnote 3499A, which concerns the use of the band in the event of natural disasters. (See Resolution BN in February 1980 *QST*, page 71.)

220-225 MHz — Addition of the Fixed and Mobile Services (primary status) and the upgrading of the Amateur Service to primary status. Government Radiolocation will be reduced to a secondary status after the year 1990.

420-450 MHz — Addition of Footnote NGZZ3 applicable to the segment 420-430 MHz prohibiting amateur operation from locations north of an imaginary line.[1] In some instances this line is approximately 140 miles from the Canadian-U.S. border. The Second NOI also proposed enlargement of the area around the White Sands Missile Range[2] (portions of Texas and New Mexico) in which a power limitation of 50 watts applies to the frequencies 420-450 MHz.

902-928 MHz — Creation of a new amateur secondary allocation. Government Radiolocation would be primary. Amateur operations would also be afforded no protection from interference caused by industrial, scientific and medical devices operating in accordance with FCC standards in effect at the date of the device's manufacture.

A Summary of the League's Comments

ARRL supports unconditionally the proposals for the amateur bands at 28, 50 and 144 MHz; therefore, it directs most of its comments to the more controversial proposals for the 220- and 420-MHz bands. The League also supports strongly the creation of a new amateur allocation at 902 to 928 MHz, requesting only minor clarification of this proposal.

Provisions for the Fixed and Mobile Services at 220 to 225 MHz

ARRL is highly critical of the Commission's proposal to include the Fixed and Mobile Services in the U.S. table of frequency allocations. Recounting the development of the U.S. WARC proposals for the 220- to 225-MHz band, the League reminds the Commission that a proposal for a CB-related radio service on the band was thoroughly explored and then rejected after opposition by ARRL in 1978. Even the FCC's last-minute proposal before WARC-79 for worldwide maritime communications at 216 to 225 MHz was, not surprisingly, defeated at the Conference in Geneva when other delegations failed to find any logic in this U.S. proposal. Other countries' existing and planned services for the 220- to 225-MHz band, including a firm commitment by Canada to maintain the entire band as an exclusive allocation to its Amateur Service, made the U.S. idea for a worldwide Maritime Mobile allocation unworkable.

The ARRL comments continued: It is a credit to the amateur spirit that U.S. amateur occupancy of the band has continued to grow dramatically in spite of the uncertainty the Commission has permitted to exist so long. Now the FCC proposes to include the Fixed and Mobile Services in the domestic table of frequency allocations. The Commission's lame excuse that this domestic proposal for 220 MHz provides "flexibility" simply keeps the Sword of Damocles dangling above the heads of the Amateur Radio community. There should be *encouragement* of amateur operations on the band. The League calls upon the FCC to make a clear and unequivocal statement to the Amateur Radio community that the 220-MHz band is no longer to be the target of every half-baked allocations scheme, as it has been for the past decade. It is time for the Commission to make a fresh start by deleting the Fixed and Mobile Services from its proposals at 220-225 MHz.

The Proposed Restrictions Along the Canadian Border at 420 to 430 MHz

The League recognizes that the Final Acts of WARC-79 require the FCC to protect Canadian fixed and mobile operations at 420 to 430 MHz from harmful interference by U.S. amateur stations. However, the League does not agree with the Commission's proposal to ban all amateur operation at these frequencies above Line A, as defined in Section 1.955 of the Commission's Rules.[3] To understand the situation fully it is necessary to know that the segment 420 to 430 MHz is used primarily for the control of remotely located stations and for amateur television (ATV) operation. Some fm (voice) repeaters have also been put on the air; however, repeaters are much more common in the 440- to 450-MHz segment.

Amateur stations used to remotely control another station, such as a repeater, are defined as being in auxiliary operation. Stations in auxiliary operation pose no threat of harmful interference to Canadian fixed and mobile operations because, by their very nature, their signals are of short duration and transmitted with low power and directional antennas. ATV stations also use directional antennas, except for ATV repeater stations. Even ATV repeater stations, however, have relatively low effective radiated powers, which are unlikely to cause harmful interference to narrowband systems. Accordingly, the League proposes substituting less severe language for Footnote NGZZ3. Additional explanation might be appropriate in Part 97 of the Commission's Rules, to wit:

> In the band 420-430 MHz, the amateur service shall not cause harmful interference to the fixed and mobile services in Canada. Operators of stations within 75 miles of the border with Canada are cautioned that they may be required to cease operation in this segment should such harmful interference be caused, and therefore are urged to use low transmitter power levels and to use antenna radiation patterns that direct their signal away from Canada.

If this is not deemed sufficient protection, the Commission may wish to establish a transmitter power limitation, such as 10 watts mean power output within 35 miles of the border, and perhaps to ban operation in the segment entirely within 5 miles of the border.

The FCC is obligated under the Communications Act to ". . . generally encourage the larger and more effective use of radio in the public interest . . .," and it would be inappropriate to impose greater restrictions than are required to honor our international commitments. Therefore, the League requests consideration of alternatives available to the Commission that would have much less impact on its amateur licensees than an outright ban.

Expansion of White Sands Missile Range Protection

The League has no objection to the expansion of the area around the White Sands Missile Range[2] (located in parts of Texas and New Mexico) in which a reduced power limit is in effect for amateur operations in the 420- to 450-MHz band, provided that requests for waivers are handled expeditiously and continue to be made available whenever possible. However, the ARRL asks the Commission to take into consideration the fact that though the City of El Paso will fall within the proposed

[1] *Line A* — Begins at Aberdeen, Washington, running by great circle arc to the intersection of 48° N., 120° W., thence along parallel 48° N. to the intersection of 95° W., thence by great circle arc through the southernmost point of Duluth, Minnesota, thence by great circle arc to 45° N., 95° W., thence southward along meridian 85° W., to its intersection with parallel 41° N., thence along parallel 41° N., to its intersection with meridian 82° W., thence by great circle arc through the southernmost point of Bangor, Maine, thence by great circle arc through the southernmost point of Searsport, Maine, at which point it terminates.

[2] The present area would be changed to latitudes 31°45′ N. and 34°30′ N, and longitudes 104°00′ W. and 107°30′ W.

*Deputy Manager, Membership Services, ARRL

[3] See note 1.

area, it is shielded from White Sands by a mountain range.

New Allocation of 902 to 928 MHz

The League is greatly encouraged to see the proposal for an amateur allocation, on a secondary basis, at 902-928 MHz. This allocation has been available to amateurs in Canada for more than a year, and U.S. amateurs are looking forward to use of the band themselves. ARRL recognizes that amateur operations will not be protected from interference from government radiolocation and industrial, medical and scientific devices operating in accordance with FCC standards in effect at the time of their manufacture. However, the League believes that the relative status of the Amateur Service to Automatic Vehicle Monitoring (AVM) systems operating on this band should be clarified. Services such as the Amateur Service listed in the international Table of Frequency Allocations are deserving of a higher status than services such as AVM, which are not listed in the Table. For that reason ARRL requests that Footnote US218 be modified to clarify the point that AVM systems may not cause harmful interference to amateur stations and must tolerate any interference from amateur stations authorized in these bands.

ARRL has no information on the reasons amateur operations on 902 to 928 MHz cannot be permitted in portions of Colorado and Wyoming[4] and requests that the matter be reviewed to ensure that the restrictions are necessary.

[4]Proposed Footnote USYY36: In the band 902 to 928 MHz, Amateur Radio stations shall not operate within the states of Colorado and Wyoming, bounded by the area of latitude 39° N. to 42° N. and longitude 103° W. to 108° W.

INLAND EXPANSION OF 420- TO 450-MHz RADIOLOCATION PROPOSED

The Federal Communications Commission has proposed allowing inland expansion of nongovernment radiolocation operations in the 420- to 450-MHz band in a Notice of Proposed Rulemaking (NPRM) in General Docket 80-135. Under the present rules the FCC allows nongovernment radiolocation on these frequencies only along the shore lines of Alaska and the contiguous 48 states. Offshore radiolocation on the 420-MHz band is used for mapping offshore areas for oil exploration, precisely determining drilling locations and hydrography research. Inland radiolocation on the 420-MHz band would have forestry, agricultural and aerial surveying applications.

The NPRM seeks to amend Parts 2 and 90 of the Commission's Rules to permit nongovernment radiolocation inland on a secondary, noninterference basis to government radiolocation and the Amateur Radio Service. According to an FCC News Release announcing the proposal, the Commission would authorize nongovernment radiolocation inland on a case-by-case basis only, with particular attention to the applicant's proposed power and antenna system requirements. These operations would be excluded in certain military areas.

The NPRM is in response to the second part of a petition by Del Norte Technology, Inc., a radiolocation equipment manufacturer. The first part of its petition asked the FCC to delete a cutoff date when offshore nongovernment radiolocation on the 420-MHz band would have been terminated. The Commission voted to delete this cutoff date last November. (See January 1981 *QST*, page 65.) Del Norte also asked the Commission to permit the use of spread-spectrum, a modulation technique using a pseudo-random digital sequence to scatter energy over a wide band of frequencies so that there is only a small amount of energy in any one hertz.

The Commission invites interested parties to comment on whether an interference standard should be included in the amended rules, whether station identification should be required of spread-spectrum systems, and information about the necessity and techniques for monitoring and identification related to the use of spread spectrum for radiolocation. Comments are due September 21, 1981. FCC rules require an original and five copies, but if you want each Commissioner to receive a personal copy of your comments you should include seven additional copies. Comments go to the Secretary, Federal Communications Commission, Washington DC 20554. Reply comments are due October 21.

INQUIRY/PROPOSAL ON SPREAD SPECTRUM IN AMATEUR SERVICE

The Federal Communications Commission has released a combination Notice of Inquiry (NOI) and Notice of Proposed Rulemaking (NPRM) to allow Amateur Extra and Advanced class licensees to conduct spread-spectrum experiments on certain bands without the need for special authorization. The NOI/NPRM in General Docket 81-414 proposes that 50 to 54 MHz, 144 to 148 MHz and 220 to 225 MHz be used for such spread spectrum experiments; however, the Commission would still welcome requests for special temporary authority to perform limited spread-spectrum experiments in the amateur bands above 225 MHz. Spread-spectrum is a modulation technique using a pseudo-random digital sequence to scatter energy over a wide band of frequencies so that there is only a small amount of energy at any one hertz. (See Rinaldo, "Spread Spectrum and the Radio Amateur," in November 1980 *QST*, page 15.)

According to an FCC News Release, spread spectrum would be limited to Amateur Extra and Advanced class licensees, who have been tested in advanced phases of radio electronics, because spread spectrum systems are inherently more complex than narrowband systems. The Commission concluded that these licensees are best qualified to build and operate the necessary equipment so as not to interfere with other radio users. The release also stated that material covering spread-spectrum techniques will be added to future Amateur Extra and Advanced class tests.

The Commission proposes not to limit system design, but to require a spread-spectrum system's bandwidth to be equal to or less than the width of the amateur band being used and contained within that band. Although no interference problems are anticipated, local engineers-in-charge will be allowed to require stations transmitting spread-spectrum signals to cease operation, if necessary, to stop interference.

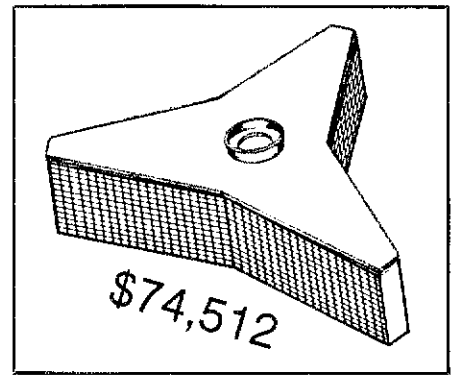
In March of this year, the Commission's Private Radio Bureau authorized the Amateur Radio Research and Development Corporation (AMRAD) to conduct limited tests using spread-spectrum modulation. (See May 1981 *QST*, page 59.) When AMRAD's special temporary authority expires, its findings will be considered in this proceeding.

The NOI/NPRM contains provisions to facilitate monitoring of amateur spread spectrum signals by the Field Operations Bureau and by other amateurs. Nevertheless, FCC Commissioner Abbott Washburn issued a concurring statement in which he said that he does not share the same feeling of comfort expressed by the other Commissioners. Washburn noted that the document includes the following language: "A major concern of the Commission in allowing amateur use of spread spectrum techniques is the Commission's, and the amateur's own ability, to monitor and locate stations transmitting wideband emissions." Washburn said that he felt a more prudent approach would be first to obtain the facts on monitoring and interference via the Notice of Inquiry, assess these facts and *then* move to Rulemaking.

The combination inquiry/proposal lists questions to guide those parties wishing to comment on this proceeding, so members wishing to obtain a copy of this document should send a business-sized, self-addressed, stamped envelope to ARRL Hq. Please specify Docket 81-414. As this article went to press, the wording of the proposal and the comment deadline had not yet been released to the public. However, League Hq. expects a long comment period — six months or so from the inquiry/proposal's publication in the *Federal Register*.

TWENTIETH ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

Help for amateur satellites is on the way — the ARRL Foundation continues to receive fine support from friends of Amateur Radio in response to its Twentieth Anniversary Satellite Fund Drive. (See "Your Help Is Needed," February 1981 *QST*, page 9.) Interested in becoming a part of tomorrow's telecommunications world today? Send your tax-deductible contribution to the ARRL Foundation, 225 Main St., Newington, CT 06111.



Recent contributors of $100 or more include: John Adel, W5RR; Stanley H. Black, K7ZIN; Barbara B. Berntsen, WB6RXP; John T. Bowman, W4BMN; Captain Robert N. Miller, W4PAE; Conrad "Chick" Boilard, WA1VCU; Bergen Amateur Radio Association; ARRL Director Frank M. Butler, W4RH; ARRL Foundation President Robert York Chapman, W1QV; Colonel Fred J. Elser, Ph.D., KH6CZ; Reidar G. Gabrielson, W7QEK; Walter W. Hoffman, WA6KGS; Kenton E. Marshall, W5TXV; Leo L. Meyerson, W0GFQ; Kjell Midtseter, LA3SG; Floyd A. Trueblood, W6TF; Terry Tyler, K4AZL; JARL President Shozo Hara, JA1AN; ARRL Foundation Treasurer F. Geoge duPont, WA1SVY; and the Yankee Radio Club. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation.*

K4MME AND W1GM MALICIOUS INTERFERENCE PROCEEDING

The Federal Communications Commission has ordered Gerard J. Morin, W1GM, of Sanford, Maine, and Leonard K. Boucher, K4MME, of Cantonment, Florida, to show cause why their Amateur Radio licenses should not be revoked. The order, issued June 4, 1981, also suspends W1GM and K4MME for the remainder of their terms (the suspension will be held in abeyance pending review by an FCC Administrative Law Judge at a hearing requested by the parties involved).

Information before the Commission indicates that at various times from August 1980 to June 1981, Morin and Boucher operated their stations in a manner that interfered with Amateur Radio public service nets. "Particularly," the Commission said, "information indicates that they have devised a scheme to deliberately and maliciously interfere with radio communications of the Maritime Mobile radio net on and around the frequency of 14.313 MHz.

"Although both Morin and Boucher are Extra Class licensees," the order continued, "and have the broadest radio privileges granted by the Commission, they have apparently operated a 'split frequency' scheme to maliciously interfere with radio net operations and prevent or frustrate the public service func-

tions of the radio net. By operating split frequency, adjacent to the frequency of the net, their transmissions are 'splattered' onto the net without their transmitting on the identical net frequency." The order further stated that, "information also indicates that Morin and Boucher also interfered with net operations by choosing their frequency and mode in such a manner that net operations are hampered."

"Specifically," the FCC document continued, "these schemes delayed the United States Coast Guard in California from obtaining assistance from the radio net on May 17, 1981." Boucher and Morin were both cited for such conduct: Morin was issued a Notice of Violation on February 26, 1981, for violation of Section 97.125 (malicious interference) resulting from radio operation on February 22 and 23, 1981. Boucher was issued a Notice of Violation for the same violation resulting from his operation on February 21, 1981.

The Commission views malicious interference as a very serious matter. "Conduct such as that described above," FCC said, "calls into question Boucher's and Morin's qualifications to retain their amateur licenses. Such conduct also warrants the suspension of their Amateur operator licenses."

In summary, the Commission will determine whether Boucher and Morin have willfully interfered with the radio operation of other operators, whether they have the requisite qualifications to remain Commission licensees and whether the licenses for W1GM and K4MME should be revoked. — *Richard Palm, K1CE.*

STAFF REPORT, FURTHER INQUIRY ON RFI RELEASED BY FCC

The Federal Communications Commission has released to the public a 92-page staff report on radio frequency interference (RFI) and released a Further Notice of Inquiry in General Docket 78-369. The staff report is a synopsis of why RFI has become an increasingly important issue, and summarizes the comments the Commission received in response to its much-heralded first Notice of Inquiry in General Docket 78-369. The report also explains the current status of the RFI problem, reviews in detail television front-end overload (especially that caused by CB radio) and presents policy options for solving CB/TVI and general RFI problems.

In November 1978, the Commission issued its first Notice of Inquiry on RFI in response to the large number of complaints it was receiving about radio frequency interference to home electronic entertainment equipment. (See January 1979 *QST*, page 64; February 1979 *QST*, page 61; and March 1979 *QST*, pages 9 and 48.) The League encouraged as many individuals and clubs as possible to send comments to the FCC. Of the 638 parties filing comments in that proceeding, about half favored some kind of government involvement in solving the RFI problem, ranging from requiring more government or industry information about interference to requiring specific components in receiving equipment. Most comments favoring regulation came from Amateur Radio operators and individuals experiencing interference. Another group comprising about one-fifth of those responding were from individuals complaining about RFI. The rest of those who commented opposed further government involvement. Among the forefront of those opposing FCC involvement in setting minimum standards for RFI susceptibility of electronic equipment were the Consumer Electronics Group of the Electronics Industries Association (EIA) and the Zenith Radio Corporation. They took the position that RFI is not a widespread problem and should be dealt with by voluntary measures. Others opposing further government involvement suggested stepped-up enforcement of existing FCC regulations on transmitting equipment, especially those pertaining to CB operators.

In its summary of the RFI problem, the Commission's staff report stated that some recent data suggests a change in the types of radio-frequency devices creating interference. The continually increasing impact of the microprocessor on everyday life is likely to change the RFI picture, and Field Operations Bureau engineers have reported that complaints of interference from computers and other devices using microprocessors are increasing. However, CB-related RFI still accounts for 64% of all complaints received by the FCC (fiscal year 1980). The report noted that, historically, people experiencing interference have sought relief from the FCC.

> To the citizen, it seems somewhat unfair that an amateur (ham) or CB operator complying with FCC technical requirements can dramatically affect his or her neighbors with interference. Yet, that situation exists throughout the country.

A footnote to the foregoing statement added:

> To the amateur (ham) or CB operator it also seems unfair that although in full compliance with FCC technical requirements they feel obligated to reduce or eliminate the enjoyment of their hobby due to a concern for their neighbor when the "fault" is with their neighbor's set.

The Interference Environment

Chapter two of the Commission's staff report gave an outline of the interference environment. It put RFI into two broad categories: on-channel and off-channel interference. On-channel interference sources are unwanted signals on a desired channel from an assigned on-channel user. Off-channel interference is from a licensed or nonlicensed spectrum user not assigned to but nonetheless radiating some rf energy on the interference victim's channel. According to the Commission staff, the only way to resolve on-channel interference is by reassigning an on-channel source to a different frequency (which is not generally practical) or by increasing the ratio of the desired signal power to the undesired signal power.

Off-channel interference sources, said the Commission staff, can occur even when a transmitter is in compliance with FCC technical specifications. In particular the Commission mentioned that today more [television] viewers are physically close to transmitters, and the rf environment includes much stronger signals than were assumed in receiver design. Such receivers overload and generate spurious signals, which results in interference. The Commission staff also reported that recent data suggests that interference from nonlicensed spectrum users, such as garage door openers, may be a "sleeping giant" with the number of complaints rising dramatically.

Even though overload-related interference is the single largest category of complaints, the FCC does not now have a convenient regulatory handle to resolve this problem, the report admitted. Another problem involves the relationship between receiver selectivity and interference. One of the report's examples of selectivity-related interference involved 6-meter operation. According to the Commission,

> Other examples of inter-service interference sources include amateur stations operating in the 6-meter band affecting adjacent TV channel 2, and military shipboard radar that can interfere with channel 13 in port cities.

Even beyond these specific examples, many unseen, or half-seen, communications technologies may change future spectrum usage. Any action taken now by the Commission will establish incentives affecting the emergence of new technologies.

CB/TVI

Chapter three of the report was devoted to TV interference from CB radios. The Commission assessed the severity of CB-related TVI primarily by a study it conducted in 1976 and 1977. The report concluded that of many factors, three (power, harmonic radiation and receiver front-end overload) were of major consequence. According to the Commission,

> Since the time of the study the FCC has taken action to reduce the severity of the first two causes. In 1977 the FCC took action to reduce the availability of illegal "linear amplifiers," external amplifiers designed to increase the power of a CB transmitter making it more likely to cause interference.[1] This action should have reduced the potential for interference due to overpower operation. With respect to the second cause, harmonic radiation . . ., the FCC in 1977 increased its requirements for the suppression of harmonic radiation from CB transmitters. (FCC footnotes omitted)

[1]Editor's Note: For information on the Commission's action on this matter, see "FCC Bans 10-Meter Amplifiers," "Happenings," May 1978 *QST*, page 46.

It is with respect to the third major cause of TVI, front-end overload, that the FCC report admits progress has been slow. It noted that in July 1977 the Electronics Industries Association (EIA) drafted a bulletin outlining procedures that could be used to test the susceptibility of TV sets to interference from CB transmissions. This draft was issued formally by the EIA in February 1980.[4] However, this bulletin is not an EIA-recommended standard, and manufacturers are under no obligation to adopt its suggestions. Thus, the effect of the guidelines on the RFI environment is not clear.

Policy Options

According to the Commission staff report, there are five alternatives for dealing with the problem of CB-caused TVI: mandatory standards, voluntary standards, combined transmitter/receiver limited liability, other transmitter liability options and labeling. Under the mandatory standards option, the Commission would develop specific performance standards for television receivers and would require receivers to meet those standards as part of the certification process. Generating the proposed standards may be costly, especially those standards involving overload. However, a mandatory standard, if chosen properly, offers the highest probability of all the options for controlling overload-induced TVI and the greatest certainty to manufacturers and consumers.

Voluntary standards would also prove useful in reducing TV receiver susceptibility to overload. However, voluntary standards, such as the EIA guidelines, raise other questions. For example, what would the standard's effectiveness be if all the manufacturers adopted the standard?

A combined transmitter/receiver limited-liability option would be an alternative to either direct regulation of receivers or voluntary cooperation by the industry. The Commission would establish a "level of care" on both transmitters and receivers. A CB operator, for example, could discharge his liability by using type-accepted equipment and an omnidirectional antenna. Similarly, a TV manufacturer could discharge liability by demonstrating that its receivers met some accepted performance guideline. But either could fail to meet these specified levels of care and still discharge their liability through other means, such as victim compensation or manufacturer-supplied filters.

A shared-liability approach is, according to the report, almost certain to increase enforcement and transaction costs, although these increases would be divided between manufacturers, the courts and the FCC. Nevertheless, the liability approach would provide some savings in efficiency when compared to mandatory receiver standards. For example, the Commission could continue not only to require type acceptance for CB equipment but also to impose an additional liability on those operators who utilize high-gain, directional antennas. A regulation that imposed such a liability could provide the Field Operations Bureau with an additional "tool" to help solve egregious overload cases. However, one negative aspect of this type of liability policy is that it might provide incentives to CB operators to use means of increasing range that are less visible (use of linear amplifiers or amateur transmitters, for example).

The Commission also could establish absolute responsibility for resolution of the RFI problem on the transmitter operator. However, the Commission does not believe that this is an efficient solution for CB/TVI problems because of the enormous enforcement and transactions costs required by the huge number of CB transmitters.

Another alternative is a Commission-sponsored program on grading and labeling of receiver RFI susceptibility. Such a program could involve not only rating receivers, but also grading the rf environment. Labels could be mandated or voluntary. In theory, a labeling program is appealing because it allows considerable flexibility to manufacturers and consumers.

The report's preliminary evaluation of these five

[4]"Susceptibility of TV Tuners To Harmonically Generated Interference," EIA, *Consumer Products Engineering Bulletin No. 8-A, February 1980, attached as Appendix A to the FCC staff report in the Further NOI in General Docket 78-369.*

alternatives is that three — mandatory and voluntary standards, and the shared-liability approach — are probably better than the others for dealing with CB-caused overload of TV receivers.

Dealing with the Overall Problem

For dealing with the overall RFI problem, the Commission staff grouped its options into three basic policy approaches: *direct regulation*, which would require spectrum users or equipment manufacturers to meet certain performance standards or to apply specific interference cures; *establishment of clear responsibility* for interference; and *reliance on market incentives*.

Direct Regulation would fall into two categories: those that address the interfering signal and those that address the affected equipment. New limitations on licensed spectrum users could further restrict the effective radiated power of their signals. Overload interference could be controlled. The interfering signal need not be so reduced in strength that it no longer would provide the service, but the spatial field strength radiation pattern of transmitted signals would be changed. Finally, interference to the i-f band of home receivers could be controlled by eliminating or reducing the interfering signal.

On the other hand, direct regulation of home electronic equipment would require that there be standards specifying a minimum level of RFI susceptibility for receivers. The signal strength against which receivers had to be protected might vary with the frequency of the out-of-band signal, and unacceptable reception degradation would have to be defined. Receiver susceptibility standards would impose on receiver manufacturers the costs of designing, manufacturing, testing and demonstrating compliance. These costs, in turn, would be passed on to the consumer.

The report continued that direct regulation of home equipment does not seem to be the most promising way to control interference. Some interference can be controlled with home receiving antenna — directional antennas — or by special filters. It would be difficult, however, to design or to enforce a regulation that would require use of such equipment even if the Commission had the authority to do so.

There are two advantages to direct regulation. First, direct regulations may be relatively easy to administer because they specify clearly what is required for compliance. Second, there is some certainty about what actions will be taken to control interference. The disadvantage of direct regulation is its lack of flexibility. No single method will be the least costly way of dealing with every interference case. Also, direct regulation will require that the Commission judge which interference cures should be applied. Given the complexity of the problem, the difficulties of that task should not be underestimated, the report warned.

Liability Rules

An alternative to direct regulation is rules that establish who is responsible for interference. Such rules would shift the responsibility for interference control from the government to the affected parties. These rules would not establish how the interference is to be reduced: rather, they would ascertain who was responsible and leave it up to that party to choose the method for avoiding the interference.

One possible liability rule option would make the operators of the transmitter of the interfering signal responsible for resolving all interference complaints. How the operators would resolve the interference would be their decision. They could even choose not to transmit at all if the expected costs of resolving the interference were so great the service would not be profitable. In other interference cases particularly difficult to resolve, the operator simply could choose to compensate the person(s) experiencing the interference.

The report acknowledges that many questions come to the surface when considering a transmitter liability rule option. Who should be responsible? Would responsibility extend to all signals causing interference or only to new signals interfering with the signals of established services? Furthermore, placing the liability for interference on those transmitting is unlikely to create incentives for manufacturers to design home equipment with more interference protection.

The other possible liability rule option would make the manufacturers of home electronic equipment responsible; i.e., the Commission could, with the requisite statutory authority, make receiver manufacturers responsible for resolving complaints of interference. Manufacturers would have more flexibility than they would under direct regulation because they would have the option of adding protection to the receivers of users who complain of interference.

Responsibility of receiver manufacturers could be limited in several ways. First, manufacturers might be made more responsible only for certain kinds of interference. Furthermore, manufacturers might not be made responsible for interference in particularly difficult environments. Third, they might be able to discharge their responsibility by meeting a specified level of care. In such cases the rf emitters might be made responsible for the remaining interference. Rules could also be written making manufacturers of nonreceivers responsible for interference.

Implicit Responsibility of Users and Manufacturers of Home Equipment

According to the Commission, interference that is not controlled by direct regulation and for which no one is assigned specific responsibility becomes, implicitly, the responsibility of the home user of electronic equipment. They suffer the interference and must decide how to deal with it. They can live with the interference, try to change the installation of the equipment, or complain to the manufacturer of the equipment or purchase different equipment. Because of the last two options, the market will implicitly shift some of the responsibility for interference to manufacturers of home electronic equipment.

This market mechanism allows a third policy approach to controlling interference. By choosing not to eliminate all RFI by direct regulation of rf emitters, the Commission can create incentives for equipment manufacturers to design equipment less susceptible to interference.

Grading and Labeling

A final option, the report concluded, would be for the Commission to establish a program of grading and labeling the immunity to interference of home electronic equipment. There could be a variety of labeling schemes, but these schemes would fall mostly into two categories: voluntary and mandatory labeling.

Although labeling in and of itself may be helpful to consumers, the benefits of labels may depend on consumer knowledge of their radio environments. The Commission could, directly or indirectly, attempt to distinguish among the radio environments based upon their interference potentials. Consumers in different areas might desire receivers providing different levels of protection; however, multiple lines of equipment may reduce the savings of large-scale manufacture. In addition, unexpected interference may occur when people move or find that they have not taken into account new sources of RFI.

Recommendations

The problems created by RFI are serious and getting worse. Unfortunately, RFI is a complicated problem with no panacea to instantly and efficiently solve all facets of the problem. Our best available data, however, suggests that a significant part of the RFI problem is TV receiver overload caused by CB radio (and to a lesser extent by Amateur (ham) Radio). By initially concentrating on this one problem, which is estimated to be the source of 25% of *all* interference complaints received by the FCC, the Commission has an opportunity to make a significant improvement in reducing citizen complaints and annoyance. The publication by the EIA of an rf-susceptibility performance guideline for television receivers brings hope that significant improvement is possible. Although we still have some questions about the EIA guideline, it clearly is a useful beginning.

Based on its preliminary analysis, the Commission staff report recommended that the FCC take the following actions: issue a Further Notice of Inquiry with three main goals — (a) seeking comments from the public on its staff's report, (b) seeking comments on the five policy options discussed in chapter three regarding CB/TVI and (c) seeking specific information about the adequacy and degree of manufacturers' compliance with the EIA performance guideline.

Comment Deadline

The Commission has requested that consumers, equipment manufacturers, service technicians, government agencies, economists, engineers, licensees and all other interested parties participate in this Further Notice of Inquiry in General Docket 78-369. Comments are due September 30, 1981, with replies due November 16. ARRL members may request a copy of the Further NOI by sending to League Hq. a large, self-addressed 9" × 12" envelope with $1.54 postage for first-class delivery. Specify "Further NOI in 78-369." Because this article is only a brief summary of the 92-page Commission staff report, Hq. recommends that prospective commenters request a copy of the entire document.

FLURRY OF FCC ACTION IN RULEMAKINGS

In a recent whirlwind of regulatory action, the Federal Communications Commission dismissed several petitions for rulemaking filed by individuals. The following is a summary of these actions.

RM-3027 — Eliminate Technician and Advanced Classes

The petitioner, Henry B. Ruh, KB9FO, proposed the elimination of the Technician and Advance class licenses, reallocation of current Advanced class privileges to the General class license, "grandfathering" of Technician and Advanced class licensees to General and Extra Class, respectively, and the administration of all exams by volunteer examiners. The petitioner expressed belief that these changes would reduce costs incurred by FCC in the administration of the Amateur Service. In dismissing the petition, the Commission noted that similar issues were considered in a different proceeding, which resulted in significant changes in licensing and examinations. FCC felt that Ruh offered no basis for reconsideration of these issues.

RM-3053 — Time Limit For Return of Novice Exam Papers

Herbert J. Lacey, Jr., proposed that FCC amend §97.28(b)(3), which requires volunteer examiners to return the completed or unopened Novice exam papers to the Commission "no later than 30 days after the date the papers are mailed by the Commission (the date of mailing is normally stamped by the Commission on the outside of the examination envelope)." Lacy proposed that this language be changed to require the volunteer examiner to return the Novice papers to the Commission "postmarked no later than the date stamped by the Commission on the outside of the examination envelope," so that the burden of computing the end of the 30-day period would be removed from the volunteer examiner. The Commission dismissed the petition as unnecessary because "rule Section 97.28(b)(3) clearly specifies that the exams must be returned within the 30-day limit. There is no requirement that the Commission must have *received* the examination papers within 30 days. The examination papers are considered as returned when they are mailed." In the Order dismissing Lacy's petition, the Commission explained the reason for the time limit as emphasizing the responsibility of the volunteer examiner and reducing the possibility of compromising the examination.

RM-3211 — Eliminate Requirement That Volunteer Examiner Be 18 Years or Older

The petitioner, Lawrence D. Rand, argued that setting an age limit for volunteer examiners is "discriminatory" because no age limit is necessary to obtain an Amateur Radio license. In dismissing the petition, the Commission said, "In our opinion, this distinction underscores the nature of the responsibility assumed by the volunteer examiner. . . The legal responsibilities invested in the volunteer examiner . . . traditionally have been associated with attainment of legal majority." The Order also made note of FCC's action in 1977 lowering the minimum age for volunteer examiners from 21 to 18.

Petition for Redefinition of Third-Party Traffic

Charles R. Clark proposed to exclude amateurs from the category of third parties as defined in Section 97.3(v). The Commission dismissed the petition as redundant because of its extensive consideration of the

matter in Docket 19245 wherein it established the current third-party traffic definition. (Note: an RM-number was not assigned to this petition.)

"Grandfathering" Proposed

H. Frank Jordan asked that Advanced class licensees of 40 or more years standing, who also possess First Class Radiotelephone licenses, be "grandfathered" to Extra Class without exam. The Commission denied the petition as "redundant and frivolous"; the issued had been decided earlier when previous "grandfather" clauses were abolished.

RM-3541 — "Grandfather Rights"

The petitioner, John Willard, K3ZKW, requested FCC to upgrade to the Amateur Extra class those operators who held the General class, or higher license, prior to the Incentive Licensing program of 1968, without examination. Willard asserts that the Commission unfairly removed privileges earned by amateurs when it adopted the RO in Docket 15928 on August 24, 1967. In dismissing RM-3541, the Commission said that it has considered the entire matter of General class operator privileges in four extensive rulemaking proceeding over the past thirty years. "His petition is repetitive in that it presents no new facts or issues to warrant further consideration", the Commission said.

Extra Class Callsign Proposal

The FCC denied a rulemaking request filed by Robert A. Wiley, Jan H. Clute, William E. Huebener, Brad D. Harris and Eric Santon for modification of Section 97.51 so that Amateur Extra Class licensees could obtain specific calls. Acting under delegated authority, the chief, Private Radio Bureau, pointed out that the issue had been thoroughly discussed and decided in Docket 21135 and that the petitioners had raised no new arguments.

RM-3035 — Novice Class Privilege Expansion Proposal

In an Order adopted June 15, 1981, the Commission dismissed the petition for rulemaking filed by the American Radio Relay League, Inc., requesting amendment of Part 97 to increase Novice class privileges to include the frequencies 3675 kHz to 3750 kHz.

In other actions, the Commission dismissed RM-3091, filed by Alan Kaul, that requested an allocation of 28.4 MHz to 28.5 MHz for use of low-power a-m amateur stations. RM-3238, filed by Charles Robert Cox proposing additional Extra Class A3J privileges at 21.225 to 21.250 MHz and 28.350 to 28.500 MHz, was dismissed in the June 15 FCC Order.

James J. Walsh, III, proposed in RM-3866 to provide an incentive sub-band at 28.400 to 28.500 MHz. This petition was also dismissed by the Chief of FCC's Private Radio Bureau. — *Richard Palm, K1CE*

NOTE

Because of space limitations, the call for nominations for ARRL Advisory Committees will appear in next month's "Happenings."

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1AD, Charles S. Doe, Bellows Falls, VT
W1AMR, Paul E. Bailey, Sheepscot, ME
W1CKM, Lester Riley, Pawtucket, RI
W1CRP, Philip W. McCrum, Portland, ME
WB1FEL, Lawrence N. Henry, Newton, MA
W1GVK, Fred H. Harrison, Stratford, CT
W1HMJ, Frank C. L. Sperry, Newtown, PA
W1JOC, Paul H. Bailey, Winthrop, ME
W1LDC, Richard I. Davis, Auburn, ME
W1OA, John "Jack" Kenny, Adams, MA
Ex-K1PUW, Angelo V. Puopolo, Somerville, MA
K1QFX, Lorenzo M. Armstrong, West Hartford, CT
W1WKL, John E. Rogers, Hyattsville, MD
W1WNP, Benjamin L. Smith, Concord, MA
*W1XF, George J. Markland, Storrs, CT
W1ZBY, Lawrence T. Stover, Portland, ME
WA2ARB, Bernard R. Beehler, Sr., Westfield, NY
WB2BHW, Joseph R. D'Amico, Brooklyn, NY
W2EAF, Eugene M. Gillespie, Boston, NY
WA2EHS, Orville M. Davis, Syracuse, NY
KA2EWV, Clifford J. Moore, Hasbrouck Heights, NJ
WB2GNZ, Inger Lapham, Bayport, NY
WB2JIE, Thomas Cleland, Sterling, NY
K2LIW, Margaret M. Sajor, Freehold, NJ
W2POV, Catello Buonocore, New City, NY
K2RAO, John G. Bourne, Hasbrouck Heights, OH
W2RKI, Franklin X. May, Buffalo, NY
WB2RYD, Herman Glaser, Brooklyn, NY
W2TUT, Clifford M. Norberg, New Hyde Park, NY
*WB2TWY, Howard C. Hayes, Amityville, NY
W2UEZ, Henry W. West, Red Bank, NJ
*W2VBP, Raymond F. Kubiszewski, Oceanport, NJ
K2YOL, Vernon T. Blose, Endicott, NY
*W2YR, Edward B. Patterson, Haddonfield, NJ
W3DX, Henry A. Crossland, Rockville, MD
WA3ETN, Richard M. Wendler, Camp Hill, PA
W3FER, C. Irvin Metzger, Martinsburg, PA
WA3IRD, Douglas A. Ward, Washington, DC
W3JTL, Anthony J. Verboys, Uniondale, PA
W3RFT, Elvin B. Feigum, Cranesville, PA
W3RYP, Franklin O. Thornton, Easton, PA
K3TPT, William F. Harman, Norristown, PA
WA3TXO, William D. Craft, Duquesne, PA
K3UUO, William J. Stroup, Warrington, PA
K3VAS, Robert F. Schrecker, Natrona Heights, PA
W3VB, William L. Opdyke, West Chester, PA
WA3VTN, William P. Bishop, Port Allegany, PA
K3WOK, Morris Sussman, Pipersville, PA
W3YBR, August A. Reismeyer, Glenshaw, PA
N4BHI, Hobart M. Shaw, Adelphi, MD
K4CAA, Harry E. Cudney, Nobleton, FL
W4FBH, Roy D. Snider, Decatur, GA
*W4FZX, Charles E. Terry, Orlando, FL
WD4HWL, Howard S. Griffith, Tallahassee, FL
KU4I, James F. Petrey, Ashland, KY
WD4JIE, Hans U. Gregorius, Stanley, NC
K4JP, Henry Nintzel, Lauder Hill, FL
KA4KLO, Charles A. Ingraham, Lake Wales, FL
WD4KPF, Virgil F. Heiken, Lawtey, FL
K4KQM, O. Henry Tiedeman, Overland Park, KS
W4LAZ, Thomas D. Pereira, Oakland Park, FL
*WB4PZW, Paul R. Browne, Raleigh, NC
WA4SYD, Charles J. Phaneuf, Jr., Ocala, FL
W4TDY, George W. Cook, Jr., Gainesville, GA
W4TSS, Alfred S. Howard, Colonial Beach, VA
W4UQU, Dalla T. Watts, Winston Salem, NC
K4WII, James G. Cotton, Sr., Melbourne, FL
W4YL, Elsie S. McCraw, Mountain Home, NC
WB4ZPM, Benedict Newell, Hendersonville, NC
N4ZY, John M. Brady, Madeira Beach, FL
N5AEF, Dexter B. Babcock, San Antonio, TX
WB5DKJ, Stanley E. Hawkins, Amite, LA
W5DKR, Eugene H. Treadaway, Sr., New Orleans, LA
W5DRO, Grant W. Moore, San Antonio, TX
WD5FMI, Byron Fox, Muskogee, OK
WB5KTQ, Carey H. Wise, Jackson, MS
W5KWQ, Owen Garriott, Sr., Enid, OK
W5LRT, Earl N. Englerth, McAllen, TX
K5RHX, Charles E. Shanks, Ponca City, OK
Ex-W5SI, E. Ray Arledge, North Little Rock, AR
W5VW, Robert A. Glover, Houston, TX
W5WGW, Robert J. Scussell, Albuquerque, NM
WB5WWA, Virgil L. Joseph, Bull Shoals, AR
W6AYL, Vernon A. Hansen, S. San Francisco, CA
*W6DEF, Harold Moore, Auburn, CA
WD6EOL, Paul M. Carroll, Los Angeles, CA
*Ex-W6EXX, William R. Luebke, Redwood City, CA
W6FF, Andrew J. Kirinich, San Diego, CA
WD6FIR, John F. Williams, Placerville, CA
WB6GOY, Rudy Alvarez, Harbor City, CA
KH6HGJ, William R. Stone, Honolulu, HI
K6HO, Paul C. Patterson, Laguna Hills, CA
K6HSA, Arthur S. Preston, Temple City, CA
Ex-W6IRA, Stanley Van Sickle, Leucadia, CA
WB6IWQ, Joseph R. Snow, Fresno, CA
WB6JQH, Richard P. Baird, Los Angeles, CA
WB6LVR, Robert L. Morgan, Mountain Home, ID
W6MEY, Nick T. Delgardo, Madera, CA
W6SEH, Russel J. Morrison, Bernadino, CA
K6SUE, Paul W. Morrison, Glendale, CA
W6ZXR, Dr. Murray O. Westerbeck, Bakersfield, CA
N7AQL, Lawrence G. Hayes, Payson, AZ
K7CF, Arby Lee Bailey, Wickenburg, AZ
W7EFV, Henry O. Pattison, Tucson, AZ
W7GS, Henry G. Gordon, Casper, WY
K7JVP, Allen J. Holliday, Salt Lake City, UT
K7KD, Dave Williams, Clackamas, OR
W7LTO, Jack B. Kyle, Eugene, OR
W7MDN, Robert D. Nagle, Port Orford, OR
W7OK, W. Don Brickey, Las Vegas, NV
W7SAX, Sidney E. Pierce, Washougal, WA
W7TLQ, Chester E. Weed, Myrtle Point, OR
W8AXR, Walter E. Kell, Liverpool, OH
W8BPK, Paul J. Henry, Toronto, OH
W8BRE, Ray C. Spence, Parkersburg, WV
W8BVS, Wayne M. Armstrong, Ottawa Lake, MI
W8CDV, Lincoln J. Hahle, Wheeling, WV
W8CDQ, Robert E. Mix, Rogers City, MI
W8DUD, Charles Glines, Morrow, OH
WB8EEQ, Robert A. Carr, Muskegon, MI
KA8DYK, Andrew Beach, Baldwin, MI
W8EUC, Albert Preblich, South Range, MI
K8HZV, Paul A. Weaver, Tipp City, OH
W8LPC, Ralph E. Sullivan, Cincinnati, OH
Ex-W8MCB, George E. Ryan, Detroit, MI
K8MHO, Paul E. Busch, Deshler, OH
W8NKU, Carl W. Krueger, Toledo, OH
W8PHR, Frank E. Walsmith, Logan, OH
W8WXO, Sidney A. Dunn, Flint, MI
W9BNO, Paul E. Johnson, Rockford, IL
WB9BVA, Frederick F. Willett, West Allis, WI
Ex-W9DTK, Charles S. Potacheck, Milwaukee, WI
WD9DZJ, Leo R. Gambill, Shelburn, IN
WD9EDC, Brian E. DeLisle, Ft. Wayne, IN
WA9GJZ, Joseph H. West, Columbus, IN
W9HUD, Glenn D. Montgomery, Scarsdale, NY
W9JLU, Leslie E. Ingram, Eagle River, WI
WA9PLG, M.B. Flanigan, Indianapolis, IN
*K9RBW, Robert W. Wilson, Atlanta, IL
WA9SUJ, Gary A. Jacobsen, Colgate, WI
W9WR, Frederick J. Hinds, Berwyn, IL
WA9WTF, Glen L. Lethlean, Apple River, IL
WØBJW, George Keller, Cherokee, IA
WAØBYZ, Carl A. Erdmann, Sunset Hills, MO
KAØCCS, Elise White, Arvada, CO
Ex-KAØDUQ, Paul R. Peterson, Zim, MN
WAØERA, Eldon Louis, Colorado Springs, CO
WAØGDQ, John L. Sawyer, Cherokee, IA
WBØJGJ, Robert D. Walton, Des Moines, IA
WØYNN, Norbert M. Zinniel, Melrose, MN
KH6CS, Milton L. Smale, Kona, HI
VE1APG, Kenneth Carter, Kentville, NS
VE3AWI, Ernest Barker, Goderich, ON
VE3DEG, Arnold B. Swayze, Wainfleet, ON
VE3FE, Jasper D. A. Smith, Oakville, ON
VE3FXM, Myrtle L. Manning, Toronto, ON
VE3HFD, Dr. Douglas Hermann, Manotick, ON
VE3IKQ, Alan Laird, West Hill, ON
VE3JA, Brodie Gillies, Braeside, ON
VE3KZY, George Hopkins, Toronto, ON
VE3LQF, Fernande Boyer, North Bay, ON
VE3VG, Harry P. Livingston, Toronto, ON
EA3AOO, Ernest Diez Corominas, Girona, Spain
G5BCJ, Earl H. Leland, South Yorks, England
Ex-S79EP, Eric Passmere, Mahe, Seychelles
VK5FH, Fred A. Haas, Crafers, S. Australia
ZL1BI, Charles H. Freeman, Auckland, New Zealand

*Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

International and National Law

Most amateurs know that it is illegal (and not nice) to transmit obscenities, to maliciously interfere with other communications and to use unauthorized frequencies. They know that Part 97 is thy set of commandments of Amateur Radio. They know that the omnipotent powers that be are the Commissioners of the Federal Communications Commission, and that all amateurs had better abide by the rules or face the consequences — a possible *life sentence* (*life* without Amateur Radio, that is). But how many know the origins of the rules or where the FCC gets its authority to issue them? Where is Amateur Radio in the international and national scheme of things?

This month, we'll examine these questions and extend our perspective beyond the day-to-day dealings with Part 97.

Q. What is meant by international regulations?

A. Because of the international nature of radio waves (i.e., they don't stop at country borders for customs checks), there must exist a mechanism to prevent chaos in the radio frequency spectrum. And, there is — the International Telecommunication Union, or ITU.

The ITU determines the needs and relative importance of a vast array of radio services and, accordingly, issues frequency allocations and corresponding regulations. The ITU accomplishes this large task by holding international conferences such as WARC-79 (see "The Geneva Story" February 1980 *QST*). Allocations for radio services are adopted or modified in the form of the International Radio Regulations of the ITU.

With these internationally agreed-upon allocations and regulations, it is then up to the radio authorities in each nation to set aside frequencies and modes for their own radio services. For example, in the U.S. and Canada, our governments have, almost without exception, given to amateurs every frequency band possible under international law. In some cases, our governments have actually left out services that are eligible to use the band according to the ITU — mighty praise for Amateur Radio, indeed!

Q. What are some of the more important Amateur Radio international regulations?

A. The Radio Regulations of the ITU define the Amateur Service and amateur stations as follows:

Amateur Service — A service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

Amateur station — A station in the amateur service.

Other ITU rules applicable to Amateur Radio are found in Article 32 (see table) of the International Radio Regulations, which will replace the present IRR Article 41 on January 1, 1982.

Table 1

International Radio Regulations — Amateur Stations

Article 32: Amateur Service and Amateur-Satellite Service

Section I. Amateur Service

§ 1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

§ 2. (1) When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified.

(1A) It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

(2) The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

§3. (1) Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

(2) Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station.

§ 4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to operate.

§ 5. (1) All the general rules of the Convention and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permits.

(2) During the course of their transmissions, amateur stations shall transmit their call sign at short intervals.

Section II. Amateur-Satellite Service

§ 5A. The provisions of Section I of this Article shall apply equally, as appropriate, to the amateur-satellite service.

§ 6. Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in Article N20/15. Administrations authorizing such space stations shall inform the IFRB and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference that might be reported can be terminated by the authorizing administration (see No. 6105/470V).

Q. How does the Communications Act of 1934 apply to Amateur Radio?

A. An Act of Congress, the Communications Act of 1934 created the Federal Communications Commission at Section 1 "for the purpose of regulating interstate and foreign commerce in communication by wire and radio. . . ." Section 4 of the Act gives the composition of the Commission: seven Commissioners appointed by the President, by and with the consent of the Senate, one of whom the President designates as chairman. Section 301 states in part, "No person shall use or operate any apparatus for the transmission of energy or communications by radio . . . except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act." The harmful-interference section (Sec. 302) provides authority to the FCC to regulate interference potential of radio frequency devices.

Much of the Commission's authority comes from Section 303 of the Act, which allows the Commission to classify radio stations, define the nature of the services, determine locations of stations, assign frequencies, regulate radio equipment, study new uses and encourage more effective use of radio, require station records, prescribe the qualifications of station operators, and issue licenses. Paragraph m grants the Commission authority to suspend the license of any operator upon sufficient proof that the licensee has violated any provision of any Act, treaty or convention binding on the U.S., which the Commission is authorized to administer, or any regulation made by the Commission under any such Act, treaty or convention; or has failed to comply with the orders of a ship's or aircraft's master on which he is employed; or has willfully damaged radio apparatus; or transmitted obscene language, false or deceptive signals, or a call sign not authorized to the station he is operating; or has willfully or maliciously interfered with any other radio signals; or has attempted to obtain or help another to obtain an operator's license by fraudulent means.

Other paragraphs of Sec. 303 provide Commission authority to inspect radio stations, designate station call signs, require painting and/or lighting of towers, and to make rules and regulations to carry out the provisions of the Act (or any international radio or wire communications treaty or convention).

Section 321 provides for absolute priority to radio communications or signals relating to ships in distress. Section 324 mandates the use of minimum power necessary to carry out the communication desired. Section 501 provides penalties for violation of the Communications Act — a fine of not more than $10,000 or by imprisonment for a term not exceeding one year, or both. The secrecy provisions are found in Sec. 605. QST

*Assistant Manager, Membership Services, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Your CRRL Representatives and Workers

In September, Amateur Radio activities move into high gear, both at the individual and the club level. Perhaps you or your group have a concern or an idea about which you'd like some action. Perhaps you need a film, slide show or speaker for your club. Contact one of your CRRL representatives or workers. They're in every part of Canada, and there's probably one near you. In the list below, responsibilities are indicated. A/D means assistant director, and PIA means public information assistant. All are League contact people. They're amateurs working for other amateurs. They're here to serve *you.*

Newfoundland: Clarence Mitchell, VO1AW (A/D), 49 Gambier St., St. Johns, NF A1B 3G2
Nova Scotia: Ed Redman, VE1BIQ (PIA, films), Box 935, Dartmouth, NS B2Z 3Z6; Randy Smith, VE1SAT (A/D), Box 881, Greenwood, NS B0P 1N0
New Brunswick: Andy McLellan, VE1ASJ (A/D, Central QSL Bureau), 2316 Rothsay Rd., St. John, NB E2H 2K5; Don Welling, VE1WF (A/D), 36 Sherwood Dr., St. John, NB E2J 3H6
Quebec: Albert Daemen, VE2IJ (CRRL Eastern Director), 2960 Douglas Ave., Montreal, PQ H3R 2E3; Robert Benson, VE2VW (CRRL Counsel), 652 Lansdowne Ave., Montreal, PQ H3Y 2V8
Ontario: Al d'Eon, VE3AND (PIA), 22 Broadlands Blvd., Don Mills, ON M3A 1J2; William Skidmore, VE3AUI (IARU Intruder Watch), RR 1, Hyde Park, ON N0M 1Z0; William Loucks, VE3AR (A/D, CRTPB liaison), 155 Brentwood Rd. North, Toronto, ON M8X 2C8; Gordon Steane, VE3BMG (A/D), 211 Kirk Dr., Thornhill, ON L3T 3L7; Tom Atkins, VE3CDM (CRRL Central Director, IARU liaison), 55 Havenbrook Blvd., Willowdale, ON M2J 1A7; Larry Thivierge, VE3GT (A/D), 34 Bruce St. West, Renfrew, ON K7V 3W1; William Hardie, VE3EFX (A/D), Box 190, Tiverton, ON N0G 2T0; Fred Hammond, VE3HC (A/D), 81 College Ave. West, Guelph, ON N1G 1S2; Wilf Antheunis, VE3FEA (PIA, films), 1254 Avenue Rd., Toronto, ON M5N 2G7; William Rumball, VE3KGJ (A/D, Administration Asst.), 38 Southview Pl., London, ON N6J 1S2; Ray Perrin, VE3FN (A/D, DOC liaison), 128 Withrow Ave., Nepean, ON K2G 3N7; Tom McKee, VE3KO (PIA), 7140 Matchete Rd., Windsor, ON N9J 2S3; Noreen Nimmons, VE3GOL (A/D), 114 Babcombe Dr., Thornhill, ON L3T 1N1; Dick Reiber, VE3IBV (A/D, Administration Asst.), 417 Regal Dr., London, ON N5Y 1J8; Harry MacLean, VE3GRO (A/D, PIA), 163 Meridene Cres. West, London, ON N5X 1G3; Martin Rosenthal, VE3MR, Box 73, Unionville, ON L3R 2L8; David McCarter, VE3GSO (PIA), 511 Hibiscus Ave., London, ON N6H 3P2; Mitch Powell, VE3OT (CRRL President, ARRL Director), 782 North Mile Rd., London, ON N6H 2X8
Manitoba: John Gowron, VE4ADS (A/D, PIA Coordinator), 229 Kisel Bay, Winnipeg, MB R2K 3E7; Gil Frederick, VE4AG (A/D), 130 Maureen St., Winnipeg, MB R3K 1M2
Saskatchewan: Percy Crosthwaite, VE5RP (A/D, CRRL Convention), RR 3, Saskatoon, SK S7K 3J6
Alberta: William Gillespie, VE6ABC (A/D, PIA, films), 10129 90th St., Edmonton, AB T5H 1R5; Fred Towner, VE6XX (CRRL Secretary, ARRL Vice Director), 123 Rundleridge Close, N.E., Calgary, AB T1Y 2L2; George Spencer, VE6AW (CRRL Western Director), 18303 67th Ave., Edmonton, AB T5T 2H8
British Columbia: Ralph Zbarsky, VE7BTG (A/D, licencing manuals), 3275 West 22nd Ave., Vancouver, BC V6L 1N1; Sid Jones, VE7FDR (A/D), 8028 Saanichton Rd., Saanichton, BC V0S 1M0; William Kremer, VE7CSD (A/D), 536 Garfield St., New Westminister, BC V3L 4A7

The following are on League advisory committees. They welcome your input.

Henry Thel, VE7WJ, Contests; Harold Parsons, VE3QA, DX; Mike Goldstein, VE3GFN, Emergency Communication; Tom Atkins, VE3CDM, Public Relations; Ron MacKay, VE1AIC, Repeaters; and Les Weir, VE3AIB, VHF-UHF.

Your elected SCM, and their appointed SECs, ECs, STMs and NMs, are also at your service. A list of SCMs appears on page 8 of every *QST.*

CRRL MATERIALS

What's available, and how much does it cost?

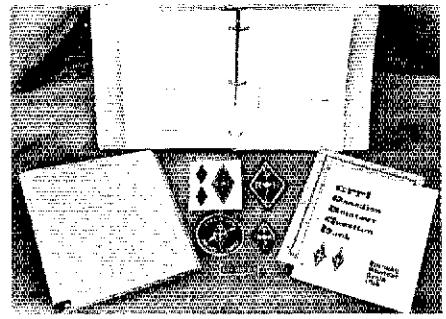
The *Canadian Amateur Radio Licencing Manuals* "The best Canadian licencing manuals on the market." That's what hundreds of satisfied users say. Straightforward explanations, clear diagrams, author Ralph Zbarsky's subtle humor — it's all there to help you learn what you need to know for your Amateur or Advanced Amateur certificate. Cost: *Amateur,* in three-ring binder — $13.50 postpaid; *Advanced Amateur,* ready for your binder — $9 postpaid.

The *CRRL Canadian Amateur Questions Book* Recently revised with over 600 questions and their answers, this book is useful for both the Amateur and Advanced Amateur certificates. It is keyed to recent DOC exams. Cost: $6.50 postpaid.

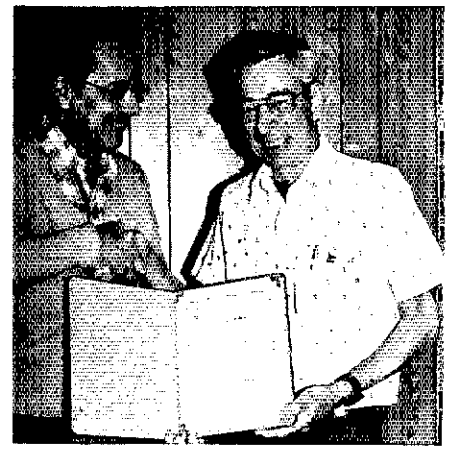
CRRL cloth patches Dress up your jacket or cap. Same size, style and quality as the ARRL patches, which are also available. All are made in Canada. Cost: CRRL ARES or large diamond patch — $2.75 postpaid; small diamond patch — $1.75 postpaid; life member chevron — $1.25 postpaid.

CRRL diamond logo stickers Two small and one large diamond per sheet, they are black and gold and may be applied to any surface. Washable. Cost: sheet — $1 postpaid.

Order all items from CRRL, Box 7009, Station E, London, ON N5Y 4J9.



Material now available from CRRL. For description, price and how to order, see text.



Tom McKee, VE3KO (left) presents Ed Doyle, VE3EWD, with a Certificate of Merit at a recent meeting of Windsor (Ontario) ARC. The certificate was issued in recognition of Ed's many years of service as EC, Ontario SEC and manager of the Ontario Phone Net.

NEWS FROM ALL OVER

☐ The new CRRL *Canadian Amateur Questions Book* was introduced at the recent Guelph Amateur Radio Flea Market. All comments were highly favorable. The *Questions Book* contains over 600 questions, including all questions on recent DOC exams, and their answers. It is useful for both the Amateur and Advanced Amateur certificates. The book is the joint effort of members of Burnaby Amateur Radio Club and CRRL workers in London, Ontario. Copies are $6.50 postpaid. Order from Dave Fancy, VE7EWI, Burnaby ARC, Box 80083, Station South, Burnaby, BC, or from CRRL, Box 7009, Station E, London, ON.

☐ Tom Wong, VE7BC, has returned from another trip to China. With Canadian embassy officials in attendance, Tom presented Chinese authorities with the 18-1/2 tons of League publications — 28,500 new books in all — that had been shipped to China earlier this year. The shipment was a goodwill gesture, the gift of U.S. and Canadian League members to the people of China. Also on the trip, Chinese radio enthusiasts, many of them former amateurs, honoured Tom at a special dinner. As a result of the books, and Tom's good work, it appears that prospects for the re-establishment of Amateur Radio in China are better than ever.

☐ Welcome and best wishes to Melfort (Saskatchewan) ARC which recently became an ARRL-CRRL affiliated club.

☐ Remember when we wouldn't go to each other's picnics? CRRL President Mitch Powell, VE3OT, and other CRRL representatives attended the CARF Symposium, held in Winnipeg on May 26. Mitch found the Symposium most worthwhile. On another note, Mitch had Canadian high score in the cw portion of the CQ Worldwide WPX Contest — and won the CARF trophy for his efforts!

☐ Dr. Jack Belrose, VE2CV, of Alymer, Quebec, recently accepted a League Technical Advisor appointment. Technical advisors are a select group of amateurs, in both the U.S. and Canada, who have expertise in specific areas of Amateur Radio. Jack is an expert on antennas and antenna testing. He is well known for his fine articles in *QST* and *Ham Radio Magazine.*

*163 Meridene Crescent West, London, ON N5X 1G3

International News

Conducted By David Sumner,* K1ZZ

CCIR Studies the Possibility of a Fourth ITU Region

For reasons that seem to be somewhat buried in antiquity but that actually make a great deal of technical and operational sense, the International Telecommunication Union (ITU) has divided the world into three regions. Region 1 comprises Europe (including all of the Soviet Union) and Africa. Region 2 includes North and South America. Region 3 takes in the rest of the world, including the Far East, Southeast Asia, most of the Pacific islands, Australia and New Zealand.

In recent years some of the developing countries, principally in Africa, have begun putting forth the concept of a fourth ITU region, to be essentially the continent of Africa. They believe that this would ensure a more equitable allocation of frequencies for those third-world administrations who have only recently become more heavily involved in telecommunications.

This thought was put forward at WARC-79, but did not receive sufficient support for immediate action. The International Radio Consultative Committee (CCIR) was directed by the Conference to study the matter and to make a suitable report. As a result, CCIR formed an International Working Party (IWP 5/4), which met in Geneva, Switzerland, in May of this year.

Because the International Amateur Radio Union (IARU) is organized on a regional basis similar to the ITU, it was felt that the establishment of a fourth region by ITU would probably require the formation of a fourth region in IARU. The work of CCIR IWP 5/4 was, therefore, of considerable interest to the IARU, and we took advantage of our privileged status within the framework of ITU to participate in the work of IWP 5/4. IARU Hq. was represented by Richard L. Baldwin, W1RU, ARRL General Manager and IARU Secretary, and by Merle Glunt, W3OKN, ARRL's consultant on frequency management and international conferences. IARU Region 1, which would be split in two if a fourth region were formed, was represented by Eric Godsmark, G5CO, who assists IARU Region 1 secretary G2BVN, and who was a member of the IARU WARC-79 team.

W1RU spends a few relaxed moments with Henri Kieffer. Mr. Kieffer is a member of the Swiss telecommunications administration and is very active in the work of the ITU. Although not an amateur himself, he has been most supportive of and helpful to the amateur service.

IWP 5/4 was chaired by a member of the Nigerian administration, and other countries participating in the work of the working party included Kenya, Canada, France, Algeria, the Federal Republic of Germany, the United Kingdom, The United States, Cameroun, Ivory Coast, Iran, Iraq, Japan, the Netherlands, Sweden and the Soviet Union.

The working party spent several days reviewing the background papers that had been submitted for their consideration by several administrations and reviewing the various technical and operational bases that might govern whether a fourth ITU region ought to be established. All those participating in the work of the group, including IARU, had ample opportunity to make their views known. By the end of a week of discussion, the consensus of the group was that there was no technical or operational justification for the formation of a fourth ITU region.

This report of CCIR IWP 5/4 will gradually filter through the CCIR committee structure, and someday may surface at a future World Administrative Radio Conference.

There is now an IARU committee, appointed by IARU President Noel Eaton, VE3CJ, studying how IARU might be restructured for even more productive operation in the future. As a result of the report of CCIR IWP 5/4, the possibility of a fourth IARU region is *not* one of the problems that the IARU Restructuring Committee will have to wrestle with. — *Richard L. Baldwin, W1RU*

REVISION OF JAPANESE RADIO REGS FOR FOREIGN OPERATORS

The following valuable information has been received from Shozo Hara, JA1AN, president of the Japan Amateur Radio League:

> With reference to establishment and operation of an amateur station by foreigners in Japan, I have the honor to inform you that the legislative bill for the revision of certain sections of the Radio Laws of Japan was successfully passed by the Japanese Diet on 15 May and proclaimed on 23 May last.
>
> The revised provisions will come into force six months after 23 May last, the date of their proclamation. In these six months, Japanese authority will make detailed regulations necessary for their enforcement.
>
> The main points of the revised provisions relating to amateur radio including the subject of establishment and operation of an amateur station by foreigners mentioned above are as follows:
>
> 1) Regarding establishment and operation of an amateur station by foreigners in Japan:
>
> (1) A license for an amateur station may be granted to an alien in whose country the same kind of license is granted to a Japanese.
>
> (2) Conditions or term or other limitations may be fixed upon a license of an alien amateur station mentioned in para. (1) above, keeping the balance to those conditions or term or other limitations fixed upon a license of an amateur station of a Japanese in that country.
>
> 2) Regarding the State examination for amateur radio operators:
>
> (1) The Minister of Posts and Telecommunications may designate a testing agency which conducts the State examination for lower classes of amateur radio operators, e.g. Radiotelegraph Amateur Radio Operator and Radiotelephone Amateur Radio Operators, in place of the Minister.
>
> (2) The designation of a testing agency mentioned in para. (1) above, is to be made on an application submitted by the testing agency.
>
> In case the Minister designates a testing agency as mentioned in para. (1), the State examination for that class of amateur radio operators concerned with the designation will not be conducted by the Minister.
>
> (3) The designated testing agency shall use qualified persons having necessary knowledge and technical ability in conducting the State examination concerned with. .

We expect that detailed regulations for the revision of the Radio Laws will soon be published. Those who may be planning a trip to Japan can write ARRL Hq. for the latest information.

*Assistant General Manager, ARRL

YL News and Views

Conducted By Jean Peacor,* K1IJV

Food for Thought for Fall

Notable Headlines

"Short Trip Shows Students the World. Amateur Radio Gives Link to the World. Amateur Radio Club Ham Can 'Work the World.' Kudos to the Hams. Operation Santa Claus Cheers Up the Young and Old Patients."

These headlines have appeared in the Whittier, California *Daily Star-Progress* and the *Whittier Review* over the course of the past year. Every headline is good PR for Amateur Radio; every one the result of the efforts of Violet Barrett, W6CBA. Vi writes, "I've done more PR work for ham radio than operating — hi."

Field Trips Provide Introduction to Amateur Radio

The first three headlines resulted from one of Vi's pet projects: She introduces children to Amateur Radio by giving talks throughout the East Whittier School District. She has been doing this for 10 years. Her talks include showing Dave Bell's film, *The Wonderful World of Amateur Radio.*

Her talks are followed up with an invitation for a field trip to her home, where she provides the children, and the parents who chaperone them, with on-the-air contacts. They have contacted stations in Missouri, New Mexico, Canada, Chicago, West Virginia and, in talking with an Oklahoma station, learned that whereas it was raining in California, the sun was shining in Oklahoma City.

Vi provides first-hand demonstrations of what ham radio is all about. She also explains its more serious side with descriptions of her time spent during the Vietnam War in contacting the hospital ship *USS Sanctuary* while that ship was in the South China Sea. These contacts provided wounded men with the opportunity to reassure local relatives. She also explains the organization of Rio Hondo Amateur Radio Club members who are ready to offer their services during any type of disaster such as a major earthquake.

Vi Barrett, W6CBA, provides "food for thought."

Santa and His Elves

The other headlines resulted from Vi's latest pet project, one that's to become an annual event. Last October, she contacted the four major hospitals in the Whittier, La Habra and La Mirada areas, plus one convalescent hospital, suggesting Operation Santa Claus. The hospitals more than welcomed the idea, and provided full cooperation.

By December, Vi had things well organized. Santa would be at a base station in the hospital, while three or four other operators with HTs would use a simplex frequency and relay information back to Santa. The hospital provided tidbits of information about each patient to make the visit far more personal. Vi went from room to room with a big red wagon, which carried her transceiver, power supply and magnetic-mount antenna. A 50-foot extension cord made it possible to visit more than one room on one hookup. Christmas is not just for children; the ages of patients visited ranged from 1-1/2 years old to 92 years young.

A few excerpts from the many newspaper comments on the project follow.

> Patients thought they'd trip the old guy who said he was the genuine Santa Claus, and asked if they could talk with the elves. With eight hams on the premises, it was pretty easy to give them an elf.
>
> One of the patients was supposed to be doing exercises for strengthening her arms, but the nurses let us know she wasn't cooperating. When Santa asked her why, she suddenly started flapping her arms and saying, "I'm doing them."

The nurses really love it; it gives the kids such a lift. The Christmas spirit was felt in these hospitals — a spirit that increased among participating radio amateurs with every hospital visit.

W6CBA

Violet Barrett's first introduction to Amateur Radio came during her junior high school years. Her uncle Ed, W6HMW (SK), encouraged her to become an SWL. Through the patience of Frank Cuevas, W6AOA, Vi became licensed while in high school on Valentine's Day in 1948. Over the years, she has been active in Navy MARS. She teaches a cw class in conjunction with an Amateur Radio class at Whittier's local junior college year round.

Vi has been a radio dispatcher for the FBI Office in Los Angeles, and for the past seven years, she has been employed as receptionist and PBX operator with the East Whittier School District. Her Amateur Radio credits include being past president and secretary of YLRC of Los Angeles; being president and past secretary of Rio Hondo ARC; having membership in QCWA, QCWW and Southern California DXC; YL International SSBers (past treasurer); being an ARRL Life Member; a member of YLRL (past sixth district chairman) and being elected to the A-1 Op Club. She is an Extra Class licensee. Vi's husband, Don (Santa Claus), became licensed as KA6DJK two and a half years ago. Amateur Radio has played a most important part in Vi's life.

With the advent of the new fall season, projects similar to those Vi has been doing would be stimulating in any community. They're certainly "food for thought."

RAG CHEWING LEADS TO EYEBALL QSO

Erhard, DJ6RQ, and Gladys, WB2OQY, first met on the air on Christmas Day in 1979. The contact was of special interest to Gladys' husband, Jan, WA2OQW, because Erhard lives in Braunschweig, Germany — where Jan, at that time a Dutch citizen, was put into a German forced-labor camp after the invasion of Holland in WW II.

The chance meeting grew into a weekly schedule. The climax came in the fall of 1980 when Erhard flew to Toronto, Canada. He was met there by Gladys and Jan carrying a big sign saying, "DJ6RQ, here is WB2OQY." The sign puzzled all of the 300 arriving passengers except Erhard.

The three drove to Gladys and Jan's home in Hinsdale, NY, for a 10-day visit. Erhard, who had never been to the USA enjoyed a fun-filled time. They visited Niagara Falls, the Finger lakes, wineries, state parks and other tourist attractions. One of the highlights for Erhard was a backyard neighborhood cookout, where he tried, for the first time, all of the traditional American picnic foods, horseshoe pitching, and a big songfest.

Erhard has invited Gladys and Jan to visit his home in Germany this year. If all went as planned, they were "portable DJ" this summer.

Enjoying an eyeball QSO in Hinsdale, New York: Erhard, DJ6RQ, Gladys, WB2OQY and Jan, WA2OQW.

RESULTS — YLRL's DXYL TO NAYL CONTEST

SSB High Scorers

DXYL		*NAYL*
DJ1TE — 2094*	Gold Cup	VE6AUP — 338
PS8YL — 1418*	Second Place	WD8IAD — 300*
VK3KS — 880	Third Place	W2GLB — 263*

CW High Scorers

DXYL		*NAYL*
VK3KS — 70*	Gold Cup	KA3CUF — 75*
OK2BBI — 31*	Second Place	WA2NFY — 20
DF2SL — 25	Third Place	WD5FQX — 8*

Plaque Winners (Combined Scores)

DXYL	*NAYL*
VK3KS	WD5FQX

*Low-power multiplier

*Country Club Dr., Monson, MA 01057

How's DX?

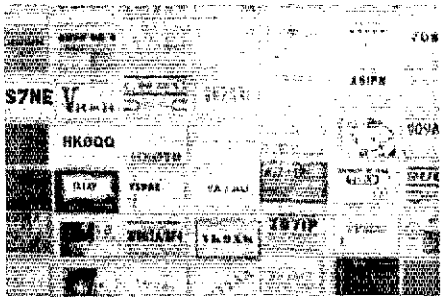
Conducted By Ellen White,* W1YL/4

Home-built DXing

Fred Keller, K7KG (ex-K7DOB), feels that making the DXCC Honor Roll has given him great satisfaction with his all home-built station. Before Fred was even out of high school he began building his own equipment. First he constructed a small, three-tube receiver, and next a 4-400 linear, which he still uses.

K7KG hopes new DXers will understand that 100-ft towers and $5000 worth of gear are not necessary. (In fact, Fred says that you're probably saying, "Sure, but the competition in 1958 was nothing compared with 1981," and you're right!) That guy on the other end, however, the one on the rare island, probably has a receiver that doesn't drift 2 kHz every *time someone turns on a light bulb!*

Starting ham radio at the age of 14 has its problems, and Fred relates a typical episode with a happier-than-usual ending. He called CQ DX on top of a rare VQ3 (a new one for W7AQB — in 1958, that is). Well, Phil, W7AQB, now was aware that a *new* DXer was in town. He called Fred and proferred operating advice as well as endless technical aid with Fred's first linear.



"Start them young," says K7KG of Puyallup, Washington! Here he is with daughter Kim and son John, who can copy many letters of the code at age four. Many vintage DX QSLs are displayed in Fred's shack. *(photos by Robert Young)*

The station gear includes a home-built receiver, recently installed in a new cabinet, and an oscillator circuit redesigned to work with a digital readout. Just above the receiver is a 50-watt ssb/cw filter-type exciter (featured in an early sixties ARRL *Handbook*). Also included is a home-built rf processor and a converted Navy surplus antenna tuner, in addition to his 4-400 amplifier.

By the time K7KG was 16 he had worked 183 countries. His current interest is in antenna design and long-path, 80-meter DX (where all old timers end up!).

FOC

If cw is your preferred mode chances are that you've become pretty proficient at it, and have done more than your share of filling the cw bands with melifluous tones that only those pure of heart really understand. If you've been cw and DXing for a fairly long period of time you're sure to have run into that rather uniquely English-oriented group called FOC (First Class CW Operators Club). The group, designed to enhance the artform itself, has been managed in many recent years by the venerable G8VG. Old Bill has indeed kept the FOC troops in line with his monthly newssheet, soon to be managed by G3FXB. Bill has headed this newsletter with a motto worth repeating, "A Man Should Keep His Friendship In Constant Repair."

Your author had the distinct pleasure of meeting G8VG and his charming wife, Muriel, some years ago, and now sincerely joins the hundreds of FOCers worldwide who wish old Bill a happy, productive retirement. G8VG has achieved what few men in history have been able to do — to be a man of action able to make a graceful exit at the appropriate time. It is difficult to make a reputation, but it is even more difficult to mar a reputation once properly made. So faithful is the (FOC) public.

THE LONG, HOT DAYS OF SUMMER

How about a cool place where UAs, UKs, VKs, ZLs and KHs are routine, and in fact many of *them* consider you the rare DX catch? Then welcome to Shemya Air Force Base, Alaska, home of ARC station KL7FBI, located 40 miles from the western tip of the American Aleutians — so far west that the dateline had to be bent to stay on the same day as the rest of the U.S. Can contacts find this place on their world maps? Not very likely; Shemya Island is only 2-1/2 miles wide and 4-1/2 miles long (2 × 4), and is one of the smaller of the Semichi Islands.

The station is located in building no. 609, a WW II command post. It has three rooms and a bathroom, and has served double duty as a MARS station in the past. A 40-ft tower with a TH6DXX is atop, as is a 60-ft tower with a 500-ft long wire, a 75-meter dipole and a 6-meter quad. There are also 6- and 3-element beams for 6 meters mounted on the eaves, and a 10-meter dipole mounted between the towers. Sounds great, right?

*19620 SW 234 St., Homestead, FL 33031

Well, there are winds in excess of 70 mi/h several times annually, with daily winds of 20 to 30 mi/h. Also, the *summer* temperatures rarely exceed 50° F. Oh yes, one has to trek a half mile through snow (107 inches in '81) and icy roads to reach the shack from the dormitory. I almost forgot: There are no civilian stores to purchase those necessary goodies (i.e., coax, PL-259s, tubes, resistors, transistors and so on . . .) so one must bring everything needed for the next year, or the rig will collect dust waiting on mail order.

On the brighter side, when 40 and 75 meters are open to the lower 48 states this station is in high demand. Located 1300 miles from Anchorage, Alaska, and about 6000 miles from the East Coast, one still can't figure out why this doesn't count as DX for U.S. amateurs.

KL7FBI can be proud of its past history. It was set up back in 1956, and boasts of being the most westerly U.S. ARC. It operates on 6, 10, 15, 20, 40, 75 and 160 meters. Over 40 amateurs have left their call signs on the shack wall in the past 25 years. It has received awards and recognition for working the Alaskan earthquakes, the 10-10 nets in several states, contests and for providing emergency communications capabilities for Shemya.

Come on in, have a cup of coffee and set up your rig or use the station rig. I have just finished up my year here, but you can talk shop with Dave, N8BG, or Clay, WA4TNV. Welcome to KL7 Foggy Bound Island. — *Gary Winters, KA4IIK/KL7, Box 191, APO Seattle 98736*

ROTTEN DXING

Some provocative words from an operator par excellence, *N6TJ*, who questions the use of a 2-meter repeater as a DX crutch, in lieu of tuning the bands and so on. Jim's words in the Southern California DX Club Bulletin hark back to DXing 25 years ago — no jamming, no DX nets, no lists, no policemen, no repeater crutch — DXing that was a lot of fun and a lot more meaningful. If you haven't tried DXing on your own, perhaps you've missed the most fun of all.

DXING — 1956

W3VKD spent a number of the early months of the year tooling about the Caribbean accomplishing a number of goals. He provided some of the W/VE gang with DXCC help and contest multipliers for the 22nd ARRL International DX Competition (back in those days when the contest pitted W/VE against the world). Art visited as many on-the-air ham friends in the Americas as possible and, where regulations then permitted, operated their stations, as well as indulged in some plain and old-fashioned sightseeing. Art's memorable QSL card delineated a neat handful of operations from places with strange-sounding names (and perhaps by today's standards even stranger-sounding prefixes!: VP5DX, KP4TF, KV4AA, FM7WQ, FM7WF, FM7WP, FM7WN, FM7WD, VP4TE, VP3YG, PZ1RRM, HK1DZ, HK3PC, HC1ES, HC2OM, KZ5FL, KZ5BC, TG9AD, VP1SD and VP1EE. Your history lesson of the month should be taken care of quite nicely by accounting for those prefix changes!

DXING — SUMMER 1981

☐ Frosty, K5LBU/ST0, reports he is back in the states at 10440 Valley Forge, No. 105, Houston, TX 77042. However, he does not have the logs or QSLs (KC4CD still has them). Special thanks to all those who waited so patiently for a contact. Still need his card from Ghana as 9G1LL? Please send him one, and you'll receive one posthaste! Good possibilities still exist for him to return to East Africa in about a year or so. AS

☐ Sunspots a bit pale? Bask in the sun at DXPO, sponsored by the Southeastern DX Club, in Atlanta at the Ramada Inn Central on Sept. 19-20. Speakers will include W2PV, WB4ZBG, WN4FVU, N2OO and W3AZD. Make your room reservations pronto!

☐ If you've been copying W1AW DX Bulletins regularly you'll know by now that 6Q0DX QSLs with a date of July 20 through 27, 1980, and after, are acceptable for DXCC credit and have been since July 1.

☐ EI4BK reports that EJ0N is a pirate; the call sign was never issued by Ireland (the Limerick Radio Club had planned to use it on an expedition, but because of various circumstances had not gotten going).

☐ The Delta DX Association, Box 73, Metairie, LA 70004, reminds us that they are quite active in the QSL bureau business, and currently are handling FG7TD (Dec. 22, 1969 to May 16, 1972, and June 5, 1978 to Sept. 6, 1979); KM8BI (July 8, 1978 through March 30, 1980); KM6FC (Midway only); AH4AA; TL8CN; TR8AC; VP2LGR; WD4CEM/KH4; OY8KH; TL8JM; TR8GDC; VQ9JJ; WH4AAA; S2BTF; TL8WH; VP2A (March '75 only); VU2DUE; WH4AAA/KH7. DDXA recently elected a new slate of officers: President — K5LM, Vice President —

Big Guns, Little Pistols and the Lost Cause

Are you a Big Gun? Now a lot of intangibles go into designating an amateur as a Big Gun or even a Little Pistol. If you're not quite sure if you or someone else belongs in one of these categories, this guide may be of help. In fact, it may make a dandy item for a club meeting to see how many guess who really is who! Thanks to K2VV, KBØHA, WB6BJH and the *Northern California DXer*.

Big Gun	Little Pistol	Lost Cause
Clears throat in a pileup and receives a 40 over 9 report.	Is last WØ to get through and is 40 minutes late for work.	Wastes 4 hours calling with no luck, finds cat strangled by irate neighbor with TVI.
Is immediately called by name by DX station.	Usually has to spell name 4 times phonetically.	Is called colorful names by DX station for interrupting phone patch.
Writes critiques of technical articles in *Ham Radio*.	Had a letter to the editor printed in *QST* once.	Has a lifetime subscription to *73*.
Knows beam heading of every DXCC country.	Knows roughly where Japan and Europe are.	Turns 2-meter beam toward the other guy's house when working him through the repeater.
Has made high claimed scores list in last eight ARRL DX Contests.	Was highest scoring Novice in section in first ARRL Sweepstakes.	Tied for fourth place in NYS in last Rhode Island QSO party.
Speaks 14 languages well enough to get a QSL.	Picked up a few dirty French words in WW II; uses them to insult others on 75 meters.	Has been spelling "amateur" wrong all his life.
Receives QSL shipments from bureau via UPS.	Receives QSL shipments by first class mail.	Still gets QSL samples from little print shop.
Has 5BDXCC and 3 ZA QSLs on the wall.	Has 40-m WAS and King Hussein's QSL on wall.	Has RCC and ARRL membership certificates on the wall.

K5RSG, Treasurer — WA5YFQ, Secretary — N5NO.

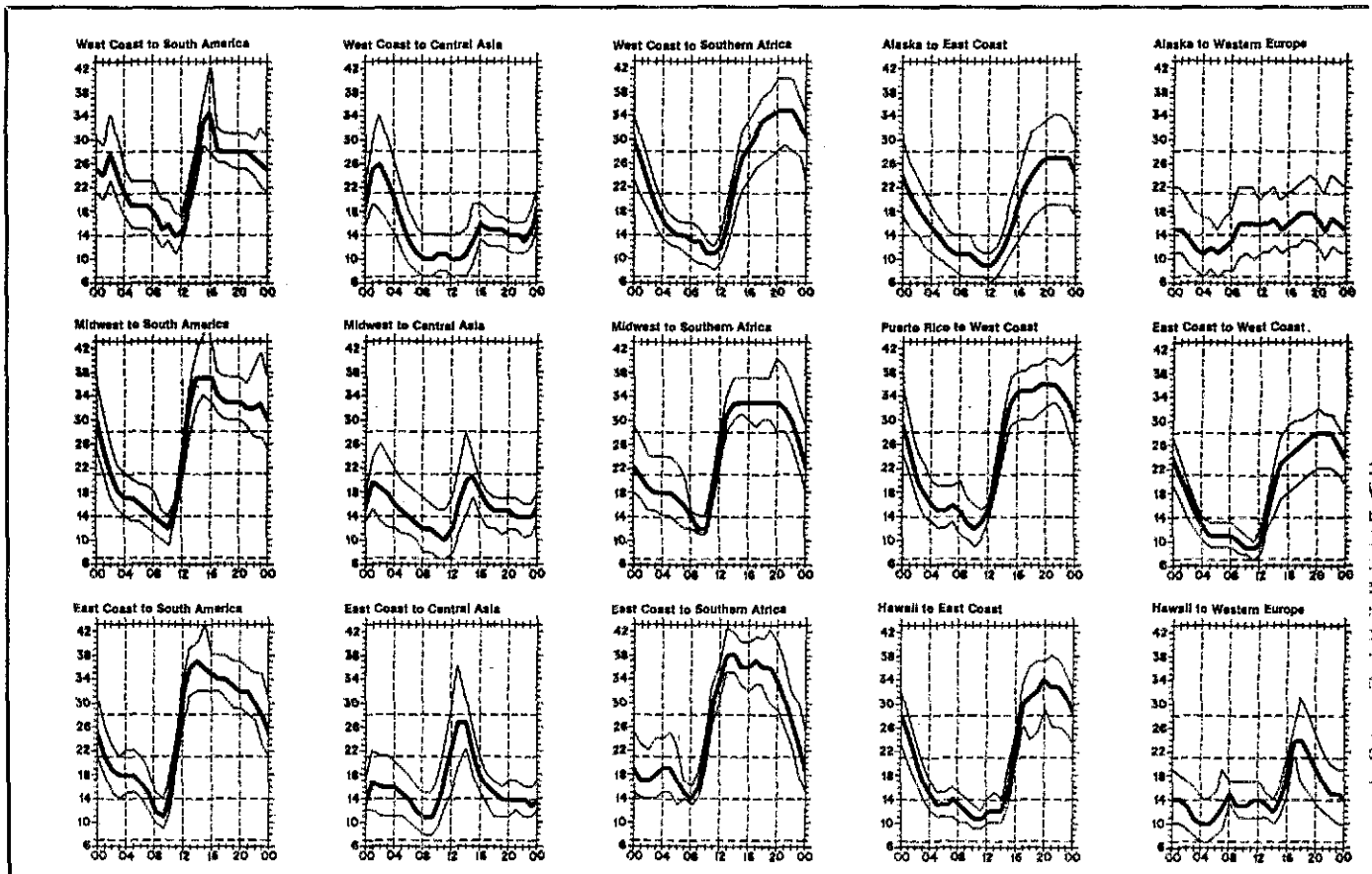
☐ *The Totem Tabloid* reports that old faithful 20 meters carried most of the June/July summer load, including XZ5 on the Family Hour and elsewhere. DXpedition-wise VK9NS was busily signing ZM7ZR from the ever-popular Tokelaus. QSL to VK2BJL. K6XT supplied cw aficionados with a distinct thrill with his /NH9 (Wake) designator. QSL to his home station.

☐ A new Q signal, sure to catch on (vis-a-vis phony claims) is QCE = Caveat Emptor.

☐ Still after the RAEM award noted on page 61 of July? Well, it isn't always easy to tell whether the specific UA is above the Arctic Circle, and valid for this award. Here are some of the most active in recent years, thanks to WA7TQS.

Call	*QTH*	*Pts*
UA1ZAB	Severomorsk	2
UA1ZAQ	Kandalaksha	2
UA1ZCG	Zapolyarny	2
UA1ZDB	Rosljakovo	2
UA1ZWW	Murmansk	2
UW1ZO	Monchegorsk	2
UA9XAH	Vorkuta	2
UAØBBN	Cape Chelyuskin	5
UAØBCS	Norilsk	2
UAØBBR	Norilsk	2
UAØKAT	Pevek	5
UAØKBV	Krasnoarmejsk	2
UAØQCM	nr Tiksi	5
UAØQDY	Lyakhovsk	5
UKØQAV	Johowa Is.	5
UPOL-22	Polar Ice Stn	10
4K1B	Mirnyj	10
UA1ZAO	Kola Bay	2
UA1ZBP	Kirovsk	2
UA1ZCW	Apatitty	2
UA1ZMB	Olenegorsk	2
UA1ZBQ	Murmansk	2
UA9LCX	Harasavey Cape	2
UAØBBP	Dickson Is.	5
UAØBCZ	Pravda Is.	5
UAØKAD	Pevek	5
UAØKBI	Cape Schmidt	5
UAØQCJ	Tiksi	5
UAØQDT	Kolyma	2
UKØKAA	Wrangel Is.	5
UWØAJ	Dudinka	2
4K1A	Molodezhnaya	10
4K1D	Novolazarev	10

☐ *The DX Bulletin* 1981 countries-needed survey ran just about neck-and-neck with the 1980 poll in that the top-nine needed spots still were BY, VS9K, XZ, ZA VQ (Laccadives), VKØ (Heard), 7O, XU and FB8W. Moving from 12th to 10th this year was 3Y. Other



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

interesting samplings of information from the author of TDXB at 306 Vernon Ave., Vernon, CT 06066.

☐ Please, please beg the brethren — the Region Three allocation is 7.075-7.100; all kinds of DXotic multipliers are awaiting your pleasure. Say and mean, "Listening 7.075 and up." Thanks for the tip to Rich Blaney, Jr., KB7IJ/KH2, Box 78, NAS Agana, Guam, FPO SF 96637.

☐ No matter how many times you call a rare one, you always work him on the last call. (Thanks W4YA — at least I think I got it!)

☐ W8ZCQ's liberated vocal cords in July's edition of *The Carascope often amuse while they enlighten.* Under the heading of the problem with the new U.S. call sign prefixes: Did you hear that sincere and monumental pileup on 14,015 with JAs screaming in droves? Turned out that the poor fox was KB6BL. When he explained he was in Los Angeles and not on Baker, the pileup immediately evaporated, transcending all then-known laws of chemistry. Definition of list operation: the welfare rolls of Amateur Radio.

☐ My apologies for a less-than-lucid month, but some lessons are learned the hard way. Spending many hours peering at hams hard at work atop a 70-ft tower installing a big antenna does something to spinal alignment, which in some miraculous way even affects the sending arm. I'll just have to see Jeeves about this one!

ARRL-Membership Overseas QSL Service

QSL Corner

Administered By Joan Becker

Send outgoing cards to this address: American Radio Relay League, 225 Main St., Newington, CT USA 06111.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound).

The ARRL-Membership Overseas QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," published every other month on this page.

U.S. amateurs may send SWL reports to foreign short-wave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Requirements

1) Presort your DX QSLs alphabetically by call sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive *QST* should indicate that the QSLs are from a "sightless member."

ARRL affiliated club stations may utilize the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash. Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

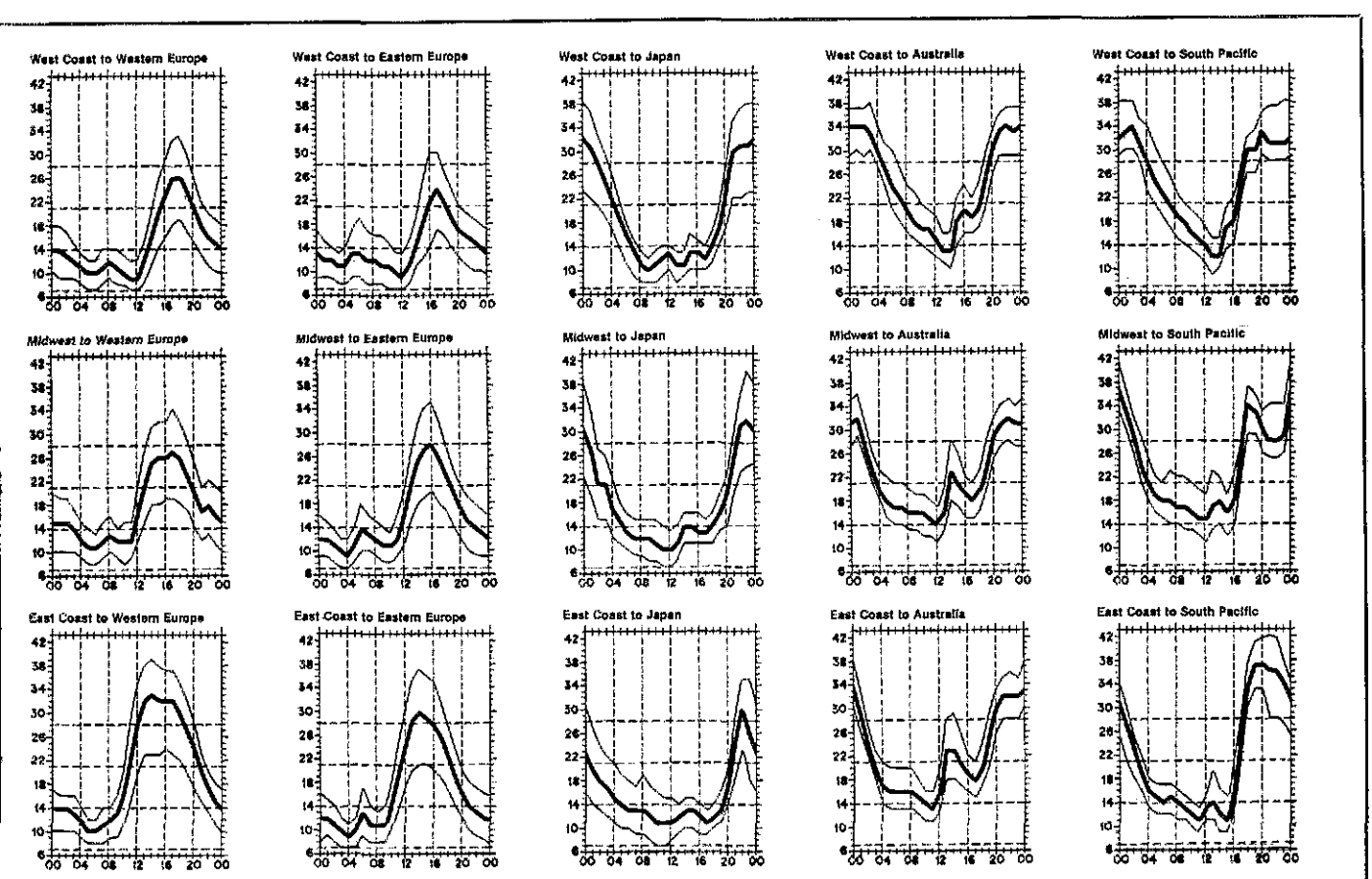
Here is some information for those of you who would like to QSL direct to the station location. It is passed along as we receive it, and therefore may not be accurate. The call sign in parentheses is the QSL manager.

A7XE (DF4NW)
AO5IC (EA5ZQ)
C31GA (F6BWJ)
C31SJ (DL1HH)
DA1WA/HBØ (KN6G)
FGØDDV/FS (W2QM)
FR7BP (WØAX)
GD5BLG (DL4FF)
GD5CGV (DF7FH)
HH2BM (W6RP)
HH2MJ (KA3ARF)
HI8LC (W2KF)
HL9WZ (WA2JOC)
H44SH (AD1S)
OHØMM (OH2MM)
TR8MX (W8AH)
VE7AAZ/4U (VE1BWV)
VP5CM (AA4CM)
VQ9QA (N3QA)
WB5UWI/VE1 (VE1ABU)
XN3LSS (VE3GCO)
YZ9CRM (YU2HDE)
ZF2AH (WA6VNR)
3D2TT (4Z4TT)
5B4JP (SM2DYS)
5N2LED P.O. Box 900, Minna, Nigeria
5T5ZZ (W4LZZ)
9H1FBS (N5APW)

QSL MANAGER VOLUNTEERS

KA3AAO
KC4UB
WD4JQD

In July 1981 "QSL Corner," page 63, appears a list of *Incoming Bureaus and addresses. August 1981* "QSL Corner," page 69, contains information about the ARRL-Membership Outgoing Service. For information on the bureau operation (Incoming and Outgoing) send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for September 15 to October 15, 1981, assume a sunspot number of 126, which corresponds to a 2800-MHz solar flux of 171.

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 May 19 through June 18, 1981. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

C5ACA/101	JE1PNC/168	PA3AIK/103	9Y4VU/247	N2AYI/100	NA4J/101	WB5HBR/101	W7KEY/119	KA9DOS/122
CT2DE/127	JH1RFR/155	PY2FNB/262	K1MRV/101	N2HS/104	W4JGQ/100	WB5QPH/105	WB7AEX/100	KB9MI/108
DJ6LM/108	JA2CQX/116	PY5CIG/103	KA1PF/110	W2TZ/225	W4VUL/177	KB6YV/104	WB7NCD/290	N9ARL/108
DK5CI/110	JE3BIQ/153	SM7AVZ/114	KB1H/108	WB2ULI/103	WA4FUA/106	KM6K/202	KA8A/104	N9BAF/153
DL3WA/120	JA6AKV/103	VE1BWW/121	N1AHR/100	K3BFQ/126	WB4PIQ/104	N6COG/106	KA8JZR/102	W9HAH/106
DL7EY/121	JA7CCZ/111	VE1FH/110	W1IAN/108	N3BKZ/117	WD4CBA/104	W6HPE/190	KB8FJ/117	WA9UCH/100
DL9TW/190	JA7UFZ/106	VE2AJX/107	W1IBZ/132	K3ZUF/271	WD4FZO/109	W6MJY/170	N8BBJ/206	WB9EVH/103
EA6GP/104	JA8GTO/102	VE3BFK/117	W1IS/101	N3AID/101	K5GH/311	W6SCC/102	N8MC/292	WB9IDU/206
G4ISK/137	JH8NKY/153	VE3GWM/106	WA1PPT/100	W3AIC/103	K5GS/318	W6TTK/105	W8LUI/102	WB9UNY/103
HA8CZ/130	KL7JC/100	VE5AE/117	WA1UDH/100	WB3JFS/100	KB5ZT/100	WA6OYV/103	W8QID/148	WD9IVL/115
HB9AUM/124	OE7JLI/111	XE1OW/267	WB1DED/103	WA3RID/100	N5ASP/120	WB6KJE/154	WA8FEN/134	AGØI/200
HB9BYZ/106	OK3WM/280	XE1OX/267	WB1DRE/124	K4AHJ/115	W5KNE/125	AF7P/103	WA8RTF/115	KØTLM/162
HB9BZD/107	OY9R/169	YU2BST/130	K2PK/213	KC4WK/102	W5POG/105	K7SP/304	WD8KEL/100	KØZZ/293
I1BWI/263	OZ1FAO/180	YU3EIJ/121	KB2MG/131	N4DDK/100	W5UCY/108	KA7DLC/102	K9KAN/101	KAØFAR/100
JH1GZE/275	OZ5DX/332	YV5HUJ/110	KB2WW/100	N4DPT/110	W5VUZ/102	KB7SC/177	K9SK/105	KBØV/117

Radiotelephone

DF5CL/103	J6LOU/101	PY2DDM/154	KB2MG/131	KV4F/280	W5VHR/101	WB6AOJ/101	KB8WQ/110	N9BAF/152
DJØUR/108	JH1GZE/275	PY2FNB/198	KB2OM/122	N4BAA/149	WD5BYZ/105	WB6KJE/153	W8DOK/110	W9DS/106
DL2NAI/137	JH1RFR/155	SM6BXV/183	KB2SQ/106	W4EFI/105	WD5DHF/127	AB7Z/105	WA8FEN/121	W9MLT/110
DL3YAO/102	JA2CQX/116	SM6EOC/323	W2TZ/143	W4GER/101	WD5EDR/114	K7SP/299	WA8RTF/105	W9ZTL/108
DL9BM/110	JA2IET/102	VE5MC/153	WA2CRA/103	K5GH/311	K6KLY/102	KA7GIN/111	WA8VPN/102	WB9EVH/102
EA3AOE/101	JE3BIQ/151	3A2MM/108	WA2EIF/100	K5GS/298	KD6KF/108	KB7SC/153	WB8RNY/105	KØZZ/239
EA7BMZ/213	JA6AZO/110	5B4EP/144	WB2ULI/103	K5SIN/102	W6AFF/106	WB7CJH/108	WB8VNP/103	KBØMK/126
F6DHI/103	JA6PL/106	9Y4VU/124	N3AQD/120	KB5BG/101	W6DU/160	K8IHQ/104	WB8VVQ/126	KBØV/112
HR1RMG/103	JH8NKY/143	KA1PF/110	W3NJU/103	N5ASP/116	W6PKB/126	KA8FEL/101	K9BLY/104	NØAIV/100
I3PFG/102	LA6RU/125	KA2CLQ/109	KB4OW/109	W5HGO/110	W6UR/133	KB8FJ/112	K9WWT/184	WØKXZ/106
I6DQE/106	LU7EGE/104	KB2HQ/113	KC4ST/101	W5KUY/132	W6YXH/100	KB8UJ/106	KB9HQ/110	WBØYJD/103
IØMPF/312	PAØTMB/109							

CW

DF1OF/105	JA5PUL/110	SM6EOC/142	K1AP/130	W2MEI/101	WD4HWI/103	WA6OYV/100	N7TT/100	KB9QK/105
DF2ED/140	JA7UFZ/102	VE2FOU/110	KA1DOS/109	W2TZ/180	WB5QPH/101	K7SP/122	WB7NCD/104	WBØL/101
DF7SE/104	KA1ND/102	VE6CHW/106	K2MGR/182	WA2NAD/102	KN6M/101	K7Q/103	W8TK/100	KØIFL/103
FG7TE/100	PY2CJW/103	VE6CJO/118	K2PK/213	WB2YOF/128	W6DU/133	KD7J/128	N9YL/112	NØZZ/190
I1BWI/202	PY2FNB/157	YV5HUJ/110	KB2FS/101	N4BQC/102	W6UR/146	N7IE/101	K9WWT/192	WØDZ/105

5BDXCC

W5OB	N4JF	LZ2KKZ	F9IE	N5DX	W6YH	W3KFQ	W5IB	W6OKX
K1KI	ZL4HN	F6AXP	W1LQQ	W7SP	ZL1BIL	N5NJ	ZL1BQD	YU3TE

Endorsements

Mixed

CE6BGZ/282	PY2ELV/327	YV5CWO/320	N2MF/292	K4XG/327	W5JE/225	W6UR/248	W7ZI/258	W9DS/213
DF6CY/253	SM3EVR/312	YV5DFI/320	N2US/240	K4XI/319	W5OB/348	W6UY/320	WA7JBE/178	W9FPZ/225
DJ1XP/331	SM4DHF/316	4X4FU/290	W2FTY/250	KB4Q/128	W5VSZ/292	W6YX/256	WB7RUV/253	W9HZ/342
DJ4XA/304	SM4EMO/290	K1AP/291	W2HI/328	KC4UQ/216	W5YH/262	WA6AJP/273	AB8Y/293	W9NYW/200
DJ5JH/326	SM5AKT/251	K1FR/125	W2LOG/270	KF4N/146	WB5OON/150	WA6BXV/205	AE8B/295	W9RN/323
DJ7ZZ/202	SM6CST/313	K1HZ/305	W2TQC/353	N4ABZ/201	WB5UDA/174	WA6SZE/202	K8GG/294	W9RY/316
DKØSA/161	SM6VR/317	K1UFS/140	WA2JAS/142	N4VA/292	WB5ZGP/262	WD6DKG/200	K8IP/330	W9VNE/327
DL1BS/301	SM7ASN/330	K1UM/304	WA2PPV/155	NI4H/194	WN5MBS/151	K7LJQ/206	K8JRM/250	W9WNB/338
DL1HH/349	SM7DMN/317	W1ER/326	WB2NYM/327	W4JD/326	K6CLV/281	K7NHV/225	KG8V/315	WA9IAF/154
DL4FL/203	SM7HCW/256	W1LMO/149	WB2YOF/180	W4KA/305	K6DG/278	K7OXB/305	KN8COQ/230	WB9LFD/246
DL7RT/278	SVØAA/255	W1PNR/211	K3HBP/240	W4KFC/345	K6FM/262	K7UT/302	N8AFR/269	WB9QPG/233
DL9YC/260	VE2FOU/157	W1WLW/310	K3OIH/249	W4ORT/329	K6LQA/325	N7ADU/163	N8BIK/225	WB9TDR/126
EA8RL/203	VE3DGX/273	W1XX/203	KA3BVI/181	W4ZR/341	K6PWR/201	N7AIF/160	N8CLJ/136	WD9AHJ/291
F2NB/305	VE3DUS/241	WA1FCN/224	KA3R/165	WA4BCN/126	K6WC/321	N7NG/333	W8EY/164	WD9IIC/271
G4EXD/132	VE3FEA/200	WA1YIO/125	KB3OM/159	WA4CCP/201	K6XW/337	N7TT/324	W8II/275	WD9IOS/175
HB9AJU/158	VE3GCE/179	WB1ARC/127	N3KR/180	WA4DRU/325	K6YCM/311	W7AO/351	W8ILC/332	KØBS/326
HB9BAH/160	VE3GJH/273	WB1EMN/272	W3AP/324	WA4OAX/175	KB6BG/200	W7CE/276	WA8EUK/250	KBØFZ/270
I1XK/328	VE3JKZ/207	AC2N/140	W3EV/278	WA4TZF/177	KC6X/213	W7CNL/319	WA8SAE/236	KBØX/275
I8SCV/175	VE4ADA/149	K2AGJ/317	W3LB/326	K5FUV/200	KN6M/274	W7DY/337	WA8TZP/164	NØCC/150
JA1ELY/320	VE6CJO/212	K2AIO/280	WA3IKK/331	K5GY/230	N6EA/343	W7FOF/214	WB8IGU/290	NØJW/202
JA1FHK/328	VE7IO/310	K2IJL/265	WA3VPL/151	K5NW/307	W6BSY/354	W7GB/260	WD8CRY/257	NØJCB/255
JA1VDJ/226	VE7SV/336	K2KGB/325	WB3FID/205	KB5FV/156	W6BZ/266	W7KHD/204	AB9V/207	WØJIN/269
JA2JSF/310	XE1JTR/240	K2MGR/270	AA4MI/201	KB5WQ/202	W6KH/349	W7KR/337	K9AWK/333	WØKZV/261
OE1BFW/296	YO3JU/329	K2ON/240	AA4MW/261	KC5CZ/174	W6MI/332	W7MAF/178	K9FD/290	WØPT/332
OK1DH/282	YU2RTC/175	K2PH/245	K4EJI/199	KM5R/240	W6OMR/313	W7SFF/260	K9KA/332	WØTJ/351
OK1FF/358	YU3DJK/282	K2UFM/310	K4ELV/189	N5AR/335	W6PKB/152	W7TE/322	K9TI/260	WBØYMR/280
OK1ZL/291	YU3TE/265	KA2CDJ/133	K4LR/280	N5AU/320	W6SJC/224	W7TS/227	K9WWT/228	WDØFSI/214
PY1ZBJ/222	YV5BBU/334	KB2NU/293	K4PVZ/284	N5NW/330	W6SN/344	W7UZA/306	KC9R/153	

Radiotelephone

CE6BGZ/268	JA1VDJ/193	XE1J/317	K2IJL/264	WA3IKK/330	W5VVD/206	WB6VSK/275	N8AFR/269	N9MP/277
DJ4XA/278	JA2JSF/293	XE1JTR/240	K2KGB/320	WB3JWC/270	W5YH/245	K7LJQ/206	N8BBJ/206	W9GU/323
DJ5JH/270	JH8MXH/187	XE1OW/267	K2UFM/306	AA4MW/251	WB5CBJ/260	K7OXB/288	N8BIB/175	W9HZ/337
DJØXJ/156	KH6BB/334	XE1OX/267	KA2CDJ/128	K4PQV/303	WB5LZG/250	K7UT/293	W8CNL/324	W9RY/300
DL3OV/141	LA4HH/203	XE3EB/327	KA2GDY/150	K4XG/309	WB5POQ/128	KB7MO/234	W8ILC/326	W9WYN/140
EA1IY/323	OA4OS/321	YO3JU/326	N2BJ/254	KC4AL/156	WN5MBS/151	KC7T/251	W8JQR/140	W9ZX/261
EA1QF/291	OE1BFW/292	YV1EAH/258	N2US/174	N4ABZ/177	K6DG/278	N7AIF/160	W8JRW/176	WA9IAF/142
EA1VG/252	OK1ADM/338	YV5BBU/334	W2BHK/277	N4VA/265	K6YCM/311	N7ASL/225	W8MAW/300	WA9PWN/292
EA3AOC/296	OY9R/169	YV5CWO/320	W2HXF/283	W4CYJ/201	KN6M/201	N7BES/203	W8PCA/291	WB9LFD/245
EA3OD/263	OZ2BM/216	YV5DFI/320	W2LOG/270	W4EBO/291	N6ATS/234	N7TT/260	W8PCS/129	WB9QPG/229
F6AXP/270	OZ3Y/346	6W8DY/329	W2PQZ/200	W4JD/266	W6BSY/342	W7EKM/319	W8RT/330	WB9TQR/125
G3MCS/319	PY1ZBJ/219	KB1I/249	WA2JAS/136	W4VQ/320	W6CCB/328	W7KH/338	W8ZET/328	WD9AJH/272
HB9BRC/164	PY2BU/320	N1AFB/111	WA2WDJ/178	W4ZR/341	W6KOE/327	W7KHD/157	WB8RMD/262	WD9IIC/199
HI8XJO/226	PY2OB/284	W1EED/282	WB2CVL/272	K5AQ/316	W6KZS/330	W7KR/336	WD8CRY/250	KØBS/325
HK3LT/282	PT7TP/225	W1JJ/305	WB2EZU/261	K5GY/200	W6LQC/324	W7LXR/229	WD8IIA/201	KØRRY/153
I2BVG/303	SM5DQC/322	W1MMV/352	WB2JFH/202	K5SSB/250	W6OMR/285	W7NCD/288	WD8MJR/183	KØVRW/282
I5BDE/289	SM5HPB/290	W1PNR/211	WB2NYM/325	KB5QQ/140	W6ORD/300	WB7PTZ/216	WD8RKT/188	KBØC/206
I6FLD/344	SM6VR/293	W1SD/328	WB2RQX/152	KC5CZ/154	W6RON/250	WB7VHA/131	K9KA/328	KBØX/267
I6ICD/225	SM7HCW/236	W1SEB/328	WB2WOU/325	N5NW/310	W6UY/312	AB8Y/263	K9LUX/205	NØRR/313
I8AKN/161	VE3DGX/269	W1WLW/179	K3DYX/131	W5AYZ/262	W6VZZ/260	K8AQ/325	K9MFI/200	WØJCB/250
I8XIU/180	VE3FEA/210	WA1WTP/252	K3ZUF/266	W5BPT/191	W6XP/324	K8GG/280	K9TN/207	WØMLY/350
IT9ZGY/336	VE3GJH/268	WA1YIO/125	N3AZU/150	W5LKP/281	W6YX/226	K8JRM/250	K9UQN/133	WØSFU/334
JA1BRK/334	VE3KGK/202	AC2J/175	W3AP/300	W5TIX/330	WA6SZE/202	K8ZZU/216	KB9MI/150	WØTJ/332
JA1DCO/153	VE7WJ/317	K2AGJ/272	W3KBZ/200	W5VSZ/284	WB6PSY/261	KN8COQ/217	N9AIB/179	WBØCGJ/260
JA1ELY/316	WP4API/201	K2AIO/157						

CW

DF3EP/179	HH2VP/135	PY2BBO/124	4X4FU/202	W2FTY/181	K4EFZ/233	W5BWF/126	W7KHD/126	K9LV/202
DJ4XA/229	I5BDE/200	PY2DFR/203	K1MM/262	W2IQO/129	K4FJ/245	W5VSZ/167	W7TS/165	K9SM/123
DJ5JH/200	JA1BN/261	PY2ELV/273	W1WLW/253	W2PQZ/160	K4XG/206	W5YH/136	AB8Y/194	K9TI/202
DL1BS/200	JA1JRK/304	SM3EVR/297	WA1FCN/175	WA2ORX/230	KA4BFT/180	K6AC/258	K8DYZ/292	K9UQN/129
DL3RK/177	JE1CKA/274	SM5AKT/246	K2AIO/117	K3FN/302	N4VA/230	K6YCM/210	KB8KW/219	W9KNI/312
EA8RL/158	KH6JWK/150	SM6CST/226	K2BZT/272	KA3R/121	NI4H/135	W6SN/176	N8MC/247	WD9AHJ/235
G4EXD/126	ON5NT/305	SM6INC/176	K2FL/301	N3KR/160	W4JD/241	W6UY/239	W8ELE/150	WD9IIC/206
GM3YTS/201	OZ1FAO/163	SM7HCW/138	K2TQC/306	W3AP/256	K5AQ/263	W6VKQ/127	WA8SAE/225	WØYBV/126
HB9BIF/150	OZ1VY/289	SVØAA/234	N2US/172	W3KT/302	K5NW/277	W6YX/140	AB9V/202	

DXCC Notes

Corrections: WBØURE/109 should be WBØURA/109.

Reminder: Those wanting to update their DXCC totals for the December 1981 *QST* DXCC listing must submit confirmations during the month of September. They must reach Headquarters on or before September 30, 1981 to be listed. You must comply with DXCC rule 5 including the once-a-year exception to update the listing.

Note: The DXCC Honor Roll will appear in October 1981 *QST* because of the backlog of DXCC applications still pending for June.

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

AMATEUR SCIENTISTS

☐ Our colleague, WA6RGX, proposes that the term "Amateur Radio operator" be changed, and that we should henceforth be known as "radio communication scientists." He refers in his letter to amateurs as "possessing this tremendous wealth of knowledge." This, unfortunately, is not a universal truth. It is even, in many cases, a rapidly declining coincidence among our fraternity.

During the past weekend, I again listened to the "tremendous wealth" of trashy ssb signals on the hf bands. In one interesting QSO, the offending operator was explaining to his opposite how he had "set up the rig to exactly the dial readings written down" by his son-in-law. He attributed the horrible sounds emanating from his rig to "band conditions between the two of us." Hmmmmm. Wealth of knowledge?

Even casual listening delivers the awful truth. Many of our operators, characterized as amateurs, are exactly that. Many of the newcomers have not taken the time to listen and read, to talk with experienced "radio communication scientists" at local club meetings, to study the art of radio communication, to acquire even a modicum of "tremendous wealth of knowledge." We are becoming more amateurish than ever before, taken as a broad group.

I'm proud to be an "Amateur" Radio operator — a ham! I am equally proud to be a registered professional engineer, with nearly 30 years of employment in the telecommunications industry. The two do not equate, necessarily, and it is not necessary that they do. We should be proud of what we are, not strive to be something that we may not really be. — *William R. Gary, K8CSG/5, Houston, Texas*

OFFICIAL OBSERVERS

☐ This letter is to express my thanks to the many wonderful, dedicated radio amateurs who serve as official observers on behalf of, and for the benefit of, all of us hams.

The ARRL may well be proud of sponsoring the OO Program, of the leadership it provides and of the caliber of its participants. Everyone with whom I have had contact has been courteous, considerate and most helpful toward insuring not only compliance with rules and regulations, but also with good operating practices and procedures, and expressions of state-of-the-art technology.

For those who have not experienced the pleasure of receiving a communique from an OO, let me share a little.

First, the saying that "the ham who never made a mistake never made anything," seems to apply quite well. Yes, even making a contact is an art in itself.

Secondly, contact with an OO is an education. For example, one learns that OOs are knowledgeable. OOs go to great lengths, beyond the call of duty, to help. They spend their own money on stamps, telephone calls, making copies of schematics, and offering parts and other expense items. They also spend time in QSX sessions, in writing, in researching and in discussions.

And, thirdly, the OOs are an inspiration. They both challenge and care, as evidenced over the years. What more could be expected? We are getting the very best. I, for one, would like to say "thank you" to each and all, and to the ARRL. — *Bill Seaver, W4DWL, New London, North Carolina*

SWIMMING POOL QTH

☐ With reference to the photograph of K7JA on page 83 of May 1981 *QST*, I hope that anyone who emulates his operating position has paid up life insurance, made out a will and notified an undertaker of his wishes. I can't imagine *QST* even publishing such a picture. That's a death-trap situation if I ever saw one! BRRRRRR!! — *Gary Huff, K9AUB, Springfield, Illinois*

☐ I congratulate K7JA for his many contacts in the ARRL November Sweepstakes, but the picture of his operating the rig in the pool represents a very dangerous situation. I am hoping he was only posing for the picture.

Many young people are entering Amateur Radio. After seeing this picture, they could be misled into having a few contacts from the pool on a hot and humid day, without realizing that a life could be lost under such conditions. — *Authur A. Davis, W1HIT, Cambridge, Massachusetts*

[Editor's Note: The photo of K7JA was meant to be a humorous pose. He was not actually operating the transceiver.]

SECRET ANTENNAS

☐ The letter on antenna rights by K3SRD, which was published in May *QST*, represents what I believe is the "mainstream" opinion on the subject. Mr. Wilderman speaks against antenna restrictions as a loss of "property rights." It is well known that many amateurs believe that they have a guaranteed right to an outdoor antenna because the federal government licensed them to operate a radio station.

I do not share this philosophy. I believe my neighbors have a right to insist on an uncluttered view, just as I have a right to insist on cessation of rock band practice after 1 A.M. I also believe my neighbors have a right to no RFI, just as I have a right to no goats next door. I hope we are moving away from the days where everyone felt he could do anything he had the power to do, regardless of the effect on neighbors and future relations.

I purchased my home knowing full well that no flag poles, clotheslines, garbage cans or outside antennas were allowed. I can't crack a big pileup on the first try, but I can operate any time of day or night and talk to a friendly stranger. I love it.

The answer is to work on technology. I think passing laws (such as the Goldwater Bill) that make others pay to prevent our hobby from being a nuisance to them is looking at the wrong issue. Fighting attempts to make the community more beautiful by crying "federal privilege" isn't going to do ham radio any long-term good. What happened when we were forced to operate only above 200 meters? We discovered reliable transoceanic communications, remember?

So let's say we're limited to 100 watts effective radiated power (because of RFI) and hidden antennas. The challenge is to communicate anyway! May *QST* had two articles that helped point the way. "Coherent CW" was said to provide a 20-dB improvement over standard cw. Not many antennas will match that! "Amtor," in June *QST*, perked up a test RTTY transmission copy rate from 20 to 99.3%. You can't convince me that you have to pour a full gallon out of a five-element beam at 60 feet in order to communicate.

I would like to hear less talk about "property rights" and more "getting on" with the technical problems created by the "anti-antenna" movement. — *Owen Godwin, WA4YOS, Tampa, Florida*

[Editor's Note: Mr. Godwin mentions three items that appeared in recent issues of *QST*. The Goldwater Bill, S. 929, is detailed in "Happenings," June 1981 *QST*, page 53. Coherent cw is described by Charles Woodson, W6NEY, in the *QST* articles: "Coherent CW — Part 1, The Concept," May 1981 *QST*, pages 11-14, and "Coherent CW — Part 2, The Practical Aspects," June 1981 *QST*, pages 18-23. "Amtor, an Improved Error-Free RTTY System," was written by J. P. Martinez, G3PLX, and appeared in June 1981 *QST*, pages 25-27.]

COVER CONTROVERSY

☐ The cover photo of June *QST* illustrates a very good example of how *not* to work on a ladder and handle erection of anything aloft. (1) The man on the ladder is in a very precarious position in that he is unbalanced. (2) Where are his safety belt and strap? (3) The two men at the base of the pole are in just the right position to catch a dropped tool on the head. The rope they are holding should have been brought through a pulley lashed to the pole so that they could stand in the clear. (4) The man holding the bottom of the ladder should have kept his attention on the job instead of gazing off in the distance. (5) The top of the ladder should have been lashed to the pole with a "clove hitch," which is easy to tie and untie. (6) The angle of the ladder is wrong. At the angle shown, any inattention might result in the base of the ladder sliding outward with unexpected results.

If all four of the participants survived this exercise, they are indeed fortunate. — *J. W. Bradley, WA4AVW, Harrison, Tennessee*

*Membership Services Assistant, ARRL

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Repeater Directory No-Shows

One of the most difficult assignments I ever had was to compile the *Repeater Directory* for the ARRL. As chief cook and bottle washer of the directory, I had to strive for complete accuracy. I couldn't haphazardly collect a bunch of repeater information, stick a $5 price tag on it and explain away its inaccuracies with a "caveat emptor." The ARRL membership wouldn't stand for it.

When a repeater is listed in the ARRL directory, it is tantamount to official recognition. If an error appears in a repeater's listing, it is embarrassing; if a repeater is left out of the directory, it is an insult. So, the directory editor must try to make the book as accurate as possible. He or she must beat the bushes for information. Mark Wilson, AA2Z, the editor of the current edition of the directory, tells how he gathered information for the book.

> In July 1980, we began to advertise for repeater owners and operators to register their machines for the new edition [of the directory]. We publicized our search for information in several different ways. The information was carried in two ARRL bulletins (nos. 76 and 106), which were transmitted over W1AW and mailed to all Official Bulletin Station appointees. "League Lines" in September *QST* carried the request for repeater operators to register their machines, as did the "FM/RPT" column in November *QST*. In addition, *HR Report* picked up the story in the July 25 issue. We did everything but hire a skywriter.
>
> At the same time, I sent letters to all frequency coordinators asking them for copies of their most current records. An s.a.s.e. was included with each of these requests. Copies of this letter were also sent to all League officers and directors, Section Communications Managers and Vhf-Uhf Repeater Advisory Committee members. In early October, I sent follow-up letters to each frequency coordinator who had not responded.

And Mark's in-box was full for several months afterwards. All of the information that showed up at his desk was included in the directory. The problem is that there were some no-shows. Obviously, the no-shows were not included in the directory. Some repeater owners/operators may have depended on their frequency coordinators to inform the ARRL about their repeater; some of these folks were disappointed. Two of the most populous states in the Union turned out to be the two least-represented states. Whose fault is that?

Most of the frequency coordinators were very cooperative and sent their repeater listings for inclusion in the directory. But, if your coordinator sent in a list in November and you put your repeater on the air in December, your repeater would not be listed unless you informed the ARRL independently.

Even if your coordinator is the most well-meaning person in the world, the bottom line is — don't depend on him or her to do your work for you. Register your repeater yourself. The ARRL has a handy registration form for you to use. A copy of the form is reprinted here. Send an s.a.s.e. to Hq. in Newington and request some CD-240s if you need more. And register your repeater annually, in September or October of each year. That's the only way to be assured of getting your machine listed accurately in each edition of the directory.

REPEATER DIRECTORY REGISTRATION CARD

Please use block letters to complete this card.

State / Province *(Abbreviation)*	County	New Listing Change No Change *(Circle One)*
	City or Town	
Input Frequency	Output Frequency	
Repeater Callsign	Notes	
Sponsor	Source	Date *(Month / Year)*

CD-240 (381) Printed in U.S.A.

Use a CD-240 to register your repeater with the ARRL annually, and you'll be assured that your machine will be included in each edition of the *Repeater Directory*.

SURVEY RESULTS CONTINUED

In the last installment of "FM/RPT," the results of questions 1 through 14 of the January survey were presented. Here are the results of the survey's final six questions.

Question 15. *In your opinion, what is the purpose of an autopatch in Amateur Radio?* The majority of the answers to this question were of two differing opinions: those who felt that an autopatch served as a function for emergency communications, and those who felt that an autopatch serves no purpose in ham radio.

Question 16. *What is the main problem, if any, in the fm repeater world today?* Most of the answers to this question fell into the following general categories: autopatch abuse, the use of CB operating "techniques," too many repeaters, repeater monopolization by long-winded users, closed and private repeater operation.

Question 17. *Can you suggest any solutions to the problem?* As usual, the problems outnumbered the solutions. The better solutions will be discussed along with the problems in future installments of "FM/RPT."

Question 18. *What is the biggest attraction of the fm repeater mode?* To most respondents, the mobility and portability of ham radio communications was the biggest attraction of the fm repeater mode.

Question 19. *What is your opinion of "FM/RPT"?* A lot of people misinterpreted this question. I couldn't tell whether the respondents thought my column "stinks" or whether the fm/rpt mode "stinks." The numerous "keep up the good work" responses were referring to the column, I guess, but a lot of the other responses were indeterminable. (By the way, the question did refer to this column, not to the mode.)

Question 20. *What topic would you like to read about in this column?* Thanks to the numerous thoughtful suggestions, I now have plenty of fodder for future columns, so stay tuned.

I'd like to thank everyone who responded to the survey. The quantity of responses made it impossible to answer personally each that I received. Hopefully, the answers you seek will appear in future "FM/RPTs." QST

*72 Stiles St., Waterbury, CT 06706

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[Note: Sponsors of large ham gatherings should check with League headquarters 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.]

Alabama: The Central Alabama Amateur Radio Assn. will hold its 4th annual hamfest on Sunday, Sept. 13, at the Civic Center, downtown Montgomery. Free admission, free parking, and 22,000 square feet of air-conditioned activities including a flea market. Set-up at 6 A.M., doors will be open from 8 to 5. Restaurants and motel accommodations nearby. Talk-in on 146.04/64 or 52; rag chew on 146.31/91, 147.78/18 or 146.045/645. For further information or market reservations write Hamfest Committee, P.O. Box 3141, Montgomery, AL 36109.

†Alabama: The Calhoun County Amateur Radio Assn. hamfest will be held at the city auditorium in Anniston, on Sept. 26 and 27 from 9 A.M. to 5 P.M. on Saturday, and from 9 A.M. to 3 P.M. on Sunday. Large exhibit and flea-market area, forums, hospitality room and bingo. Talk-in on 147.69/09. For information contact Dale Boothe, KA4LRL, 3430 Greenwood Ave., Anniston, AL 36201, tel. 205-238-8804.

Arkansas: The Queen Wilhelmina Hamfest Assn. will have its 12th annual get-together on Sept. 12 and 13 atop scenic Rich Mountain, near Mena, at the historic inn at Queen Wilhelmina State Park. Campsites, prizes, nonham/children's activities, dealers, flea market. Talk-in on 19/79 or 52. For more information write to V. C. Reeder, KB5OW, Rte. 2, Box 429A3, Fort Smith, AR 72916.

Colorado: The Boulder Amateur Radio Club will hold BARCFEST/81 on Sunday, Sept. 27, beginning at 9 A.M. at the Boulder National Guard Armory, 4750 N. Broadway at the Boulder city limits. Admission donation of $2 per family includes swap space and prizes, snack bar and auction. Talk-in on 146.10/70 and 52. For further information contact Mark Call, NØMC, 4297 Redwood Ct., Boulder, CO 80301, tel. 303-442-2616.

†Connecticut: The Candlewood Amateur Radio Assn.'s flea market and auction will be on Sunday, Sept. 20, at the Essex House, Rte. 6 in Newtown, exit 8 off I-84, from 10 A.M. to 4 P.M. Admission $1, tables $6. Prizes, dealers, plus a magic show for the kids. Talk-in on 147.72/12. For more information contact George, WB2THN, tel. 914-533-2758, or Ken, KA1GDS, tel. 203-744-6953.

Georgia: The Augusta Amateur Radio Club will hold its annual hamfest on Sunday, Sept. 20, at the Julian Smith Casino in Augusta. Tickets are $1. Doors open at 9 A.M. All indoors except flea market. Talk-in on 146.34/94. Bingo and refreshments. For more information contact Diane Miller, WB4YHT, tel. 404-860-3700.

†Georgia: The 8th annual Lanierland ARC Hamfest will be held at Holiday Hall, Holiday Inn, Gainesville, on Sept. 27. Doors open at 9 A.M. (8 A.M. for dealer set-up). Dealers and distributors provided with free tables and inside display area. Boat-anchor auction, test bench for boat anchors, bingo, prizes, food available. Flea market in parking lot. Talk-in on 146.07/67. For more information contact Paul Watkins, W4FDK, Rte. 11, Box 536, Gainesville, GA 30501, tel. 404-536-8280.

Georgia: The Coosa Valley Amateur Radio Club will host the annual Rome Hamfest on Sunday, Oct. 4, at the Rome fairgrounds. Gates open at 7 A.M. Admission is $1. Activities include dealer displays, boneyard, flea market, bingo, and hot homemade barbeque and Brunswick stew. Many prizes. Talk-in on 147.30/90. For more information contact Cathy Strickland, WA4YSV, Rte. 3, Cave Spring Rd., Rome, GA 30161. tel. 404-235-2311.

†Illinois: Peoria Superfest '81 sponsored by the Peoria Area Amateur Radio Club will be held on Sept. 19 and 20 at the Exposition Gardens, W. Northmoor Rd., Peoria. Gates open at 6 A.M., commercial building at 9 A.M. Advance admission is $2, at the door $3. Full camping facilities. Forums, amateur and computer displays, huge flea market, non ham/children's activities. Saturday night informal smorgasbord at Heritage House, 8209 N. Mt. Hawley Rd., and movies at hamfest site. Talk-in on 146.16/76. Info and reservations from Superfest '81, 5808 N. Andover Ct., Peoria, IL 61615.

†Illinois: The Sangamon Valley Radio Club of Springfield holds its sixth annual hamfest on Sunday, Sept. 27, at the Sangamon County Fairgrounds, New Berlin, 12 miles west of Springfield on Rte. 36. Indoor display and covered pavilion for flea market. Exhibits, kids' activities and food available. Overnight camping. Many prizes. Tickets are $2 in advance, $2.50 at the gate. Information from SVRC, c/o Red Cross Bldg., 1025 S. Sixth St., Springfield, IL 62703.

†Illinois: The 11th Radio Expo, sponsored by the Chicago FM Club, will be held on Sept. 19 and 20 (rain or shine), at the Lake County Fairgrounds, N.W. intersection of Illinois Rtes. 45 and 120, Grayslake. Flea market open 6 A.M. to 6 P.M.; exhibits open 9 A.M. to 4 P.M. Displays by major manufacturers, largest-ever flea market (indoors and outdoors), free camp area and parking, bring tables and chairs. Seminars and technical talks, non-ham programs, many prizes and full food service. Tickets good for both days are $3 in advance, $4 at the gate. Talk-in on 146.16/76, 52 and 222.50/224.10. Advance tickets, send a no. 10 s.a.s.e. to Box 1532, Evanston, IL 60204, tel. 312-278-3976.

Indiana: The Marshall County Amateur Radio Club's 5th annual hamfest and electronic flea market will be held at the 4-H fairgrounds in Argos, on Sunday, Sept. 20. Dealer set-up at 6 A.M., public admitted at 8 A.M. to 4 P.M. Seven-foot tables available — $3. Radio and electronic-related gear only. Prizes and refreshments. Tickets $2, advance; at door, $2.50. Talk-in on 52, 146.07/67 and 222.9/224.5. For information write or call Paul R. DeVos, WB9VFJ, 109 Maple Ave., North Liberty IN 46554, tel. 219-656-4631.

Indiana: The Porter County Amateur Radio Club, Inc. will hold its annual hamfest at the Porter County Fairgrounds in Valparaiso on Sunday, Sept. 13. Flea market, prizes and technical sessions. Dealers and commercial exhibitors; free indoor and outdoor spaces available. Admission $2. Talk-in on 147.96/36 and 52. For tickets and information contact David Nicolaus, WB9AOU, 956N 200W, Valparaiso, IN 46383, tel. 762-1346.

†Iowa: The 7th annual CVARC Hamfest sponsored by the Cedar Valley Amateur Radio Club is scheduled for Sept. 27 in the Hawkeye Downs Exhibition Building in Cedar Rapids. Doors open at 7 A.M. Overnight camping area, picnic facilities, manufacturers and dealers welcome, ARRL representatives and many prizes. Tickets $2 in advance, $3 at the door. First table, $5; others, $7. Talk-in frequencies are 146.16/76, 52, 223.34/94. For advance tickets, reservations write CVARC Hamfest, P.O. Box 994, Cedar Rapids, IA 52406.

†Kansas: The Boothill Amateur Radio Club Hamfest sponsored by the Dodge City Boothill Amateur Radio Club will be held in the 4-H building in Dodge City on Sept. 13 from 9 A.M. to 3 P.M. Covered-dish dinner, prizes, swap table, entertainment. Talk-in on 01/61. Information from Dale Kennedy, BARC, 2312 5th Ave., Dodge City, KS 67801, tel. 316-225-1410.

Kansas: The Sand Hill Amateur Radio Club, Inc. will have a swapfest on Sunday, Sept. 27, at the 4-H building on the Finney county fairgrounds, Garden City, from 9 A.M. to 4 P.M. Registration fee is $2. Bring a covered dish. Talk-in on 146.31/91 and 52.

Massachusetts: The 19/79 Repeater Assn. of Chelsea will hold its annual flea market on Sunday, Oct. 4, from 11 A.M. to 4 P.M. (sellers admitted at 10 A.M.), at the Beachmont VFW Post, 150 Bennington St., Revere. Admission $1. Sellers' tables, $6 in advance; $8 at the door, if tables are still available. Talk-in on 19/79 and 52. For table reservations send check to 19/79 Repeater Association, P.O. Box 171, Chelsea, MA 02150.

Massachusetts: The Hampden County Amateur Radio Assn. will hold its annual auction at the Feeding Hills Congregational Church, junction Rtes. 57 and 187, Feeding Hills, on Oct. 2 at 8 P.M. Talk-in on 146.34/94. For more information contact Gent Lam, WA1CQF, tel. 413-737-9426.

Michigan: The Grand Rapids Amateur Radio Assn. will hold its annual swap and shop on Saturday, Sept. 19, at the Hudsonville fairgrounds. There will be prizes, dealers, an indoor swap area and an outdoor trunk swap area. Gates will open at 8 A.M. for both swappers and public. Talk-in on 146.16/76. For more information write Grand Rapids Amateur Radio Assn., Inc., P.O. Box 1248, Grand Rapids, MI 49501.

†Michigan: The fifth annual Five County Swap-N-Shop, sponsored by the Genesee County RC, Bay Area ARC, Lapeer County ARRC, Saginaw Valley ARA and Shiawassee ARA, will be held at Bentley High School, 1150 Belsay Rd., Burton, on Sunday, Sept. 20, from 7:30 A.M. to 4 P.M. Admission is $2 in advance, $3 at the door, children under 12 free. Dealers, prizes, food. Table rent $6. Talk-in on 52. Info and reservations from Ed King, 10885 Dehmel, Birch Run, MI 48415, tel. 517-624-9094.

†Michigan: The L'Anse Creuse Amateur Radio Club will hold its 9th annual Swap and Shop at the L'Anse Creuse High School, Reimold St., Mt. Clemens, on Sept. 20 from 9 A.M. to 3 P.M. ARRL and FCC representatives. Prizes, parking, food concession. Talk-in on 69/09 and 52. Advance tickets $1, $2 at the door. For more info or tickets send s.a.s.e. to Michael Corcoran, N8CEN, 650 Chippewa, Mt. Clemens, MI 48043.

Michigan: Adrian Amateur Radio Club's 9th annual hamfest is scheduled for Sunday, Sept. 27, at the Lenawee county fairgrounds, Adrian. Prizes, games, programs, plus much more. Tables: $5 per 8 ft, $3 per 4 ft, $2 per 8-ft trunk space, $2 inside space for your table. Limited tables available. Table reservation by check no later than Sept. 20. Advance tickets $1.50, $2 at the door. Talk-in on 146.31/91 and 52. Tickets, tables, info: Adrian Amateur Radio Club, Inc., P.O. Box 26, Adrian, MI 49221.

†Michigan: Blossomland Blast-1981 sponsored by the Blossomland Amateur Radio Assn. will be held Sunday, Oct. 4, from 8 to 3:30 E.S.T. at Lake Michigan College Convention Center, one mile off exit 30 on I-94. Southwestern Michigan's best swap and shop with new and interesting programs. MARS display, Brass Pounders contest, prizes, breakfast and lunch catered. Tables $5 each. Advance tickets $2, $3 at the door. Children (with families) under 12 free. Make it a Michigan weekend: Oktoberfest, Coho fishing, Michigan wineries. Fun for the whole family. Talk-in on 22/82 and 52. For tickets and information send an s.a.s.e. to BARA, P.O Box 175, St. Joseph, MI 49085.

Minnesota: The Viking Amateur Radio Society will hold its annual swapfest on Oct. 10 at the Waseca High School, Highway 13-N., Waseca. Doors open at 9 A.M., close at 4 P.M. Talk-in on 34/94. Information: VARS, P.O. Box 3, Waseca, MN 56093. Preregistration available.

†Mississippi: The Mississippi Coast ARA 5th annual hamfest will be held at the International Plaza, Biloxi, on Oct. 3 and 4. Hours are Saturday from 8 A.M. to 5 P.M. and Sunday from 8 A.M. to 2 P.M. Free admission. Flea market, commercial displays, forums and Saturday night shrimp boil. Many prizes. Free on-site parking for self-contained RVs. Talk-in on 13/73 and 52. Further information from MCARA, P.O. Box 1785, Gulfport, MS 39501, or John Belham, Jr., W5PDG, 2302 Middlecoff Dr., Gulfport, MS 39501, tel. 601-896-3884.

Missouri: The Missouri Single Side Band Net picnic and swapfest will be held on Sept. 13 at Jefferson City, beginning at 10:30 A.M. Dinner at noon. Talk-in on 147.00. Further information from Benton C. Smith, K0PCK, Prairie Home, MO 65068, tel. 816-427-5319.

New Hampshire: The 5th annual Connecticut Valley FM Assn. hamfest/flea market will be on Sunday, Sept. 27, from 9 A.M. to 5 P.M. at King Ridge Ski Area, New London. Adult admission is $1, flea market set-up is $5, children under 16 free. Further information from Francis B. Callahan, KA1BWE, Box 173, East Wallingford, VT 05742.

New Jersey: The South Jersey Radio Association will sponsor its 65th annual hamfest on Sunday, Sept. 13, from 10 A.M. to 4 P.M. at the Pennsauken High School Grounds, Remington Ave. and Rte. 73, Pennsauken. Admission is $3, tailgaters $5 per space. Swap shop, tailgating, prizes, games, food and refreshments available. Talk-in on PARA/SJRA Repeater 146.22/82, 52 and 147.48 simplex. Info and reservations from Edwin T. Kephart, W2SPV, 4309 Willis Ave., Pennsauken, NJ 08109, tel. 609-663-6710.

New York: Seaway Valley Hamfest, sponsored by multiple clubs in northern New York and southeastern Ontario will be held in the Municipal Arena in Louisville (near Massena), on Saturday, Sept. 12, from 9 A.M. to 4 P.M. Advance admission $2, at the door $2.50. Flea market, auction, commercial and dealers, magic show, movie *The World of Amateur Radio*, prizes, snack bar all day, child care. Talk-in on 146.31/91, 04/64, 16/76 and 52. Info and reservations from Lois G. Ierlan, WA2RXO, 725 Proctor Ave., Ogdensburg, NY 13669, tel. 215-393-3297.

New York: Annual indoor/outdoor, rain/shine hamfest sponsored by the Hall of Science ARC will be

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

held at the municipal parking garage, one block north of Queens Blvd., 80-25 126 St., Kew Gardens, on Sunday, Sept. 13, from 9 A.M. to 4 P.M. Parking, prizes, refreshments, auction, action! Sellers $3 per space, buyers $1. Talk-in on 52. For additional information call Tom Doyle, KA2DTB, days at 212-351-6354.

†New York: On Sunday, Sept. 13 (rain date Sept. 20), the Suffolk County Radio Club will hold its 4th annual Electronic Flea Market at the Odd Fellows Hall, Jayne Blvd., Port Jefferson. Gates open at 7 A.M. Sellers $3 (one car/one driver). Walk-ins $1.50 Nonham family members free. Bargains, prizes, food and hamship. Talk-in on 52 and 94, also 223.5 MHz. More details from Floyd Davis, tel. 516-234-9376.

†New York: Hamburg HAM-O-RAMA '81, Friday, Sept. 18, from 6 P.M. to 9 P.M. and Saturday, Sept. 19, from 7 A.M. to 5 P.M. at the Erie County Fairgrounds near Buffalo. New equipment displays, computers, technical programs, nonham programs, valuable awards and more. Tickets $3 advance, $4 at gate. Children under 12 free. Outside flea market $2 per space, inside flea market $7 per space. Talk-in on 146.31/91. Advance ticket deadline Sept. 4. S.a.s.e. to David G. Baco, WA2TVT, 130 Vegola Ave., Cheektowaga, NY 14225.

New York: Free flea market! Elmira international hamfest at the Chemung county fairgrounds, sponsored by the Elmira Amateur Radio Assn. on Sept. 26. Dealers, technical talks, great food and even more awards than last year. Tickets and info from John Breese, WA2FJM, 340 West Ave., Horseheads, NY 14845.

†New York: Sept. 27, The Long Island Mobile Amateur Radio Club (LIMARC) will sponsor ARRL HAMFAIR '81 Part II. Held at the Islip Speedway at Exit 43 off the Southern State Parkway, just south of the exit on Islip Ave. (Rte. 111), or Exit 56 L.I. Expressway. This is the 26th event. Food, refreshments, awards. No reservations needed; thousands of free parking spaces for buyers. General admission $2, exhibitors spaces $5 each (admits 1 person). Nonham family members free. All licensed amateurs must pay admission. Heavy-rain date is Oct. 4. For info call at night Sid Wolin, K2LJH, tel. 516-379-2861, or Hank Wener, WB2ALW, tel. 516-484-4322.

†New York: Yonkers Amateur Radio Club will sponsor a giant electronics flea market on the parking lots of Loral Electronics, Fullerton Ave., Yonkers, on Sunday, Oct. 4 (rain date, Sunday, Oct. 11), from 9 A.M. to 5 P.M. Pre-registration is $1.50, at the gate $2. Sellers $4 advance, $5 at gate (1 admitted), bring tables. Prizes, live demonstrations, computers, TV satellite, hi-fi equipment, YARC worldwide radio station, many more commercial demos. Sales of new and used equipment; giant auction. For further information call 914-969-2520. Talk-in on 146.265/865, 146.31/91, CB channel 4.

†North Carolina: The Western Carolina ARS will hold its Asheville Autumnfest on Oct. 10 at the Asheville Civic Center. Admission is $3 in advance, $3.50 at the door. Activities include McElroy Memorial cw competition, bingo, dealers, flea markets and demonstrations. Talk-in on 31/91, 16/76 and 52. For more information contact WCARS, P.O. Box 1488, Asheville, NC 28802.

Ohio: The 39th annual Findlay Hamfest will be held on Sunday, Sept. 13, at the Hancock Recreational Center, just east of I-75 Exit 161, 40 miles south of Toledo. Tickets are $2 in advance, $2.50 at door. Open Saturday from 5 P.M. to 9 P.M. for set-up; Sunday at 6 A.M. For tickets, information and reservations, send s.a.s.e. to P.O Box 587, Findlay, OH 45840.

Ohio: The Greater Cincinnati Amateur Radio Assn., Inc. will present the original 44th annual hamfest on Sunday, Sept. 20, at Stricker's Grove on Rte. 128, one mile west of Venice (Ross). Exhibits, prizes, food and refreshments available. Flea market (radio-related products only), music, talks, hidden transmitter hunt and sensational air show. Admission and registration $4. For information: Lillian Abbott, K8CKI, 317 Greenwell Rd., Cincinnati, OH.

†Ohio: The Cleveland Hamfest Assn. will present the 7th annual Cleveland hamfest on Sunday, Sept. 27, at the Cuyahoga County Fairgrounds in Berea, from 8 A.M. to 5 P.M. Activities will include indoor exhibits, forums, nonham program and outdoor flea market with separate parking. Food services include both breakfast and lunch. Many prizes. Talk-in on 52 with W8QV. Advance tickets $2.50 prior to Aug. 31, $3 at the door. Contact the Cleveland Hamfest Assn, P.O. Box 27211, Cleveland, OH 44127.

†Oregon: Welcome to our 35th annual hamfest (Walla Walla Valley ARC, Inc.) at the Milton-Freewater, community building. New gear displays by the top dealers in the Northwest. Computer, antique, repeater and home-built gear displays. Saturday, Sept. 26, and Sunday, Sept. 27. Free registration. Big swap shop both days, radio gear only. N.W. Tri-State officers' meeting and Emergency Coordinators' meetings Sunday morning. Varied get-togethers Saturday night. Potluck dinner Sunday at 12:30 P.M. 52, 19/79, 04/64, 28/88, 16/76 and 3960 kHz monitored. For further info write Walla Walla Valley ARC, P.O. Box 321, Walla Walla, WA 99362.

Pennsylvania: The Uniontown ARC will hold its 32nd annual gabfest on the club grounds on Saturday, Sept. 12. Pre-registration fee is $2 each, three for $5. Swap and shop set-ups are free, must have your own tables. Prizes, food, parking. Gabfest starts at noon. Club is located on old Pittsburgh Rd., just off Rte. 51 and 119 bypass. Talk-in on 147.045/645 and 52. More info contact UARC Gabfest Committee, c/o John T. Cermak, WB3DOD, P.O. Box 433, Republic, PA 15475, tel. 412-246-2870.

Pennsylvania: Skyview Radio Club swap and shop will be held at Sokil Camp, 700 Wild Life Rd., Lower Burrell, on Sunday, Sept. 27, from noon to 4 P.M., rain or shine. Prizes, food, parking and shelter in case of rain. Talk-in on 04/64. Contact Jim Jackson, K3VRU, RD #1, Box 7A, Apollo, PA 15613, for more information. Registration $1 at door, nonham family members free.

†Pennsylvania: The 26th Annual York County Hamfest will be held on Sept. 27 at the Memorial Hall of York county fairgrounds. Registration begins at 8 A.M., vendor set-up at 6:30 A.M. Prizes, QSL card contest, flea market, overnight camping (3-point hook-ups, fee charged). Registration $3, tailgate space $2 (10 ft), inside tables $5. For information: Leroy Frey, K3POR, 170 S. Albemarle St., York, PA 17403, tel. 717-854-1203.

Pennsylvania: The Pack Rats fifth annual Mid-Atlantic States VHF Conference is Oct. 3 at the Warrington Motor Lodge, Rte. 611, Warrington. Advance registration $3, at the door $4. Price includes admission to 10th annual Hamarama flea market on Oct. 4 from 8 A.M. to 4 P.M. at the Bucks County Drive-in Theater, Rte. 611, Warrington. Flea market alone is $2, tailgating $3 per space. Bring your own table. Talk-in W3CCX on 52. Information for both events available from Ron Whitsel, WA3AXV, P.O. Box 311, Southhampton, PA 18966, tel. 215-355-5730.

South Carolina: York County Amateur Radio Society is proud to announce its 30th annual hamfest on Sunday, Oct. 4, at Joslin Park in Rock Hill. For additional information and pre-registration write YCARS, P.O. Box 4141 CRS, Rock Hill, SC 29730.

Coming Conventions

September 18-20
Dakota Division, Rochester, Minnesota

September 26-27
Great Lakes Division, Louisville, Kentucky

September 26-27
Roanoke Division, Virginia Beach, Virginia

October 2-4
South Florida Section, Clearwater

October 2-4
Texas State, Houston

October 3-4
Midwest Division, Salina, Kansas

October 9-11
Southwestern Division, Scottsdale, Arizona

October 10-11
Delta Division, Memphis, Tennessee

October 17-18
Louisiana State, Kenner

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

DAKOTA DIVISION CONVENTION

September 18-20, 1981, Rochester, Minnesota

The Dakota Division ARRL Convention, sponsored by the Rochester Amateur Radio Club, will be held at the Holiday Inn (downtown) in Rochester on September 18-20, 1981. (Be sure to mention the ARRL Convention for special room rates.)

Rochester is the home of the famed Mayo Clinic, and is the site of a major IBM laboratory and manufacturing facility. Friday night there will be a pool-side social hour and registration desk from 7 to 10 P.M. Saturday will feature a full program with technical sessions, an ARRL forum, an evening awards banquet and a Midnight Wouff Hong initiation. John Lindholm, W1XX, manager of the ARRL Communications Department, will be a featured speaker. A full program for nonhams will also be available. There will be 3000 sq ft of dealer exhibit space.

Admission is $5 in advance, $7 at the door. Hams aged 16 and under will be admitted for $3. Awards banquet tickets are $25 per couple, $13 each. Advance registration (before Sept. 15) to Willis VanNorman, KØJCF, Rte. 3, Box 25, St. Charles, MN 55972. Tickets will be held for you unless you include an s.a.s.e. Two-meter talk-in by WØMXW, the club station, will be on the 146.22/.82 and 146.625/.025 repeaters.

DELTA DIVISION CONVENTION

October 10-11, 1981, Memphis, Tennessee

The Mid-South Amateur Radio Association (sponsor) along with Memphis VHF Club, Raleigh ARA and Delta ARC will hold the Memphis Hamfest/Delta Division Convention on October 10-11, 1981, at the Memphis fairgrounds in the youth building (same location as last year), from 8 A.M. to 4 P.M. Saturday and 8 A.M. to 2:30 P.M. Sunday. Admission is $3, under 14 free. Nearby motel accommodations are available; write for details and reservations. Memphis is beautiful in October. Plan to visit the Elvis Presley Estate while here.

A large, air-conditioned building will accommodate over 200 flea-market spaces; space is also available on the outside. A full line of activities is planned. ARRL dignitaries are expected to be on hand for an ARRL forum. There will be nonham activities, a DX forum, antenna forum, and displays and forums showing how computers pertain to Amateur Radio. Saturday FCC exams are pending at this time.

There are plans for a big party/dance, with snacks, in the hamfest area Saturday night. If

you haven't attended one of these, you've missed something good.

For flea-market and commercial space or other details, write Memphis Hamfest, 28 N. Cooper, Memphis, TN 38104, or call Clayton Elam, K4FZJ, tel. 901-274-4418 (days) or 901-372-9618 (nights). Talk-in will be on 34/94 and 52. On-site trailer hook-up is available; set-up on flea market and dealers until 9 P.M. Friday night. Dayton is the first, and Memphis is the last big one of the season. Y'all come!

GREAT LAKES DIVISION CONVENTION

September 26-27, 1981, Louisville, Kentucky

The 1981 ARRL Great Lakes Division Convention in conjunction with the eleventh annual Greater Louisville Hamfest is September 26-27 at America's largest single-floor exhibition center, the Kentucky Fair and Exposition grounds, located in the central part of Louisville. Just take Exit 12B off I-264. Gigantic indoor exhibitors' area and flea market with over 250,000 sq ft of floor space, totally air-conditioned.

A full slate of programs is on tap for you: Kentucky nets meetings; ARES meeting; Army, Navy and Air Force MARS; QSL-card contest; cw contest; home-built equipment contest; DX forum with George Carlton, ADØS, of the May 1981 Kingman Reef expedition; and technical forums on every subject you can think of. We have a wonderful nonham program planned. Special guest this year will be Harry J. Dannals, W2HD, President of the ARRL, who will be our main speaker at the banquet on Saturday night. Also, Len Nathanson, W8RC, Director of the Great Lakes Division, will lead the ARRL forum. Other guests include Gerald Hall, K1TD, associate technical editor at ARRL Hq. If you have not received a hamfest brochure by the end of August, please write for a copy.

If you need room reservations contact either the Executive Inn Motor Hotel at 502-367-6161 or the Executive West Motor Hotel at 502-367-2251. Both hotels are located across the street from the hamfest site. Make sure you mention the hamfest for a special rate.

Hamfest registration is $3.50 in advance and $4.50 at the door. Flea-market vendor space is $3 per space for one day, or a special rate of $5 per space will cover both days. Plenty of exhibitor space is available; please write or phone for information. Flea market vendors and exhibitors may set up their wares anytime after 1800 EDT on Friday, September 25. Flea-market spaces will be sold on a first-come, first-served basis.

For exhibitor information, advance registration, hamfest brochure or just general inquiries, contact the Greater Louisville Hamfest, c/o Denny Schnurr, K4GOU, P.O. Box 34444, Louisville, KY 40232, tel. 502-634-0619.

MIDWEST DIVISION CONVENTION

October 3-4, 1981, Salina, Kansas

The Central Kansas Amateur Radio Club proudly presents the 1981 Midwest Division Convention at the Salina Bicentennial Center lots of room and air-conditioning.)

Major speaker will be Lt. Col. John Blaha, who is an astronaut candidate (pilot). Hugh Vandegrift, WA4WME, will present his great DXpedition programs. Among the many programs planned are AMSAT, FCC forum, ARRL forum, antennas, 160 meters, MARS, ROBOTS, propagation and public service. We will have many excellent nonham programs including one on self-defense, a fashion show and flower arranging. The large commercial area will include Ten-Tec, Collins, Palomar, Kantronics and others. Many dealers will have special prices. The large indoor flea market is air-conditioned. Tables are only $2. If you don't like meetings, come to the flea market, look for that bargain you've always wanted to find and have an eyeball contact with old friends. JMF Manufacturing makes pc boards, and you will be able to tour their plant on Saturday afternoon. The Wouff Hong ceremony will be conducted on Saturday at midnight.

The banquet will feature Brookville chicken, buffet style, with 10 serving lines. Lt. Col. Blaha will also speak at the banquet, and the Free Spirit singers will entertain with an excellent program. WDØBNC will present his famous belly dancers. Banquet tickets are a low $10 each.

Pre-registration is $7, at the door $8. The luncheon on Saturday for nonhams is $4.50.

The CKARC is one of the smaller clubs to put on this convention, but we have covered all bases. All we need is you. We guarantee you a good time. Please register early. Contact WDØBNC, alias John Shoultys, 2157 Edward, Salina, KS 67401, or tel. 913-823-6624 for more information.

ROANOKE DIVISION CONVENTION

September 26-27, 1981, Virginia Beach, Virginia

The sixth Annual Tidewater Hamfest/Computer Show and ARRL Roanoke Division Convention will be held in the Virginia Beach Pavillion September 26-27.

Programs will include an ARRL forum, traffic, DX forums, and free bingo. FCC exams for Technician through Extra Class will be given. Form 610 must be completed and sent to the FCC office at 870 N. Military Hwy., Norfolk, VA 23502, before September 15. You must clearly indicate on the form that the exam will be taken at the ARRL Convention in Virginia Beach, Virginia. No walk-ins will be accepted. There will be free transportation to the oceanfront, where the Neptune Festival will be taking place.

Admission is $3.50; flea-market tables $5 for one day, $7 both days. Tickets and information: TRC, P.O. Box 7101, Portsmouth, VA 23707, tel. 804-587-1695.

SOUTH FLORIDA SECTION CONVENTION

October 3-4, 1981, Clearwater

The Florida Gulf Coast Amateur Radio Council is proud to announce its annual convention and to sponsor the ARRL South Florida Section Convention, October 3-4, at the Sheraton Sand Key, Clearwater, Florida. Our theme is "Back to the Beaches," so make it a family weekend on our beautiful Gulf beaches.

ARRL forums, technical forums, demonstrations, meetings, exhibits for the amateur, special exhibits for nonhams and a limited swap area will be featured. There will be a QCWA-sponsored Saturday noon luncheon, Saturday night pool-side luau with all the trimmings, Sunday noon luncheon and fashion show, and lots of surprises.

Registration is $4; those under 12 years old free. Swap tables are $10 for the weekend. Luncheon tickets, $6; luau tickets, $12. Special hotel rates for conventioneers are available; get your reservations early. For further information or reservations, write FGCARC, P.O. Box 157, Clearwater, FL 33517, or contact Jan, KA4ELA, tel. 813-544-6734. Repeater talk-in will be on 146.37/97.

SOUTHWESTERN DIVISION CONVENTION

October 9-11, 1981, Scottsdale, Arizona

The 1981 ARRL Southwestern Division Convention will be hosted by the Scottsdale Amateur Radio Club. The convention will be held October 9-11 at the Scottsdale Ramada Safari Resort.

High points of the convention will include an ARRL forum, many technical sessions and a western-style steak (22 oz) dinner on Saturday. The special after-dinner speaker will be Senator Barry M. Goldwater, K7UGA. Saturday will also be the day that the senator's "shack" can be toured by the conventioneers and their families. There will be many nonham activities, including a chance to shop in the world-famous Fifth Avenue stores in Scottsdale.

Many prizes will be awarded, and exhibitors will include ICOM, Kenwood, Yaesu and others. Advance registration is $6 (children under 12 free when accompanied by an adult). The steak dinner is $19, and tickets are limited. The tour of Senator Goldwater's shack is free; however, transportation to the shack is by bus only. Bus tickets are $2.

For more information contact SARC Convention Committee, P.O. Box 3073, Scottsdale, AZ 85257.

TEXAS STATE CONVENTION

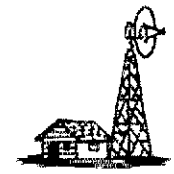
October 2-4, 1981, Houston

Houston Ham Conventions, Inc. and the Houston area radio clubs invite you to Houston ComVention 81 the ARRL Texas State Convention. ComVention has become a national show in the last few years. This year we are adding ham radio oriented computer exhibits and forums, an indoor air-conditioned flea market and a Friday night equipment auction to our long list of activities plus 60 commercial exhibits. Technical sessions will include personal computing, antenna design, amplifiers, MARS, traffic, AMSAT, QRP, SMIRK and one of the largest DX/Contest meetings in the country featuring Father Moran, 9N1MM. Also on hand will be DX-peditioners K1MM, K5YY and N4MM, and a few surprises.

Everything takes place at the Astrodomain with family activities planned at Astroworld and the Astrodome. The Gaylarks have a full schedule for the ladies. A Sunday morning tour of the Johnson Space Center has been arranged, including Shuttle Mission Control and a meeting with an astronaut. The banquet speaker is ARRL President Harry J. Dannals, W2HD, who will also participate in an ARRL forum with West Gulf Director Wangler.

Special ComVention rates of $48 single or double have been arranged with the Astro Village Hotel. Pre-registration (before Sept. 15) is $5, $7 at the door. The banquet costs $18, the JSC tour $6, and each flea-market space is $6. Full details available from HHC, Inc., Box 79252, Houston, Texas 77024, tel. 713-481-4586.

The World Above 50 MHz



Conducted By William A. Tynan,* W3XO

Activity Nights

"Now that I've put all of that effort into getting on the band, I can't find anyone to talk to." How often have you heard that complaint or made it yourself? Seldom is there really no one to talk to, unless of course you live in a particularly remote area. On most vhf and low uhf bands, even a modest station has a consistent range of 100 miles or more. Certainly there is somebody else on the band within that distance. Probably you are not getting on at the same time as others with whom you could readily communicate. Obviously the best way to be sure that your operating time corresponds with that of others on the same band is to agree in advance when you are going to get on. You can do this by arranging specific schedules with those you know are active. This is fine, but you may be missing some potential contacts you may not know about, particularly those at greater distances. That's where the concept of the general activity night comes in. This idea calls for a certain region, or even the whole country, to decide when operation on a particular band is to be stressed. Thus, the probability of various inhabitants of the band encountering each other is considerably enhanced.

The selection of specific days and times is best left to each area. Often there are conditions that influence this selection. It may be that a particular evening is best for the most active stations. Operating patterns may arise as a result of long-term schedules set up by as few as two stations. Others join in, and an activity habit is established. Although often selected based on such factors, activity nights may persist for years after the situation that influenced the original choice has long since ceased to be an influence. Of course, it is more important to have activity nights than to have them at the same time as other parts of the country. On the other hand, if there are no extenuating circumstances, it makes sense to decide on a time consistent with neighboring areas. In any case, it is vital to provide as much publicity for the chosen day and time as possible. Club and regional newsletters such as *Florida Skip* can be helpful in spreading the word. As in the past, I will endeavor to provide space in this column for announcements of vhf and uhf activity nights and various schedules. But I can present them only if people write and tell me about them.

As a guide for selecting times and days in other regions, as well as to inform those in the designated regions, I will pass along what I know now about existing activity night schedules. In the Northeast, the following have pretty well been established: Monday, 2 meters; Tuesday, 1-1/4 meters; Wednesday, 70 cm; and Thursday, 23 cm. In all cases activity peaks around 2100 in the evening, local time. In that part of the country there has not been a need, because of the high activity level existing, to establish a specific time to concentrate on 6 meters, but in other areas that may not be the case. Nor has there been sufficient activity on the higher microwave bands to justify the selection of specific schedules for them. But that can, and probably will, change with time.

In many places, 2-meter activity tends to concentrate around the local or regional SWOT Nets. The monthly *SWOT Bulletin* regularly carries information about these get-togethers. Write Len Hoops, KC5IJ, 1704 Glenn Dr., Fort Worth, TX 76131 for information. For 70 cm, at least, the Wednesday-evening time used in the East appears to be gaining favor in the Midwest and South. On the West Coast, WB6NMT reports that there is no particular time set aside for 2-meter activity, except, of course, the SWOT Nets and the Saturday- and Sunday-morning efforts to work stations to the east. For 1-1/4 meters, 1900 Wednesday evenings is a popular meeting time, as is 0730 to 0830 Saturday and Sunday mornings. In northern California, 70-cm activity seems to peak around 2100 on Tuesday and Thursday evenings, with Sunday mornings at 1000 also quite popular. The most concentrated times for 23-cm operation are Wednesday evenings at 2100 and Saturday mornings from 1000 to 1200. All times are local Pacific.

If activity schedules are established for your area, make an effort to concentrate your operating during those times. If not, try to get some started. Report them to this conductor so that I can pass the information along.

By this means we can build more activity on the bands above 50 MHz at all times, not just during the designated operating periods.

ON THE BANDS

6 Meters — Wow! That's the only word that sums up the 1981 Es season. It began in earnest in late May with strong double-hop openings across the country, accompanied by even stronger single-hop propagation. Before mid-June, a Pacific Northwest opening to Japan had taken place. During the June VHF QSO Party, widespread openings occurred in virtually all parts of the country. Even Alaska was worked from South Texas. W5UWB reports putting KL7IBG into his contest log. The SMIRK Test, on the following weekend, was also blessed with excellent Es propagation in most areas except New England. We here in the mid-Atlantic states experienced a five-hour opening to California along with a bumper crop of single-hop stations from Florida to the Midwest. Also, XE1TIS was in both days, doing a land-office business. Ken racked up a total of 230 QSOs and a multiplier of 33. Contacts included all of the New England states except Vermont. I agree with his assessment of "not bad for his first contest ever"! Then there were the LU openings on June 16 and 17. On the first of these two days, LU3EX was into the eastern part of the country. The following afternoon Alfredo was joined by three more Argentine stations, and a number of ssb and cw contacts resulted, including many with low-power U.S. stations. Even 10 watts and a dipole proved sufficient to make the grade with the LUs.

On at least three occasions prior to mid-July, the ZB2VHF beacon was received on the East Coast. June 30 (about 2200Z) was one of these times and, fortunately, ZB2BL arrived home from his club in time to work many stations from Virginia to New England. ZB2GW also completed a number of QSOs. This is the second year in a row that we have proof that Es can span the Atlantic. We have known for several years, from West Coast-to-Japan results, that Es is capable of hopping the Pacific. And now comes the real shocker! On July 9, beginning about 0500Z, WA5LIG in Dallas began hearing numerous weak signals. Just prior to that he had caught a partial identification of a KL7. The weak signals built up, and proved to be JAs! During the next hour Dennis worked 20 Japanese stations, at times having to specify call areas to sort out the pileup. WB5CHW was alerted by phone, even though it was after midnight Dallas time, and Jim also snagged a few of the prize catches. From the time of day involved, as well as the season of the year, I would judge this to be some kind of Es propagation. As such, it is the greatest distance that this conductor has ever heard of being worked on 50 MHz via that mode of propagation.

The Fourth of July weekend was certainly celebrated with a bang! Six meters was wide open both Saturday and Sunday with strong double-hop and very short single-hop propagation. DX to the south was also very much in evidence with such notables as 8P6KX, HI8DAF, VP5D, VP5DYL, PJ7DEW, DL3ZM/YV5 and, last but far from least, FG0DDV/FS being widely worked. This last station was a DXpedition by the North Jersey DX Club and, although the 6-meter rig they were counting on proved to be unavailable, they were able to borrow an IC-502 and 4-element beam from PJ7GIL. It was this 3-watt champ that saved the day and produced a new country for many 6-meter DXers. QSLs should go to W2QM.

I am sure most will agree that even if the season dies in mid-July, as these lines are being written, it's been a great one.

2 Meters — The year 1981 may go down in vhf history as the best ever for 144-MHz Es, or "E Skip" as the 2-meter gang usually calls it. There have been so many openings, and they have been so widespread geographically, that attempting to report them all in detail would be almost like trying to recount the particulars of every 6-meter opening taking place during a season. Probably the biggest day was July 5. In the morning (Pacific Time), California, Nevada and Arizona stations completed numerous contacts into Texas and Oklahoma. WA7JTM in Phoenix worked WB5JAR Little Rock, Arkansas, for a new state, and quite a rare one indeed for an Arizona 2-meter operator. W5UWB of Kingsville, Texas, QSOed both K7ICW and K7ZOK in Las Vegas, Nevada, and was even able to maintain some semblance of communication when the latter switched to his "handie-talkie." Another QRP happening took place later in the day while Texas stations were working into the northern Midwest. K5CKD, in the Houston area, managed an ssb contact with WØKRX in Minneapolis using a TS-700A into an indoor, quarter-wave whip. A few contacts were made from the Mid-Atlantic states into Texas and nearby states. Florida and other southern stations had a field day with New England and the VE2s and 3s. N4JS/5 of Meridian, Mississippi, heard K1WHS with very strong signals for over an hour. (See the 1-1/4 meter section.) Science has triumphed, and one of radio's mysteries has been solved at last, at least in the case of this particular Es opening. Its cause has been uncovered, and VE2DFO's gift of prophesy has been firmly established. Don warned Ray, VE3FN, that as soon as he disassembled his station, in preparation for an impending move, the band would open. Sure enough, three hours after Ray took his gear apart and packed it in boxes, other Ottawa stations started working the southern U.S. states. When will the next opening happen, Don?

K4GFG of Fort Lauderdale, Florida, reports another case of FAI, like those occurrences observed last year and mentioned in the May 1981 column. At 0200Z on June 22, Tom worked WA4CQG of Auburn, Alabama, on 144 MHz during an intense 6-meter Es opening. He had advised Dale by phone where to point his EME antenna including the proper elevation, which in this case was 30 degrees. A full-length article explaining this fascinating propagation mode is in preparation.

A last-minute flash in the August column mentioned the tropo opening, which occurred between the

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

2-Meter Standings

For WAS holders, listing is WAS number, call, state and call areas. For others, call, state, U.S. states worked and call areas. Call areas are 10 U.S. call areas plus KH6 and KL7, plus each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Compiled as of October 15, 1980. *Indicates that one or more contacts were made via EME. † indicates WAC.

WAS Holders

1	KØMQS*	IA	12
2	K5CM*	OK	12
3	NØJA*	MO	12
4	K9HMB*	IL	12
5	K1WHS*†	ME	12
6	WA4MVI*†	NC	12
7	K5JL*	OK	12
8	WA9DOT*	WI	12
9	WBØZXU*	IA	12
10	K9CA*	IN	12
11	WØSD*	SD	23
12	K5BMG*	LA	12
13	K5GW*	TX	12
14	WB5LUA*	TX	23
15	K4GL*	SC	23
16	WØVB*	MN	14
17	WB5LBT*	LA	20
18	K4PKV*	NC	12
19	WØRWH*	MO	17
20	W8IDU*	MI	23
21	K1MNS*	NH	12
22	WB9VEM*	IL	12
23	K5FF*	NM	16
24	W5FF*	NM	16
25	W7FN*	WA	12
26	W1JR*	MA	12
27	WBØQMN*	CO	12
28	WB4EXW*	NC	18
29	K9KFR*	IN	12
30	K3VGX*	PA	12
31	SM7BAE*		21
32	WA7BJU*	OR	12
33	VE7BQH*	BC	35
34	W6PO*	CA	12
	AA1A*	MA	47 20
	K1FO*	CT	47 18
	K1BKK*	VT	40 14
	K1HTV	CT	39 14
	K1GVM	MA	38 9
	K1PXE	CT	35 13
	W1JSM	NH	33 8
	WA4MMP/1	RI	33 8
	KA1GD	CT	31 11
	N1AIS	MA	28 12
	W1GXT	MA	27 8
	K1FWF	MA	24 10
	W1AIM	VT	24 8
	W1FJH	MA	24 8
	W1HDQ	CT	24 7
	W2PGC*	NY	47 14
	WA2PVV*	NY	46 16
	W2AV*	NY	44 14
	K2OS*	NY	44 14
	W2AZL*	NJ	41 10
	W2BLV	NJ	37 12
	W2ORI	NY	37 10
	W2CRS	NY	37 8
	K2OVS	NY	36 12
	WB2WIK	NJ	35 8
	WA2TIF	NY	34 11
	K2QR	NY	33 11
	WB2CUT	NJ	33 11
	WA2FGK	NJ	33 8
	WA2PMW	NY	32 11
	K2DNR	NY	32 8
	WA2SLY	NY	31 12
	W2CNS	NY	29 11
	K2BWR	NJ	27 7
	W2DWJ	NJ	26 7
	W2RS	NJ	24 11
	K2YCO	NY	24 7
	WA2YWP	NY	21 6
	WA3USC*	MD	43 12
	AB3D*	DE	43 11
	W3TMZ*	MD	38 12
	K3QCQ*	PA	37 8
	W3XO	MD	37 10
	W3BDP	DE	37 9
	W3IWI	MD	36 12
	WB3JHP*	MD	36 9
	W3RUE	PA	36 8
	W3KWH	PA	35 10
	AE3T	PA	35 8
	K3MWV	PA	32 10
	WA3WUL	DE	32 10
	WA3DMF	MD	32 9
	WB3LJK	MD	30
	K1GSR/3	MD	29 11
	K3HCE	MD	29 11
	W3LNA	PA	28 8
	N3AHI	PA	25 8
	W3OTC	MD	22 9
	WA4GPM*	VA	47 10
	WA4CQG*	AL	46 8
	WD4IIS*	GA	42 12
	WB4LHD	TN	40 11
	W4HHK	TN	38 9
	K4CAW	NC	38 9
	WB4NMA	GA	38 9
	WA4LYS	FL	37 11
	WD4MUO	VA	37 9
	WD4GXN	VA	37 8
	K4KAE	SC	36 13
	W4MKJ	KY	36 12
	K4QIF	VA	36 9
	W4VHH	NC	36 8
	W4ZD	FL	35 12
	WA4PCS	KY	35 9
	WD4GXU	VA	35 8
	W4LNG	GA	34 8
	W4FJ	VA	34 8
	W4ISS	GA	33 8
	N4CD	VA	33 8
	W4SMU	KY	30 9
	W3IY/4	VA	30 8
	N4QH	GA	23 8
	K5MB*	OK	49 12
	WD5CRK*	OK	49 12
	N5KW		49 12
	W5JTL*	MS	46 13
	K5MWH*	AR	47 10
	K5SW	OK	45 10
	W5RCI	MS	44 —
	N5KW	OK	41 10
	W5HN	TX	39 12
	W5HFV	OK	38 10
	WA5HNK	TX	35 12
	WA5EID*	AR	32 13
	W5UWB*	TX	31 9
	WB5JVR	TX	26 10
	WA5YOU	LA	26 8
	WØRRY/5	TX	26 5
	WA5TBE	TX	25 8
	W5VVV	TX	21 7
	WB6NMT*		26 13
	K6JYO		19 5
	K6HAA		13 4
	WA6JRA		11 5
	K6HMS		11 5
	N6CA		8 3
	K6QXY		7 3
	K6GAO		7 6
	WA1JXN/7*†	MT	49 31
	W7CI*	AZ	48 17
	W7JF*	MT	44 14
	K7NII*	AZ	41 12
	W7HAH*	MT	40 15
	WA7JUO*	NV	38 16
	WA7ADK	UT	24 6
	K7ICW	NV	21 9
	WB7EPA*	AZ	16 6
	N7BHC	UT	15 4
	WA7JTM	AZ	11 5
	WB7QBC	WY	12 3
	W8WN*	MI	47 10
	K8AT*	OH	45 10
	WA8HTL	MI	40 9
	WB8IGY	OH	39 8
	K8AXU	OH	38 11
	WB2DIN/8	WV	36 9
	WA8NLC	MI	35 9
	K8RZB	OH	35 9
	K8WKZ	MI	35 8
	WB8PAT	OH	34 9
	WA8MIL	MI	34 9
	W8LCY	OH	31 8
	WB8FEZ	MI	30 8
	W8TN*	WV	24 11
	W9UD	IL	45 13
	K9SGD	IL	45 12
	W9YF	IL	45 10
	W9AAG	IL	42 9
	N9SS	IL	41 9
	W9NLP	WI	40 10
	W9IP	IL	40 9
	K9XY*	WI	41 18
	K9UNM	IN	38 8
	K9EFX	IN	37 9
	W3EP/9	IN	36 9
	K9WZV	IN	35 10
	W9VWY	IL	35 9
	K9SM	IL	34 8
	WB9QBU	IL	34 .
	WA9UHB	IL	33 9
	WB9TPV	IL	31 9
	AA9D	IL	22 8
	WØRWG*	MO	48 15
	WBØVYV*	IA	48 11
	KØCJ	MN	46 12
	WØLER	MN	46 10
	WØEMS	NE	46 10
	WØOHU	MN	45 12
	KØSE*	MN	45 10
	WØRLI	MN	45 9
	KØALL*	ND	44 15
	AIØL	MO	44 11
	KØDAS	IA	45 12
	WØPN	MN	40 11
	NØLL	KS	39 10
	WBØIUT	NE	37 10
	WBØUFQ	MO	36 9
	WØRAP	IA	35 10
	WØPW	CO	35 9
	WBØWFY	MO	35 8
	KØAOD	MO	34 11
	KØTLM	MO	34 10
	WBØZKG	IA	32 8
	WØVHQ	MO	29 7
	WBØDGF	NE	27 9
	WAØLPK/KL7*		47 18
	KH6IHP*		22 13
	VE1UT*	NS	26 8
	VE1ASU		18 6
	VE2DFO*		48 30
	VE3FN		37 11
	VE3EMS		36 11
	VE3UH		35 11
	VE3FKX		34 10
	VE3AIB		29 10
	VE3AQG		28 8
	VE4MA		8 4
	G5CSZ*		26 30
	I4EAT*		12 64
	G4DZU*		11 8
	VK5MC*		7 7
	SM6CKU*		5 4
	VK3ATN*		4 4
	ZL1AZR*		2 2

east coast of Florida and the Caribbean on Sunday evening of the ARRL VHF Contest. KP4EOR provides more details. David says that it started at 1915Z on June 14 when he called a CQ to the northwest. He was answered by a weak ssb signal signing WB4TJP, Titusville, Florida. From then until 0400Z, when he went to bed sans lunch or dinner, David contacted Florida stations W4NEE, WA3BSZ/4, WB2OTK/4, W4HUQ/4, WB4TVE, W4WHK, W4AOK, N4MZ, WD4FAB, WA4GHK, W4WAF, K4SM, WB2RJL/4 and NI4Z. In addition, he worked two South Carolina stations, KB4NW and WD4JHF, as well as VP2MNQ on the Island of Montserrat. The next afternoon and evening was a repeat. David hooked up with many of the same stations again, plus N4EJW, W4VTJ, WA4OWC, WD4KGY, KA4LRQ, N4EYX, K4GFG, WA4EHK, N4AIP, WA4HSY, W4YMA, W4ZMJ, WA3RIU/4, K4FXP, N4AQL, WA4DHK, K4NTD, W4EMB, W4WSR, WA4VLX, WB4EJE and Florida mobile station WD8QXR, who was 5×1 on ssb. Signals both days were, in some cases, well over S9. Few stations farther south than Fort Lauderdale and none north of South Carolina were heard, but at about 0600Z, KP4EJT, who lives on a hill with a good shot to the north, was watching WOR-TV channel 9 from New York City. Others known to have taken part in the two days of super tropo were KP4EKG, KP4AHQ, KP4CF, KV4FZ, W4UWH/KP2, VP2VGR, VP2MX and VP2MNQ.

In the moonbounce arena, WAØLPK/KL7 is racing the calendar to complete WAS before he must dismantle his station for a move back to the lower 48. As of early July he still had Rhode Island, Kansas and Wyoming yet to go. Jim's stations-worked total stands at 90, so it is clear that he has been active, and his station does work.

1-1/4 Meters — KØDAS of Robins, Iowa, reports that he is putting his major effort into this band, although he is active on 2 meters and 70 cm as well. Rod runs a kW to a pair of 4C X 250Bs and a 13-element Yagi at 70 feet. His efforts paid off on the evening of June 11 when he worked WB7EPA/Ø in Wichita, Kansas, for what may have been the first contact between these two states on 220 MHz. Also in the tropo realm, a card from K5FF relates news of a June 11 QSO between her and W5HN of Dallas during a good 2-meter tropo opening to the same area.

WB9SNR, near Chicago, reports that activity on this band during the June ARRL VHF QSO Party was the best that he has never seen. Jim managed 21 contacts in nine sections, the best DX being VE3EMS at a distance of 430 miles (690 km). On June 18 he caught a tropo opening to the south, and worked N4JS/5 in Mississippi and WA4CQG in Alabama. In that same opening N4JS/5 of Meridian, Mississippi, lists 12 stations worked in the 8th and 9th call areas, plus VE3EMS.

A shot at the first two-way Es contact on 1-1/4 meters was lost July 5 when N4JS/5 asked Maine station K1WHS on 2 meters to shift to 220 and make the attempt. Dave sadly informed him that his 220 equipment was down at the time. John had heard a few "blips" on the band during the massive 144-MHz opening, indicating that the muf might have been high enough. Better luck next time. This conductor is convinced that it will happen eventually. Then, like the four-minute mile, it will probably be repeated many times over.

EME is the mode espoused by WØVB. He believes that the 1-1/4 meter band is very well suited for such operation. As proof, Terry notes that he is running just 300 watts output to an array of four Cushcraft 220B Boomers. As of mid-June he had successfully completed contacts with W5FF, K5FF and WB6NMT.

70 Cm and Down — A coastal tropo opening on June 17 resulted in state number 28 for K2RIW. All but one of Dick's 70-cm states have been on tropo. He has been trying to work Florida with his big array of sixteen 19-element RIWs for almost two years, and that night he did it. Thanks to an alert from WA4SBC of Virginia Beach, Virginia, he hooked up with WB4TJP in Titusville, near Cape Canaveral, a distance of 944 miles (1510 km). On the Florida end, the rig is an Echo 70 with 10-watt output to a single, 16-element KLM. In the over three hours that Dick talked to WB4TJF before going to bed, signals ranged up to 26 dB above noise. The next morning the Florida station was still there, and signals were hitting 38 dB above noise. Efforts by K2RIW to set up contacts for other Long Island and southern Connecticut stations were unsuccessful, except in the case of N2MB who did manage a QSO. Also unsuccessful were Dick's attempts to work other Florida stations. WA4SBC had been working K4NTD in Winter Garden and W5HUQ/4 in Jacksonville, but they were inaudible at K2RIW. Both are inland from the coast, although W5HUQ is 69 miles (110 km) closer to Dick's QTH. Apparently the 20 miles (32 km) separating him from the over-water path appeared enough to prevent propagation. This is indeed an interesting account, and it shows what can be done with activity in the right places.

The long-haul schedules conducted by K2RIW continue with very successful results. On Tuesday and Thursday evenings at 1930 local time he contacts K4CAW in Greensboro, North Carolina, a distance of 480 miles (770 km). An improved noise figure on Dick's part has brought year-around copy up to an average of 95 percent from a previous 60 percent. More than 200 QSOs have now been completed with signal strength recorded every 15 seconds. An effort will be made to correlate this data with various weather patterns. Another North Carolina station, WA4ZIA at Locust, 541 miles (865 km) from Long Island, is often worked following the K4CAW schedule, with copy running about 50 percent on ssb. That station runs an array of four RIWs and a kW.

Another regularly kept sked by K2RIW is with WA8HGX of Romulus, Michigan, a distance of 526 miles (842 km). The time for this one is 2030 local on Thursday evenings. WA8HGX is using an array of 16 RIWs, like Dick's, and about 400 watts. Copy has been averaging about 60 percent on ssb, but that should improve when Bruce completes his kW amplifier.

The 432 and Above EME News, put out by K2UYH, indicates that the ARRL EME Contest may have met one of its intended results. AI notes that the sked weekend after the Contest experienced higher-than-usual activity. Apparently many new stations are getting on and staying on. In the 23-cm moonbounce department, the newsletter says that W7GBI is now operational on that band. Charlie's first QSO was with G3LTF. He has heard K2UYH, K4QIF, VE7BBG and WB5LUA. A lossy T-R relay prevented contacts with these stations, but that should be fixed by now. Norwegian 70-cm EME operation should not be far off. LA6VM, using an array of eight 13-element quagis with open-wire feed and a 3SK97 preamp, heard 15MSH, DL9KR, F9FT, KA0Y and KA1GT during the second weekend of the EME Contest. LA9DL is also reported to be building a station. Both are working on amplifiers.

The July issue of the *News* also contains a very informative graph displaying the effect of receiving system noise figure on overall performance.

OK1DKW writes concerning the activities of the OK1KIR club group. These enterprising Czechs have equipment going on 70, 23 and 13 cm. An 18-foot (5.5-meter) dish is used on all three bands. On 70 cm they produce about 800 watts and have a 0.5-dB noise figure preamp mounted at the rear of the dish. In the EME contest they worked 11 stations and heard 38. The current 23-cm amplifier puts out about 200 watts, but they hope to raise it to 350 watts soon. Receive-system noise figure is around 2 dB. On 13 cm, a single 2C39 provides about 30 watts, but they still need a transistor for their DJ6Q1 preamp. The group wishes schedules, preferably on weekends. Those interested may write Radioclub OK1KIR, *Plzenska 131,150 00*, Praha 5, Czechoslovakia.

The New Frontier

Conducted By Bob Atkins,* KA1GT

The World Above 1 Gig

Loop Yagi for 2304 MHz

The use of Yagi type antennas above 1296 MHz has not been very common for two reasons. First, it is quite difficult to build a linear Yagi structure and to match it to 50 ohms at 2304 MHz because of the construction accuracy required. Second, the gain of quite a small parabolic dish is appreciable at 2304 MHz, and so the use of a dish is quite realistic. It is possible, however, to build a loop Yagi for 2304 MHz that has a reasonable amount of gain, is not too difficult to construct and has about 1/9 of the wind loading of a solid, 2-ft dish, both having about the same gain).

The loop Yagi detailed here had a gain of 20.9 dBi when measured at the East Coast VHF Conference this year (compare 21.6 dBi for a 25-in. dish). It has an estimated wind loading of 0.35 sq ft against a wind loading of 3.14 sq ft for a solid, 2-ft dish. Of course a mesh type dish can be used at 2304 MHz to reduce wind loading if one is available, but most of the surplus dishes of this size are solid. This antenna was constructed using copper elements mounted on a brass boom. If aluminum was used as the construction material, gain should be similar, though this has not been tried. The dimensions of the antenna were scaled from the 1296-MHz loop Yagi design in "The New Frontier" columns for October and November 1980. This antenna was constructed using 34 elements since no more would fit on the available boom (note that this is not good design practice!). If a longer boom were available, slightly more gain may be realized by extending it to 44 elements, as has been done successfully at 1296 MHz, though again this has not been tried. The antenna is quite sensitive to the detuning effect of mounting it with a metal mast in close proximity to the elements. It is recommended that either the antenna is end mounted, or offset mounted to a metal mast via at least 6 inches of a nonconducting material (wood, Plexiglas, etc.).

As a final note, I would like to add that I do not know the bandwidth of this antenna, or whether it will work on frequencies other than close to 2304 MHz, its design frequency, nor can I supply specific design information for other frequencies.

*111 Reinman Rd., Warren, NJ 07060

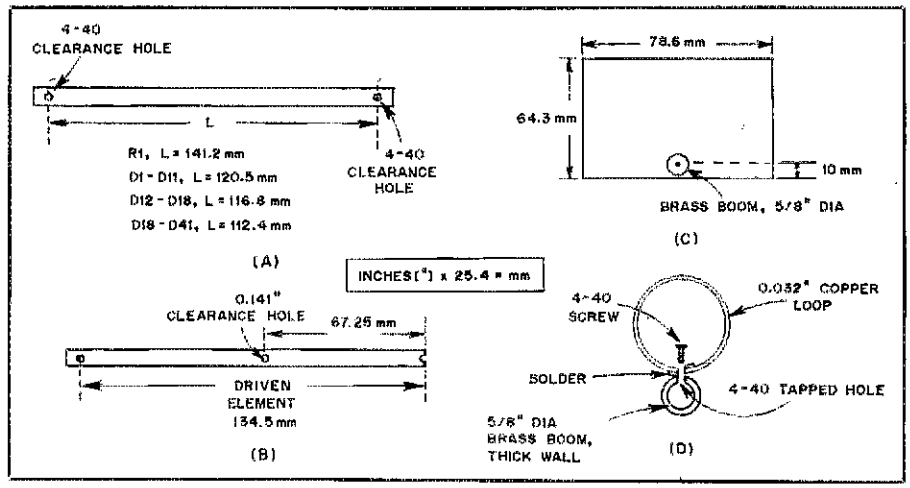


Fig. 1 — Element dimensions using 0.032-inch copper strip. At A are reflector and director loops; the driven element is shown at B. See October 1980 "The New Frontier" for feed and mounting information. At C is the reflector sheet. Any suitable material may be used — copper, brass or aluminum sheet, 0.015- to 0.040-inch thick, solid or mesh. At D, element mounting.

Element Spacing (mm) from Rear Reflector Sheet

R1	44.3	D5	154.4	D11	441.8	D17	747.0	D22	1001.3	D27	1255.6
DE	57.9	D6	187.5	D12	492.6	D18	797.8	D23	1052.1	D28	1306.5
D1	73.9	D7	238.3	D13	543.5	D19	848.7	D24	1103.0	D29	1357.4
D2	85.7	D8	289.2	D14	594.4	D20	899.5	D25	1153.9	D30	1408.2
D3	111.2	D9	340.0	D15	645.2	D21	950.4	D26	1204.7	D31	1459.1
D4	136.6	D10	391.0	D16	696.1						

Suggested spacings for 44 el follow:

D34	1611.7	D36	1713.4	D38	1815.1	D39	1866.0	D40	1916.9	D41	1967.7
D35	1662.5	D37	1764.3								

Eastern VHF/UHF Conference Noise Figure and Antenna Gain Measurements

The 7th annual eastern vhf/uhf conference was held in Boxboro, Massachusetts, on May 15-17. The results of the 1296- and 2304-MHz noise figure and antenna gain measurement sessions are listed here.

1296 MHz

Call	*Converter Description*	*Noise Figure (dB)*
W1JR	SOTA 1296	5.5
K1LPS	MMC-1296 with input filter	9.0

Call	*Preamplifier Description (into 3-dB NF Conv.)*	*Noise Figure (dB)*
KA1GT	NEC 21889	1.2
W1OOP	2304 PA with NEC V645	1.6
KA1GT	Plessey GAT 2	2.0
W1OOP	A 1200 hybrid amplifier with NEC V645	2.1
W1OOP	A 900 with 30-dB gain	2.2
KA1GT	NEC V645	2.2
W1OOP	A 900 with 23-dB gain	2.3
KA1GT	MRF 901	3.0
K1LPS	HP HXTR 2101	3.3
WA1VUW	3SK97	3.6
K1LPS	MRF 901	4.3
K1LPS	MRF 901 kluge	4.3
AF1T	MRF 901 with 10-dB gain	4.5
W3HQT	SSM SD1520 1-watt linear amplifier	8.0

2304 MHz

Call	*Converter Description*	*Noise Figure (dB)*
W1JR	Home-built converter	6.00

Call	*Preamplifier Description (with 6-dB NF Conv.)*	*Noise Figure (dB)*
W1OOP	Cascaded NEC V645	2.0
KA1GT	NEC V654	2.65

1296 MHz

Call	*Antenna Description*	*Gain (dBi)*
WA2ZZF	Reference horn	15.4
W1JR	Quad of 23-el. F9FT Yagis stacked 28 in.	22.7
G3BVU	4 vert. stacked (19-in.) Spectrum Int. 28-el. loop Yagis	22.1
KA1GT	2 Stacked (28-in) 39-el. loop Yagis	21.6
W3HQT	45-el. loop Yagi on 12-ft boom	19.5
KA1GT	39-el. loop Yagi on 10-ft boom (no. 1)	19.4
KA1GT	39-el. loop Yagi on 10-ft boom (no. 2)	19.4
WA1VUW	44-el. loop Yagi on 12-ft boom	18.0
W1JR	23-el. F9FT Yagi on 68-in. boom	16.9
W1JR	26-el. original G3JVL loop Yagi	15.6
WA1VUW	W2IMU dual-mode horn	11.7
WA2ZZF	13-el. W2CQH Yagi	11.1
W1JR	Polrad 10-dB reference gain horn	9.8

2304 MHz

Call	*Antenna Description*	*Gain (dBi)*
WA2ZZF	Reference gain horn	13.5
W1JR	32-in. dish	22.6
N. Metivier	25-in. snow sled dish	21.6
KA1GT	34-el. loop Yagi (11.5 λ)	20.9
W1JR	Polrad 15-dB gain reference horn	14.6
WA1VUW	Quad of 20-el. helices	12.7
WA2ZZF	EIA reference	12.6
WA2ZZF	Corner reflector	12.6
W1JR	Cavity-backed dipole	12.5
WA2ZZF	29-in. dish with 1296 feed	12.0
N. Metivier	2-lb coffee can feed	10.7

Involvement — A Key to Winnebago County's 1980 SET

Preplanning and agency rapport are prime requisites for a successful emergency test.

By Merrill Lewis,* WB9KZH

Weather Report — sleet continuing with heavy icing, snow and rising winds by mid-afternoon. Driving conditions are extremely hazardous with power outages and falling trees reported. Several roads are now impassable, and many areas have been without power since midnight. A state of emergency has been declared, and citizens are advised not to venture out.

This weather simulation became the core of three scenarios making up the 1980 ARRL Simulated Emergency Test in Winnebago County, Wisconsin, on October 18 and 19. In the planning, it became obvious that the whole scheme must develop with a measure of cohesion and logic. The objectives agreed upon were: (1) Involve as many amateurs as possible. (2) Contact whichever agencies might be reasonably involved, and develop active agency participation wherever possible. (3) Handle worthwhile formal traffic for upper-level National Traffic System nets for training purposes.

*Emergency Coordinator, Winnebago County, 1927 Montana St., Oshkosh, WI 54901

Planning Is Key

The first two objectives depended on groundwork that had to be laid well in advance, in the way of dealing with amateurs as well as government and civil agencies. In Winnebago County, the Amateur Radio Emergency Service consists of 30 operators. This list of amateurs was offered to the state office of emergency government as a team of operators who were willing to serve RACES. I asked the OEG to certify all as RACES operators. Thus, in Winnebago County, ARES and RACES are one and the same. A weekly 2-meter net meets Sunday evening to maintain contact and to deal with RACES/ARES matters. This organization of amateurs served to make the 1980 SET successful.

For the past four years, efforts have been made to develop a rapport with any agency involved with emergencies. In the beginning, it was surprising to learn how little the agencies knew of Amateur Radio. Mostly through personal contact, but also through public exposure, the Winnebago County sheriff, the director of emergency government, the Oshkosh police and fire departments and the Oshkosh Red Cross Chapter gradually became aware of the considerable potential and discipline of radio amateurs. It was this growing familiarity that made the whole process of planning and implementation an easy and productive experience.

Implementation

Objective one was carried out in this

WB9KZH reports the progress of the air-boat rescue to net control. The air-boat crew consisted of a Sheriff Department pilot, two paramedics and the county emergency director. It was a cold, windy and wet run across choppy water, but the "victim" was saved. *(WB9JSW photo)*

Red Cross volunteers prepare to load supplies destined for the homes of people without heat. *(WB9JSW photo)*

manner: Each operator was to get involved in the handling of formal traffic by initiating at least one piece of traffic. In addition, each was given (by previous mailing) an HXE[1] message to be sent out of state. (About 50% of these messages were answered.) Some 20 additional messages were mailed to various hams throughout the U.S. and Canada, with the request that they put the traffic on their respective nets. These were health-and-welfare messages addressed to the Oshkosh Red Cross Chapter, requiring relay to the Winnebago County airport; operating positions were established at both locations.

Three books of traffic were planted with nonamateurs in a major Midwestern city. These messages were to be aired by amateurs in that city, and were addressed to amateurs in Winnebago County. The text read "CAN YOU REACH OSHKOSH AIRPORT QUERY INFORMATION ABOUT JOHN DOE'S ARRIVAL IS URGENT." This required a relay via 2-meter net control to the airport, and would result in return traffic — more activity for the operators in the cities of Neenah and Menasha.

The three scenarios mentioned earlier were designed to maximize agency involvement. The first developed when an operator was dispatched to Red Cross headquarters. Red Cross officials, who had been on top of the growing crisis, had alerted volunteers and put them through a loading exercise. A truck was loaded with supplies in anticipation of reports funneling in concerning elderly and infirm persons stranded in heatless homes. The balance of activity for the Red Cross was to pass and deliver traffic, mostly from the airport. These were the planted HXE messages inquiring about stranded passengers at the terminal.

The second scenario was a test of an air-rescue boat by the sheriff's department. Since Oshkosh (the county seat) lies between Lake Winnebago on the east and Lake Butte des Morts on the west, with the connecting Fox River running through the city, a boat is considered an important piece of rescue equipment. The department saw SET as an opportunity to test a boat on a shake-down cruise. The simulation took the form of a heart-attack victim in the town of Winneconne. A ham with a hand-held contacted the Safety Building communications center in Oshkosh, where an amateur was on duty. The relay to the sheriff was almost instantaneous, and the boat was launched. The mission proved to be of considerable benefit to the department, and officials thanked the amateurs for the "excuse" to test their equipment.

The third scenario dealt with the grounded passengers at the Winnebago County airport terminal. An operating position was established to receive the traffic coming from the Red Cross and from Neenah and Menasha. Several messages were initiated by passengers and were relayed directly to NTS liaison stations.

Lessons Learned

Not everything came off as planned, obviously; but it must be said that many of the agency personnel have come to realize the potential of Amateur Radio. It will take continuing efforts on the part of radio amateurs to keep it that way.

The Simulated Emergency Test has value as a learning experience, and any benefits derived must be expressed in terms of what was learned.

1) Under test conditions, we can count on about 75% participation from registered ARES/RACES operators. It could be assumed that the percentage would be higher under real emergency conditions, and that is seen as a comforting margin.

2) Any of the registered operators could be counted upon to assume net control responsibilities, thanks in part to the weekly round robin of net-control assignments.

3) There is work to be done in encouraging amateurs to get involved in formal traffic handling. We found skills lacking in writing message texts, determining checks and reading handling instructions.

4) The public is very interested in knowing that Amateur Radio is intimately concerned with emergencies. It is important to be conspicuous during SET.

5) Public officials are cooperative if and when they can see how Amateur Radio could serve their purpose in an emergency.

6) More might have been done to encourage involvement of hams who live in the outlying areas of the county and who aren't registered in the ARES/RACES programs. This will be a major concern next year.

[1]HXE means, "Delivering station get reply from addressee; originate message back."

Simulated Emergency Test Announcement

October 17 and 18 is the weekend to remember, sports fans!

By Robert Halprin,* K1XA

There may be no World Series in October, but for the League's Amateur Radio Emergency Service and National Traffic System, the show must go on! On October 17 and 18 strikes will occur, coast to coast, because that's the weekend of the annual Simulated Emergency Test — a Field-Organization-wide preparedness exercise for all radio amateurs. Throughout the U.S. and Canada, a veritable blitzkrieg of blizzards, tornadoes and other nontraditional, concocted disasters will strike, designed to simulate realistic conditions under which Amateur Radio operators provide emergency communications. And the best thing is that each strike will be settled in no more than 48 hours!

On a local basis, the SET will be coauthored largely by section, district and local emergency coordinators, and net managers. They create scenarios for chaos, such as the search for King Kong in California, an attempted terrorist takeover in the Midwest, a runaway barge filled to the gills with toxic chemicals in Ohio, a jumbo-jet crash in Colorado and nuclear-accident evacuations just about everywhere.

Many of our League officials have already been primed for the SET by virtue of the ARRL/Red Cross Message Relay.[1] This April activation of the Field Organization honored the 100th birthday of the American Red Cross, which culminated in gift-wrapped radiograms presented to Red Cross officials at their centennial convention. An upcoming article will detail the successful conclusion of this radiogram relay program.

Those of you who have not taken part in SET previously may be wondering, "How do I participate?" Here's how, in a nutshell. Most

*Assistant Communications Manager, ARRL

[1]Notes appear on page 80.

local activity, particularly of an ARES nature, will occur on 2 meters. If you have a 2-meter fm transceiver, you're golden. Contact your local or district emergency coordinator and tell him/her you would like to help out in SET. If the identity of this individual is unknown to you, the next step is to contact your section emergency coordinator (see list) or your section communications manager (see page 8). These league officials synchronize SET activities in your section, and will fill you in on the particulars.

Many ARES groups work closely with RACES and civil preparedness entities, Red Cross, Salvation Army, REACT and other agencies. Thus, there should be more than enough assignments for everyone. If it turns out that your locality does not have an ARRL emergency coordinator, perhaps you or another qualified amateur could volunteer. Let your SEC and/or SCM know.

With 2-m fm capability, you can enjoy the many NTS local nets that exist on that band. If you are unfamiliar with formal traffic-handling procedures, we suggest you familiarize yourself with the information contained in the *Operating an Amateur Radio Station, Public Service Communications Manual* and *Net Directory* pamphlets,[2] as well as the *ARRL Operating Manual*, available at your local radio book counter.

Those who are low-band oriented can get in on the SET action by helping out on the section-level NTS net. Most every ARRL section has a traffic net meeting on 75/80 meters. In an emergency, it is imperative that all stations go about handling communications in a standard format. So it is important to familiarize yourself with the procedures spelled out in the above publications, as well as to monitor and report into net sessions before the SET, to get to know the ropes (and avoid sounding like a dope!).

As was the case last year, NTS will expand into four cycles on October 17 and 18 (see Table 1) to deal with the expected traffic overload. The month of October will also likely see the NTS area staffs submit recommendations concerning the present daily NTS schedule (of which the four-cycle sequence is a significant component). For background on the NTS sequencing, see June 1981 *QST*, p. 77, and September 1980 *QST*, pp. 78-79.

For SET, all nonroutine test messages should carry the word TEST before the precedence, e.g., Test Priority on phone or TEST P on cw. As a further step to ensure that test messages will not be construed as the real thing, use the words TEST MESSAGE in the first two words of the text. Do not use TEST in the precedence or in the text of a routine message. A routine message is a routine message, regardless of whether or not it was drafted for the SET. For improved efficiency and fewer Excedrin headaches, try to avoid using long words such as participating, communications, etc., in texts whenever possible.

To prevent SET messages from dragging out beyond the SET period, the handling instruction HXB is used. Loosely interpreted, HXB means "cancel message if not delivered within the SET period; send a service message to originating station." For SET messages sent during exercises held on a date other than the primary weekend, use HXB followed by a number, e.g., HXB48, which means "cancel message if not delivered within 48 hours of filing time; send a service message to originating station." If the message is not a test

Section Emergency Coordinators of the American Radio Relay League

Alabama: Hubert H. Wheeler, W4IBU, 2100 Buckingham Dr. SW, Huntsville 35803
Alaska: Walter Pierce, KL7EWQ, Box 839, Wasilla 99687
Arizona: Erich J. Holzer, N7EH, 3526 E. March Pl., Tucson 85713
Arkansas: Joel Harrison, WB5IGF, 1403 Forrest Dr., Searcy 72143
California:
East Bay: William D. Meyer, WB6KQU, 4747 Piper St., Fremont 94538
Los Angeles: J. David Tucker, WB6FAK, 14419 Collins St., Van Nuys 91401
Orange: Joe H. Brown, W6UBQ, 5444 La Sierra Ave., Riverside 92505
Sacramento Valley: Ron Menet, N6AUB, 13224 Omega Ct., Grass Valley 95445
San Diego: Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego 92117
San Francisco: Frederick W. Bray, WB6ZRK, 2551 Greenwich, Apt. 2, San Francisco 94123
San Joaquin Valley: Leland Rhoy, WA6YAB, 4817 N. Crystal, Fresno 93705
Santa Barbara: Matthew D. Lee, WB6BWZ, P.O. Box 1943, Santa Maria 93456
Santa Clara Valley: Edward A. Gribi, WB6IZF, 51280 Pine Canyon Rd., King City 93930
Colorado: Frank D. Williams, K3PUR, 5592 S. Moore St., Littleton 80123
Connecticut: Robert Warzocha, W1SY, 12 Wooding Rd., Yalesville 06492
Delaware: David R. Elzey, W3PQ, 513 Woodmere Rd., Milford 19963
Florida:
Northern Florida: James S. Walters, WA2GIN, 3525 Wellington, Pensacola 32504
Southern Florida: William J. Johnson, AA4WJ, 1119 Lady Elaine Dr., Valrico 33594
Georgia: Robert E. Good, Jr., K4VHC, Box 2, Sargent 30275
Hawaii & Pacific Territories: *J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Idaho: Harold Short, WA7UHW, 923-10th St., Rupert 83350
Illinois: Robert J. Hajek, W9QBH, P.O. Box H, Riverside 60546
Indiana: Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220
Iowa: Ralph Wallio, WØRPK, RR 4, Indianola 50125
Kansas: W. D. Bemmels, WØKL, 40 Rockwood Dr., Ottawa 66067
Kentucky: Paul Eiden, N4EEL, Rte. 5, Peaceful Way, Sheperdsville 40165
Louisiana: *James R. Giammanco, N5IB, 9451 Corsica Ave., Baton Rouge 70810
Maine: Lee Branum, KL7IJG/1, 7 Elm St., Ellsworth 04605
Maryland & DC: Thomas J. Abernethy, WA3TAI, 1133 Apple Valley Rd., Accokeek 20607
Massachusetts:
Eastern Massachusetts: Douglas A. Chisholm, WA1BLG, 41 Birchwood Rd., Wilmington 01887
Western Massachusetts: William J. Hall, W1JP, Prospect Hill Rd., Brimfield 01010
Michigan: Dale Williams, WA8EFK, 291 Outer Dr., Dundee 48131
Minnesota: Les Taylor, WAØQIT, 123 S. 65th Ave., West Duluth 55807
Mississippi: Charles E. Bardsley, WB5FXA, 2425 Pascagoula St., Pascagoula 39567
Missouri: James Bair, NØAJI, 136 N. Lawn, Kansas City 64123
Montana: Robert Leo, W7LR, 6790 S. 3rd Rd., Bozeman 59715
Nebraska: James E. Sanford, NØAIH, 4764 Meridith Ave., Omaha 68164
Nevada: Richard N. Dresbach, WA7KCD, 9250 Spearhead Way, Reno 89506
New Hampshire: Dan Morehouse, AK1E, Box 160, Danbury 03230
New Jersey:
Northern New Jersey: Robert Weingaertner, WB2VUF, 21 Brook Dr., Morris Plains 07950
Southern New Jersey: Austin B. Prestwood, Jr., W2HOB, 6 Kingsley Rd., Mount Holly 08060
New Mexico: R. B. Goodman, W5ALR, 2821 A. Palo Verde NE, Albuquerque 87112
New York:
Eastern New York: Dennis R. Baumgarte, KB2TM, 18 Mildred Ave., Poughkeepsie 12603
New York City & Long Island: Philip Cerniglia, WA2KKJ, 51 Barthold Ave., East Patchogue 11772
Western New York: James M. Mozley, W2BCH, 126 Windcrest Dr., Camillus 13031
North Carolina: Harry J. Prout, WA4BFT, 708 Reta Rd., Durham 27704
North Dakota: Mike Mankey, WBØTEE, 1318 Pocatello, Bismarck 58501
Ohio: Ralph A. McDonough, K8AN, Box 240, RD 2, Adena 43901
Oklahoma: H. O. Townsend, WA5MLT, 2324 Morgan Rd., Norman 73069
Oregon: Wesley A. Allen, K7WWG, 2870 SW 199th Pl., Aloha 97005
Pennsylvania:
Eastern Pennsylvania: Robert A. Josuweit, WA3PZO, 9 Derwen Dr., Havertown 19083
Western Pennsylvania: Paul Cherish, AB3Q, 304 Bluff St., Kittaning 16201
Rhode Island: Edmond H. Cote, Jr., KA1EHR, 309 Franklin St., Warren 02885
South Carolina: James G. Walker, WD4HLZ, Rte. 2, Box 432, Marion 29571
South Dakota: James M. Nance, WAØTNM, Rte. 2, Box 69 Colome 57528
Tennessee: Ed Dunn, W4NZW, P.O. Box 10393, Knoxville 37919
Texas:
Northern Texas: Charles T. Byars, W5GPO, 4217 Meadowbrook, Wichita Falls 76308
Southern Texas: Linden Sisk, AK5N, 12719 West Club Lane, Houston 77099
Utah: George A. Mackley, WB7BZJ, Box 523, Sunset Estates, Irvins 84738
Vermont: Reed A. Garfield, WB1ABQ, P.O. Box 571, Lyndonville 05851
Virginia: Paul Hoffman, KZ4K, 1902 Sterling Dr., Sterling 22170
Washington: Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406
West Virginia: George Puzzuole K8QEW, 3616 Morgan Dr., Weirton 26062
Wisconsin: Gary D. Maples, W9OAK, 1006 Marquardt Rd., Wausau 54401
Wyoming: Gregg G. Wood, WB7EIN, 901 Cahill Dr., Cheyenne 82001
West Indies: Jose Vazquez, KP4CU, P.O. Box 2884, Bayamon, PR 00619

Canada

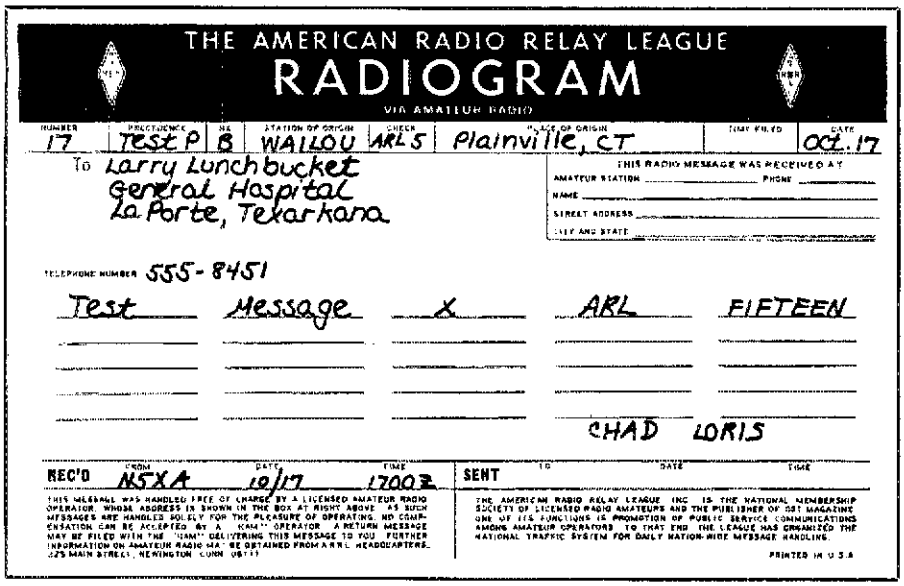
Alberta: E. Roy Ellis, VE6XC, P.O. Box 2, RR 1, Ft. Saskatchewan T8L 2N7
British Columbia: H. E. Savage, VE7FB, 4553 W. 12th Ave., Vancouver V6R 2R4
Manitoba: Richard B. Maguire, VE4HK, 588 Tremblay Ave., Winnipeg R2J ON8
Maritime/Newfoundland: David L. Oldridge, VE1EI, Box 38, Site 25, RR 6, Armdale, NS B3L 4P4
Ontario: Jack W. Strangleman, VE3GV, 512 Pinetree Dr., London N6H 3N1
Quebec: Adrien Michaud, VE2DEA, 1630 St. Croix Blvd., Montreal H4L 3Z8
Saskatchewan: Lawrence W. Kyle, VE5II, Box 2022, Melville S0A 2P0

*No appointed section emergency coordinator; section communication manager listed.

Table 1

NTS Schedule During SET, October 17-18

Cycle ONE	*Cycle TWO*	*Cycle THREE*	*Cycle FOUR*
10:00 A.M. Section	1:00 P.M. Section	4:00 P.M. Section	7:00 P.M. Section
10:45 A.M. Region	1:45 P.M. Region	4:45 P.M. Region	7:45 P.M. Region
11:30 A.M. Area	2:30 P.M. Area	5:30 P.M. Area	8:30 P.M. Area
12:30 P.M. Region	3:30 P.M. Region	6:30 P.M. Region	9:30 P.M. Region
			10 P.M. Section



THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE
17	TEST P	B	WA1LOU	ARL 5	Plainville, CT		OCT. 17

To Larry Lunchbucket
General Hospital
La Porte, Texarkana

THIS RADIO MESSAGE WAS RECEIVED AT
AMATEUR STATION _____ PHONE _____
NAME _____
STREET ADDRESS _____
CITY AND STATE _____

TELEPHONE NUMBER 555-8451

Test Message X ARL FIFTEEN

CHAD LORIS

REC'D FROM N5XA DATE 10/17 TIME 1700Z

SENT TO DATE TIME

THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR, WHOSE ADDRESS IS SHOWN IN THE BOX AT RIGHT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION CAN BE ACCEPTED BY A "HAM" OPERATOR. A RETURN MESSAGE MAY BE FILED WITH THE "HAM" DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM A.R.R.L. HEADQUARTERS, 225 MAIN STREET, NEWINGTON, CONN. 06111

THE AMERICAN RADIO RELAY LEAGUE, INC. IS THE NATIONAL MEMBERSHIP SOCIETY OF LICENSED RADIO AMATEURS AND THE PUBLISHER OF QST MAGAZINE. ONE OF ITS FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATIONS AMONG AMATEUR OPERATORS. TO THAT END, THE LEAGUE HAS ORGANIZED THE NATIONAL TRAFFIC SYSTEM FOR DAILY NATION-WIDE MESSAGE HANDLING.

PRINTED IN U.S.A.

Fig. 1 — An example of a properly filled-out SET radiogram

message and you would like to have it delivered even after the SET is over, don't use HXB at all.

Although October 17 and 18 is the official SET weekend, groups are free to hold their SETs on any two-day period between September 1 and October 31 to coincide with the time when amateur activity, public service value and mass-media exposure can be the greatest. All SETs held within this designated SET period will be included in the SET results in an upcoming issue of *QST*. The deadline for all reports is January 31, 1982.

On the subject of reports, all ARRL officials automatically receive an SET newsletter and reporting forms. Those of you who are public service coordinators of some type, but not affiliated with the ARRL Field Organization (shame, shame), should write the Communications Department at Headquarters and request the SET package. A compilation of timely reports is one way we can document the unique ability of Amateur Radio operators to provide communications in the public interest.

For that matter, would you be able to communicate if you suddenly lost commercial power? This happens in many emergencies. Some exercises and net sessions will operate on the assumption that electrical service has been disrupted. Equip yourself with some sort of emergency-power source or battery-operated gear.

Quicker than you can say "Larry Lunchbucket," you'll be having fun in whatever aspect of SET you choose to participate. But don't accept any third-party traffic for it, as it were. Get out there and experience this activity firsthand. And if it makes you feel good, stay with it.

Notes

[1]See *QST*, April 1981, p. 11.

[2]Send a large, 9 × 12 s.a.s.e. (35¢ in postage for *OARS* and *PSCM* and 52¢ for *Net Directory*) to Communications Dept., ARRL Hq. The *Operating Manual* is $5 postpaid.

Club Corner

Conducted By Sally O'Dell,* KB1O

WHERE'S YOUR MUSEUM?

The time is now. The place is wherever you have the room. The occasion is your club's celebration of its collection of memorabilia. Elizabeth Karpiej, KA1DTU, Assistant Circulation Manager, serves on the ARRL volunteer museum committee. She describes our museum at Headquarters and lists some ideas you might use in your museum.

The ARRL museum is located in the front lobby of the Headquarters building in Newington. It was recently set up again, after having spent some years in packing cases while the Hq. building was being expanded. A small in-house committee manages day-to-day responsibility for the museum. This group handles the inventory, arrangement of exhibits, storage and general upkeep. We also acknowledge, evaluate and catalogue donated pieces.

Besides the usual and expected items, the museum displays a collection of memorabilia from significant Amateur Radio events and anniversaries. For example, the Seymour Weymss Smith Cup was presented to the Chicago Radio Council in 1921 at the first ARRL Convention, for "fostering 'Citizen Wireless.'" It was donated back to the League in 1965. We also have a book presented by the Chinese Amateur Radio League. Dated in 1947, it praises the role of Amateur Radio in promoting world peace and brotherhood.

Radio clubs have played an important part in developing the ARRL museum. Your organizations have often contributed books, material, parts and/or antique equipment to us in memory of a Silent Key or to commemorate an important event in a club's history, e.g., a copy of the log used to handle traffic during the Italian earthquake.

We are glad to have these donations, of course, but there can be many advantages to a club's having a small museum of its own for public display and demonstration purposes.

If room permits, a permanent display can be set up in your club's meeting place to provide a common or shared focus of interest for visitors and members alike. The display, history and, if possible, the demonstration of older equipment (we're talking 1940's and 1950's here, not 1918) can be a very good way to increase members' interest and participation in meetings. A collection of ham gear through the years is sure to be found among your members. It can be a vivid, visual example of the state-of-the-art advancements and improvements that we dedicate ourselves to when licensed.

Libby Karpiej, KA1DTU, works on the ARRL Museum. *(Joyce Martin photo)*

Concurrent with the display and demonstration use within the club itself is the club exhibit. Your club's participation in the local harvest fest, flea market, Armed Services Day and so forth, can interest and inform people who "never heard of it" or "knew you were there but weren't sure what hams did and why." Especially interesting in this setting can be equipment and magazine or newspaper articles from the "good old days" when most radios were modified from commercial broadcast receivers or were home built from spare parts. (Plastic lamination to help preserve these paper mementos is inexpensive and usually obtainable locally.)

An advantage of having a "club equipment pool" available is the opportunity this gives your members (especially some of the newer hams) to practice and become comfortable with different types of rigs. Amateurs often are called upon to handle emergency communications. This service is not always possible using one's own rig, and knowing how to operate other equipment could be invaluable! With the introduction of digital read outs and all solid-state transceivers, many newer hams may never have had the opportunity to tune up a vacuum-tube rig. The day might well come when such a lack could be sadly felt. Training sessions with different pieces of equipment can be helpful, and having the equipment on hand in the club museum can literally be a lifesaver.

If your club does not have room for a permanent display, you might try contacting the local historical society or library. Often these institutions have the room to allow a fixed set up or will gladly put your collection on their rotating exhibit list.

Don't be put off trying to organize a collection of ham gear with the through that no one in the club or among local hams has anything *really special*. Ask. You'll probably be amazed at the number of pieces folks have tucked away in corners of their shacks! Don't just look for rigs in working condition or for rare pieces. (Not everyone has an original Armstrong 1922 breadboard around!) Back issues of *QST* (and other ham publications from whenever your "good old days" were) still have information on building gear that would now be "antique." What better way for a young whippersnapper to gain a sense of radio's history than to build an old one-tube transmitter, guided by an old timer's wise hand? And the product will be one in which *all* club membes can be double proud. Pictures of someone's first Field Day or a set of tubes for a line of radios no longer made are interesting articles. Old magazines and local newspaper clippings, as well as the club's awards and/or certificates, can contribute to an impressive display and help start your group on the way to preserving important ham memories.

*Club Program Manager, ARRL

Results, Fourth ARRL EME Competition

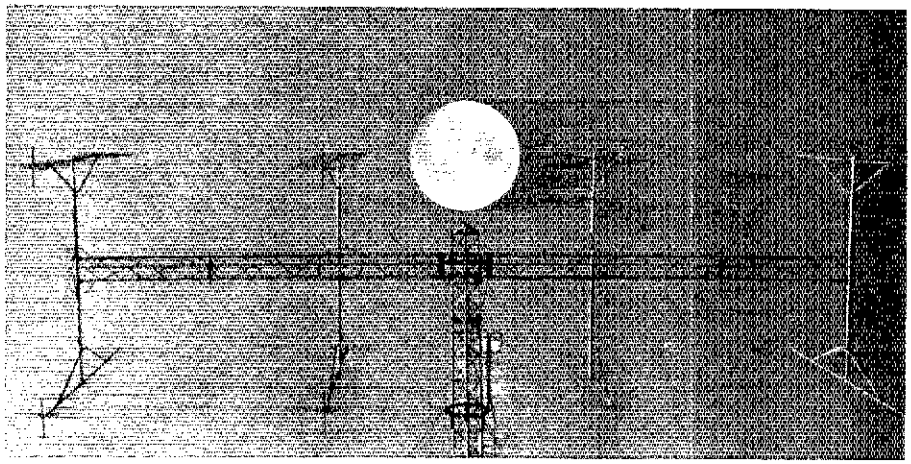
By Mark J. Wilson,* AA2Z

This year's EME competition was marked by yet another big increase in activity. The 68 logs received indicate that a total of 174 stations completed successful EME QSOs, compared with 121 last year and 98 the year before. The average QSO total for single-operator stations was up slightly to 19.5, compared with 19 last year. This was, in part, caused by an increase in the number of stations making one or two QSOs.

K1WHS led the single-operator category with an incredible 270,000 points — 90 QSOs on 2 meters alone. Dave's 336-element array (see it on the cover of this issue) helped him work many small stations, including DJ5MS who was using a single Yagi. DL9KR finished second with a 432-MHz score of 63 QSOs, up 12 from his score last year. The group at K2UYH put Al's 28-foot dish to good use, winning the multioperator category for the fourth year in a row.

Activity was up on 220 and 1296 MHz this year. K5FF completed seven contacts on 220, and PAØSSB found eight stations on 1296. Several stations indicated that they are gearing up for these bands, so look for even more activity next year.

Speaking of next year, several people suggested moving the contest to weekends in October and November to allow antenna construction during the summer and to take advantage of better fall conditions. If you have an opinion about this, drop us a line.



The 144-MHz array at OH6NU/OH6NM

Band Leaders

	Single Operator	*Multioperator*
144 MHz	K1WHS	OH6NU
220 MHz	WB6NMT	K5FF/W5FF
430 MHz	DL9KR	I5MSH
1296 MHz	PAØSSB	K2UYH

SOAPBOX

I was on both weekends with my new EME array, and can only say that I am still in shock after hearing such DX and QRM on 144 MHz. The level of 144-MHz activity in Europe is literally staggering. It was very easy to tell when the moon set in Europe because the QRM level dropped 10 dB!! (K1WHS). I contacted many new stations this time; 17 initial contacts were completed (JA6CZD). It was very strange to notice that when a strong station was heard, it was impossible to reach him, and the opposite was true as well. It seems that QSOs were only possible when signals were weak on both sides (F5SE/F9FT). The good European activity was a big surprise (SM7BAE). It was a very interesting contest, and brought out many calls that had not been heard for some time (G3LTF). Being a newcomer to EME, I was disappointed with the use of schedules during a contest (N9AB). The conditions both weekends were deplorable with heavy auroral activity (W1JR). Worked Utah and Wyoming to complete my 2-meter WAS (WA3VSJ). I have a 24-foot dish under construction, and hope to be on 432 and 1296 soon (WA8HGX). Operated under primitive conditions during my "DXpedition" to South Carolina (WA4MV1/4). Antenna aiming was simple. Just listen on 144.010 for K1WHS, and then swing the antennas to peak up his signal (W8TN). My efforts were on 220 MHz using four Yagis and just 300 watts output. Got operational the second half, and worked K5FF and WB6NMT right off the bat. The remarkable thing is that *they* copied *me* with minimum antenna and minimum power! The end result is that WØVB is QRV on 220 EME! Skeds anyone? (WØVB). This is the first time (I believe) that a contest station, or any station, has operated EME on more than one band simultaneously. We operated on 2 meters with an eight-Yagi array and on 220/432/1296 with my 28-foot dish (K2UYH). Our contest highlight was that K5FF completed a QSO with every 220 station that was workable during the contest — seven contacts in all!! (W5FF/K5FF).

*Assistant Communications Manager, ARRL

Scores

Line scores list: Call, score, stations heard, stations worked, multipliers, band (A-144 MHz, B-220 MHz, C-432 MHz, D-1296 MHz).

Single Operator

K1WHS 270,000-94-90-30-A
DL9KR 176,400-63-63-28-C
KAØY 147,200- 6- 6- 4-B
40-40-28-C
DL7YCA 132,600-62-57-26-C
JA6CZD 115,000-50-50-23-C
WA1JXN/7 103,500-54-45-23-A
WBØQMN 100,000-40-40-25-A
WB5LUA 92,500- 5- 5- 4-A
30-30-19-C
2- 2- 2-D
F9FT(F5SE,opr) 92,000-40-40-23-C
PAØSSB 81,600-26-26-16-C
8- 8- 8-D
WBØTEM 81,600-20-13- 8-A
22-21-16-C
OK3CTP 81,400-43-37-22-C
SM7BAE 70,200-45-39-18-A
JA9BOH 68,000-44-34-20-C
SM2GGF 68,000-12-12- 4-A
22-22-16-C
G3LTF 65,100-28-28-18-C
3- 3- 3-D
VE2DFO 48,000-42-32-15-A
W7FN 45,800-41-27-17-A
JA6AHB 40,800-24-24-17-C
N9AB 36,800-30-23-16-C
K4QIF 32,300-17-17-15-C
2- 2- 2-D
SM5FRH 22,000-32-20-11-A
VK5MC 18,000- 4- 4- 1-A
14-14- 9-C
OH3TH 17,600-16-16-11-C
K8WW 16,800-14-14-12-C
DL3YB 16,500-15-15-11-A
F6CJG 15,000-36-15-10-A
W5LUU 14,400-27-16- 9-A
WB6NMT 12,100- 5- 5- 5-A
8- 6- 6-B
K1MNS 9600-12-12- 8-A
W1JR 5600- 8- 8- 7-C
K9XY 5600-24- 8- 7-A
YU2RGC 4800- 8- 8- 6-C
OK4XI 4200-29- 7- 6-A
DL6WU 4200-24- 7- 6-C
K2OS 3000-19- 6- 5-A
WA3VSJ 3000-10- 6- 5-A
KA1GT 2500- 8- 5- 5-C
SM5CPD 2000-12- 5- 4-C
WA8HGX 2000- 9- 5- 4-C
YU1EW 2000- 5- 5- 4-C
WA4MV1/4 1600- 6- 4- 4-A
K7NII 1600- 7- 4- 4-B
W7CI 900- 3- 3- 3-A
JA4BLC 800- 4- 4- 2-C
W8IDU 400- 2- 2- 2-A
W8TN 400- 2- 2- 2-A
K9ZZH 400- 2- 2- 2-C
WØRWH 400- 5- 2- 2-A
WØVB 400- 5- 2- 2-B
K9IMM 200- 2- 2- 2-A
K5WXN 100- 1- 1- 1-A
N6AMG 100- 1- 1- 1-A
WA9ACI 100-12- 1- 1-A
KØDAS 100- 2- 1- 1-A

Multioperator

K2UYH(+KA2JTB,KB2AH, N3AIH,W3HQT) 230,400- 6- 6- 6-A
51-51-23-C
3- 3- 3-D
I5MSH(+I5s CTE MZY TDJ UNA) 140,400-60-54-26-C
I2COR(+I1NU,I2s TFI YID IW2ATM) 60,900-35-28-20-C
OH6NU(+OH6NM) 49,500-58-40-15-A
I2ODI(+I2CSE,I4BXN) 49,400-38-38-13-A
K5FF/W5FF 28,500- 7- 7- 4-B
16-12-11-C
F6BSJ(+F6s FTN GBY,F8DO) 10,800-29-12- 9-A
OK1KIR(+OK1s AKF AXH OAI DAK DCI DKW) 9900-39-11- 9-C
KØALL(+WBØAUM) 4900- 7- 7- 7-A
N6GN(+K6RFT,W6SFH, WB6KDF,WD6CJF,WB7ABP) 4800-23- 8- 6-C
WB4IZR(+WB4WMT) 3000- 6- 6- 5-C
WD4IIS(+AA4GA) 900- 3- 3- 3-A

Non-Amateur Equipment

K3NSS(W1ZX,K3AGR,N3s CAF CAL,W3PJM,WA3UPH, WB3AEQ,oprs) 88,000-44-44-20-C

SWL

JA9YAP(+JE2QPU,JF3HKY, JA9OBN) (20 stations - 432 MHz)
YU2RIZ (12 stations - 432 MHz)

Other Active Stations

OJ4AU,DJ5MS,DJ8QL,DJ9DL, DK1PZ,DK1KO,DK5LA,DL2LAH, DL4AXE,DL7QY,DL8GP, DL8HAB,DL9GS,F6CIS,F2TU, F8ZW,F6AMQ,F6FTN,F6GBY, F1DYD,F6FHP,G3POI,G3XGS, G4DZU,GW4ZIP,GW4CQT, GW3XYW,HB9SV,I4BXN, I4VEQ,IW4ADT,JA6DR,JA8QQ, JE6CTS,WAØLPK/KL7,LX1DB, OE9XXI,OH7PI,OH4UC,OK1MBS, OZ1EME,PAØAVS,SK2AU, SM4IVE,SMØERR,SM5CPD, SMØBYE,UR3TCF,UT5DL, VK3BKE,YU1AW,YU1SV, YU3NLM,YU7PX,YV5ZZ,ZE5JJ, ZL3AAD,ZS5TR,K1FO,K1MFQ, W1XP,WA1TZV,K2CTA,W2AV, W2AZL,W3VD,WA3USC,WB3JHP, K4PKV,W4WD,WA4NJP,K5AZU, K5IL,W5UKQ,W5JTL,W5HM, WB5TKU,WB5LBT,WB5ERD, KD6R,N6MB,W6ABN,W6PO, WB6ESQ,W7FU,W7GBI,W7JF, W7HAH,WA7BBM,WB7TYU, WB7UFO,W8WN,K9KFR,W9BOZ, WA9KRT,WØWHE,WØPUF, WØMDL,WØRAD,WA9LPK, WBØYSG,VE1UT,VE1OD, VE4MA,VE7BQH,VE7BBG

Results, June VHF QSO Party

By Bill Jennings,* K1WJ

There is dancing in the streets of East Hartford, and hams in Wellesley are euphoric. There's joy in Hilltown and up on "the Pack," but spirits are somber in San Carlos.

Why? Because N6NB operated one last VHF contest on the East Coast, and then drove his radio van west to sell it to a Californian. No longer will this western interloper fly coast to coast on airline super savers, pick up his van in New Jersey and terrorize eastern mountaintops.

The van, which houses a complete VHF contest station, a crank-up tower and even a 5-kW generator to power everything, is now owned by K6GSS, and its future haunts will be places like Mount Hamilton in the Santa Clara Valley section, not mountains in the rare sections of the East.

For me, the last eastern contest was a nice finale to it all, with coast-to-coast E-skip on 6 meters and contacts from Illinois to New England on the higher bands. Spruce Knob, the highest point in West Virginia, may not quite be Mount Greylock, but it's an exciting place to operate a VHF contest.

Altogether, I used the van to operate three VHF contests full time. The result: New England and national scoring records in both the June and September events, plus a new Roanoke division record this time. It cost a lot of money, but for this Westerner, operating a few VHF contests in that fabled VHF wonderland east of the Appalachians was worth it all. Thanks to the logistics support of people like W1SL, K1XR, KC2X, KB2M, K2OWR, WA2UNN and WB2WIK, I went home with enough VHFing memories to last a lifetime. — Wayne Overbeck, N6NB

The view from Catfish Mountain in Northern New Jersey at WB2OHV. 'OHV and multiop partner KA2EIA found the local mosquito population out in force to spur them on.

From the same people who brought you that rather ordinary January VHF Sweepstakes weekend comes "Super June VHF QSO Party."

To appreciate just how fine a weekend on the vhf bands during a contest can be, you simply had to be one of the 1122 participants who submitted 547 official entries and whose scores are listed at the end of this report. If you weren't there, scan the multiplier, top ten and Division leader boxes, and let the numbers do the talking. Anyone trying to bring up that old bugaboo about "punk" conditions is certainly going to have to go against some pretty convincing statistics.

Among other outstanding statistics in the June 12-14 event were the first 300-kilopoint scores ever recorded in an ARRL VHF Contest. Not one, but two stations (both of the multioperator variety), W1FC and W2SZ/1, hit the old 3×10^5 and kept right on going. There was DX aplenty to be worked. The WA8ONQ group, conspicuous by its absence from the W/VE top ten for multioperator stations, made the trip to Montserrat and put the call sign VP2MNQ in 57 logs. C6ADV was there to be worked on 6 meters, as 332 vhf contesters did, while two groups journeyed to XE-land to provide a little excitement from south of the border. Thanks to XE2s BC and XW. Let's not forget K1FJM who traveled to the Grand Cayman Islands to put ZF2EW on for the contest. On the domestic side of the ledger, 14 new all-time division records were set, six by single-operator stations and the other seven by their multiop counterparts. A comparison of the 1980 and 1981 top-ten scores reveals that there was a plus-6000-point gain in the average score of the 1981 single op "top tenner" to 57,398 points over the 51,952-point score posted by his 1980 counterpart. Multioperator average top-ten scores posted an astronomical jump of almost 29 kilopoints from 160,465 in 1980 to 189,335 in the contest just past. If you still think that this was just an ordinary contest weekend, you probably weren't in the right place at the right time — and we all know how that feels.

Look at the top of the heap in the single-operator listings. W9IP led the pack, not to mention that his 90-k plus score also obliterates his own 1980 Central Division record for single-operator stations and is the new single-operator record for the June contest. His secrets? Mike lists his advantages as, ". . . a high location in the clear, fast-rotating antennas, good quality audio, two antennas on 6 meters and instant bandswitching. Oh, by the way, please mention that I did not use fm." A little farther down the top-ten listings we find such familiar calls as N6NB/8 (now that the van is gone maybe we won't have to use the

Division Leaders

Single Operator			*Multioperator*	
Call	*Score*	*Division*	*Call*	*Score*
C6ADV	12,616	DX	XE2BC	28,272
K3SXA*	45,144	Atlantic	W3CX*	240,380
W9IP*	90,797	Central	K9HMB*	136,656
WAØCSL	20,995	Dakota	WØSD*	89,782
N4JS/5	27,676	Delta	N5DL	46,893
WA3VJU/8	26,565	Great Lakes	W8VP	87,349
WA2FGK/2*	61,903	Hudson	K2XR*	203,218
KØTLM	28,875	Midwest	WB7EPA/Ø	15,435
K1FO	69,216	New England	W1FC*	315,582
KB7WW*	26,649	Northwestern	K7AUO*	38,556
K1RZ	20,496	Pacific	W6YKM	32,305
N6NB/8*	84,780	Roanoke	W2CNS/8*	152,934
K5MAT	17,160	Rocky Mountain	NØBRI*	33,930
K4CKS	39,064	Southeastern	WD4IIS	79,540
WB7FDQ	10,038	Southwestern	WA7JTM	49,120
WA5VJB	25,480	West Gulf	N5KW	74,562
VE2DFO*	37,410	Canadian	VE3LNX	27,600

*New Record

*Communications Assistant, ARRL

portable indicator on Wayne anymore), K1FO and K3SXA — all top-ten types from the 1980 June contest. Let's welcome newcomers WA2FGK, WA1UQC, K1FWF, WB1CJT, W3XO and K1EM to the hallowed halls of the top-ten listings.

The competition for the title of top multioperator station in the June contests was ultimately won by the W1FC group in what can only be termed a battle of the microwaves with the rival W2SZ/1 team. Both multiops posted excellent 300-kilopoint scores, significantly eclipsing the old June party multiop best of 250,000 points set by the W1FC gang in 1980. Above 1296, W1FC worked six QSOs and six multipliers on 2 GHz, six QSOs and six multipliers on 3 GHz, five QSOs and five multipliers on 5 GHz, and seven contacts and five multipliers on 10 GHz. That, coupled with a big QSO total on 6 and 2 meters and good multiplier totals on 220, 432 and 1296, left the guys from New Hampshire with 1804 QSOs and 149 multipliers as well as a new June contest record score for multiop stations of 315,582 points. Over on Mt. Greylock in Western Massachusetts, the W2SZ/1 gang was heavily into the microwave scene also. They made four QSOs and four multipliers on 2 GHz (including a QSO with W3CCX in eastern Pennsylvania), six QSOs and five multipliers on 10 GHz, and the 'SZ secret weapon — one QSO and one multiplier on 24 GHz. In all, W2SZ had 1755 QSOs and 147 multipliers for a score of 310,611 points, good enough for second place among the multiops in this contest and a whopping 60 kilopoints better than the 1980 record score.

Thirteen all-time division records changed hands in June. Five of the divisions had "double headers" where both the single-operator and the multioperator records were broken: the Atlantic, Central, Hudson, Northwestern and Roanoke Divisions.

In the single-operator column, K3SXA took away the WA2DPU 1978 Atlantic Division record by over 2000 points. W9IP is now tops in the Central Division, while WA2FGK/2 added 12 kilo-points to the 1979 WB2W1K record in the Hudson Division. The Northwestern Division leader is now KB7WW, who threw a 6000-point whipping on the 1974 record of K7GWE. N6NB/8 again terrorized the East from West Virginia, and broke the K4WO 1979 record by 35,000 points to set the standard for single operators in the Roanoke Division. VE2DFO took up the VE1ASJ 1980 challenge and added 11 kilopoints to the old record in the Canadian Division.

W3CCX, K2XR and W1FC are the three multioperator stations who got into a self-improvement kick and bettered their own records in the Atlantic, Hudson and New England Divisions, respectively. In the Central Division, K9HMB added almost 76,000 points to the year-old WØOHU/9 record, while WØSD erased the WØOHU/Ø record in the Dakota Division. K7AUO zapped the four-year-old record of W7LYE/7 in the Northwestern Division, while the gang from W2CNS took their show on the road and smoked the 1979 W4BFB record in the Roanoke Division by nearly 105 kilo points. NØBRI added nearly 8000 points to the Bicentennial year record of WB5AXC/5, and now has the mark to beat in the Rocky Mountain Division.

All in all a pretty impressive list of accomplishments, wouldn't you say?

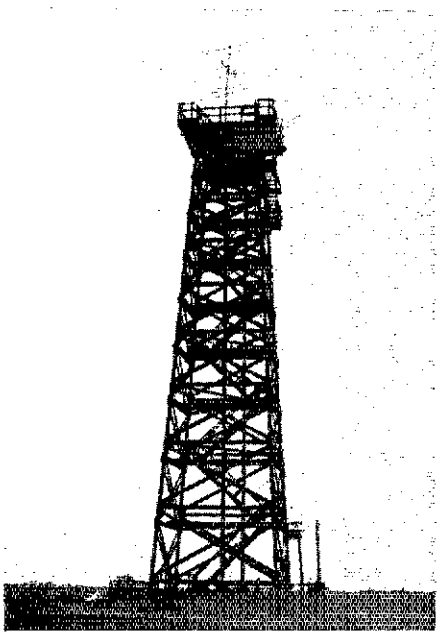
On a more mundane level we have a few comments about submitting vhf contest entries and about logging in general. In a vhf contest (or any contest, for that matter) accuracy in copying call-signs and contest exchanges cannot be stressed too strongly. When the contest log checker here finds an incorrectly copied call-sign in a contest entry, he extracts that call and a three-QSO penalty. A missing or incorrectly copied exchange is also extracted from the lot with a resulting reduction in score. Remember also that a complete and valid contest QSO requires the call of the station worked and the *complete* exchange for *every* QSO. Score credit cannot be given for incomplete QSOs, and some people will find their scores adjusted accordingly.

A new Ad-Hoc committee has been formed to provide, among other things, ideas and suggestions concerning the ARRL vhf/uhf contest program. Your thoughts and ideas about the vhf/uhf contests would be greatly appreciated. Please address all correspondence to committee chairman John Lindholm, W1XX, here at Hq.

Don't forget the September VHF QSO Party on September 12-13. Good luck.

SOAPBOX

Conditions were good on Saturday and fantastic on Sunday. Sunday morning we had a tropo opening on 2 meters to Northern California, something which is unheard of here in Arizona. Sunday night 6 meters went "bonkers" as signals from all parts of the U.S. were coming in (WA7JTM). Dear Soapbox: Why didn't you tell us that 6 meters would open up again on Sunday night? Missed a bunch of multipliers by taking down the antennas early after a slow day (W9DHK). [Dear W9DHK: Why didn't you ask? 73 de Soapbox]. Plentiful Molson beer made for an enjoyable contest in spite of the fact that I did not make too many contacts. My wife finally decided that she likes the contests because she gets to go on vacation. I hope to operate from a DX location next June, too (ZF2EW/K1FJM). All rigs made it through the contest, although Murphy did strike one or twice. The 6-meter rig melted a coax jumper and cooked a pair of 4CX150 tubes in the Thunderbolt before we realized



Tower of power. W9IP took home all the marbles from atop his 110-foot roost near Urbana, Illinois.

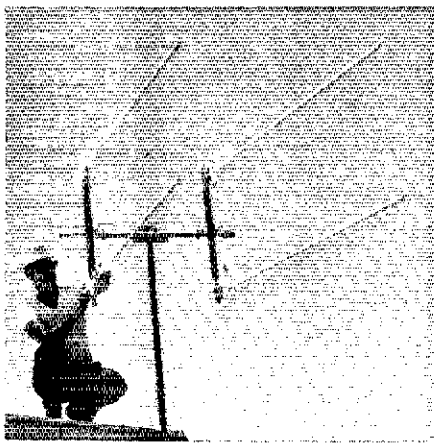
Multiplier Leaders

Single Operator

50 MHz	*144 MHz*	*220 MHz*	*432 MHz*	*1296 MHz*
K1TOL—60	WA1MAO—22	K1PXE—18	K1PXE—21	K1PXE—8
WA2FGK—49	KA2BTD—21	WA2FGK—14	K2RIW—24	W3CXU/2—6
	WA2GSX	W2EIF		
W3XO—50	K3SXA—21	K3SXA—18	K3SXA—18	W3IP—1
K4CKS—56	KC4EG—17	W3IY/4—15	W3IY/4—14	
			K4CAW	
K5MAT—49	N4JS/5—13	N4JS/5—3	K5BMG—9	WA5VJB—2
		K5BMG		
K6YK—38	K1RZ—13	K6IBY—8	K6PVS—8	K6ZMW—8
KB7WW—55	K1VOW/7—7	(4 stns)—2	(3 stns)—3	(3 stns)—1
WA3VJU/8—56	N6NB/8—23	N6NB/8—18	N6NB—18	WA8TXT—8
W9IP—60	W9IP—23	W9IP—11	W9IP—15	WB9SNR—5
WAØCSL—63	WBØSWD—16	KØDAS—8	WØVB—8	
	WØRWH			
VE2DFO—41	VE3FN—21	VE2DFO—14	VE2DFO—14	VE2BBK—1
C6ADV—38				

Multioperator

50 MHz	*144 MHz*	*220 MHz*	*432 MHz*	*1296 MHz*
W1FC—59	W2SZ/1—24	W2SZ/1—22	W2SZ/1—23	W2SZ/1—13
K2XR—60	K2XR—24	K2XR—21	K2XR—21	K2XR—10
	WA2SNA			WA2SNA
W3CCX—55	W3GNR—24	W3CCX—22	W3CCX—23	W3CCX—11
WD4IIS—57	(3 stns)—21	N4CD—9	N4CD—14	
N5KW—62	N5DL—17	N5DL—6	N5DL—10	
			WA5FDF	
W6YKM—39	WB6YQN—13	WB6YQN—7	WB6YQN—11	WB6YQN—11
WB6YQN		N6AMG		
N7DB—61	WA7JTM—12	N7NW—3	WA7JUO—7	WA7JUO—4
W2CNS/8—65	W2CNS/8—26	W2CNS/8—19	W2CNS/8—22	W2CNS/8—10
K9HMB—65	K9HMB—18	K9MRI—10	K9HMB—12	
W9UD/Ø—70	WØSD—17	W9UD/Ø—9	WØSD—13	(3 stns)—1
VE3LNX—40	VE3LNX—15	VE3LNX—12	VE3LNX—8	
XE2BC—24	XE2BC—14	XE2BC—6	XE2BC—6	XE2BC—5



WB6NMT adjusts the XE2BC 1296 array. Louis must have done a good job because five 1296 multipliers appear in the 'BC log.

that we had a problem. Something ate the guy ropes on the 2-meter antenna. WB3LJK noticed the bushes moving and, upon investigating, found that something had eaten 90% of the way through the rope holding up the 2-meter tower. The critter also chewed on the rotor cable. Porcupine? Squirrel? Or BIG mouse? (N4CD). Greatest VHF Contest that I have ever seen. I'm sure there will be record-breaking scores from all over the U.S. and Canada (K2QIE). An improvement over the Sept. '80 contest, but still lousy conditions. No QSOs on Saturday. Most stations were only in for 20-30 seconds; yet we could tell that the Midwest had a QRM level like 20 meters. QSLs for XE2XW go to W5XW (XE2XW/W5XW). QSO points should be allowed for both voice and cw contacts on the same band to help pass the time when the band is closed and to encourage more cw (W0ETT). Worst 6-meter conditions for the contest since 1973. Up until Sunday afternoon we had nothing but meteor bursts. When it did open up, the muf seldom went to channel 5 or 6 on the television (so no near misses for 2 meters). Two-meter tropo earlier in the week had been providing W4, W9 and W0 QSOs, but storm activity wiped that out (WA5IYX). Six meters was very exciting, providing us with 60 multipliers including Bermuda. Too bad it didn't open to W6 here in NNJ as it opened to all other parts of the west (K2XR). Loss of good participation, but very high winds throughout the West blew away the previous month's superb tropo, resulting in the poorest conditions on vhf in general, and 1296 in particular, that this op has seen in years! Yuk! Mountaintoppers were subjected to winds peaking near 100 knots and temps near (or below) freezing. In one case (WB6NMV/7 at Mt. Ashland in Oregon) snow fell for three days straight! (K6ZMW). Most significant for me was that with the way things had been going I decided to keep things simple — no amplifiers at all. Ten watts into the coax on all bands, 6 meters through 432. That comes out to four watts at the antenna on 220 and three watts to the antenna on 432. Still . . . I did very well. Certainly the best that I had ever done on 220 and nearly as well as I have ever done on 432 from up here on the mountaintop, running more power and bigger antennas. . . . A lot of new faces and more people showing up on the exotic bands like 1296 and 2304 (K1LPS). We did not go mountaintopping for the first time in 25 years because of heavy rains. It was impossible to gain access to our former good locations. Operated from the home location despite heavy power-line noise (VE7AFB). Told the inquisitive tourist that I was DFing a radio-tagged moose. Then his eyes nearly popped out when I told him that I lived at North Pole (Alaska, of course) (WB4WXE/KL7). Conditions for the first part of the contest (about 16 hours) very poor — sporadic and very short bursts (6 to 20 seconds). The 6-meter band opened up on the 14th about 1300Z and closed about seven hours later. Heard W6 stations and W7 (Oregon, Washington, Idaho and Arizona) types, but could not work them. In the September contest I'll be running 100 watts (C6ADV). We have worked for several years to set a Dakota Division record. It is very difficult this far west to run up our multiplier total. We spent a lot of time and effort to do EME on 2 meters and 432 under some very lousy EME conditions . . . WB0AUM made a special trip to Wyoming so we could get that multiplier on 2 meters (W0SD). Just three weeks before the contest, this area had (by insurance company records) the most expensive hail storm in history. It wiped out my 6, 2 and 432 beams. Just barely got replacements in time (WA5VJB). Does it snow in June? You bet! Our FB spot at 4500 feet got three inches of snow on Friday night, and we were forced to evacuate (KB7G). Activity was good considering tropo conditions were stinko. We consider outselves lucky here in northern Illinois as some Indiana and Ohio stations literally got blown away (winds and lightning). We desperately need more stations on 1296. On 1296 you need 30 to 50 watts out for a decent signal. With 40 watts out, a loop Yagi or two and a good MRF 901 or NEC 645, 300-mile contacts can be made under almost any conditions (WB9SNR). Very few crummy sounding signals on 6 meters this contest. Makes operating the contest a lot more enjoyable and worthwhile (WA2CWA). Everything went fine for the first hour and 20 minutes. Then several small tornadoes hit the area, wiping out our ac power, and a direct lightning hit on the 432 tower smoked several pieces of equipment. For eight hours we sat in the dark, muttering and drinking beer. When the lights came back on, we crudely repaired the rigs and limped through the rest of the contest (W8VP).

Top Ten

Single Operator

Call	*Score*
W9IP	90,797
N6NB/8	84,780
K1FO	69,216
WA2FGK/2	61,903
WA1UQC	46,822
K1FWF	46,576
WB1CJT	46,346
K3SXA	45,144
W3XO	42,000
K1EM	41,400

Multioperator

Call	*Score*
W1FC	315,582
W2SZ/1	310,611
W3CCX	240,380
K2XR	203,218
W2CNS/8	152,934
WA2SNA	149,322
K1TR	143,701
K9HMB	136,656
K3MTK	126,500
W1TKZ	114,450

Three of the 11 operators of K3HKK, the number two multiop score in Western Pennsylvania.

FEEDBACK

Kindly note the following corrections to the 1980 June VHF QSO Party. See pages 74-77 of September 1980 *QST*.

K2SHB should be included in the list of operators of WA2TIF, multioperator, Eastern New York.

W1QXX's logs were lost in transit, and finally arrived. John's linescore in the Eastern Massachusetts Section should read 20,349-283-63-ABCD. This would make John the number two single op in Eastern Massachusetts.

In the Northern Texas Section, we scored WA5VJB's entry incorrectly. WA5VJB's linescore should be 28,860-396-65-ABCD. This adjustment moves Kent into second place in Northern Texas, and moves WD5FZM into first place, single operator, in the Northern Texas Section and the West Gulf Division. QST

Scores

Scores are listed in order, single operator stations first within each section. From left to right: call, score, QSOs, multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2.3 GHz, G-3.4 GHz, H-5.7 GHz, I-10 GHz, J-24 GHz).

U.S.A.

1

Connecticut

K1ED 49,216-549-103-ABCDE
WA1UQC 46,822-498- 82-ABCD
K1EM 41,400-516- 75-ABD
K1PXE 37,596-328- 78-ABCDE
K1ZZ 20,800-260- 64-ABCD
WA1BRD 16,328-302- 58-ABC
W1FV 13,207-281- 47-A
WA1MAO 10,362-471- 22-B
W1WHL 8904-212- 42-A
W9KDR 4477-116- 37-ABD
K1VMI 2703-150- 17-B
KA1BU 1592-144- 18-B
WA1GTP 2294- 73- 31-ABD
WA1LOU 1998-111- 18-B
WA1ZNT 1650- 66- 25-AB
K1MOJ (KB1H,opr) 1131- 87- 13-A
WB1CZX 400- 40- 10-B
W1GNC 10- 5- 2-B
WB1FVS (+KA1DZV,WA1HEE) 94,000-747-100-ABCD
W1QK (+KA1AWV,W1PV,WA1S KOX WXV,WB1S CVW EZL) 80,910-801- 90-ABCDE
WB1BXS (+K1GX) 5040-240- 21-B

Eastern Massachusetts

K1FWF 46,576-488- 82-ABCD
W1QXX 24,388-333- 67-ABCD
W1JR 20,860-189- 23-ABCDEFI
W1GXT 20,196-238- 68-ABCDE
WB1FUB 10,528-223- 47-ABD
WB1FKF 7614-128- 47-ABCDE
N1AIS 7511-238- 29-BD
K1GVM 6928-169- 41-ABD
WA1CRE 4323-124- 33-ABC
N1HR 4320-240- 18-B
WA1JOF 4200-210- 20-B
KA1CXC 4089-141- 29-AB
KA1DHO 2944- 92- 32-AB
WA1NQV 1200- 50- 24-A
K1CM 612- 34- 9-D
WB1FOD 490- 31- 14-ABD
K1SR2 486- 27- 9-D
KA1R 356- 89- 4-B
W1JOT 341- 18- 11-BDE
W1FM 208- 52- 4-B
W1XM (K1MK,W1XG,WA4TTG, N6RYK,oprs) 68,432-579- 94-ABCDE

Maine

K1TOL 30,420-507- 60-A
KA1OJ 1125- 75- 15-B

New Hampshire

WB1CJT 45,346-480- 82-ABCD
W1EJ 33,374-390- 74-ABCDE
AC1J 2016- 79- 24-ABD
WA1GOR 702- 39- 18-AB
W1FC (+AB1A,AD8V,AF1T,AK1E, N1s AHC BC RC,N4BGF,K1s BTF GW KA KEC PEK PQO RX VR,K8UR,W1s DUW EHF FJH HIV KXL ZBT,W8PW, WA1s HON JHK NPN WJG WJQ YVL ZSF) 315,582-1804-149-ABCDEFGHI

Rhode Island

W1AJR 13,496-227- 56-ABD
K1OS (+K1PAM,W1XQ) 22,630-332- 69-ABCD

Vermont

WB1GQR (WB2JSJ,opr) 22,568-334- 62-ABCD
K1LPS 16,962-202- 66-ABCD
W1AIM 12,726-175- 63-ABCD
WA1ABQ 225- 25- 9-B
W1TKZ (AF1M, K1s OGF,TK,UR, W1OOP,WA1s PQY YAU YOJ ZLQ, WB1BUM,N2AWG,oprs) 114,450-888-105-ABCDEFI
WA1MAG (+KA1CXD,WA1s JEX NBU TBV) 23,499-366- 63-ABD

Western Massachusetts

KA1APR 21,910-283- 70-ABD
K1SF 14,694-214- 62-ABCD
AC1(12,696-239- 52-ABC
KJ1WGN 9750-171- 50-ABCDE
KA1RB 5550-197- 26-BD
K1RPB 5285-151- 35-AB
WB1ABF 5004-139- 36-AB
WA1VCU 1744-101- 16-BD
WA1VEI 923- 62- 13-BC
K1JG 18- 4- 4-B
W2SZ/1 (K1s DH IO ZM, WA1s LPJ RWU UGE UGF,WB1s CBH HIH AG2X,K2s MM TR UF WR,N2NT, WA2s AAU SPL,WB2s CFP JLR PKO QCJ,N8AFM,WA8USA,oprs) 310,611-755-147-ABCDEFIJ
K1TR (+K1s BA EA,N1BEM,WA1s GXN ONB PBU QWF VFJ) 144,701-1172-107-ABCDEFGHI

2

Eastern New York

W2CPS 31,600-351- 80-ABCDE
WA2TEO 30,184-343- 77-ABCDEF
K2CBA (WB2DNE,opr) 27,232-288- 72-ABCD
N2CMS 3024-101- 28-ABCDEI
K2BGU 1311- 57- 23-A
W2KHQ 960- 64- 15-B
N2EK 928- 58- 16-B
W2IP 770- 55- 14-B
WB2FKJ (AB2I,AB2J,K2s DNR DPL OIK SHB,KB2TM,W2s AWX KBH, WA2TIF,WB2s OVV SUH UWJ,oprs) 108,272-951-101-ABCDEI

New York City - Long Island

WA2YWP 31,536-383- 72-ABCD
N2BFJ 21,846-315- 66-ABC
WB2CMI 16,284-276- 59-AB
K2DVS 14,076-184- 68-ABD
K2RIW 6578-137- 24-D
N2BAR 4826-127- 38-AB
WA2PMW 1875-125- 15-B
KE2N 1462- 66- 17-B
WB2LZN 1428- 84- 17-B
WA2EUS 1360- 72- 16-BD
KB2W5 (+KA2DTE) 11,951-323- 37-AB

Northern New Jersey

WA2FGK/2 (K2LNS,opr) 61,903-530-103-ABCDE
WB2WIH 7370-319- 70-ABCD
KB2AH 25,632-328- 72-ABD
WA2LWA 25,278-383- 66-AB
WB2QDG 24,056-338- 62-ABCD
WB2ONA 21,842-296- 67-ABCD
KA2BTD 15,680-304- 49-ABCD
N2CJP 13,100-244- 50-ABCD
WA2UDT 8325-185- 45-AB
K4BNC 7248-151- 48-AB
WB2CUT 5260-263- 20-B
WA2ALM 2108-124- 17-B
WB2IMO 2106- 81- 26-A
WB2IKC 1560-104- 15-B
WB2RJH 1500-100- 15-B
WA2LXS 684- 57- 12-B
WA2PKZ 408- 51- 17-BD
K2XR (K1XR,K2s JWF OWR,KC2X, WB2WIK,oprs) 203,218-1256-139-ABCDEI
WA2SNA (K2s BJG LPG,KA2s EPL GMH, N2s AAZ CIA,W2s IHM LVT RS TFM,WA2s DTJ EKM JSW SLH SLY TWO UPK,WB2s JCP QEA RFR, WD2s AAL ADH,oprs) 149,322-814-123-ABCDE
N2BOW (+N2s BMP CEI) 45,500-576- 70-ABCDI
N2BNL (+K2s PM TKN VHV,KA2s CHK DZX HOA HOL,W2FGW,WB2s ETW GWD LVZ NOA VIN) 21,858-358- 61-ABCDE
WB2EWV (K2DLJ,KB2EF,N2GA, W2EKU,WA2s HMU MIS OCN URN

RMZ TKU,WB3HHS,oprs)
7371-177- 39-ABC
WB2OHV (+KA2EIA)
2541-103- 21-BD

Southern New Jersey

W2EIF 28,718-260- 83-ABCDE
WA2KOK 17,875-243- 65-ABCD
W2HRW 14,616-252- 58-AB
WA2RYE 12,000-250- 48-A
W3CXU/2 11,395-130- 53-BCDE
N2ASU 1540- 70- 22-AB
W2CFY 224- 28- 8-B
K2BWR (+K2ZRJ)
33,670-296- 91-ABCDE
KC2J (+KA2BET,KA3s BDW KTR,
WA2GTJ,WB2s ANJ OGJ WJE)
9675-190- 45-ABCD
AC2F (+W1JAG,WA1WZC,WA2s
PYX LLN WSK,WB2STV,WD2AEN)
8284-218- 38-ABD

Western New York

WB2BGI 35,280-381- 84-ABCD
WA2AWX 15,252-231- 62-ABD
K2GK 6837-149- 43-ABE
K2MQY 5586-133- 42-AB
W2SEU 5160-120- 43-AB
W2DUC 4521-137- 33-AB
WA2GSX 1953- 93- 21-B
WA2ABN 1725-115- 15-B
W2WGL 1152- 64- 18-B
K2JLQ 990- 66- 15-B
K2PQI 975- 75- 13-B
KA2HJG 144- 12- 12-B
K2QR 1- 1- 1-B
K2QIE (+AK2F,KA2DDJ,KG2Y,
N2HR,WA2s LOG PHA,WB2WSV)
70,191-663- 99-ABD
K2JFV (+WA2TMC)
25,275-309- 75-ABCDE
WA2ZJF (K2s IJ RKW,WA2s MYU
RQC,WB2s FBP MYZ NFB,KA2DON,
oprs) 23,025-259- 75-ABCDE
N2FV (K2OEQ,KA2JVX,SM6CZZ,
WA2YTM,WB2s DYJ IEY, KAØADV,
oprs) 13,908-203- 68-ABCD
WA2AAZ (+KA2HCX,WA2MCB,WB2s
JSB LJN QXJ TGU)
6300-175- 36-AB

3

Delaware

K3SXA 45,144-423- 88-ABCD
K4CHE/3 25,014-358- 66-ABCD
K3CNH 1890- 70- 27-AB
K3HVG (+K3KDP,W3BNN)
6929-169- 41-AB
AC3T (+AE3J)
6798-186- 33-ABCD

Eastern Pennsylvania

AE3T 12,882-226- 57-AB
K3IWK 11,605-202- 55-ABD
W3ETB 6705-132- 45-ABCD
N3BHS 5589-221- 23-ABC
WA3CSP 3800-100- 38-A
N3BBI 2400- 48- 48-ABD
KA3B 2232-124- 8-B
KA3FQT 2032-127- 16-B
N3KZ (N3BMH,opr)
1875-125- 15-AB
N3AYK 1242- 64- 18-ABC
WA3BRW 1232- 56- 23-A
N3AYJ 1102- 52- 19-ABC
W3KM 1005- 67- 15-B
AA3B 69- 23- 3-B
KA3AIS 36- 18- 2-B
W3CCX (WA1YHO,K2EVW,W2NM,
WA2DPU, K3s IUV ZPN,KA3FOG,
N3s AHI MW, W3HQT,WA3s AXV
WAS JUF NUF YUE,WB3s IND JYO,
KD6KD,oprs)
240,380-1371-140-ABCDEFI
K3MTK (K3LZ,KA3HHQ,WA3s KPP
LBI PUL TUL ZFD,WB2YEH,oprs)
126,500-1150-110-ABCDE
WB3CZG (+N2CMI,K3MKZ,N3AVC,
WB3s IWZ NVS,W4FHK)
83,634-699-106-ABCD
K3YTL (KA3EEO,N3AVZ,W3DZH,
WA3s JWP YON,WB3s BVF CAI DYE
FAA FKQ,oprs)
80,560-777- 95-ABCD
W3EEK (+AJ3R,K3FMF,W3VA,WA3s
VIL ZCJ,WB3GZV,VE3HOH)
68,530-727- 89-ABCD
WA2OMY/3 (+AA2Z)
29,078-428- 62-ABCD
WB3LNZ (+KB3s HE IB,N3ADC,
WB3FXJ) 27,590-428- 62-ABC
W3HZU (K3s GDI SZY,N3AIA,W3s
AXC SST,WB3s AWJ BWG,oprs
21,696-333- 64-ABD
W3LP (W3s GFN JUZ,WA3CUQ,oprs)
12,720-240- 53-AB
WB3JYY (+WB3s EFI JZE)
3658-118- 31-ABC
K3UK/3 (+K3BS)
800- 50- 16-B

Maryland - D.C.

W3XO (KA1GD,opr)
42,000-473- 84-ABCD
K3AKR 17,216-242- 64-ABCD
W3IP 8501-122- 47-ABCDE
N3API 3770-130- 29-AB
W3HQX 1170- 78- 15-B
N3ATY 1022- 73- 14-B
N3CDA 312- 26- 12-AB
W3MSN 252- 21- 12-AB
W3PGA (K3s PHH YZY,KB3EL,
N3BGC,W3s JDF VRD,WA3s HZJ LAW
oprs) 5292-147- 36-AB
AC3P (+AC3F,WB3EBB)
1890- 63- 30-AB

Western Pennsylvania

K3MD 3024-108- 28-AB
LA4LN/W3 20- 4- 4-BD
W3GNR/3 (+KA3s AWL DEO DWR,
WA3s BUX FFC JBV)
70,513-552-107-ABCDE
W3PIE (WA3DJG,WB3s CBB,JNP,oprs)
39,100-542- 68-ABD
K3HKK (K3BIE,KA3s DBO DBT DBZ
DGI,LA4LN,N3BBH,WA3WNE,
WB3CXR,WN3VAW,N4BIX,oprs)
15,840-228- 60-ABD
WA2CBU/3 (+AF2K,WA2CBT)
2640- 88- 30-AB

4

Alabama

KC4P 32,047-423- 73-ABD
K4ZGB 18,760-335- 56-AB
WA4CQG 5760-125- 40-ABCD
KC4KK 4655-133- 35-A
K4GUU 848- 49- 16-BD

Georgia

K4CKS 39,064-506- 76-ABC
N4QH 19,456-304- 64-AB
NA4I 3210-107- 30-AB
AK4T 1960- 70- 28-AB

WA4TNB 760- 40- 19-AB
WD4IIS (+AA4GA,WA4s IBI OYH,
WB4NMA,WD4JQV)
79,540-775- 97-ABCD

Kentucky

KC4EG 21,120-296- 66-ABD
N4EQT 3465- 55- 55-ABD
KU4A 2418- 93- 26-AB
WB4NXY/4 1280- 61- 16-BCD
W4SMU 200- 24- 8-BD

North Carolina

K4GMP 14,558-251- 58-AB
WD4ODS 4320-108- 40-AB
K4CAW 3886-103- 29-BD
WA4AAV 2490- 83- 30-AB
K4ROM 1375- 55- 25-AB
W4ZZ 704- 44- 16-AB
WA4WZQ/4 (+K4YBC,WA4WZP,
WD4GQU) 32,565-457- 65-ABCD
WA4MVI (+WB4s IXU LZC,WD4RGT)
7412-199- 34-ABD
W4ATC (KA4OXP,N4ELM,oprs)
1080- 66- 12-ABD

Northern Florida

W4ODW 23,943-313- 69-ABCD
W5HUQ 15,562-235- 62-ABD
WD4FAB 11,236-204- 53-ABD

South Carolina

WA4LDU 12,390-190- 59-ABD
N4DT 8466-155- 51-ABD
WD4CHS 558- 93- 6-B
N4TJ 486- 54- 9-B
NB4S 405- 45- 9-B
WD4PLF 240- 20- 12-AB
WB4NBK 192- 16- 12-A
AJ4N (+KA4EVT,KJ4X,WD4ADK)
9720-239- 40-ABC

Southern Florida

W4OO 10,965-255- 43-A
WD4MGB 7839-201- 39-A
WB4OSN 2139- 69- 31-AB
WB4YBG 2025- 45- 45-AB
WB2HAE 990- 31- 30-ABD
WB4KGY 40- 8- 5-B

Tennessee

WD4JHD 8400-142- 56-ABCD
WD4OGF 962- 74- 13-B

Virginia

WA4SBC 22,035-298- 65-ABCD
K4LHD 17,568-263- 61-ABCD
N4CNN 8736-152- 52-ABCD
W3IY/4 4872- 84- 29-CD
NØKV/4 4074- 97- 42-AB
N4MM 3700-100- 37-A
KL7GLL/4 2884-103- 28-A
LU1BAR/W4 2727-101- 27-AB
W4DO 2295- 85- 27-AB
N4RA 1984-124- 16-B
KA4KKF 720- 36- 20-AB
W4KMS 589- 31- 19-A
KX4V 416- 26- 16-AB
N4CWP 168- 42- 4-B
KA4SCA 156- 26- 6-A
AB4L (+KA4s NXN NZO OBW RSL
SDF UDS,KB4s NT XK,KC4AO,
WA4IVF,WB4s RAF WTC YJC,
WD4s BWL DUT DUU LQT)
70,052-798- 83-ABCD
N4CD (+WA4s PGI ZRP,WB3LJK,
WD4CXU) 62,016-545-102-ABCDEI
WD4AZG (+KB4OF)
2210- 85- 26-AB
W4UVA (AA4O,AD4J,KA4LXS,
KB3KJ,WD4EIS,oprs)
1222- 94- 13-B

West Indies

WP4ACV 60- 10- 6-AB

5

Arkansas

N5DL (+K5FOY,WA5s JEV OOE,
WD5s CAN CAP)
46,893-508- 87-ABCD
WB4LHD/5 (+N5AYD,WA5UMP,
WB5BHS,WD4KWD,WD5FBX)
35,550-465- 75-ABD
WA5FDF (+K5ETU,WB5JAR)
20,054-254- 74-ABD

Louisiana

K5BMG 12,075-159- 69-ABCD
N5JM 3135- 95- 33-A
W5UKQ 621- 36- 9-BDE
WA5YOU (+WB5NIF)
13,888-210- 62-ABCD

Mississippi

N4JS/5 27,676-394- 68-ABCD
W5UCY 5040-121- 40-ABD
AE5H 3627- 93- 39-A
W5RCI 954- 42- 18-BD
KK5K 612- 68- 9-B
WA5WUX (+WB5AMI)
4840-110- 44-AB

New Mexico

K5MAT 17,160-312- 52-ABC
W5DEK 3240-105- 30-ABC
WB5AOX 12- 6- 2-B
K5TA (+K5HUI,N5RR)
18,846-349- 54-AB
WD5GNW (+WØZYF)
4553-157- 29-AB
W5IXS/5 (+W5IXR,W7ZEA)
3406-128- 26-ABC

Northern Texas

WA5VJB 25,480-428- 52-ABCDEH
K5GMX 12,972-276- 47-ABD
WB9PVK/5 1775- 71- 25-AB
KC5IJ 1596- 65- 21-ABD
KF5N 115- 23- 5-AB
WD5FZM (+KA5DBG)
22,116-337- 57-ABCD
N5CMI (+WBØTTQ)
13,968-269- 48-ABCD
AD5I (+WB5KTC)
12,540-270- 44-ABD

Oklahoma

N5KW (+K5CM,N5CG)
74,562-831- 86-ABCD

Southern Texas

KC5GB 9798-210- 46-ABD
WA5IYX 1829- 59- 31-A
WA5RNL 474- 79- 6-B
W5BLB 112- 16- 7-A
W5UWB (+WA5TBE)
9702-188- 49-ABD
N5AF (+WB5LVL)
2340- 90- 26-AB

6

East Bay

N6EIO 3104- 97- 32-AB
WB6ZEP 1545- 83- 15-ABD
WA6LHD 750- 75- 10-B
N6AMG (+N6IG,W1ARR,WB6s
IXH WML) 32,160-465- 60-ABCDE

Los Angeles

KC6A 4975-120- 25-BCDE
WA6PZL 3066-146- 21-A
W6PFE 1960- 85- 20-ABCD
N6DBA 1060-212- 5-B
WA6ZGQ 945-189- 5-B
WB6OKJ 693- 40- 11-AC
WB6AAG (+WB6s JCD PZJ)
19,500-351- 52-ABD
W6GGV (+WB6PKA)
2848- 69- 32-ABCD
K6BPC (KD6BX,WA6FAT,WB6AXE,
oprs) 2162- 88- 23-ABCD

Orange

WA6PMX 5700-178- 30-ABC
KB6XG 4598-156- 22-ABCD
WB6MFW 3410-110- 31-AB
K6PVS 2980-127- 20-BD
W6ABN 2592- 83- 27-AD
PAØZN/W6 2064- 96- 16-BC
N6DBF 1463-209- 7-B
K6IBY 320- 20- 8-C
W6XD 270- 27- 10-AB
K6HMS 168- 20- 8-BD

Sacramento Valley

W6DOR 893- 47- 19-A
WA6FWQ 756- 63- 12-B
W6SYY 175- 25- 7-B
K6AAW 154- 22- 7-B

San Diego

WA6OIL 2450- 83- 25-ABCD
KS6A 1118- 69- 13-BD
W6HPH/6 324- 27- 12-ABCD
W6XJ (+KO6R,WB6s IMV OKK)
17,088-327- 48-ABDE
W6TIK (+KA6FTP, WB6GHH,WD6FGN)
6107-191- 31-ABC

San Francisco

WB6WML 384- 24- 16-A
W9DHK (+W6LID,WB6JHU)
9994-223- 38-ABCD
WA6KLK (+KA6MQH,N6CQH,WA6s
KFA WTT,WB6SRM,WD6FGX)
9718-216- 43-ABD

San Joaquin Valley

K6YK 7224-172- 42-AB
K6JKQ 2080- 47- 26-ABCDE
WB6LBR 1914- 66- 29-AB
K6LMN/6 1080- 84- 12-BC
W6YKM (+WA6s HCI KXN)
32,305-415- 65-ABCDE

Santa Barbara

WA6IJZ 3105-108- 27-ABD
WD5JMC 572- 44- 13-AB
N6AHI 351- 27- 13-AB
K6ZMW/6 408- 17- 8-E
WB6YQN (+W6s HXW OAL,WA6s
EJO OYS,WB9KMO)
48,195-514- 81-ABCDEFGI
K6MEP (+N6AFI,WA6s DJS FPX,
WB6EDA) 25,568-430- 47-ABCD

Santa Clara Valley

K1RZ 20,496-316- 61-ABCD
WA6GYD 10,363-202- 43-ABDE
K6KLY 7416-173- 36-ABCDE
K6QAX 2565- 95- 27-AB
W6GD (+W6s DJM YFK ZUB,
WA6MGZ,WB6FFC)
15,930-239- 54-ABDE
W6PIY (KA6s CWE EOT HBC PKQ,
WA6MZF,oprs)
10,222-245- 38-ABCD

7

Alaska

KL7WE 36- 18- 2-AB
WB4WXE/KL7 2- 2- 1-A

Arizona

WB7FDQ 10,038-239- 42-A
KI5C/7 7222-157- 46-AB
WA7EPU 6105-159- 37-ABD
K1VOW 243- 23- 9-BD
WA7JTM (+K7OO,WA7s LYI ZOW,
WB7MWI) 49,120-594- 80-ABCD
W7LUX (+N7s ADH FU,W7YS,WA7NXL
WA7NXL,WB7s COO EVX)
10,384-227- 44-ABCDE

Idaho

W7WKR 19,024-326- 58-ABD
WAØDYU 2565- 95- 27-A
WA7FSI 1914- 87- 22-AB

Montana

K7OFT/7 14,706-258- 57-ABD
KB7Q 11,352-264- 43-AB
W7HAH 8925-175- 51-AB
W7KNT 6732-198- 34-AB
WA7PDC 2862-106- 27-AB

Nevada

K7ZOK 5687-115- 47-ABDE
W7ABX 2592- 96- 27-AB
WB7TXG 70- 10- 7-B
WA7JUO/7 (+KA7CVV,KB7BZ,N7s
AKB AKU BPA,WB7SBL)
12,100-215- 50-ABDE

Oregon

KB7WW 26,649-413- 63-ABCD
WB7OOF 8484-175- 42-ABCD
K7HSJ 6012-143- 36-ABCDE
W7TYR 5145-115- 35-ABCDEFGH
W6LLP/7 85- 15- 5-BC
N6RY 32- 16- 2-B
N7OB/7 (+K7RWT,N7BLS,WA1GFM,
WA7s BAC ECY,WB7PMP)
42,210-572- 70-ABCD
K7AUO (+K7UVK,W7s ADV BKN
UDM,WA7HXA,WB7UNU,oprs)
38,556-506- 68-ABCDEFGHI
WB6NMV (+WA6ZJF,WB6NAC,
WD6CHL) 11,205-240- 45-ABCD
W7JXU (+KA1BFK)
10,363-232- 43-ABCD

Utah

N7BHC 9108-203- 44-ABD
N6CA/7 105- 17- 5-BE
WN7SIU 105- 15- 7-A
WA7ADK (+WB7QVZ)
8536-192- 44-ABD

Washington

W7FI 10,400-200- 52-AB
WB7UUP 9139-223- 37-ABCD
KB7LQ 6372-216- 27-ABCD
K7VNU 3492- 97- 36-A
W7MCU 3026- 71- 34-ABCDI
W7IDZ 625- 25- 25-AB
N7NW (+K7s ND WTG,W7YOZ,
WB7DTI,WA6BKQ)
36,260-474- 70-ABCDEI
KB7G (+KB7B)
10,019-227- 43-ABC
W7VRM (+WB7FHF)
1768- 75- 17-ABCDFGHI

Wyoming

W7XF 14,448-301- 48-A
WBØAUM/7 3751-121- 31-AB
W7LFL 1675- 67- 25-AB

8

Michigan

WA8SQL 18,850-268- 65-ABD
K8EFS 8932-136- 58-ABCD
WD8BRE 8526-203- 42-AB
WB8YFE 3154- 71- 38-ABD
W8KNH 2068-188- 11-B
K8MSW 2064- 86- 24-AB
WD8KLU 1564- 60- 23-ABD
K8BGZ 1498-107- 14-B
WB8AAX 1209- 93- 13-B
K8LJQ 910- 91- 10-B
KB8RK 800- 80- 10-B
KA8GOM 760- 95- 8-B
KA8DDQ 693- 63- 11-B
W8CAP 364- 52- 7-B
WD8MJQ (+WD8DSV)
20,026-323- 62-AB
WB8KAY (+N8CKH,WA8HHH)
17,582-298- 59-AB
WB8PGK (+KA8CKS,WA8s MFL
MGO QBG VXE,WB8WXS)
5889-149- 39-ABC

Ohio

WA3VJU/8 26,565-373- 69-ABD
WD8ISK 26,122-310- 74-ABCD
W7EKI 23,552-322- 64-ABCD
WA8TXT 17,955-199- 63-ABCDE
K8NXI 11,650-226- 50-ABD
N8AXA 8789-174- 47-ABCD
K8DW 2704- 79- 26-ABCD
KA8DVD 6840-171- 40-AB
WA8GMT 6235-145- 43-A
K8WW 4416- 94- 23-DE
KD8Z 4416-153- 24-BD
WA8RCN 1540- 70- 22-AB
W8SRW 1071- 63- 17-B
KA8HQU 980- 49- 20-AB
W8LCY 972- 81- 12-B
K8MR 315- 45- 7-B
W8VP (+K8AL,KA8s AMF DBZ
DFX DUI LBD,N8BOZ,W5IJA,
W8PR,WA8FHF,WB8s ERB,TSI)
87,349-691-113-ABCD
WA8ONQ (WA3OJX,N4AMG,K8VVV,
N8BPB,WA8OGS,WD8QME,oprs)
47,680-555- 60-ABCD
W8RI (KA8KEJ, N8s BLB ZM,
W8UNV,WA8SVV,WB8s MRU OFR
QXN,WD8NBK,oprs)
17,544-322- 51-ABCD
N8CSL (+WD8IVL)
1848-132- 14-B

West Virginia

N6NB/8 84,780-709-108-ABCDE
W8TN 3638-106- 34-ABD
KJ8J 1050- 75- 14-B
W8UT 980- 45- 14-BD
W2CNS/8 (+K2s LDU OS, W2AV,WA2s
ZKD ZQN,WB2s AQQ DIN KAO,
W3ZZ,N8II)
152,934-915-142-ABCDEFI
K3LNZ/8 (K3s DUA ICH,WA3s EOQ
OYW NZL,W4s NVW PSJ,oprs)
70,824-604-104-ABCDE
K8CG/8 (+K8BS,KB8ZM)
1364- 57- 22-ABDI

9

Illinois

W9IP 90,797-763-109-ABCD
K9RO 39,468-481- 78-ABCDE
WB9WMM 8533-161- 53-AB
WB9SNR 8122-176- 31-BCDE
WA9YLB 6726-125- 38-BCD
WD9COL 5880-147- 40-AB
WB9EOP 5617-122- 41-ABD
W9IVI 3712-116- 32-AB
K9MBX 1148- 55- 14-BD
AF9R 392- 28- 7-D
K9DNW 31- 31- 1-B
K9HMB (+K9s GL RS PW,WA9CJO,
WB9s CAS TIY,WD9DCL)
136,656-1201-104-ABCD
AA9D (+W9s AKW ZX,WB9VDV)
52,287-572- 87-ABCD
KB9II (+WA9ULU)
19,800-329- 60-ABC
KD9Z (+AK9F,WB8HAD)
5650-226- 25-AB
KA9CSJ (+KA9AQR)
2624- 82- 32-A

Indiana

WD9EME 12,862-200- 59-ABCD
WA9PKL 12,180-210- 58-AB
N9AZC 9945-195- 51-AB
KB9JD 8869-181- 49-AB
K9DZS 6118-133- 46-AB
K9DZE 4477-121- 37-AB
WB9FNR 3161- 98- 29-ABD
K9LQZ 1442-103- 14-B
WA9WNF 64- 8- 8-B
K9MRI (+KB9WZ,WB9CNS)
58,996-635- 86-ABCD
WB8HUC/9 (WB8s GEU GEW GEX
GEY GFA,oprs)
34,293-477- 69-ABC
N9BWB (+N9BWA,WB9NTL)
33,460-450- 70-ABCD
N9NC (+K9LJP,N9s EI NB,W9s BSV
VP,WB9STO) 7880-179- 40-ABCD

Wisconsin

KB9NM 9850-194- 50-ABC
WA9LZM 5236-119- 44-AB
W9NAW 3367- 91- 37-A
WD9ACY 1606-146- 11-B
WB9ROE 779- 41- 19-AB
N9AV 646- 34- 19-A
W9NMP 8- 4- 2-B
K9GDF 2- 2- 1-B
K9IMM (+W9XM, WA9s ACI
KGQ,WB9BPS)
29,564-372- 76-ABCD
N9CIQ (+WA9HCZ)
689- 50- 13-ABD

Colorado

WØETT 16,744-322- 52-A
WB5DSH/Ø 14,674-319- 46-A
W9MHL/Ø 12,116-233- 52-A
WDØBZA 966- 46- 21-A
KØADG 570- 30- 19-A
WB7VMQ 34- 17- 2-B
NØBO 26- 26- 1-B
NØBRI (+WØKEA)
33,930-521- 65-ABD
AAØL (+ADØO,KØUNS,KAØFOZ,
KBØNY,WAØLSH,WBØMHP)
26,622-456- 58-ABDE
WDØDJU (+KBØCY)
2478-114- 21-ABC

Iowa

WBØZKG 20,090-284- 70-ABD
KAØY 16,244-233- 62-ABCD
WBØVYV 16,080-259- 60-ABD
WDØFOY 8352-142- 58-ABC
KØDAS 2737-104- 23-BCD
WBØSWD 2176-136- 16-B

Kansas

NØLL 22,572-342- 66-AB
WBØISW 4455-117- 33-ABCD
WØHT 3213-171- 17-BD
WBØQYA 2912-112- 26-A
WØQOA 708- 53- 12-BD
WAØCFQ 640- 40- 16-AB
WØSP 342- 38- 9-B
KØVUA 300- 50- 6-B
KØETD 100- 10- 10-B
WB7EPA/Ø (+KBØDW,WBØNRV)
15,435-235- 63-ABCD

Minnesota

WØXG 18,963-301- 63-AB
WØVB 10,032-153- 57-ABCD
WBØGGM 2079- 63- 33-AB
KCØP 1925- 77- 25-AB
WAØRLY 1682- 58- 29-AB
W5LSZ/Ø 570- 30- 19-A
W9UD/Ø (+W3EP,AE9M, K9s AKS
CHZ,WB9QPI,WD9FSA,AKØP,
WØOHU) 87,360-773-105-ABCDE

Missouri

KØTLM 28,875-355- 77-ABCD
NØIS 16,750-309- 50-ABD
WØFY 12,354-199- 58-ABD
KØCB 6840-145- 45-ABCD
WØRWH 2624-164- 16-B
NØALV 2304- 48- 48-ABD
WØJRP 1914- 58- 33-AB
WØKC 105- 15- 7-A
WAØNOK (+WAØOFU)
14,364-240- 57-ABC

Nebraska

NØAJU 15,624-248- 63-AB
KFØY 21- 7- 3-B
WØBJQ (KAØDWJ,WAØWRI,
WBØUGF,oprs)
2106- 81- 26-AB
WDØBQM/Ø (+KAØs CRI IOJ,
WØKAV,WDØBQU)
440- 40- 11-AB

North Dakota

WAØCSL 20,995-323- 65-AB
KCØW 4847-129- 37-ABC

South Dakota

KØUDZ 6252-168- 37-ABD
WBØULX 1334- 46- 29-AB
WØSD (+WA2VEY,AAØF,KØs OTZ
WM ZZ,KAØGGS,NØAIT,WØPUF,
WBØTEM) 89,782-816-106-ABCDE

VE

Maritimes - Newfoundland

VE1UT 1350- 70- 18-BD
VE1RC 1128- 42- 24-AD

Quebec

VE2DFO 37,410-368- 87-ABCD
VE2BBK 9240-139- 55-ABCDE
VE2BXF 660- 33- 20-AB

Ontario

VE3CRU 26,864-311- 73-ABCDE
VE3FGU 17,262-274- 63-AB
VE3FN 5304-133- 34-BD
VE3FDP 5220-136- 36-ABD
VE3EYR 3626- 96- 37-ABCD
VE3EVW 1200- 50- 24-A
VE3FGN 1001- 84- 11-BC
VE3LNX (+VE3s ADJ LIZ)
27,600-316- 75-ABCD
VE3UOT (VE1BCZ,VE3NAB,oprs)
1599-118- 13-ABD

Saskatchewan

VE5JQ 5889-149- 39-ABD

Alberta

VE6BCC 3100-100- 31-A
VE6SW 1755- 63- 27-ABD

British Columbia

VE7ASI 2400- 83- 25-ABCD
VE7ASM (VE7s AFB ER, oprs)
1638- 59- 26-ABD

DX

Bahamas

C6ADV 12,616-332- 38-A

Japan

JA1RJU 2- 2- 1-A

Montserrat

VP2MNQ (VP2MX,W9OEH,WA8s
NJR ONO,WB8IGY,oprs)
1539- 57- 27-AB

Mexico

XE2BC (WB5QNH,WB6NMT,
WD6DNW,XE2s AOM COF IO
MCG MMD MX NT QW,oprs)
28,272-376- 62-ABCDEI
XE2XW (K5HVC,KA5DTN,W5XW,
WA5NAD,oprs)
308- 22- 14-A

Cayman Islands

ZF2EW (K1FJM,opr)
1598- 94- 17-A

Check Logs

N2CG, W2AWF, WA6NHB, K7ICW

Operating News

Conducted By John F. Lindholm,* W1XX

DXCC Integrity

Working DX can be one of the really enjoyable facets of Amateur Radio. If that weren't so, there wouldn't be so many active amateurs who tune the bands daily looking for new countries to work. As the June editorial so well portrayed DXing, "Counting countries is such a natural thing to do."

One of the first questions that the layman asks the radio amateur is, "What's the farthest-away place you can contact?" When told that such distant localities as Australia, Japan and Singapore are commonplace, amazement prevails. Amazement gives way to astonishment when it is further volunteered, "And I've contacted over 200 countries!"

Stalking DX is an art. Although brute force in the pileup sometimes prevails, the finesse of the short, well-placed call can more often snare the elusive DX contact needed for DX Century Club credit. It's still operating skill that comes through in the clutch.

But many bemoan the total lack of such skill that is too often evident on the DX bands. Due criticism are the "policemen" who keep the DX-pedition frequency clear, often with offensive remarks and often out-of-band themselves; those who call out of turn; those who don't listen; those who use lists inappropriately; and so on. Some put the blame on the influx of newer amateurs who have joined our ranks through concentrated, League-supported training programs. Everyone, however, does not agree with this diagnosis.

In response to an inquiry about the influx of CBers to the amateur ranks, active DXer W1FB appropriately responded: "I have not seen any hard evidence that indicates the 'quality' of radio amateurs has been degraded significantly by our effort to bring CBers into the amateur ranks. Those I have met personally seem to be entirely upright, although I'm sure some 'bad apples' do exist. But, having been a licensed amateur for 31 years, I can recall many rude, malicious operators on the ham bands long before CB came into being. So, it may be somewhat unfair to direct a blanket indictment toward CBers who became hams."

One of the more perverse DX activities to be uncovered in recent years has been the bogus QSL scam. While the DXCC rules emphasize fair play and good sportsmanship, it is frightening to discover that for some the prize looms greater than the quest. The motivation to acquire the next endorsement sticker becomes so great that, to gain greater status, any and all means are employed — even unethical and dishonest means, including the deliberate manufacture of forged QSL cards. What satisfaction can be obtained from such skulduggery is puzzling to say the least.

This direct attack on the DXCC Award of every Century Club member places a responsibility on the ARRL to administer the award according to the rules, and to take appropriate corrective action against those very few who do not wish to play by the rules. DXCC has maintained a long history of worldwide recognition as "the" DX award. This reputation has been enhanced by the meticulous attention to detail paid by the DXCC desk in the administration of the award. The ARRL Awards Committee was not about to treat lightly this latest attempt to scuttle your DX efforts.

The Committee's review of all the facts has resulted in the disqualification of some well-known DXCC members under Rule 11, submission of forged cards. But such action has not been taken precipitously. It was taken only after several months of investigation, yielding exhaustive documentary evidence obtained from QSL managers, both stateside and overseas, and from log extracts — solid conclusive evidence of violation of the rules. Only then did the Committee move for disqualification from DXCC membership of those proven to be involved.

As these investigations were in process, DX enthusiasts were subjected to a barrage of rhetoric from individual sources. To some, this must have been confusing. But it is a tribute to the vast majority of the DX community who recognized it for just what it was — a smokescreen to cover the sinister tracks of those who would enhance their own personal DXCC standing with fraudulent QSL cards.

During the hot days of summer, those DXers in the know wondered if the League was really interested in preserving the integrity of DXCC. And with the passing of many silent days, some opined, even on the airwaves, that the League was doing nothing. Rather than succumbing to the emotionalism of the moment, the DXCC desk quietly and methodically went about the task of documenting "airtight" cases. The wisdom of this course is self-evident.

Now that appropriate action has been taken (further investigations are still active), some of the brethren would have us light the night skies ablaze with the calls of the perpetrators. Though it is tempting to do so, splashing the sordid details across the pages of *QST* would not be in the best interest of Amateur Radio. Such sensationalism would be a disservice. Rather, let's hope that the proper perspective of DXing, as being a fun aspect of a fantastic hobby and service, has been restored.

Suffice it to say that paradise is not lost to DXers. All is well in Mudville. The integrity of the DXCC program has been preserved, for DXCC is bigger, much bigger, than any individual or group of individuals who won't play by the rules. DXCC is you. To those who entrust us to enforce the rules fairly and impartially, we pledge our continued effort to maintain the high level of integrity that you as members of DXCC have come to expect.

"Good" DX!

MEET YOUR SCM

William R. Shrader, W7QMU, took office on January 1 as Section Communications Manager for the Oregon section. Bill lives in Medford, where he works as an engineer for KTVL-TV. First licensed in 1951, he is a Life Member of ARRL, holds an Extra Class license, and is a licensing class instructor. He belongs to the Rogue Valley (Oregon) and the Juneau (Alaska) ARCs, having been president of both. Formerly K6IFX, WB4LZE, G5BFA and KL7HGH, Bill is also active in Army MARS. Amateur Radio is definitely his top hobby interest, so we know he will do a fantastic job as SCM of Oregon. Good luck, Bill! — *Arline Bender, WA1VMC*

Oregon SCM W7QMU

*Communications Manager, ARRL

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 94. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

5-Band WAS

Awards issued April 25, to July 23, 1981

884 N5RF
885 KC4EB
886 W7HZL
887 WB2CEI
888 KØALL
889 WB4GOI

890

890 WB5SVV
891 IØAMU
892 AGØU
893 K1MZN
894 KE8H
895 WA1AER
896 WD9HAW
897 WA4IDN
898 WBØTEM
899 KB1I

900

900 TG4NX
901 N4CD
902 WØFF
903 WD9IPX
904 WA4TYJ
905 W1WLW
906 N6ATS
907 KJ4S
908 W9UQO
909 KE2N

910

910 AB9O
911 ND4Z
912 AB9E
913 K7LAY
914 WA2QAU
915 WB7RGN
916 W7KEU
917 NI4H
918 KB4OW
919 N3ALL

920

920 WD8KWT
921 KL7IEN
922 WB7QOM
923 KB2FD
924 9Y4VU
925 NL7J
926 WB4KDU
927 WB7QEQ
928 N4QH
929 OZ1LO

930

930 N7ARG
931 EA3SF
932 K7GNC
933 WB7AYN
934 EA3VY
935 KD4KS
936 WA2MUA
937 AI1M
938 N7AGC
939 WA4QBX

940

940 K8DL
941 KH6AQ
942 WA5YTX
943 K8TL
944 KA8BXA
945 HH2VP
946 AG9S
947 W7YKN
948 WB4GNT

OSCAR Operating Schedule

	OSCAR 7			OSCAR 8			
Date (UTC)	*Orbit No.*	*Time (UTC) Hr Mn*	*EQX W. Long. (Degrees)*	*Orbit No.*	*Mode*	*Time UTC Hr Mn*	*EQX W. Long. (Degrees)*
1 Sept.	31,086	0054	94.8	17,793	A + J	0103	79.3
2 Sept.	31,099	0148	108.4	17,807	X	0108	80.5
3 Sept.	31,111	0047	93.2	17,821	A	0112	81.7
4 Sept.	31,124	0141	106.8	17,835	A + J	0117	82.9
5 Sept.	31,136	0041	91.7	17,849	J	0122	84.1
6 Sept.	31,149	0135	105.2	17,863	J	0126	85.3
7 Sept.	31,161	0034	90.1	17,877	A	0131	86.6
8 Sept.	31,174	0129	103.7	17,891	A + J	0136	87.8
9 Sept.	31,186	0028	88.5	17,905	X	0140	89.0
10 Sept.	31,199	0122	102.1	17,918	A	0002	64.4
11 Sept.	31,211	0021	87.0	17,932	A + J	0006	65.6
12 Sept.	31,224	0116	100.5	17,946	J	0011	66.8
13 Sept.	31,236	0015	85.4	17,960	J	0016	68.0
14 Sept.	31,249	0109	99.0	17,974	A	0020	69.2
15 Sept.	31,261	0008	83.8	17,988	A + J	0025	70.4
16 Sept.	31,274	0103	97.4	18,002	X	0030	71.6
17 Sept.	31,286	0002	82.2	18,016	A	0034	72.8
18 Sept.	31,299	0056	95.8	18,030	A + J	0039	74.0
19 Sept.	31,312	0150	109.4	18,044	J	0043	75.3
20 Sept.	31,324	0050	94.3	18,058	J	0048	76.5
21 Sept.	31,337	0144	107.8	18,072	A	0053	77.7
22 Sept.	31,349	0043	92.7	18,086	A + J	0057	78.9
23 Sept.	31,362	0138	106.3	18,100	X	0102	80.1
24 Sept.	31,374	0037	91.1	18,114	A	0107	81.3
25 Sept.	31,387	0131	104.7	18,128	A + J	0111	82.5
26 Sept.	31,399	0030	89.5	18,142	J	0116	83.7
27 Sept.	31,412	0125	103.1	18,156	J	0121	84.9
28 Sept.	31,424	0024	88.0	18,170	A	0125	86.1
29 Sept.	31,437	0118	101.6	18,184	A + J	0130	87.3
30 Sept.	31,449	0017	86.4	18,198	X	0134	88.5
1 Oct.	31,462	0112	100.0	18,212	A	0139	89.8
2 Oct.	31,474	0011	84.8	18,225	A + J	0001	65.2
3 Oct.	31,487	0105	98.4	18,239	J	0005	66.4
4 Oct.	31,499	0004	83.3	18,253	J	0010	67.6
5 Oct.	31,512	0059	96.8	18,267	A	0014	68.8
6 Oct.	31,525	0153	110.4	18,281	A + J	0019	70.0
7 Oct.	31,537	0052	95.3	18,295	X	0024	71.2

Orbit predictions by Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7372° W. per orbit in a period of 114.9415 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1883 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesdays and Fridays — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL Hq.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A — x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B — x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

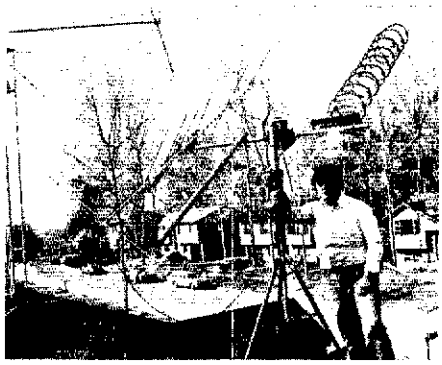
Mode A — x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J — x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq.

Strays



Skip Paulsen, W1PV, AMSAT Area Coordinator for Connecticut, poses proudly with his new Mode J antenna system. The antenna on the left is a commercial, circularly polarized, 2-meter array. Skip plans to install a relay-operated circularity switcher at the antenna feed point. On the right is a nine-turn, 70-cm helix built from an article in May 1980 *QST*. The clear plastic box, just above Skip's head, houses a desense filter and preamplifier. *(photo courtesy KA1FJR)*

Stan Wood, WA4NFY (center), with help from AMSAT Area Coordinators Nick Laub, WØCA (left), and John McDonald, WB4ZXS (right), gave an outstanding OSCAR 8, Mode J demonstration at the ARRL National Convention in Orlando, Florida. This crew racked up 13 QSOs during a single OSCAR 8, Mode J pass. *(photo courtesy WØCA)*

FASTER THAN A SPEEDING BULLETT. . .

☐ WA7MTF will be the call of the special-event station at the Bonneville Salt Flats in Utah, where an attempt to set a new world land speed record will be made by a British group from the Isle of Wight. Dates are Oct. 3, 4, 10, 11, 17, 18 and 24 at 1700 to 0500Z on Saturdays, and 1700 to 0300Z on Sundays. Frequencies will be 14.240 and 21.340 MHz for SSTV, and 21.370 and 14.290 MHz for ssb. QSLs plus s.a.s.e. should be sent to WA7MTF, 8085 S. 1475 E., Sandy, UT 84092. — *Richard Briggs, WA7MTF*

Public Service

Conducted By Robert J. Halprin,* K1XA

More From the Mailpouch

In the May installment of this column ("From the Mailpouch," p. 93), a section communications manager from the west coast wrote of the alleged mutual exclusivity of the Amateur Radio Emergency Service and the National Traffic System. His thesis caused a number of readers, particularly in the leadership category, to wax eloquent. Here are some of the excerpts:

> I would like to comment on your Public Service column of the May 1981 issue of *QST*. As I see it, your anonymous SCM has made the following points: (1) NTS refuses to cooperate with ARES. (2) the STM in this gentlemen's section is ineffectual. (3) NTS is dying. (4) Computer TTY is a good way to handle traffic. (5) NTS is not interested in computers.
>
> Frankly, your anonymous SCM is not effective in his job and is something of a crybaby. He has assumed that, since his STM (section traffic manager) does not attend ARES meetings, that the entire NTS is refusing to cooperate. I suggest he read his job description. The STM position is an appointment made by the SCM. If his STM is not effective, who is at fault?
>
> NTS is not dying, and fully operational nets in all modes are presently in existence — including TTY. No one can dispute that computer TTY will, in the future, be an efficient way to handle volumes of traffic. The number of amateurs with computer capability is growing, but still small. As in the case of fm and ssb nets, computer nets will expand and increase in number as the equipment becomes more commonplace. So what? Will NTS die because some cw operators prefer not to become involved with computers? There are presently many traffic handlers who have never worked a cw net. There are also many traffic handlers who have the capability for every possible mode.
>
> I suggest your anonymous SCM might better serve his constituency by appointing an effective STM and SEC (section emergency coordinator) and pursuing something more constructive than whining to Headquarters. Also, Mr. Halprin, despite your disclaimer in the first paragraph, you bear some responsibility for publishing an anonymous letter that contains this sort of drivel.
>
> If you have the nerve to publish this letter, please use my name and call. — *James J. Coleman, KA6A, STM Orange*

This response was addressed directly to the SCM author:

> With all respect, I suggest your troubles begin, perhaps, with your statement, "My section traffic manager is a nice guy. . . ." I chose my STM for his known traffic ability and versatility, *and* for his known involvement with ARES and public service operating generally.
>
> We hold a weekly ARES net statewide, with all three of us (SCM, SEC and STM) in regular attendance. DECs, ECs, AECs, NMs, ORSs (district emergency coordinators, emergency coordinators, net managers, official relay stations) all attend, all contribute. We hold a weekly on-the-air traffic workshop with, again, the section leadership supporting their presence and active participation. A fair share of our ECs hold their traffic appointments, and are active in traffic handling. A similarly large proportion of traffic appointees are card-carrying active ARES/RACES members.
>
> How does this come about? The weekly on-the-air meetings help. My own and the SEC's and STM's frequent one-on-one mailings to individuals and groups help. We have developed a "care package" that we send to new licensees and to newcomers to our nets, which is carefully constructed to provide equal amounts of traffic and emergency services information. And, perhaps the biggest influence comes from our annual workshops, one for each of three geographical areas of our section. These are day-long, hands-on, give-and-take, carefully planned sessions with equal time and effort devoted to *all* aspects of public service and emergency operating. At the section level in Michigan, the ARES/NTS border is, truly, fuzzy almost to extinction. It wasn't easy to achieve, nor is its maintenance effortless — we work at it constantly.
>
> Higher-level NTS? My experience has been that, by and large, traffic that gets into the region and area nets gets handled. Period. My own preference in the (rare) genuine emergency situation is direct link with the disaster area, through locally established liaison. Actual *emergency* precedence traffic goes to the first available working landline. Real Priority traffic, usually ditto, unless direct links can be established. Welfare traffic, which normally has to await on-site disaster team pleasure anyway, usually can be handled by in-and-out interface liaisons, with NTS reps and independent ops (welcome even from "out of the woodwork") enjoying equal treatment.
>
> RTTY? Other "compressed communications" techniques? Frankly (perhaps unfortunately), still in the "gleam in the eye" stage as I see them, although surely the potential is there.
>
> More than anything, I guess, I'm seizing the opportunity, I hope, to get into national print with a plea for unanimity of purpose among *all* service-minded amateurs. A relatively small proportion of us "pay the rent" for Amateur Radio's use of admittedly large swatches of valuable rf spectrum space. We few can do a better job of it if we can get past the "looking at labels" stage and begin truly to work together to fulfill our chartered obligation, FCC Rules 97.1(a) ". . . particularly with respect to providing emergency communications." — *Jim Seeley, WB8MTD, SCM Michigan*

A former SCM of Louisiana contributed this to the debate:

> Perhaps the hardest thing for the average ARES member to understand, unless he or she is an active NTS operator, is this relationship (between ARES and NTS). I can see how an SCM setting up a new ARES program in his or her section could easily misread the signs from the average NTS operator. Even SCMs who are NTS operators seem to have a hard time with ARES members.
>
> The National Traffic System, as far as the ARES is concerned, could be called the National *Training* System. To be sure, NTS is the long-lines division of the ARES, but it should be more than that. It should be the basic training department of ARES. NTS is unique in that it is a volunteer organization that has a definite function to perform, even when there is no emergency. Not so the ARES. This organization does have drills and nets, but on the average, not many members are active. Unless the training is made more attractive, very few volunteers will attend. At many section hamfests, meetings are held that include all ARES members and NTS operators. I do believe that the ARES would progress at a faster rate if the SECs and ECs would encourage their members to be active on the local and section NTS nets. They would learn the basic principles of formal traffic handling, something that is missing from most ARES activity I have monitored.
>
> It should be pointed out here that one of the basic differences between the two groups is their basic method of operating. NTS is a complete system, made up of many operators, and does not depend on one person to maintain itself. It is not the cult of the individual. Many NTS operators don't know the name or QTH of their opposite number. The ability to operate properly, to pass information correctly, is the basic qualifier for all NTS operators. One problem arises when very active members of NTS, those who take jobs as TCC (Transcontinental Corps) operators or region or area net managers, have to devote most of their operating time to these activities, and therefore must let some of the local ARES nets fall by the wayside.
>
> Another problem that concerns both NTS and ARES is the change in basic information handling that has taken place in the last 25 years or so. Before the advent of computers and satellites, most information exchange was handled by radio or land-line communication. To be sure, amateurs have been using RTTY since the early fifties, but seldom for traffic handling. One of the problems here is that the technical ham may be quite interested in the electronics of RTTY, and have no interest whatsoever in handling traffic. As computers and RTTY become more available, we will see more traffic people moving to them. A lot of work has to be done in these modes before they can come into general use in the emergency communications field or in the National Traffic System. The point that the SCM makes in his letter is that we are not using these newer modes. We do need more work with RTTY and computers, but I'm afraid it will be slow. The RTTY operator who will work the traffic nets, to pick up traffic or to disperse it, is very rare. — *Bob Schmidt, W5GHP, TCC Director/NTS Central Area*

The following letter was written by Bill Davis, WA3NAZ, only weeks before he tragically died in a plane crash. Bill included his background in the first paragraph to give readers an idea of where he was coming from — you'll agree that he was a Renaissance man of public service. Bill was that unique individual who combined a devotion to the present ARES/NTS structure with the active and progressive global perspective of a visionary. His intellect, as well as his involvement, will be missed equally:

> In a little over a decade in this business (notice it is no longer a hobby in many ways), I have been an EC, a civil defense radio officer, an NM and an STM, with all sorts of workerbee jobs along the way. My once alphabet-soup pedigree is now down to NCS (net control station) and EAN (Eastern Area Net) receive station, so I can run my mouth freely. I have seen Pennsylvania floods and hurricanes, West Virginia mud slides, Georgia tornadoes, and, worst of all, Christmas on EAN. In all that experience, I have developed a most definite opinion on the way ARES and NTS things should be.
>
> What the SCM out west fails to see is the other person's view. I am compelled to toil over this typewriter because I have been at both ends of this discussion. You see, the NTS man sees his role as that of sort of an official courier. He prides himself (save a few ARES converts) in exacting copy, careful timing and efficiency. The ARES folks see netters as stuffy-pushy types who won't give you the time of day without a formal request.
>
> On the other hand are OESs (official emergency stations) whose only concern is cranking up the generators and getting on the air in whatever ragtag fashion is quickest. It's like Field Day without points. Paramount to an ARES type is the saving of life and property, and chuck the format. To the NTSer, the OES looks like a buffoonish CB-type, lingoing through some sort of request on 2 meters in a T-shirt and a hard hat that says "ZEBCO" on it.
>
> Unfortunately, the impressions of both groups are quite accurate. But most significant is that I fail to see the failing in either set of virtues. The NTS type who is so stagnated that he or she can't route traffic directly (like it says in English in the *Public Service Communications Manual*) if a crisis demands it, is as worthless as the OES who can't get a request through because the receiving station can't tell one part of the message from the other (format) or "common spelling" got him on the wrong street.
>
> It is apparent that the western SCM has had his public service background with the latter type of folks. It is so unfortunate that more of these persons don't become bitten by the message bug. (Of course, the same level of unfortunance occurs when traffic types never get their socks wet.)
>
> What is even a greater tragedy is what they do not see in the netters activity, and net types allow this myth to continue. The myth goes something

*Assistant Communications Manager, ARRL

like, "NTS exists because we may need a national system for routing traffic out of an emergency-stricken area, and its day-to-day operations are only in practice for this event." I suppose at one time, when Mother Bell was not so reliable and the government not so concerned, this was so. But it is now foolish to delude ourselves — the National Traffic System is, in and of itself, a self-contained arm of the public service bunch. Denying this is to say that fair and mall booths are only training exercises, and that delivering a message from a relative to a nonamateur is only practice. Man, this is the real thing.

The handling of messages as its own end, not a means by which the stuffed-shirters stay proficient. Therein lies the basis of my criticism of the western SCM. Somehow he has it that the NTS purpose is solely to supply the ARES with an outlet. What is worse is that to justify the existence of NTS, we have permitted this farce to spread.

So, to counter his dismissal of traffic types who have no interest in ARES-type public service as self-centered, I submit that their form of public service is one that is done every hour of every day with great sacrifice of time and expense — not to mention daily dinners at the radio and forgetting what your spouse looks like. Those folks who pound the brass religiously are active in their own brand of public service, and they are not compelled by disaster or emergency, but, of all things, pride in those silly things like meeting schedules and copying accurately.

And to say that since NTS bogs down in SET is an indication that NTS is dying is a rather convoluted argument. It's much like conjecturing that the Grand Coolie Dam would fall under the stress of every drop of water on the continent if it were all placed in the reservoir behind it. The SET, while a lot of fun, is one of the most ridiculous exercises for NTS. For one thing, us netters go through it every Christmas anyway. And for another, to believe that 543 floods, 422 tornadoes and a host of other natural and unnatural demons would occur nationwide, short of the second coming, is juvenile. In all of the many communications emergencies in which Amateur Radio participated that I have observed, the efficient ones were separated from the inefficient ones by NTS participation.

But, I think I can see the problem your west-type SCM is having, coping with those picky little fellows called traffic handlers. I have the same problem coping with ARESers. When you really need an important message to go out, you call a netter and tell him or her you have a Priority or Emergency for thus and so, and how fast will it get there. The schedule-happy netter says that the section net meets in four hours, the region net 45 minutes later, and on and on. This is certainly not the kind of system that we need to handle messages of this sort. Why, you could call on the phone and be as efficient. And, you're darn right. NTS was never designed to handle a message — it was designed to handle *messages*.

This is a lot like the fellow who delivers a message you relayed to him from some faraway land, and he comes back to the net and lets you know the message was delivered. I can't seem to make any friends when I say how I really don't care, since that is exactly what I would expect, unless a service or response were required. And in that case, there is no gurarantee I would relay the reply.

So what is needed is for the EC or SEC to arrange for links to key cities or agencies within and *outside* the section, with the help of the STM. (Why do I have to tell this guy what is already in the *PSCM*?)

Of course, the best system will be one with every public-service-minded operator with an auto-starting rig and computer; with the proper codes, the message will wind up in the right hands. This day will come, and I hope the transition will arrive with something to replace those satisfiers of the brasspounder's needs — accuracy and timeliness. This day is a bit far away to be chucking out NTS.

COMMUNICATIONS SERVICE OF THE MONTH

Fourteen inches of rain fell on Great Bend, Kansas, and vicinity on June 14 and 15 causing record-breaking flooding. Great Bend, with a population of 22,000, lies at the confluence of the Arkansas River and Walnut Creek, in the southwest portion of the state. By early Monday morning, the 15th, power had been cut off to most of the city, and telephone service was deteriorating. The Kansas National Guard was activated for evacuation of residents, and the Kansas Emergency Preparedness Division requested communication assistance from EC NØBLD, State Radio Officer, particularly for health-and-welfare inquiries statewide.

The amateur operation evolved in two phases. The first was the intra-city, 2-meter operation, both simplex and on the WBØOQX repeater. This mode assisted National Guard trucks in evacuation, kept evacuation centers in contact with each other, kept City departments in contact, helped with lost-and-found persons, and was the basic communications for the Red Cross. On Monday, it provided inter-city contact via hf link through EC WDØEPS in Larned.

Since the homes of all the Great Bend amateurs were flooded and their base stations inoperative, hams converged on the city from all directions to assist with both equipment and expertise. First to arrive were DEC KØEZ, EC WBØOAO, and WØEB, all from Pratt. KØEZ supervised the 2-meter operation, assigning operators and coordinating with local agencies. Other operators drove from such cities as Hays, Topeka, Lawrence, Wichita, Hutchinson and Howard.

The second phase was the hf operation into the state and beyond. NØBLD alerted SEC WØKL who contacted EC WDØEPX and activated the Kansas Emergency Net on 3920 kHz. NØBLD supervised operation of the amateur station in the state EOC. On Monday the only radio communication into Great Bend was via the WBØOQX repeater (short haul), or via 75 meters to WDØEPX, and then relayed via 2 meters into the city. By early Tuesday morning, amateurs from Salina and Topeka had brought in hf equipment and set up stations operating on 3920 kHz and 7250 kHz, relieving WDØEPX of this responsibility.

By Tuesday evening flood waters had begun to recede, and the process of block-by-block evaluation was initiated, which was necessary before people could return to their homes. Two-meter operators again provided vital communication, especially with hand-held units. As citizens were returning to their homes Wednesday morning, the hf stations in Great Bend were dismantled at 8 A.M., and the 2-meter net was secured at noon.

Flood damage estimates were set at $20 million to residences and $180 million to area properties. There were no deaths and no significant injuries attributable to the flood, and the participating amateurs feel that their services contributed to the safety record.

Eighty-five percent of the city of Great Bend was flooded, and at least 3000 people were evacuated. The Barton County Community College evacuation center listed 1000 families, and the Immaculate Conception Convent Center listed 800 individuals.

Red Cross stations WØSOE in Wichita and WØCET in Topeka operated hf, and a great deal of Red Cross traffic, both official and health and welfare, was handled by Amateur Radio. No official count of traffic is available, but the total would be well over 100. WBØOAO, who operated the 2-meter base station at the temporary EOC until relieved late Tuesday afternoon by KBØVV, estimated that 800 rescue messages and 1000 health-and-welfare messages were handled on vhf in the city.

Over 50 operators were directly involved in the operation, with 65 pieces of equipment, five generators and two specially equipped vans being supplied.

Full cooperation on the part of fellow amateurs was experienced. No intentional interference was observed, and many offers of help came from operators in all parts of the United States. — *W. D. Bemmels, WØKL, SEC Kansas*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For June, 34 SEC reports were received denoting a total ARES membership of 18,780. Sections reporting were: Ala, Ariz, Co, EBay, Ill, Ind, Kans, Ky, La, Me, Mich, Miss, NH, NLI, NNJ, Ohio, Org. NTex, SV, SDgo, SF, SBar, SCV, SJV, SC, SNJ, SFla, Utah, Va WMass, WNY, WPa, WVa, Wisc.

☐ The half-year summary of SEC reports, including late reports, follows: 222 were reports received from 52 different sections. During the first half of last year, 233 reports from 49 sections had been received. At press time, the following sections had 100-percent reporting record: Ala, Ariz, Colo, EBay, Ind, Kans, La, Me, Mich, NLI, NTex, Ohio, Org. SV, SDgo, SJV, SBar, SCV, SC, SFla, Va, WVa, WMass.

☐ For 1980, 19 SECs reported every month. Including late reports, the following sections had 100-% reporting (the number in parentheses shows how many years of complete reporting has occurred): Ala (1), Alta (3), Ariz (6), Del (7), Ind (7), La (1), Mich (12), Minn (1), NFla (5), Ohio (3), SV (1), SDgo (10), SJV (3), SCV (1), SFla (29!), SNJ (2), Va (4), WVa (5), WMass (1).

KØFPC and WBØLFH man the emergency rigs at Great Bend, Kansas. *(photo courtesy of WØKL)*

REPEATER LOG

According to reports received between June 21 and July 21, the following repeater groups were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
WR1ABO								1		1
WR1AFG								1		1
K1ZZN				8			1	1		10
WR2ADJ				5	1			2		8
KC2CY	2			2	3		2		1	8
WB2NQV	2		2	1			1	2	1	9
W2VL		1	8	4	2			1	1	17
WB2ZII							1	2		3
N3AIA				4			3			7
W3CWC	5		1	4	3	2	4	1	1	21
W3EEK				2			4	1	1	8
K3JSZ				2			4			6
W3URL				2			1	1		4
KA4BGA	2			6						8
W4LBL				30					1	31
WB4LET	4						5			9
WB4PLK						1				1
WB4QES	2	1	1	17	1		5		1	28
WA4SWF	2					1			1	4
W4VQA						1				1
WR6AEN			1	39	2					42
WA6ATY			1	1			1	1		4
N6AUB	1			2				2		5
WA6EUZ			1	9	3					13
W6IYY			1	3			5	1	1	11
WB6PVS				2	1		4	1		8
WA6WTT		1	1	4				2		8
W7WGW			4	7	1					12
WR8ADO		1		2			1			4
WR8AES	1						3	1		5
WR8AOC								1		1
WR8ARB	1			5						6
W8NXD	1		2	1			3	2		9
WA8ULB	2			1					1	4
WB9ACJ	5			8			6			19
W9FUL	5							4		9
WB9YJF	7			1	1				2	11
WØKUJ	8									8
WØRGB	2									2
TOTAL	52	4	23	173	14	5	54	28	12	366

NATIONAL TRAFFIC SYSTEM

We regret to report the passing of two of NTS's finest — Bill West, W2UEZ, and Bill Davis, WA3NAZ.

EAN/c2 certificate issuances: K1GF WB1CPF WB1HIH N1BHH WB3GAU WB3CAI K3JSZ K4ZN NJ4L KA8CPS WD8LRT KB8MX VE3KK VE3HTL.

The early session of 1RN/c2 has been meeting on 7230 kHz. The 2030Z session of 8RN/c2 has been convening on 7240 kHz.

June Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	30	789	26.3	.634	89.4	
CAN	30	670	22.3	.310	100.0	
PAN	51	489	9.6	.351	86.7	
Region Nets						
1RN	57	166	2.9	.251	67.5	90.0
2RN	60	296	4.9	.317	91.0	96.7

1	2	3	4	5	6	7
3RN	30	139	4.6	.305	91.7	60.0
4RN	59	298	5.1	.215	82.2	100.0
RN5	30	338	11.3	.269	90.2	100.0
RN6	88	493	5.6	.249	75.0	88.3
RN7	60	488	8.1	.634	100.4	85.0
8RN	55	210	3.8	.296	72.8	96.7
9RN	80	316	5.3	.283	97.9	100.0
TEN	50	209	3.5	.152	50.0	100.0
ECN						93.3
TWN	55	173	3.2	.307	52.3	86.7
TCC						
TCC Eastern	91[1]	407				
TCC Central	74[1]	346				
TCC Pacific	83[1]	256				
Cycle Four						
Area Nets						
EAN	30	1647	54.9	1.256	94.4	
CAN	30	764	25.5	.611	100.0	
PAN	30	988	32.9	.956	98.3	
Region Nets						
1RN						96.7
2RN	90	588	6.5	.460	90.7	90.0
3RN						86.7
4RN	59	526	8.6	.321	86.7	96.7
RN5	60	527	8.9	.427	87.1	100.0
RN6	60	613	10.2	.337	94.0	98.3
RN7	60	616	10.3	.828	98.1	100.0
8RN	58	415	7.2	.382	94.0	98.3
9RN						100.0
TEN	60	316	5.3	.294	77.2	100.0
ECN	60	271	4.5	.400	82.0	100.0
TWN	59	410	6.9	.372	91.3	96.7
TCC						
TCC Eastern	91[1]	593				
TCC Central	80[1]	280				
TCC Pacific	117[1]	742				
Sections[2]	5642	25,637	4.5			
Summary	7023	41,016	5.8			
Record	10,319	50,268	18.4			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (203): ATN PSN (AB), AENB AEND AENJ AENK AENM AENQ AENX (AL), APN ARN MBN OZK (AR), ATEN HARC SWN (AZ), NCN NCTN SCN (CA), COBN HNN (CO), CN CPN NVTN RTN WCN (CT), FAST FMSN FMTN FPON FPTN MEN PEN QFN QFNS SPARC TPTN (FL), CGVHFN CVEN GCN GSN GSSBN GTFCN (GA), I75MN ICN ITEN TLCN (IA), BSN IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN KWN QKS (KS), 4ARES 5ARES 6ARES 11ARES BARES CARN KEN KNTN KPON KRN KSN KTN KYN MKPN PAEWTN SEKEN TSTMN (KY), LAN LRN LTN (LA), EM2RI EMRIPN EMRISS HHTN NEEPN NENN RIEM2MN WMFN WMN (MA/RI), MEPN (MDC), AEN MPSN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MNAMWXN MSN MSPN (MN), APN (MR/NF), CAEN MN MSBN MSN MTN (MS), CMN CN CNCTN CNN JFK M2MEN NCSSBN P22Ø PCTN RARS THEN TRI (NC), MNARES NCHN NE4Ø NE75 NMPN NQCN NSN PARC2MN WNN (NE), GSFM GSPN NHN (NH), NJN NJVN NWNJVN OBTTN UCETN (NJ), RRN (NM), NSN (NV), CNYTN NLIPN NYPON NYS SDN STAR WDN (NY), ALERT BRTN FRCN HCARES LCNWARES 06MN ONN OSN OSSBN TATN (OH), OLZ OTWN (OK), ARESTN BSN OSN PDXARES WCN (OR), D3ARES EPA EPAEPTN PFN PTTN WARCVTN WPA WPATMTN (PA), BR2MN LC2MN SCNTN SCSSBN YCAN (SC), TNCWN TNPN TNVN (TN), DFW TEX TJN TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN VTN (VA), VTN (VT), IETN PSTS WSN (WA), BEN BWN NWTN WIN WNN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

TCC Central/c4 certificates were awarded to W4ZJY, N5BB, N5BT, K5GM, N5RB, W5RB, W5SBE, N5TC, W5TFC, K5TL, W9CXY, W9DND, W9NXG, WB9UYU, WØAM, KØEVH, NØEZ, WØHI.

1	2	3	4	5
Cycle Two				
Eastern	120	93.3	814	407
TCC Central	90	82.2	575	346
TCC Pacific	120	69.2	496	256
Summary	330	81.6	1885	1009
Cycle Four				
TCC Eastern	120	78.5	1090	593
TCC Central	90	88.9	556	280
TCC Pacific	120	97.5	1496	742
Summary	330	88.3	3142	1615

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (June) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s CQB RQ XD ZOJ, WB2IQJ, K3JSZ, WB3GZU K4DHX, W4s JK SQQ, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s ATU CWA GOL Central Area (W9JUJ, Director) — W4OGG, WD4HIF, K4VM, W5s CTZ KLV, KA5BSN, KB5s TC UL, WA5EQQ, WB5s NKC YDD, K5s BNH KJN PE, W9s HOT JIJ JUJ NXG, WB9WGD WDØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE N7RG, WA7GYQ, WB7TQF, WØs EJD HXB RE, WBØMTA, NØTU, WDØAIT, KØDJ, NØBDE, VE6CHK. *Cycle Four* — Eastern Area (W2CS, Director) — N1BHH, W1s EFW KX NJM QYY, K1s BA EIR GN SSH XA, WB1CPF, W2s CS FR GKZ MTA RQ XD, K2NY, WA2s ICB SPL, WB1CPF, W3s FAF PQ, WB3GZU, W4s JK UQ, K4s BKX KNP ZK, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL Central Area (W5GHP, Director) — K5GM W4ZJY, W5s RB SBE TFB, N5s BB BT RB TC, K5TL, W9s CXY DND NXG, K9BVE, WB9UYU, AEØR, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW, W7s DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ, WØs HXB LB, WDØAIT, VE7ZK.

Independent Nets (June 1981)

1	2	3	4
Amateur Radio Telegraph Society	30	436	321
Central Gulf Coast Hurricane	30	152	2140
Clearinghouse	30	115	339
Early Bird	30	679	288
Empire Slow Speed	30	59	328
Hit and Bounce, Slow	30	85	288
IMRA	26	426	1032
Mission Trail	30	216	1263
North American SSB	26	61	177
Southwest Traffic	30	183	1136
20-Meter ISSB	26	778	622
75-Meter ISSB	30	317	912
7290 Traffic	48	670	2705

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll June 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

918
KA9CPA
271
WP4BDS
191
W4CKS
188
KAØAID
186
N1BHH
159
WD8LRT
158
W7LRB
156
WP4AOH
150
KA1ON
WA1TBY
147
WD4COL
141
W9JUJ
KZ4K
138
WA4PFK
KA3T
136
W7LNE
KBØMB
WD4HIF
128
WB2MCO
123
NP4F
122
NG4J
120
WB4FVV
WB3GZU

119
WA5RVT
118
WB5YDD
117
KA8CPS
116
W2AHV
AA4FG
115
N4EDH
114
KB2KW
WD4AWN
W2GLH
113
WA4STO
K4SCL
W5CTZ
AF8V
N8BJD
112
W4GPL
KA1BBI
111
WD4ALY
110
W1EOF
K1BSO
W2XD
109
WB2EAG
KB5NX
WB8MTD
108
W9YCV
WA4JDH
W2MTA
WB4WYG
106
KA1FE

105
KA3CDQ
W7GHT
K3JSZ
WB1HIH
104
KF8J
K4JST
NØBLD
AK1W
AFØO
103
KA4ASZ
W4NWM
VE3GOL
102
WB7DZX
VE1WF
VE3GT
WA3WIY
101
WB8JGW
K7GXZ
N2APB
N7AKX
100
KA2CTU
99
KB3DT
N6AED
98
WA4CCK
W5DTR
N9BYK
N1ARI
97
W1TN
KA1BJY
N5AMK
96
WB3HTW
95
KT6A

W7LG
AG2R
W9DM
K3JL
94
KB4OZ
N6AWH
KB2WI
WB4AID
KC5FX
WA7MEL
WA2KOJ
93
W2YJR
KA4LNA
WØOYH
VE3DPO
92
N9AEI
WD8IBY
91
N4BZH
KA4GFU
N1NH
K2VX
90
N2XJ
WB3CAI
AG9G
89
W4ANK
KC5NN
88
KB5TC
VE3WM
87
WA7IHS
W8UE
W9NXG
86
W4OGG
WB4TZR

KP4DJ
N2BXB
N9AUG
85
WØKJZ
WD5JYI
W5HMR
WB8YDZ
84
WA4PIZ
N6GW
WD8PEI
N5TC
K9BVE
83
WB7OEX
WØFT
KA4MZY
82
K5TL
WB9YPZ
81
N5RB
WB8SYA
W3VA
KA2BHR
N2BNB
W5VMP
80
WA8HGH
WB2IDS
K5CXP
79
VE2PJ
K4EV
WB5MMI
WB5NKC
78
N2BDW
W5KLV
WB1GXZ
N2CFF
AF2L
KB4WT
77
W2ACQ
KD4FP
WB7TQF

WD8RHU
N5BT
76
KB5EK
W6RNL
75
WB3FKP
74
KK8L
KAØE
VE3BVG
K5HGX
KK5B
N9AZI
73
WD5AAH
WBØHOX
WB4FDT
VE3KK
72
WD8KFN
KØDJ
WD9FRI
WØOTF
W7FJZ
W8VPW
71
WA8GMT
KI2D
KA5AZK
WB9YPY
70
W8GGX
WB5UZS
WA7LGN
WB1ABQ
WA4EYU
W4ZJY
WAØTFC
KG2D
69
W7TGU
WB6OBZ
N7CSP
KB2GT
68
KG5L
AA4EI

WA7DPK
W1TM
K4ZN
KA2CLQ
WA3EHD
W9JIJ
KB8MX
67
VE2EDO
WA6LVO
WB2OWO
WØOUD
N4UF
W5VMY
66
N4PL
WD9EVV
W8IM
KA3BMU
AC3N
K7ZIG
65
W8EK
KC1G
KA2GOH
N3AKC
WD4BSC
KC5SF
K5ZC
WA8DHB
KS6T
KA9GBE
WA3WQP
64
AA3B
AD7G
63
WB8SIQ
W9QLW
WD8KBW
K6YD
KA4ERP
WD5KBK
KA5IWF
K4ZB
62
WD8PMW
KA5AVQ
AJ5F

W6CPB
WA1VRL
WAØNMA
W1RWG
N5FN
61
WB2IXR
K1NAN
K2ZVI
N4BGH
KØPIZ
K5SOR
WA8PIM
60
WB2HDU
N8BQK
W5SBE
W4HON
K3CR
K8DTG
WA4LJI
KG9B
KØCY
AI6E
58
KA2HNQ/T
55
KA4BBA/T
WA8JNQ/T
53
N5CRR/T
50
WD9ERN/T
KA9IKR/T
49
KA8DEZ/N
48
KA4AUR/N
45
KA8IWW/N
43
KA5KRI/T
42
KA4IKH/N
KA4SAA/N

Brass Pounders League June 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N4AZI, WB4FVV, KZ4K.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	639	907	1344	73	2963
NØBQP	34	1103	314	596	2047
KA9CPA	24	995	153	859	2031
WØWYX	29	426	397	579	1981
WP4BDS	704	279	740	199	1922
WAØHJZ	26	628	16	433	1103
W9JUJ	1	487	496	40	1024
WP4AOH	175	272	247	106	800
WA4JDH	1	394	333	2	731
WD4HIF	5	335	342	40	722
N5DAA	335	318	19	2	674
WB5YDD	11	305	290	59	665
W3VR	236	129	267	10	642
NP4F	135	177	224	64	600
KT6A	3	280	294	12	589
W7VSE	10	315	180	57	562
W5TFB	14	265	263	8	550
W7DZX	2	277	249	4	532
VE3GOL	2	227	284	16	529
NG4J	22	269	205	31	527
WD9ESZ	6	138	380	3	527
W1EOF	103	125	282	12	522
N1BHH	0	223	201	80	504
KS6T	3	258	248	10	503
W5DAD	21	229	229	21	500

BPL for 100 or more originations plus deliveries:

W7LRB	230
WD8LRT	190
N6AED	174
KA8CPS	164
W1ACT	162
W7TGU	153
W1YI	127
NP4F	126
WA4PFK	126
WB4FVV	125
AF8V	123
W7LNE	121
K4TH	119
WD4COL	110
W4EAT	108
KBØMB	106

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

SEPTEMBER

1

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z Sept. 2 (9 P.M. PDT Sept. 1). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

5-6

Four-Land QSO Party, Aug. *QST*, page 82.

North American Sprint, Aug. *QST*, page 82.

LZ DX Contest, Aug. *QST*, page 82.

9-11

YL Howdy Days, Aug. *QST*, page 82.

12

ARRL Frequency Measuring Test, Aug. *QST*, page 82.

12-13

ARRL September VHF QSO Party, Aug. *QST*, page 76.

European DX Contest, phone, July *QST*, page 84.

New Mexico QSO Party, sponsored by the Albuquerque DX Association, full UTC period. Exchange signal report, serial number and QTH (county for NM stations; state, province or country for others). Suggested frequencies: cw — 63 kHz up from the bottom band edge; phone — 3900 7265 14,285 21,365 28,650; Novice — 3705 7105 21,105 28,105. Work stations once per band/mode. Count one point per QSO. NM stations multiply by sum of states, provinces and DXCC countries worked on each band/mode; others multiply by sum of NM counties worked on each band/mode. Awards. Dupe sheets for 100 or more QSOs. Mail logs (s.a.s.e. for results) by Oct. 15 to: Albuquerque DX Association, P.O. Box 997, Corrales, NM 87048.

Washington State QSO Party, sponsored by the Boeing Employees ARS, from 0100-0700Z Sept. 12, 1300Z Sept. 12 until 0700Z Sept. 13, and 1300Z Sept. 13 until 0100Z Sept. 14. Exchange signal report, serial number and state/province/country (county for WA stations). WA stations score two points for phone, three points for cw QSOs (including other WA stations) and multiply by sum of states/provinces/countries worked for final score. Others score two points for phone and three points for cw QSOs with WA stations, multiply by WA counties worked. Add one multiplier for each eight stations worked in the same county. Suggested frequencies: phone — 1815 3925 7260 14,280 21,380 28,580; cw — 1805 and up 60 kHz from lower edge; Novice — 3725 7125 21,150 28,160. Mail entry by Oct. 15 to BEARS Contest Committee, c/o Willis Propst, K7RS, 18415 38th Ave. South, Seattle, WA 98188.

Foxhunt Contest, sponsored by the Foxboro Company ARC, from 1300-2200Z Sept. 13. Frequencies 7265 and 21,365. The object is to find and work Foxboro club stations WB1EMT, and then find two other Foxboro club stations you'll be directed to hunt on the band. Each Foxboro station will send QSO number with prefix of F, O or X. Log information: include F, O and X numbers and call signs of stations worked. Certificates. Logs (include s.a.s.e. for results) to : Frank S. Jasinski, W1XA, 42 Saddleback Hill Rd., Bellingham, MA 02019.

14

W1AW Qualifying Run, 10-35 wpm at 0200Z on Sept. 15 (10 P.M. EDT Sept. 14). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Sept. 1 listing for more details.

19-20

CAN-AM Contest, phone, sponsored by the Ontario Contest Club and Canadian DX Association, from 1800Z Sept. 19 until 1800Z Sept. 20. Three classes: single operator (all band, single band and QRP), multioperator single transmitter (includes single-operator club stations, and single operator other than the licensee) and club competition. Multioperator stations may operate entire 24-hour period. Single ops operate 20 hours with one or two rest periods. Time off must be clearly marked in log. Exchange signal report, serial number and multiplier abbreviation. W/K stations use two-letter postal abbreviations (CA, CT, COT, etc.); U.S. Caribbean possessions use CN; U.S Pacific possessions use PC; Canadians use NF (VO1, VO2), NB, NS, PE (Prince Edward Island), SI (Sable and St. Paul Is.), PQ, ON, MB, SK, AT, BC, NW, YU. Count three points per W/VE QSO and two points for W/W and VE/VE QSOs. Multiplier is 50 states, two possessions, 10 Canadian provinces, two territories, one island (65 possible per band). Stations outside of their call area must sign /KH6 or /3 or whatever is appropriate. Final score is QSO points times sum of multipliers per band. Phone and cw sections of the contest are separate, but overall cw plus phone scores will be used for overall competition. Trophies, plaques and awards. For club competition the club secretary must submit a list of those eligible and their scores. Logs must show time in UTC. Do not use separate logs for each band. Mail entries by Oct. 20 (Oct. 27 for cw) to Yuri Blanarovich, VE3BMV, Box 292, Don Mills, ON M3C 2S2.

College Radio Scrimmage, sponsored by the Penn State ARC, from 2200Z Sept. 19 until 0400Z Sept. 20, cw and ssb. Idea is to put long-lost alumni in touch with their alma mater. Entry classes: alumni and college station. One transmitter only. Exchange name of college, junior college or university you last attended and the last two numbers of the year you graduated or will graduate. Club stations substitute "Amateur Radio Club" for number. Noncollegians substitute "high school" for college name. Sample exchange: "Harvard 77." Stations may be worked once per band. Multiply total QSOs times number of different college/university/junior colleges worked. Suggested frequencies: phone — 1815 3895 7230 14,280 21,355 28,560; cw — 60 kHz from low end; Novice 25 kHz from low end. S.a.s.e. for results. Logs must be received by Nov. 1, 1981. Send to Penn State ARC, K3CR, 202 Engr. Unit E, University Park, PA 16802.

Maryland-District of Columbia QSO Party, sponsored by the Columbia ARA from 1900Z Sept. 19 until 1900Z Sept. 20. Exchange signal report, serial number and QTH (county for MDC stations except independent cities of Baltimore and Washington; state, province or country for others). Single operator only. MDC stations multiply total QSOs by sum of MD counties, states, provinces and countries. Others multiply MDC QSO total by MD counties and independent cities (maximum 25). Multiply score by 1.5 if using 200 watts or less. Suggested frequencies: phone — 3950 7250 14,290 21,390 28,590; cw — 60 kHz from low end; Novice -- 20 kHz from low end. Awards. Mail entry by Oct. 20 to CARA, c/o Robert K. Nauman, WA3VUQ, 4017 Font Hill Dr., Ellicott City, MD 21043.

Scandinavian Activity Contest, cw, sponsored by the Norwegian Radio Relay League, from 1500Z Sept. 19 until 1800Z Sept. 20. (Phone on Sept. 26-27.) Work stations in Norway (LA/LB/LG/LJ), Svalbard and Bear Is. (JW), Jan Mayen (JX), Finland (OF/OG/OH/OI), Aland Is. (OHØ), Market Reef (OJØ), Greenland (OX), Faeroe Is. (OY), Denmark (OZ), Sweden (SJ/SK/SL/SM) and Iceland (TF) on 3.5 to 28 MHz. Single operator/all band, multioperator/single transmitter (stay on band at last 10 minutes at a time) and multi-multi (includes club stations) categories. Exchange signal report and serial number. Multiops use separate serial numbers on each band. Non-European stations count one point per QSO on 14-21-28 MHz and three points per QSO on 3.5-7 MHz. Multiply QSO points by sum of number of call areas worked per band (LA1 = LB1 and SM3 = SK3 = SL3, etc.) for final score. Suggested frequencies: cw — 3505-3575 7005-7040 14,010-14,075 21,010-21,120 28,010-18,125; phone — 3600-3650, above 3795, 7050-7200 14,150-14,300 21,200-21,350 28,400-28,700. Original logs (or photocopies) must be submitted. Logs with more than one percent duplicates will be disqualified. Plaques for continental leaders. Mail entry by Oct. 15 to NRRL Contest Manager Alf Almedal, LA5QK, N-4052 Roeyneberg, Norway.

10-Meter Portable Contest, sponsored by the Associazione Radioamatori Italiani. From 1200Z Sept. 19 until 1600Z Sept. 20, with a required four consecutive-hour time-off period. Phone and cw. Use 28.0 to 28.2 and 28.5 to 28.7 MHz only. Fixed and portable classes. Portable stations must sign portable and must use other than the normal QTH and antennas. Exchange signal report, serial number and ITU zone. Enter mixed mode, phone only or cw only. Each station may be contacted only once. Score two points per QSO in the same country, five points different country same continent and 10 points different continent. Multiply QSO points by number of ITU zones worked for total score. Logs must include time (UTC), call sign, complete exchange, points, your input power. Separate cw and ssb logs. Awards. Mail by Dec. 31, 1981, to Sanremo ARI Section, P.O. Box 114, 18038 Sanremo, Italy. Enclose at least one IRC for results.

23

W1AW Qualifying Run, 10-35 wpm at 1300Z (9 A.M. EDT) Sept. 23. See Sept. 14 listing for more details.

26-27

CAN-AM Contest, cw, see Sept. 19-20 listing.

Scandinavian Activity Contest, phone, see Sept. 19-20 listing.

Classic Radio Exchange, sponsored by the Southeast ARC, from 2000Z Sept. 27 until 0300Z Sept. 28. Object is to talk with those who restore, operate and enjoy older equipment. A classic radio is one built since 1945 but at least 10 years old. Exchange name, signal report, state/province/country, receiver/transmitter type, etc. Add numbers of different transmitters, receivers and states/provinces/countries worked for each band and mode. Multiply that total by total QSOs on all bands. Multiply that total by Classic multiplier — total years old of all transmitters and receivers used, three QSOs minimum per unit (transceivers multiply years old by two). Suggested frequencies: phone — 3910 7280 14,280 21,380 28,580; cw — 60 kHz from low end; Novice 20 kHz from low end. Send logs, comments, anecdotes to Stu Stephens, K8SJ, 1407 Hollyrood [yes, Hollyrood — Ed.], Sandusky, OH 44870.

Delta QSO Party, sponsored by the Delta Division of the ARRL, from 1800Z Sept. 26 to 0600Z Sept. 27 and 1200Z to 2400Z Sept. 27. Work stations in AR-LA-MS-TN. Exchange signal report, serial number and QTH (ARRL section for non-Delta Division; state and county if in Delta Division). Delta Division stations multiply QSOs by total ARRL sections worked (max. 74). DX stations count for QSO credit only. Others multiply QSOs by Delta Division counties worked (max. 316). Suggested frequencies: phone — 3990, 7290 14,290 21,390 28,590; cw — 50 kHz from low end; Novices — 25 kHz from low end. Achievement award for working five stations in each state (AR-LA-MS-TN). Mail entry by Oct. 21 to Malcolm P. Keown, W5XX, 213 Moonmist, Vicksburg, MS 39180.

Maine QSO Party, sponsored by the Portland Amateur Wireless Assn., from 2300Z Sept. 26 until 2359Z Sept. 27. Exchange signal report, serial number and QTH (county for ME stations; state, province or country for others). Stations may be worked once per band. Count three points per QSO, and multiply by number of ME counties worked (ME counties, states, provinces and countries for ME stations) for final score. Suggested frequencies: phone — 1815 3930 7280 14,280 21,380 28,580; cw — 1805 and 55 kHz up from lower band edge; Novice — 20 kHz from lower band

*Assistant Communications Manager, ARRL

edge. Mail entries by Dec. 1 to PAWA, Box 1605, Portland, ME 04104.

YLRCI Contest, sponsored by the Young Lady Radio Club Italiano, from 1300Z to 2200Z Sept. 26 and 0400Z to 2100Z Sept. 27. Single operator only, 80-10 meters, phone and cw. Exchange signal report and QSO number. YLs work anyone; OMs work YL stations only. Work the same station once per band regardless of mode. Count one point for QSOs in the same country, two points for QSOs with different countries and three for QSOs with stations on different continents. Multiply by sum of DXCC countries, W, VE, JA and VK call areas worked on each band. In addition, count five multipliers for each 25 different DXCC countries worked. Mail logs by Oct. 31 to Nuccio Meoli, IØYKN, P.O. Box 10, 00119 Ostia Antica, Rome, Italy.

JLRS Party Contest, phone, sponsored by the JLRS from 2000Z Sept. 25 until 0800Z Sept. 27 (cw 2000Z Oct. 2 until 2000Z Oct. 31. 80-10 meters. Exchange signal report and serial number. OMs count one point per YL QSO and five points per QSO with JLRS members. YLs count one point per OM QSO and five points per QSO with JLRS members. Multiply by total number of different prefixes worked. Entry classes: (A) more than four bands; (B) less than three bands. Mail logs by Oct. 20 to Kuni Kan, JA1YL, 4-5-38-406 Hyakunincho, Shinjuku-ku, Tokyo 160, Japan.

30

West Coast Qualifying Run, 10-35 wpm at 0400Z Oct. 1 (9 P.M. PDT Sept. 30). See Sept. 1 listing for more details.

OCTOBER

3-4

California QSO Party, sponsored by the Northern California Contest Club, from 1800Z Oct. 3 until 2359Z Oct. 4. Single-operator stations operate only 24 hours with off times indicated. Exchange serial number and QTH (county for CA stations, state/province/country for others). Stations may be worked once per band per mode; all cw contacts must take place in the cw sub-band. Count two points for phone QSOs, three points for cw QSOs. CA stations multiply QSO points by states plus Canadian call areas (VY1 counts as VE8) for final score. Non-CA stations multiply CA QSO points by CA counties worked (max. 58) for final score. Suggested frequencies: phone — 1815 3895 7230 14,280 21,355 28,560; cw — 1805, 60 kHz from low end; Novice — 25 kHz from low end. Trophies to highest CA score; highest out-of-state score, highest CA mobile score. Mail by Nov. 1 to NCCC, Dennis Egan, N6QW, 811 Byerley Ave., San Jose, CA 95125.

JLRS Party Contest, cw. See Sept. 26-27 listing.

VK/ZL/Oceania DX Contest, phone, sponsored by the New Zealand Assn. of Radio Transmitters, from 1000Z Oct. 3 until 1000Z Oct. 4 (cw — Oct. 10-11). Exchange signal report and serial number. Count two points per VK/ZL QSO and one point for other Oceania QSOs, except Oceania stations count two points per VK/ZL QSO and one point for other non-Oceania QSOs. Multiply QSO points by sum of VK/ZL call areas worked per band for final score. Mail entry so it arrives before Jan. 31, 1982, to NZART Contest Manager, ZL2GX, 152 Lytton Rd., Gisborne, New Zealand.

10-11

ARRL CD Party, for Communications Department appointees and ARRL Officials. Details in the fall issue of *QCD*.

VK/ZL/Oceania DX Contest, cw. See Oct. 3-4 listing.

GARTG SSTV Contest, sponsored by the German Amateur Radio Teleprinter Group, from 0600Z Oct. 10 until 0600Z Oct. 11. 3.5 to 28 MHz; exchange signal report and serial number. GARTG members also send membership number. Count one point per QSO on 3.5, 7 and 14 MHz, two points on 21 MHz and 5 points on 28 MHz. Multiply by number of DXCC and WAE countries worked per band. W, VE, JA, PY and VK call areas count as separate countries. Mail logs by Dec. 11 to Wolfgang Punjer, DL8VX, Box 90 11 30, 2100 Hamburg 90, Fed. Rep. of Germany.

High Speed Code Test, sponsored by the Connecticut Wireless Assn., at 0115Z Oct. 12 (9:15 P.M. EDT Sunday Oct. 11). W1NJM will transmit simultaneously on 3636 and 7085 kHz, and K6DYX on 3690 and 7025 kHz. Call-up begins at 0115Z, instructions start at 0130Z. Five minutes of plain English text with periods, commas and question marks (no other punctuation) will be sent at speeds of 60, 55, 50, 45 and 40 wpm, in that order. Copy one minute solid for certificate. Send copy with s.a.s.e. to George Hart, W1NJM, 66 Highland St., Newington, CT 06111.

21/28 MHz Contest, sponsored by the Radio Society of Great Britain, phone only, from 0700Z until 1900Z Oct. 11. Single operator only. Exchange signal report and serial number. Contact British stations only (G, GD, GI, GJ, GM, GU, GW); GB stations do not count for contest credit. Count three points per QSO, multiply by sum of British prefixes worked on 21 and 28 MHz. Mail entry to arrive before Dec. 1 to RSGB HF Contests Committee, P. O. Box 73, Litchfield, Staffs WS13 6UJ, England.

9-Land QSO Party, sponsored by Ill Wind Contesters, from 1800Z Oct. 10 until 2359Z Oct. 11. Operate no more than 24 hours. Work Indiana, Illinois and Wisconsin stations. 9-land stations exchange signal report, county and state. Others exchange signal report, state/province/country. The same station may be worked once per band per mode. Stations changing counties may also be worked again. 9-land stations count two points per QSO, multiply by sum of states, provinces, countries and 9-land counties. Others count two points per 9-land QSO; multiply by 9-land counties worked for final score. Suggested frequencies: cw — 1805 and up to 60 kHz from low end; phone — 1815 3895 7230 14,280 21,355 28,600 vhf; Novice — 3725 7125 21,125 28,125. Send results with a large s.a.s.e. to Ill Wind Contesters, c/o John Sikora, WB9IWN, 8747 Northcote, Munster, IN 46321.

13

W1AW Qualifying Run, 10-35 wpm at 0200Z Oct. 14 (10 P.M. EDT Oct. 13). See Sept. 14 listing for more details.

17-18

AC-DC Contest
Jamboree-on-the-Air
Minnesota QSO Party
Pennsylvania QSO Party
QRP International QSO Party
WA-Y2 Contest

21-22

YL Anniversary Party

24-25

CQ Worldwide DX Contest, phone.

25

W1AW Qualifying Run

NOVEMBER

7-8

ARRL Sweepstakes, cw.

21-22

ARRL Sweepstakes, phone.

50 Years Ago

September 1931

☐ "A Combination A.C. and D.C. Amateur-Band Receiver," by James Millen, W1AXL, of the National Company, is an eight-page description of the development of the SW-3. This three-tube receiver features ganged tuning of the r.f. and detector circuits, a variable-ratio dial drive, and a *calibrated* audio volume control (for estimating the signal report). Band-spread coils for the 80-, 40- and 20-meter bands are available. The "A.C. and D.C." of the title refers to the two models offered: an all-a.c. using a separate a.c. power supply, and a d.c. version using a.c. or d.c. on the heaters and a battery plate supply. (The SW-3 was destined to become one of the most popular ham receivers ever offered.)

☐ In Part II of "The Standard Frequency Transmitter at W1XP," Paul Hendricks describes the 500-watt amplifier at the Round Hill station. This rig has all the "goodies" one might expect in a '61 amplifier; cooling fan, 3000-volt power supply and even screen-grid modulation.

☐ "Practical Electron Transmitters and Receivers," by John Dyer, of W1CCZ, is an account of his work with Barkhausen-Kurz oscillators at 70 cm. and thereabouts. These interesting devices require tubes with cylindrical plates, because the electrons are put into circular orbits by applying positive voltage to the grid and negative to the plate. By adding a quench oscillator, a super-regenerative B-K receiver was obtained.

☐ Secretary K. B. Warner reports on the International Technical Consulting Committee in Copenhagen, at which there were no decisions affecting amateurs.

☐ Trimm Manufacturing of Chicago is offering a new lightweight headset that weighs only four ounces, including cord and headband. To quote the review, ". . . they are as sensitive to weak signals as headsets ordinarily used in amateur stations, but do not handle the very loud signals as well, since they are not designed to work as loud-speakers."

25 Years Ago

September 1956

☐ A "first" for ham radio is "Transistorizing the Single-Side-Band Exciter," by Jo Jennings, W6EI, and Emanual Alvernaz, W6DMN. The rig uses transistors in the audio section, the 456-kc. crystal oscillator and amplifier (diodes in the balanced modulator), the amplifier *following the mechanical* filter, the 3350-kc. crystal oscillator, and the balanced mixer. Output from the balanced mixer is amplified by a 6CL6, the only tube in the exciter.

☐ "The ARRL-IGY Propagation Research Project," by Mason Southworth, W1VLH, is a description by the recently-appointed project director of the scope of the work. V.h.f. ham-contact data will be collected on a worldwide scale, to be analyzed by Southworth and the Air Force Cambridge Research Center.

☐ Utilizing the new tubes that require only 12.6 volts on the plate and screen, Vern Chambers, W1JEQ, writes on "Something New in High-Frequency Mobile Converters." The neat unit is a double-conversion job with plug-in coils for band changing.

☐ Lew McCoy, W1ICP, describes "A Very Simple Output Indicator," to be used between transmitter and antenna. It consists of a dial lamp and a variable capacitor to adjust the coupling to the line for various power levels.

☐ In Part II of "Notes on the Development of Yagi Arrays," Carl Greenblum reports his findings on performance variations when stacking Yagi beams. And John Pomeroy, W8TUO, describes his "Tri-Band Quad," a lightweight two-element array he turns with a TV rotator.

☐ Still on antennas but in a more light-hearted vein, Bob Moren, W4INL, discourses "On Erecting Towers." Lots of chuckles and maybe even some truth. — *Byron Goodman, W1DX*

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ ORS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC. Alberta report in spite of mail strike. Red Deer picnic was another success. FD activities not in yet. VE6AMM and XYL, VE6AMN rcvd fine write-up in paper re ham radio. Traffic count will be later.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: JP SEC: HK. STM: RO. NMS: TE VJ NM ACX. Field Day activity about normal for this section. Gopher Creek boys went all out and expect to be on top in Canada this year. Around one hundred amateurs are going to be listed as weather watchers. 77 have been listed so far. This is in cooperation with EMO. WRIN QNI 90, QTC nil, sess 4. MMN QNI 458, QTC 30, sess 30. MTN QTN 102, QTC 27, sess 17. MEPN QNI 742, QTC 20, sess 30. Traffic: VE4PG 42, VE4TE 34, VE4ACX 33, VE4GF 21, VE4AAD 15, VE4JA 12, VE4AED 7, VE4AJE 7, VE4TL 5, VE4FK 4, VE4OE 4, VE4AAU 3, VE4CR 3, VE4LB 3, VE4MG 3, VE4XN 2, VE4AES 1, VE4JP 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — Asst SCM: VO1FG, NM: VE1VO VE1WF. SEC: VE1EI. STM: open. No reports of anyone in hospital. Field Day saw a fair amount of activity. Halifax amateurs participated search for body in the Halifax area. Not much news arriving because of postal strike, and summer activity appears to be down with all enjoying the good weather. APN seems to be maintaining the usual activity. Urgently need assistance with APN for NCS chores. Anyone interested? Nets: APN 30 sessions, QNI 111, traffic 65, time 308, Traffic: VE1WF 451, VE1LCR/RO 62, VE1XF 38, VO1AW 24, VE1BXA 8, VE1BPM 6.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. NMs VE3s AJN CYR FPI GFN GNW KK. The WX and band condx helped to make this year's Field Day very successful with many clubs and individual groups participating. Thanks to all who helped make the Red Cross message relay a success. 29 messages were sent to the ARC Convention in Washington as they celebrated their 100th year of existence. After serving for several years as editor of the Oakville Club Bulletin, 'Hot Bananas,' VE3HGJ, having moved to Niagara Falls, is assuming that post with the Niagara Peninsula ARC. Good luck. New field appts are ORS, VE3s LSJ MO; VE3JUZ as EC for Oakville replacing VE3ITN who is stepping down. The following are Silent Keys: VE3GNV and long time active amateur on 75, VE3PY. League affiliated clubs who have not submitted annual reports to League Headquarters in the past two years and desire to continue affiliation, should do so before the end of the month. If required, I have the necessary forms on hand. VE3KLX is enjoying his new FT-707. New calls are: VE3s LSX MOJ MTV MTW MVI MWT MWV. VE3s HOP and LFM have received their Advanced. Next examination date is Oct. 21. Amateur of the year club awards: NPARC: VE3DVI; Oakville: VE3FZG; Scarboro: VE3GNI; Welland Co. VE3ISD, congrats to all. EC Timmins, VE3JHE, is now a VE7. Suggestions have been received regarding a monthly 'on the air' traffic handling workshop — if you are in favour or have any ideas, drop me a line. The 1981 annual RSO Convention will be held in Kitchener-Waterloo on October 2, 3 and 4 — see you there. As we head into our fall schedule of activities, make a special effort this year to support and promote your local club. Traffic: VE3GOL 529, VE3KK 236, VE3GT 224, VE3HGJ 181, VE3GNW 121, VE3DPO 117, VE3CYR 108, VE3KXB 106, VE3BZB 62, VE3QI 60, VE3WM 53, VE3BVG 50, VE3EWD 49, VE3AJN 34, VE3DUK 30, VE3DVE 30, VE3FGU 29, VE3AYZ 22, VE3LNN 21, VE3FPI 19, VE3HTL 15, VE3IFP 10, VE3WG 9, VE3DZH 7, VE3KLX 6. (May) VE3HTL 24. (Apr.) VE3FGV 12.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. New appointees: VE2PJ as STM, VE2EDO as ORS. Congrats to VE2GHF for getting his ticket and being active on Field Day. On June 24th, the Happy Gang Net was 8 years old, hats off to this group of white caners. The QSN will go back to its winter schedule on September 1st. Notre Section a ete tres bien representee au Field Day, plusieurs clubs et non-club ont participe. Bravo a tous et a l'an prochain. Avec regret j'ai a vous annoncer le deces de VE2AKX. Traffic: VE2PJ 150, VE2BP 62, VE2EDO 40, VE2EKC 33, VE2EC 26.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: WA3WIY 102, K3JL 95, N3AKC 65. All stations who handle traffic please get reports to W3DKX, preferably via radiogram. We understand that DARC lost one or more antennas at FD to a mini-stampede by horses from a nearby stable. Due to physical limitations, W3DKX will not be a candidate for reelection as SCM. We hope that WA3DUM and WB3FOC soon solve their rig problems and return to traffic handling on the DE nets. K3JL has joined W3URR and others in adding radio control model aircraft to their operating frequencies. (June) DEPN QNI 37, QTC 5. DTN 304, QTC 49. (May) DSSN QNI 37, QTC 4/3. Traffic: WA3WIY 96, W3QO 65, W3DKX 57, N3AKC 51, WB3DUG 42, K3JL 31, WB3OC 12, WA3ZBI 12, K3ZXP 10, W3WD 2.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZQ. STM: WB3JYZ.

Net	Freq.	Time	QNI	QTC	Sess.	Mgr.
EPA	3610	7/10 P.M. Dy	408	236	55	AA3B
EPAEPTN	3917	6 P.M. Dy	393	158	30	WA3EHD
PFN	3958	5 P.M. M-S	235	217	26	WA3WQP
PTTN	3610	6:30 P.M. Dy	188	68	30	K3JSZ

Local and vhf nets reporting: D3ARES HARC VTN Luz Co ARES Mtg Co AREC and WARC with a total QNI 291, QTC 38 in 25 sess. OBS reports: K3EBZ KA3FKD W3CL W3ID W3VA WB3CAI WB3FVJ and WB3JYZ. OO reports: KC3B W3FAF W3GVR and W3KEK. OVS reports: W3GOA PSHR: AA3B K3EBZ K3JSZ N3AIA W3VA W3YZW WA3EHD WA3ViL WA3WQP WB3FKP and WB3HTW. New appointments: KA3FKD, EC for Luzerne Co, WB3AAC, EC for Chester Co. PTTN welcomes K3YD and WB3KUZ. EPAEPTN welcomes KA3GJT and N3CGT. New gear dept: K3SAE a FT902DM, W3KYH a Yeasu hf rig and IC2AT, WA3NVK an ICOM 255A. Congrats to WB3JYY, first place EPA finish in recent 10M contest. Members of SARA provided communications for the "Shenandoah Valley 10 km Challenge Run." New call sign: KA3CXB now KB3OM, KB3JJ now KC3Q, KA3FVW now N3BQE. KA3HLT and KA3HLS in Williamsport area. WB3KUZ reports for first time Field Day messages were received at this office from KB3OM W3EEK/3 K3PSO/3 WA3GUK/3 W3UU W3SJI K3YTL/3 N3WW/3 N3AY K3ONW K3II/3 W3BN/3 and K3IEC. AF2J, Pres of U of P ARC, reports N3KZ is being activated and will be active again in the traffic nets. K3JSZ reports KA3GSY KA3GTC KA3HCG KA3HMC KA3HMG and KA3HMH all new Novices from the recent Hazleton ARC classes. Welcome to ham radio. WA3CKA now working for 6M WAS. W3HK doing lots of traveling these days. WB3FKP received 15M cw WAS and 6M 600 Club award. WN3COW also received WAC award. N3AZT upgraded to Extra class and awaiting new call. N3ADU and WB3FKP received PFN certificates. KA3CAT reports much fun on FD cooking for the HARC gang. WA3IFY reports Holmsburg ARC members participated in 1981 March of Dimes Superwalk. WB3FYT is erecting a new Wilson Triband beam. W3WAS celebrating 40 years in ham radio. New officers for Mt. Airy VHF RC: W3IIT, pres.; K3KTY, v.p., W3ZD, cor. secy.; K3IGX, rec. secy.; K3GAS, treas. The "Pack Rats" had a very successful VHF QSO Party both in score and participation. WB3JYZ made "Who's Who Among American High School Students." Hope every one had a FB FD and according to reports received and activity noted on the bands, the EPA Section was well represented. Traffic: K3JSZ 260, WA3WQP 187, AA3B 145, W3DP 127, W3IPX 119, W3FAF 115, WA3EHD 109, W3VA 109, WB3HTW 95, WB3FKP 90, WA3OFD 63, WB3CAI 56, K3EIP 54, N3CD 50, W3ADE 25, W3GL 20, WB3JYZ 19, K3EBZ 17, K3ARR 16, W3YZW 16, K3QXC 15, WB3FVJ 12, W3ID 12, WA3VIL 12, WA3CKA 11, W3EEK 10, N3AIA 8, N3AZT 6, KA3FKD 3, W3HK 1, WB3KUZ 1. K3YD 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — FD messages from N3ND W3WH W3ZH W3DQI K3AA K3EF W3USS W1ZX WA3WRC W3VPR KE3E and WA3NAN. Tnx to those that made telephone deliveries! ECs K3CMN and WB3LTA had their gangs out for some real events as well as practice! Congrats to all who participated. The sea going AARC had a "raft-up" meeting on the bay. The trip to Germany did not seem to bother lots of traffic points by WB3GZU. KA3T manages to get into the MEPN mobile, home, or visiting hams. W3HTB leads the ckin cadre. KA3CDQ included many eyeball visits on this summer's vacation. WB3BFK feeds us much local MARS traffic. WA3EOP is holding down two jobs. W3LDD is into DXing. N4EOC is new from S. Carolina — welcome to MDC. WA3VPL is making deliveries in the hard places. W3FZV made over 100 QSOs in the PVRC reunion. N4DR/3 is also KK2XGH, on thirty meters. W3HVS manages to do his bit of PR. KA3Q is trying a little traffic handling. KB3NL is EC of Carroll County. AK3X made cw DXCC despite those odd working hours. K3KMO finds the summer very busy. K3ZNV, pres., serves notice that the NBS BRASS is going to be an active club with N3TE, v.p.; KA3DXZ, secy./treas., W3EXP WA4UAU K3NA, dir. W3IK gets his zip changed without moving, and sends in a FB OO report. W3OYY has been fighting the electrical storms. W3DFW is vacationing again! FAR is preparing for Gaithersburg, Sept 13. KA3ERP upgraded to General — congrats. W3CDQ has skeds far and near, but wants a cw YL in Montana and N. Dakota for WAS/YL. KA3DXZ overcame these rig problems. KC3D has a new service bench. W5NZ/3 finds slim pickings on 440 MHz. W3PQ is expected back on MDD soon. K3CRW was back at the old stand after a bout of family illness. Net/Manager Sessions/Traffic/QNI average: WC 2-mtr/WB3GEJ 5/5/19; WR PON/W3DFW 22/26/16.3; MDC PON/W3OYY 4/6/18; MEPN/WB3GZU 31/121/26.3; Toppers were W3DKX W3GDU KA3T. Others, WB3BSH W3HTB WA3IHW W3LDD and K3ONU. Traffic: WB3GZU 465, KA3T 185, KA3CDQ 93, WB3BFK 58, W3FZV 41, N4DR/3 28, WA3EOP 26, W3HVS 19, WA3VPL 19, W3LDD 14, KA3DXZ 10, AK3X 4, KC3D 2, KB3NL 2, KA3Q 2.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV WA2DHZ WB2NAO WB3CUF. Silent Keys reported: K2YXJ and KA2JIW. PSHR: KA2BHR KA2CTU KA2GOH KB2GT KG2D KI2D N2APB N2BXB N2CFF W2GLH W2MTA WA2KOJ WB2IDS WB2OWO. (OO) KI2D WB2MMB N2NW. (OVS) K2DNN K2QR WA2TCZ WB2SGI. (OBS) W2GLH. Field Day messages: K2IO K2JD K2PNA K2QR K2RN K2SA K2UW N2APB N2MD W2AE W2LZ W2OFQ W2RUI W2SEX WA2MFU WA2MNA WA2OYR WB2ODH WB2RLC. New officers: RARA — W2EBF N2EH WB2MDC WB2UTI; Fort Herkimer — KB2RK W2IJA KA2ILI WA2BBE; Syracuse VHF — W2RHQ W2PJO W2EMW WA2ZVN: Drumlins ARC — WB2MBO WB2TGU WA2MCB AB2F. Public service events: Elmira Special Olympics (K2DNN/W2GJ); Tioga Run for Hope and Owego-Nichols Raft Race (K2DTQ/K2UNY); Vestal 20 km Run (WA2ZSC), 10K Race and Mile Marathon (LARC/W2YRL). RARA awards: KB2B WA2NFY. Chenange County has at least 7 new hams near Green; WR2APD site looks like Tut's Tomb.

Net	Freq.	Time/Day	QNI	QSP	QND	Mgr.
NYSCN	3677	1000/Sun	35	11	4	W2MTA
THIN	3913	1600/Sun	37		4	WA2KOJ
NYPON*	3913	1700/Dy	536	255	30	K2KQC
NYSPTEN	3925	1800/Dy	617	104	30	AA2Y
ESS	3590	1800/Dy	329	59	30	W2WSS
OCTEN*	34/94	1815/Dy	362	78	30	WA2MFV
STAR/E*	325/925	1830/Dy	148	54	29	KI2D
Q Net	31/91	1830/Dy	365	3	30	KA2CMQ
BSN	93/33	1900/Dy				WA2DMK
NYS/E*	3677	1900/Dy	435	231	30	KA2CTU
OSWARES	75/15	1930/Sun				KB2RK
JCARCN	10/70	2000/Dy	497	7	30	WA2WAX
WNYECN	3955	2000/3rd Sun				W2BCIT
OARCN	25/85	2015/Wed	77		4	K2VTT
SLVARES	31/91	2100/Sun	20		4	WB2NAO
CNYTN*	90/30	2115/Dy				WA2PUU
WDN*	04/64	2130/Dy	793	123	30	N2APB
NYS/L*	3677	2200/Dy	369	254	30	KA2CTU
STAR/L*	325/925	2215/Dy	48	14	11	KI2D

*Part of NTS. STAR/L session 2215 shut down until further notice. Binghamton area invited to check into 1830 session. WNY Section has 103 appointee stations (ORS, OVS, OBS, OO, EC, etc.) do you have yours? Contact your SCM. Hamfests: Seaway Valley at Louisville September 12; Hamburg September 19; Syracuse October 3. W2AET wrote informative article on E.M.P. in Fulton "Toroid" and Ocara "QNC." Kilovolts per meter would tangle anyone's antenna. Traffic: W2MTA 466, WA2ELD 266, WA2HSB 164, N2BXB 162, WB2IDS 141, KA2CTU 140, W2GLH 128, N2CFF 114, N2APB 105, WA2KOJ 88, KA2BHR 76, W2FR 61, KG2D 58, KA2GOH 57, KA2CLT 51, KI2D 44, N2ARD 40, WB2OWO 38, AF2K 34, WB2LJK 34, WB2TXK 31, WB2QIX 30, WA2RXO 29, WA2MFU 26, KA2BHB 22, W2RQF 22, KB2GT 21, WB2NAO 21, WA2AIV 20, N2CBZ 17, WA2NAD 17, K2RN 15, K2DNN 14, AF2A 12, WB2SGI 11, K2VR 6, W2ZOJ 5, KA2DBD 4.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — Asst SEC/STM: N3EE. SEC: AB3Q. DECs WB3JDI WB3EFQ WB3KJH. NMs N3FM W3NEM W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	30	284	126	3585	7:00 P/D
WPAPTN				3983	6:15 P/D
WPA2MTN	30	512	57	146.28/88	8:00 P/D
NWPA2MTN				146.04/64	9:00 P/D

N3FM would like to have more cw operators check into the WPACW net, especially in the Pgh area. The whole section could use more people on the cw and phone traffic nets. Anyone who is not involved in cw tfc handling and would like to, is advised to check into the PTTN net on 3610 kHz at 6:30 P.M. daily. NM AG3R will welcome you and you will learn how to operate before moving up to the higher speed nets. The WPA ARES Net will meet weekly Monday nights after the WPAPTN. All are invited to check in. New Novices are KA3HEV KA3HCW KA3HSB KA3HII KA3HJA KA3HKD KA3HLH KA3HBL KA3HLN KA3HJA. To General: KA3GIA KA3HEJ WB3EUQ. To Advanced: WB3AEV. To Extra: WB3KAF (age 16). Congrats to all. Our sympathies to W3NGO and W3UNX on the passing of their mother. Congrats to W3YQ & WA8PAV/3 on the new jr. op. Allegheny County's new EC is WA3ZMP, our thanks to W3DGK, the former EC, for all his hard work during his tenure. I hope everyone had a good Field Day turnout, it was a beautiful weekend. Traffic: (June) W3EGJ 170, N3FM 161, N3ADU 139, KB3DT 126, AC3N 79, K3CR 68, WB3GUK 64, WA3PXA 59, KA3BMU 52, N3BKV 50, K3SMB 46, K3VOV 38, W3MML 35, W3RUL 32, WA3UNX 27, W3KUN 24, W3SMV 22, K3HCT 19, N3KB 16, W3SN 16, KA3BGC 12, WB3DXG 12, W3KMZ 12, KA3DEH 11, W3YQ 10, W3TTN 9, W3JGD 7, WA3QNT 7, WB3SCW 6, WB3KJH 5, W3LOD 3, W3SGJ 3, AF3B 2, W3LWW 2 (May) W3EGJ 208.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP —

Net	Freq	Times/Days	QTC	Sess.
ILN	3690	2330/0300 Dy	147	52
Ill Phone	3915	2130 Dy	88	30
NCPN	3915	1200/1700 Dy	123	52
IEN	3940	1400 Sn	7	4

D9RN 97 percent stations: W9HOT W9NXG W9JIJ WD9EVV WB9WGD K9BVE. CAND 100 percent stations: WD9EQG W9JIJ WD9EVV W9NXG W9HOT. Dan Hoover Memorial Net, W9VEY, had a QTC of 11 in 5 sessions. The 25th anniversary of the Shawnee Amateur Radio Association was held August 30th at the Carterville Hamfest. The St. Charles, MO office of the National Weather Service presented a spotters course on May 13th at the Southern Ill Amateur Radio Society meeting. Quincy amateurs interested in starting a 10-X chapter should contact AC9M for further information. WB9VKC had a girl harmonic May 22, congratulations. A superior rating was received by the Cordova Nuclear Generating Facility during their May 20th, 4 county simulated emergency test, the expertise and traffic handling was attributed to: WB9IJMG N9BZR KA9GNR KA9FXX KA9HKE WA9NXE W9AEF WD9EHM KA9HHC WB9YQM AB9W, all of which received commendations of excellent performance by the Federal monitors. S79RD, formerly W9HXD, got a WAHM award from the Hamfesters Radio Club for QSOs with KB9KD KA9M & WA9EKA. WB9SFT reports 37 amateurs from the Rockford, Sterling and Beloit area helped with the 3 day air show put on by the Confederate Air Force over the 4th of July holiday. The Sangamon County ARES provided communications for Lincoln Fest, also on the holiday, by manning the first aid posts. On June 21st, the Lamoine Emergency Amateur Radio Weather Net was activated by N9BA N9AYO and KB9BI who were tracking a tornado from Warsaw and Basco, reporting damage as it went. The following were active in reporting the tornado's position and warning those in the path: W9FNW W9RBU W9HLT WD9IXE AG9Y KC9B WD9HAW W9EBT KA9CFD KA9GVJ WD9GDF KC9BX WA9DKO KA9IDW W9EWJ WB9MWO WA9ACT WA9BRZ KD9L KA9FIM KA9AQW. The Starved Rock Radio Club provided communications for the 10,000 meter run on June 27th and on June 28th provided communications for the 200 unit parade televised from Oglesby. The new officers of the Knox County ARC are: KD9L, pres.; KA9GGU KA9GGW, co-v.p.; WD9FBE, secy. Congratulations to the following upgrades, to Extra — K9BTB W9LHS KF9O; General — KA9ELB N9BLV; to Technician — KA9KLX. Traffic: (June) W9NXG 278, K9BVE 256, W9HOT 218, W9JIJ 154, WD9EVV 142, KB9X 115, W9LNQ 61, W9TLU 61, WB9OFO 55. KN9BAM 48, W9KR 25, WB9WGD 23, KA9EGW 14, WD9EBQ 14, WD9EED 11, W9QBH 10, N9TN 8, W9KSU 5, W9HPG 1. (May) K9SW 14.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF.

Net	Freq.	Time/UTC/Daily	QNI	QTC	Sess.
ITN	3910	1330/2300	2180	293	60
QIN	3656	1430/0100/0400	714	355	88
ICN	3708	0014	151	30	30

CALL US FIRST

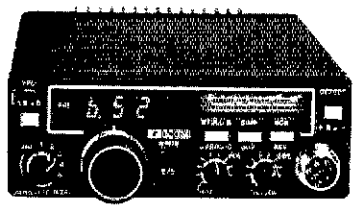
...AND FINALLY TOO!

Rock-bottom quotes! Draw upon our big inventories for fast action

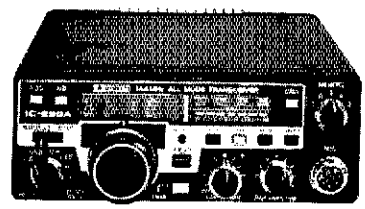
HAM RADIO OUTLET

ICOM

NEW!
IC-25A
2 METER FM TRANSCEIVER



Exceptional! 25 watts/5 memories/2 scan system in a very small package, only 2" H, 5½" W, 7" D. 13.8VDC. Complete w/Touch-Tone™ mike.



NEW!
IC-290A
2 METER FM/SSB/CW TRANSCEIVER

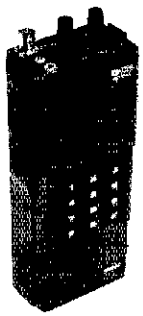
5 memories/Priority/Scan/Squelch on SSB. 10W pep SSB, 10W out FM, CW. 13.8VDC.

CALL FOR YOUR SPECIAL PRICE

IC-720A
ALL BAND TRANSCEIVER

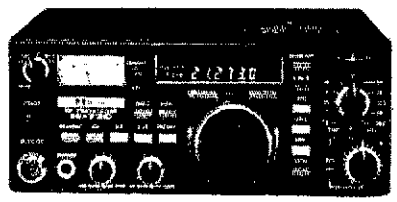
All nine high frequency bands • All solid state • Broadband tuned • Digitally synthesized with 10 Hz resolution • Two VFO's • General coverage receiver, 0.1 MHz to 30 MHz (no transmit on general coverage) • Simplex, duplex • RIT • 100W p.e.p. output on SSB, 100W, CW and RTTY, 40W, AM • Digital readout • Passband tuning • Operating voltage, 13.8VDC at 20 amps. • Dozens of other desirable features.

CALL US FOR YOUR SPECIAL PRICE



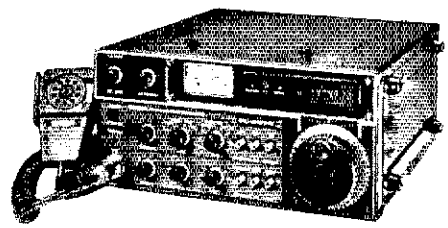
IC-2AT
(Touch-Tone™)
IC-2A
(Regular)
CALL FOR SPECIAL PRICE

IC-730 MOBILE TRANSCEIVER



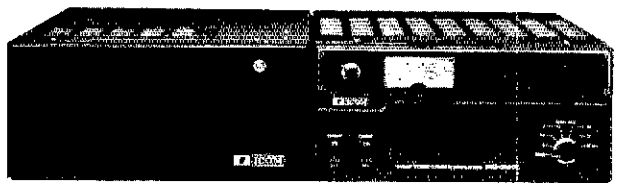
CALL FOR YOUR PRICE

IC-451A 430MHz BASE STATION



CALL FOR YOUR PRICE

IC-2KL LINEAR AMPLIFIER



160 through 15 meter operation. Includes new 10 and 18 MHz bands • All solid state • Broadband tuning • 500W output SSB (pep) CW and RTTY • Fully protected final • Heat pipe cooling system • Full metering • Power supply, 115VAC or 220VAC • Automatic band-switching when used with IC-701/IC-702 units.

CALL FOR YOUR SPECIAL PRICE

FREE SHIPMENT, ALL OF THE ABOVE ITEMS, UPS (Brown)

Prices, specifications, descriptions subject to change without notice.

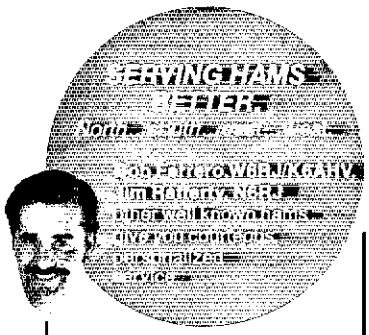
Store addresses and phone numbers are given on opposite page.

Calif. residents please add sales tax.

FIVE STORE BUYING POWER!

Fast shipment popular items from huge stocks! And 5 to 1 odds (your favor), that scarcer items are available within multi-store complex! Quantity buying means top discounts and best prices for you. Call us first!

Amateurs world-wide are taking advantage of our fast service and special prices.



FREE PHONE
800
854-6046
CALIF. CUSTOMERS PLEASE CALL OR VISIT LISTED STORES

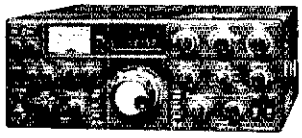
FREE SHIPMENT
(UPS Brown)
CONTINENTAL U.S.A.

master charge VISA

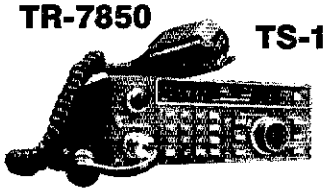
KENWOOD

Save substantially! Call now for your price.

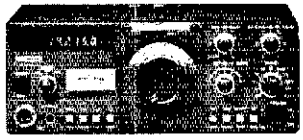
TS-830S



TR-7850



TS-130S



TR-2400

HAM RADIO OUTLET

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033 (213) 860-2040
Between Disneyland & Knott's Berry Farm

BURLINGAME, CA 94010
999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport.

OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

SAN DIEGO, CA 92123
5375 Kearny Villa Road (714) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

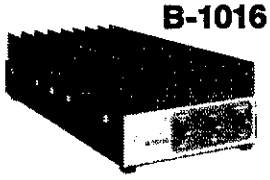
VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd.

OVER-THE-COUNTER
Mon. thru Sat. 10AM to 5:30PM

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON • AVANTI • BENCHER • BERK-TEK • BIRD • B&W • CALLBOOK • CDE • COLLINS • CUBIC • CURTIS • CUSHCRAFT • DAIWA • DATONG • DENTRON • DRAKE • DX ENGINEERING • EIMAC • HUSTLER • HY-GAIN • ICOM • J.W.MILLER • KENWOOD • KLM • LARSEN • LUNAR • METZ • MFJ • MICRO-LOG • MINI-PRODUCTS • MIRAGE • NYE • PALOMAR • ROBOT • ROHN • SHURE • SWAN • TELEX • TELREX • TEMPO • TEN-TEC • TRISTAO • YAESU and many more!

MIRAGE

B-1016 2 METER AMPLIFIER



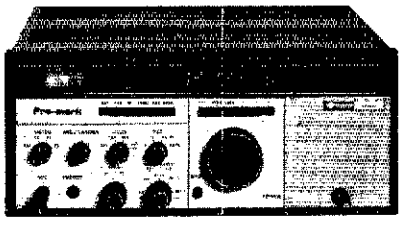
160W OUTPUT
SSB, FM, CW

Freq. range: 144-148MHz • RF out:160W nom. (10W in) • RF power in: 5-15W • DC operating pwr: 13.8VDC @ 20-25A • Intermittent duty cycle • Built-in receiver pre-amp. Automatic internal or external relay keying.

REGULAR $279.95

YOUR PRICE $249.95

ROCKWELL/COLLINS



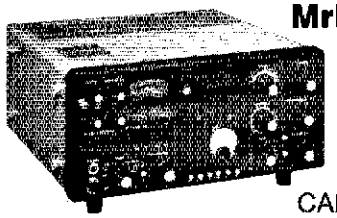
The superb KWM-380 choice of the discerning.

Take advantage of 5-store buying power.

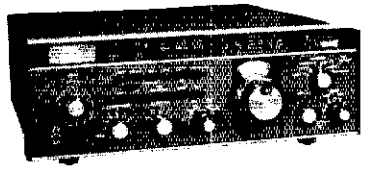
CALL US FIRST

YAESU

FT-101ZD Mrk III



R. L. DRAKE

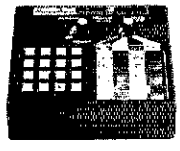


TR-7/DR-7

CALL FOR SPECIAL PRICE

AEA

MORSE-MATIC ™



BIRD

43,

ALL ELEMENTS, CARRYING CASE

IN STOCK

CALL FOR YOUR SPECIAL PRICE

ETO ALPHA

Model 76PA
Regular $2195
YOUR PRICE **$1799**

Model 78
Regular $3185
YOUR PRICE **$2599**

Prices, specifications, descriptions subject to change without notice.

Calif. residents please add sales tax.

IPN	3910	2130	949	161	30	
IWN	3910	1315	1160		30	

Hoosier vhf nets report for June: QNI 4539, QTC 167, Bulletins 65, time 6568 minutes for 20 nets. 9RN QNI: W9JUJ W9QLW W9EI KB9IT WD9GXW N9HZ N9AEI K9WWJ WA9QCF WB9UYU N9ACG W9XD. QTC 361 in 1050 minutes. CAND QNI: KA9ENS WA9ZSL WD9ART WD9CIS W9DLF W9QLW K9CGS W9JUJ. QTC 686. D9RN QNI: K9CGS W9DLF W9JUJ WB9MIK K9FZX. QTC 316. Silent Keys: WD9DZJ WD9EDC WA9LPG WA9GJZ K9ITK K9INB W9VDB W9BRF. Appts: DEC — W9MJI for Vigo, Vermillion, Parke, Putman, Sullivan, Clay and Green Counties: ECs — W9ZSK Morgan County, WD9EZB Lake County, W9ENU Kosciusko County; ORS — WB9DIX. Johnson County thanks to KG9K who has 28 ARES members, much activity and a good chance for a club soon. June must be labeled "RAIN." We had tornadoes in Whitley, Monroe, Lake, and Tippicanoe Counties. We had a flash flood in Ripley County. Flooding everywhere. Thanks to: WD9AJS WB9UNL WD9AHF K9FZX WA9UGP N9ARB WA9VKV KA9FLF N9BCQ N9BCP WD9DDZ KA9GAM N9EV WB9MWG WB9AMK KA9JUR WB9FPK W9YEL Whitley County: KA9BTP WB9VAL K9AHX WD9IRQ WB9CZC and KC9C Tippicanoe County: WB9SHF K9AGJ WB9TFD WB9SRM WA9LRG WA9JNC KA9FTM Ripley County. Hendricks County has a new tower and antennas at c.d. headquarters. RARA and WVARC helped with races and a parade. Traffic: (June) W9JUJ 1024, WA9QCF 168, N9ACG 131, WB9UYU 121, W9QYY 119, K9SFO 101, N9AEI 90, W9QLW 69, K9FZX 66, W9PMT 65, W9XD 46, WA9OKK 41, WA9OHX 30, WB9AWI 26, WA9KWH 23, W9DLF 21, N9PS 20, K9WWJ 20, K9KTB 19, K9DIY 17, KG9K 17, WD9ART 16, WD9DWD 14, W9IOH 12, W9URO 12, N9AST 11, W8LKU 9, W9RTH 8, N9CDQ 7, W9UEM 6, AJ9C 5, W9EUP 5, K9FHQ 5, W9UPI 5, WB9YAY 5, W9IDKP 4, WA9JNC 4, W9BDP 3, KC9C 3, N9CBC 3, WD9EPU 3, WD9EXI 3, KB9WI 3, K9OUP 2, W9WEI 2, WB9AJY 1, W9POF 1. (May) KC9C 4, W9ATG 2.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTO, SWN 3985, 1115Z, QNI 998, QTC 1168. WB9YPY, BEN 3985, 1700Z, QNI 649, QTC 185, WB9ESM, WSBN 2200Z, QNI 910, QTC 457. WD9ESZ, WNN 3723, 2300Z, QNI 197, QTC 52, N9AUG, WSSN 3662, 2300Z, QNI 112, QTC 29, N9BYK, WIN-E 3662, 0000Z, QNI 259, QTC 116, W9YCV, WIN-L 3662, 0300Z, QNI 218, QTC 67, K9LGU, XPO 3925, 1701Z, QNI 430, QTC 37, WA9NIX, NWTN 34/94, 2330Z, QNI 596, QTC 43, WB9YPY, Gr. Bay .72/12, QNI 25, QTC 0, WB9NRK, WB9JYR has received 6-meter "600" Club award. K9QXY has Extra. The QCWA meeting at Port Washington was well attended with 117 for dinner, real nice people. New Novices Stevens Point area: KA9KUF KA9KXB KA9KXC KA9KUG KA9KUH. I understand the Stevens Point Swaptest was a FB one. New Novices Phillips area: KA9KZR KA9KZS KA9KZT. WD9IOI now KF9I. WD9ICP now N9CEO. New ham Rhinelander area KA9LER. New Novice Watertown area KA9LBM. WB9CYT has Advanced. KA9LGI KA9LGJ new Novices Park Falls. WD9EAQ was one of the 12 finalists for Alice in Dairyland. KA9CPW has General. WD9GYS has Tech. WB9ESM KA9IKR have Advanced. KA9BHK has Tech. How did your club do on FD? KA9CPA WD9ESZ made BPL. KA9HPO new NM for WNN. Traffic: KA9CPA 2031, WD9ESZ 527, WB9YPY 254, K9FHI 216, W9DM 187, W9YCV 181, N9AZI 173, WD9DHF 155, W9CXY 130, WB9YPZ 102, K9AKG 101, W9UCL 90, W9DND 82, WA9WYS 79, N9AUG 78, N9BYK 74, AG9G 68, WB9ESM 57, WD9FRI 52, K9GDF 52, WB9NRK 52, WA9ZTY 51, K9AQ 49, W9LDO 47, W9IEM 46, W9IHW 43, W9KTG 43, K9UTO 41, WA9DXW 38, W9SO 38, N9BDL 37, W9FDY 36, N9BCX 35, K9LGU 33, WA9YVC 32, KB9NG 29, KA9EMF 28, WB9FYK 27, N9ATP 26, KG9B 25, WD9ERN 25, K9HDF 24, KA9GYD 23, K9UU 22, W9SQJ 20, K9ANV 18, WB9JSW 18, KA9HPO 17, WB9ICH 16, W9UW 16, KA9GBE 15, N9CP 10, KA9IKR 10, KA9IHR 8, KB9FM 5, KE9C 4, W9RTP 2.

DAKOTA DIVISION

MINNESOTA: Helen Haynes, WBØHOX — STM: AFØO. SEC: KAØALF. Net reports:

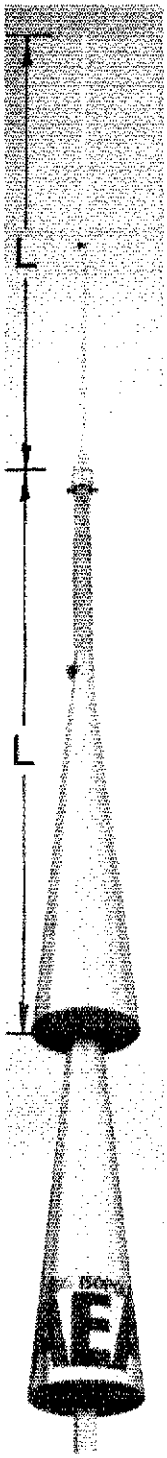
Net	Time	Freq.	QNI	QTC	Mgr.
MSN/1	2330Z	3685 kHz	201	98	AFØO
MSN/2	0300Z	3685 kHz	103	28	KØJCF
MSPN/N	1710Z	3945 kHz	483	53	WAØAIN
MSPN/E	2245Z	3929 kHz	1141	205	KCØT
MNAMWXN	2315Z	3929 kHz	467	257/30	WDØCGM
MSSN	2215Z	3710			WBØWXU

Congratulations to WDØHEB for winning First Place in Indian Dress and Indian Dance in the Jr. Men's Traditional Dance held at Ft. Dodge, IA. Upgrades: Novice to General — KAØKHB WDØDHZ. Novice to Tech — KAØKGZ KAØLAH KAØKWA. Advanced to Extra — KKØH, formerly WDØHMF, KKØG, formerly KAØCXK. New Novices: KAØKYZ, age 9, KAØKZJ KAØKXS KAØKXT KAØKXX KAØKXY, age 11, KAØKXZ KAØKZI. Our sympathies go to WBØJUL and to KØPSH, in the recent loss of their mothers. Congratulations to KBØMB of Roseville, who has been named new Assistant Manager of the Daytime Tenth Region Net. Traffic: KBØMB 459, WAØTFC 343, WBØHOX 215, AFØO 140, WØHZU 86, WDØCGM 74, WØDFX 57, KCØT 52, KØPIZ 51, WBØNZB 43, WAØAIN 32, WØRIO 30, NØCLS 29, KØJCF 24, KAØEPY 19, KØCSE 16, WØOPX 15, WBØVYE 11, KNØKCW 6, NØJP 5, WAØFSM 2, WDØGPX 2, WAØOIT 2.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: KJØS. Mayville Hamfest was well attended with AKØS as winner of the QLF contest. Dickenson ARC will have their hamfest on Aug. 8-9. New officers of Bismark ARC are: WBØOFW, pres., WØZJZ, v.p.; KAØIVO, secy.; WBØYXA, treas.; KBØUK, mem. at large; WDØEUV, ed. Congrats to Novices KAØKZV KAØKZW KAØKZX KAØKZY KAØKZZ KAØLAB; Gen. WBØVLF WBØOFF; Adv. KAØIVO; Ex. WBØSHO KBØIN, he is dad of WBØVLF. KAØJFG is now KCØBF. Thanks to all ARCs that sent messages to SCM on Field Day as condx weren't the best. WAØRWK WAØRWL visited WAØVGJ and WAØRWM during that time so they attended the Three River Field Day in Wahpeton. Let's talk it up and get a car-pool to the Dakota Division Convention at Rochester, MN. on Sept 18-20. Traffic: WAØRWM 108.

SOUTH DAKOTA: SCM, Erwin Heimbuck, KØOTZ — The South Dakota picnic was held in Mitchell this year and a good time was had by all. It is with great honor that I report WØDNV is the proud recipient of the travelling trophy. Wear it with pride. Many clubs were active on FD, with reports being sent by the Spink ARC and a group in Union County. The Rapid City group has replaced the TX antenna and feed line on the 34/94 machine with new antennas on the way for the RX also. The whole system will have been replaced at that time. Congrats to WØKJZ who has been named OSL manager

MORE PERFORMANCE FOR YOUR DOLLAR!
COMPETITORS KNOW ABOUT THE
ISOPOLE™

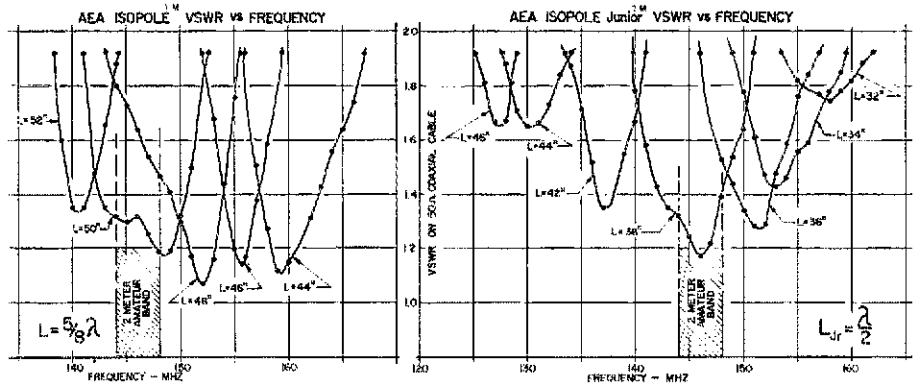


ISOPOLE 144
$49.95
ISOPOLE 220
$44.95
MAST NOT SUPPLIED

DO YOU? STUDY THE FACTS . . .

The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

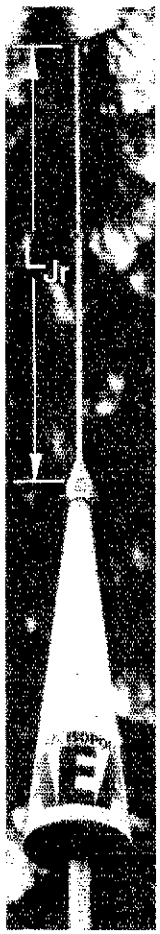
All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state transceivers. **Typical SWR is 1.4 to 1 or better across the entire band!**



Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is **not supplied**)

Operating on MARS or CAP? The IsoPole and IsoPole Jr. antennas will typically operate at least ± 2 MHz outside the respective ham band without re-tuning. However, by simple length adjustment, the IsoPoles can be tuned over a wider range outside the ham bands.

Our competitors have reacted to the IsoPole, maybe you should too! Order your IsoPole or IsoPole Jr. today from your favorite Amateur Radio Distributor. For more information on other exciting AEA products, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Call 206/775-7373



ISOPOLE 144JR
ISOPOLE 220JR
$39.95
MAST NOT SUPPLIED

AEA Brings you the Breakthrough!

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

by BY2AM/MM. The Lawrence/Harding County CD Net is active every Sunday on 3728 kHz. Traffic: WAØVRE 146, KØFRE 88, WØHOJ 86, WØMZI 64, KØAIE 58, WØKJZ 49, WBØOMF 33, WØRWE 13.

DELTA DIVISION

ARKANSAS: SCM, Dale E. Temple, WRXU — SEC: WB5IGF. NMs: KC5CE W5MYZ W5POH WA5AWA. Nets: Arkansas Razorback Net 3995 0030 Dy; OZK 3.760 0100 Dy; Arkansas Phone Net 3.397 1200 M-S. SCM & SEC visited several Field Day sites and looks like several had good turn out and numerous contacts. WB5IGF, Searcy, is new SEC. Condolences to the family of W5WUM, Silent Key. He was a long time ham and friend to all. He will be missed. Net reports: Ark. Phone Net, 603 QNI, 36 QTC, 1144. Min. Mockingbird Net, 464 QNI, 12 QTC, 435 Min. Razorback Net, 760 QNI, 45 QTC, 464 Min. OZK, 124 QNI, 19 QTC, 327 Min. All ECs are encouraged to send reports to WB5IGF. Send news to W5RXU. Traffic: WB5GOH 41, K5DW 15, W5UAU 6, W5KL 6.

LOUISIANA: SCM Jim Giammanco, N5IB — Field Day has come and gone. We received reports of activity from SOWELARC, BRARC, SARA, MTARC, Springhill ARC, Delta DX Assn., and the Union Parish Contesters. And there were many others in LA that this station worked. SOWELARC operated their Field Day as a simulated hurricane emergency, using the parish EOC as their operating site. New officers of the Delta DX Assn. are K5LM, pres.; K5RSG, v.p.; WA5YFQ, treas.; N5NO, secy. The DDXA now serves as QSL manager for 18 DX stations. W5MD was elected to his third term as President of the Baton Rouge QCWA. At the NOVHF Club, WA5TMD was reelected president, with K5CVX as v.p.; KB5XZ, secy.; WD5IAA, treas. KB5AS placed 14th cw and 25th phone in the April Open CD Party. 9V1UQ and 9V1UR, formerly of Baton Rouge, now of Singapore, were guests at a recent meeting of the Acadiana DX Assn. FCC exams will be given at the New Orleans Hamfest on Saturday, October 17. Contact WA5MJM for further details.

LAN	3615 kHz	7 & 10 P.M. Dy	274	129	K5TL
LTN	3910 kHz	6:30 P.M. Dy	244	41	N5EK
LSN	3703 kHz	7:30 P.M. M-F			
LRN	3087.5 kHz	6:30 P.M. Sn, 8 P.M. Wed	7	0	N5RB
LEN	3910 kHz	8:00 P.M. Sn			

Traffic: K5TL 206, N5RB 97, WD5FLM 81, N5BFV 50, KC5SF 45, WD5GKP 37, KA3BER/5 36, W5VMY 19, WD5CWK 3.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. Field Day seemed to be a success with good reports from around the state. New officers for Jackson ARC: WD5BSJ, pres.; N5DDV, 1st v.p.; KA5KCL, 2nd v.p.; KA5FXX, treas.; KA5EDW, secy.; KC5SI KA5FXL, dir. Good turnout at Tri State Hamfest in Hernando with WA5EZQ winning 1st prize. Need more support for MTN and MSN. MSBN still holding good QNI of 2000 plus even in the summer months. Tnx to WD5EYM who continues at the helm for second year. Congrats to new upgrades: Extra — N5CIO K5GET W5EDT; Adv — N5DDV KA5FDD KA5HQZ KA5KZX. N5AMK now A-1 Operator. CAND (W5KLV) 30 sess, QTC 686. DRN5 rep 100 percent MS sta: N5AMK W5EDT WA5OKI. DRN5 (WB5YDD) 30 sess, QTC 338. MTN (K5OAF) 30 sess, QNI 95, QTC 36. MSBN (WD5EYM) sess 30, QNI 2065, QTC 69. MN (WB5RMW) sess 29, QNI 517, QTC 17. MSN (KA5GGG) sess 20, QNI 62, QTC 3. RACES (N5AMK) sess 4, QNI 163, QTC 2. CAEN (KA5AGD) sess 4, QNI 85, QTC 0. Traffic: N5AMK 306, K5OAF 122, W5EDT 73, WB5SNB 24, WD5EYM 21, KA5GGG 2.

TENNESSEE: SCM, John C. Brown, WB4PRF/NO4Q — STM: K4YOL. SEC: W4NZW. The subject of upgrading is still biggest news in section. SCM finally got his Extra call, NO4Q, after 93 days. So don't be discouraged. Also find that two others, WD4SIG and WD4NJR are now waiting. Many more I am sure. Hamfests are going hot and fast this time. Crossville, Oak Ridge and Nashville. Let's all get out and renew the eyeball QSOs support the long hard work of the many fine hamfest workers and committee. If a lot of you former cw people want to renew the old fist, just tune in on 3710 at 2300 UTC. A more gung-ho group you will not find than on the TSN. So go have some fun. There are many stations that do not take time to send in monthly station activity reports. Your SCM sure would like to hear from you. The TSN honor roll for the month finds KA4BSG WA4CMS NN4D N4DZW N4EAM N4EFB KA4FIE NG4J KY4I. WA4LXP KA4OVE KA4PWU KA4RJC and WB4YSN. Congrats to the bunch for the fine job. Many are repeats, so keep up FB work. They also offer a numbered QSL when you check in with them for the first time. Keep it up for the "Honor Roll" certificates. Traffic: NG4J 527, W4WXH 196, WA4NIF 183, WB4BKF 163, W4ZJY 134, W4OGG 109, WD4SIG 75, W4DDK 42, WD4NJR 35, KY4L 23, KA4BSG 20, W4PFP 20, K4WOP 20, K4YOL 20, W4TYV 19, NM4W 14, W4CSY 11, W4MRD 11, W4NZW 11, WB4ZSZ 11, KA4GSS 9, WA4BWW 8, W4PSN 6, W4DPO 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: N4EEL. Nets reporting:

Net	QNI	QTC	Net	QNI	QTC
KRN	561	24	MKPN	949	106
KTN	1180	185	KNTN	332	112
KYN	238	83	KSN	296	34
KEN	89	1	KPON	54	5
BARES	106	6	CARN	113	12
PAWN	297	30	TSTMN	462	38
4ARES	29	3	5ARES	64	4
6ARES	85	1	11ARES	71	0
SEKEN	24	2			

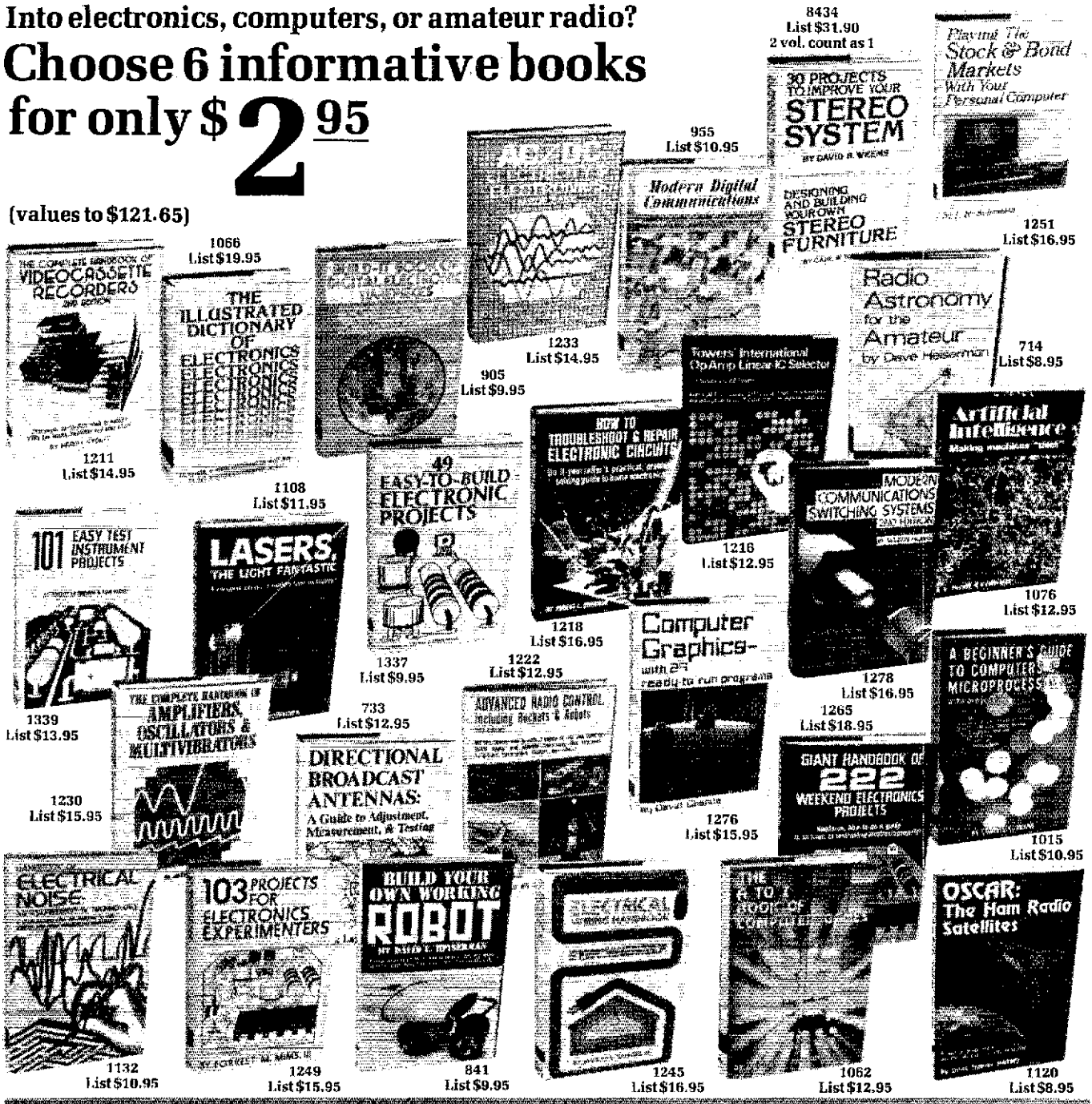
D9RN/DCAN/9RN all 100 percent. New appts. — OVS: N4ECG; EC: WB4YAB KA4OIK KA4REF N4ELU KB4OZ KA4BYA KA4MAP WA4YPI W4YWH. Received reports from seven clubs taking part in Field Day. NØZO and family home from Zambia and active from Campbellsville. W4CID has moved to Ohio. Lincoln Trail ARC has received affiliation with ARRL. Be sure and attend one of the forums at the Louisville Fest. Traffic: KA4MZY 183, WD4BSC 115, WB4APG 112, KA4GFU 102, KC4VB 82, KC4XM 74, K4JLX 66, KB4OZ 62, KS4V 57, KZ4G 49, WA4EBN 48, WA4JTE 38, K4MHL 30, K4HOE 26, WA4AGH 25, KA4SAA 25, KA4IKH 24, K4ZWB 24, WA4AVV 23, WD4COF 21, N4EZE 20, KD4IF 19, KC4WN 17, N4EEL 13, WD4IYI 13, WA4UIV 11, WB4AUN 9, WD4CJQ 9, KA4MBF 9, W4PKX 9, K4AVX 8, WA4YPO 7, WB4UOI 6, NN4H 5, WD4IYH 5, WA4GAL 3, KV4A 2, N8XX/4 1.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KC8DN

Into electronics, computers, or amateur radio?

Choose 6 informative books for only $2.95

(values to $121.65)



7 very good reasons to try Electronics Book Club . . .

- **Reduced Member Prices.** Save up to 75% on books sure to increase your know-how
- **Satisfaction Guaranteed.** All books returnable within 10 days without obligation
- **Club News Bulletins.** All about current selections—mains, alternates, extras—plus bonus offers. Comes 14 times a year with dozens of up-to-the-minute titles you can pick from
- **"Automatic Order".** Do nothing, and the Main selection will be shipped to you automatically! But . . . if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- **Continuing Benefits.** Get a Dividend Certificate with every book purchased after fulfilling Membership obligation, and qualify for discounts on many other volumes
- **Bonus Specials.** Take advantage of sales, events, and added-value promotions
- **Exceptional Quality.** All books are first-rate publisher's editions, filled with useful, up-to-the-minute info

ELECTRONICS BOOK CLUB
Blue Ridge Summit, PA 17214

Please accept my Membership in Electronics Book Club and send the 6 volumes circled below. I understand the cost of the books selected is $2.95 (plus shipping/handling). If not satisfied, I may return the books within ten days without obligation and have my Membership cancelled. I agree to purchase 4 or more books at reduced Club prices during the next 12 months, and may resign any time thereafter.

714 733 841 905 955 1015 1062 1066 1076
1108 1120 1132 1211 1216 1218 1222 1230 1233
1245 1249 1251 1265 1276 1278 1337 1339 8434

Name _____ Phone _____

Address _____

City _____

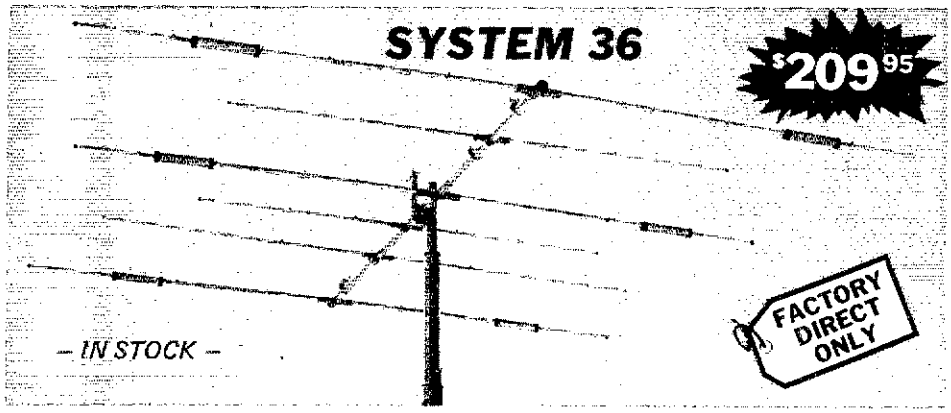
State _____ Zip _____

(Valid for new members only. Foreign and Canada add 20%.) QST-981

WILSON SYSTEMS INC. MULTI-BAND ANTENNAS

SYSTEM 36

$209.95



A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15 and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz	14-21-28	Boom (O.D. x Length)	2" x 24' 2½"	Wind Loading @ 80 mph	215 lbs.
Maximum power input	Legal Limit	No. of Elements	6	Maximum wind survival	100 mph
		Longest Element	28' 2½"	Feed method	Coaxial Balun (supplied)
VSWR at resonance	1.3:1	Turning Radius	18'6"		
Impedance	50 ohm	Maximum mast diameter	2"	Assembled weight (approx.)	53 lbs.
		Surface area	8.6 sq. ft.	Shipping weight (approx.)	62 lbs

NEW!

ADD 40 OR 30 METERS TO YOUR TRI-BAND WITH THE NEW 33-6 MK

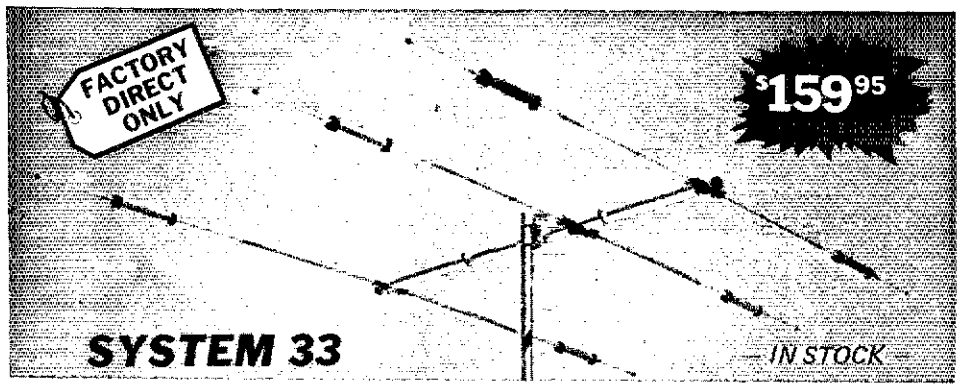
$59.95

– IN STOCK –

Now you can have the capabilities of 40-meter or 30 meter operation on the System 36 and System 33. Using the same type high quality traps, the new addition will offer 200 HKZ of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36 or SY33, and using the same single feed line.

SYSTEM 33

$159.95



Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33". New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the "SYSTEM 33" quick and simple.

SPECIFICATIONS

Band MHz	14-21-28	Boom (O.D. x length)	2" x 14'4"	Wind loading at 80 mph	114 lbs.
Maximum power input	Legal Limit	No. of elements	3	Assembled weight (approx)	37 lbs.
		Longest element	27'4"	Shipping weight (approx)	42 lbs.
VSWR at resonance	1.3:1	Turning radius	15'9"	Direct 52 ohm feed – no balun required	
Impedance	50 ohms	Maximum mast diameter	2" O.D.	Maximum wind survival	100 mph
		Surface area	5.7 sq. ft.		

WILSON SYSTEMS, INC.

4286 S. Polaris Ave. Las Vegas, Nevada 89103

Prices and specifications subject to change without notice

ORDER FACTORY DIRECT 1-800-634-6898

$59.95

WV-1A

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(See GR-1 below)

SPECIFICATIONS

- 19' total height
- Self supporting – no guys required
- Weight – 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

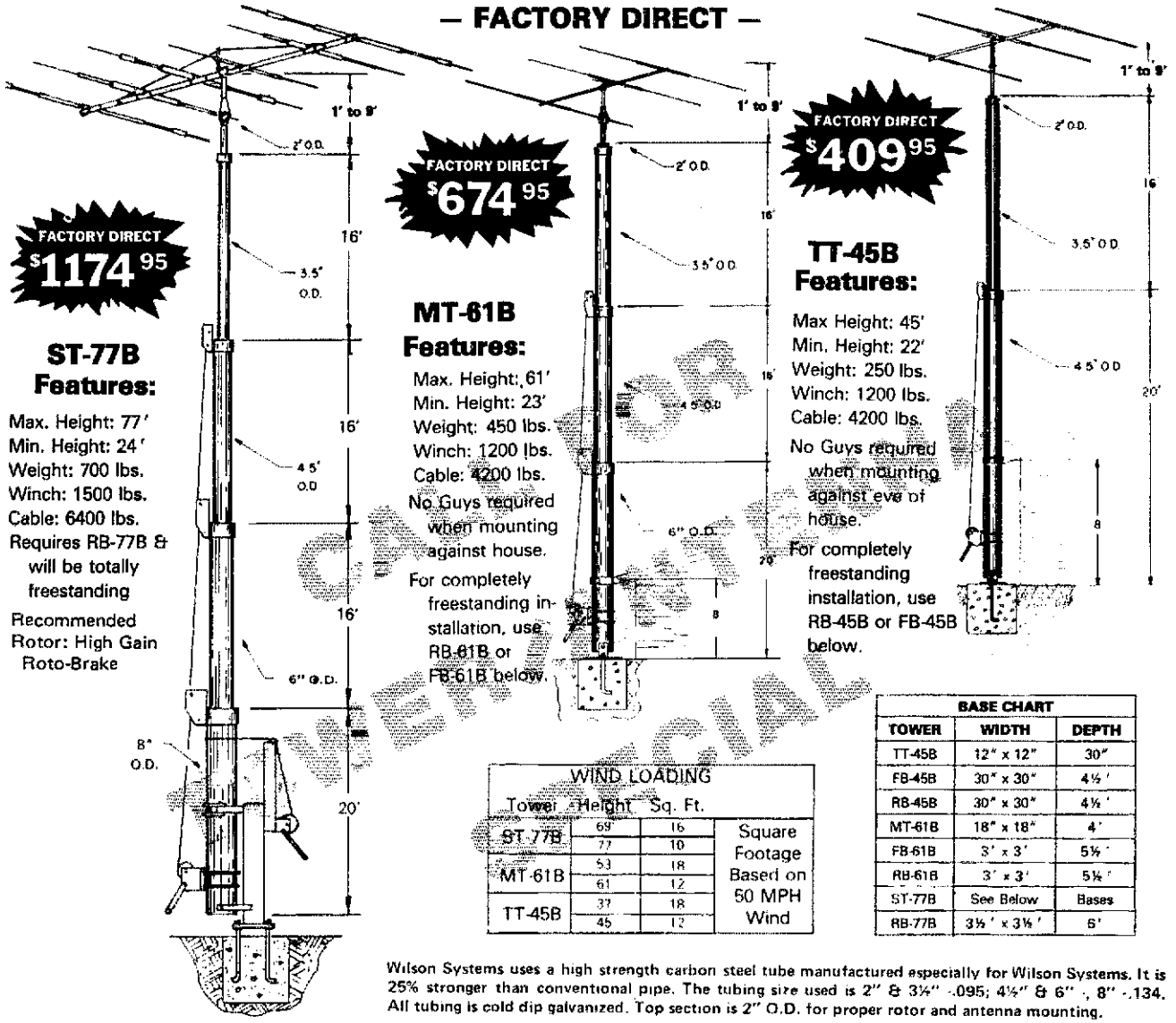
GR-1

$14.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise.

WILSON SYSTEMS TOWERS

— FACTORY DIRECT —



FACTORY DIRECT $1174.95

ST-77B Features:

Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding

Recommended Rotor: High Gain Roto-Brake

FACTORY DIRECT $674.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.

FACTORY DIRECT $409.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69'	16	Square Footage Based on 50 MPH Wind
	77'	10	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
RB-61B	3' x 3'	5½'
ST-77B	See Below	Bases
RB-77B	3½' x 3½'	6'

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe. The tubing size used is 2" & 3½" -.095; 4½" & 6" -, 8" -.134. All tubing is cold dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

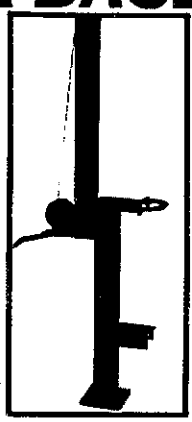
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

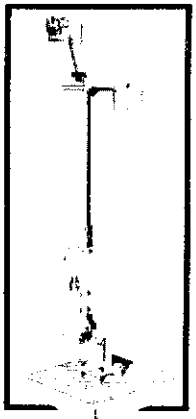
FB-45B.. 112 lbs... $209.95
FB-61B.. 169 lbs... $299.95



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B.. 144 lbs... $289.95
RB-61B.. 229 lbs... $379.95
RB-77B.. 300 lbs... $569.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

ORDER FACTORY DIRECT 1-800-634-6898

Prices Effective 9-1-81 thru 9-30-81
Specifications Subject to Change Without Notice

WSI WILSON SYSTEMS, INC.
4286 S. Polaris Ave., Las Vegas, Nevada 89103

K8RCT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ K8ZJU.

Net	Freq.	Time/Day	QNI	Ttc.	Sess.	Mgr.
MITN*	3953	1900 Dy	681	377	30	WD8LRT
QMN*	3663	1800 Dy**	80	333	60	WA8PIM
MACS*	3953	1100 Dy	595	159	30	K8LNE
GLETN	3932	2100 Dy	1155	135	30	K8DTG
MNN*	3722	1730 Dy**	330	86	60	KA8DEZ
UPN*	3922	1700 Dy	625	79	34	WA8DHB
WSSBN	3935	1900 Dy	558	30	30	WB8SUR
BR	3930	1730 M/S	390	17	26	WB8ZGP
MEN	3930	0900 Su	145	10	4	WB8ZGP
VHF Nets 13 rpts			969	34	55	WD8NKT

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000. 3932 kHz is MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. UP ARES Thur 3922 kHz, 3922 kHz, 1800. OO reports: K8JH W8QG AC8Y. OBS reports: K8NKB AF8V. Silent Key, with deep regret: W8RFB. Upgrades: to General, KA8MRY; to Advanced, WA8AXF WA8QAF; to Extra, KA8GMJ. We've all enjoyed W7LVB's extended visit "back home." The older fellows will remember him as W8RTN. W8HIN has stepped aside, retired after *long* service as manager of BR/MEN. I'll miss those reports from Alaska (MI, that is!). He is still very much on the scene, however, and it's time to welcome WB8AGP as the new manager. Another "retiree" is WD8KZX as manager for D8RN, replaced by KB8MX. It's nice to have a little corner of EAS here in Michigan. SEMTN is no more. My thanks to all who helped in this valiant but fated effort. WB8RYR got it started when he was STM. WA8RNB put in many months as manager. The folks who operate the DART repeater made some generous concessions. But ... it died, primarily from dwindling participation and loss of interest. I still am not convinced that a full time vhf traffic net in the Detroit metro area won't work. SEMTN did for a while. Any ideas? Let me know. Training. Fellowship. A focal point for emergency operation. A megalopolis to be served. Think about it, gang, and let's have some ideas. Field Day messages received at this station: 22. Not bad, considering I was at WB8CSQ most of the weekend, instead of at home as last year. BPL: KA8AID KA8CPS WD8LRT. Traffic: WD8LRT 471, KA8CPS 416, KA8AID 354, WB8MTD 293, AF8V 279, WB8YDZ 179, KB8MX 151, WA8PIM 142, WD8IBY 110, WB8ITT 106, W8UE 103, WA8DHB 98, K8KMQ 90, K8GXV 79, N8BJD 71, WD8OEP 61, W8IHX 60, WD8NKT 58, KA8DEZ 57, N8BNC 52, K8LNE 52, WD8MJB 51, KA8IWW 50, W8PDP 46, W8YIO 45, W7LVB 42, K8DTG 41, WD8OSE 41, WD8RNQ 40, KC8DC 37, W8CUP 35, WD8ROK 34, W8VIZ 34, WD8RHU 31, KA8ECT 30, WD8EIB 30, WB8ZGP 30, K8OCP 28, WB8SYA 28, KB8GT 25, WD8BSE 23, WB8TTA 23, K8UPE 23, W8VPW 22, WB8YRY 18, W8JUP 16, WD8RWR 16, W8SCW 16, W8LDS 15, KE8X 15, KA8HFS 14, KI8Q 14, WB8DJS 12, WB8HPZ 12, WB8YWA 11, K8BZ 10, K8ZJU 10, W8HIN 9, KF8M 8, WA8AXF 5, W8TBP 4, KB8BS 3, KM8I 3, W8MOF 3, N8AOM 2, KA8GMJ 2, K8RV 1.

OHIO: SCM, Allan L. Severson, AB8P — Asst SCM, W8MOK. SEC: K8AN. STM: K8OZ. NMs: W8EK KF8J WB8JGW WD8KFN WD8QMP WB8YGW.

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN				6:45/10 P.M.	3.577
BNR	103	42	28	6 P.M.	3.605
ONN	66	14	16	6:30 P.M.	3.708
OSN	252	159	30	6.10 P.M.	3.577
OSSBN	2307	781	89	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
O6MN	408	48	29	9:00 P.M.	50.160

In June, "Cincinnati ARRL '81," our first ARRL Ohio Convention in years, came and went all too quickly. But I know amateurs in this section will long remember the dedication of K8JE and his first-rate crew, who worked like trojans and performed miracles. The Convention was truly a work of art. Thanks guys. And thanks to President Dannals, W2HD, and Director Nathanson, W8RC, for the countless hours spent with members from this and adjacent sections, who seldom get to hear diverse up-to-the-minute news from beyond our borders. I hope to see many more of you at the next Ohio Convention, trusting that the Cincinnati folks have enough magic in reserve for their next round of amazing feats. My "Tin Plate" QSL card arrived, courtesy of Steelworkers ARC, Steubenville Area ARC and National Steel. It occupies a prominent position on my wall. Great job, gang! There is still time to hone your SET plans, get more involvement, and help bring about a more interesting event. Plans with a scenario seem to produce more activity and better results. Worth a try? Here's an inspiration for all of us: W8TK's XYL went from General to Advanced in one month without even trying the Novice test. Congratulations to N8CWV!

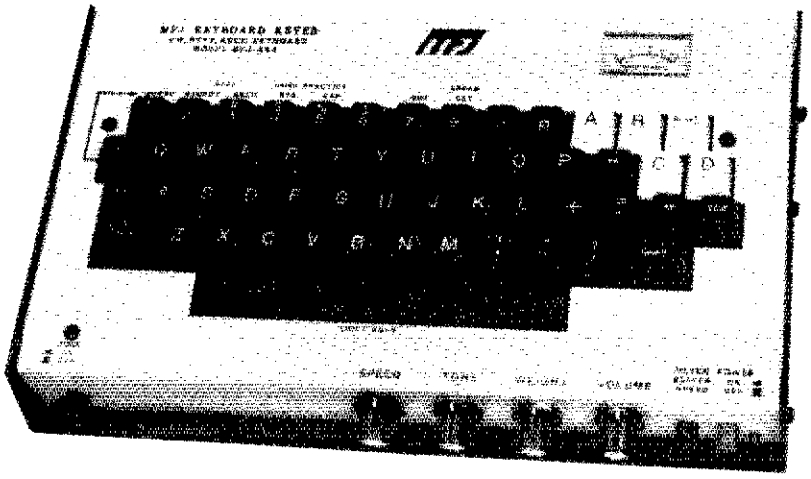
Local Nets	QNI	QTC	Sess.
BRTN	327	163	30
COARES	117	40	4
CCOMF	112	10	9
Firelands Red Cr.	83	9	6
LCNWOARES	648	124	54
RARA	58		4
TATN	369	102	30
VWCEN	16	1	2

Traffic: (June) W8PMJ 422, WB8JGW 221, AB8P 198, KB8YS 177, K8OZ 171, WA8HGH 153, WB8WTS 152, KF8J 146, WD8KBW 112, W8OZK 104, KA8DJZ 97, W8GGX 95, K8DL 93, KK8L 90, WD8NEC 82, WA8GMT 78, WD8DYW 67, W8EK 66, W8TP 66, N8JR 61, WB8DMF 60, KA8HOK 60, WD8PEI 58, WA8SSI 58, WD9HDZ 55, W8UJ 53, W8IM 50, WD8ODV 50, WD8PMW 49, WB8QHU 49, WD8PUH 43, K3RC 42, N8XX 42, N8BQK 41, KA8IUK 41, K8GET 38, WB8YGW 37, W8RG 36, N8CW 34, W8EMK 34, W8MOK 34, WB8QHV 34, WB8SIO 33, WB8UBR 32, WB8OXN 31, K8HF 30, WB8YUS 29, K8JDI 28, WA8JNQ 27, WA8BUW 25, W8UPD 25, W8MGA 23, WB8AWM 22, WB8YTD 22, WA8OYJ 19, N8CGM 18, WB8HOE 16, N8AKS 15, W8CAR 14, K8CKY 14, K8NJO 14, WA1QAA 14, N8APM 13, KA8GGZ 13, KA8HGH 13, WD8OMP 13, WD8DOS 12, KA8GVZ 12, K8PYT 12, WB8SRC 12, WA8ZID 12, W8WEG 12, WB8PIY 11, WB8SJE 11, W8ZM 11, KA8KFW 10, WB8MRL 10, WB8CJU 9, N8CJS 8, WB8TRK 8, WD8OYO 7, N8AUH 6, WB8RUW 6, W8UQY 6, WD8MIO 5, W8OQL 5, WD8CHL 3, WB8KKI 3, WB8NHV 3, WD8OYK 3, N8CDQ 2, WD8EKI 2, WD8QAC 2. (May) W8PMJ 302, WB8SGL 26, W8UPD 25, WB8KKI 17.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: W2IT KB2TM. NM: W2WSS WB2IXR N2BDW WB2ZCM WB2MCO WB2HDU KA2CTU. A really good dialogue has resulted

MFJ Super Keyboards



5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, +300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1¼"H (front) x3½"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+$3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+$3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+$3).

110 VAC ADAPTER. $7.95 (+$3).

BENCHER IAMBIC PADDLE. $42.95 (+$4).

A PERSONAL TEST

Give the MFJ-496 or MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC, or mail check or money order for **$339.95** for MFJ-496, **$279.95** for MFJ-494, **$39.95** for MFJ-53 AFSK module, **$29.95** for MFJ-54 Loop Keying module, **$29.95** for MFJ-61 Clock module, **$7.95** for the 110 VAC adapter and **$42.95** for Bencher Paddle. Include $5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today

TO ORDER OR FOR YOUR NEAREST DEALER
CALL TOLL FREE 800-647-1800

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

from the meeting between the staff of ENY and WNY at Newark Valley. More cooperation between two sections will be the result. Look for information as far as a new radioteleprinter net which will include ENY and WNY. K2LOZ passed away in June. He was formerly an active 6-meter operator and more recently active on 2 meters and with RTTY. He will be missed — particularly by members of WECA in Westchester where he served as their first president. Those of you who are timid about getting into cw traffic nets — how about trying ESS at 6 P.M. on 3590 kHz. Only received Field Day messages from Overlook Mt ARC, Lake Nancy ARC, Poughkeepsie ARC, Macillas Guerilla ARC, CCNR, Rip Van Winkle and Orange Cty. Where were all the rest of you? Don't forget SET weekend in October — PDS. Thanks to all those who came to ENY staff meeting in August. Almost forgot — congratulations to KB2KW as new SEC. PSHR: W2ACO/W2BIW N2BDW WB2EAG WB2HDU WB2IXR KB2KW WB2MCO W2YJR K2ZVI. Traffic: WA2SPL 563, WB2EAG 241, WB2MCO 236, KB2KW 154, N2BDW 89, W2IQK 70, W2ACO/W2BIW 69, W2YJR 54, K2ZVI 48, WB2HDU 32, WA2CJY 31, WB2SON 19, WB2VVS 16, AA2Y 15, WB2ELA 10, WB2IXR 10, W2EFU 6, WB2OHR 5.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section: NLI CW 3630 kHz 1900/2200 WB2TQC, mgr; NLI Phone 3928 kHz 1815 WA2SWL mgr; Nassau VHF 146.04/64 2100 M,W,Sun WA2SOE mgr; Big Apple VHF 147.915/315 M-F 2030 N2BMF mgr; Suffolk VHF 144.77/145.37 M-F N2BKK mgr; LIMARC 146.25/85 Fri 2045 WA2SOE mgr. Note: all times are local, please try and help out by checking in whenever you can. Most of the vhf nets can be reached with one watt with a good antenna. I am also starting to get numerous requests for hams to provide communications at various events, seems like somebody found out just how good we are, please try to help out, besides covering our obligation in Part 97, you usually get the best seat in the house to observe what is going on. Please note an addition to the above nets, NLS has changed its time to 1930 local on 3728. WA2PMW received WAS and WAC awards from the League. WA2SEL vacationed in VE3-Land, also, WA2SEL and WD9IDS, both broadcasters, recently exchanged gifts to mark the Oct. 22 anniversary of their 2 years of weekly skeds. WA2SEL received a T-shirt from WD9IDS station, WFMB and he sent a WCBS tote bag out to Illinois. WA2RMN placed ninth nationwide in the ARRL Novice Roundup. WA2LOO, with W2DKM operating, placed first in the NYC-LI Section in the phone category in the Ten-Meter contest, WB2AMU placed second in the cw category and WA2HSQ placed second in the cw and phone category. K2CMV recently visited RSGB Headquarters. The Grumman ARC provided communications for the international soccer tournament sponsored by the Hicksville Americans Soccer Club, teams participated from all parts of the world. WA2TFW checked into the Grumman net on June 19, using AM-FM clock radio, modified for 2 meters and a Wavetek signal generator feeding an 18" piece of wire. My apologies to those who do not see their traffic listed, just received a bundle from the post office with a bunch of April reports in them. N2BSS worked Hawaii for his 50th state. Traffic: (June) W2AHV 173, W2GKZ 128, WA2PMW 50, N2BSS 44, WA2ARC 34, KA1NH 32, KA2CLO 31, K2IZ 26, WA2SEL 22, N2BGR 18, KA2KGH 14, WB2IDP 10. (Apr.) W2AHV 214, K2GCE 66, W2GKZ 34, W2DBQ 22, K2YOK 4.

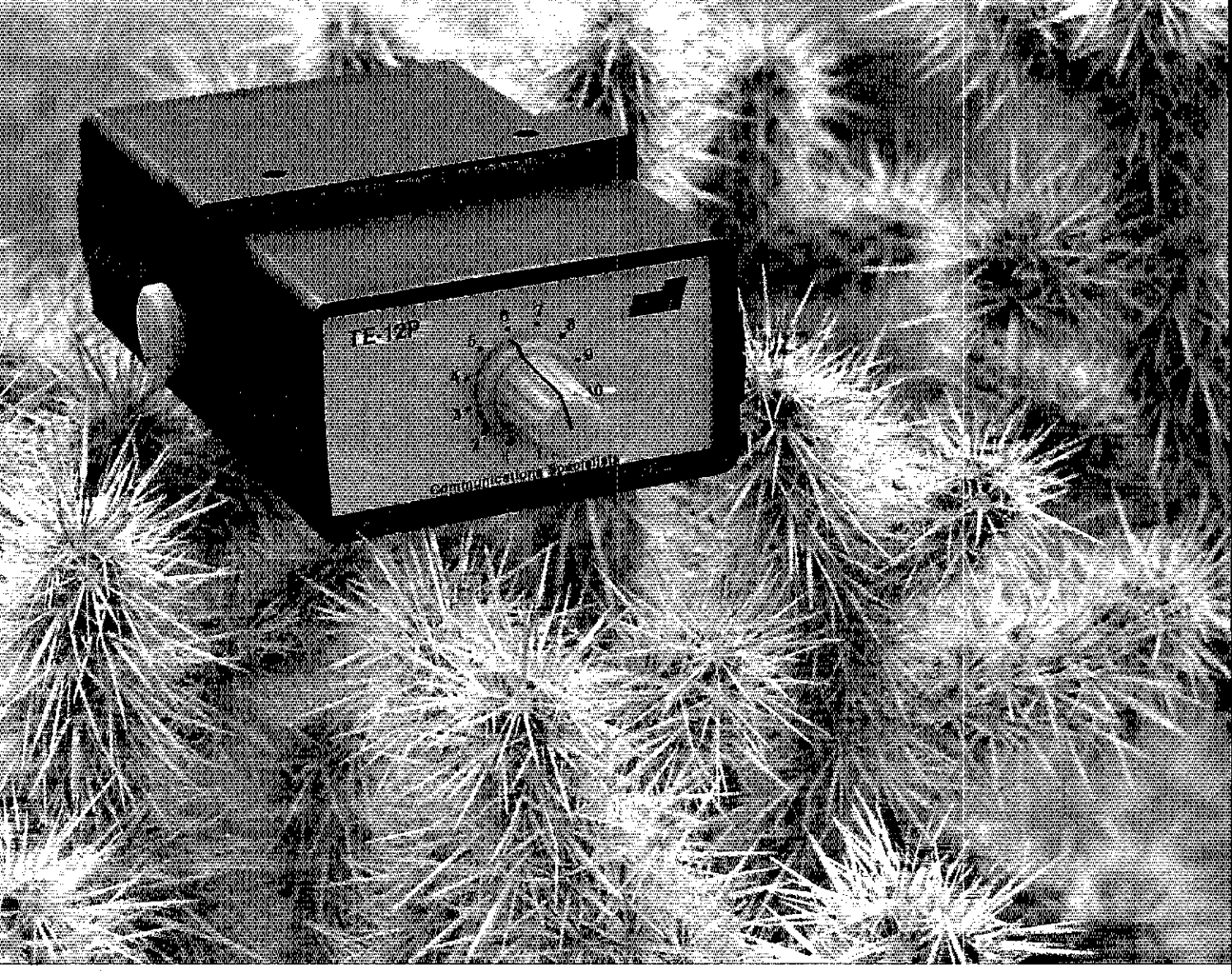
NORTHERN NEW JERSEY: SCM, Robert E. Neukomm, KB2WI — ASCM: W5DTR. SEC: WB2VUF. STM: W2XD. NMs: W2CC N2BOP W2PSU KA2GQQ W2TCA N2XJ WB2IQJ N2BNB.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJPN	W2CC	3950	6 P.M. Dy	34	490	230
NJN/E	N2XJ	3695	7 P.M. Dy	30	350	132
NJN/L	N2XJ	3695	10 P.M. Dy	30	251	104
NJSN	WB2IQJ	3735	6:30 P.M. Dy	29		
OBTTN	N2BOP	72/12	8 P.M. Dy	30	534	118
UCTEN	KA2GQQ	085/685	7:30 P.M. Dy	30	243	62
NJVN	W2TCA	49/49	10:30 P.M. Dy	30	348	117
NYNJVN	N2BNB	90/30	8:30 P.M. Wed	4	43	6
NJRTTY	W2PSU	147.51	Autostart	30		

New appts: W5DTR appointed as Asst SCM. He had previous experience as an SCM and is a faithful operator on most all nets. KA2HNQ is NM of NJVN with KA2GMH as asst. We wish W2TCA well on his retirement as NM of NJVN and CGNS on a job well done! The Morris Radio Club will sponsor FCC exams on Oct. 24, 1981, during its annual hamfest/flea market. Congrats to the MRC on its 50th anniversary as an affiliated radio club of the ARRL. They received a special certificate from the League. Pertroy CD group is working on their new communications vehicle. RAVEN reports: You can tell the good guys by their orange plastic safety hats worn during events where they must be clearly visible. Singer-Kearfott donated the hats. On April 9th, Capt. Tom Mullaney, chief of the Wayne OEM, sponsored a meeting with WB2IXS, OEM director of Pompton Lakes. Fairlawn ARC had a successful FD. Their annual picnic will be Aug. 15, Saddle Brook Park. N2AYJ printed their newsletter with a WORDSTAR wordprocessor — nice job! The "Forty-Niner" won number 1 in the recent vhf contest under Medium Class of Affiliate Club competition — CGNs! Upgrades: N2BKB to Advanced and KA2KJF to Tech. New call KB2MZ — old WB2GBH. KA2DDG new General. N2BKB to Extra. W2XD got CP-40 from League — CGNs. WB7NJY now N2CPT and getting involved in TFC again. N2XJ hand-led 2 emergency messages to Hawaii. KA2JMH to Advanced. KA2AXY now KC2AM, N2BOZ now KC2AH, WA2QWR now KC2AK and WB2JHN now KC2CA. Green Brook rpt reports KA2ERG & WA2YMK will present Ni-cad info at their July 23rd meeting. KA2FXA to General. JSARS "Ka-Chunker" reports WA2PXD is new pres. with WA2HEB as editor. 16 clubs sent FD radiograms. Get your notices to me by next issue for fall Novice and General classes with dates and places. Most IMPORTANT — get that Novice on the air with your "Big Brothers," Elmers, Mavens or what-you-have. BUT HELP GET THEM ON THE AIR! A permanent award honoring W2UEZ has been created. The first recipient is N2CER as "best newcomer" in traffic handling in 1980. Traffic: W2XD 154, AG2R 131, K2VX 125, KB2WI 116, N2BNB 114, N2XJ 107, N2BOP 81, WA7DPK 74, KA2JMH 65, KA2HNQ 46, AF2L 45, KA2GMH 38, WB2RMJ 37, WA8ZNH 31, WB2KLF 29, W2UH 27, N2SU 22, WB2JCE 16, KC2AK 16, N2BC 16, W5DTR 16, KA2GSX 16, W2NKD 12, KA2FXA 6.

MIDWEST DIVISION

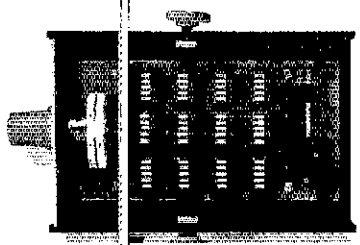
IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WBØAVW WAØAUX WDØHND WØYLS. WØRPK and I attended the initial meeting of the Iowa



Stuck with a problem?

Our TE-12P Encoder might be just the solution to pull you out of a sticky situation. Need a different CTCSS tone for each channel in a multi-channel Public Safety System? How about customer access to multiple repeater sites on the same channel? Or use it to generate any of the twelve tones for EMS use. Also, it can be used to access Amateur repeaters or just as a piece of versatile test equipment. Any of the CTCSS tones may be accessed with the TE-12PA any of the audible frequencies with the TE-12PB. Just set a dip switch, no test equipment is required. As usual, we're a stickler for 1day delivery with a full 1 year warranty.

- Output level flat to within 1.5 db over entire range selected.
- Immune to RF.
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak.
- Instant start-up.



TE-12PA

67.0 XZ	85.4 YA	103.5 1A	127.3 3A	156.7 5A	192.8 7A
71.9 XA	88.5 YB	107.2 1B	131.8 3B	162.2 5B	203.5 M1
74.4 WA	91.5 ZZ	110.9 2Z	136.5 4Z	167.9 6Z	
77.0 XB	94.8 ZA	114.8 2A	141.3 4A	173.8 6A	
79.7 SP	97.4 ZB	118.8 2B	146.2 4B	179.9 6B	
82.5 YZ	100.0 1Z	123.0 3Z	151.4 5Z	186.2 7Z	

- Frequency accuracy, ±.1 Hz maximum −40°C to +85°C
- Frequencies to 250 Hz available on special order.
- Continuous tone

TE-12PB

TEST-TONES:	TOUCH-TONES:		BURST TONES:			
600	697	1209	1600	1850	2150	2400
1000	770	1336	1650	1900	2200	2450
1500	852	1477	1700	1950	2250	2500
2175	941	1633	1750	2000	2300	2550
2805			1800	2100	2350	

- Frequency accuracy, ±1 Hz maximum −40°C to +85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

$89.95

COMMUNICATIONS SPECIALISTS

426 West Taft Avenue, Orange, California 92667
(800) 854-0547/California: (714) 998-3021

ICOM HF

Two Great Systems to Meet Your HF Needs

IC-2KL Solidstate Linear

IC-720A 9 Band Xcvr w/General Coverage Rcvr

IC-720A Phone Patch

IC-720A. ICOM's Top of the Line HF System.

IC-720A. ICOM's full featured HF Xcvr...with top of the line features:

- 9 band Tx/Rx (all new WARC bands included) 160 - 10 meters broadbanded.
- General coverage receiver...0.1 to 30MHz continuous tuning.
- Passband tuning built-in standard.
- Digital display of mode/VFO and frequency.
- 200 watt PEP input...all solidstate.
- Automatically bandswitches IC-2KL/AH1.
- 2 VFO's built-in standard.

IC-2KL. Broadband solidstate linear automatically bandswitched by the IC-720A, IC-730 (w/optional LDA unit), or IC-701...1000 watt PEP input...compact, no tuning required.

ICOM Phone Patch. Works directly with IC-701, IC-720A or IC-730...FCC certified.

IC-730. ICOM's Portable/Affordable System.

IC-730. ICOM's Affordable Portable HF Xcvr. Ideal for mobile/portable use with features found in no other unit in such a compact size:

- 8 bands Tx/Rx 80 - 10 meters broadbanded.
- IF shift standard/passband tuning optional.
- 200 watt PEP input...all solidstate.
- 2 VFO's built-in standard.
- Memories...one frequency per band.
- Compact size...only 3.7 in(H) x 9.5 in(W) x 10.8 in(D).

IC-AH1. 5 band automatic bandswitching mobile antenna for use with IC-720A, IC-701, or IC-730 (w/optional LDA unit).

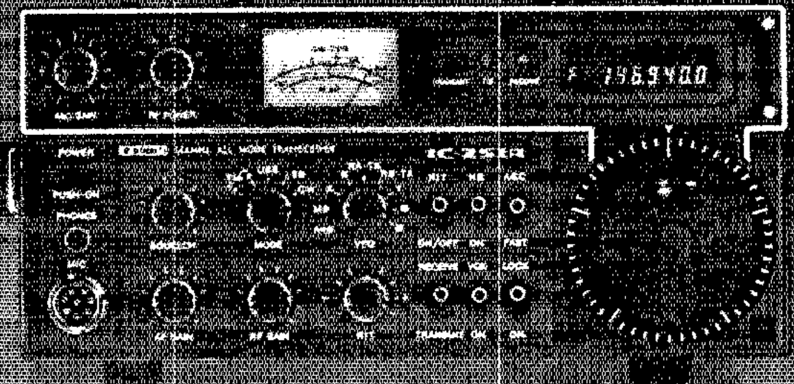
IC-SP3 - External Speaker

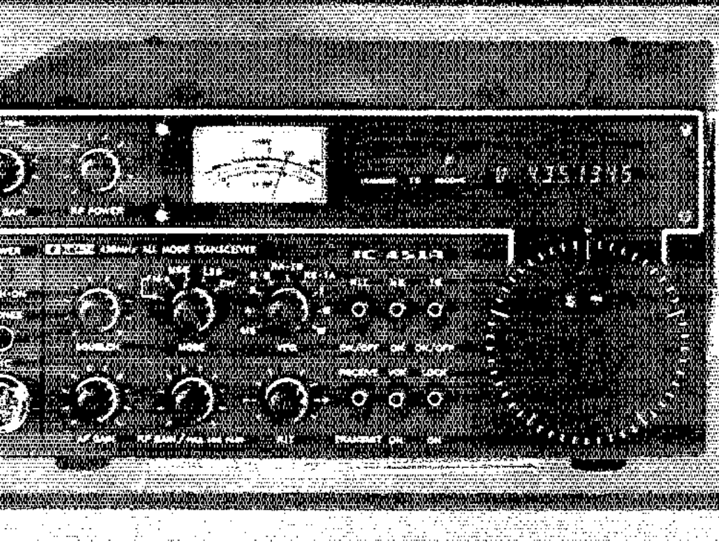
IC-730 - 8 Band Mobile/Base Xcvr

IC-AH1 - Automatic Bandswitching HF Mobile A

2112 116th Avenue N.E., Bellevue WA 98004 / 3331 Towerwood Dr., Suite 307, Dallas, TX 75234

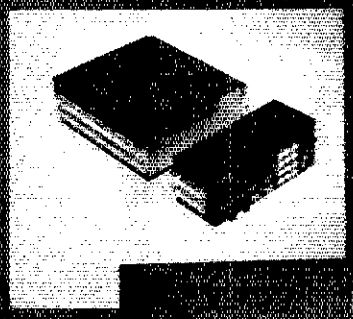
ICOM





New! AZDEN® PCS-3000

BLAZING THE FRONTIER OF MICROCOMPUTER COMMUNICATIONS



SUPERIOR COMMERCIAL GRADE 2-METER FM TRANSCEIVER

FALL SALE

$299.00

FREE TOUCH-TONE® PAD KIT INCLUDED

COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- 8 MHZ FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN: Receive and transmit 142.000 to 149.995 MHz in selectable steps of 5 or 10 kHz. COMPARE!
- SIZE: Unbelievable! Only 6¾" by 2⅜" by 9¾". COMPARE!
- MICROCOMPUTER CONTROL: All frequency control is carried out by a microcomputer.
- MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES: When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. COMPARE!
- PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL: Frequency is selected by buttons on the front panel or microphone.
- 8 CHANNEL MEMORY: Each memory channel is reprogrammable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- INSTANT MEMORY 1 RECALL: By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- MEMORY SCAN: Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
- GREEN FREQUENCY DISPLAY: Frequency numerals are green LEDs for superior visibility.
- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
- SUPERIOR RECEIVER: Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. COMPARE!
- ILLUMINATED KEYBOARD: Keyboard backlighting allows it to be seen at night.
- TRUE FM, NOT PHASE MODULATION: Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- OTHER FEATURES: Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
- ACCESSORIES: CS-ECK 15-foot remote cable . . . $35.00. CS-6R 6-amp ac power supply . . . $59.95. CS-AS remote speaker . . . $18.00. CS-TTK touch-tone® microphone kit (wired and tested) . . . $39.95.

AMATEUR-WHOLESALE ELECTRONICS ORDER NOW TOLL FREE

8817 S.W. 129th Terrace, Miami, Florida 33176
Telephone (305) 233-3631 • Telex: 80-3356
HOURS: 9 - 5 Monday thru Friday
• U.S. DISTRIBUTOR • DEALER INQUIRIES INVITED

MasterCard VISA

800-327-3102

CREDIT CARD HOLDERS MAY USE OUR TOLL FREE ORDERING NUMBER.

CUBIC'S ALL BAND ASTRO-103

A new name, a new look, and a new standard of performance in ham radio!

(and you don't have to be a computer expert to use it!)

ALL BANDS INSTALLED AND OPERATING! 160 thru 10 including WARC bands

DUAL ultra stable PTO's

Fast break-in (QSK)

RTTY VOX

Jack for separate receive antenna

Fully variable AGC decay

Dual 8-pole filters, 1.4:1 shape factor -6 to -100dB

True Passband Tuning with width and position indicators

Built-in VSWR meter

CW output pulse shaping — hard or soft

Sophisticated Noise Blanker

Speech Processor

Exceptional Dynamics Noise Floor -132dBm 3rd order intercept +15dBm

RF/IF Gain Controls

Optional CW Narrow Crystal Filter

ASTRO-103 — The Professional Ham Rig.

The Cubic ASTRO-103 expands on the highly acclaimed ASTRO-102BXA with the addition of the most wanted features — RTTY, an input connector for a separate receive antenna, and of course, ALL-BAND coverage from 160 through 10 meters, including the new bands at 10, 18, and 24.6 MHz. All bands are operating now, nothing to buy later, and of course WWV is covered.

With the optional 400Hz crystal filter installed, which cascades with one of the 8-pole I.F. filters and can be moved through the passband, along with QSK provisions, the ASTRO-103 is the CW operator's dream!

Performance under high cross mod conditions found in todays' crowded bands is second to none. With dual independent high stability PTO's for split band DX and all its other features, the ASTRO-103 is the result of American Technology and American Quality combined to bring the best to the American Amateur.

ASTRO-150A

Another member of the ASTRO family, the ASTRO-150, has been highly acclaimed as the most flexible Base station. With microprocessor control, VFO tuning and microphone scanning, the ASTRO-150A led the way for competitive radios now appearing on the market.

ASTRO-102BXA

The ASTRO-102BXA provides basically all the fine performance of the ASTRO-103 at a lower cost, but less the WARC bands, which of course may be added later if desired.

CUBIC — Success Built on Excellence

Cubic Corporation with over 3,500 employees world-wide, including more than 1200 scientists, engineers and technicians, has more than one million square feet under roof.

Established in 1951 the company has grown and expanded in high technology fields, including computer based automatic fare collection systems, electronic countermeasures, supersonic pilot training and other defense and space systems, electronic positioning devices and, of course, communications. New Cubic Amateur products reflect this heritage of excellence and is your assurance of the strength and resources to support your purchase in the years to come.

CUBIC COMMUNICATIONS, INC.

305 Airport Road, Oceanside, CA 92054
(714) 757-7525

Photo By RIC HELSTROM

Volunteer Organization Assisting in Disasters (IVOAD). This involvement will provide better rapport with user agencies and the ARES. More on this later. Remember the Midwest Division Convention in Salinas, KS, let's have a good showing from Iowa. Jones County amateurs operated during Grant Wood Art Festival and will make it an annual event. KBØZZ has achieved WAS on 20M, 40M and 80M. EIDXA has its own repeater on 145.19. KAØILX upgraded to Extra before his sixteenth birthday. WAØNMA made PSHR this month. WA4VWV assisted c.d. officials in the flash floods in Clarke Cty. WØFQ was busy in his district with multiple tornadoes. Congrats to KAØEVC KAØKJV WDØDCD KAØHGI KAØILR for upgrades. Welcome to Vilisca HS ARC on club affiliation. KFØF reports that KCØET and KBØOZ are great cooks. TEN rep this month: NØSM KØGP WØYLS WØSS KAØX WBØUPF NØBLA AEØR WØFO. DTRN rep: WAØAUX WBØQAM WØYGV KØGY AIØK NØAHP. Good showing. Keep up the activities.

Net	Freq.	UTC	QNI	QTC	Sess.
75M Phone	3970	1730-2300	2086	108	60
TLCN	3560	2330-0300	375	148	60
tCN	3713	0100	23	3	4

Traffic: WAØAUX 338, WØSS 193, WØYLS 124, KØCY 113, WBØQAM 82, KAØX 77, AEØR 73, KØGP 66, WBØUPF 41, WAØNMA 36, WØBW 34, WAØAVW 22, WDØHND 15, KAØJQG 8, KØJGI 5, WØFQ 4, KFØF 3.

KANSAS: SCM, Robert M. Summers, KØBXF — It looks like this month's report will show some of the type of activities of several years ago. I knew it was too quiet to be true. Several reported about the same comments. Biggest item was the Great Bend flood and second was the Lawrence tornado. A number of operators were active in communications during the G.B. flood and to my knowledge KBØVV KBØOJ NØCBI WBØRZC KAØGAI and WDØEPX have been recommended by NØBLD to receive the Public Service Award for their activities. When all the reports are in, I am sure there will be others. Other type activities include Boy Scouting in the Hiawatha area to such events as Tin-Man Triathlon Race, St. Francis Bike/Run Race, Field Day and many severe weather watches. I did receive FD messages from the following clubs/groups: Sand Hills ARC, Parsons, Boeing Employees Wichita, Hiawatha ARC, JARS, KS ARES Zone 13, Central KS ARC, Johnson Co. ARC, Chippewa ARC and WDØENU. If others were sent, they are still out there somewhere. Kansas WX Net QNI 746, QTC 463; CSTN QNI 1534, QTC 98; QKS QNI 398, QTC 114. NØBDG NØAFJ WDØFWK WØOUU WBØZEN received net certificates for their activities on the cw net. QKS. Many thanks again to guys like NØBLD, State Radio Officer, Div. of Emerg. Preparedness; WØKL, SEC, and to all of you public minded amateurs who are always there, prepared to aid in any emergency. That's why we all get to enjoy so much of the hobby, Amateur Radio. KSBN QNI 959, QTC 124. KPN QNI 386, QTC 31. Traffic: WØFIR 100, WØQMT 93, NØBLD 66, WØAM 67, WAØLBB 63, WØFT 56, KØBXF 54, KØFPC 50, WØOYH 43, WØKL 40, WØCHJ 35, WBØZEN 35, WØPB 28, WØASY 26, WBØYLP 24, WØFDJ 22, KAØCUF 21, WØRBO 12, WØNYG 6, WØMI 5, WØRT 3, WØOAG 2.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst SCM: Joe Flowers, WØOTF. SEC: MØAJI. STM: WBØLFY. Now that Field Day has passed, everyone has returned to things previously left undone. WBØNIE has earned her PhD. Congratulations! WBØLFY has just poured the base for his new 60 ft. tower. KØRWL has put up a new 50 ft. tower and will soon be putting up a new quad. I understand that KAØCFX already has the Callaway Radio group planning for Field Day '82. Rumor has it that the Emerson Electric Club of St. Louis is really enjoying fox hunts. KAØAUU is in the hospital and WAØZMO has just returned home from the hospital.

Net	QNI	QTC
NEMOE	143	4
ACE	33	1
CMOEN	147	4

Our deepest sympathy to the family and friends of KAØCRG who joined the ranks of the Silent Keys. Traffic: WØBMA 150, WØOUD 97, KØSI 61, KØBM 49, WØOTF 48, KAØP 18, WBØLFY 15, KAØE 6, WBØNIE 6, AGØK 2.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: NØAIH. STM: WDØBQG. Hope everyone had a fun Field Day. Congrats to Novices: KAØKZN KAØLAS KAØLAR; Adv.: NØBXJ NØCBK WBØTTF NØCKH. We now have 48 counties with newly appointed ECs with 45 more counties needing ECs. If you are interested in public service and do not know your EC, please contact your SEC or SCM. We do need more help and all are welcome. Thanks to all the new ECs, ARES members and My HAT OFF to "BIG JIM" for his SUPERB job of organization. Time to make reservations for the Midwest Convention and hope to have a good showing from NE. WDØBQF has a new 2-meter open repeater on 146.67 in Scottsbluff. Sounds good. Traffic: WØHOP 30, KAØBCB 28, WØZNI 26, WAØBOK 21, WBØGWR 15, WØEUT 13, WAØPCC 11, WBØGMQ 10, WØNIK 9, WBØOPP 6, WØHTA 5, KØFSA 3, WBØEDU 2, WØGJU 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3640	1900 + 2200	60	405	344	K1EIR
CPN	915/315	1800/1000 Sn	27	87	233	WB2PJU
NENN	3720	1815				WB1CPF
NVTN	28/88	2130	30	53	318	WA1ELA
RTN	13/73	2100	28	83	267	WB1CPF
WCN	78/18	2030	30	141	409	W1DPR

High QNI: CN: KA1EGE WB1EKV WB1ESJ K1UQE. CPN: KA1AMK K1EUW KA1KD. RASON Traffic Net now operating daily. Caribe DX Association is new ARRL affiliate. New officers of Southington ARA: W1HUE, pres.; WB1EPD, v.p.; WB1GIR, treas.; W1EFW, secy. New calls: N1BQG ex-KA1DST, KE1H ex-WB1DHI. New Novice KA1HID. The Booth family is now on the air from three states; KA1HBH in Connecticut joins his folks KA1AWO and KA1BAX in Rhode Island and his brother WA1WRI in Maine. WA1VNX has put a new repeater on the air in Naugatuck, 146.355/146.955. Meriden ARC has printed 1000 copies of the long-awaited Castle Craig Certificate. KA1GPG received a QSL card printed on a beer can (too bad it was empty). N1ED and WB1AIU helped each other erect new antennas ... a mini-quad at Joe's and a 10 meter beam at Ed's. Field Day activity reports received from K1DII W1WP/AD1O, ARS of Norwich, Connecticut Wireless Assn, CQ Radio Club, Enfield ARC, Fairfield ARA, Middlesex ARS, Natchaug ARA, Shoreline ARC, Southington ARA and Tri-City ARC. Traffic: W1EFW 307, K1GF 294, W1NJM 172, WB2PJU 155, WB1ESJ 150, WB1CRH 105, WB1GXZ 81, K1EIC 76, KA1BHT 75, WA1LOU 65, KA1KD 64, WB1EKV 61, W1BDN 49, K1UQE 42, W1DPR 39, WA1WQG 37, K1EUW 27, W1QV 13, K1CE

Introducing the first fully programmable keyer

Store commands, as well as text, for automatic execution

The Heathkit μMatic Memory Keyer's custom microprocessor stores up to 240 characters of text or commands. *Variable-length buffers* eliminate wasted memory space. "Command strings" allow text to be stored in several buffers, then strung together in any sequence for most efficient use of memory. Command strings can also select speed, weight, spacing and auto-repeat count.

No external key to buy

Integral capacitive "touch" paddles unplug and store in their own compartment inside the Keyer when not in use. Left handed? A touch of the key-pad and the paddles are reversed. Choose any speed between 1 and 99 words per minute, and any of 11 weight settings. Special rear-panel jack connects mechanical paddle.

Great code practice machine, too

A "practice" mode sends random code groups of random length and selectable types for a total of 6,400 different practice sessions. Each sequence sends approximately 3,000 characters before repeating.

Other features:

Built-in sidetone oscillator and speaker have pitch and volume controls. Phone jack and earphone are included for private listening. Complete details on the great new μMatic Memory Keyer are in the latest Heathkit Catalog. Or see it at your nearby Heathkit Electronic Center.*

Send for free catalog

Write to Heath Company,
Dept. 009-814, Benton Harbor, MI.
In Canada, contact Heath Company,
1480 Dundas Street E., Mississauga, ONT L4X 2R7

Visit your Heathkit Store

Where Heathkit products are displayed, sold and serviced. See your telephone white pages for locations.

*Units of Veritechnology Electronics Corporation in the U.S.

Heathkit®

6, W1CUH 5, W1ICF 3, W1VS 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	380	328
EMRIPN	KA1BJY	3.898	1730/Dy	331	208
EM2MN	KA1CGP	90/30	2000/MWF	178	55
NEEPN	K1BZD	3.945	0830/SN	55	17
HHTN	K1BSO	04/64	2230/Dy	465	215
EMRISS	N1BHH	3.715	2030/Dy	141	49

Well, Field Day is over for another year and I received radiograms from more than 15 individuals or groups, so it looks like there was a lot of activity. I got around to visit a few clubs again this year as well as getting a little operating time of my own. One unusual event this year was the effort of three clubs from RI and EMass who put together an impressive operation from Battleship Cove in Fall River. They had a total of 8 stations operating from three ships including the Battleship Massachusetts and a submarine. The public was invited to send radiograms and 162 were originated (BPL). All the people involved did a great job. Unfortunately they are too numerous to mention. W1EOF has retired as SCM of RI and W1YNE has taken over. Best of luck Gordon and Jack. Middlesex ARC held a successful flea market. Whitman club is considering building a new clubhouse. Quannapowitt member WA1UZH got first place in 10-10 QRP contest. Norfolk County RA officers: W1CON, pres.; W1IXI, v.p.; K1HRV, secy.; W1IDV, treas. Massasoit member K1IOC generates electricity from wind. WA1LAD reports that the Mikefarad Net has a new net manager, WA1DWS. W1GXT worked ZB2BL and ZB2GW on six for his first transatlantic contacts. KA1HDO worked 34 states on six in June. Foxboro ARC provided 2M communications for a road race in Foxboro. AE1X got married. Both license plate bills are still in Senate Ways and Means Committee where they will stay until the Committee finishes the state's budget for the year, which is proving to be no small task. More later. Traffic: N1BHH 504, WA1TBY 345, W1ACT 325, KA1BJY 202, KA1ON 188, K1GN 169, K1BSO 143, WB1GQO 94, KA1MI 63, N8TM 44, WA1LAD 38, W1CZB 31, K1BZD 29, KA1EMO 27, W1TC 26, WB7TPY 21, W1CE 16, K1LCQ 14, WA1FNM 6, WA1DXT 2, W1CE 2, K9HI 1, KA1S 1, AE1X 1. (May) N8TM 59, N1BNI 37, W1SR 18, WB1EZT 14, WA1DXT 4. (Apr.) WB1EZT 28.

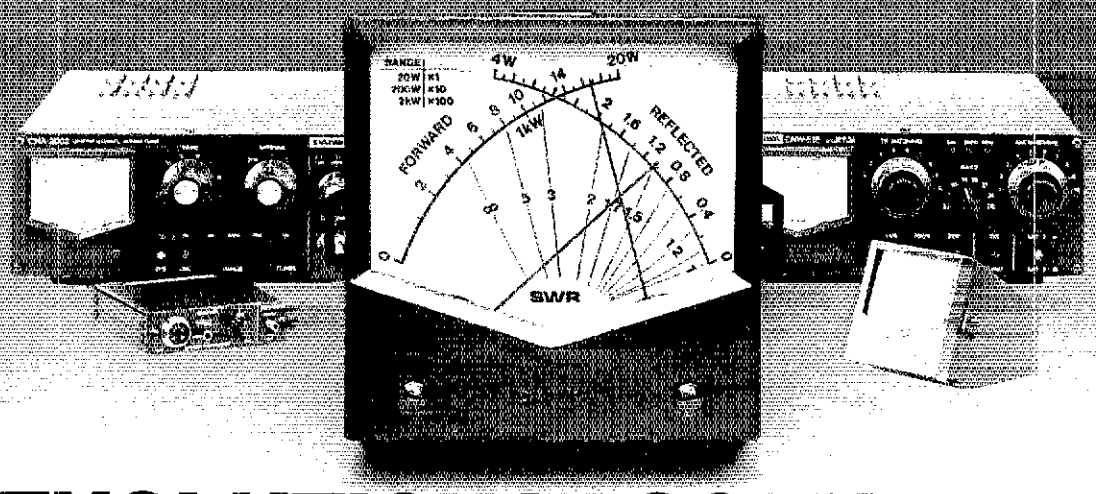
MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: W1BJ. Old Orchard Beach hams W1BCV W1YMD WA1WWH upgraded to Advanced. W1VJ W1QKK K1NYY WA1CED KA1AFV handled 158 msgs in a simulated marine disaster in which 29 agencies, coordinated by Civil Defense, participated. CEP director stated that key to sucess was good comms. Aroostook ARA provided comms for canoe race — Washburn to Presque Isle. Augusta Emerg AR Unit comms for spec olympics, road race, other pub svc proj. Sandy River and Aroostook active in Field Day Nets sessions/QNS/QTC: SGN 26/938/143; MSN 13/69/13; SPSN 13/198/20: AEN 5/75/1; PTN 29/249/109; MPSN 7/26/4. Traffic: W1BJ 148, AK1W 91, W1RWG 82, WB1BYR 68, W1KX 45, K1NAN 43, N1BCE 32, W1BMX 32, W1HEC 26, W1CTR 22, W1AHM 21, W1GKJ 21, K1GUP 21, N1BJW 15, WA1FCM 14, KA1EKT 13, WA1YNZ 12, N1BCT 10, KA1CMG 10, KL7IJG 10, W1NBG 6, KA1GEE 3, KA1GPO 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — SEC: AK1E. STM: W1TN. NMs: N1NH K1OSM. Gov. Gallen proclaimed June 21-27 as Amateur Radio Week. Attending at the Governor's office were: WB1BRE W1JY W1NH W1OMZ W1ALE N1AIX WB2QLL. A call-up neted over 50 stations on 94. Thanks to all. The early sess of FRN, now on 7230 kHz, had 83% NH representation. SEC, AK1E, recommended cancellation of some appts, this has been done. KA1BBJ is tops in PSHR and NHN checkin. WB1FPD is back on the air. EC reports received from W1FYR K1OIQ KB1A WB5MTR. Field Day messages received from W1WQM K1RD W1GUX W1QYY WB1BRE. GSON had 69 QTC and 321 QNI. The White Mountain Club, now Central NH Club, meets at Metz Antenna factory. K1LGQ KA1BXN WA1NUN now Extra. Interstate Repeater Society new officers: K1MRK, pres.; KA1FUJ, v.p.; N1ALT, treas.; K1YPP, secy.; K1PGM, mem at large. New EC WB5MTR looking for Belknap County asst EC and ARES members. NHN had 138 QTC 159 QNI. W1MPP K4RO are back from FL and summering in East Waterford, ME. Traffic: W1TN 192, N1NH 157, KA1BBJ 151, KA1CXP 110, K1OSM 104, N1ALM 95, K1YMH 68, W1MHX 43, AK1E 37, W1VTP 37, KA1FWQ 35, WB1DKX 25, KB1A 24, W1ALE 16, KA1CJI 15, N1AHN 4, W1BYS 4, WB5MTR/1 4.

RHODE ISLAND: SCM, G. Fox, W1YNE — SEC: KA1EHR. STM: KA1FE. RIEM 2MN 21 sessions, 47 QTC, 187 QNI, meets 1830, 147.96/36. Newport Rptr OSARG (10/70) assisted Central RI Red Cross in disaster drill. Group also handled communications for Gaspee Day parade and race. Sug Sig and Newport clubs operated from USS Massachusetts during Field Day. ORS KA1EAL assisted with traffic. KA1FE back on RTTY. N1RI on cross-country bike trip. Last seen in Kansas. ARES in reorganization stage with KA1EHR and KA1FE working very closely. Traffic: W1EOF 522, KA1EAL 203, KA1FE 189, KC1G 87, W1YNE 55, KA1BTU 44, AE1S 4, N1RI 2.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. The good WX brought the usual ups and downs on net activity during the time "wish you were here" type of fair tfc seems to abound. That sent to gen. del. for vacationers should never be originated. It demands mailing the delivering stn. I think the cost to the delivering stn — for that type of tfc — is an imposition. VTSSB 29/475/68, VTN 25/100/43, GMN 26/429/42, Carrier 26/426/29, RFD 4/76/11, VPN 4/56/4. GMWS op'd with 3 stns plus Novice; BARC the same, for FD. VTN, 3614, seems to be doing FB when looked at from checkins vs tfc. VTSSB is not the only VT net handling tfc, altho some seem to believe so! Traffic: K1BQB 115, N1ARI 110, WB1ABQ 46, W1RNA 36, AE1T 13.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. SEC: W1JP. STM: W1TM. NMs: W1UPH W1UD WA1ITL. Surgery on W1BVH's cw arm ok. W1DVW making good progress and relocating Merrimac, NH near Jr. Op. Banner year FD all over WMA with msgs received from W1UD/Montachuset ARC, WA1VEI/N1XZ UMass ARA, W1JO/K1BOX Harvard MA, K1PKZ/Provin Mtn. RC, WB1GSO/W1BIM CMARA, KB1W/Berkshire RC, W1NY/Hampden CRA with big boost with W1TM's cw, and four Mode J Oscar QSOs including G4JJ. K1SF enjoying 6-meter sporadic Es. W1YI achieved BPL with 119 orighations and big help via NE Teleprinter Net. PSHR: WB1HIH 105, W1TM 68. Traffic: W1TM 245, W1YI 190, WB1HIH 137, WA1ITL 54, W1KK 38, K1IJV 34, K1JHC 33, W1EFC 29, W1JP 26, KB1W 24, KA1T 22, W1NY 16, W1UPH 11, W1ZPB 10, WB1DBN 7, WA1MJE 1. (May) W1UD 285, KA1T 14, W1UPH 10, WB1DBN 5.



A REVOLUTION IN CONVENIENCE

DAIWA announces an *all-new lineup* of high-quality amateur radio innovations.

Cross-Needle Meters CN-520 / CN-540 / CN-550

DAIWA cross-needle precision is now available in a compact case. Get forward power, reflected power and SWR readings at a single glance—from a meter that fits anywhere!

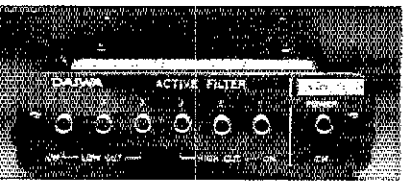
CN520 - Frequency: 1.8-60MHz • **Power range:** Forward 200/2kw, Reflect 40/400 watts • **Detection Sensitivity:** 40 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** 72W x 72H x 95D m/m

CN540 - Frequency Range: 50-150MHz • **Power Range:** Forward 20/200 watts Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

CN550 - Frequency Range: 144-250MHz • **Power Range:** Forward 20/200 watts, Reflected 4/40 watts • **Detection Sensitivity:** 4 watts minimum • **Accuracy:** ±10% at full scale • **Dimensions:** same as CN-520

Active Audio Filter AF-306

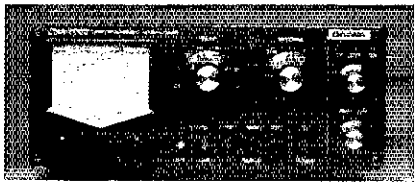
By electronically filtering unwanted signals, the AF-306 gives you clean, distinguishable copy. Featuring its own internal speaker, the AF-306 Active Audio Filter is easy to install, easy to operate.



Input: 2.8v (4v max.) • **Output power:** 1 watt @ 8 ohms • **Distortion:** less than .2% • **S/N ratio:** better than 50dB • **Low Cut Filters:** 400Hz, 800Hz, 1100Hz • **High Cut Filters:** 1100Hz, 1600Hz, 2500Hz

Automatic Antenna Tuner CNA-2002

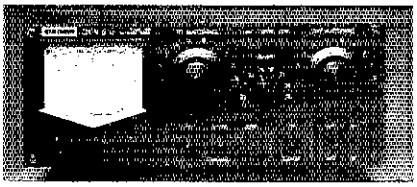
Leading the way in convenience is the Daiwa CNA-2002 2.5 kW (PEP) Automatic Antenna Tuner. Cross-Needle Metering and optimum matching in under 45 seconds make it the perfect compliment to any state-of-the-art amateur station.



Frequency range: 3.5-30MHz including WARC bands • **Tuning Time:** less than 45 seconds • **Power rating:** SSB - 2.5kW PEP, CW - 1kW (50% duty), AM - 500 watts, RTTY, SSTV - 500 watts • **Output Impedance:** 15-250 ohms (unbalanced) • **Dummy Load:** 100 watts/1 minute (installed) • **Metering Ranges:** Forward power - 20/200/2000 watts, Reflected power - 4/40/200 watts, SWR - 1:1 - infinity • **Power requirements:** 11-16vdc @ 200ma

Manual Antenna Tuners CNW-518 / CNW-418

The serious amateur wants to achieve the best antenna match possible. That's why DAIWA offers two manual antenna tuners that maximize power transfer—and offer cross-needle metering as well.

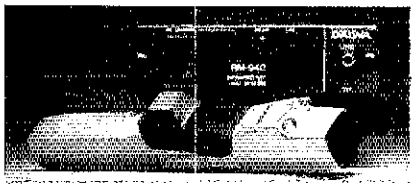


CNW-518 - Frequency range: 3.5-30MHz including WARC bands • **Power rating:** 1kw CW (50% duty) • **Output Impedance:** 10-250 ohms (unbalanced) • **Insertion loss:** less than .5 dB

CNW-418 - Same as above except - **Power rating:** 200 watts CW

Infrared Cordless Microphone RM-940

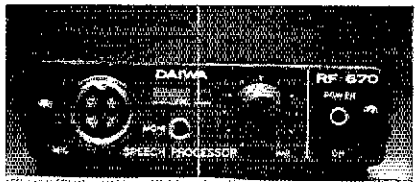
DAIWA ingenuity is also evident in the RM-940, an Infrared cordless mobile microphone system. Audio and transmit/receive switching are carried on a safe infrared beam. Experience the freedom of cordless mobile operation. Ask your Daiwa dealer for a demo today!



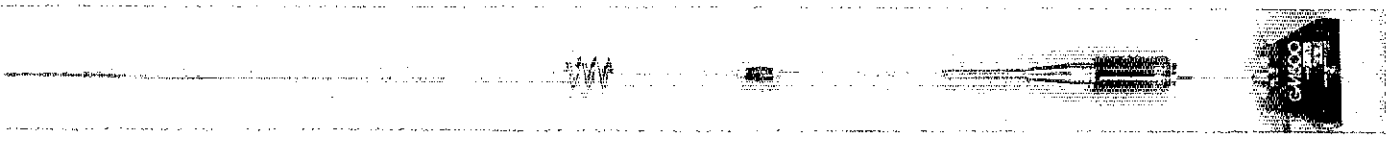
Microphone: Electret Condenser type • **Continuous Operating Time:** 5 hours minimum • **Charging Time:** 8 hours max • **Usable Distance:** 3.5 feet—microphone to sensor • **Power Requirements:** Controller—13.8 vdc @ 80 ma, Microphone—2.5 vdc @ 30 ma.

Speech Processor RF-670

DAIWA innovative thinking led to the development of the RF-670 Photocoupler Speech Processor. Its unique design gives your signal the boost it needs to cut through bothersome QRM. Get RF-type processing performance with the RF-670's economic photocoupler design.



Clipping Level: 20dB max • **Frequency response:** 300-3000Hz (-10dB) • **Clipping Threshold:** less than 2mV at 1kHz • **Bandwidth:** 2400Hz at 6dB down • **Distortion:** less than 3% at 1kHz, 20dB clip • **Output level:** 40mV max • **Mike imp.:** 600-50k ohms • **Power requirement:** 13.5v @ 60ma • **Dimensions:** 90 x 25 x 93 m/m



UHF/VHF Mobile Antennas

Premium quality, high-gain design. Special *tilt-over* feature for added convenience.

DA500 - 146/440 MHz Dual Band Length 960 m/m
DA100 - 5/8 wave • Length: 1,360 m/m • 146 MHz
DA200 - 7/8 wave • Length: 1,870 m/m • 146 MHz

Gutter Mount

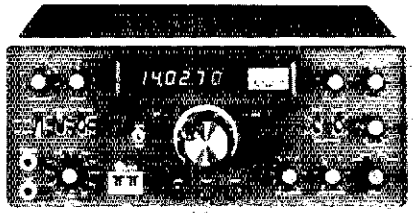
GM500 - Frequency Range: 1.8MHz-500MHz • **Power Rating:** 1kw • **Dimensions:** 86W x 54H x 37D m/m

mcm COMMUNICATIONS 858 E. Congress Park Drive Centerville, Ohio 45459

Exclusive U.S. Agents for these Daiwa products. Dealer inquiry invited

DAIWA
Amateur Radio Innovations

TEN-TEC Solid-State Transceivers - Low AES Prices

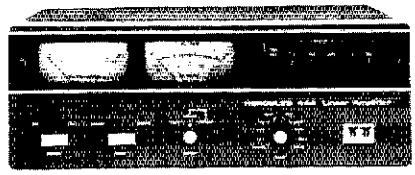


TEN-TEC Model 546 OMNI/Series-C All solid-state, 200 watt SSB/CW HF Transceiver. 9 HF bands, 160-10m including 10, 18 & 24.5 Mhz & 10 MHz WWV; 40 KHz VFO overrun. Instant band change, no tune-up. 100% duty cycle, 20 min. Digital readout, six 0.43" LEDs - reads to 100 Hz. Mosfet rf amp., sensitivity 0.3 uV for 10 db S + N/N ratio, 90 dB dynamic range; 18 dB attenuator for strong local signals. 8-pole 2.4 KHz SSB filter, 1.7 shape factor @ 6/60 dB and audio active filter. Select standard SSB filter, optional 1.8 KHz SSB filter or optional CW filter plus 450 Hz or 150 Hz of audio filtering. 50 dB notch filter, ± 500 Hz & ± 4 KHz offset tuning, 2-speed QSK instant break-in, VOX or PTT, adjustable threshold ALC, S/SWR meter, sidetone, Hi-Z mic. input, built-in spkr. 12-14 VDC/18A. 5½"h × 14½"w × 14"d, 14½ lbs.

Regular $1289 - ***Sale Price $1059***

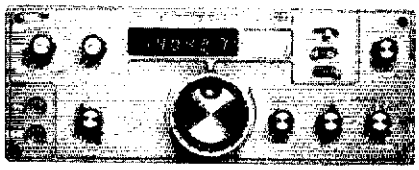
OMNI Accessories:

280	18A power supply *(Reg. $169)*.....	SALE	$152.95
255	Deluxe ps w/speaker *(Reg. $199)*...	SALE	179.95
217	500 Hz 8-pole CW filt. *(Reg. $55)*....	SALE	49.95
218	1.8 KHz 8 pole SSB filt. *(Reg. $55)*..	SALE	49.95
219	250 Hz 6-pole CW filter *(Reg. $55)*..	SALE	49.95
243	Remote VFO *(Regular $189)*.....	SALE	169.95
1140	DC circuit breaker.....		10.00



TEN-TEC Model 444 HERCULES All Solid-State, KW Linear Amplifier for 160 to 15 meters - 1.8 to 21.5 MHz with provisions for 4 Aux. bands. Broadbanded, no tune-up, instant break-in. 1000 watts input, 500-600 watts output typical, all bands; 50 watts drive. Duty cycle - SSB: Continuous voice modulation; CW/RTTY: 50%, 5 minutes maximum key down. Manual bandswitching, or automatic when using the OMNI. Separate 45 VDC @ 24 A power supply and built-in control power supply, forced air cooled, automatic line voltage correction and exciter by-pass, two meters for collector I/E and forward/reverse power, adj. ALC, 6 LED monitors. Amplifier: 5¾"h × 16"w × 15½"d, 22 lbs; Supply: 7½"h × 15¾"w × 13½"d, 50 lbs.

Regular $1575 - ***Sale Price $1349***

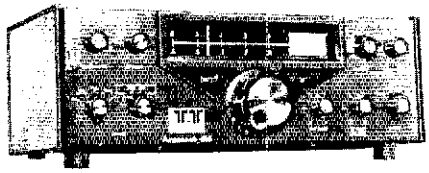


TEN-TEC Model 580 DELTA All solid-state, 200 watt SSB/CW HF Transceiver. 9 HF bands, 160-10m including 10, 18 & 24.5 Mhz & 10 MHz WWV; 40 KHz VFO overrun. Instant band change, no tune-up. 100% duty cycle, 20 minutes. Digital readout, six 0.3" LEDs - reads to 100 Hz. Sensitivity 0.3 uV for 10 db S + N/N ratio, 85 dB or better dynamic range. 8-pole 2.4 KHz SSB filter & audio active filters. Select the standard SSB filter, standard SSB filter with one section of audio filter, optional 250 Hz or 500 Hz CW filter or CW filter with four audio active filter sections. 50 dB notch, ± 1 Khz offset tuning, QSK instant break-in, VOX or PTT, adj. AGC & drive, 20 dB atten., S/SWR meter, extra receiver jack, sidetone, Hi-Z mic. input, built-in spkr. 12-14 VDC @ 18A. 4¾"h × 11⅜"w × 15"d, 12½ lbs.

Regular $869 - ***Sale Price $769.95***

DELTA Accessories:

280	18A power supply *(Regular $169)*..	SALE	$152.95
255	Deluxe ps w/speaker *(Reg. $199)*...	SALE	179.95
282	250 Hz 6-pole CW filter.....		50.00
285	500 Hz 6 pole CW filter.....		45.00
283	Remote VFO *(Regular $189)*.....	SALE	169.95
289	Noise blanker.....		39.00
1140	DC circuit breaker.....		10.00

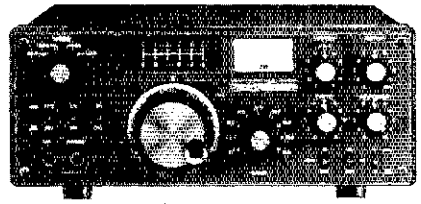


TEN-TEC Model 515 ARGONAUT All solid-state, 5 watt (QRPp) SSB/CW HF Transceiver. 5 HF bands, 80-10m plus 10 & 15 MHz WWV. No tune, broadbanded final - instant band change. Analog dial, 4-pole 2.4 KHz crystal SSB filter. Typical receiver sensitivity 0.35 uV for 10 db S + N/N ratio. Built-in SWR/S meter. QSK instant CW break-in and PTT on SSB.. ± 4 KHz offset tuning, adjustable sidetone, built-in speaker, Hi-Z mic input, LED output and offset indicator. 12-14 VDC @ 1A. 4½" × 13"w × 7½"d, 6 lbs.

Regular $469 - ***Sale Price $399.95***

ARGONAUT Accessories:

210	Power supply.....	$34.00
210/E	110/230v - 13v/1A power supply.....	39.00
206A	External 25 KHz calibrator.....	39.00
208A	External Notch & 150 Hz CW filter.....	59.00
212	29-29.5 MHz crystal.....	5.00
213	29.5-30 MHz crystal.....	5.00



TEN-TEC Model 525 ARGOSY All solid-state, 10/100 watt SSB/CW HF Transceiver. 6 HF bands 80-10m, including the new 30m band & 10 MHz WWV; 40 kHz VFO overrun on each band edge. Switchable, 10 watts or 100 watts input. 100% duty cycle, 20 minutes. Instant band change, broadbanded, no receiver front end or final tuning. Analog dial accurate to ± 2 kHz. 4-pole 2.5 KHz crystal SSB filter, sensitivity 0.3 uV for 10 db S + N/N ratio. Meter shows forward/reverse power, SWR and received signal strength. Offset tuning ± 3 KHz, notch filter, QSK instant CW break-in and PTT on SSB, sidetone, adjustable ALC. 12-14 VDC @ 9A. 4"h × 9½"w × 12"d, 8 lbs.

Regular $549 - ***Sale Price $499.95***

ARGOSY Accessories:

225	9A power supply *(Regular $129)*....	SALE	$119.95
217	500 Hz 8 pole CW filt *(Reg. $55)*.....	SALE	49.95
218	1.8 KHz 6-pole SSB filter *(Reg. $55)*..	SALE	49.95
219	500 Hz 8 pole CW filter *(Reg. $55)*...	SALE	49.95
220	2.4 KHz 8 pole SSB filt. *(Reg. $55)*...	SALE	49.95
222	Mobile mount.....		25.00
223	Noise blanker.....		34.00
224	Audio CW filter.....		34.00
226	25 KHz crystal calibrator.....		39.00
1125	DC circuit breaker.....		15.00
1126	Linear amplifier switching kit.....		15.00

Other Accessories:

234	Speech processor *(Reg. $139)*.....	SALE	$124.95
214	Electret microphone for 234.....		39.00
209	300 watt dry dummy load.....		26.00
215	Ceramic microphone with plug.....		29.50
215PC	Ceramic mic. w/plug & coil cord.....		34.50
227	1.8-30 Mhz, 200w tuner *(Reg. $79)*....SALE		72.95
228	Tuner, as abv w/SWR *(Reg. $95)*...	SALE	85.95
645	Dual paddle keyer *(Reg. $85)*.....	SALE	79.95
670	Single paddle keyer.....		39.00

AES has Over 23 Years Experience in Mail Order

master charge

VISA

Order direct from this ad. Send Check or Money Order. To expedite prompt shipment, Call TOLL FREE and use MASTERCARD or VISA; phone COD orders accepted. Prices do not include shipping.

STORE HOURS: Mon, Tue, Wed & Fri 9-5:30; Thurs 9-8; Sat 9-3
(Las Vegas & Clearwater stores NOT open Thursday evenings)

EXPANDED WATS PHONE HOURS. Even though we have multiple WATS lines, many customers report that they have trouble getting through, especially on Mondays. We have found that lines are less congested afternoons, evenings and towards the end of the week. To serve you better, the Milwaukee headquarters will answer our Nationwide WATS line **1-800-558-0411** until 8 pm (Milwaukee time) Monday thru Thursday. Orders placed Thursday evening can be shipped Friday and be in transit over the weekend.

New AES Branch Store!

1898 Drew Street

Clearwater, Fla.

Phone: (813) 461-4267

Call Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 - Phone (414) 442-4200

AES BRANCH STORES — **ASSOCIATE STORE**

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio Wats 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO Florida 32803
621 Commonwealth Ave
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL 1-800-621-5802

The Collins KWM-380. For those who missed out last year, another chance.

Remember last year when we introduced the new KWM-380?

It sold out practically overnight. Strong testimony to the high-technology appeal of this successor to the famous Collins S/Line and KWM-2.

What makes the KWM-380 so popular? Fifty years of HF communications experience. An established technology base. AC/DC power supply, speaker and accessory functions all in one unit. Microprocessor frequency control for rate selectable tuning in 1 MHz, 1 kHz, 100 Hz or 10 Hz. Frequency memory provides split VFO function for half-duplex transmit and receive.

The high resolution frequency synthesizer locked to a high stability frequency reference is accurate to 10 Hz. Undesirable signals are easily eliminated with independently selectable I.F. bandwidths and passband tuning. Optional I.F. filters can be selected independent of operating mode.

The Collins KWM-380.

See it at your authorized dealer before someone else beats you to it. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. Phone 319/395-5963. Telex 464-435.

Rockwell International

where science gets down to business

NORTHWESTERN DIVISION

ALASKA: SCM, Fred S. Wegmer, KL7HFM — ASCMs: AL7AC KL7IBG. STM: AL7O. SEC: AL7CM. With the summer weather, new antennas are sprouting up all over Alaska. The new tri-band beam atop the Pioneer's home in Anchorage makes it possible for KL7BJD to once again become active. You'll be hearing her regularly on 14,292. Welcome back to the air! Last year we bid adieu to KL7P and KL7Q as they moved to San Antonio, now KL7NR and NL7C are going the same way. I hope Texas sends back our KL7's some day. Anc ARC Prexy, KL7AP, should be home soon after her jaunt through the lower 48 spreading Alaskan good will. Along with OM KL7CQ, she will be going on an extended DXpedition to Bhutan (A51) and Macao (CR9) so give them a call.

IDAHO: SCM, Len Allen, W7JMH — K7ETJ reports the Kootenai Club has two 2-meter repeaters: 146.18/78 and 146.37/97. The CD Net is held weekly, with 15 to 20 QNI and most members help out in local simulated emergencies. Mary Lewis, W7QGP, NW Dir., was given the Treasure Valley Hamfest Commemorative quilt made by XYLs of W7TYG and W7OZJ. W7EYR has new TS530 and new DXCC — congrats. W7RDB back from LA vacation. For Field Day, KARS was at Farragut with ten ops and 12 ARES members. Idaho Contest Conspiracy Group was at Lower Deer Point, 6 ops, 3 ARES. Idaho Falls Mavericks were at Island Park with 8 ops, no ARES.

Net	Freq.	Time	Sess.	QNI	QTC
Farm	3935 ssb	8 P.M. Dy	30	1175	31
CD	3990 ssb	8:10 A.M. M-F	22	526	21
IMN	3635 cw	9 P.M. M-F	22	208	133
KARS	146.37/97 fm	7:30 P.M. Th	4	64	

Traffic: W7GHT 294, W7JMH 37, W7KDB 9.

MONTANA: SCM, Les Belyea, N7AIK — Asst. SCM: K@PP. SEC: W7LR. STM: WB7DZX. Mary Lewis, W7QGP, the Northwestern Division Director, was in the state on four for two weeks and met with club groups and had informative talks and was well received. THANK YOU. Upgrades: WB7FBW and KB7BJ to Extra, congrats. New call: WB7STG now KJ7C. Eastern Montana makes all visitors feel like family, this was demonstrated at their Father's Day picnic held in Sidney. N7BMR and crew did a great job. The Bozeman/Livingston area claims that they are the Extra class capital of Montana with 15, any challengers? The Montana Traffic Net is back on 75-m (3910) on a permanent basis. Field Day is now long past with a good turn out made by the section. The Butte ARC and the Gallatin HRC had a head to head competition during FD, who will win? KB7G worked a Vermont station on 6-m to complete WAS on 6 meters, FB. LARK (Libby) repeater is on the air, 31/91, and doing a good job in the northwest, also the Zortman repeater, also 31/91, in Havre is in operation. Traffic: W7TGU 443, WB7DZX 135, K7SIK 48, W7NEG 20, N7AIK 18, W7JMX 16, W7DB 2.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	0145Z Dy	3908	741	49	K7WPC
OSN	0230/0600Z Dy	3587	392	432	KB7JW
OARES	0115Z Dy	3993.5	533	135	W7HLF
OARES	0230Z Dy	3993.5	140	38	W7HLF
WCN	0300Z Dy	3706	324	145	K7ZIG
PTTN	0300Z Dy	147.76	674	140	W7LRB
PdxARES	0330Z Dy	147.32	1309	54	K7WWR
LBLARES	0330Z Dy	146.79	1008	19	WB7OQH
SOARES	0315Z Th/S	146.94	203	123	KA7DBS
MPARES	0300Z T/Th	147.02	211	3	WA7ZAF
LCOARES	0300Z TWFS	146.85	198	16	W7LRB

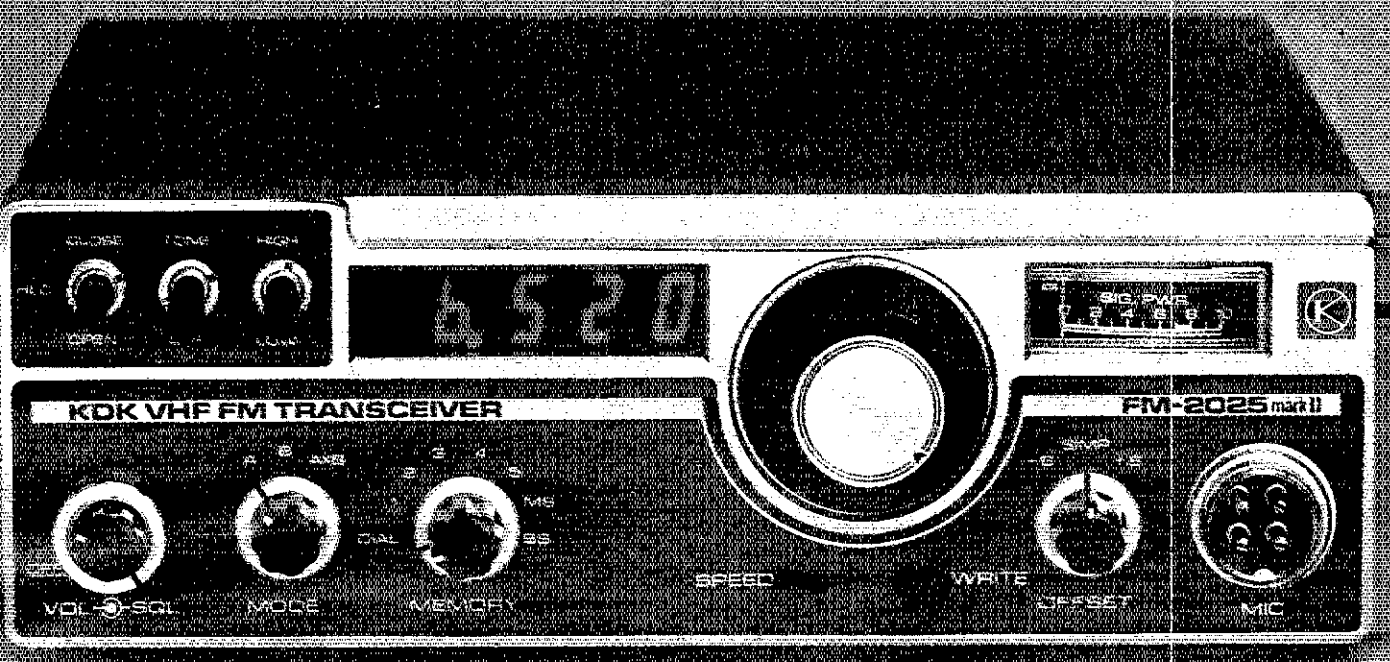
Ten Field Day reports received. Upgrades: Novice — KA7KIS KA7KIR; Tech — KA7KBH KA7CVO KA7CVR KA7KBJ; General — KA7AID KA7HOI KA7CXP KA7AIW WB7NHT; Advanced — W7ZVC WB7OTR WB7WHO; Extra — N7BMY. Congrats all. KA7DWZ and AK7T helped capture a purse snatcher via 2 meters. New DXCC for N7BIJ and WAS six meters for WB7SZM, congrats. Grants Pass club maintained communications for the white water races on Rogue River. OTVARC had 100 out of 113 members in attendance for May meeting. WA7TEG and KB7MP rescued two young men in car accident during Field Day. KA7ILE is with National Guard for summer. Traffic: (June) W7VSE 562, W7LRB 373, K7NTS 252, KB7JW 170, WA7IHS 159, W7LNE 144, K7IFG 141, WA7LGN 140, WB7OEX 123, W7QMU 55, KI7Y 32, W7TC 26, KA7DBS 12, K7WWR 12, W7LT 9, W7DAN 7 (May) K7NTS 286, KB7JW 265, W7ZB 129, WB7DSK 3.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX. SEC: WA7RWK. NMs: WA7CBN KA7CSP W7GB W7IEU.

Net	Time(Z)	Freq.	QNI	QTC	Mgr.
NTN	1930	3970	1083	82	K7AJT
WARTS	0200	3970	2785	227	W7EQY
NWSSBN	0230	3945	608	47	W7ZPK
WSN	0245/0545	3590	572	187	W7GB
EWTN	0130/0530	146.64	86	82	WA7CBN
IETN	0130/0300	147.30	91	19	KA7CSP
PSTS	0130/0630	145.33	118	74	W7IEU
SCARES(N/E)	0330 Wed	147.18	41	0	W7ERH

The above nets meet 1 hour earlier during daylight saving time. N7CT has received his 50 year pin from QCWA. WA7LQV has 30 more to go for 5BWAS. W7ERH active again after installing new antenna. WB7FGC out for FD with Spokane Dial Twisters. KB7G up to 15 states on QSCAR and took good advantage of opening to East Coast during vhf contest. KA7CSP WA7LNC and W7ZEP working to set up an amateur "spotter" system for NWS in the Spokane area. W7FCB of WWDX Club asking for ham radio demonstrations to be set up in shopping malls on the 2nd weekend of September. That is the same weekend as the Washington State QSO Party that signals the end of Washington State Amateur Radio Week, my thanks to K7RS and BEARS for keeping this party rolling, a nice way to end our week. Four charter members of the Radio Club of Tacoma attended 65th birthday party of the club. My thanks to those who helped during Maryfest week in Marysville and to those who left us a clear frequency for operating. Another ps function did not have such good cooperation, the vhf contest was on and one of the contest stns caused some problems to the communications being handled. Please use some discretion when contesting. Our public service communications usually don't last too long and it's easier for one station to change than it is for a whole group to change frequency, especially when using xtal controlled hand-helds, and we do disappear quite quickly after we "do our thing." Anyway the station that sent me the report hopes the other fellow did good in the contest. W7MGG WB7AHF KB7PI KE7A N7AME WA7MAP KA7DQG and W7IEU took part in a hospital emergency

KDK MAKES 2 METER FM SIMPLE AND EASY!



KDK INTRODUCES A NEW GENERATION OF 2 METER FM RADIOS.
E SPARKLING 2025A MKII IS LOADED WITH FEATURES. EASE OF OPERATION IS THE DESIGN CONCEPT AT KDK.

Features such as ten channel memory in two banks of five h, a solid 25 watts of power, full MARS and CAP coverage m 143.000 Mhz to 148.995 Mhz, plus built in memory re-tion for up to one year . . . and much, much more makes this radio of the year.

If you have been waiting to move up to a new model, or have hed for a radio with "everything" . . . KDK has it!

The ten channel memory is easily addressable and you have banks of five channels each. You can even use both banks at e for odd splits.

Standard 600 hz shift up or down — plus factory available rds for foreign shifts. Your 2025A is never obsolete!

Band scan or memory scan. Memory scan is easy. There is also d scan with upper and lower limits you can choose yourself!

Built in nicads for the memory retention which has drain in o-amps, not milli-amps. The internal battery will hold the mory for up to one year! No other radio offers you this ture.

Fast and easy dialing. Full solid state dialing and you can ose from the front panel either a fast or slow dial rate.

No relays are used, only solid state switching. This eliminates ouble spot many radios encounter.

KDK has also eliminated another trouble spot by completely d wiring each radio. No internal plugs to become intermittant no wire wraps either, just good solid wiring.

KDK gives you one of the hottest receivers you can find. By ng UHF (not VHF) dual gate MOS-FETs with electronic auto ing for the RF amplifier and the first mixer, you have a com-ation of ultra sensitivity and maximum quietness.

The squelch on the 2025A MkII is highly sensitive and front el adjustable, use it for ultra-DX or super local.

•The audio output stage in the 2025A MkII uses an integrated circuit which has internal protection against over-voltage and shorted output conditions. Plus it is a high audio output chip — just what you need in a noisy mobile situation.

•The transmitter uses direct VCO varicap modulation for true FM. Your transmitted audio sounds as it should; crisp, clear and natural.

•The power output stage of the 2025A MkII will not break down even with an infinite VSWR load, and uses heavy duty solid state antenna switching with a four stage low pass filter. All this gives you an exceptionally clean, spur free output.

•KDK has included an adjustable sub audible tone circuit which can also be used for CTCSS or tone burst on transmit. Again, more features!

•Size is 2 7/10" high, 7 1/8" wide, and 9 1/2" deep.

•You can switch from 25 watts to 3 watts low power.

•And, of course, the DC cable is included along with the matching microphone and mobile mounting bracket. A tone encoder microphone is also available to match and is, naturally, pre-wired.

Write for brochure — Dealer inquiries invited!

AT YOUR DEALERS . . .

KDK

Distributed by:

KDK DISTRIBUTING CO., INC.
617 SOUTH GALLATIN ROAD — MADISON, TN 37115
Phone (615) 865-7949

communications exercise. Results? The hospitals are now looking at a plan to link the hospitals together via Amateur Radio with permanently installed equipment and antennas for emergencies. Traffic: W7DZX 532, WB7TQF 306, W7FJZ 187, N7CSP 186, K7CTP 129, K7GXZ 129, W7GB 120, W7IEU 84, N7AFY 83, WA7BDD 78, WA7JEB 60, AD7G 46, N7AFZ 45, W7BUN 39, WA7RCR 34, WA7EDQ 30, W7LG 28, N7CT 18, W7APS 15, WB7CFH 13, KA7CSP 13, WA7LQV 11, W7ERH 7, K7RBT 3, WA7OJI 1.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF VE2AQV/W6 N6DHN. SEC: WB6KQU. FD messages received from MDARC, 50 members, 30 ARES; EBARC, 1 member; NBARA, 15 members & media coverage. Thirty-five members of the Napa Valley Emergency Net provided communications services at the devastating Atlas Peak fire, which destroyed many homes, including that of W6QH. Napa EC, N6XN, and the NVEN gang did an outstanding job. W6ZF's West Coast Bulletin, 3540 kHz at 8 P.M. PST, now being sent on his new KB-4900 keyboard as arthritis no longer allows the manual mode. SARS ran FD from Kennedy Park. MDARC mourns the loss of N6CFH. SBARA's new officers: WD6GKN, pres.; KQ6A, v.p.; WD6BZO, secy.; K4ROT, treas.; KA6BUD, activities; K6OI, trustee; WA6MDI, raffle chmn.; N6DNC, taffler; N6DUQ, ed.; WA6QJB WD6AIA K6UIU, at large. EBARC member, WD6FRP, outlined her operations as ZL⌀TCZ/WA6 in "The Blown Fuse." Traffic: W6OA 121, K6APW 34, KA6ERF 12.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. Las Vegas Club Field Day had as chief cook AD7K. We understand the food was so good he should open a beanery. Congrats to KB⌀DT (ex-WA7GSG) on his upgrade. WB7ACV busy on cw putting Reno on the map. KB7BP has a computer and will soon be on RTTY and high speed cw. N7AKX going to Veterans Hospital each week providing message service for the patients. Nevada Sagebrush Net meets weekdays at 7:30 P.M. Pacific time on 3906 kHz. W7BS is Net Manager. Traffic: N7AKX 413, W7BS 75, W7SK 8.

PACIFIC: SCM, Pat Corrigan, KH6DD — Congrats to all the fine Field Day efforts this year. Each island had activity with the Big Island having both east and west Hawaii going at it. The effort at Bellows AFS this year was 100% wind powered. Great! HARC mounted a small but effective operation from Round Top. K6SVL was recent visitor. He saw KH6BZF and KH6GDR among others and had lunch with KH6IJ. Nose was also seen at Field Day. PTN stalwarts carried on during KH6HIJ's trek east to visit family. Congrats to Honolulu ARES group who did outstanding job providing comms for 1st annual Windward Marathon. Many fine compliments. Also, to KH6IC and company who did the same for Kailua July 4th parade. Big Island ARC FD operation was also good PR. KH6HDA in Seattle will be papa soon. KH6HGG now KB2YC.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. New officers for the River City ARCS are : W6WAH, pres.; KA6ADR, v.p.; Marie Martin, treas.; WA6RPB, editor; WB6NPC, secy.; WA6APE WB6ROS WB6YKI WB6YLK KA6LLQ, dir. The J.f. Sabin Pioneer RC has elected WA6NDZ, pres.; W6TEE, v.p.; W9QG/6, secy.; W6VTY, treas.; W6LVC WB6DQP, dir. New calls in the Chico area are KA6NZJ and KA6NZK. Congratulations to WA6GQK on his new Advanced ticket and to WD6GTO and KA6LMJ on their Techs. Field Day survivors include River City ARCS, GEARS, North Hills, Sacramento ARC, Yuba/Sutter RC and World Radio Staff RC. K6SG went single operator for a change. N6JV had to stay home, but got his WPX total to over 1675 worked on cw. Traffic: W6SX 5, W6RSP 3.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Explorer Post 599-Analy High School is now an ARRL affiliated club. Joint effort of Marin Amateur Radio Club, Sonoma County Radio Amateurs and Amateur Communications Society at Marin County Fair was very successful. Welcome to Novices KA6PXQ KA6PXR KA6PXS, all graduates of AG6C class. Congrats to N6EMJ on upgrade to Advanced. The mayor of Eureka proclaimed June 22-28 Amateur Radio Week, in connection with Field Day. Redwood Empire Radio Amateurs furnished communications for parade and 26 mile run, and have a 2-meter station set up in hospital for emergencies. SF Section was well represented on Field Day. Traffic: W6IPL 200, K6TWJ 30, WA6QXV 6.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. W6IRV is a Silent Key. New officers of the Fresno ARC: WA6UOR, pres.; WB6ZCJ, v.p.; WA6YAK, secy.; WA6LDJ, treas. The club meets the 2nd Fri in Fresno. WD6ADC has WAS on 6 meters. WB6ODX and W6DPD worked Colorado and Kansas on 2-m ssb. WB6GBJ has a Swan 350C. W6ZFN has a TR2400. WA6IWW has an Azden PCS 3000. WA6ZCL has new antennas. WA6JDB chasing DX. AK5B spent 13 weeks in Firebaugh and worked some exotic DC. KA6LGE KA6LGN and WB6WVE are Generals. KA6LGO and KA6MQL are Techs. K6RGZ is Extra. KA6LGD is N6EMW. KA6LGF is KD6YQ. KA6LGR is N6EMX. NCN: QNI 1614, QTC 665. Look for KB6AR or KB6CC operating from the 1981 Visalia Balloon-a-Fair on 7.235, 14.285, 21.360, or 28.510 MHz from 0100Z 26 Sept to 0100Z 28 Sept. QSL with large s.a.s.e. to KB6CC. Don't forget the big Cal QSO Party in early October. Traffic: N6AWH 143, KV6W 49, KB6CC 37, K9YBM 29, W6DPD 23, WA6YAB 12, WD6FRS 8, WA6JDB 4.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6REF — SEC: WB6IZF. Assistance to Calif Forest Department was coordinated by WB6IZF for the fire south of Big Sur. Five to ten operators were on duty for several days, also hams patrolling fire danger areas during the extremely dry season — if you can help contact IZF. W6OII reports busy on nets and handling tfc, also busy as editor of "Scuttlebutt." W6CF, ex SCM, QRL with work and not much on-the-air activity. W6KZJ as well as many others had a fine time during Field Day, he also had a good tfc total. W6PRI working NCN and county hunting. WB6GFJ spent July and August as FO⌀FB in Tahiti. W6ZRJ doing code proficiency runs and getting a new rig on the air. WB6HBL has a new keyer paddle and working mobile cw. W6MMG reports only ragchewing during month and that KA6OCG is new Novice in Belmont. OO, K6AYB sent in report on poor cw sigs. K6RQ gave talk on repairing ham radio gear to the Santa Cruz CARC. W6DXQ is now KA6AH. SCCARC is going full speed ahead on plans for Pac Div Convention in Oct, 1982, if you can help, contact WA6OCV. LERA ARC welcomed the following new members; WB6CRG W2BBC WA6YCI

TUNE IN THE WORLD WITH HAM RADIO

- **NEW EDITION - 80% NEW MATERIAL**
- **NEW CODE PRACTICE CASSETTE**

Over 200,000 persons have used TUNE IN THE WORLD WITH HAM RADIO as their steppingstone into Amateur Radio, the space-age hobby. The third edition of this popular package has been expanded with over 80 per cent new material. The code practice cassette has also been redone and improved. Packed into the *Tune in the World* booklet are chapters on:

EXPLORING HAM RADIO: Hams come from all walks of life; age is no barrier; building your own station; a look back in time.

MANAGING THE RADIO SPECTRUM: The FCC; rules and regulations; the Novice license; licensing classes.

LEARNING YOUR NEW LANGUAGE: The Morse Code — why every ham knows it; how to learn it the right way.

UNDERSTANDING BASIC THEORY: Easy-to-learn explanation of electronic theory and what you need to know to qualify for a Novice license.

SETTING UP YOUR STATION: Choosing a location; how to select your equipment; what antenna to use; glossary.

OVER THE AIRWAVES PAINLESSLY: How to operate; tuning up; safety; identifying stations in foreign countries; awards; clubs; The ARRL and *QST*.

The booklet consists of 134 pages of text and an additional 26 pages of equipment and publication advertising. The C-60 cassette provides 60-minutes of code practice instruction. The entire package is available for $8.50 (in U.S. funds) and is available at your favorite dealer or from:

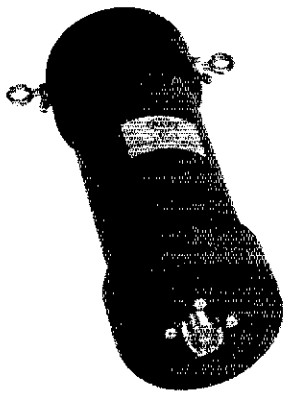
Published by The American Radio Relay League
225 Main Street
Newington, CT 06111

A BETTER BALUN

from Barker & Williamson, Inc.

BROAD BAND BALUNS

Power Rating 2.5 KW–5 KW PEP
Frequency Range 3.5–30 MHz
SO 239 CONNECTOR



Types Available

Model BC-1
50 ohms unbalanced to 50 ohms balanced

Model BC-2
50 ohms unbalanced to 200 ohms balanced

Model BC-3
50 ohms unbalanced to 300 ohms balanced

Model BC-4
50 ohms unbalanced to 600 ohms balanced

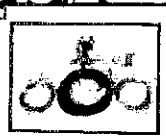
See your dealer or write:

Barker & Williamson, Inc.
10 Canal Street
Bristol, Pa. 19007

B&W

UNIQUE

TRIPOLE MULTI-BAND



The TRIPOLE antenna covers the 160, 80, 40, 20, 15, 10 and 6 meter bands without retuning or a tap change. 80 to 120 ft. length. 2 KW PEP. Twinverted V and horizontal without an antenna tuner. Neat appearance, built-in balun, rugged, aids mast or tower guying. A best choice for an all-around amateur station antenna.

Guaranteed. Kit T80-K $74.95; Assembled T80-A $84.95 Prices postpaid cash. TX residents add 5% sales tax.

Call or send card for information on TRIPOLE antennas and feedline kits. Order direct or ask your Dealer

UNIVERSAL RADIO CO.
Dept. Q1 P.O. Box 26041
El Paso, Texas 79926 (915) 592-1910

VISA or MASTER CHARGE

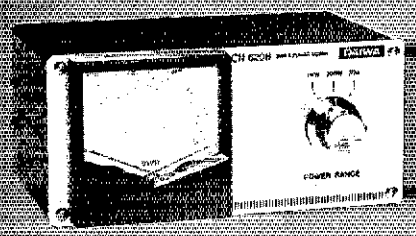
DAIWA Communications Essentials

Simultaneous SWR/Forward & Reflected Power Readings

SWR & POWER METERS

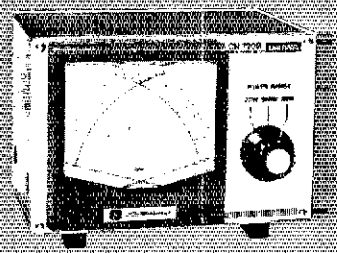
Tolerance: ± 10% full scale
Input/output Impedance: 50 Ohms
Connectors: SO-239

Model CN-620B (New 2 Kw Scale)

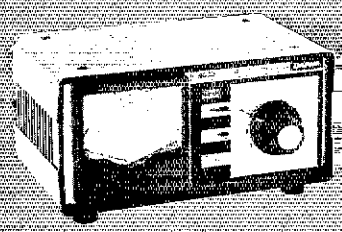


Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 165 x 75 x 97 mm;
6.5 x 3 x 4 in.

Model CN-720B (New 2 Kw Scale)



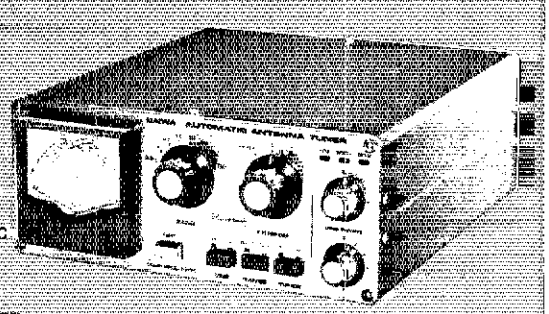
Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 180 x 120 x 130 mm;
7 x 4.75 x 5 in.



Model CN-630

Frequency Range: 140—450 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 2 Ranges (Forward, 20/200 Watts)
(Reflected, 4/40 Watts)
Dimensions: 180 x 85 x 120 mm;
7.12 x 3.37 x 4.75 in.

Automatic Antenna Tuner Model CNA-50

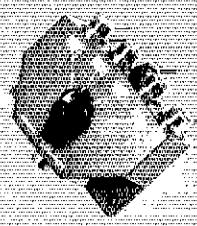


Frequency Range: 3.5—30 MHz (Including WARC Bands)
Power Rating: 500 Watts PEP
Internal Dummy Load: 50 Watts/1 Minute
Impedance Matching: 15-250 Ohms to 50 Ohms Resistive
Input Power Required for Automatic Tuner: 1, 5 or 10 Watts (Set by rear panel switch)
Tune-up Time: 45 Seconds Max.
Power Requirement: 13.8 VDC/2 Amp

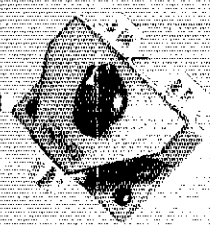
Coaxial Switches

Power Rating: 2.5 kW PEP, 1kW CW
Impedance: 50 Ohms
Insertion Loss: Less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz
Isolation: Better than 50 dB at 300 MHz; better than 45 dB at 450 MHz; adjacent terminal
Unused terminals grounded
Connectors: SO-239

4 Position/ Model CS-401



2 Position/ Model CS-201



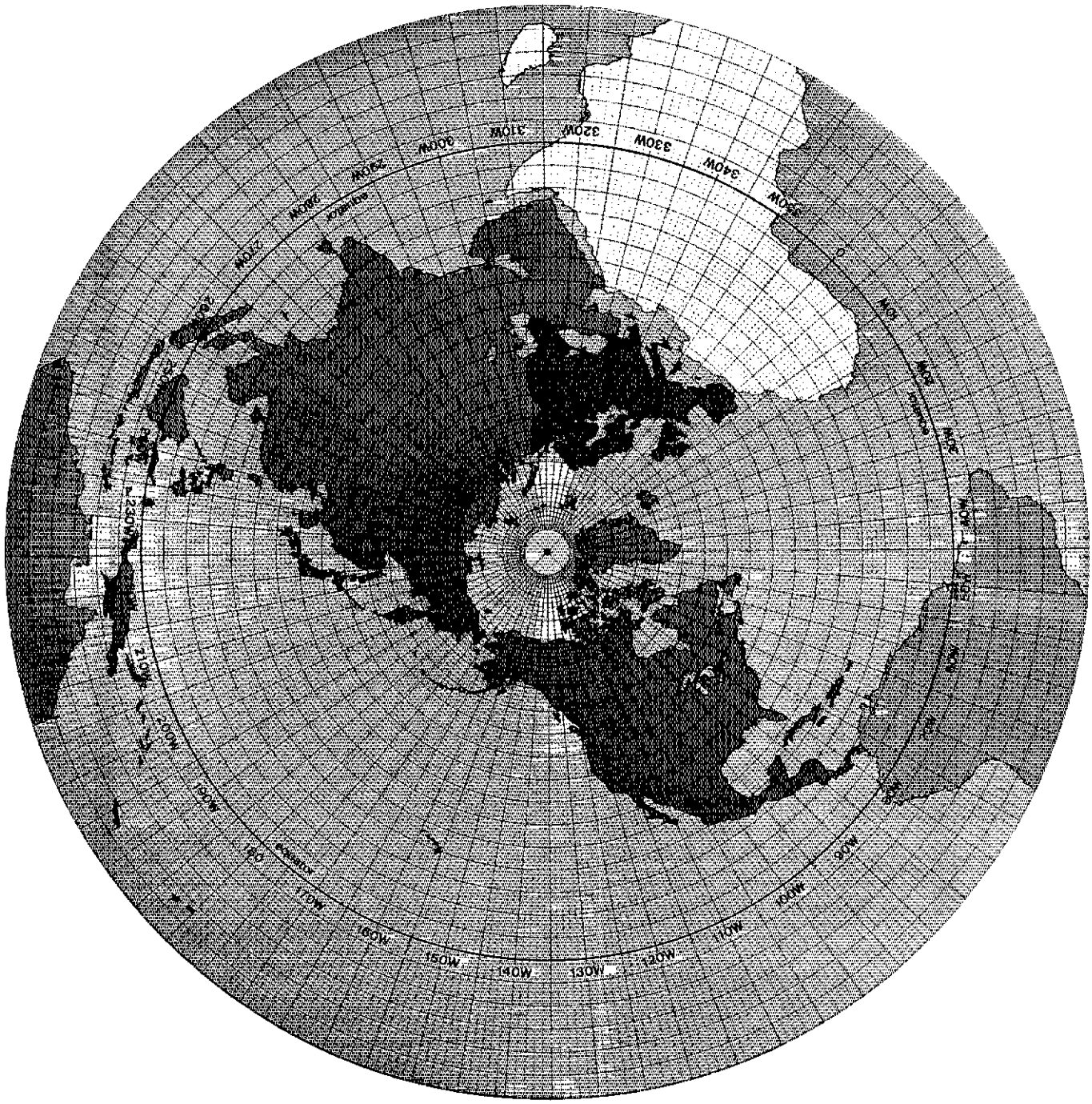
Exclusive USA agent for these units; Inquiries invited.

Write for literature.

A Wholly Division

BELL INDUSTRIES

19070 REYES AVE. ■ P.O. BOX 5825
COMPTON, CALIFORNIA 90224
Phone (213) 537-5200



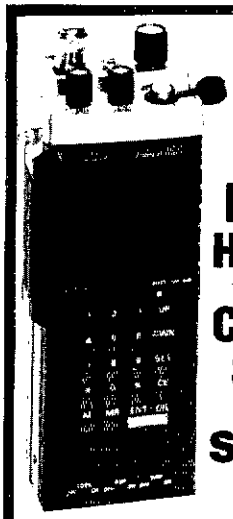
"ALL NEW"
OSCARLOCATOR PACKAGE

$7.00 USA
$8.00 ELSEWHERE
(U.S. FUNDS)

10 steps to successful OSCAR communications ● station requirements for satellite communications ● how to operate using a phase II satellite ● input vs. output frequency charts ● new plotters ● amateur radio satellite launch history chart ● pictures ● what is AMSAT ● telemetry forms ● VOSAT educational satellite information ● and more.

THE AMERICAN RADIO RELAY LEAGUE, INC

225 MAIN STREET



YAESU

FT-207R Hand-held

CLOSEOUT SPECIAL

SAVE $89

YAESU FT-207R 2m FM Hand-held. Microprocessor controlled, 800 channels - keyboard entry 144 to 148 MHz. LED display, up/down manual or autoscan, priority channel & memory back-up. ±600 kHz offsets or any odd splits. 2½ watts or 200 mw output. With Nicad pack, wall charger, flex antenna, earphone & strap. 7¼"h × 2⅜"w × 2¼"d, 1¼ lbs.

Regular $339 - ***Closeout $249.95***

Accessories for FT-207R

NC-1A 15-hr drop-in charger	SALE $44.95
NC-3A 15/4-hr drop-in chgr/AC adapt.	SALE 79.95
FBA-1 Battery sleeve for NC-1A/3A	8.00
NBP-9/FNB-1 Extra NiCad battery pack	23.00
NC-9B Extra 15-hr wall charger	10.00
PA-2 Mobile DC-DC adaptor & charger	39.00
YM-24A Speaker/microphone	32.00
FTS-32E 32 tone CTCSS encoder	40.00
FTS-32ED 32 tone CTCSS enc/dec	75.00
LCC-7 Leather carrying case	35.00
TA-2 19" telescoping whip antenna	9.40
MMB-10 Mobile bracket	15.00

Limited Quantity - Order Today!

master charge THE INTERBANK CARD

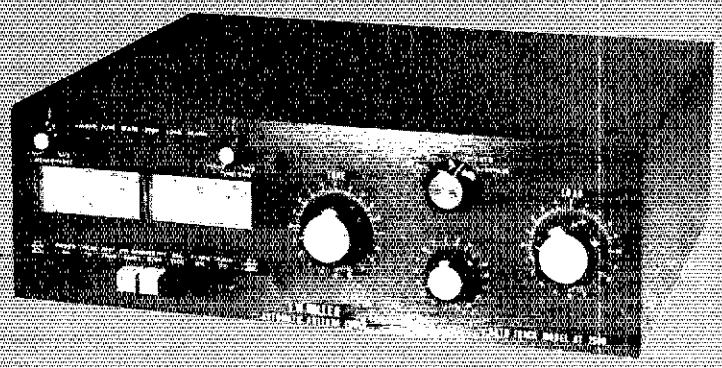
VISA

AMATEUR ELECTRONIC SUPPLY®

4828 W. Fond du Lac Avenue
Milwaukee, Wisconsin 53216
Phone: (414) 442-4200
Wisconsin WATS: 1-800-242-5195
Nationwide WATS: 1-800-558-0411

AES Branch Stores In: Clearwater, FL • Orlando, FL • Wickliffe, OH • Las Vegas, NV

New Automatic Antenna Tuner Auto-Track AT 2500



Designed and Built by J. W. Miller Div.

Check these state-of-the-art specifications

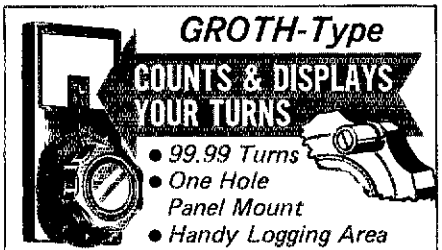
- Power Capability: 2500 W PEP.
- Frequency Range: Continuous 3.0 to 30 MHz (including WARC Bands).
- Impedance Matching: 10 ohms to 300 ohms to 50 ohms resistive.
- Direct Reading SWR Meter: 1:1 to infinity.
- Direct Reading Power Meter: Two meter scales from 0 W to 250 W and 0 W to 2500 W, front panel switch selects FWD or Reflected Power *(illuminated panel meters)*.
- Power meter displays RMS with continuous carrier and automatically displays PEAK when driven with SSB signal.
- Average "Automatic" tune-up time: 15 seconds or less.
- Tune-up time not affected by power level; can be as low as 1 W (5-10 W preferred).
- Power requirements are 115/230 VAC 50-60 Hz, 10 W operating/5 W standby; or 13.5 VDC, 1 A operating/.5A standby.
- Antenna tuner packaged in cabinet 17"W x 5¾"H x 14"D (Front panel handles or rack mount optional at extra cost.)

Write for literature.

Specifications subject to change without notice.

Dealer Inquiries Invited

J.W. Miller Division
BELL INDUSTRIES
19070 REYES AVE. ■ P.O. BOX 5825
COMPTON, CALIFORNIA 90224
Phone (213) 537-5200



GROTH-Type

COUNTS & DISPLAYS YOUR TURNS

- *99.99 Turns*
- *One Hole Panel Mount*
- *Handy Logging Area*
- *Spinner Handle Available*

Case: 2x4"; shaft ¼"x3"

TC2	$10.00
TC3	$11.00
Spinner Handle Add	$1.50

Prices include UPS or Parcel Post

Model TC2: Skirt 2-1/8"; Knob 1-5/8"
Model TC3: Skirt 3"; Knob 2-3/8"

R. H. BAUMAN SALES
P.O. Box 122, Itasca, Ill. 60143

DERRICK ELECTRONICS, Inc.

Your DISCOUNT ham dealer in Broken Arrow, Oklahoma

Call 1-800-331-3688

for your Okie DISCOUNT deal on:

•KENWOOD	•LARSEN	•CUSHCRAFT	•TEMPO
•ICOM	•HUSTLER	•BENCHER	•MF J
•DENTRON	•HY-GAIN	•MIRAGE	•KLM

Many additional product lines

Accepted

714 W. KENOSHA — P.O. Box A — BROKEN ARROW, OKLA, 74012

KA6ODY and K6CRI. The following members of SMRC have been on the sick list: W6DWJ K6ITL W6SSA W6SER and W6NVO-hope they have all recovered by now! The dust has cleared from the annual Field Day competition between FARS and PAARA. PAARA sadly reports the passing of long time member, officer and editor of PAARAgraphs, W6BFH. Other Silent Keys reported by PAARA are W6VYC W6DEF and W6AZS. Traffic: W6YBV 292, W6KZJ 84, W6RFF 31, W6OII 24, W6ZRJ 20, WB6IZF 4, W6PRI 4, W6CF 2

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: NJ4L. SEC: WA4BFT. NMs: CN AB4V, CMN NJ4L, then WD4CNR, JFK WB4WII, NCSSB WB4CES. The Coastal Carolinas Chapter, QCWA, meeting was held July 11, in Goldsboro. New officers installed: AA4L, pres.; W4OMW, v.p.; W4UTO, secy./treas. A program of photos and stories of Amateur Radio in the 20s was presented by W4JG and W4OMW. Congratulations to the following upgrades: Extra - N4BWO; General - KA4AOZ and KA4AUR. Cape Fear ARS provided communicatios for 10,000 meter run at Spivey's Corner Holler'n Contest under K4NUG. Also two demo ht stations were operated. Silent Key reported - WB4DYD. Shelby Hamfest always big event on NC calendar. See you there. Make your plans for Asheville in October. Major activity upcoming in October - Simulated Emergency Test (SET). Contact your local Emergency Coodinator (EC) to see how you can participate. At least plan to monitor section and local nets during SET. Please send news items from your area to me for inclusion in this column. Requests coming in for TIP (Traffic Information Pool) presentations to W4EAT. Your club invited to request one of these progams. Traffic: (June) WD4CNO 339, NJ4L 276, W4EAT 234, AB4S 207, WB4WII 180, AB4V 138, WD4CNR 128, WD4JJK 105, K4DHX 98, KU4W 98, WA4SRD 89, W8PJS 85, N4CJJ 81, WA4UTC 76, WB4UJH 65, WA4OBR 64, KF4R 60, K4IWW 55, WD4EIQ 41, K4FTB 41, KZ4A 40, WB4CYN 38, K4MC 38, AB4J 37, W4FMN 35, WA4CUD 33, NE4J 28, KA4KJI 27, WA4PID 22, N4UE 21, W4WXZ 16, NB4L 14, WD4CFZ 13, N4CCK 9, K4XE 7, W4EHF 6, WD8NRC 6, WB4HRR 3, KC4MI 2, WB4TOP 2. (May) KF4R 112, N4ARY 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NM: K4PFC W4ODE KA4AUR. Tnx to all the clubs who sent in Field Day reports, some real good scores. Look for the fall one — The Greater Pee Dee Radio Society has new repeater — 146.145/146.745. Spt'g ARC busy with Amer. Red Cross in apartment house fire, which caused 40 homeless and 2 fatalities. North Augusta Belvedere ARC busy with severe weather conditions, & helping authorities in search for a downed plane. Trident ARC 2M Net busy with severe weather conditions. Check-ins/traffic: SC SSBN 1068/130; Blue Ridge 2M Net 1822/71; SC Noontime Net 382/47; Lancaster County 2M Net 161/6; Western SC Emergency Net 360/20; Newberry County ARES Net 81/5; Carolina State Line Net 46/10; CNN 187/63; Trident ARC ARES Net 189/0; York County ARES net (June) 228/22, (May) 186/16; Dixie 6M SSBN 9/0; SC 2M SSBN 31/0; Spartanburg ARC 2M Net 354/25. Traffic: (June) W4ODE 274, K4ZN 263, W4ANK 128, KA4AUR 105, W4NTO 97, K4ZB 52, K4FRX 41, W4FMZ 39, WA4MIY 39, W4MTK 29, AF4E 20, W4DRF 18, WA4MCG 13, WB8TCT/4 11, KA4LRM 10, NC4F 8, K4RVC 5, K4ADI 1, N4EE 1, WB4NBK 1. (May) WB8TCT/4 11, WD4DOL 4.

VIRGINIA: SCM, Luck Hurder, WA4STO — SEC: KZ4K. STM: KY4K. Chief OVS: N4CD. Chief OO: W4HU. Chief OBS: K3RZR.

Net	Time	Freq.	Sess.	QTC	QNI	NM
VNTN	Noon	3905	30	81	207	WD4FTK
VSBN	6:00	3947	30	209	522	W4NWM
VSN	6:30	3705	30	127	318	WB4KSG
VN	7:10	3680	60	317	520	W4SUS
VLN	10:15	3947	30	151	445	WD4ALY
WARC	8:30 A.M. Sn	3745	4	9	9	K4JST

While many of us were on vacation in June, others were busy planning on-the-air activities. KA4ERP and WB4LNT were actively preparing for the Boy Scout Jamboree in July/August. No BPLs this month, but wait for July! Steve Place from Hq will be at Camp A.P. Hill to help coordinate the RTTY traffic efforts in an attempt to snow us! Nice Field Day reports received from many clubs and newsletters received from Richmond, Williamsburg, and Staunton area clubs. W4FJ is excited about new British satellite due up in September which will transmit not only synthesized voice data but SSTV pictures of the earth on 2!m! Should be a popular bird. Ex-SEC, N4AZI, sends his greetings to his old section from Baton Rouge, LA. Nice to see that K4LMB is again getting active in traffic circles. KA4HLI performing liaison duties while home from college — with a broken hand! Chief OVS, N4CD, very active on vhf in June with 46 states worked and several new DX countries — better than many of us do on ht. WD4CXU and WB4IUS active on six meters. Chief OO, W4HU, reports 18 reports sent out by Virginia OOs. This is an important function within our self-policing amateur ranks, and more volunteers are needed. Congrats to new ECs W4PAS and WA4PAS. NM, W4NWM, bemoaning the incredibly regular electrical storms each night at 6 P.M. Kudos to high traffic op W3ATQ this month. WA4EQW and WB4PNY heard mobiling all over the Old Dominion on cw. Don't forget that the Virginia Section traffic training program is available to all interested League members for the asking, as are appointments to qualified operators in their fields of amateur interest. SEC, KZ4K, preparing for nuclear plant disaster in the fall and needs help from all ECs and DECs. Traffic: W3ATQ 347, WA4CCK 330, WB4PNY 293, K4JST 198, WA4LJI 188, KZ4K 175, WD4ALY 136, WD4FTK 136, WB4KSG 132, WA4STO 132, W4SUS 127, WB4FLT 125, W3BBN 118, K4JM 116, W4NWM 110, WB4FDT 83, N4RF 81, K3RZR 63, KD4FP 61, KB4WT 61, KA3DTE 55, N4EVV 37, N4BJX 31, W4UQ 31, K4EJ 30, KB4PW 30, WA4YIU 29, K0JH 28, WB4DQZ 27, WA4OWC 27, WA1VRI 27, KA4ERP 26, N4DYY 26, K4VWK 24, KY4K 23, KA4IUM 22, WB4KIT 20, W3BBQ 18, W4YVG 18, W4NFA 17, K4MTX 16, WB4RWY 14, KI4W 14, WB4ODZ 13, KA4HLI 8, W4KFC 8, W4LXB 8, NN4I 7, WB4LAB 7, N4LE 7, W4PVA 7, WA4RTS 7, WB4MAE 6, WB4ZTJ 6, WB4UHC 5, W4CFV 4, W4KXE 4, KC4HN 3, N4DW 2, W4OKN 2, WA4TVS 2, W4TZC 2, WA4EQW 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs K8MHR W8FZP WD8LDY KD8X. 23rd annual WV ST ARRL Conv. was July 4 & 5, at Jackson's Mill. WB8GDY was selected outstanding amateur of the year for 1981. WV Field Day award for 1980 was won by WVDXA. Certificates of merit were

IF YOU DIDN'T CALL THIS NUMBER

TOLL-FREE

1-800-325-3636

BEFORE BUYING

- Collins
- Dentron
- Drake
- ICOM
- Kenwood
- Tempo
- Ten-Tec
- Swan
- Yaesu

YOU

PROBABLY

PAID TOO MUCH !!

HAM RADIO CENTER

8340-42 Olive Blvd. • P.O. Box 28271 • St. Louis, MO 63132

master charge

VISA

Barry Electronics Corp.

WE SHIP WORLDWIDE

WORLD WIDE AMATEUR RADIO SINCE 1950

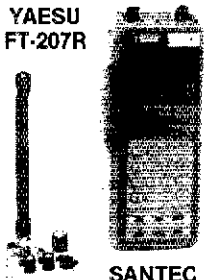
Your one source for all Radio Equipment!

All Handy Talkies In Stock For Immediate Delivery!
VoCom 2 meter 5/8 Telescoping Whip & Duckie Antennas & HT Amp's HEAVILY STOCKED

World Wide Satellite Systems Available

We Will Not Be Undersold
Call: 212-925-7000

YAESU FT-207R



TEMPO S1. S2. S4, S5

ICOM IC2AT

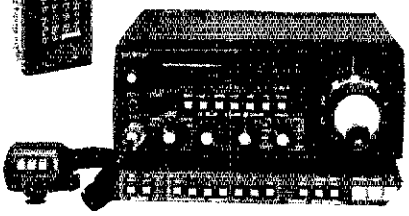
SANTEC HT-1200

DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier

Complete Earth Satellite Receiving Station Available at Barry for only $5990.00.

Includes 12' or 16' dish, control console, receiver with polarity control, LNA, feed cover, cables. (Less concrete pad.)

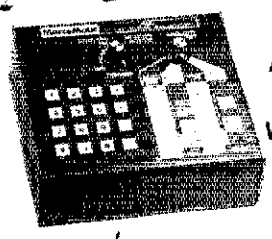
Write or call today for full details.



Rockwell/Collins KWM-380

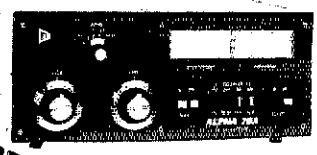
YAESU

FT-101ZD MARK III, FT-107M, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM, FT-290R

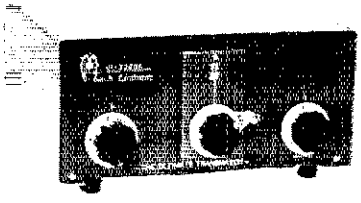


AEA Morse Matic

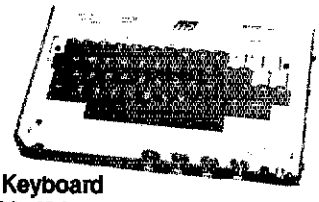
BIRD Wattmeters & Elements in stock

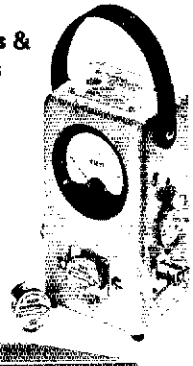


ETO Alpha 76CA
2 + KW PEP/3-8874 FINALS
With Hipersil Transformer

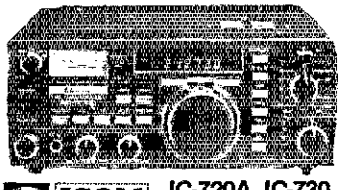


Murch Model UT2000B



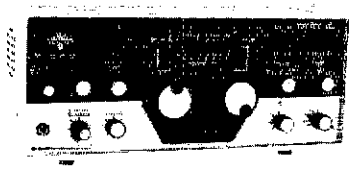


MFJ Keyboard 496, 494

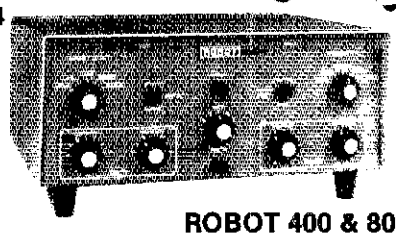


ICOM IC-720A, IC-730 IC-25A, IC-290A

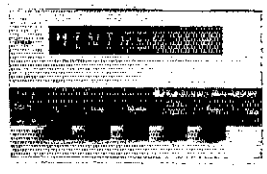
HY-GAIN TOWERS & ANTENNAS



ASTRO 103 150A & 100 MXA
DIPLOMAT 150



ROBOT 400 & 800



KANTRONICS Mini-Reader

Amateur Radio Courses Given On Our Premises

Export Orders Shipped Immediately.

"Aqui Se Habla Español"

New York City's *LARGEST STOCKING HAM DEALER* *COMPLETE REPAIR LAB ON PREMISES–*

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP.
512 BROADWAY, NEW YORK CITY, NEW YORK 10012
BARRY INTERNATIONAL TELEX 12-7670 212-925-7000
TOP TRADES GIVEN ON YOUR USED EQUIPMENT

AUTHORIZED DISTS. MCKAY DYMEK FOR SHORTWAVE ANTENNAS & RECEIVERS.

IN STOCK—NEW ROBOT MODEL #800, BIRD WATTMETER, HY-GAIN, LARSEN, SHURE, KDK-2015R, TURNER, ASTATIC, VOCOM, VHF ENG., MFJ, KANTRONICS, DSI, AVANTI CORDLESS TELEPHONES, POCKET SCANNERS, NYE, BENCHER, VIBROPLEX

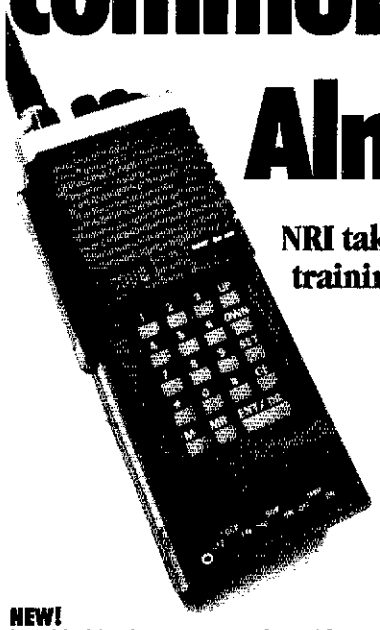
WE NOW STOCK THE MURCH ULTIMATE TRANSMATCH 2000B

DEALER INQUIRIES INVITED, PHONE IN YOUR ORDER & BE REIMBURSED.

What's new with NRI's home-training program in communications electronics?

Almost everything!

NRI takes you to the edge of technology with state-of-the-art training on microprocessor-based communications equipment.



NEW!
hand-held, microprocessor-based 2-meter scanning transceiver

The remarkable world of communications is expanding in quantum leaps! Almost before you can absorb the last one, there's a new advance in technology, a new use for a new miracle of science. And NRI trains you to keep the pace.

Now, NRI's renowned home-study course in Communications Electronics reflects the latest, state-of-the-art technology...includes up-to-the-minute equipment, experiments, and training techniques. And you learn it all at your convenience, in your own home in your spare time. NRI brings your training to you. No need for night school, classroom pressures, travel expenses, or strict schedules. You're a class of one, learning at your own pace by methods proven with 67 years of experience and over a million and a half other students.

Hands-On Training with Choice of Transceiver or Scanner

That's because NRI training is fully practical training. You not only get the "book learning," but also actual real-world experience through NRI Action Learning techniques. Your hands-on training is built around an advanced 2-meter transceiver that performs as a fixed or mobile station. Its microcomputer controls let you synthesize any frequency in its range, program full or four-channel scanning.

If you wish, you may choose to take your training with the Bearcat 210 scanner receiver. Also microprocessor based, it operates over five bands to give you automatic operation from 32 to 512 MHz.

NEW!
programmable, microprocessor-based, synthesized five-band scanning monitor receiver

New Action Audio "Talks" You Through Training

In addition to lessons, experiments, and reference manuals for this high-tech equipment, exclusive NRI Action Audio cassettes reinforce your training. Your NRI instructor leads you step by step through each circuit, explaining its function and interaction with others to make concepts crystal-clear.

Test Instruments Included

Your NRI Communications Electronics course also includes professional test instruments. Use them in the many experiments and demonstrations you perform, then keep them to use in your professional work. You get the Beckman Tech 300 hand-held LCD digital multimeter with six ranges and 26 scales to cover almost every IM-2400 measuring need you'll encounter. You also get the Heathkit UHF frequency counter, indispensable for both bench and field measurements of transmitter output frequency. Both instruments come with NRI Action Audio training backup.

At the heart of your experiment program is the NRI Discovery Lab and the famous NRI Antenna Applications Lab. Using them with your instruments and equipment, you'll perform over 80 separate projects to demonstrate and illuminate the new concepts you learn. Up-to-the-minute experiments cover bipolar and field effect transistors, op amps, phototransistors, digital logic circuits and power supplies.

NEW! **fully portable, six-function, 26-scale LCD digital multimeter**

New Training in Satellite Communications, Microcomputers, and Digital Electronics

NRI lessons are kept up to date! Latest subjects include the booming field of satellite and data communications and telemetry. You also get training in the key field of microcomputers and digital controls, appearing on more and more communications equipment.

You're Trained in Every Field

Satellite communications is just one of the many fields covered by this complete communications program. You also learn how to install, service, and repair mobile radios; CBs; microwave antenna systems; aircraft and marine radio and navigational electronics; AM, FM and TV broadcast equipment; radar; just about any electronic communications equipment you'll ever run across. You're trained for the good-paying jobs in the secure, high-demand field of today's electronics professionals.

FCC License or Full Refund

NRI stands behind you all the way. Government regulations require that the servicing of transmission equipment be performed by a technician holding a valid FCC Radiotelephone License. NRI promises that you'll pass your FCC exam and get your license *or your tuition will be refunded in full.* No ifs, ands, or buts...this money-back agreement is good for a full six months after your graduation. That's how confident we are of the completeness and quality of NRI training.

NEW!
wide-range portable frequency counter with LED digital display

Free Catalog, No Salesman Will Call

Find out all the facts on this exciting way to get into one of the hottest opportunity fields around. Send the coupon for your copy of our free catalog describing NRI Communications Electronics in detail. You'll get lesson plans, equipment specifications, and experiment descriptions plus information on other high-tech courses like Microcomputers, Digital Electronics, TV and Audio Servicing, etc. Send the coupon today and see what's new with NRI and new for you. If coupon has been removed, please write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

NEW!
the famous NRI Discovery Lab® now with advanced high technology experiments

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.

NO SALESMAN WILL CALL.

Please check for one free catalog only.

- ☐ Communications Electronics • FCC Licenses • Mobile • CB • Aircraft • Marine
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Computer Electronics including Microcomputers
- ☐ Digital Electronics
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration, & Solar Technology
- ☐ Building Construction

All career courses approved under GI bill. ☐ Check for details

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council

19-091

given to: K8WV W8TN W8NR KB8QX and W8YP. WV QSO party plaques were given to: 1980, KD8X: 1981, K8LZ. WB8LAI was given an award for working all WV Cos. on 2M. Prize winners were: 1st WB8PHU, 2nd W8PZT, 3rd WB8SAW, Special, W8AH. KD8X was selected as net mgr. for WVN. Midday Net with 35 msgs. Phone net 69, WVN 28, Novice 18, Hillbilly 64, and KFC 2-Mtr 6. Traffic: KD8G 87, W8HZA 39, KC8CR 28, K8MHR 28, WD8POG 27, N8AJC 26, W8JWX 20 KC8CS 15, K8QEW 13, WD8DHC 12, WD8LDY 12, W8CKX 11, W8YP 10, W8CAL 8, K8ZDY 7, KD8X 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR, STM: WØMCL, NM: WØEJD NØAXQ WDØAIT WAØRYL KBØZ. Field Day brought out a large number of eager amateurs from all over the section. Some took to the mountains while some tried their luck on the flatlands. They all reported as to having had a good time. The Arapahoe Radio Club decided to operate QRP and depended on the antennas to be the main thing, so they put in a lot of work putting up quite an antenna farm for the event. They did very well with this plan, proving that with a good antenna it is possible to make a lot of good contacts on five watts of power. Other clubs and groups tried various combinations of power and antennas. KØDJ reported that the Pacific Area Staff of the Transcontinental Corps (TCC) will meet in the Denver area the first or second weekend of October to discuss NTS matters. Watch the Pacific Area Nets for the final dates. We of the Colorado Section want to welcome the group to the Denver area, and hope their stay here will be a pleasant one. Nets: HNN, 26 sess, QNI 1597, QTC 128, Inf. 251, QNF 1182; Colombine, 26 sess, QNI 946, QTC 60, Inf. 191, QNF 986. Traffic: (June) NØBOP 2047, WØWYX 1981, WAØHJZ 1103, KØDJ 329, WØEJD 249, WØLAE 62, WØNFW 51, WBØMCL 27. (May) KØDJ 414, WBØMCL 63.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WB5NNG KG5L W5VFO. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 162 msgs with 228 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 139 msgs with 812 stations in. New Mexico Breakfast Club meets daily on 3.940 kHz at 0700 local and handled 83 msgs with 684 checkins. Yucca 2-Mtr Net, 146.01/61 handled 28 msgs with 674 checkins. Vy sorry to report passing of W5FT and KBØCM. They will sure be missed. Lots of activity as the new Cibola County came into being. Field Day brought many reports including Abq DX, Silver City, Los Alamos, Abq Caravan Club, Alamogordo and many others. Traffic: W5DAD 500, KA5DDW 129, W5ENI 94, KG5L 45, KB5LI 14.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: George M. Mackley, WB7BZJ, P. O. Box 523, Sunset Estates, Ivins, Utah 84738. There are many ARRL appointments available to interested and qualified Utah radio amateurs, may we hear from membership. It was reported that KA7BHM was on the golf course instead of at the Field Day site. W7YAI is a water rights consultant as well as having a very nice collection of antique radio gear in his museum. N7BUP passed the General license test. Beehive Net on 7272 kHz, 1830 GMT daily had an average check in of 38.87 members with a total of 142 different stations. KB7KV is active on 10 meters almost daily. Rainbow Canyons ARC members of Cedar City enjoyed FD at Greens Lake and copied the FD message from President Reagan. FD participants: W7MUG W7PBV K7JH WA7HHE WB7TUR N7AVJ N7BUO KB7BZJ KB7GRW KA7BHM and KA7KOH. Traffic: K7HLR 182, WA7KHE 121, WA7MEL 100, WA7TEH 100, W7OCX 20, W7PBV 2.

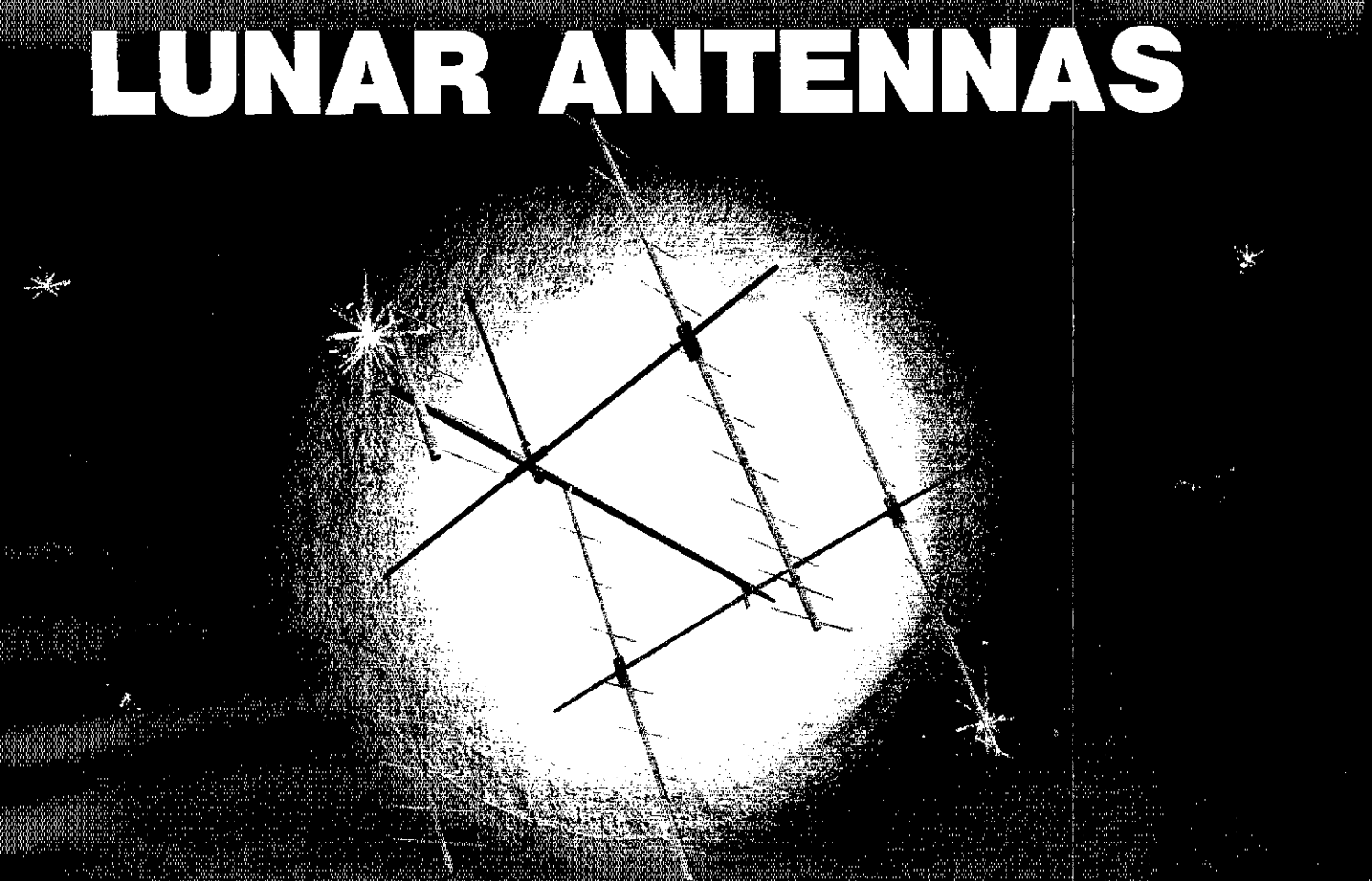
WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. Field Day activity was reported from many areas with groups from Casper, Cheyenne, Cody, Laramie, Rock Springs and Torrington among those participating. Three new combination county EC and RACES Officer appointments have been made; KC7AX — Big Horn County, W7OGT — Converse County and W7ILL — Sublette County. N7CPK recently upgraded to General. WB7NHR reports the Wyoming Cowboy Net held 22 sess with 495 QNI and 8 QTC. WAØPFJ reports the Wyoming Jackalope Net held 25 sess with 502 QNI and 0 QTC. The emergency communications program proposed by the State Civil Defence Agency is in full swing at this time. Traffic: WA7GYO 234, WB7NHR 139.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. Huntsville ARC new officers for 1981 are: K4GKG, pres.; WB4EKJ, v.p.; KD4JD, secy./treas.; WB4YHJ, asst. secy./treas. Montgomery ARC will hold their hamfest Sept. 13th at civic center in Montgomery, AL. Anniston ARC will hold their hamfest Sept 26-27th. BARC new officers '81 are: N4QB, pres.; NM4C, v.p.; WD4TOU, 2nd v.p.; WA4BHS, 3rd v.p.; W4YD, secy.; N4AHJ, treas. Many clubs and persons took part in Field Day such as Lake Martin ARC, WA4OGD, 10 operators 9 ARES members. Covington ARC, WB4MLL, 5 ARES members. Mobile ARC, K4ZM, 25 ARES members. Limestone ARC, K4EWD, 9 operators, 2 stations. Clark Cty., WB4THU. Calhoun ARC KC4OL, 25 ARES members, 29 people involved. W4IBU, SEC, reports ARES members were involved. Shelby Cty. ARC participated. Tuscaloosa ARC, W4XI, 35 operators, 20 ARES members. Montgomery ARC held Field Day, Valley ARC, KA4DZY, 13 operators, 2 stations. BARC, 76 operators, 35 ARES members, 5 stations on all the time. Enterprise ARC reports WD4NXN upgraded to Tech. in B'ham, May 16th. SCARES reports the following upgraded: KB4XX to Extra, KA4RGE to General & KA4SWY KA4PPC WA4USZ to Tech. SCARES invites everyone to use their repeater on AENN net 146.985/.385 Tuesday. The club is seven months old and they are progressive. AENR report (May) 6-mtr 52 QNI, one message, 7 sess. AENM manager, WA4PIZ, reported 2335 QNI in 106 messages in 34 sess. AEND, W4CKS, 171 QNI, 94 messages in 30 sess. Tuscaloosa ARC asks all to check in to West Ala. Emergency Net Sunday nite 22/82, 8:30 local time thru WA4KCQ/R. W4XI is net control. Traffic: WA4JDH 731, W4CKS 184, K4AOZ 46, WA4LXP 43, WA4PIZ 42, K4UMD 26, AA4J 12, WB4TVY 6, WA4PMP 4.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC/NVOAD: WA4PUP. STM: W4WXA. Chief OBS: W4BIA. As I start my 2nd elected term as SCM on Oct 1st, I want to thank all of you for the FB support given me in the past. Remember, that I am always open to suggestions that can be used to help make the section better. Tragedy struck on June 18th when WA3NAZ died in a plane crash in Lee County Alabama. He was a fine ham and avid traffic handler & will be missed by his many friends. The Atlanta Hamfestival was another great success & I enjoyed seeing old friends & making

LUNAR ANTENNAS



PROVEN BEST PERFORMANCE
PROVEN HIGHEST EFFICIENCY
PROVEN SUPERIOR CONSTRUCTION

Three models available:

Model NMT 11/144 for 144MHz (2 meters)
Model NMT 11/220 for 220MHz (1.3 meters)
Model SST 0719 for 432MHz (.07 meters)

Each of these antennas has been tested and tried in the field and proven to be the top performer in its frequency range, with the highest efficiency gain for a given boom length and highest efficiency for number of elements.

For instance, the NMT 11/144 and NMT 11/220 were both used in the first moon bounce from Mexico. In addition, the NMT-11/220 were used for the first 220 MHz EME 4-Yagi QSO, and for the first 220 MHz EME SSB QSO.

The SST 0719, when compared against other leading antennas at a recent convention exhibited the highest efficiency/gain for a given boom length, besting the others by a considerable margin.

Superior mechanical construction featuring brass driven elements for high efficiency, through boom insulated element mountings, and integral TFE coaxial balun result in Lunar Antennas being the most efficient antenna available.

For a sharper, stronger signal in transmit and receive, get a Lunar antenna today.

Two way and four way power dividers also available for all three bands.

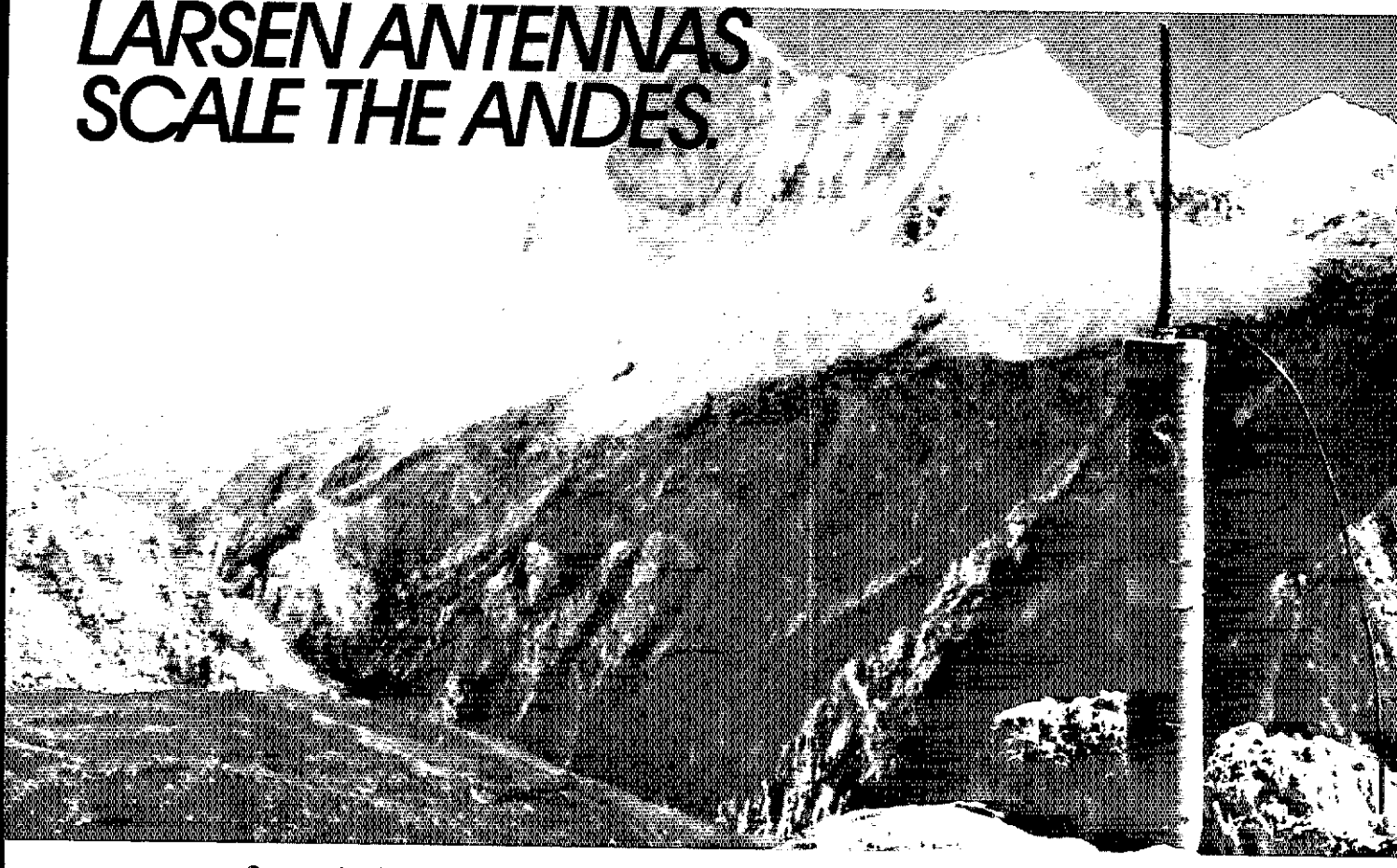
Write for complete literature.

LUNAR electronics

2775 Kurtz Street, Suite 11
San Diego, CA 92110
Telephone: (714) 299-9740 Telex: 181747

AT YOUR LUNAR DEALERS NOW!

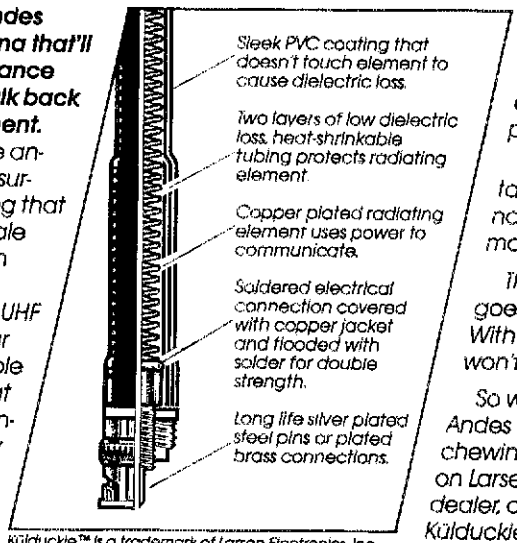
LARSEN ANTENNAS SCALE THE ANDES.



Communications in the Andes Mountains takes an antenna that'll go the distance in performance and durability. It's a long walk back down the hill for a replacement.

Larsen Külduckie™ portable antennas used for seismological surveying in the Andes are meeting that challenge. Proving they can scale mountains without scaling down their performance.

Larsen makes over 20 VHF and UHF models to mate with most popular handhelds. All designed with double protected electrical connections at the maximum stress points so the antenna can bend 180 degrees in any direction. With a copper plated radiating element that uses power to communicate, not for dielectric heating. Two layers of low dielectric loss heat-shrinkable tubing that protect the element without deteriorating performance. And a top coat of PVC that gives the Külduckie portable antenna a sleek finish.



Külduckie™ is a trademark of Larsen Electronics, Inc. USA and Canadian Larsen, Ltd., Canada.

Even if your communications don't take you to the Andes, these antennas deliver peak performance almost anywhere.

That full measure of performance goes into our product integrity too. With a no nonsense warranty that won't leave you high and dry.

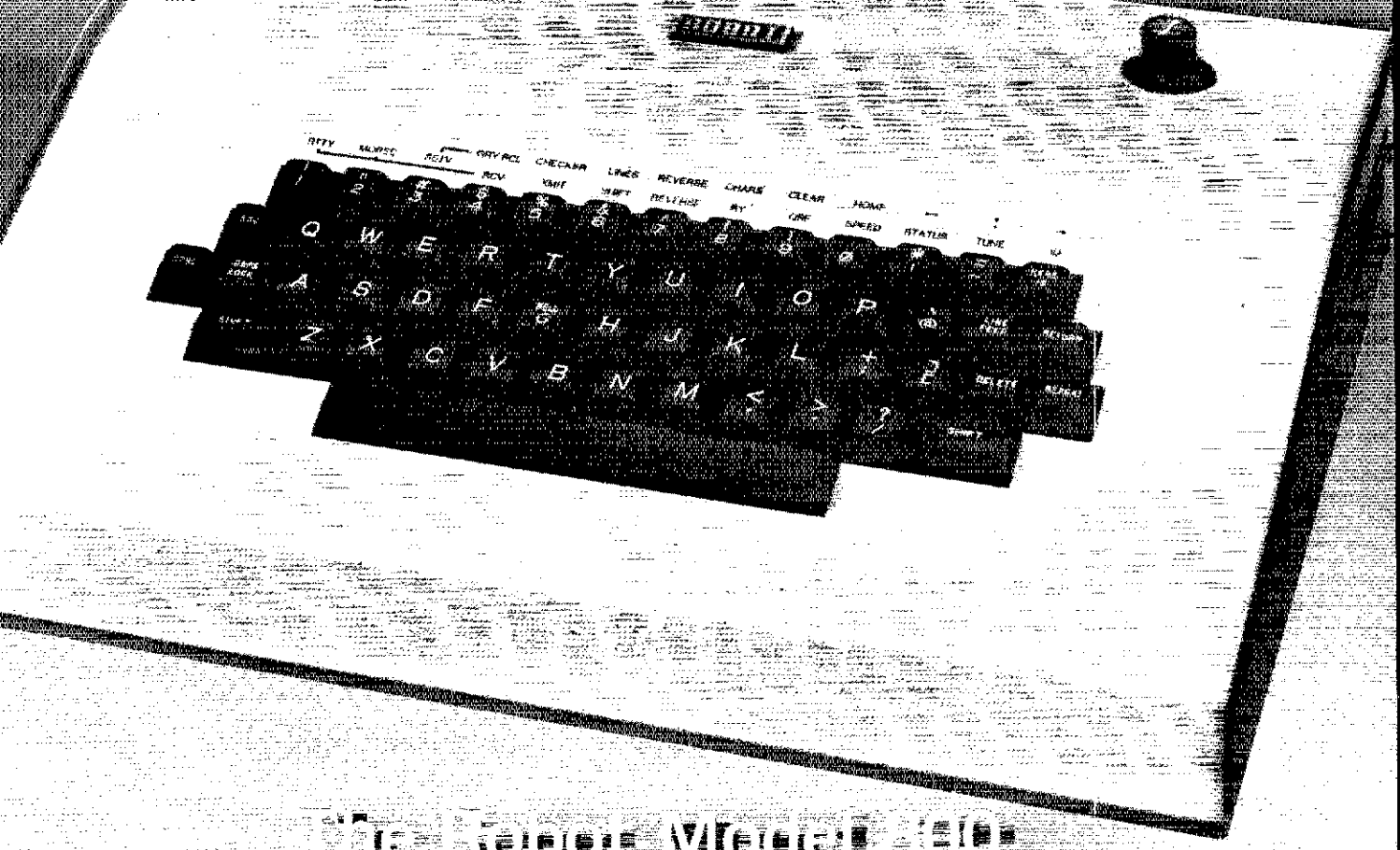
So whether you're climbing the Andes with your portable, or rag-chewing from a local fishing hole, try on Larsen. See your favorite Ham dealer, and ask to hear a Larsen Külduckie portable antenna demonstration.

For the Larsen dealer nearest you, call or write:

Larsen Antennas

IN USA: Larsen Electronics, Inc.
P.O. Box 1799 Vancouver, WA 98668 Phone 206-573-2722
Toll Free Order Line 1-800-426-1656 and
Washington State 1-800-562-1747

IN CANADA: Canadian Larsen Electronics, Ltd.
283 E. 11th Avenue, Unit 101
Vancouver B.C., V5T 2C4 Phone 604-872-8517



Not just a keyboard, but the first integrated specialty mode terminal.

The Model 800 Super Terminal offers a complete list of features and capabilities, including our built-in demodulator, all in one package that connects directly with your amateur station's transmitting and receiving equipment. All that's needed to have a complete operating system is the addition of a standard TV monitor.

BAUDOT/ASCII OPERATING FEATURES

DISPLAY: Full 24 line by 72 character standard TTY display.

AUTO START: The Model 800 writes characters on the screen only after detecting the presence of an incoming RTTY or ASCII data signal. This prevents printing of unwanted random characters on the screen while tuning or during gaps in reception.

PROGRAMMABLE WRU (WHO ARE YOU) AND SELCAL FEATURES: Upon receiving a user programmed 8 character code, the Model 800 will automatically key the transmitter and transmit one of its 64 character (HERE IS) messages. Upon receipt of the user programmed 8 character SELCAL code, the Model 800 will automatically go into receive mode and store up to a full page of received information in its display memory.

HERE IS: The Model 800 has two 64 character programmable HERE IS messages.

ON SCREEN STATUS INDICATOR: A status line at the top of the screen tells the operator exactly which combination of operating modes have been selected.

ON SCREEN TUNING INDICATOR: Accurate tuning is an absolute requirement for accurate trouble-free reception during poor signal conditions. The best results are obtained when the output of the mark and space discriminator filters are equal in amplitude. The on screen tuning indicator in the Model 800 is the "plus-plus" type, which provides this information.

NEW FEATURES!

The 800 is now capable of split-screen operation! This enables you to type your response in the bottom half of the screen area while receiving. Receive copy is displayed in the upper half of the screen. This feature can be disabled for full screen display.

The transmit text buffer has been increased to 511 characters. In addition, a transmit cursor has been added which will show you which character is currently being transmitted at any given time.

CURRENT LOOP KEYER FOR HARD COPY

PROGRAMMABLE NARROW SHIFT ID

DEMODULATOR: The demodulator built into the Model 800 is superior in quality to any RTTY demodulator offered on the market. The key feature which makes this claim possible is the use of separate two tone active discriminator filters for demodulation of the RTTY signal.

ADDITIONAL ASCII OPERATING FEATURES: The Model 800 will send and receive ASCII at 110 baud. It has all of the transmission and editing features of the RTTY mode.

SIMPLE TO OPERATE

One of the most important features to keep in mind with the Model 800 is that all functions that are used frequently are easily accessed by the user. Many competitive units boast elaborate features which are either not used in amateur operation or that require complicated access procedures which make them inconvenient. All of the frequently used control functions in the Model 800 are either associated with a key which is labeled with the function, or have silkscreening above the key which describes the function.

MORSE CODE OPERATING FEATURES

OPERATION: The Model 800 has all of the transmission and editing modes of RTTY during Morse code operation.

MORSE AUTOTRACK: The Model 800 automatically tracks incoming code without manual speed adjustment. The speed range for transmission and reception is 3 to 99 words per minute.

SIDE TONE OSCILLATOR: The Model 800 has a built-in side tone oscillator so that the operator can listen to incoming code as it is interpreted by the computer.

MORSE CODE TRAINER: The Model 800 can be set to generate random five letter groups of characters at any preset speed for Morse code training purposes.

SPEED INDICATOR: In addition to all of the other functions, the status line in the Morse code mode indicates the speed of the incoming code.

SSTV GRAPHICS OPERATING FEATURES

The ROBOT Model 800 allows alphanumeric characters to be typed in an SSTV format, displayed on a TV monitor, and transmitted as a normal SSTV picture. This eliminates the need for "menu board" or hand-lettered SSTV pictures, thereby freeing up the slow scan camera or scan converter for other operations.

ROBOT

ROBOT RESEARCH, INC.
7591 CONVOY COURT SAN DIEGO, CA 92111

new ones. Planning any kind of a hamfest takes a lot of time & effort. So hats off to all in the section who make these fine events possible. Local ARES nets are on the increase. The Sun Administrative Net continues to gain checkins. N4BGH, ARES NM, requests net control volunteers for the rest of the year. Has your local club tried a flea market for fund raising? Seems like this is the new way to bolster the club treasury. It was a wonderful experience listening to the many tales & DX yarns by the group in the SE DX club hospitality room at the Hamfestival. W3AZD had the opportunity to get with some of the nation's best DXers. NI4P after many years turned in 222 cards for his DXCC. Congrats! W4KGP reports that the Coastal Area repeaters are ready for any kind of an emergency. KA4FVU did it again, she took 1st place in the World Wide YL-OM contest. When your club holds an election, please inform me of your new officers. Also please check with your club secretary to see if the ARRL paperwork has been sent into the League to keep your ARRL affiliation. The annual SET will be next month. I hope that plans are being made now so that the section will have a great showing. Tnx to all who helped with the GASBE (Bike Race) from Eutaula, AL to Savannah, GA. The cyclists send their praises for another job well done. Traffic: (June) W4WXA 132, W4GH 78, W4PIM 63, K4EV 46, WB4ZVX 42, K4JNL 41, W4BIA 31, WB4LBM 26, W4HON 24, AA4EI 21, N4BGH 16, WB4GWA 12, KA4ATM 11, K4BAI 9, WA4PUP 8, K4PIK 7, N4BIM 6, AK4T 5. (May) AA4EI 13, KA4ATM 5.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. NM: N4EC KF4U. New or renewed appts include WB4TZR N4BOY W4WGR N4BZH. Applications for League appts are welcome. Write for more info if you are an active member. Plenty of Field Day activity with K4GSO W4WJ W4PLB W4IZ N4KE W4IIR K4BV W4DU KN4Y W4ZBB K4SP AJ4L KC4MM K4ZC all reporting in. WN4IIV has been elected mgr. of the Northern Fla. Phone Net which meets daily on 3.950 kHz at 2330Z. New officers Tallahassee ARS are: KA4DBZ, pres.; KN4Y, v.p.; W4CUJ, secy.; KA4DCF, treas.; W4MLE, editor. Sorry to hear K4INK and W4PIR are Silent Keys. W4DTV has started another pair of ham classes. He has licensed over 150 hams and recently celebrated his 50th anniversary with YF Mabel. Congrats! Nice FD feature article on W4IIR SHARC FD in several editions of the St. Pete Times, complete with pictures. WD4CDO now Tech and N4DZT Advanced. NOFARS won softball game with OPARC, 13 to 11 despite 98° heat. Ham of the month in Orlando is N4EWH for her work with the club paper. N4EGR now Tech and is YF of N4AXN. Tnx to N4BZH & WD4DNC for fine jobs as NM over the past year. W4IZ plans operation at the Greater Jax Fair this month. KA4UYD, who made first contact during FD, is son-in-law of K4RNS, a well-known Florida ham. Florala QCWA net meets at 7:30 P.M. Mon. on the 28/88 repeater. New officers are W4VXV W4MMW and W4WKQ. Traffic: (June) WD4HIF 722, W4SIZ 435, N4PL 376, N4EDH 216, WD4IIO 136, WA4EYU 167, AA4FG 122, W4JL 117, N4BZH 66, WB4TZR 59, W4BSP 58, W4KIX 65, W4MGO 65, KF4U 62, WB4EXA 45, WB4FJY 27, WA4STZ 25, N4UF 18, WA4QXT 15, WB4DTS 8, W3IDO 8, WB4LNO 8, N4BOY 6. (May) WA4EYY 110, N4EC 93.

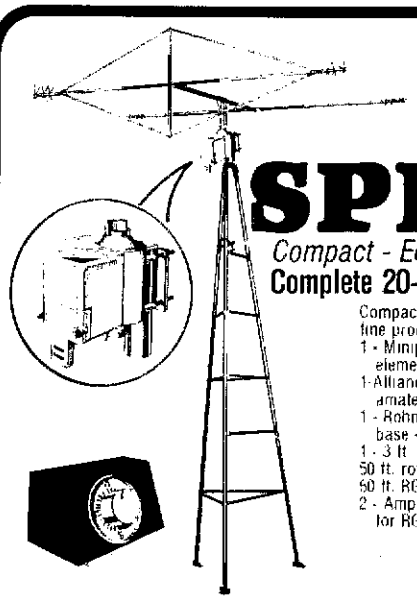
SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. KB4OW, Asst SEC, is acting SEC during most of July while AA4WJ is away on vacation. June was a light month for traffic with a total of only 7897 for the section. BPLs went to W3CUL W3VR K4TH and WD4COL. PSHR program is still going good with 11 stations qualified (see list elsewhere). Congrats to 4 clubs newly ARRL affiliated. They are Florida Institute of Technology ARS, South Hillsborough Amateur Radio Klub "SHARK", Tamarac ARA, and Winterset RC of Florida. There are a few older clubs that have not sent in their annual report to ARRL Hq. This should be done promptly to remain on the active club list. Field Day brought a flurry of activity with 15 clubs sending me Field Day activity reports. They are: Sarasota ARA, Old Florida Radio Transmitting Society, Collier County ARC, Brandon ARS, Platinum Coast ARS, Dade Radio Club, 660 Simplex RTTY Group, Fellowship Radio Club, Palm Beach DX Assn, West Palm Beach W4AW, Martin County ARA, Pioneer ARC W4QO, Bashful Perverts N4BP, Broward ARC, Tampa ARC. Welcome to WB8VLR, moving to this section from Ohio and settling in Winter Haven. She assisted Red Cross during the Cardington Ohio Tornado for 24 consecutive hours. WB4AID reports he has a new emergency power plant. W3CUL reports her Hercules and OMNI compatible at last. KA4BBA wants to express thanks to all who sent her cards, flowers, and encouragement during her recent hospitalization. We are real pleased with the way Eldean came through a 19-hour micro-surgery brain operation and is active again in traffic and emergency work, back on the PSHR list, and back to work again. Congrats, Eldean. Congrats also to KA4GUS and WD4HZR, new managers of Dade Emergency Net. New manager of Tropical Phone Traffic Net is KA4LNA. Congrats, but we are concerned because of your heavy load, managing TPTN, OFNS and BEN. Everybody please give him good cooperation so he can make it through the next year. Looking forward to seeing many of you at Melbourne and Clearwater hamfests. Traffic: W3CUL 2963, W3VR 642, K4TH 416, WD4COL 405, WB4FVV 402, WA4PFK 356, K4SCL 355, WD4AWN 263, W4NFK 242, NC4H 236, K4EUK 224, K4ZK 153, W4GPL 150, WB4WYG 149, WB4AID 111, WB4PIB 103, KA4ASZ 88, WD4CHQ 70, W4DVO 69, KA4LNA 58, W4IRA 51, W3TLV 45, W4ESH 42, K5IHH 32, KE4O 32, W4IYT 31, WB4GCK 30, WA4HDH 26, W4KMN 26, WB4SNX 26, KA4FZI 25, W4WYR 24, N4KB 14, WB4GSV 10, W4SMK 10, KA4BBA 6, WB8VLR 6, WA4EIC 4, WB4DWA 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — Field Day was a total success in the W.I. Section. Four different teams participated. PRARC operated three positions at San Patricio under KP4ID. The traffic nets operated at Cerro Maravillas under NP4D. The Ponce DX Club operated at Sierra de Aibonito under NP4A and the Mayaguez Campus of UPR was the site of the Eng. Dept. Radio Club under KP4VA. KP4BSQ resigned as SEC for medical reasons. A Certificate of Merit was issued to recognize his valuable services as SEC for the past two years. New SEC is KP4CU. He is very active in the reorganization of ARES. New appointments: NP4CF, District Emergency Coordinator — San Juan area. PSHR: WP4BDS 271, WP4AOH 161, NP4F 123, KP4DJ 86. Traffic: WP4BDS 1922, WP4AOH 800, NP4F 600, KP4FBT 146, KP4DJ 132, KP4FAF 30, KP4EMY 28.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP.

ANTENNA SYSTEMS/ TOWER HARDWARE



SPECIAL!

Compact - Economical Antenna System

Complete 20-15-10 meter Roof Mounted System!

Compact Antenna Package with the following fine products:

1 - Miniproducts HQ-1 20-15-10-6m Miniquad - longest element only 11 ft
1-Alliance U100 rotor and control box - handles small amateur antennas with ease
1 - Rohn 10 ft. rootmount tripod - heavy duty - hinged base - galvanized for long life
1 - 3 ft. mast - stong glavanized steel
50 ft. rotor cable - 4 conductor for U100 rotor
50 ft. RG8X cpax cable - milespec lowloss coax
2 - Amphenol silver plated PL259 with adapters for RG8X

Total Cost only $279

Delivered Anywhere in Continental U.S.A.

PLUS FREE SHIPPING

Anywhere In Continental U.S.A.

BUTTERNUT ANTENNA & ACC.

HF5V-III	80-10 mtr. Vertical	$ 89
TBR-160	160-mtr. Coil Kit	$ 33
RM Kit	Roof Mount Kit	$ 33
STR Kit	Stub Tuned Radial Kit	$ 20

HY-GAIN

TH5DX	New 5 El. Triband Beam	$209
TH6DXX	6-El Triband Beam	$239
TH3MK3	3 El. Triband Beam	$179
TH3JR	3-El. Triband Beam	$139
TH2MK3	2-El Triband Beam	$119
HY QUAD	2 El Triband Quad	$209
402BA	2 El. 40-mtr Beam	$179
205BA	5-El. 20-mtr. "Long John"	$239
155BA	5-El. 15-mtr. "Long John"	$149
105BA	5-El 10-mtr. "Long John"	$ 99
204BA	4-El. 20-mtr Beam	$189
203BA	3 El. 20-mtr. Beam	$119
153BA	3-El. 15-mtr. Beam	$ 69
103BA	3-El. 10-mtr. Beam	$ 59
DB1015A	3-El. 10/15 mtr Beam	$129
64B	4 El. 6 mtr. Beam	$ 49
66B	6 El. 6 mtr. Beam	$ 89
18HT	Hy-Tower 80-10 mtr. Vert.	$279
18AVT/WB	80 10 mtr. Trap Vert.	$ 85
214B	14-El. 2-mtr. Beam	$ 33
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80/10 mtr. Trap Dipole	$ 89
BN86	80-10 mtr. KW Balun	$ 14

KLM

KT34A	4-El. Triband Beam	$319
KT34XA	New 6 El. Triband Beam	$479
7.0 7.3 4A	4-El. 40-mtr. Beam	$629
7.2 1	40 mtr. Rotatable Dipole	$159
144-148 13LB	13 El. 2 mtr. Long Boomer	$ 79
432 16LB	16 El. 432 MHz Long Boomer	$ 69
144 150 16C	16 El. 2 mtr. 'Oscar' Ant.	$ 99
420-450 18C	18 El. 435 MHz 'Oscar' Ant.	$ 59

HUSTLER

4BTV	40-10 mtr. Vert	$ 79
5BTV	80-10 mtr. Vert	$ 99
G6 144 B	2 mtr. Base Vertical	$ 69
G7 144	2 mtr. Base Vertical	$ 99

HF Mobile Resonators Standard (400W) Super (2KW)

10 & 15 mtr	$10	$15
20 mtrs.	$12	$18
40 mtrs.	$15	$21
75 mtrs.	$17	$32

Bumper mounts, springs, folding masts IN STOCK – CALL!

MINI PRODUCTS

HQ 1	Miniquad	$139

CUSHCRAFT

A3	New 3-El. Tribander	$169
A4	New 4 El. Tribander	$209
A74	New 40-mtr. Kit for A3/A4	$ 55
R3	20-15-10 mtr. Motor Tuned Vertical	$219
AV5	80-10 mtr. Trap Vertical	$ 89
20-3CD	3-El. 20 mtr. Monoband	$165
20-4CD	4-El. 20-mtr. Monoband	$239
15-3CD	3-El. 15-mtr. Monoband	$ 82
15-4CD	4-El. 15-mtr. Monoband	$ 98
10-3CD	3-El. 10-mtr. Monoband	$ 59

CUSHCRAFT (Continued)

10-4CD	4-El. 10-mtr. Monoband	$ 75
A50-5	5-El. 6-mtr. Beam	$ 59
617-6B	6-El. 6 mtr. "Boomer"	$169
32 19	19-El. 2-mtr. "Boomer"	$ 75
214B	14-El. 2-mtr. "Boomer"	$ 59
214FB	14-El. 2-mtr. FM "Boomer"	$ 59
220FB	28 El. 2-mtr. FM "Power Pack"	$188
220B	220 MHz Boomer	$ 69
ARX2-B	2 mtr. "Ringo Ranger" II	$ 38
ARX-450B	450 MHz "Ringo Ranger" II	$ 38
A147-20T	2-mtr. Vert & Horiz. Beam	$ 59
A144-10T	10-El. 2 mtr. "Oscar" Ant.	$ 39
A144-20T	20-El. 2 mtr. "Oscar" Ant	$ 56
A432-20T	20 El. 432 MHz "Oscar" Ant.	$ 45
A14T-MB	Dual "Oscar" Ant. Mounting Boom	$ 20

HY-GAIN CRANK-UP TOWERS

HG37SS	37 Ft. Self Supporting	$529
HG52SS	52 Ft. Self Supporting	$839
HG54HD	54 Ft. Heavy Duty Self Supporting	$1629
HD70HD	70 Ft. Heavy Duty Self Supporting	$2499
HG50MT2	50 Ft. Side Support	$659

ROHN TOWERS

20G $29.50 25G $38.50 45G $83.60

HDBx40	Free standing 40' (18 sq. ft)	$249
HDBx48	Free-standing 48' (18 sq. ft)	$305
HBX-56	Free-standing 56' (10 sq. ft)	$335
FK2548	48' 25G Foldover Tower	$699
FK2558	58' 25G Foldover Tower	$779
FK2568	68' 25G Foldover Tower	$849
FK4544	44' 45 G Foldover Tower	$979
FK4554	54' 45 G Foldover Tower	$1089
FK4564	64' 45G Foldover Tower	$1179

(Freight paid on all foldover towers. Prices 10% higher west of Rocky Mountain states).

ALL ROHN ACCESSORIES IN STOCK – CALL!

GALVANIZED STEEL TOWER HARDWARE

3/16" EHS Guywire	$11/100 ft.	$99/1000 ft.
1/4" EHS Guywire	$14/100 ft.	$129/1000 ft.
5/32" 7 x 7 Aircraft Cable		$10/100
3/16" CCM cable clamps (3/16" or 5/32" cable)		$0.30
1/4 CCM cable clamps (1/4" cable)		$0.40
1/4" TH Thimble (fits all sizes)		$0.25
3/8 EE (3/8" Eye & Eye Turnbuckle)		$5.50
3/8 EJ (3/8" Eye & Jaw Turnbuckle)		$6.00
1/2 EE (1/2" Eye & Eye Turnbuckle)		$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)		$9.00
3/16" Preformed guy deadend		$1.65
1/4" Preformed guy deadend		$1.85
6"-dia. 4-ft. long earth screw anchor		$12.50
2" dia. 10 ft. long heavy duty mast		$39.00
500 D Guy insulator (5/32" or 3/16" cable)		$0.95
502 Guy insulator (1/4" cable)		$1.95

ROTORS & CABLES

Hy Gain HDR-300 (25 sq. ft)	$399
Alliance HD-73 (10.7 sq. ft.)	$ 99
Alliance U-100 (Elevation Rotor)	$ 39
CDE CD-45-2 (9 sq. ft)	$ 99
CDE HAM 4 (15 sq. ft.)	$169
CDE TAILTWISTER (30 sq. ft.)	$239
8 Conductor Rotor Cable	$0.18/ft.
Heavy Duty 8 Conductor Rotor Cable	$0.36/ft.

COAXIAL CABLE AND CONNECTORS

RG-213/U (Mill spec, RG-8/U)	$0.29/ft.
RG 8X (Mill spec.)	$0.15/ft.
RG58C/U (MILL SPEC)	$ .12/ft.
RG59/U - 75Ω HM	$ .14/ft.
RG11/U - 75Ω HM	$ .29/ft.
1/2" 50 OHM Copper Hardline	$1.10/ft.
1/2" Copper Hardline connectors	$22.00
1/2" 50 OHM Poly Jacketed alum. hardline	$0.69/ft.
1/2" Alum. Hardline Connectors	$15.00

RG-213U

Non-Contaminating Jacket 95% Sheild .29/Ft.

RG-8X

Non-Contaminating Jacket 95% Sheild .15/Ft.

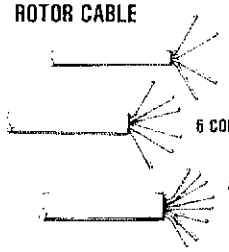
COAXIAL CABLE LOSS CHARACTERISTICS (DB/100ft.)

CABLE TYPE	Char. Imped	10MHZ	30MHZ	150 MHZ	450 MHZ
RG-58 C/U	53.5	1.40	1.90	6.0	12.5
RG-8X	52	85	1.20	3.5	6.8
RG-213/U	50	60	90	2.3	5.2
RG-59/U	75	1.10	1.70	4.1	8.2
RG-11/U	75	60	.90	2.3	5.2

HARDLINE

½" ALUM.	50	30	45	12	27
½" COOPER	50	20	35		18

ROTOR CABLE



4 COND. 4 #22GA. .12/ft.

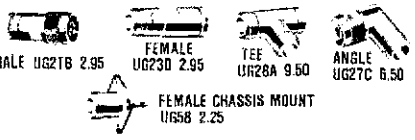
6 COND. 6 #22GA. .15/ft.

8 COND. 2 #18GA. 6 #22GA. .18/ft.

HEAVY DUTY 8 COND. 2 #16GA. 6 #18GA. .36/ft.

AMPHENOL CONNECTORS

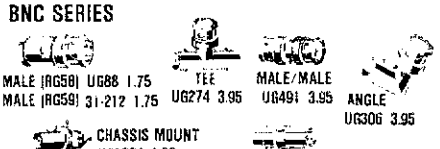
"N" SERIES



MALE UG21B 2.95 FEMALE UG23D 2.95 TEE UG28A 9.50 ANGLE UG27C 6.50

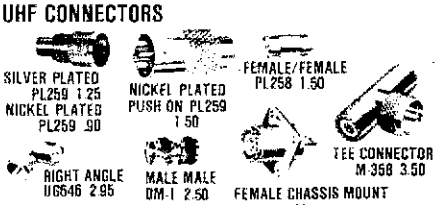
FEMALE CHASSIS MOUNT UG58 2.25

BNC SERIES



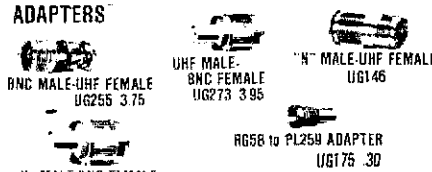
MALE (RG58) UG88 1.75
MALE (RG59) 31-212 1.75
TEE UG274 3.95
MALE/MALE UG491 3.95
ANGLE UG306 3.95
CHASSIS MOUNT UG1094 1.50
FEMALE/FEMALE UG914 2.50

UHF CONNECTORS



SILVER PLATED PL259 1.25
NICKEL PLATED PL259 .90
NICKEL PLATED PUSH ON PL259 1.50
FEMALE/FEMALE PL258 1.50
RIGHT ANGLE UG646 2.95
MALE MALE DM-1 2.50
TEE CONNECTOR M-358 3.50
FEMALE CHASSIS MOUNT SO239

ADAPTERS



BNC MALE-UHF FEMALE UG255 3.75
UHF MALE-BNC FEMALE UG273 3.95
"N" MALE-UHF FEMALE UG146
"N" MALE-BNC FEMALE UG201
RG58 to PL259 ADAPTER UG175 .30
RG8X & RG59 to PL259 ADAPTER UG176 .30

master charge

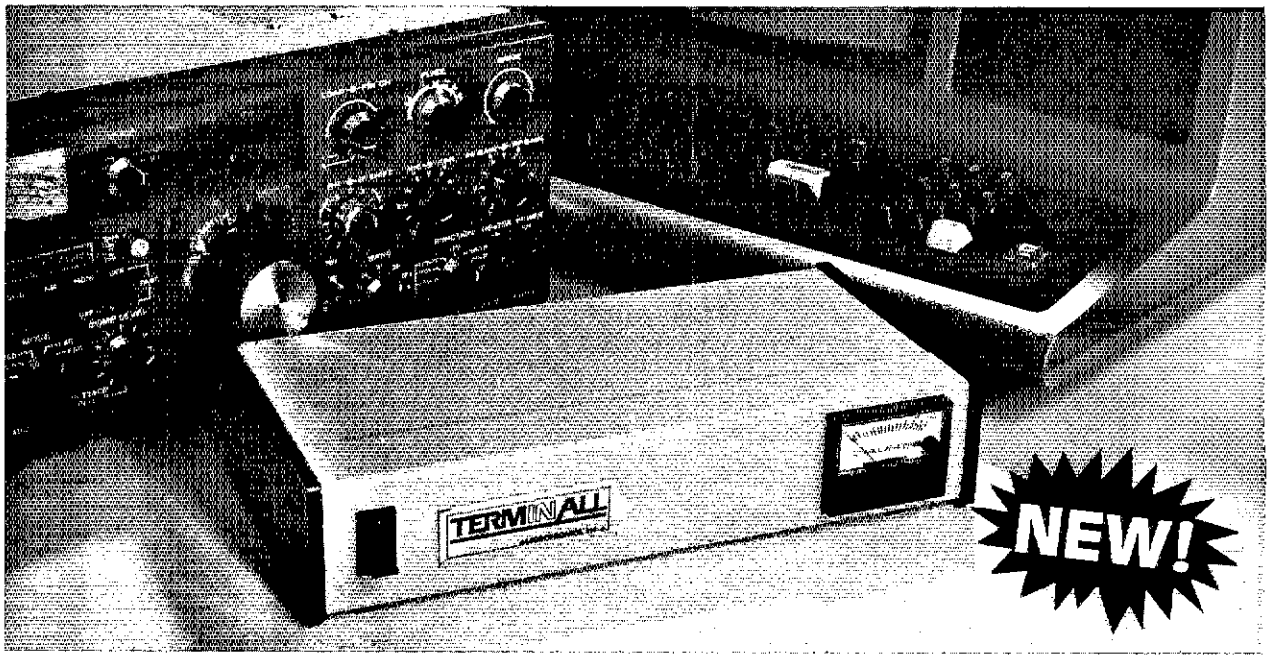
TEXAS TOWERS

A DIVISION OF TEXAS RF DISTRIBUTORS, INC.
1108 Summit Ave., Suite 4 / Plano, Texas 75074
Mon.-Fri. 9 a.m. - 6 p.m. Sat. 9 a.m. - 1 p.m.
TELEPHONE: (214) 423-2376
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

VISA

TERMINALL

The communications terminal that does it all!



TERMINALL is a hardware and software system which converts your TRS-80* (Model I or Model III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL gives you more for your money. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code or radioteletype (RTTY). Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code - it's fully automatic - and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

More for your money

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost because separate terminal units usually cost at least $225 assembled, and most do not even have a crystal controlled AFSK. TERMINALL eliminates not only the higher cost of an external terminal unit, but also eliminates the hassle of interfacing to another piece of equipment.

■ **Outstanding documentation.** Professionally written, 90 page user manual - contains step-by-step instructions - explicit examples - numerous photographs and illustrations - theory of operation -parts layouts - schematic diagrams - trouble shooting guide.

■ **Built in software backup** - set up the program parameters and messages the way you like to operate - then have the program save a new copy of itself -on either cassette or disk!

■ **Software** supplied on both cassette and auto-run diskette at no additional cost.

■ **Built in separate, mutli-stage active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 170 and 850Hz shift -keyboard selectable - and uses either the panel meter or scope outputs for easy tuning. Copy the weak ones. Copy the noisy ones. Copy the fading ones.

■ **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF application. A must on many VHF RTTY repeaters.

■ **Built in hardware clock** - one second readout maintains correct time even during cassette I/O. User programmable time/date format.

■ **Built in 110 or 220** volt AC power supply.

■ Built in parallel printer driver software. Simply attach a parallel ASCII printer (e.g. the EPSON MX-80) to your printer port to obtain hardcopy in all modes. Note: parallel printers typically cost less than serial ASCII printers.

■ **Fantastic Morse reception;** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Keyboard selectable noise threshold. Received code speed displayed on status line.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, transmit delay (fixed, none or auto adaptive) Break mode and more!

■ **The all-in-one TERMINALL design** makes it great for use on HF or VHF -Ham, Commercial, SWL or MARS! SWL's, we will be happy to modify TERMINALL for 425Hz reception instead of 850Hz, at no extra cost, if requested with your order. (Some News and weather services use 425Hz)

General Purpose vs Dedicated

TERMINALL has capabilities far surpassing other "dedicated terminal" systems. And yet, since it works on a general purpose computer, the majority of your investment (the TRS-80) is spread out over many different applications - not just Radio communications. And your system is expandable. For example, Disk based mailbox software may be added at any time.

Simplicity of operation. Lower cost. General purpose computer. What are you waiting for? This is the way to go!

Complete with software on cassette and diskette, assembled and tested hardware, and extensive instruction manual. Specify Model I or Model III. Level II 16K required. **$499.**

We Discount EPSON Printers. Call Now!

MACROTRONICS, inc. ®
1125 N. Golden State Blvd.
Turlock, CA 95380

To order toll free 1-800-344-7493
In CA and for service (209) 667-2888

15 Day Money Back Trial Period. One year parts and labor limited warranty. Add $4 shipping in U.S.A. CA residents add 6% sales tax.
We continue to experience telephone difficulties, please keep trying.
***Recognized trademark of Tandy Corporation.**

vhf/uhf converters & preamps

EME
Scatter
Tropo
Satellite
ATV
Repeater
Radio Telescope

- Factory aligned for optimum noise figure
- Full one year warranty
- Rugged aluminum enclosures
- Quality components and construction
- Converters feature 28 - 30 MHz i-f

CONVERTERS	FREQ. RANGE (MHz)	N.F.(dB)	PRICE
144VD	50-54	< 1.5	$57.95
144VD	144-148	< 1.8	$57.95
220VD	220-222	< 2.0	$59.95
432VD	432-434	< 2.2	$67.95
435VD	435-437	< 2.2	$67.95
432/435VD	432-434 & 435-437	< 2.2	$77.95

PREAMPS			
28VD	28-30	< 1.1	$29.95
50VD	50-54	< 1.3	$29.95
144VD	144-148	< 1.5	$29.95
144VDA	144-148	< 1.0	$37.95
220VD	220-225	< 1.8	$29.95
220VDA	220-225	< 1.2	$37.95
432VD	420-450	< 1.8	$32.95
432VDA	420-450	< 1.1	$48.95

Postpaid for U.S. and Canada. CT Residents add 7-½% sales tax. C.O.D. orders add $2.00. Air mail to foreign countries add 10%.

VISA master charge

Request our detailed catalog!

Advanced Receiver Research Box 1242 Burlington, CT 06013 (203)684-0776

5W2M FM SYNTHESIZER

FACTORY DIRECT OFFER

$249 with Battery Pack REG. 299 - Antenna Wall Charger

- FULLY Synthesized from 144 to 148 5KC Step MARS, CAPS conversion available
- Highest battery pack capacity in the market and also removable
- Small size 165 mm (H) 64 mm (W) 41 mm (D)
- Accessories
  - TTP $30 • Speaker Mike $30 • Desk top Charger $46 • Battery pack $32 • Belt clip leather case • CTCSS Burst tone encoder

DG800

all controls on top

DIGIDEN COMMUNICATIONS
5441 Paradise Rd. A226
Las Vegas, Nevada 89119
702-736-6657
All FCC certified and carry 90 day warranty

PAGER SIZE WALKIE TALKIE

NEW!

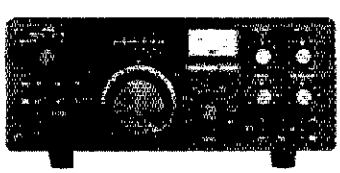
DG146A $179 with Antenna Battery pack 52/52, Wall Charger

SPECIAL OFFER OF COMMERCIAL RADIOS TO VERY SPECIAL HAMS. UNLIMITED USE FOR AMATEUR CAP, MARS. DG 220A (220 MHZ) DG450A (UHF) coming soon

- 2 watt output • 7.2V 450 MaH battery pack • six channels
- small size 120 mm (H) 60 mm (W) 32 mm (D) • Extra channels $10

SEND CHECK or money order. Add $3 for shipping and handling for UPS brown. SEND postcards for brochures all prices subject to change without notice. Export inquiry invited.
Call for stock, or allow 4-5 wks

Call or write for price & delivery on TEN-TEC ARGOSY

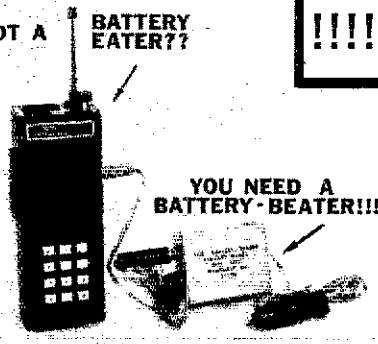


RDC

Ross Distributing Company
78 South State Street
Preston, Idaho 83263
Ph: 208 / 852-0830

This month's special: Iso Pole Jr. - $25.00

GOT A BATTERY EATER?? !!!!!



YOU NEED A BATTERY-BEATER!!!

(Radio not included)

BEAT YOUR BATTERIES!

OPERATE your SYNTHESIZED HT CONTINUOUSLY from any 12-30v D.C. source: Auto, Truck, RV, Light Aircraft (12 or 28v system), Home D.C. Power Supply!!! STEWART's New"BATTERY-BEATER"provides the proper REGULATED voltage for your rig and plenty of current for CONTINUOUS FULL POWER TRANSMIT! All day travel, all evening Simplex Net with NO QRT TO RE-CHARGE! TRANSMIT EVEN WITH DEAD NiCads!!!!

- NOT a battery charger but a FULL POWER SOURCE with TWO PROTECTION CIRCUITS!
- RUGGED ALUMINUM CASE! NEW, IMPROVED MODEL FOR ICOM! SO TOUGH THE AVERAGE MAN CAN STAND ON IT!
- YOUR NiCads REMAIN IN PLACE! Simply unplug for INSTANT PORTABILITY!!
- DESIGNED by an engineer from NASA's Jet Propulsion Laboratory with components rated 50% beyond requirements!
- PRE-WIRED JACK for your radio with detailed, step-by-step installation instructions.
- TWO 6 FT. POWER CORDS - 10 FT. TOTAL REACH! VELCRO pads to mount anywhere! 1 FULL YEAR WARRANTY!!
- NO INTERFERENCE with PL's! LONGER LIFE FOR NiCads!
- The ONLY accessory power supply that can claim all these exciting features, and more!!
- NOW AVAILABLE for TEMPO S-1,2,5; YAESU FT-207R; ICOM IC-2A/T; WILSON MK II, MK IV; SANTEC HT-1200! (MEMORY RIGS RETAIN MEMORY!!!
- PRICE: ALL MODELS- $30.00 Post Paid, Ca. Res. add $1.80 Tax. C.O.D.'s- You pay Postage and COD fees.
- PHONE: 1-213-357-7875 for C.O.D.

STEWART QUADS P.O. Box 2355 IRWINDALE, CA. 91706

Summer doldrums have set in it seems, and activity is at a lull. On June 14th, I attended the ARCA meeting in Casa Grande. It was a fine meeting and I thank all those present for their hospitality. Information gathered at this meeting indicates that the Ft. Tuthill Hamfest looks to be a successful event as well as the SW Div. Convention. Hope to see all at both events. K7OMR has assumed the duties as the new TRA president. There are two new ARRL affiliated clubs in the section, they are the Green Valley ARC and the London Bridge RA. For those of us who check into traffic nets let's all help the NCS and follow good net discipline. Congratulations to WB7EAW and new harmonic. Field Day activity was reported by several groups in the section. I hope all participants were successful in their endeavors on Field Day. Members of TRA will have provided communications for the J.C. 4th of July Fireworks. I regret to report that WB7CPY became a Silent Key in June. If you haven't seen or would like to see your station's activity report in this column, then all you need do is to send it to me. ATEN: QNI 856, QTC 160. SWN: QNI 228, QTC 162. Traffic: KB7HA 78, W7OIF 67, K7MC 59, WA7KOE 56, K7NTG 56, K7UXB 23, KE7W 21, W7EP 17, K7NMQ 10, K7JKM 9, N7EH 8, WA7YUL 7, WA7NXL 5.

LOS ANGELES: SCM, Stan Brokl, N2YQ — ASCM: N6UK. SEC: WB6FAK. STM: W6INH. On June 18, KB6BX was contacted by Compton Red Cross to provide the communications after a major apartment fire. Participants in this real disaster included WD6ERM N6ZH W6PGM AK6Y KA6CSS W6YEQ WB6EDE W6BVG and WD6CHR. The RACES repeater, K6CPT/R, was used throughout this emergency. Fiesta Days Run in La Canada was supported by the Crescenta Valley ARC. Participants used WA6FEO/rpt and included W6SUI W6LAN WB6VWG WA6JLB W6KAO WD6CKN W6MHZ WA6PVZ K6VRY WA6CTJ WB6DRN WB6VVS and WB6VVZ. I received 8 Field Day messages this year, an all time high. Included were N6MI W6CN W6VIO W6JW W6OC W6MPH WA6SFM and W6UE. The clubs were all out to win this year. OO reports this month: K6CL 4, K4WGW 14, K6KA 80. Members of the Associated Radio Amateurs of Long Beach, W6RO, participated in the Boat Parade on Sunday, June 7. W6PGM headed the event. Traffic: (June) W6INH 128, WA6OCM 114, K6OWA 92, WB6YID 74, N6BCY 54, WA6LVO 50, KA6ALH 28, W6NKE 26, KT6D 25, N5DZQ 20, K6CL 18, N3EG/6 9, W6RO 4 (May) K5DY 71.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. STM: KA6A. SEC: W6UBQ. NMs: WB6AKR K6JT W6CBP WA6OCA WA6WZO. DECs: K6GGS WB6JBI W6LKN WB6YZY. WA6RNA appointed OO. W6FNG & K6OLT appointed OES. New So Calif ATV Club officers: WB6LOP, pres.; N6AZV, v.p.; WD6BZN, secy./treas.; WA6MVD, pub./ed.; WB6OFG, treq. co. Catalina Repeater Association (WR6AAA) new officers: WB6SJK, pres.; WD6CIS, v.p.; WB6PCY, secy.; KB6HY, treas.; W6IFW, pr. New groups: Orange Hill Contesters Charter, WA6JAH, pres.; Mesa Emergency Service Auxiliary Communications (MESAC): KA6GVV, pres.; WB6GXD, v.p.; KA6GVX, secy.; KA6MOG, treas.; WB6NOA, comm. off.; N6FM, repeater trustee. The Mission Trail Net (which meets daily 7 P.M. 3928 kHz) elected K6JQY, pres.; W6DTL, v.p.; WA6WZQ, secy.; WA6RWN, treas., and awarded WB6EIG for most traffic (7th year) and awarded W6DXL Life Membership. For five days, over 60 ARES/RACES members (including N6BAE/R & WB6FUB/R) provided communications to the Calif Dept of Forestry (CDF) in battling the fire that covered 29,000 acres in Riverside County; once more the Volunteer-In-Prevention (VIP) program under the leadership of EC AI6I and EC WA6QMW proved their worth. Congrats to N6AED for 5BWAS; also he & KS6T made both BPL & PSHR for the month. For current So Calif Repeater list including 6 & 10 mtrs, contact SCM. So Counties Amateur Teleprinter Society (SCATS) holds RTTY nets on W6IWO/R (146.1/.7) Tue & Wed 8 P.M. FB FD with SCM receiving eleven messages.

Net	Freq.	Time-Dy	QNI	QTC	NM
SCN/1	3598 kHz	7:00 P.M.	316	374	K6FI
SCN/2	3598 kHz	8:15 P.M.	256	138	K6PHV
SCN/VHF	147.045/645	9:00 P.M.	395	185	WA6OCA
SCN/RTTY	3637.5 kHz	8:00 P.M.			WB5EKU

(K5DY SCN Net Manager — KA6A Asst. NM)
Traffic: KS6T 503, N6AED 367, WB6EIG 343, WB6QBZ 206, AI6E 121, W6CPB 68, K6ZCE 32, N6DNH 24, WA6QCA 24, W6TKV 20, WA6WZO 16, W6RE 14, W6NTN 12, WA6WZN 5, WB6SEL 4, KI6X 4.

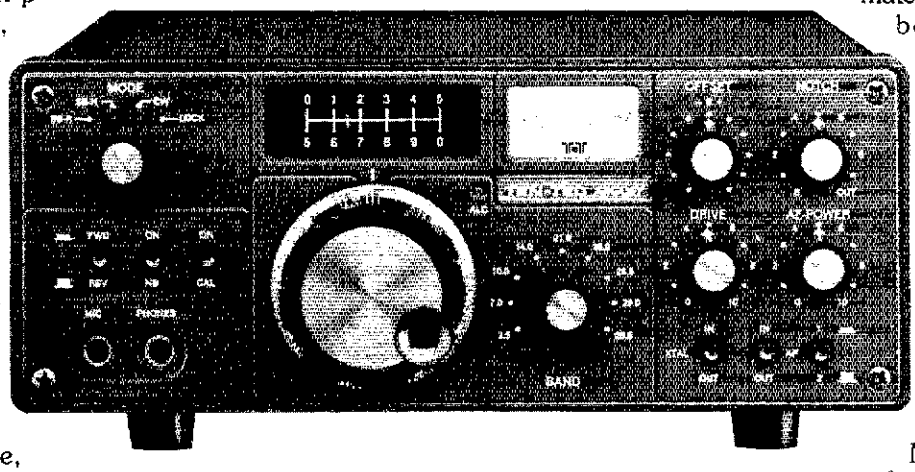
SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW (222-5575). SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). Stations reporting monthly traffic totals by message need only give total messages handled unless qualifying for BPL. WB6HFE has retired as EC for Northern (S.D. County) District. Thanks for a job well done. WA6EYX will act as EC for Northern District pending reorganization into three districts. Severe fire hazard weather in June resulted in three days of Red Flag alerts with approx 40 amateurs providing patrols for the Calif Dept of Forestry. Amateurs also helped man the CDF booth at the Southern Calif Expo, freeing fire fighters for fire suppression duties. Call sign changes: WA6AEZ to KA6BH, WB6NKG to KD6XJ. North Shores ARC and ARC of El Cajon made the TV news on Field Day. Poway ARS sponsored a S.D. Radio Council donation to AMSAT. Palomar ARC keeps its members posted on license expiration dates. Break into the art of message handling on the Palomar ARC repeater, 146.13/73 MHz, nightly at 2000. Traffic: (June) KT6A 589, N6GW 205, KM6I 128, KB6AI 84, K6HAP 68, KU6D 46, N6AT 31, K6QCW 20, WA6UFY 4, KO6Z 2. (May) K6AE 4, WA6UFY 4, W6UQF 4.

SANTA BARBARA: SCM, Robert N. Dyrutt, W6POU — Some excellent replies sent on "plain language rules" docket. FCC's Carlos Roberts granted (token) two month extension he says ARRL asked for? Most section amateurs convinced docket is harmful to A.R. and desire its rejection. Concerned amateurs formed SPAR-Society for Protection of Amateur Radio — for political action in support of A.R. and ARRL. For info sent s.a.s.e. to SPAR, P.O. Box 41, Santa Barbara, CA 93102. New officers: Valley Good Guys ARC — WB6VHS, pres.; Simi Settlers ARC — W6AFF, pres.; WD6EZY, editor. SBARC KEY-KLIX editor WD6ADG replaced by KA6OFZ. KA6OXO is Tech. KA6BOT 100% on Tech exam. YLs WD6EZY WA6OHX WB6ONY keep two clubs buzzing. WD6DPL QSY to Mich. WB9KMO/WB6QDS exch. 2 way color pix with WB8ELK over 200 miles — Mt. Pinos to Yosemite. Publ svc: fires in Thousand Oaks occupy K6CAB WB6RVA WB6CNO WD6BCN N6CU. Dial EC, WB6LMX, sets agreement with Red cross and hospital. Ventura Co. Sea-To-Summit Bike-a-thon involved 4 mobiles, 2 MC mobiles. Traffic: K6YD 142, W6ZRR 134, WA6MBZ 104, W6JGS 67.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: WA5QFD. STM: W5VMP. SEC: W5GPO. NMs: AA5J

Here's a Concept You Haven't Seen In Amateur Radio For A Long Time— Low Price.



New TEN-TEC Argosy $549

The right design — for all the right reasons. In setting forth design parameters for ARGOSY, Ten-Tec engineers pursued the goal of giving amateurs a rig with the right features at a price that stops the amateur radio price spiral.

The result is a unique new transceiver with selectable power levels (convertible from 10 watts to 100 watts at the flick of a switch), a rig with the right bands (80 through 10 meters including the new 30 meter band), a rig with the right operational features plus the right options, and the right price for today's economy—just $549.

Low power or high power. ARGOSY has it. Now you can enjoy the sport and challenge of QRPp operating, and, when you need it, the power to stand up to the crowds in QRM and poor band conditions. Just flip a switch to move from true QRPp power with the correct bias voltages to a full 100 watt input.

New analog readout design. Fast, easy, reliable, and efficient. The modern new readout on the ARGOSY is a mechanical design that instantly gives you all significant figures of any frequency. Right down to five figures (± 2 kHz). The band switch indicates the first two figures (MHz), the linear scale with lighted red bar-pointer indicates the third figure (hundreds) and the tuning knob skirt gives you the fourth and fifth figures (tens and units). Easy. And efficient—so battery operation is easily achieved.

The right receiver features. ***Sensitivity*** of 0.3 μV for 10 dB S+N/N. ***Selectivity:*** the standard 4-pole crystal filter has 2.5 kHz bandwidth and a 2.7:1 shape factor at 6/50 dB. Other cw and ssb filters are available as options, see below. I-f frequency is 9 MHz, i-f rejection 60 dB. ***Offset tuning*** is ± 3 kHz with a detent zero position in the center. ***Built-in notch filter*** has a better than 50 dB rejection notch, tunable from 200 Hz to 3.5 kHz. An optional noise blanker of the i-f type has 50 dB blanking range. ***Built-in speaker*** is powered by low-distortion audio (less than 2% THD)

The right transmitter features. ***Frequency coverage*** from 80 through 10 meters, including the new 30 meter band, in nine 500 kHz segments (four segments for 10 meters), with approximately 40 kHz VFO overrun on each band edge. ***Convertible power:*** 100 or 10 watts input with 100% duty cycle for up to 20 minutes on all bands. ***3-function meter*** shows forward peak power on transmit, SWR, and received signal strength. ***PTT*** on ssb, ***full break-in*** on cw. PIN diode antenna switch. ***Built-in cw sidetone*** with variable pitch and volume. ***ALC control*** on "high" power only where needed, with LED indicator. ***Automatic*** normal sideband selection plus reverse. ***Normal 12-14V dc*** operation plus ac operation with optional power supply.

The right styling, the right size. Easy-to-use controls, fast-action push buttons, all located on raised front panel sections. New meter with lighted, easy-to-read scales. Rigid steel chassis, molded front panel with matching aluminum top, bottom and back. Stainless steel tilt-up bail. And it's only 4" high by 9½" wide by 12" deep (bail not extended) to go anywhere, fit anywhere at home, in the field, car, plane or boat.

The right accessories—all front-panel switchable. Model 220 2.4 kHz 8-pole ssb filter $55; Model 218 1.8 kHz 8 pole ssb filter $55; Model 217 500 Hz cw filter $55; Model 219 250 Hz cw filter $55; Model 224 Audio cw filter $34; Model 223 Noise blanker $34; Model 226 internal Calibrator $39; Model 1125 Dc circuit breaker $15; Model 225 117/230V ac power supply $129; Model 222 mobile mount, $25; Model 1126 linear switching kit, $15.

Model 525 ARGOSY —— $549. Make the right choice, ARGOSY—for the right reasons ***and*** low price. See your TEN-TEC dealer or write.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

electronic mail
aerospace
press
satellite
training aids
embassy/diplomatic
maritime
government
emergency/disaster
meteorological
oceanographic
handicapped
civil defense

CONSIDER THE ATR-6800

You know of its reputation in Amateur Radio. But did you know of its world-wide uses in commercial/industrial communications networks? ATR-6800's are communicating over land-lines, via satellite, and on HF/VHF radio links all over the world. They're teaching Morse Code on military bases around the country and operating as TELEX & TWX terminals. We offer engineering expertise for your particular requirement be it Data Encryption, Computerized Training or any special interest. ATR-6800 with 9" video monitor and one plug-in Applications Module . . . $2495. Companion MX-80 printer . . . $699. Contact the "REAL-WORLD" at MICROLOG CORP. 4 Professional Drive, Suite 119, Gaithersburg, Md. 20760. TEL: (301) 948-5307. TELEX: 908778. You'll be pleasantly surprised.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

AE5I KA5IWF WD5JYI. The Texas Slow Speed Ttc. Net (TSN) has a new mgr. to fill out term of WD5JIM. It's WD5JYI in Irving. If you want to "get your feet wet" in cw ttc handling, the TSN is the place to do it. The net meets nightly on 375 kHz @ 0100Z, and not only is it a good training net, but an official Section Net of the National Ttc. System. Your QNI is invited, and you will be answered at the speed you check-in. It's time for all ARES groups to start planning for the annual Simulated Emergency Test (SET) in October. It's good to get the local police/fire and city officials involved as much as possible to let them have a good idea of our capabilities and demonstrate our professionalism as communicators. The monthly first-Saturday "Sidewalk Sale" in Dallas has moved to Ross Ave. just west of Central Expwy. No more wading in the mud, and ample parking. PSHR: KA5IWF WD5JYI KA5AZK AJ5F K5HGX K5SOR N5BT KK5B KC5NN W5HMR W5VMP KA5AVO KC5FX and WB5UZS. Traffic: N5BT 213, K5BNH 161, KC5FX 124, KK5B 113, K5HGX 111, KA5AZK 100, KA5IWF 63, K5QKM 56, WA5INJ 38, WD5JYI 38, KC5NN 37, WB5OXE 36, W5HMR 27, KA5AVO 22, W5VMP 20, K5PC 18, WA5EZT 16, AJ5F 14, K5SOR 14, WB8TZ 10, KB5UL 8, WA5KHE 6, K9MX 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — 24 ORS reports, 4 PSHR, 2 OBS and 2 OO reports for the month of June. Summer slump has hit hard from the lack of participation at all levels. Did receive 11 FD messages. ARES membership count on those was almost nil. W5UYH moving to Tulsa to new job. WB5KNS still recuperating from her illness. I have been concentrating much of my time to routine operating and working with CORA on the convention/ham holiday and have not done some of the other work I should have. Therefore, reports of your activities are very skimpy, and I have been remiss about some other things that should have been done. Again: If I don't hear from you, I cannot put your news in this column. Traffic: (June) W5REC 204, WB5NKC 195, W5RB 169, WD5IFB 143, W5AS 89, K5CXP 83, KB5EK 83, WA5FSN 81, WB5ELG 71, WA5OUV 66, WB5TFX 65, W5VXU 64, K5CAY 35, W5VLW 33, W5UYH 31, WA5JGU 28, WB5LSW 28, W5VOR 26, K5MGD 17, KF5A 14, W5SUG 13, WB5NKD 12, NØIN 8 (May) K5CXP 92.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N. I am pleased to announce the following appointments: KB5SY, EC Jefferson Cty.; K5ZC and N5CRU, ORS; K5VRF, OO W5SG reporting that the Texas DX Society had a great FD outing in class 3A. WA5RVT WD5AAH and N5FN participated in a DPS ERT drill. Tidelands ARS and U. of Tex. Medical Branch supplied communications during recent floods and also had a drill utilizing 2-mtr RTTY. WB5UYV is now KC5RP. WA5ROE says the Big Bend ARC had a program presented by W3IWI, AMSAT president. This was the first club to view the unedited video tape of Phase IIIA liftoff and demise. K5DG organized an all-valley FD with operators present representing 12 cities. WB5YDD W5SHN KC5JL W5TUK WB5YTI K5OWK W5KLV served CAND this month. WD5JJS and N5AF OVS stations reporting this month. KA5DDY is now N5DJR. KA5LEI is now a Technician. KA5CSA (N5FN XYL) upgraded to Tech. Since this report will appear during my last month in office, I would like to take this opportunity to thank everyone for their support and activity during my tenure. I took the reins of a healthy organization 2 yrs. ago and I hope that I am leaving it in as good or better condition. Please give the next SCM as much support as you have given me. Traffic: N5DAA 674, WB5YDD 665, W5TFB 550, W5SHN 457, W5KLV 382, W5CTZ 349, KB5TC 230, K5HZR 153, N5TC 135, N5CRR 121, WA5RVT 112, W5SBE 79, KB5NX 77, KZG 68, WD5AAH 60, KA5GYJ 49, WB5MMI 43, WD5KBK 39, W5BGE 30, N5FN 30, WB5EFJ 26, KA5KRI 26, WD5GKH 18, KB5KZ 15, AK5M 13, KC5RP 7, K5DG 5, WD5DQR 5, K5RVF 2.

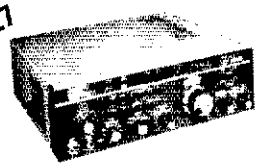
Bob's Amateur Radio Center

7322 N.W. 46th STREET – MIAMI, FLORIDA 33166 – (305) 591-2107 – (305) 592-2788
Se Habla Espanol – Telex 808327

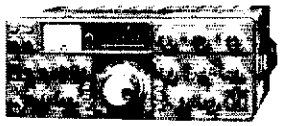
● STORE HOURS – Monday thru Saturday – 9:30 am to 5:30 pm

"Our hospitality is second to none"

DRAKE



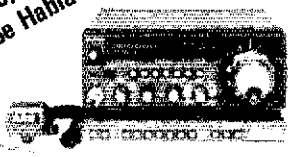
KENWOOD



ICOM

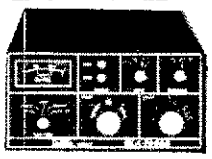
Kantronics
A commitment to excellence.

DAIWA
J. W. Miller

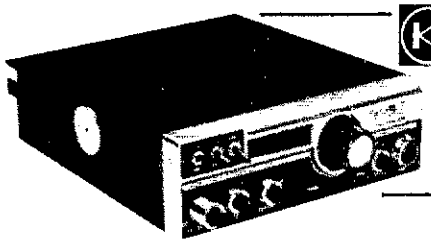


YAESU

DenTron



KDK



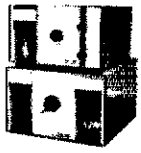
Authorized DEALER for KDK

Bearcat
Bearcat 350

Bearcat 210XL

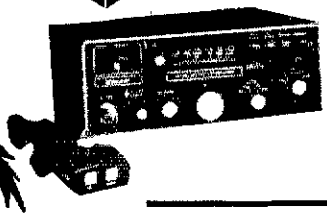
Cordless Freedom Phone

Henry Radio
Now Stocking!
1KD5 – 2KD5



GSC POWER SUPPLIES
STOCKING! 20 amp – 10 amp.

CUBIC



ROBOT

ANTENNAS CUSHCRAFT – HYGAIN
LARSEN – HUSTLER – AVANTI

cushcraft

MFJ ENTERPRISES, INC.

MIRAGE

Berk-Tek

avanti antennas

TRAC

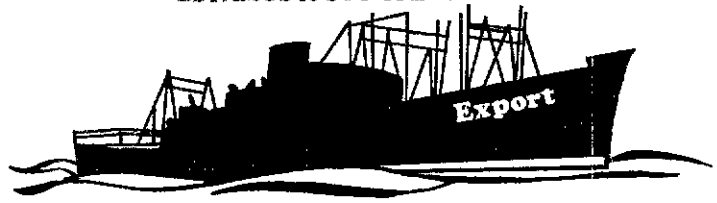
ALLIANCE

RPT – We stock a full line of Repeaters!

RF PRODUCTS

B&W

TENEMOS LA TIENDA MAS GRANDE Y MAS ATRACTIVA DE RADIOAFICION EN EL SURESTE DE ESTADOS UNIDOS. ESTAMOS SOLAMENTE A MINUTOS DEL AEROPUERTO INTERNATIONAL DE MIAMI. TENEMOS TODAS LAS MARCAS PRINCIPALES DE LA RADIOAFICION.
LLAMENOS, ESCRIBANOS, O VISITENOS,
ESTAMOS A SUS ORDENES



Prices are subject to change without notice.

Bob's Amateur Radio Center

7322 N.W. 46th STREET – MIAMI, FLORIDA 33166 – (305) 591-2107 – (305) 592-2788

SEPTEMBER SALE

NOW YOU CAN SAVE BIG AT THE ANTENNA BANK

CHECK OUR LOW PRICES
THEN CALL OUR ORDER DESK
TOLL FREE
800-336-8473

HYGAIN ANTENNAS

TH6DXX Triband Beam	$239.95
TH3MK3 3 Element Beam	174.95
TH5DX 5 Element Beam	199.95
TH3 Jr. 3 Element Triband	132.95
18AVT/WB 10-80 Vertical	79.95
14AVQ/WB 10-40 Vertical	49.95

Call us for our price on the Hy-Gain Package Deal advertised elsewhere in this issue

CUSHCRAFT ANTENNAS

A4 New 4 Element Triband	197.28
A3 New 3 Element Triband	159.63
AV3 New 3 band vertical 10-20m	37.38
AV4 New 4 band vertical 10-40m	76.85
AV5 New 5 band vertical 10-80m	81.61
ARX-2B New Ringo Ranger 2m	33.98
32-10 2m Boomer DX Beam	68.00
214B Jr. Boomer 144-146	54.39
A147-11 2m 11 Element	30.58
Mini Quad HQ-1	129.95
Alliance HD73 Rotor	91.95
CDE Ham IV/CD45 II Rotors	165.95/94.95

Cable

RG8/U Foam 95% shield	24c/ft.
RG213 Mil Spec	28c/ft.
Mini 8	12c/ft.
8 wire rotor wire	16c/ft.

B & W

370-15 Allband Dipole	119.95
370-14 4 Band Antenna Kit	41.94

ROHN TOWERS

20 G .... $29.50 25G .... $39.95 45G $87.50

HDBX 48 Free Standing 48' (18 sq. ft.)	320.00
HBX56 Free Standing 56' (10 sq. ft.)	340.00
FR2548 48x 25G Fold-over Tower	695.00

(Freight Paid on Foldover Towers. Prices 10% Higher West of Rocky Mountains)

WE STOCK ROHN ACCESSORIES

Hustler 4BTV/5BTV	69.57/88.55
MO1/MO2 Mast	15.40
10/15 meters .... 7.48 super	12.65
20 meters .... 10.06 super	15.23
40 meters .... 12.07 super	16.95
75 meters .... 13.22 super	27.00
SF-2 2m 5/8 wave	8.90
SF-220 220 Mhz 5/8 wave	8.90
HOT trunk mount "Hustleoff"	13.80

AVANTI

AP151.3G 2m "on glass"	27.95
AP220.3G 220 MHz "on glass"	27.95
A-450.3G 450 MHz "on glass"	27.95

Unadilla - Reyco

W2AU Baluns	11.87
Traps per pair 10/15/20/40	16.67

Van Gordon

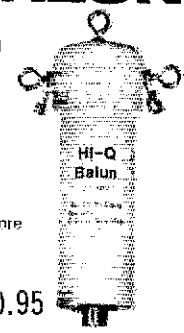
PD 8010 10 80 wire dipole	28.80
PD 4010 10 40 wire dipole	25.20
PD 8040 40-80 wire dipole	26.40
SD-40 short dipole	21.60
SD-80 short dipole	22.80
HI Q Balun	6.75
HI Q Traps	13.20
HI-Q Center Insulators	4.50

800-336-8473 Orders Only
Shipping costs not included
Va. residents add 4% tax
NO C.O.D. Prices subject to change without notice. We reserve the right to limit quantities. For other information call

THE ANTENNA BANK
6460 General Green Way
Alexandria, VA. 22312
703-569-1200

HI-Q BALUN

- For dipoles, yags, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz
- Small, lightweight and weatherproof
- 1:1 impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector



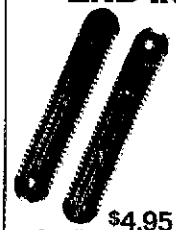
$10.95

HI-Q ANTENNA CENTER INSULATOR

Small, rugged, lightweight, weatherproof
Replaces center insulator
Handles full legal power and more

$5.95 With SO 239 connector

HI-Q ANTENNA END INSULATORS



Rugged, lightweight, injection molded of top quality material with high dielectric qualities and excellent weather ability. End insulators are constructed in a spiral channeling fashion to permit winding of loading coils or partial winding for tuned traps.

Patent No. 4,091,350

$4.95

May be used for
- Guy wire strain insulators
- End or center insulators for antennas
- Construction of antenna loading coils or multiband traps

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
PD-80	80/75	130	$ 76.95	$ 79.85
PD-40	40/15	66	72.95	74.85
PD-20	20	33	54.95	56.85
PD-15	15	22	52.95	54.95
PD-10	10	16	52.95	54.95
Shortened dipoles				
SD-80	80/75	90	59.95	62.75
SD-40	40	45	49.95	51.95
Parallel dipoles				
PD-8010	80 40 20 10/15	130	79.95	81.95
PD-4010	40 20 10/15	66	74.95	76.95
PD-8040	80 40/15	130	79.95	81.95
PD-4020	40 20/15	66	74.95	76.95

Dipole shorteners – only, same as included in SD models

S-80	80/75	$11.95 pr
S-40	40	$10.95 pr

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center Insulator, (no 14 antenna wire, ceramic insulators, 100 nylon antenna support rope (SO models only 50 ft.) rated for full legal power. Antennas may be used as an inverted V and may also be used by MARS or SWLs.

Antenna accessories – available with antenna orders

Nylon guy rope, 4mil test, 100 feet	$ 4.49
Ceramic dogbone Type I antenna insulators	.75 pr
SO-239 coax connectors	.95

All prices are postpaid USA 48
Available at your favorite dealer or order direct from

Van Gorden Engineering
BOX 21203, S. EUCLID, OHIO 44121

Dealer inquiries invited

BEAM HEADINGS - COMPUTERIZED
DX AID CONTEST AID
3 Giant listings-Customized on your EXACT QTH
A must for efficient beam use.

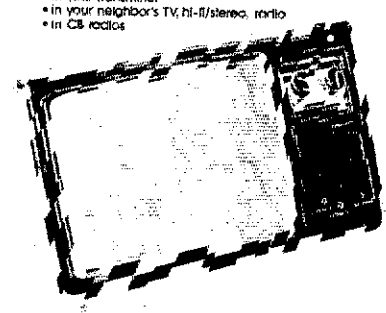
1st List: All ARRL countries & more, over 860 DX locations, distances in kilometers. Hear call immediately know your heading. Listed by call sign prefix, no tiny maps. ***2nd List:*** Over 450 USA/CANADA cities. Listed alphabetically by city, distances in miles. ***3rd List:*** Like 2nd list, but alphabetic by state. Send name, call, QTH, latitude & and longitude if known, $6.95 for all lists to:

Ted Herrman, AE8G
901 S. Buckingham Ct., Sterling, VA 22170

$3.00

RADIO FREQUENCY INTERFERENCE

How to identify it and cure it:
- In your transmitter
- In your neighbor's TV, hi-fi/stereo, radio
- In CB radios



Published by the American Radio Relay League

RADIO FREQUENCY INTERFERENCE

WILL GET YOU IF YOU DON'T WATCH OUT!

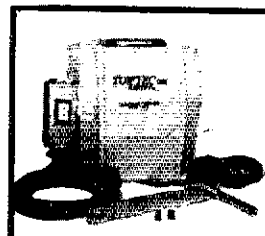
Radio Frequency Interference can ruin your favorite TV show or curtail 10 meter operation. It can drive a wedge between neighbors who used to be friends. It can be a headache to the service technician who tried to get rid of it once and for all.

This book covers what you need to know about RFI. At times the solution may be as simple as adjusting the fine tune control on the TV. Or it may require some simple modifications. Whatever the cause, there is an answer to every type of RFI problem.

You'll find it all in **RADIO FREQUENCY INTERFERENCE.**

$3.00 U.S. $3.50 Elsewhere

American Radio Relay League
225 Main St.
Newington, CT 06111



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, HY-GAIN, WILSON, TEL-TOW'R, PIPES, ETC.

TOWTEC CORP.
118 ROSEDALE RD., YONKERS, N.Y. 10710
Tel. (914) 779-4142

$280

11th ANNUAL
GREATER

LOUISVILLE

HAMFEST

1981 ARRL GREAT LAKES DIVISION CONVENTION

- ★ TECHNICAL FORUMS
- ★ AMSAT FORUM
- ★ MARS MEETINGS
- ★ DX FORUM
- ★ NOVICE FORUM
- ★ QSL CONTEST
- ★ ARRL FORUM
- ★ KY. NETS MEETING
- ★ MICROPROCESSOR FORUM
- ★ CW CONTEST
- ★ ARES
- ★ HOMEBREW EQUIPMENT CONTEST

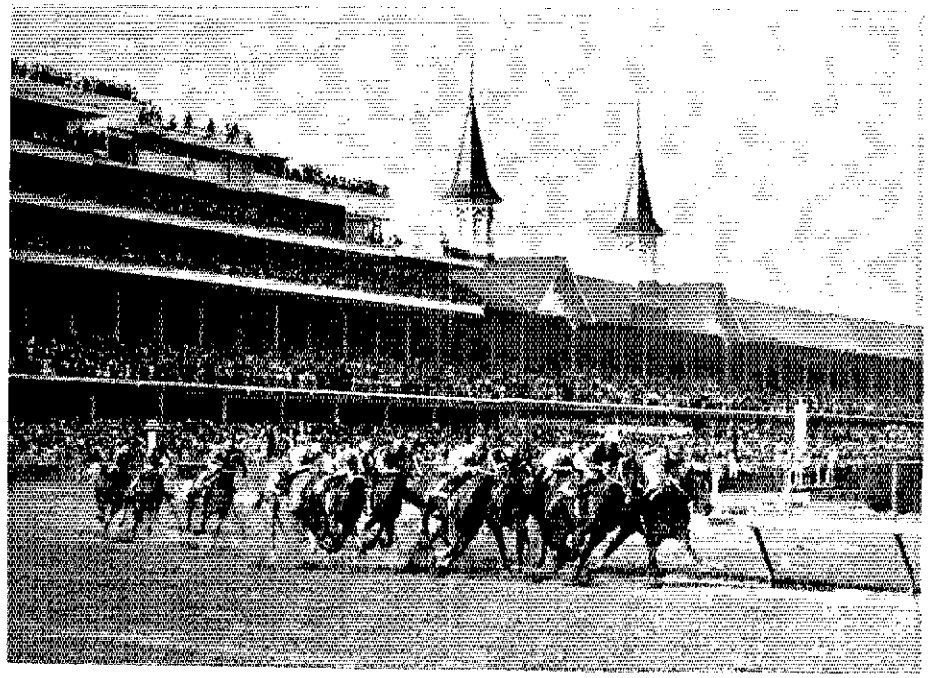
★ "FANTASTIC LADIES PROGRAM BOTH DAYS"

Sept. 26th & 27th
Kentucky Fair & Exposition Center-LOUISVILLE, KENTUCKY

TAKE Exit 12 B off of I-264
GIGANTIC INDOOR EXHIBITORS AREA AND FLEA MARKET
Over 250,000 sq. ft. of floor space, completely air conditioned.

★GALA SATURDAY NIGHT BANQUET★
with featured speaker Harry J. Dannals, W2HD, President ARRL

Special Hamfest Award given at Banquet



HAMFEST REGISTRATION – $3.50 IN ADVANCE / $4.50 AT THE DOOR
BANQUET - $12.50 IN ADVANCE ONLY
FLEA MARKET SPACE – $3.00 FOR ONE DAY ONLY - $5.00 Covers Both Days

CAMPING IS AVAILABLE ON THE GROUNDS FREE AT SPECIALLY MARKED AREAS
Hook up to A.C. is $5.00 per night

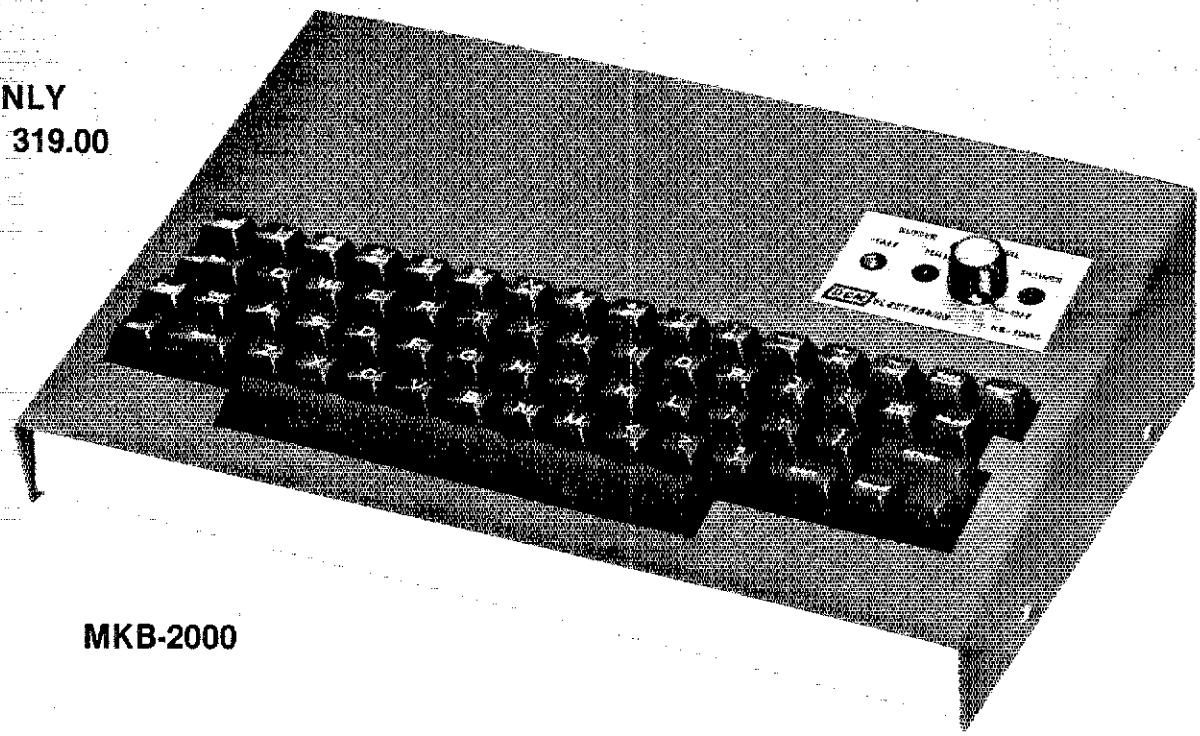
ROOM RESERVATIONS – THE EXECUTIVE INN MOTOR HOTEL – PHONE 502-367-6161 or THE EXECUTIVE WEST MOTOR HOTEL - PHONE 502-367-2251 (Both Hotels directly across from HAMFEST) (Please mention HAMFEST for Special Rate)

FOR ADVANCE REGISTRATION, EXHIBITOR INFORMATION, HAMFEST BROCHURE OR GENERAL INQUIRY, CONTACT:
THE GREATER LOUISVILLE HAMFEST
% DENNY SCHNURR, K4GOU
P. O. BOX 34444
LOUISVILLE, KENTUCKY 40232
PHONE: 502-634-0619

YOU'VE SEEN THE REST . . .

NOW LOOK AT THE BEST!

ONLY
$ 319.00



MKB-2000

- 500 Character text buffer with BREAK feature which allows you to transmit without clearing your preloaded text.
- Ten 40 Character programmable message memories which can be run together or made to call each other for longer messages.
- Buffer can be operated in character, word, or line mode and preloaded for later transmission. Word mode allows you to send smooth code, even if you "hunt and peck." Each word can be typed in and edited before it is transmitted. Pressing the space bar will transmit the word. Also, selected segments of the text buffer can be repeated.
- Cassette interface allows you to record and transmit very long messages or code practice tapes using a standard cassette recorder.
- Built-in 110 VAC Power Supply
- Attractive anodized brushed aluminum and gray wrinkle finish case provides excellent RF shielding, only 13.3 x 9.4 x 3.5 in.
- MORSE Features include a 1-199 WPM speed range, 9 setting weight control, 10 settings of inter-character spacing all of which are keyboard selectable at anytime. Random code generator which allows you to select 5 character groups of letters or letters, numbers and punctuation. Special keys for CQ,DE,BK, AR,AS,BT,SK,VE,KN and error. Rugged solid state outputs for positive or negative keying. Built-in sidetone with adjustable tone and volume controls. Tune key for transmitter tuning.
- RTTY Features include 60,66,75,100,132, WPM Baudot speeds and 110,300 baud on ASCII. Automatic CR/LF with selectable 1-72 character line lengths, automatic LTR-FIG shift, CW ID, QBF and RY test messages, "Brag Tape" cassette interface, sync idle, "Space" condition command, loop keyer output and PTT line control.
- Glass Epoxy printed circuit board with sockets on all integrated circuits.
- One Year Warranty on Parts and Labor

MKB-2000 Keyboard (Morse Only) **$319.00**

RTTY Option (Baudot and ASCII)	**$50.00**	AFSK Modulator	**$50.00**
Memory Expansion	**$75.00**	Reed Relay Output	**$25.00**

Add $5.00 per unit for shipping U.S.A.

Send For Free Information

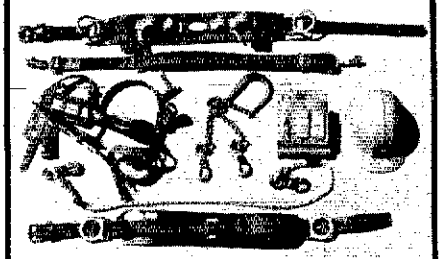
DGM ELECTRONICS, INC.

master charge VISA

787 BRIAR LANE, BELOIT, WISCONSIN 53511 (608) 362-0410

Specifications and prices subject to change without notice or obligation

Safety Belts



Mfg. by Klein Tool Co.

Lineman Belt, (waist size?)	$65.00
Pole strap, 5'8" max. length	35.00
Pole climbing gaffs, pair	82.00
Tower Hook Chain	33.00
Tool Pouch	15.00
Hard Hat, adjustable	7.00
Nylon Lanyard 5'	16.00
Utility Belt (waist size?)	30.00

Write for free spec sheet or order from Ad. Personal check or MO. We pay shipping

AVATAR Co.
Ron Williams W9JVF
1147 N. Emerson
Indianapolis, Indiana 46219

Safety Belts

NEW MFJ-102 SOLID STATE
24 HOUR DIGITAL CLOCK

Switchable to 24 hour GMT or 12 hour format. ID timer. Seconds readout. Bright BLUE .6" digits. Alarm, snooze, lock functions. Power out, alarm on indicators. Assembled.

Switch to 24 hour GMT or 12 hour format!
ID timer. Seconds readout.
Bright BLUE .6 inch digits.

$32.95

Now you can switch to either 24 hour GMT time or 12 hour format! Double usefulness.

Switchable "Seconds" readout for accuracy.

ID timer. Alerts every 9 minutes after you tap the button. Also use as snooze alarm.

"Observed" timer. Just start clock from zero and note end time of event up to 24 hours.

Alarm. For skeds reminder or wake-up use.

Synchronizable with WWV.

Fast/Slow set buttons for easy setting.

Big, bright, blue digits (vacuum fluorescent) are 0.6" for easy-on-the-eyes, across-the-room viewing.

Lock function prevents missetting.

Operates on 110 VAC, 60 Hz (50 Hz with simple modification). UL approved.

Handsome styling with rugged black plastic case with brushed aluminum top and front. Sloping front for easy viewing. 6x2x3".

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for refund (less shipping). One year limited warranty by MFJ.

Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $32.95 plus $4.00 shipping/handling for MFJ-102.

Put this new improved MFJ digital clock to work in your shack. Order today.

CALL TOLL FREE . . . 800-647-1800

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

ASSOCIATED RADIO 913-381-5900

8012 CONSER BOX 4327
OVERLAND PARK, KANSAS 66204

BUY—SELL—TRADE

All Brands New & Reconditioned

Your BANKAMERICARD welcome here

We Want to DEAL—Call Us—We'll Do It Your Way.

WE'RE #1

master charge THE INTERBANK CARD

NOTE: SEND $1.00 FOR OUR CURRENT CATALOG OF NEW AND RECONDITIONED EQUIPMENT.

★ ALSO WE PERIODICALLY PUBLISH A LIST OF UNSERVICED EQUIPMENT AT GREAT SAVINGS. A BONANZA FOR THE EXPERIENCED OPERATOR.

TO OBTAIN THE NEXT UNSERVICED BARGAIN LIST, SEND A SELF ADDRESSED STAMPED ENVELOPE.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievements added upon request. S.a.s.e. brings TAD data sheet. W6LS 2814 Empire, Burbank, CA 91504.

YAESU OWNERS — join the ten-year old International Fox-Tango Club. Receive valuable newsletter monthly, catalogue of modifications, free advertisements, technical consultation, FT Net, more. Annual dues now $8 per year US, $9 Canada, $12 overseas airmail. Send to N4ML, Box 15944, West Palm Beach, FL 33406.

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, Box 192, Garrison, NY 10524.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

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.

FREE FLEA market! Elmira, New York International Hamfest at the Chemung County Fairgrounds, September 26. Dealers, Tech talks, great food (cheap), and even more awards than last year. Tickets and info from John Breese, WA3FJM, 340 West Avenue, Horseheads, NY 14845.

HAMBURG, New York — Ham-O-Rama '81 — Friday, September 18th 6:00-9:00 PM and Saturday, September 19th 7:00 AM-5:00PM at the Erie County Fairgrounds near Buffalo, New York. New equipment displays, computers, technical programs, ladies programs, awards and more. Tickets $3 advance or $4. at gate. Children under 12 free. Outside flea $2. per space. Inside flea $7. per space. Talk-in 146.31/91. Advance ticket deadline September 4th. S.a.s.e. to David Baco, WA2TVT, 130 Vegoia Avenue, Cheektowaga, NY 14225.

"PERFORATOR," quarterly journal of the non-profit, social, research, and information society "Worldwide Keyboard Operators." Send $1 for sample copy and membership application. All operators of cable, wireless, IBM Radiotype, and Radioteletype are welcome. Arnold J. Madiol, WD8JIV, Box 555, Grand Haven, MI 49417.

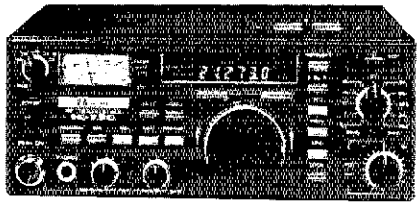
THE NORTHWEST Ohio Amateur Radio Club will hold its annual hamfest on Sunday October 11, 1981 at the Allen County Fairgrounds in Lima, Ohio. Doors open 6:00 A.M. Tickets $2. advance, $2.50 at the door. Camping available at the fairgrounds. Talk in on 52/52, 07/67, and 34/94. To reserve table space or for more information write N.O.A.R.C. P. O. Box 211, Lima, Ohio 45802 or call 419-645-5381.

ICOM

You pay LESS at AES...just Call TOLL FREE 1-800-558-0411 - ask for our DISCOUNT DESK

IC-720A Solid state, digital HF Transceiver. 9 HF Ham bands, receives .1 to 30 Mhz. 100w output, cont. LED readout, 2 VFO's, AM, CW, SSB & RTTY filters. PBT, RIT. VOX, semi break-in, blanker & processor. 13.5v/20A 4½"h × 9⅝"w × 12½"d, 17 lbs ..... **Regular $1349.00**

FL-32 500Hz CW filter 59.50
FL-34 5.2 KHz AM filter 49.50



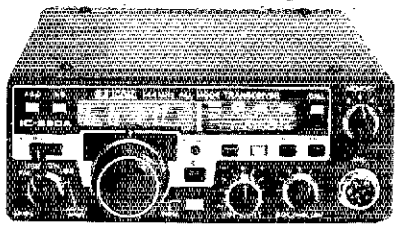
IC-730 Solid-state 80-10m (WARC) HF Transceiver. 200w PEP input. 2 VFOs, 8 freq. memory. IF shift with PBT optional. UP/DN tuning with optional microphone. 9⅛"w × 3¾"h × 10⅜"d, 10 lbs. ..... **Regular $829.00**

FL-30 SSB filter (passband tuning) 59.50
FL-44 455 KHz SSB filter 159.00
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 CWE audio filter 39.00
EX-205 Transverter switching unit 29.00
HM-10 Scanning microphone 39.50

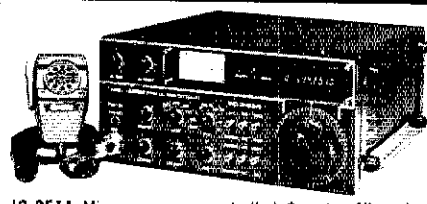
Accessories for 720/730

PS-15 Power supply $149.00
PS-20 20A power supply 229.00
Adaptor cable - PS-20 to 720/730 ..... 10.00
CF-1 Cooling fan - PS-15/20 ..... 45.00
EX-144 Adaptor for CF-1 on PS-15 ..... 6.50
MB-5 Mobile mount 19.50
Phone patch 139.00
SP-3 External speaker 49.50
SM-5 Electret desk microphone 39.00
AH1 5-band mobile antenna with tuner 289.00

IC-2KL 160-15m (WARC) solid-state linear, 500 watts output. With AC supply ..... **Regular $1795.00**



IC-290A All Mode 2m mobile. 143.8-148.199 Mhz. 1 or 10 watts. RIT, prog. offsets, 5 memories, 2 VFOs. 2 scanning systems, SSB squelch, priority channel, sidetone, blanker, memory retention provision, T/T microphone. 6¾"w × 2⅛"h × 8⅝"d.... **Regular $549.00**



IC-251A Microprocessor controlled 2 meter All-mode Transceiver for 143.8-148.1999 Mhz. 7 digit display. 10 watts, 3 memories, mem. scan & programmable band scan. 600 KHz offsets, variable splits with two built-in VFO's. 13.8vdc or 117vac. w/amplified hand mic. 4½"h × 9¾"w × 10½"d, 11 lbs..... **Regular $749.00**

IC-451A UHF All Mode Transceiver for OSCAR mode B or J & simplex. For 430-440 or 440-450 MHz. Features similar to the IC-251A ..... **Regular $899.00**

IC-551 All mode, microprocessor cont. 6m transceiver for 50-53.999 MHz. 6 digit display, 10w, 3 mem. ch. w/var. scan, 2 VFO's & blanker. 13.8vdc & 117vac 4½"h × 9¾"w × 10½"d, 14 lb ..... **Regular $479.00**

EX-107 VOX unit 55.00
EX-108 Passband tuning & RF processor 105.00
EX-106 FM adaptor for 551/551D..... 125.00

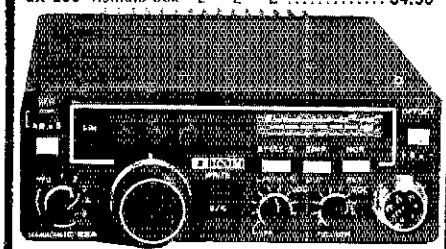
IC-551D same as 551 but 80 watts. EX-107 & EX-108 built-in. 13.8vdc @ 18A ..... **Regular $699.00**

PS-20 20A AC power supply 229.00
CF-1 Cooling fan for PS-20..... 45.00

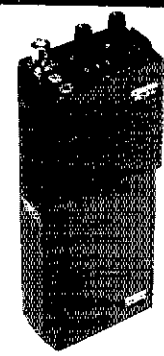
IMPORTANT!
The prices shown in this ad are suggested by the Manufacturer.
On most MAJOR items we can save you money with a Big Discount. Call now TOLL FREE and ask for our DISCOUNT DESK.

IC-560 2 meter SSB, FM & CW Mobile Transceiver, LED readout, 10 watts, 3 memories, mem. scan & prog. band scan. 600 KHz offsets, 2 VFO's. 13.8 VDC @ 3.5A Microphone & mobile mt ..... **Regular $489.00**

IC-22U The 800 channel synthesized successor to the IC-22S. Frequency selection by a pushbutton, 1 or 10 watts. Microphone, mobile mount, DC cord & plugs 6¼"w × 2⅛"w × 8½"d, 3¼ lbs ..... **Regular $299.00**
EX-199 Remote box - 2" × 2" × 2" 34.50



IC-25A Compact, full-featured 25w 2 meter rig. 5 memories 2 VFOs, priority channel, 2 scanning systems, automatic scan resume, provision for memory backup. With T/T mic 2"h × 5½"w × 7"d .... **Regular $349.00**



SAVE $25

IC-2A Synthesized 2m FM Hand Held, 800 channels in 5KHz steps 144.00 to 147.995; 600KHz offsets. Thumb wheels & +5 khz upshift. With 250ma pack output is .15w LOW or 1.5w HIGH. Optional packs for larger capacity or higher power. With 250ma nicad pack, wall chgr, flex ant, belt clip, strap, earphone and plugs. IC-2AT has built-in T/T pad. Only 6.6"h×2.6"w×1.4"d, 1 lb.

	Regular	SPECIAL!
IC-2A 2m HT w/nicad & wall chgr	$239.50	**$214.50**
IC-2AT HT w/TTP, nicad & chgr	$269.50	**$244.50**

BC-30 Drop-in charger for BP-2,3 & 5 ..... 69.00
BP-2* 450 ma, 7.2v nicad pk, 1W output 39.50
BP-3 Extra 250 ma nicad pk, 1.5W output 29.50
BP-4 Alkaline battery case 12.50
BP-5* 450 ma, 10.8v nicad pk, 2.3W output ... 49.50
CP-1 Cig lighter plug & cord (BP-3) 9.50
DC-1 DC operation module 17.50
FA-2 2m flexible antenna 10.00
HM-9 Speaker/microphone 34.50
LC-2A Leather case for IC-2A 34.95
LC-2AT Leather case for IC-2AT 34.95
2A-TTN TT pad 39.50
*BC-30 required to charge BP-2 & BP-5

IC-202S 2 meter portable SSB Transceiver. 3W PEP output. Uses regular "C" cells, optional Nicad pack & charger or IC-3PS AC supply/speaker. With hand mic, whip antenna and strap ..... **Regular $279.00**
IC-20L 2m amplifier. 10w SSB/FM..... 98.00
IC-402 432 Mhz portable SSB Transceiver. Features same as IC-202S above ..... **Regular $389.00**
IC-30L 432 Mhz amp., 10w SSB/FM..... 105.00
IC-502A 3W SSB 6m portable, as above.... **$239.00**

IC-3PE 3A power supply/speaker 95.00
IC-3PS AC supply/spkr for portables 95.00
HM-3 Deluxe mobile microphone 17.50
HM-5 Noise canceling microphone 34.50
HM-7 Amplified mobile microphone 29.00
HM-8 Touch-tone microphone..... 49.50
HM-10 Scanning microphone 39.50
SM-2 5-pin electret desk microphone 39.00
SM-5 8-pin electret desk microphone 39.00
HP-1 Headphones 34.50

master charge VISA

AES Store Hours: Mon, Tue, Wed & Fri 9-5:30; Thurs 9-8; Sat 9-3
(Las Vegas & Clearwater stores NOT open Thursday evenings)

E-X-P-A-N-D-E-D WATS PHONE HOURS
Our Milwaukee Headquarters will answer the Nationwide WATS line **1-800-558-0411** until 8 pm (Milwaukee time) Monday thru Thursday.

New AES Branch Store - **Clearwater, FL**
1898 Drew St. Phone (813) 461-4267

Call 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

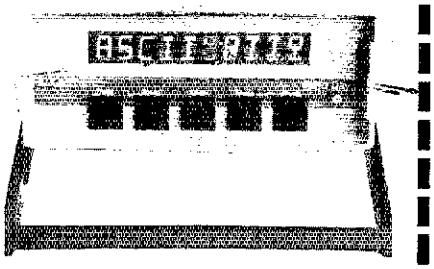
ORLANDO Florida 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ASSOCIATE STORE

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL. 1-800-621-5802

Code reading makes ham radio more fun!



Field Day 2

A code reader can add to the fun of ham radio by allowing you to copy many signals that are too complex or too fast to decode by ear.

You can get in on such things as news-wire service transmissions, weather information and financial reports that are sent by radioteletype (RTTY), ASCII computer language or Morse code.

Some code readers only copy one or two types of signals, but the **Kantronics Field Day 2** ™ allows you to copy RTTY at 60, 67, 75 and 100 WPM, ASCII at 110 and 300 (if sent as it is typed) Baud and Morse at 3 to 80 WPM.

The **Field Day 2** even has an editing program to improve sloppy Morse. You get more of the message and fewer illegal character signs than with other code readers. With a **Field Day 2** you also get a 24-hour clock, code speed display and TTL compatible demodulator output.

The **Field Day 2** is a complete unit in one package with a large, easy-to-read, 10-character display and is backed with a full-year limited warranty.

Code reading makes ham radio more fun, and now you can get started with one compact, versatile unit, at $449.95, suggested price, the **Field Day 2.**

Call or visit your Authorized Kantronics Dealer for a demonstration!

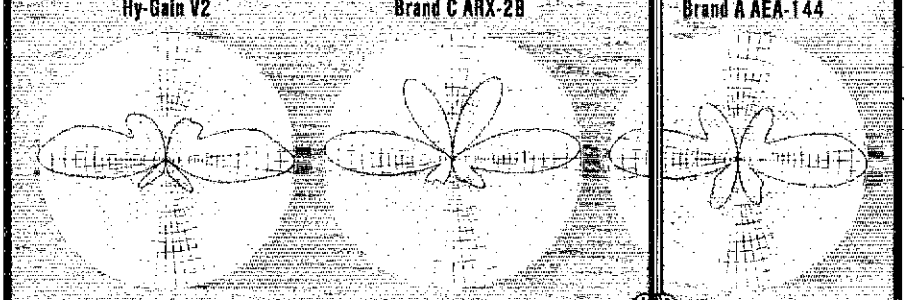
Kantronics
(913) 842-7745
1202 E. 23rd Street
Lawrence, Kansas 66044

hy-gain®

NEW Extended Double Zepp Antenna Design

The Hy-Gain V2 is 2-meter extended double zepp vertical consisting of two stacked 5/8 waves properly decoupled to allow no RF on the coax feedline. Coax connects to the decoupler inside the antenna for complete weatherproofing. Mechanically the V2 has no equal. It's easy to assemble and all elements are corrosion resistant 6063-T832 aluminum with rustproof hardware. The V2 is a complete antenna that's ready to mount on any mast up to 2" (50.8 mm) in diameter.

Two sets of 1/4 wave radials and a centered feedpoint put the radiation at the horizon, not the sky! The V2 and two competitors were measured for radiation efficiency on a ground-reflection-range, which was designed according to IEEE standard 149-1979, and the results shown below were conclusive.



Designed to operate from 138 MHz through 174 MHz, the V2 obtains a VSWR of less than 1.5:1 at resonance and has a 2:1 VSWR bandwidth of at least 7 MHz. The antenna's isolation from the support mast is 20 dB minimum.

The new V2 will equal or surpass the electrical performance of any competitive two stacked 5/8 wave antenna, regardless of gains claimed or your money back. Money-back limited to 30 days. If not satisfied, return to place of purchase.

TELEX hy-gain
TELEX COMMUNICATIONS, INC.
9600 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A.
Europe: 22, rue de la Légion-d'Honneur, 93200 St. Denis, France.

CINCINNATI — The Original Forty-Fourth Annual Hamfest — Sunday September 20, 1981 at Stricker's Grove on State Rte. 128, one mile west of Venice (Ross) Ohio. Exhibits, awards, food and refreshments available. Flea market (radio related products only), Music, talks hidden transmitter hunt and sensational air show. Admission and Registration $4. For information: Lillian Abbott, K8CKI, 317 Greenwell Rd., Cincinnati, OH.

ARRL Roanoke Division Convention September 26 and 27 in the Virginia Beach, Virginia, Pavillion. Free transportation to the oceanfront where the Neptune Festival is also taking place. FCC Amateur exams given to those sending Form 610 request in advance. Admission $3.50. Major award will be an fm transceiver. Flea market tables $5 per day, $7 both days. TRC, P.O. Box 7101, Portsmouth, VA 23707. 804-587-1695.

FINDLAY HAMFEST. The 39th Annual Findlay Hamfest will be held on Sunday, September 13, at the Hancock Recreational Center, just east of I-75 exit 161, on the north edge of Findlay, 40 miles south of Toledo. Awards will include a deluxe low band rig, two Icom IC-2A handhelds, a memory keyer, and many more items. Tickets $2 in advance and $2.50 at the gate. Tables will be: $2.50 per 1/2. Open Saturday from 5 P.M. to 9 P.M. for set-up; Sunday at 6 A.M. For tickets, information, and reservations, send s.a.s.e. to P.O. Box 587, Findlay, OH 45840.

THE AUGUSTA GA Amateur Radio Club will hold its Annual Hamfest on Sunday September 20, 1981 at the Julian Smith Casino. Tickets ae $1 each. Open at 9AM. Talk-in on 146.34/94. Refreshments for more information contact Diane Miller WB4YHT at 404-860-3700.

ELEVENTH Annual Greater Louisville Hamfest and this years 1981 Great Lakes Division Convention is Sept. 26th and 27th at the Kentucky Fair and Exposition Center in Louisville. See our display ad in this issue of QST or write — Greater Louisville Hamfest c/o Denny Schnurr, K4GOU, P.O. Box 34444 Louisville, KY 40232 or phone 502-634-0619.

SEPT 27, LIMARC sponsors ARRL Hamfair 81 at Islip Speedway, Islip Ave., (Rte. 111) Exit 43 Southern State Pkwy. Over 375 exhibitors at the last show in May. No reservations needed, electricity available. Call nites Sid Wolin, K2LJH, 516-379-2861, Hank Wener, WB2ALW 516-484-4322. Heavy Rain date Oct. 4th.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

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 apreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

QSLs, Catalog 45c N&S Print, 2523 West Orangewood Avenue, Phoenix AZ 85061.

QSLs with class! Unbeatable quality, reasonable price. Samples, 50c refundable. QSLs Unlimited, P. O. Box 27553, Atlanta, Georgia 30327

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

BE SURPRISED — Get a variety of cards — 100 for $7 or 200 for $11. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

QSLs by W7HUL. Samples 50c. 8511 19th Ave. N.W., Seattle, WA 98117.

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.

CLUB Call pins: 3 lines, 1-1/4, $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner 2041 Linden St., Ridgewood NY 11385.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

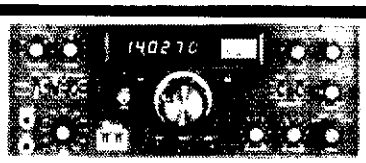
QSL ECONOMY: 1000 for $12. s.a.s.e. for samples. W4TG, Drawer F, Gray, GA 31032.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

COLORFUL QSLs — 11 ink colors, 13 card colors to choose from. Samples 50c Specialty Printing, Box 361, Duquesne, PA 15110.

$2.95 PER HUNDRED (1,000 price). Exciting two color designs. Send 36c postage for 1982 catalog. Satisfaction guaranteed. Quality QSL's since 1934. VP5QED Press P. O. Box 1523, Boca Raton, FL 33432.

TEN-TEC

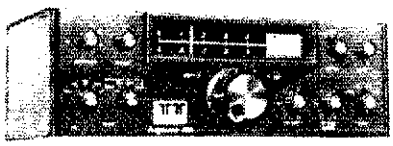


OMNI

546	OMNI-C9 Band Digital XCVR	$1059
255	Deluxe Power Supply w/Spkr	169
280	Standard Power Supply	149
217	500Hz 8 Pole CW Filter	55
218	1800Hz 8 Pole SSB Filter	55
219	250Hz 6 Pole CW Filter	55
243	Remote VFO	169

DELTA

580	9 Band 200w. SSB/CW XCVR	$ 759
255	Deluxe Power Supply w/Spkr.	169
280	Standard Power Supply	149
282	200Hz 6 Pole CW Filter	49
283	Remote VFO Unit	169
285	500Hz 6 Pole CW Filter	45
287	Mobile Mount	TBA
289	Noise Blanker	39
1140	D.C. Circuit Breaker	10



ARGONAUT

515	Argonant-5W. 80-10mtr. XCVR	$ 399
210	Power Supply	34
206A	Crystal Calibrater	36
208A	Notch/CW Filter	56

HERCULES

444	Hercules 160-15 mtr. All Solid State IKW Amplifier	$1349

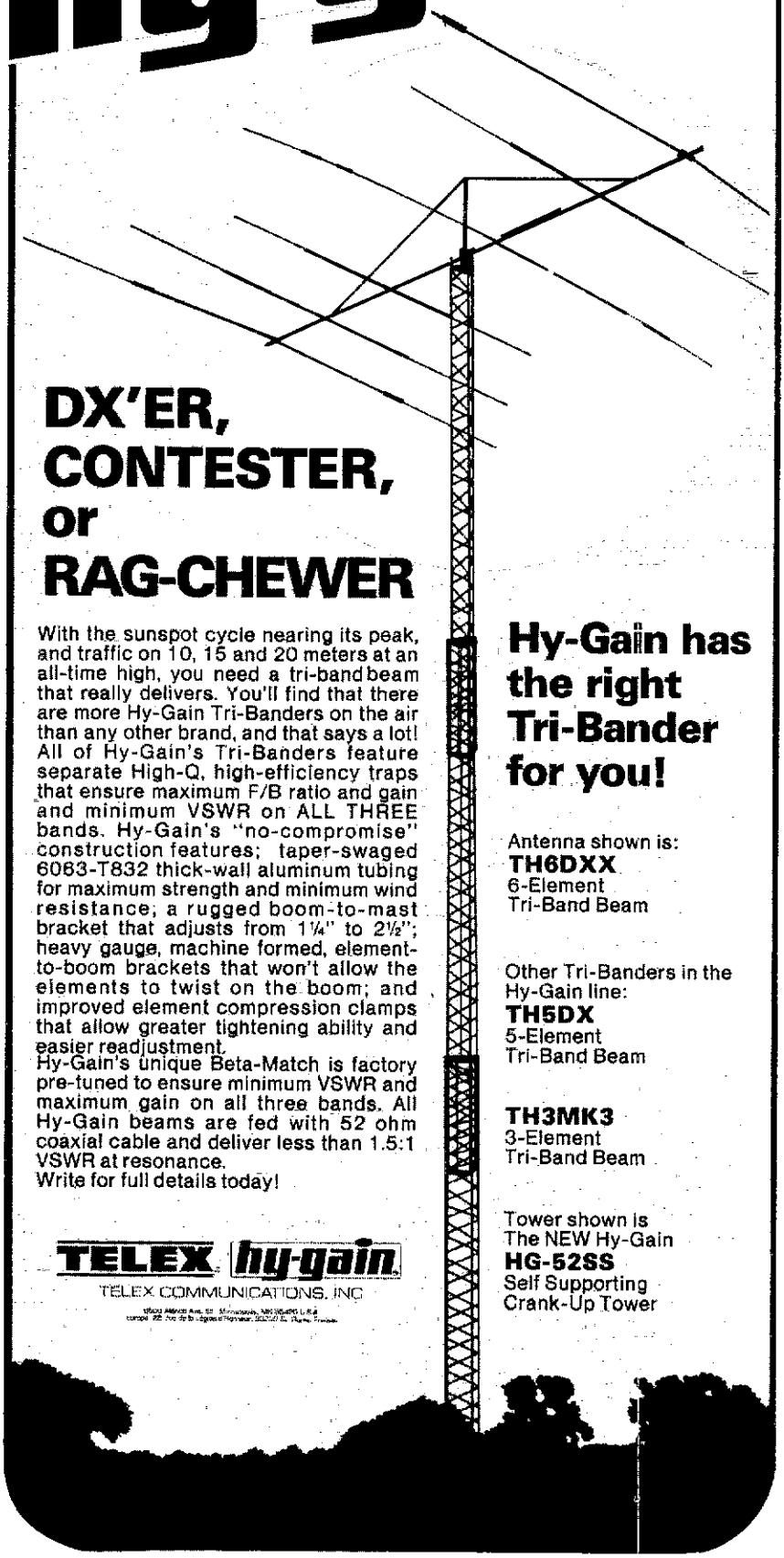
ACCESSORIES

214	Mike for Model 234	$ 39
215PC	Ceramic Mike w/Coil Cord	34
234	Speech Processor	129
227*	Antenna Tuner	75
645	Dual Paddle Keyer	79
670	Single Paddle Keyer	39

TEXAS TOWERS

A Division of
Texas RF Distributors, Inc.
1108 Summit Avenue, Suite 4
Plano, Texas 75074
TELEPHONE: (214) 423-2376
Prices Subject to Change Without Notice

hy-gain®



DX'ER, CONTESTER, or RAG-CHEWER

With the sunspot cycle nearing its peak, and traffic on 10, 15 and 20 meters at an all-time high, you need a tri-band beam that really delivers. You'll find that there are more Hy-Gain Tri-Banders on the air than any other brand, and that says a lot! All of Hy-Gain's Tri-Banders feature separate High-Q, high-efficiency traps that ensure maximum F/B ratio and gain and minimum VSWR on ALL THREE bands. Hy-Gain's "no-compromise" construction features; taper-swaged 6063-T832 thick-wall aluminum tubing for maximum strength and minimum wind resistance; a rugged boom-to-mast bracket that adjusts from 1¼" to 2½"; heavy gauge, machine formed, element-to-boom brackets that won't allow the elements to twist on the boom; and improved element compression clamps that allow greater tightening ability and easier readjustment.
Hy-Gain's unique Beta-Match is factory pre-tuned to ensure minimum VSWR and maximum gain on all three bands. All Hy-Gain beams are fed with 52 ohm coaxial cable and deliver less than 1.5:1 VSWR at resonance.
Write for full details today!

TELEX hy-gain
TELEX COMMUNICATIONS, INC

Hy-Gain has the right Tri-Bander for you!

Antenna shown is:
TH6DXX
6-Element
Tri-Band Beam

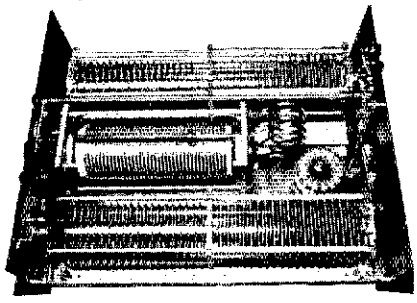
Other Tri-Banders in the Hy-Gain line:
TH5DX
5-Element
Tri-Band Beam

TH3MK3
3-Element
Tri-Band Beam

Tower shown is
The NEW Hy-Gain
HG-52SS
Self Supporting
Crank-Up Tower

Murch - The Leader in Transmatch Products Presents

The Ultimate Transmatch - Model UT-2000B



Specifications

- *Continuous tuning 10-160 meters
- *Front panel function switch -in and out - dummy load (not supplied) - ground
- *Handles any antenna system, dipoles, random wires, verticals, whips, beams, open wire line
- *Built in heavy duty 4 to 1 balun 3 cores
- *Ceramic rotary inductor. #8 gauge wire
- *Turns counter for precise tuning
- *4000 volt capacitors
- *Built in line sampler- no external bridge needed
- *Full legal power on all bands
- *Provides an SWR of 1 to 1 to the transmitter
- *Gray cabinet, dark gray panel
- *12"w x 15½"d x 5"h
- *Shipping weight: 13 lbs
- *Price: **$248.50** & shipping

Also Available

UT2000A - 10-80 meters - $159.95 & shipping
UT2000A-LS - 10-80 meters - $188.00 & ship.
68A Multiband Antenna 10-80M $54.50 P.P.

Now Available - Components

A - capacitor 8¼"x3¼"x3 $48.00 & shipping
A (split capacitor) 10"x2¾"x3 $56.00 & shipping
B - capacitor 14¼"x2¾"x3" $68.00 & shipping
Ceramic inductor 10½"x3"x4½" $80.00 & shipping
4 to 1 balun 2"x2"x2" $21.95 & shipping

MURCH ELECTRONICS, INC.

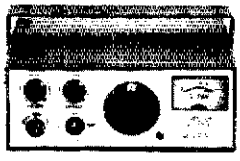
P.O. BOX 69
FRANKLIN, MAINE 04634
207-565-3312

SEND FOR
NEW LITERATURE

master charge VISA

$$$$$$$$$$$$$$$$$$$$$$$$

SUPER VALUE FROM CLEGG.



MARK 3
$205

- 144–148 MHz • 15 watts
- 12 channels—crystal controlled
- Special modifications for CAP & MARS available

Phone (717) 299-7221 today to place your order or to request a detailed brochure describing this transceiver and related power supplies, antennas, amplifiers and other accessories.

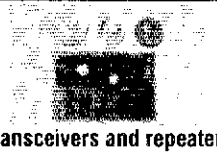
Clegg Communications Corp.

1911 Old Homestead Lane • Lancaster, PA 17601

**Special quantity pricing is available on the MARK 3 transceiver. Get your group together and call for a quote on your requirements.*

$$$$$$$$$$$$$$$$$$$$$$$$

GLB ID-1
AUTOMATIC IDENTIFIER



- **For transceivers and repeaters!**
- **Small — only 2.3" × 1.7" × 0.6"!**
- **Low cost — only $39.95 (wired & tested)!**
- **Easy installation — 2 wires plus ground!**
- **Pots for speed & amplitude!**
- **8 switchable messages!**
- **Each message up to 2000 bits long!**
- **Automatic operation!**
- **Reprogrammable memory!**
- **Allow $1.50 for shipping & handling**

We have a complete line of transmitter and receiver strips and synthesizers for Amateur and commercial use. Write for our catalog.

We welcome MasterCard or VISA

GLB ELECTRONICS

1952 Clinton St., Buffalo, N. Y. 14206
1-(716) 824-7936, 9 to 4

Radio World
800-448-9338

Introducing

REPEATA-MATE RM-1

Create Your Own Repeater For Special Events or Emergencies. Two Mobile Rigs Plus an RM-1 makes a Super, Fast Repeater.

INTRODUCTORY PRICE **$39.95**

VISA To Order or For More Information, Call or Write:

ONEIDA COUNTY AIRPORT TERMINAL BUILDING
ORISKANY, NEW YORK 13424
N.Y. Res. Call (315) 337-0203 or 736-0470

MORSE CODE, BAUDOT and ASCII RTTY FOR THE TRS-80 MODELS I and III

DISASSEMBLED HANDBOOK - VOLUME 4

no RS-232C interface is required

Chapt.	1	5 to 800 WPM Morse transmit pgm.
Chapt.	2	Adding type ahead capabilities
Chapt.	3	Morse receive decoding program
Chapt.	4	Merging + 12 prepared messages
Chapt.	5	Baudot transmit 60-66-75-100 WPM
Chapt.	6	Baudot receive for above speeds
Chapt.	7	Merging + 22 prepared messages
Chapt.	8	ASCII transmit program 110 Baud
Chapt.	9	ASCII receive decoding program
Chapt.	10	Merging + 22 prepared messages

$18 [US] per copy add $2 shipping [$4.50 overseas airmail]

—GERMAN & FRENCH LANGUAGE EDITIONS—

Morse, Baudot & ASCII on disks $49 [Vol. 4 required for instructions]

RICHCRAFT ENGINEERING LTD.
#1 Wahmeda Industrial Park
Chautauqua, New York 14722

COD orders [US only] [716] 753-2654

CADILLAC of QSLs — Completely different! Samples $1. (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs — Custom designs for railroad employees and railfans. Send addressed business envelope with double first class postage for free samples and catalog. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

RUBBER Stamps return address $3.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLS — Variety, value, quality, custom, samples and catalog 50c. Alkanprint, Box 3494, Scottsdale AZ 85257.

COMPLETE QSL catalog. 32p, cuts, forms, type plys fifty samples. $1., refundable. Unadilla Press P. O. Box C, Unadilla, NY 13849.

DRESS UP your shack. Seven plastic holders handle 280 QSLs. $4. prepaid. K4NMT, Box 198T, Gallatin, TN 37066.

1000 ADDRESS labels with call $1.95 — S.a.s.e., sample. KØOJW, 814 Riderwood, Hazelwood, MO 63042.

PICTURE QSLs made from your photo-slides. 250 b/W $21. Single 1,000 full color $70. Samples. Picturecards, Box 5471 Amarillo, TX 79107 806-383-8347.

UGLY QSLs: Delightfully repulsive! Extraordinarily unusual. Samples and catalog 50c. Al Zanella, P.O. Box 4337, San Francisco, CA 94101.

PICTURE QSL cards of your shack, etc. from your photograph or black and white art work, 500 $18. 1000 $26.50. Also unusual non-picture designs. Generous sample pack 75c, half pound of samples $1.25. Customized cards, send specifications for estimate. Raum's, 4154 Fifth Street, Philadelphia, PA 19140. Phone, 1-215-BA-8-5460.

GOOD NEWS! Visa and Master Charge cards are now accepted. Write for free samples . . . Watch what we do next! QSLs by W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

FREE CALLSIGN pin with each Deluxe Callsign Desk Plate, engraved on 2 × 8 walnut in elegant gold anodized holder. Second line says Amateur Radio Station. $6.85. Arnold — N5CAO, 214 Hill Lane, Red Oak, TX 75154.

General

WANTED: To complete collection — Don Chesser's Ohio Valley DX Bulletins copies No. 1 thru No. 28; KWM-1 DX Adaptor; Pse airmail Jock ZL2GX, 152 Lytton Road, Gisborne, New Zealand.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310 N4TT. Buy parts, late machines.

SERVICE by W9YKA. Professionnal grade lab, FCC 1st class license. Amateur and Industrial ssb-fm equipment. Repairs, calibration, modifications, consultation. Reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 5 issues $2. Ham Trader Yellow Sheets, POB356, Wheaton, IL 60187.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1 Eighth Street, Pelham NY 10803.

ARCOS — Amateur Radio Component Service. VHF/UHF high power amplifier kits, parts and accessories. High voltage power supplies. Proven performance in world-wide use. Dowkey, Ermac, Bird, KLM. Sase for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

COLLINS repair and alignment, $75. Gear for sale and taken on consignment. Former Collins engineer, First Radiotelephone, calibration laboratory, K1MAN 207-495-2215.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806.

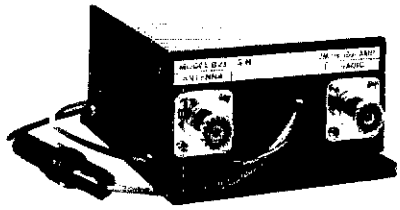
WANTED: Hallicrafter and Echophone receivers, transmitters, parts, accessories, manuals for my collection. "The Hallicrafter Collector." Chuck Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering. 930 Marine Dr., Port Angeles WA 98362.

HOSS-Trader "Ed," says Big Sale, shop around for the best price then telephone the Hoss last. New Drake AC-4 supply cash $98. New Drake DC-4 $109.; new Drake display TR7 transceiver $1095. New HyGain TH6DXX Beam $239. Sale Alpha 374-A linear regular $2395. cash $1895. New Rohn 50' foldover tower prepaid $659. Special New Dentron new Clipperton-L linear 2000 watts $595. New Dentron MLA 2500 B linear, $849. New Alliance HD-73 rotor, $96.; New Astro Swan 100MXA transceiver regular $699., cash $479. New Icom IC-2A walkie talkie, $199. New Azden PCS-3000 $312. New Icom 720-A, $1149. Ham 4 rotor $129. Used — 530-S, $639. Used Icom 730-S: $649. Moory Electronics Company, P. O. Box 506, DeWitt, Ark., 72042 tel.: 501-946-2820.

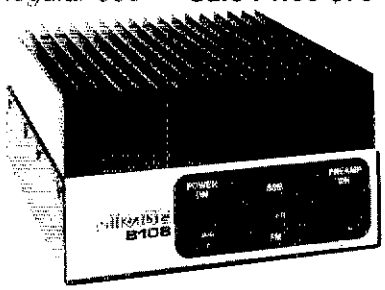
DRAKE R-4/T-4X Solid State Tubes directly replace vacuum tubes to give better performance! Pre-mixer and mixers R-4:6EJ7/6HS6/6BE6 plus T-4X: 6EJ7/6HS6/6AU6/12BA6 $18.50 each, ppd. R-4A/B/C Improvement kits, $20.60, ppd. Sartori Associates, W5DA, Box 2085, Richardson, TX 75080. 214-494-3093.

MIRAGE VHF/UHF
Solid-State POWER AMPLIFIERS



MIRAGE B-23 All mode Solid State VHF Power Amplifier for Hand-helds & low power FM/SSB transceivers. For 144 to 148 MHz, 100mw to 5w in/30w out @ 2w, RF relay. Size: 4½"w × 2½"h × 2½"d. Wt. 1¼ lbs. 13.6 Vdc @ 5 Amps.

Regular $89.95 - ***Sale Price $79.95***



MIRAGE B-108 Solid State VHF Power Amplifier with built-in switchable 10db gain/25db N.F. receive preamplifier. For 144-148 MHz. 5-15w in/80w out @ 10w. Operates with as little as 1w; 1-2w in gives 15-30w out. Linear, for FM, CW and SSB with external or automatic internal relay keying with adjustable delay. Size: 5½"w × 3"h × 8"d. Wt. 3 lbs. Requires 13.6 Vdc @ 10-12 Amps.

Regular $179.95 - ***Sale Price $159.95***

MIRAGE B-1016 Similar to B-108, except 5-15w in/160w nominal out @ 10w; 1-2w in gives 30-60w out. Size: 5½"w × 3"h × 12"d. Wt. 5 lbs. 13.6 Vdc @ 20-25 Amps.

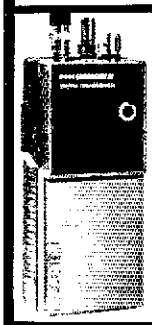
Regular $279.95 - ***Sale Price $249.95***

MIRAGE B-3016 Same as B-1016, except rated 15-45w in/160w out @ 30w input. Requires 13.6 Vdc @ 20-25A.

Regular $239.95 - ***Sale Price $209.95***

MIRAGE D-1010 430 to 450 Mhz All Mode Amplifier. 5-15w in/100w out @ 10w; 1w in/25w out, 3w in/75w out. Size: 3"h × 5½"w × 12"d. 5 lbs. 13.6 Vdc @ 20 A. **Model D-1010N** same, but with Type N connectors - add $9.00.

Regular $319.95 - ***Sale Price $289.95***

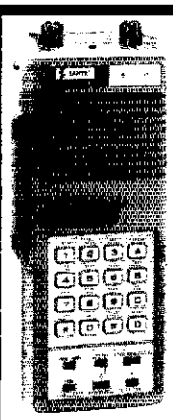


HT CLOSEOUT
PACE Communicator MX

Compact, 2m hand-held FM Transceiver 144-148 Mhz, 1 watt, 6 channels with 18 channel capability (6 simplex, 6 at +600 KHz, 6 at -600 KHz), 1 channel installed (146.52 simplex). Only one crystal per channel. Complete with flexible rubber antenna, nicad battery & charger. Size: 2½"w×6⅝"h×1¼"d, Wt. 16 oz.

Closeout Price ***$129.95***

Crystal Certificates ..... each $5.00



ENCOMM
Santec HT-1200

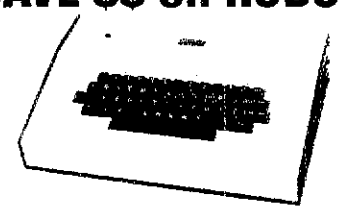
Microprocessor controlled 2m FM hand-held. Keyboard frequency entry w/LED display. 143.000 to 148.995 (Tx); to 149.995 (Rx). Ten memory channels programmed for 146.52, .76, .82, .88, .94, 147.00, .06, .12, .18 & .51 (re-programmable). Scan and search. ±600 Khz offsets or any odd split using memory. 1 or 4 watts. Size: 2½"w × 6.7"h × 1½"d. 1½ lbs. With Nicad battery flex antenna, wall charger, earphone & strap.

Regular $379 - ***Sale Price $319***

ACCESSORIES

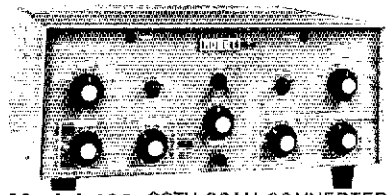
ST-LC Leather case	$29.95
ST-5BC 5-hour base quick charger & stand	69.95
SM-1 Remote speaker microphone	29.95
ST-500B Extra 500ma nicad battery	24.95
ST-MC Mobile charge/power cord	9.95
ST-EC External charge adaptor	4.95
SS-32 Subaudible tone generator	29.95
MC-50S Remote speaker	14.95
ST-EMC External microphone connector	6.95

SAVE $$ on ROBOT



Model 800 SPECIALTY MODE TERMINAL

Regular $895 - ***Sale Price $799.95***



Model 400 SSTV SCAN CONVERTER

Regular $795 - ***Sale Price $699.95***

ACCESSORIES

RF-1 RF modulator board	$ 29.00
RCA TC-1000 B/W CCTV camera	Sale 239.95
RCA TC-1110 9" B/W TV monitor	Sale 184.95

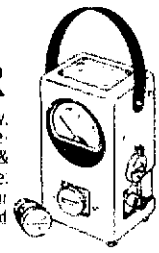
Summer Special!
EIMAC 3-500Z TUBES
$99.95 each

Standard C7800
New for 450 Mhz!

STANDARD C7800 450 MHZ FM Transceiver. Microprocessor controlled - 480 channels in 25 kHZ steps, 438 to 449.975. 1 or 10w nominal output. Coverage divided in to 12 steps of 1 mHz, each 1 mHz span is scanned up and down at 25 KHz or 50 KHz intervals, fast or slow, automatically searching for busy or vacant channels; instant push-button access to two priority channels. Program and scan any 5 frequencies, has memory back-up. Microphone has built-in up-down frequency control. LED readout & S/RF meter. 6¼"w × 2¼"h × 6 ⅞"d, 6½ lbs. 13.8 VDC/4½ A. With mobile mount and DC cord.

AES** Introductory Price ...* ***$399.95

BIRD 43
THRULINE WATTMETER



Read forward & reflected power directly, accurately. Covers wide range of frequency and power levels with low VSWR & insertion loss. Economical and flexible: buy only the element(s) covering your present frequency and power levels - add extra ranges as requirements expand.

Model 43 wattmeter w/SO-239 connectors		$142.00
Model 4431 as abv. w/variable RF sampler		240.00
Elements, 2-30 Mhz, (see table below)	each	55.00
Elements, 25-1000 MHz, (see table)	each	45.00
CC-1 Carrying case		28.00
4240-062 Type N female QC connector	each	7.00
4240-063 Type N male QC connector	each	10.00
4240-125 BNC female QC connector	each	9.00
4240-132 BNC male QC connector	each	20.00

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

ELEMENT TABLE

Order direct from this ad - send Check or Money Order. To expedite prompt shipment, Call TOLL FREE and use MASTERCARD or VISA; phone COD orders accepted. Prices DO NOT include shipping charges.

master charge — VISA

STORE HOURS: Mon, Tue Wed & Fri 9-5:30; Thurs 9-8 (Vegas 9-6); Sat 9-3 • Milw WATS line open for orders until 8 pm CDST, Mon thru Thurs.

Call 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 Florida 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ASSOCIATE STORE

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL. 1-800-621-5802

CALL TOLL FREE
1-800-426-7741
The Northwest's Largest Ham Store

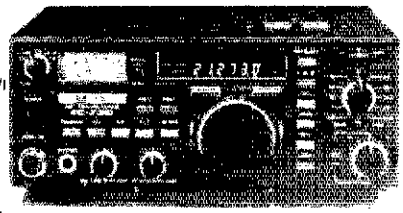
WASHINGTON RESIDENTS CALL 1-800-562-6818

ALASKA RESIDENTS CALL COLLECT 1-206-784-7337

ICOM SPECIALS

IC-730 THE AFFORDABLE MOBILE HF TRANSCEIVER

NEW



CALL FOR YOUR PRICE

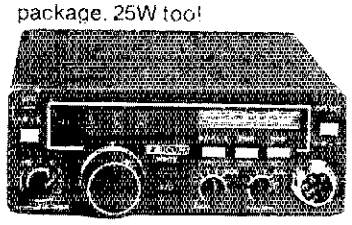
Amateur Net $829.00

Only 3.7 in (H) x 9.5 in (W) x 10.8 in (D).
Unique tuning speed selection for quick and precise QSY choice of 1 kHz, 100 Hz or 10 Hz tuning.
Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
One memory per band for storage of your favorite frequencies on each band. Dual VFO system built in standard at no extra cost. 200W PEP input — powerful punch on SSB/CW. Receiver preamp built-in. Noise blanker (selectable time constant) standard. VOX built-in. Large RIT knob for easy mobile operation. Amateur band coverage 10-80M including the new WARC bands. Speech processor — built-in IF shift slide tuning standard (pass band tuning optional). Receives WWV. Selectable AGC. Up/down tuning from optional microphone.

MINICOM IC-25A

Full featured 2m FM transceiver in a very compact package. 25W too!

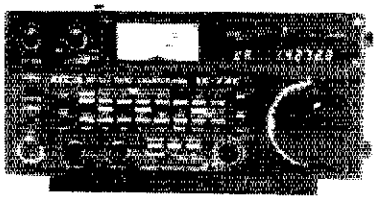
NEW



CALL FOR PRICE AND AVAILABILITY

Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

IC-720A HF TRANSCEIVER PACKAGE SPECIAL



NOW AVAILABLE FOR IMMEDIATE SHIPMENT

IC-720A w/mobile mic.	1349.00
PS-15 20A Power Supply	149.00
FL-32 500Hz CW filter	59.50
FL-34 AM filter	49.50
SM-5 matching desk MIC	39.00
	$1646.00

ALL FOR $1498.00

You save $148.00 plus Free Shipping Via UPS Brown Label.

IC-251A 2M ALL MODE

SALE $599.95

Amateur Net $749.00

143.8000 - 148.1999 MHz, 10W,SSB,FM,CW. Dual VFO's with 3 memories. Dual all mode scanning system. AC supply self-contained.

IC-290 2M ALL MODE TRANSCEIVER

NEW

CALL FOR YOUR PRICE

Amateur Net $549.00

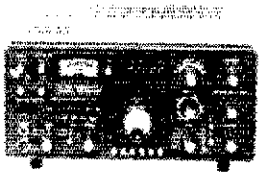
Covers 143.8 to 148.1999 MHz FM SSB (USB/LSB) and CW. Output 10W/1W. 5 memories with 2 VFO's and priority channel. Tuning rate 5 KHz or 1 KHz on FM, 1 KHz or 100Hz on SSB and CW. Squelch with scan operational on SSB.

AEA MORSEMATIC

- Dual Microcomputers provide many features.
- Approximately 500 character memory with unique "soft-partitioning."
- Morse trainer mode with programmable speed-up.
- Beacon mode for VHF DX scheduling.
- Automatic serial number sequencing.

YAESU FT-101ZD MARK III

Now available with Audio Filtering



DRAKE TR7

Available from stock with most accessories.

THE VERY POPULAR IC-2A/IC-2AT

IC-2A Am. Net $239.50 (Shown)

IC-2AT Am. Net $269.50 (with encoder)

CALL FOR SPECIAL PRICE

CALL TOLL FREE FOR YOUR DISCOUNT PRICE

Dealers For: AEA, ALLIANCE, ALPHA, AVANTI, BENCHER, B&W, CDE, CUSHCRAFT, DAIWA, DENTRON, DRAKE, FLUKE, HUSTLER, HYGAIN, ICOM, INLINE, KLM, LARSEN, LUNAR, MFJ, NPC, NYE, ROHN, SHURE, TEMPO, TELEX, TEN-TEC, VIBROPLEX, YAESU, MIRAGE AND MORE.

WE ARE ALSO EQUIPPED TO HANDLE EXPORT ORDERS.

C-COMM
6115-15th AVE. N.W.
SEATTLE, WA. 98107
(206) 784-7337

We accept VISA

MON. THRU SAT. 9:00 A.M. to 5:30 P.M.

Prices and specifications subject to change without notice or obligation.

TOROIDS, 88 mHy. Five for $6. M. Reed, Box 74, Soquel, CA 95073.

HAMS for Christ. Amateur Radio bible tracts. New address — Dave Friar, AF8D, 4656 Krental Street, Holt, MI 48842. Nets 14300 kHz at 2100Z; 7230 kHz at 2200Z. Info: in South Pacific/Oceania write to ZL1UE, New England, AC1Y.

HARDLINE coax — 7/8" 50 ohm, poly-jacketed, $1.75/ft. Connectors $16.00. Specifications: Link, 1081 Aron St., Cocoa, FL, 32922, 305-631-1117.

NEED help for your Novice, General ticket? Recorded audio-visual theory instruction. No background necessary. Free information: Amateur License Instruction. P. O. Box 6015, Norfolk, VA 23508.

RADIO collector pays top dollar — radios magazines parts etc. Before 1928. Weingarten 67-61 Alderton Street, Flushing NY 11374 212-896-3545.

RALPH HICKS, W5BCO — Your dealer for Motorola fm, ssb and marine. P. O. Box 15633, Tulsa, OK 74112.

WANTED — old microphones — pre 1940, for my microphone museum. Also mic-related items. Write Bob Paquette, 443 N. 31 St. Milw. WI 53208.

WANTED: For personal collection: tube-type audio equipment and accessories — McIntosh, Marantz, Western Electric, etc. 100% reply. Marcus WA9IXP P.O. Box 385 Elm Grove, WI 53122 414-475-5356.

ARE you REALLY ready for FCC exams? Test yourself with POSI-CHECK, multiple choice questions, IBM sheets for self-testing, keyed answers with explanations. Not a scam, not a crib sheet — a legitimate study guide based on latest FCC syllabi for current exams. 17 years tested experience. Novice, $5.50; General, $6.95; Advanced, $7.75; Extra, $7.95. First class mailing included. Send check or money order with order. NOTE New Address: POSI-CHECK, 6510 School Street, Des Moines IA 50311.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

MIRROR -in-the-lid, spinning disc, and other pre-1946 T.V. sets, parts, literature wanted for substantial cash. Finder's fee paid. Arnold Chase, WA1RYZ, 9 Rushleigh Road, West Hartford, CT 06117 203-521-5260 (collect o.k.).

MANUALS for most ham gear made 1937/70. Send $1 for 18-page "Manual List" postpaid. HI-Manuals, Box Q-802, Council Bluffs, IA 51502.

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.

MICROWAVE SPECIALISTS: We buy and sell microwave test instruments, waveguide components. Lectronic Research 1423 Ferry, Camden, NJ 08104.

CASH for December 1915 to December 1921 QSTs for personal collection. Ken Miller, K6IR, 16904 George Washington, Rockville, MD 20853. 301-774-7709.

FREE SAMPLE! Ham/Computer Insider Newsletter, Send sase w/2 stamps. W5YI; Box 10101; Dallas, TX 75207.

OVERPRINTED. 1980 Fox-Tango Club Newsletters. 56 loose-leaf pages packed with modifications and information for Yaesu rigs. Only $5 while they last. N4ML Box 15944, W. Palm Beach, FL 33406.

WANTED AN-MS connectors, synchros, etc. send list Bill Williams, P. O. 7057 Norfolk, VA 73509.

TV sets built before 1956 and old TV Guides. W3CRH, Box 90-Q, Rockville, MD 20850 301-654-1876.

TRS-80 OWNERS Super-Log — Ultimate logkeeper. Lightning search and sort. Free bonus program included — $16.95; Pass the FCC exam! 87% of our customers have. 10 theory programs per license class. Specify General, Advanced, or Extra $19.95 or 3/$39.95 MICRO-80 S-2665-T. Busby, Oak Harbor, WA 98277.

ICOM TRIO/KENWOOD owners, very informative separate newsletters. Details, s.a.s.e. U.I.R.C. 364 Kilpatrick Ave., Port St. Lucie, FL 33452.

WANTED: Government surplus radar equipment, microwave equipment and "old" General Radio test equipment P. J. Pilshner 2 Lake Avenue Extension, Danbury, CT 06810 WA1LDU.

COLLINS 75A-4 Solid state tubes replace 6 BA7 mixers for better sensitivity, dynamic range, reliability. $21.50 ppd. Sartori Associates, W5DA, Box 2085 Richardson, TX, 75080 214-494-3093.

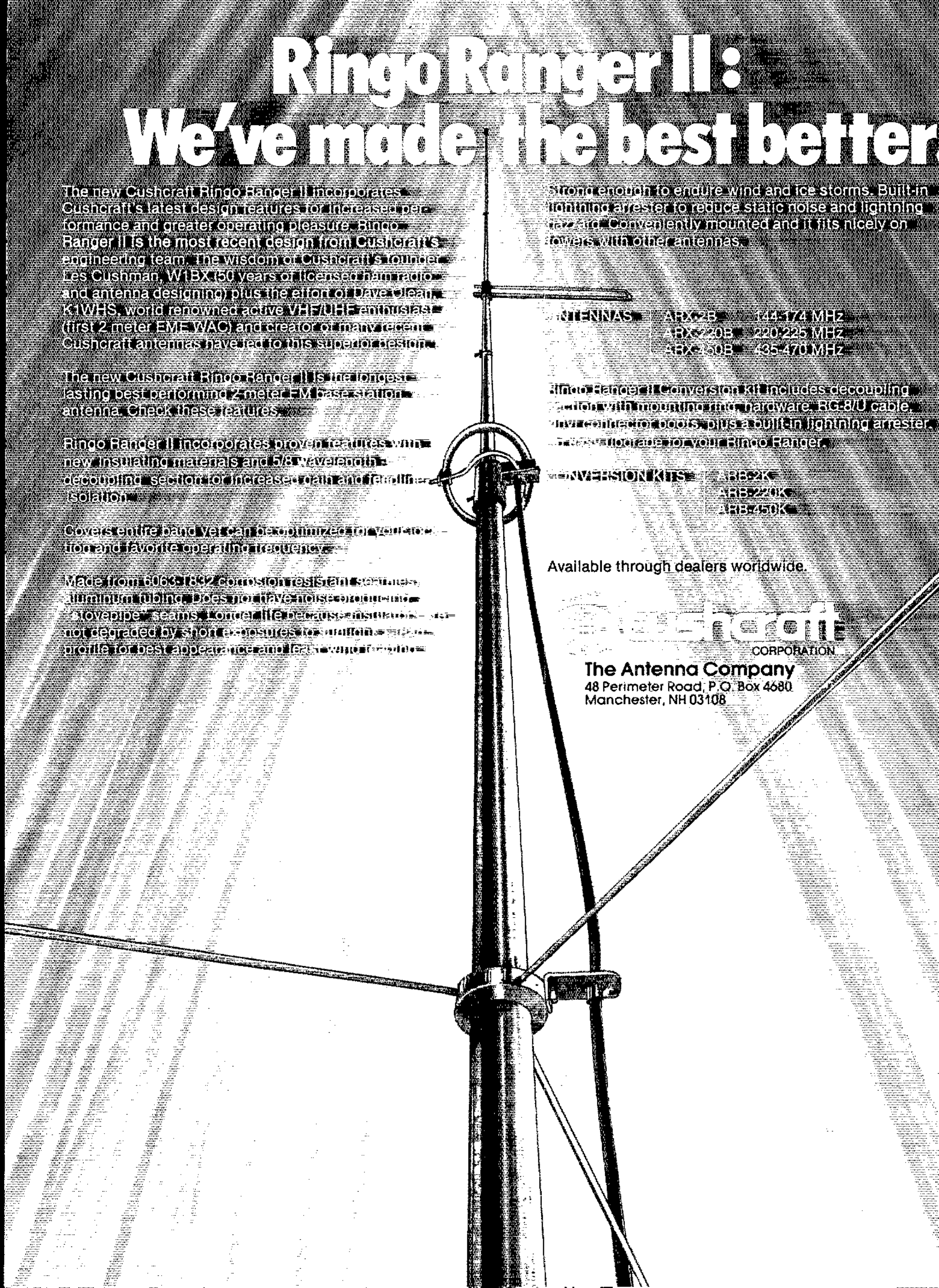
BIG SALE, Gray Museum cleaning house. QSTs 1920s $3 each, 1930/1970 $5. per year plus shipping. Send your needs to: Charles Williams, WA8AXQ, 400 Broadway, Cincinnati, OH 45202.

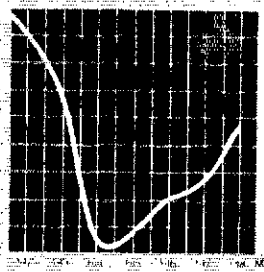
COLLINS KW-1 Wanted Paul Kluwe Vermontville, MI 49096

WORLDWIDE Awards Directory Volume 1 is available now. Over 270 awards listed with addresses, costs, and descriptions. You can obtain wallpaper very easily if you know how to go about it. Order now! $9.95 — KBØZP. 736 39th Street, West Des Moines, IA 50265.

ROHN TOWER — available direct to your from worldwide distributor, all products available. Sample prices 25G sections $40.54 each, 45G section $91.85 each. BX48 tower $231. each. Hill Radio, Box 1405, 2503 G.E. Road, Bloomington, IL 61701 309-663-2141.

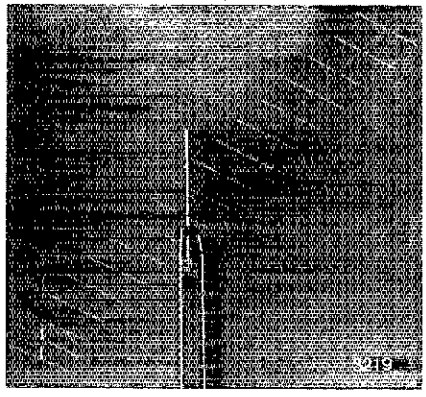
PRINTED Circuit Boards. From $0.25 to $0.40 per square inch with your negative. Free estimates. Communications Design, Inc. 1105 Lehr, West Memphis, AR 72301.

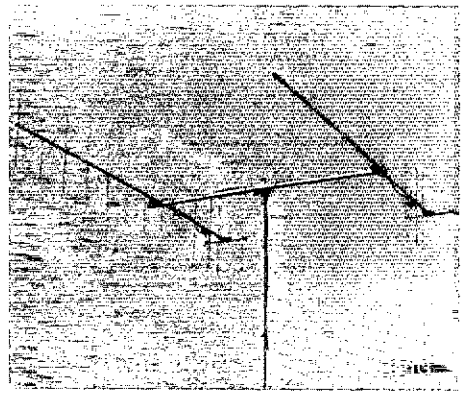

Ringo Ranger II:
We've made the best better.
The new Cushcraft Ringo Ranger II incorporates Cushcraft's latest design features for increased performance and greater operating pleasure. Ringo Ranger II is the most recent design from Cushcraft's engineering team. The wisdom of Cushcraft's founder Les Cushman, W1BX (50 years of licensed ham radio and antenna designing) plus the effort of Dave Olean, K1WHS, world renowned active VHF/UHF enthusiast (first 2 meter EME WAC) and creator of many recent Cushcraft antennas have led to this superior design.
The new Cushcraft Ringo Ranger II is the longest lasting best performing 2 meter FM base station antenna. Check these features:
Ringo Ranger II incorporates proven features with new insulating materials and 5/8 wavelength decoupling section for increased gain and feedline isolation.
Covers entire band yet can be optimized for your location and favorite operating frequency.
Made from 6063-T832 corrosion resistant seamless aluminum tubing. Does not have noise producing "stovepipe" seams. Longer life because
not degraded by short exposures to sunlight.
profile for best appearance and least wind loading.
Strong enough to endure wind and ice storms. Built-in lightning arrester to reduce static noise and lightning hazzard. Conveniently mounted and it fits nicely on towers with other antennas.
ANTENNAS: ARX-2B 144-174 MHz
ARX-220B 220-225 MHz
ARX-450B 435-470 MHz
Ringo Ranger II Conversion kit includes decoupling section with mounting ring, hardware, RG-8/U cable, and connector boots, plus a built-in lightning arrester. An easy upgrade for your Ringo Ranger.
CONVERSION KITS: ARB-2K
ARB-220K
ARB-450K
Available through dealers worldwide.
Cushcraft CORPORATION
The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108



Boomer

6 and 2 meter High Performance Yagis





Two Meter Boomers

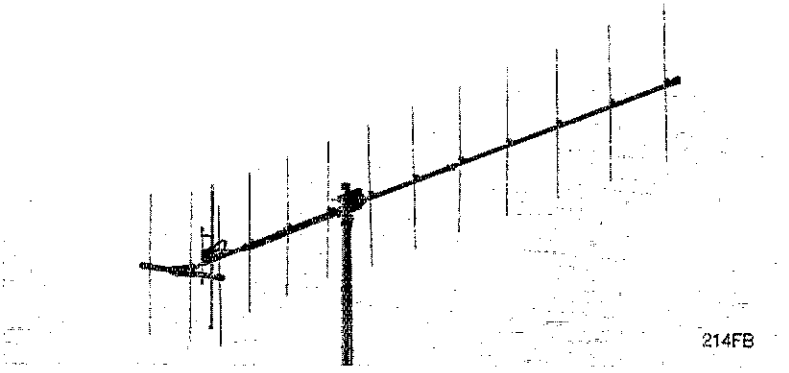
Whether you have the space for the 3.2 λ 32-19 or the compact 2.2-λ models, two meter Boomers are your best choice. They offer the maximum gain available for their boom length (See NBS no. 688). They feature trigon reflectors for additional front-to-back ratio and clearer patterns. All stainless steel hardware and heavy gauge heat treated aluminum are used throughout. Whatever your choice of two meter amateur activity, the Boomer will fill your needs. For FM use the 228FB or 214FB. For CW/SSB on the low end use 32-19 or 214B, in EME, DX or just reliable QSOs Boomer will perform for you.

Six Meter Boomer

The new six meter Boomer offers more boom and more gain from its new element spacing. The six meter Boomer has Cushcraft's typical attention to detail, including T match feed with balun, and extra heavy duty mechanical construction. The key to this Boomer's super performance and relatively lightweight is special element spacing and boom length.

Specifications

Model No.	32-19	214B	214FB	228FB	617-6B
Frequency range (MHz)	144-146	144-146	144.5-148	144.5-148	50.0-54
Forward gain (dBd)					
Front to back ratio (dB)					
E-plane B/width (deg)	2x14	2x17	2x17	2x17	2x19
H-plane B/width (deg)	2x17	2x18	2x18	2x9	NA
Side lobe attenuation (dB)	>60	>60	>60	>60	>60
SWR less than (typ)	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
Impedance (ohm)	50	50	50	50	50
Recommended stacking distance					
E-plane (ft)	14	10	10	10	NA
E-plane (m)	4.27	3.05	3.05	3.05	NA
H-plane (ft)	12	10	10	10	22.5
H-plane (m)	3.66	3.05	3.05	3.05	6.86
Weight (lbs)	12	8	8	22	26
(kg)	5.44	3.63	3.63	9.98	11.79
Length (ft)	22	15	15	15	34
(m)	6.71	4.57	4.57	4.57	10.36
Longest element (in)	40⅝	40⅝	39⅝	39⅝	113⅜
(cm)	102.5	102	100.3	100.3	289
Turning radius (ft)	11	7.5	7.5	9.5	17.7
(m)	3.35	2.29	2.29	2.90	5.39
Windload (sq ft)	3.5	1.7	1.7	4.0	4.8
(sq m)	.33	.16	.16	.37	.45



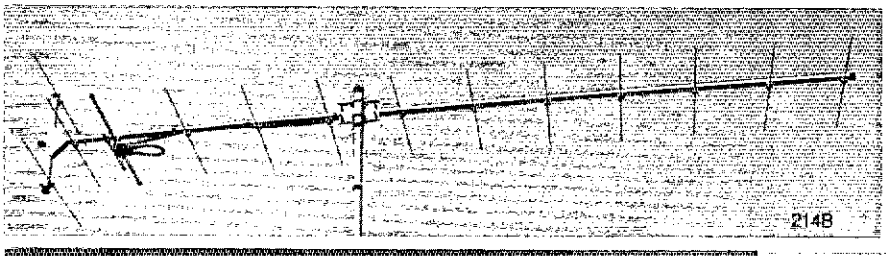
Stacking Kits

For stacking two Boomers, use the following coax harness and power divider kits.

32-19 = 32-SK 214B = 22-SK 617-6B = 617-SK

When stacking four Boomers, use the following complete stacking kits. They include H frame, harness, hardware and complete instructions.

32-19 = 324-QK 214B = 224-QK



Specifications, Stacked Boomers

Antenna	2x214-B	2x32-19	2x617-6B	4x214-B	4x32-19
Forward gain (dBd)					
Front to back ratio (dB)					
E/H plane beamwidth (deg)					
E-plane	34°	28°	35°	17°	12°
H-plane	19°	17°	20°	19°	15°
Stacking dist. vert. (ft)	10	12	34	10	12
(m)	3.05	3.66	10.36	3.05	3.66
Horiz. (ft)	—	—	—	10	14
(m)	—	—	—	3.05	4.27
Wt approx (lb)	18*	26*	62*	69	97
(kg)	8.16	11.79	28.12	31.30	44.00
Turn radius (ft)	9	11	18	9	13'4"
(m)	2.74	3.35	5.49	2.74	4.06
Wind Area (Ft2)	3.4*	7.0*	9.6*	8.3	15.2
(sq. m)	.32	.65	.89	.77	1.41

*Support mast not included

The nominal dimensions and weights listed are for complete arrays. The antennas and stacking kits must be ordered separately.

cushcraft CORPORATION

The Antenna Company

48 Perimeter Road, P.O. Box 4680

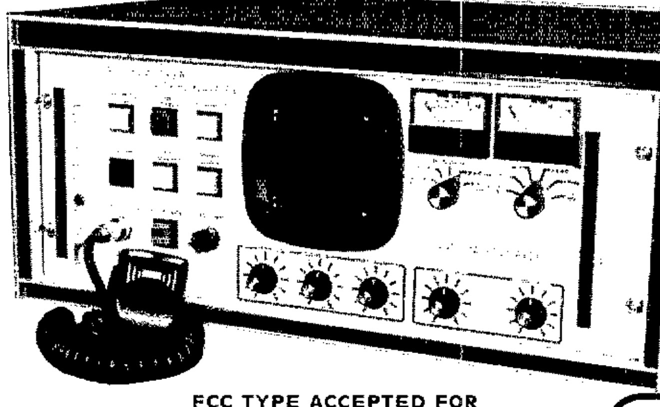
Manchester, NH 03108

Spectrum — Simply The Finest In VHF/UHF Repeaters!

2M 220

- True RX Double Balanced Mixer for wide dynamic range — *and low Intermods & 'Desense'!*
- 30W Xmtr., (or 70W on 2m)
- Built-in 8 Pole Rcvr. Preselector
- Full Metering
- Lighted Pushbuttons & Status Indicators — for ease of maintenance

MADE IN U.S.A.



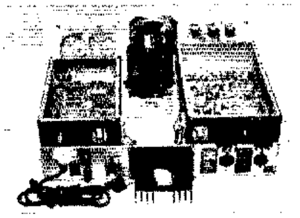
FCC TYPE ACCEPTED FOR COMMERCIAL SERVICES!

450MHz

- Rcvr. Sens.: 0.3u V/12dB SINAD typ.
- 8 Pole Xtal Filter, Plus 4 Pole Ceramic Filter!
- Front Panel Controls for timers & AF levels
- Built-in AC Supply, w/ instant Btry, Switchover
- Built-in I Der
- Supplied w/.0005% Xtals & a local mic
- "True FM" Modulation

Whether you want to install a new Repeater System or upgrade your old one,

don't you want the finest repeater available . . . at a reasonable price? And don't you want to buy it from a reputable firm with years of experience in Repeater Systems? A company that will stand behind the unit 100% if you should encounter a problem? Check around — check features, performance, availability of a full line of accessories and options . . . and check prices.



If you do, you'll find that there isn't a repeater on the market that really compares to the SCR1000! There are low-power "barebones" units, and there are super-expensive repeaters (which don't even offer many of our features!) All things considered, we feel that the SCR1000 is simply the finest repeater available — produced by a very reliable company which specializes specifically in this field. So make your next repeater a Spec Comm.

Years from now, you'll still be glad you did!

Sold Factory Direct or through Foreign Sales Reps.
Send for Data Sheets. Contact Our Int'l Dept. for Export Sales.

Options available: Duplexers, 'PL', Autopatch/Land Line Control, Hi/Lo Power, Various Tone & Timer Bds., Racks, etc. — Inquire.

Also Available

COMMERCIAL MOBILE & BASE VHF TRANSCEIVERS

136-174 AND 220-240 MHz

- 6 Channels
- 30 Wts.
- 0.3UV Rcvr.

FCC TYPE ACCEPTED FOR COMMERCIAL SERVICES

PCL250
- Super Rugged
- Finest Quality Throughout
- Reasonable Price

SPECTRUM COMMUNICATIONS

DEPT. Q-12 •1055 W. GERMANTOWN PIKE•NORRISTOWN, PA. 19401•(215) 631-1710

Amateur Radio Supply of Nashville, Inc.

Sure, we take trades on new equipment! Call or write.

We DO NOT print a catalog. We carry all major lines. Use this Magazine as your Catalog. Call or write for price quotes.

615 South Gallatin Road — Madison, TN 37115

CALL A.R.S.O.N. NOW!

615 868·4956

for the Best DEALS

NEW! STORE HOURS
Monday—Friday, 9am—5pm
NOW! Open SATURDAYS
9am — 4pm

USED EQUIPMENT — We have a good stock of late model used equipment. Sorry, no listing. Our stock changes weekly. Call or write your needs.

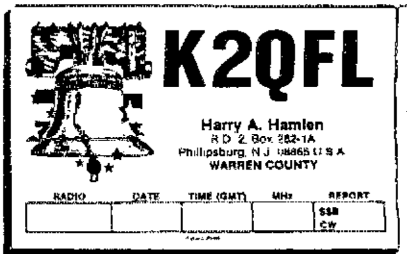
We Trade!

YAESU · KENWOOD · CUBIC · CDE ROTOR · DenTron · MIRAGE · DRAKE · ROBOT · ICOM · B&W · hy-gain · TEN-TEC OMNI · SANTEC · TRIONYX · avanti antennas · DATONG · ALLIANCE · MFJ ENTERPRISES, INC. · cushcraft The Antenna Company · Kantronics A commitment to excellence. · DAIWA · J. W. Miller

NEW! TR 7730

Call or write for Best Deals! 615 South Gallatin Road — Madison, TN 37115

Amateur Radio Supply of Nashville, Inc.

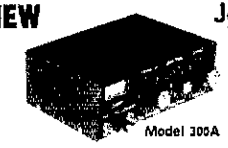


1,000 nice QSLs - Only $25.00!

Thousand lots, one side, black ink on 67 lb vellum bristol. This report form only, post-paid. **Please specify white, tan, gray, yellow, blue or green stock.** Please give me your **call, name, address & county. Please specify Liberty Bell, your own art** (black-white line art only), **or no art** (I'll use larger, centered type). **Shipment within one week! Satisfaction guaranteed!** Free with each order - 5 Band DXCC Checklist and a "World's Best XYL" Award imprinted with your XYL's full name **(specify)**. Checks & M.O.s payable to **Harry A. Hamlen, K2QFL**, and send orders to R.D. 2, Box 282-1A, Phillipsburg, NJ 08865. Please ask about rates, samples on QSLs in full color.

NEW

JSR ENGINEERING ANTENNA TUNER



Model 300A

ONLY $79.95

COMPARE ...
- 10 THROUGH 160 METER COVERAGE
- USE WITH ANY MODERN TRANCEIVER
- SWR AND POWER METER, 30 AND 300 WATT
- 4:1 BALUN BUILT IN
- REAR PANEL CONNECTIONS FOR BALANCED LINE, WIRE OR COAX LINE.
- COMPACT, BLACK FINISH CABINET - 7¼ x 2½ x 5-1/8
- 1000 VOLT SPACING ON MATCHING CAPACITORS
- FULL SCALE ON SWR METER LESS THAN 2 WATTS OUTPUT. IDEAL FOR QRP RIGS
- FULL YEAR GUARANTEE

OPTIONAL BACK LIGHTED METER $5.00
OPTIONAL MOBILE MOUNTING BRACKET $3.00
ADD $3.00 SHIPPING AND HANDLING
CALIFORNIA RESIDENTS ADD STATE SALES TAX

SEND CHECK OR MONEY ORDER TO:
JSR ENGINEERING
PO BOX 368
WEST COVINA, CA 91793
TEL. (213) 919-4025

PCS-3000 WITH T.T. MIKE KIT

AZDEN

SEND MONEY ORDER OR CASHIERS CHECK FOR PROMPT SHIPMENT

$299.00 POSTPAID!

THE PARTSTORE
999 - 44th Street
Marion, IA 52302

PHONE: (319) 373-1803
(319) 849-2000

FREE Electronic Bargain Catalog Upon Request

$39.95 ADD $2.50 FOR POSTAGE

30 CHANNEL CABLE TV CONVERTER

ORDER No. 184AE047

ETCO ROUTE 9N., PLATTSBURGH, N.Y. 12901. TEL.: (518) 561-8700

FREE! UNUSUAL 96 PAGE ELECTRONIC PARTS & IDEAS CATALOG!

COLLINS KWS-1 and 75S-3 for sale to licensed Amateur only. Both mint condition. Glen Wilcox, K6TGE, Route 6, Box 57, Fallbrook, CA 92028. 714-728-7777.

WANTED: early 42-50 MHz and 88-108 MHz fm tuners, receivers, chassis, related literature. Al Germond, 211 Brenda Lane, Columbia, MO 65201 314-449-8035.

WANTED: For mostalgia a KWM-1 in good condition, with manual and cable. Extra crystal drawer would be appreciated. K7LQI. Frank McJannet.

HALLICRAFTERS Service manuals. Amateur and SWL. Write for prices. Specify model numbers desired. Ardco Electronics, P. O. Box 95, Dept. Q, Berwyn, IL 60402.

ALPHA 77-SX wanted in mint condition. Prefer N.E. area. Arnold Chase WA1RYZ, 9 Rushleigh Road, West Hartford, CT 06117. 203-521-5280.

WORKED South America Award. Send log copy of 13 countries and $2. K5ODZ, 4805 Willowbend, Houston, TX 77035.

WORKED Central America award. Send log copy of 7 countries and $2. K5ODZ, 4805 Willowbend, Houston, TX 77035.

RTTY: Complete HAL setup — DS-2000/ST-5000, cw board, monitor, all cables and manuals. Perfect condition. Make offer, Bob Jackson AG5X 713-488-0065.

FOR SALE: HyGain 3750 ht transceiver, 3854 speaker, 3855 VFO, service manual, covers, MC-50 mike. Absolutely mint condition. $1500. Shipped collect. Don Schneider N4CJU. 493 Lakeside Pl., Largo, FL 33541 813-531-1016 eves.

WANT: 1920s batt. radios, horn speakers & literature. W6THU 1545 Raymond, Glendale, CA 91201.

LEARN More about equipment and how to fix it. Owner Repair of Radio Equipment book $8.95 postpaid. K6RQ, 14910 LG Blvd., Los Gatos, CA 95030.

VERTICALS! Own one? Buying One! Presenting a bonanza book package. Both "Comments, Hints, Suggestions & Criticisms by Vertical Users and Vertical Users: Novice to Extra for $8.95 postpaid. Separately $3.95 plus $1 postage/handling. Danrick Enterprises Dept. 99, 213 Dayton Ave., Clifton, NJ 07011.

6 NEW Elmac 3-500Z $170 pair. 2 used 4-1000A's tested 2 kW $60. Trade on super high power or Klystron or? tubes. 415-530-8840 WA6LHR.

KEYER KITS $16.95 to $22.95. S.a.s.e. for information. MSC, 1304 Toney Drive, Huntsville, AL 35802.

WANTED: Yaesu FR101, FL2100B, FTV-250 and accessories. W2UGM, 66 Columbus Ave., Closter NJ 07624, 201-767-0123.

ELECTRONIC Parts, reclaimed from used equipment. Gold connectors, mechanical filters, relays, tubes, much more. Remarkable prices. Free catalog. Bainbridge Industries, 26056 CR-H, Cortez, CO 81321.

DEC PDP8, PDP11, LSI11 computers, peripherals, software, parts, manuals, books, p.c. boards, etc. any condition wanted. Trade cash, Collins S-line or Signal One CX7A/B. WD5JFR/Ø P.O. Box 3156 Englewood CO 80155. 303-779-5256.

FALL Specials Alpha Amplifiers, Drake TR-7/DR-7s, IC-2ATs, TR-2400s and many, many more. Call us before you buy. Ham Radio Outlet, 2620 W. La Palma, Anaheim, CA 92801. 800-854-6046.

N6RJ 2nd OP A must for the serious DXer. Fully updated to current DXCC country list. $6.95 Free UPS delivery. Ham Radio Outlet, 2620 W. La Palma, Anaheim, CA 92801. 800-854-6046.

HEATHKIT HW-101, ps, SB-600, remote VFO, SB-650 display $425 or trade against TRS-80 313-335-6049 Gail KC8V.

CX7B with 500 and 200 Hz cw filters LED readout $795. Sherwood 125 hz cw filter for TR7/R7 $60. W7RX 206-232-0782.

SIGNAL/ONE Repairs. Mandelkern. 505-523-2897.

COLLINS KWM-380/HF-380 service, modifications and consultation backed by factory training and complete inventory of spare boards and parts. K1MAN, 207-495-2215.

TS-820S/VFO-820, Magicom processor (not installed), cartons & manuals. Fox-Tango 1.8 ssb filter. $700. Want older Electro-Voice Model 638 mic w/vertical slots in grille. Still looking for a Turner Model C-4 stand for Model 80 mic. Want owner's manual for 51J-4. Clean one, pse, no reprints. A.N. Gerli, AC1Y, 35 Brookmoor Road, Avon, CT 06001.

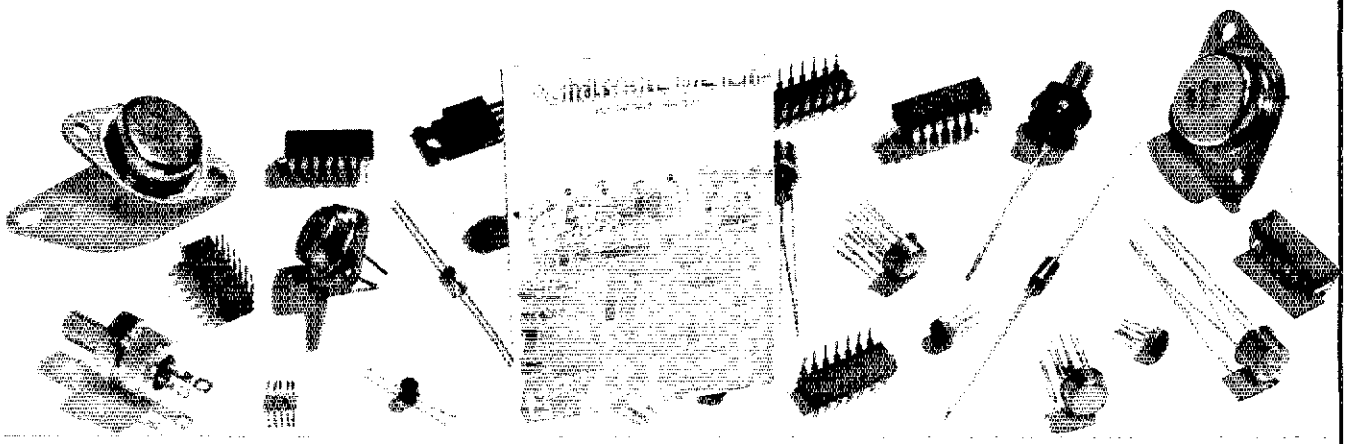
ROSS'S NEW factory sealed carton specials for Yaesu FT-902DM $1289, FT-101ZD $760, FT-107M $980, FT-707 $690, FT-625RD $639, FT-480R $449, FRG-7 $239.90. AEA MM-1 $169.90, CK-1 $114, IsoPole 144 $36, IsoPole 144 JR $27. Alda 103 Transceiver $369. Alliance HD-73 $95. Azden PCS-3000 $309.90. Kenwood TS-830S $869.80. TS-130S $669.80, TS-530S $735, R-1000 $399.90, TL-922A $1025, TR-9000 $441.60, TR-7800 $354.20, TR-7850 $399.90. Mirage B108 $150, B-23 $69.90. RF Power Labs A1000 $1100. Ten-Tec 444 $1300, 525 $479. All prices plus shipping. Closed Monday at 2:00. Ross Distributing Company, Preston, ID 83263. 208-852-0830.

DRAKE TR7, PS7, 2 fans, 1.8, .5 filters, service manual, $1195. Dave, N3RD, 215-935-9719.

AMATEUR REPAIR Professional service, reasonable rates, all brands. USA KDK repair center. Amateur Radio Repair Center of I.E.C. Inc., 1020 Brookstown Ave., Winston-Salem, NC 27101 919-725-7500.

WANTED Collins 51S1 51J4, crystal pack CP-1, Adrian, 4900 E. Kansas, Denver CO 80222.

SOLID ADVICE ON SOLID STATE DEVICES



- Become a better trouble shooter
- Extend your theoretical understanding of solid state devices
- Get comfortable with the inner workings of today's amateur gear
- Enjoy your hobby with technical confidence

You can do all these things when you have the help of Wes Hayward, W7ZOI and Doug DeMaw, W1FB, authors of **SOLID STATE DESIGN.**

Pick up a copy today at your local electronics dealer or order direct from ARRL.
Solid State Design $7.00 U.S. and possessions, $8.00 elsewhere.

AMERICAN RADIO RELAY LEAGUE, INC.
225 MAIN STREET
NEWINGTON, CT. 06111

There's SOMETHING FOR YOU at:

AMACOM 81
JEFFERSON AMATEUR RADIO CLUB

JARC's Silver Anniversary

October 17 & 18 Hilton / New Orleans Airport
901 Airline Highway, Kenner, Louisiana

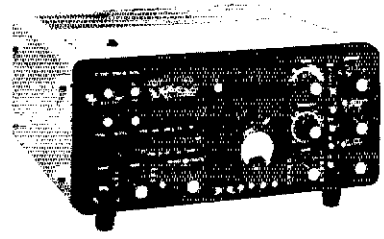
Forums, Demonstrations : Amateur Radio, Computer, FCC, Old Timers, Repeater Linking.

ARRL Louisiana Section Convention
Amateur and Computer Ware
INDOOR Flea Market
Family Events, Awards
Talk-in: 147.69 / .09 MHz

Write for more details:
Jefferson Amateur Radio Club
P.O. Box 73665
Metairie, LA 70033
504-887-5022
W.D. "Bill" Bushnell, WA5MJM, Chairman

FCC TESTS Saturday Afternoon (bring copy of your license)

YAESU FT-902DM



OUR TOP OF THE LINE!

- **Diode Ring RX Front End**
- **True Frequency Counter**
- **WARC Bands Factory Installed**
- **Built-in Curtis 8044 Keyer**
- **Built-in Memory System**
- **Variable IF Bandwidth**
- **SSB, CW, AM, FM, FSK**
- **AC/DC Supplies Built In**

Call for price and delivery.

RDC

ROSS DISTRIBUTING COMPANY
78 South State Street
Preston, Idaho 83263
Telephone (208) 852-0830

AMATEUR RADIO OPERATOR
KA1KK

YOUR CALL

—on an embroidered emblem for cap, jacket or blazer.

Black, 100% wool felt background with gold embroidered borders and lettering, gray tower and red "RF waves" with YOUR CALL LETTERS custom embroidered in the lower panel in red. Size 2¾" by 3½" call letters up to 6 letters limit. Send check or money order. 5.98 each, 2 for 10.98.

Warner Designs,
Box 790, Manchester Center, Vermont 05255

PASS FCC EXAMS

TESTS-ANSWERS FOR FCC FIRST AND SECOND CLASS COMMERCIAL LICENSE

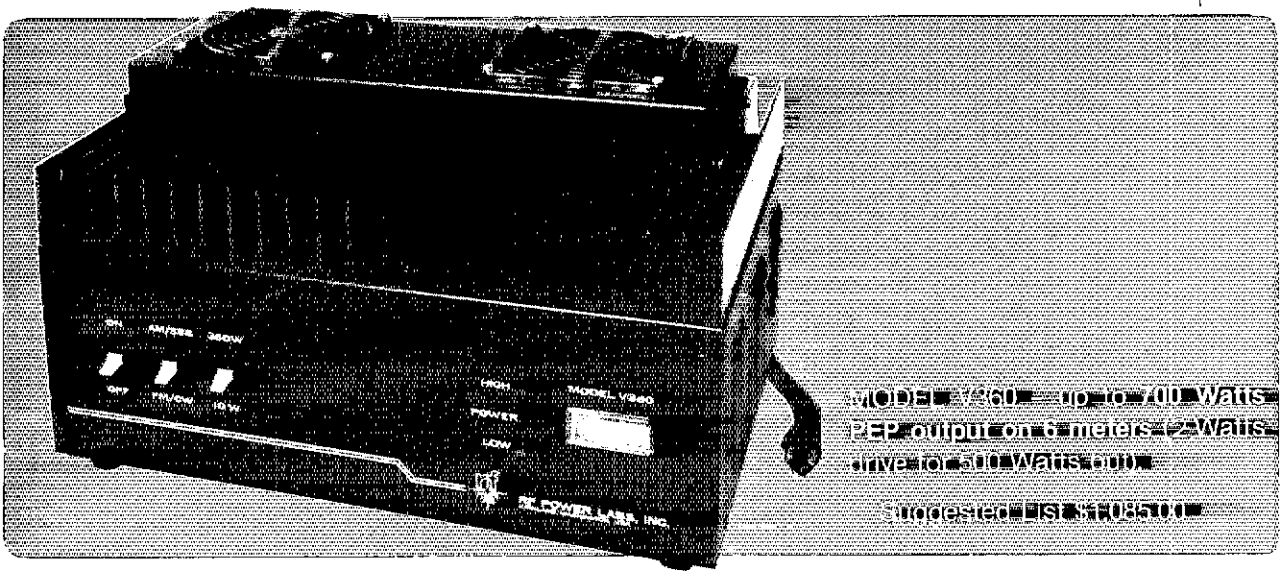
The Original FCC Tests-Answers exam manual that prepares you at home for FCC First and Second Class Radiotelephone licenses. Newly revised multiple choice exams cover all areas tested on the actual FCC exam. Plus — *Self-Study Ability Test.* Proven! $12.95 postpaid. Moneyback Guarantee.

COMMAND PRODUCTIONS
Radio Engineering Division
P.O. Box 26348 T
San Francisco, CA 94126

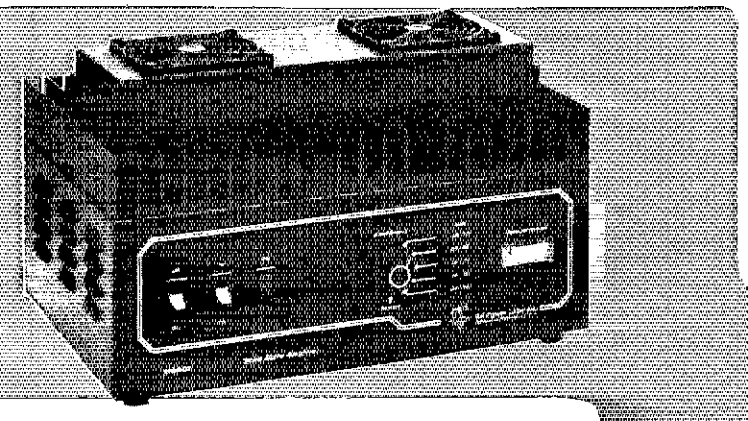
R.F. POWER LABS, INC. SETS THE STANDARDS IN SOLID STATE AMPLIFIER TECHNOLOGY

rf POWER LABS

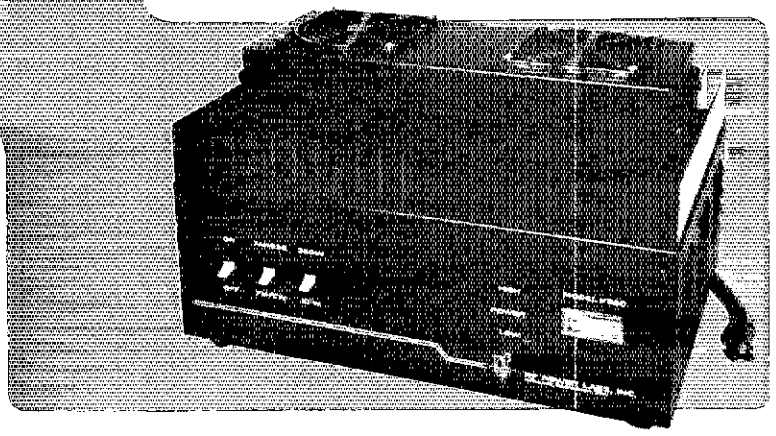
FCC type accepted.
100% Solid State.



MODEL V360 — up to 400 Watts
PEP output on 6 meters — 2 Watts
drive to 300 Watts out
Suggested List $1,085.00



Model V350
400 Watts Output
144 - 148MHz
Suggested List $1,085.00



Model A1000
1.2KW input 160 - 15 Meters (also A1000X
2-30 MHz and C500X 500W output 2-22MHz ex-
port models)
Suggested List $1,395.00

ALSO
Commercial, Military and Scientific amplifiers
from 10 KHz to 400 MHz at 400 watts output
and 2-32 MHz up to 5000 watts output.

Power supplies are internal on all models shown.

RF POWER LABS, INC.

21820 - 87th S.E. Maltby Industrial Village/Woodinville, WA 98072
Tel: 206-481-8833/Telex No.: 32-1042

QST 1960-79 $85 or offer. Globe Sidebander DSB-100 $35, Heath VF-1 $9. All mint, plus shipping. K7BHE, 215 East 7060 South, Midvale, UT 84047, 801-255-1249.

SELL: HEATHKIT SB-303, SB-400, cw filter, SBA-104-1 noise blanker, RTTY adjusted, spare tubes, etc. Homebrew digital display, best offer over $450. WB2SIB, 166 Canton, Tonawanda, NY 14150 716-693-4182.

TEN-TEC ARGONAUT 509, like new 5-watt cw/ssb transceiver, power supply, mike, $210 prepaid. 70-watt homebrew 2 meter tube xmtr, perfect, $40. Stu Cowan, W2LX, Box 596, Rye, NY 10580.

HAL TELETYPE system: RVD-1005 visual display, ST-6 RTTY demodulator, DKB-2010 dual mode keyboard, all new never used, $500. FOB. No break-up. Frank Dane, 13633 Boquita Dr., Del Mar CA 92014.

DRAKE L7 amplifier 10-80M $950 Model 28ASR teletype with manuals $250 both excellent — contact Mark Nadel WD2AFA days 516-538-2300.

SELL Drake TR4 MS4 AC4 or Hallicrafters FPM 300 MK II. Make offer. WB0FKY 816-997-3880 days. 816-524-5529 nights.

HEATH HW-104 80-10 meter ssb/cw transceive with cw filter, power cable, extender card, and manuals $385. 13.5 V 8AH NiCad battery and charger for above $55. Shipping included. Chris Wartes, K7II, 706 Harvest Rd., Bothell, WA 98011. 206-481-8090.

MIRAGE 2M amplifier: 2W in, 30W out. Mint, $65; Kenwood remote VFO 520-S, mint $100. A.J. Doucette, K1WO.

TEMPO S1, heavy-duty battery pack, rubber duck, holster, TTP, BNC antenna connector, extra case, parts, wall charger, $200. DSI 3600A frequency counter, very good condition, $100. Ameco CN50, CN144, CN220, power supply, all for $45. Purchaser pays shipping. Certified check or money order, please. S.a.s.e. inquiries. N1FB 4 Roberts Rd., Enfield, CT 06082.

FOR SALE: Drake T4XB, R4B, AC4 with manuals, cables, 15 extra crystals, covering newly allocated bands and also CB. Also Dentron 10-160AT Tuner with manual. Drake gear $500. Dentron $75, will ship. John Kell K9TKE, 6922 Yankeetown Hwy., Newburgh, Ind. 47630, tel. 812-853-3082.

MOUNTAINTOP in N.C. World's best ham location, in the Smokies near Hendersonville. 5-1/3 acres on the very top, 3600'. Three bedroom, two bath completely furnished modular home. Central air. 24 × 10 panelled ham room, 100' electrically operated Triex tower, beams, etc. Priced at a steal because of owner's health. Upper sixties. Jim Leonard W4FPS, 704-692-9702.

CLEGG 22-ER-Mark 11. Like new. Works OK. $75. You ship. A. Wilson, 617-896-3549.

HALLICRAFTERS SX-122 with 100 kHz callibrator and manual. Excellent condition. $150. you ship. MFJ-901 $25. R. LaSalle N1ASK 401-568-8889.

FOR SALE: Heath SBA-300-3 6 meter converter. Never used. $25. Dow co-ax relay 110V. $20. K4HHR.

OVERSTOCKED — DEMO's cant tell from new. Full year Ten-Tec warranty. OMNI-C $989, Delta $689, Argonaut $379, Century Digital $349, Century Analog $299, Model 544 Digital $539, power supplies and accessories extra. VHF Engineering power amplifiers, 450 MHz 10/40W $140, 220 MHz 10/60W $140, 145 MHz 30/150W $206, 2/70W $153, 1/20W $57, 10/40W $57. Hy-Gain TH6DXX $225, 14AVQ $45. Used Century very clean $269. Send s.a.s.e. for complete listing. No credit cards. Loomis Electronics, 3462 Stagecoach Trail. Loomis, CA 95650, 916-652-5015.

COLLINS Station: KWM-2/Waters Rejection Tuning; 516F-2, 30L-1 winged, excellent $885. 75A-4, sn 3301, .5, 3.1, 6 kHz filters $285. Pickup, K1KLO, 203-434-5621.

QST, 73, CQ magazines 1976-1980 for sale; also HRH 1977-1980. Cost $5. per year plus shipping. Send s.a.s.e and payment to AF7G/2, 19-1A Lake Avenue, East Brunswick, NJ 08816.

KENWOOD TS-520S mint condition, very low hours, original carton $575. I ship WA2MNR 212-867-9040 day 212-595-5802 eve.

SALE: Yaesu C.P.U.2500R 2-meter transceiver with remote cont. mike and Autopatch keyboard. Mint $325. KC4EP 813-696-2554.

SELL: Mint condition, Swan Astro 102BX transceiver including latest factory installed modifications, Owner's Operation and Service manuals. $779 plus UPS freight and insurance. W8CFT, 517-332-5766.

DRAKE: R4B, T4XB, MS4, AC4, complete, extra xtals, excellent, $740. Hammarlund HQ170A, 160-2m, VGC, $179. Chuck, WB8THK 313-643-0308, 616-846-4052.

R4C T4XC AC4 MS4 extras $800. Rare console C4 $250. N6BV 415-386-6153.

WANTED: Drake L-4B with power supply. 617-227-5228. N1BJO.

COLLECTORS QSTs from 1936. Most years complete, also much CQ, 73, Ham Radio, old repair books etc. Will not break up. Best offer plus shipping by November first, 1981. Send $1 for lists to W8ELG, 360 Oxford Ave., Elyria, OH 44035.

CONNECTICUT's Ham Store Rogus Communications Swan, HyGain, Rohn, MFJ, Times coax, B&W; also used equipment. New location: 250 Meriden/Waterbury Turnpike, (Rte 66) Southington, 06489., 612-2252.

MICROLOG AVR2 AKB-1 with 9" Sanyo monitor, loaded, excellent $950, Ron, KB3S, 412-941-3206.

FOR SALE: Heathkit IO-101 color bar dot generator/vec-scope. Immaculate condition $100. plus shipping. Wanted: color cideo camera. K7GFL, ph 209-582-3807.

WE BACK EVERYTHING WE SELL WITH OUR PERSONAL GUARANTEE

PRICES F.O.B. HOUSTON

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ITEMS SUBJECT TO PRIOR SALE

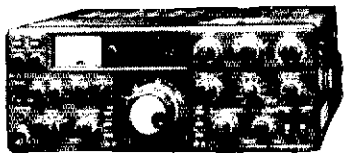
MADISON Electronics Supply

master charge

VISA

NEW NIGHT LINE
TOLL FREE
1-800-231-3057
MON, WED, FRI, 6 PM-10 PM CT

TS830S TRANSCEIVER



160-10 METERS, 3 WARC BANDS, NOTCH, VBT, IF SHIFT, BUILT IN AC

LIST	949.00
FILTER	62.95
MC50	49.95
YOUR COST	949.00

TS530S TRANSCEIVER

LIST	799.00
CW FILTER	62.95
MC-50	47.95
YOUR COST	799.00

ICOM

IC2 AT
*$269.95
BP-5-
49.95
BC-30-
69.95

NEW IC-22U
List - 299.00
INTRODUCTORY
PRICE
269.00

ACCESSORIES

HM-8	49.95
HM-9	34.50
HM-10	39.95
PS-15	149.00
PS-20	229.00

DONS CORNER

The most asked question around the store is, "What HF rig do I need?" Being in the business of selling radios, I could offer a dozen answers, but the two top contenders are the Icom 720, and the Kenwood TS830S. The Icom is in stock. Kenwood, as you know from shopping, is slow delivering, but they are making a try to catch up.

You should lay your hands on the MFJ496 Keyboard. Even my code sounds good. Now if I hooked up the Field Day . . . .

Kenwoods are going on special. The TR2400 is down to $299.00. I hear the TS180S may do it too. If you have read this far, here's the payoff . . . My spy at the factories, Tang In Stead, reports the Kenwood has a TS840 out. Dual VFO's, digital synthesized, and more. Across the street at Icom, there's a new IC ???. Before he was chased out, he discovered it goes from 1.8 mHz to, get this, 500 mHz!! T/R is done with plug-in modules. More on it as our snitches report in.

Last note . . . add an Alpha Delta Transitrap . . . replaces conventional lightning arrestor and goes inside the shack.

OK, go read the other ads if you must. I'll stay in touch via the 'Corner', and try not to keep any secrets from you.

See you next month!

THE KWM-380
SOME AT OLD
PRICES - CALL QUICK

YAESU FT707
$810.00 LIST

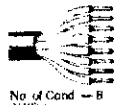
- 80-10 INCL. WARC
- 90 WATTS OUT
- BEST SPECS ON CURRENT MOBILE RIGS
- SOLID STATE LED SRF METERS

FT101ZD MK3
$889.00

- ALL BANDS + WARC
- TUBE FINALS
- NO TUNER REQUIRED

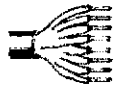
BELDEN

	Part Number	MHz	db/100 ft.	db/100 m
RG8/u Dbl. Shield	9888	50	1.2	3.9
65 ¢/ft.		100	1.8	5.9
		200	2.6	8.5
		300	3.3	10.8
		400	3.8	12.5
RG8/u Foam .81VF	8214	50	1.2	3.9
36 ¢/ft.		100	1.8	5.9
		200	2.6	8.5
		300	3.3	10.8
		400	3.8	12.5
RG8/u Regular . 66VF	8237	100	2.0	6.6
32 ¢/ft.		200	3.0	9.8
		400	4.1	13.4
		900	7.8	25.6
RG 213 Non-contaminating	8267	100	2.0	6.6
43 ¢/ft.		200	3.0	9.8
		400	4.7	15.4
		900	7.8	25.6



8448
27 ¢/ft.

No. of Cond — 8
AWG (in mm) —
6-22 (7×30),
2-18 (16×30), (1.19)



9405
45 ¢/ft.

No. of Cond — 8
AWG (in mm) —
2-18 (26×30)
6-18 (16×30), (1.17)

Belden Mini RG-8 (9258)-19¢/ft.

KENWOOD
TS-130S Deal
TRANSCEIVER 759.00
AT-130 (139.00) -FREE-
TS130S & AT130 759.00

ETO-ALPHA

ALPHA 78	2707.00
ALPHA 374A	2036.00
ALPHA 76A	1585.00
ALPHA 76PA	1860.00

DRAKE

TR7/DR7	1349.00

ICOM

IC730	*829.00
IC720A W/PS	*1498.00

HANDIES

KENWOOD
TR-2400 * 399.00

SANTEC
HT 1200 299.00

MOBILE 2M

KENWOOD
TR9000
ALL MODE * 499.00

ICOM
IC-290
ALL MODE * 548.00

ET CETERA

Cubic 103	1195.00
Cubic-Swan 102BXA	$999.00
Astro 150A	849.00
Robot 800A	749.00
Mirage B23 1 watt-30 Watt amp	89.95
Cushcraft A3 Tribander	169.00
Cushcraft A4	219.00
Bird 43, Slugs	Stock
CDE Ham-4 Rotor	199.00
Ham X	269.00
GE 572B	38.00
GE 6146B	10.95
Fits Kenwood Yaesu	
Kenwood Service Manuals	
Stock	10.00 ea.
Telrex TB5EM	425.00
Belden #14 8000 Stranded	
Antenna Wire	10¢ ft.
Lunar 2M4-40P	109.00
Adel Nibbling Tool	8.95
Janel QSA5	41.95
Alliance Hd73 Rotor	109.95
Amphenol Silverplate PL259	1.00
New-Icom IC 720 A AC/mike	1298.00
Bearcat 220 - $329.00	300-399.00
Manual Typewriters	$35.00
Guaranteed to Work	
Mallory 2.5A/1000 PIV	
Epoxy Diode	19¢ ea.
Antique Tubes	Call

2 Guaranteed Service Techs on COLLINS KWM-2/KWM-380/S-LINE CALL!

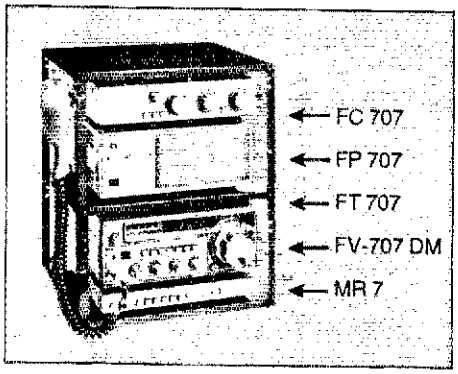
713-658-0268 * CALL FOR QUOTES **1508 McKINNEY HOUSTON, TEXAS 77010**

N&G DISTRIBUTING

Call TOLL FREE
1-800-327-3364

7201 N.W. 12th ST.
MIAMI, FLORIDA 33126
1-305-592-9685 • 1-305-763-8170

WE ALSO CARRY MANY
MARINE & AIRCRAFT RADIOS

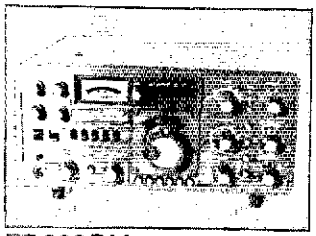


LARGEST IN THE WORLD

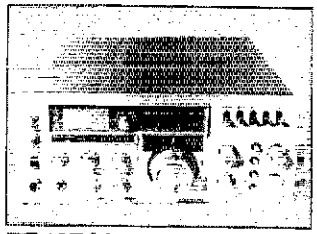
WE SERVICE WHAT WE SELL...

N&G DISTRIBUTING CORP is an Import and Export business serving the Caribbean area since 1956. In recent years, having expanded our business to South America and South Florida. We are two minutes from the MIAMI INTERNATIONAL AIRPORT.

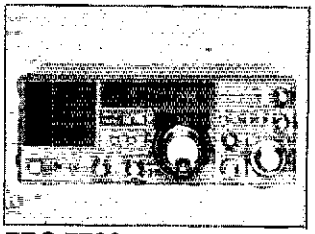
SPECIAL THIS MONTH YAESU



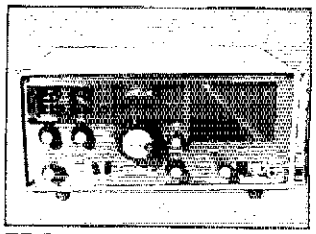
FT 902 DM
LIST 1535.00



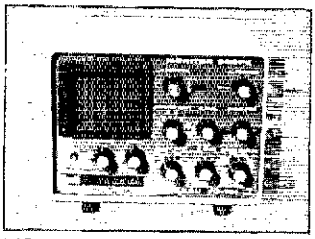
FT 107 M
LIST 1045.00
N&G PRICE 850.00



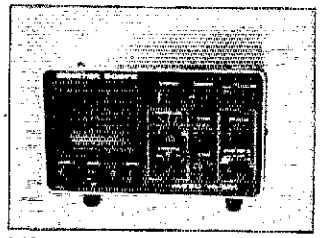
FRG 7700
LIST 550.00



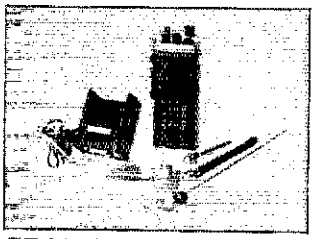
FRG 7
LIST 300.00



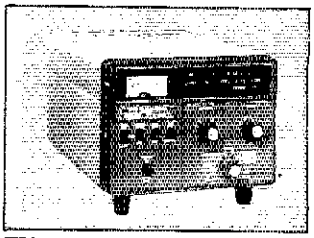
YO 101 SCOPE
LIST 320.00
N&G PRICE 220.00



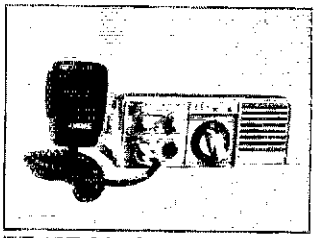
YO 301 SCOPE
LIST 320.00
N&G PRICE 220.00



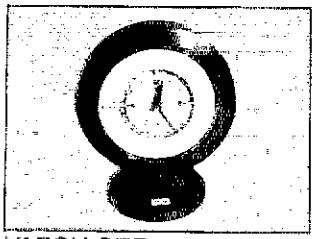
FT 207 HANDIE
LIST 339.00



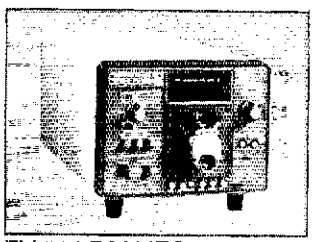
FT 901 TRANSVERTER
LIST 389.00



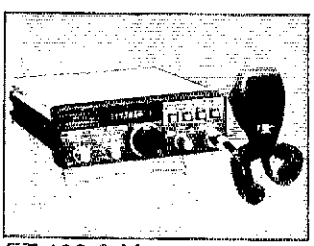
FT 127 220 MHz
LIST 350.00
N&G PRICE 295.00



YAESU QTR 24 hr.
LIST 50.00



FV 901 DM VFO
LIST 475.00



FT 480 2-Meter ALL MODE
LIST 529.00

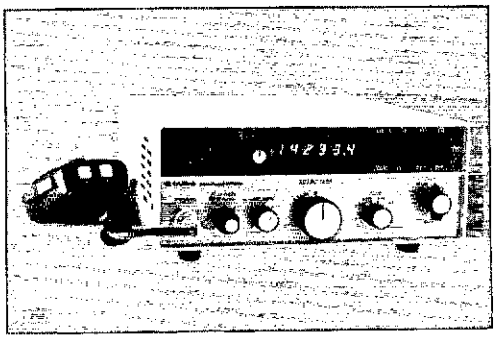
ALL PRICES ARE SUGGESTED RETAIL PRICES • PLEASE CALL FOR QUOTES.

N&G DISTRIBUTING

Call TOLL FREE
1-800-327-3364

7201 N.W. 12th ST.
MIAMI, FLORIDA 33126
1-305-592-9685 • 1-305-763-8170

WE ALSO CARRY MANY
MARINE & AIRCRAFT RADIOS



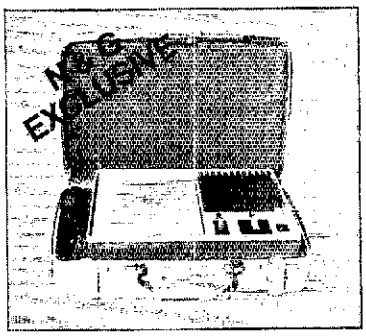
ASTRO 150 $975.00
MATCHING POWER SUPPLY 179.95
MATCHING ANTENNA TUNER 169.95

General Frequency Range
160 Meter Band – 1.8-2.4 MHz†
80 Meter Band – 3.0-4.5 MHz
40 Meter Band – 6.0-8.3 MHz
20 Meter Band – 13.8-16.0 MHz
15 Meter Band – 20.8-23.0 MHz
10 Meter Band – 28.0-30.0 MHz††
†† Model 150 only
† Model 151 only

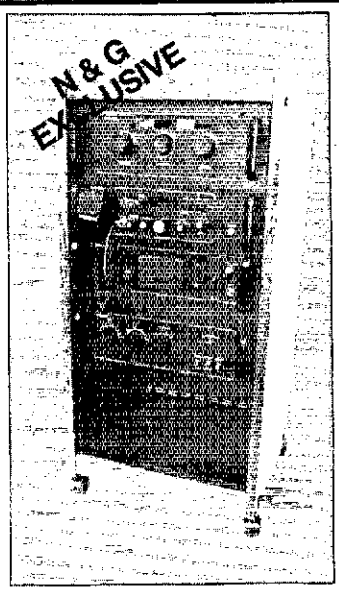
HF/SSB PORTABLE RADIO STATION 100 WATT 115/230V 50/60 Hz AC OR 12V DC IS AVAILABLE

CUBIC

DIPLOMAT 150

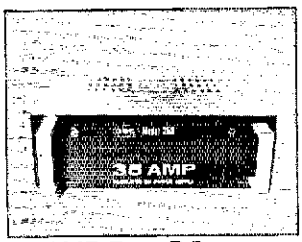


BATTERY PACK CHARGER

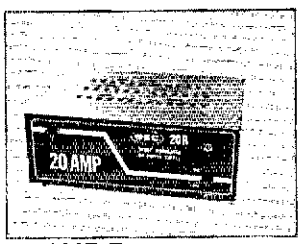


ST 2 TUNER
ASTRO 150
PSU 5 POWER SUPPLY
1500Z Amp.
LIST PRICE 3000.00

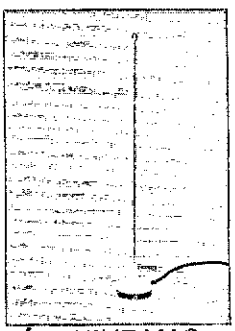
BIRD WATT METERS & ACCESSORIES
LARGEST SELECTION IN THE EAST



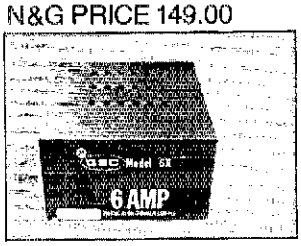
35 AMP Reg. P.S.
LIST 250.00
N&G PRICE 149.00



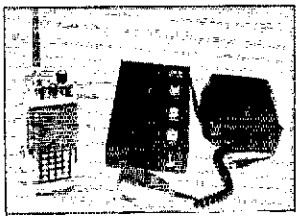
20 AMP Reg.
LIST 129.00
N&G PRICE 79.95



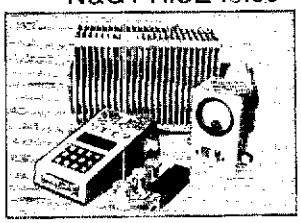
1/4 WAVE MAG
LIST 24.95
N&G PRICE 15.00



6 AMP Reg.
LIST 89.95
N&G PRICE 39.95



MA 25B
LIST 279.00
N&G PRICE 249.95



BIRD 43 142.00
All Bird Prod. in Stock

ALL PRICES ARE SUGGESTED RETAIL PRICES • PLEASE CALL FOR QUOTES.

WANTED: Mint Atlas 210X or 210X limited edition, no power supply, no mic, no console. State price. WA4MME, 2308 Zinnia Court, Killeen, TX 76541.

CENTURY 21 By TenTec one owner, perfect condition $230. Call 9-6 WA4MIY 803-882-6787.

FOR SALE: RAZ-1 rcvr Pre-Selector and power supply, 15-700 KC, excellent CDX $150. New TU-26-B tuning unit, 200-500 KC $15. W2YIB, 8 Bates Drive, Caldwell (Fairfield) NJ 07006 201-227-1739.

FOR SALE: Drake SPR-4 rcvr w/xtal cal. noise blanker, AL-4 loop antenna, factory aligned. $350. Ten-Tec model 570 xcvr, 276 xtal cal, 670 keyer, $250. Mizuho SX-59 preselector $50. All items mint. Will ship UPS. Certified check/MO only. R.S. Crowell KA4UPQ 640 Stonehenge Drive, Mary Esther, FL 32569. 904-244-0307.

2020 TEMPO matching speaker. Best offer. 201-899-7570, W2CDU.

FOR SALE: Drake R4B, T4XB, MS4, AC4, extra rx xtals excellent condition $725. Heath HR-1680 $175. Heath SB401, SB303 $425. Complete documentation for all. Reg Atkins W8LYW P.O. Box 59. Arbovale WV 24915 ph 304-456-4459.

YAESU FRG-7700 with memory, $490, UPS paid, Bill Mucker, 599 Corinthia Milpitas, CA 95035, 408-263-9050.

FOR SALE: QST 1958 to 1970 complete some 42-45 1960 to 71 singles. You bid, you ship. S.a.s.e. for list W8LYW P.O. Box 59, Arbovale WV 24915.

DRAKE TR7/DR7 (late model), PS7, 2XFA7, SL500, MS7, RV7, SP75, 7077, service annual — all like new, $1755. Heath HD-1410 keyer $35; Dentron kW transmatch $70. Jeff, K2OD, 609-397-3255 mornings; 201-788-5777 afternoons.

TRADE HEATH 2-meter hand-held for ?????????? Has tone pad, remote hand microphone and holster (modified Motorola). Crystals for 146.94, 146.52, 146.79, 146.88, 147.00, 147.09, 146.97, 146.55, 146.67 and 147.36. S.a.s.e. for response. Peter O'Dell, KB1N, 7 Brian Rd., South Windsor, CT 06074.

ARMY MARS is looking for additional members in MA, RI and CT. For more information, send your name and address to Peter O'Dell, 7 Brian Rd., South Windsor, CT 06074.

COMPLETE Heath Station: SB-300, SB-400, SB-600 thru SB-630 $590; HW-32A, AC supply $65. N1BNC, 617-924-2585

DRAKE TR7, w/MS7, PS7, fans, desk mike, cw filters, RTTY filter, service manual, absolutely mint condx. $1250. Icom IC-255A, w/TT mike, brand new, $375. CES auto dialer mic $55. Norm, K7TBI, P.O. Box 70563, Seattle, WA 98107 206-789-5959.

CLEANING SHACK: Hallicrafters SR2000 $598. Oldies: SX 25 $60 S20R $60 S40C $60. Echophone $95. CE20A VFO $85. SBE 33 $138. Heathkit DX-35 $35. DX60 $56. HR10B $56. HW12A $69 HW22A $69. HW32A $69 HP13 desply $49. no. AC SB300 $135 SB303 $238 HW16 $95. HG10B VFO $56. Swan 250 $138. 117XC $95. HQ120 $85. Lafayette HA410 $49 HA460 $49. Gonset Comm III $49. HW10 Shawnee $55. All must go, first M.O., bank checks. FOB add UPS cost. F.E. Coble N4LX 251 Collier Ave., Nashville, TN 37211 phone 615-833-2724.

ALMOST Complete set of QST, best offer. C.J. Mozzochi, Box 180, Marlborough, CT 06447.

FOR SALE: In good condition copies of QST magazine, Nov. & Dec. 1925: Most of the months of the years 1935 thru 1952 and 1955 thru 1958. Prefer selling as entire lot. Best offer Erma A. Owens, 702 Lawson, Royal Oak, MI 48067, 313-542-7057.

HEATHKIT SB301 rcvr, excellent condition $225. Johnson Viking II xmtr; works on cw only, $45. EICO VFO for Viking, $25. Jack Thompson 2504 Beaverbrook Dr., Greensboro, NC 27406. 919-274-8831.

AMATEUR REPAIR — Professional service, reasonable rates, all brands. KDK after-warranty repair center. Amateur Radio Repair Center of IEC, Inc., 1020 Brookstown Ave., Winston-Salem, NC 27101 919-725-7500.

JOHNSON'S Amateur Radio Supply 700 N. Clark Blvd., Clarksville, IN. 47130. Easy access from I-65 north or south. The only full line amateur dealer in the Greater Louisville area. We're new and ready to deal. In addition to most major lines, we have a full service department. Call or write for good prices and good service. 812-283-3876.

WANTED: VHF marine band transceiver. WB5FXI.

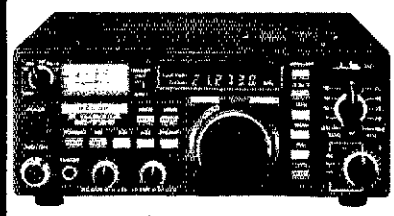
ATLAS 350XL with DD and PS. New finals. $650. Call Paul Lieberman, 201-549-9050.

HEATHKIT SB-100 transceiver with HP-23 a.c. supply, mobile mike, 5 spare tubes, manuals, $260. postpaid. Heathkit HP-13 mobile supply, manual, $75. postpaid, Wing, K1WVX, 203-668-2079.

MADISON Fall Specials: IC2AT $249.; TR2400 $299.; Santec HT1200 $299.; IC22U $250. (limited); IC730 $729.; IC720A/AC $1298.; Robot 800A $749.; Yaesu FT707 $699.; FT901DM $1299.; Digitran keypads for KWM380 $12.; Cubic 103 $1195.; Telrex −10%, drop ship; Lunar 2M4-40P $109.; antique tubes call! Alpha 78 $2707.; 374A $2036.; 76A $1585.; 76PA $1860.; Belden MiniRG8 (9258) 19c/ft; 8214 RG8Foam 36c/ft; 8267 RG213 43c/ft; 9405 heavy rotor cable 45c/ft; Amphenol silverplate PL259 $1.; GE 572B $38.; Complete service facilities. All items guaranteed. Prices fob Houston, include sufficient postage. Madison Electronics, 1508 McKinney Houston, TX 77010. 713-658-0268; nite 1-800-231-3057 6-10 PM CT MWF.

FT101ZD WARC, 350Hz cw filter, fan. Absolutely mint. $595. Bud, N7BFN, 206-939-6899.

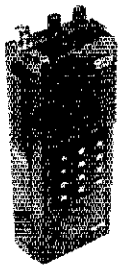
NEW FROM ICOM



ICOM 730

ICOM 720A

ICOM IC 2AT HANDHELD



THE COMM CENTER INC.

Laurel Plaza
Route 198
Laurel, Md.
20810

MD.: 301-792-0800

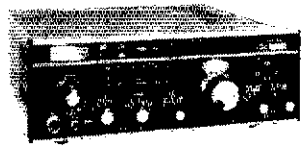
OPEN TUES. THROUGH SAT.

CALL TOLL FREE
1-800-638-4486

THE BEST

YAESU FT-902

KENWOOD
ICOM
TRAC KEYERS
TEN-TEC OMNI



DRAKE TR-7

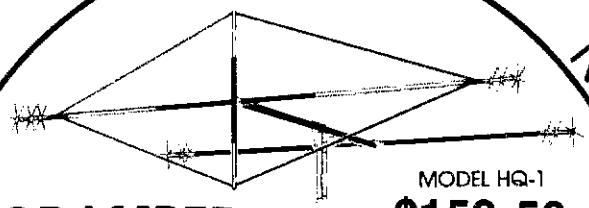
TOP OF THE LINE. NUMBER ONE. IF YOU'RE THE TYPE OF PERSON THAT WILL SETTLE FOR NOTHING LESS, WE'VE GOT WHAT YOU'RE LOOKING FOR...TOP OF THE LINE FROM THE TOP LINES. WE OFFER MORE THAN JUST THE RIGS -- SUPER SERVICE AFTER THE SALE. CALL US SOON FOR A QUOTE ON YOUR NEXT RIG.

800-845-6183

G.I.S.M.O.
1039 LATHAM STREET
ROCK HILL, S.C. 29730

Service Department
Call 803-366-7158

NOW-SILICONE SEALED



MODEL HQ-1
$159.50

CRAMPED FOR SPACE—WANT DX?

Then you want the antenna that's known around the world for its small size and superior performance... The Multiband HYBRID QUAD for 6-10-15 & 20 meters.

- WING SPAN-11 FT.
- BOOM-54 INCHES LONG
- WIND AREA-1.5 SQ. FT.
- 1200 WATTS P.E.P. INPUT TO FINAL
- FEED LINE-50 OHMS
- EACH BAND FREQUENCY ADJUSTABLE

If not stocked by your dealer order direct. We pay shipping in USA. Send for free catalog of other models and more data

Mini-Products, Inc.
1001 W18th St., Erie, Pa. 16502

NOW-SILICONE SEALED

QSL — CARD — QSL

KAØCSR

MIKE O'LAUGHLIN
P.O. BOX 7575 KANSAS CITY, MISSOURI 64116

- Key - Black Ink
- Border - Blue Ink
- Call - Name - Address Red Ink
- Size - 3½ x 5½
- Glossy Stock
- Standard Report Form on Reverse Side

100 Cards $14.00
Additional 100 - $4.00

Order No. 403

Mail Check or Money Order To:

Box 7575 North Kansas City, Mo. 64116

RUSPRINT

VISA

WANTED: Atlas TX110 transmit module. N7ACM.

FOR SALE: TR7400A, mag. mount ant original ctns. like new with Ringo Ranger $290. TR7800, Hustler Colinear base ant, like new $325. Astron RS12A PIS new condition $48. Hallicrafters HT 32A exc. make offer, you p/u this 805-398-2111 K6GLJ.

WANTED: Collins 75A-4 touch-up paint. Also, service bulletins for 75A-3, 75A-4, KWS-1 to Xerox and return. John WB8IPG; 263 Falmouth; Warren, MI 48089.

MINT Collins gear; KWS-1, $695. 75A-4, 3 filters, $395. Matching 75A-4 speaker, $35, or trade for Heath SB-604. All unmodified, with manuals, original crates. John Werner; 26316 Falmouth; Warren, MI 48089, 313-759-4539.

ESTATE SALE: HW101, HP-23B power supply, D-104C mike $295; Cantenna with oil $10; DX-100 transmitter $75; HQ-110 receiver $95; DX-160 receiver $115. All with manuals. You ship. WB2N, 201-747-5825.

WANTED: Instruction manual, Realistic DX-160. $5, for loan or copy inc. all postage. N1AK, 47 Elm Street, Rutland, VT 05701.

SALE SB301-SB401 crystal pack in SB-401 cables manual very clean excellent, $325, W5JE, 501-452-3445.

WANTED: Old push/pull componnents, need 1000HCS40 Johnson coil and National MB-150 tank L/C. Paul Cooper, K6PY. 9845 Oakdale Ave., Chatsworth, CA 91311. 213-993-8459.

SEND MORSE code on Radio Shack Color Computer. Sound from TV speaker. Cassette, $12.95. WB3FZI, 525 Dutch Ln., #2, Hermitage, PA 16148.

FOR SALE: Robot 70 monitor and camera. $515. Brand new, mint condition, in original carton. Drake MS-4 speaker $20. Will ship UPS. Certified check. Gloria McDaniel, W9GHO, 6090 Fall Creek Road, Indianapolis, IN 46220, 317-257-0362.

AMATEUR RADIO servicing. Professional laboratory. Professional technician holding 1st phone, 1st Telegraph, Amateur Extra, electronics teaching credential. S.F. Bay, N6ABE 4797 Mira Loma St., Castro Valley, CA 94546, 415-881-5429. Great Circle Electronics.

MICROWAVE modules 432-435/28S $250. 144/28 $200. Evenings WA4BUE 804-424-1855.

FOR SALE: Yaesu FT-101 Mark I xcvr, excellent condition with original manual; $450. Heathkit Electronic Keyer, HD-1410, LN; $45. Jack Thompson, 2504 Beaverbrook Dr., Greensboro, NC 27406. 919-274-8831.

CONVERTERS: All 10 meter IF: Janel $55., Ameco Nuvistor 6 and 2 meter with accessories (as is) $40. evenings WA4BUE 804-424-1855.

SB-230 amplifier. Works great. spare parts. $350 Phil, KB8EC 616-874-9129.

WANTED: 10 mtr mobile cw xcvr. 250 watts or less final input. Converted CB ok. State make, model, input pwr, condition & price. KA4PQF, POB 589, Bassett, VA 24055.

DENTRON MLA-2500 2kW linear amplifier $550 ppd. Microlog AKB-1 keyboard and AVR-2 modulator with standard TV adaptor for cw, RTTY, ASCII, Baudot, and all factory options included $625 ppd. Heathkit phone patch $25 ppd. I also have two old wire recorders if anyone interested. Unadilla low-pass filter for hf $25 ppd. All gear in great condition. Cort Decker, WB9QVU, Rte. 3, Woodridge Drive, Eau Claire, WI 54701. 1-715-878-4545.

HALLICRAFTER'S HT-32B $195 WDØHHM, 529 Cedar Lane, Moorhead, MN 56560.

2M ANTENNA wanted — I'm looking for a Hy-Gain 215B. Call or drop me a card with price. WB5OBK, Paul, Box 54, Yancey, TX 78886 1-512-426-3903.

FOR FREE QSTs 6/61-12/80 complete for UPS collect or direct pickup. WA2ICJ, 9 LindaLane, Newton, NJ 07860.

FOR SALE: Lightly used Collins S-line by original owner 75S-3B. 312B4, 32S-3, 30L1, 516F2, DL1, SM2 microphone $1800. Ainsworth R1 Box 103 Vernon VT 05354.

WANTED: ATLAS 210X operationally complete w/ps ready for mobile operation write K4FDW.

WRITE for list of old tape recorders, pick-up arms, turntables, amplifiers, lateral/vertical reproducers, etc. available and items wanted. William C. Love, 5808 Northumberland St., Pittsburgh, PA 15217.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick Dept. 424, 230 Woods Lane Somerdale, NJ 08083.

YAESU FT-101ZD, Fox-Tango 1.8 ssb filter, SP-901 speaker, mint, $675. K1RRR 1-203-259-7033.

COLLINS KWM-2, 516F2 winged $475. K4CK, 305-967-5997.

ICOM 720A with PS15 supply, new, $1295, Heath SB104A, N.B., SB644A VFO, HP-1144 AC supply, all $599, Kenwood TS820S, cw filter, $599, Jerry Gunsolley, 711 E. 21st, So. Sioux City, NE 68776. Ph. 402-494-4232 or 402-494-1507.

DRAKE 2NT mint condition $85, Nye squeeze paddles $15, Drake 2A/2AQ, needs work $100. K7WPC 3846 Barview Blvd, Coos Bay, OR 97420.

ALPHA/Signal/One/Collins summer sale: 76A $1425, 76PA $1695, 76CA $1825, 374A $1795, 78 $2445, 77 DX $3775. Sig/One CX-11, mint, warranty $2790. Collins KWM-380, new, sealed, late serial $2395, KWM-380, used, immaculate, #913 $2195. Payne Radio, K4ID, 615-384-2224.

ALL BAND TRAP ANTENNAS!

PRETUNED - COMPLETELY ASSEMBLED - ONLY ONE NEAT SMALL ANTENNA FOR UP TO 7 BANDS! EXCELLENT FOR CONGESTED HOUSING AREAS - APARTMENTS LIGHT - STRONG - ALMOST INVISIBLE!

FOR ALL MAKES & MODELS OF AMATEUR TRANSCEIVERS - TRANSMITTERS - GUARANTEED FOR 2000 WATTS SSB 1000 WATTS CW. INPUT FOR NOVICE AND ALL CLASS AMATEURS!

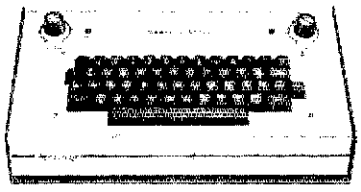
COMPLETE AS SHOWN with 90 ft. RG58U-52 ohm feedline, and PL259 connector, insulators, 30 ft. 300 lb. test dacron end supports, center connector with built in lightning arrester and static discharge - molded, sealed, weatherproof, resonant traps 1"X6"- you just switch to band desired for excellent worldwide operation - transmitting and recieving! Low SWR over all bands -Tuners usually NOT NEEDED! Can be used as inverted V's - slopers - in attics, on building tops or narrow lots. The ONLY ANTENNA YOU WILL EVER NEED FOR ALL DESIRED BANDS - WITH ANY TRANSCEIVER - NEW - EXCLUSIVE! NO BALUNS NEEDED!

80-40-20-15-10-6 meter - 2 trap --- 104 ft. with 90 ft. RG58U - connector - Model 998BUA . . . $79.95
40-20-15-10 meter --- 2 trap --- 54 ft. with 90 ft. RG58U - connector - Model 1001BUA $78.95
20-15-10 meter --- 2 trap --- 26ft. with 90 ft. RG58U - connector - Model 1007BUA $77.95

SEND FULL PRICE FOR POSTPAID INSURED. DEL. IN USA. (Canada is $5.00 extra for postage - clerical - customs etc.) or order using VISA - MASTER CHARGE - CARD - AMER. EXPRESS. Give number and ex. date. Ph 1-308-236-5333 9AM - 6PM week days. We ship in 2-3 days. ALL PRICES WILL INCREASE . . SAVE - ORDER NOW! All antennas guaranteed for 1 year. 10 day money back trial if returned in new condition! Made in USA. FREE INFO. AVAILABLE ONLY FROM

WESTERN ELECTRONICS Dept. AQ- 9 Kearney, Nebraska, 68847

AFFORDABLE CW KEYBOARD FROM $69.95



Transmits perfect Morse Code * Built-in 16 character buffer * Internal speaker and sidetone * Reed relay output eliminates keying problems * All solid state circuits and sockets for reliability * Speed range 5—45 WPM * Perfect companion to our MORSE-A-WORD CW code reader.

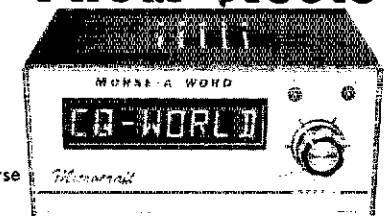
MORSE-A-KEYER KIT, model MAK-K, Complete kit of parts & manual $159.95
MORSE-A-KEYER, model MAK-F, Factory wired & tested $199.95
MORSE-A-KEYER ESSENTIAL PARTS KIT, model EPK-K. . . . . $ 69.95
(Essential parts kit for home-brewers consists of pc board, board parts and manual. You supply ASCII keyboard, cabinet, power supply & miscellaneous parts.)

Send check or money order. Use your VISA or MasterCard. Add $5.00 shipping and handling for Continental U.S. Wisconsin residents add 4% Wisconsin State Sales Tax.

Microcraft Corporation Telephone: (414) 241-8144
Post Office Box 513Q, Thiensville, Wisconsin 53092

MORSE-A-WORD FROM $139.95

Eight character moving display.
Built-in code practice oscillator.
Excellent for learning Morse Code.
Complete — no CRT or expensive extras needed.
Decodes audio CW signals from your receiver's speaker and displays letters, numbers, punctuation and special Morse characters as the code is received.

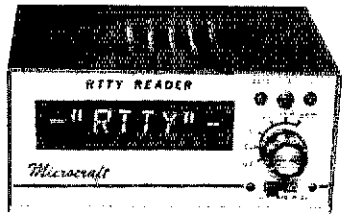


MORSE-A-WORD Kit, 4 char. readout . . . . . MAWK-4 ~~$149.95~~ $139.95
MORSE-A-WORD Kit, 8 char. readout . . . . . MAWK-8 ~~$169.95~~ $149.95
MORSE-A-WORD wired, 8 char. readout . . . . . MAWF ~~$249.95~~ $219.95

Send check or money order. Use your VISA or MasterCard. Add $5.00 shipping and handling for continental U.S. Wisconsin residents add 4% State Sales Tax.

Microcraft Corporation Telephone: (414) 241-8144
P. O. Box 513Q, Thiensville, Wisconsin 53092

RTTY READER--FROM $149.95



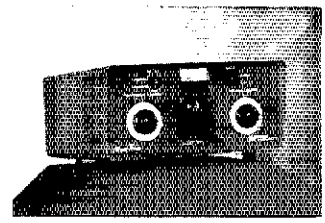
Decodes RTTY signals directly from your receiver's loudspeaker. * **Ideal** for SWLs, novices & seasoned amateurs. * **Completely** solid state and self-contained. Compact size fits almost anywhere. No CRT or demodulator required . . . Nothing extra to buy! * **Built-in** active mark & space filters with tuning LEDs for 170, 425 & 850 Hz FSK. * **Copies** 60, 67, 75, & 100 WPM Baudot & 100 WPM ASCII. * **NOW** you can tune in RTTY signals from amateurs, news sources & weather bulletins. The RTTY READER converts RTTY signals into alphanumeric symbols on an eight-character moving LED readout. Write for details or order factory direct.

RTTY READER KIT, model RRK . . . . . ~~$169.95~~ $149.95
RTTY READER wired and tested, model RRF . . . . . ~~$249.95~~ $219.95

Send check or money order. Use your VISA or MasterCard. Add $5.00 shipping and handling for continental U.S. Wisconsin residents add 4% Wisconsin State Sales Tax.

Microcraft Corporation Telephone: (414) 241-8144
Post Office Box 513Q, Thiensville, Wisconsin 53092

MAXI TUNER
SOLVES ANTENNA PROBLEMS



THE FINEST ANTENNA TUNER AVAILABLE

Coax, Random Wire and Balanced Antennas

- Presents 50-75 Ohm Resistive Load to Your Transmitter Using Virtually Any Antenna System (Balun Optional. . . . $19.95)
- Continuous 1.7 - 3.0 MHz Coverage
- Rotary Inductor (28 μH)
- Rugged Cast Aluminum Turns Counter
- Handles 3 KW PEP 2 kW with Balun
- Velvet-Smooth 6 to 1 Vernier Tuning
- 0 - 100 Logging Scale on 500 pF Capacitors

continental **FREE SHIPMENT** U.S.
Maxi without SWR — $259.95
Maxi with SWR — $299.95
Wisconsin residents add 4% Sales Tax

FOR COLOR BROCHURE
OPERATING HINTS
CALL OR WRITE

RF POWER COMPONENTS
1249 GARFIELD ST.
NIAGARA, WIS. 54151
(715) 251-4118

RADIO WAREHOUSE

IC-2AT
$245.00

IC-22U
$289.00

IC-730
$747.00

IC-720/PS-15
$1349.00

AVAILABLE NOW

TR-7850	$399.00
TS-530S	$779.00

Shipping not included
Prices shown, cash with order

P.O. BOX 2728
DALLAS, TX 75221
Telephone: (817) 496-9000

WANTED: BC-375 surplus xmtr. W1ZHW, 6 Hawthorne St., Acton, MA 01720.

COMPUTER: S-100 mainframe and power supply will sell separately. Mainframe Vector 8803 with eleven sockets, chassis, panel and cabinet. Power supply +8Vdc @ 24A, +16Vdc @ 4A, -16V dc @ 4A, plus all power requirements to support four disk drives, includes separate cabinet. Also 8K Godbout static memory board and MFIO with 8080 monitor (IMSAI MPU compatable) W4MRJ, 404-252-3779.

SELL Yaesu FT 480R $440, Mirage B1016 and dc supply $340. Like new. KB5MR, 918-299-9645.

DISCOUNT Callbook outlet. 1981 U.S. $16.50 DX $15.50 both $31. K4CLA.

KLM 144-150-16C antenna, never installed, $75. W7LJI, 503-686-8879.

WANTED: Drake FS-4 synthesizer. Rick Roderick, Rte. 2, Box 178-E, Russellville, AR 72801. Ph. 501-968-7373.

QSTs before 1924 — s.a.s.e 1925-1929 $3., 1930-1939 $2. 1940-1955 $1. Special deal on 1922-1960, make offer W3ZD 215-675-4539.

SELLING OUT Hallicrafters equipment. SR-150, SR-160, HT-44, SX-117, two PS150-120AC p/s, D-104 mike, Turner hand mike, modified HP-23 AC p/s. SR-150 recently reconditioned. $1,000 takes all. Lot sale only. H.E. McKnight, Sherwood Gardens Apt. 66, Vicksburg, MS 39180.

SELL: Kenwood-Trio TS120V and PS20 power supply, new condition, cartons, cables and manual — $395. W2NZG 201-427-3893.

RTTY. Two machines — 28ASR and 28RO. Beautifully reconditioned, new wiring, cabinets repainted, must be seen to be appreciated. Will sell separately, local pick-up only. Also, sell Autek QF1A filter, want nice WRL-755 VFO. W4MRJ 404-252-3779.

THE VHF shop — super deals on KLM, Lunar, Microwave modules, Tama etc. Call (Weekdays after 2200Z, Weekends anytime) or write K3MKZ Box 349, RD4 Mountaintop, PA 18707 717-868-6565 MC/VISA.

SWAN 508 external VFO $110. Paul, KB8VM, 919-867-5415.

YAESU FT-707 with 600 Hz cw filter FP-707 speaker ac supply. Both perfect condition original cartons 10 hour use. Best offer over $825 or first $875. FT-227R like new original carton best offer over $200 or first $230. W2KK 2201 Duvall, Woodbine MD 21797. 301-854-6014.

ICOM 701 with p/s. Mint. $775. Young, 4620 SW 89th Avenue, Miami, FL 33165. 305-223-9789.

BARGAIN DXCC rig. Mint 100W, 5-band, digital Yaesu FT-301 D transceiver, matching P.S., etc. $595 (flexible). Want grid dipper. N7ACB, 208-788-4540

YAESU FT-7B for sale still in box with all materials and warranty card. Must sell. $480 or best offer to Keith, W4HEN, Box 2644, Cleveland Station, FL 33517.

COLLEGE EXPENSES must sell!!! Collins 62S-1, $650. Collins 51S-1, $900. Both excellent condition. WA9WBV, Tom Rogers, P. O. box 255, Dekalb, IL 60115, 815-756-7765.

YAESU FTV-250 2 meter transverter for FT-101 and FT-901 series $170, George WB1FXI, 413-739-8247 evenings.

DRAKE C-line T4XC, R4C, AC4, MS4, crystals, filter. Excellent. $875. WB3DIP, 412-537-7693.

HAM-AD-FEST™ every month. Ham buy, sell, trade, want ads. 12 issues, $3. 24 issues $5. WA4OSR's Rigs & Stuff™ Dept. Q9B, Box 973, Mobile, AL 36601.

HEATH HW2036A 2-meter synthesized xcvr, HD1984 Micoder, HW2036-3 ps. excellent $240. W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

TRI-BAND YAGI TET 3F37DX 7 element used 1 yr. $125. 115V primary KW + transformer 4720Vct 95 lbs. $50 pick up. 312-246-7423 KA9JKQ.

HEATH SB101 with HP-23A $325. W8MGI Days: 614-223-7338.

SELL SB401/301, crystal pack, filters (3), 850/170 FSK, full QSK/TRCV, electronic TR/sw, keyer w/paddle, antenna (11) switch, speaker, compreamp, all cables, extra tubes, full documentation, manuals. $475. W1ZPB, Northfield, MA 01360. 413-498-2729.

MUST SELL: HW-101, pwer supply, cw-filter, going to college, good condition $300 or B.O. Andy Wirth 23 Dawning, Ossining, NY 10562 914-941-6392.

DRAKE 2-C receiver, 2-NT transmitter, 2-CQ speaker and Hallicrafters HA-5 VFO. Great condition, $265. Call 207-548-6344, or write, Doug Hoeschle P.O.B. 202 Searsport, ME 04974.

FT401B-$390, TS820S w/VFO 820 — $850, SB200 $345, TH2MK3 $75. KØHRF, 402-391-0784.

YAESU FRG-7 general coverage receiver like new perfect $200. W6WY 1-661-4189.

HAMMARLUND HXL-1 1.5kW linear $350. Globe HG-303 60W cw transmitter $50. EICO 888 engine analyser $35. All mint. W2BCM 212-380-5851.

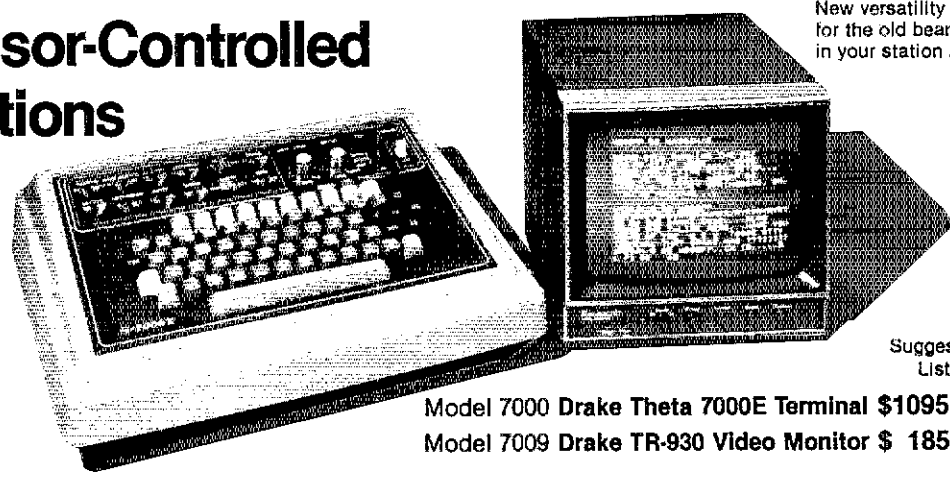
FREE AD with subscription (20 words free, extras $.10 each)! Ham buy, sell, trade, want ads. 12 issues, $3., 24 issues $5. WA4OSR's Rigs & Stuff™, Dept. Q9A, Box 973, Mobile, AL 36601.

TOWER. Universal aluminum section. 13-STR, $50, W8MGI. Days: 614-223-7338.

INTERESTED in satellite communications? Contact ARRL Hq. for information about the OSCAR program.

DRAKE® Theta 7000E Microprocessor-Controlled Communications Terminal

New versatility for the old bear in your station . . .



The perfect addition to any amateur radio installation! Complete, automatic send/receive of Morse code (cw) Baudot code (RTTY) and ASCII code (RTTY). Works with any video monitor.

Suggested List:

Model 7000 Drake Theta 7000E Terminal $1095.00

Model 7009 Drake TR-930 Video Monitor $ 185.00

7-Channel Battery Back-Up Memory, the Theta 7000E has seven keyboard-selectable, non-volatile, random access memory channels each of which can hold 64 characters. Data in these memories is alterable at any time and is retained when power is removed. Messages in these memory channels can be repeated 1 to 9 times via keyboard command. All channels may be daisy-chained for continuous read-out. Channel number in use is indicated on display.

Wide Range of Transmitting and Receiving Speeds, 5 to 50 wpm in Cw with autotrack on receive. Standard RTTY speeds of 60, 67, 75, and 100 wpm Baudot code and 110, 150, 200, and 300 Baud ASCII code.

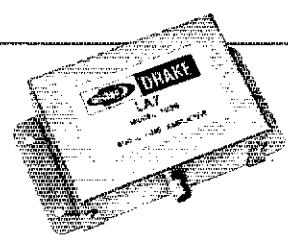
Self Contained Demodulator, three-step shift selects either 170 Hz, 425 Hz or 850 Hz shift with manual fine tune control of space channel for odd shifts. High/low tone pair select. Mark only or space only copy capability for selective fading.

CONVENIENT KEYBOARD FEATURES, automatic keyboard-operated transmit, (KOX) or manual keyboard transmit. **Unshift on space,** reverts to LETTERS case after reception of each space character in Baudot code. **CR/LF is automatically inserted** every 60, 72 or 80 characters while transmitting. **Cw identification,** in RTTY mode. **Echo function,** prerecorded cassette tapes can be read and transmitted. **Test messages,** "RY" and "QBF". **Transmit word mode,** characters can be transmitted in word groupings.

Crystal Controlled AFSK Modulator:

High Tone Pairs	Shift	170 Hz	425 Hz	850 Hz
	Mark	2125	2125	2125
	Space	2295	2550	2975
Low Tone Pairs	Shift	170 Hz	425 Hz	850 Hz
	Mark	1275	1275	1275
	Space	1445	1700	2125

• **Printer Interface for Hard Copy,** all modes for parallel ASCII printers. Loop keyer for conventional teleprinters. • **Composite Video Output,** for any standard video monitor. •**Kansas City Standard AFSK Output,** KCS tone pair for ASCII. • **Large Capacity Display Memory,** two page display memory contains 32 X 16 lines per page. • **Split-Screen,** with a keyboard command, the display can be divided in two; the upper half for transmit and the lower half for receive. Messages can be composed while receiving. • **Buffer Memory,** 53 character type-ahead keyboard buffer. • **Word Wrap-Around,** in receive mode, word wrap-around prevents the last word on a line from becoming split in two. Moves whole word to next line. • **Automatic Letters Code Insertion,** if desired, LETTERS (dlddle) code can be transmitted continuously in a pause of transmitting from the keyboard. • **Audio Monitor,** a built-in audio monitor circuit with automatic transmit/receive switching enables checking of the transmit/receive tones. • **Transmitter Keying Circuitry,** keys either grid block, cathode keyed, or solid-state transmitters. • **Power Requirement,** The Theta 7000E requires only 13.6 Vdc @ 1 amp. Plugs into 13.6 Vdc accessory jack on PS7 or PS75 power supplies. • **Effective Packaging for RFI Protection,** well designed metal cabinet and protective circuits prevent RFI. • **Terminal Size:** 15.8"W x 11.8"D x 4.7"H (40 x 30 x 12 cm) • **Weight:** 11 lbs (5 kg) • **Monitor Size:** 8.7"W x 9.8"D x 8.9"H (22.1 x 24.1 x 22.6 cm) • **Weight:** 11 lbs (5 kg)



Model 1230 **LA7 Line Amplifier** **$49.95** Suggested List

Line output, input levels as low as 15 mV rms (47 kilohm) will result in an output of 1 mW nominal into a 600 ohm balanced line. Output level adjustable by internal pre-set level control. Interfaces low level audio to RTTY terminal unit or phone line that requires a 600 ohm balanced/unbalanced input. One 36" phono to phono cable supplied. • **Size:** 4.5"L x 1.3"H x 2.5"W (11.4 x 3.3 x 6.4 cm). **Weight:** .3 lbs. (.14 kg).

R.L. DRAKE COMPANY DRAKE®

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

ARRL CODE KIT

Boost Your Code Speed From 5 to 13 wpm Quickly, Easily, Enjoyably

For the Novice or Technician Radio Amateur Going for the General or Advanced License

●

HERE'S WHAT YOU GET

Two Hours of Random Code Groups on Quality Tape Cassettes – Practice at 5, 7½, 10 and 13 Words per Minute

PLUS

Complete, Lively, Fully Illustrated Guide to the Code With Proven Study Tips

$8.00

Start studying for that General Class Exam today! Two top-quality 60-minute cassettes with one-half hour of random code characters at 5, 7½, 10 and 13 wpm insure that you will improve your code speed quickly and correctly. The step-by-step progression is the ideal way to work up to 13 wpm. The book provided in this package is packed with proven suggestions and hints for increasing your ability to "copy". Only $8 at your dealer or from ARRL.

THE AMERICAN RADIO RELAY LEAGUE

225 MAIN ST.

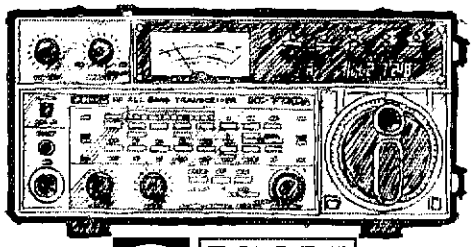
NEWINGTON, CONN. 06111

AGL Electronics

YOUR FULL SERVICE DEALER

The Price Is Right,
The Class Is Extra . . .

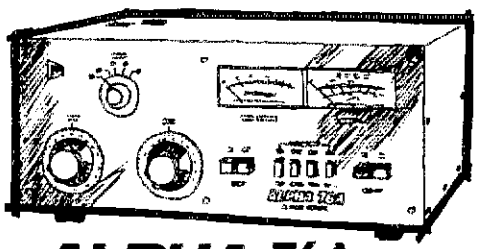
AGL Electronics deals only in Ham equipment of the highest quality at the best prices available, and the service and attention are Extra Class. Our entire staff holds Extra Class Amateur licenses, and they've all been dealing in Ham equipment for years.



ICOM

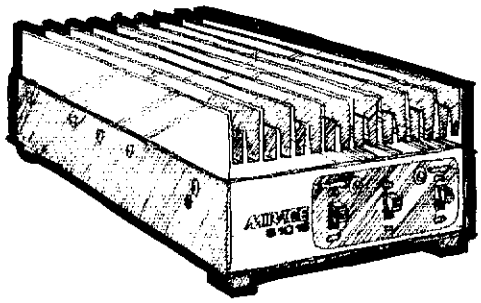
IC-720A

ICOM's big-feature HF transceiver that synthesizes all modes and all bands. Two VFO's built-in. Simplex, duplex and RIT.



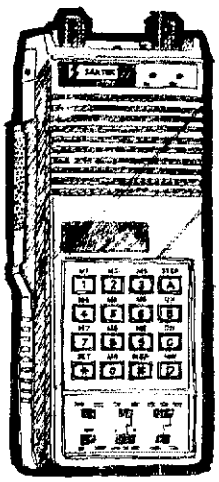
ALPHA 76A

The high frequency linear amplifier with true continuous duty. 2 + KW PEP, 1 KW Locked-key. 15 through 160 meters. "Powerhouse."



MIRAGE B1016

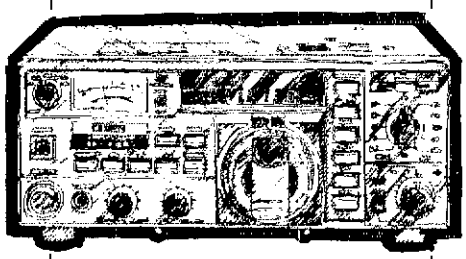
2 meter amplifier, 10 in — 160 out! With a 5 year limited warranty. Also call us for other Mirage products.



SANTEC

HT-1200

4W power, 4-modes scanning, Keyboard input with 10 memories



ICOM

IC-730

Full feature HF transceiver, 200W PEP input, Dual VFO standard

TELREX ANTENNAS

20M546	call for price
20M646	call for price
TB6EM	call for price
TB4EC	call for price
40M346	call for price
40M329	call for price
20M436	call for price
20M536	call for price
15M532	call for price
10M523	call for price
10M636	call for price

CUSHCRAFT

32-19	$74.00
214B	$58.00
ARX-2B	$38.00

TEN-TEC

525 Argosy	$ 471.00
546 Omni "C"	$1085.00
280 Standard P.S.	$ 156.00
255 Deluxe P.S. with speaker	$ 170.98

HY-GAIN ANTENNAS

TH5DXX	$201.00
TH3 MK II	$178.00
105BA	$ 98.00
155BA	$150.00
205BA	$237.00

—CALL FOR OTHERS—

ROTORS

HyGain HDR300, 25 sq ft	$395.00
CDE Ham IV, 15 sq ft	$167.00
CDE T2X, 30 sq ft	$231.00

ROHN TOWER

25G	$ 38.50	45G	$87.60
FK-2548	$ 691.00	48 ft Foldover	
FK-4554	$1079.00	48 ft Foldover	
FK-4564	$1169.00	68 ft Foldover	
HDBX-48	$ 305.00	Self-Supporting 48 ft	
HBX-56	$ 335.00	Self-Supporting 56 ft	

HY-GAIN CRANK-UP TOWERS

HG-52SS . . . . . $ 777.50
52 ft. self supporting, 9 sq. ft. at 80 mph.
Nested height: 20½ ft.

HG-50MT2 . . . . . $ 669.00
50 ft. side supported, 6 sq. ft. at 80 mph
Nested height: 20½ ft

HG-54HD $1513.00
54 ft. self supporting, 16 sq. ft. at 60 mph.
Nested height: 21 ft

HG-70HD $2187.00
70 ft. self supporting, 16 sq. ft. at 80 mph.
Nested height: 23 ft.

All towers require prepayment by cashier's check or money order. Orders for antennas and rotators will receive a **2.5% Discount** if order is accompanied by cashier's check or money order.

Free freight on Rohn Tower orders of over $1,900.00. Freight paid on foldover towers. All others F.O.B. Dallas. 10% higher west of the Rockies, unless shipped from Dallas; slightly higher if drop-shipped.

Prices subject to change without notice.

Technicians seeking employment in the Sun Belt, send resume to K5FUV, 705 North Bowser, #106, Richardson, Texas 75081.

For quick shipment, call today: 800-527-3418

Store Hours Monday through Friday: Eastern 10-7, Central 9-6, Mountain 8-5, Pacific 7-4

Send All Mail Orders to: 705 N. Bowser, #106, Richardson, Texas 75081

Retail Store: 13929 N. Central Expressway, Suite 419, Dallas, Texas 75243, (214) 699-1081

AGL Electronics

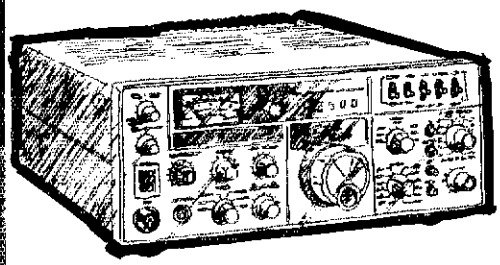
YOUR FULL SERVICE DEALER

YAESU

It takes a Tough Radio to make it at N5AU!*

We know what the YAESU FT-107M can do . . . we put it to the contest.

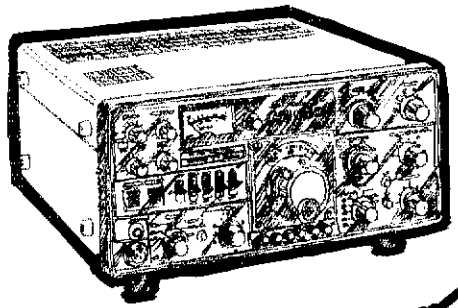
VP5RFS 10,000 QSO's in one week by KC5EA and (shown) N5AU



FT-107M

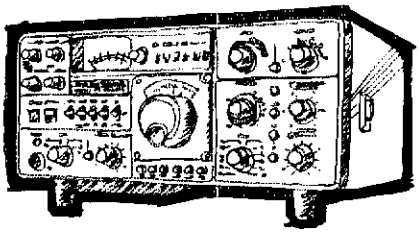
K5ZD operating N5AU to 1,600 QSO's on 10 meters during ARRL DX contest

OTHER FINE YAESU PRODUCTS AVAILABLE FROM AGL:



FT-101ZD MARK III

FT-707



FT-902DM

Today's demanding Amateur deserves nothing less than the top-quality, proven-performance of YAESU. And AGL Electronics is proud to be one of America's leading suppliers of YAESU products.

We know what YAESU can do for you, because we know what YAESU does for us. Speed, ease of operation, and high quality performance under varying conditions make YAESU the Contester's Choice.

Call us today for any unit in the entire YAESU line of transceivers and accessories. Our deliveries are almost as fast as our YAESU QSO's.

*N5AU, a Multi-Multi Contest Station, is one of the largest Amateur Radio stations in the world, with 24 towers installed. Needless to say, strong signals in the area require a good receiver front-end. The **FT-107M** passed the test with flying colors.

For quick shipment, call today: 800-527-3418

Store Hours Monday through Friday: Eastern 10-7, Central 9-6, Mountain 8-5, Pacific 7-4

Send All Mail Orders to: 705 N. Bowser, #106, Richardson, Texas 75081

Retail Store: 13929 N. Central Expressway, Suite 419, Dallas, Texas 75243, (214) 699-1081

SELL: Ten-Tec 540; FSK, filter/SW, manual: immaculate. $485. Also DX100 w/QSK/FSK, manual. $70. W1ZPB, Northfield, MA 01360. 413-498-2729.

COMPLETE C-LINE station. Mint. R4C #28532, T4XC #29354, AC4, MS4, all 3 cw filters, 6 extra crystals including 160, all of 10 and WWV. Original cartons, manuals. Dentron MT 3000A tuner. Rohn 45G 58' tower, Mosley TA-36, CDE totor, HK5A keyer and paddle, Shure 444 mike, Instructograph w/tapes. My cost over $2800. Sacrifice $1595. Ben KAØBGL 612-483-8860.

WANTED: Rectifier Unit, Navy Model TCK-4 or TCK-6, Type CG-20219. Must be in original factory condition throughout, and not "weathered." Also want parts and/or assemblies for Navy Model TCK series (basic through –7) transmitters, in original undamaged condition. Navy Spare Parts boxes with complete contents preferred. Will consider entire units. Please write Bill Cronan III, N6SE, 9056 Willowgrove Ave., Santee CA 92071.

MUST SACRIFICE: complete Ten-Tec 544 station; Kenwood 2M-FM TR-7400A with supply; Heath handheld VF-2031, loaded. Write for specifics: All mint: Dennis Jaques, WD8OUO, 235 Hull St., Coldwater, MI 49036.

KENWOOD 599A xmtr, rcvr. Excellent $525. Lowry, Brown's Lane Old Lyme, CT 06371.

FOR SALE: Heath tube checker $150., transister checker $60. VTVM IM 5228 $75. Digital IC tester $75., Freq. counter $150. WA2TTV Richardson Phone 716-372-1549.

SUPERBOARD II RTTY program. $65. Free details. Bob Pearson. 99-060 Lohea, Aiea, Hawaii, 96701.

DANGER: Klein 890-18 chain hook assemblies sold recently have been recalled for possible defect in roll pin. Return for replacement. Avatar Co. Ron Williams, W9JVF. 1147 N. Emerson, Indianapolis, IN 46219.

BUY-SELL-TRADE. Send $1 for catalog. Give name address and call letters. Complete stock of major brands new and reconditioned Amateur Radio equipment. Call for best deals. We buy Collins, Drake, Swan etc. Associated Radio Communications 8012 Conser, Overland Park, KS 66204 913-381-5900.

QUALITY Stainless threaded, washer, hardware fasteners! For antennas, boating, other hobbies! Bolts, screws, nuts, washers, specialties! Ceramic insulators! Lists 25c! Walt-W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

FOR SALE: Heath SB301/401 combination $350., SB610 Monitor scope $110, SB650 Digital Dial, $110. SBE 34 ssb xciever, $195. OI 1154, Digital Aircraft clock, $100. All manuals, cables, etc. Call Paul, WA8ZLJ/6 408-365-5723 or write 111 Division St., #19, King City, CA 93930.

KENWOOD TS-520 with speaker and cw filter, 117V/12V DC supply built in, Microphone, manual, and original boxes, excellent condition $475. Kenwood Phone Patch, 6 mo. old $45. N5BRG, Bob Stricklin, 2262 Woodcreek, Carrollton, TX 75006 214-242-9488.

ICOM 251A, all mode 2m xcvr. Mint $575. Jim, AC4H, 817-488-9487.

YAESU FT101ZD with SP901P and 500 Hz cw filter. Mint $675. Azden PCS 2000 TTP $200. Jim Robertson KC4LS, 404-869-7537 Georgia after 6 P.M.

SALE/TRADE: rx, HQ-170, HA800B: tx, DX-60, 723; VFO, 722, HG-10B; xcvr, HW-16, HW-8. Wanted: ssb xcvr. KA1EXB 203-426-3910.

WANTED: 405X crystal oscillator for Swan 500. Prentice, 3419 Chetwood, Timonium, MD 21093 301-252-6287.

FOR SALE: Kenwood TS120S $495; Kenwood TS180S, w/DFC/Dual ssb filters, $725; Hammurlund HQ-170AC-VHF, 160m-2m, clock, $135; MFJ-752 ssb/cw Superfilter, $60; Heathkit Q-Multiplier, $15; Motorola VHFm Walkietalkie #H13-1AL, $25; TCS-12 receiver, $18. WA7ZYQ, 208-245-2070.

PROGRAMS for TRS80LII 16K, $100 new, will ship for $35, send for list. John Bayne, 3912 Rugen, Glenview, IL 60025.

WANTED Drake FS-4, Hallicrafter 9TO keyer, WA5JUL, P.O. Box 7321, Pasadena, TX 77504 713-671-5712-Day.

FOR SALE: Swan TV-2 $125., Drake 2NT $75. Both mint. Johnson 275 watt Matchbox with SWR meter $75. fair condition. Call Jerry, WB2KZX, 212-278-0897.

TYPEWRITER KEYER two 100 word memories, $150. AR22 rotator and controller, $45. WA6IGU 805-498-7251.

FOR SALE: TS-820S, mint, dc supply, Kenwood mic., $750. WA5JUL P.O. Box 7321 Pasadena, TX 77504 713-671-5712 day.

COMPLETE KW station Hallicrafters HT-37, SX 111 Heath Warrior amp 3-element tri-bander 30' tower rotor, all cables $650 or separate pick up K.C., MO KØPKS 816-452-7108.

KDK IS Back! Featuring the all new FM-2025A Mark II. Only $339 shipping prepaid for the most fantastic rig yet made! Azden PCS-3000 also available for immediate shipment at fantastic prices. LCC Engineering, 116 Country Farms Road, Box 140, Marlton NJ 08053. 609-983-8844 6 P.M. till midnight.

A-2516 RECEIVER like new. 80-11 m. ssb/cw. Best offer. Patrick Matthews, White Oak, SC, 29176.

DRAKE TR7, P.S., 300 & 500 kHz cw filters, external spkr, dust covers. Low use, mint condx. $1200 firm. Will pay shipping. Call 319-263-4641 after 6 P.M. KAØADF.

HAVING a technical problem? Get in touch with the League's technical department at Hq. for help. Be sure to include your membership expiration date and an s.a.s.e. with your question.

ARRL Publications/Supply Order

☐ THE RADIO AMATEUR'S HANDBOOK The standard manual of Amateur Radio Communications.

SOFT COVER	CLOTHBOUND
$10.00 U.S.	$15.75
$11.00 Canada	$18.00
$12.50 elsewhere	$18.00

☐ TUNE IN THE WORLD WITH HAM RADIO All the beginner needs to know to obtain the Novice license. Package includes text and code practice cassette. $8.50

☐ ARRL ANTENNA ANTHOLOGY The best from QST. $4.00 US, $4.50 Elsewhere

☐ ARRL ANTENNA BOOK Contains theory and construction of all types of antennas. $5.00 US, $5.50 Elsewhere

☐ BASIC BOOK OF HAM RADIO An overview of the radio amateur's world in layman's terms. $4.95

☐ ARRL CODE KIT Two 60 min. cassettes and booklet to get you from 5 to 13 wpm quickly! $8.00

☐ A COURSE IN RADIO FUNDAMENTALS Classroom text and home study guide. $4.00 US, $4.50 Elsewhere

☐ ARRL ELECTRONICS DATA BOOK reference guide of charts, tables, & circuits. $4.00 US, $4.50 Elsewhere

☐ FM AND REPEATERS FOR THE RADIO AMATEUR Complete manual of fm and repeater operation and equipment design. $5.00 US, $5.50 Elsewhere

☐ HINTS AND KINKS Contains over three hundred practical ideas for your hamshack. $4.00 US, $4.50 Elsewhere

☐ SOLID STATE DESIGN FOR THE RADIO AMATEUR Practical circuits and theory. $7.00 US, $8.00 Elsewhere

☐ UNDERSTANDING AMATEUR RADIO Written for the beginner. Contains theory and how-to-build-it info. $5.00 US, $5.50 Elsewhere

☐ WEEKEND PROJECTS FOR THE RADIO AMATEUR Easy to build projects from QST. Vol. 1 $3.00 US, $3.50 Elsewhere

☐ OSCARLOCATOR PACKAGE - locators for Oscars 7 and 8, tips on using ham satellites, full color $7.00 U.S. $8.00 elsewhere

☐ ARRL OPERATING MANUAL Definitive source of good operating practices applied to over a dozen most popular Amateur Radio activities. $5.00 US, $5.50 Elsewhere

Q&A BOOKS Give sample questions and answer to FCC amateur exams.

☐ NOVICE $2.00 US, $2.50 Elsewhere

☐ TECH. & GENERAL $2.50 US, $3.00 Elsewhere

☐ ADV. & EXTRA $3.00 US, $3.50 Elsewhere

☐ RADIO FREQUENCY INTERFERENCE Solutions to a real problem that faces every radio amateur. $3.00 US, $3.50 Elsewhere

☐ REPEATER DIRECTORY 1981-82 edition. listing of U.S. and Canadian repeaters $1.00 US, $1.50 Elsewhere

☐ SINGLE SIDEBAND FOR THE RADIO AMATEUR A compilation of the best s.s.b. articles from QST. $4.00 US, $4.50 Elsewhere

☐ SOLID STATE BASICS Designed to clear away all the mystery that surrounds, semiconductor devices. $5.00 US, $5.50 Elsewhere

RSGB PUBLICATIONS

☐ VHF-UHF MANUAL $17.50
☐ AMATEUR RADIO TECHNIQUES $12.50
☐ TEST EQUIPMENT for the RADIO AMATEUR $11.00
☐ OPERATING MANUAL $10.00

RSGB RADIO COMMUNICATIONS HANDBOOKS

☐ Volume 1 $20.00
☐ Volume 2 $18.50
☐ Both Volumes $35.00

THE ARRL FLAG

☐ 2'x3' cloth flag $15.00
☐ 3'x5' cloth flag $21.00
☐ Pin $2.50
☐ License Plate $5.00
☐ Cloth Patch $5.00

BINDERS

☐ 6½ x 9½ (US and Canada only) $6.00
☐ 8½ x 11 (US and Canada only) $7.00

☐ L/C/F CALCULATOR Slide-rule ty for problems on inductance, capacitance and frequency $3.

DECALS

☐ Amateur Radio Emergency Service 2/$0.
☐ Amateur Radio Emergency Service 5/$1.
☐ Member or Life Member, each 2/$0.

CLOTH PATCHES (washable)

☐ Amateur Radio Emergency Service 3½ inch diameter $2.
☐ 3" League Diamond $1.
☐ 5" League Diamond $2.
☐ Life Membership chevron for 3" League Diamond Patch $1.
☐ Life Membership chevron for 5" League Diamond Patch $1.
☐ Rubber Stamp $2.

MEMBERSHIP PINS

☐ Membership $2.
☐ League Official _____ $2.
Title
☐ Replacement for Life Members $2.
☐ LIFE MEMBERSHIP PLAQUE (for replacement-allow 8 wks. delivery) $25.

LOG BOOKS

☐ 8½ x 11 Spiral $1.75 US $2.50 Elsewhere
☐ Mini Log 4 x 6 $1.00 US $1.50 Elsewhere
☐ 3-hole Loose Leaf 96 8½ x 11 sheets $3.

MAPS

☐ US Call Area: Full color showing call areas, ARRL division/section boundaries and time zones $3.
☐ World Map, 1980 edition Great Circle map with country prefix list, ITU region boundaries, time zones and much more $4.5

☐ MESSAGE DELIVERY CARDS 10 for $0.3
☐ RADIOGRAM PADS 70 sheets $0.7

SMITH CHARTS®

☐ Standard (set of 5 sheets) $1.0
☐ Expanded (set of 5 sheets) $1.0
☐ ANTENNA PATTERN WORKSHEETS 100 8½x11 sheets $3.0
☐ MEMBER'S STATIONERY 100 8½ x 11 sheets $3.0

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE ALLOW 3-4 WEEKS FOR DELIVERY.

PAYMENT MUST BE IN U.S. FUNDS

Ship postpaid to:

NAME _____ CALL _____

STREET _____

CITY _____ STATE/PROV. _____ ZIP/PC _____

Total Enclosed (or charge to MC, VISA or Chargex) $ _____

VISA or Chargex No. _____ Expires _____

Mastercard _____ Expires _____

Bank No. _____

Have you fully completed your order form? Is your check signed or charge number indicated?

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN ST., NEWINGTON, CT 06111

CLEANING HOUSE! Johnson Thunderbolt 2kW PEP continuous tuning 10 through 80, extra transformer, some tubes. Runs class AB, B, C. Excellent $550. Triton IV, remote VFO, cw filter, NB, mike. Excellent $495. Icom 211, mint $425. Icom 115, 13 pr xtals, charger but no batteries. Mint $125. Johnson kW Matchbox with SWR $135. Meter may need work. Drake 2B with Q-mult $175. HP audio generator model 200C $125. All above shipped prepaid. Free Johnson Pacemaker, excellent, pick-up only. K5GC George Challenger, 1323 Escalante Street, Santa Fe, NM 87501. 505-983-7993, or 505-988-3664.

SELL: Hallicrafters SX-101 rcvr, HT32A xmtr, excellent, $250 30 ft Rohn 25G, AR-22 rotor, $100, Les, K2PV 516-921-5052.

MIDLAND 13-510 synthesized 25W mint manual original carton TT mike $235 ship UPS PP W4RGF Greenville NC 919-758-5529.

YAESU FT-101, FV-101, YO-100 scope, SP-101P Landliner, Digital Display DD-1, UD-844 mike, audio compressor. All mint $775. Yaesu FTDX-560 with fan, audio compressor. $350. John de Celis, K3DVS, Haddonfield, NJ 800-523-2959. 9 A.M. to 4 P.M.

RTTY Microlog AKB-1 keyboard keyboard (cw RTTY); AVR-1 demodulator — VM-12 monitor mint condition, $650. N4QT 205-834-1197.

SELL: Excellent Hallicrafters model HT-20, CW & AM, 1.7 - 31 MHz continuous coverage transmitter. Ideal for cw on MARS. With Operating and Servicing Instructions manual. Best offer plus freight and insurance. W8CFT, 517-332-5766.

KENWOOD TS-180S, all filters, speaker, supply $775. Yaesu FT 901 DM late model $850. All mint in original cartons. KØYST 507-359-2901 days, 507-354-8924 nights, weekends.

SELLING: Heathkit SB-200, $300; HW-100 HP-23A, $350; HW-2036, Micoder, $225; National NCX-500, $275; NCX-3, $175; Johnson kW Matchbox, $160; EICO scope 460, $90; WB2JDC, P. O. Box 425, Whitestone NY, 11357 212-423-4483.

HEATHKIT HW101, PS23, HS1661, cw filter $350. H9 video terminal $285. Yaesu FT 227R $225. All mint, original cartons, with Covercraft covers. Tektronix 514 oscilloscope, excellent condition, $125. George Zdasiuk, VE3EWM/W6, 814 Jordan Ave., Los Altos, CA 94022, 415-941-7322.

TUBES for your amateur gear. All good condition in original cartons. Many types to choose from. Save 50% or more! For a listing rush a s.a.s.e. to: Jim Sanderson, 3017 SE Tolman St., Portland OR 97202.

Jobs for Hams

ENGINEERS, Technicians: Permanent employment. Carl Steavenson, K6WZ. 13638 Sproule, Sylmar, CA 91342.

ADVERTISING DEPARTMENT STAFF

Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Jean Marhefka, Advertising Assistant

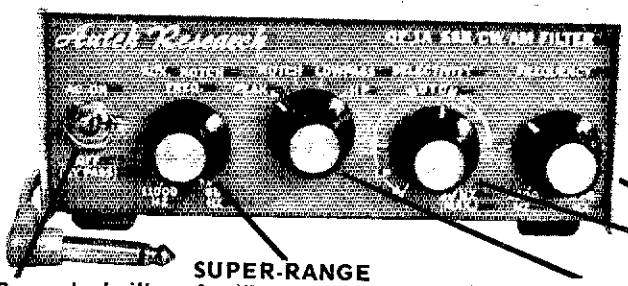
203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

Index of Advertisers

Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES



Add an Autek.

QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $65 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE 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, all modes.)

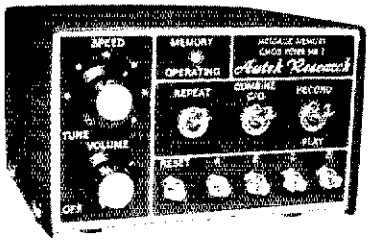
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST.**) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 4½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS

- ☐ QF-1A Filter at $65.00
- ☐ MK-1 Keyer at $99.50
- ☐ ME-1 Expander for MK-1 at $40 (factory installed)
- ☐ ME-1 Owner installed at $30 (save $10)

Add 4% tax in Fla. Add $3 each to Canada, Hawaii and Alaska. $2 for UPS air. Add $15 each elsewhere (shipped air).

Enclosed is $_____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Send to Autek Research, Box 302E, ODESSA FL 33556

PRICING: Autek is an innovator, so we're heavily copied. Yet, the "copies" cost you much more. We also give you a free AC supply and pay US shipping. How do we do it? Volume. And because WE SELL ONLY FACTORY DIRECT. No 25% to 50% middlemen markups.

DELIVERY: For 9 years we've shipped over 95% of orders from stock. Some companies have regular long delays. Not us. Order with confidence.

REPUTATION: Don't take our word. Ask on the air for a personal recommendation.

DIRECT MAIL: Your order or request for information will be processed just as fast and with fewer chances for error if you write. PLEASE ORDER BY MAIL. We're best set up for mail. However, if you need to call, our number is (813) 920-4349.

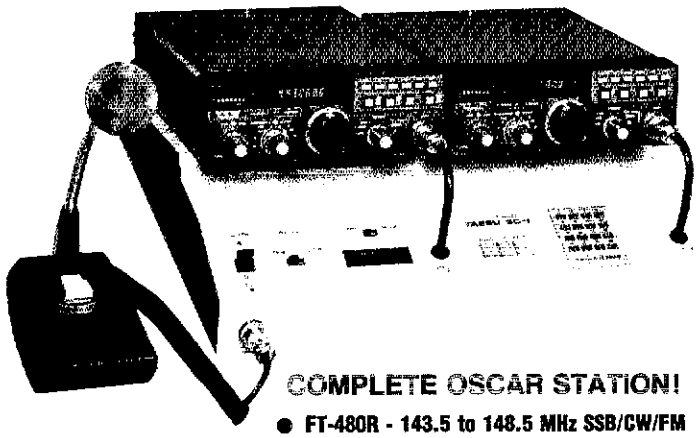
Autek Research

Box 302E
ODESSA, FL
33556

By Popular Demand . . .

Yaesu's All-New VHF/UHF Transceivers!

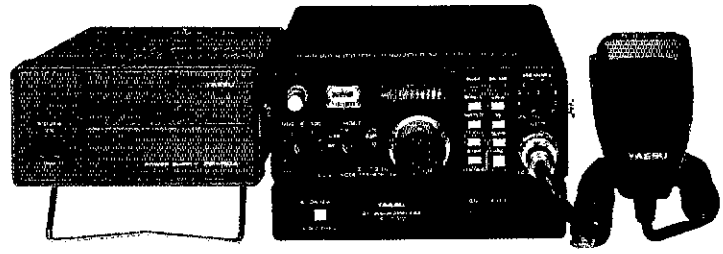
Yaesu is proud to introduce a new generation of computerized VHF and UHF equipment. With the features you have asked for and the quality you demand, these revolutionary transceivers are your passport to the newest frontiers in Amateur Radio!



COMPLETE OSCAR STATION!

- **FT-480R - 143.5 to 148.5 MHz SSB/CW/FM**
- **FT-780R - 430-440 MHz SSB/CW/FM**
- **SC-1 Station Console w/Digital Clock**

A complete microprocessor-based communication system with convenient switching of scanning and microphone controls, AC power supply, and 16 button tone pad.



FT-290R 2M MULTIMODE PORTABLE!

- **Battery Powered (NiCd C-Cells Optional)**
- **LCD Display with Night Light**
- **USB/LSB/CW/FM with 2.5W RF Output**

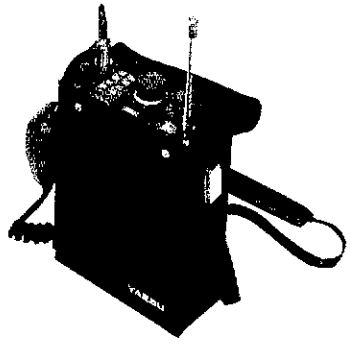
An entirely new concept in VHF operating! LCD display with full microprocessor control, 10 memories, two VFO's and multimode flexibility, all from a battery powered package. Telescoping antenna built in. Optional FL-2010 PA and FP-80A AC Supply.

FT-208R

2 METER FM HAND-HELD!

- **LCD Display with Lithium Backup Cell**
- **Selectable 5 kHz/10 kHz Scanning**
- **10 Memories with Auto/Resume Scan**
- **16 Button Tone Encoder**

Yaesu's latest thoroughbred for 2 FM is the FT-208R Hand-Held. Four digit LCD display, 10 memories, limited band scan, and priority channel make this the most versatile hand-held ever made available to the amateur fraternity.



FT-690R

6M MULTIMODE PORTABLE!

- **USB/CW/AM/FM Battery Portable**
- **LCD Frequency Display with Night Light**
- **10 Memories with Lithium Backup Cell**

Catch those exciting DX openings with the new FT-690R 6 meter portable. Repeater shift (1 MHz), two scanning steps per mode, and dual VFO's for top flexibility.

FT-708R

70 CM FM HAND-HELD!

- **LCD Display with Lithium Backup Cell**
- **Selectable 25 kHz/50 kHz Scanning Steps**
- **440-450 MHz with 10 Memories**
- **Memory/Band Scan and Limited Band Scan**
- **Resume Scan**
- **16 Button Tone Encoder**

Yaesu leads the way with its pioneering microprocessor controlled 440 MHz hand-held. Priced competitively against much simpler units, the FT-708R system includes a full line of accessories, including CTCSS, NiCd chargers, and remote speaker/microphone options.

Sporting unmatched engineering and manufacturing know-how, Yaesu's technical staff is committed to pushing the state of the art. Yaesu products are backed by a nationwide dealer network and two factory service centers for your long-term service needs. So when it's time to upgrade your station equipment, join the thousands of hams that are tired of compromise – join them by investing in Yaesu!

Some accessories pictured above are extra-cost options. See your Yaesu dealer.

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU

The radio.

881

YAESU ELECTRONICS CORP. 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

Top-Notch.

VBT, notch, IF shift, wide dynamic range

TS-830S

Now most Amateurs can afford a high-performance SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 meters (including the three new bands). The TS-830S combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- **160-10 meters, including three new bands**
  Covers all Amateur bands from 1.8 to 29.7 MHz (LSB, USB, and CW), including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- **Wide receiver dynamic range**
  Junction FETs (with optimum IMD characteristics and low noise figure) in the balanced mixer, a MOSFET RF amplifier operating at low level for improved dynamic range (high amplification level not needed because of low noise in mixer), dual resonator for each band, and advanced overall receiver design result in excellent dynamic range.
- **Variable bandwidth tuning (VBT)**
  Continuously varies the IF filter passband width to reduce interference. VBT and IF shift can be controlled independently for optimum interference rejection in any condition.
- **IF notch filter**
  Tunable high-Q active circuit in 455-kHz second IF, for sharp, deep notch characteristics.
- **IF shift**
  Shifts IF passband toward higher or lower frequencies (away from interfering signals) while tuned receiver frequency remains unchanged.
- **6146B final with RF NFB**
  Two 6146B's in the final amplifier provide 220 W PEP (SSB)/180 W DC (CW) input on all bands. RF negative feedback provides optimum IMD characteristics for high-quality transmission.
- **Built-in digital display**
  Six-digit large fluorescent tube display, backed up by an analog dial. Reads actual receive and transmit frequency on all modes and all bands. Display Hold (DH) switch.
- **Adjustable noise-blanker level**
  Built-in noise blanker eliminates pulse-type (such as ignition) noise. Front-panel threshold level control.
- **Various IF filter options**
  Either a 500-Hz (YK-88C) or 270-Hz (YK-88CN) CW filter may be installed in the 8.83-MHz first IF, and a very sharp 500-Hz (YG-455C) or 250-Hz (YG-455CN) CW filter is available for the 455-kHz second IF.
- **More flexibility with optional digital VFO**
  VFO-230 operates in 20-Hz steps and includes five memories. Also allows split-frequency operation. Built-in digital display. Covers about 100 kHz above and below each 500-kHz band.
- **Built-in RF speech processor**
  For added audio punch and increased talk power in DX pileups.
- **RIT/XIT**
  Receiver incremental tuning (RIT) shifts only the receiver frequency, to tune in stations slightly off frequency. Transmitter incremental tuning (XIT) shifts only the transmitter frequency.
- **SSB monitor circuit**
  Monitors IF stage while transmitting, to determine audio quality and effect of speech processor.

More information on the TS-830S is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

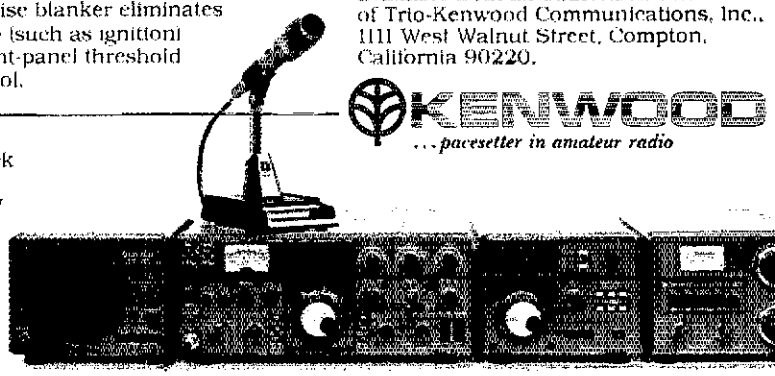
KENWOOD
...pacesetter in amateur radio

Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-230 external digital VFO with 20-Hz steps, five memories, digital display
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- TL-922A linear amplifier
- SM-220 Station Monitor
- PC-1 phone patch
- HC-10 digital world clock
- YG-455C (500-Hz) and YG-455CN (250-Hz) CW filters for 455-kHz IF
- YK-88C (500-Hz) and YK-88CN (270-Hz) CW filters for 8.83-MHz IF
- HS-5 and HS-4 headphones
- MC-30S and MC-35S noise-cancelling hand microphones



Specifications and prices are subject to change without notice or obligation.