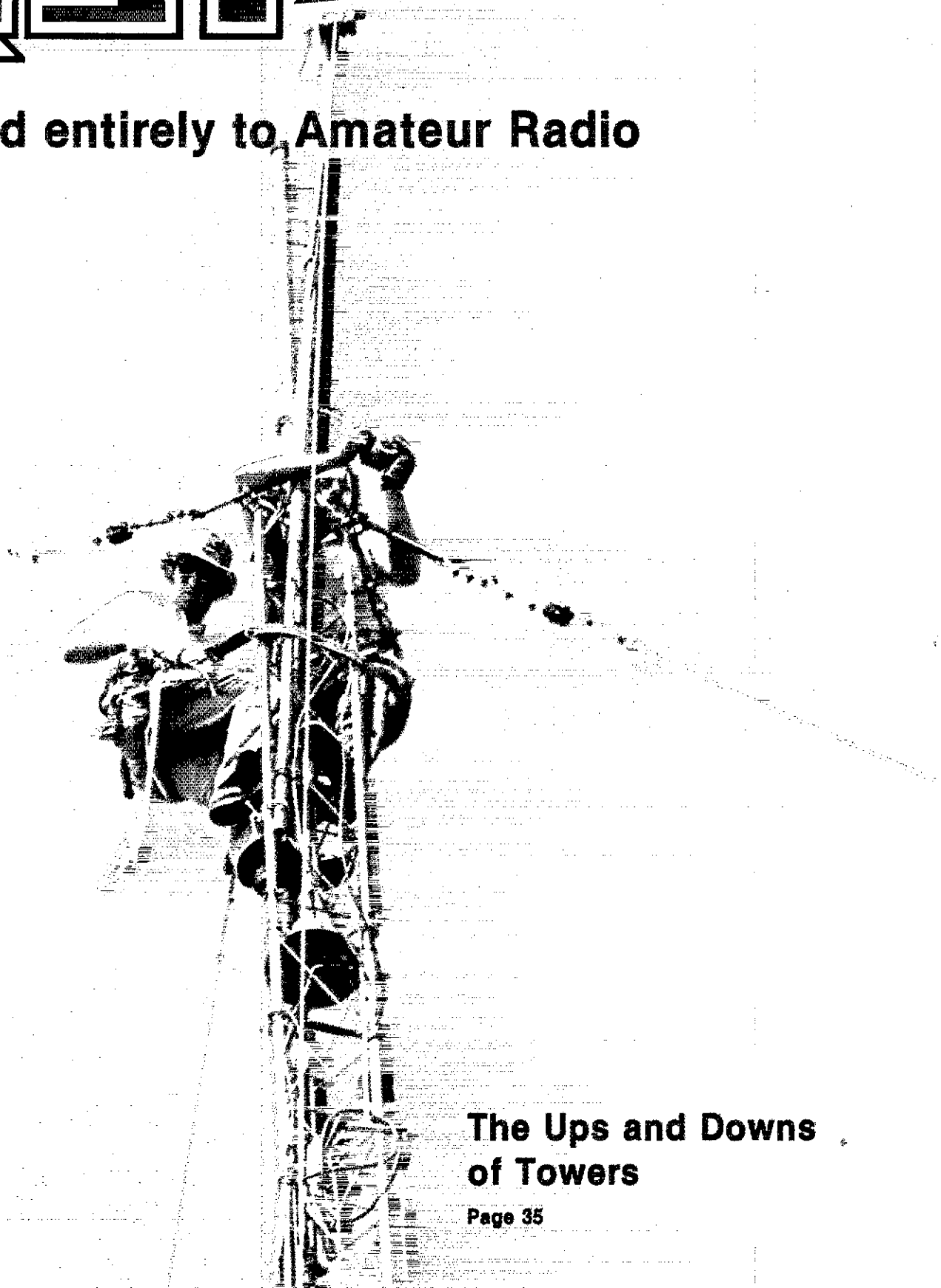
July 1981 $2.50

QST

devoted entirely to Amateur Radio



The Ups and Downs of Towers

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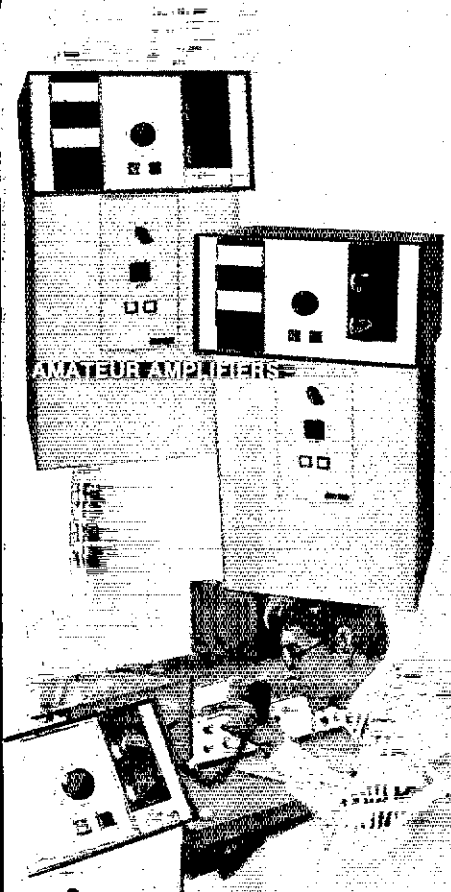
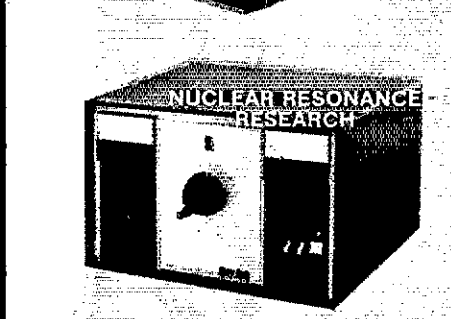
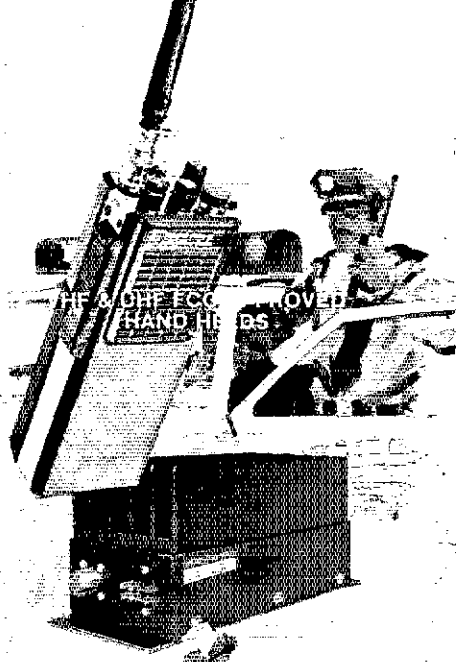
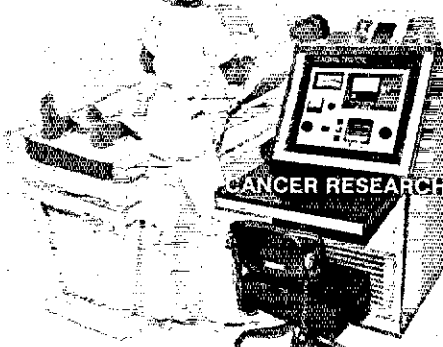
Henry Radio

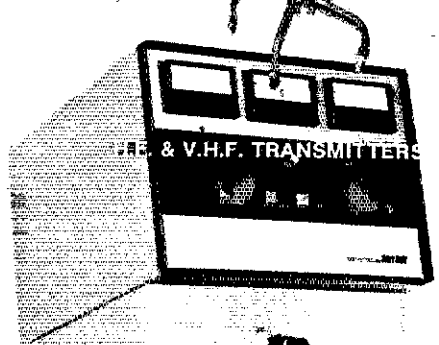
Where superb amateur equipment points the way to tomorrow's technology in high reliability R.F. equipment for commercial, industrial, medical, military, scientific research applications.

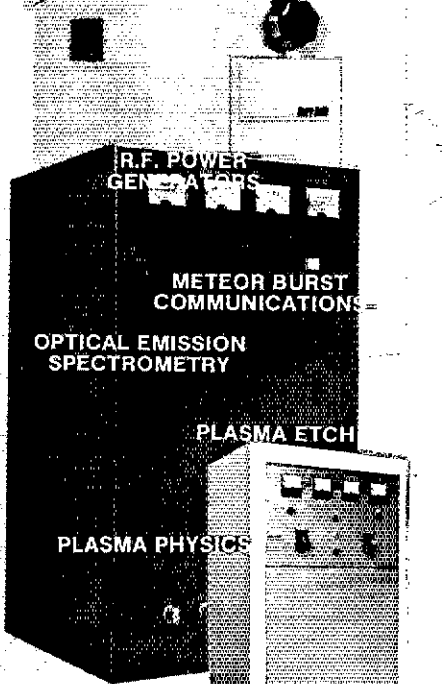












More than half a century in the communications business has made Henry Radio a tradition, and our original commitment to the amateur radio fraternity is no less important today than it was then. Over these many years our products and services have expanded to include a complete line of superb quality high power HF linear amplifiers and solid state VHF and UHF amplifiers. Our own Tempo line of synthesized handhelds for amateur use at 144, 220 and 440 MHz has now expanded to include commercial channelized handhelds and solid state amplifiers, all FCC type accepted. We are also a major manufacturer of a broad line of industrial and medical RF power supplies and plasma generators providing reliable continuous duty HF and VHF in the power range of 500 to 10,000 watts.

If your requirements fall into any of these areas Henry Radio may have just what you're looking for. We guarantee to provide the same personal service and superior products that has enabled us to serve the free world's communications needs for 53 years. The name "HENRY" has always symbolized quality, reliability, responsibility and service. What more can we say? Tell us how we can help you with your communications and R.F. power requirements.

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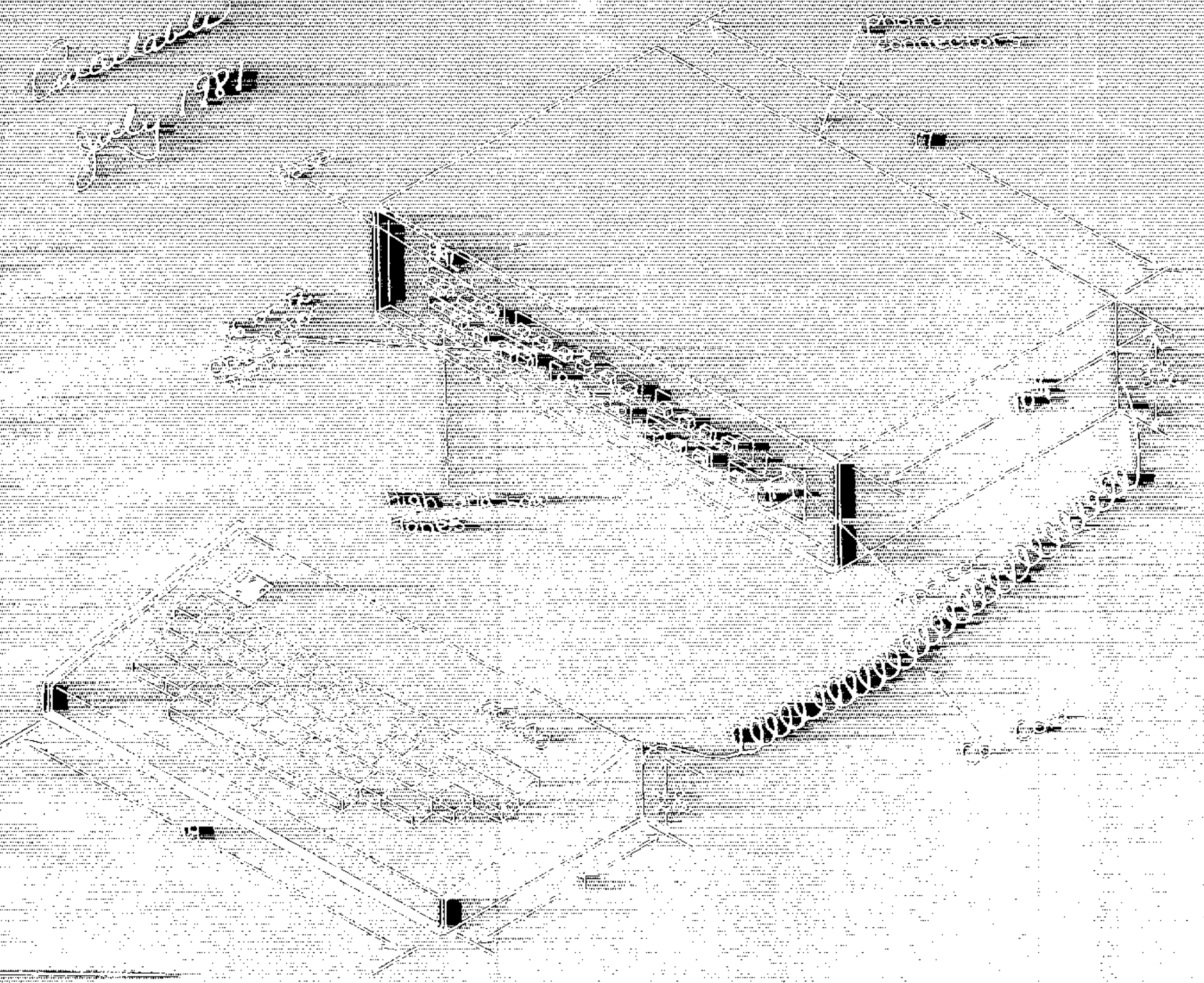
The CT2100 Communications Terminal

HAL COMMUNICATIONS CORP.

NEW PRODUCTS

DATE: 1-26-81 SCALE: ½

DRN BY: GWH
APP BY: RTL
No. 31251



SPECIFICATIONS:

- Two cabinets - basic CT2100 plus separate KB2100 keyboard.
- RTTY and Morse demodulators and video circuits included in CT2100.
- Small keyboard size, connects with one "coil-cord" for popular "lap operation".
- Streamlined CT2100 cabinet is attractive and small - may also be rack mounted.
- Satin finish black vinyl front panel with multicolor graphics.
- 26 control switches; red for "primary" and blue for "secondary" controls.
- 15 rear panel connectors - standard phono connectors.
- On-screen tuning indicator, LED indicators, and external scope connections.
- LED indicators for mark, space, CW tune, RTTY tune, audio overload, and KOS.
- CT2100 demodulates, decodes, and displays received Morse and Baudot or ASCII RTTY.
- CT2100 with KB2100 transmits and receives Morse, Baudot, or ASCII.
- Morse receive circuit tracks speed and minor frequency variations; 1 to 100 wpm.
- Morse transmit 5 to 100 wpm; key negative or positive key lines.
- Baudot or ASCII data rates of 45, 50, 57, 74, 100, 110, 150, 300, 600 or 1200 baud.
- Internal RTTY demodulator for both "high" and "low" RTTY tones plus two sets of modem tones (1070/1270 Hz or 1200/2200 Hz). Narrow shift CW ID included.
- All three RTTY shifts (170/425/850 Hz) for both "high" and "low" tones.
- Input/output connections for audio tape recorder, RTTY loop or RTTY RS232 data.
- RTTY markhold, autostart, normal/reverse, full or half duplex, KOS transmit control.
- Large character (36 per line) or standard display (72 characters per line).
- White characters on black screen or reverse video.
- Two pages of receive display.
- Split screen for transmit buffer - pretype WHILE receiving.
- Two user-programmable 32 character HERE IS messages.
- Eight non-volatile, 250 character EPROM stored brag-tape and HERE IS messages.
- Serial printer output prints all received text, Morse, Baudot, or ASCII.
- Built-in 120/220 50/60 Hz power supply.
- Receive-only users need only the CT2100 - add the KB2100 for transmitting later.

LOW COST:

CT2100 Receive Only Communications Terminal	[illegible]45.00
KB2100 Transmit Option Keyboard	[illegible]45.00
RCA/TR930 TV Monitor - 9"	$169.00

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
217-367-7373

ICOM Presents the Minicom IC-25A

Imagine...25watts/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 VFO's 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

July 1981 Volume LXV Number 7

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Newington, CT 06111 Tel: 203-666-1541

Member of the Audit Bureau of Circulations

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THE COVER

A tower will bring many years of good operating — if you know the right way to put it up, and if you can protect it from restrictive ordinances. See pp. 35, 48 and 50.
(K1WA photo)

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Basic Amateur Radio

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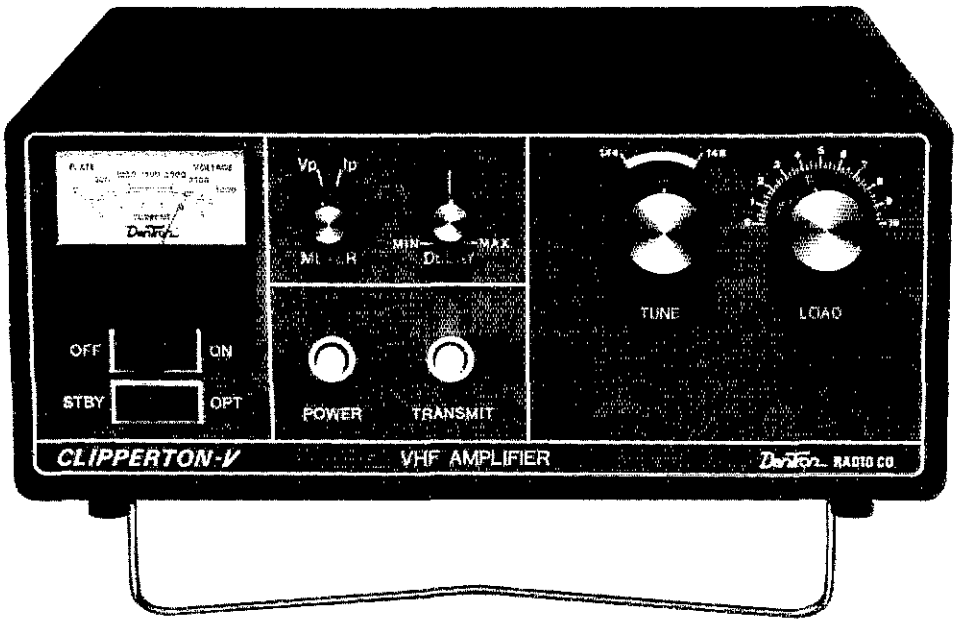
POWER

500 WATTS AT 2 METERS



With the new Clipperton-V Amplifier

Power! When you hook into DenTron's new 500 watt, 2-meter VHF amp you've got it. Enough to capture the frequency and leave the others behind. If you're into FM, repeaters, SSB, CW or DXing, the Clipperton-V linear amplifier is loaded with goodies just for you. And when it's DenTron you know it's reliable, high quality, and American-made.

Ask your dealer to demonstrate the new Clipperton-V. And pick up a copy of our complete product guide. Or send to us for a free copy today. Suggested retail $599.50.

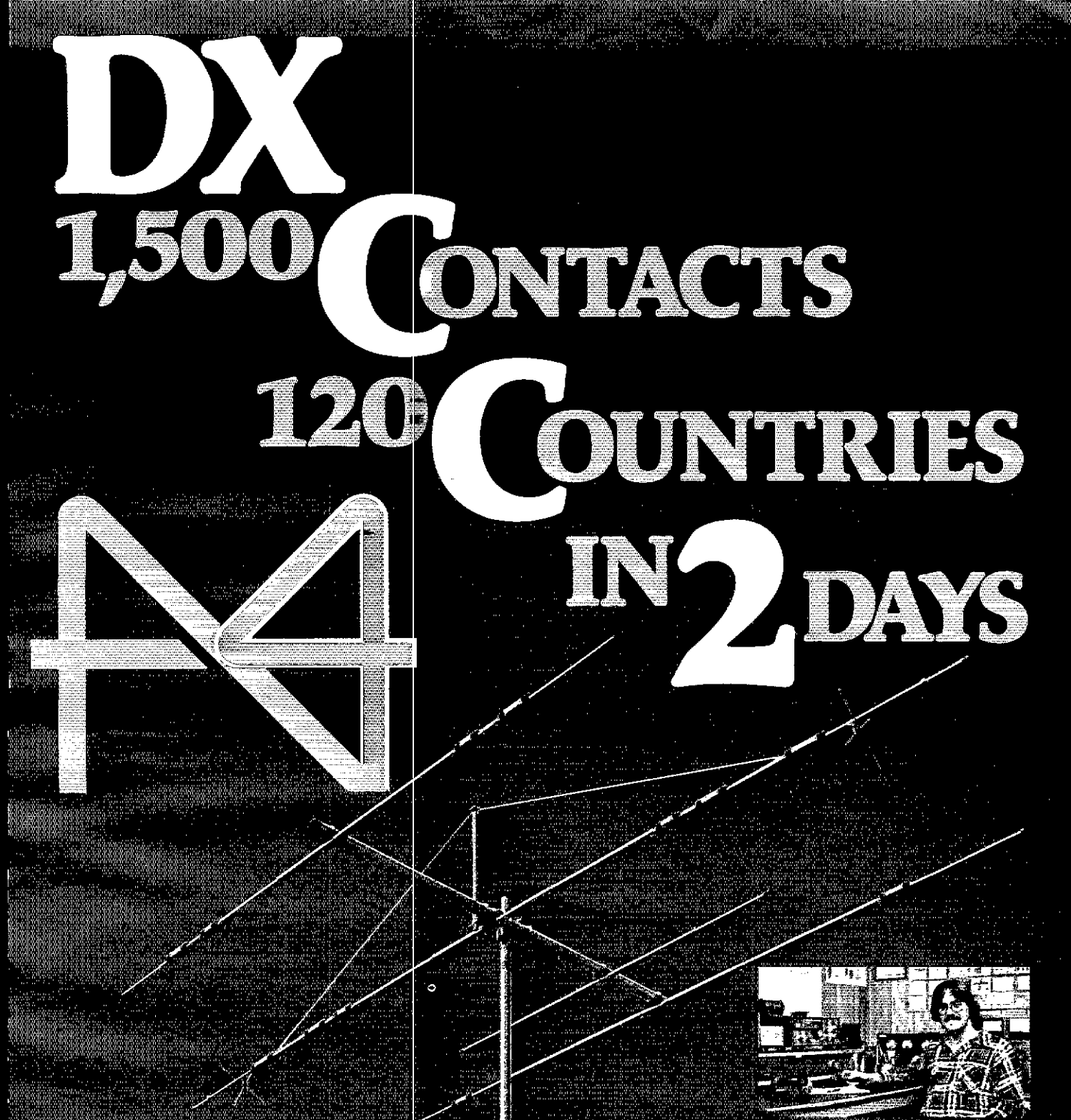
Specifications:

- Frequency ranges
  144-148 MHz
  50-54 MHz with 6 meter modification kit
  30-165 MHz (custom from factory for commercial applications)
- 4CX250B ceramic/metal tetrode tube
- Pressurized chassis tube cooling system
  Modes - USB, LSB, CW, RTTY, FM
- Power requirements - 117/234 VAC, 50/60 Hz
- RF drive power - 20 watts maximum, 10 watts RMS minimum for 500 watt dc input
- RF sensing keying circuit with delay feature for SSB
- dc plate voltage - idle + 2250V approximate
- dc bias voltage - variable 55 to 130V
- Input impedance - 50 ohms nominal
- Output impedance - 50 ohms nominal
- Antenna load VSWR - 2:1 maximum
- Harmonic suppression - down 60 db or better
- Size - H 6″ x W 15″ x D 17″
- Weight - 45 lbs.
- Input - 500 watts

DenTron® Radio Co., Inc.

1605 Commerce Drive / Stow, Ohio 44224
(216) 688-4973

DX
1,500 CONTACTS
120 COUNTRIES
IN 2 DAYS



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 A4 available through dealers worldwide.

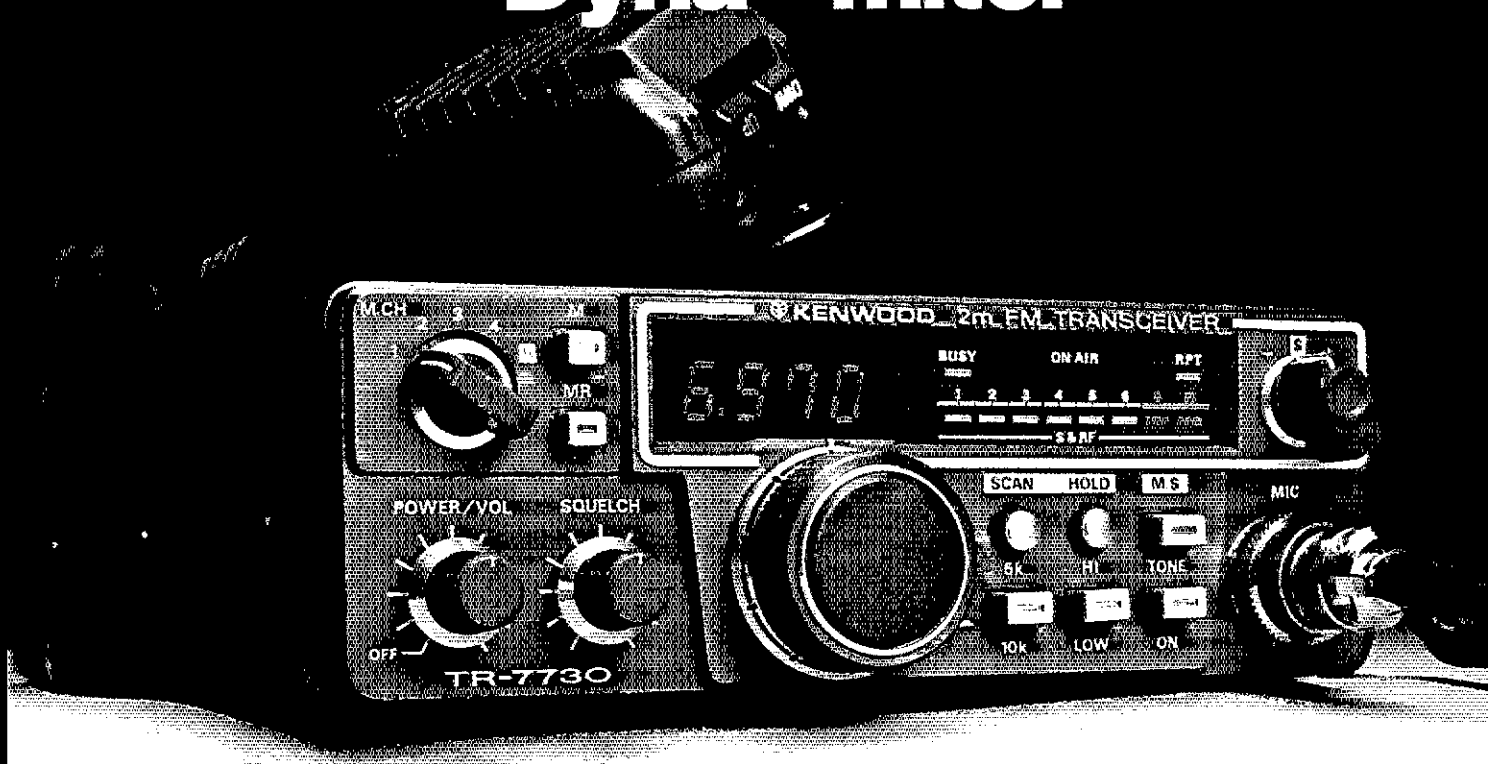
"I used your new A4 during the 1981 Phone ARRL DX contest. It was dynamite!! In 24 hours I had worked 99 countries. After 48 hours my total was 125. The A74 add-on kit allowed me to work 28 countries on 40 meters alone. It added new versatility to my 40 meter activity. By the end of 48 hours I had worked 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

*Logs to be verified

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

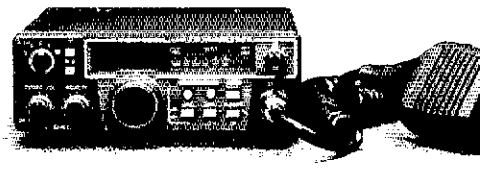
More information on the TR-7730 and TR-8400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

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.



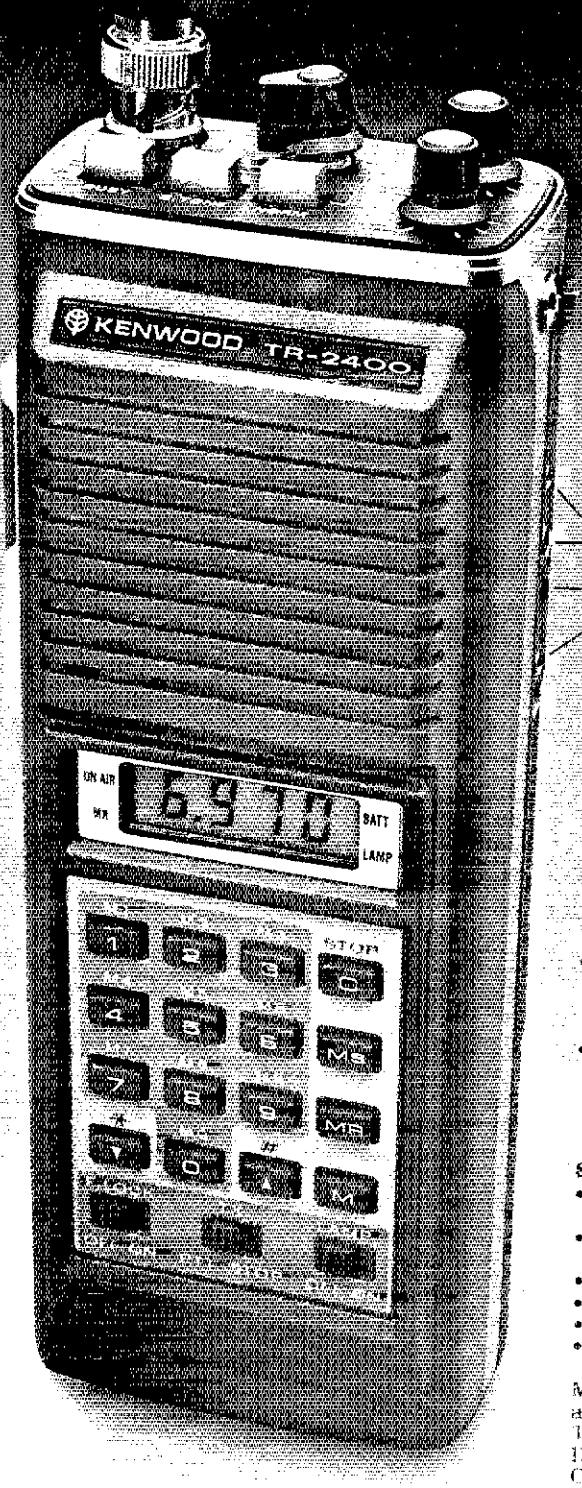
Specifications and prices are subject to change without notice or obligation

Hand-shack.

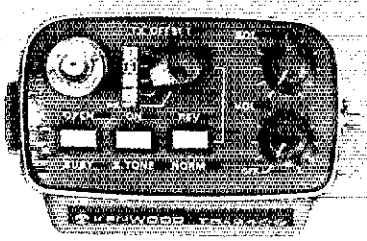
Synthesized, big-LCD, 10-memories, scanning, DTMF

TR-2400

Put a ham shack in your hand. The TR-2400 is the ideal hand-held for 2 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.
- **Autotone 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 800 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:

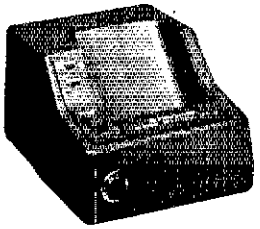
- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- External-microphone plug
- AC charger
- Hand strap
- Earphone

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

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

KENWOOD
...pacesetter in amateur radio



Specifications and prices are subject to change without

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*Executive Committee Member

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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, WB4PRF, P. O. Box 37, Eva 38333

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., Copiague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

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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 Laroe 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
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 (809-764-3099)

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles — Stanley S. Brokl, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fried 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..."

"Plain Language" Rules: A Shift In The Wind

The once-quiet waters of the Commission's "plain language" rules proceeding have been disturbed. Earlier this year, the League decided to support, in principle, the "plain language" rewrite proposal in PR Docket 80-729. The Board of Directors and membership felt that although amateurs have proven themselves capable of understanding and obeying the rules as they currently exist, ARRL didn't want to get in the way of the Commission's seemingly altruistic effort to rewrite Part 97 in a more presentable manner. This decision and opinion was formalized at Minute 77 of the ARRL Board meeting, March 11-12. This statement of policy reflected the Board's sentiment, scarcely three months after the Commission released the document to the public on December 19, 1980, and was based on the input of members who vocalized their thoughts to their representatives. But, at the time, only a handful of members and other amateurs had the opportunity to inspect the document and determine its nature and scope. Copies of the original document were not readily available from the Commission, and the *Federal Register* reproduction contained several typographical errors. The bottom line is that, in March, with the comment deadline of June 19 looming only three months away, few amateurs had seen the text of the proposed new rules.

In the days and weeks that followed the Board meeting, the Hq. staff began the task of preparing the League's formal comments based on (1) the policy established at Minute 77, and (2) correspondence from members. However, as the docket's circulation increased (Hq. mailed a copy to every ARRL-affiliated club and made copies available to members), input from ARRL officers, directors, officials and members indicated a shift in the wind — a major segment of the membership was *opposed* to the proposal in its entirety. Letters and phone calls relayed the general feeling that the proposed rules are inappropriate for a disciplined and trained service such as the Amateur Radio Service, which requires the demonstration of technical and operating skills. And despite the Commission's professed intention *not* to change the substance of the rules in this proceeding, members are continuing to find that substantive changes *have* been introduced, meaning that more time and energies are essential to investigate these changes to determine possible adverse effects.

Considering these developments, the League filed a petition with FCC requesting an extension of time with which to prepare complete and comprehensive comments. At about the same time, ARRL learned that another extension request had been denied by the Commission at staff level. It is evident that the Commission feels that enough time has been afforded and is reluctant to slow the wheels of its "plain language" express. In the face of a probable unfavorable decision on the League's petition, the Board had two options: (1) to follow the guidelines established at Minute 77, or (2) amend those guidelines to provide for the *opposition* of the very concept of plain-language rules. The following resolution was proposed and adopted:

RESOLUTION

Whereas, the Board of Directors of the American Radio Relay League, at its Annual Meeting on March 12, 1981, did adopt a policy statement on FCC plain-language rules;

Whereas, the Board at that time stated that "the League does not desire to oppose legitimate attempts to improve and strengthen the manner of presentation of the amateur rules," and, further, that "the League supports the concept of plain-language rules";

Whereas, owing primarily to delays within the government, at the time of the Annual Meeting relatively few members of the League had had an opportunity to study the text of the plain-lanugage proposal;

Whereas, publication of the proposal in the Federal Register included many serious errors which have not been corrected by the Commission;

Whereas, in-depth study is uncovering numerous problems with the Commission's proposal which give the League's members great concern;

Whereas, the amateur community desires additional time to study the Commission's proposals and to comment upon them;

Whereas, the Commission has indicated an unwillingness to extend the deadline for the filing of comments despite the several delays in making the text of its proposal available to the public;

Whereas, it is the desire of the ARRL Board of Directors to reflect the will of the League's membership; and

Whereas, it is not in the interests of amateur radio or the League for a hasty decision to be forced in this important matter;

Now, therefore, BE IT RESOLVED that the ARRL Board of Directors believes an extension of time for the filing of comments in FCC Docket No. 80-729 is absolutely essential to the proper consideration of the proposals contained therein; and that if a reasonable extension of time is not forthcoming, the Board does hereby direct the filing of comments on behalf of the League opposing the concept of plain-language rules as proposed by the Commission; and further, in those comments, special attention shall be devoted to the questionable use of limited Commission resources for a rulemaking proceeding which is deemed to be unnecessary and/or undesirable by the amateur community while important problems are being inadequately addressed.

By the time you read these words, the Commission will have made a final determination on whether to extend the comment deadline. If it decides to go ahead with its original timetable, the League will be forced to oppose the entire docket on principle in accordance with the adopted resolution. Because of the magnitude of this proceeding and its possible long-reaching effects on the Amateur Radio Service, more time to consider its complexities is absolutely essential. — *Richard Palm, K1CE*

League Lines...

Privileges restored on 160 meter band. Effective June 10, 1981, the FCC restored to U.S. Amateur Radio stations full power privileges on the frequencies 1800-1900 kHz, 1000 watts maximum DC plate input. However, some power and operating restrictions will continue to apply to some parts of the U.S. for the frequencies 1900-2000 kHz for protecting Loran-A radionavigation systems operated in eastern Canada. These restrictions are as follows:

States of:	Maximum DC plate input power in watts			
	1900-1925 kHz	1925-1950 kHz	1950-1975 kHz	1975-2000 kHz
	day/night	day/night	day/night	day/night
ME, MA, NH, RI	100/25	0	0	100/25
CT, DE, MD, NJ, NY, PA, VT	200/50	0	0	200/50
KY, NC, OH, SC, TN, VA, WV	500/100	0	0	500/100
FL, GA, IL, IN, MI, WI	500/100	100/25	100/25	500/100
AL, AR, IA, MN, MS, MO	1000/200	200/50	200/50	1000/200
remainder of states and territories	1000/200	1000/200	1000/200	1000/200

Mode limitations of A1 and A3 emission remain in effect for the entire 160 meter band.

"It Seems to Us . . ." expresses ARRL's concern that amateurs need more time to file comments in FCC's proposal to rewrite the Amateur Rules into plain language, Docket 80-729. The League is hopeful its request to extend the comment deadline to August 21 will be granted.

Interested in the amateur satellite program? Then you'll want to consider receiving a new biweekly newsletter, AMSAT Satellite Report. To receive a sample copy and subscription information, send a business-size self-addressed, stamped envelope to AMSAT Satellite Report, Box 177, Warwick, NY 10990.

Does the idea of working at ARRL Headquarters interest you? An opening exists in the Club and Training Department for a manager of the OSCAR Education Program. Experience with the OSCAR satellites, a background in science education and a General class or higher license are preferred. If you would like to introduce educators throughout the country to Amateur Radio via the OSCAR Satellites, contact Steve Place at Hq.

Goodbye, mho! The FCC will be phasing out the use of the unit mho as it revises the amateur exams. Mho will be replaced by the SI System's unit, siemens. League publications, as they are revised, will also reflect this change.

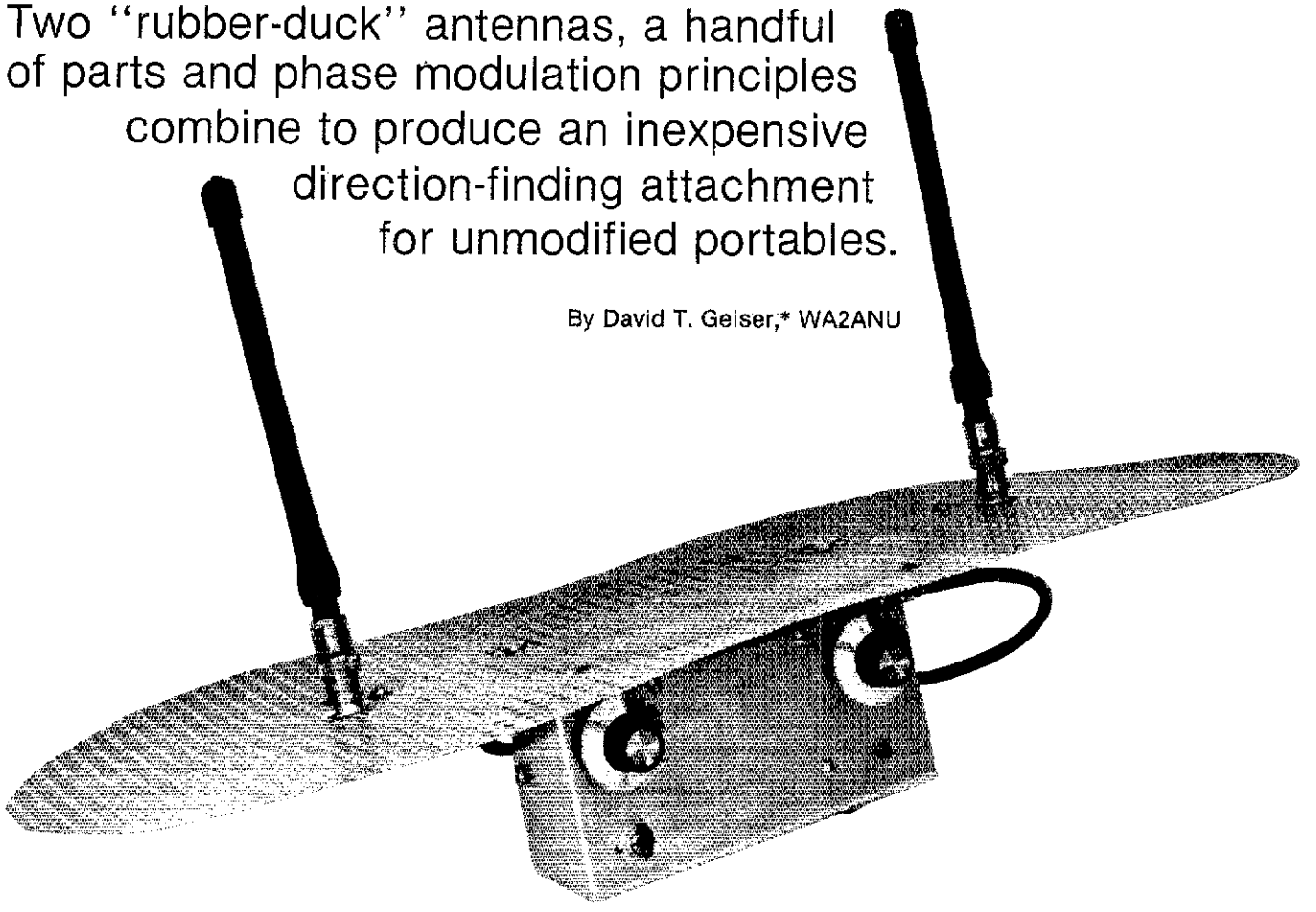
Volunteer examiners needed for Commission's handicapped Amateur Radio examination program. The Commission's Rules permit the examination for an Extra, Advanced, General or Technician class license to be administered at a location other than a Commission examination point by an examiner chosen by the Commission when it is shown by a physician's certification that the applicant is unable to appear at a regular Commission examination point because of a protracted disability preventing travel. The Commission's district offices maintain lists of licensed amateurs who have volunteered to administer examinations to handicapped applicants. Additional volunteers are needed. Licensed amateurs who wish to volunteer their services for this program should furnish the following information to their local district office: name, address, telephone number, class of license held and call sign, distance from home they would be willing to travel or any other limitations on their service.

The League now has a repeater on 220 MHz -- 223.24 in 224.84 out, to be precise. The repeater was donated by Maggiore Electronics, and the antenna was donated by Hustler. The Newington Amateur Radio League is responsible for maintenance, and ARRL Communications Manager W1XX is trustee. Next time you're in the area, give a shout on W1AW/R.

Double-Ducky Direction Finder

Two "rubber-duck" antennas, a handful of parts and phase modulation principles combine to produce an inexpensive direction-finding attachment for unmodified portables.

By David T. Geiser,* WA2ANU



Most amateurs use antennas having pronounced directional effects, either a null or a peak in signal strength, for direction finding. Fm receivers are designed to try to eliminate the effects of amplitude variations and are difficult to use for direction finding without looking at an S meter. Most modern portable transceivers do not have S meters.

This "Double-Ducky" direction finder (DDDF) is different in that it switches between two nondirectional antennas, creating phase modulation on the incoming signal that is heard easily on the fm receiver (Fig. 1). When the two antennas are exactly the same distance (phase) from the transmitter (Fig. 2), the tone disappears.

*ARRL TA, RD 2, Box 787, Snowden Hill Rd., New Hartford, NY 13413

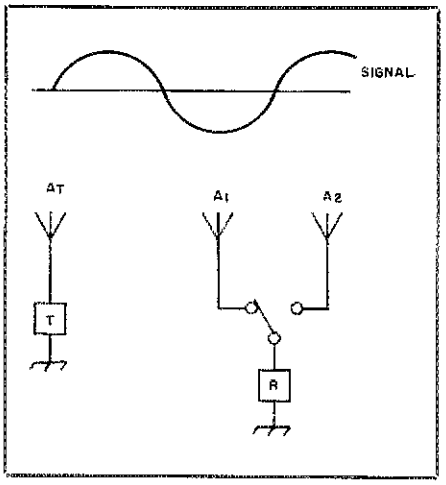


Fig. 1 — Rapid switching between antennas samples the phase at each antenna creating a pseudo-Doppler effect, which an fm detector will detect as phase modulation.

Fm receiver detectors usually fall into either the "discriminator" or "phase-detector" categories. The phase-detector will convert audio-rate changes in phase to an audio tone. Discriminators look upon changes in phase as if they were

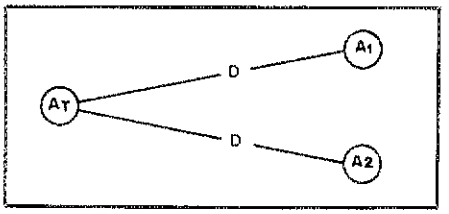


Fig. 2 — If both receiving antennas are an equal distance (D) from the transmitting antenna, there will be no difference in the phase angles of the signals in the receiving antennas; therefore, the detector will not detect any phase modulation, and the audio tone will disappear from the output of the detector.

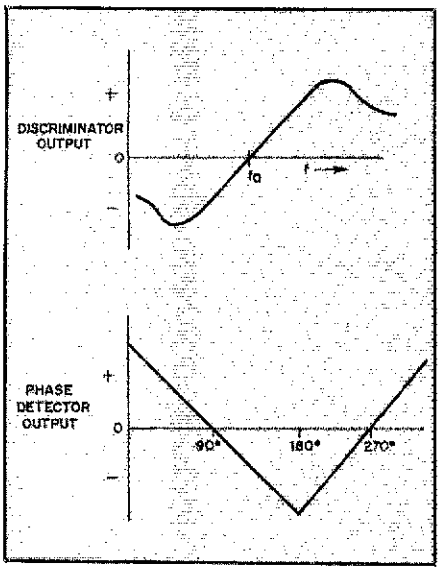


Fig. 3 — Typical discriminator and phase detector response curves.

changes in frequency and, if the phase changes happen at an audio rate, will give alternately reversed pulses at that same rate. Both detectors give audio output from the speaker that disappears only when the phase doesn't change as a result of the switching (Fig. 3).

In theory the antennas may be very close to each other, but in practice the amount of phase modulation increases directly with the spacing, up to spacings of a half wavelength. While a half-wavelength separation on 2 meters (40 inches or 1020 mm) is pretty large for a mobile array, a quarter wavelength in my experience gives entirely satisfactory results, and even a one-eighth wavelength (10 inches or 250 mm) is acceptable.

I think in terms of a fixed spacing between the antennas, mount them on a ground plane and rotate that ground plane. The ground plane held above the hiker's head or car roof reduces the needed height of the array and the directional-distorting effects of the searcher's body or other conducting objects.

Direct pickup of the signal by the receiver does not have much effect. Such pickup with minimum/maximum systems (S meters) smears nulls and peaks, but only provides a convenient beat for the phase modulation in this system.

The basic principle is not new, though I have seen only one Amateur Radio article on the topic.[1] Commercial direction finders similar to the DoppleScAnt are offered (usually costing upwards of $1000) giving directional indication to a fraction of a degree. (The DoppleScAnt gives unidirectional indication and is an interesting "post-graduate" course in this principle.)

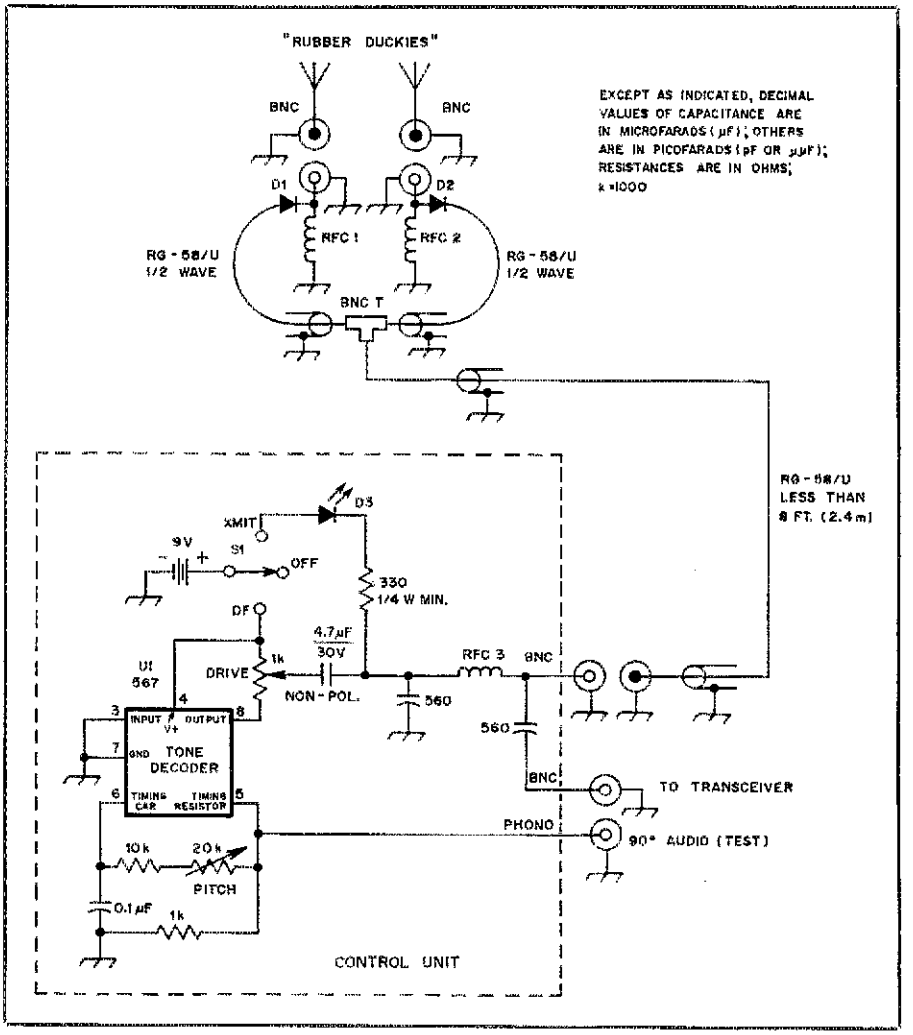


Fig. 4 — Schematic diagram of the DDDF circuit. Construction and layout are not critical. Components inside broken lines should be housed inside a shielded enclosure. Most of the components are available from Radio Shack, except D1, D2, the antennas and RFC1-RFC-3, which are discussed in the text. S1 — See text.

The DDDF is bidirectional and, as described, its tone null points both to and away from the signal origin. An L-shaped search path would be needed to resolve the ambiguity. Probably a reflector could be added, putting some asymmetry into the pattern and giving a sense indication.

Specific Design

It is not possible to find a long-life mechanical switch operable at a fairly high audio rate, such as 1000 Hz. Yet we want an audible tone, and the 400- to 1000-Hz range is perhaps most suitable considering audio amplifiers and average hearing. Also, if we wish to use the transmit function of a transceiver, we need a switch that will carry perhaps 10 watts without much problem.

A solid-state switch, the PIN (positive-intrinsic-negative) diode, has been developed within the last few years. The intrinsic region of this type of diode is ordinarily bare of current carriers and, with a bit of reverse bias, looks like a low-capacitance open space. A bit of forward bias (20 to 50 mA) will load the intrinsic region with current carriers that are happy to dance back and forth at a 148-MHz rate, looking like a resistance of an ohm or so. In a 10-watt circuit, little enough power is dissipated in the diode for it to survive.

Because I intended to use only two antennas, the obvious approach (Fig. 4) was to connect one diode "forward" to one antenna, to connect the other "reverse" to the second antenna and to drive the pair with square-wave audio frequency ac. Rf chokes (Ohmite Z144, J. W. Miller RFC-144 or similar vhf units) were used to let the audio through to bias the diodes while blocking rf. Of course, the reverse bias on one diode is only equal to the forward bias on the other, but in practice this seems sufficient.

A number of PIN diodes were tried in the particular setup built. These were the Hewlett-Packard HP5082-3077, the

[1] T. Rogers, "A DoppleScAnt," *QST*, May 1978, p. 24. [There are a number of errors in the DoppleScAnt diagram, Fig. 4. A corrected diagram is available upon request from ARRL Hq.]

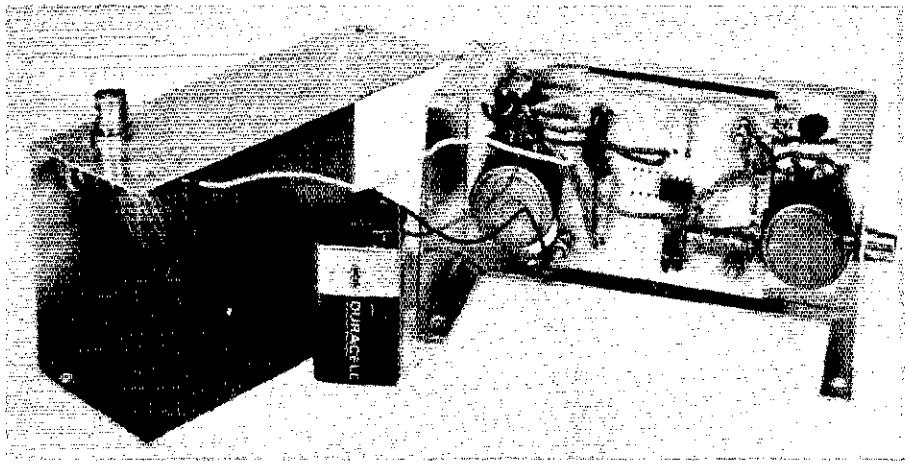
Alpha LE-5407-4, the KSW KS-3542 and the Microwave Associates M/A-COM 47120. All worked well, but I left the HP diodes in the finished equipment because they provided a slightly lower SWR (about 3:1) during my testing. Rigs accustomed to working with "rubber duckies" will not be dismayed with such an SWR.

The square-wave generator should put out good square waves -- each diode should be equally (or nearly equally) biased. The generator should be tunable with a variable resistor, and the bias should be adjustable. After some survey of various ways to do this, I settled on the 567 IC as the best compromise. The output does have a dc bias that had to be removed with a nonpolarized coupling capacitor. This minor inconvenience was more than rewarded by the ability of the IC to work well with between 7 and 15 volts (a nominal 9-V minimum is recommended).

The nonpolarized capacitor also proved useful for blocking dc when the function switch was set to XMIT. I placed D3, a light-emitting diode (LED), in series with the transmit bias to indicate I had selected its high battery current drain (20 mA or so).

I originally chose an ordinary center-off toggle switch for S1, but am now of mixed mind whether I should have used a locking type. Certainly the ordinary switch is more convenient if rapid transmit/receive is desired, but the batteries I have worn out by accidentally leaving the switch on would have paid for the more expensive locking type.

"Rubber duckies" are not very efficient antennas, but they were chosen for two reasons. Full quarter-wave whips were used in one of the early models, but they whipped and were too tall. The whipping confuses the null (even on a relatively small excursion), but rubber damps vibration. Better pickup results from better antennas; I have done 60-mile (96-km) DFing with the 1/4-wave whips.



Internal "workings" of the DDDF. Simplicity of design, along with a minimum of components, makes this a simple one- or two-evening project.

Cables going from the antenna to the coaxial T connector were cut to an electrical 1/2 wavelength (about 2/3 of a free-space half wave) to help the open circuit, represented by the reverse-biased diode, look open at the coaxial T. (The length of the line within the T was included in the calculation.)

The length of the line from the T to the control unit is not particularly critical. I, however, like to keep the total of the cable length from the T to the control unit to the transceiver under 8 feet (2.4 m) because the capacitance of the cable does shunt the square-wave generator output. (I have a prejudice in favor of square waves having square edges.)

My choice for the size and shape of the ground plane (Fig. 5) was arbitrary, guided by instinct and the size of scrap metal in the junk box. The metal really should extend away from the base of the antennas a distance at least equal to their height, 8 inches (200 mm), but thoughts of wind resistance and spending more money argued for the smaller size.

The size and shape of the control box are unimportant; all that matters is the shielding. The 5-1/4 × 3 × 2-1/8 inch (133 × 76 × 54 mm) standard Minibox is convenient and widely available. I powered the unit with a common 9-volt, transistor-radio battery mounted in the box.

Other Variations

The first model used shunt PIN diodes to short out the antenna (Fig. 6). This is good for receiving and eliminates the need for two rf chokes, but the power-handling capability on transmit is only about 2.5 watts. Quarter-wave coax lines are run from the antennas to the T so that the shorted antenna will appear like an open

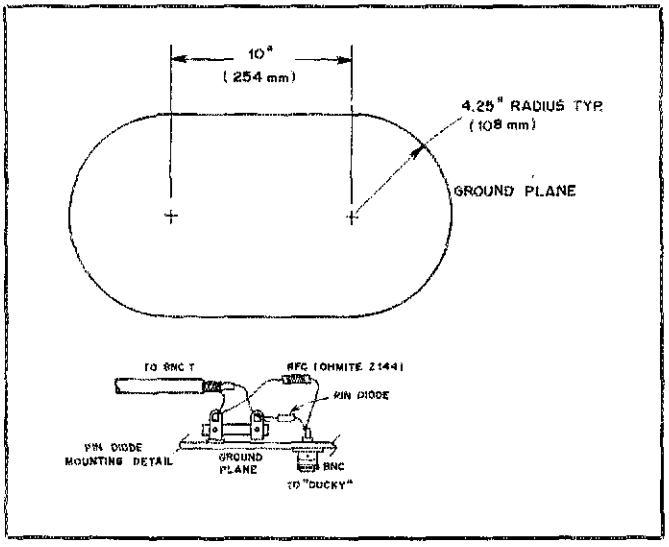


Fig. 5 — Ground-plane layout and detail of parts at the antenna connectors.

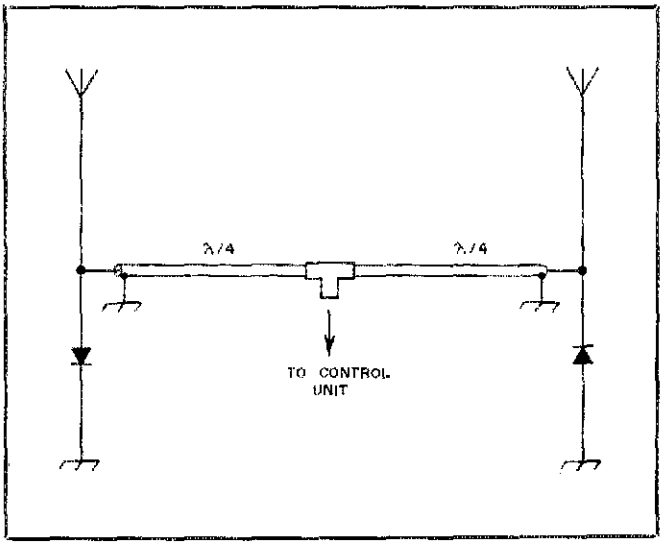


Fig. 6 — This variation of the basic design uses PIN diodes to shunt the antennas.

circuit at the junction of the T.

A shorted quarter-wave line may be used in place of the antenna rf chokes in the present design. This will look like a fairly high reactance (capacitive or inductive) over most, if not all, of the band, while still looking like a short circuit to the square wave (Fig. 7).

Increasing the spacing between the pickup antennas will give the greatest improvement. Every doubling (up to a half wavelength) will cut the width of the null in half. A 20-inch (500-mm) spacing has given me nulls about 1° wide.

I succumbed to temptation and mounted an automobile compass between the two antennas so I would have a true direction finder! The idea didn't work out because the magnetic material in my "rubber duckies" made the compass always indicate north, regardless of which way was north! (The compensators didn't have enough range.)

Perhaps the most interesting variation is to add right/left indication. The receiver audio output is put through a phase shifter (if necessary) and run to a balanced modulator that uses the quadrature output of the square-wave generator as a reference. As the dc polarity output changes when the antenna swings through the null, a dc microammeter on the mixer output can be used to give a right/left indication (Fig. 8). (For reasons discussed later, the indication is good only in the region of linear operation of the detector in the receiver.)

Usage Instructions

Switch the control unit to DF and advance the drive potentiometer until a tone is heard on the desired signal. Do not advance the drive high enough to distort or "hash up" the voice. Rotate the antenna for a null in the fundamental tone. Note that a tone an octave higher may appear. The cause of the effect is shown in Fig. 9. At A an oscilloscope synchronized to the "90° Audio" shows the receiver output with the antenna aimed to one side of the null (on a well-tuned receiver.) Fig. 9B shows the null condition and a twice-frequency (one octave higher) set of pips, while C shows the output with the antenna aimed to the other side of the null.

If, on the other hand (Fig. 10), the incoming signal is quite out of the receiver linear region (10 kHz or so off frequency), the off-null antenna aim may present a fairly symmetrical af output to one side (A). It may also show a near null with instability (indicated by the broken line on the display) at a sharp null position (B) and, aimed to the other side, give a greatly increased af output (C). This is caused by the different parts of the receiver fm detector curve used. The sudden tone change is the tip-off that the antenna null position is being passed.

Even in difficult nulling situations where a lot of second-harmonic af exists, rotating the antenna through the null position causes a very distinctive tone change. With the same frequencies and amplitudes present, the quality of the tone (timbre) changes. It is as if a note were first played by a violin, and then the same note played by a trumpet. (A good part of this is the change of phase of the fundamental and odd harmonics with respect to the even harmonics.) The listener can recognize differences (passing through the null) that would give an electronic analyzer indigestion.

The user should practice with the DDDF to become acquainted with how it behaves under known situations of signal direction, power and frequency. Some will want to tune the signal with the function switch in XMIT position and then switch to DF. In an unknown situation I like to use the tone to tell me a signal is present — my transceiver (IC-211) will both whine and DF on signals more than 10 kHz off frequency. Use of the 5-kHz synthesizer step then helps keep the tone spectrum less complicated.

I find that the whine (or tone) the DDDF adds to a carrier gives an unexpected dividend — I can receive cw telegraphy with its help on any fm receiver. When I hear the tone (and I can recognize it below the fm threshold) I turn the antennas for maximum volume and start copying. It's fun. Try *that* with your S meter!

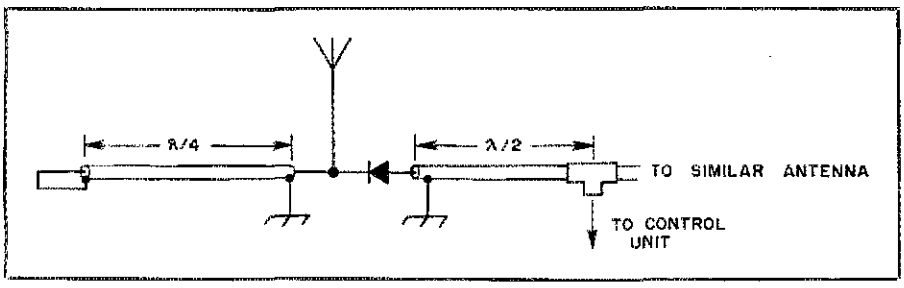


Fig. 7 — Another variation of the basic design. Here, a shorted quarter-wavelength section of coaxial cable replaces the rf choke at the antenna.

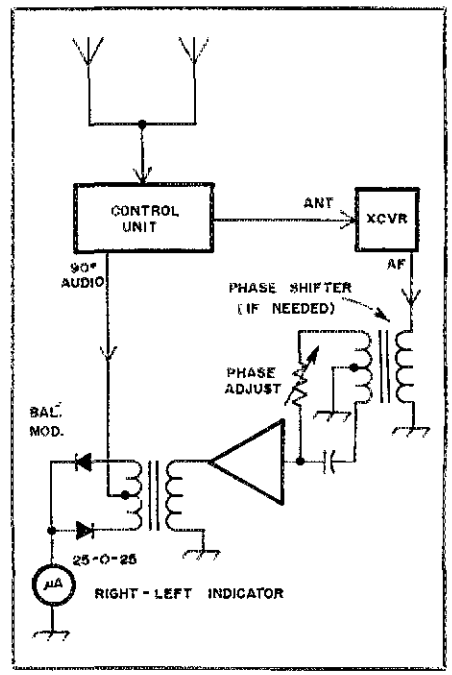


Fig. 8 — Block diagram of a simple right/left indicator. Depending on the setting of the potentiometer, the phase shift may range from 0° to near 180°. In general, one half the full value of resistance of the potentiometer should equal the capacitive reactance of the capacitor at the audio frequency used. Readers with questions should send an s.a.s.e. directly to the author.

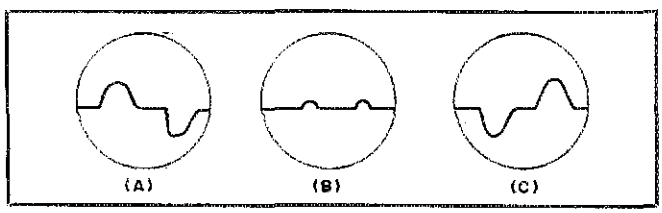


Fig. 9 — Typical on-channel responses. See text for discussion of the meaning of the patterns.

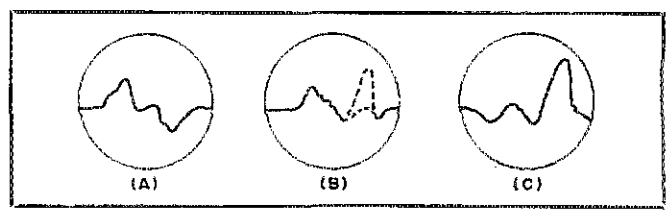
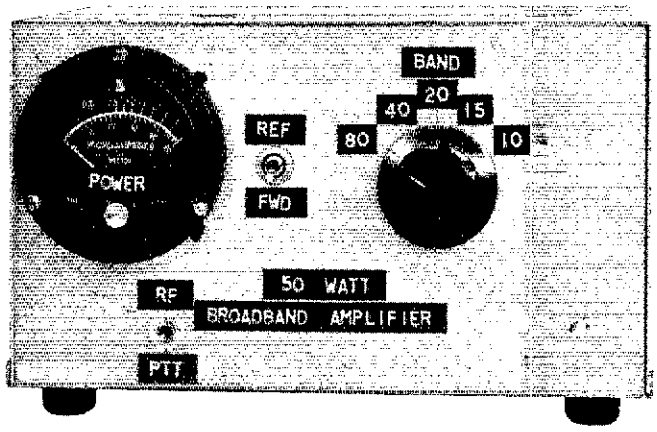


Fig. 10 — Representative off-channel responses. See text for discussion of the meaning of the patterns.

Boots for QRP Rigs



There comes a time when you have to put your QRP feet into some QRO boots to wade through the QRM. Here's a way to do it and enjoy a building experience, too.

By Steve Kapplin,* W4YVP

Many hams enjoy both phone and cw QRP operation. Occasionally, they may desire a bit more power than the 2.5 watts available from rigs such as the popular Ten-Tec Argonaut. Before the 1978 FCC rulings regarding linear amplifiers went into effect, Ten-Tec manufactured a companion amplifier for the Argonaut; but these amplifiers are no longer being made, and finding a used one for sale is nearly impossible. Building an amplifier might seem like a difficult task, and most articles detailing construction of solid-state rf power amplifiers are limited to the 100-watt (or more) output class. Low-power amplifiers, which have appeared in the amateur journals, tend to be Class C types and are therefore unsuitable for ssb use.

The need for design and construction information is a particular one for those interested in a compact, medium-power amplifier. From the author's experience, there appears to be a need for more design criteria, which would enable any prospective builder to design rf power amplifiers around any suitable power device without having to rely on circuit duplication as a guarantee of success. These thoughts initiated the design and construction of the amplifier presented here.

Designed to be a companion to my Ten-Tec Argonaut transceiver, this amplifier can also follow any suitable 2-watt driver. Although a pair of Motorola MRF449A transistors is used, sufficient information is provided for accommodating necessary design changes to meet the specifications of other power devices. I felt that most other power amplifier design articles are too "cookbook" in the sense that prospective builders usually have no way to discern from them if device substitutions are possible. Thus, you are discouraged from the attempt because you cannot make an exact duplicate. Some design criteria are presented here to aid prospective builders, and you are encouraged to substitute wherever feasible in the interest of reducing costs and using the contents of your "junkbox." If you are a good scrounger, you can build this amplifier for less than $100. The transistors can be purchased for less than $12 each and represent the largest single component cost. I have not provided a circuit board pattern because this unit is a prototype.

*11711 Moffat Ave., Tampa, FL 33617

Table 1

Amplifier Operating Specifications

Input/output impedance:	50 ohms
Output power (50-ohm load):	50 watts PEP
Driving power required:	1.25 watts PEP (± 1 dB)
Input VSWR:	1.5:1
Frequency coverage:	80 to 10 meters
Power requirements:	12 to 14 V dc at 8 A

General Description

Motorola MRF449A transistors are employed in a push-pull, broadbanded circuit. Broadbanded, ferrite-loaded transformers are used for both input and output impedance matching. Input gain compensation networks and negative feedback are used to provide an almost flat response across a frequency range of 3 to 30 MHz. The amplifier is followed by a set of band-switched, 5-section Chebyshev filters. Although push-pull operation reduces even-order harmonics, odd-order harmonics will not be adequately suppressed without the use of the filters.

Class AB operation is established by providing forward bias to the transistor bases so that the transistors will draw a small amount of quiescent collector current. Provisions are made for antenna switching using a built-in relay. The relay can be activated either by using an external control voltage controlled by the driver PTT line (not to exceed 9 volts) or by an internal, rf-activated relay driver; a front-panel mounted switch provides selection. The builder can, of course, use any control method that is convenient. Nominal specifications of the amplifier are detailed in Table 1.

Circuit Description

The power amplifier schematic diagram is shown in Fig. 1. An input matching transformer, T1, is followed by the input correction networks (two 3.3-ohm resistors and two 0.0033-μF mica capacitors) and a bias feed network consisting of RFC1, RFC2 and R2. T2 is the shunt-feed transformer, and T3 is the output impedance-matching transformer. The two 6.8-ohm resistors in the base circuits provide base stabilization and a ground return path for the bias supply. With R2 in the bias feed network, sufficient current will stand in the biasing diodes to stabilize the bias voltage under full base current. It is essential that the base bias be regulated to within 0.1 volt from idle to full base current. For transistors such as the MRF449A and MRF450A, an H_{fe} of 30 is typical. Thus, base current varies from a value of less

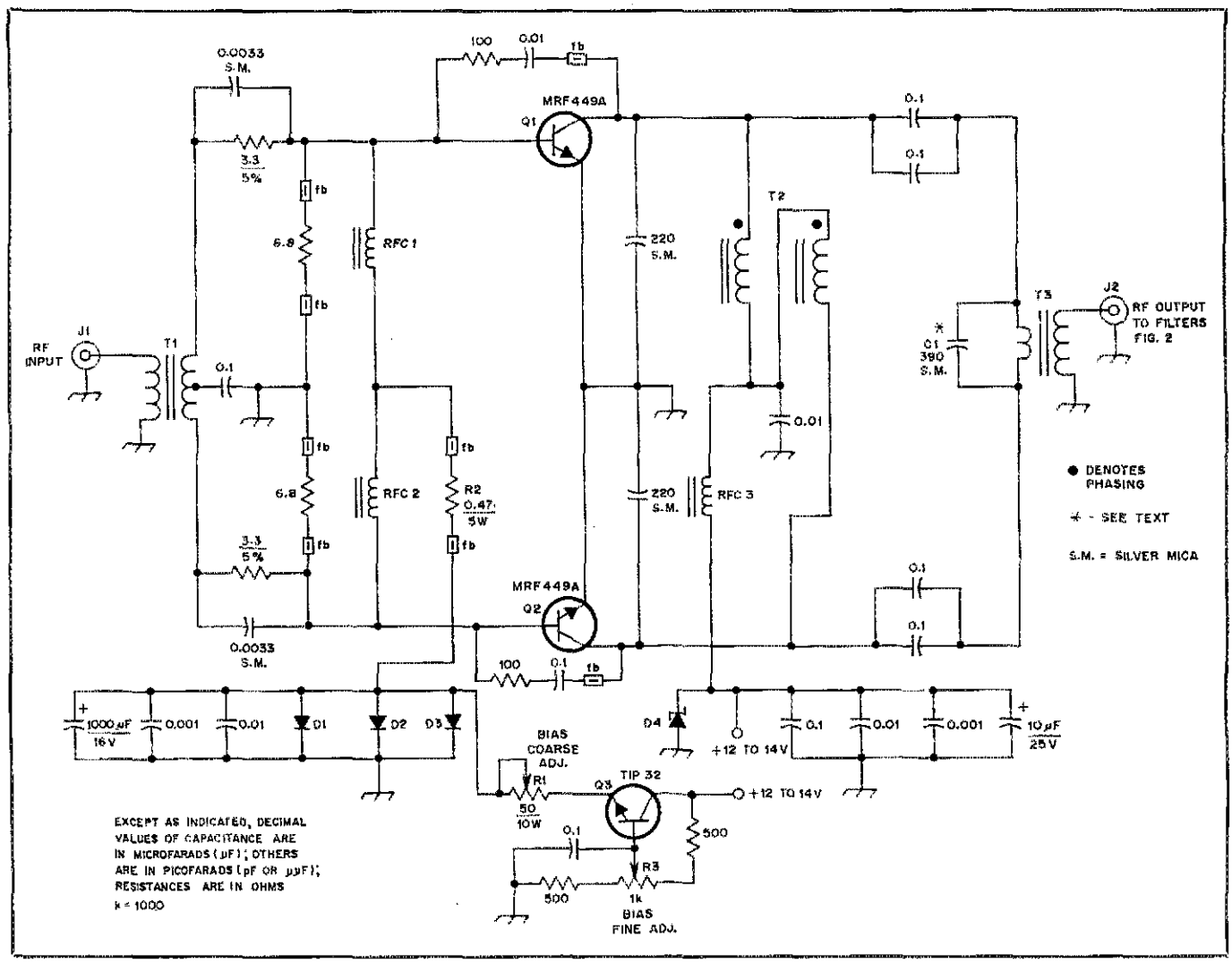


Fig. 1 — Schematic diagram of the linear amplifier. The ferrite beads in the feedback networks are slipped over one lead of each capacitor, which has a length of 1/2 to 1 inch (13 to 25 mm).
D1-D3, incl. — Silicon, 50 PIV, 1A (1N4001 or equiv).
D4 — 15-V, 10-W Zener (ECG5191A or equiv).
J1, J2 — Phono jacks.
Q1, Q2 — Silicon rf power transistor, 60 W (Motorola MRF 449A or equivalent, see text).
Q3 — Silicon af power transistor, 50 W (TIP 32 or equiv).
R1 — 50 Ω, 10 W, adjustable.
R2 — 0.47 Ω, 5 W, wire wound (Radio Shack 271-130).
R3 — 1 kΩ pc-mount potentiometer.
RFC1, RFC2 — Ferrite core type, 10 µH minimum inductance (see text).
RFC3 — 3 turns no. 16 or 18 enameled wire on Amidon FB2401-43 bead.
T1, T2, T3 — See text.

than 5 mA to over 250 mA peak during ssb operation. Regulation of the base bias voltage is provided by the shunt diodes (D1, D2 and D3), which act as a Zener regulator. The diodes are forward biased through the dropping resistor (R1) and the emitter follower (Q3) which provides a small range of adjustment.

Perhaps the most perplexing aspect of solid-state power amplifier design is represented by the input correction networks and the feedback networks. Without the aid of computer simulation programs, the design of these networks resembles minor surgery coupled with a twist of voodoo! Transistors exhibit increased gain at lower operating frequencies. Over the nearly four-octave range of a broadband amplifier, transistor gain will typically vary from 15 dB at 30 MHz up to 28 dB at 3 MHz. The purpose of the correction and feedback networks is to improve the broadband characteristics by flattening out the gain curve and improve stability across the operating frequencies. Component values are chosen to provide a reduction in gain that is proportional to the increase in transistor gain at decreased operating frequencies. The total amount of gain compensation is split between the input correction and feedback networks. No more than about 6 dB of feedback should be used with power devices operating at power levels of approximately 50 watts; more than that tends to increase harmonic production.

The MRF449A exhibits a change in gain of approximately 8 dB from 4 to 30 MHz. If this amount of gain is split between the correction and feedback networks, then 4 dB of input correction is required. According to the MRF449A data sheet, the 30-MHz gain of the device is 17 dB. Therefore, the device gain at 4 MHz will be about 25 dB. For 50 watts of output power and a power gain of 25 dB, the driving power required is 50/316 = 0.16 watt. The push-pull input impedance for the MRF449A is about 13.5 ohms at 4 MHz. (This value was not available from the data sheet and was "guesstimated" by averaging input impedances of other transistors for which data were provided.) For transistors in this general power class, this estimate should do for an initial design. Network design is accomplished as follows:[1]

1) Find the required base-to-base drive voltage:

$$V_{b\text{-}b} = \sqrt{P_i \times R_{b\text{-}b}} = \sqrt{0.16 \times 13.5}$$

[1]Notes appear on page 20.

2) Find the drive current:

$$I_{b\text{-}b} = V_{b\text{-}b}/R_{b\text{-}b} = 1.48/13.5 = 0.11A$$

where

$V_{b\text{-}b}$ = drive voltage, base-to-base.
$R_{b\text{-}b}$ = input impedance, base-to-base.
$I_{b\text{-}b}$ = drive current, base-to-base.
P_i = input drive power.

The gain change of 4 dB will be absorbed in the correction network. The required resistance is found by:

$$R = \frac{(V_{b\text{-}b} \times 4\ dB) - V_{b\text{-}b}}{I_{b\text{-}b}}$$

$$= \frac{(1.48 \times 1.58) - 1.48}{0.11} = 7.8\ \Omega$$

or 3.9 ohms in each base lead. (Note that the 4-dB voltage ratio is used in the formula.)

Because of the feedback network, input correction resistors of 3.3 ohms were found to be sufficient. Although the absolute value is not critical, carefully matched resistors should be used. Each resistor is shunted by a mica capacitor. The reactance of the capacitor at midband (15 MHz) should equal the resistance that it shunts.

The value of the resistors used in the feedback network was chosen experimentally. Once the amplifier is completed and ready for bench testing, the gain curve can be measured and the amount of feedback or input correction can be changed to produce a reasonably flat response across the bandwidth of the amplifier. It should be possible to provide a gain curve that is flat within 2 or 3 dB from 3 to 30 MHz. With the component values given here, this amplifier was flat within ± 1 dB.

It is better to compensate the gain curve with the correction networks than to use feedback. Excessive feedback will increase the level of harmonics and can degrade the third-order IMD performance, while insufficient feedback leads to instability. Both the feedback and input correction networks aid in providing stable operation. You could start by using the feedback networks only, experimenting with resistor values until you provide about 4 dB or so of gain compensation. Then add the input correction network and experiment with resistor-capacitor combinations until the additional gain compensation is provided. It is possible to produce a relatively flat gain curve. If you choose to extend operation down to 160 meters, the input networks described here may have to be changed.

The input transformer must provide a midband impedance transformation from the base input impedance to 50 ohms. The MRF449As exhibit a base impedance of about 3 ohms each at midband or 6 ohms in push-pull. This would require a 9:1 impedance transformation for a good match to 50 ohms. However, the input correction networks are in series with the base and add to the base-to-base impedance, while feedback tends to reduce input impedance. At midband the input impedance appeared to be about 13 ohms, base-to-base. This value can be matched fairly well with a 4:1 transformer. A simple conventional transformer having a 2:1 turns ratio, or a 4:1 balun, can be used. The conventional transformer used in this design provided a reasonable input VSWR of less than 1.5:1 from 80 to 10 meters.

Biasing Network

The biasing network incorporates three 50-V, 1-A diodes in parallel, which act as a Zener diode. The diodes are forward biased by applying a dc voltage from the +12-volt supply through dropping resistor R1. The emitter follower, Q3, provides a small range of adjustment by means of R3. Initially, bias is set at 0.68 volt as measured at the bases of Q1 and Q2. Motorola does not publish data for the MRF449A in ssb service, so the best setting for collector idling current must be guessed at. Setting the bias at 0.68 volt should ensure proper operation for this transistor. Where possible, however, a data sheet should be consulted for the appropriate idling current.

Dc collector current passes through T2 rather than through the center tap of the output transformer, T3. This arrangement provides better balance and improved suppression of even harmonics, particularly important if the transistor pair isn't matched. T3 may also be made physically smaller since it does not have to carry dc as well as rf currents; it matches the collector output impedance of Q1 and Q2 to a 50-ohm load. The output load impedance for push-pull operation is found by:

$$R_L = \frac{2(V_{CE} - V_{CEsat})^2}{P_{out}}$$

$$= \frac{2(13.6 - 1.6)^2}{50} = 5.76\ \Omega$$

where

V_{CE} is the collector-to-emitter voltage.
V_{CEsat} is the collector-to-emitter saturation voltage.
P_{out} is the output power.

This impedance can be matched by using a transformer with a 9:1 impedance ratio (3:1 turns ratio). The compensating capacitor, C1, is used to improve the high-frequency characteristics of the transformer. A value of 390 pF worked well in this unit. A small trimmer capacitor (such as an ARCO 469) might be used to first find the optimum value. The trimmer can then be replaced with a fixed-value silver mica unit.

The amplifier output is fed to the filter board, which contains five band-switched, 5-pole Chebyshev low-pass filters as shown in Fig. 2. Design information for these filters may be found on pages 6-11 and 6-12 of the 1981 *Radio Amateur's Handbook*. ARRL lab tests of the completed amplifier showed the third-order IMD products down at least 30 dB during a two-tone test at 50 watts PEP output. Second harmonic suppression is at least 45 dB and third harmonic suppression more than 50 dB. These are worst-case conditions which were measured on 80 meters.

Construction

The power amplifier circuitry should be contained on a separate, double-sided pc board. Leave the bottom foil intact to act as a ground plane. Modular construction was used in my unit with the antenna changeover relay, relay drivers and the biasing network built on small pc boards. Between-board connections are made with short lengths of small-diameter coaxial cable (RG-174/U) fitted with shielded phono plugs that mate with jacks at the proper places. This type of interconnection provides servicing ease and ensures good grounding and minimal rf leakage, which can otherwise lead to rf feedback problems or other stray currents. The output filters should be built on single-sided pc board; their construction will be covered later.

As may be seen in the photo on page 18, the amplifier board is mounted in a vertical position on the back panel of a 6 × 6-1/2 × 7-inch (152 × 165 × 178-mm) enclosure. The transistor mounting studs and flange project through the pc board, where they are able to lie flush against the panel with the studs projecting through the panel and heat sink mounted on the opposite side. The heat sink should be bolted securely to the rear panel to ensure that both the sink and the chassis will dissipate the heat. A judicious amount of heat-sink compound should be used at the point where the transistors bolt to the sink. The heat sink I used was a "junk box" item and measures 1 × 4 × 3 inches (25 × 102 × 76 mm). By itself, this heat sink is inadequate, but with the chassis sharing the work, sufficient heat sinking is available. Two-tone tests, several minutes in length with the amplifier operating at full output, did not raise the sink temperature over 110° F (40° C).

Physical layout of the amplifier is not critical, but it should be symmetrical and linear — input at one end, output at the other end. The transistor strip leads should be soldered flush to the pc board. First, lay out the board and etch it. Then drill a 3/8-inch hole in the center of the transistor mounting area. The transistor flange will push through so that the strip leads will lie flush on the pc board. Before soldering the leads to the board, bend a 1/16-inch (1.6-mm) tab up on each lead. This will make any future removal of the

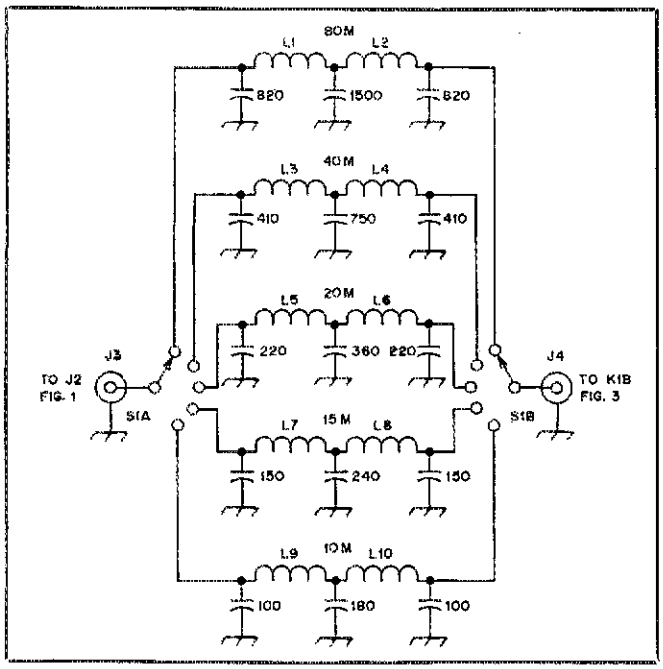


Fig. 2 — Schematic diagram of the 5-pole Chebyshev output filters. All capacitors are silver mica types. Note: All inductors are wound on Amidon T 68-2 cores using no. 24 enameled wire.
L1, L2 — 21 turns (2.4 μH), f_c = 4.5 MHz.
L3, L4 — 15 turns (1.28 μH), f_c = 8.5 MHz.
L5, L6 — 11 turns (0.64 μH), f_c = 17 MHz.
L7, L8 — 9 turns (0.44 μH), f_c = 25 MHz.
L9, L10 — 7 turns (0.31 μH), f_c = 35 MHz.
S1 — 2-pole, 5-position ceramic rotary.

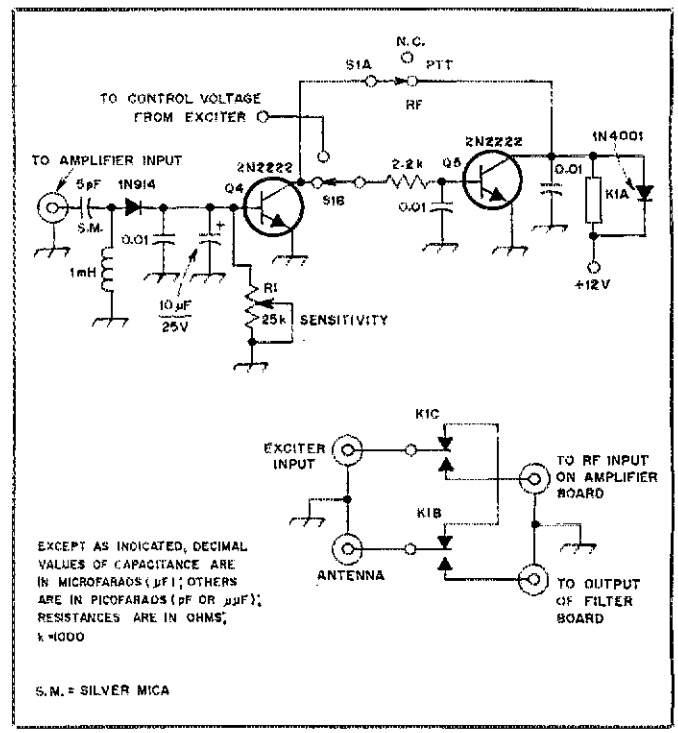
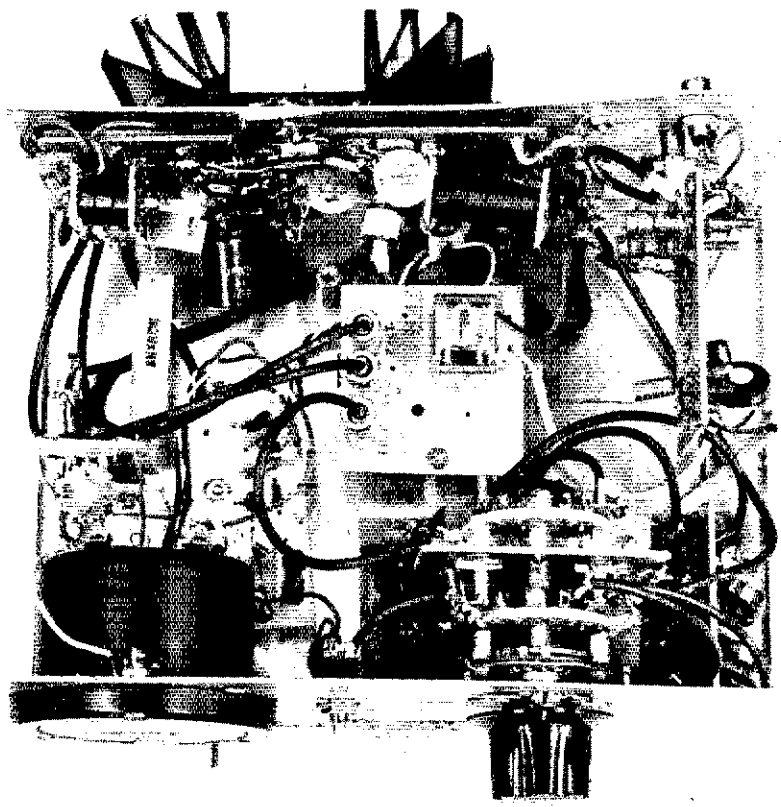


Fig. 3 — Schematic diagram of the antenna switching circuitry. S1 provides a means of selecting either the control voltage from the exciter or the rf input to the amplifier to energize K1.
K1 — Dpdt relay, 2-A contacts, 12-V, 100-ohm (minimum) coil (Radio Shack 275-206 or equiv).
S1 — Dpdt miniature toggle switch (Radio Shack 275-1546).



This topside view of the amplifier shows its modular construction. The bias circuit components are mounted behind the panel meter. Next in line is the board containing the rf sensing circuitry for the antenna changeover relay. The relay itself is on a separate board behind the band switch and output filter board. At the far right is the power-output/SWR-meter board. The final-amplifier board is secured to the rear panel of the enclosure as described in the text.

transistor much easier. Be sure to heat sink the transistors while soldering.

Ferrite Transformer Construction

The three ferrite-loaded transformers can be constructed from Amidon FB2403-43 beads (μ = 950), some pc board material and 0.19-inch (4.8-mm) diameter brass thin-wall tubing. Such tubing can be purchased at a hobby shop or 3/16-inch (4.8-mm) copper tubing may be substituted; the brass tubing is preferred. (Amidon FT50-43 toroids may be used instead of the beads and 1/4-inch (6.4-mm) copper tubing in place of the brass tubing.) Six beads are required for T1, four for T2 and 10 for T3. If the more expensive toroids are used, only two are needed for T2 and eight for T3 at this power level. A pictorial description of the mechanical construction of these transformers may be found in chapter two of *The Radio Amateur's Handbook*, 1979 through 1981 editions.

T1 consists of two stacks of three FB2401-43 beads on lengths of brass or copper tubing. The end plates are made from two pieces of pc board material drilled to accept the tubing. One end plate has the foil left intact while the other end plate has the foil cut in the middle. Thus, the tubing acts as a one-turn winding. The second winding consists of two turns of no. 24 insulated wire, which is carefully threaded through the tubing. This transformer has a 4:1 step-down ratio from the primary (2-turn winding) to

secondary. The center tap on the secondary is made by soldering the leads of C1 and RFC1 to the center of the foil on the pc board end plate.

T2 uses two stacks of two FB2401-43 beads each. No tubing or pc board end plates are used. The two stacks are held together with electrical or masking tape. Two turns of a twisted pair of no. 20 insulated or no. 18 enameled wire are bifilar wound and wired as a 4:1 balun.

T3 is made from two stacks of five FB2401-43 beads each, constructed similarly to T1. The secondary consists of three turns of no. 24 insulated wire. This transformer has a 9:1 impedance step-up ratio.

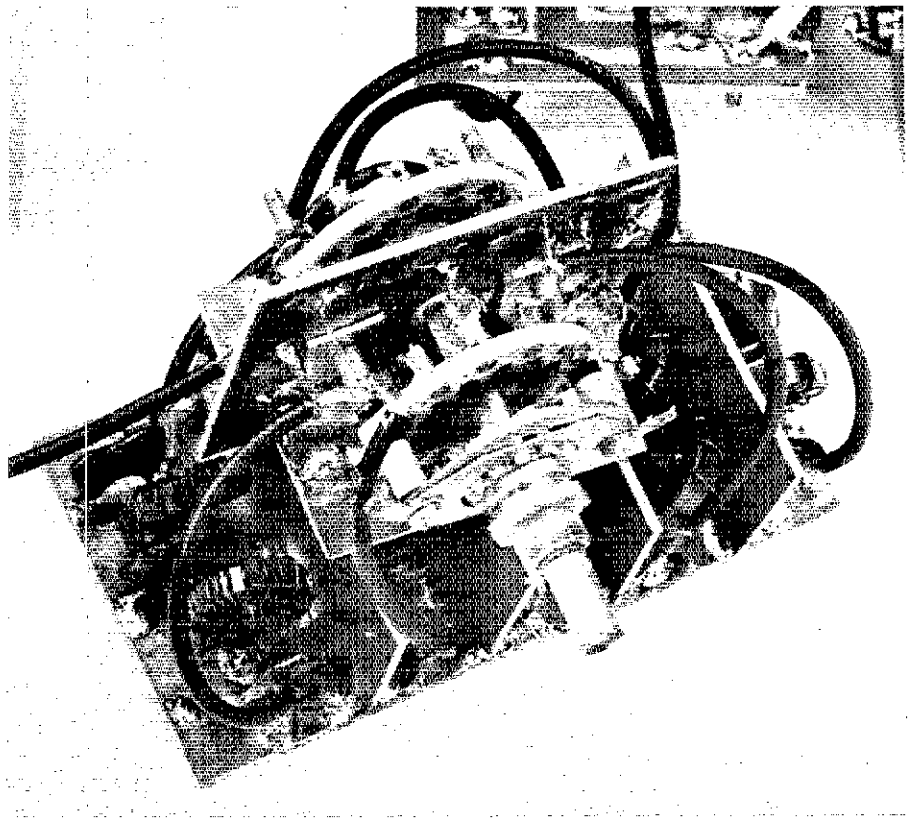
If you decide to use toroids instead of beads, then use two FT50-43 stacked toroids for T2. Two turns of a twisted pair of no. 18 or 20 wire are wound as a 4:1 balun. T1 and T3 are constructed similarly except that 1/4-inch (6.4-mm) copper tubing is used. The transformers are not difficult to construct, but require a bit of care. T1 and T3 should be constructed before the board layout is made so they may be used during that process. RFC1 and RFC2 are small chokes wound on Amidon six-hole beads. Alternatively, use a twisted pair of no. 24 wire and wind 4 turns on an FB2403-43 bead.

The 0.47-ohm, wire-wound resistor is a stock Radio Shack item; do not omit it. This resistor provides a slight voltage drop so that when 0.68 volt is present at the bases of Q1 and Q2, the current through the diodes is slightly higher than if the resistor were not there. Its presence provides a slightly higher standing current in the diodes, which helps to regulate the bias voltage as Q1 and Q2 draw more base current.

The output filter board is a single-sided pc board. Do not use two-sided board because it will degrade filter performance. A two-wafer switch should be used with a shield of double-sided pc board between the wafers. The pc board not only acts as a shield, but also is a convenient ground point for the braid of the coaxial cables interconnecting the switch to the individual filters. Shields were also placed between each filter. The shielding between the individual filter sections may not be necessary, but the switch shield is. Be sure that all coaxial cable braids are grounded at both ends. At this power level, any leakage seems to degrade the filter action.

Fig. 3 is the schematic diagram of the antenna relay circuitry. S1 is mounted on the front panel of the amplifier enclosure. Both the transistors and relay are available from local Radio Shack outlets.

A Breune-type wattmeter[2] is installed between the antenna jack and the antenna relay; the circuit is shown in Fig. 4. Before installing the wattmeter, it should be balanced using a 50-ohm load and an accurate wattmeter. This simple wattmeter has excellent linearity and will provide



A close-up look at the output filter board. The pc board shield section between the switch wafers is required to ensure proper output filter performance.

reasonably accurate power measurements down to the 1-watt level. If you use a standard 50-μA meter as shown, you can calibrate the meter face by simply choosing the desired full-scale power reading (P_{FS}); power measurement is then determined by:

$$(I/50)^2 \times P_{FS}.$$

Adjustment and Operation

First disconnect RFC3 from the dc line and set R1 at maximum resistance. Set the bias trimming potentiometer (R3) at midrange. Apply +12 volts to the amplifier and, while monitoring the voltage at the bases of Q1 and Q2, adjust R1 for a voltage reading of about 0.68 volt. R3 may be used for a fine adjustment. Remove the +12 volt supply, reconnect RFC3 and install an ammeter in the dc supply line. Reapply the +12 volts to the amplifier and check for 0.68 volt at the transistor bases; readjust R3 if necessary. The ammeter in the line should read about 0.75 A. The value is not critical, but it should be greater than 0.6 A for good regulation.

Attach a 50-ohm dummy load (capable of dissipating 50 watts) and the exciter to the amplifier. Ensure that both the exciter and the amplifier are set for the same band of operation. With power applied to the amplifier, slowly increase the exciter output while carefully monitoring the output meter and the dc line ammeter. As

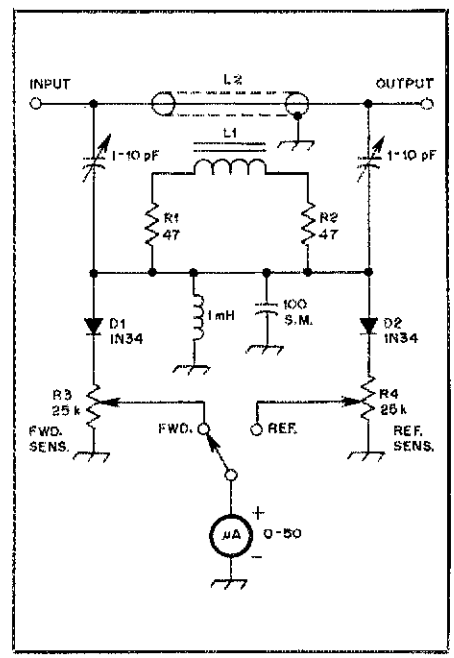


Fig. 4 — The optional wattmeter schematic diagram. The diodes, D1 and D2, should be closely matched in forward and reverse resistance characteristics; an ohmmeter check will suffice. R1 and R2 should also be matched closely for best performance.
L1 — 18 turns no. 26 enameled wire on FT50-43 core or FB2401-43 bead.
L2 — Short length of RG-58/U (for use with toroid core) or RG-174/U (for bead); a 1-3/4-inch (45-mm) length is sufficient. The shield braid is left on the cable and grounded only at the output-port side.
R3, R4 — 25-kΩ pc-mount potentiometers.

drive increases, output power and collector current will increase. Increase the drive until about half-power (25-watts) output is indicated. At this point, the collector current should be close to 6 A; 5.1 A for the collector current, 0.75 A of standby current drain and a relay current drain of 0.1 A. If you obtain similar readings, everything should be working properly. Turn off the drive and check that the amplifier current drops quickly to the standby level. If the current doesn't drop back quickly (within 30 seconds or less) you have a thermal runaway problem and should shut off the power immediately. I encountered no such problem, but if you do, it can be cured by placing a small amount of resistance in the transistor emitter leads. Start with a fraction of an ohm (0.2 to 0.5 ohm) and increase the value until you find one that allows the devices to operate properly. (You will have to readjust the base bias for 0.68 volt). Motorola transistors designed for ssb service within this frequency range are not likely to exhibit thermal runaway problems.

If all is well so far, full-power tests can be run. It is preferable to conduct these tests using a two-tone signal because that reduces power dissipation. If you use single-tone tests, do not prolong them. While the heat sink I used is quite adequate for ssb operation with a 50% duty cycle, it is not large enough to heat sink the transistors during protracted, full-power, key-down tests. On each band, set the drive to deliver 50 watts of output power and switch the wattmeter to read reflected power. Gradually back off the drive and observe the reflected power reading, looking for any "bumps." These are signs of instability. The cure for this is usually in the feedback networks. Insufficient feedback is the likely culprit.

C1 is used to compensate the output matching transformer on the 10-meter band. Adjust C1 for an output power and VSWR readings on 10 and 15 meters, which closely approximate each other. The 10-meter VSWR will probably be somewhat worse than on 80 to 15 meters.

Full-power output should be obtainable on each band with about 1.5 watts of driving power. If you are able to measure the input VSWR, it should not exceed 1.5:1. Cw efficiency of the amplifier will be approximately 45 to 50%, while two-tone efficiency will approximate 35 to 40%. Collector idling current should be about 100 to 150 mA, two-tone collector current 4.8 A and single-tone current about 7.6 A. These figures will vary, of course, and are meant only as benchmarks.

Final Notes

Not all readily available transistors will make good linear amplifiers. Avoid using transistors designed for operation above 175 MHz; stick with transistors designed for the hf bands. Vhf transistors such as the 2N6084 should work well, as will the MRF450A, MRF458A, PT9796A, A50-12 and BLW60. The MRF450A can produce upwards of 35 watts PEP output with good IMD performance and is very clean at the 25-watt power level. It can dissipate 115 watts compared with 60 watts for the MRF449A. (The "A" designation denotes stud mount.) The circuit components used with the MRF449As may not be appropriate for these other transistors, however, requiring some trial and error in component selection. Also, some transistors are flange-mount types and might be a bit more difficult to work with mechanically. The Motorola *RF Data Manual* is a good reference text.

The general design considerations and techniques given here can be applied to any power level up to about 75 watts. At higher power levels there are other design problems to confront. With power levels of 50 watts and less, simpler designs can be used and duplicated successfully. I hope that many dedicated QRPers who operate phone will find this compact, solid-state amplifier a useful accessory.

Notes

[1] The base impedance used in the push-pull case is the series input impedance, which is found in the data sheet. In the absence of a data sheet, an approximation for medium-power transistors is about 1.5 to 2 ohms at 30 MHz, rising to about 6 to 8 ohms at 3 MHz. Though not perfectly accurate, these estimates will suffice for deriving the initial component values.

[2] W. B. Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April 1959, p. 24.

Strays

TA PROFILES

☐ Do you find it frustrating to chase DX when band conditions are poor? Well, ARRL Technical Advisor John Battle, N4OE, can chase DX even if the bands are dead — he has a collie whose name happens to be "DX"!

John has been a TA since 1979. His field of expertise is rf/microwave, circuit/system design and communication systems. He has published technical articles in both Amateur Radio and trade journals, and has delivered talks at hamfests and other ham gatherings on a variety of technical subjects.

As an active radio amateur since 1961, John holds an Extra Class license as well as phone and telegraph commercial licenses. His Amateur Radio activities include contesting, DX, traffic handling and just plain rag chewing. He is currently Activities Manager for the Southeastern DX Club. John shares his hobby with his wife Nancy, WA4WQH, who holds an Advanced class license and is an active contester and DXer.

TA N4OE smiles at the prospect of having time to work in his home laboratory.

In addition to his operating activities, John spends a great deal of his spare time building and experimenting with electronics in his home laboratory. He also has interests in astronomy, music and science fiction.

Residing in Norcross, Georgia, John is employed by the Georgia Institute of Technology as a research engineer; he specializes in communications systems and radio propagation. He holds a BSEE degree from the University of Texas, and has done graduate work at various schools in engineering and astronomy. John is a registered professional engineer. — *Marian Anderson, WB1FSB*

QST congratulates . . .

☐ William A. Wilson, K6ARO, of Los Angeles, who was recently appointed by President Reagan as Ambassador to the Vatican.

☐ Bob Gunderson, W2JIO, recipient of the Armstrong Pioneer Award for his outstanding contributions to Amateur Radio via his work with, and for, blind hams.

☐ Andrew Freeman, W0GFE, who was recently named the electric industry's "Man of the Year."

Wire Line — A New and Easy Method of Microwave Circuit Construction

Simple tools and techniques provide access to the microwave frequencies.

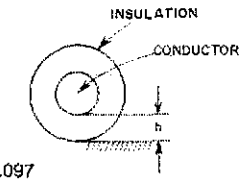
By Robert C. Wilson,* KL7ISA, and Hal Silverman,** W3HWC

In our branch of the Communications Satellite Corporation (COMSAT), hams are not plentiful. So when the authors met and found that a common interest in amateur microwave techniques existed, we formed a lunch-time technical society at the plant. After a lot of discussion, research and breadboarding, we came up with a new technique that will certainly put microwave circuit construction within easy reach of any amateur.

"Wire line" is a greatly simplified transmission line construction technique which does not require extreme precision or pc-board etching and uses commonly available parts and tools. By using only a soldering iron, diagonal cutters and a ruler, it is possible to build microwave mixers, oscillators, super-regenerative detectors and other microwave rf circuits with surprisingly good results.

Table 1

Required Wire Spacing for a 51.5-Ohm Impedance Line



Wire Gauge (AWG)	*Diameter (in.)*	*Dielectric Constant (e)* 1	2	3	4	5
12	0.080	0.007	0.027	0.049	0.072	0.097
14	0.064	0.006	0.022	0.039	0.057	0.077
18	0.040	0.004	0.014	0.024	0.036	0.048
22	0.002	0.002	0.009	0.015	0.022	0.030
30	0.010	0.001	0.003	0.006	0.009	0.012

The required wire-to-ground-plane spacing (h) in inches is shown below the various dielectric constant values. Inches x 25.4 = mm.

Theory

Transmission line circuits are necessary at microwave frequencies to keep the circuit losses under control, to conduct the signals from one place to another and to match one circuit to the next. One of the more popular microwave transmission-line techniques is called stripline. Stripline employs an etched copper strip transmission line over a ground plane. Literature is available describing stripline techniques and circuit design.[1] Much of this information may be useful in understanding wire line techniques.

The wire-line approach employs single-wire transmission lines using a ground-plane image. Theory indicated that there was no reason this technique would not work at microwave as well as at audio frequencies. The formula

$$Z_o = \frac{138}{\sqrt{e}} \log_{10} \frac{4h}{d}$$

where

Z_o = line impedance
e = dielectric constant of the medium
h = height above ground
d = diameter of the wire

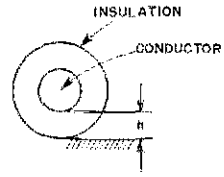
would closely approximate the final results.

If the wire is insulated and the insulation is brought into contact with the ground plane, a simple, stable and adjustable circuit element is formed. The spacing of the wire above the ground plane is determined by the insulation on the wire. We found that the effective value of the dielectric constant, e, may be

Table 2

Spacing Versus Impedance Using No. 14 Wire

Impedance (Z_o) in ohms	*Spacing (h) in inches*
30	0.006
40	0.019
50	0.036
70	0.089
100	0.256
120	0.481



This table gives the required spacing (h) in inches for no. 14 AWG wire with a dielectric constant (e) of 3 to provide a specific impedance. Inches x 25.4 = mm.

[1]Notes appear on page 23.

*5805 Ipswich Rd., Bethesda, MD 20014
**Rte. 7, Box 199, Mt. Airy, MD 21771

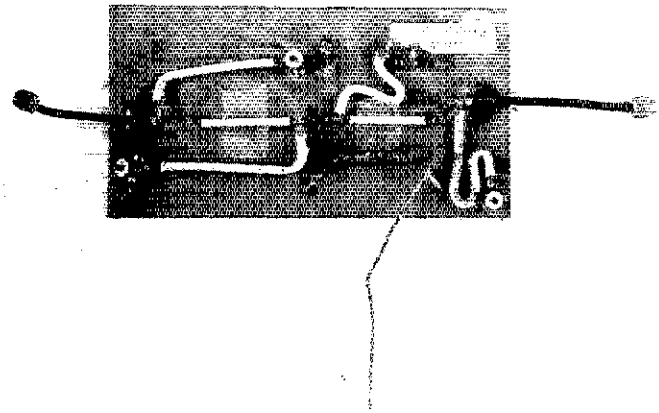


Fig. 1 — A wire line 1296-MHz rf amplifier. The simplicity of construction is quite evident.

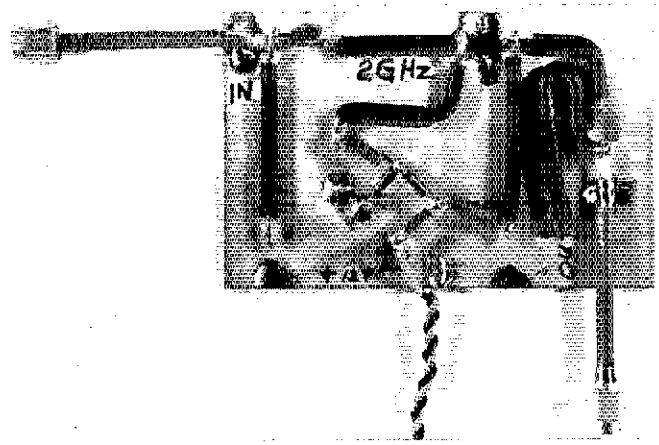


Fig. 3 — Another wire line amplifier, this one constructed for 2 GHz. Note the absence of tuning capacitors; it was tuned by cutting the stubs to proper size.

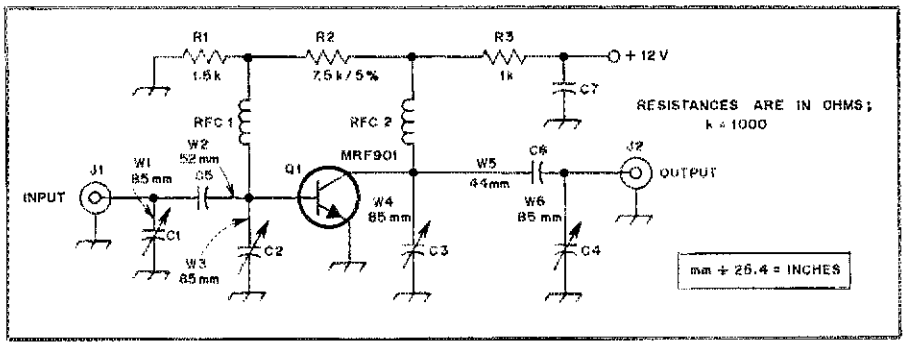


Fig. 2 — Schematic diagram of the 1296-MHz amplifier. If the dimensions shown for W1 through W6 are followed closely, excellent results should be obtained. All resistors are 1/2-watt types.
C1-C4, incl. — 15 pF polypropylene trimmer.
C5, C6 — 47 pF disc ceramic ("zero" lead lengths should be used).
C7 — 0.01 µF disc ceramic.
J1, J2 — SMA connectors.
Q1 — Motorola MRF-901, npn silicon transistor, f_T = 4.5 GHz.
RFC1, RFC2 — 10 turns no. 30 enam., 1/8-inch (3-mm) dia, close wound.

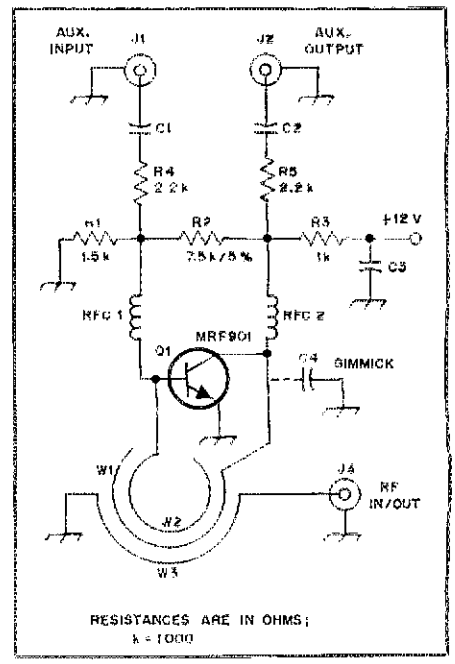


Fig. 4 — The "triple-threat oscillator." Description and arrangement of the lines (W1-W3) and the tuning procedure are discussed in the text. All resistors are 1/2-watt types.
C1-C3, incl. — 0.01 µF, 100 V.
C4 — Gimmick capacitor made from an 8-32 screw threaded into the pc board near W1.
J1-J3, incl. — SMA connectors.
RFC 1 — 10 turns no. 30 enam., 1/8-inch (3.2 mm) dia.
RFC2 — 10 turns no. 30 enam., 1/4-inch (6.4 mm) dia.
W1 — 1.85 inches (47 mm) no. 14 wire (see text).
W2 — 1.46 inches (37 mm) no. 14 wire (see text).
W3 — See text.

adjusted to take into account the amount of the field both in the air and in the insulation.

Experimental results indicated that a piece of no. 14 AWG, PVC-insulated house wire glued to a copper ground plane has an impedance of 58 ohms. This produces an effective dielectric constant of about 2 for PVC in this configuration. Table 1 shows the general range of results that may be expected using common wire sizes with varying types of insulation. Table 2 indicates that a maximum impedance in the range of 100-120 ohms is expected because of spacing and radiation problems; at the low end, 30 ohms could be considered a limit.

One item of interest is the double-stub tuner, a short section of transmission line about 3/8 wavelength long with an adjustable stub tuning line attached at either end. This produces a matching system much the same as a pi-network tuner, but one that will operate in the microwave range. Using small ceramic,[2] glass or polypropylene tuning capacitors on the ends of the stub lines (each about 3/8 wavelength long) will allow a wide range of impedance matching. If a different impedance-matching range is necessary, the lines may be shortened or lengthened easily. Using this method, it is possible to "screwdriver adjust" most microwave circuits for best results.

An RF Amplifier and Oscillator

Amplifiers that have been designed and built using wire line have surpassed initially expected results and have often exceeded the specification sheet gain for the transistor used. The amplifier shown in Figs. 1 and 2 was built using ordinary house wire, polypropylene variable capacitors and an ion-implanted Motorola MRF-901 transistor. This unit works very well at 1296 MHz and, if the dimensions given are duplicated, similar results should be obtained. Other amplifiers (such as the 2-GHz unit shown in Fig. 3) have been built for use at frequencies up to 3 GHz. The total cost of such a project is about $5.50.

The "triple-threat" oscillator shown in Fig. 4 will function as an ordinary oscillator, as a crystal injection-locked oscillator and as a super-regenerative detector. In order to build a receiver, one must have a local oscillator and its output should be clean.[3] Bipolar devices often produce parametric parasitic frequencies and noise, and our first conventionally developed circuits were no exception.

Therefore, the circuit shown was designed. This circuit uses a minimum of high-cost devices and eliminates items like chip capacitors. A bias network similar to that of the amplifier prevents accidental burn-out.

The "tricks" involved here are making the lead lengths as short as possible on the rf side of the circuit. Wrap W1 on a 3/8-inch (9 mm) form and adjust the diameter so that it reaches from the collector to within 1/8-inch (3 mm) of the base of Q1. (Always pre-tin the component leads and use as little heat as possible when soldering.) Do the same for the base lead, W2, and position it inside the collector lead. Glue down the collector lead using only "instant" glue.[4] For maximum output, push the base lead tightly against the collector lead and do the same for the output lead, W3; then glue them down. (W3 is simply a wire line run to the output connector at the edge of the board.) If a signal with very low harmonic content is required, the base lead, W2, may be spaced away from the collector lead until the oscillator almost stops.

The oscillator range has not been tested fully, but we have built some that work from 1 GHz to 2.5 GHz. By feeding a 100-kHz sine wave into the auxiliary input, and placing a 3-kHz low pass filter and an audio amplifier at the auxiliary output, it becomes a super-regenerative detector. We have been able to receive signals at levels as low as −90 dBm with no problem. Like all super-regenerative receivers, this one may cause RFI and is recommended only for short-term experimental operation.

Combined Circuits

The rf amplifier, mixer and oscillator might be combined into a down-converter. If a more stable down-converter is desired, it is possible to crystal lock the oscillator by injecting a 100-MHz-range signal into the auxiliary input. The oscillator must then be tuned for lock. This is evident only when using more sophisticated observation methods such as noticing if received signals are stable when the frequency trim screw is moved slightly.

We hope that the methods described here will provide a solid starting place for amateurs interested in microwave experimentation and activities. We would like to thank the management of COMSAT for releasing the data offered here and for providing the equipment used during the experimental stages. QST

Notes

[1] *Reference Data for Radio Engineers*, Howard W. Sams Co., sixth edition, chapter 24.
[2] Some ceramic capacitors have poor Q at microwave frequencies.
[3] R. C. Wilson, "Parasitic Oscillations in High-Power Transistor RF Amplifiers," *Ham Radio*, September 1970.
[4] Use only a cyanoacrylic glue similar to Eastman 910® to prevent detuning or loss of Q.

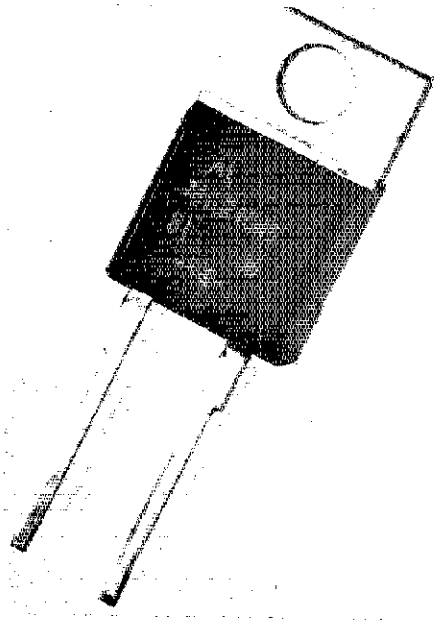
New Products

MOTOROLA SCHOTTKY RECTIFIERS

☐ Low-cost Schottky diodes are now available in plastic cases from Motorola Semiconductor Products Inc. They are designated MBR1020, 1035 and 1045, and are packaged in the familiar TO-220AC style case. The series of devices is rated at 10 A (case temperature of 135° C) with voltage ratings from 20 to 45. Prices are roughly 60% lower than those for equivalent-characteristic Schottky rectifiers in metal cases.

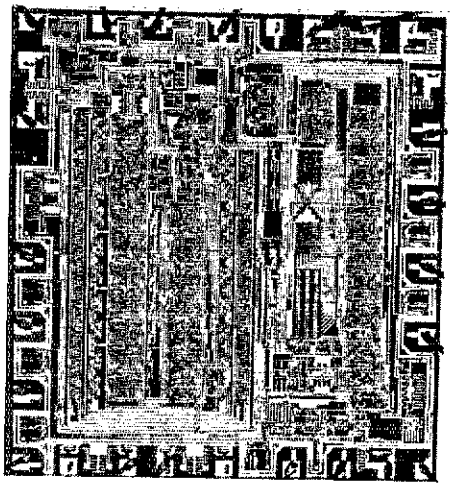
The main feature of interest to designers is the low forward voltage of Schottky diodes. For the Motorola units under discussion, the forward voltage drop is typically 0.2 at 0.5 A and increases to only 0.5 V at 10 A (instantaneous). Silicon rectifier diodes of standard design have a forward voltage drop of 0.6 to 0.7 V. The lower drop of the Schottky diodes is of value in circuits where a minimum drop is mandatory — such as the gate diode between a solar-electric panel and the storage battery (buffer), or when a diode is used in series with a dc line to protect against circuit damage from reverse-polarity power supply connection. There are many other applications that call for a low-forward-voltage type of diode, so the new MBR series may be entirely suitable for the need.

The 100 to 999 lot cost for the MBR diodes is $1.35, $1.70 and $2, respectively, for the 1020, 1035 and 1045 devices. Data sheets are available from Motorola Semiconductor Group, Box 2953, Phoenix, AZ 85062. — *Doug DeMaw, W1FB*



NEW MOTOROLA LSI SYNTHESIZER FAMILY

Motorola has introduced two new frequency-synthesizer ICs, the first of a series of seven devices. The MC145155 and MC145156 use LSI technology to reduce synthesizer costs, fostering the implementation of PLL circuitry in equipment that still relies on tuned circuits and multiple crystals.

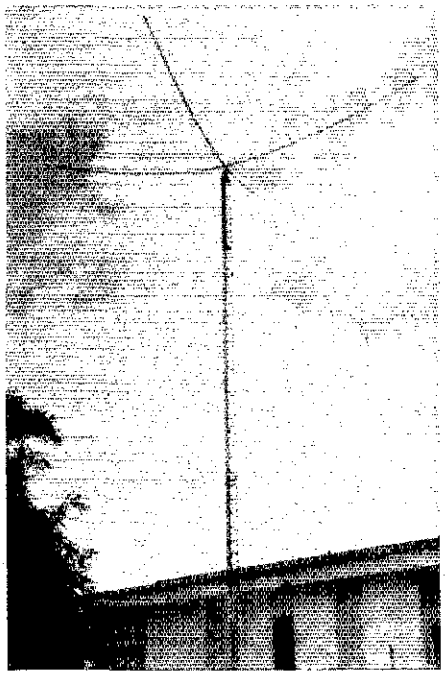


The inside of an LSI chip resembles an aerial view of an ancient Egyptian temple.

The devices are programmed with a clocked, serial input bit stream. Other members of the family are still under development but are due for introduction in 1980. Common family features include a crystal reference oscillator, reference divider, digital phase detector, lock detection circuitry and the necessary programmable divide-by-N counters. The reference oscillator also serves as an input buffer when the use of an external reference source is desired. Other family highlights include: 3- to 9-V dc operation, low dc power drain, −40 to +85° C operating temperature range, improved phase/frequency detector design, operation with low input drive levels (500 mV p-p), and on-chip latches and shift registers for the serial and data bus designs.

The MC145155 and MC145156 are available in both ceramic and plastic DIPs. Availability is through OEM sales offices and authorized Motorola distributors. Further information may be obtained from: Motorola Semiconductor Products, Inc., Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB*

The Telerana — A Broadband 13- to 30-MHz Directional Antenna



This lightweight, high-gain antenna won't tax your patience, budget or construction ability. You'll like the results!

By Ansyl Eckols,* YV5DLT, ex-W5DLT

My friendship with George Smith, W4AEO, spanning many years, is directly responsible for the development of the Telerana, a rotatable log-periodic antenna that is lightweight, easy to construct and relatively inexpensive to build. Not only does it cover the range of 13 to over 30 MHz with an acceptable SWR, but in my opinion, based on my observations and those of many amateurs, it also outperforms other antennas of equal size.

During one of our QSOs back in the early 1970s, George had expressed his interest in log-periodic antennas. Indeed I was impressed by the signal strength his antenna put into South America. Appreciating his enthusiasm for the log periodic, I offered to take signal readings in Venezuela whenever he performed tests. After a year of almost daily schedules and comparison checks, George, as a token of his gratitude, made a log-periodic antenna that he kindly shipped to me. Upon its arrival, I wasted little time in suspending it above the roof of my home. The results were noteworthy. Put up in an inverted-V configuration, the array quickly was dubbed "the spiderweb" by my wife, Graciella. Being aesthetically inclined, she was rather displeased by the appearance of wires spreading over the house. Admittedly, it lacked the status of an ornament. What then to do?

*[Editor's Note: After accepting Mr. Eckols' article for publication, we were saddened to learn of his passing.]

Table 1

Shopping List for the Telerana

1 — 1-1/4-inch (32-mm) galvanized, 4-outlet cross or X.
4 — 8-inch (203-mm) nipples.
4 — 15-ft (4.6-m) long arms. Vaulting poles suggested. These must be strong and all of the same strength [150 lb (68 kg)] or better.
1 — spreader, 14.8 ft (4.5 m) long (must not be metal).
1 — 4:1 balun unless open-wire or TV cable is used.
12 — feed-line insulators made from Plexiglas or fiberglass.
36 — small egg insulators.
328 ft (100 m) copper wire for elements, flexible 7-22 is suggested.
65.6 ft (20 m) no. 14 Copperweld wire for interelement feed line.
164 ft (50 m) strong 1/8-inch (3-mm) dia cord.
1 — roll of nylon monofilament fishing line, 50 lb (22.7 kg) test or better.
4 — metal tubing inserts to go into the ends of the fiberglass arms.
2 — fiberglass fishing-rod blanks.
4 — hose clamps.

After considerable thought, study of available information and frequent consultations with George, an alternative came to mind. This called for a more compact, rotatable version of the antenna that could be mounted atop my tower in place of the three-band Yagi installed there. The Telerana (Spanish for "spiderweb") came into being as a result.

An Efficient Antenna with Good F/B and F/S Ratios

The YV5DLT spiderweb antenna is a

Table 2

Impedance Checks with Palomar Bridge and Collins 51J4 Receiver

Without Balun			*With 4:1 Balun*		*SWR with SECO Tester*	
Frequency	*R*	*jX*	*R*	*jX*	*Frequency*	*SWR*
12	250	70	55	+40	14.0	1.4
13	80	−30	30	−10	14.1	1.3
14	250	70	90	?	14.2	1.3
15	60	0	35	+10	14.3	1.4
16	250	−10	80	−7	14.4	1.5
17	150	−10	45	0	14.5	1.6
18	150	−20	45	−10	21.0	1.5
19	150	20	45	+10	21.1	1.5
20	150	−20	45	−10	21.2	1.4
21	140	0	45	+10	21.3	1.3
22	200	−20	60	−10	21.4	1.3
23	120	−20	40	−5	21.5	1.2
24	220	−20	50	0	28.0	1.1
25	150	−25	40	−10	28.1	1.1
26	100	−20	35	+10	28.2	1.1
27	175	0	50	+10	28.3	1.1
28	140	−30	45	−10	28.4	1.1
29	90	−10	40	+20	28.5	1.2
30	160	70	70	+10	28.6	1.2
					28.7	1.2
					28.8	1.2
					28.9	1.3
					29.0	1.3
					29.1	1.3
					29.2	1.4
					29.3	1.4
					29.4	1.4
					29.5	1.4
					29.6	1.4
					29.7	1.4
					29.8	1.5
					29.9	1.5
					30.0	2.0

Measurements made with bridge connected to antenna input; SWR measured with Seco tester. Note that the SWR does not exceed 1.5:1 up to 30 MHz.

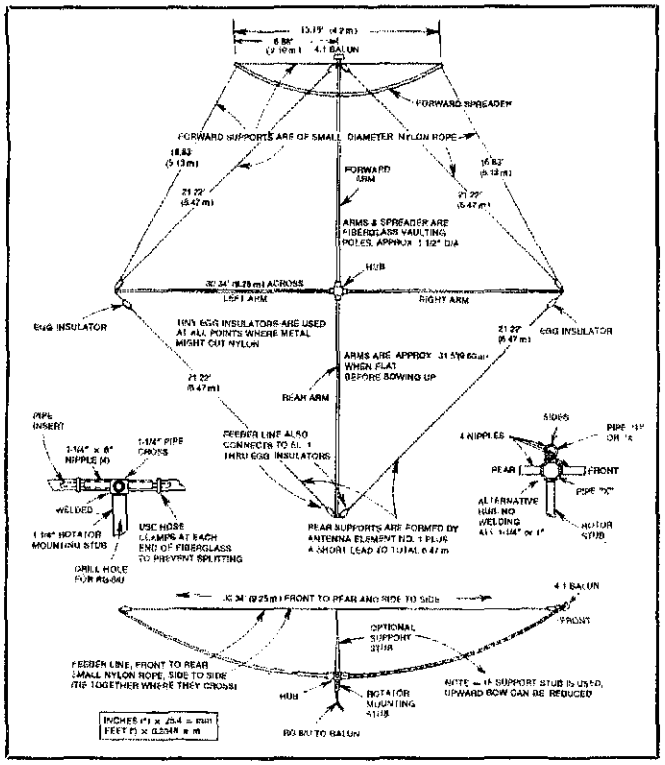


Fig. 1 — Configuration of the YV5DLT spiderweb antenna. Nylon monofilament line is used from the ends of the elements to the nylon cords. Solder all metal-to-metal connections. Use nylon line to tie every point where the lines cross. The forward fiberglass feeder lies on the feeder line and is tied to it. Note that both metric and English measurements are shown except for the illustration of the feed-line insulator. Use soft-drawn copper wire for elements 2 through 12. Element 1 should have no. 7/22 flexible wire or no. 14 Copperweld.

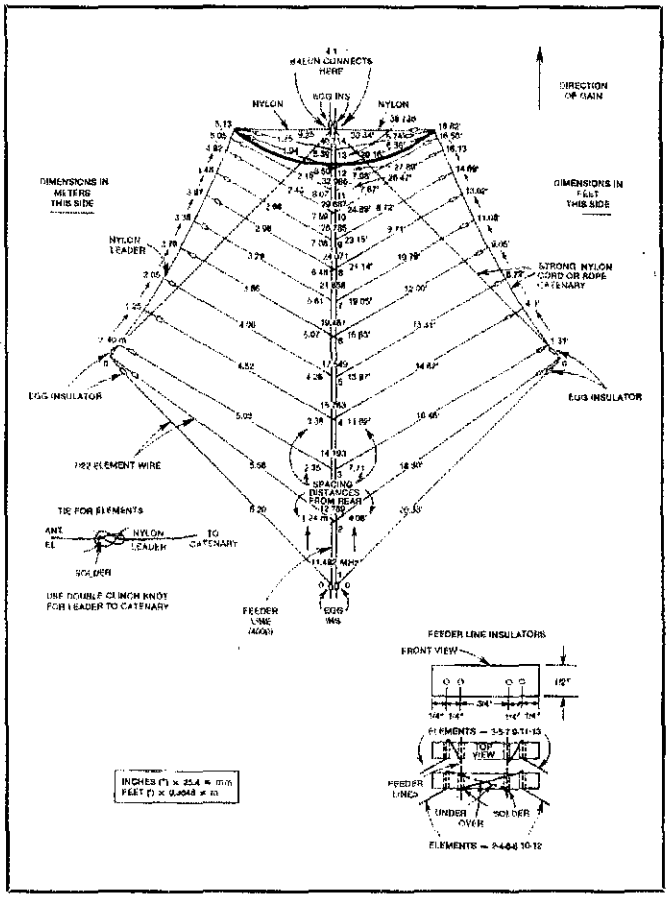


Fig. 2 — The frame construction for the YV5DLT spiderweb antenna. Two different hub arrangements are illustrated.

very efficient high-gain, broadband antenna developed from the log-periodic family. It has a 90% taper and a 0.05% wavelength spacing with the elements swept forward. Because these terms are not always found in Amateur Radio literature on log-periodic design, it will be helpful to the reader who is just being introduced to the terminology to understand that a 90% taper refers to a taper factor of 0.90, and the 0.05% refers to a spacing factor of 0.05. These terms originated in early log-periodic experimental work (about 1958). They are, however, part of the terminology of antenna engineering texts today. For the benefit of readers who may wish to find additional background information on log-periodic antennas, attention is called to the articles by Peter Rhodes, K4EWG, which appeared in *QST* for November 1973, December 1976 and October 1979 and the 13th edition of *The ARRL Antenna Book*.

This version of the YV5DLT Telerana, shown in the accompanying drawings and photographs, actually is usable from near 12 MHz to 30 MHz, the cutoff frequency of the balun. Without the balun, the frequency range would be higher. The SWR ranges from near unity to 2:1. A perfectionist may wish to use an impedance matching network (tuner) to lower the SWR at the transmitter end of the feed line, but it is hardly worth the effort of retuning. In fact, some Amateur Radio writers frown on the use of both a balun and a tuner. See Table 2 for impedance and SWR measurements.

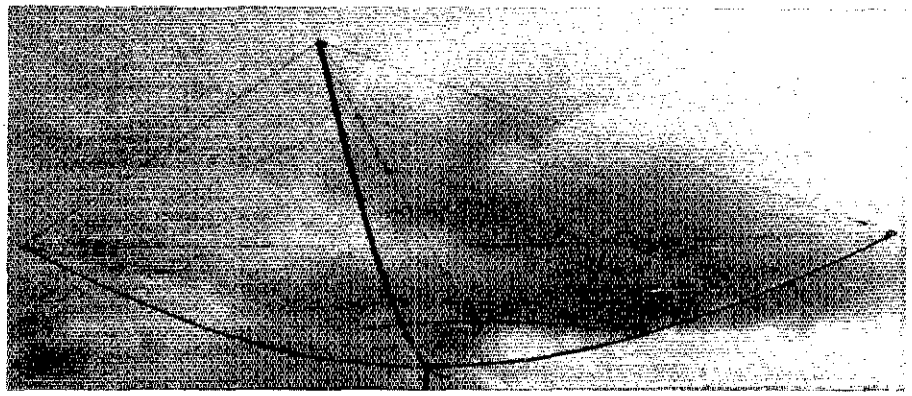


Fig. 3 — The spiderweb antenna, as shown in this somewhat deceptive photo, might bring to mind a rotatable clothesline. Of course it is much larger than the clothesline, as indicated by Figs. 1 and 2. It can be lifted by hand.

Log-periodic antennas have reduced gain at the low-frequency end. For that reason, the Telerana was designed with two elements resonating at a frequency lower than the 20-meter band to ensure good performance on 20 meters (≈10 dB). Gains are slightly higher on the 10- and 15-meter bands. The front-to-back and front-to-side ratios are very acceptable.

The 18- and 25-MHz Bands Included

Not overlooked in the design of this antenna are the future 18- and 25-MHz bands, which are within the range of the spiderweb. It can be made to operate at frequencies of 10 or even 7 MHz merely by adding the necessary longer elements

with proportional increase in the physical size. A 40-meter antenna would be about 65 × 65 ft (20 × 20 m) or slightly smaller because of slant.

The Telerana array consists of 13 dipole elements properly spaced and transposed along an open-wire, interelement feeder having an impedance of approximately 400 ohms. See Figs. 1 and 2. The array is fed at the forward (smallest) end with a 4:1 balun and RG-8/U cable placed inside the front arm and leading to the transmitter. An alternative feed method is to use open wire or ordinary TV cable and a tuner, eliminating the balun. The direction of gain or forward lobe is away from the small end.

The frame (Figs. 3 and 4) used to support the array consists of four 15-ft (4.6-m) fiberglass vaulting poles slipped over short nipples at the hub, appearing like wheel spokes (Fig. 5). Instead of being mounted directly into the fiberglass, short metal tubing sleeves are inserted into the outer ends of the arms and the necessary holes drilled to receive the wires and nylon.

For my first antennas, I was unable to obtain fiberglass and was forced to use aluminum tubing that I insulated into short sections to prevent resonance. They worked fine, but after a while became permanently formed into the upward bow and lost the tension needed for tightening the array. The fiberglass vaulting poles used now are excellent for the purpose. They can be obtained through suppliers' ads in *QST* Ham-Ads. Other materials just as good as fiberglass may exist.

Any builder of the YV5DLT spiderweb will be pleasantly surprised and gratified with the results. It opens possibilities for each builder to incorporate his or her own ideas. The only absolute law for this antenna is that alternate elements must be transposed exactly as shown in the drawings.

Wind Resistance

Although this array seems to offer less wind resistance than a quad, in some areas of high-wind velocities making the array in a flat plane instead of bowed upward may be a better arrangement. This definitely would eliminate metal arms being used because of the proximity of the elements. Anything selected for the arms should be strong enough to prevent drooping. Also, a vertical stub could extend upward from the hub to the plane of the array, securing the feeder and crossbow string to it. This method would permit less upward bowing. My antenna has withstood several high-velocity windstorms without damage.

Materials

A shopping list is provided for the convenience of those amateurs who wish to build the spiderweb antenna. The center hub of my antenna is made from a 1-1/4-inch (32-mm) galvanized four-outlet cross or X and four 8-inch (208-mm) nipples (Fig. 5). A 1-inch (25.4-mm) dia X may be used alternatively, depending on the diameter of the fiberglass. A hole is drilled in the bottom of the hub to allow the cable to be passed through after welding the hub to the rotator mounting stub.

All four arms of the array must be 15 feet (4.6 m) long. They should be strong and springy for maintaining the tautness of the array. If vaulting poles are used, try to obtain all of them with identical strength ratings.

The front spreader should be approximately 14.8 feet (4.5 m) long. It can be much lighter than the four main arms, but must be strong enough to keep the lines rigid. If tapered, the spreader should have the same measurements from the center to each end. *Do not use metal for this spreader.*

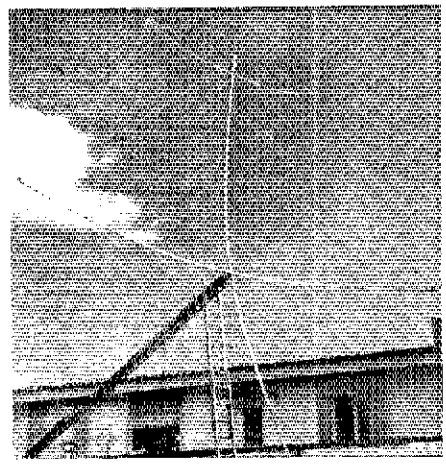


Fig. 4 — The spiderweb antenna resting on a ladder in preparation for preliminary tests. A block and tackle, barely visible in the picture, extends from the house to the tower.

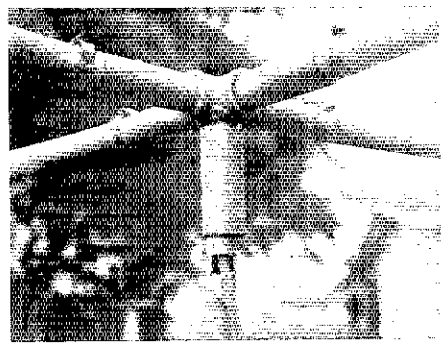


Fig. 5 — The simple arrangement of the hub of the YV5DLT spiderweb. See Fig. 2 and the text for details.

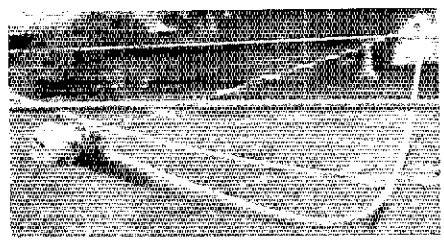


Fig. 6 — The elements, balun, transmission line and main bow of the spiderweb antenna.

Construction

Building the frame for the array is the first construction step. Once that is prepared, then everything else can be built onto it. Assemble the hub and the four arms, letting them lie flat on the ground with the rotator stub inserted into a hole in the ground. The tip-to-tip length should be about 31.5 feet (9.6 m) each way. A hose clamp is used at each end of the arms to prevent splitting. Insert the metal inserts at the outer ends of the arms, with 1 inch (25.4 mm) protruding. The mounting holes should have been drilled at this point. If the egg insulators and nylon cords are mounted to these tube inserts, the whole antenna can be disassembled simply by bending up the arms and pulling out the inserts with everything still attached.

Choose the arm to be at the front end. Mount two egg insulators at the front and rear to accommodate the interelement feeder. These insulators should be as close as possible to the ends.

At each end of the crossarm on top, install a small pulley and string nylon cord across and back. Tighten the cord until the upward bow reaches 39.4 inches (1 m) above the hub. All cords will require retightening after the first few days because of stretching. The crossarm can be laid on its side while preparing the feeder line. For the front-to-rear bowstring, it is important to use a wire that will not stretch such as no. 14 Copperweld. This bowstring is actually the interelement transmission line. See Fig. 6.

Secure the rear ends of the feeder to the two rear insulators, soldering the wrap. Before securing the fronts, slip the 12 insulators onto the two feed lines. A rope can be used temporarily to form the bow and to aid in mounting the feeder line. The end-to-end length of the feeder should be 30.24 feet (9.25 m).

Now, lift both bows to their upright position and tie the feeder line and the crossarm bowstring together where they cross, directly over and approximately 39.4 inches (1 m) above the hub.

The next step is to install the no. 1 rear element from the rear egg insulators to the right and left crossarms using other egg insulators to provide the proper element length. Be sure to solder the element halves to the transmission line. Complete this portion of the construction by installing the nylon cord catenaries from the front arm to the crossarm tips. Use egg insulators where needed to prevent cutting the nylon cords.

In preparing the fiberglass front

spreader, keep in mind that it should be 14.75 feet (4.5 m) long before bowing and is approximately 13.75 feet (4.2 m) when bowed. Secure the center of the bowstring to the end of the front arm. Lay the spreader on top of the feed line, then tie the feeder to the spreader with nylon fish line. String the catenary from the spreader tips to the crossarm tips.

At this point of assembly antenna elements 2 through 13 should be prepared. There will be two segments for each element. At the outer tip make a small loop and solder the wrap. This will be for the nylon leader. Measure the length plus 0.4 inch (10 mm) for wrapping and soldering the element segment to the feeder. Seven-strand no. 22 antenna wire is suggested for use here. Slide the feed-line insulators to their proper position and secure them temporarily.

The drawings show the necessary transposition scheme. Each element half of elements 3, 5, 7, 9, 11 and 13 is connected to its own side of the feeder, while elements 2, 4, 6, 8, 10 and 12 cross over to the opposite side of the transmission line.

There are four holes in each of the transmission-line insulators (see Fig. 1). The inner holes are for the transmission line, and the outer ones are for the elements. Since the array elements are slanted forward, they should pass through the insulator from front to back, then back over the insulator to the front side and be soldered to the transmission line. The drawings show how the transpositions have the element end go over and under the opposite line.

Everywhere lines cross, they are tied together with nylon line, whether copper/nylon or nylon/nylon. This makes the array much more rigid. All elements should be mounted loosely before you try to align the whole thing. Tightening any line or element affects all others. There will be plenty of walking back and forth before the array is aligned properly. Do not expect it to be real taut.

Concluding Notes

The spiderweb antenna weighs no more than 40 lbs (18 kg). My antenna is 3 lbs (1.3 kg) heavier at the front than at the rear. Consequently I provided a 3-lb counterweight in the rear arm.

My transmitter output is connected through RG-8/U, which terminates in a 4:1 balun at the antenna. I have used a tuner to lower the SWR at the transmitter end feed point of the coaxial cable, but I prefer the broadband feature of the antenna and willingly accept the slight mismatch that, after all, results in very little loss.

Perhaps I should also mention that the YV5DLT Telerana antenna performs well enough at heights of 5 to 10 feet (1.5 to 3 m) that all preliminary testing can be done at this level. This is a real convenience to the builder.

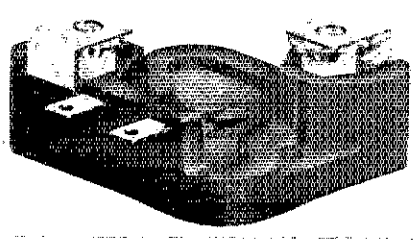
I wish to thank George Smith, W4AEO, for his many years of collaboration in numerous projects; Paul Scholz, W6PYK, for his help; and Al Ray, KB5Z, for his patience in helping me with on-the-air tests during the past three years. I do suggest that you review the numerous articles by George Smith, Paul Scholz and Peter Rhodes that have appeared in *QST* and other radio publications.

New Products

MOTOROLA HIGH-CURRENT, SILICON POWER TRANSISTORS

☐ Motorola has announced a series of new high-current power transistors. The MJ10050, MJ10100 and MJ10200 are npn Darlingtons that are designed to operate at collector currents of 50, 100 and 200 amperes and have V_{CEO} ratings of 850, 450 and 250 volts respectively. They are capable of dissipating 500 watts. These devices are aimed at six-step, ac-motor speed/torque controls and low-frequency inverters.

The transistors are housed in a unique "User-Designed Package." Some of the features are: single-sided mounting with isolated mounting holes, bussable terminals (1/4-inch or 6.4-mm bolt with captured nut), separate drive terminals (1/4-inch or 6.4-mm fast-on terminals), drive terminal capable of accepting a no. 6 bolt, extra large heat-sink contact area, hybrid free-wheeling diode and spacing and creepage distances to meet equipment standards



These devices are rated to operate from 120-, 220- and 440-volt lines. They key transistor parameters such as leakage, saturation voltages and switching times are specified at elevated temperatures, enabling the designer to predict performance under practical conditions. In addition, the rated overload capability of the devices is published for design considerations.

Further information may be obtained from Mr. Jack Takesuye, Motorola Semiconductor Products Inc., P. O. Box 20912, Phoenix AZ 85036. — *Paul K. Pagel, N1FB*

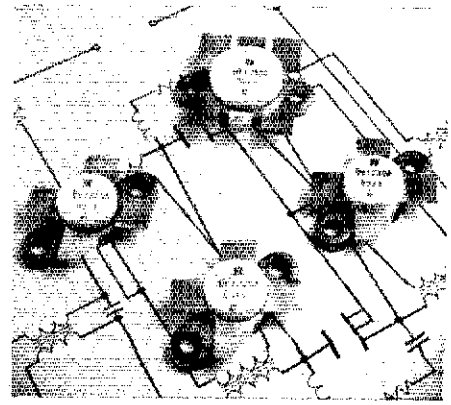
NEW VMOS POWER FETS BY SILICONIX

The long-awaited 12-V versions of the Siliconix, Inc., VMOS Power FET transistors have finally hit the market. Previously, the manufacturers of VMOS devices directed their efforts at the 28-V dc market. This made it somewhat impractical for amateurs or land-mobile equipment manufacturers to employ VMOS components in their equipment.

The new Siliconix devices are designed for maximum efficiency at 12 V dc. They deliver their rated power output up to 175 MHz, operating Class A, B or C. These units, the DV1210, 1220, 1230 and 1240, are conservatively rated at 10, 20, 30 and 40 watts, respectively. They are packaged in the familiar flange ceramic strip-line package. They are available also in the new "stripline" TO-220 style of package, called the "C-220."

The significant virtues of VMOS Power FETs are high gain, low baseband noise and immunity to burnout from mismatch. Furthermore, they are not subject to thermal runaway.

The 100-lot price class of the new VMOS parts is $11.69 (DV1210), $15.37 (DV1220), $19.22 (DV1230) and $23.38 (DV1240). The manufacturer is Siliconix, Inc., 2201 Laurelwood Rd., Santa Clara, CA 95054. Tel. 408-988-8000. — *Doug DeMaw, W1FB*



The Burglar Alarm that Resets Automatically

"Curses! Foiled again!" says the would-be thief as he runs away. This alarm is smart enough to reset itself and wait for the next intruder.

By Dan Sanderson,* KM5T

Although insurance is now available for Amateur Radio mobile equipment, it is not pleasant to have your rig stolen. Even with replacement-type insurance, there is a deductible amount — usually a minimum of $50. You may want to take additional precautions to protect your mobile radio gear.

Start with the obvious. If you don't already do it, make it a habit to lock your doors each time you leave your car unattended. You might also consider one of my camouflage ploys. Before leaving my car, I use a dark towel to cover my equipment. Even though these two steps probably reduce greatly the likelihood of theft, I was still not satisfied. I wanted some kind of alarm system.

When the Thief Has Fled

Most alarm construction projects have no provision for shutting the alarm off automatically after the thief has fled. The alarm continues to drone on and on until the owner shuts it off, the battery wears down or irate passersby make unauthorized modifications to the electrical system of your car. Alarms that must be switched on and off manually each time you enter or leave the car seem like a pain to me. On the other hand, an alarm that has a delay of a few seconds built into the system can be left on continuously. The underlying assumption is that the thief would leave the door open while removing the equip-

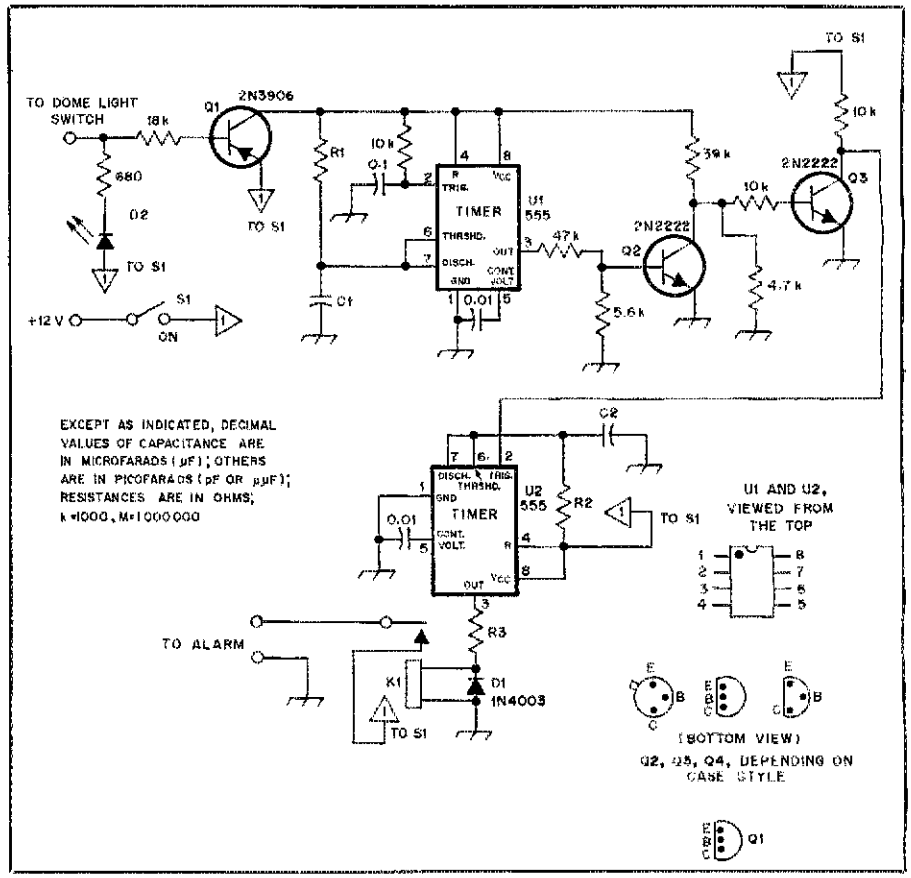


Fig. 1 — Schematic diagram of alarm circuit. Capacitors are disc ceramic except those numbered, which are chosen on the basis of availability for a particular value (see text for discussion). Resistors are 1/4-watt carbon-composition types, except for R3, which is a 2-watt power resistor.

D1 — Silicon power diode, 1 A, 200 PIV, 1N4003 or equiv.
K1 — See text.
Q1 — Silicon pnp general-purpose bipolar transistor, 600 mW, 2N3906 or equiv.
Q2, Q3 — Silicon npn general-purpose bipolar transistor, 500 mW, 2N2222 or equiv.
U1, U2 — Linear timer IC, type 555 or equiv.

*Box 2462, Victoria, TX 77901

ment — a reasonable assumption for an unsuspecting thief.

My design objectives for the alarm were that it be fairly simple to construct using few parts, be reset automatically in case it was triggered, be tolerant by allowing a few seconds grace to enter and leave the car, be left on at all times and be immune to false triggers. After some thinking and experimenting, I came up with this circuit using two NE555 timers (Fig. 1). The first timer is turned on by opening the car door. Pin 3 of U1 goes high immediately and stays high for about 13 seconds. As long as the output of U1 is high, Q2 is on and Q3 is off. After 13 seconds the output of U1 goes low, triggering U2. The output of U2 goes high and turns on the alarm via K1, an spst relay. The alarm stays on for about one and a half minutes and can be reset only by opening S1 during this time. Then the output of U2 goes low and the alarm is ready for the next thief.

Q1 can be almost any medium-power pnp switching transistor. A 2N3906 would be ideal and is easy to obtain. D2, an LED, will light only when the door is open, to remind you that the alarm is set.

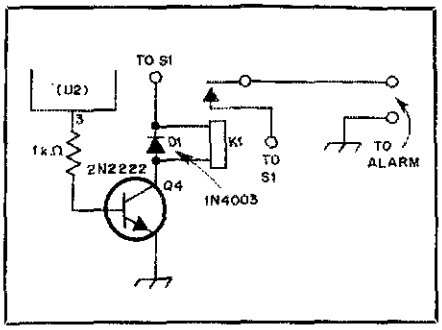


Fig. 2 — Circuit modifications necessary if relay K1 draws more than 100 mA. See Fig. 1 for discussion of component characteristics.

The time delay for U1 is adjusted by R1 and C1. I used 100 kΩ and 100 μF at R1 and C1 respectively to provide a timing period of about 13 seconds for U1. Other timing periods can be had by changing the value of these components. I used 470 kΩ and 100 μF at R2 and C2 respectively to produce a timing period of about 90 seconds for U2. The dropping resistor, R3, should be eliminated if you use a 12-V relay. I use a 6-V, 500-Ω relay (Radio Shack 275-004); R3 is 470 Ω. If you use a relay that draws more than 100 mA, I suggest that you adapt the circuit as shown in Fig. 2. I attached a burglar alarm bell mounted in the trunk, but there is no reason why you couldn't use the output of K1 to operate the horn relay or any other device that you choose.

The circuit is enabled by opening the door, which causes a spring-loaded switch to close. This closure drops the potential of the "cold" side of the dome light (and the input of the alarm) to ground. I suspect that most cars are wired in a similar manner. Layout is not critical. I mounted the circuit inside a small, flat plastic box. An etching pattern and parts placement guide are shown in Fig. 3.

So far, I don't think I've foiled any would-be thieves, although I have forgotten about the alarm a few times while unloading groceries. On the other hand, I still have my equipment — some people can't make that claim!

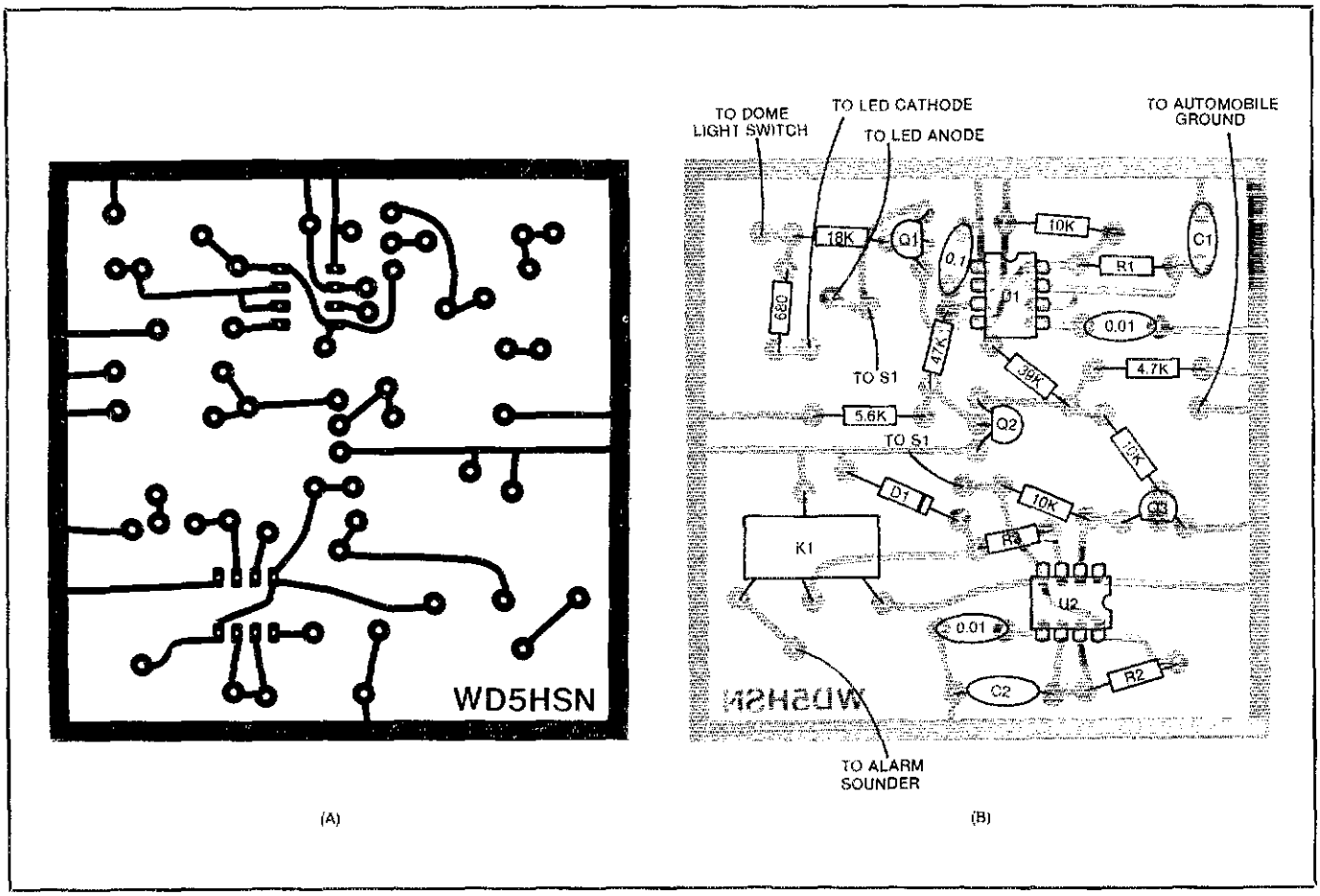


Fig. 3 — At A, circuit-board etching pattern for the burglar alarm. Black represents copper. The pattern is shown at actual size from the foil side of the circuit board. At B, the parts-placement guide. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Resistances are in ohms; k = 1000. Capacitors without numbers are in microfarads.

Microcomputer QSO Robot

Ever dream of a completely automatic station that would make QSOs while you sit back and watch? Today's microcomputers make it easier than you might think.

By J. C. Sprott,* W9AV

This presentation concerns the use of a BASIC program enabling radio amateurs who are TRS-80 owners to make automated cw QSOs. Little or nothing is required to interface the computer to the station equipment. Because of the simplicity of the technique employed, it does have limitations, but for many, this information could open the way to an exciting new area of amateur communication.

In a few years, a microcomputer is likely to be considered an indispensable part of any well-equipped Amateur Radio station. Although *microprocessors* are finding their way into many ham products such as programmable scanners and Morse keyboards, only a true *microcomputer* can be adapted conveniently to the diverse needs of enterprising hams.

One of the more popular microcomputers in use today is the Radio Shack TRS-80 model I, level II. I hadn't had mine long before setting out to fulfill a longtime dream of a completely automated cw station that would make QSOs while I sat back and watched. I expected (at least) a modest hardware interface construction project and a lot of tedious assembly-language programming. After thinking about the problem for a while and playing with the BASIC INPUT and OUT functions, I realized that my goal could be reached without modification or hardware construction and without resorting to the use of assembly language. A similar approach may be used with the TRS-80 model III.

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Keyboard-Generated Morse

My first task was to generate Morse code in response to input from the computer keyboard. That is relatively easy. Table 1 contains the BASIC transmit program. Each of the 47 code characters is stored as six elements of the array X(I,J). Six elements permit the longest characters (such as the comma) to be stored using a coding of 1 for a dot, 3 for a dash, and 0 to fill in spaces. For example, the letter "Q" would be: 3, 3, 1, 3, 0, 0. The characters are generated by the OUT function in a loop, the length of which is controlled by X(I,J). Speed of transmission is adjustable up to about 60 wpm.

When using the program with a real-time keyboard, some limitations exist: lack of a buffer, a variation in weighting, a "Lake Erie" swing and "choke up." The "choke up" occurs when a key is pressed while a character is being transmitted and is actually caused by a programming error in the ROM interpreter.

Table 1

TRS-80 Level II BASIC Program for Generating Morse Code from the Computer Keyboard

```
400 DEFINT A-Z: DIM X(47,6): CLS: INPUT "SPEED (WPM)";S: SI=400/S-5: FF=255: F4=
4: IF PEEK(293)=73 THEN FF=236: F4=2
410 FOR I=1 TO 47: FOR J=1 TO 6: READ X(I,J): NEXT J,I
420 CLS: PRINT "KEYBOARD ACTIVE"
430 X$=INKEY$: IF X$="" THEN 430
440 I=ASC(X$)-43
450 IF I<1 OR I>47 PRINT" ";: FOR J=14 TO 7*SI: NEXT: GOTO 430 ELSE PRINT X$;
460 FOR J=1 TO 6: IF X(I,J) THEN FOR K=2 TO SI*X(I,J): OUT FF,F4: NEXT: OUT FF,0
: FOR K=2 TO SI: NEXT
470 NEXT: FOR J=6 TO 3*SI: NEXT: GOTO 430
480 DATA 3,3,1,1,3,3,1,3,1,3,1,0,1,3,1,3,1,3,3,1,1,3,1,0,3,3,3,3,3,0,1,3,3,3,3,0
,1,1,3,3,3,0,1,1,1,3,3,0,1,1,1,1,3,0,1,1,1,1,1,0,3,1,1,1,1,0,3,3,1,1,1,0,3,3,3,1
,1,0,3,3,3,3,1,0,3,3,3,1,1,1,3,1,3,1,3,1,1,3,1,1,1,0,3,1,1,1,3,0
490 DATA 1,1,1,3,1,3,1,1,3,3,1,1,0,0,0,0,0,0,1,3,0,0,0,0,3,1,1,1,0,0,3,1,3,1,0,0
,3,1,1,0,0,0,1,0,0,0,0,0,1,1,3,1,0,0,3,3,1,0,0,0,1,1,1,1,0,0,1,1,0,0,0,0,1,3,3,3
,0,0,3,1,3,0,0,0,1,3,1,1,0,0,3,3,0,0,0,0,3,1,0,0,0,0,3,3,3,0,0,0,1,3,3,1,0,0
500 DATA 3,3,1,3,0,0,1,3,1,0,0,0,1,1,1,0,0,0,3,0,0,0,0,0,1,1,3,0,0,0,1,1,1,3,0,0
,1,3,3,0,0,0,3,1,1,3,0,0,3,1,3,3,0,0,3,3,1,1,0,0
```

This program is suitable for both models I and III.

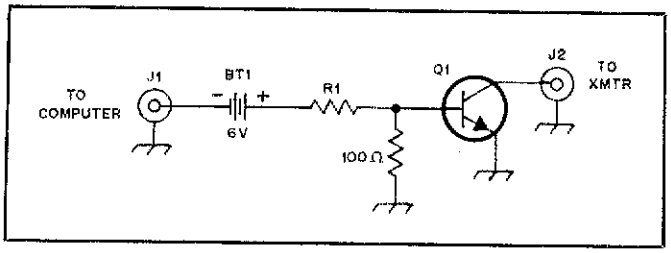


Fig. 1 — Keying circuit for use between the TRS-80 and a transmitter. Q1 is selected to meet transmitter key circuit voltage and current requirements. Use the largest ohmic value for R1 that provides reliable keying. For negative-polarity keying circuits, use a pnp transistor and reverse the polarity of BT1. J1 and J2 may be phono connectors.

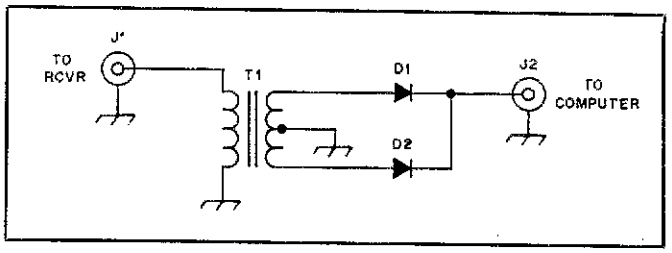


Fig. 2 — An impedance-matching circuit for use between a receiver low-impedance speaker output and the TRS-80 cassette input.
D1, D2 — Silicon, 50 PIV, 1 A, Radio Shack 276-1101 or equivalent.
J1, J2 — Phono connectors.
T1 — Miniature audio transformer, 8Ω to 1-kΩ c.t., Radio Shack 273-1380 or equivalent.

This anomaly is almost nonexistent in the model III TRS-80, which provides much smoother operation in the keyboard mode, copies a slightly higher (14%) range of speeds and appears to accept a somewhat larger range of input frequencies through the cassette port. The mentioned limitations could be corrected, but at the expense of a much more complicated and obscure machine-language program and a much more exotic hardware interface. This would void the constraints under which the system was developed. I wanted the program to be entirely in BASIC so that others could understand and modify it easily. I also desired that little or nothing be required to interface the computer to the station equipment so that any amateur with a TRS-80 could try it.

Computer To Transmitter

Transmitter keying is accomplished by the contacts of the relay, which the TRS-80 uses to control the cassette recorder motor. Measurements showed that a potential of 6 volts and a current of 100 mA existed at the recorder jack. I assumed that the relay contacts could safely handle any transmitter keying circuit exhibiting similar voltage and current characteristics. My Ten-Tec Century 21 meets this requirement, and no problems have arisen during many months of operation. For a transmitter having higher keying-circuit voltages or currents, a second relay or a switching transistor could be used, as shown in Fig. 1.

The task of converting received Morse code to a character that can be displayed on the video monitor is a bit more complicated. For hardware simplicity, it would be nice to be able to feed the detected cw audio signal directly from the receiver to the cassette recorder earphone jack on the computer. This can be done, provided the receiver can supply a 1-volt peak-to-peak, 2-kHz signal across the 100-ohm input resistance. (A correspondingly larger voltage is required at lower frequencies.) For a receiver or transceiver with a low-impedance speaker output (8 ohms or less), the circuit shown in Fig. 2 provides impedance matching and a doubling of the audio frequency.

Table 2 contains the BASIC receive program listing. The program has a number of timing loops that measure the duration of each dot, dash and space. Values of I and J are then generated, and the character is looked up in the string table Y$(I,J). Speed of reception is adjusted automatically. A top speed of about 25 wpm is the practical limit of a TRS-80 Morse receive BASIC program. A number of hardware modifications are available that will increase system speed by a factor of two or more.[1,2] Copy is nearly perfect from machine-sent cw such as W1AW transmissions, but one should not expect miracles in the presence of QRM, QRN or QSB, or when the code is being sent with the wrong foot.

Automated QSOs

For this type of operation, VOX keying or QSK cw operation is used. Messages are stored in a string such as: CQ CQ CQ THIS IS A ROBOT DE W9AV W9AV K. The computer generates the code characters one at a time, and at the end of the message switches to the receive mode.

During receive, a string is generated from the incoming characters. Before deciphering the call of the received station, the computer looks for your station call or a portion of it in the first half of the string. This prevents the calling of a station incorrectly when the QRM is heavy. The string is searched for the last occurrence of a numeral, and the characters between the numeral and final character (usually a K or $\overline{AR}$) are counted. If there is one such character, the call is a 2 × 1.

[1,2]Notes appear on page 32.

Table 2

Level II BASIC Program for Copying Morse Code

```
600 CLEAR 100: DEFINT A-Z: DIM Y$(6,63): CLS: B=7
610 Y$="ETINAMSDRGUKWOHBLZFCP VX Q YJ 56>7   8 /-    94=      3   2 10"
620 N=0: FOR I=1 TO 5: FOR J=0 TO 2[I-1: N=N+1: Y$(I,J)=MID$(Y$,N,1): NEXT J,I
630 Y$(5,13)="KN": FOR J=1 TO 63: Y$(6,J)=" ": NEXT: Y$(6,7)=":"
640 Y$(6,12)="?": Y$(6,21)=";": Y$(6,40)="<": Y$(6,42)=".": Y$(6,51)=","
650 FOR I=0 TO 6: J(I)=2[I: NEXT: PRINT "RECEIVE ACTIVE"
660 I=0: J=0
670 OUT 255,0: IF INP(255)<128 THEN N=N+1: IF N<2*B THEN 670
680 OUT 255,0: N=0: IF INP(255)<128 PRINT " ";: GOTO 670
690 OUT 255,0: N=N+1: IF INP(255)>=128 THEN 690
700 IF N>=B THEN J=J+J(I): B=(9*B+2*N+6)/12 ELSE B=(3*B+2*N+2)/4
710 N=0: I=I+1: IF I>6 PRINT " ";: GOTO 660
720 IF INP(255)<128 THEN N=N+1: IF 2*N<B THEN 720 ELSE 740
730 OUT 255,0: IF INP(255)>=128 THEN N=0: GOTO 670
740 PRINT Y$(I,J);: N=N+1: GOTO 660
```

Table 3

Sample of an Automated QSO Using the QSO Robot

```
QRL?
^^^^^
CQ CQ CQ THIS IS A ROBOT DE W9AV W9AV K
^^^^^  W9AV W9AV DE W1AW W1AW -
W1AW DE W9AV TNX FER CALL = U ARE IN QSO WITH A TRS 80 COMPUTER
= UR RST 599 599 = PSE ONLY MY RST? BK
^^^^^  BK R FB ES TNX      =  UR RST 589  589 BK
QSL 589 TNX = QTH MADISON, WI ? MADISON, WI = UR QTH? BK
^^^^^  BK QTH IS  NEWINGTON, CT ?  NEWINGTON, CT  BK
R FB = NAME IS CLINT ? CLINT = UR NAME? BK
^^^^^  BK  FB  CLINT  = NAME  HR IS JOE ? JOE BK
R OK JOE TNX FER QSO ES HPE U ENJOYED TALKING TO A COMPUTER 73 W
1AW DE W9AV <
^^^^^ 73       TNX QSO ES PSE QSL  W9AV DE W1AW <EE
TNX ES QSL SURE < EE
```

Otherwise, it is assumed it is a 2 × 2 or 2 × 3 unless the first and last characters are the same, in which case it is probably a 1 × 2 or 1 × 3. The call of the received station is then stored in a string for future use.

Transmit speed is adjusted automatically to the speed of the received signal (between 10 and 24 wpm) and displayed on the monitor. Whenever 10 spaces in a row are received, the computer assumes that the received station has finished transmitting and the program switches to transmit. This creates a slightly awkward pause that sometimes causes an impatient operator at the other end to begin transmitting again, but it seems to be the only practical solution.

The computer asks a short series of questions such as those in Table 3. Responses can be varied from one QSO to the next to make the computer seem to be more "human." A considerable amount of program logic is required to extract the relevant information from all the extraneous comments that are inevitably made by those who have never had a computer QSO before. Trial and error, lots of ingenuity and quite a few frustrating QSOs are required before wisecracks about the computer being a "lid" begin to subside!

Operation

In the first two months of operation, my computer made over 250 QSOs, and the comments received were almost uniformly favorable. Except for a few occasions when I interrupted the computer to answer a particular question, it was on its own. About all I ever had to do was to retune the receiver occasionally when someone called too far off the received frequency. In fact, the system works so well that I was tempted to leave it on all night while I slept, but the FCC requires an appropriately licensed control operator to monitor transmissions.[3]

I prefer to operate on 10 or 15 meters when the band is not crowded and to operate for only an hour or two at a time. Although another robot has yet to answer mine, I'm sure it's only a matter of time. Upon receipt of an s.a.s.e., I'd be happy to provide further information about this and similar programs that are available at low cost on cassette tapes.[4] I welcome any comments from readers who can improve the operation of the system without greatly increasing its complexity. It would be a contribution we should all welcome. ☐

Notes

[1]Archbold Electronics, 10708 Segovia Way, Rancho Cordova, CA 95670.
[2]Simutek, P. O. Box 13687, Tucson, AZ 85732.
[3]FCC rules and regulations, §97.3(m)(3): *"Automatic control"* means the use of devices and procedures for control so that a control operator does not have to be present at the control point at all times. (Only rules for automatic control of stations in repeater operation have been adopted.)"
[4]The ARRL and *QST* in no way warrant this offer.

Strays

CALL FOR PAPERS ON PACKET RADIO AND COMPUTER NETWORKING

☐ The ARRL is sponsoring a conference on Amateur Radio Computer Networking on October 16, 1981, at the National Bureau of Standards in Gaithersburg, Maryland. The purpose is to explore the possibilities of an integrated amateur computer network using hf, vhf and satellite packet radio as primary transmission means. The network would consist of radio amateurs in both the U.S. and Canada and would provide means of public service by handling third-party traffic, including that of computer amateurs and the deaf. Papers are sought on both technical and operational topics including: network structure, protocols, message handling, equipment design and selection, integration with the National Traffic System, interconnection with computerized bulletin board systems and other topics. This event will be hosted by the Amateur Radio Research and Development Corporation (AMRAD) and by the Radio Amateur Satellite Corporation (AMSAT), whose annual meeting will be held on October 17 at the nearby Goddard Space Flight Center. Those wishing to present papers should send a special letter of intent to Paul L. Rinaldo, W4RI, President, AMRAD, 1524 Springvale Ave., McLean, VA 22101, before August 15, 1981.

INSTRUCTIVE UPDATE

☐ The Club and Training Department at Hq. has an update sheet available, which can be obtained free for an s.a.s.e., for the 1976 General Class Instructor Guide. The reading assignments match the newest editions of the *License Manual* and *The Radio Amateur's Handbook* and point out additions and deletions. — *Maureen Thompson, KA1DYZ, Training Assistant*

I would like to get in touch with . . .

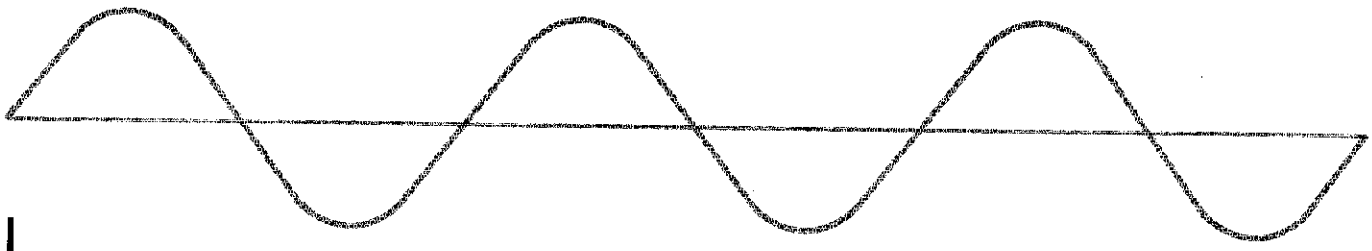
☐ amateurs interested in forming a Heathkit users net for the purpose of sharing information and modifications. Tom Collins Jr., KA3CMR, P.O. Box 10203, Wilmington, DE 19850.

• *Basic Amateur Radio*

Phase Versus Frequency Modulation

Think there is no real difference between phase and frequency modulation? You may be in for a few surprises.

By Harry R. Hyder,* W7IV



I have heard hams make the statement that phase and frequency modulation are the same thing, or that the only difference is in the way they are generated at the transmitter. This is not strictly true, although the differences are somewhat subtle. For instance, if we were to phase or frequency modulate a single sine wave on a carrier, there is no way someone at the receiving end could tell whether it was generated by either a pm or fm transmitter — even with a spectrum analyzer. A sine wave would be produced at the output of either a pm or fm receiver.

Basic Difference

Let us look at two transmitters; one has a phase modulator and the other a frequency modulator. Their modulation circuits have response all the way down to dc. What happens when we apply a dc voltage to their inputs? The fm transmitter will jump to a new frequency and stay there. The pm transmitter, on the other hand, will jump towards a new frequency, but immediately return to the original frequency and stay there. This is the basic difference.

If we were to carry this further and apply square waves to the inputs, a graph of frequency versus time would look like that shown in Fig. 1. At first glance the pm waveform doesn't look very useful; spikes at the rise and fall of the square waves are all that we get. And this is what we would actually see at the output of an fm receiver tuned to a square-wave-modulated pm transmitter. But a receiver designed for pm detection would produce square waves.

Most of our 2-meter rigs have pm transmitters and fm receivers; therefore, we need some way out of this impasse if we wish to use square-wave modulation. At the present, we do not usually square-wave modulate our transceivers, although we may do so in the future when digital communication becomes more widespread. But square waves best illustrate the basic principles; they are the acid test for any modulation system.

Suppose, before we applied the square wave to the pm transmitter, we put it through an integrator. (An integrator is merely a low-pass filter with a response that falls off at the rate of 6 dB per octave.) A square wave coming out of an integrator looks like a triangular wave, as

*1638 W. Inverness Dr., Tempe, AZ 85282

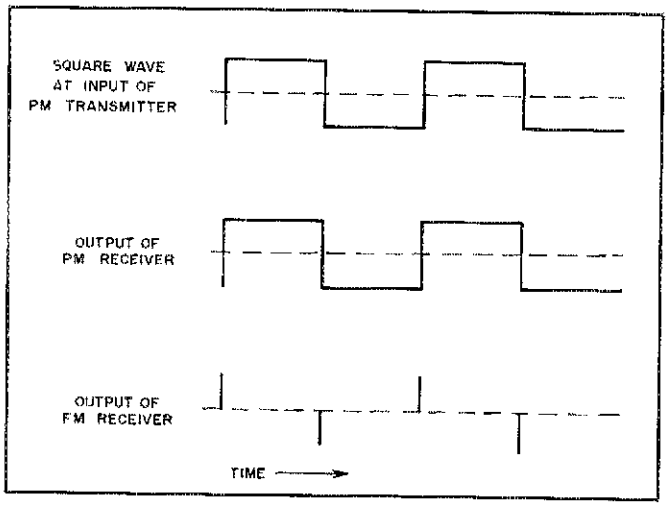


Fig. 1 — Diagrams showing the output of pm and fm receivers when detecting a square-wave-modulated pm signal. Broken lines indicate unmodulated carrier condition.

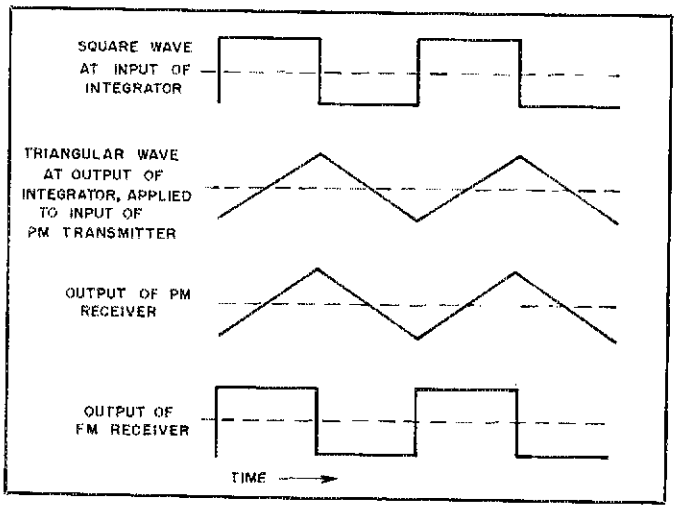


Fig. 2 — Diagram illustrating the use of an integrator in the modulation section of a pm transmitter. Broken lines indicate unmodulated carrier condition.

shown in Fig. 2. When this triangular wave is used to modulate a pm transmitter, what kind of demodulated signal does an fm receiver produce? A square wave!

Therefore, the way to make a pm transmitter produce fm is by integrating the modulating waveform before it is applied to the phase modulator. Integrators are easily built these days with op amps, but a simple, passive R-C filter will do just as well over the audio range.

Why

The explanation for these seemingly mysterious things is quite simple. Frequency can be defined as the rate of change of phase. It is usually expressed in cycles per second (Hz), but it can also be expressed in degrees per second (one cycle equals 360°). Radians per second is the most common format of this angular approach. There are 2π radians in a cycle, which explains why $2\pi f$ appears in so many equations.

Imagine that we have two identical audio amplifiers and that we apply the same sine-wave signal to both. We view the individual outputs on a two-channel oscilloscope. They are of the same frequency, but they differ in phase because of minor internal differences of the amplifiers. For our purposes, we want the outputs to be exactly in phase. To this end, we have equipped the amplifiers with adjustable phase shifters, so it is merely a matter of adjusting one of the phase shifters until the two waveforms are in phase as viewed on the oscilloscope.

Now, during the brief interval when we were turning the knob of the phase shifter, the frequency of the output signal was actually higher than the input signal, or lower, depending on which direction we turned the knob. But as soon as we took our fingers off the knob, the input and output frequencies were the same. It is like hastening my step in the street to catch up with a friend. I have to walk faster than he does, but when I do catch up, we walk together at the same pace. So a fixed phase difference does not represent a frequency difference, but a changing phase difference does. To produce a frequency deviation in a transmitter, we must have a means of making the phase of the signal change *continuously* with respect to the phase of the unmodulated carrier.

Fig. 3 shows elementary frequency and phase modulators. The varactor or capacitance diode in either case varies its capacitance in accordance with the modulating signal. The frequency modulator is understood easily. Varying the capacitance across the oscillator tank circuit changes the frequency of oscillation. The phase modulator is not so obvious. It is completely isolated from the oscillator and cannot affect its frequency. How does it produce frequency deviations?

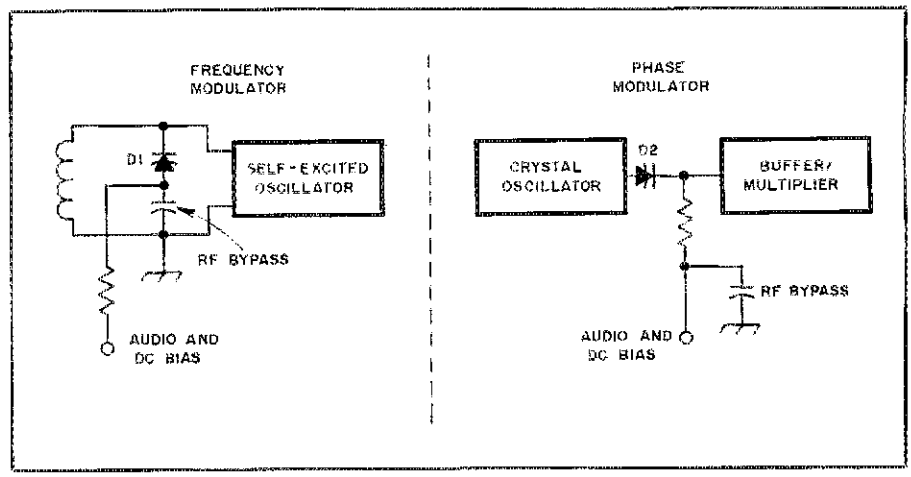


Fig. 3 — Typical frequency- and phase-modulator circuits. D1 and D2 are varactor or capacitance diodes.

The varactor diode in this case is an interstage coupling capacitor. There is always a phase shift across a coupling capacitor in any amplifier; the amount of shift is equal to the angle whose tangent is X_C/R. Thus the phase shift varies with capacitance. When we vary the phase shift continuously by applying an audio signal to the varactor, we produce frequency deviations; the phase is changing continuously with respect to the unmodulated frequency, at an audio rate.

This also explains why applying a dc voltage to the phase modulator produces no deviation — it just produces a fixed phase shift, which is the same as changing the value of a coupling capacitor! The more rapidly the varactor capacitance changes, the more rapid is the phase change, and, hence, the greater the frequency deviation.

With a square wave applied to the phase modulator, the phase changes very rapidly at the leading and trailing edges of the wave, producing spikes. But during the "flat top" portion, the phase remains at a different but constant value. When we integrate the square wave, creating a triangular wave form, the phase changes at a constant rate, increasing and decreasing, which results in fixed positive and negative frequency deviations of the carrier. The net result is a square wave at the output of the fm receiver. The deviation is proportional to the rate of change of the modulating signal — the slope of a triangle in this case.

Modulation Index

The ratio of the frequency deviation to the modulating frequency is called the "modulation index." It is also equal to the peak phase deviation in radians. Obviously, it is meaningful for only one frequency. This is taken to mean the highest desired modulating frequency. Fm broadcast transmitters are designed on the assumption that the highest desirable frequency is 15 kHz. Because they deviate 75 kHz, the modulation index is 5. Voice communication fm uses a lower modulation index, as does TV sound.

Almost unlimited frequency deviations can be produced by direct fm of an oscillator, but such an oscillator would be inherently unstable. Fm transmitters almost universally use phase modulators, with integrators in the audio channel to simulate fm. Even Armstrong's first fm transmitter of the early 1930s used a phase modulator. Actually, fm broadcast stations "pre-emphasize" audio frequencies above 1 kHz at the rate of 6 dB per octave. This means that these frequencies are really phase modulated. The purpose of this is to improve the signal-to-noise ratio in the high audio range. An fm broadcast receiver contains an R-C network to "de-emphasize" these frequencies at the same rate, making the received audio spectrum "flat."

Phase modulators have one disadvantage — the degree of phase shift they can produce is small. It is obvious that changing the value of a coupling capacitor in an amplifier cannot produce a phase shift of even 90°. A simple phase modulator is limited to about one-half radian (roughly 30°). Thus, a phase modulator with a 3-kHz audio input could produce only 1.5 kHz of deviation. Higher desired values are obtained by frequency multipliers that also multiply the deviation.

Pm has no particular advantage over fm. Fm merely got there first, perhaps because it is intuitively easier to understand. In digital communication, some forms of pm have advantages over fm when used with receivers designed for pm. We may see more of pm in the future when digital techniques overtake Amateur Radio. "Pm is the same thing as fm!" will not be heard so often then.

• *Basic Amateur Radio*

The Ups and Downs of Towers

Thinking about erecting a tower? Confused by the wide variety of types and accessories? Here are some basic facts that may help you decide.

By Peter O'Dell,* KB1N

On a calm morning after a violent storm, a friend walked out of his house to check his antenna farm. In the past he had lost an occasional dipole leg, but nothing more serious. This morning it was different: He looked up to find that his tower now extended vertically 60 feet (18 m) and horizontally 30 feet (9 m) from the top of the vertical portion. Although he may not have considered himself lucky, he was. The only real damage was to two sections of the tower. Cleanup consisted of removing everything above the fifth section. Oh, it wasn't easy, but he managed to do it safely.

At the time, he may not have thought so, but things could have been a lot worse. I've heard a story of an Amateur Radio operator who lost his life when his tower crashed through the roof of his house, causing the 20-meter reflector to impale him in his bed as he slept. I have no idea whether this really happened or not, but it certainly isn't out of the realm of possibility. I say my friend was lucky, not because he escaped unharmed, but because he had tempted fate for years and still came away unscathed. How had he tempted fate? His choice of tower was light-duty "TV tower." Instead of obtaining the manufacturer's recommended procedures for installation, he merely dug a small hole, filled it with two bags of hand-mixed concrete and set the bottom section of the tower in the hole. He installed large (projected surface area) antennas that far exceeded the maximum ratings that the tower could safely handle. His guy-wire choice, the small type normally used for roof-mount TV antenna installations, was just as overly optimistic. He was indeed lucky that things had lasted this long without major damage to property (or people).

Destructive Forces

Probably the most destructive force that your tower will have to withstand is wind. It is difficult to imagine the magnitude of force that wind can have as it pushes against a tower. The force is related to the projected surface area and the square of the velocity of the wind as it moves past the tower. Much more rigorous discussions of wind loading have appeared in Amateur Radio literature and are suggested for those interested in a more in-depth approach to the topic.[1,2]

Towers must be built to withstand such forces. The Electronic Industries Association (EIA) has set forth guidelines and standards for antenna structures.[3] Based on meteorological data collected over the years, the EIA standards are more stringent for various areas of the country, depending on the highest velocity of wind that can be expected. Fig. 1 depicts these areas graphically. Consult the manufacturer's installation instructions to determine the erection procedures

[1]Notes appear on page 39.

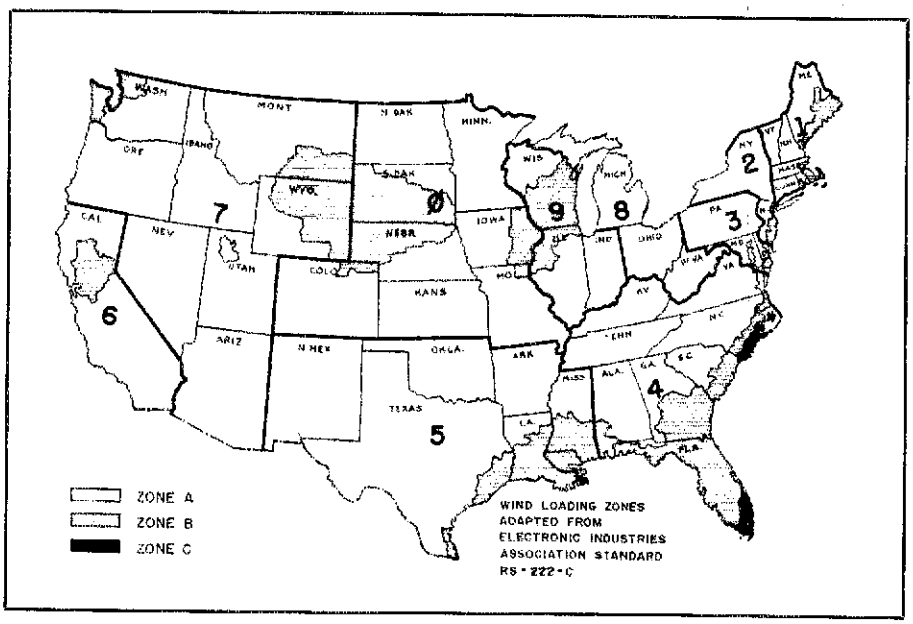


Fig. 1 — Wind-zone map of the continental United States. Structures under 300 feet (91 m) high should be built to withstand winds up to 87 miles per hour (140 km/hr) for zone A; up to 100 miles per hour (161 km/hr) for zone B; and 112 miles per hour (180 km/hr) for zone C. If you are unable to determine which zone you live in because of the limited resolution of this map, you should consult the breakdown by counties in EIA RS-222-C (see Note 3).

*Basic Radio Editor

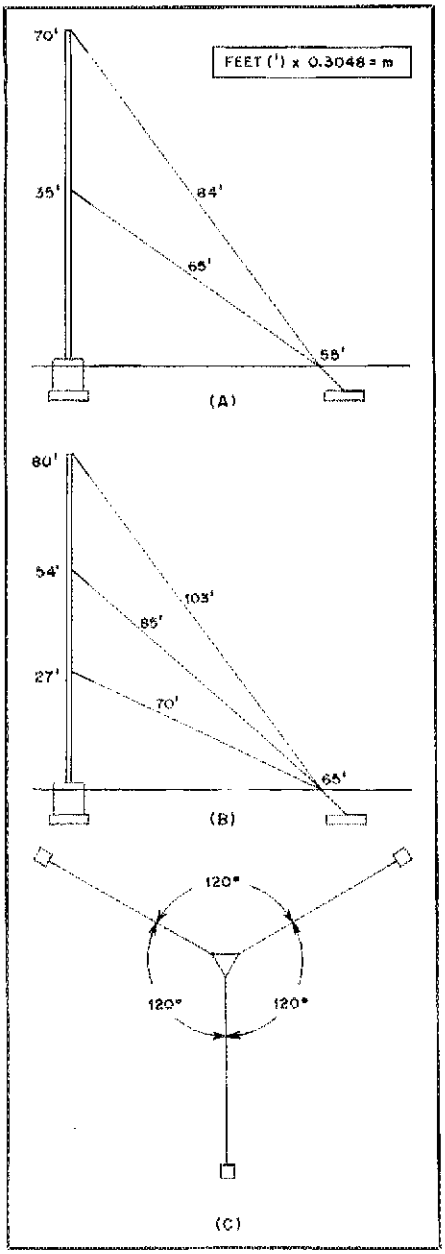


Fig. 2 — Diagram depicting proper method of installation of a typical guyed tower.

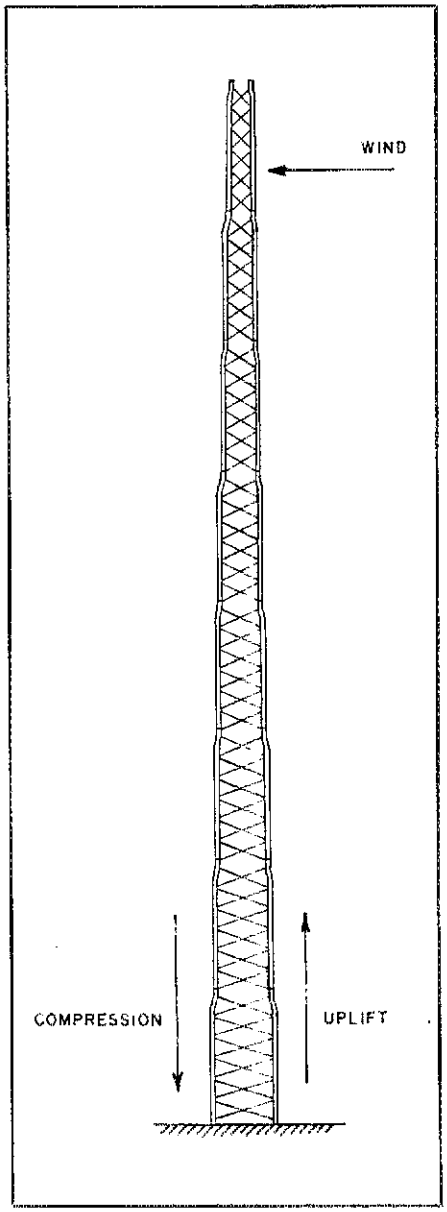


Fig. 3 — Diagram of typical free-standing (unguyed) tower. Arrows indicate the directions of the forces acting upon the structure. See text for discussion.

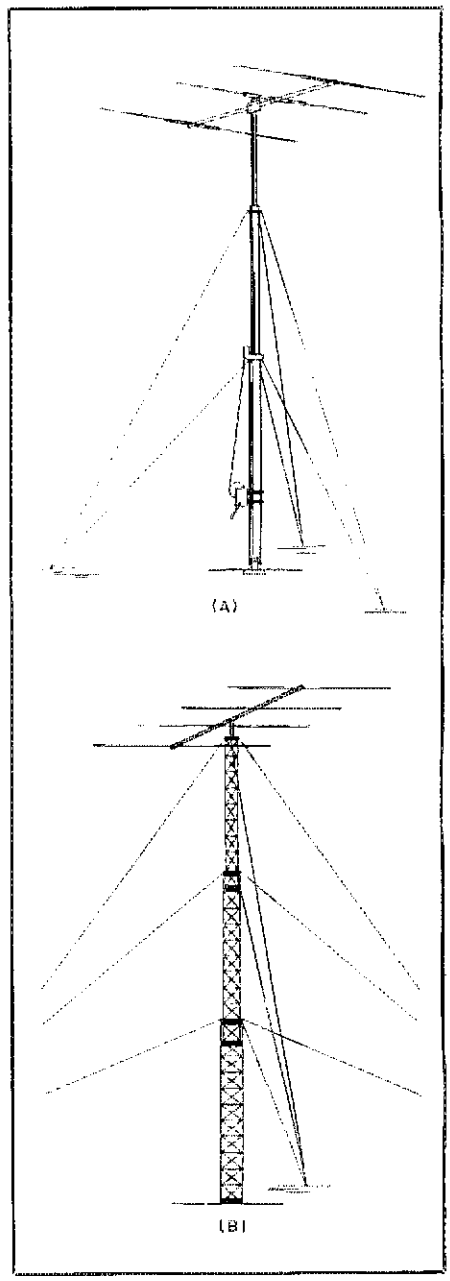


Fig. 4 — Two examples of "crank-up" towers.

for your tower at your particular location. If you are not sure which zone your location is in, you may want to go directly to the EIA pamphlet; it breaks the zones down by county.

Most tower manufacturers specify their products on a "maximum square feet" basis. (In countries using the metric system of measurement, the ratings will be in square meters.) This statistic tells you how many square feet of antenna (projected surface area) you may safely place atop your tower. Most antenna manufacturers provide the square footage of their antennas. If you overload your tower, you run the risk of having it damaged or destroyed in a heavy windstorm. Several manufacturers and dealers have told me that this is the single largest cause of tower failure at Amateur Radio stations.

Types of Towers

The most common variety of tower is the guyed tower made of stacked identical sections. The information in Fig. 2 is based on material from Rohn's catalog. Rohn calls for a maximum vertical separation between sets of guy wires of 35 feet (10.5 m). At A, the tower is 70 feet (21 m) high, and there are two sets of evenly spaced guy wires. At B, the tower is 80 feet (24.5 m) high, and there are three sets of evenly spaced guy wires. Exceeding the vertical spacing requirements could result in the tower buckling.

This may not seem like a reasonable possibility unless you understand the functioning of the guy wires. The guy wires restrain the tower against the force of the wind and translate the lateral force of the wind into a downward compression that forces the tower down onto the base. Normally, the manufacturers specify the initial tension in the guy wires. This is another force that is translated into the downward compression on the tower. If there are not enough guys and if they are not properly spaced, a heavy gust of wind may turn out to be the "straw that breaks the camel's back." Fig. 2C is an overhead view of a guyed tower. Manufacturers usually call for equal angular spacing between radials. If it is necessary to deviate from this spacing, you would be well

advised to contact the engineering staff of the manufacturer or a civil engineer.

Some types of towers are not normally guyed — these are usually referred to as free-standing or self-supporting towers. The principles involved are the same regardless of the manufacturer's choice of names. The wind blowing against the side of the tower creates an overturning moment that would topple the tower if it were not for the anchoring at the base. Fig. 3 details the action and reaction involved. The tower is restrained by the base. As the wind blows against one side of the tower, the opposite side is compressed downward much as in the guyed-type setup. Because there are no guys to restrain the top, the side that the wind is blowing against is simultaneously being pulled up (uplift). The combination of the force of the wind and the structure is creating a moment that tends to pivot about a point in the base of the tower. The base of the guyed tower simply must hold the tower up, but the base of the free-standing tower must simultaneously hold one side of the tower up and the other side *down*! It should not be surprising that manufacturers often call for a great deal more concrete in the base of free-standing towers than they do in the base of guyed towers.

Fig. 4 shows two variations of another popular type of tower, the crank-up. In regular guyed or free-standing towers, each section is bolted atop the next lower section. The height of the tower is the sum of the heights of the sections (minus any overlap). Not so with the crank-up towers. The outer diameter of each section is smaller than the inner diameter of the next lower section. Instead of bolting together, the sections are attached with a complex set of cables and pulleys. The overall height of the tower is adjusted by using the pulleys and cables to "telescope" the sections together or apart.

Depending on the design, the manufacturer may or may not require guy wires. The primary advantage of the crank-up tower is that the owner must do the antenna work near the ground. A second advantage is that the tower can be kept retracted except during use, which reduces the guying needs (presumably, you would not try to extend the tower and use it during periods of high winds). The disadvantages include mechanical complexity and cost (usually). It is extremely dangerous to climb on a crank-up tower, even if it is extended only a small amount. Should the hoisting system fail, the inner sections could come crashing down like the blade of guillotine! (There are cases on record where amateurs have lost their lives by climbing extended crank-up towers on which the hoisting system failed.)

Another convenience feature that some towers have is a hinged section that permits the owner to fold over all or a portion of the tower. The primary benefit is in allowing antenna work to be done closer to ground level without the necessity of removing the antenna and lowering it. Fig. 5 shows a hinged base; of course, the hinged section can be designed for portions of the tower other than the base. Also, a hinged feature can be added to a crank-up tower.

Several dealers and experts have commented to me that misuse of hinged sections during tower erections is a common problem among radio amateurs. Unfortunately, these episodes often end in accidents. If you do not have a good grasp of the fundamentals of physics, it might be wise to avoid hinged towers (or to consult an expert). It is often far easier (and safer) to erect a regular guyed tower or self-supporting tower with gin pole and climbing belt than it is to try to "walk up" an unwieldy hinged tower. Think seriously about hinged towers before you take the plunge!

The Base

Each manufacturer will provide his customers with detailed plans for properly constructing the base. Fig. 6 is an example of one such plan. This plan calls for a hole that is 3.5 × 3.5 × 6.0 feet (1 × 1 × 1.8 m). Steel reinforcement bars are lashed together and placed in the hole. The bars are positioned such that they will be completely embedded in the concrete, yet will not contact any metallic object in the base itself. This is done to minimize the possibility of a direct discharge path for

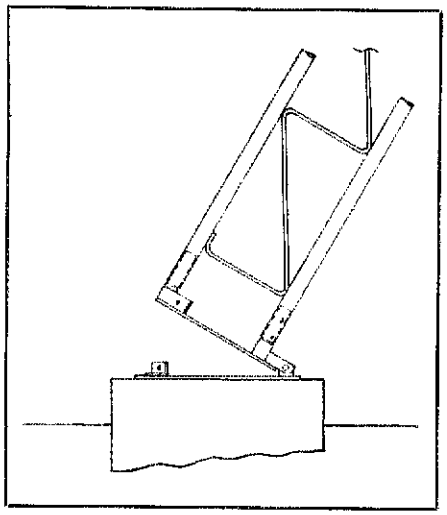


Fig. 5 — Fold-over or tilting base. There are several different variations of hinged sections permitting widely different types of installation. Great care should be exercised when raising or lowering a tilting tower.

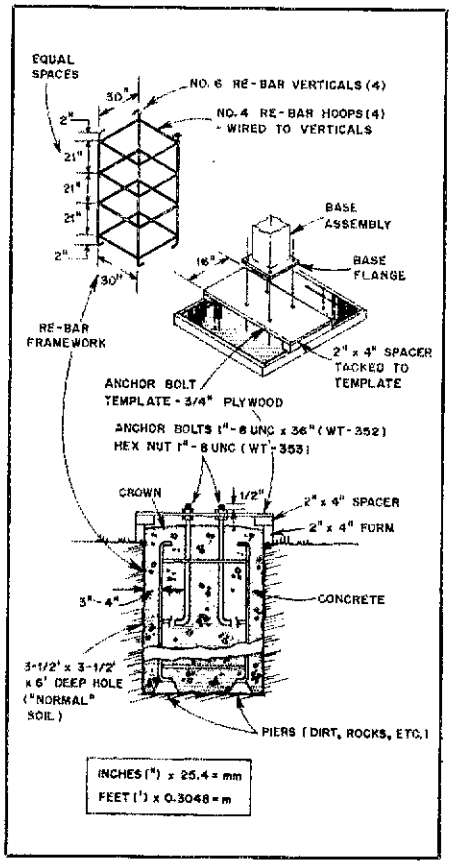


Fig. 6 — Plans for installing concrete base for Wilson ST-77B. Although the instructions and dimensions will vary from one tower to the next, this is representative of the type of concrete base specified by most manufacturers.

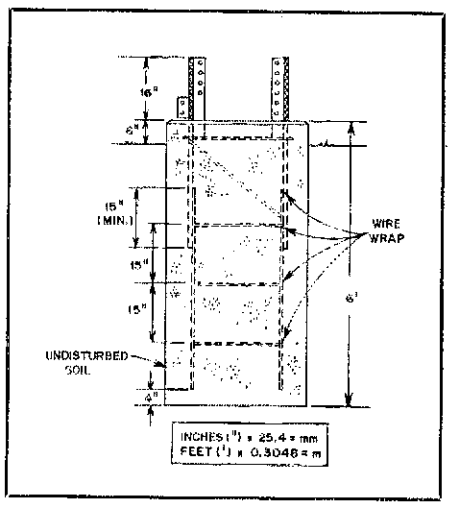


Fig. 7 — Another example of a concrete base (Tri-Ex LM-470).

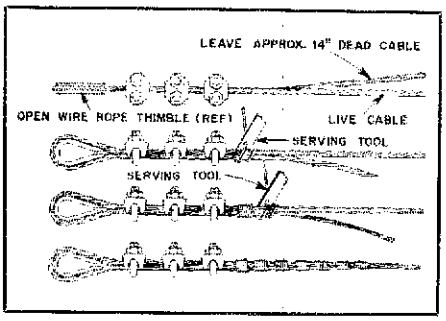


Fig. 8 — Traditional method for securing the end of a guy wire.

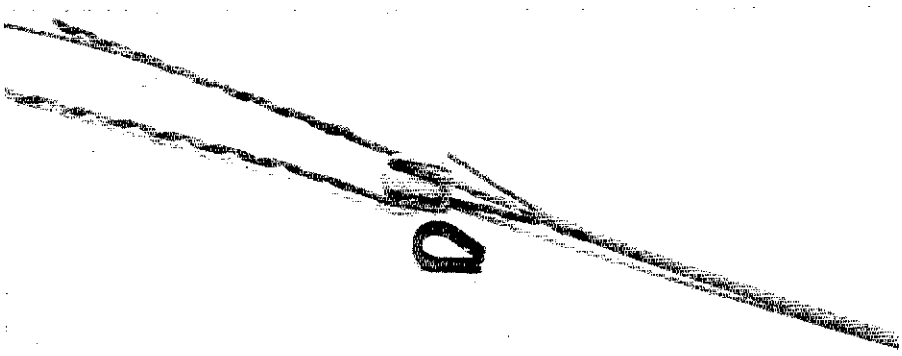


Fig. 9 — Alternative method for attaching guy wires using preformed guy grips. The grip on the right is completely assembled (the end of the guy wire was left extending from the grip for illustrative purposes). On the left, one side of the grip has been partially attached to the guy wire. In front, a thimble for use where a sharp bend might cause the guy wire or grip to break.

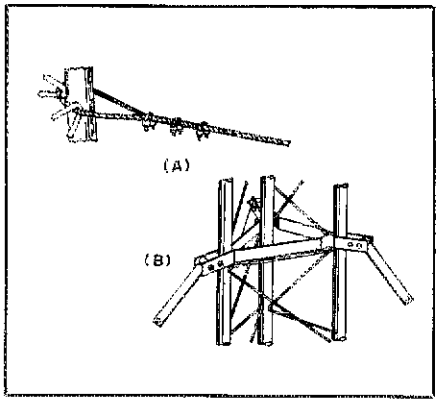


Fig. 10 — Two methods of attaching guy wires to tower. See text for discussion.

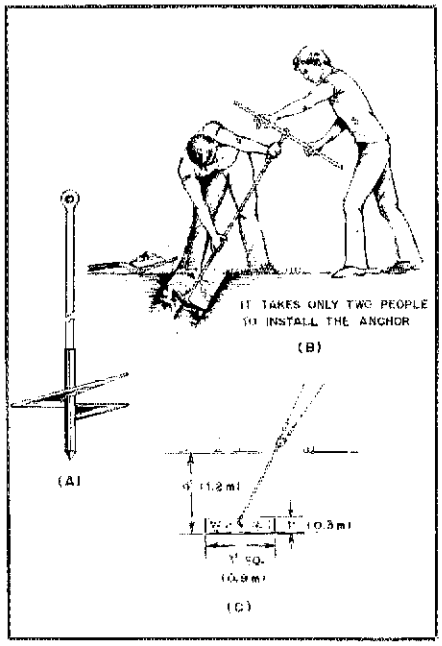


Fig. 11 — Two standard types of guy anchors. The earth screw shown at A is easy to install and widely available, but it may not be suitable for use with soil deviating from normal. The concrete anchor is more difficult to install properly, but it is suitable for use with a wide variety of soil conditions and will satisfy most building code requirements.

lightning through the base. Should such a discharge occur, the concrete base would likely explode and bring about the collapse of the tower.

A strong wooden form is constructed around the top of the hole. The hole and the wooden form are filled with concrete so that the resultant block will be 4 inches (102 mm) above grade. The anchor bolts are embedded in the concrete before it hardens. Usually it's easier to ensure that the base is level and properly aligned by attaching the mounting base and the first section of the tower to the concrete anchor bolts. Each manufacturer will provide specific detailed instructions for the proper mounting procedure. Fig. 7 provides a slightly different design for a tower base.

The one assumption so far is that you have normal soil. "Normal soil" is a mixture of clay, loam, sand and small rocks. A technical discussion is beyond the scope of this article, but you may want to adopt more conservative design parameters for your base (usually, more concrete) if your soil is sandy, swampy or extremely rocky. If you have any doubts about your soil, contact your local agricultural extension office and ask for a more technical description of your soil. Once you are armed with that information, contact the engineering department of your tower manufacturer or a civil engineer.

Attaching Guy Wires

In typical Amateur Radio installations a guy wire may experience "pulls" in excess of 1000 pounds (450 kg). Under such circumstances, you do not merely twist the wires together and expect them to hold. Fig. 8 depicts the traditional method for fixing the end of a piece of guy wire. A thimble is used to prevent the wire from breaking because of a sharp bend at the point of intersection. Three cable clamps follow to hold the wire securely. As a final backup measure, the individual strands of the free end are unraveled and wrapped around the guy wire. It is a lot of work, but it is necessary to ensure a firm connection.

Fig. 9 shows the use of a device that replaces the clamps and twisted strands of wire. These devices are known by various names — guy grips, preforms or deadends. Regardless of what you call them, they are far more convenient to use than are clamps. You must cut the guy wire to the proper length. The preform is installed into whatever the guy wire is being attached to (use a thimble, if needed). One side of the preform is then wrapped around the guy wire. The other side of the preform follows. The savings in time and trouble more than make up for the slightly higher cost.

Guy wire comes in different sizes, strengths and types. Typically, 3/16-inch (5-mm) EHS guy wire will be adequate for the moderate tower installation found at most Amateur Radio stations. Some amateurs prefer to use 5/32-inch (4-mm) "aircraft cable." Although this cable is somewhat more flexible than 3/16-inch EHS, it is only about 70% as strong. We recommend that you stay with standard guy wire and that you use nothing smaller than 3/16-inch (5-mm) EHS.

Fig. 10 shows two different methods for attaching guy wires to towers. At A, the guy wire is simply looped around the tower leg and terminated in the usual manner. At B, a "torque bracket" has been added. There probably isn't much difference in performance for wind forces that are tending to "push the tower over." If you happen to have more projected area (antennas, feed lines, etc.) on one side of the tower than the other, then the force of the wind will cause the tower to tend to twist into the ground. The torque bracket will be far more effective in resisting this twisting motion than will the simpler installation. The trade-off, of course, is in terms of initial cost.

There are two main types of anchors used for guy wires. Fig. 11A depicts an earth screw. It usually measures 4 to 6 feet (1.2 to 1.8 m) long. The screw blade at the bottom typically measures 6 to 8 inches (150 to 200 mm) in diameter. Fig. 11B illustrates two people installing the anchor. The shaft is tilted such that it will be in line with the guy wires. Earth screws are suitable for use in "normal" soil where permitted by local building codes.

The alternative to earth screws is the concrete block anchor. Fig. 11C shows the installation of this type of anchor; it is suitable for any soil condition, with the possible exception of a bed of lava rock! Consult the instructions from the manufacturer for the precise method of installation.

Turnbuckles and associated hardware are used to attach guy wires to anchors and to provide a convenient method of adjusting tension on the guy wires. Fig. 12A shows a turnbuckle of a single guy wire attached to the eye of the anchor. Turnbuckles are usually fitted with either two eyes or one eye, and one jaw. The

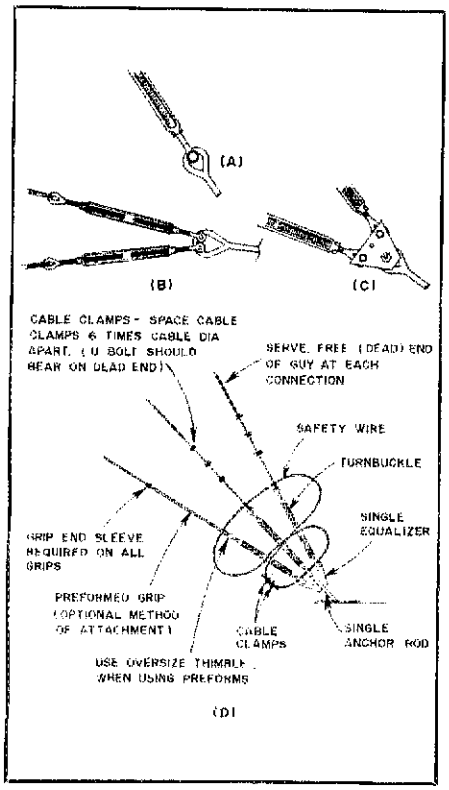


Fig. 12 — Variety of means available for attaching guy wires and turnbuckles to anchors.

eyes are the oval ends, while the jaws are U-shaped with a bolt through the tips. Fig. 12B depicts two turnbuckles attached to the eye of an anchor. The procedure for installation is to remove the bolt from the jaw, pass the jaw over the eye of the anchor and reinstall the bolt through the jaw, through the eye of the anchor, and through the other side of the jaw. For two or more guys attached to one anchor, it is recommended that you install an equalizer plate (Fig. 12C). In addition to providing a convenient point to attach the turnbuckles, the plate will pivot slightly and tend to equalize the tension on the guy wires. Once the installation is complete, a safety wire should be passed through the turnbuckles in a "figure-eight" fashion to prevent the turnbuckle from working loose

Sources of Information

Data for this article was compiled from the literature made available by the following manufacturers. For more information and particular specifications, we suggest that you contact them or their dealers directly.

Aluma Tower
Box 2806
Vero Beach, FL 32960

Hy-Gain Division
Telex Communications, Inc.
9600 Adrich Ave., S.
Minneapolis, MN 55420

Tristao and Pratt Tower Company
P. O. Box 3715
Visalia, CA 93278

Wilson Systems, Inc.
4286 S. Polaris Ave.
Las Vegas, NV 89103

Heights Manufacturing Co.
4516 N. Van Dyke
Almont, MI 48003

Unarco-Rohn
P.O. Box 2000
Peoria, IL 61601

Tri-Ex Tower Corp.
7182 Rasmussen Ave.
Visalia, CA 93277

Universal Manufacturing Company
12357 E. 8 Mile Rd.
Warren, MI 48089

Summary

We've presented a short overview of towers and accessories. There is no way to answer all of your questions in an article of this scope. Hopefully, we have put you in a position to ask more (and better) questions of the person who has all the answers — the tower manufacturer. Before putting down the first dollar on your tower, do some research and make sure that your planned installation will be safe and will suit your needs. Please do not construe this article as an endorsement of any particular manufacturer, type of tower or type of accessory. We cannot and will not tell you which tower to buy. That is your decision. Make sure you don't wake up after a heavy storm and find that you've been impaled by your 20-meter reflector. QST

Notes

[1] R. A. Lodwig, "Wind Force On A Yagi Antenna," *QST*, July 1974, p. 46.
[2] J. J. Nagle, "How to Calculate Wind Loading on Towers and Antenna Structures," *Ham Radio*, August 1974, p. 16.
[3] *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures*, EIA Standard RS-222-C, Electronic Industries Association, March 1976, available from EIA, 2001 Eye St., N.W., Washington, DC 20006, price $7.40.

Strays

TECHNICAL CORRESPONDENCE NEEDED

☐ Technical Correspondence Editor Hall, K1TD, is looking for letters that treat subjects of technical interest to *QST* readers. He is particularly interested in receiving letters dealing with solutions to technical problems, new design techniques and improvements to existing modern circuits. Constructive criticisms of published *QST* articles (technical aspects) are used in the column when appropriate and are welcomed. Our objective is to make the column interesting and useful by publishing material of high quality.

We are always happy to receive contributions for our Hints and Kinks column, too. If you have developed an innovation that might be of interest to other amateurs, please write a description of the gadget or concept and send it to Hints and Kinks Editor Leland, W1JEC, at ARRL Hq.

Talk about luck! While preparing to throw out some old books, Robert Hertzberg, K4JBI, unexpectedly found his original ham ticket folded up in one of them. Issued by the Department of Commerce, it was dated December 18, 1919. The former 2ABK has run the gamut from spark gap to sideband and is still an ardent operator and experimenter. *(photo courtesy of K4JBI)*

Technical Correspondence is the spot in *QST* to have your ideas or opinions aired. K1TD is waiting to hear from you! — *Doug DeMaw, W1FB*

CLUB REBATES/FOREIGN FUNDS

☐ Clubs wishing to take a commission for their treasury must send membership/subscriptions, new or renewal, to Hq. They must be sent by a club officer. Foreign remitters please write us promptly when sending money, stating the amount sent and clearly indicating what it covers. This will enable us to fill your request more quickly. — *Marion Bayrer, ARRL Circulation Department*

I would like to get in touch with . . .

☐ amateurs interested in forming a German language net. Harry Hinz, WB6LNZ, P. O. Box 546, Rio Vista, CA 94571.

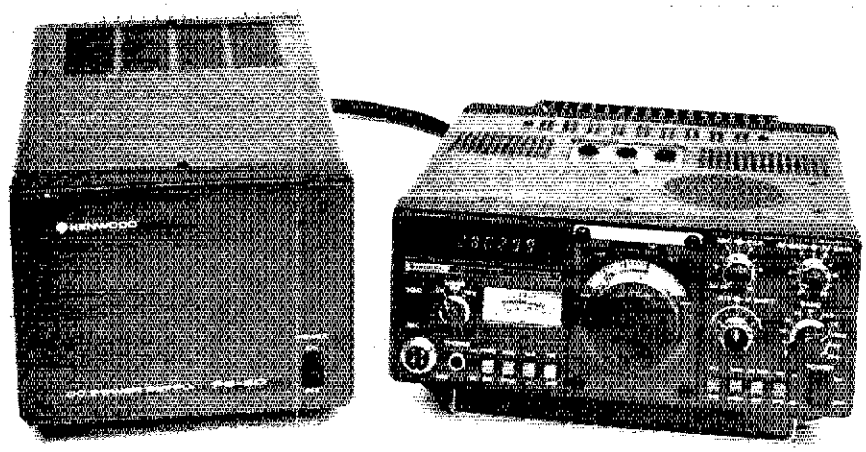
☐ an amateur I worked in Panama in 1979. My log information is as follows: date, 7-29-79; time, 1645Z; call, KZ5KB; RST, his-569, mine-569; frequency, 21.195 MHz; name, Ken; QTH, Ft. Gulick. Dick MacWilliams, KA3CDQ, 4905 Ashford Dr., Upper Marlboro, MD 20870.

☐ other hams who would like to learn or practice foreign languages on the air. Gabe Gargiulo, WA1GFJ, 160 Elm St., North Haven, CT 06473.

Product Review

Conducted By Paul K. Pagel,* N1FB

Kenwood TS-130S HF SSB Transceiver



Conventional wisdom has it that filmmakers often follow a successful movie with a sequel having much the same cast, roughly the same plot and none of the spontaneity that made the original popular. Usually, such imitations are dubbed by the critics as "Son of . . ." movies. The TS-130S could easily be tagged as "The Son of the TS-120S,"[1] but the TS-130S is in no way an inferior copy of the original. Kenwood has kept the solid foundation of the TS-120S and added features that greatly enhance its performance.

Refinements

Perhaps the most obvious change is in terms of frequency coverage: The '130 deletes the 15-MHz band and adds the new WARC bands.[2] For the time being, the only significance this has is that the operator will use the 10-MHz WWV signal for time and frequency reference instead of the 15-MHz signal. Factory-installed diodes prevent accidental transmission on the WARC bands before they become available for use. The owner's manual has instructions for removing each diode to enable transmission on a particular band. If the operator desires to simultaneously enable transmission on all three bands, he merely removes one jumper. Either way, it is a relatively minor procedure that the average amateur can perform in a few minutes.

In terms of flexibility, the most advantageous feature added to the '130 is the provision for optional filters and the means to switch them. Like the '120S, the user can add either the 500-Hz (YK-88C) or the 270-Hz (YK-88CN) filter for cw operation. The user can also choose to add the 1.8-kHz ssb filter (YK-88SN) to use as an alternative to the built-in 2.4-kHz ssb filter. With the '120, the cw filter was selected automatically when the rig was placed in the cw mode. Not so with the '130! A push-button switch located on the front panel allows the operator to choose between narrow and wide filters. In the WIDE position, the '130 automatically selects the 2.4-kHz ssb filter regardless of the setting of the MODE switch. Switching to the NARROW position causes the '130 to select either the optional cw or ssb filter, depending on the setting of the MODE switch. The receiver will be disabled if the NARROW position is selected without the corresponding filter installed. I used this feature to get a rough idea of the isolation of the ports on the filters. If the ports were not isolated, there would be a great deal of leakage of signals around the filters, defeating their purpose. This would be indicated by being able to hear signals in the NARROW position with no filter installed. I found that the only signals I could hear were the ones that had been "pegging" the S meter. My personal opinion is that the isolation is good enough that the filters are not compromised.

The table of specifications shows the noise floor to be −138 dBm at 80 m. This is more sensitivity than could ever likely be needed on this band; in fact, it contributes to the likelihood that the receiver will suffer from front-end overload in the presence of strong signals. Kenwood has added a 20-dB attenuator to the '130 that can be selected with another push-button switch located on the front panel. By using the attenuator and judiciously adjusting the RF GAIN control, the operator can avoid the problems associated with the front-end overload.

Another handy addition to the '130 is the built-in speech processor. As with most speech processors, results were not always predictable. On-the-air tests indicated that at times the processed signal was more effective than the unprocessed signal. At other times, the unprocessed signal seemed to do better. Presumably, varying band conditions, degrees and types of interference, and perhaps "black magic" account for the apparent inconsistencies. Nonetheless, having the processor available at the press of a conveniently located button gives the operator one more weapon for crashing the pileups.

The '120 did not always display the correct frequency on the digital readout when beyond the edges of the specified band. This minor annoyance has been alleviated in the '30. For instance, if you are listening to WWV on 10 MHz and move the VFO 100 Hz below the WWV signal, the digital display will switch from 10,000.0 to 9,999.9. For the average amateur this is probably of little importance; however, one of my primary on-the-air activities is participating in Army MARS nets, which are

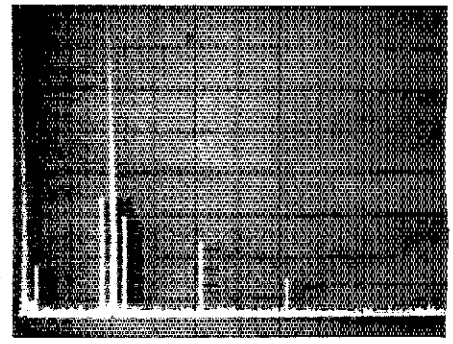


Fig. 1 — Worst-case spectral photograph of the TS-130S transmitter output on 14 MHz at 100-watts output. Vertical divisions are 10 dB each; horizontal, 10 MHz. Close-in spurs are down approximately 45 and 50 dB, respectively. The second harmonic is down about 55 dB. The TS-130S meets current FCC requirements for spectral purity.

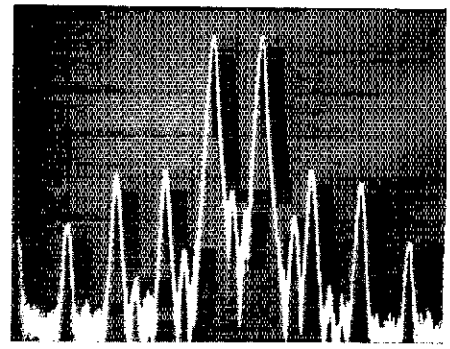


Fig. 2 — This photo represents 20-meter two-tone testing of the TS-130S at 100-watts PEP output. Each vertical division is 10 dB; horizontal, 1 kHz. Third-order products are about 38 dB down from the PEP output level.

[1] P. K. Pagel, "Product Review," *QST*, February 1980, p. 38.
[2] R. L. Baldwin, "It Seems to Us . . ." *QST*, January 1980, p. 9.

*Assistant Technical Editor

located just above and below the amateur bands. It is certainly convenient to "dial up" the given frequency of a net with no guesswork or mental gymnastics. As with the '120, the analog dial would be adequate (temporarily) should a problem develop with the digital readout.

On the '120, the operator used the MODE switch to select between cw, usb and lsb. The markings on the '130 MODE switch read: CW SSB REV. Diode switching selects the "normal" sideband for any given band when the switch is in the SSB position. If the operator desires to operate on the other sideband, he switches to the REV (reverse) position. This feature is hardly earthshaking, but it does facilitate rapid band changes.

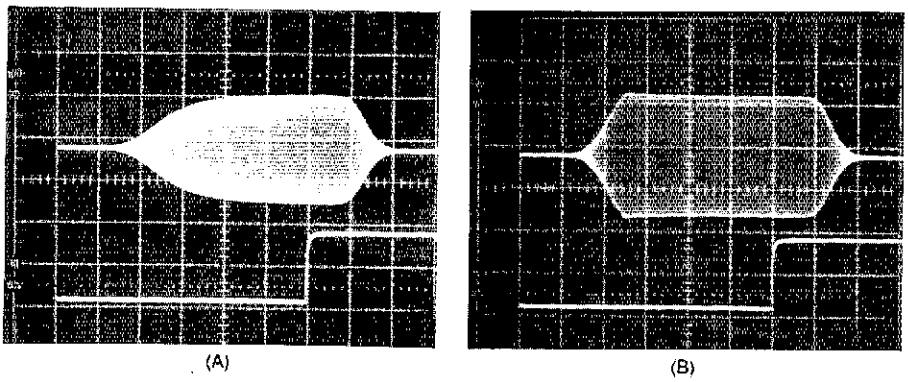
Kenwood TS-130S Transceiver Serial No. 1020547

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 80-10 m, WARC bands included.	As specified plus approximately 70 kHz beyond upper and lower band edges.
Modes of operation: Ssb/cw.	As specified.
Readout: Analog and digital; 6-digit, fluorescent blue digital display.	0.25 inch (6.4 mm) digits.
Resolution: Analog, 1 kHz; digital, 100 Hz.	As specified.
Kilohertz per turn of knob: Not specified.	25.
Backlash: Not specified.	Nil.
RIT range: ±2 kHz.	±2 kHz.
Receiver attenuator: 20 dB.	As specified.
S-meter sensitivity (μV/S9): Not specified.	80 m, 100; 40 m, 100; 30 m, 100; 20 m, 100; 17 m, 100; 15 m, 102; 12 m, 102; 10 m, 100.
DB/S unit: Not specified.	From S1 to S9, 6 dB; from S9 to +30 dB, linear; above +30 dB, nonlinear.
Receiver sensitivity: 0.25 μV for 10 dB S+N/N.	Receiver dynamics measured with optional YK-88C i-f filter installed.

	80 M	*20 M*
Noise floor (MDS) dBm:	−138	−138
Blocking DR (dB):	109	110
Two-tone, third-order IMD DR (dB):	79	78
Third-order input intercept (dBm):	−19.5	−21

Audio power output (8 ohm load): 1.5 W.	As specified.
Power consumption: Receive, 9.66 W; transmit, 248.4 W.	Not measured.
Transmitter rf power output: Not specified.	80-12 m, greater than 100 W; 10 m, greater than 90 W.
Spurious suppression: Better than 40 dB.	45 dB.
Harmonic suppression: Better than 40 dB.	Approx. −55 dB on 20 m (worst case).
Carrier suppression: Better than 40 dB.	As specified.
Third-order IMD: Not specified.	Approximately −38 dB (see photo).
Key-down time limitation: Not specified.	See text discussion of built-in protective circuitry.
Frequency stability: Within 1 kHz during the first hour after 1 minute of warm-up; within 100 Hz during any 30-minute period after warmup.	−110 Hz after 10 minutes, −337 Hz after 1 hour. (Measured with transmitter operating at 20-W output into 50-ohm load.)

Size (HWD) 3.8 × 9.6 × 11.7 inches (94 × 241 × 293 mm).
Weight: 12.4 lb (5.6 kg).
Color: Gold brown/gray.



(A) (B)

Fig. 3 — The keyed cw waveform of the TS-130S. At A, the carrier level control was adjusted so that the alc meter barely deflected upscale. The waveform is "soft and mushy." At B, the carrier level control was fully advanced. The alc meter was "pegged," yet the waveform remained relatively soft, indicating that it is difficult to overdrive the TS-130S. The best waveform was obtained by adjusting the carrier level control to the point that resulted in the alc meter reading being in the upper limit of the alc zone. Horizontal divisions are 5 ms each. As with the '120, roughly 7 ms after key up, the wave starts to decay. No key clicks were discernible. Because of the delay, the weighting may be a little heavy — that is probably unnoticeable below 40 to 50 wpm.

Constants

Most of the basic parameters of the '120 have not been changed in the '130. The '130 has the built-in VOX controls located on the top cover of the rig. This presents no problem for fixed or mobile use. The optional MB-100 mobile bracket is designed such that the operator should have no trouble reaching the VOX controls while the rig is installed in it, should that be necessary. I found the built-in noise blanker to be quite effective in taking out ignition noises from nearby automobiles.

The TS-130S is delightfully simple to operate. The transmitter is broadbanded, so tune-up is limited to selecting the appropriate band, picking a frequency and choosing the appropriate mode. Because the finals are solid-state, Kenwood has taken precautions to protect them from conditions that might lead to their destruction. A large and quite effective heat sink is attached to the finals. In fact, the heat sink on the finals is larger than the heat sink on the companion PS-30 power supply. A very quiet fan is mounted on the heat sink of the '130. Normally the fan is off; when the temperature of the heat sink rises above a predetermined level, the fan is switched on automatically. For the first couple of months that I used the rig, the fan did not come on. I had begun to suspect that it might be defective. During the lab tests we locked the transmitter on at full output power (into a dummy load, of course). The heat sink warmed up rapidly, and the fan did come on. It is an extremely quiet, but effective, fan.

The '130 has built-in circuitry that protects it from high VSWR levels. The circuitry senses the high VSWR and automatically reduces the drive level. At my station, one of the antennas failed in the midst of a QSO. The operator at the other end reported a sudden drop in my signal level. I checked the SWR and found that it was well above 5:1. I tested the '130 on a dummy load and found that the unit performed normally. The protective circuitry had passed the acid test!

Another feature carried over from the '120 that is quite useful is the IF SHIFT, which moves the i-f crystal filter center frequency ±1 kHz. This allows the operator to adjust the tone or eliminate interference. At the beginning of one of my cw QSOs, there was relatively little activity on the band, and I was using the ssb filter. As the ragchew progressed, additional stations appeared nearby. I switched to the 500-Hz cw filter, which removed the distraction. Then, suddenly, a very loud station came on top of the station I was working and began calling CQ. I decided to try taking him out with the IF SHIFT. It worked like a champ: I could tell he was still there, but he was so far down the slope that the station I was working was once again armchair copy. I was impressed.

The '130 has a built-in, 25-kHz crystal calibrator that can be adjusted to WWV. It also has provisions for installation of four crystals for fixed frequencies of operation. The S meter also doubles as an indicator for transmit conditions. On transmit, the meter can read either collector current or alc (automatic limiting control). The alc meter

reading is most useful in adjusting the microphone gain control for ssb operation. In the ARRL lab, we found that the best cw waveform could be obtained by setting the carrier level control so that the alc meter rested at the upper boundary of the alc zone (see photo).

A wide variety of accessories for the TS-130S are available in addition to the PS-30 power supply and MB-100 mobile bracket already mentioned. These include VFO-120 external VFO and the DFC-230 digital frequency controller. A DIN socket on the rear panel provides the means for controlling an external amplifier.

The only glitch noticed during several months of operation occurred one evening shortly after KB1O and I checked into a MARS net. I looked up at the rig and noticed that smoke was streaming out the air vent on the top. In a flash, I turned the rig off and unplugged it. I removed the top and bottom covers and looked for visible signs of damage — none. I reconnected the power supply and turned the unit on. Like a hawk, I watched for the first sign of smoke to pinpoint its source. I waited . . . and waited . . . and waited some more. Nothing. I connected a dummy load and tested the transmitter. Everything seemed normal. So I put it on the air and got excellent signal reports. Still no sign of smoke. For several weeks I operated the '130 with the top and bottom covers removed. There was never a recurrence of the smoke. I've found nothing abnormal in the unit's operation. I concluded that a small varmint had crawled into the innards and met an untimely end.

If I had a complaint it would not be about the rig at all, but about the documentation that goes with it. The owner's manual provides clear text and detailed pictorial drawings that indicate how to connect the TS-130S to various options and environments. It has a block diagram and schematic diagrams of the various boards, and one large diagram of the whole radio. Here the '130 falls short of the '120; its manual at least had an abbreviated description of the circuit. Kenwood does sell an optional service manual. If this radio were destined for the CB market or another service where no technical expertise is expected of the operator, then I think they would be justified in limiting the owner's manual to the information contained in this one. That is not the nature of the amateur market, though. I think that Kenwood and the other manufacturers who do not automatically provide good technical documentation of their equipment are doing a disservice to the amateur population and the Amateur Radio Service in general.

As with the '120, the '130 seems to have been designed with the mobile operator in mind. Over the years, mobile rigs have often implied compromise. The TS-130S is not the top of the Kenwood line in terms of receiver performance (see the receiver figures of the TS-830[1]). But the difference in performance is balanced by the added versatility. The TS-130S is convenient, easy to operate and ideal for mobile installations. The TS-130V, a low-power version with most of the features of the TS-130S, is available for the QRP enthusiast. Additional information about the TS-130S may be obtained from Trio-Kenwood Communications, Inc., 1111 West Walnut St., Compton, CA 90220. Price class for the TS-130S is $750. — *Peter O'Dell, KB1N*

[1]P. K. Pagel, "Product Review," *QST*, May 1981, p. 38.

J. W. MILLER AUTOMATIC ANTENNA TUNER AUTO-TRAK MODEL AT2500

☐ The moment I saw the AT2500 in operation I recognized that it was going to be a challenge to describe. The input and output capacitor knobs turning as if by magic, without a hand guiding them, surely implied a high degree of complexity and sophistication. It was not a disappointment. The past few months have been spent observing the operation of the tuner with a variety of loads, power levels and modes of operation at W1SE.

Eighteen pages of the 20-page instruction manual describe each circuit in explicit detail. The manual is extremely well organized, and includes schematic and circuit-board layouts with every component identified.

General Description

Two primary assemblies make up the AT2500. The main tuner assembly houses the rf components and two circuit boards, which contain circuitry to control the motor-driven capacitors. During operation the tuner band switch, lettered A through R, must be set to the correct band before automatic operation may begin. The capacitors may be operated manually, with or without the automatic feature disabled and for minor "touch-up" by those who just can't keep their hands off the knobs. This feature is handy should there ever be a control-circuit malfunction. Manual operation of the tuner is possible with the boards removed for repair or replacement. The impedance-matching circuit is a conventional T network.

The second assembly is the remote directional bridge coupler which, though separate, is connected to the main tuner assembly by means of a captive plug-in cable.

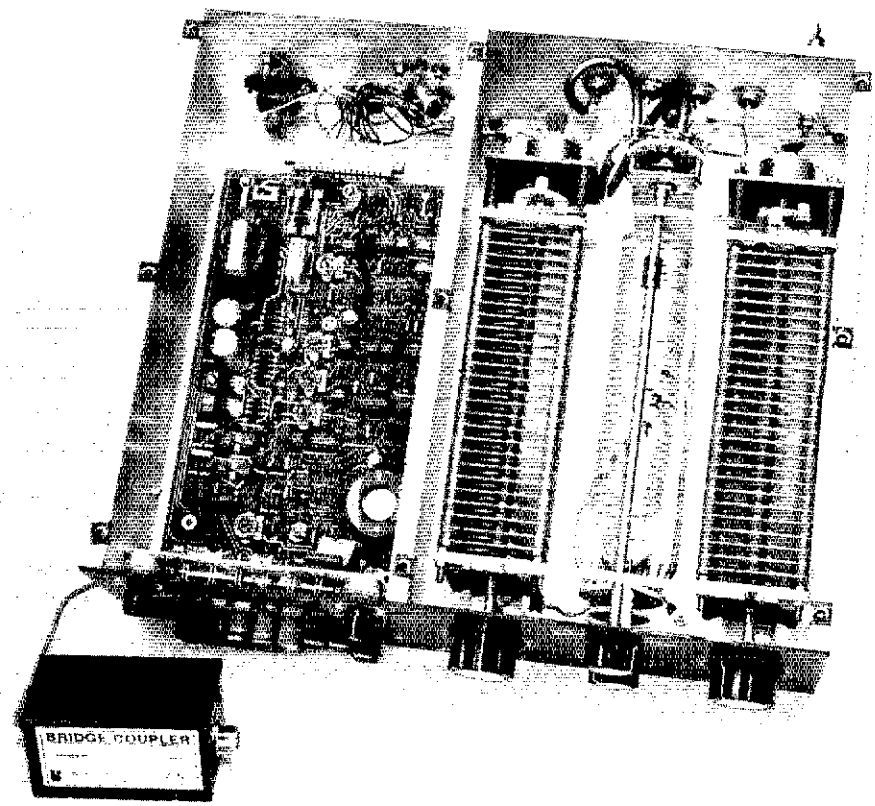
Circuitry

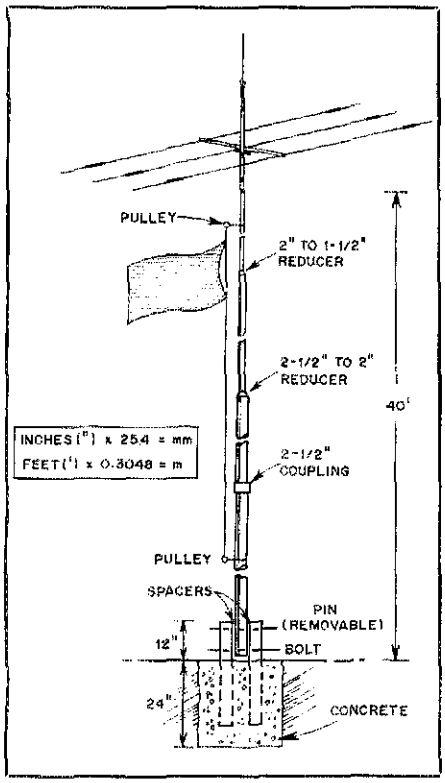
A very brief description of each circuit will provide the reader with an idea of what the AT2500 does. The remote directional bridge coupler is a separate package, designed to be inserted in the coax line at the output of the rf source, i.e., transmitter, transceiver or amplifier — the point in the feed line where it is most important to exhibit a low SWR. The bridge generates dc voltages that are proportional to the forward and reflected rf voltages present on the cable. Ultimately, these dc voltages are used to actuate the motors that drive the capacitors in the rf section.

An SWR analog computer circuit automatically calculates the SWR as derived from the dc voltages developed by the bridge. The calculated SWR is in turn displayed on the front-panel SWR meter.

These same dc voltages also drive the power logarithmic amplifier to provide in excess of 60 dB of compression, enabling the front-panel power meter to read either 1 to 250 or 10 to 2500 watts on a single scale. Each range is selected by a panel switch.

As the motors turn the capacitors, the dc voltage developed by the bridge circuit is changing constantly. The slope detection circuit monitors these changes, and as a decending voltage begins to change, that is to increase, the particular motor operating at that moment is stopped, and the other motor is started. As the SWR is reduced, by alternate starting and





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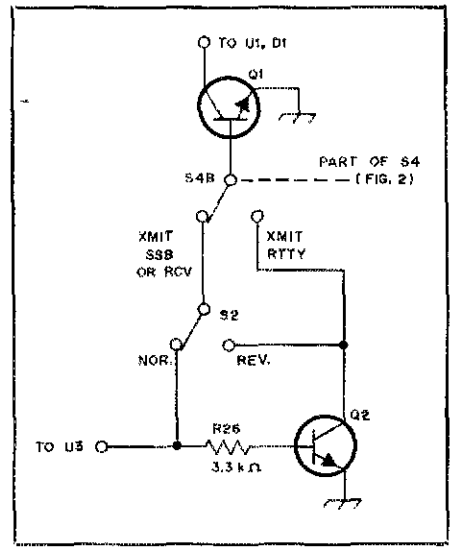

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Hints and Kinks

Conducted By Stuart Leland,* W1JEC

TEST BOX

☐ So that I could experiment with transistors in some orderly fashion, I assembled a "Test Box" (Figs. 1 and 2). On a comparison basis, this device supplies useful information from one transistor to another. The user can select ac or dc coupling, vary the resistance from base to ground, control the voltage V_{cc} to base and adjust the outputs from collector or emitter follower with or without capacitance. Additionally, it provides for adjustment of the feedback from base to V_{cc} or collector. Another provision permits switching from pnp to npn configurations and vice versa.

From audio to 40 MHz, the parameters may be adjusted quickly for best performance, gain and collector loading. Transistors can be checked for use as substitutes or duplicate operation. Moreover, similar transistors can be checked operationally prior to installation in a particular circuit.

Because any transistor inserted in the socket can be removed easily, there is no problem in checking the various potentiometer settings with an ohmmeter. A center-zero milliammeter for use with the tester is illustrated in Fig. 2B. This meter is mounted externally and is connected to the tester through pin jacks J3 and J4. Power is supplied from an external, variable-regulated power supply.

My test box contains mainly junk box components. The enclosure is a 4- × 6-inch (102- × 152-mm) cabinet, but this can be a builder's choice. All rf leads should be short and rigidly supported. You may use whatever type of transistor socket is available. — *Gene Shapiro, WØDLQ, Leawood, Kansas*

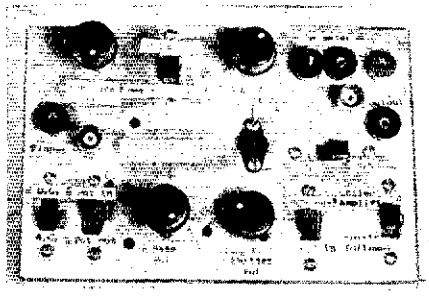


Fig. 1 — An experimenter's test box. This versatile device facilitates making value and circuit changes where transistors are used. Parameters can be adjusted quickly for best performance, gain and collector loading. See text for explanation.

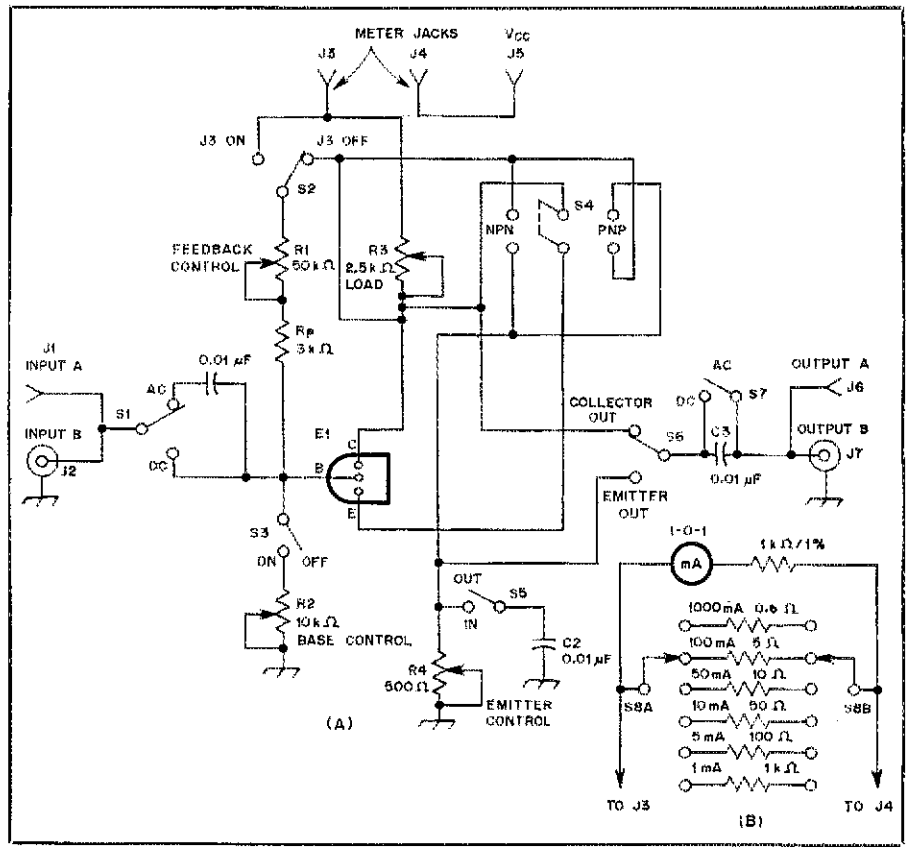


Fig. 2 — Schematic diagram (A) of the WØDLQ test box. Components are housed in a 4- × 6-inch (102 × 152-mm) enclosure. The metering circuit (B) is housed separately. It may be connected to the test box through J3 and J4. A center-zero meter (Weston 301) is arranged in a circuit adapted from the 1964 *Handbook*. There are six separate ranges provided by the 1%, 1/4-watt resistors. Rp is a protective resistor guarding against transistor damage. J1 and J3-J6, incl., are pin jacks. J2 and J7 are BNC connectors.

HINT FOR THE AVANTI ON-GLASS ANTENNAS

☐ The Avanti glass-adhesive antenna is a good design for the ham who doesn't like a "mag" mount or who doesn't want to drill holes in the body or trunk of his or her car. I had some difficulty in getting the mounting foot for my Avanti 2-meter on-glass antenna to adhere well to my windshield. Here's how I cured the problem.

The mounting-foot casting may not have been dressed adequately in some cases to make it really flat. The easiest way to check for this is to pass the foot carefully over a medium-cut metal file. (See Fig. 3.) If the bottom of the foot isn't flat, filing will take care of that. Also, take note of the indentations on the bottom of the foot — they should appear as in the drawing, with an edge similar to a dado joint you'd see in woodworking. This is so the adhesive will have something to "grab." Place the foot in a vise and carefully hacksaw the edges a bit deeper. Now, there'll be plenty of "edge" for the adhesive to make contact. — *Sandy Gerli, AC1Y, ARRL Hq.*

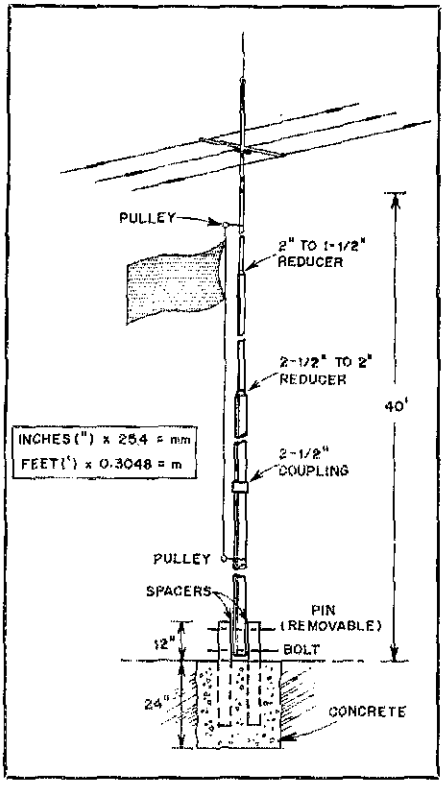
Fig. 3 — Sandy Gerli, AC1Y, suggests this modification of the mounting foot for the Avanti 2-meter on-glass antenna. The change increases adhesiveness.

A COMBINATION FLAGPOLE AND TILT-OVER TOWER

☐ Being a true-blue American and an homeowner, I decided to install a flagpole so Old Glory could be proudly displayed. I was also tinkering with the idea of constructing a low-cost antenna tower to accommodate several antennas that were eyesores mounted on top of my roof. After considerable thought and manipulations on the drawing board, I arrived at the design shown in Fig. 4. Not only is this combination flagpole and antenna mast intended to support the 10-, 15- and 20-meter tribander shown in the drawing, but also an AR2 Ringo will be mounted above the tribander and a single-wire antenna will be suspended from the pole solely for "SWLing."

Raising the mast to a full upright position requires a team of five people. Two can raise it manually, two are needed to handle ropes for steadying while a fifth person's task is to insert the locking bolt through the base uprights and the mast. Total weight of the 10-foot (3-m) sec-

*Assistant Technical Editor



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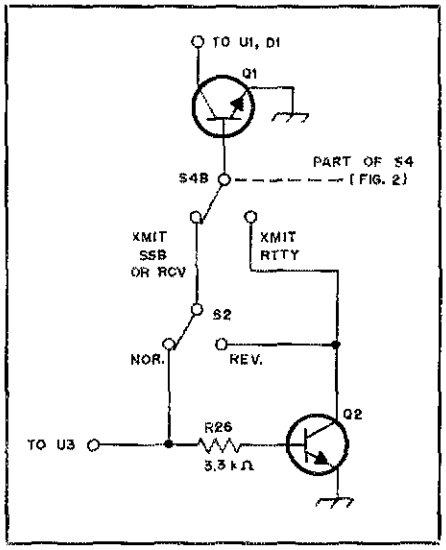

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Technical Correspondence

Conducted by
Jerry Hall,* K1TD

SMOKE DETECTOR SENSITIVITY

☐ Thank you for a copy of the article in November 1980 *QST*.[1] The smoke detector industry is aware that smoke detectors using electronic components are subject to some degree of influence by radio-frequency interference. To address this matter, Underwriters Laboratories has included in their test procedure of all smoke detectors a transient test involving radio-frequency interference. This should eliminate the problem on smoke detectors that are built today.

I would caution your readers about modifying the circuit to eliminate the problem on some of the older detectors. A change in the electronics to eliminate the radio-frequency interference could alter the sensitivity setting of the smoke detector. It is not enough to blow smoke into a detector to check its operation since the concentration of smoke from a cigarette could be far in excess of the normal setting of the smoke detector. For instance, the smoke detectors are required to respond within the range of 0.2% to 4% per foot of smoke. A cigarette could produce 40% to 50% per foot of smoke, leading the homeowner to a false sense of security that the smoke detector is operating properly when in fact it would not be. A further caution: In addition to eliminating the warranty, any listing by a testing laboratory would be voided as soon as the detector circuit was changed. — *Charles E. Zimmerman, PE, Fire Protection Engineer, National Fire Protection Assn., 470 Atlantic Ave., Boston, MA 02210*

[1]P O'Dell, "SDI — Dangerous Crippler of Radio Amateurs," November 1980 *QST*.

*Associate Technical Editor

FREQUENCY-COUNTER CLOCK PHASE LOCKED TO WWV

☐ I would like to present to your readers a block diagram of a proposed system which phase locks a counter clock crystal to WWV (Fig. 1). With this system, the counter reads all frequencies with the accuracy of our national standard.[2] While I have never been involved in frequency measurement competitions, I am aware that ARRL operates these events and that there is a considerable following among the amateur fraternity. I assume that somewhere in this activity there would be interest in a measurement scheme which is absolute and does not involve zero beating crystals, and so forth.

With reference to Fig. 1, instability caused by drift in the local oscillator cancels in mixer no. 2; the output of this mixer is exactly twice the 10-MHz frequency received from WWV, phase locked. Since only carrier is wanted, the intermediate-frequency filter should be as sharp as the local-oscillator stability permits — hence the crystal-controlled local oscillator.

Processing within the shield is done at frequencies remote from the input and intermediate frequencies to avoid feedback problems. The multiplier is a "linear" push-push type so that near-zero amplitudes are not lost. Effective buffering is required to prevent residual 455-kHz energy from reaching the input. The clock crystal is phase locked to provide short-term memory, allowing the crystal to "run through" momentary disruptions of the WWV transmission. Operation can be switched to a fixed capacitor when transmissions are unusable.

[2]Editor's Note: Because of propagation phenomena, the approximate accuracy of the received 10-MHz WWV skywave signal under typical conditions is at best a few parts in 10^7.

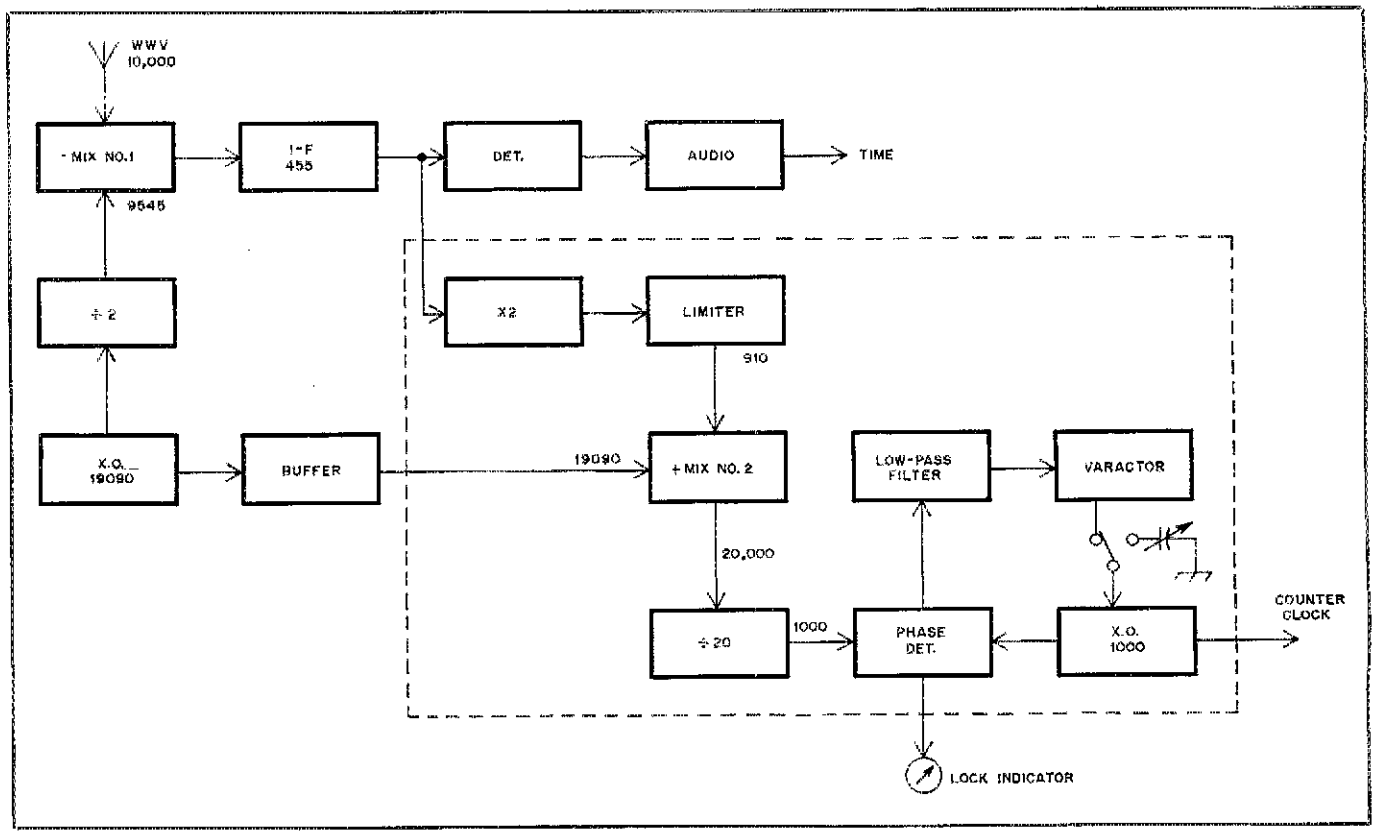


Fig. 1 — Noble's proposed scheme for phase locking a frequency-counter clock to WWV signals. X.O. indicates crystal oscillator; frequencies are indicated in kilohertz. The 1000-kHz crystal oscillator may be switched to operate with the variable capacitor when received WWV signals are unusable.

As in mountain climbing, the scheme is here, to be followed up by those who may be qualified in solid-state design and who have a direct application for the device. — *Frank Noble, W3MT, 10004 Belhaven Rd., Bethesda, MD 20034*

NOISE IN ACTIVE FILTERS

☐ Many common types of active filters can generate noise of much higher amplitude and wider bandwidth than the filter and active device characteristics would indicate. The reason for this is that although the signal is applied at the filter input, the device noise appears at the device (e.g., op-amp) input. The response to excitation at these two points is quite different, as I'll illustrate.

Fig. 2A shows a common low-pass filter[1] using an operational amplifier as a unity-gain buffer. With the values shown, the filter has a peak frequency, F_o, of about 650 Hz, a Q of five, and a voltage gain of five at f_o. The response of the filter is shown in Fig. 3A.

In Fig. 2B, op-amp noise is shown in simplified form as a voltage source in series with one input lead. The corresponding frequency response is given in Fig 3B. Note that the noise response is more than 20 dB greater than the signal response at f_o, and that it continues at unity above, as well as below, the filter cutoff frequency. So although the active filter does limit the noise from the preceding stages, it generates in itself a disproportionate amount of noise that extends beyond the desired bandwidth.

The peak noise response will depend on the component values, but a voltage gain of $1 + 2Q^2$ is a typical number, and it can't be reduced below $1 + Q^2$ for this filter type. Multiple-feedback low-pass and band-pass[4] types were analyzed with the same results.

The effect shown here won't be noticeable in "add-on" audio filters because of the high level of signal present. However, this does indicate the need for a fairly large amount of low-noise gain (on the order of 30 to 50 dB) preceding the active filter in direct-conversion receivers or other applications where high audio gain is involved. — *Roy W. Lewallen, W7EL, 5470 SW 152nd Ave., Beaverton, OR 97007*

[1]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*, ARRL, 1977, Fig. 17, p. 80.

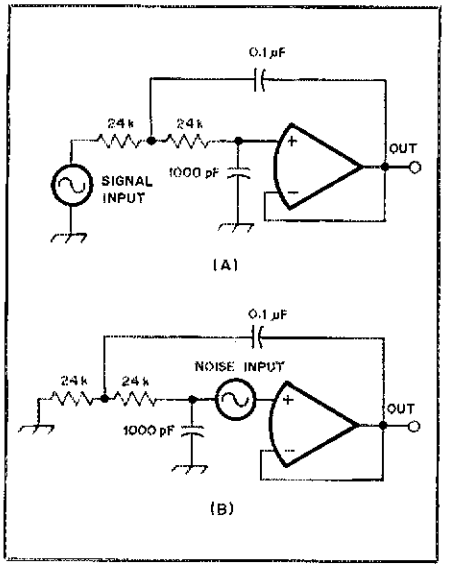


Fig. 2 — Common circuit for a low-pass active filter at A, and simplified diagram illustrating device noise, B.

PACKET RADIO AND BIT ERRORS

☐ The announcement of an operational amateur packet radio system in the April issue of *QST*[5] was welcome news in that it reaffirms the interest of the radio amateur in state-of-the-art communications. I fear, however, that the casual reader may not fully appreciate that the "highly reliable and nearly error-free communications" mentioned in this announcement requires an automatic request for repeat (ARQ). Packet radio does not solve the problem of bit distortion, bit dropout and "hits" in the received serial bit stream. Such errors are characteristic of RTTY operation, and arise from the effects of ionospheric propagation, multipath and interference.

The use of cyclic redundancy checkwords (CRC) facilitates the detection of errors in the transmitted message without the need for prior knowledge of the message content. This is somewhat like the parity bit in each ASCII character, except that in this case the checksum extends over the block of characters transmitted and is typically a 16-bit word rather than a single bit. If a checksum error is detected at the receiving station, the entire message packet is rejected, or, if the address of the sender is known, the receiving station can automatically request a repeat. Thus, "highly reliable and nearly error-free communications" are achieved by accepting and forwarding only those message packets that have the correct checksum.

At vhf and uhf, where multipath distortion on the leading edge of each bit transition lasts for only 5 microseconds or less, rates approaching 100 kilobaud can be used for packet radio. At hf, however, the useful or uncorrelated bandwidth of an ionospheric propagation path frequently limits RTTY speeds to less than 100 wpm (74.2 baud), or to bit lengths greater than 13.5 milliseconds. Thus, at hf it is doubtful that the baud rates for packet radio will differ from those now used for RTTY.

I do not intend the above comments to dampen the enthusiasm for experimenting with packet radio. On the contrary, I am pointing out some interesting and challenging problems for the amateur to be thinking about. Clearly this is a new area, and the possibilities of blending Amateur Radio with hobbyist computer techniques are, with the approval of the FCC, unlimited. — *Jack H. Priedigkeit, W6ZGN, 441 Sherwood Way, Menlo Park, CA 94025* QST

[2]*Ibid.*, Fig. 21, p. 81.

[3]H. Magnuski and P. O'Dell, "First Packet Repeater Operational in U.S.," April 1981 *QST*, p. 27.

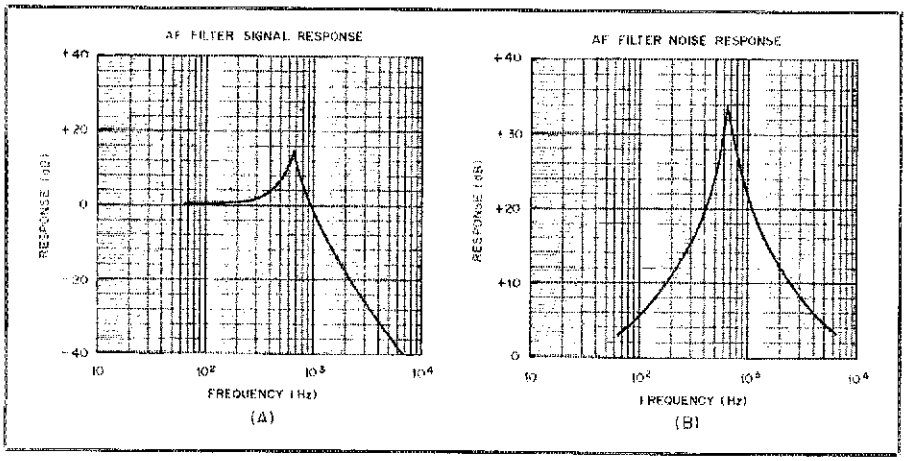


Fig. 3 — Calculated frequency-response curves. At A and B, respectively, are the curves for the circuits of Fig. 2A and 2B.

Feedback

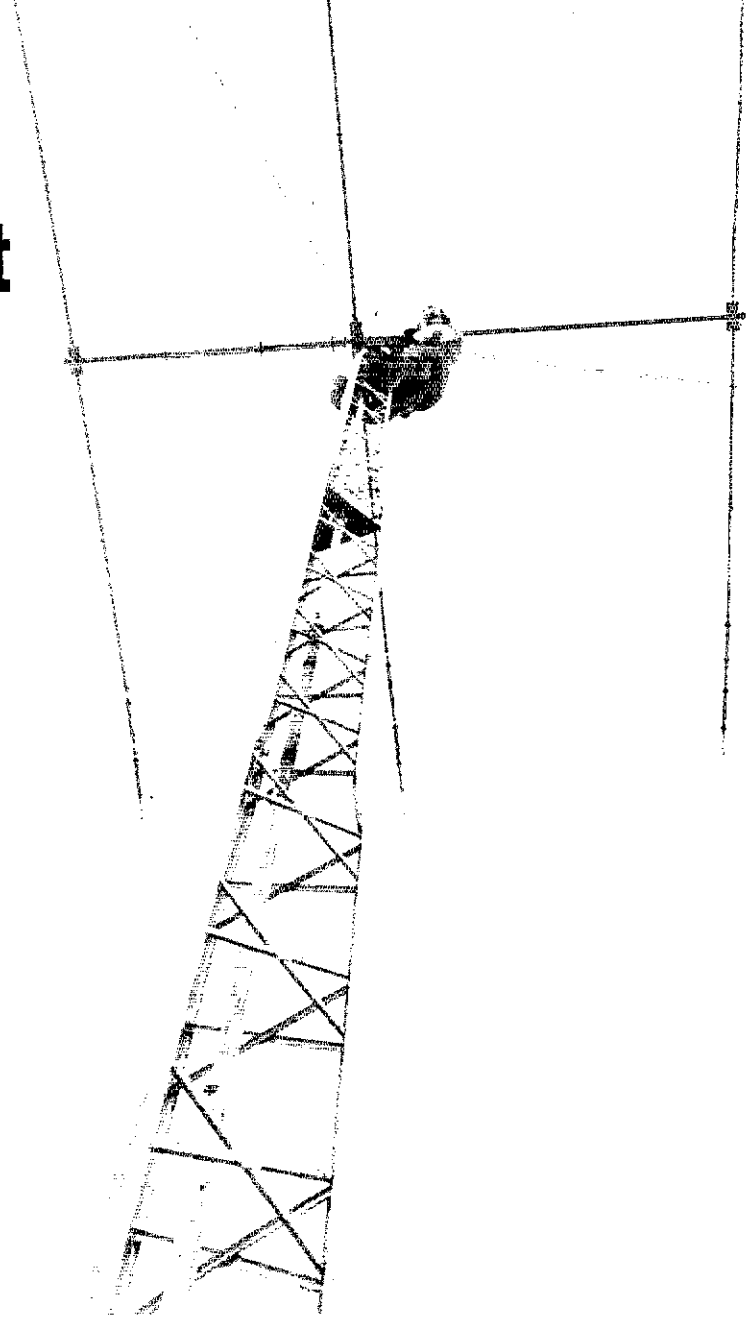
☐ In "General-Coverage Reception with the Drake R-4C Receiver," May 1981 *QST*, C2 should have a value of 5 to 100 pF, not 0.5 to 100. Author Luetzow points out that Daytapro Electronics, Inc., 3029 N. Wilshire Ln., Arlington Heights, IL 60004, will supply an etched circuit board for the construction of the unit. (The ARRL and *QST* in no way warrant this offer.)

☐ Reference is made to the Product Review column in the May 1981 issue of *QST*. Fig. 2 on page 38 is *not* an accurate depiction of the noise about the carrier frequency of the TS-830S. The picture really shows the noise sidebands of the spectrum analyzer. Noise output of the review unit is actually so low it cannot be measured with the instrumentation on hand in the ARRL laboratory.

☐ The Technical Correspondence column carries an item by V. Bhatt, VU2RX, in the October 1980 issue of *QST* entitled "A 4:1 Unun." Key words were omitted from the 8th and 9th lines of that item. The sentence should read, "This simple device, used to match 50 ohms output impedance of a transceiver to about 200 ohms input impedance of a typical linear amplifier, had totally escaped my attention . . ."

☐ In "QST Profiles," May 1981, the line reading ". . . to frequencies as great as 100 nanohertz" should read ". . . gigahertz." QST

The League's Fight Against Restrictive Tower Ordinances



By W. Dale Clift,* WA3NLO

David Deerfield is a city councilman, and he has a problem. A group of irate citizens is yelling demands that the city do something about a ham radio operator who is "tearing up the neighborhood's television reception."

Although he admittedly isn't an expert on radio communications, Councilman Deerfield feels the responsibility to show his constituents that he cares about their problems. When debate begins on the issue raised by the onlookers, Deerfield is first to speak: "I move that the corporation counsel draft an amendment to the zoning ordinances that will take care of this problem."

The motion carries unanimously, and yet another city is on the way toward restricting the rights of Amateur Radio operators.

This scene could happen in your city or town tomorrow. If it does, here is what the League will do to protect your rights.

We're Ready to Assist

Through its general counsel, an extensive file of successful case histories and Amateur Radio public relations materials, the League stands ready to assist when an overly restrictive local ordinance threatens to keep amateurs from operating their federally licensed station.

Typically, League Hq. learns of a particular legal case when a member calls or writes. A building inspector's attention may have been drawn to a member's antenna as a result of a neighbor's complaint — the neighbor may have an RFI problem or may not like the looks of the antenna. If a ham is in violation of local zoning laws or building codes, he or she may or may not have to immediately dismantle the antenna, depending on the circumstances. If he or she wants to keep the antenna up, however, chances are that a hearing will be necessary. Or the local government may choose to adopt a restrictive law specifically targeting Amateur Radio operators, similar to the amendment that Councilman Deerfield proposed.

Should you be faced with a hearing or debate on a restrictive ordinance, Headquarters can send you public relations material that will explain to members of a hearing board and neighbors just what Amateur Radio is, and how it can be invaluable in times of emergency. Should you need information about how to handle such subjects as RFI, aesthetics or safety, Hq. can provide additional guidance.

If it appears that the zoning ordinance

*Deputy Manager, Membership Services

is unfair, vague, is unrelated to the health, safety or welfare of the public, or is seeking to regulate such communications practices as selection or use of frequencies, licensing or RFI-related matters, Hq. will ask the ARRL general counsel to examine the ordinance and write a letter on the member's behalf to the zoning authority. This letter will cite legal cases and give an opinion on the zoning ordinance's applicability to the member's situation.

Sometimes, an individual's legal situation is so complicated that the best recommendation Hq. can make for the ham is to get in touch with a local attorney who is familiar with the laws of his home state. League assistance does not stop there, however. If a member hires an attorney, he or she may consult with the League's general counsel free of charge. The assistance thus provided can be invaluable. Because he is at the hub of most Amateur Radio-related legal activity, the ARRL general counsel knows the latest developments in this specialized area of the law. Not only will the general counsel be able to save the member's attorney time and effort, he will also make available information that might not be readily attainable by a local attorney.

Often, a professional other than an attorney is needed to present the amateur's side of the dispute. If the zoning authority requires a seal or certificate of approval from a registered professional engineer or architect, Hq. will attempt to identify one in the member's locale by contacting the member's local ARRL officials.

Some situations call for more direct intervention by the League. ARRL will sometimes ask for permission to file an *amicus* "friend of the court" brief, if a member's case presents a question that could affect other amateurs residing in the same county or state. Requests for such assistance should be made by the member's personal attorney to the ARRL general counsel.

Steps the League Is Taking

1) Provide public relations material to explain the usefulness of Amateur Radio to a community.

2) Through the ARRL general counsel, provide advice, free of charge, to the amateur's personal attorney.

3) Again through the general counsel, provide a letter of support for the amateur's position, citing legal precedent.

4) Provide the name and address of a locally known architect or engineer if their services are called for.

5) Provide financial assistance, under certain guidelines, in support of cases that will have a far-reaching impact on Amateur Radio.

6) Provide financial support to the Personal Communications Foundation, a private, nonprofit clearinghouse for Amateur Radio legal information.

7) Disseminate information on RFI and assist members of Congress who introduce legislation that will help solve the problem.

Funding Guidelines

Funding is also available, in some cases, for assistance in carrying some of the financial burden of litigation. Obviously, the League cannot provide financial aid to all who request it. Therefore, it has adopted guidelines to assure members that League money will be used where it will have the greatest effect for Amateur Radio. The guidelines must also comply with the League's by-laws, which prevent League income and assets from inuring to the financial gain of any individual. These guidelines, sometimes called the three-wicket test, follow.

The extent of the League's financial participation in any legal case shall be determined primarily by two factors:

1) That a legal precedent of substantial value to amateur radio is likely to be established; or, that an established legal precedent which has been of substantial value to amateur radio is in danger of being overruled.

2) The financial ability of the amateur to participate in covering the costs of the case. The legal merit of the case shall be judged by the general counsel based on its possible long-term effect on legal precedent. The financial ability of the amateur to participate in covering the costs of the case will be judged on the basis of a confidential financial statement furnished by the amateur to the general manager and on an evaluation of the financial resources available locally (such as from affiliated clubs). The general counsel and the general manager will present their recommendations to the Executive Committee, based on the above evaluation, and the Executive Committee will authorize the specific limit of payment.

The League has been involved in many cases, but the average member hears only of the more notable ones. The *Oelkers* case, for example, decided in federal court, held that a city's zoning ordinance was so restrictive as to be an infringement of the ham's civil rights. This case won nationwide acclaim from the amateur community because its precedent-setting decision awarded the amateur his attorney's fees amounting to over $8000. See December 1980 *QST* "Happenings," and the article that follows this one, for details. In 1980 alone, the League provided over $13,000 to individuals involved in litigation because of their Amateur Radio activities.

There are also less obvious ways in which the League has been fighting the encroachment of government regulation on the ham radio operator. The Personal Communications Foundation, a nonprofit clearinghouse for legal information involving Amateur Radio, has received funding from the League over the last few years. Most recently, the League gave the PCF $350 per month for seven months to fund a law student's part-time research into areas of law that could be of assistance to radio amateurs.

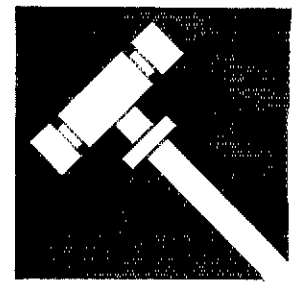
The League is also working to solve one of the primary problems leading to the adoption of local antenna ordinances and nuisances aimed at the radio amateur — RFI. The League has assisted Senator Goldwater and other members of Congress in the introduction of legislation that seeks specific authority for the FCC to regulate the RFI susceptibility of electronic home-entertainment devices. Senate Bill S. 929, which was reported in June 1981 *QST* "Happenings," is a step in the direction of attacking RFI/TVI when the fault does not rest with the radio amateur. Once the public and local government officials better understand that poorly designed electronic home-entertainment devices are RFI *susceptible* and see the FCC doing something to solve this problem, local government will be less pressured to adopt restrictive legislation aimed at the radio amateur.

There are, of course, things the League cannot do. The League cannot provide a personal attorney or other representative for each case. Not only would it be too costly, but the logistical problems in retaining attorneys licensed to practice in all the states and provinces defy a practical solution. Also, the League cannot provide funding to a case that would have little effect on legal precedent affecting Amateur Radio in general. Conferring a benefit to one or a few individual members would be against the ARRL by-laws. League income and resources must be used only for the benefit of Amateur Radio in general. For this reason, the League also is prevented from using the pages of *QST* to channel funds to an individual.

Also, the League cannot provide money to a case that is bound to be lost because of a procedural flaw, because the ham has waived his rights by an agreement with the opposition, or because the case has been prejudiced in some way that makes the legal prognosis of the case poor.

There is no easy solution to the ever-growing problem of local regulation of Amateur Radio. Some of the legal arguments against this encroachment include federal preemption, deprivation of property rights without due process and the unconstitutional infringement of freedom of speech. However, state and local governments have court-recognized "police powers" to regulate activities that may affect the health, safety or welfare of its citizens. Local and state governments usually cite this power as the authority for the regulation of the construction, erection and height of amateur antennas. The problem really lies in balancing these powers with the rights of the radio amateur and the Federal Government's claim to be wholly responsible for interstate radio communications. The courts have been dealing with these questions since Congress first exercised jurisdiction over radio and wire communications. We can expect this conflict to continue, and the members can expect the League to intervene in this conflict whenever the interests of Amateur Radio can be promoted or must be defended.

Federal Court Victory for Amateurs in Oelkers Case



By Frederick J. Lawson,* K6JAN

When the City of Placentia, California, decided to pass an ordinance that banned radio towers more than 25 feet in height, George Oelkers decided to fight back. He, along with other amateurs in the community, would have to dismantle their towers or face possible criminal prosecution. Through his attorney, Fred Lawson, K6JAN, Oelkers sued the city in federal court,[1] on the grounds that Placentia's ordinance violated his freedom of speech, and was vague, overbroad and otherwise unconstitutional. In addition, the suit claimed that the federal government had preempted the field of radiocommunication back in 1934. The following article is a summary of the precedent-setting case from attorney Lawson's perspective.

The Central District, Ninth Circuit, United States District Court, in Los Angeles ruled on September 24, 1980, that the City of Placentia, California, must pay to George Oelkers, W6QOL, the amount of $8182.50 as attorney fees and court costs in the case. The Court had previously ruled on January 8, 1979, that the City of Placentia was permanently prohibited from enforcing two of its ordinances which restricted the height of radio antennas to 25 feet and 30 feet above ground, respectively. The City was not satisfied with its original ordinance of 30 feet, and adopted an "Urgency Ordinance . . . imposing a moratorium on all permits and entitlements for radio towers and appurtenant antennae exceeding 25 feet in height and prohibiting their erection." The ordinance further provided that a violation would constitute a criminal misdemeanor "punishable by a maximum fine of $500 and/or imprisonment not exceeding 6 months." It should be noted that during the time Oelkers' lawsuit against the City was pending, the court permitted him to maintain his two antennas at 50 feet above ground.

The federal court declared on January 8, 1979, that both city ordinances were in violation of the United States Constitution.

The Court Decision

In its written opinion, the federal court based its decision on important facts, which the court declared were as follows:

1) In compliance with this court's order of May 1, 1978, Plaintiff's antennae are maintained currently at a height not exceeding fifty (50) feet. Plaintiff is deprived of the use of some radio frequencies at said height and of consistent effective worldwide radio communications.

2) If Plaintiff's antennae are lowered to twenty-five (25) feet and ordered to comply with the subject ordinances, it is uncontested that there will be no functional utility of Plaintiff's radio equipment.

Finally, the court declared as its conclusions of law, the following:

1) This case involves the important right of Plaintiff's freedom of speech. By the imposition of a twenty-five (25) foot height limitation on radio towers and antenna, Plaintiff will be denied use of his radio equipment. Thus, this involves effective prohibition of speech rather than regulation of speech.

2) If the subject ordinances were to be enforced, Plaintiff would be forced to either remove his towers or face civil or criminal prosecution.

3) This case involves serious questions of federal preemption, since Plaintiff is a federally licensed amateur radio operator pursuant to the Communications Act of 1934 47 U.S.C., Section 151, et seq.

4) Since the subject height limitation ordinances and code sections are unconstitutional as applied to Plaintiff herein, this court grants a permanent injunction as per the attached order.

Attorney Fees and Costs Awarded

On September 26, 1980, the federal court ordered the City to pay reasonable attorney fees and costs to Mr. Oelkers. The court determined "reasonable attorney fees" in the case to be more than twice the amount that Mr. Oelkers actually paid. In its written opinion, the court based its attorney fee award on three important factors and declared as follows:

This court considers the following relevant guidelines: (1) the novelty and difficulty of the question, (2) the experience, reputation and ability of the attorney, and (3) the customary fee.

The area of personal radio communication requires much technical expertise. Its impact upon individual rights has yet to be fully explored by the courts. Thus, the number of hours expended in litigation of the novel and intricate constitutional issues involved in this case are justified.

Mr. Lawson, an experienced trial attorney, has appeared around the country on numerous occasions in similar actions involving personal radio communication. His abilities were clearly displayed during the litigation of this case.

In light of the technical and novel issues involved in this case and considering Mr. Lawson's expertise and reputation in this area, the award of attorney's fees at the customary rate of one hundred dollars per hour is reasonable.

Finally, realizing that the attorney fee award was more than twice the amount actually charged to the client, the court declared, "The issue of entitlement of attorney's fees should be settled without regard to the existence of any private fee agreement."

Plaintiff's Legal Grounds

Mr. Oelkers, as plaintiff, sued the City of Placentia on the following legal theories:

1) The City's ordinances were unconstitutional on their face and/or as applied to plaintiff in that they deprived him of his right of free speech as guaranteed by the First and Fourteenth Amendments of the United States Constitution because they deprived him of the right to maintain his Amateur Radio towers and antennas, which are a necessary apparatus to his ability to communicate worldwide through the use of his Amateur Radio station.

2) The City's ordinances were unconstitutional in that they were vague, overbroad and gave unlimited discretion to administrative officials in issuing permits to exercise First Amendment rights.

3) The ordinance and the threatened enforcement thereof had a chilling effect on plaintiff's constitutionally guaranteed freedom of speech and, unless the City was restrained and enjoined from enforcing said ordinances, plaintiff would be unable to communicate through his federally licensed Amateur Radio station.

4) The ordinances were unconstitutional in that the subject matter and regulation of federally licensed Amateur Radio stations and operators has been preempted by the Federal Communications Act of 1934, and the ordinances violated Article Six, Section 2 (federal supremacy) of the United States Constitution.

5) The ordinances were unconstitutional in that they deprived plaintiff of

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[1]Notes appear on page 51.

equal protection of the law, as guaranteed by the Fourteenth Amendment of the United States Constitution.

6) The ordinances were unconstitutional in that they deprived plaintiff of liberty and property without due process of law (Fourteenth Amendment).

7) The ordinances were unconstitutional as an invalid exercise of the state police power in that they do not bear any reasonable relationship to the public safety, health, morals or general welfare. Application thereof is unreasonable, arbitrary, discriminatory, oppressive and confiscatory, and constitutes an unwarranted interference with substantial property rights.*

Conclusion

Amateur Radio antenna cases are very complex and require very careful analysis and a thorough knowledge of state and federal constitutional law. Litigation should be a last resort, and should normally be considered only after every reasonable attempt to negotiate and compromise (if possible) with local city officials has failed.

Most cases require years of litigation in the trial courts, and several more years at the appellate level. The Schroeder (W6UFJ-N6QQ) state court case[2] was in the courts (including the United States Supreme Court) for more than five years, and it took more than two years to obtain a favorable judgment in the Oelkers case — and that was without a trial.

Another important consideration is the tremendous monetary expense and emotional trauma involved in substantial litigation (including the threat of criminal prosecution and incarceration). For example, this office waived approximately $40,000 in attorney fees and court costs in the Schroeder case — after Mr. Schroeder had already paid several thousand dollars toward his attorney fees, and after the ARRL and two radio and antenna manufacturers had contributed several thousand dollars. The Schroeder case resulted in substantial gains for radio amateurs (by ruling that TVI was a matter of federal concern, and state courts were "preempted" from exercising their jurisdiction in this area), but it required substantial efforts and sacrifice by the plaintiff and many others while it was in the courts.

Antenna cases can be won, and with each victory the rights of radio amateurs are advanced, but we must be extremely cautious, because a loss in court may prove disastrous to us all. QST

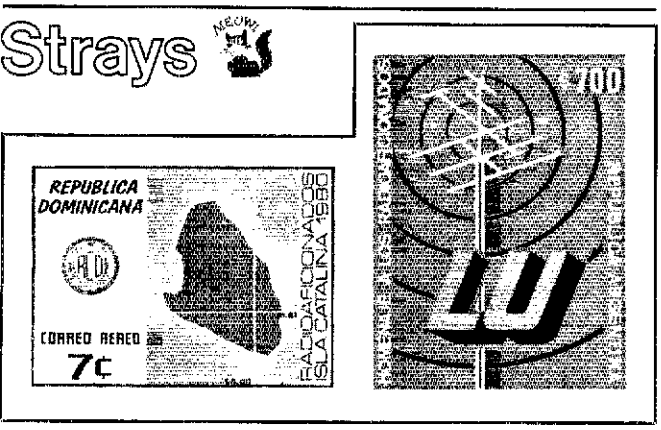
*[Editor's Note: A 223-page compilation of legal papers filed with the court is available from Membership Services, ARRL Hq., for $30 postpaid.]

Notes

[1] *Oelkers v. City of Placentia*, Case #CV 78-1301 RMT (U.S. Dist. Ct. Central District of California, 9th Circuit).

[2] *People of California v. Schroeder*, 73 Cal.App. 3d 841, 141 Cal.Rptr. 85 (1977); aff'd 46 U.S.L.W. 3664 (1978). For background information, see "Happenings," April 1978, p. 56, and July 1978, p. 45.

Strays



Two Amateur Radio stamps of interest to collectors, in addition to those listed in December 1980 *QST*, page 89, have been issued. The Dominican Republic seven centavo airmail stamp, left (copies and first-day covers of which may be purchased from the Direccion General de Correos, Santo Domingo, Dominican Republic) was designed by HI8MFP. The Argentinian issue (which may be obtained from the Seccion Filatelica, Correo Central, Local 55, 1000, Buenos Aires, Argentina) bears the words "Honoring the Radio Amateurs." There are now 19 such stamps issued for the express purpose of recognizing or honoring Amateur Radio. *(courtesy of Victor C. Clark, W4KFC)*

"Those were the days . . ." This fading 1921 photo of a friendly meeting of amateurs in Houma, Louisiana, shows (l-r) 5XA, 5ZAB, 5LA and 5RF, now KA5CIC. Also in that year, according to *Two Hundred Meters and Down, The Story of Amateur Radio*, the best all-around amateur station contained: a 200-W cw, icw and radiotelephone transmitter; a 1-kW rotary spark transmitter; a switchboard controlling all power circuits; and a receiving cabinet. The aerial system was comprised of a 4-wire, 90-ft flat-top supported on 67-ft masts; a fan-type counterpoise of six 50-ft wires; and a ground connection made to 3 buried hot water tanks. *(photo courtesy Mark Schiebl, WB5HVB)*

NATIONAL SCOUT JAMBOREE, 1981

☐ Station K2BSA, the Amateur Radio station of the National Scout Jamboree, to be held this year near Fredericksburg, Virginia, will be operating daily from July 27 through August 4 on 10-80 meters, phone and cw. With about 35,000 in attendance, world Scout frequencies will be used for calling and short QSOs. No formal operating schedule is planned; just keep listening on 3.940, 3.590, 7.290, 7.030, 14.290, 14.070, 21.360, 21.140, 28.990 and 28.190 MHz. For a commemorative QSL, send your card and a business-sized s.a.s.e. to K2BSA, 225 Main St., Newington, CT 06111, with date and time in UTC. — *Steve Place, WB1EYI, Club and Training Department*

". . . HOUSTON, THIS IS COLUMBIA"

☐ Bob Gonsett, WA6QQQ, of Encinitas, California, heard direct voice signals from the space shuttle *Columbia* during its maiden flight in April. Using a simple receiving setup of a 220-MHz ground-plane antenna, a mixer and a receiver, Bob briefly heard the signals during Orbit 1. — *Communications General Corporation news release*

I would like to get in touch with . . .

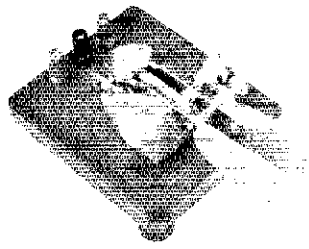
☐ persons who had wartime experiences with radio operations of any and all kinds for a book I am planning to write. Replies in English, German and French are welcomed. Mike Ockenden, G3MHF, "Pelhams," 39 Rattle Rd., Pevensey, Sussex, England.

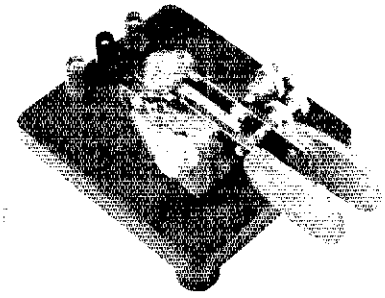
☐ amateurs interested in the study of archaeology and amateurs who have, or are, restoring an MGA. John Fiorini, KB9QW, 517 Colford, W. Chicago, IL 60185.

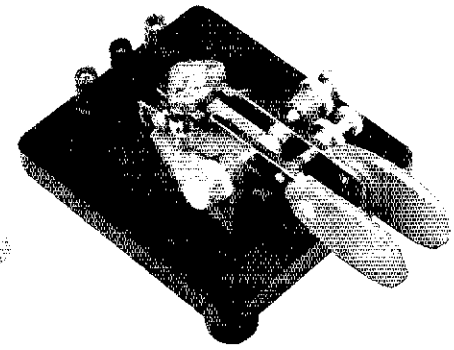
The Iambic Gambit

Dust off the iambic feature on your squeeze-keyer and get ready for this refresher course on iambic techniques.

By Lew Fay,* AA5Q







Besides plain bad key work, the cw sub-bands display an appalling misunderstanding of the cw user's best friend — the squeeze or iambic keyer. The popularity of the keyboard for sending and the computerized video display for receiving is coming on like a nosedown 747. But for financial and other reasons, a considerable array of cw folk are sticking, for the time being, with the hand keyer in one configuration or another.

Solid research is hard to come by, but in some 5000 cw contacts over the past three years, I venture that 70 to 75 percent were made while using some kind of hand keyer. Cutting it even thinner, if only 50 percent were, this still represents a lot of hand-keyer work.

Many of my nonkeyboard friends are smooth and sophisticated cw operators, and handle the iambic keyer with aplomb. But over and over, I find my contact is using (1) an old and deeply venerated Vibroplex, (2) a single-paddle electronic keyer or, most likely, (3) an iambic keyer *less* the iambic feature as though it were a single-paddle lash-up, ignoring the magnificent advantages of the squeezer.

Query them about it and excuses pop up. "I'm too old to learn those consarned new tricks. Anyhow I'm getting along all right as is. Lemme alone!" Okay, but using a fine iambic keyer as though it were a single paddle is equivalent to riding a motorized bicycle up a hill without cutting in the motor. Squeezing off letters on an iambic is such a soothing and restful exercise, one could miss half the fun of cw for want of a few hours of oscillator practice.

Poetic Iambic

What is iambic? For an answer, go back to your high-school acquaintance, familiar with English poetry, who will tell you it's a metrical foot consisting of one short syllable followed by one long syllable, or of one unstressed syllable followed by one stressed syllable. Or, in other words, "di-dah-di-dah-di-dah, etc." A Shakespearean analogy could even be used: "MeTHINKS the LAdy DOTH proTEST too MUCH . . ."

The true iambic response of the squeeze-keyer is obtained simply by squeezing both the dot and the dash paddles together. You get a line of strung-together N's or A's, depending on where you start — all without spacing.

Actually, in making the switch from single-paddle sending, you need consider only seven letters, albeit often-used ones. They are C, F, K, L, Q, R, and Y. All the rest you can make in the usual manner of holding down dashes or dots for the required period. In these seven letters the true beauty of the iambic keyer shines forth. Master them, and your switch to iambic keying will be both assured and pleasant to hear.

Consider the C first. This is the only letter in which the true iambic capability of the squeeze-keyer stands out. You just squeeze the paddles together, taking care to hit the dash side with your forefinger a *split second* ahead of the dot side with your thumb.

Then start getting off the keyer with both thumb and forefinger as soon as the second dash in the C sounds. It takes a bit of practice. The tendency will be to get off too quickly, thus dropping the last dot and leaving a K instead of a C. Practice and a fair ear will solve this problem.

For the other iambic letters, a peculiar property of the iambic keyer comes into play. This is the keyer's willingness to interrupt a string of dots with an inserted dash, or a string of dashes with an inserted dot. Difficult? Not very. Consider the Q. You merely hold down the forefinger as though you were going to send an O. But after the second dash you tap a dot with your thumb, holding the forefinger firm. Then let the forefinger finish the letter with the final dash, and you have a beautiful dah-dah-di-dah.

It works in reverse, too. In making an F, begin as if you're going to send an S, using the dot or thumb side of the keyer. But after the second dot, tap the dash side with your forefinger, still holding your thumb down, and *voila* — a fine di-di-dah-dit!

Precisely the same technique will wring K's, L's, R's and Y's from your iambic keyer — with much improved accuracy and far less effort than you've been expending.

Obviously you will have to use your ear much more than with either a Vibroplex or a straight key. And you'll need a side tone strong enough to hear above QSK clatter. But most rigs have that built in, or are at least amenable to inserting them. For one of my keyers, I use an MFJ with Nye paddles. The MFJ has a built-in side tone that you can crank up loud enough for any requirement. My other keyer is a Heathkit 1410 with a very timid side tone. I hung a small 9-volt speaker/amplifier on the 1410 audio output, and I was in business.

Don't sell short the remarkable capability of the iambic keyer. Until you get ready to build or buy a keyboard, it will be a source of comfort and pleasure second only to a fireplace at the far end of the shack.

First licensed as 8CZL in 1924, the author is very active on 40-m cw and especially enjoys handling traffic. Lew has an extensive journalistic background. He holds a master's degree from Ohio State University, and has been editor of Amateur Radio newsletters in the Fort Worth, Texas, area; free-lance magazine writer and photographer; and department chairman of journalism at Texas Christian University. Now retired, he keeps busy with editing, copyreading and Amateur Radio.

*5912 Wheaton Dr., Fort Worth, TX 76133

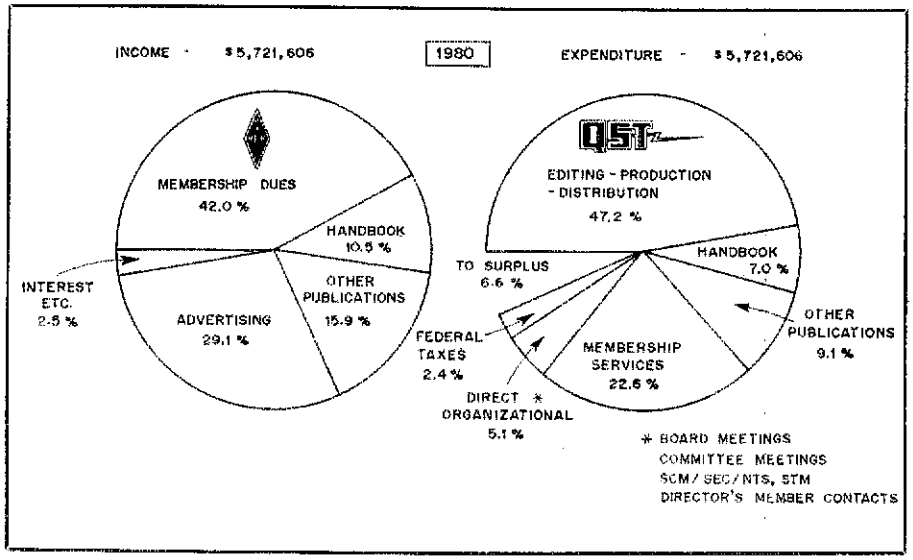
Happenings

Conducted By W. Dale Clift,* WA3NLO

League Members To Choose Board Representatives

It is not "Newington" that dictates what the League will and will not do — it's you! As a full member, your voice determines the direction and policy that the ARRL will take. This fall, members of the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions will choose directors and vice directors to represent their interests before the full ARRL Board for two-year terms beginning January 1, 1982. Beginning with this election, new policies and procedures will be implemented to assist you, the member, in making your choices (see "Election Procedures," May 1981 *QST*, page 9).

The future of the League is in your hands — let your voice be heard. Come election time — vote!



ARRL Divisions

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

Call for Nominations

Nominations are now open for director and vice director in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions for the two-year term beginning January 1, 1982. From now until September 1 at noon, League headquarters will accept nominating petitions signed by 10 or more full members of a division, naming a full member of that division as a candidate for director or vice director. Each petition must be accompanied by information (on a form provided by Hq.) that will allow the Executive Committee to determine the eligibility of the candidate in accordance with the provisions of the By-Laws, and by a statement of not more than 300 words setting forth the candidate's qualifications, which will be included with the ballot mailed to members. There must also be a signed statement that the information is true to the best of the candidate's knowledge and belief. (Each candidate for office will also be required to execute and be bound by a covenant not to sue.) The candidate's statement shall be reprinted without content editing. No candidate will be allowed to make any derogatory statement about any person or entity. Any willful violation of the signed statements concerning accuracy and suit will be grounds for disqualification by the Executive Committee, whose decision is final and may not be appealed except to the full Board of Directors.

The nominee must hold at least a General class amateur license or a Canadian Amateur Advanced Certificate, must be at least 21 years of age, and must have been licensed and a full member of the League for a continuous term of at least four years at the time of the election. No person is eligible whose business connections are of such nature that he or she could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. Accordingly, the primary test of eligibility is the candidate's freedom from commercial or governmental connections of such nature that his or her influence in the affairs of the League could be used for his or her private benefit. Neither is a person eligible who is engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature in whole or in part for radio amateurs. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL, and (3) are free from conflicts of interest.

Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all full members of the League in that division who were in good standing on September 1. (You must be a licensed radio amateur to be a full member.) The ballots will be mailed not later than October 1 and, to be valid, must be returned to Hq. by noon on November 20. A group of nominators can name a candidate for director, or vice director or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Since all the powers of director are transferred to the vice director in the event of the director's death, resignation, recall, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

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

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned, full members of ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1982-1983 term.
(Signature . . . Call . . . City . . . ZIP . . . Date . . .).

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-laws, along with a pamphlet outlining the duties and responsibilities of elected League officials. The *AABL* is presently being revised in accordance with the changes adopted by the Board of Directors at its last meeting in Orlando, March 11-12 (see "Orlando Rendezvous," May 1981 *QST*, p. 51).

Absentee Ballots

All ARRL members who are licensed by

*Deputy Manager, Membership Services, ARRL

FCC or DOC but are temporarily residing outside the U.S. or Canada are now eligible for full membership. Those members overseas who arrange to be listed as full members in an appropriate division prior to September 1 will be able to vote this year where elections are being held.

Even within the U.S., full members temporarily living outside the ARRL division they consider home may have voting privileges by notifying the secretary prior to September 1, giving their current *QST* address and the reason that another division is considered home (for instance, holding an amateur call appropriate to the division). If your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Division, but your *QST* goes elsewhere, please let the ARRL secretary know, as soon as possible but no later than September 1, so you can receive a ballot for your home division.

The Incumbents

These persons presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year: *Atlantic* — Jesse Bieberman, W3KT, and Hugh A. Turnbull, W3ABC; *Canadian* — Mitch Powell, VE3OT, and Frederick H. Towner, VE6XX; *Dakota* — Garfield A. Anderson, KØGA, and Tod Olson, KØTO; *Delta* — Lionel A. Oubre, K5DPG, and O. D. Keaton, WA4GLS; *Great Lakes* — Leonard M. Nathanson, W8RC, and George H. Goldstone, W8AP; *Midwest* — Paul Grauer, WØFIR, and Claire Richard Dyas, WØJCP; *Pacific* — William J. Stevens, W6ZM, and Robert C. Smithwick, W6JZU; *Southeastern* — Frank M. Butler, Jr., W4RH, and Evelyn Gauzens, W4WYR.

Petitions need 10 or more signatures of full members and are due at Headquarters by noon, September 1. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to full members of record September 1. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin on noon, January 1, 1982.

For the Board of Directors:
June 1, 1981
Richard L. Baldwin, W1RU
Secretary

ARRL, FCC PROTEST U.S. DECISION TO DROP CHARGES AGAINST ALLEGED PIRATE

The ARRL has directed the following letter to the U.S. attorney's office in Miami, Florida, in protest of U.S. Attorney Atlee W. Wampler's decision to drop charges against an illegal broadcasting station (*United States vs. Jose M. Gonzalez*). The decision resulted in the dismissal of the case.

April 16, 1981

Atlee W. Wampler, III, Esq.
U.S. Attorney
U.S. District Court
Southern District of Florida
Miami, FL 33130

Dear Sir:

We understand that a case against the operator of an illegal broadcasting station (*United States of America vs. Jose M. Gonzalez*, Criminal No. 80-311-Cr-WMH, U.S. District Court, Southern District of Florida) was dismissed on April 14 upon your recommendation that the charges be dropped. On behalf of the nearly 400,000 U.S. citizens who are licensed Amateur Radio operators, the League must express its deep disappointment at this action.

The operations of illegal broadcasting stations, in violation of the Communications Act of 1934 and the rules of the Federal Communications Commission that respond to the Act, long have been a source of severe interference to the authorized users of the radio spectrum, including the nation's radio amateurs. In recent years the problem has been especially acute in the Miami area in the 7-MHz band, which is allocated to the Amateur Radio Service. These illegal broadcasts cause serious interference to amateur communications. The amateur community was greatly encouraged when, early last year, it appeared that the Federal government finally was addressing the problem (see enclosure, as published in *QST*, the League's monthly membership journal with a circulation of 165,000).

It is deeply distressing to hear that the government is now backing away from its responsibility to enforce the Communications Act. Indeed, after so much taxpayer money was spent on the investigation of this case, the only word that comes to mind is "irresponsible." While there are of course serious international interference resolution questions involved, the key issue, as we view it, is enforcement of U.S. law and protection of the rights of its citizens, in this case radio amateurs, from interference by illegal broadcasting transmitters.

The issue, in any event, should not be decided on a national or international political basis.

We do not intend to let this matter rest. However, we would be pleased to hear any explanation you would care to make which might mitigate our sense of outrage.

Sincerely,
Harry J. Dannals, W2HD
President

At the recent Missouri State Convention, the coveted "PHD Lid" was bestowed upon worthy guests (l-r) ARRL Vice President Carl Smith, WØBWJ; Richard Palm, K1CE, of ARRL Hq.; and FCC Regional Director Sam Stelk, KØSS, by the PHD Amateur Radio Association during the world-famous GOLD buffet in Kansas City. *(Photo courtesy Dale Monaghen, WØHSK)*

The Federal Communications Commission, which had invested more than 1000 hours of staff time to developing the charges, also filed a strong letter of protest. The FCC's concern is that the U.S. failure to prosecute Gonzalez for his alleged pirate radio broadcasts "would send a signal that we'll accept this type of activity." The Commission further demanded an explanation of the decision from the U.S. Justice Department.

According to the Associated Press, informed sources at the Commission say Wampler's action came as a complete surprise to FCC officials, and their frantic efforts on the afternoon of April 14 to contact his superiors in Washington proved fruitless. FCC sources said the case was dismissed despite a clear Justice Department promise more than 1-1/2 years ago to pursue "egregious" violations of radio rules. The dismissal of charges has also generated bitter resentment among FCC officials in Florida, who have charged that Wampler's decision was based on nothing more than politics. Wampler denied that politics had any role. "Our decision was not based on politics," a Wampler assistant said. "The charges were dropped after the defendant agreed to halt his broadcast activities." James C. McKinney, chief of the FCC's Field Operations Bureau, has formally asked the Justice Department to explain Wampler's action. "If this isn't an egregious case, then there is no such thing," McKinney said. "I am not going to invest any further manpower until I can be assured by the Justice Department that prosecutions can move forward in that district with that U.S. attorney."

According to McKinney, the case of Gonzalez began in the spring of 1979 when Wampler agreed to support the FCC in securing and executing search-and-seizure and arrest warrants. FCC field engineers, using DF equipment, had discovered the location of a shortwave radio transmitter that Gonzalez was allegedly using to broadcast anti-Castro propaganda to Cuba. After being arrested and then released on bail, Gonzalez allegedly set up a second radio operation, which the FCC again tracked and shut down.

"Disappointment was putting it mildly," McKinney said of his staff's response to the case's dismissal. "My office did consider this a critical case because this man was the best known of the group down there that tends to operate these stations for political purposes."

ARRL shares the Commission's bitter disappointment. Illegal broadcasting causes serious interference to amateur operation in many cases. The League feels that the United States Attorney's Office was acting irresponsibly in its obligation to enforce U.S. law, in this case, the Communications Act of 1934 and the rules of the FCC. No response to the ARRL letter had been received at press time. — *Richard Palm, K1CE*

LEAGUE REFUTES SUPPORT FOR COMMISSION'S PROPOSAL TO EXCLUDE AMATEURS FROM 1900-2000 kHz AS GROUNDLESS

In its reply comments to the Commission in Docket 80-739, the matter of implementation of the WARC Final Acts, ARRL has refuted, as groundless, support of two companies given the Commission in its proposal to allocate 1900-2000 kHz to Radiolocation on an exclusive basis, thus completely eliminating longstanding amateur occupancy of that band. Both companies, Offshore Navigation, Inc. and Racal-Decca Survey, Inc., are commercially engaged in supplying radiopositioning services.

ARRL, in its original comments, explained in detail why allocation of 1900-2000 kHz to the Amateur Service is necessary to Amateur Radio and is in accordance with the U.S. WARC proposals. (See April 1981 *QST*, "Happenings.")

Offshore Navigation, in its comments, claimed that the loss of 10 kHz in the band 1615-1800 kHz, by virtue of preclusion of radiolocation below 1625 kHz and the secondary status of radiolocation from 1625-1705 kHz, justifies radiolocation exclusivity in 1900-2000 kHz. Further, its comments claimed that such an allocation would "both compensate for restrictions upon usage below 1705 kHz and provide some opportunity for growth of radiolocation operations." ARRL has shown in its comments filed in this matter that radiolocation in medium-frequency bands

fared much better at WARC-79 than it would have if the U.S. proposal to permit broadcasting up to 1860 kHz had been adopted. The League stated: "There can thus be no justification for elimination of Amateur Radio at 1900-2000 kHz based upon the loss of a mere 10 kHz of radiolocation allocation at 1615-1625 kHz." The League has repeatedly shown that allocations in the vicinity of 1750 kHz for radiolocation constitute unsound spectrum management. "Offshore Navigation and other commercial radiolocation suppliers were just recently allocated secondary use of 420-450 MHz in Docket 80-137," the League's reply continued. "The needs of radiolocation can, according to radiolocation equipment manufacturers, be met in the 420-450 MHz band." The League states: "Del Norte Technology, Inc., a commercial manufacturer of such equipment, has claimed that radiolocation transponder systems designed to operate in the 420-450 MHz band are capable of ranges up to several hundred miles in free space. In general, under average conditions at 420-450 MHz, it is claimed that such transponders are capable of ranges of 2 to 3 times the line-of-sight distance without causing interference to or suffering interference from amateur or government radiolocation, the primary users of the band." The League points out that if this is true, then where is the need for an exclusive radiolocation allocation at 1900-2000 kHz? The fact is, no such need exists, the League said.

The ARRL concluded by reiterating its position in the matter; that for the U.S. to depart from its pre-conference position and prohibit the Amateur Service from operating in the 1900-2000 kHz segment would constitute a serious breach of faith with its 382,000 amateur licensees. — *Richard Palm, K1CE*

ARRL BLASTS FCC CHARACTERIZATION OF AMATEURS IN QUIET ZONE DOCKET: 78-352

In response to a Commission *Report and Order* adopted March 26, 1981, in the matter of the establishment of rules and procedures to minimize potential interference to radio astronomy operations, the so-called Quiet Zone proceeding, the American Radio Relay League submitted a Petition for Reconsideration to the Commission. The ARRL requested that the Commission revisit this matter because of the "arbitrary, capricious and unreasonable" approach taken by the federal agency.

In the *Report and Order*, the Commission categorized this matter as a "proceeding to choose between the public good and the individual aspirations of a group of radio users . . ." In its petition, the League blasted the categorization as an "outrageous characterization of the situation as regards the thousands of public service oriented amateurs in and around the so-called Quiet Zone whose amateur activities are oriented toward or limited to preparation for and participation in emergency radio communications. The Commission has made an unthinking, unfair and untrue characterization . . . in stating that this matter constitutes a choice between the public good and the individual aspirations of a few radio users," The ARRL response continued. "A better and more accurate view would be to characterize amateur efforts as the 'public good' and the efforts of the Observatory and Naval Lab as the individual aspirations of a few radio users."

The League further stated that, "The Commission has failed to establish criteria for determining whether a particular repeater installation is acceptable." In the appendix to the *Report and Order*, the Commission added a new subparagraph (f) to Section 97.85 of the rules, which provides that should an objection to a proposed repeater installation or modification be received by the Commission from the Observatory for itself or on behalf of the Naval Research Laboratory within 20 days of notification by the amateur station proposing the repeater, the Commission will "consider all aspects of the problem and take whatever action is deemed appropriate." Condemning this approach as "vague" and "Solomon-like," the League response further indicated that it constitutes an expansion of the Commission's authority beyond its scope of legal power provided under the Communications Act, and ". . . provides an excellent basis for denying any and all future repeater installations or modifications in the Quiet Zone." The petition calls for the revisitation by the FCC to the matter of setting standards and technical requirements to be made of amateur repeater stations in the Quiet Zone if there are indeed any to be made. The League pointed to the Commission's existing authority to enforce its rules concerning good engineering practices and purity of emissions standards.

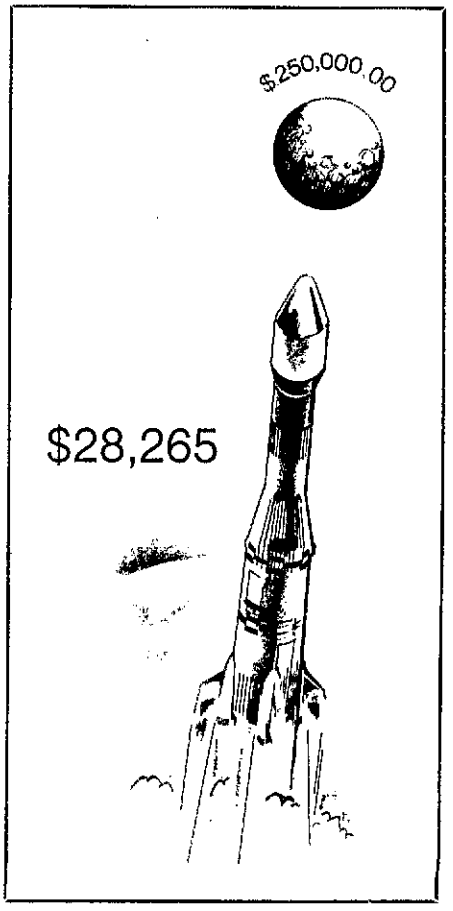
The ARRL also voiced concern that "the vagueness of the problem as expressed in the *Report and Order* explains, but does not justify, the vagueness in the Commission's arbitrary method of dealing with it. Even if the Commission should continue to disregard the value of amateur emergency and public service efforts in the Quiet Zone in favor of an unprecedented blanket protection for radioastronomy on *all* frequencies, there must be some criteria to allow amateurs to determine in advance whether a particular repeater station will be permitted." The League also complained that the protected area is overly large and arbitrarily established — "a classic case of arbitrary administrative overkill. If the Commission insists on a blanket, open-ended protection of the Lab and Observatory on frequencies allocated to the Amateur Radio Service, even though many frequencies are already exclusively allocated to radioastronomy, it is incumbent on the Commission to at least confine the boundaries of the protected area to the minimum necessary to accomplish the stated purpose. This it has failed to do, and thus the impact on the Amateur Service is greater than it need be," the League said.

In its concluding remarks, the League stated: "The regulations as set forth artificially and unnecessarily create an inherently adversarial relationship between the amateur community and the Observatory and Lab." ARRL is concerned that this relationship replaces what Quiet Zone amateurs and the League have worked so hard and long to establish — "a cooperative, successful working relationship, which would eliminate interference so much better than the rules could ever hope to do." The Observatory and Lab have commended amateurs for their work in this area.

The petition closes with a request that the Commission reconsider the action taken in this matter. For further information on the *Report and Order* in the Quiet Zone Docket 78-352, see "Happenings," June 1981 *QST*. — *Richard Palm, K1CE*

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

The work of the ARRL Foundation toward the goal of high-performance satellite communications on behalf of the amateur community is continuing to receive fine support from members interested in a piece of the action (see June 1981 *QST*, page 46). We've got a long way to go, certainly, but with the aid of hams such as those listed here, the combined goal of AMSAT and the Foundation of $250,000 are within reach. Why not become a part of tomorrow's telecommunications world today by sending your tax-deductible contribution to the ARRL Foundation, 225 Main St., Newington, CT 06111. Your donation may also be applied to the matching funds available so that your support will be doubly effective! And, not only will your gift be matched dollar for dollar, but your generosity will be recognized according to the following levels of participation: for gifts of $25 or more, a distinctive lapel pin; for gifts of $100, the donor's name and call will be listed in *QST*; for gifts of $250, the donor will be awarded a specially designed certificate; and for gifts of $1000, the donor will be pictured in *QST* and will receive a personal telephone communication of thanks from the ARRL Foundation President. Recent contributors of $100 or more include: John J. Bowden, WD9GPJ; K. Diane Courtney, WB4INM; James A. Carmody, KB5CA; ARRL Foundation Vice President L. Phil Wicker, W4ACY; and A. L. Howard. The Foundation has thus far received $28,265. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*



Moved and Seconded

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 387
May 13, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 3:00 P.M., EDST, on Wednesday, May 13, 1981. Present on the line were President Harry J. Dannals, W2HD, in the Chair; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; General Manager Richard L. Baldwin, W1RU; and General Counsel Robert M. Booth, Jr., W3PS.

President Dannals reviewed correspondence received from Director Jay Holladay, W6EJJ, relative to PR Docket 80-729, Revision of the Amateur Radio Service Rules into "Plain Language." After discussion, all spoke in favor of requesting a six-month extension of time in which to comment. The General Counsel was instructed to make the necessary filing in the early part of the next week.

The Committee then proceeded to an extended and intensive discussion of the desire by the Indiana Radio Club Council to recall Central Division Director Metzger, and their request for a list of ARRL members in the Central Division. The Committee took the following actions:

a) The Committee voted unanimously that it was not the intent of the Board nor of the Ethics Committee, on whose report Board action of March 1981, was based, to provide petitioners for recall with a list of ARRL members.

b) The Committee voted unanimously that it was not the intent of the Board nor of the Ethics Committee, on whose report Board action of March 1981, was based, to provide petitioners for recall with labels addressed to ARRL members.

c) The Committee voted 3-1 that no statements of any sort should be included with any recall ballot that might be mailed to members of a division by the Hq. in response to a valid petition for recall.

d) The Executive Committee, speaking unanimously, took formal note of the fact that at the present time, because of the lack of an in-house computer, it will take somewhat longer to check the validity of signatures on a recall petition than it will later this year.

Without taking formal action, the Executive Committee noted that it has been the intent of the Ethics Committee and the Board that a recall petition be instituted only where there was indication of improper or inadequate performance on the part of an incumbent director, which was not the case in the present instance. The Committee further noted that it was not the intent of the recall procedure to force an immediate election, nor would that happen in the present instance.

There being no further business, the meeting by telephone conference call was concluded at 4:00 P.M., EDST.

Respectfully submitted,

Richard L. Baldwin, W1RU
Secretary

Silent Keys

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

N1AAZ, Joseph J. Caldarone, Rowley, MA
KA1BYT, Osborne V. Schiffner, Bingham, ME
W1ADC, William R. Gifford, York, ME
W1AEK, Edward Trumpfeller, Sr., Trumbull, CT
WA1DHB, Maurice R. Poirier, Spencer, MA
W1HIB, Stanley J. Wenc, East Douglas, ME
WA1HUX, Stanley L. Judkins, Wilton, CT
K1IKV, Paul R. Davidson, Coventry, RI
W1IX, Horation W. Lamson, Sr., Arlington, MA
W1MAS, Robert W. Wood, Hillsboro, NH
WA1PMC, The Rev. Henry R. Canuel, New Orleans, LA
W1SAL, Joseph N. Sleeper, Tilton, NH
W1SCE, Orrin A. Priest, Fort Myers, FL
WA1SQM, Hugh G. Montgomery, Tucson, AZ
K1WLV, Albert A. Catelli, New Bedford, MA
W2AQG, Herbert J. Goldstein, Orange, NJ
K2ED/W2IUV, Charles F. H. Johnson, Jr., Colts Neck, NJ
WA2FAK, Albert E. Piddington, East Northport, NY
W2FE, Warren K. Hamilton, Bath, NY
W2HDH, J. Warren Jameson, Westwood, NJ
*WB2ISL, Dr. John S. Shami, Chappaqua, NY
W2ITB, Thurlow A. Chandler, Cranbury, NJ
W2JHA, Alfred E. Callander, Batavia, NY
W2ONF, Louis C. Bohs, Jr., Smithtown, NY
WB2PGZ, Robert F. Hoag, Johnson City, NY
W2PXQ, Eugene P. Klumpp, Angola, NY
W2TBA, John J. Granada, Westfield, NY
WA2UKK, David E. Grummons, Apalachin, NY
K3AFZ, Alfred Micheletti, Monessen, PA
W3ALB, Edwin L. Lewis, Malvern, PA
KA3DCL, James L. Rich, Ben Avon, PA
W3KTY, David F. Jones, Butler, PA
K3SOT, Harrison V. Harner, Harrisburg, PA
W4AXZ, Augustus Z. "Doc" Bridgewater, Fletcher, NC
WA4BAS, James Christ, Ormond Beach, FL
K4DRH, Erwin Enos, West Palm Beach, FL
WB4DRN, George J. Hornaday, Ashville, NC
K4EHA, Philip H. Conner, Nashville, TN
W4EQX, Sherwood Githens, Jr., Durham, NC
W4FEX, James F. Pierce, Hampton, VA
W4FGL, William C. Greene, Covington, GA
ex-WA4GMA, Paul R. McElroy, Deltona, FL
WB4JNN, Thelma D. Alexander, Orlando, FL
K4JY, Albert M. Pichitino, Ft. Lauderdale, FL
W4KIF, Charles F. Chaney, Morristown, TN
W4LDM, Wilford E. Vining, Sr., Orlando, FL
WD4MZN, Dr. Robert L. May, Hendersonville, NC
W4OGX, William J. Pandolf, Port Charlotte, FL
W4OMT, Stanley O. Need, Naples, FL
W4PBB, Ronald M. Lawrence, La Follette, TN
W4PHM, Vernon K. Dunlap, Largo, FL
K4RAO, William H. Risley, Buena Vista, VA
W4SQ, J. Kenneth Hiler, Melbourne, FL
W4UD, Russell V. Robinson, Bristol, TN
WA4YCH, Stanley D. McMillan, Lake Worth, FL
W4YGT, William E. Barker, Orlando, FL
W4YKU, Raymond I. Albert, Lynchburg, VA
K4ZSG, Eston E. Williams, Orangeburg, SC
K5AMI, James Marler, Pryor, OK
WB5CJB/W9EVL, Lester E. Asmus, McAllen, TX
W5DDI, George W. Holt, Oklahoma City, OK
WA5DWZ, H. Nick Morrow, Alamogordo, NM
W5FK, Edward G. McKinney, Fort Worth, TX
WA5FPS, John F. Dankworth, Albuquerque, NM
WA5GKT, John O. Sonnier, Youngsville, LA
WB5HBF, Milton R. Bradley, Alamogordo, NM
WA5IAF, Floyd E. Shelton, Van, TX
WA5JTZ, William H. Coffey, Port Arthur, TX
W5JXR, Orby A. Wilkes, Kerrville, TX
W5KZI, Edward A. Brandao, Plain Dealing, LA
WB5ONO, Walter N. Scarborough, Jr., Corpus Christi, TX
W5OPH, Thomas J. Hall, El Paso, TX
WA5RKP, Robert S. Findlay, Florence, MS
WB5SQT, George W. McClure, Albuquerque, NM
W5TN, Adam J. Levy, Galveston, TX
WA5VHN, Lester W. Roberts, Newalla, OK
W5VYZ, Albert C. McClellan, Las Cruces, NM
WA5ZMO, Orval W. Chandler, Broken Arrow, OK
WA6DKL, Hugh G. Rockwell, National City, CA
WB6GAV, Charles G. Gemeroy, Escondido, CA
W6JUT/ex-W1HED, William J. "Ernie" Edwards, San Diego, CA
KA6LDD, Joseph Mattaliano, Fresno, CA
WB6NZZ, Lester V. Myrah, Orangevale, CA
W6QR, Gil S. Severns, San Diego, CA
W6QXP, John F. Roberts, Jr., Palo Alto, CA
K6TBH, William F. Lucas, San Diego, CA
WB6VUS, Joseph R. "Dick" Jenson, Modesto, CA
W6WN, Robert J. Woolverton, Alameda, CA
W6ZY, George W. E. Shields, Dixon, CA
WA6ZZU, William H. Donahue, E. Palo Alto, CA
W7DBA, John P. Jerome, Selah, WA
W7EZO, Melvin H. Larson, Ephrata, WA
W7FZR, James R. Heay, Bremerton, WA
KA7FPV, James P. Hart, Kent, WA
W7JGL, William H. Toben, Tucson, AZ
ex-W7LHJ, Donald C. Calnon, Jr., Beaverton, WA
ex-W7LW, Ray T. White, Portland, OR
W7MCW, Harry W. Jackson, Bremerton, WA
K7NLT, Tapley V. Goin, Kelso, WA
K7SNE, John J. Long, Pasco, WA
WA8AHY, Clarice E. Baullinger, Mass, MI
WB8ANY, Olof T. Sturdy, Mesa, AZ
W8CO, Clifford H. Harding, Flint, MI
W8DDG, Frank M. Hackman, Lima, OH
WA8EVR, Charles J. Droste, Harper Woods, MI
K8IZA, Theodore G. Hayward, Delton, MI
WD8LRX, John Pekuri, Champion, MI
W8MUH, Howard L. Rabe, Port Huron, MI
K8MWK, William R. Isham, Columbus, OH
WA8NVL, Edward F. Arbogast, Stone Creek, OH
W8QB, Harold H. Rench, Jackson, MI
W8RMJ, Clem Thomas, New Carliste, OH
W8RPN, Harry Smith, Traverse City, MI
W8SUV, Irvin A. Hughes, Vassar, MI
WA8UMQ, Earl L. Carpenter, Owosso, MI
W8YLY, Reino A. Lystila, Hancock, MI
K8ZKM, Lloyd W. Brox, Grand Ledge, MI
KA9ATF, William O. Foell, Elgin, IL
W9CSA, John Bayalis, Chicago, IL
W9CSG, Otto W. Schoenrock, Janesville, WI
W9CYW, Elroy H. Black, Calumet City, IL
W9DZC, Howard E. Grubbs, Greenfield, IN
WB9GVG, Raymond J. Husebo, Merrimac, WI
WA9LDH, Keith E. Schroder, Naperville, IL
W9MTZ, Lloyd V. Smith, Silver Lake, IN
W9QQR, Mario T. Cerneka, Carpentersville, IL
W9RID, Nils Ehlin, Watseka, IL
W9TRO, Wilbert E. Atwood, Smithton, IL
W9TWR, Donald C. MacLaughlin, Peshtigo, WI
*AA9U, John L. Zimmerman, Daleville, IN
W9UDD, Fred E. Haneline, Leisure City, FL
K9YBZ, Vernon B. Swigert, Sr., Indianapolis, IN
K9YQK, Reinhardt W. Scherfling, Skokie, IL
WØDVC, Wallace L. Cooper, Kansas City, MO
WØEWO, Don C. Griffin, North Platte, NE
WDØFKX, Leo W. Nord, Cook, MN
WBØFTB, Russell M. Twist, St. Louis, MO
WØGZZ/exW6VIC, Sanford B. Luftig, Wichita, KS
WØLFQ, Edward Goelz, St. Louis, MO
WØLJ, Gerald R. Sutton, Atlantic, IA
WØLSX, Athelstan I. Clipperton, Butterfield, MN
WAØMAA, Kim G. Cole, Plymouth, MN
WØMAR, Win A. Alderman, Wichita, KS
WØMCL, Emory B. Whitworth, Raytown, MO
WØNRV, William C. Holm, Duluth, MN
WDØOPQ, Everett S. Williams, Omaha, NE
WAØPDA, W. Robertson White, Aurora, CO
KØPPO, John M. Price, Ozawkie, KS
WØRAV, C. Joe Glaser, Blackduck, MN
WØTNW, Richard F. Keeth, Shawnee, KS
WØTYW, Myron D. Piersol, Maplewood, MO
KØVYP, Charles O. Bush, Forrest City, MO
WØYOS, Kenneth G. McKee, Seneca, KS
VE2HI, Ethel Pick, Westmount, PQ
VE3AWD, Harry T. Aird, Willowdale, ON
VE3EVD, George A.R. Cowan, Sebring, FL
VE3JAX, George E. Taylor, Thunder Bay, ON
VE5CB, Gudlaugur J. Skafel, Foam Lake, SK
VE5HM, Hugh C. McDonald, Wiseton, SK
VE6AVO, John R. Ower, Litchfield Park, AZ
VE7CN, Victor A. Blue, Nanaimo, BC
G3LB, Arthur R. Yates, Ripon, England
TI2LA, Luis D. Arce, San Jose, Costa Rica
YV5DLT/ex-W5DLT, Ansyl D. Eckols, Caracas, Venezuela

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*.

*Life Member, ARRL

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

INTERFERENCE AND COEXISTENCE

☐ Over the last several months, intentional and malicious jamming has grown to an intolerable level, especially on certain DX nets on 15 meters. Aside from the total disruption of the nets, the jamming has had the effect of turning otherwise gentlemanly hams into surly, name-calling bigots. And in a way I don't blame them. While the traditional method to discourage jamming has been silence, this simply is not working any more. Furthermore, the DX stations, while exhibiting extraordinary patience, are simply not showing up on the nets as frequently as they use to.

I recently taped one of our more persistent jammers on a DX net with the intent of sending the tape to the FCC. A check with the monitoring station in Maine, however, proved very frustrating. I was informed my tape was useless since it could have been a phony. When asked the call sign of the jammer, I was told that he was well known to the FCC, and that they were working on it. Apparently it takes a very long time (sometimes years) to apprehend these people. The reason, I was told, is that unless the individual says specifically on the air that he is intentionally jamming, there are no grounds for prosecution.

It seems to me that we must modify the existing rules and regulations so that the FCC can do their job in a more efficient and effective manner. Why can't the Board of Directors of the League work with the FCC on this matter? As it stands now, the hands of the FCC are shackled.

A short time ago, the League asked for suggestions on the subject of jamming. I submit that peer pressure alone is not the answer; nor do I believe that violence will solve the problem. The FCC is the answer. They are ready and willing. Let's make them able. — *Lawrence L. Lanier, K1MIZ, New Canaan, Connecticut*

[Editor's Note: ARRL has been working with FCC to help give FCC the authority and flexibility it needs to effectively prosecute jammers. Most notably, ARRL strongly supports two bills now in Congress — Representative William E. Danemeyer's (R-39th District of California) H.R. 2203 and Senator Barry Goldwater's (R-Arizona) S. 929, which would, among other things, authorize the FCC to utilize volunteers for the purposes of monitoring and reporting offenders, and explicitly exempt amateur transmissions from the secrecy provisions of Section 605 of the Communications Act. See April 1981 *QST*, page 69, and June 1981 *QST*, page 53. These "tools" would allow the League's Interference Task Force to fully implement a system of nationwide local interference committees to resolve most interference problems and channel the more severe ones to the FCC.]

☐ The proliferation of news concerning the coming crackdown by FCC on rule violators and those guilty of malicious interference is encouraging. Encouraging, but very, very belated. Perhaps the provisions of S 929, submitted by K7UGA, will indeed bring about much-needed change.

How can we tell if all this is real? When those noxious characters, known to any active ham, disappear from the bands. There are a few well-known individuals who delight in using profane, obscene and more repugnant forms of expression on the air. The existing rules provide for their removal, and they openly thumb their noses at the FCC and the amateur fraternity.

We can believe it is real when these clods disappear from Amateur Radio forever. — *W. R. Gary, K8CSG/5, Houston, Texas*

☐ I would like to add a few thoughts to, and examine an aspect not covered in K5CN's dissertation on frequency occupancy, "Accommodation, Acquiescence or Anarchy," in February *QST*. Since the appearance of this article, I have heard several cases of deliberate interference on 20 meters, with "the February issue of *QST*" being cited as the authority to disrupt QSOs or nets already in progress.

Let me clearly state that I agree with the basic premise that "no frequency on any ham band 'belongs' to any amateur, individually or collectively . . ." It doesn't matter how long "The Old Boys' Net" has operated on 14,325.295 kHz. If the net is not occupying that frequency *at that specific time*, the frequency is fair game for any amateur authorized to operate on 20 meters.

This brings us to the aspect of the problem not addressed in K5CN's article. If a QSO is *already in progress* on a frequency, then that frequency is in use. If a query of "Is this frequency in use?" is met with a polite, "Yes, it is, thanks for asking," then the searcher should search on. (The Old Boys will just have to fire up a few kHz away.) By the same token, if a net is *already in session* on any particular frequency, then that frequency is occupied. (Any query as to frequency usage at this point usually generates sufficient rf in reply to melt the "intruder's" antenna!)

Granted, no one station or net "owns" *any* particular frequency. When, however, a QSO or net operation is already in progress on any particular frequency, they are occupying the frequency *at that time*. Any other station who insists on exercising his "inalienable right to any frequency in the band" by parking on top of the operation already in progress, after being advised and acknowledging that he knows it is in progress, is only promoting the anarchy deplored by K5CN.

Unintentional QRM is unavoidable on today's crowded bands. Intentional QRM and deliberate jamming, on the other hand, only illustrates the sophomoric thinking of certain people. A case in point: There are two nets on 20 meters which use frequencies separated by 4 kHz (plus or minus QRM). Certain stations habitually operate exactly between these two nets. Their remarks and actions clearly show that they know quite well they are causing QRM to both nets. Today, one of them quoted "the article in *QST*" as his right to do so. I am certain that such was not K5CN's intent!

I am sure no one wishes to be "pushed around" on the bands, least of all the stations already occupying and using a frequency. They have just as much right to use the frequency as the "individualist" searching for a clear spot.

Unless the seemingly prevalent attitude of "me first and to hell with the rest" changes to one of accommodation and regard for *everyone's* rights, we will surely end up with chaos on our bands. Just think what it would sound like if a couple of nets spread out into individual QSOs all over the band! — *Norman M. Talley, W4ARH, Shaw AFB, South Carolina*

GOOD OPERATING PROCEDURES?

☐ I would like to extend my personal feelings toward the operating procedures of many of the hams throughout the world.

Being an amateur for just over two years now, I have found the hobby exciting and enjoyable. Within the past month, I have received my General ticket, and my operating privileges were extended to the phone bands, which I thought I would enjoy to no end. After my first few contacts, I was sure that this was the ultimate hobby. My feelings changed considerably after tuning around the band to a supposedly clear frequency. When I asked if the frequency was in use, I received a reply of, "You're damn right it is." I could hardly believe my ears. For a couple of seconds all I could think of was the times I experienced on the CB radio, which was the main reason that I gave it up in the first place. Comments like that do not leave a very good impression on the new ham.

It seems that after all the hard work involved to learn the theory, get the code speed up, and remember rules and regulations and good operating procedures, some hams would at least have the decency to extend common courtesy to not only other hams just beginning, but also to their fellow hams of 40 or 50 years if that is the case. I'm sure there are many hams who would agree with me. Please show a little respect to the people who are looking for an enjoyable, time-consuming hobby! — *Jim Theisen, KA8DYW, Oak Harbor, Ohio*

CALL-SIGN HEAVEN

☐ I personally believe that the new call-sign assignment system is great. Heaven knows I never would have gotten my Advanced class license if it hadn't been for the call-sign change privilege. To think this system is ridiculous is unwarranted.

In addition, allowing hams to keep their calls after moving to a new district is fine. Think how many of us might lose a highly valued call sign just because one is forced to move. No sir, the new Phase II and III systems are not "ridiculous." On the contrary, I would call it progress. — *Bruce Goff, KC5CR, Oklahoma City, Oklahoma*

*Membership Services Assistant, ARRL

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Public Service Communications: A Regulatory Look

Amateurs have long been known for their ability to provide communications not only in emergencies, but in more common instances such as public events — marathons, parades, expeditions and the like. Much planning goes into a communications activity on the part of hams and, invariably, part of this planning includes a look at the Part 97 aspects of any given event. This month we'll take a look at how one should consider a public communications activity from the regulatory angle.

Q. Our local radio club has been asked to supply communications for a marathon sponsored by a commercial company, a cosmetics manufacturer. Is it okay to help with such an affair even though the sponsor is commercially involved for profit?

A. Yes, the public service aspect of the event outweighs any "business" factor which might be applied to a sponsor. Of course, amateurs themselves must avoid *any* form of remuneration for using their stations (§97.112) and operate only for the public benefit — medical traffic, lost children, crowd control and so forth. *No* business communications may be involved (§97.114[c]). The rules define business communication as "any transmission or communication the purpose of which is to facilitate the regular business or commercial affairs of any party." The distinction is that Amateur Radio can provide a service to the participants and the public, but *not* to the sponsors (if it's a money-making event). An example of a permitted transmission: "WB7TPY at checkpoint Heartbreak Hill — request medical assistance." No-no's include: "K1FHN at sponsor headquarters — the sponsor wishes to advise its New York office to invest in Acme Running Shoe Company immediately, please route via 75-meter position."

You don't have to screen every transmission for possible illegality; simply use a little common sense when planning your communications activity for a public event.

Q. In a communications emergency, is it permissible to handle third-party messages requesting supplies from the Red Cross? Wouldn't this kind of traffic be considered to be facilitating the normal course of business of the Red Cross?

A. The key word is *emergency*. Emergency communications must relate directly to the *immediate* safety of life of individuals or to the *immediate* protection of property (§97.3[w]). In an emergency situation, the FCC does not prohibit U.S. amateurs from handling traffic relating to the saving of life and property. Requests for emergency supplies from a Red Cross center would be permitted under these circumstances. Normally, however, such communications would not be permitted.

Q. Our town's sheriff's department has asked our club to provide them with communications assistance as part of their tornado watch and emergency program. Wouldn't we be facilitating the regular business of the sheriff's department?

A. In an emergency, the communications that hams can provide often save lives. Amateurs are permitted to supply such communications to public officials and servants, such as police and fire departments, as long as there is a bonafide emergency situation. But, again, once the emergency is over, Amateur Radio assistance should cease.

Generally, when hams are on hand assisting public-event officials or assisting fire and police units in emergencies, they are performing in the spirit of the basis and purpose of the Amateur Radio Service (§97.1).

Q. Our local Amateur Radio club is holding a shopping-mall display with the hope of generating interest in our fall Novice classes. It would be nice if we could allow passersby to actually talk over the air. Is this permitted under the rules?

A. Yes, with certain conditions. §97.79(d) permits "any third party to participate in amateur radio communication from his (the station licensee's) station, provided that a control operator is present and continuously monitors and supervises the radio communication to ensure compliance with the rules." Essentially, this means that you may allow a passerby to speak into the microphone of the station, but you must control the transmitter functions to make sure that it is operated properly. Additionally, keep in mind that the passerby is a *third party* — third-party traffic rules apply so that he or she may not communicate with a ham in another country that does not have a third-party agreement with the U.S. Keep a third-party agreement countries list at your operating site.

Third-party traffic requires a log notation — enter the person's name and a brief description of the activity. Finally, good luck with the display! Shopping malls provide ideal means for amateurs to publicize ham radio and the club. Simply bear in mind the extra rules that specifically apply.

Q. Our RACES group will be participating in a city civil defense disaster drill. The city council, thankful for our support, wants to present each of us with a chronometer watch for our efforts. No money is involved. Is this gift okay under the rules?

A. It is always best to be cautious about accepting anything for your Amateur Radio work. FCC prohibits operation of an amateur station "for material compensation, direct or indirect, paid or promised" (§97.112). This includes *direct payment* (money, goods, food, etc.) and *indirect payment* (goodwill, publicity, advertising, etc.). The rules are quite clear, and interpreted strictly by the Commission.

Q. The rules say that a RACES group may not test or drill for more than one hour per week. How can we possibly engage in emergency-preparedness exercises with such a time constraint?

A. Recently, a civil defense organization petitioned the FCC asking that the one-hour-per-week limitation on drills for RACES stations be extended because one hour is too brief a period to conduct an effective drill. The Commission disagreed and said that one hour per week is enough time, and *the same Amateur Radio operators, using the same equipment, could at any time operate under their own Amateur Radio licenses.* So, the time limit stands. *But* the message is clear — your group may drill to its heart's content; after the initial hour of drill, simply swap your RACES hat, for say, an ARES hat (§97.191[b]).

Q. Why is the Commission so adamantly opposed to amateurs involving themselves in an occasional important "business" communication?

A. As we've discussed, third-party traffic on behalf of an organization is permitted to the extent it does not involve the regular business or commercial affairs of the organization. The exception is in an emergency — an organization such as the Red Cross is allowed to use Amateur Radio to coordinate disaster activities but not for its day-to-day functions.

The Amateur Radio Service rules were written, among other reasons, to preclude nonamateur communications and organizations from encroaching upon the Amateur Radio frequency spectrum, and upon the legitimate purposes of the Amateur Service. In adopting these rules, it was the Commission's belief that Amateur Radio should not become a quasi-business type radio service. Such activities are not within the basis and purpose of the Amateur Radio Service. The Amateur Service was never intended to take the place of a two-way business radio communication service or a common-carrier operation. The convenience of Amateur Radio does not justify the use of amateur frequencies by nonamateur organizations for their nonemergency communications needs. While the Commission encourages amateur operators to handle and develop a message-handling capability, it would not be consistent with the purposes of the Amateur Service to permit an amateur station to operate what amounts to a communications service for a third-party entity — notwithstanding the nature of the entity, be it a public service organization such as a police or fire department.

It's important for amateurs to understand the basis and purpose of Amateur Radio so that the amateur community can keep the Service on its proper path. QST

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

*Assistant Manager, Membership Services, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

VE8RCS

When the weather turns hot, it becomes easy to think about hamming in cooler places, such as Canada's most northerly outpost, Alert, NWT.

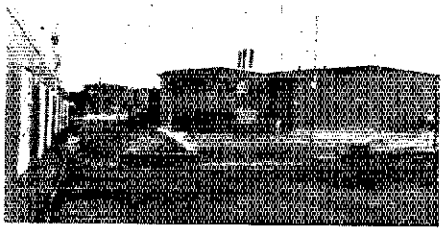
Canadian Forces Base Alert is located on the tip of Ellesmere Island, about 900 km from the North Pole. Alert was begun in 1950, when the Canadian Department of Transport and the U.S. Weather Bureau decided to set up a joint meteorological station there. In 1956, the RCAF decided to set up a post near the Canadian-U.S. camp to carry out communications research. Two years later, the army took over, and updated Alert's antiquated facilities. Since then, Alert has undergone continuous expansion.

Alert now has most of the services of a modern community. Five diesel-powered generators supply up to 1000 kWh of electricity. Each day, 10,000 gallons of water is pumped from Dumbell Lake, 2 km away, and heated and reheated before being stored for use in two 50,000-gallon reservoirs. Forty-eight vehicles of all types provide transportation in and around the base.

Station personnel have living quarters that would be the envy of many servicemen in the south. The three newest barracks have kitchenettes, lounges, and automatic washers and driers! Residents of Alert have plenty of free time. For more active types, there's a weight-lifting room, a gym, a curling club and a bowling club. A closed-circuit television system carries taped television programs eight hours a day. An fm station, manned by volunteers, plays music around the clock. And to keep in touch with the folks back home, there is weekly mail delivery by Hercules aircraft from CFB Trenton — and VE8RCS.

VE8RCS is located across from the barber shop, in the same building that houses the junior ranks' mess and the CHANEX store. In many ways, it's a typical ham station. The room is about 12 × 15 ft. The main station is a 901DM and Alpha 274 feeding a 5-element Wilson monobander at 65 feet. This station is used exclusively on 20 meters. A second station, with a TS-820 feeding a TH6 at 50 feet, is used on other bands and for backup. What is different about VE8RCS is its purpose. A typical tour of duty at CFB Alert is six months. The cold, the isolation and particularly the separation from family and friends can become very depressing. Thus, the many licenced amateurs among CFB Alert personnel devote hundreds of hours each month to phone-patch traffic, keeping the 200 residents of Alert in touch with those in the outside world. You can imagine it's a service well appreciated.

Listen for VE8RCS daily on 14.165 MHz. If they're not busy, check in with them, and ask about the weather. If it's hot where you are, you'll likely wish you were with the fellows in Alert. Just remember, though, a few months from now it will likely be −50° C up there!



Left: Polar Bear ARC — VE8RCS: the main station. A sign over the nearby backup station reads, "End of day — make sure beam is pointed south"! Centre: CFB Alert is the most northerly outpost in Canada — and the world — about 900 km from the North Pole. Right: The buildings are orange, for visibility from the air. The ducts carry water and electricity. With a sharp eye, you can just make out the beams. (*VE5AE photos*)

DOC RELEASES DRAFT TRC-24

DOC has released draft copies of a new TRC-24, the syllabus for all amateur examinations. Earlier this year, DOC had indicated it would be retaining the present examination structure, requiring a conceptual and practical knowledge of technical material for the Amateur certificate, and a more detailed knowledge of much the same material for the Advanced Amateur certificate. In this draft TRC-24, DOC has abandoned this position. DOC is now proposing a distinctive set of subjects for each certificate. The five subjects for the Amateur certificate would be (1) theory of electricity, (2) tubes and semiconductors, (3) radio-wave propagation, (4) block diagrams and emissions and (5) amateur station setup. The five subjects for the Advanced Amateur certificate would be (1) power supplies, (2) receivers, (3) transmitters, (4) antenna systems and (5) test equipment. The subjects for the Digital Amateur certificate would be the five for the Advanced Amateur certificate plus (1) pulse modulation, (2) digital communications, (3) control techniques, (4) packet radio and (5) protocols and software. All subjects are explained in considerable detail, a great help for both instructors and those studying for certificates. Nevertheless, the proposal is a significant change from present requirements. CRRL believes many amateurs will want to make comment. Copies of this draft TRC-24 are available from CRRL, Box 7009, Station E, London, ON N5Y 4J9.

CRRL ELECTIONS

Elections for CRRL Board of Directors will be held this fall. The following are required, for a two year term beginning January 1, 1982: a CRRL vice president and a CRRL secretary. The ARRL Canadian director is automatically the CRRL vice president. The ARRL Canadian vice director is automatically the CRRL secretary. For details concerning their nominations, see "Happenings" elsewhere in this issue.

Also required for two-year terms, beginning January 1, 1982, are three CRRL regional directors. The Western director represents British Columbia, Alberta, Saskatchewan, Manitoba, and the Yukon and North-West Territories. The Central director represents Ontario. The Eastern director represents Quebec, New Brunswick, Prince Edward Island, Nova Scotia and Newfoundland.

Nominations for CRRL regional director must be signed by 10 or more full League members living in the region. Nominations must be received by the CRRL secretary by noon, September 10, 1981. Those nominated must, at the time of their nomination, (1) have reached their 21st birthday, (2) have been a full member of the League, continuously, for four years immediately preceding and (3) have been a holder of a Canadian Advanced Amateur certificate throughout those years.

The incumbent CRRL regional directors are: Western — A. George Spencer, VE6AW; Central — Thomas B. J. Atkins, VE3CDM; and Eastern — Albert G. Daemen, VE2IJ. It is recommended that nominations have somewhat more than 10 signatures on them, and that nominations be sent to the CRRL, Box 7009, Station E, London, ON N5Y 4J9, by registered mail, marked "Attention — CRRL Secretary."

CORRECTION

The correct price for Garry Hammond's *Amateur Radio Awards Directory* is $7.50, not $6.50 as reported last month.

*163 Meridene Crescent West, London, ON N5X 1G3

YL News and Views

Conducted By Jean Peacor,* K1IJV

Results — YLRL's 32nd YL/OM Contest

The YL/OM Contest was created by the Young Ladies Relay League 32 years ago. It has continued to grow in popularity. Limited space prevents listing the scores in their entirety, but the top 25 contestants in each category will follow. It's interesting to note the increasing number of high-scoring stations using low power. In addition to the awards for the three highest scores, YLRL certificates are issued to the top-scoring station in each district or country.

YL/OM Contest Results — Cw

YL		*OM*
OK3TMF*—62,140	Gold Cup	W7ULC*—1414
KT4E/8*—25,625	Second Place	W5UN*—1215
W8YL*—24,351	Third Place	W8UMP*—1094

YL CW

N7YL—22,040; NI4R*—18,460; IT9GCV*—17,719; WA8FSX/7*—13,950; K8DMU/7*—13,950; K4LMB—12,558; K1NEI—11,970; WBØNIE*—11,471; W1YPH*—11,358; WB3GXG*—11,138; N9AIB*—8910; K8ONV/4*—8843; WD4NGD*—7910; YC1BZ*—7320; WA2WHE*—6758; I5UNA*—6325; WA4SRD*—6309; N5CII*—5750; K1QFD*—5699; WA2NFY—4836; KA3CUF*—4730; VK3KS*—3998.

OM CW

W4MOY*—1020; WA3EXX*—853; W9LNQ*—825; VE3KUC*—805; VE3JKE*—798; W1BNS—744; W9RKP*—735; VO1AW—690; K1WJL*—660; W9LKI*—656; I1MM*—656; W2AAU—630; W1HOZ*—600; W1JD—572; W1PEG—540; W6ZT—525; KØBM*—495; WBØBJP—473; W3ARK—462; KAØCLS—432; W1POJ*—425; W2RPZ—418; HC2BW—418.

YL/OM Contest Results — Phone

YL		*OM*
KA4FVU*—125,190	Gold Cup	W2GBX/4*—6815
DF9YY—121,401	Second Place	OZ5EV—4089
OH8MA—119,534	Third Place	VE6MP*—3465

YL PHONE

WB7FDE*—107, 678; DJ2YL—88,935; IT9JLA*—72,900; VE2FIM*—53,550; WB7QOM*—47,190; VP9IX*—45,825; KT4E/8*—41,125; DJØEK—39,100; PS8YL*—38,690; KAØCAO*—36,758; OK2BBI*—30,363; HP1XIE*—27,431; GD4GWQ*—26,714; WB7WQE—26,554; WB7RFC—26,136; DF3TE—24,495; WB9VXQ*—23,850; KA2CRL*—23,400; YU1YL—22,704; WA8FSX/7*—22,350; WB3GXG—21,216; WD4NGD*—19,550.

OM PHONE

W7ULC*—2544; W1BNS—1836; K1WJL*—1666; W4WWQ*—1595; W6OU*—1486; K7RDH—1363; KA1B*—1156; DJ2SL—1000; LA2DR*—990; I1MM*—925; W9LNQ*—880; W1PEG—875; W4MOY*—862; K2LFG*—825; YU1DD—780; OK1AGN*—723; WA2UDT*—700; EA3LA*—700; OK3CEE*—619; SP1GZF*—619; K4YXJ—600; KB8GH*—600.

*Low Power

DR. SUSAN L. PICKMAN, WA2HLQ

Susan Pickman of Massapequa, New York, has been licensed as WA2HLQ for 22 years. Susan suggests that her father Joe Forman, W4EMI/W2BUU, provided his children at an early age with either keys or microphones, rather than rattles to explore because they are now a six-ham family. Her sister Roberta is K2TZW; Roberta's husband Joel is K2HQQ; her brother Martin is WB4TOD; and Susan's husband Robert is WA2IFW.

In May of 1980, Susan received her PhD in history at the State University of New York at Stony Brook and was the graduate student speaker at the commencement ceremony. She received this honor because she is one of the few to complete a PhD while working full time in another capacity.

Her full-time position, then as now, is Grants Business Manager at the University. She has served in that capacity for four years, and her responsibilities include the fiscal management of over $30 million in nonstate-appropriated funds for research and education at a multi-purpose university center (which includes undergraduate, graduate and professional programs, as well as a hospital of 450 beds). In addition, Susan is an adjunct assistant professor in the Department of History.

Perhaps you talked with Susan when she first became licensed as a Novice at age 11. Her ragchewing was in English at that time; an added enjoyment for her now is ragchewing in Spanish. You might also find her chasing DX on 20 and 15 meters or handling traffic. Susan and Robert are members of the Long Island Mobile Antenna Radio Club and can be found on 2-meter fm while commuting.

Congratulations on such fine accomplishments, Susan.

*Country Club Dr., Monson, MA 01057

Dr. Susan L. Pickman, WA2HLQ

VE3QEH — 10TH ANNIVERSARY

March 17, 1981, marked the 10th anniversary of Queen Elizabeth Hospital in Willowdale, Ontario, being on the air with the call VE3QEH. In honor of the occasion, Dot Aldridge operated the station all day with Basil Gould, SWL, logging for her.

Dot has been a resident of the hospital for 55 years and is the most cheerful person you could hope to meet. She serves on the Patient's Council and the Chaplaincy Advisory Committee, makes her own clothes and does needlework.

A special certificate is being issued to the 109 stations who contacted VE3QEH on March 17. Dot assisted in making this station's 10th anniversary something special.

Dot Aldridge, celebrating the 10th anniversary of VE3QEH

HAM OF THE YEAR AWARD

Diane Bybee, KA5CFM, is the first YL recipient of the Arlington Radio Club's "Ham of the Year" award. Although Diane has not been licensed very long, she has been a very active ham in Texas. Her participation in club campouts, Field Days and other activities, plus serving the club as secretary for the second year, did not go unnoticed by members.

Diane has been working toward upgrading her Amateur Radio license, but hamming by no means takes all of her time. She is a full-time student at the University of Texas in Arlington besides making a home for her husband Bill, KA5CFO, and three sons Jim, KA5CFM, John, KA5IZQ, and 8-year-old Joe, who is studying toward becoming licensed.

Club members believe that it would be difficult to find a more productive ham than Diane. It was with pride that they presented her with their "Ham of the Year" award.

Arlington (Texas) Radio Club's president, WA5KXX (left); Diane Bybee, KA5CFM; and master of ceremonies WD5IBM.

How's DX?

Conducted By Ellen White,* W1YL/4

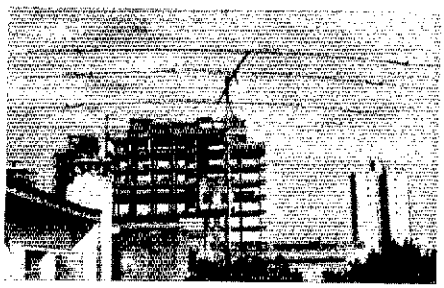
Goal Setting

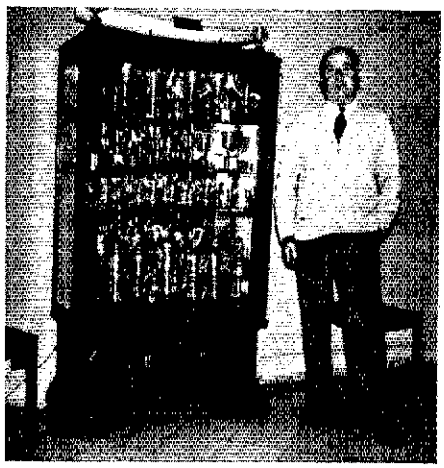
Sitting down in the shack and tuning across the band doesn't *always* result in "new ones" for DXCC. And, hard as it may be for some DX types to realize, there is a great deal more to DXing than the coveted DXCC! [I trust this doesn't tread on the fringes of heresy. — Ed.]

Your own productiveness on the air can be enhanced greatly by establishing some realistic goals for yourself. Band open to JA? See how many JA's you can work in an hour or how many of the JA call areas you can QSO in a given period of time. Band open to middle Europe? Why not hone in on one of the many attractive awards by actively working towards the DLD (for example) by collecting DOK numbers (district identifiers) from stations in West Germany. How many different countries can you work in the time you allot? Band *really* wide open? See how rapidly you can work all continents.

In addition to increasing your own operating enjoyment and productiveness of your on-the-air time, this methodology will afford contacts with many of the "weaker" stations who will be equally thrilled at the opportunity to have a QSO with you.

Goal setting ties in nicely with awards. One of the handiest and most moderately priced references to rules for awards can be found in VE3GCO's *The Radio Amateur Awards Directory of the World*. For $7 U.S. (postpaid), you'll find this hefty book a worthwhile investment as a reference for rules, forms, maps and records for awards from working the Antarctic to the USSR (with YL Awards thrown in without charge!). VE3GCO's address is: Garry V. Hammond, 5 McLaren Ave., Listowel, ON Canada N4W 3K1.





LU6DJX is a seasoned DXer by anyone's measure. Now 71 years old, he made his very first contact in October of 1929. Alfredo showed up as a brand new member of the DXCC in February of 1948, with 128 countries. Persistent DXing over the years saw him amass credits and earn an Honor Roll listing in March of 1954. At the end of 1980, LU6DJX appears with totals of 319/364. Inside the station we find an SR-700A, ST-700, FL-2000B and FT-101B, while outside antennas, at a modest 35-ft elevation, include a 3-L trap beam and a half-wave dipole for 40 meters. LU6DJX — an award winner by any standards.

THE RAEM AWARD

Let's apply the above goal-setting philosophy to one of the popular USSR Awards. Basic rules require the applicant to submit a minimum of 68 points accumulated by contacting Soviet Amateur Radio stations above the Arctic Circle. Repeat contacts with the same stations do not count, and a specific city or inhabited area may be counted just once (e.g., only one QSL from Cape Chelyuskin). The exact location is required on each QSL card. Cw contacts only count after December 24, 1972.

1) An RAEM contact is 15 points.

2) A contact with a Soviet drifting Arctic station is worth 10 points (i.e., UPOL-21).

3) A contact with a fixed Soviet Antarctic station (usually a 4K prefix) is worth 10 points.

4) A contact with Cape Chelyuskin, Cape Schmidt, Vankarem, Dickson, Pevek, Ambarchik or Ustx-Olenex is worth 5 points.

5) A contact with Soviet Arctic Islands is worth 5 points (Wrangel, Ayon, Severnaya Zemlya, Ostrov Dickson, Ostrov Kildin).

6) Other stations or locations above the Arctic Circle are worth 2 points.

7) For South American stations, all point values double.

To apply for this or any other Russian award, send your QSLs and a cover sheet with your name, call, mailing address, the name of the award you're applying for plus a list of the confirmations enclosed (date, call, emission, frequency and report) to Box 88, Moscow, USSR. Each application must be accompanied by 14 IRCs (the equivalent of one ruble) for the return of your cards by registered mail.

*19620 SW 234 St., Homestead, FL 33031

THE MEDIA

Last month's column lead dealt rather singularly with only the printed means of expanding your DX input.

In addition to DX bulletins you'll find a more immediate type of information available via on-the-air DX bulletins. If you're in a heavily populated urban area, chances are good that there is a local DX club active with a DX-alerting network. Admittedly there is a rather subjective area surrounding having someone else do your listening for you, but this may not really be very much different from reading the weeklies to find times and frequencies of choice tidbits. At any rate, a popular on-the-air DX bulletin is transmitted weekly by ARRL Headquarters via W1AW, the Maxim Memorial Station. Replacing the regular bulletin transmissions on Friday (UTC) is a concise appraisal of the DX scene, information courtesy of the Southern New England DX Association, as follows: cw, 0000 0300 1400 2100; phone, 0130 0430; RTTY, 0100 0400 1500 2200 UTC. A typical offering in early May included activity tips on Benin; Franz Josef Land; Willis, Campbell, Chatham and Glorioso Islands; New Caledonia; Tunisia; Cape Verde; Bhutan; and Bangladesh.

BENIN

A study of the ARRL DXCC List is in itself a history minicourse. Benin provides just one example. It wasn't so very long ago that Benin appeared on the DXCC List as the country of Dahomey. Benin is the name formerly given by the French to their possession on the Guinea coast of Africa, including Dahomey. Prior to August of 1960 the prefix that would have been used was FF8, French West Africa.

Interesting tidbits of geography and history enhance your own enjoyment of DX. Find out *where* that country is that you've so recently worked, not only in terms of beam headings but in relation to people, terrain and history. DXers soon become proficient in geography, as well as their hobby, in a painless fashion!

KK CONFIRMATIONS

K2FV asks that you be advised regarding the recent N2KK operations. There have been some QSL delays. As of early May the N2KK/ST2 and 6U0KK cards had arrived and were in process. The situation then begins to get pretty complex. Hams who sent in requests for more than one country in one envelope will not receive responses until *all* the cards are received from the printer. Those who asked for more than five QSLs to be returned in one envelope with just one first-class stamp will receive five *only*. (Note that six cards weigh more than one ounce.) Those DX stations who sent an airmail stamp or two IRCs will have sent only enough postage to cover three cards.

Some thoughtful DXers have sent Dave extra postage. He particularly wants to thank them for being considerate of the QSL Manager who has been caught by both a first-class and an international postal increase.

With over 6000 envelopes on tap, most of which were sent prior to January 1981, you can appreciate the magnitude of the problem. AS, please, on 4S7/807/J20.

TURKS AND CAICOS

Operation from WB8BTH and N8RK took place during the week of March 3-9. Activity before and after the DX Contest netted 1815 QSOs (with 20 and 10 being the big bands). During the contest VP5TDX found superb 10-meter propagation with many

stateside signals at 40 over 9. Results with the two-man, single-transmitter effort far exceeded their initial goal of 3000 QSOs. Raw totals (band/-QSOs/multipliers) were: 160-27/14, 80-314/48, 40-398/48, 20-1396/53, 15-1483/55, 10-2702/55. Thanks to all for making the VP5TDX/VP5JDT a success; send QSLs with an s.a.s.e., please, to W1HCS.

EASTER ISLAND

W4PRO and W4GSM left for Easter on February 22, hard on the heels of NØNO and company who were there for the weekend of the ARRL CW DX Contest. The planned phone jaunt was somewhat less successful than expected because of damage to the antenna system and illness of op W4PRO.

WA1SQB, on Easter with the Earthwatch Society, aided the operation; and Father Dave, CEØAE, supplied assistance in interpreting and arranging for housing. Port Captain CEØCOJ (organizing a radio club on the island!) and G3MUV/CEØ provided aid and comfort. Special thanks from the crew to the secretary of the Radio Club of Chile, CE3GN, for his kindnesses.

The crew left all the antennas on Easter, which is now equipped with a tower and a TH-3.

After four weeks on Easter you, too, could find what W4PRO/CEØA found waiting in his mailbox!

Long-time ops on Easter.

DX STAMP SERVICE

What is the easiest way for that rare DX station to return his card to you? In recent issues, bureaus with their pros/cons were covered. W9LT feels a timely reminder is in order regarding the outgrowth of the famous W2SAW stamp service of some years ago. George Robertson, W2AZX, 7661 Roder Pkwy., Ontario, NY 14519, offers the DX Stamp Service for worldwide postage. In essence you send the DX station the appropriate stamp he would use from his own country, removing the necessity for him to go to his post office to purchase stamps and also removing currency conversions, etc. Send for George's list, keyed to the ARRL DX List. Orders are promised to be filled within 48 hours.

TIMELY TIPS

☐ Do you have a local DX buddy who is visually impaired? Alert him to the fact that braille copies of the manual, *DX and the Blind Ham*, are duplicated, bound and mailed to blind hams in any part of the U.S. For further information, contact Mrs. Lila Queen, 450 26th Ave., San Mateo, CA 94403, tel. 415-345-2246.

☐ N4TL suggests that you avoid red ink for QSLs because the color fades. Tom notes additionally that felt-tip pens are usually water colors, and the resultant ink will probably rub off.

☐ Just about coinciding with the arrival of the July issue of *QST* should be a special operating occasion for the ARI, Associazione Radioamatori Italiani, in the mounting of an operation from one of the Cheradi Islands (Gulf of Taranto, in the Ionian Sea, using the prefix IJ7).

☐ K2EYJ reminds us of a handy free booklet available from any post office, Publication 51, *International Postal Rates and Fees*, dated March 1981.

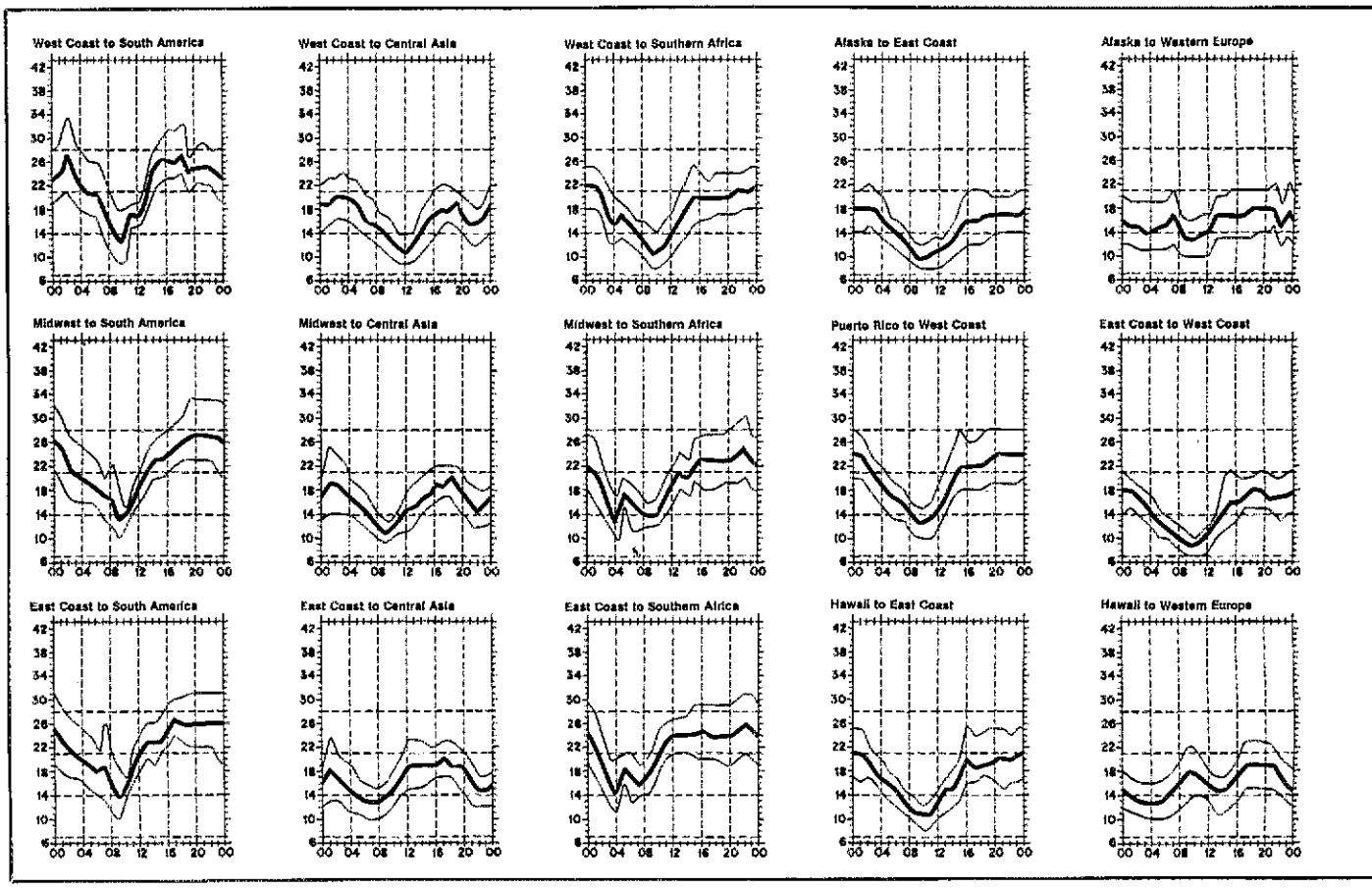
☐ 1978 Russian Contest results (CQ-M): 1978 single-op high scorers, multiband and single band, included W5FO, WA4OML and K3EST; 1979 top marks were posted by K7UR, WA2VYA, K4KG and K3EST.

☐ Just received in the mail is a neat 10-pager called *QSL Report*, edited by Hiromichi Katsurashima, JH1HWN, 5-2236-33 Iriya, Zama-city, Kanagawa, Japan. The monthly is in a 7 × 10-in. format, neatly presented with a listing of QSL managers, their addresses, addresses of choice DX stations plus some esoteric ads. You'll find Hiro's compilation a useful one. Write him for details.

☐ DX quizzes are always a sure-fire bet at any DX assemblage, and a goodie was used at the National in Orlando. Here are a couple of sample questions to stimulate the brain cells. (1) What are the new names of the countries we used to know as Dahomey, Cambodia, New Hebrides, Southwest Africa? (2) Traveling from Mexico to Colombia you would pass through five countries. What are their prefixes and in what order would you traverse them? (3) Name an actual amateur call sign that has no suffix.

☐ Updating the DXCC Credit Check of last month, please note that the Mayotte operation by 18JN/FH8 is indeed okay.

☐ Catch that 1-watt, 14.022-MHz neat signal from XT2AW? QST



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

QSL Corner

Administered By Joan Becker

The ARRL DX QSL Bureau System (Incoming)

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

How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL-Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

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

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

Claiming Your QSLs

1) Send a 5- × 7-1/2-in. s.a.s.e. to the bureau serving your district.

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

3) A preferred way to send envelopes is to affix an 18-cent stamp. If you expect to receive more than 1 oz. of cards, please affix postage accordingly.

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

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of 6 to 8 months, or longer, may take place before you receive your cards.

Helpful Hints

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

DOs

Do keep self-addressed 5- × 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

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

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

Do notify the bureau of your new call as you upgrade.

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

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

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

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

Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QSL Service" in this column every other month).

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

ARRL DX QSL Bureau System

First Call area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07538.

Third Call Area: all calls* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: single-letter prefixes — Mecklenburg ARS, P. O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls* — Northern Illinois DX Assn. Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

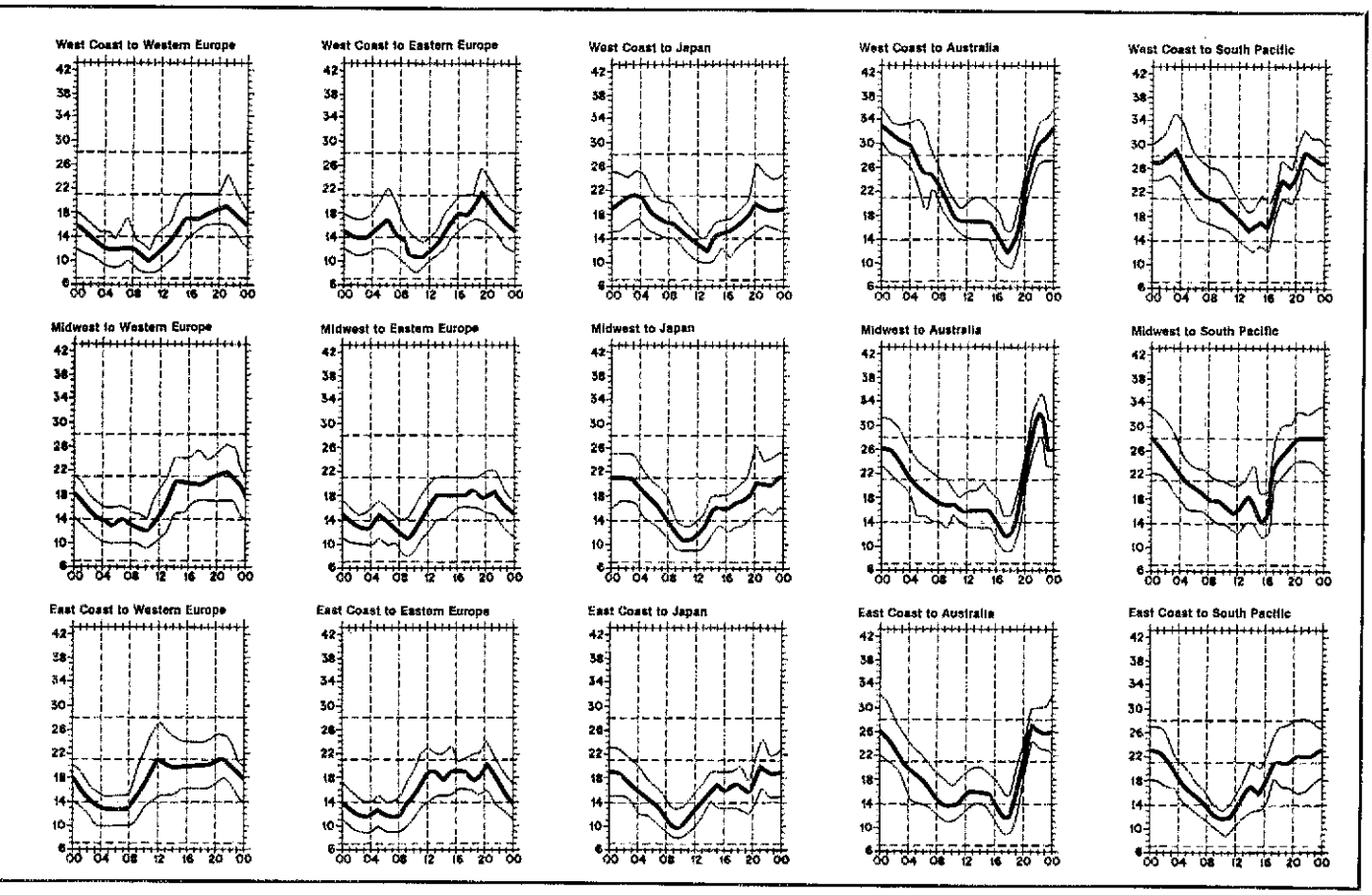
Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P. O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for July 15 to August 15, 1981, assume a sunspot number of 134, which corresponds to a 2800-MHz solar flux of 179.

Garfield St., Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls — Joseph J. Frekot, AH2G, P. O. Box 7227, Tamunig, Guam 96911.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, Kennebecasis Valley Amateur Radio Club, Box 51, St. John, NB E2L 3X1. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, SK S4S 5E3.

VE6* — G. D. Holeton, VE6AGV, 4003 First St., N.W., Calgary, AB T2K OX2.

VE7* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

VY1 — ARRL QSL Bureau, W. L. Champagne, VY1AU, P. O. Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

Club Corner

Conducted By Sally O'Dell,* KB1O

Get 'Em Ready for Contest Time

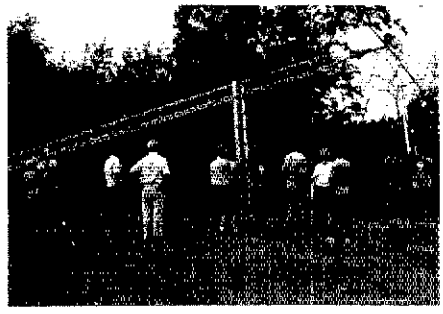
How does your station look at this time of year? How does your *club* station look? Are you ready for the contest season coming up this fall? Do you realize that it creeps up on us sooner than we realize? Now is the time to do something about *preparation*. Many newly formed and general-interest clubs do not realize that they can participate in most of the ARRL-sponsored contests as a club. You don't have to be a "contest club" to want to compete on a club level.

Major ARRL-sponsored operating events and conventions are listed each January in *QST*. Check this annual calendar to decide which contests you want to operate and when to start preparations.

During the year there are three ARRL contests with club-level competition. They are: VHF Sweepstakes in January, International DX Contest in February, and March and November Sweepstakes. In these contests, clubs can compete against each other in three categories. The *unlimited* class is for clubs submitting more than 50 logs; the *medium* class is for clubs submitting more than 10 but less than 50 logs, and the *local* class is for clubs submitting 10 or fewer logs. Each class has certain membership/distance requirements, so check the club competition rules in January *QST* for further details. The winners in each category are awarded gavels for their efforts.

Some Contest Ideas for Your General Club

Your club station can become an active contest station. Get it on the air by assigning operating times to each of your members. A multi-single will get everyone involved for a short time and yet won't destroy an entire weekend. Of course, the party before and after the contest will be enjoyed as much as the contest. Sometimes, serious contesters pool their equipment and efforts and commit themselves to a full-blown effort. This happens when one person can't afford (or doesn't have enough time) to prepare a first-rate, multiple-person contest station as easily as a group.



Members of the Northeast Iowa Radio Amateur Association getting ready for Field Day 1978.

When you participate in an "Elmering" party, each member fine tunes his or her performance (with a little assistance). Kick off the session with a strategy meeting, and you will be prepared as the contests get underway.

What is your club doing right now to prepare? As people usually say, "There is so much to be done and so little time to do it all in." Many clubs form a technical committee that assists members when they run into problems. Your committee can operate under specific rules or help those with problems as the need arises. One problem a technical committee can handle is tower and antenna assistance. When club members prepare to work on their own antennas, are they properly informed on safety procedures?

One competition that many clubs participate in is Field Day. Although it isn't a contest (but rather an exercise of emergency preparedness), and although you don't have to be a club to participate, many clubs join in. Anyone can become involved, from a single individual or loosely formed group organized for Field Day to a formal club.

A contest consists of some log time, some operating time and lots of preparation time. In the northeast, spring and summer are antenna-work time; in California, it's all year long. Some clubs sponsor a "build a 220 transmitter" program in preparation for the contest season. Others prepare with contests sponsored by the club, for the club. What is your club planning to do?

*Club Program Manager

50 Years Ago

July 1931

☐ In his editorial, K. B. Warner reviews the many advantages and benefits of League membership, and he points out that the $2.50 membership fee doesn't begin to pay for all the services. The difference is made up by revenues from outside sources — advertising, newsstand sales and the sale of radio literature.

☐ "The A.R.R.L. Board Meets" is Secretary Warner's account of the annual meeting. Important issues were appropriations for representation at the C.C.I.R. (International Technical Consulting Committee on Radio Communications) at Copenhagen, a frequency-band policy for the 1932 Madrid International Conference and a domestic recommendation on 'phone allocations. This latter involves moving 80-meter 'phone to the high-frequency end of the band and quadrupling its spread to 100 kc., while reducing the 160-meter voice assignment to only the high-frequency half of the band in an effort to reduce broadcast-interference complaints.

☐ An 11-page article by Technical Editor Jim Lamb, "Developments in Ultra-High Frequency Oscillators," reviews circuitry for using available vacuum tubes as low as 1/2-meter wavelength, requiring unfamiliar Barkhausen-Kurz and Gill-Morrell techniques. More familiar "TNT" circuitry is involved in a pair of 5-meter oscillators, employing push-pull '10s and '52s. Field tests with several different types of antennas were very encouraging.

☐ In "Five-Meter Receiver Progress" Ross Hull describes a 3-tube *super*-regenerative job using a series-tuned detector, separate quench oscillator and pentode audio. Ross points out that this E. H. Armstrong circuit, first revealed in 1922, was a "flop" for b.c. reception but is ideal for 5-meter amateur work where the band is 4 Mc. wide. Used mobile to receive modulated signals from the Lamb oscillators, the receiver provided excellent reception at points up to 35 miles away.

Ev Battey, in "Results of the 1931 Sweepstakes Contest," reports that the second SS was a big success, generating great enthusiasm among the participants. One such booster is quoted: "It was the most interesting two weeks that I have ever spent at the key." National leader was W8CHC, who exchanged messages with 305 stations in 54 sections. All 68 sections were active in the event.

☐ George Grammer describes "Inexpensive Crystal Control," featuring receiving tubes as crystal-controlled oscillator and tetrode buffer/multiplier stages to drive a '10 output amplifier. George credits some of the success to increased plate-voltage ratings (from 180 to 250) on the '24 tetrodes.

☐ Amateurs are permitted cross-band contacts with expeditions, and working and handling traffic with these adventurers is encouraged. "Finding the Expeditions" lists the transmitting frequencies and watch times devoted to amateurs. The column includes heady stuff like the Haardt Trans-Asia Expedition (motor car), Sikorsky Pan-American Airways (plane in Brazil) and the Wilkins-Ellsworth Transarctic Expedition (submarine *Nautilus*).

☐ A full-page ad for Jenkins Television Corp. offers receiver and scanning-disc kits at reasonable prices.

25 Years Ago

July 1956

☐ A world-wide cooperative scientific program is the subject of the editorial and two articles. In "The International Geophysical Year," Dr. L. V. Berrner outlines the objectives of the IGY program, which calls for a series of geophysical observations during the period July 1957, through December 1958. Included in the plans will be the launching of a small, unmanned earth-circling satellite carrying a 108-Mc. transmitter. Roger L. Easton of the Naval Research Laboratory describes "Radio Tracking of the Earth Satellite," an activity that should appeal to amateurs.

☐ Vern Chambers, W1JEQ, writes about "Twenty-Five Watts for the Beginner," a simple 80-meter c.w. rig for the Novice.

☐ Lew McCoy, W1ICP, holds forth on "Eliminating 80-Meter Novice Harmonics," which he does simply with a low-pass filter in a coffee-can housing.

☐ For the 'phone man, Don Martin, W8QBN, tells how he uses "Wide-Range Tone Controls in Ham Phone." The idea is to employ "hi-fi" techniques to *trim down* the audio response for maximum communications effectiveness.

☐ In "Keying the Radiotelegraph Transmitter," W1DX uses five pages to tell his story, which does nothing to dispel his reputation for loquaciousness. — *Byron Goodman, W1DX*

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from March 17 through April 16, 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

DF3NA/116	JE2HCJ/237	VP9DL/119	WA2KGD/104	KA4GYU/104	KA5GJO/109	W7JAA/101	WB8DOD/225	WD9BHK/105
DF5DP/107	JA7TAP/102	VP9JM/109	WA2RLO/101	KB4PY/112	KJ5W/103	WA7TNE/101	WD8NKT/101	KØARR/113
EA9GD/114	JA9SQO/217	YU7ADA/117	WA2VUV/252	KB4Q/142	N5BA/165	AF8D/101	AF9C/105	KØKCY/117
G3BLS/100	JAØMT/231	ZS6ANL/114	WA2ZKB/105	KC4CS/105	WA5SKY/127	KA8DL/104	K9KVA/111	KAØFPK/112
GU3HFN/103	KL7HEI/101	KA1CMP/112	WB2HCI/231	KC4PY/107	KA6DXY/103	KC8A/236	K9VGE/110	WØBBT/100
H44SH/112	LZ1DB/101	N1AFM/105	KJ3JZU/152	KZ4D/136	KD6BO/109	KD8F/160	KA9FKL/104	WØCON/100
HB9BKP/107	LZ1YE/229	W1CUH/120	KA3CGM/145	N4BU/117	N6DW/106	KK8K/111	KB9H/113	WØQAU/100
HB9XX/106	OH2LP/121	W1ISD/152	KA3DBN/151	N4CYX/106	N6JE/139	N8BRT/110	KB9JJ/100	WBØEHC/123
HC8EE/110	OZ7OP/314	WA1FSD/101	W3SUA/101	NE4F/107	W6TOG/171	N8BKF/220	KB9OX/106	WBØURE/109
JE1OFL/102	PA3AMN/109	K2KIT/105	WA3UIY/104	WB4VMB/101	WB6FDQ/107	N8RW/105	WA9WGT/102	WBØVBH/100
JH1FGR/103	PT6ABZ/109	KA2CFH/100	WB3CHS/248	WD4ENA/101	WD6FBH/100	W8CU/118	WB9NYG/103	WBØWOL/104
JJ1SOE/105	SMØBHF/109	W2AOY/120	WB3GUH/101	WD4HZM/111	N7SU/103	W8LQZ/102	WB9UIO/102	WDØCHC/107
JH2RWP/109	VK2AYK/110	WA2DQI/100	K4QHN/134					

Phone

CE1DM/112	IT9UAG/283	VE3HGD/202	WB2YOF/122	KB4O/140	WD4BJW/105	WD5DQF/109	WB7VHA/104	K9KVA/111
DF5DP/105	JL1SEW/140	VK3NDY/163	K3JZU/105	KC4CS/105	WD4HDT/103	WD5DQK/109	K8EFS/100	KB9QZ/109
DF5KX/121	JE2HCJ/233	YV6AAB/W5/129	K3LUE/105	KC4PY/107	WD4IBT/102	N6ATS/219	KA8BUM/103	N9AII/100
EA7BFW/106	JH2RWP/109	W1WLW/153	K3MRT/101	KD4Z/101	K5ARH/168	N8BAK/104	N8BKF/218	WB9QCY/110
EA7HN/147	JAØMT/176	WA1LZL/123	K3OF/116	KF4N/128	K5CON/150	N8ET/308	N8BRT/110	WB9UIO/102
EA7VE/188	KH6DZB/121	N2AVI/103	N3ARD/102	KX4S/217	K5DPG/144	W6RON/239	W8JJO/106	WD9BBX/149
EP2SL/101	KP4AER/102	W2IFK/150	W3GNM/102	N4EF/125	KC5P/101	W6TOG/153	WB8DOD/225	KØKCY/101
G3OPL/100	LA5JX/109	W2ZY/110	K3VCZ/120	W4CXP/104	N5BA/122	W6XH/285	WB8RDN/102	KØREF/164
G4GFH/108	LZ1YE/205	WA2DGS/100	WB3HCH/117	W4PTW/100	WA5WDB/107	WA6QCO/100	WD8LMU/101	WAØNAA/101
GJ4HSW/116	OK1JSU/100	WA2RLO/101	K4EED/128	WA4NOH/102	WB5LBI/104	WB7QEQ/104	WD8MQJ/102	WBØCHS/100
H44SH/112	PY2ZDE/140	WB2MVF/110	KA4BUN/100	WD4AIE/105	WB5ZKY/105	WB7SGV/108	AF9C/105	WDØCHC/101
IN3DYG/246	PY5WD/216	WB2MZI/105						

CW

DA2AA/100	HH2VP/103	XE1KC/110	AK2H/102	KA4IWX/104	WA4TYJ/132	K6TS/102	N6DFY/104	WD8KGZ/108
DJ7LI/107	JH8IVO/110	ZS6ANL/104	AK2L/103	K4QHN/114	KJ5W/102	KA6AUX/105	N6DW/104	N9AIB/100
DK2UW/130	LA4AT/137	4Z4OL/115	W2IFK/100	KG4F/102	N5BA/111	KB6HT/118	KA7AUH/102	N9FC/106
DL1TL/204	LZ1YE/113	N1ATD/102	KA3CGM/100	N4EF/136	W5HEZ/205	KR6Q/103	K8PYD/229	WB9UTY/101
DL3RK/157	OH3KL/101	N1QY/103	KA3DBN/115	WA4DPU/101	K6OMB/103	N6AR/173	W8LU/164	WØEJ/118
HB9BTX/102	SM6CNX/102	W1AOQ/102	N3AUE/104					

RTTY

5BDXCC

I8YRK	KA2K	N6AR	YU7OCV	W7KS	AA4KY	AB1A	JA2JW	K2PZ
JA1BK	EP2TY	I1YG	WA6TLA	GU4EON				

Endorsements

Mixed

DJ1QX/183	OZ2RC/174	K1VR/309	W2WZ/252	K4GXH/288	K5RSG/263	W6PN/319	N8BIK/203	W9ON/251
DJ3AS/180	PY2JSF/152	K1XA/225	WA2MTI/260	K4IBP/293	K5TA/261	W6SWM/264	N8BLZ/155	W9RY/315
DK3PO/329	PT2VE/232	K1ZZ/305	WA2ULA/121	K4RZ/310	W5EDX/327	WA6OEC/270	N8SW/254	W9TY/294
DL1DA/290	PY4ALC/270	N1ACW/297	WB2BNJ/300	K4SE/295	W5LVD/300	WB6RSE/291	W8DUA/264	WA9USE/260
DL6MK/331	PY5EG/248	N1AOZ/235	WB2KJL/204	K4YXJ/270	W5ONL/176	WB6RSU/220	W8KKF/281	WB9JVR/125
DL7JY/224	PY5WD/302	N1APA/237	WB2NYM/235	KA4DLC/128	W5RJC/262	K7BHM/275	W8LNL/140	WB9LFD/236
DL9PR/210	SM6AYM/236	N1TZ/283	WB2YOF/138	KA4GKQ/155	W5RRK/303	K7CVL/311	W8LU/305	WB9NOV/256
EA6ET/234	SM5BBC/324	W1AJO/257	AC3A/196	KB4BH/286	W5SGT/225	K7EQM/242	W8NPF/300	WB9WHQ/125
G3KMQ/278	SM5BRW/295	W1JDE/271	AE3T/318	KB4KA/203	WD5ABG/175	K7JH/203	W8PCS/261	ACØA/270
G4BUE/291	VE2BHK/199	W1RFW/195	K3CQY/158	KC4CT/260	WD5DRS/202	K7LAY/299	W8QQH/279	ACØM/270
GW4BLE/250	VE3CPU/265	W1TPK/289	K3FN/308	KC4DY/213	WD5GJB/218	K7LJQ/187	WA8TZP/148	AEØK/300
HB9BGN/300	VE3HGD/205	W1TSP/282	K3KA/300	KC4HR/125	WD5IAF/144	KB7SB/175	WB8AAX/242	AIØO/168
HB9G/177	VE3II/307	W1WEF/262	K3ND/310	KG4F/244	WN5MBS/127	KD7J/179	WB8PHO/208	KØAB/335
HKØEHM/183	VE3JGT/200	WA1PDG/201	KA3R/145	KV4X/221	AF6F/211	N7BJH/314	WB8YQX/201	KØBX/253
I3LLD/318	VE3KJK/227	WA1YWH/202	N3BJ/292	N4OM/304	AF6S/292	N7MC/296	WD8CBP/226	KØDN/274
JA1UQP/330	VE4OP/236	WB1CCH/278	N3RL/299	N4TX/303	K6ANP/270	N7US/301	WD8NVA/185	KØQQ/278
JA1ZZ/333	VE7BD/323	WB1GDG/263	N3VA/225	W4FLA/322	K6GWN/309	W7BGH/343	AA9U/211	KØSI/154
JA2CXH/264	VE7ZX/230	WB1GOO/181	W3GOH/302	W4HY/296	K6NN/158	W7CG/352	AI9R/270	KØUKO/200
JA2INS/308	VP2SQ/162	AB2C/150	W3MZG/251	W4OMY/151	KB6HT/286	W7HZL/165	K9CW/280	KØZFL/120
JA3BQE/321	YU1DD/317	AF2L/225	W3PTV/205	W4TYZ/165	KB6Q/207	W7IUV/294	K9JS/284	KD9B/181
JR3RRY/154	YU1OCV/275	AJ2E/313	W3VQ/310	W4VWW/170	KB6ZL/207	W7PFZ/290	K9MBQ/207	KF9H/300
JA5NG/260	YU3TFC/160	K2AGJ/315	W3XX/300	W4WFB/153	KD6EU/151	W7RVQ/160	K9MFI/264	KN9OJY/207
JH5FQO/247	ZE3JJ/242	K2GBH/201	W3YY/300	WA4ZMM/232	KM6K/200	WA7MOK/200	K9RF/324	N9AT/277
JH6UJP/256	ZE3JO/256	K2XA/316	WA3DMH/266	WB4NFO/251	KN6M/271	WB7ROE/128	KB9KB/290	W9CYY/206
JA8GZV/263	ZL1ARY/334	KB2RZ/225	WB3DNA/272	WB4UBD/276	KS6T/130	AB8K/291	KC9R/128	W9EJ/208
JW5NM/250	4X4NJ/310	N2AMS/125	WB3FSI/261	WD4IBA/185	N6ET/330	AC8Y/131	K8IP/329	W9GAX/200
KG4WM/199	4Z4OL/150	N2JD/252	AA4CJ/316	WD4MJP/149	N6GM/341	K8MC/203	W9COY/124	W9JIG/220
LA2AV/178	AD1S/268	N2RR/260	AB4H/325	AE5V/175	N6JV/315	K8RWL/325	W9EIZ/205	W9JSN/206
LA4AT/186	AE1T/217	W2AWK/323	K4AEB/311	AF5H/292	N6ND/300	KA8ANQ/153	W9FKC/358	W9SD/332
LA7JO/304	AG1C/199	W2FHY/270	K4AMC/224	AI5B/293	W6HT/308	KB8AU/156	W9FPZ/220	W9SMV/319
NL7J/175	K1AR/270	W2HLD/200	K4AVU/224	K5ARH/213	W6IA/262	N8ACA/243	W9HK/338	WAØIDK/300
OE7UDH/328	K1EFI/234	W2IFK/250	K4BIY/289	K5FNQ/275	W6JD/284	N8BBK/125	W9IT/266	WAØJYJ/280
OH2AC/263	K1KOB/150	W2IYX/315	K4CXY/283	K5OS/328	W6NPY/300		W9NYG/163	WDØGML/230
OH2PQ/194	K1KTB/261	W2NJN/289	K4EED/130	K5QY/290	W6OMM/300			

Phone

CX7BF/280	JR3RRY/154	K1KTB/261	WA2VUY/247	K4AEB/311	WD4IBA/176	N6JV/163	KC8A/223	N9BA/280
CX9CO/301	JH5FQO/247	N1AFC/183	WA2WDJ/152	K4CXY/274	WD4MJP/146	W6HT/260	KD8F/157	W9DMH/270
DJ3AS/159	JA5NG/253	N1TZ/277	WB2BNJ/296	K4GXH//285	AF5H/280	W6JD/140	N8ACA/240	W9LA/326
DJ3CN/288	JA7XZZ/127	W1BH/174	WB2CEI/282	K4HGG/160	K5OS/326	W6NTX/314	N8SW/240	W9NIO/200
DK3PO/326	JA8GZV/256	W1TPK/288	WB2KCI/230	K4SE/288	K5RSG/257	W6SN/275	W8ELE/156	W9RY/299
DJ4OK/177	KG4DI/127	W1TSP/171	WB2NIC/270	KB4KA/202	W5EDX/325	W6SWM/260	W8KKF/281	W9TY/173
EA4QR/153	KH6JEB/270	WA1LOU/180	WB2ROX/133	KC4BX/177	W5HEZ/261	W6ZPV/261	W8LU/291	WB9JXT/251
EI8AU/150	KH6OR/342	WB1EGL/139	WD2AER/159	KC4CT/260	W5RJC/206	WA6OEC/229	W8MPW/348	WB9NOV/229
F5RV/296	KP4BS/126	WB1GDG/268	AC3A/179	KC4DY/211	W5TKV/253	WA6PJR/251	W8NDJ/153	WB9LFD/235
F6FWW/126	OE1PC/271	WB1GOO/158	N3RL/287	KG4F/227	WA5BBR/175	K7LAY/276	WB8YQX/200	WD9FOE/206
G3KLL/204	OE7UDH/325	K2AGJ/271	N3VA/225	KV4X/219	WA5HLQ/191	K7LJQ/187	WD8BSX/268	WD9HAW/250
G4BUE/275	OZ3YI/183	KA2FRW/175	W3DR/253	N4BQB/151	WA5SKY/126	KB7SB/174	WD8CBP/226	ACØA/267
HB9BGN/284	OZ7OP/313	KB2RZ/183	W3EFA/278	N4MM/327	WA5ZGI/260	KD7J/149	WD8DEL/224	KØEPC/321
HKØEHM/182	PY2JSF/151	N2JD/252	W3FJY/195	NF4Y/202	WB5CBJ/250	N7BJH/309	WD8NVA/185	KØQQ/271
I5AFC/306	PY5EG/244	N2RR/200	W3GG/325	W4AVY/328	WB5TXP/175	W7ELU/292	AA9U/210	KØSE/253
I5ENL/239	PZ1BK/222	W2AWK/298	W3HAY/156	W4EPZ/332	WD5ABG/175	W7YEM/290	AI9R/251	KDØB/179
I7SCA/331	SM5BRW/263	W2HXF/281	W3IGU/203	W4KH/256	WN5MBS/127	WA7CYP/175	K9MD/290	KNØQJY/203
I8LEL/303	VE3II/306	W2IJB/275	W3KFQ/236	W4OWM/138	AF6F/203	WA7KNK/281	K9MFI/178	N9AT/270
I8SAT/290	VE3JGT/198	W2NJN/231	W3RW/203	W4WFB/153	K6NN/153	WB7FDE/160	K9QXK/162	W9EJ/169
IT9VQC/242	VE7PO/221	W2IYX/315	WB3ABS/233	WA4ZMM/227	KA6V/177	K8AQA/256	K9RF/311	WØFHA/202
IT9YSW/149	VY1CC/150	W2WZ/220	WB3CHS/248	WA4ZUS/150	KB6HT/282	K8GWM/286	K9TI/229	WØPEL/224
JA1HEE/204	VP2SQ/160	WA2DXJ/306	WB3EFC/240	WB4KTG/243	KB6ZL/149	K8LJG/320	KB9IS/260	WØQGI/344
JA1UQP/326	ZE1BP/282	WA2KGN/130	WB3FSI/257	WB4LND/218	KC6X/179	K8WOW/154	KB9KB/255	WAØABT/176
JE1XRZ/200	ZL1ARY/307	WA2SRM/225	WB3KDY/157	WB4NFO/251	KN6M/189	KA8ANQ/151	KB9KD/260	WAØLHK/182
JA2CXH/257	AD1S/265	WA2MTR/152	AA4CJ/279	WB4UBD/276	N6AR/334	KB8AU/156	N9AWR/230	WDØAWL/228
JA3BQE/310	AG1C/180	WA2VJL/127	AB4H/314					

CW

G4BUE/212	SM5BRW/236	KB2FD/180	W3GRS/294	K4AMC/195	K5UR/292	W6PT/300	W8ELE/125	W9IT/176
JA2INS/240	SM6AYM/236	WB2KJL/143	W3KFQ/181	K4CXY/220	W5KC/245	WA6OEC/178	AI9R/188	W9NUD/153
LA2AV/138	SM6HCJ/129	K3FN/301	W3TVB/219	K4SE/265	AF6S/275	WB6RSE/286	K9CW/151	W9TY/270
OH2BN/260	SM7BXV/163	N3BJ/151	AA4AK/199	W4RHZ/126	N6JV/267	N7US/153	K9MFI/204	AIØO/132
OH2PQ/180	K1XA/156	N3RL/230	AA4KT/250	AF5H/175	W6ID/250	W7IUV/236	KB9KB/265	KØSI/151
ON5KD/249	N1TZ/153	W3EVW/270	AB4H/256	K5FNQ/174	W6JD/247	K8WW/281	W9BW/289	WBØTTL/178
PY5WD/260	WA1ZIC/118	W3GG/151						

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Survey Results

In January "FM/RPT," I asked 20 questions. I received 664 responses and entered the answers into my computer. The TRS-80 juggled the numbers and put out some interesting statistics, which I will relate to you now.

QTH?

Question 1. *What is your location?* The largest response (21% of the total) came from the 6th call district. The 8th call district was second with 14%. The smallest response came from 3-land (5%). Club efforts in 6-land and 8-land were responsible for the great response from those areas. A number of repeater organizations distributed the survey questions to their members, and I thank them now for their efforts.

An interesting aside . . . approximately 8% of the respondents did not answer this question. (Why? I don't know.) So I deciphered smudged postmarks and supplied the answer for those without one.

Question 2. *What is your license class?* 36% of the respondents were Advanced class licensees (compared with 29% of the non-Novice U.S. ham population which is Advanced), 23% were Generals (vs. 39%), 20% were Extras (vs. 8%) and 18% were Technicians (vs. 22%).

I was surprised that the response from Technicians was not greater. These results indicate that as hams upgrade from the Technician class, they remain interested in the fm repeater mode. It is not a stepping stone that is abandoned when the more plentiful higher class privileges become available.

Question 3. *How long have you been active in the fm repeater mode?* There are a lot of fm repeater veterans out there! 41% have been operating for five or more years, while 43% have been operating between two and four years. The remainder (15%) are newcomers with one year or less of fm repeater operating experience.

Question 4. *How much of your ham operating time do you spend in the fm repeater mode?* 32% of the respondents spend 0 to 25% of their on-the-air time in the fm repeater mode. The other 68% of the respondents were evenly divided: 22% are fm repeating 25 to 50% of the time; 22%, 50 to 75%; and 23%, 75 to 100%.

Two Meters Most Popular

Question 5. *Which bands do you use in the fm repeater mode?* The most popular fm repeater band was no surprise. A whopping 94% of the respondents were on 2 meters. In the first, third, fourth, fifth and tenth call areas, 100% of the respondents were 2-meter users. 450 MHz was a distant second in popularity with 20% of the respondents admitting to 70-cm activity. 15% of the respondents also use 222 MHz, and 8% are on 6 meters. Less than 1% are active on 1215 MHz and above.

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Question 6. *What type of equipment (synthesized or crystalized) do you use on 144, 222 and 450 MHz?* Synthesizers are in; crystals are out. On 2 meters, 53% of the respondents have synthesized mobile rigs (vs. 29% crystalized), and 46% have synthesized base rigs (vs. 25% with crystals). Synthesized portable equipment has been available for a relatively short time, but the survey indicates that synthesized handhelds must be selling like the proverbial hotcake. 31% of the respondents have 2-meter synthesized portables (vs. 32% using crystals). Beyond 2 meters, the most popular gear is 450-MHz crystalized base and portable equipment (11% each) and 450-MHz mobile crystalized equipment (10%). The other categories that were sampled (222-MHz crystalized and synthesized and 450-MHz synthesized mobile, base and portable gear) were used by 6% or less of the respondents in each category.

Table 1

Response to Questions 8 and 9

Delineated according to U.S. call districts and the total Canadian response.

Call District	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*0*	*VE*
No. of repeaters:											
Accessible	17.0	17.2	17.2	10.5	36.4	110.9	69.0	14.8	14.8	11.3	11.1
Used	3.8	3.4	3.7	3.4	3.4	10.5	8.5	3.3	3.2	3.5	6.3

Question 7. *What is your primary operating activity in the fm repeater mode?* Again, there was no surprise as to the most popular response to this question. Ragchewing is preferred by 30% of the respondents, while a close cousin, mobile communications, was preferred by 25%. The other 45% broke down as follows: emergency communications, 14%; autopatching, 5%; experimentation and traffic handling, 4% each; DX information, 1%; RTTY or ASCII, less than 1%; other activity, 12%. The most popular "other activity" was remote base operating.

Of 40.9 Accessible, 5.3 Used

Question 8. *How many repeaters can you access from your station?* The average respondent can access 40.9 repeaters. No surprise that the 6th call district had the most accessible repeaters with 110.9 available to the average user. (Note that remote-base operating is very popular on the West Coast. Remote-base users can access many more repeaters than the majority of hams not using remote bases. This capability influenced the 6-land response to this and the next question.) The accompanying table breaks down questions 8 and 9 according to each call district.

Question 9. *How many of these accessible repeaters do you actually use?* The average respondent actually uses 5.3 repeaters out of the 40.9 he can access. Six-land had the most repeaters used per respondent — 10.5. (See Table 1.)

Question 10. *Do you support a repeater financially through membership dues or otherwise?* Who said hams are cheap? 88% of the respondents support the repeaters they use.

Question 11. *Do you have access to an autopatch?* Autopatches are as popular as ever. 81% of the respondents can access at least one autopatch. Autopatches are most popular in 8-land (91% accessibility) and least popular in 2-land (71%).

Question 12. *If you can access an autopatch, how often do you do so in the average week?* Those respondents who can use an autopatch do so 1.2 times per week. Autopatches are used most often in 6-land (2.4 times per week) and used least often in 8-land (0.6 times per week). The eighth call district has more autopatches than anywhere else, but they are used the least!

Question 13. *Are you a repeater owner?* 18% of the respondents were repeater owners.

Question 14. *If you are an owner, how did you obtain your repeater's frequencies?* 86% of the responding repeater owners obtained frequencies from a frequency coordinator. 6% had frequencies before there was a coordinator, and 5% were self-coordinated. 1% used other means.

More to Come

Questions 1 through 14 were objective, while questions 15 through 20 were subjective, which provides an opportune break in the publication of the survey results. The answers to the remaining questions will be discussed in the next installment of "FM/RPT."

"Til then, happy mobiling!

QST Profiles

Conducted By Carol Colvin,* AJ2I

Paul Rinaldo, Amateur Radio Activist

Tracing the roots of his radio and electronics interest back to his father's music store, Paul L. Rinaldo, W4RI, remembers working part-time repairing radios while he was in high school. He then learned the code and passed his amateur exams in 1949 during his years at Valparaiso Technical Institute.

Now a resident of the Washington, DC area and knowledgeable of bureaucratic ways, Paul is affiliated with many organizations including Communications Resources, Inc. (he is founder and president), AMSAT, AFCEA, IEEE, AMNET and the ARRL RFI Task Group. He is also the author of several technical articles,[1] organizes technical symposia, is active in computer societies, and is now an ARRL Technical Advisor with specialties in computer communications, spread spectrum and technical aids to persons with disabilities.

The productivity of Paul's technical know-how and get-things-done attitude is demonstrated in the growth of the Amateur Radio Research and Development Corporation (AMRAD). He founded and is now president and director of this group. AMRAD started informally in 1973 as a handful of people interested in the technical side of Amateur Radio. Deciding that they wanted meetings dedicated totally to technical talks, the group outlawed nearly all business proceedings. AMRAD incorporated in 1975 and now has approximately 400 members all over the world; experimenters were and are encouraged to join. Some of their accomplishments include research in applying personal computers to telecommunications for the deaf, and spread spectrum experiments.[2]

Interested in seeing Amateur Radio become a strong and recognized experimental service, Paul feels that we amateurs must develop our skills to keep at state-of-the-art technical levels.

With emphasis on experimentation, Paul L. Rinaldo, W4RI, is dedicated to keeping Amateur Radio on the leading edge of technological developments.

QST: Some complain that the "pioneering spirit of experimentation of the early days of Amateur Radio" is gone. Do you agree with this sentiment?

Rinaldo: The complaint is, of course, hogwash. I think that it indicates that the complainant is out of the picture. Sure, if you want to define experimenting or homebrewing as something like building tube transmitters on your kitchen table, there's not much of that done anymore. The real experimenting is going on in the digital world. The computer is making real change. In the old days, it was necessary to build a separate piece of hardware to do something new. Or, the existing equipment had to be modified. With a computer, the hardware can often stay the same, and the changes are made in the software. If anyone is really doubtful, just add up the number of technical articles published each year in *QST, CQ, Orbit, Ham Radio, 73, Microcomputing, Byte, Micro* and so on, that are related to Amateur Radio. Throw in some of the larger club newsletters — it's impressive. Maybe the problem is that the Japanese are building some neat transmitters, transceivers, receivers and the things we traditionally built for ourselves back in the days before ssb. We're not building those things . . . now it's digital keyers, code converters, packet node controller boards, computer interfaces, computer systems and so forth.

QST: Describe some projects AMRAD is working on.

Rinaldo: We are involved in research in applying microcomputers to telecommunications needs of the deaf. We were given a federal grant to develop interfaces for the Apple, TRS-80 and PET computers to make them compatible with the teletypewriter standards used by the deaf. We also set up a message system, called HEX, which is a computer that can be accessed by Teletype line. It is primarily a place where people involved in communications with, or education of, the handicapped can leave information or retrieve it. This is unique in that it can be accessed either by Baudot or ASCII terminals on the same telephone line. The project is now into its second year. This year will see the completion of interfaces for the Atari, TI and S-100 computers, plus increasing the capacity of HEX so that it can handle several telephone lines and a larger number of messages. All of the results are in the public domain.

Our spread spectrum experiments are pretty well described in May 1981 *QST*.[3] Actually, we're responding to a challenge put out by Mike Marcus of the FCC. He made some comments to Ted Cohen and Perry Williams that spread spectrum would be a good area of amateur experimentation, and that an STA (special temporary authority) would probably be granted if applied for. I didn't want to let that one die because it would have reflected poorly on Amateur Radio. Besides, I thought it would be some fun. I don't think anyone knows whether or not spread spectrum is going to be a regular mode for the ham bands. It does have its positive points, however, and I think we ought to check them out. Plans are for K2SZE and I to begin high-frequency tests using commercial equipment.

AMNET is the acronym we're pushing for the amateur (packet radio) computer network. AMRAD people are getting ready to go on the air with packets: First, we will do some 2-meter testing. Among other things, we are testing a terminal node controller board, which handles HDLC (high-level data link control) protocol, for W1AW. We will start hf tests between AMRAD and W1AW as soon as both ends can get all the equipment assembled and working. Also, we plan to test on hf with KA6M and VE7APU about the same time. The next effort will go into convening a U.S./Canadian packet radio networking meeting in October, at the National Bureau of Standards building in Gaithersburg, Maryland.[4]

Each year, AMRAD sponsors a number of awards for high school science fair entries in the Arlington/Fairfax County area. We send several judges to each science fair and pick winners for AMRAD awards for electronics projects. Winners give a "show and tell" at one of our meetings and get magazine subscriptions, e.g., *QST, Byte,* etc., plus honorary AMRAD memberships for a year. The object, of course, is to lure some kids into ham radio.

QST: What communications roles do you see for Amateur Radio in the near and distant future?

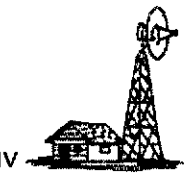
Rinaldo: It's hard to guess where Amateur Radio is going because it is a multi-faceted hobby. Public service is important, also the training aspect of Amateur Radio. My personal concern has been mainly technical. I see that as getting stronger over the years. If people like Mike Marcus, Carlos Roberts and some others stay around the FCC, we're likely to see the technical/experimental goals stressed. As you are aware, AMRAD has been advocating setting up a new digital network; call it what you will — packet radio or amateur computer networking. I'm sure that this is going to happen because of the work already being done by AMRAD, AMSAT, KA6M, VE7APU, the Hamilton (Ontario) group, Ottawa, etc. Right now, it's a technical imperative, meaning that we have the technology and interest, so let's do it! As this thing grows, we'll need some organizational framework and some funding. While technical in nature now, it will change to an operational network integrated with, or tacked onto, the National Traffic System. The new network will have a tremendously greater capacity and speed than the present NTS, with errors considerably reduced. It can become a real public service, particularly in times of emergency.

Notes

[1]See P. L. Rinaldo, "Spread Spectrum and the Radio Amateur," *QST*, November 1980, p. 15.
[2]See "Happenings," *QST*, May 1981, p. 59.
[3]See note 2.
[4]See details in this issue, page 32.

*Editorial Assistant, QST

The World Above 50 MHz



Conducted By
William A. Tynan,* W3KMV

A VHF/UHF Primer — Meteor Scatter

Many have asked for information on meteor-scatter communication, or m.s. as it is frequently called. In particular, inquiries have come asking how this mode can be used on 50 MHz. As a continuing part of the series aimed at the beginning vhfer, I will try to present the basics of m.s. including some thoughts on how the 6-meter enthusiast can use the mode to while away the hours between openings.

Every hour of the day or night, hundreds or even thousands of tiny particles strike the earth's atmosphere from outer space. Most are extremely small, on the order of specks of dust or grains of sand. A few may be the size of a pea. Very seldom a large chunk of space matter, the size of a rock or very infrequently a large boulder, will come crashing in. Fortunately for life on our planet, all but the larger pieces burn up from friction in the atmosphere before reaching the earth's surface. The ones that don't completely disintegrate before hitting the surface are called meteorites. A few of the mammoth ones have left big scars such as the huge crater in New Mexico. Most of the craters, however, which have been made over the eons of the earth's history, have long since been eroded away by the action of wind and water.

But on their travel into the atmosphere, all meteors heat up to incandescent temperatures. In so doing, they cause the thin atmosphere to ionize, and we all know what ionization does to radio waves — it reflects them. Most of the meteor's heating, and hence the ionization, takes place in the vicinity of the E region about 60 miles (100 km) above the earth. The altitude at which the bulk of the ionization takes place establishes two parameters of interest to anyone wishing to reflect radio signals from the ionized trails left by meteors. Note that it is not the meteors themselves that reflect the signals. One parameter is the distance over which communication can be expected, in this case about 1200 to 1400 miles (2000 to 2300 km). The other is the time over which signals are present. Because the major ionization from meteors occurs in the relatively lower reaches of the ionosphere, the molecules of air are more densely packed together than they are at greater altitudes such as in the F region, more than twice the height. Because they are more densely packed, the ionized particles collide more frequently and, in so doing, recombine to form their original nonionized state. Thus, meteor reflections of signals do not usually last very long, maybe only a fraction of a second for most meteors. This is known as a "ping." The term "ping jockey" is applied to those vhfers who spend a good deal of their time working m.s. A few "meteor bursts" last up to several seconds, and a very few persist for 30 seconds to a minute. These super long ones are referred to by ping jockeys as "blue whizzers" but can more scientifically be called "overdense bursts." Most meteor bursts observed at vhf are of the "underdense" variety.

Although meteors enter the earth's atmosphere continuously, their frequency of entry is quite variable. At a particular location, meteors that are close enough and large enough to allow communication may be no more frequent than one or two per hour throughout most of the year. Despite this, many dedicated ping jockeys carry on m.s. skeds even during these "dry" periods. They make contacts, too. Even commercial and government communication links, where quite low data rates are acceptable, employ meteor reflections, in conjunction with a store and forward communication systems, to span distances of about 1000 miles or so. One such application of the mode is transmitting weather data, which doesn't usually change very rapidly, from remote unattended stations. This is one case of a propagation mode pioneered by amateurs being put to use by other services. During particular times of the year, the frequency of meteors encountering our atmosphere is much greater than during other times. These are called "meteor showers." Showers occur when the earth, in its journey around the sun, passes through the debris of a comet that has disintegrated. If the debris is well distributed around the orbit of the comet, the shower tends to produce consistent results in terms of the number of meteors hitting our atmosphere. If, on the other hand, the debris is bunched up in one portion of the orbit, the effect of the shower varies greatly from year to year. It is during showers that most m.s. skeds result in completed contacts. There are 33 meteor showers listed in the *Radio Amateur's VHF Manual*, but some are much more productive than others. Two that are particularly productive and consistent from year to year are the Geminids in mid-December and the Perseids in early August. The names for the showers may sound strange to those not well grounded in astronomy. They are named for the constellations from which the fiery particles appear to emanate.

The best way to begin as a ping jockey is to set up some schedules during one of the major showers. The upcoming Perseids provide an excellent opportunity. From time to time this column carries comments from vhfers who are available for m.s. skeds, usually on 2 meters. You can also scan the standings boxes for stations located in states you need, and drop each vhfer a note requesting a schedule. For a start, try to pick a station within an 800 or 1000 mile (1300 to 1600 km) range. In addition to the mails, the Central States VHF Net, which meets each Sunday evening (0230Z Monday) on 3818 kHz, is also a good place to go shopping for potential contacts as well as some good practical advice from old hands. The most popular band for m.s. is 2 meters, but a number of contacts have also been made on 1-1/4 meters and a few on 70 cm. Like all other forms of propagation involving ionization, the higher the frequency, the greater the ion density needed to reflect signals. Thus many meteor trails occur that do not support communication at the higher frequencies such as 432 and 220 MHz, or even 144 MHz. Also, because the ionization dissipates rather rapidly, bursts that do occur at the higher frequencies usually don't last long.

All things considered, 2 meters is probably the place to start as a ping jockey. There are quite a few good bursts, especially during showers, and the mode can be productive in salting away some states that might be difficult to work otherwise. In the early days of m.s. work on 2 meters, almost all skeds were run with high-speed cw, but in recent years ssb has become increasily popular because of its higher data rate and lack of need for great proficiency with the code. Ssb does, however, require very accurate frequency control. In addition, the Doppler shift, which is often present because of the rapid advancing of the ionized front, can be sufficient to render the signal unintelligible even when the receiver is set precisely to the actual transmitting frequency of the other station. Thus, one must be prepared to make some quick frequency adjustments. For the same reason, it isn't wise to use too sharp a filter for cw meteor work.

Common practice is to set up schedules so that one station transmits for the first 15 seconds of each minute while the other station listens. Then the process is reversed for the next 15-second period. Generally, the more westerly station transmits during the first and third segments of each minute. Despite various efforts to change it, a signal-reporting scheme has evolved that uses S-1 to designate short pings, S-2 to denote longer bursts of a few seconds and S-3 for bursts of 5 to 10 seconds or more. Note that S has nothing to do with signal strength in this system. Contrary to the belief of many, one does not need a kW and a huge antenna to be successful at m.s. In fact, too narrow a beamwidth can lead to poorer results, in terms of the number of bursts encountered, because a smaller volume of the sky will be illuminated. A few hundred watts, however, doesn't hurt; nevertheless, about 100 watts, in conjunction with a reasonable size single Yagi, should put one in business. Even 10-watt stations have, on occasion, made m.s. contacts. But, I would say that attempting it with such power levels is trying to do it the hard way. There are those, however, who take great pleasure in triumphing over such obstacles.

Almost everything said about 2 meters goes for 6-meter m.s. as well, but bursts are much more frequent and longer lived. In addition, especially during the morning hours, a usable residual signal, which is often strong enough to permit some communication on a continuous basis, often exists between bursts. Little m.s. work on 6 meters is done via schedules, but I

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

would urge the neophyte at the game to begin that way, nevertheless. Pick a station about 1000 miles away, possibly one you have worked on Es, and suggest that you try regular skeds, perhaps on Saturday or Sunday mornings. Select a frequency somewhat removed from the bulk of the activity, say between 50.140 and 50.170 MHz. This way you should not cause, or receive, much QRM. Establish a calling and listening sequence along the lines of that outlined for 2 meters. KØCJ and others have made the observation that many more scatter contacts could be made on this band if the procedures used were a little more structured, as on 2 meters, rather than being almost completely random in terms of definite schedules and established operating procedures.

Meteor scatter is one of the most exciting modes of vhf, as well as being very reliable, if one has patience to carry out the sometimes long schedule sequences necessary to complete contacts.

Try it: You might like it! For further reading on the subject refer to: *The Radio Amateur's VHF Manual*; "VHF Meteor Scatter Propagation," by W. Bain, W4LTU, April 1957 *QST*; "The World Above 50 MHz," December 1978 *QST*. An organization known as the International Meteor Research Network has been formed to collect data on meteors. Those wishing information on their aims and objectives may write P.O. Box 863, Palm Bay, FL 32905.

ON THE BANDS

6 Meters — Even as the first blushes of the summer Es began to appear, F2 and TE continued, for some parts of the world at least. XE1TIS writes that, following a dry spell for him, April 23 brought a good TE opening to Argentina. Beginning at 2350Z, Ken worked LUs 3EX, 7DZ, 3MAE, 3DCA, 1DMA and 6DBL as well as CX8BE. On April 25 he again ran into LU3EX, who told him of a JA opening in progress at the time with dozens of Japanese stations being QSOd by a number of LUs. Three evenings later, at about 0100Z, Ken received a 10-meter call from VK3OT saying that his 50-MHz signals were being received. A QSY to 52.005 brought a QSO with Steve plus VK3ZTK and VK3KAG. Following a dropout on 52 MHz, XE1TIS managed 6-to-10 crossbands with VK3BQS, VK7TW, ZL3AFT and H44PT. For QSLs or skeds write to Kenneth M. Price, P.O. Box 337, Irapuato, Gto Mexico. If the band appears to be open in that direction but no XEs are in evidence, he can be alerted by phone at 01-52-462-62316.

Imagine waiting two years to work the U.S. for a new country on 6! That's what YJ8PD did until April 12 when Peter hooked up with W6XJ. Then on the 16th he worked KD6R, WB6NMT, K6DYD and a whole raft of other 6s, including many from northern California, plus W7KMA and WA7LYI in Arizona. On the 18th he added WB7OHF (also Arizona) and W5UWB, South Texas. On two days in mid-April, Peter heard, but was unable to work, the Kingman Reef DXpedition. That group was on and did work a number of South Pacific stations, I am told. However, I have received no details.

One of the lucky 6s to snag YJ8PD was WA6BYA. In addition to Peter on April 15, Bob lists contacts with ZL1BHX on 50 MHz and VKs 4AYX, 2ZBO and 2DDG, on 52 MHz. On the 17th, several LUs were worked with S-9 plus signals, and on the 19th another string of 10 VKs, all above 52 MHz, went into the log. On May 1, W7KMA (Phoenix) excitedly called this conductor on the phone. It seems that Tom had just completed working four VKs, all above 52 MHz, between 0100 and 0144Z.

N6CT's log always makes good reading. The entries for April 19 are especially intriguing. Above 52 MHz, Bruce hooked up with VK9NS and VK9NL (Norfolk Island) along with VK2DDG, VK4ZJB, VK4AYX and VK4HD.

The LUs got as far north as the Kansas City area on the evening of April 30, according to KØTLM. Tom speculates that an Es-to-TE link-up was responsible for the good fortune. He worked LU8AHW on cw and LU9AEH and LU3EX on ssb over a period of about 30 minutes beginning around 2335Z. On May 9, he reports a weak contact with KH6IAA during a period when Es was into the Fresno, California, area.

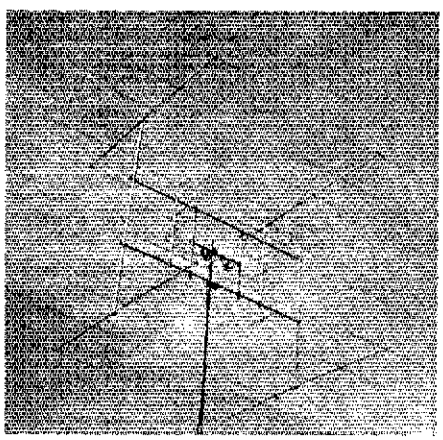
A rather interesting report comes from the Australian journal, *Amateur Radio*. It concerns a reception report from Mar del Plata, Argentina, 250 miles (400 km) south of Buenos Aires, of fm broadcast station 3FOX in Melbourne, Australia. The station is on 101.9 MHz with 10 kW erp from a dual-polarized antenna. The reception reportedly took place at 0829Z September 13, 1980. The mode of propagation is anybody's guess.

This part of the world has had to be content with aurora and some fair Es openings. At least the season has begun. How good it will be should be clearer by the time you read this.

Good luck and DX to all. CU around 50.2!

K6ZMS wants it known that he is in possession of a number of QSLs from LU8EEM. The cards are made out of U.S. stations, mostly 5s but a few 4s, 8s and Øs. If you worked that station and have not received confirmation, drop Ray an s.a.s.e. at 7158 Stone Fence Dr., San Antonio, TX 78227.

2 Meters — The aurora mentioned last month still dominates most of the reports received through mid-May. NOAA cites two X-ray type flares occurring on the sun on April 10, which were concluded to be the cause of the widespread and intense aurora of April 13. The flares were accompanied by satellite observations of a high proton flux. The major magnetic storm, which caused the aurora, began 58 hours after one of these flares, a longer delay than usually seen. It was evidenced by an A Index reading of 121 and a Fredericksburg K Index peaking at 9 between 0300 and 0900Z on the 13th. Many, even in southern latitudes, reported a visual aurora in the form of a red glow, indicating that the excited gas was oxygen. One such report came from K7ICW in Las Vegas, Nevada. Al says that this was the first aurora seen in his area since May 7, 1967. He became so busy eyeballing the red glow in the northeast sky and rousing various vhfers by phone that he didn't get much time to operate. But his son, N7AKB, was busy on 6 meters working stations from Washington to Minnesota. K7ZOK, also of Las Vegas, did hear W4WD/7 in Utah on 2 meters as did several southern California stations. K7ICW, in addition to alerting hams, also took the time to let the local news media in on what was happening. Up to then, fire trucks were being called out to fight "that huge blaze northeast of town"! WØCY of Salina, Kansas, has a similar story. Jim comments that he has seen but two other proton-type auroras, one in 1957 and the other in 1972; but he classifies this one as the "granddaddy of them all." He first observed the red blob in the northeast sky at 0340Z, but nothing was heard on 2 meters until it moved closer to due north at about 0400. He began by contacting KØTLM in Kansas City, and then was off to the races. Between then and 0530 he worked 14 more stations from Indiana to Colorado and south to Texas. The Lone Star State QSOs were K5UGM and WB5LUA of the Dallas area, and KE5C in Temple. Jim notes that this last station represents the farthest south he has ever heard on 2-meter aurora. He found the beam heading to be quite critical, about 10 degrees. He also noted that the elevatable OSCAR antenna he was using came in handy on some signals. Those particularly from more southerly stations could be improved by elevating the antenna. This effect has been reported before, and it appears that an elevatable antenna is particularly beneficial for the more northerly located stations where the aurora appears higher in the sky.



The 6- and 2-meter arrays at K6QXY. Four 7-element KLMs are used on the lower band, and two 20-element collinears for 144 MHz.

N7BHC of Hunter, Utah (near Salt Lake City) made good use of the buzz mode, working W7FN in Washington for state number 13, as well as some repeats of states worked previously. WA1JXN/7 (Montana) was contacted on ssb. Dave notes that K7RJ of Salt Lake City also worked W7FN using only 10 watts and a small home-built Yagi.

Another aurora, also believed to be of the proton-induced type, occurred on Sunday evening, May 10. This conductor found 6 meters quite lively, but few 2-meter reports have been received prior to deadline. W2FPY (northern New Jersey) is one who has provided information on this event. Steve, using his OSCAR set-up, heard many very loud signals but his 15 watts output was able only to attract the attention of a single station, WB8VZK in Ohio. W2FPY promises to be ready with more power next time.

WAØLPK/KL7 writes that he is now at 45 states. Among the five he needs are Wyoming, Kansas and Rhode Island, which are currently not active on 2-meter EME. Jim is due to leave Alaska within the year, and KL7MJ is to take over the gear. I am sure that many will be glad to hear that the state will continue to be active. The EME Contest brought 11 QSOs, including one with W7CI for that station's 49th state.

A letter from WA7EPU announces the 1981 SWOT Contest. As in previous events, this is a one-week-long affair beginning 0000Z July 17. This year's exchange includes counties. You county hunters should find this format to your liking. For full rules and a summary sheet, drop an s.a.s.e. to Dean Figgins, WA7EPU, P.O. Box 1141, Carefree, AZ 85377.

Cw nets are a rarity on 2 meters, but N8BXI wants us to know about one being held Wednesday evenings at 2100 local time on 144.3 MHz. All within range are welcome. The net provides a good chance to improve one's code proficiency, an opportunity all too often missing on vhf.

1-1/4 Meters — The aurora of mid-April was intense enough to give this band a ride, too. Unfortunately, activity was not as high as it might have been — at least that's the opinion of W9IP. Mike was sorry that more stations were not around to take advantage of the unusually fine conditions. On Saturday evening, April 11, WØVB (Minnesota) was worked for a new state. The following evening, WØSD (South Dakota), KØDAS (Iowa), W9MRI (Indiana), W2PGC (western New York) and W3GPY (eastern Pennsylvania) went into the log. Although the latter station was in for over two hours, no other signals were heard. The Sunday-evening fireworks were well timed for KB7WW near Portland, Oregon. Art, whose former call, WA7RTA, might be more familiar to 6-meter operators, had just got his 1-1/4-meter station going that afternoon. He began by working a local, and then went on to contact K7KOT (Tacoma, Washington), K7KV (Seattle) and VE7BLF. All of this was with a converted Microwave Modules rig producing 12 watts output. Art says that he will have an 8877 on by the time you read this. Also working K7KV was Art's neighbor, K7HSY, who was running a mere 4-watts output.

KB7WW turns in a very vivid description of the visual display, which reached directly overhead and lit up the Portland sky with red and green from due east to due west.

K5FF reports on EME Contest activity. Lee made a total of seven contacts during the event, bringing her 1-1/4-meter EME total to 11. As testimony to the increase in EME activity on this band, she notes that the 1979 results published in *QST* showed no 220-MHz contacts. In 1980, three QSOs were listed. Lee's rundown of the nine stations on over the two weekends shows a total of 17 QSOs. Included in the highlights were the first 1-1/4-meter EME QSOs for WØVB. Terry was running just 300 watts output. In addition, the first ssb EME QSO on the band took place. KAØY and WB6NMT can take credit for that accomplishment.

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.]

British Columbia: The Okanagan International Hamfest sponsored by the Penticton ARC will be held July 25-26 at Centennial Park, Oliver. Note the change in location. Family members can bring their hobbies for display or sale. Flea market, entertainment, bunny hunts, potluck luncheon Sunday noon. Registration on Saturday at 9 A.M., activities begin on Saturday at 1 P.M. and Sunday at 2:30 P.M. First come, first served; no reservations at Centennial Park. Talk-in on 34/94 OKN repeater and 76/76. Further information from John Juul-Andersen, VE7DTX, 8802 Lakeview Dr., Vernon, BC V1B 1W3 or Lota Harvey, VE7DKL, 584 Heather Rd., Penticton, BC V2A 1W8.

Illinois: The 24th annual Breakfast Club Hamfest and Picnic will be held Saturday and Sunday, July 18-19, at Terry Park, Palmyra. A flea market, games, food, music and prizes. Camping on the grounds for self-contained units. Activities start at noon on Saturday. On-grounds religious services Sunday. Talk-in on 52 and 3973 kHz. Information available from Quad-Co Radio Club members WA9ARY, K9CIL, K9UCC or W9KIC.

Illinois: The Big Thunder ARC annual hamfest will be on August 2 at the Boone County Fairgrounds, Hwy. 76. Camping permitted, $3 fee. Indoor facilities and tables available at a nominal fee. Talk-in on 52 and 147.375 repeater. Contact Bob Anderson, K9DCG, 910 W. Locust St., Belvidere, IL 61008 with s.a.s.e. and check for advance tickets at $2, tel. 815-544-3215. Acres of outdoor parking available.

†**Illinois:** Hamfesters Radio Club, Inc. will sponsor their 47th annual hamfest on August 9, from 6 A.M. to 4 P.M., at Santa Fe Park, 91st and Wolf Rd., Willow Springs. Advance admission is $2; $3 at the door. Manufacturer's displays, swappers, early-bird coffee, clowns and prizes. Talk-in on 52. For further information and reservations, contact Dennis Borkowski, N9BIA, 10624 S. Terry Dr., Palos Hills, IL 60465, tel. 598-5838.

Indiana: The Madison County ARC is sponsoring the annual MCARC Hamfest on Sunday, July 26, at the National Guard Armory on the 109 By-pass in Anderson. Doors open at 8 A.M.; vendor set-up will start at 7 A.M. Advance tickets $2.50, $3.50 at the door. Vendor space without table $1.75; with table $2.50. Many prizes. Talk-in on 146.22/82 and 52. For advance tickets and spaces, contact Everett G. Riley, RR 4, Box 354, Alexandria, IN 46001.

Indiana: The Steuben County Radio Amateurs present the 23rd annual FM Picnic and Hamfest at Crooked Lake, Angola, on Sunday, Aug. 2. There will be prizes, picnic-style BBQ chicken, inside tables for vendors and exhibitors, overnight camping (fee charged by county park). Talk-in on 52 and 147.81/21. Admission is $2.50.

Kansas: The Northwest Kansas 1st Amateur Radio Swapmeet, sponsored by the Trojan ARC, will be Sunday, Aug. 2, at the Community Bldg., Colby, starting at 9 A.M. Auction at 2 P.M. Admission $1; tables, $1 each (same for dealers). No speeches, meetings, just old-fashioned, informal swapping, selling and visiting. Activities for nonhams. TVRO demonstration. Lunch available. Talk-in on 146.22/82 and 52. Contact WAØGBN or KAØFBQ for more information.

†**Kansas:** The Kansas-Nebraska Radio Club will host its 30th annual hamfest August 8-9 at the air-conditioned Cloud County Community Junior College in Concordia. Programs of interest to amateurs and nonhams. Highlights will be the awards banquet at the Senior Citizens' Center Saturday, and a western-style barbecue at a moderate price. For further information contact Don Nulton, Rte. 3, Concordia, KS 66901, tel. 913-243-2384.

†**Kentucky:** The Central Kentucky Hamfest sponsored by the Bluegrass Amateur Radio Society will be held on Sunday, Aug. 9, at Tates Creek Junior High School, Lexington, from 8 A.M. to 4 P.M. Advance admission $3.50, $4 at the door. Prizes, technical forums, EME-OSCAR, ARRL, radio-controlled airplanes, weather-spotters training, traffic-net session, nonhams' program. Flea market outdoors, no charge; vendors indoors, $10/table; food service. Talk-in on 146.76. Reservations and information from Irwin G. "Ernie" Cohen, K4DHN, 3379 Sutherland Dr., Lexington, KY 40502, tel. 606-272-1459.

Maryland: The Baltimore Radio Amateur Television Society (BRATS) announces its annual Maryland Hamfest to be held on Sunday, July 26, at the Howard County Fairgrounds, Rte. 144 at Rte. 32, adjacent to I-70, about 15 miles west of Baltimore. Tickets are $3, nonhams free, tailgaters $2, tables $5 each. For information, write BRATS, Box 5915 Baltimore, MD 21208, or call Mayer, W3GXK, tel. 301-655-7812.

Michigan: The Straits Area Radio Club will hold its Swap and Shop at the High School gymnasium, 327 E. Bluff Dr., Harbor Springs, Saturday July 18, from 9 A.M. to 4 P.M. For info contact Bernie Slotnick, KB8RE, 630 Ann St., Harbor Springs, MI 49740.

Michigan: The Amateur Radio Public Service Association will hold a swap and shop on July 26 at the St. Joseph County Fairgrounds, M-86, Centerville. Admission at the door will be $2, tables $3. Gates open at 7 A.M. Talk-in on 52.

Michigan: The 33rd annual Upper Peninsula Hamfest sponsored by the Delta County Repeater Association will be held on August 1-2 from 9 A.M. to 5 P.M. at Flatrock Township Hall. Admission $2. U.P. Net and U.P. Repeater meetings, ARPSC workshop, ARRL forum, swap & shop, nonhams' activities, lunches served both days. Talk-in on 147.15/75 repeater. Annual banquet Saturday evening. For further information contact Aileen Gagnon, WA8DHB, Kipling Location, MTD Route, Gladstone, MI 49837, tel. 906-428-9789.

Minnesota: The Detroit Lakes Amateur Radio Club will hold its 5th annual picnic at Long Lake Park located 2 miles west on Hwy. 10, on Sunday, July 19. Road will be marked. Registration $1. Flea market items welcomed with no charge. Free coffee. Talk-in on 22/82.

Mississippi: The Delta ARA will hold the Mid-Delta Hamfest Aug. 8-9 at the Greenville Mall Civic Center. Hours Saturday 12 to 4 P.M. Sunday 8 A.M. to 2 P.M. Admission is free. Activities include ARRL forum, MSBN and MARS meetings. Talk-in on 22/82. For more info contact Max McWhorter, WB5FDI, 1042 Dyer Cir., Greenville, MS 38701, tel. 601-334-9775.

†**Missouri:** The Zero-Beaters 20th annual hamfest sponsored by the Zero-Beaters ARC will be held at the Washington Fairgrounds on July 19 starting at 9 A.M. Admission $2. Missouri Army MARS meeting, refreshments and meals available. Talk-in on 52. Further information from the Zero-Beaters ARC, Box 24, Dutzow, MO 63342, tel. 314-239-7053.

Missouri: The North Central Missouri Hamfest sponsored by the NEMO ARC, Macon ARC and Tri-County ARC will be held on Sunday, August 2, at the Municipal Auditorium, Moberly. Doors open at 9 A.M. Advance registration $1.50, $2 at the door. Special tickets 8 for $10. No admission charge to hamfest. Seminar by Bob Heil, K9EID, "CB to Ten-Meter Conversion." A rig will be converted at the seminar. ARRL booth, commercial displays, flea market, nonhams' activities, all in air-conditioned facilities. Motels and nearby campgrounds in Rothwell Park. Talk-in on 147.69/09, 52 and 3963 MHz. For further information contact Charles Coy, WBØENV, 601 McKinley, Moberly, MO 65270.

Montana: The Great Falls Area ARC will sponsor the Glacier/Waterton International Hamfest at Essex on July 17-19. Doors open 9 A.M. to 8 P.M. on the 18th, and 7 A.M. to noon on the 19th. Advance registration $7, $6 at the door. QCWA, DX, EME, ARRL, nonhams' activities, fox hunts, prizes. *Campground* — this is a true outdoor experience; bring your tent! For information and reservations write to P. O. Box 7052, Great Falls, MT 59403.

†**Montana:** The 49th WIMU, sponsored by the Gallatin Ham Radio Club at West Yellowstone, is scheduled for July 31 to Aug. 2 from noon Friday through noon Sunday. Advance admission $8, at the door $10. Swap tables, dealers/distributors displays, QCWA meeting, 2-meter hunt, arts and crafts, free hay rides and fly-fishing lessons. Side trips into Yellowstone Park. Seminars and prizes. Saturday-night banquet with guest speaker, Sunday-morning breakfast. Talk-in on 146.28/88, 146.50, 3910 kHz. For further information and reservations contact Les Belyea, N7AIK, Box 327, Belgrade, MT 59714, tel. 406-388-4253.

Nebraska: See Kansas, Aug. 8-9.

New Hampshire: A flea market will be held Saturday, July 18, at the Manchester airport. Starting time is 9 A.M. General admission is 50¢, $2 for seller. Bring your own table or tailgate. Refreshments available. Talk-in on 52 or 124.9 MHz (for aircraft). For information contact K1WPM, tel. 603-622-0831 or W1KGZ, tel. 603-668-8880.

†**New Jersey:** The Third Annual West Jersey Radio Amateurs Hamfest will be held Sunday, July 19, at McGuire Air Force Base, Wrightstown from 9 A.M. to 4 P.M. Admission is $2.50, table and outdoor tailgating spaces $2.50 each. Bring your own tables. Refreshments available. Talk-in on 52, 147.75/15 and 144.87/145.47. Contact Bill Luebkemann, WB2LCC, 116 Country Farms Rd., Marlton, NJ 08053 (s.a.s.e. appreciated), tel. 609-983-8844 daily 6 P.M. to midnight.

†**New York:** The Batavia Hamfest sponsored by the Genesee Radio Amateurs, Inc. will be held at the Alexander Firemen's Grounds, Rte. 98, Alexander, on Sunday, July 12, from 7 A.M. to 6 P.M. Advance registration $2, $3 at the door. Children under 12 free. Prizes, programs, nonhams' activities, contests, flea market, large exhibit area, boat-anchor auction at 4:30 P.M. Free parking, coffee and donuts at 7 A.M. Overnight campers welcome, BBQ chicken and other refreshments. Bring QSL cards to enter in QSL contest. Flea-market space $1; vendor space $15 for 8-ft table. Advance tickets must be ordered by July 1. Talk-in on 146.04/64, 144.71/31 and 52. For further information write to GRAM, Inc., Box 572, Batavia, NY 14020.

North Carolina: The Cary ARC ninth annual midsummer swapfest will be Saturday, July 18, from 9 A.M. to 3 P.M. at the Lion's Club Shelter in Cary (near Cary High School). Buying, selling, bartering; lunch; open auction, prizes. Never an admission or commission. Talk-in on 28/88, 75/15 or 52. Further info from Cary ARC, P.O. Box 53, Cary, NC 27511.

North Dakota: The 18th annual Peace Garden Hamfest will be held July 11-12 on the American side of the International Peace Gardens, 12 miles north of Dunseith. Registration at the Lodge from noon to 6 P.M. on Saturday and from noon to 3 P.M. on Sunday. Swap tables, fox hunts and other activities. For more information write Ramsey County Amateur Club, Box 5, Devils Lake, ND 58301.

†**Ohio:** The seventh annual Hall of Fame Hamfest sponsored by the Tusco ARC and Canton ARC, will be held at the Nimishillen Grange, 6461 Easton St., Louisville, on July 19. Flea market opens at 6 A.M. Advance tickets $2.50, at the door $3. Flea market, ARRL forum, Novice and Technician cw contest, computer forum. Tables reserved at $3.50 each. Check must accompany reservations. Flea-market parking $1 per vehicle. Talk-in on 52 and 146.19/79. Tickets, reservations and information from Butch Lebold, WA8SHP, 10877 Hazelview Ave. NE, Alliance, OH 44601.

†**Ohio:** The 17th annual Wood County Ham-A-Rama is July 19 at the Bowling Green Fairgrounds, Bowling Green. Gates open at 10 A.M. with free admission and parking. Food, prizes. Trunk-sale space. Dealers' tables $3, payable in advance by check to Bill Wilkins, 16220 Portage Rd., Bowling Green, OH 43402. Saturday set-up available. Tickets $1.50 in advance, $2 at the door. Write to Wood County ARC, Eric Willman, 14118 Bishop Rd., Bowling Green, OH 43402. K8TIH talk-in on 52.

†**Ohio:** Noarsfest '81, sponsored by the Northern Ohio ARS, will be held at the Lorain County Fairgrounds, Welling on Saturday, July 25, from 8 A.M. to 5 P.M. Advance admission $2.50, $3 at door, under 12 free. Indoor exhibits, large outdoor flea market, prizes, food, free parking and camping. Indoor tables $5, flea-market space $1. Talk-in on 146.10/70 and 52. For tickets: NOARSFEST, P. O. Box 354, Lorain, OH 44052. For dealers: George Morningstar, W8ANM, 198 Glenview Dr., Avon Lake, OH 44012.

Ontario: The Burlington ARC will hold its seventh annual Ontario Hamfest July 11-13 at the Milton Fairgrounds, located south of the intersection of Hwys. 401 and 25 (exit 39) in Burlington. General admission $3. Pre-registration before June 15 is $2. Gates open Friday, July 11, at noon and Saturday, July 12, at 7 A.M. Flea market opens at 8 A.M. Tables free. Camping, food and prizes. Talk-in on 147.81/21. For more information write BARC, Box 836, Burlington, ON L7R 3Y7.

†**Pennsylvania:** The Nittany ARC "Mount Nittany Hamfestival" will be held Saturday, July 11, from 8 A.M. to 5 P.M. at the HRB Singer Inc. picnic grounds, Science Park Rd., State College. General admission $3, advance $2, flea-market space $5, space

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

$3. Flea market, auction, contest, prizes, food. Bring the whole family — enjoy the Central Pennsylvania Festival of the Arts held in State College at the same time. Talk-in on 16/76 and 25/85. Further information from Dave Buckwalter, NARC, P. O. Box 614, State College, PA 16801.

†Pennsylvania: The Two Rivers ARC Hamfest will be held at the McKeesport Campus of Penn State University on July 12 from 9 A.M. to 5 P.M. Forums, prizes, food, outdoor flea market, indoor set-ups $3 per table. Talk-in on 146.22/82. Tel. 412-373-2536 for more information.

Pennsylvania: The Broadcasters' ARC will conduct their fourth annual hamfest on July 12 from 9 A.M. to 8 P.M. at Pocono Downs Race Track, Rte. 315, north of Wilkes-Barre. Unlimited outdoor and indoor space, refreshments, prizes, free fm clinic and ac power available. Admission $3, nonhams free, no additional charge for sellers. Gates open at 8 A.M. for set-up. Talk-in on 147.66/06 and 52. Contact: Charles Baltimore, WA3NUT, BARC, 62 S. Franklin St., Wilkes-Barre, PA 18773, tel. 717-823-3101.

†Pennsylvania: The 44th annual South Hills Brass Pounders and Modulators hamfest will be held on August 2 from 10 A.M. to 4 P.M. at South Campus, Community College of Allegheny Co., Pittsburgh. Admission $2 or 3/$5. Computers, OSCAR and ATV demo, MARS forum, DX forum, flea market. Talk-in on 146.13/73 and 52. Further information from Andrew L. Pato, WA3PBD, 1433 Schauffler Dr., W. Homestead, PA 15120.

Pennsylvania: The Mid-Atlantic ARC of Philadelphia announces its annual J.B.M. Hamfest on Sunday, Aug. 9, at the Budco 309 Drive-in Theater, Montgomery, from 9 A.M. to 4 P.M., rain or shine. Doors open at 8 A.M. for tailgaters. Prizes, refreshments, exhibits, flea market and new this year, an alternate energy fair, featuring solar heating and energy-saving projects. Admission $2.50; $1 additional for one tailgating space and 75¢ for each additional space. Talk-in on 147.66/06 or 52. For further information call Don Schuenemann, WB3AYT, tel. 215-822-9076.

South Carolina: The Charleston ARS is sponsoring the eighth annual Charleston Hamfest July 18-19 at the Omar Shrine Temple, 44 E. Battery St., Charleston. Completely air-conditioned. Refreshments available. For more information contact: Charleston Hamfest Committee, P.O. Box 30643, Charleston, SC 19407, tel. 803-747-2324 or 496-3660.

†Tennessee: The third annual Oak Ridge Hamfest will be held July 18-19 in Oak Ridge. Technical Forums, flea market, dealers, prizes, QSO room and programs for nonhams. Hours are 9 A.M. to 5 P.M. Saturday and 9 A.M. to 3 P.M. Sunday. Talk-in on 146.28/88 and 52 with backup on 147.72/12. For further details contact ORARC Hamfest Committee, P. O. Box 291, Oak Ridge, TN 37830.

Tennessee: The Radio Amateur Transmitting Society (RATS) will hold the Nashville Hamfest on Sunday, July 26, at the National Guard Armory, Sidco Dr., Nashville. Doors open at 8 A.M. Admission $2, tables $5 each. Refreshments available. Talk-in on 90/30. For more info contact RATS, P.O. Box 2892, Nashville, TN 37219.

Texas: The 16th Annual Northwest Texas Emergency NET Picnic and Swapfest will be held on Sunday, Aug. 2, at 8 A.M. in the city park in Levelland. Cosponsored by the Hockley County ARC and the Northwest Texas Emergency Net. Talk-in on 28/88, the Levelland repeater, WR5AFX. This event is for the entire family. Bring your own picnic basket. Swapping all day, tables provided. A $3 registration is requested.

Vermont: The Burlington ARC will hold its annual International Hamfest Aug. 8-9 at the Old Lantern Campground, 14 miles south of Burlington, just off Rte. 7. Admission $4, U.S. funds. Flea market, commercial exhibits, cw contest, tower-raising contest, HT transmitter hunt and the traditional Canadian-American tug of war. Talk-in on 34/94. For more information contact Hap Preston, W1VSA, P.O. Box 312, Burlington, VT 05402. For campground reservations call 802-425-2120 (Old Lantern Campground, Charlotte).

†Virginia: The Shenandoah Valley ARC hamfest will be on Sunday, Aug. 2, starting at 7 A.M., at the Berryville Fairgrounds, Berryville. Admission $3, tailgating $5. Bingo, craft exhibitions. Hamfest banquet at Carpers Valley Country Club on Saturday, Aug. 1, $8.50. For further information contact Jo-Ann Aaron, WB2CMV/4, Mt. Falls Rte. Box 119AZ, Winchester, VA 22601 or SVARC, Box 139, Winchester, VA 22601.

†Washington: The Radio Club of Tacoma will sponsor Hamfair-81 Aug. 15-16 from 8 A.M. to 10 P.M. Saturday, and 7 A.M. to 3 P.M. Sunday, at Pacific Lutheran University, 122nd and Park Ave., Tacoma. Admission $4.50, dinner $7. Technical seminars, organizational meetings, flea market, commercial displays, nonhams' activities, 2-meter clinic, prizes, contests, ARRL, YLRL, cw contest and proficiency run. Talk-in on 147.88/28. For info and tickets contact Eva Anderson, WB7QNS, 517 Berkeley Ave. West, Tacoma, WA 98466, tel. 206-564-8347.

Wisconsin: The South Milwaukee ARC, Inc. will hold its annual swapfest from 7:30 to 5 on Saturday, July 11, at the American Legion Post #434, 9327 S. Shepard Ave., Oak Creek. Picnic area, refreshments, overnight camping available, prizes. Admission $2. Talk-in on 146.94. Flyer with map available by writing the South Milwaukee ARC, P. O. Box 102, South Milwaukee, WI 53172.

Coming Conventions

July 4-5
West Virginia State, Weston (Jackson's Mill)

July 24-26
West Gulf Division, Oklahoma City

August 1-2
N. Florida Section, Jacksonville

September 18-20
Dakota Division, Rochester, Minnesota

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

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

NORTH FLORIDA SECTION CONVENTION

August 1-2, 1981, Jacksonville

The Greater Jacksonville Hamfest Association is pleased to announce the ninth annual Jacksonville Hamfest and ARRL North Florida Section Convention, August 1-2 at the Orange Park Kennel Club, located at the intersection of I-295 and U.S. 17 just south of Jacksonville. This facility offers plenty of free parking and over 30,000 square feet of exhibitor and swap table displays. All events will be held indoors, and many prizes will be awarded.

A full slate of programs is on tap along with meetings of several statewide and regional organizations. Two-meter talk-in by club station W4IZ will be on 146.16/.76 and 146.07/.67 repeaters.

Advance registrations are available from Robert J. Cutting, W2KGI, 1249 Cape Charles Ave., Atlantic Beach, FL 32233, and are priced at $3.50. Registration at the door is $4. Swap tables are available from Andy Burton, Jr., WA4TUB, 5101 Younis Rd., Jacksonville, FL 32218, at $12 per table for both days. No one-day tables. Registrations may be ordered with the tables through WA4TUB.

Headquarters hotel will be the Best Western First National Inn just across from the hamfest site on U.S. 17. Special hamfest rates are available; write either WA4TUB or W2KGI.

The hamfest is sponsored by the five Amateur Radio clubs of the Florida crown area, and you are cordially invited to attend.

WEST GULF DIVISION CONVENTION

July 24-26, 1981, Oklahoma City, Oklahoma

The West Gulf Division ARRL Convention and famed "Ham Holiday," sponsored by the Central Oklahoma Radio Amateurs (CORA), will be held July 24-26 at the Myriad Convention Center in downtown Oklahoma City. Its program will include an ARRL forum; technical talks on windpower generation, microwaves and satellites, and other timely topics; plus a QCWA breakfast and Wouff Hong initiation. A full nonham's program will feature a hobby lobby, microwave cooking and a fashion show.

Harry Dannals, W2HD, President of the ARRL, will speak at a Saturday evening banquet. Surprises will be awarded at noon Sunday. A pre-registration fee of $6 must be received before July 17. After that it will be $7. Mail registration to CORA, P. O. Box 20118, Oklahoma City, OK, 73120.

An immense, ground-level, indoor exhibitor and swapfest area is available. Tables are free to noncommercial registrants. A large, flexible suite of meeting rooms is reserved on the second floor. Access to the Sheraton Century Hotel across the street and an interesting under-the-street shopping area is provided from the spacious basement parking area of the Myriad.

The Myriad is located amid downtown Oklahoma City, but it is only a few minutes away from a variety of motels along I-35 and I-40. Oklahoma City invites all amateurs to attend our biggest hamfest ever.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Amateur Microwave Spectrum Allocations

This month I thought it might be useful to list the amateur microwave bands, the new satellite sub-bands approved by WARC and the new WARC bands that will probably be opened up in late 1982 (though no announcement concerning these bands has been made by the FCC at this writing). From time to time you may also come across letter designations of regions of the microwave spectrum, e.g., X band. A list of the frequency ranges referred to by these letters is also given below.

Existing Amateur Bands

1215*-1300 MHz Secondary
2300-2450 MHz Secondary
3300-3500 MHz Secondary
5650-5925 MHz Secondary
10-10.5 GHz Secondary

*Presently 1215 MHz but 1240 after WARC
24-24.05 GHz Primary
24.05-24.25 GHz Secondary

New WARC Bands

47-47.2 GHz Primary and Satellite Primary
75.5-76 GHz Primary and Satellite Primary
76-81 GHz Secondary and Satellite Secondary
119.98-120.02 GHz Secondary
142-144 GHz Primary and Satellite Primary
144-149 GHz Secondary and Satellite Secondary
241-248 GHz Secondary and Satellite Secondary
248-250 GHz Primary and Satellite Primary

New WARC Satellite Sub-bands

1260-1270 MHz Uplink Secondary
2400-2450 MHz Secondary
3400-3410 MHz Secondary
5650-5670 MHz Uplink Secondary
5830-5850 MHz Downlink Secondary
10.45-10.5 GHz Secondary
24-24.05 GHz Primary

The designations "Primary" and "Secondary" refer to the category of service allocated to the amateur band. For an explanation of these terms see February 1980 *QST*, page 62. "Uplink" refers to operation permitted only in the earth-to-space direction, "Downlink" to the space-to-earth direction. The letter designations, which are often used in connection with surplus microwave gear, are as follows: L band, 1.0-2.0 GHz; S band, 2.0-4.0 GHz; C band, 4.0-8.0 GHz; X band, 8.0-12.5 GHz; K_u band, 12.5-18.0 GHz; K band, 18.0-26.5 GHz; K_a band, 26.5-40 GHz.

Readers may be interested to learn that an amateur satellite under construction at the University of Surrey in England, designated UoSAT, is scheduled for launch in late 1981 and will carry beacon transmitters capable of operation on 2.4 and 10.47 GHz. I hope to have further information about these beacons in the near future.

EME NEWS

At 1700Z on April 7, Jan Otten, PAØSSB, worked Steve Mieth, W6YFK, on 2304-MHz EME. Though this is not the first EME contact on this band, it is the first Europe to North America contact.

Since their last test, Jan had made some improvements to his system and is now getting about 12 dB of sun noise using an NEC64535 preamp. On transmit, Jan used an amplifier borrowed from PAØDBQ, which produced about 100-W output from a 7211. This amplifier was mounted at the feed of his 20-ft dish. Steve was using a klystron amplifier giving about 700 W out, and an 18-ft dish. The signals from W6YFK received at PAØSSB were Q5 and quite readable, even on ssb. Signals the other way were considerably weaker but still "M" copy (readable with some difficulty) on cw, and so the contact was made.

MICROWAVE STANDINGS

From time to time Bill Tynan publishes standings lists in "The World Above 50 MHz" for the 50- to 1296-MHz bands. I would like to do the same for the remaining microwave bands — 2.3, 3.4, 5.6, 10 and 24 GHz. If you have made contacts on any of these bands and would like to submit an entry to the standings listing, please write giving the number of stations worked, number of states and U.S. call areas worked, and best DX. It would also be interesting to know when the contacts were made, on what mode (whether wideband or narrowband if fm) and your current state of activity on these bands. On some of these bands I suspect that working one station will get you on the list!

TRANSPACIFIC ON 1296 MHz?

Chip Angle, N6CA, reports that the KH6HME beacon/station should be operational on 1296 MHz by the end of April. The station has 30-W output (from an amplifier built by WA6MEM) to a 25-dBi antenna, has a receive noise figure of 1.4-dB (rest of station built by N6CA) and operates on 1296.001 MHz. Perhaps before too long we will see a California-to-Hawaii contact on 1296 MHz. Good luck to all involved.

The equipment used for this contact was narrowband, i.e. crystal controlled using receiver bandwidths of less than 2 kHz. It seems unlikely that low-power wideband equipment, e.g. Gunnplexers, could take advantage of rain scatter, though it might be usable over very short, but obstructed, paths.

CANADIAN ACTIVITY ON 10 GHz

Don Jarvis, VE2DWG, recently sent me an interesting letter and a tape of some recent 10-GHz contacts made by him and the West Island Amateur Radio Club microwave group operating from the Montreal area. Using MA Gunnplexers they have experimented with color video transmissions and have even made some recent mobile-to-mobile contacts using wideband fm over distances up to 1 mile over level ground (the stations involved were VE2FMF, VE2FRJ and VE2DWG). The best DX they have achieved so far is 25 miles, and they hope to better that this summer.

10-GHz RAIN SCATTER PROPAGATION

The following item is from the RSGB *Microwave Newsletter* of March 1981.

Rain Scatter on 10 GHz — During a recent QSO between G8ADP and G3YGF, there was a heavy rainstorm at G8ADP. While it was actually raining, signals were very rough and about 10-20 dB above the normal troposcatter level. The interesting thing was that the signals were the same strength whichever direction G8ADP beamed and also when his reflector plate was set vertically, so that his dish was just pointing straight up into the rainclouds. The beam heading at G3YGF was its normal narrow value, though signals could be heard at elevations of 5-8 degrees. The rain cell was presumably scattering signals in all directions from heights of up to several thousand feet. The path from this cloud to G3YGF would then have been line of sight. This would enable stations to operate from very poor home locations by pointing a relatively low-gain aeriel at very local rainclouds. Whilst heavy rain does attenuate signals over line-of-sight paths, do not overlook the enhancements it can provide over obstructed paths.

WAVEGUIDE

I have recently received a number of questions about waveguide suitable for 10 GHz. The following information may be of use. The waveguide used most often at 10 GHz is referred to as WR 90 (EIA designation). It is 1 × 1/2-in. OD and 0.9 × 0.4-in. ID, and is available in a number of different materials — brass, aluminum, copper and silver-plated brass being the most common. Attenuation ranges from 7 to 4 dB/100 ft, the lower figures being for the higher conductivity materials. Brass waveguide is commonly referred to as RG-52/U and aluminum waveguide as RG-67/U. Waveguide flanges come in two major types, plain and choked. Plain flanges have smooth flat faces whereas choked flanges have small grooves in them. When the choked type flange is used to couple two pieces of waveguide, a $\lambda/2$ choke is produced with the metal-to-metal join at the $\lambda/4$ point. For low attenuation plain flanges must be smooth, clean and parallel, whereas choked flanges are somewhat less critical. Flange designations are UG-39/U for plain brass, UG-135/U for plain aluminum, UG-40/U for choked brass and UG-136/U for choked aluminum. Waveguide for 10 GHz can often be found at flea markets. New waveguide can be obtained from Lectronic Research Labs Inc., Atlantic and Ferry Avenue, Camden, NJ 08104. Prices depend on type and material of construction, but are typically $3 to $4 for flanges and $3 to $4 per foot for linear waveguide. Lectronic Research Labs has a minimum order of $25.

*c/o ARRL, 225 Main St., Newington, CT 06111.

Results, Eighth Annual ARRL 10-Meter Contest

10 Meters — A Band for All Seasons, for All Different Reasons!

By Mark Wilson,* AA2Z

Perhaps the best thing about the 10-Meter Contest is that there truly is something for everyone. A ham tuning around 10 meters the weekend of December 13-14, 1980, would have found a band full of signals extending from the bottom of the cw segment right up to 29 MHz. The listener would have heard some big guns, their adrenalin flowing, running stations at a rate of 200 per hour — along with some not-so-big guns experiencing the sheer excitement of breaking 100 QSOs per hour for the first time. The listener might have also been surprised by the hordes of casual-operators-turned-contesters making their first hesitant contest QSOs and enjoying them. In the 28.100- to 28.200-MHz band segment, many Novices and Technicians were having the time of their lives passing out thousands of 4-point contacts to the hungry masses. No worldwide contest is complete without rare DX, and this contest was no exception. VK4NIC/3X, 9X5AB, A51PN and others helped satiate the demand for their countries and provided some great multipliers at the same time. And then there was the Caribbean DXpeditioner begging for contacts in what, at times, seemed to be an east-west contest. In the evening hours, scatter contacts provided a big bonus for those operators savvy enough to work it. Truly, there was a little bit of everything.

Despite all these good omens, the total number of logs received and the average scores were down slightly from last year's seventh running of the 10-Meter Contest. They weren't down much, mind you, but they serve as a reminder that 10 meters is subject to the whims of the solar cycle and that you'd better "play 10 meters while the playing is good." This year we received a total of 1540 logs (1052 W/VE and 488 DX), compared with a record 1565 for the 1979 contest. With the revised rules, the highest single-op scores are spread out among the three categories. Even so, the overall W/VE Top Ten averaged 640,286 — only about 35,000 points lower than last year.

Speaking of the revised rules creating four entry categories (Mixed Mode, CW Only, Phone Only and Multioperator), many operators seemed to enjoy the opportunity to compete on their favorite mode. Phone Only was the most popular, with 40.9 percent of all entrants opting for that category. This isn't really too surprising considering that N7DD amassed the highest W/VE (and world) phone score and even outdistanced the KH6XX top Mixed-Mode score and the KØRF top multiop score by about 100K. Larry's 3076 Qs were down a bit from his winning effort last year, but it was a fine score nevertheless.

What was surprising was that CW Only proved to be the second most popular category, garnering 27.4 percent of all entries. Although cw was very popular among foreign entrants (31.6 percent), it was also popular with the W/VE types. (25.1 percent). K5RC led the pack on cw with 1402 QSOs and 121 multipliers, a score that wasn't too far out of the Mixed-Mode Top Ten. The cw crowd was treated to a few juicy multipliers like OH1MA/CT3 and ZD8TC, available exclusively on code.

Last but not least of the single-op categories was the old standby, Mixed Mode. Only 20.2 percent of the participants chose to try their luck with both key and mike. Those who did managed to get the best of both worlds — the high rates indigenous to phone, the 4-point Novice/Tech QSOs and rare multipliers available on cw. KH6XX, with K7TI at the controls, led the W/VE entrants here and came in second only to KG6DX for the world-high Mixed score.

The remaining 11.5 percent of the logs were from multioperator stations. The crew at KØRF overpowered the competition (again), taking the lead by a healthy margin and proving for the umpteenth time that contests can be won from locations other than the east or west coasts. K3LR was the multiplier king this year, ferreting out 153 of the elusive creatures.

A look at the "Top Five — DX" box shows that there was no "ideal" spot to be this year, with calls from all continents appearing in the listings. KG6DX took top honors in Mixed Mode, while G3FXB managed to walk away with the CW Only title from the other side of the world. The top Phone Only and Multiop efforts both came from the Caribbean. PJ2FR managed to get enough W/VE and DX stations to turn their beams south to clinch the top slot on phone. The HH2MC multiop effort came within striking distance of 1 megapoint, just missing by about 90 QSOs. Their 975,546 score is the highest ever submitted in a 10-Meter Contest, and the record may not be broken 'til the next sunspot peak.

There has been much discussion on the subject of antenna hardware, and the lack thereof, needed to do well in the 10-Meter Contest. In these years of high solar activity, high antennas aren't the key to winning. In fact, *several big* scorers complained that their antennas were *too high*, and that they were run off "their"

Top Five — DX

Mixed Mode		Cw	
Call	*Score*	*Call*	*Score*
KG6DX	900,900	G3FXB	270,480
G5CMX	527,478	YU7BCD	257,656
OK1DWA	385,140	OH1MA/CT3	236,720
SM5GMG	379,512	JF1VVR	153,710
YU4GD	326,442	PAØVDV	147,696
Phone		**Multiop**	
Call	*Score*	*Call*	*Score*
PJ2FR	762,880	HH2MC	975,546
AH2E	741,600	HK3TF	798,620
KB7IJ/KH2	699,870	GW4BLE	657,176
HP1XRK	648,774	G3FJE	492,960
DJ3HJ	499,380	YU4FRS	471,492

JAØCUV/1 is a famous DXer turned contester. Tack turned in the number 4 cw score from Asia.

*Assistant Communications Manager, ARRL

Top Ten — W/VE

Mixed Mode

Call	Score
KH6XX	785,520
WØYK	657,882
KM5R	612,434
N8II	477,630
WN4KKN	454,950
KBØRC	449,274
KØSCM	377,704
WA1ZDW	366,618
W8WPC	365,568
N4BP	362,096

Cw

Call	Score
K5RC	348,722
N4AR	332,250
K7NHV	306,240
VE3BMV	305,592
N7CW	299,224
N6TR	281,324
W2VJN	262,386
K1XA	251,088
W1HCS	244,866
VE6UD	228,058

Phone

Call	Score
N7DD	879,736
AA5B	684,204
N7DF	603,806
N6RZ	584,500
VO2CW	584,256
N6KT	522,892
KL7BV	437,346
NL7P	435,972
N6BK	433,242
WA1UZH	416,100

Multiop

Call	Score
KØRF	777,888
AI7B	697,580
N4RV	689,870
K3LR	661,878
AA8U	602,980
VE4VV	585,640
W7WHB	563,152
N4WW	556,386
WB1EYI	554,124
K5TM	516,088

Division Leaders

Division	Mixed Mode	Cw	Phone	Multiop
Atlantic	K3HPG	W2VJN	K2ITG	K3LR
Central	W9LT	WA9EOD	WAØAVL	N9GK
Dakota	KFØA	AFØQ	KDØL	KØSR
Delta	W4OGG	N4ZZ	WB5SKQ	W5EA
Great Lakes	W8WPC	N4AR	WB8JBM	AA8U
Hudson	WB2WIK	K2TW	WA2LQO	N2WT
Midwest	KBØRC	NØTT	WØXK	WØGM
New England	WA1ZDW	K1XA	WA1UZH	WB1EYI
Northwestern	WB7ROE	K7NHV	KL7BV	AI7B
Pacific	KH6XX	WA7UEC	N6RZ	K6YA
Roanoke	N8II	W4OEL	WA4ZXA	N4RV
Rocky Mountain	WØYK	ACØS	AA5B	KØRF
Southeastern	WN4KKN	K4BAI	WB4NMA	N4WW
Southwestern	W6TPJ	N7CW	N7DD	W6LH
West Gulf	KM5R	K5RC	AF5K	K5TM
Canadian	VE2MJ	VE3BMV	VO2CW	VE4VV

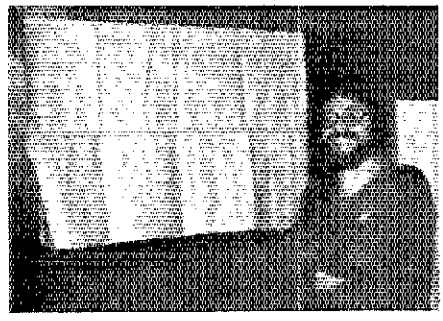
DX Continental Leaders

Continent	Mixed Mode	Cw	Phone	Multiop
Africa	ZS6IW	OH1MA/CT3	6W8HL	—
Asia	JE3KAM	JF1VVR	JH7FMJ	JA2YKA
Europe	G5CMX	G3FXB	DJ3HJ	GW4BLE
North America	FGØFWK/FS	—	HP1XRK	HH2MC
Oceania	KG6DX	FK8CL	AH2E	—
South America	LU1TAB	—	PJ2FR	HK3TF

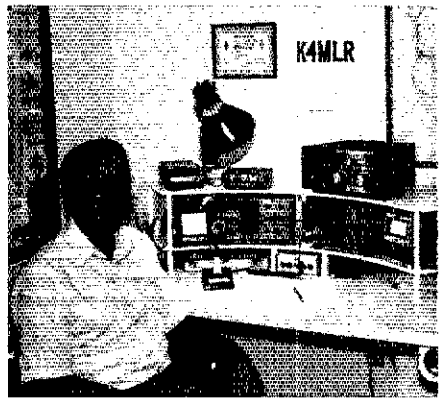
frequency by a fellow competitor with a tribander at 40 feet. Although some stations solved this problem by installing antennas at different heights, the bottom line is that a 3- or 4-element beam at 40 or 50 feet would have been a very competitive antenna this year. And that's an antenna within reach of most hams.

The key to success this time around was sticking it out in the QRM and knowing when and where to find the multipliers. Although scatter kept the band active most of the night in some areas, only 24 of the W/VE stations listing their hours put in the entire 36 hours of allowed operating time. Those who managed to figure out how to work scatter were well rewarded for their time with extra QSOs and a close-in multiplier or two.

All in all, it was a great contest. Perhap old Sol will let us have another year or so like it before putting 10 meters to sleep again.



"K7 Woody Wood Pecker" or "K7 Woody Woodpecker"? Whatever! Paul, WA7CSK operated K7WWP to the top phone spot in the Washington Section. There's a lot of work invested in that big ol' dupe sheet hanging on the wall.



K4MLR, cw winner from Alabama.

SOAPBOX

My father and I went through our first contest together and had a ball. It was his first contest in 25 years of hamming and my first after 9 months in the amateur fraternity . . . look out, Larry Pace, N7DD. In a few years one of us will go solo and steal the Arizona top seat from you! [Villainous cackle, rub hands together and look shifty eyed.] (KB7PJ/W7CTE). Thanks for going to the single-mode and mixed-mode format. Never was too much for shouting. Pounding the key is more my game (KB8EC). This was the first time that I had worked meteor scatter. Was the meteor shower just a coincidence or was it arranged by the contest committee?? (KAØD). [Editor lets loose with a villainous cackle, rubs his hands together and looks shifty eyed.] We were extremely pleased to work all states in a single weekend on 10 meters. We couldn't believe that after only 40 QSOs we had worked the hardest states (Hawaii, Alaska, W6 and all W7 except Montana). See you next year (VE1UNB/VE1ABU). AE5V invented a new word for the phonetic list . . . JULIWATT! (KC5CZ). Band really died a quick death on Saturday evening (W7FGT). Solar levels not as high as last year, so I didn't have to spend as much time looking for a likely 50-MHz opening in the midst of the contest. I did check the 28.885 net often, though (WA5IYX). I hope that more of you big guns will turn up your volume all the way next year so that you can hear us little pistols (WB2OZS). Our Decatur (Alabama) ARC had a mini-contest within a contest. Submit your best hour in one or more categories (K4MLR). . . . activity from stateside seemed lower than last year. No way to get in more than 24 hours out here in the boondocks (KB5UL). I can't believe that I was S-9 all the time. I tried to give realistic reports, but have a sneaking suspicion that some stations were not! I've found that being a housewife is not very compatible with contesting. Next year I will fix a bolt on the inside of the shack (which is a shed in the garden) and have two flags, one with "FOOD" written on it and the other with "DRINK" printed on, to hoist as necessary (G4JKS). I would like to suggest that ops should listen a little longer before calling another "CQ" for the weaker groundwave and backscatter signals. You'd be surprised at what you would hear (W8FGA). Once again I tried the 10-Meter Contest. Been trying since 1977 working out of an apartment building. . . . I learned a few more things to help me in the future. I sure would like to tell the contesters that they would pick up a few more QSOs on scatter if they would just listen longer. There were many ops who would get part of my call, call me one time when the band had dropped down, then go call "CQ" again. There were a few who hung in there and were rewarded with a few extra QSOs. Then there was KØRF who was running W5s on scatter and doing well for nighttime on 10 meters . . . Hope to see, hear and work everyone (and *more*) again next year (WB5VZL). I wasn't too excited about the single-mode entry categories for single operators when I first heard about it. Now I see that it gives more stations an opportunity to win, which helps keep up the interest in a 36-hour contest (WB8JBM/WB8DQP). I think the weekend chosen for this contest, the operating procedure and scoring are all perfect (WA9MRU). [BLUSH! — Ed.] The new rule change for different mode categories is welcomed here. It takes much effort to do both phone and cw when the band is hot. In my section, a super-human effort (as well as a super station) is needed to win. The new rule change allows me the pleasure of operating the entire contest in the cw mode (WB2AMU). As I work mostly cw contests, I have never had the opportunity to hear a real pileup of stations on ssb. Everytime PJ2FR said, "QRZ ?" this thundering roar would fill the band. I only wish that I were the subject of all that attention. Maybe next year when I have a proper antenna and some power at my disposal (VE2DZE). It sure is going to be something five years from now, when we are eeking out a few miserable QSOs on a dead band, to think about the 10-Meter Contests of 1979 and 1980 (WB1GQR).

FEEDBACK

Kindly refer to page 67 of the July 1980 issue of *QST* for corrections to the 1979 10-Meter Contest.

WB2YOF, listed in the Northern New Jersey section, was really in the Southern New Jersey Section where he took second place for single operators. WB2JGP, shown as the number three multiop station in Northern New Jersey, should have been listed as the multiop winner in the Southern New Jersey Section. In the Western Pennsylvania Section, WA3FUV's score was listed incorrectly as 120,324 points with 813 total QSOs and 74 multipliers. Don really had 108 multipliers; thus, his total score should be adjusted up to 175,608 points and to a first-place single operator finish in his section. In Oregon, KA7BSJ was a Novice operator and should have been listed as such for an 11th-place finish among Novice/Technicians in the United States. Nebraska's KAØELX should also have been listed as a Novice and should receive mention for turning in the number 7 Novice/Technician score nationwide. N7DF from Utah should have been listed as the single-operator Division leader in the Rocky Mountain Division. Finally, the WA4YCR listed in the Virginia Section is really WA4CYR.

SCORES

DX scores are listed by continent/country, alphabetically according to prefix, while U.S./Canadian scores are listed by ARRL Section within call area. Single-operator mixed-mode scores (denoted by the letter A) are listed first, followed by single-operator cw-only scores (indicated by the letter B), then the single-operator phone-only entries (shown as the letter C) and finally multioperator scores in descending numerical order (shown as "D" stations). DX station line scores show the call sign used; operator(s), if any; total score in points; number of QSOs; number of multipliers; and a letter designating entry class.

W/VE stations' line scores show the call sign used; operator(s), if any; total score in points; number of QSOs; number of multipliers; number of hours of participation; and a letter that denotes the entry class.

DX

Africa

OH1MA/CT3 236,720-1063-110-B
EA6GP 45,832- 337- 68-C
EA6FS 1950- 39- 25-C
EA8TY 213,120- 960-111-C
ZD8TC 132,374- 547-121-B
ZS6IW 140,060- 741- 94-A
6W8HL 244,608-1092-112-C
9X5AB(ON8RA,opr) 40,470- 566- 71-B

Asia

A51PN 7360- 115- 32-A
HL9DX 7332- 94- 39-C
JE3KAM 267,720-1164-115-A
JH7UJU 137,760- 646-105-A
JA3EQC 54,780- 330- 83-A
JH7CUO 45,110- 337- 65-A
JA4ESR 17,262- 137- 63-A
JA9SQO 14,136- 124- 57-A
JA9SOT 9090- 101- 45-A
JI1LBJ 8820- 90- 49-A
JA6AKV 3712- 64- 29-A
JF1VVR 153,710- 774- 95-B
JE1SPY 136,800- 678-100-B
JK1OPL 100,580- 535- 94-B
JAØCUV/1 88,064- 512- 86-B
JA2NPS 67,896- 414- 82-B
JA2HO 64,000- 400- 80-B
JH1WIX 54,096- 287- 84-B
JA3AA 51,944- 297- 86-B
JH7JVJ 51,666- 319- 79-B
JA1DFQ 42,282- 261- 81-B
JA2DHL 40,936- 295- 68-B
JH7UJN 39,200- 280- 70-B
JA1EF 36,156- 232- 69-B
JA2FOX 34,840- 241- 67-B
JR3COZ 23,628- 179- 66-B
JA3BKC 21,888- 192- 57-B
JJ1OSP 13,780- 121- 53-B
JH1MTR 13,668- 128- 51-B
JA1OP 13,440- 140- 48-B
JR3SPV 9588- 94- 51-B
JA7JND 8800- 105- 40-B
JF2XNV 7600- 91- 40-B
JF1LKM 3828- 56- 33-B
JH2XTV 3128- 45- 34-B
JA9CWJ 2268- 54- 21-B
JH3XEX 1330- 35- 19-B
JA1BOK 270- 15- 9-B
JA9BV 126- 9- 7-B
JH7FMJ 303,066-1341-113-C
JM1FOK 35,328- 256- 69-C
JA6EFT 31,392- 218- 72-C
JA1FO 28,420- 203- 70-C
JA1ALX 21,204- 186- 57-C
JA1HYU 15,900- 150- 53-C
JA1JGP 14,364- 133- 54-C
JE1SLP 13,420- 110- 61-C
JA7KM 11,374- 121- 47-C
JA3BBG 9312- 97- 48-C
JA1AAT 7482- 129- 29-C
JF3SFK 6882- 93- 37-C
JA6PL 6688- 88- 38-C
JL1CCY 3710- 53- 35-C
JH2ORJ 2970- 55- 27-C
JL1KCO 2352- 49- 24-C
JA1RDP 2312- 46- 17-C
JA6QUU 2016- 48- 21-C
JF3FUN 1824- 38- 24-C
JR3QCT 1224- 36- 17-C
JR4MYL 308- 14- 11-C
JA3UV 168- 12- 7-C
JH4KED 160- 16- 5-C
JF3FMD 32- 4- 4-C
JH1FJK 30- 5- 3-C
JA7YKA(JJ1BTA,JG1GIF, JE2RQT,JH2GXG,JR2GMC, JA4UDP,JH4VBQ,JA9NFO,oprs) 336,984-1478-114-D
JH1YDT(JAØVSH,JF1s EAL SDH, JI1QPU,JJ1WKN,JK1CQG, JL1GPO,oprs) 164,836- 841- 98-D
JA3YKC(JE3MAS,JF3PMM, JR3FRR,JH4s PAM WER, JA5GZB,oprs) 140,272- 797- 88-D
JA1YHA(JE3MLS,JH4TJS, JI1AEB,JK1AJX,oprs) 94,248- 559- 84-D
JA3RL(JE3KIG,JR3MUV,oprs) 9440- 117- 40-D
JI9YFU 48- 6- 4-C
UV9AX 207,060- 986-105-A
UAØSAU 133,700- 955- 70-A
UAØSGL 42,336- 441- 48-A
UA9UTF 41,392- 398- 52-A
UAØLFK 26,880- 140- 96-A
UAØTO 11,562- 141- 41-A
UA9QBT 40,920- 330- 62-B
UA9CBM 4800- 60- 40-B
UAØOP 1400- 35- 20-B
UAØKBC 1288- 28- 23-B
UAØCCW 19,516- 222- 89-C
UA9OIE 38,610- 429- 45-C
RA9UOF 29,520- 328- 45-C
UA9AKO 28,000- 200- 70-C
UAØQCA 11,610- 135- 43-C
UK9FER(RA9FGO,UA9s FAL, FDL,EGO,oprs) 196,218- 991- 99-D
UKØZAB(UAØs ZBF ZBW,oprs) 133,152- 876- 76-D
UK9UAC(UA9s UBM UUN,oprs) 121,452-1047- 58-D
UK9OAX(3 oprs) 9664- 151- 32-D
UL7LAW 181,818- 999- 91-A
UL7GI 27,600- 300- 46-B
UL7TA 12,090- 155- 39-B
UL7OAA 17,672- 188- 47-C
UK7PAL(UL7s PAE PBY PCZ, oprs) 228,448-1298- 88-D
RM8MAG 3978- 51- 39-C
9M2KG 1932- 46- 21-A

Europe

CT4SL 39,600- 560- 80-C
DF2RG 9384- 102- 46-A
DJ6QO 1428- 34- 21-A
DJ4SO 122,464- 680- 89-B
DF3LZ 104,232- 472-101-B
DL1AM 16,284- 111- 69-B
DL1TH 15,680- 160- 49-B
DK8KC 6192- 85- 36-B
DL1YA 5412- 83- 33-B
DK9MB 3430- 49- 35-B
DL1JC 1824- 29- 24-B
DL7JR 756- 20- 14-B
DJ3HJ 499,380-1722-145-C
DL8PC 332,540-1279-130-C
DK2MN 325,666-1441-113-C
DF8SS 274,320-1270-108-C
DF8XC 216,960- 960-113-C
DL7YS 69,696- 396- 88-C
DA2AL 38,982- 267- 73-C
DJ2RB 30,444- 258- 59-C
DL9HN 22,896- 159- 72-C
DK8JB 20,412- 324- 63-C
DJ4YH 17,520- 146- 60-C
DK6BI 13,200- 120- 55-C
DK8AX 8944- 104- 43-C
DF9ZP 5332- 124- 43-C
DK5KJ 1596- 38- 21-C
DA1CN(K9VIF,opr) 1408- 32- 22-C
DLØWW(DD9FB,DF1ZE,DF5ZF, DF7ZP,DJØSU,DK8WD,DL3ZA, oprs) 412,100-1585-130-D
DKØDL(DF1 NE NH,DK5QL, oprs) 193,030- 995- 97-D
EA2IA 264,204-1074-123-A
EA5AOI 25,480- 182- 70-A
EA3AVV 49,248- 319- 76-B
EA5BRG 19,832- 148- 67-B
EA3WL 16,390- 140- 55-B
EA1ASI 14,382- 141- 51-B
EA5YU 12,144- 130- 46-B
EA4YW 9984- 128- 39-B
EA2CR 7968- 166- 48-B
EA3GF 1924- 37- 26-B
ED3AIN 319,872-1344-119-C
EA1AHY 73,684- 393- 94-C
EA5VK 64,020- 330- 97-C
EA3AEJ 54,360- 302- 90-C
EA5AQX 35,136- 288- 61-C
EA3AOS 30,108- 193- 78-C
EA7BF 20,412- 162- 63-C
EA1YA 17,112- 124- 69-C
EA5ANR 9176- 74- 62-C
EA1DM 7360- 80- 46-C
EA2OJ 6572- 62- 53-C
EA5TX 714- 21- 17-C
EA7BWY 540- 18- 15-C
F6GCP 140,580- 710- 99-A
F6BEE 110,960- 760- 73-A
F6CCI 2592- 48- 27-A
F6DKV 65,448- 404- 81-B
F6EQV 35,230- 252- 65-B
F3AT 20,700- 143- 69-B
F9BR 17,980- 139- 62-B
F3IM 15,080- 134- 52-B
F6EPO/7 2016- 48- 21-B
G5CMX(N8ET,opr) 527,478-1983-133-A
G4JKS 92,794- 559- 83-A
G3TMA 60,060- 385- 78-A
G2FNK 35,604- 207- 86-A
G3YBH 30,740- 261- 53-A
G3TXF 23,128- 195- 59-A
G2AJB 9288- 100- 43-A
G3FXB 270,480-1135-115-B
G3PVA 52,256- 267- 71-B
G3ESF 27,008- 214- 64-B
G4BUE 15,682- 149- 49-B
G3CWL 338- 13- 13-B
G3FJE(G4s BWP DRS GIR JQL, oprs) 492,960-1896-130-D
GD4HOX 22,032- 162- 68-C
GI4KHZ 12,544- 112- 56-B
GM3YOR 100,848- 573- 88-B
GM4HQF 42,864- 282- 76-C
GM3RAO(+GM4FDM) 264,194-1169-113-D
GW3GHC 252,648-1089-116-A
GW3NYY 87,754- 475- 89-B
GW4BLE(+GW4NJW) 657,176-2314-142-D
HAØHW 20,360- 181- 55-A
HA3HZ 15,582- 147- 53-B
HA9RE 339,090-1336-127-C
HG8KQX 269,748-1143-118-C
HG4XX 14,784- 132- 56-C
HA3KNA(3 oprs) 151,424- 814- 91-D
HB9DX 11,704- 77- 76-B
HB9BRQ 6560- 70- 40-B
HB9QA 390- 15- 13-B
HB9AAA 316,421-1330-119-C
HB9AUS(+HE9ASD) 234,700-1050-107-D
I1POR 374,440-1628-115-C
I1UW 120,840- 570-106-C
I5NSR 91,188- 447-102-C
I4CSP 18,744- 132- 71-C
IØUBZ(+IØUZF) 103,740- 570- 91-D
LA9MW 4818- 73- 33-A
LA5SH 81,510- 416- 95-B
LA7SI 4260- 67- 30-B
LA4HH 73,656- 396- 93-C
LA4M(LA2TO,opr) 15,520- 142- 55-C
LA6UL 4368- 52- 42-C
LA2IJ 3008- 47- 32-C
LA5YV 1386- 33- 21-C
LA3JT 680- 20- 17-C
LA9ZV(+LA9GX) 301,250-1205-125-D
LZ1EP 10,094- 103- 49-B
LZ2DR 288- 12- 12-B
LZ1KDP(LZ1s GC ZF,oprs) 197,064- 938-102-D
OE1ETA 24,128- 208- 58-A
OE1XBC(OE2VEL,opr) 155,916- 639-122-C
OH1KA 163,212- 913- 87-A
OH2FS 18,216- 207- 44-A
OH6DQ 6300- 105- 30-A
OH8LB 4872- 58- 42-A
OH1PY 4836- 62- 39-A
OH7NW 2244- 51- 22-A
OH2BPE 308- 14- 11-A
OH3KM 127,110- 669- 95-B
OH6RC 83,514- 436- 93-B
OH6MK 75,900- 544- 69-B
OH2BSA 30,284- 216- 67-B
OH6EI 29,982- 263- 57-B
OH1KO 19,688- 213- 46-B
OH5UQ 11,222- 179- 31-B
OH1HS 6150- 123- 25-B
OH6DC 5104- 83- 29-B
OH9VL 2860- 65- 22-B
OH3LA 22,440- 204- 55-C
OH1TD 10,240- 128- 40-C
OH2BVF 5700- 75- 38-C
OH3AF(OH3s BP EN,oprs) 2530- 53- 23-D
OK1DWA 385,140-1470-131-A
OK1AGN 160,272- 742-108-A
OK3EA 160,160- 695-112-A
OK1AVD 136,752- 616-111-A
OK1TA 133,108- 620-107-A
OK1KFW/P(OK1DXW,opr) 45,122- 292- 77-A
OK3KFO(OK3CMZ,opr) 30,418- 227- 67-A
OK2BWH 25,420- 205- 62-A
OK1KZ 16,720- 151- 55-A
OK2BCJ 15,264- 144- 53-A
OK2BJU 13,832- 133- 52-A
OK1KQJ(OK1AYP,opr) 13,520- 120- 52-A
OK3TOA 7260- 121- 30-A
OK3CFA 6336- 96- 33-A
OK1FCA 6232- 82- 38-A
OK2YN 3660- 61- 30-A
OK1XG 1276- 29- 22-A
OK2PAE 75,864- 414- 87-B
OK3IF 39,600- 272- 73-B
OK1KSH(OK1WFQ,opr) 24,522- 199- 61-B
OK3BA 17,150- 167- 49-B
OK1QH 15,300- 148- 50-B
OK1KPZ(OK1OCS,opr) 11,956- 117- 49-B
OK2BRZ 7656- 87- 44-B
OK2LN 6864- 88- 39-B
OK1DKR 6474- 80- 39-B
OK3KYR(OK3DT,opr) 6408- 85- 36-B
OK1US 3672- 68- 27-B
OK2SGW 3248- 55- 28-B
OK1DVK 3240- 60- 27-B
OK1AIA 2254- 49- 23-B
OK1DKS 15,688- 148- 53-C
OK2KWI 6560- 82- 40-C
OK1KCF 462- 21- 11-C
OK3VSZ(OK3s CQC ZAF,oprs) 144,530- 745- 97-D
OK1KPA(multiop) 35,788- 389- 46-D
OR4XG 84,396- 519- 78-B
ON4SH 30,104- 212- 71-B
OR4FD 22,644- 211- 51-B
OR6GB 27,776- 224- 62-C
ON7VP(+ON6NW) 139,986- 703- 99-D
OY1A 1380- 30- 23-C
OZ1AUX 11,270- 115- 49-A
OZ5KU 66,704- 379- 88-B
OZ1EE 49,560- 354- 70-B
OZ1OKG 45,260- 365- 62-B
OZ7YL 36,960- 280- 66-B
OZ1CCB 36,498- 237- 77-B
OZ1FGS 15,540- 185- 42-B
OZ1FAO 4560- 60- 38-B
OZ8E 4278- 69- 31-B
OZ1BII 4060- 56- 35-B
OZ1DYU 3128- 46- 34-B
OZ5EV 218,624- 976-112-C
OZ6XR 36,040- 265- 68-C
OZ1BUR 35,376- 264- 67-C
OZ1CGW 26,400- 220- 60-C
OZ1FRR 13,680- 120- 57-C
OZ9OL 6308- 83- 38-C
OZ3FC 4760- 68- 35-C
OZ8T 4130- 59- 35-C
OZ2BM 3200- 40- 40-C
OZ6JM 2450- 49- 25-C
OZ1ZE/A 2322- 43- 27-C
OZ5JR 1224- 34- 18-C
PAØGAM 38,860- 270- 72-A
PAØPHK 22,032- 149- 68-A
PA2FDR 11,990- 101- 55-A
PA2WJZ 2204- 38- 29-A
PAØVDV 147,696- 703-102-B
PAØLVB 51,072- 305- 76-B
PAØMIR 96,758- 459-101-C
PAØCOP 94,958- 601- 79-C
PAØAOG 3520- 55- 32-C
SM5GMG 379,512-1471-126-A
SM3DXC 108,750- 604- 87-A
SMØBDS 16,440- 132- 60-A
SM5BDV 13,216- 106- 56-A
SM7BKH 72,726- 387- 93-B
SM5BNX 28,288- 205- 64-B
SM7CZC 504- 17- 14-B
SM5CAK 88,956- 706- 63-C
SM4JEL 11,400- 100- 57-C
SM5BDA 8216- 79- 52-C
SM5DYC 4930- 85- 29-C
SMØCHA 2288- 52- 22-C
SMØDRB(+G4JVG) 190,152- 834-114-D
SP5BR 90,400- 452-100-A
SR9AKD 37,740- 255- 74-A
SR9HWN 15,840- 165- 48-A
SP2FUA 11,128- 107- 52-A
SR7KTE 11,008- 125- 43-A
SP2JFY 5082- 77- 33-A
SP2UUU 644- 21- 14-A
SR9CAV 88,722- 475- 93-B
SR6OMJ 14,892- 144- 51-B
SR8MJ 14,500- 145- 50-B
SP9CVY 10,780- 110- 49-B
SR3BYZ 3808- 67- 28-B
SR5JTR 2840- 71- 20-B
SP6HRK 1794- 39- 23-B
SP6GVU 31,228- 211- 74-C
SR6CZ 12,064- 116- 52-C
SP9DFH 8720- 109- 40-C
SP6ECA 7644- 78- 49-C
SP6DMT 2862- 53- 27-C
SP3CMA 544- 17- 16-C
SR7FTP 126- 9- 7-C
SR5LM 18- 3- 3-C
SP9KAD(SP8HRA,SP9CJD,oprs) 20,520- 180- 57-D
SVØAT 18,326- 187- 49-B
SVØAU 146,544- 852- 86-C
SVØAW/9 47,520- 396- 60-C
TF3DC(+TF3YH) 159,588- 795- 99-D
UA6AOC 208,128-1084- 96-A
UW6DR 182,784- 940- 96-A
UK4WAB 56,064- 384- 73-A
UA3AAH 28,512- 213- 66-A
UA4CM 23,940- 168- 70-A
UA3AEX 21,600- 225- 48-A
UA3TAM 14,696- 167- 44-A
UA3TEW 6324- 93- 34-A
UA4CH 55,008- 382- 72-B
UA3UAC 41,072- 302- 68-B
UW3UO 32,096- 270- 59-B
UA3MDX 17,200- 172- 50-B
UA3ABT 10,320- 128- 40-B
UA3ESN 10,108- 132- 38-B
UA4WWA 138,720- 816- 85-C
UW6DZ 60,216- 386- 78-C
UA3TN 53,724- 363- 74-C
RA3DKE 16,284- 138- 59-C
UA3AIF 12,320- 140- 44-C
UV3DN 8220- 137- 30-C
RA3DQP 4130- 59- 35-C
UK3QAE(UA3s QJC QKX QLL, oprs) 279,552-1238-112-D
UK3WAA(UA3s WBI WCW WZ, oprs) 90,200- 550- 82-D
UK3ABO(2 oprs) 31,248- 252- 62-D
UK3RCO(EZ3RRH,UW3RR, oprs) 17,400- 174- 50-D
UA2EC 28,400- 193- 71-A
UB5VAZ 176,142- 987- 93-A
UB5MDL 41,180- 290- 71-A
UB5ICS 32,544- 223- 72-A
UY5TE 9102- 123- 37-A
UB5LEE 1500- 30- 25-B
UB5PBA 77,896- 428- 91-C
UB5LCV 75,932- 463- 82-C
UB5VCO 65,600- 400- 82-C
UB5KAN 33,408- 233- 72-C
RB5IQV 9492- 113- 42-C
UB5DAG 1080- 27- 20-C
UC2WBJ 10,922- 120- 43-A
UC2OAI 13,750- 122- 55-B
UC2WAZ 8096- 91- 44-B
UD6DLJ 3960- 66- 30-A
UD6DKW 1332- 37- 18-B
UO6DER 912- 24- 19-C
UF6FFR 11,160- 124- 45-C
UO5OWC 53,332- 396- 67-B
UO5OEK 40,704- 311- 64-B
UP2BCD 83,160- 462- 90-A
UP2BAS 33,540- 257- 65-A
UP2BDO 28,438- 237- 59-A
UP2BY 66,896- 439- 74-B
UP2BFR 68,552- 418- 82-C
UK2BBK(4 oprs) 66,246- 543- 61-D
UK2BCR(2 oprs) 20,880- 261- 40-D
UQ2DZ 87,376- 506- 86-A
UQ2GCP 12,320- 140- 44-A
UQ2GIZ 36,540- 281- 63-B
UK2GAI(UQ2PP,UF6QAM,oprs) 13,608- 120- 54-D
UR2QD 158,826- 771-103-A
UR2OI 20,628- 191- 54-A
UR2RKB 94,458- 519- 91-C
UR2RBM 2376- 44- 27-C
UK2RBT(4 oprs) 87,576- 492- 89-D
YO3CR 20,002- 141- 71-A
YU4GD 326,442-1327-123-A
YU2OG 134,368- 646-104-A
YU7BCD(YU7OQI,opr) 257,656-1172-107-B
YU7OQY 45,402- 327- 69-B
YU4PH 15,444- 143- 54-B
YU7SF 5472- 72- 38-B
YU7ORQ 256- 16- 8-B
YU1NZW 44,660- 274- 77-C
YU2OM 40,348- 262- 77-C
YU5XAF 3776- 59- 32-C
YU4FRS(5 oprs) 471,492-1865-126-D
YU2CKH(3 oprs) 210,912-1014-104-D
Y22WF 84,630- 456- 91-A
Y22TO 75,472- 424- 89-A
Y31SM 20,088- 162- 62-A
Y24SG 15,120- 140- 54-A
Y27GL 9102- 111- 41-A
Y51ZE 17,490- 159- 55-B
Y23IL 9996- 104- 49-B
Y34SE 7752- 102- 40-B
Y24EA 5700- 75- 38-B
Y31ZF 4970- 70- 35-B
Y32ZB 946- 43- 11-B
Y78XL 190,736- 917-104-C
Y37XJ 140,616- 651-108-C
Y41YM 85,860- 530- 81-C
Y26DL 61,350- 409- 75-C
Y49RO 35,568- 234- 76-C
Y76WN 16,422- 161- 51-C
Y38YK 12,100- 110- 57-C
Y26HO 10,464- 109- 48-C
Y53WL 10,080- 120- 42-C
Y38ZA 8160- 80- 51-C
Y24NN/A 2912- 52- 28-C
Y35XA 1610- 35- 23-C
Y64YH 1408- 32- 22-C
4U1ITU(W3s ICM JPT,oprs) 293,040-1221-120-D

North America

C6ADV 163,068- 762-107-C
FGØFWK/FS(W1HCS,opr) 288,850-1325-109-A
HH2MC(+HH2s BX JR,N5s AJW JC) 975,546-3411-143-D
HI8LC 34,160- 300- 56-A
HI8GBG 148,580- 782- 95-C
HP1XRK 648,774-2439-133-C
KG4DI 32,096- 236- 68-C
PJ8UQ 7238- 77- 47-C
VP2SS 110,080- 640- 86-A
6I7J 204,000- 850-120-C
ZF2AG 28,700- 205- 70-C

Oceania

W7LPF/DU2 48,132- 382- 63-B
WA2UUK/DU2 354,624-1847- 96-C
KP4KK/DU2 255,960-1422- 90-C
DU1EFZ 65,436- 574- 57-C
FK8CL 79,218- 489- 81-B
KG6DX 900,900-3465-130-A
AH2E 741,600-3200-119-C
KB7IJ/KH2 699,870-2845-123-C
KX6OI 64,400- 460- 70-C
VK3AEW 13,524- 137- 49-B
VK4VU 364,896-1629-112-C
VK2NHV 27,720- 231- 60-C

South America

HC2BW 20,770- 148- 67-A
HK3TF(+HK3AXT,K3ZO) 798,620-2735-146-D
LU1TAB 32,400- 216- 75-A
LU1BR 258,092-1142-113-C
LU8FEU 157,932- 738-107-C
PJ7FR 762,880-2560-149-C
PP2ZDD(W2LEJ,opr) 266,954-1051-127-C
4M3AZC 466,320-1740-134-C

Maritime Mobile Region II

KB7W/MM2 27,528- 222- 62-A
K1CC/MM2 1584- 33- 24-A
WB8IGY/MM2 6300- 90- 35-C
W6VLD/MM2(K6TXA,WA6s DPQ EUM HJK,WB6LDD,oprs) 124,902- 771- 81-D

W/VE

1

Connecticut

WA1ZDW 366,618-1399-129-30-A
WA1DER 298,776-1266-118-33-A
K1KI 285,200-1150-124-12-A
N1CC 72,160- 410- 88-11-A
K1YRP 16,560- 178- 46- 5-A
K1XA 251,088-1169-106-30-B
W1WEF 197,064- 946-102-24-B
AK1B 47,124- 295- 77-16-B
WB1HJF 44,080- 277- 76-12-B
W1CNU 11,132- 121- 46- 6-B
KA1CZF/N 8658- 94- 39-16-B
N1BDB/T 288- 11- 9-11-B
KA1EKY 256,932-1098-117-28-C
W1VH 29,232- 203- 72- 8-C
W1IVB 27,846- 442- 63-15-C
AB1U 25,404- 219- 58- 5-C
KA1LO 22,800- 228- 50-16-C
N1ABY 7888- 116- 34-10-C
WB1CRH 1568- 28- 28- 2-C
WB1EYI(+AA2Z,K1JX,WB1AVA) 554,124-2167-122-36-D
K1NYK(+KA1s AN BMB,WA1YEC, WB1GIF) 233,988-1054-111-36-D

Eastern Massachusetts

KA1R 124,384- 676- 92- 9-A
N1EE 16,020- 178- 45- 2-A
W1IHN 198,072- 910-108-30-B
K1VUT 66,294- 367- 87-20-B
KA1CLV 36,820- 243- 73-26-B
N1AUD 33,264- 249- 63-23-B
WB1DFV 24,066- 191- 63- 7-B
W1DA 22,500- 225- 50- -B
AD1C 15,510- 139- 55- 8-B
KA1AMR/N 13,552- 125- 44-26-B
KA1CC 1512- 35- 21- 1-B
WA1UZH 416,100-1825-114- -C
KA1GG 202,392- 937-108-30-C
K1KJT 198,220- 935-106-32-C
K1FWF 141,728- 688-103-17-C
W1EM 108,780- 555- 98-16-C
W1GXT 79,872- 416- 96-22-C
KA1CXG 50,468- 341- 74-18-C
W1FDR 32,320- 202- 80-18-C
WA1YVT 17,780- 127- 70-16-C
K1GRB 12,656- 113- 56- 8-C
K1RB 9604- 98- 49-16-C
AE1X 8272- 88- 47- 5-C
W1PLJ 5952- 93- 32- 8-C
AC1P(+WB1FLA) 169,916- 789-107-26-D
W1EKO(+AB1X) 163,170- 735-111-29-D
N1AEQ(+K1s LXJ ZZJ,KA1s AAD BVN DAS FEG FVA,N1AOW, WB1HFM) 142,200- 711-100-36-D
KA1EIV(+KA1DTA,WA1EJM, WB1EZS) 98,430- 579- 85-26-D

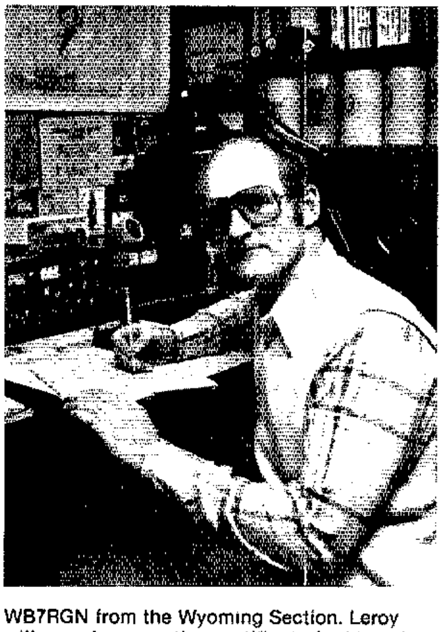
Maine

W1GKJ 34,272- 230- 72-12-A
KA1CVM 157,716- 674-117-29-C
KM6FC/W1 83,126- 467- 89-19-C
WB1CXJ 26,640- 148- 90-16-C
WB1EIK 22,568- 217- 52- -C
K1BZ 7462- 91- 41- -C
WA1PDG(+N1AFC) 168,448- 884- 94-29-D

New Hampshire

K1WW(N1BBV,opr) 220,104- 990-108-36-A

WD5CAY from Southern Texas couples that TS-520 and SB-200 to a Wilson System 33 antenna at 52 feet.



WB7RGN from the Wyoming Section. Leroy will soon have another certificate for his collection as a reward for his phone efforts in the 10-Meter Contest.

Luis, LU1BR, logged over 1100 QSOs to earn 4th place among the phone operators in South America.

AK1A 181,396- 895-101- -A
KA1O 174,932- 852-101-29-A
AC1J 14,994- 146- 51- 5-A
W1HCS(W7KMB,opr)
244,866-1087-111-35-B
N1BEY 51,840- 298- 81-22-B
WB1EIH/T 25,856- 166- 64-22-B
W1END 21,168- 163- 63-14-B
KA1BBI/N 2928- 52- 24- 6-B
W2NSD(WB8BTH,opr)
388,284-1703-114-32-C
AF1H 224,500- 898-125-31-C
W1ICU 9646- 91- 54- 7-C
AF1T(+K1LLJ)
299,096-1372-109-28-D

Rhode Island

WA1BYE 122,776- 596-103-17-C
W1RFQ 5408- 52- 52- 4-C
KA1FHR(+KA1BBV,N1RI,WB1s
DEZ DXQ) 142,416- 774- 92-30-D

Vermont

KA1BEE 11,398- 130- 41-11-B
WB1GQR 224,448-1002-112-16-C
W1CTM 204,552- 947-108-27-C
K1IK(+KA1DE,WB1ELC)
162,936- 876- 93-14-D

Western Massachusetts

K1IIU 10,400- 103- 50- 6-A
N1TZ 378,624-1479-128-30-C
K1SF 173,800- 790-110-20-C
N1ADX 6440- 92- 35-11-C

2

Eastern New York

W2DW 12,980- 118- 55- 4-A
WB2KHE 11,880- 133- 44-12-A
N2BJB 3072- 64- 24- 9-A
K5NA/2 2024- 45- 22- 2-A
N2BJG 47,742- 325- 73-25-B
K2MN 10,070- 95- 53- 4-B
WD2ABL 7280- 94- 35-15-B
KA2FOY/N 4884- 64- 33-14-B
N2BIN 61,370- 323- 95-17-C
KA2EAY 45,156- 318- 71-28-C
WB2MJQ 28,014- 203- 69-12-C
WB2SHE 20,034- 159- 63-11-C
WB2OFV 16,610- 151- 55- 6-C
N2FS 12,152- 124- 49-10-C
N2BFG 5214- 79- 33- 7-C

New York City - L.I.

WB2QEU 173,052- 759-114-25-A
WA2HSQ 17,836- 181- 49-16-A
N2UN 14,280- 138- 51- -A
K2OVS 10,824- 132- 41- 5-A
N2GC 104,742- 513- 99- -B
WB2AMU 90,228- 421-103-26-B
WB2DLA 9828- 121- 39-15-B
WB2PLT 160- 5- 8- 4-B
WA2LQO(W2DKM,opr)
193,312- 863-112-19-C
WA2SUH 136,488- 564-121-29-C
WA2SVT 53,792- 328- 82-28-C
KA2EYR 39,648- 236- 84-22-C
WA2SEL 24,192- 252- 48- 9-C
W2KZE 16,986- 149- 57- -C
AC2P 13,056- 136- 48- 8-C
WB2PXA 8742- 93- 47- 5-C
WB2HTW 8436- 111- 38- 5-C
WA2ARC 768- 24- 16- 6-C
KA2ELW(+WB2PWV)
443,502-1716-129-34-D
WB2PWR(+KA2DIZ,WA2YWP)
188,088- 916-102-36-D
WB2DRV(+WB2DHY)
168,752- 796-106-32-D
KA2GOO(+KA2s HRX IOV)
22,184- 174- 56-20-D

Northern New Jersey

WB2WIK 266,880-1099-120-26-A
KD2G 130,592- 616-106-29-A
W2RQ 97,152- 528- 92- 6-A
W1GD 56,340- 313- 90-14-A
WA2PQU 15,070- 137- 55-11-A
K2TW 131,670- 652- 99- -B
WA2JHN 41,902- 276- 73-21-B
WB2NGT 40,888- 261- 76-13-B
WA2IFS 6364- 86- 37- -B
WB2NCF/T 5100- 71- 30- 9-B
KA2KRA/N 280- 13- 10- 1-B
WB2RLB 135,864- 612-111-34-C
WB2MCB 9180- 102- 45- 8-C
W2GNW 4800- 60- 40- 5-C
WB2UTO 2352- 49- 24- 2-C
N2WT(+WA2SFB)
503,010-1861-135-36-D
AC2U(+KC2X)
356,608-1393-128-29-D
WB2EGI(+KD2I,WA2PID,WB2TSY)
288,652-1183-122-33-D

Southern New Jersey

WB2YOF 196,560- 829-117-28-A
W2VJN(WA2ZKY,opr)
262,386-1136-113-36-B
W2GTN 16,470- 133- 61-14-B
N2AWC 4212- 70- 27-14-B
N2CQ 3024- 56- 27- 2-B
N2HF 139,590- 705- 99-24-C
W2QKJ 17,928- 166- 54-20-C
W2UBS 8316- 77- 54-19-C
KB2LQ(+WB2JGP)
110,544- 561- 98-26-D

Western New York

W2FUI 41,292- 270- 74-23-A
WA2HRL 41,040- 282- 72-23-A
W2FTY 38,940- 174-110-22-A
WB2GLD 29,436- 221- 66-17-A
WB2OZS 21,840- 192- 56-21-A
KA2DHQ 19,398- 178- 53-17-A
WA2IKO 89,424- 400-108-28-B
KA2HDY 71,230- 411- 85-23-B
KA2ECV 35,376- 239- 67-26-B
KA2CGV 23,528- 168- 68-16-B
WA2EYA 19,936- 174- 56- 9-B
K2XU 15,510- 158- 47- 6-B
W2M1A 2592- 42- 24- 3-B
AK2O 2378- 41- 29-12-B
WA2LEZ 1080- 28- 18- 5-B
WA2MNM 143,584- 641-112-34-C
WA2JXC 84,390- 435- 97-27-C
WA3EFE 56,724- 326- 87-33-C
WB2TKD 46,576- 284- 82-20-C
WA2EKK 25,200- 200- 63-14-C
KB2SE 19,080- 180- 53-16-C
WA2IMG 12,480- 120- 52- 9-C
WA2AAZ(WB2TGU,opr)
2464- 56- 22- 6-C
WB2TGU 1980- 45- 22- 6-C
K2QIE(+KA2ODJ,WA2s LOG PHA,
WB2WSV) 217,620- 930-117-37-D
WB2PSI(K2s MP SPO,W2AV,
WA2ZKD,WB2KAU,oprs)
160,650- 675-119-30-D
W2OW(K2OC,KF2X,KG2s Y Z,N2s
BLX HR,N6IN,W1HHO,WA2VFX,
WB2FON,oprs)
152,324- 674-113-30-D
KE2B(+KA2IPE,N2CBS)
46,968- 297- 76-26-D
WA2ICY(+K2VD,KA2s DVC KFH,
WA2FQA) 14,784- 159- 44-15-D

3

Delaware

W3NX(AA5B,opr)
220,398-1011-109-22-A
K3HBP 177,840- 780-114-16-A
KA3CMR 26,600- 190- 70-11-A
N8NA/3 7070- 98- 35- 3-A
WA3HZT/T 3792- 59- 24-12-B
KJ3NH 48,348- 306- 79-21-C

Eastern Pennsylvania

WB3IYY 53,504- 348- 76-29-A
WB3JZE 43,950- 274- 75-29-A
WA3TQJ 21,632- 200- 52-24-A
N3AOT 12,800- 128- 50- 4-A
WB3DCT 125,496- 552-108- -B
K3VW 13,208- 127- 52- 3-B
WA3MVP 10,944- 113- 48- 6-B
WA3YON 6364- 79- 37-15-B
W3VQ 5000- 50- 50-13-B
W3CEI 2912- 56- 26- 5-B
WB3CDE 152,872- 788- 97-21-C
K3FN 96,574- 443-109-25-C
WA3NHO 91,584- 477- 96- -C
WB3CIW 84,266- 463- 91-24-C
KA3ANG 80,960- 460- 88-21-C
W3GPR 31,240- 220- 71-26-C
WA3ZTE 23,280- 194- 60- 7-C
W3ETB 20,128- 148- 68- -C
AC3O 15,372- 183- 42-10-C
WA3YTI 4774- 77- 31- 5-C
WB3KDA 2310- 55- 21- C
K3WW(+K3WJV,KB3GJ)
318,660-1410-113-30-D
K3UC(+AJ3H,K3VDU,WB3FXF)
254,016-1134-112-30-D
WB3FLK(+KB3KG,WB3HJC)
113,280- 575- 96-36-D
N3AOG(+KA3EAQ,WB3EPU)
82,160- 392-104-32-D

Maryland - D.C.

K3HPG 330,250-1309-125-27-A
K3EW 292,410-1083-135-36-A
W3UJ 112,360- 529-106-14-A
WA3EEE 15,568- 136- 56- 4-A
W3FQE 6272- 112- 28- 8-A
W3GN 128,106- 629- 99-30-B
WA3VPL 22,080- 181- 60-20-B
N3ST 16,328- 150- 52- 7-B
W3FA 6460- 95- 34- 3-B
K2ITG 279,216-1108-126-31-C
WA3NAN(KA1GD,opr)
220,248- 966-114-14-C
WA3VUQ 154,770- 737-105-22-C
N4VA/3 73,848- 362-102-10-C
WA3TGB 55,146- 303- 91-23-C
WA3YKR 16,006- 151- 53-12-C
K3VY 9280- 116- 40- -C
W3MSN 5168- 76- 34- -C
AG3S 816- 24- 17-12-C

Western Pennsylvania

K3OE 4880- 61- 40- 3-A
K3UA 43,680- 273- 80- 6-B
W3IW 38,868- 246- 79- 7-B
W3HDH 34,650- 225- 77- 6-B
AI3E 13,310- 121- 55- 6-B
WA3WYQ/T 816- 25- 17-12-B
WB3IET 94,600- 473-100-23-C
WA3ESH 41,830- 235- 89-23-C
WB3HPF 25,530- 185- 69-20-C
W3DKL 21,824- 176- 62-10-C
WA3MOY 12,384- 144- 43-10-C
N3BAW 6888- 82- 42- -C
W3YA(WB3CXR,opr)
780- 26- 15- 2-C
K3LR(+AF3P,KA3s OPQ EOX,
WB8VPA,WD8ALG)
661,878-2162-153-36-D

4

Alabama

WN4KKN 454,950-1679-135-27-A
W4EVT(WB4YHF,opr)
44,352- 264- 84-14-A
KB4PY 37,422- 230- 81-20-A
K4MLR 13,110- 115- 57- 9-B
WD4IXE 157,614- 723-109- -C
AA4TG 22,344- 196- 57-21-C
WA4MGJ 6800- 100- 34-11-C

Georgia

NB4X 7416- 103- 36-10-A
K4BAI 125,712- 576-108-18-B
WB4NMA 190,704- 822-116-36-C
K4HAV 160,800- 670-120-21-C
WD4RCO 57,324- 281-102-22-C
K4KG 31,126- 197- 79-24-C
N4BWS 17,270- 157- 55-20-C
N4PB 320- 20- 8- 1-C
K4CKS(+AK4E,KI4E,WA4s IBI IDY,
WD4JLI) 302,640-1153-130-36-D
W4IKR(K4SIK,KA4NWC,KB4CW,
KD4V,KU4T,N4s ATH BQJ BYX
CAR DQP DMZ,ND4C,WA4TGX,
WB4s FMJ FNS OEX,oprs)
43,740- 269- 81-32-D

Kentucky

AA4A 269,376-1102-122-26-A
N4AR 332,250-1300-125-30-B
KA4IKH/N 39,468- 254- 69-15-B
W4YOK 9494- 100- 47- 4-B
WD4LTD 98,552- 508- 97-26-C
WD4CRG 49,140- 270- 91-24-C
ND4Y 46,992- 264- 89- -C
WD4FXX 22,816- 184- 62-24-C
WA4RUW 7968- 83- 48- 4-C
W4CN(+NF4R)
50,560- 321- 80- -D
KA4ISI(+KA4ISJ)
23,072- 206- 56-27-D

North Carolina

AA4NC 106,496- 508-104-11-A
W4GMW 15,344- 134- 56- -A
WA4ZXA 231,420-1015-114-27-C
WA4FXJ 152,460- 693-110-36-C
WD4ORA 69,776- 392- 89-28-C
KQ4M 45,198- 279- 81-13-C
WA4NOT 312- 13- 12- 2-C
W4XC(+WD4MKQ)
123,522- 511-119-18-D
WA4IYH(+N4FD)
115,584- 516-112-11-D
WD4GQU(+WA4WZQ)
67,640- 356- 95-33-D

Northern Florida

N4SA 353,104-1522-116-24-A
AA4EH 25,058- 187- 67-15-A
W4VQ 32,234- 227- 71- 4-B
W3FDP 87,010- 385-113-25-C
WB4YPS 22,288- 199- 56-22-C
WD4HSA 10,530- 117- 45- 5-C
KA4MCM 7844- 106- 37- 9-C
N4WW(+AA4NA,N4EF,NE4F,
WB4YFF) 556,386-1972-141-36-D
KB4HF(+KF4W,KW4F,N4IB,
WD4ASW) 175,828- 778-113-29-D
W4WWW(+W4UEA,WA4s EQZ HHC,
WB4GMB,WD4RJI)
166,500- 750-111-34-D
N4FY(+WB4CND)
157,842- 711-111-36-D
W4IIR(KA4PNX,K4IWR,N4AXN,
WA4s VRC WYY YKQ WD4s JTC
MNU PGA PJS,oprs)
86,530- 507- 85-25-D
W4ZBB(KA4s KJX QZU,N4s BEY
DPM,WB4SFU,WD4HDT,oprs)
37,398- 271- 69-24-D
KA4FOO(+N4CYV)
34,050- 225- 75-19-D

South Carolina

WB2GJO 6290- 85- 37- 9-A
WB5YMS 46,112- 259- 88-20-B
KA4AUR/N 11,776- 118- 46-15-B
WB8ICT/4 74,690- 385- 97-25-C

Southern Florida

N4BP 362,096-1484-122-25-A
K1PLR 13,974- 137- 51- -A
WD4AHZ 122,200- 625- 94-20-B
KR4U 13,230- 131- 49-15-B
W4YN 10,282- 97- 53- -B
N4DDK 5760- 79- 30-10-B
KA4OCL/T 5684- 83- 29-13-B
WA3RID 135,240- 644-105-21-C
KA4MBC 35,680- 223- 80-19-C
WD4HRX 33,264- 216- 77-15-C
K1FJM/4 25,536- 228- 56- -C
KD4Q 21,924- 189- 57-16-C
W2GBX 20,000- 100-100- -C
K4JAI 19,038- 167- 57- 6-C
W4HVU 16,520- 140- 59-10-C
VE3BTQ/W4 8262- 81- 51- 8-C
WD4FZR 7000- 100- 35-12-C
WB4OWD(+KB4KJ,WA4QKX)
413,000-1652-125-31-D

Tennessee

W4OGG 55,860- 294- 95-11-A
KB4SL 22,656- 177- 64- 9-A
N4ZZ 228,028-1046-109-30-B
KC4OV 226,044- 897-126-29-C
KY4B 47,520- 270- 88-17-C
N4DPG(+NE4G)
80,340- 387-103-28-D

Virginia

AA4M 241,316- 982-122-26-A
W4ZEI 47,088- 326- 72-17-A
WB4PIQ 4410- 49- 45- 4-A
W4OEL 96,552- 438-108-29-B
K4OAQ 73,158- 411- 89-15-B
N4OT 23,584- 176- 67- 7-B
N4HB 15,300- 150- 51- 4-B
W4YE 6450- 75- 43- 2-B
N4DEK 2964- 54- 26-10-B
WB4CTF 175,856- 758-116-19-C
WA4CYR 126,776- 598-106-25-C
W4WWQ 58,376- 324- 87-13-C
WD4BTF 15,276- 134- 57-11-C
WB4PVT 10,980- 122- 45-11-C
LU1BAR/W4 9630- 107- 45- -C
NC4S 3200- 64- 25- 3-C
N4RV(+K3EST)
689,870-2298-149-36-D
WA4IVL(+N4MO)
202,520- 822-122-28-D
K4RC(+W3ATQ,K4s JST MU,WB4s
DCW UHC) 30,952- 209- 73-13-D
K4HTA(K4LUG,KA4s DCB ORG
SMS,W4NFA,WA3ROL,WD4s KQS
NDD,oprs) 14,156- 143- 46-20-D

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Arkansas

K0VGB 27,820- 212- 65-13-A
AD5F 22,184- 229- 47-16-A
W5EIJ 5548- 72- 38- 5-B
KF5L 65,688- 357- 92-30-C
N5DY 12,480- 156- 40-12-C

Louisiana

W5WG 48,416- 331- 68-27-B
WD5EAE/N 34,526- 566- 61-12-B
WB5SKQ 315,768-1338-118-28-C
KB5IE 23,548- 203- 58- -C
K5LVZ 3648- 57- 32- 6-C
W5EA(AF5V,KC5CZ,WB5DVS,
WD5CZN,oprs)
284,640-1186-120-29-D

Mississippi

KA5BEE/N 19,140- 152- 55-11-B
KA5JJU/N 8800- 94- 40- -B
N5AZK 171,784- 788-109-31-C
W5NCB 17,550- 135- 65-12-C
WD5GOH 2898- 69- 21- 4-C

New Mexico

KN5O 59,124- 340- 78-16-A
K5XY 14,872- 140- 52-19-A
WA5YTX 61,138- 366- 77-10-B
N2JB/5 51,920- 419- 59-25-B
AA5B(K5TA,opr)
684,204-2554-134-29-C
N6BK 433,242-1917-113-26-C
K5JW 281,960-1484- 95-24-C
K5VYT 217,560-1110- 98-23-C
WD5GNW 14,586- 187- 39-14-C
K2QLY 4872- 84- 29- 2-C
KC5AT 2440- 61- 20- 3-C
WB0UPR/5 950- 25- 19- 3-C

Northern Texas

KM5R 612,434-2203-139-35-A
WB5VZL 208,184- 982-106-36-A
WA4JZB 11,000- 110- 50-11-A
K5NW 202,248- 935-106-26-B
KB5UL 46,104- 315- 68-21-B
W5QF 35,224- 233- 74-18-B
K5LC 12,300- 244- 25-14-B
KA5GFJ/N 11,480- 132- 35- 8-B
KA5HGE/N 10,290- 116- 35-12-B
WB5YHE/N 196- 8- 7- 8-B
AF5K 367,668-1459-126-24-C
WD5EWP 147,136- 836- 88-18-C
W5PLN 136,220- 695- 98-27-C
W5IU 48,928- 278- 88-25-C
WB5HPG 42,174- 297- 71-14-C
W5SOD 7344- 102- 36- 4-C
K5TCK 2496- 52- 24- 3-C
K8TD(multiop)
277,704-1197-116-28-D
KB5UT(+N5AYK)
166,122- 839- 99-26-D

Oklahoma

KM5H 308,452-1305-118-25-A

NØIN/5	31,098- 217- 71- 4-B
K5CKQ	133,926- 663-101-24-C
KC5CU	26,418- 259- 51-10-C
N5AFV	23,744- 224- 53-22-C
K5DEC	23,618- 241- 49-17-C
WD5IRR	620- 31- 10- 4-C
K5DLE(+W5EIU)	132,804- 705- 93-29-D

Southern Texas

KA5HRU	17,302- 207- 41- 8-A
N5ZR	17,040- 206- 40-12-A
N5B5W	5940- 86- 33- 5-A
K5RC	348,722-1402-121-33-B
K3ZMI/5	31,080- 193- 74-10-B
WB5UCL	8880- 118- 37- 5-B
KA5JSJ/N	396- 11- 11-14-B
K5WA(WA3OVC,opr)	284,740-1238-115-30-C
K5DX	227,088- 996-114-20-C
WD5CAY	112,716- 558-101-32-C
KC5CP	80,724- 434- 93-28-C
W5ASP	55,936- 437- 64-12-C
W5UFA	52,440- 345- 76-20-C
WA5IYX	44,446- 313- 71-18-C
W5VD	42,408- 279- 76-23-C
AK5G	21,708- 201- 54- 6-C
K5HIM	3392- 53- 32- 8-C
K5TM(K5s GN ZD,oprs)	516,088-2081-124-32-D
N5CKX(+N5s CUO CKW JJ)	238,396-1113-107-34-D
KB5CA(+WB5YJW)	134,636- 694- 97-33-D
N5AF(+WB5LVL)	20,700- 207- 50-11-D
N5CDY(+W7IKT)	14,904- 207- 36-16-D

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East Bay

KS6H	50,820- 385- 66-14-A
K6XO	45,698- 313- 73- -A
K6ARE	4464- 71- 31- -A
K6CSL	24,856- 216- 52-21-B
WB6ZEP	28,196- 266- 53- 9-C
KS6Q	6800- 100- 34- 7-C

Los Angeles

W6TPJ	255,852-1242-103-27-A
WB6OZV	86,718- 438- 97-20-A
WB6OWD	43,550- 335- 65-19-A
KB6IE	14,018- 144- 43-18-A
K6EWL	225,056-1017-104-23-B
N6HC	126,582- 867- 73-13-C
K6SE	80,480- 503- 80-12-C
W6CN	77,376- 416- 93-18-C
KD6GO	14,220- 158- 45-19-C
N6BCY	7760- 97- 40- 6-C

Orange

K6JCV	176,418- 869- 99-25-A
W6HK	167,214- 958- 87-30-A
N6DQU	23,184- 203- 56-11-A
WA6JAH	91,872- 505- 88-13-B
AC6H	45,780- 294- 70-20-B
N6PE	18,972- 171- 51- 5-B
KB6MT	40,824- 324- 63-10-C
W6TSE(+N6CFB,WB6OFE)	196,588-1003- 98-25-D
N6AED(+KA6DSD,WA6MRA, WB6RWZ)	167,676- 942- 89-25-D
KA6DJZ(+WA4HYF,WA6TBH)	92,016- 633- 72-26-D

Pacific

KH6XX(K7TI,opr)	785,520-3273-120-36-A
KH6H	23,760- 212- 54- 8-B
NH6A	17,748- 174- 51-10-B
WH6AMR/N	13,376- 132- 44-26-B
KH6IFY(KH6CP,opr)	616- 44- 7- 2-B
KH6CP	198- 11- 9- 1-B

Sacramento Valley

W6AMW	87,040- 511- 85-28-A
WD6CQH	816- 24- 17- 6-B
AI6V	363,800-1819-100-29-C
W6YMH	32,736- 264- 62- -C
WA6NBI	1458- 27- 27- 3-C

San Diego

N6ND	186,992- 899-104- -A
WA6UFY	34,560- 267- 64-16-A
AA6EE	23,010- 195- 59- 9-A
K6XT	107,610- 626- 85- -B
W6ZT	28,178- 177- 73-18-B
KA6IEH	17,596- 166- 53- 6-C
W6KBD	2300- 50- 23- 7-C

San Francisco

AF6F	3000- 50- 30- 3-B
K6ANP	210,432-1096- 96-28-C
WB6NBR	179,928-1071- 84-29-C

San Joaquin Valley

WD6BJK	10,320- 116- 40- 7-A
N6AVV	7220- 95- 38- 6-A
W6MYP	50,440- 364- 65- -B
W6YKM	1584- 44- 18- 2-B
KA6EVN/T	210- 10- 7- 9-B
WB6LBR	97,200- 486-100- -C
N6BVP	23,002- 217- 53-12-C
WB6WEW	13,066- 139- 47- 9-C
WA6JDB	3686- 101- 43- 4-C
W6RKX	4757- 72- 33- -C
N6DQM(+W6GAM)	18,824- 181- 52-18-D

Santa Barbara

N6HK	34,440- 246- 70-13-A
WB6DNN	29,402- 207- 61-15-A
N61R	281,324-1265-106-30-B
KA6GKU/N	35,032- 243- 58-17-B
W6IKF	26,000- 235- 52-11-B
W6OUL	6468- 70- 42- 4-B
WA6NHB	99,372- 546- 91-23-C
WA6IJZ	29,394- 213- 69- 8-C
KD6LB	22,848- 204- 56-11-C
KD6CN	3900- 65- 30- 4-C

Santa Clara Valley

WD6CKT	56,316- 481- 57-18-A
N6UW	40,068- 313- 63-20-A
K6RU	30,326- 257- 59-36-A
KA6IEX	20,160- 179- 56-18-A
KJ6Z	17,550- 189- 45- 9-A
KA6LGX/N	26,414- 224- 47-20-B
KA6HTC/N	7820- 89- 34-25-B
KA6ING/T	4158- 57- 27- 3-B
K6MO	3468- 51- 34- 2-B
N6RZ(WB6SHD,opr)	594,500-2378-125-30-C
N6KT	522,892-2143-122-33-C
K6HNZ	328,090-1505-109-30-C
N6NF	313,038-1581- 99-23-C
AC6V	63,656- 436- 73- 9-C
W6LC	46,644- 338- 69-15-C
N6OI	42,032- 296- 71-14-C
WB6MDF	30,744- 244- 63-15-C
W6YVK	27,664- 247- 56-12-C
WD6BWO	14,000- 140- 50- 5-C

WD6EKO	9438- 121- 39- 9-C
W6EMD	128- 8- 8- 4-C
K6YA(AG6D,K6MA,N6s BZA ST, W8RPA,WA6s LIJ ROM,oprs)	271,890-1428- 95-32-D
W6PIY(KA6EOT,WA6MZF,oprs)	34,048- 286- 56-25-D

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Alaska

WB4WXE/KL7	9064- 99- 44- -A
KL7AF	104,784- 709- 74- -B
KL7BV	437,346-2403- 91- -C
NL7P	435,972-2319- 94-32-C
AL7BM	268,096-1888- 71-29-C
WDØFIR/KL7	206,400-1376- 75-22-C
WL7AKS	9922- 121- 41-22-C
AL7Z(+KL7JIZ)	289,850-1695- 85-26-D

Arizona

KB7LF	200,288-1138- 88-25-A
W7FGT	164,912- 913- 88-31-A
N7CW	299,224-1294-113-27-B
KB7HH	120,484- 640- 91-27-B
W7ZMD	38,658- 379- 51- 9-B
WA7NXL	25,764- 200- 57-13-B
W7YS	9200- 100- 46- 4-B
W6HDP	1596- 38- 21- 3-B
N7DD	879,736-3076-143-36-C
WB7FDQ	405,536-1748-116- -C
N7BCG	152,388- 918- 83-22-C
K7RDH	48,048- 308- 78-15-C
WA7YUL	8736- 112- 39- 6-C
N7BGK	1350- 27- 25- 7-C
W6LH(+WA6HJV)	320,340-1686- 95- -D
W9FI(+WA7BXV)	246,720-1279- 96-25-D
KB7PJ(+W7CTE)	27,816- 223- 61-15-D
AF7H(KA7s GFT GWZ HEA, KAØCKI,WB2TBA,WB6SFF, WDØDEP,oprs)	24,108- 233- 49-30-D

Idaho

N7SU	161,352- 967- 83-18-A
N7BEM	20,680- 200- 47-13-A
WB7TJI	6848- 103- 32- -A
K7NHV	306,240-1341-100-25-B
KB7N	77,674- 511- 71-20-B
W7KXA	8400- 105- 40- 5-C
KB7CQ(+KB7CR)	278,216-1676- 83-30-D

Montana

KB7Q	134,472- 862- 78-17-A
W7MAF	36,096- 384- 47- -A
KL7FDQ/7	15,480- 171- 36- 8-B
K7GQI	6660- 74- 45-10-C
KA7HFB(+K7ABV)	19,208- 196- 49- -D

Nevada

K7NV	188,200- 909-100-23-A
W7ABX	42,210- 305- 67-14-A
KB7NO	22,736- 192- 58-15-A
WA7UEC	154,872- 932- 81-21-B
K7SFN	170,544- 969- 88-10-C
K7TRG	143,850- 685-105-20-C
WA7KNK	134,288- 763- 88-19-C
WB7VVH	19,074- 187- 51-13-C
W7IKA	3600- 50- 36- 4-C

Oregon

WB7ROE	176,790-1061- 83-20-A
W7GUR	62,370- 396- 77-15-A
KA7DHU	7252- 98- 37- 5-A
W7TC	105,410- 635- 83-23-B
W7CB	88,396- 552- 77- 9-B
KB7J	37,320- 303- 60-18-B
WB7WOE	27,972- 240- 54- 9-B
WB7CXW	8712- 105- 33- 7-B
W7LNE	2668- 46- 29- 2-B
KB7MO	280,384-1348-104-26-C
WB7QYI	249,600-1248-100-29-C
WB7SRU	74,736- 518- 72-20-C
WB7QFH	51,652- 349- 74-16-C
WB7EEI	44,400- 370- 60-17-C
W7MLJ	44,200- 340- 65-20-C
AI7B(+W7EJ)	697,580-2673-130-28-D
W7WHB(+AG7M,KA7FPP,N7ZZ)	563,152-2291-122-32-D
W7CQR(+WA7UEV)	193,130-1084- 89-23-D
N4BOS(+KA7CTP)	146,336-1076- 68-30-D

Utah

N7SM	165,150-1101- 75- -A
N5CT	19,488- 203- 48- 9-B
N7CCW	6750- 94- 27-18-B
N7DF	603,806-2537-119-27-C
K7JH(+KA7s BHM GRW,KB7KV, N7AVJ,W7s MUG PDV,WA7HHE, WB7TUR)	292,040-1490- 98-24-D

Washington

W7WMO	115,962- 753- 77-12-A
KA7AXD	91,316- 582- 74-17-A
K7NW	68,040- 474- 70-13-A
KB7G	113,472- 750- 72-16-B
W7DAZ	54,560- 380- 62-13-B
W7GB	29,970- 323- 45- 8-B
WB7RMQ	28,288- 188- 64-15-B
WB7WSX	17,794- 166- 41- -B
N7BFN	17,700- 141- 59- 8-B
KA7FWY	3542- 75- 23- 5-B
K7WWP(WA7CSK,opr)	315,456-1696- 93-32-C
N7ABJ	239,232-1344- 89-30-C
WB7AGZ	62,270- 479- 65-21-C
WA7STA	46,872- 372- 63-17-C
WB7RFC	38,468- 326- 59-12-C
AK7H	25,476- 193- 66-12-C
N7AME	13,992- 159- 44- 9-C
W7LUR	9718- 113- 43- 6-C
K7IDX	9240- 70- 66- -C
KD7Z(+KD7P)	452,034-2263- 99-27-D
KC7I(+W7WA)	325,164-1637- 98-34-D
N7BES(+N7BUL,WB7VNY)	321,458-1657- 97-28-D

Wyoming

KB7M	20,706- 202- 51-15-A
WB7RGN	240,960-1255- 96-26-C
N7CG	149,040-1035- 72-24-C

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Michigan

KA8EHM	63,720- 353- 90- -A
WB8AYW	61,656- 366- 84-17-A
KA8HIB	45,298- 299- 71-17-A
K8ED	43,608- 275- 79-15-A
KB8EC	205,588- 998-103-32-B
WB8OGM	129,050- 693- 89-28-B
AC8Y	28,512- 216- 66- 4-B
KA8EBG/N	19,470- 177- 55- -B
W8VSK	13,224- 116- 57- 6-B
K8QWG	12,792- 123- 52-14-B
WB8AAX	12,446- 123- 49- 7-B
W8WVU	8652- 100- 42- 4-B
KA4NCZ/8N	6080- 68- 38-24-B
K8KIR	2700- 49- 25- 5-B
WD8KXV	2024- 45- 22- 4-B
KA4DBL/T	1188- 26- 18- 5-B
WA8WMC	1080- 41- 12-10-B
W8YL	234- 13- 9- 1-B
KB8PK	181,000- 905-100-23-C
W8FGA	105,876- 519-102-33-C
WB8VCC	27,232- 184- 74-13-C
K8PUJ	25,862- 193- 67-14-C
K8LIX	19,764- 162- 61-14-C
K8KUH	15,120- 140- 54-14-C
K8CV	7144- 94- 38- -C
W8TWJ	4088- 73- 28- 5-C
AA8U(+AI8D,K8s LF MJZ SXA YHH KA8s AEE FAK JZM KZJ,KB8UF, KD8B,N8AW,WB8s ALP BJI,WD8s BDK BDW BWN DSV MBB RRC SBJ)	602,980-2065-146-36-D
K8ZE(+AK8M,K8s NWD ZZU,N8s BKF BLX,W8s MNL NGO,WD8BKM)	427,166-1559-137-36-D
WB8BUQ(+KA8BPY,WA8RUF)	39,974- 251- 79-22-D

Ohio

W8WPC(N9AG,opr)	365,568-1422-128-35-A
K8HV	260,760-1060-123-30-A
KF8K	54,288- 339- 78-29-A
W8UPH	40,548- 325- 62-19-A
K8MR	31,536- 216- 73- 5-A
K8BL	25,578- 200- 63- 8-A
WB8SID	16,324- 154- 53-12-A
W8LCY	15,196- 128- 58-11-A
W8NPF	9676- 118- 41-17-A
WB8KKI	89,680- 461- 95-32-B
W8FN	81,536- 416- 98-12-B
AA8S	39,368- 259- 76-13-B
KA8JRI/N	11,178- 69- 69-20-B
KA8JCB/N	7676- 84- 38-10-B
N8XX	3400- 50- 34- 5-B
K8HF	1360- 34- 20- 2-B
KI8I	1012- 23- 22- 1-B
WB8JBM(WB8DQP,opr)	400,812-1578-127-34-C
K8CMO	142,968- 644-111-26-C
WD8QME	142,080- 740- 96-29-C
N8ATR	106,284- 521-102-29-C
WA8AGH	94,976- 448-106-28-C
N8BKB	79,500- 375-106-18-C
AC8C	75,992- 413- 92-18-C
N8BPB	72,770- 383- 95-25-C
WB8DOD	53,000- 265-100-15-C
WA8WCU	40,800- 255- 80-29-C
WD8JBB	40,442- 277- 73-13-C
K8IQQ	32,568- 276- 59-16-C
N8TN	31,372- 253- 62- 9-C
WD8DPT	26,400- 200- 66-13-C
WD8ADH	18,422- 151- 61-15-C
N8AXA	12,768- 112- 57-19-C
WD8KTM	11,250- 125- 45-11-C
K8RSH	10,260- 114- 45- 8-C
WD8NZR	6080- 95- 32-11-C
WA1QAA	1836- 54- 17-10-C
W8LXP	1512- 36- 21- 4-C
K8III(+KA4DCZ,WB8KRY)	473,020-1765-134-33-D
WA8ONQ(+WA3OJX,WA8OGS)	336,990-1195-141-33-D
WB8IFP(+K8MN,KB8EI,WB8ZJY)	315,126-1281-123-32-D
K8OCL(+K8ND,KB8AC,N6UB,W8s BTW OMY,WB8s YIJ YUO,WD8s JLM OTO)	244,560-1019-120-34-D
WD8KMX(+KA8CXL,N8ADV, WD8CJQ)	231,616-1034-112-30-D
AJ8B(+K1FJ,KA9IFQ)	7920- 72- 55-22-D

West Virginia

N8II	477,630-1769-135-31-A
K8OWL	850- 25- 17-13-B
WD8AXY	26,928- 187- 72-20-C
WA8VZO	19,610- 185- 53-14-C
WB8WEZ	208- 13- 8- 1-C
N8APA(+N8ABW)	129,580- 589-110-30-D

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Illinois

WD9DCL	334,552-1341-124-27-A
WD9GVY	110,032- 591- 92-31-A
KB9E	102,486- 547- 93-30-A
WD9FUJ	82,790- 481- 85-26-A
WB9YTT	41,168- 248- 83-14-A
W9WJ	27,032- 218- 62-12-A
KA9Y	9734- 157- 31-12-A
N9UN	6438- 87- 37- 4-A
WA9EOD	189,924- 908-102-29-B
W9VA	81,880- 445- 89-12-B
WD9DBC	64,622- 409- 79-16-B
K98G	63,008- 347- 88- 8-B
W9OA	48,960- 360- 68- -B
N9TI	40,800- 271- 75-10-B
K9JU	31,360- 224- 70- 7-B
W9PNE	25,350- 189- 65-17-B
KA9AXD	23,142- 186- 57-17-B
W9HPG	19,008- 144- 66- 9-B
W9REC	9460- 86- 55-17-B
KA9ACS	8214- 106- 37- 9-B
W9FSD	2064- 43- 24-18-B
KA9FON	1088- 32- 17- 6-B
WA9MRU	80- 8- 5- 1-B
WAØAVL	270,250-1175-115- -C
K4VUD/9	156,832- 754-104-36-C
AI9J	91,728- 504- 91- -C
WD9GQV	51,504- 296- 87-27-C
WD9GGY	49,224- 293- 84- -C
AK9N	33,228- 234- 71-14-C
KB9AW	31,104- 216- 72-19-C
K9BQL	25,326- 180- 67- 7-C
KB9I	17,400- 150- 58- 5-C
W9ZGP	13,310- 121- 55-12-C
W9NXP	8424- 81- 52-10-C
KB9PB	6402- 97- 33- 7-C
KD9F	6240- 78- 40- 6-C
KA9ERX	5248- 64- 41- 2-C
WB9ZED	4560- 95- 24- -C
WD9JLQ	1024- 32- 16- 2-C
AJ9D(+KA9CQM,N9AEJ)	240,240- 999-120-28-D
AG9E(+WD9APJ)	45,296- 298- 76-23-D
WO9IMN(+KA9FHL)	12,400- 145- 40-12-D
KA9F(+WD9IHI)	6844- 118- 29- 9-D

Indiana

W9LT	351,744-1374-128-34-A
K9IU(W3EP,opr)	57,564- 348- 82-17-A
WD9EME	35,642- 250- 71-23-A
K9TUS	127,116- 590-107-24-B
N9ACD	38,760- 248- 76-18-B
WD9DVO/N	37,800- 283- 63-24-B
KA9CZD/N	1950- 57- 15-15-B
WB9QPN	139,708- 658-106-25-C
KB9CO	79,200- 396-100-22-C
N9JG	32,428- 242- 67-11-C
K9JS	3782- 61- 31- 4-C
WB9LUG	2310- 35- 33- 5-C
N9GK(+KA9GKD,N9BW)	300,322-1241-121-32-D
KB9MO(+N9BSO,WD9DGA)	217,350- 945-115-21-D

Wisconsin

W9OP	243,316-1028-118-28-A
N9KS	53,246- 337- 79-11-A
W9HE	32,620- 233- 70-10-A
K9GDF	28,560- 238- 60-10-A
N9AU	19,032- 182- 52- 5-A
WB9HGS	12,126- 127- 47-10-A
W9YCV	7920- 90- 44-10-A
KB9S	87,576- 522- 82-17-B
W9WAQ	78,204- 395- 98-26-B
N9EZ	10,640- 140- 38- -B
W9VZR	252- 15- 7-18-B
WB9GGD	227,356-1006-113-26-C
WD9DEE	172,928- 772-112-25-C
WB9SVM	97,020- 495- 98-27-C
N9ACP	91,052- 442-103-25-C
WA9TGL	68,382- 393- 87-21-C
K9WTF	40,896- 288- 71-12-C
WB9ZEN	29,078- 217- 67-17-C
K9KR	26,532- 201- 66-11-C
N9HR	23,744- 212- 56-15-C
K9IAC	23,142- 203- 57-14-C
KA9GXE	17,920- 160- 56-26-C
K9JF	11,110- 101- 55- -C
WB9SVN	7056- 126- 28-13-C
KA9ARW	6848- 107- 32- -C
WA9BZW	5084- 82- 31- 5-C
W9CWK	4752- 72- 33- 5-C
K9BTQ	3960- 99- 20- 6-C
K9DWS	3840- 60- 32- 4-C
KB9DZ	3402- 81- 21- 6-C
WD9EFJ	2948- 67- 22- 4-C
WB9GZP	2108- 62- 17- 4-C
KA9CEJ	1496- 44- 17- 4-C
WB9EGZ(+W9XT)	290,720-1264-115-36-D
WD9EGE(+WD9BJA)	66,272- 398- 82-24-D

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Colorado

WØYK	657,882-2509-131-35-A
ADØD	226,352-1204- 94- -A
NØZA	76,006- 409- 89-21-A
WØRSR	51,264- 356- 72-12-A
ACØS	68,820- 465- 74- 9-B
WDØABI	65,008- 433- 68-23-B
WØETT	60,514- 369- 79- -B
KBØNF	14,852- 151- 47-22-B
KAØAIA/N	5888- 105- 23- 6-B
K9PVI	380,730-1715-111-26-C
K9MWM	342,576-1586-108-31-C
WØQKY	143,632- 764- 94-21-C
KAØFPJ	76,494- 627- 61-27-C
NØAJM	15,054- 193- 39-22-C
WBØYEA	7560- 126- 30-14-C
KØRF(+WØs UA UN)	777,888-2701-144-36-D
NØBNX(+KAØs HBE JCG,NØBOV)	31,500- 313- 50-21-D
WD9DTU/MØ(+WBØOAJ)	5148- 99- 26- 5-D

Iowa

WØEJ	224,084-1050-106-20-A
NØBB	46,800- 301- 75-19-B
WAØDWL	1184- 32- 16- 3-B
KBØPR	314,048-1402-112-28-C
WDØEIF	67,298- 437- 77-23-C
W9PPF	42,606- 263- 81-23-C
KØSRL	28,968- 204- 71-16-C
AGØM	15,792- 168- 47-21-C
KØEVC	13,950- 155- 45-17-C
KAØD	13,860- 165- 42-21-C
KAØGIS	5016- 76- 33- 5-C
WØGM(WAØUYW,WBØs SEL YUI, oprs)	265,984-1035-128-25-D
KØRW(+KØKWU,WØs JI NB, WA2CNF,WBØs SWD TKH)	157,080- 709-110-34-D
WØIO(AJØV,WA1MKE,oprs)	32,118- 303- 53-26-D

Kansas

WAØQMU	241,248-1077-112-32-A
WAØTKJ	50,700- 325- 75- -B
KFØM	29,636- 232- 62- 8-B
WDØFHK	29,312- 229- 64-14-C
WBØYJT	23,600- 236- 50-13-C
KØIEW	21,528- 207- 52-15-C
WØIIJ	13,468- 182- 37- -C
KAØGGH	11,328- 118- 48- 8-C
WBØSEZ(+WDØHRK)	12,636- 162- 39-14-D

Minnesota

KØMPH	100,264- 604- 83-17-A
KEØA	98,064- 681- 72-18-A
WØBF	13,140- 146- 45- 4-A
AFØQ	83,130- 489- 85-23-B
WAØWWW	24,766- 195- 61-16-B
KFØT	18,860- 186- 46-15-B
WAØLGU	16,192- 184- 44-18-B
WAØDEL	9144- 124- 36-11-B
KBØAX	8750- 114- 35-14-B
KØVW	7200- 100- 36- 5-B
KDØL	282,728-1198-118- -C
KBØC	144,768- 696-104-22-C
KAØDXG	136,338- 733- 93-23-C
WBØOHS	90,306- 519- 87-18-C
ACØW	72,288- 502- 72-24-C
KØSE	64,260- 315-102-15-C
WAØLPV	50,716- 414- 62-15-C
WAØVHX	38,080- 272- 70- 6-C
WBØFHS	30,652- 194- 79-28-C
WDØBQP	29,964- 227- 66- 8-C
WDØFOF	27,756- 257- 54-19-C
KCØA	18,000- 250- 36-13-C
WBØYUC	13,824- 192- 36- 6-C
WAØGNO	9594- 123- 39-12-C
KØSR(+KFØP,WBØHCH)	313,874-1295-121-31-D
WAØFPL(+NØBUI)	189,516- 929-102-29-D
WDØCEO(+WAØTVB)	96,390- 567- 85-24-D
WØSW(AIØE,AFØW,KNØKCW,WØs BAM WUG,WBØs QZF VYC,WDØs DTU GUX GUW HXW,oprs)	91,392- 544- 84-29-D
WAØYLE(+AEØQ)	68,800- 400- 86-24-D
KBØS(+KCØP)	63,520- 397- 80- -D
WBØQQW(+WA2HFI)	46,376- 341- 68- -D

Missouri

KBØRC	449,274-1681-133- -A
NØTT	219,300-1059-102-27-B
WBØLFY	111,108- 573- 94-19-B
KØRWL	13,502- 157- 43- 3-B
WDØHDB/N	648- 18- 18-12-B
WØXK	397,574-1451-137-28-C
WAØMTM	321,836-1319-122-30-C
WØCDC	38,394- 243- 79-33-C
WØQYG	22,144- 173- 64-17-C
KØUQV	16,016- 154- 52- 9-C
KØMYD	10,368- 96- 54-10-C
WØERZ	4788- 63- 38- 7-C
AKØW	4260- 71- 30-13-C

KØFA(+KBØE,KEØW,NØs AOP AQC AQZ,WØOQ,WEØOQV)	250,372-1181-106-27-D
WBØMUU(+KØMAT)	43,920- 244- 90-15-D

Nebraska

KØSCM	377,704-1523-124-30-A
KØSW	36,938- 253- 73-16-B
W6SSC	118,084- 557-106-29-C
KAØDXR	24,376- 277- 44-18-C
WDØGIL	18,944- 256- 37- 8-C
KØDI(+KØKTZ,WBØQLH)	83,430- 514- 81-15-D

North Dakota

KFØA	112,882- 733- 77-11-A
WBØBNR	50,274- 441- 57-20-A
AKØT	12,714- 163- 39- 6-B
WDØCHC	65,920- 824- 80-12-C
WØCAQ	29,376- 288- 51-12-C
KCØW	15,688- 212- 37- -C
WØHSC(+WBØYVX,WDØAJS)	64,240- 588- 55-13-D

South Dakota

WDØBWH/N	50,700- 347- 65-21-B
WBØMWJ	226,240-1120-101-20-C
WØACT	90,240- 564- 80- -C

VE

Maritimes - Newfoundland

WB5UWI/VE1	224,616-1146- 98- -C
VE1ABI	168,300- 825-102-25-C
VE1UNB(VE1s ABU BTG STR GF, oprs)	340,632-1494-114- -D

Labrador

VO2CW	584,256-2148-136-26-C

Quebec

VE2MJ	158,550- 755-105-22-A
VE2WA	100,672- 479-104-19-A
VE2UM	52,316- 304- 82-23-A
VE2FGS	179,800- 899-100-30-C
VE2FSM	46,248- 282- 82-16-C
VE2DZE	34,572- 258- 67-12-C
VE2ATF	23,940- 210- 57- -C
VE2XL	13,132- 134- 49-17-C
VE2FMH	11,656- 124- 47-12-C
VE2KW	6240- 104- 30-13-C

Ontario

VE3KME	65,296- 424- 77- -A
VE3FEA	9016- 98- 46- 6-A
VE3BMV(VE3CWA,opr)	305,592-1261-119-36-B
VE3DAP	122,364- 587-103-24-B
VE3LUG	1536- 38- 16- 6-B
KB6FR/VE3	302,872-1156-131-28-C
VE3FIU	39,936- 256- 78-16-C
VE3MV	33,110- 215- 77-14-C
VE3IHB	18,040- 164- 55-10-C
VE3GWM	9000- 125- 36- -C
VE3BPC(VE3s EEH ENF,oprs)	60,724- 323- 94-31-D
VE3KPL(+VE3HQU)	55,002- 309- 89-24-D

Manitoba

VE4AED	782- 23- 17- 3-A
VE4YY	47,792- 374- 61-14-B
VE4AES	157,122- 903- 87-25-C
VE4AIE	54,120- 492- 55-17-C
VE4QZ	42,448- 379- 56-18-C
VE4VV(+VE4RM)	585,640-2386-121-29-D

Saskatchewan

VE5AAO	41,624- 438- 44-16-B
VE5JQ(+VE5s BBQ ZU,K5MH)	127,452- 807- 73-23-D
VE5DB(+logger)	72,494- 541- 67-18-D

Alberta

VE6MP	72,834- 597- 61- 6-A
VE6UD	228,058-1107-101- -B
VE6PD	3916- 58- 22- -B
VE6CGY	14,602- 149- 49- -C

British Columbia

VE7CGN	45,750- 365- 61-16-B
VE7CVM	333,480-1588-105-24-C
VE7DFO	238,788-1474- 81-34-C
VE7EL	204,370- 955-107-26-C
VE7AWT	152,192- 928- 82-20-C
VE7CTD	35,088- 344- 51-17-C
VE7FG(VE2EUB,VE7s CMT EMX ENF,oprs)	436,224-1513-142-24-D

Yukon - N.W.T.

VY1CC	155,526-1127- 69- -C

Check Logs

K1OW,N1ACJ,WA1POZ,N2GU, W3ARK,W3JXQ,W3UT,K4PQL, KB4IY,WB4BBH,WB5QPH,WD5JTZ, K6FM,KA6JHU/N,KF6I,AK7J, K7EW,N7DH,WD8BOK/N,KA9CQM, KA9HUW/N,W9CG,NØBGQ,VE3ASJ, VE3CYX,VE3DGX,VE3GJH,VE6OU, DL8BL,EA7AKQ,F6BIA,F6CLM, G3WP,HA8BY,JH7RZW,LA3JAA, LA5BE,LA6XI,LA9TG,LB1GB, LZ1IA,LZ2CC,LZ2KKZ,OH1EH, OH1PS,OH5PT,OK1DIB,OK1XC, OZ1EXZ,OZ9PR,OZ9RL,PAØTV, PAØUV,PT7ZMG,SM5ARG,SM5ARL, SM6AYM,SM6BZE,SM6HCX, SM/ASN,SM7GCP,SM7IWN, SMØJHF,SP4HKN,SP5ACN,SR3XR, RA3DDU,RA3DFN,RA3DPD, UA1WEA,UA3ACD,UA3AGG, UA3DAT,UA3DGI,UA3DID, UA3DL,UA3QGP,UA3RFZ, UA3TAG,UA3TBK,UA3TOP, UA4ACP,UA4ADG,UA4AHT, UA4FDD,UA4FDS,UA4QM, UA4YAB,UA6AJG,UA6ARP, UA6PCJ,UA9CFC,UA9FHK, UA9SHU,UA9UKL,UA9UOF, UA9WFB,UA9XS,UA9YBR, UAØCEY,UAØWAV,UB5UEV, UB5VAA,UB5WOD,UK6ACR, UK9AAP,UK9HAP,UK9SAZ, UK9UAA,UK9XAN,UKØSAZ, UL7GAA,UL7QF,UM8MDZ, UP2BDX,UR2CR,UR2OU, UR2JL,UT5CF,UV3FL,UV3MM, Y21CF,Y22PK/P,Y23PF/A, Y24NO/A,Y25TO,Y27FN,Y31JG, Y38WA,Y41ZH,Y47YM,Y51YF, Y56WG,Y86YL,NL5288

Disqualifications

WB6FCR,WAØLKL,K7SS(+K7RA), 4V2B(HH2BM,opr)

Rules, 1981 ARRL UHF Contest

Let's make this the year that we don't trust to "fate" for an ample number of stations to work during the UHF Contest. Let's start now. We can talk it up on those weekly 432 nets/schedules and convince the noncontesters to give the UHF Contest a shot. We can also get cracking on building that 1296 station that's been put off a season too long (might even pay off in the September VHF QSO Party). We've simply got to do better than those all-too-few (120) entries that were received for the 1980 UHF Contest. With a little planning and effort, we can make this UHF Contest a major operating event.

Complete rules follow. Don't forget to send a self-addressed, stamped envelope (s.a.s.e.) to ARRL for official entry forms.

Good luck.

Rules

1) The 1981 ARRL UHF Contest begins at 1900 UTC on Saturday, August 8, and ends at 1900 UTC on Sunday, August 9. Entrants may use as much of this period as they wish.

2) Contacts may be made on all authorized amateur bands above 220 MHz, using all authorized modes of emission. (However, use of the 430-MHz band is limited to 430-433 MHz, inclusive.)

3) No station may contact any other station more than once per band for QSO credit, regardless of mode.

4) For a valid contact to occur, each station must send *and* receive an exchange consisting of a signal report plus either a four- or five-digit number, indicating the position of the station in longitude and latitude, rounded *down* to the next whole number.

Example: K8WW in Seven Hills, Ohio, would send 59 and 8141 as his exchange, since his longitude and latitude are 81° west, 41° north. WB6NMT in San Diego, California, might send 599 and 11732 (117° west and 32° north). Even a station at 117°, 59′ west would send 117, not 118!

Stations not competing in the contest may be counted for contact and multiplier credit if they send their location with enough specificity that the competing station may determine the appropriate longitude-latitude designation.

5) Partial QSOs do not count. Both calls, the full exchange, and acknowledgement must be sent and received.

6) Fixed, portable or mobile operation under one call is permitted. Only land-based stations (not aeronautical or maritime mobiles) may be counted for multipliers. A portable or mobile station may not be counted for more than one QSO per band, even if the station is moving. However, a station that changes locations may be contacted for additional multipliers but only once for QSO points.

7) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not subsequently be used during the contest period under any other call sign, even if more than one call is assigned to a given location by the licensing authority (except for family stations). One complete station must exist for each contact an entrant claims.

8) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

9) All equipment and antenna adjustments, logging and operating must be performed by one person for a station to qualify for single-operator status. All stations in which more than one person participates in any of these functions during the contest period are classified as multioperator stations.

10) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (i.e., able to communicate over a distance of at least a kilometer).

11) Scoring: a) Each completed contact on the 220-and 430-MHz bands is worth three contact points. QSOs on 1296 MHz are worth 6 points each, while those on 2304 and higher frequencies are worth 12 points each.

b) The total multiplier is derived by counting the number of different exchanges (i.e., longitude and latitude numbers) received on each band and summing these band totals. Thus, each geographic area one degree in longitude by one degree in latitude is a unit worth one multiplier and may be counted as such on each band on which they are worked.

c) The final score is determined by adding up the contact-points amassed on all bands used and multiplying that total by the sum of longitude-latitude multipliers on each of the bands.

Example: W3HMU works 25 stations in 12 one-degree multipliers on 220 MHz. 34 stations in 17 multipliers on 432, 10 stations on 1215 MHz in six multiplier blocks, and one station in one multiplier on 2304 MHz. He has 249 contact-points (75 + 102 + 60 + 12) and a multiplier total of 36 (12 + 17 + 6 + 1), for a final score of 8964 points (249 × 36).

12) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work in that area, even if the repeater is turned off.

13) A station located precisely on the dividing line between two one degree longitude or latitude units may select either one as his location but may not hand out both multipliers without moving his complete station (including antennas) at least 100 meters.

14) Entries must be postmarked no later than August 27, 1981, and must set forth the call sign, exchange (both sent and received), time/date, frequency/band and mode used for each claimed QSO. An accompanying summary sheet must list the total number of QSOs and multipliers (both broken down on a by-band basis *also*), the final claimed score, a description of the equipment used, calls of *all* operators if multiop, mailing address and station location, and a signed statement that all rules and regulations have been followed. Also note the best DX QSO made on each band.

15) The high-scoring single-operator and multioperator station in each ARRL *Division* will receive a certificate. Additional certificates will be awarded at the discretion of the ARRL Awards Committee.

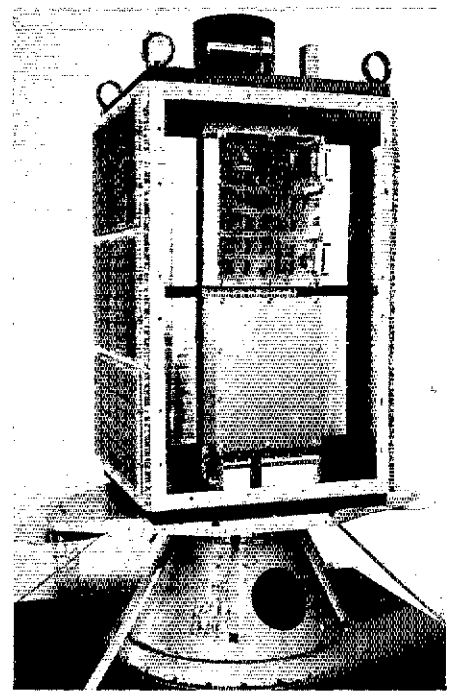
16) Disqualifications: see January 1981 *QST*, page 79.

Strays

BRITAIN'S FIRST AMATEUR SATELLITE

Construction is now entering the final stages of the UoSAT experimental spacecraft at the University of Surrey, England. Project Manager Dr. Martin Sweeting reports the launch is currently scheduled on a NASA Delta mission, accompanying a Solar Mesosphere Explorer spacecraft, at 1119 UTC on 15 September 1981, from the Western Test Range at Vandenberg AFB, California.

Primary mission objectives are: hf ionospheric propagation studies, evaluation of shf for amateur space communications, slow-scan TV image experiment, rapid global data dissemination, speech telemetry experiment and evaluation of "gravity-gradient" stabalization techniques for use with low-orbit amateur spacecraft. Further objectives are to stimulate wider interest in the space sciences by including an experimental voice telemetry system and a simple camera capable of transmitting slow-scan TV compatible pictures of earth and cloud cover in a format suited to small terminal users. — *Bernie Glassmeyer, W9KDR, OSCAR Program Manager*



Design for the UoSAT came from AMSAT's OSCAR 8. The spaceframe is the same width and depth, but twice as high. The beacon antennas, located on the bottom of the spacecraft, are (left to right) 10 GHz (helix), 145 MHz (four, 19-inch canted turnstiles), 435 MHz (four, 7-inch canted turnstiles) and 2 GHz (helix). Inside, the 6-Ah, 14-Vdc Ni-Cad batteries can be seen on the bottom, and above them part of the 12 electronic modules. The cone-shaped test stand is the same one used for OSCARS 7 and 8. (*photo courtesy University of Surrey*)

Public Service

Conducted By Robert J. Halprin,* K1XA

The Feeling Thermometer

A regular thermometer registers your temperature. The feeling thermometer registers your opinion. Are you hot, cold or lukewarm about the information in the Public Service column? One of the ways that opinions, attitudes and beliefs are compiled is through the use of the survey questionnaire.

In recent times, we've seen readers' surveys done in "How's DX" and "FM/RPT" (not to mention the high-powered Florida State Amateur Radio survey, which used a sophisticated methodology). And periodically the editors of *QST* survey a sample of the membership about the content of the whole journal. What you see before you, however, is the first-ever Public Service column readers' survey. The idea here is to permit the reader to tell the conductor where to get off!

In other words, the intent, as shared with the conductors of the columns just mentioned, is to improve the editorial dimensions and, accordingly, your reading enjoyment of this department. If you aren't too tired from completing other surveys, you can help us achieve those goals.

There are 18 questions in the survey — the first portion is primarily opinion, the second mainly demographics. The questionnaire is a mixture of open- and close-ended questions — when responding to the open-ended ones (3, 4, 5 and 11), please print or type. Use additional sheets if necessary.

It is important that as many people as possible answer these questions, so that the results will be representative of the reading "population." Please complete and mail the survey to your conductor, Robert Halprin, K1XA, at League headquarters. The results will appear in a future column.

1) In your honest opinion, as compared to the other columns in *QST*, the Public Service column is (check *one* response):
☐ much better
☐ better
☐ about the same
☐ worse
☐ much worse

2) Please rate your interest in the various components of the Public Service column by placing *one* number in each blank. KEY: 1 = very interesting 2 = interesting 3 = no opinion 4 = not interesting 5 = never read

the lead editorial_____
PSHR_____
BPL_____
Repeater Log_____
Public Service Diary_____
ARES Reports_____
SEC Reports_____
Communications Service of the Month_____
NTS Reports_____
Independent Nets_____
Other (specify)_____

3) What topics would you like to see covered more often in the Public Service column?_____

4) What topics would you like to see less often in the Public Service column?_____

5) What improvements can you suggest for the Public Service column?_____

6) Are you familiar with the new *ARRL Operating Manual?*
☐ yes ☐ no

7) If yes, how would you rate this publication?
☐ excellent
☐ good
☐ fair
☐ poor

8) Are you familiar with the names of the countries that have signed third-party traffic agreements with the U.S. or Canada?
☐ yes ☐ no

9) During the past 12 months, on the average how many hours per week have you spent using any of the following modes? (Insert *one* number in each blank.)

ASCII_____
cw_____
fm_____
RTTY_____
ssb_____
other (specify)_____

10) Can your home station operate without commercial power?
☐ yes ☐ no

11) Give a brief description of your station (rigs, antennas, amplifiers and so on)._____

12) Do you hold an ARRL appointment from your section communications manager?
☐ yes ☐ no

13) If yes, please specify appointment(s):_____

14) In what field(s) of public service communications, if any, are you active? (check *all* those that apply)
☐ ARES
☐ RACES
☐ NTS
☐ MARS
☐ Local Public Safety Events
☐ International Phone Patching
☐ Low-Band Monitoring Services
☐ Independent Traffic Nets
☐ Other (specify)_____
☐ None

15) What is your class of license?
☐ Novice
☐ Technician
☐ General
☐ Advanced
☐ Extra

16) How long have you been licensed?
☐ less than 2 years
☐ 2-5 years
☐ 6-10 years
☐ 11 or more

17) What other Amateur Radio on-the-air activities, if any, do you participate in? (check *all* those that apply)
☐ DXing
☐ Ragchewing
☐ Awards Chasing
☐ Contesting
☐ Satellite Operating
☐ Others (specify)_____

18) Where do you live? (state or province)_____

PUBLIC SERVICE DIARY

☐ Fremont, Nebraska — February 16. After trying unsuccessfully for more than three days to reach his son in South Carolina by telephone with important information, WDØHWR sent a message via the South Carolina SSB Net. Less than 30 minutes after the message was sent, local police located the son and told him to get in touch with his father. (WDØHWR)

☐ Port Jervis, New York — February 19. When ice and flooding cut the telephone cable across the Delaware River linking Port Jervis with Matamoras, Pennsylvania, hams provided communications for police, fire and Red Cross officials. (WA2JCP)

☐ Katy, Texas — March 7. Several members of the Katy Amateur Radio Society assisted Harris County deputies in the search for an 11-year-old boy reported missing during the early morning hours. After a combined foot, auto and aerial search, the youth was found some 30 miles away unharmed. (WB5WBG)

☐ Titusville, Florida — March 18. A training drill turned into a real emergency for the Central Brevard Emergency Net when local civil defense officials requested communications assistance during the search for two young people lost in an area threatened by brush fires. Using 2 meters, the hams aided police and searchers, and the young people were found safe. (WB4WYG)

☐ Victorville, California — March 21. A 10-year-old girl suffered an accidental gunshot wound while target shooting. WB6CUO was on the scene and called for help via 2 meters. WB6QFU answered the call, calmed WB6CUO down, and directed him toward the nearest hospital. She then called the sheriff's office and requested an ambulance be sent to meet WB6CUO. The girl arrived at the hospital in less than 20 minutes, and the operating surgeon credited WB6QFU with saving her life through quick action. (K5EDS and N6BXY)

☐ Shelton, Washington — April 26-27. Local authorities requested additional communications between search parties while looking for a lost three-year-old girl. The search was later called off because of darkness, but the next morning the girl was found in good condition. (KA7IES, EC Shelton Co.)

*Assistant Communications Manager, ARRL

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Port Jervis, New York — February 12. When heavy rains and thaw caused an ice dam on the Delaware River, the resulting raging flood waters inundated this locality and completely isolated Matamoras, Pennsylvania. Orange County ARES members and many other Amateur Radio operators provided vital emergency communications for several service organizations using the 2-meter repeater, WR2AAC. (WB2SON, EC Orange Co.)

☐ Montgomery County, New York — February 20-21. Large ice jams and heavy rains caused major flooding along the Mohawk River. The civil defense director requested assistance, and hams kept track of the flooding and reported to civil defense headquarters via 2 meters. (KA2AYZ, EC Montgomery Co.)

☐ Crofton, Kentucky — March 14. A freight train carrying phosphoric acid derailed, forcing about 65 families to flee their homes. Local hams provided, via 2 meters, emergency communications for the Red Cross as temporary shelters were set up. (WA4KLN, EC Christian County)

☐ Cocoa Beach, Florida — March 27-30. Eleven people died and dozens were injured in the collapse of a building under construction. Amateurs were called upon to assist, and more than 59 hams responded to help the Brevard County Civil Defense and the Red Cross coordinate the rescue. Using 2 meters, the amateurs helped arrange for rescue workers, equipment, food and medical supplies. (KB4OW, EC South Brevard Co.)

☐ Huntsboro, Alabama — April 1. When a tornado struck, hams provided communications assistance for police, Red Cross, church and welfare agencies. Stationing themselves in central locations, the hams relayed 131 messages via 2 meters. (K4JNL, SCM Georgia)

☐ Moberly, Missouri — April 19. The Tri-County ARES Net convened to assist the Moberly Police Department search for a missing three-year-old child. Several net members teamed with the Rescue Squad and maintained communications with the NCS at police headquarters. The child was later found unharmed. (WBØENV, EC Randolph Co.)

☐ Farmingdale, New York — April 23. KA2EYR and KA2HFH were mobile in front of a lumber yard when they witnessed an explosion and fire. They quickly notified the Farmingdale Fire Department. (WA2SUB, EC Babylon)

☐ Brookshire, Texas — April 23. A small plane was blown from the sky by a thunderstorm resulting in at least one fatality. K5CNU, a fire control expert, and WB5FIV, a paramedic, assisted police with damage surveys. (AB5X, EC SW Harris Co.)

☐ Santa Barbara County, California — April 28. KB6PX used 2 meters to report a vehicle on fire. WB6BWZ responded and called in the emergency by landline. He made follow-up calls every 10 minutes until fire equipment arrived. (WB6BWZ, EC Santa Barbara)

COMMUNICATIONS SERVICE OF THE MONTH

The great "snowstorm" of March 1981 provided an excellent opportunity for the Amateur Radio operators of western North Carolina to "show their stuff" to the community. Through the combined efforts of many individuals and the cooperation of several local repeater owners, many stranded motorists, hams and nonhams, were able to receive the necessary assistance.

Using the 16/76 repeater located on top of Mount Pisgah and owned by WA4BVW, the 04/64 repeater located on top of Bearwallow Mountain and owned by WB4YAO, and the 31/91 repeater on Spivey Mountain owned by the Western Carolina Amateur Radio Society, emergency nets for assistance and information were established during the afternoon and evening hours of March 22, 1981.

Besides the normal traffic in the area, many amateur operators were on the roads returning from the North Carolina State Ham Convention in Charlotte, North Carolina. Up to 10 inches of snow made the mountain roads hazardous. Poor weather conditions in the surrounding areas of upper South Carolina and Central North Carolina added to the problem.

WB4SXR and W4HHE, both of Asheville, North Carolina, coordinated activities on the 16/76 and 31/91 repeaters. Many stations, including WA4CNI, WA4LNZ, K4GHH and WA4MTY, shuttled information, including road and traffic conditions and health-and-welfare reports and requests, between organized nets.

The "dramatic" rescue of the evening took place using the 04/64 repeater when WA4QQN, of Skyland, North Carolina, was serving as net control of the impromptu emergency net. N4NH, of Asheville, was mobile trying to return his son to school in Boone, North Carolina, when his car generator quit on an isolated stretch of road north of Marion, North Carolina, in McDowell County. N4NH was losing battery power and could only partially reach the repeater. By using the "two kerchunks for yes, one for no" method, Dan was able to determine N4NH's approximate location. WD4CUF and KA4CHZ, both of Marion, contacted the local rescue squad and informed them of the situation and the location. After several hours of anxious waiting, N4NH "kerchunked" the repeater to let the net know that help had arrived.

Many other stations assisted during the operation including WD4IHH, W4HVL, WD4OUW, K4KEP, KA4HPM, WD4PTL, WA4UTY and WD4AAK. In addition to receiving help during the storm, K1HNY, of Knoxville, Tennessee, who was stranded on I-26, relayed information to the net for those who were stalled around his vehicle.

By the following morning the major highways were cleared, and all stations that had requested aid were accounted for, in good condition and back on their way. Many people, hams and nonhams, were grateful for the work and concern shown by the "mountain hams." — *Dan Henderson, WA4QQN, Fletcher, North Carolina*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For April, 39 SEC reports were received denoting a total ARES membership of 20,479. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, EBay, Ill, Ind, Kans, Ky, La, Me, Mich, Minn, Nev, NH, NLI, NC, NFla, NTx, Ohio, Ont, Org, SV, SDgo, SJV, SBar, SCV, Sask, SC, SFla, SNJ, Tenn, Va, Wash, WVa, WMass, WNY and WPa.

☐ The following repeater groups assisted with communications during the 1981 March of Dimes Superwalk: WA4HBM, KH6AH, K1DIY, WR4ABN, WR1ABP, WR5AKZ, WRØAHT, WA6ATY, WA7JAW, WB6PVS, WR4ALJ, W1WQM, WR3AGI, WAØREX, WA3JDX, W6ASH, WR3ADK, WR2ACN.

REPEATER LOG

According to reports received between April 21 and May 21, the following repeaters 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
N1AHH								1			1
K1FFK	1										1
W1QXR								2			2
WR2ANF	2						5				7
W2ALS	1						4				5
WR2ADB	2				1		3				6
WR2AHD	2				1		5				8
WR2AIS								4			4
WB2NQV				2	1			1			4
W2VL			1		10	1					12
WR3ABM							1				1
N3AIA				1	4						5
W3CWC			1	4	4	3	2	4	8		26
K3JSZ					1			3			4
W3UER			1		5	2	1			1	11
WA3ZXG					4			6			10
WR4AHQ	2								1		3
WR4AMA							1				1
WR4AMJ					2			1	3		6
WR4AVI				1					1		2
K4BQP					1						1
WB4BXM	2				2		1		1		6
W4HFH								1			1
W4JNB	1										1
W4LBL					67						67
WB4QES			4	1	16	1		3			25
W4WQ	1										1
W4YXO	2								1		3
WR5ABW							1				1
WR5AKZ	4				2						6
K5DI					2						2
WB5RDD	2										2
WB5VFF				1	1						2
WR6ADX									1		1
WR6AEN			1	1	31	3					36
WR6AFV									1		1
WR6AIS									1		1
N6BAE									1		1
WA6EUZ					11	1	1				13
K6FB									1		1
W6FNO							1				1
W6KPS					1						1
WB6OQS									1		1
W6PVR								1	4		5
WB6PVS				1	2	1			5	4	13
WB6QEV					1						1
KG6RN	1								2		3
W6UU										1	1
WA6WTT					3					1	4
WC7AAT										1	1
WR7ACE					1		1				2
WR7AJF					1						1
K7CC				3	2				1		6
W7WGW				1	2						3
WR8AES									2	5	7
WR8AJL									1		1
WR8ARB										2	1	3
K9AAJ										1	1	1
WR9ADQ										1		1
W9FUL	4								2			6
K9PQP										1		1
WB9YJF	8										1	9
WRØAEV	1											1
WRØAMX	51											51
WØCXH	1				1				1			3
WØKE	7				4							11
KØRAJ	1											1
Total	96		8	16	185	12	8	38	63	4		430

NATIONAL TRAFFIC SYSTEM

The bands were punk — not rock 'n roll, but amateur. Poor conditions, in other words, severely hampered NTS activities. The summer doldrums are here.

Welcome KB8MX as new manager of 8RN/c2, succeeding WD8KZX. VE3QI is back in the fold on ECN. The 1930 UTC session of 2RN is meeting on 7235 kHz for the summer. Certificates: TWN/c2 — NØBFH NØBDE WA7WQE N7RG. 2RN/c4 — WA2JBO WA2SEL WB2KMY (first annuals) WA2SPL (fourth annual). EAN/c2 — W1XX W2RQ W2XD WD4CNR WD4CNQ WA4LJI WA4CCK WD4FTK WB4UHC W3ATQ.

April Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	30	1163	38.8	.813	91.7	
CAN	30	939	31.3	.518	100.0	
PAN	59	705	11.9	.366	100.0	
Region Nets						
1RN	56	278	4.9	.309	70.1	100.0
2RN	60	322	5.4	.290	95.3	100.0
3RN	30	189	6.3	.333	91.0	76.7
4RN	60	972	16.2	.577	83.0	100.0
RN5						100.0
RN6	89	481	5.4	.241	70.0	100.0
RN7	60	501	8.4	.594	100.0	100.0
8RN	59	310	5.3	.311	82.2	96.7
9RN	60	434	7.2	.364	100.0	100.0
TEN	55	238	4.3	.155	54.6	100.0
ECN						76.7
TWN	59	243	4.1	312	61.7	100.0
TCC						
TCC Eastern	102[1]	599				
TCC Central	82[1]	621				
TCC Pacific	99[1]	347				
Cycle Four						
Area Nets						
EAN	30	2146	71.5	1.658	97.2	
CAN	30	1140	36.8	.882	98.3	
PAN	30	1051	35.0	1.031	99.4	
Region Nets						
1RN	55	755	13.7	.590	89.7	100.0
2RN	89	748	8.4	.585	93.7	96.7
3RN	60	450	7.5	.625	98.3	96.7
4RN	60	1064	17.7	.609	96.7	96.7
RN5	60	805	13.4	.585	88.1	100.0
RN6	60	622	10.4	.425	100.0	100.0
RN7	60	593	9.9	.770	99.0	98.3
8RN	59	446	7.6	.377	97.0	96.7

9RN	60	423	7.1	.337	96.0	96.7
TEN	60	375	6.3	.314	83.3	98.3
ECN	60	218	3.6	.305	87.0	96.7
TWN	60	496	8.3	.410	93.7	100.0
TCC						
TCC Eastern	99[1]	544				
TCC Central	82[1]	458				
TCC Pacific	115[1]	801				
Sections[2]	8003	34,668	4.3			
Summary	9642	56,155	5.8			
Record	7420	51,475	19.1			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (256): APSN ATN (AB), AENB, AEND, AENI AENJ AENK AENM AENR EBN (AL), HARC SWN (AZ), BCEN (BC), NCN SCN NCN (CA), COBN CWN HNN (CO), CN CPN RTN WESCON (CT), DSSN DTN (DE), FAST FMSN FMTN FPON FPTN MEN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), CGVHFN CVEN GCN GSN GSSBN GTN (GA), I75MN IANBPM ICN ITEN TLCN (IA), IMN MCEN (ID), IEN ILN ILPN NCPN (IL), HVHFN ICN IPN IWN OIN (IN), KPN KSBN (KS), 4ARES 6ARES BARES CARN KNTN KPON KRN KSN KTN KYN MKPN PREWTN SEKEN SFARES TSTMN (KY), LAN LRN LTN (LA), EM2RN EMRI EMRIPN HHTN NEEPN RIEM2MTN WMFN WMN (MA/RI), MEPN MMN MTN WRIN (MB), MDD (MDC), MACS MITN MNN QMN SEMTN UPN (MI), MNAMWXN MSN MSPN (MN), ACE MEOW MOSSB NEMOE (MO), APN (MR/NF), CAEN MN MSBN MSN MTN (MS), BRTMN CFARS CMN CNCTN CNN JFK LCTMN M2MTN NCAERSN NCSSBN P220 PCTN RARS SGNTN SCSSBN THEN TRN WSCEN (NC/SC), DATA (ND), CCTMN MNARES NCHN NE4Ø NE75 NMPN NWVN NDN PSTV2M WNN (NE), GSFN GSPN NHN (NH), JSARS NJN NJPN NJVN NWNJVN OBTTN SOCTN UCETN (NJ) NMBC NMRRN SWN Y2MN (NM), NSN (NV), CDN CNYTN EPN HVN NLIPN NYPON NYS OCTEN SDN STAAR STAR WDN (NY), ALERT BN BNR CCOMF FRC HCARC LCNWARES NWOARC O6MN ONN OSN OSSBN RARA TATN TSRAC VWCEN (OH), OFON OLZ ONON STN (OK), KTN LN OLN OSN OPN (ON), BSN ORARES OXN PDXARES PTTN SOARES WCN (OR), EPEPTN HARCTN NWPATMTN PFN WARCVTN WPA WPATMTN (PA), SATN (SK), CW LF TN TPN TSN TVHFN (TN), DFW TEX TJN TSN TTN (TX), BUN UCN (UT), VTN VTSSB (VT), VLN VN VNTN VSBN VSN (VA), EWTN ITEN NTN NWSSBN PSTS SCARES WARTS WSN (WA), WVARES WVFN WVHN WVMDN WVN WVNN WVPN (WV), BEN BWN NWTN WIN WNN WSBN WSSN (WI), WCN JN (WY).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

TCC-Eastern/c2 certificates were awarded to W1QYY, W1XX, K2PL, W2ZOJ, WB3GZU, AF8V, W8PMJ, VE3CWA, VE3QI, VE3GOL, WB8YDZ, WA2MFV and K3JSZ.

1	2	3	4	5
Cycle Two				
TCC Eastern	120	86.0	1188	599
TCC Central	90	91.0	959	621
TCC Pacific	120	82.5	894	347
Summary	330	86.2	2841	1567
Cycle Four				
TCC Eastern	121	81.8	1688	544
TCC Central	90	91.1	901	458
TCC Pacific	120	95.8	1591	801
Summary	331	89.6	4180	1803

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (April) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s COB RQ XD ZOJ, WB2IQJ, K3JSZ, WB3GZU, W4s JK SQQ, WA4CCK, WB4PNY, AF8V, W8PMJ, W8BYDZ, 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, W9s HOT JIJ JUJ NXG, WDØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, N6GW, W7s DZX GHT VSE N7RG, WA7GYQ, WB7TQF, WØs EJD HX8 RE, WBØMTA, NØTU, WDØAIT, KØDJ, KDØM, NØBDE. *Cycle Four* — Eastern Area (W4SQQ, Director) — W1s KX NJM, K1s BA FIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — W4ZJY, W5s RB SBE TFB, N5s RB RT TG, K5TL, W9s CXY DND NXG, K9BVE, WB9UYU, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s LOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW, W7s DZX EP GHT LYA VSE. WA7GYQ, KØs BN OJ TER, WØHXB, WDØAIT, VE7ZK.

Independent Nets (April 1981)

1	2	3	4
Amateur Radio Telegraph Society	30	1543	327
Central Gulf Hurricane Net	30	195	2546
Clearing House	30	138	329
Early Bird	30	895	337
Empire Slow Speed	30	59	382
IMRA	26	483	1068
Mission Trail	30	278	1427
New England Teleprinter	12	105	65
Northeastern Single Sideband	20	20	75
Southwest Traffic	30	104	1491
20-Meter ISSB	26	85	48
75-Meter ISSB	30	468	970
7290 Traffic	48	835	2861

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll April 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.

885
KA9CPA
221
KZ4K
219
KY4K
179
N1BHH
157
W7LRB
155
WD4COL
152
WD8LRT
148
W7VSE
148
WA4PFK
147
KA1ON
146
WB3GZU
145
N4EDH
142
K5CXP
130
WD4AWN
128
N9BYK
WB4FDT
W7LNE
127
WD6CSL
126
NG4J
124
KB5TC
123
WB4FVV
122
WA6RVT
KB5NX
119
AA2H
118
K8OZ
KG1G
117
WDØCID
W9YCV
116
WA1TBY
W9JUJ
115
K4SCL
WB7DZX
114
WD4HIF
W4ANK
113
AA4FG
112
WB1CPF
WA4DDH
WB5YDD
W4NFK
111
KA8CPS
109
WB4WYG
VE3GOL
WA4YIU
K4JST
KA3CDQ
108
WØOYH
K1OSM
WB7TQF
107
W2GLH
W2MTA
WA4UTC
106
W2ZOJ
KA2CTU
AF8V
105
K2VX
K7GXZ
KU4W
104
N9AUG
AK1W
K3RZR
WA3PXA
AF2L
103
WB1HIH
NJ4L
W1RWG
102
WB2ZCM
WDØAIT
WB2MCO
WA4SRD
KE7I
K2GCE
101
WA3WIY
WD4CNR
W5VMY
100
W1EOF
WA4CCK
KA3DTE
KB3DT
AG2R
99
K3JL
KA4ASZ
W2YJR
W2XD
WD4ALY
KA1BJY
98
W4WXH
97
N8CW
WB8JGW
KA8DJZ
WB8MTD
W6NTN
96
WD8IBY
KA4GFU
W2UEZ
KBØMB
95
WA3NAZ
WA4STO
W4NWM
WDØDEX
WD8RHU
94
W5DTR
N4AZI
KN6C
93
WD5JYI
92
KB2WI
AJ3R
91
KA4LNA
90
WA5RKU
N7AKX
VE1WF
W4JK
WA2KOJ
KA7JEX
K3JSZ
K9BVE
NB4L
WP4BDS
WAØTNM
89
WØFT
N1NH
W4CKS
WB3CAI
KB5UL
K1BSO
KC5FX
88
KA1DZV
W9DM
WA7MEL
WA7IHS
87
KT6A
N2APB
KA2GQQ
W5CTZ
86
N5TC
KB8MX
W4OGG
AG9G
KA2BHR
KK5B
85
VE3KK
KA1BBI
W7BS
WA4EIC
N6AWH
NP4D
84
WB8SYA
N9AEI
N5BT
W5KLV
WD4CNQ
KA2GSL
KAØE
W1TN
WB2OWO
83
KB2KW
WA4EYU
82
K3CR
WB6QBZ
W7FJZ
K6YD
WØKJZ
KC4MW
81
N5RB
W5VMP
AFØO
KZ4G
80
VE3DUK
K4EV
VE3HGJ
KA2CLQ
KØEZ
KB4OZ
W7GHT
79
WB8YDZ
W4GPL
KA9HPQ
KA4MZY
W4FMN
WD8KBW
KF8J
78
VE3GT
WB5MMI
W9NXG
N4PL
77
WA4PIZ
AC3N
KA5CFP
KA5AVQ
KE8X
76
WB2IXR
KF4U
WA6LVO
75
WB1ESJ
WA8PIM
WB1GXZ
KI2D
KØPIZ
W8VPW
74
VE3QI
W6RNL
W6HUJ
K7JV
73
W5JOV
WA2ZJP
W2BIW
AJ5F
VE5AE
W9QLW
WD8PMW
N9AZI
K5TL
72
VE3JRT
KA3BMU
N2BDW
W1BJ
KG5L
KAØBCB
N4AXN
71
K8AAZ
WA7LGN
WD9AJA
WA2CUW
WB9YPZ
W3VA
WB6BZZ
K4IWW
70
W8GGK
W9IOH
KB7JW
VE5HG
KØSI
WB2LJK
WD8BHE
N4UF
KA3T
69
KØCY
W8UPD
KA5AZK
KA8GVZ
WD4JJK
WB8SIQ
WBØHOX
WB7DEX
68
N8BJD
W1JTH
VE5AAT
KØJCF
K4EJ
WB5UVX
WB9JSR
KA2ELB
67
KA9GBE
N4BZH
N5CEK
KØDJ
AD7G
WD8PEI
W8EK
66
WA8GMT
NP4F
N3BKV
K4ZN
WB2IDJ
KB2OE
65
WBØQAM
K8DTG
N6GW
N2BNB
N3AZT
AA3B
WP4AOH
KCØT
64
VE3HTL
WA7GYQ
N6ANL
WD5DQR
WA3WQP
WA3EHD
WB3HTW
KA2JMH
63
W5SBE
KB2GT
KA9IKR
KB5EK
WA8DHB
W8VIZ
WA2SEL
WØOTF
WA2GIN
WD9EVV
62
WD8RNQ
WØHXB
VE3BVG
WA7DPK
KA4IUM
WB4TZR
WA2MFU
61
KA1KP
W4HON
KA6A
W9JIJ
AC7P
W4ZJY
KP4U
WA1VRL
WA3EOP
WA3VIL
60
KA4BBA
W8UE
WD5GKH
W1TM
VE5WM
KB6FC
WD5AAH
58
KA5IWF/T
52
WA8JNQ/T
50
N5CRR/T
45
KA8DEZ/N
43
KA4SAA/N
42
KA4AUR/N
KA4ODX/N

Brass Pounders League April 1981

A BPL Medallion (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: KA1ON.

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	677	992	1389	76	3134
WØWYX	56	1294	332	975	2657
KA9CPA	22	1006	211	826	2065
W5SHN	321	289	570	28	1280
WAØHJZ	30	694	56	485	1265
NØBOP	21	643	128	400	1192
WA4JDH	0	547	471	11	1029
W9JUJ	3	432	457	10	902
WD4IIO	396	54	39	54	900
KS6T	2	433	426	4	865
W4JK	3	483	413	1	855
WD4HIF	2	394	404	18	818
W7DZK	9	384	379	3	771
W3VR	184	263	301	12	760
N4PL	48	317	369	24	758
WA4CCK	1	367	384	4	756
W7SOT	5	410	0	324	742
KØONK	2	612	118	9	741
WB5YDD	14	359	309	48	730
WB3GZU	43	313	324	45	725
W4SIZ	7	332	315	17	671
N1BHH	0	298	282	73	653
K4TH	11	287	199	146	643
WB4PNY	3	313	320	2	638
WB4FVV	3	306	284	28	621
K4SCL	0	326	289	4	619
WB1CPF	2	382	213	5	603
W7VSE	2	311	231	59	603
N4AZI	18	293	275	12	598
WA2SPL	74	239	263	8	584
KT6A	3	280	283	12	578
WD4AWN	2	284	252	29	567
KY4K	2	324	124	113	563
N4EDH	100	166	246	49	561
WB7TQF	107	154	261	39	561
KZ4K	1	287	133	120	541
NG4J	11	276	219	23	529
WAØAUX	26	230	256	0	512
WP4BDS	81	95	282	45	503
VE3GOL	26	199	258	20	503
WB3GZU (Feb.)	61	371	365	75	872

BPL for 100 or more originations plus deliveries:

W4EAT	253
W7LRB	205
W4LX	156
WB4EXA	127
W3BBN	123
KA8CPS	110
WD4COL	110
WD4SIG	107
N2BOP	104

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

Translating Hamspeak

Mean what you say and say what you mean. But do we? An analysis of speech betrays hidden meanings. We all tend to speak in ciphers. Diplomacy dictates that instead of telling a guy that he's a slob, we should say: "You have a disheveled appearance."

On Wall Street when "all economic indicators point to a slight negative trend in the real goods and services produced," you know we're in a depression. Or if your boss tells you that "it would appear that a determination of the extent of your projected services to his organization is in jeopardy," you know what he really means — you're fired!

Parents are accustomed to receiving reports on little Johnny in school such as: "He seeks to gratify his natural social inclination to promote peer communication in an inappropriate academic environment." Actually, the kid can't shut up. Or little Suzie "displays a great talent for the physics of aerodynamic design." The little punk throws paper airplanes in class.

Amateur Radio has it's own hamspeak that requires translation. We all hear it and use it on the air every day.

Here are other choice examples of hamspeak which will hopefully aid you in your next QSO. Presented in handy chart form so that when you are working a station you can refer to it for speedy translation, this is offered in the spirit of improving Amateur Radio communications skills. Place it under the glass of your operating table along with your other operating aids.

What Is Said In QSO	What It Really Means
In a Contest	
Ur 569	Please repeat my report. You got QRMed.
Ur 599	How do you like my programmable keyer?
On the Traffic Nets	
The check-count is double X-ray.	I am too lazy to count the text.
Smith...common spelling... Sierra, Mike, India, Tango, Hombre.	See, I *do* know the phonetic alphabet!
I QSL your message number foah, ni-yen, fife routine.	Isn't my military style snappy, eh?
On the Repeater	
You're 78% full quieting.	Move your antenna. You're not making it.
The repeater's got a problem. I always can make it into the repeater from the Holland Tunnel.	The tech committee better get on the stick if they expect me to pay up my dues for this lousy machine.
Let me drop the repeater and see if I timed out.	Hello...hello.
General	
This is with the processor on. This is with the processor off. On. Off. How does it sound?	Boy, with this new radio I am the king. I am *so* loud...
This is with the amplifier on. This is with the amplifier off. On. Off. How does it sound?	Ditto above.
The antenna here is a 3-element Yagi at 18 meters.	Now let's see. There's 2.54 centimeters in an inch...3 feet in a yard...1 yard equals 3 meters plus a little, or is it 1 meter is a little more than a yard? That means the antenna is up... *six inches*. What?
I'm good in the *Callbook*.	Wait'll he finds out I've moved three times in the past year.
The temperature here is 22 degrees Celsius.	There are icicles hanging from the roof outside the shack window. Let's see, have I converted right? Maybe I should use Fahrenheit; after all Basil is in England. Next time I'll use degrees Kelvin and fake everybody out.
On the Satellite	
SWISH...SWISH (of the vfo)	Where the deuce is my signal?
On Slow-Scan	
Your picture looks a little fuzzy.	Clean your lens, you fool!
On RTTY	
There was a little QRM on your brag tape.	Gee, I wish I could afford all that fancy equipment.
On the DX Bands	
Ur 599.	You're a new country for me. Please QSL.
Your report is 2 by 2...twenty-two ...one two, one two, rifle-shot... 2 by 2.	Boy, if I could only hear you. I sure hope someone relays my report. I need this one for 80-meter 5-band.
Please listen for my friend.	Poor Claude. He can't make it through the pileup. I better help him. Besides, that will emphasize how much louder my signal is than his.
Stand by! Stand by! Stand by! (repeated 36 times with venomous inflection)	Stop calling and give the DX station a chance to come back to somebody.
Your're 40 over S-9, Vlad. Why don't you let me take a list for you, so you can work more stations?	*Power*. I will *control* the frequency. I will be the king.
(in the same pileup) Thank you for coming back to my call. The name here is...(etc.)	I'll outtalk the pileup by pretending he came back to me.
(again the same pileup after the DX station announces: "the Whiskey Six Mexico station, go ahead.") Kilo Bravo Fourteen X-ray Guatemala (repeated 27 times).	He *must* mean me. Guatemala is located right next to Mexico.

SCM ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

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

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

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

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

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, September 4, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1981, returns counted November 17, 1981, and SCMs elected as a result of the above procedures will take office January 1, 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning January 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited in January *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

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

John F. Lindholm, W1XX
Communications Manager

*Communications Manager, ARRL

SCM APPOINTMENT

In the Tennessee Section, John C. Brown, WB4PRF, has been appointed to complete the term (until December 31, 1981) of Earl Leonard, KB4G (resigned).

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.

APRIL OPEN CD PARTY

Activity was good for the open party. Outstanding band conditions made the phone weekend especially good with many high scores. Two stations even managed a clean sweep. On cw, conditions weren't quite so good, making the high scorers work a little harder than usual. Complete results will appear in the summer edition of *QCD*, which will be sent to all League appointees and officials and to everyone who sent in an Open CD Party log.

Listings below indicate final score, QSOs, multipliers and ARRL section. — *Mark Wilson, AA2Z*

April Open CD Party High Scores

Cw	
N6TR	48,180-730-66-10-LAX
K6LL/7	46,336-724-64-10-AZ
N6RO	44,682-677-66-10-EB
K7NHV	43,848-696-63-10-ID
N6BT (WA6VEF, op)	43,584-681-64-10-SCV
KN5H	40,320-640-63-10-STX
W2RQ	40,040-616-65-10-NNJ
K9GL	38,016-576-66-10-IL
AA6RX	36,725-565-65-10-LAX
N6VI (WA6OTU, op)	36,595-563-65-10-LAX
N4KG	36,394-587-62-10-AL
K8NZ	33,390-530-63-10-OH
AG7M	33,088-517-64-10-WA
N6NF	33,085-509-65-10-SCV
KB5AS	33,046-533-62-10-LA
K8MR	32,860-530-62-10-OH
K1XA	32,818-538-61-10-CT
NØSS	32,512-508-64-10-MO
N4SA	31,668-546-58-9-NFL
W6BIP	31,310-505-62-10-SF
N1EE	30,618-486-63-10-EMA
K8CC	29,925-475-63-10-MI
N6PE	29,829-489-61-10-ORG
NØTT	29,340-489-60-10-MO
K9KM	29,087-493-59-10-IL
KA1R	25,984-448-58-10-EMA
K4OAQ	24,998-431-58-10-TN
N6AA	24,780-413-60-6-LAX
W3YOZ	24,420-407-60-10-MDC
WAØAVL	23,973-393-61-10-IL
AA3B	22,774-386-59-10-EPA
W9OP	22,040-380-58-9-WI
W7ZMD	22,021-361-61-10-AZ
WØEJ	21,286-367-58-8-IA
Phone	
K6LL/7	77,328-1074-72-10-AZ
K5TA	76,146-1029-74-10-NM
W6MSF (WA6VEF, op)	74,266-1046-71-10-SCV
N7DF	72,051-987-73-10-UT
N7US	66,674-901-74-10-AZ
WA1ZDW	54,823-751-73-9-CT
KC9C	52,122-714-73-10-IN
AA5B	51,660-738-70-10-NM
N6NF	49,984-704-71-10-SCV
W1WEF	48,990-690-71-10-CT
VK3WA/VE3	46,944-652-72-10-ON
AK4L	42-702-647-66-10-CT
WØEJ	37,656-523-72-10-IA
WB1HIH	35,811-519-69-10-WMA
WAØAVL/9	35,064-487-72-10-IL
N4SA	33,048-486-68-9-NFL
WD8KKF	30,672-432-71-9-OH
NØBBS	29,949-447-67-10-MN
K4ZGB	27,470-410-67-10-AL
K3CR (WD8PUH, op)	24,765-381-65-10-WPA
W4WKQ	23,832-331-72-10-NFL
WB7SIC	22,754-367-62-10-OR
K5CM	22,578-318-71-6-OK
K1HI	21,886-353-62- -NH

OSCAR Operating Schedule

Date (UTC)	OSCAR 7 Orbit No.	OSCAR 7 Time (UTC) Hr Mn	OSCAR 7 EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	OSCAR 8 Mode	OSCAR 8 Time UTC Hr Mn	OSCAR 8 EQX W. Long. (Degrees)
1 July	30,309	0025	86.0	16,928	X	0131	84.7
2 July	30,322	0119	99.6	16,942	A	0136	85.9
3 July	30,334	0019	84.4	16,956	A + J	0140	87.1
4 July	30,347	0113	98.0	16,969	J	0002	62.5
5 July	30,359	0012	82.9	16,983	J	0006	63.7
6 July	30,372	0106	96.4	16,997	A	0011	64.9
7 July	30,384	0006	81.3	17,011	A + J	0016	66.2
8 July	30,397	0060	94.9	17,025	X	0020	67.4
9 July	30,410	0154	108.5	17,039	A	0025	68.6
10 July	30,422	0053	93.3	17,053	A + J	0030	69.8
11 July	30,435	0148	106.9	17,067	J	0034	71.0
12 July	30,447	0047	91.7	17,081	J	0039	72.2
13 July	30,460	0141	105.3	17,095	A	0044	73.4
14 July	30,472	0040	90.2	17,109	A + J	0048	74.6
15 July	30,485	0135	103.7	17,123	X	0053	75.8
16 July	30,497	0034	88.6	17,137	A	0058	77.0
17 July	30,510	0128	102.2	17,151	A + J	0102	78.2
18 July	30,522	0028	87.0	17,165	J	0107	79.5
19 July	30,535	0122	100.6	17,179	J	0112	80.7
20 July	30,547	0021	85.5	17,193	A	0116	81.9
21 July	30,560	0115	99.0	17,207	A + J	0121	83.1
22 July	30,572	0015	83.9	17,221	X	0126	84.3
23 July	30,585	0109	97.5	17,235	A	0130	85.5
24 July	30,597	0008	82.3	17,249	A + J	0135	86.7
25 July	30,610	0102	95.9	17,263	J	0140	87.9
26 July	30,622	0002	80.7	17,276	J	0001	63.3
27 July	30,635	0056	94.3	17,290	A	0006	64.5
28 July	30,648	0150	107.9	17,304	A + J	0011	65.7
29 July	30,660	0049	92.8	17,318	X	0015	66.9
30 July	30,673	0144	106.3	17,332	A	0020	68.2
31 July	30,685	0043	91.2	17,346	A + J	0024	69.4
1 Aug.	30,698	0137	104.8	17,360	J	0029	70.6
2 Aug.	30,710	0037	89.6	17,374	J	0034	71.8
3 Aug.	30,723	0131	103.2	17,388	A	0038	73.0
4 Aug.	30,735	0030	88.0	17,402	A + J	0043	74.2
5 Aug.	30,748	0124	101.6	17,416	X	0048	75.4
6 Aug.	30,760	0024	86.5	17,430	A	0052	76.6
7 Aug.	30,773	0118	100.1	17,444	A + J	0057	77.8

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 103.1842 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — 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.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

JULY

1

Canada Contest, June *QST*, page 82.

8

W1AW Qualifying Run, 10-35 wpm at 0200Z on July 9 (10 P.M. EDT July 8). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 50.08 147.555 MHz. 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/endorsements.

11-12

IARU Radiosport Championship, May *QST*, page 79.

17-23

SWOT QSO Party, sponsored by Side Winders on Two. Seven-day contest, operate as much as you wish, 2-meter cw and ssb only (a station may be worked once per mode). No satellite or repeater contacts. Exchange county and state or territory. DX use equivalent. SWOT members include SWOT number. All contacts must be made from one geographic location; portable or mobile stations may submit from the location where they had the highest score. Multiply total SWOT-member QSOs by their geographic locations and multiply by two. Multiply non-SWOT-member QSOs by their geographic locations. Add the two numbers for final score. Certificates to the high scorer in each ARRL section from which more than one entry is received, 1981 SWOT Trophy to overall winner. Winners to be announced in SWOT Bulletin. Logs not required unless requested. Send summary sheet postmarked by August 21 to Dean Figgins, WA7EPU, P. O. Box 1141, Carefree, AZ 85377.

18-19

Colombian Independence Day Contest, sponsored by Liga Colombiana de Radioaficionados, 48-hour period, phone and cw, 160-10 meters. Exchange signal report and serial number (HK stations will send signal report and 171 — for 171 years of independence). Count 10 points for HK contacts, three points for DX contacts and one point for those with your own country. Multiply by sum of DXCC countries worked per band. Only one QSO per band. Plaques. Mail entry by August 30 to LCRA, Contests and Awards Manager, Apartado 584, Bogota, Colombia.

QRP Summer Contest, sponsored by AGCW-DL from 1500Z July 18 until 1500Z July 19. Categories for less than 3.5 watts, below 10 watts, multioperators and non-QRPers. Complete rules were published in December 1980 *QST*, page 100. Log deadline August 14. Mail logs to DJ5QK, Otto A. Wiesner, Feudenheimer Str. 12, D-6900 Heidelberg 1, Fed. Rep. of Germany.

SEANET Contest, cw, sponsored by the Phillipine Amateur Radio Association. Work Southeast Asia stations, 48-hour period UTC, 160-10 meters, single operator all-band and single-band, multioperator single-transmitter categories. Send signal report and serial number beginning with 001 on each band. SEANET countries: A4 A5 A6 A7 A9 AP BV BY CR9 C2 DU EP HL HS H4 JA JD JY KC6 KG6/KH2 KH6 KX6 P2 S2 S7 VK VQ9 VS5 VS6 VS9 VU VU-A VU-L XU XV XW YB YJ ZL 3B6 3B8 3D2 4S7 4W1 5Z4 9K2 9M2 9M6 9M8 9N1 9V1. Contacts with SEANET countries count two points on 20, 15, 10 meters; five points on 40, 80 meters; and 10 points on 160 meters (double those numbers when working DU HS YB 9M2 9M6 9M8 9V1 stations). Multiply QSO points by the number of SEANET countries worked and then by three to get the final score. Send one IRC for results. Send your entry so that it arrives before October 31 to Eshee, 9M2FK, P. O. Box 13, Penang, Malaysia.

22

W1AW Qualifying Run, 10-35 wpm at 2300Z (7 P.M. EDT) July 22. See July 8 listing for more details.

25-27

CW County Hunters Contest, sponsored by the CW County Hunters Net, from 0000Z July 25 to 0200Z July 27. Mobile, portable and fixed categories. Exchange QSO number, category, signal report, state and county (province or country for DX). Stations may be worked again if they change county. Those changing counties may repeat QSOs for points. County-line stations send only one number, but each county is valid for a multiplier. Count one point for QSOs with fixed stations, three points for portables and mobiles. Multiply by total counties worked for final score. Mobiles and portables calculate their score on the basis of total contacts within one state. Suggested frequencies: 3575, 7055, 14,070, 21,070, 28,070. Mobile and portable stations only call CQ below 7055 and 14,070; others spread out above. Check (dupe) sheets required if more than 100 QSOs. Large s.a.s.e. for results. Send by September 1 to CW County Hunters Net, Jeffrey Beehner, W9MSE, 673 Bruce St., Fond du Lac, WI 54935.

July 27 — Aug. 4

National Scout Jamboree, K2BSA will be operating from Fort A.P. Hill, Virginia throughout the nine-day period. Frequencies: phone — 3940, 7290, 14,290, 21,360, 28,990; cw — 3590, 7030, 14,070, 21,140, 28,190.

AUGUST

1-2

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, from 1800Z Aug. 1 to 2300Z Aug. 3 with a rest period from 0500Z to 1200Z Aug. 2. Phone and cw. Exchange signal report and QTH (county for IL stations; state, province or country for others). Suggested frequencies: cw — 60 kHz from low end; phone — 3975 7275 14,275 21,375 28,675; Novice/Tech — 25 kHz from low end. Count one point per QSO (two points for Novices and Technicians). IL stations multiply QSO points by sum of states, provinces (10 maximum) and countries (5 maximum). IL portables or mobiles add 200 points for each country where 10 QSOs were made. Non-IL stations multiply QSO points by IL counties for final score (one bonus multiplier for each group of eight QSOs in the same IL county). Club participation awards. S.a.s.e. for results. Send entries by September 15 to RAMS/K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634.

5

West Coast Qualifying Run, 0400Z August 6 (9 P.M. August 5). See July 8 listing for more details.

8-9

ARRL UHF Contest, this issue, page 78.

European DX Contest (WAEDC), cw, sponsored by the Deutscher ARC, full 48-hour period, 80-10 meters. (Note: Phone Sept. 12-13, RTTY Nov. 14-15.) Single-op all band; multiop, single transmitter. Multi-single only: only one band change allowed within 15-minute period, except for new multipliers. Only 36 hours of operation out of the 48 are permitted for single-op stations. The 12 hours of nonoperation may be taken in one, but not more than three, periods any time during the contest. Non-EUs work EU stations only. Exchange RS(T) plus serial number starting with 001. Each QSO worth 1 point. Stations may be worked once per band. Each confirmed QTC (given or received) counts 1 point. The multiplier for non-EUs is determined by the number of EU countries worked per band. The multiplier on 80 may be multiplied by 4; the multiplier on 40 by 3; the multiplier on 20, 15, 10 by 2. Score is the total QSO points plus QTC points multiplied by the sum total of multipliers from all bands. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. It can only be sent by a non-EU to an EU. A QTC contains the time, call and QSO number of the station being reported. A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to the same station on all bands is permitted. You may work the same station several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the third series of QTCs sent and that 7 QSOs are reported. Certificates. Usual disqualification criteria. Contest Committee decisions final. Log 40 QSOs or QTCs per page, separate logs per band. Deadlines: cw — September 15; phone — October 15; RTTY — December 15. Mail to: WAEDC Committee, Postbox 1328, D-895 Kaufbeuren, Fed. Rep. of Germany.

13

W1AW Qualifying Run

15-16

New Jersey QSO Party
Rhode Island QSO Party
S.A.R.T.G. Worldwide RTTY Contest

22

Red Cross Centennial QSO Party

22-23

All Asian DX Contest, cw
Ohio QSO Party

23

W1AW Qualifying Run

29-30

Occupation Contest

SEPTEMBER

12-13

ARRL September VHF QSO Party

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country. state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

*Assistant Communications Manager, ARRL

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 — SCM/SEC: E. Roy Ellis, VE6XC. ASCM: VE6AMM. STM: VE6ABC. NM: (ATN) VE6ABC, (APSN) VE6AFO. VE6AFO has taken on the Calgary EC job on the retirement of VE6NI. NARC held its annual awards night with six awards. Boy Scout Jam is to be held in Calgary area not Edmonton as previously reported. Alberta Hamfest sponsored by NARC and LRC for July 31 to Aug 2 1981. Traffic: VE6CHK 154, VE6BBL 117, VE6ABC 41, VE6ON 13, VE6AMM 10, VE6AFO 7, VE6CE 4, VE6AMB 2, VE6ARL 2, VE6YW 1.

BRITISH COLUMBIA: SCM, H. Ernie Savage, VE7FB — British Columbia Emergency Net, 3650 kHz, Net Manager VE7CSI, Asst. NM; VE7CCJ. Eric and others gathered at NMs home for a BCEN meeting, the SCM was there and pleased to report that it was a successful meeting, and food also real good. British Columbia Public Service Corp Net, VE7OC NM reports high of 174, low of 86, total 3830. Real bad band conditions, most of the month. VE7ZP, age 94, became a Silent Key, in the thirties he examined many of us for our ham ticket. I was one that enjoyed that fond memory of one swell Ri. Dogwood Chapter QCWA will be holding their sixth GAM in Ganges June 27th. All are welcome, just let VE7FB know week before. Burnaby ARC prints a real newsy paper. Have you an envelope with stamps for your QSLs in Burnaby? Traffic: VE7ZK 128, VE7CSI 57, VE7FB 31, VE7CCJ 22, VE7EDN 23, VE7BLO 11, VE7BZI 5.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst SCM: VE4JP. SEC: VE4TR. Asst SEC: VE4HK. STM: VE4RO. NMs: VE4s TE VJ NM ACX. VE4GB is back from winter holidays in the south. Band conditions have been bad for all of April. The CW Net is on summer sked and is on a four day week — Mon, Tue, Wed, and Thur. WRIN QNI 76, sess 2, QTC nil. MEPN QNI 875, sess 30, QTC 30. MMN QNI 396, QTC 30, sess 30. MTN QNI 229, QTC 175, sess 30. Traffic: VE4IX 118, VE4PG 65, VE4RO 58, VE4UM 52, VE4TE 29, VE4AJE 28, VE4HR 24, VE4JA 22, VE4FK 20, VE4AAD 16, VE4XN 8, VE4LB 7, VE4NE 5, VE4AFO 4, VE4CR 4, VE4EN 3, VE4MG 3, VE4NM 3, VE4AAF 1, VE4ADS 1, VE4BF 1, VE4YQ 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — ASCM: VO1FG. NM: VO1JN & VE1WF. SEC: VE1EI. STM: Open. Hosp. VE1AFS & VE1RA, wish both speedy recovery. VE1 test results, 1st cw, VE1BYD, 1st phone, VE1ACB, congrats to both. SONRA reports an increase in membership of 25 percent. A mini-hamfest will be held at Sackville, N.B. Contact VE1SH for details. Fall date for amateur exams is Oct. 20. Kings Co. (N.S.) Bulletin contains another interesting article on early communications by VE1BC. VE1SAT setting up for Oscar Phase III. WESTCOM ARC has been active during the winter. APN — 30 sess, QNI 173, TFC 91, Time 427. Traffic: (Apr.) VE1WF 285, VE1LCR 70, VE1XF 64, VE1BXA 23, VE1BZC 18, VE1BSH 13, VO1AW 13. (Mar.) VE1WF 261, VE1RO/LCR 77, VE1XF 25, VO1AW 16, VE1BXA 14, VE1AUL 13, VE1OC 5, VE1BPM 4, VE1BSH 4.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. I'll have this right yet — the ARES net meets on 7060 kHz the first Sun of the month and will continue during the summer months. New field appointments: ECs — VE3JPP, Pickering/West Hill, VE3KK, Kitchener-Waterloo, VE3KXB, Peterboro. ORS: VE3JPP VE3KLX and VE3WM. OO: VE3FCU. Regretfully I announce the following Silent Keys: VE3s DEG EZC FXM JA and KZY. 22 members of the London ARC supplied comms for the 14th annual Thames River classic canoe race. On my behalf, VE3OK and members of the Windsor ARC presented VE3EWD with a section certificate of merit in recognition of the work he has done while serving in various appointment capacities, most notably as the SEC and as NM of the Ontario Phone Net. VE3MEW and VE3DDB did an excellent job promoting and explaining Amateur Radio on CKQM and CHEX. At the same time, VE3HKW was explaining the ARES to the local newspaper and TV in North Bay. VE3AF, who recently celebrated his 90th birthday, was enrolled as an Honorary Life Member of the Ottawa ARC in recognition of his long service to Amateur Radio and his particular contribution to the development of the Canadian radio time signal, CHU. The Laurentian Net has shifted to 7070 kHz for the summer months. The 7th annual Ontario Hamfest is July 11 at Milton. VE3JW, sponsored and operated by the Ottawa Valley Mobile RC at the Museum of Science and Technology, has a new station consisting of a Ten Tec Omni C and a linear amplifier. VE3UR is attempting to raise his DXCC standings which is now at 308 countries. The KWARC Bulletin is being prepared almost exclusively by computer. Congrats to VE3s LHW MBL and LWK on passing their Advanced. And how was your Field Day score? Traffic: (Apr.) VE3GOL 503, VE3HGJ 284, VE3KK 201, VE3QI 161, VE3GNW 133, VE3GT 119, VE3JLL 110, VE3CYR 79, VE3JRT 78, VE3HTL 76, VE3DUK 48, VE3BVG 47, VE3KXB 37, VE3WM 36, VE3FGU 35, VE3AWE 33, VE3EWD 32, VE3ISW 28, VE3LNN 24, VE3AJN 23, VE3IFP 21, VE3BZB 20, VE3DVE 12, VE3IXB 10, VE3KLX 9, VE3DZH 6, VE3WG 4. (Mar.) VE3CWA 162, VE3IXB 4, VE3EFX 2.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. NMs: VE2PJ VE2FSA. On the 2nd and 3rd of July, the RAQI Convention will be held at Levis. For more information, check on the Quebec Fone Net. The St-Jean ARC held a two-meter mobile hunt on April 12. 14 members and 7 cars took part. The winning team was VE2s BUZ DUE closely followed by ASI and JN. For main attraction a sub-compact car with a rotatable 14 ele beam on the roof which came in last. Good fun was had by all. De la Mauricie VE2FJX est un nouveau amateur et on lui souhaite la bienvenue parmi nous. Felicitations a VE2ED qui a ete choisi le representent de RAQI a CRRL. Traffic: (Apr.) VE2FKI 58, VE2EC 40, VE2BP 35, VE2EKC 32, VE2FSA 7. (Mar.) VE2FSA 22.

SASKATCHEWAN: SCM, W. C. Munday, VE5WM — STM: VE5XC. SEC: VE5II. NMs: VE5s DC HG SF TT WM. Congratulations to all new amateurs and to those successful in upgrading their license to Advanced amateur at the last DOC exams. Reminiscent of the "Dirty 30s," dust storms were prevalent throughout the province and many an antenna fell victim to the high winds. Thanks to those amateurs who took part in "Operation Red Cross Message Relay." Thirteen congratulatory messages originated from SK. A total of 158 messages were handled with 10 amateurs reporting traffic counts for the month. Traffic: VE5AAT 38, VE5KS 23, VE5HG 22, VE5XC 22, VE5XS 16, VE5WM 12, VE5UX 11, VE5AE 6, VE5TT 6, VE5LN 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PO. STM: WA3WIY. PSHR: WA3WIY 101, K3JL 99. DTN QNI 334, QTC 69; DSSN QNI 61, QTC 19. Traffic: W3QQ 145, K3JL 89, WA3WIY 89, WB3FOC 53, N3AKC 42, WB3DUG 33, N3AXH 15, WA3ZBI 15, WA3DUM 11, K3ZXP 8, W3WD 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ.

Net	Freq. Time	QNI	QTC	Sess.	Mgr.
EPA	3610 7/10 P.M. Dy	479	281	58	AA3B
EPAEPTN	3917 6 P.M. Dy	507	179	30	AJ3R
PFN	3958 5 P.M. M-S	249	284	26	WA3WQP
PTTN	3610 6:30 P.M.	227	89	27	AG3R

Local and vhf nets reporting: D3ARES, D10ARES, HARCTN, Luzerne Co, TN MTG CO, AREC and WARCVTN, with a total QNI 380, QTC 39 in 27 sess. OBS reports: KA3FKD W3CL W3ID and W3VA. OO reports: KC3B W3FAF W3GOA and W3GVR. OVS: W3GOA. PSHR: K3JSZ KA3EAQ WB3CAI W3GOA WA3TKU W3VA WB3HTW WA3EHD WB3FKP N3AIA AA3B K3QXC N3BFL AJ3R W3YZW KA3DZD WA3WQP WA3VIL and N3AZT. New appointments: K3JSZ and WA3EHD to NM; WB3HTW to ORS, congrats. Upgrades: KB3JJ and WA3UQZ to E; KA3BLP to A and KA3CBL N3BCC and N3BOE to Gen. WA3UQA is now KC3M and KA3FVY now N3BOE. New gear. WA3NVK a TS520SE, WA3JWP a FT902DM, WB3FAA FT101 and TS700A, WA3YON 8 el 6-mtr beam. WB3FKP and WB3FYT made DXCC. WB3GAI made WAS-SSB. WA3NVK recovering after being in serious auto accident. Effective May 1st, WA3EHD will be the new Net Manager for the EPAEPTN and K3JSZ will be new NM for the PTTN. All NCS get your QNS to your NM as soon as possible. I want to thank AG3R and AJ3R for the wonderful jobs they did as NM for the PTTN and EPAEPTN. Good luck fellows. K3JSZ reports 6 new hams for HARC. W3ID W3KEK and WA3CKA QRL with garden work. N3AIA reports "York County Plan" has been agreed to by local governmental agencies and filed with the FCC. WB3FAA reports massive chess games being played on Wilkes Barre area repeaters. N3AKQ spent nice vacation in Texas. Reading ARC received high praise from officials for providing communications for the 26 mile "Old Dutch Marathon." N3CP now QRP with indoor Slinky ant. KA3DZD reports D10ARES net now using Tone Alert to call all nets on 146.28/88 rpt. W3VA received 50 yr Golden Certificate from QCWA. Notice all EPA Section hams. The EPA Section basket picnic will be held Sat., July 25, at Tuscarora State Park 5 miles west of Tamaqua. Bring the family and enjoy meeting fellow hams, EPA officials, NMs and appointees in the beautiful PA mountains. Traffic: WA3WQP 347, K3JSZ 265, AJ3R 223, AA3B 187, W3IPX 139, W3DP 111, W3FAF 103, WB3GAI 94, W3VA 90, WA3EHD 78, WB3FKP 72, N3BFL 66, AD3X 56, WA3OFD 46, WA3VIL 41, N3CD 40, W3ID 40, W3ADE 34, K3EIP 34, W3YZW 32, WB3HTW 24, K3QXC 22, N3AZT 16, W3CL 14, AF3Z 10, N3AIA 9, K3ARR 9, KA3EAQ 9, KA3FKD 8, WA3TKU 8, K3WPI 8, WA3CKA 7, N3CP 4, WB3FAA 3, K3KW 3, K3YD 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — WA3TAI is the MDC SEC. K3OMN had Mt. ARC members W3NP K3CCC and WB3EHK on their bike/mobiles, and N3BJP N3AFB N3BHY AJ3X AJ3Y WA3WSW WB3AXV WA3SYE WB3FMM WB3ARM and K3MWI participating in the March of Dimes. In other areas Baltimore ARC, Laurel ARC and Anne Arundel ARC were marching too. WB3LTA KA3DXZ WA3UOF and WA3BMM have the Montgomery County RACES/ARES going great with a fine bulletin and good info. W5NZ/3 finally made it to the 2-meter band. Just missed the March OES report of W3CYQ. W3ZNW isn't going to like Daylight time! W3CDQ had a big hand in the QCWA arrangements for the old timers dinner. W3HVS is an old time MEPN man. Did I say W3DQI has too many bylines? KA3CDQ is right up there with the traffic men. KA3T plans full time college this fall. KC3D enjoyed Dayton. W3FZV made the CD party and the midnight special. They left WB3GZU off the Feb. BPL list! KB3NL had a so-so month. K3CRW is busier than ever. K3KMO and the APL gang tried moonbounce, but get no cooperation from the ionosphere. W3LDD is doing a good job as 3RND liaison. W3HVS likes these real on site RACES/ARES drills. WB3GEJ gets his 2-meter net reports in via hfer WA3EOP. W3DFW reports by radio and W3OYY by mail. KS6X mans WA3FXJ with both stations into traffic. WB3BFK has a pile of skeds. Nice Newsletter from Mt. ARC, and the Ham Arundel News from the AARC. The Columbia ARA takes over the MDC QSO party, 1900Z Sept 19 to 1900Z Sept 20. WA3VUO is contest conductor. Look for the announcement. K3KJZ was the busy man with Italian earthquake traffic. Wrong call in the April column. W3MR KB3LV and W3IK are active OOs. The FAR will have W2GHK pres.; WB4MJF WA3EUI, v.p.'s, N3AKD, rec. secy.; WA4LWB, corres. secy.; W3RXJ and K3AO, treas. If the elections go without a hitch. Tnx to K3KMO — MDD/W3PQ March 60/218/6.6. Net/Manager Sessions/Traffic/QNI average. April WC 2-mtr/WB3GEJ 5/3/21, WR PON/W3DFW 21/21/17.8, MDC PON/W3OYY 5/14/22.4. W3PO hopes to get the transmitter fixed and back soon. Traffic: (Apr.) WB3GZU 725, KA3CDQ 157, KS6X/3 157, W3FA 148, KA3T 71, WB3BFK 50, W3FZV 46, WA3EOP 34, W3LDD 33, K3ORW 33, W3DQI 27, WA3FXJ 19, W3HVS 5, WB3LTA 4, W5NZ/3 4, W3ZNW 4, KC3D 2, KA3DXZ 1, KB3NL 1. (Mar.) W3CYQ 7, KA3DXZ 3.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — STM: WB2LCC. SEC: W2HOB. Hamfest season is fast approaching, so clean out your garage to make room for the mountains of junk you'll soon be bringing home! The West Jersey Radio Amateur's 3rd annual hamfest will be held at McGuire AFB on Sun, July 19 from 9 A.M. till 4 P.M. Admission is $2.50, with selling spots indoor and outdoor going for $2.50 also. The large indoor area is air conditioned, if you wish to use it you had better get your reservations in early. Prizes will be awarded every 15 minutes and there will be plenty of activities including a QLF contest and films. For further info, directions or to order tickets contact me directly at 983-8844 or by mail. My address is on page 8. Coming in Aug and Sept are the Gloucester County ARC and South Jersey Radio Assn hamfests. Stay tuned to the column for more details on these. Do you have time available in the daylight hours? The National Traffic System needs people to operate the daytime NTS. Nets operate at various hours of the day, and whatever time you can spare could easily be put to good use. Why not give it a try? How can you lose??? Traffic: AA2H 137, KC2A 128, K2YBN 68, KA2GSL 60, KA2GTE 57, WA2TWK 55, WB2LCC 51, WA2CUW 41, N2CEQ 39, WA2WUL 28, WA2HEB 26, WA2ONW 26, WB2JCX 23, KB2OE 19, WA2PTQ 19, WA2PLM 18, WB2GFM 11, WA2GTJ 6.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV (NIAGARA) WA2DHZ (SOUTHERN) WB2NAO (NORTHERN). Appts: (ORS) WB2HLV KA2IGH; (OES) W7GUN WB2SGI, (OVS) WB2SGI.

Net	Freq.	Time/Day	QNI	QSP	QND	Mgr.
NYSCN	3677	1000/Sun	46	12	4	W2MTA
THIN	3913	1600/Sun	43		4	N2APB
NYPON*	3913	1700/Dy	654	413	30	K2KQC
NYSPTEN	3925	1800/Dy	727	142	30	AA2Y
ESS	3590	1800/Dy	382	59	30	W2WSS
OCTEN*	34/94	1815/Dy				WA2MFV
STAR/E*	325/925	1830/Dy	204	106	30	WB2AZW
Q NET	31/91	1830/Dy	429	7	30	KA2CMQ
BSN	93/33	1900/Dy	247	16	28	WA2DMK
NYS/E*	3677	1900/Dy	519	278	30	W2ZOJ
OSWARES	75/15	1930/Sun				K2DUR
SLVARES	31/91	1930/Sun	31	1	4	WB2NAO
JCARCN	10/70	2000/Dy	341	6	28	WA2WAX
WNYECN	3955	2000/3rd Sun				W2BCH
OARCN	25/85	2015/Wed	99	1	5	K2VTT
CNYTN*	90/30	2115/Dy	412	93	30	WA2PUU
WDN*	04/64	2130/Dy	763	210	30	N2APB
NYS/L*	3677	2200/Dy	362	271	30	W2ZOJ
STAR/L*	325/925	2215/Dy	132	37	30	WB2AZW

*Part of NTS. Other NMs: WA2ELD W2FR K2KIR WA2ZJP. Certificates of Merit: K2DTQ and WA2VUV, "Southern Tier Traffic Watch"; WA2AIV, Western District Net Founder; W2ZOJ, New York State CW Net Manager. PSHR: KA2s BHR CTU KB2GT KI2D W2s GLH MTA ZOJ WA2s KOJ MFU ZJP WB2s IDS LJK OWO.

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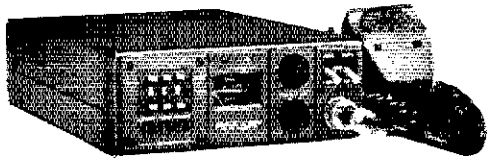

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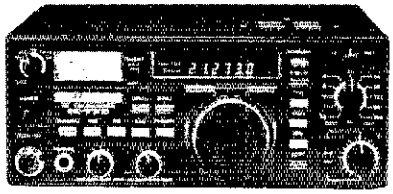

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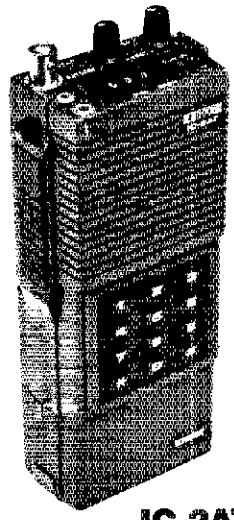

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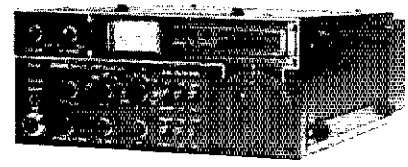

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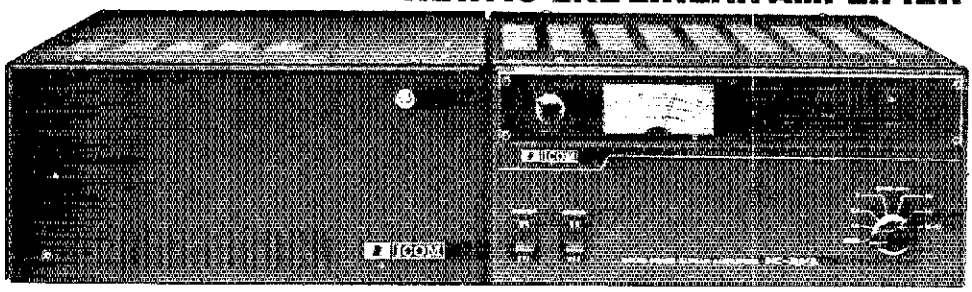

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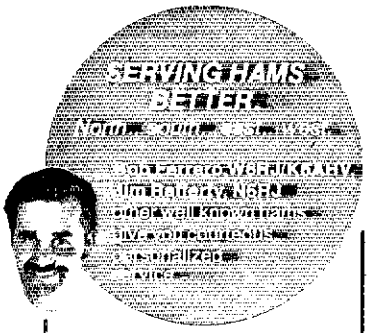

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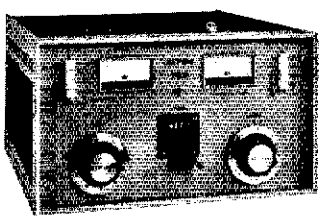

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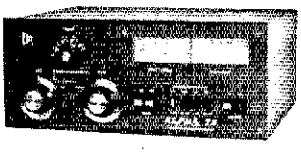

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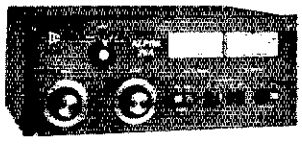

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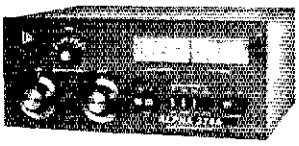

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160 W OUTPUT SSB, FM, CW.

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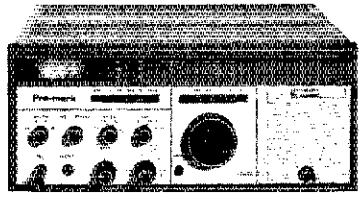

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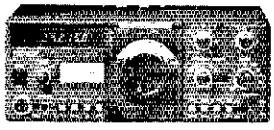

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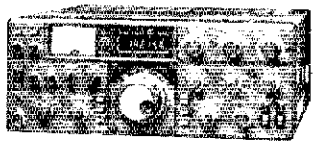

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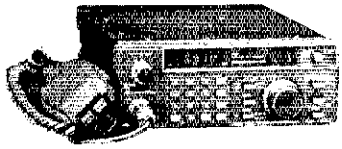

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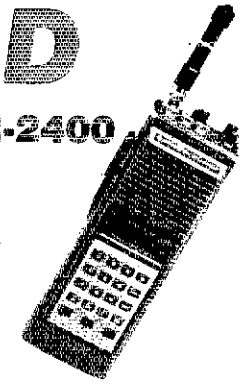

TR-2400

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PSHR: (Feb.) K2RN. Sorry to report more Silent Keys this month with loss of W2ROL WA2EHS and WB2JIF. OVS reports from WA2AWX WB2LJK aurora; WA2TCD needs RI for six meters WAS; K2QR worked 19 states 2M aurora OO: N2NW (4 + 4) KI2D (5 + 2) in Mar/Apr. WB2KLD (4). Well known MARS and NTS operator, W2EAF, became Silent Key. W2TZ made 5 Band DXCC. K2OOD and eight others in ARES Tompkins Co. ARES, Apr. 4 Fall Creek Canoe Race; K2UNY and another eight in Tioga Co., Candor-to-Owego Canoe Race same day. Run for Hope in Oswego Apr. 5, ten operators (WA2KOJ); Run for Life in St. Lawrence (KA2CMQ and WB2ASK). Ham radio alive in Chenango, Novice classes thriving; Oxford-to-Green Canoe Regatta May 2 (KI2Y); WA2TPU broke 171K QRP International. RAWNY Picnic July 26, Town Park Cheektowaga; new officers: WB2OKB W2CUU (Member of Year) WB2OWO WA2OJV; USS Little Rock Special Event Apr. 25, BIG SUCCESS. WNY LO Meeting at Liverpool well attended. Don't miss Batavia Hamfest July 12 at Alexander. No BPL. Traffic: (Apr.) W2MTA 395, WA2ELD 252, W2ZOJ 253, AB2IDS 188, W2GLH 179, N2APB 174, KA2CTU 165, KA2CLT 152, WB2OWO 150, WB2SGI 119, WB2LJK 110, W2FR 109, WB2QIX 86, KA2BHR 73, KI2D 62, W2GJ 62, WA2KOJ 62, KG2D 55, WA2ZJP 54, KB2GT 50, AF2A 44, WA2PUU 41, WA2MFU 40, K2RN 33, AF2K 31, KA2GOH 26, W2TZ 26, WA2RXO 23, N2ARD 21, WA2AIV 20, W2PPS 19, K2VTT 19, WB2TXK 17, WB2NAO 15, KA2HCB 14, KA2DBD 10, K2VR 5, KA2FYF 4. (Feb.) KA2EVJ 117, K2RN 50.

WESTERN PENNSYLVANIA: Otto L. Schuler, K3SMB — ASCM & STM: N3EE. SEC: AB3Q. DECs WB3JDI WB3EFQ. NMs N3FM W3NEM W3MML WA3PXA

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	30	420	192	3585	7:00 P/D
WPAPTN	30	632	128	3983	6:15 P/D
WPA2MTN	30	543	71	146.28/88	8:00 P/D
NWPA2MTN	29	374	8	146.04/64	9:00 P/D

I am sorry to announce that WA3TXO is a Silent Key. Two new ECs are KA3FKK for Blair County, W3HUM for Fulton County and WA3ZSC for Crawford County. AB3Q is looking for ECs for Butler, Greene, Fayette, Potter and Huntingdon Counties. Don't forget the ARES Net 3983 kHz after the WPAPTN on the second to last Mondays of the month. Amateurs provided communications for the March of Dimes Walkathon in many cities and towns in April. I hope you sent the info on who aided in the walk. In Allegheny Cty we had 35 amateurs helping. How many did you have? The Mercer Cty ARC new officers for 1981-82 are K3FZP, pres.; WB3KKX, vice pres., KA8GCD, treas. New Novice is KA3HEJ, new Tech N3CAZ and KA3EHN is now a General with call N3BRP. The editor of the Sine of The Times (Indiana County ARC) has again received an award for excellence from the ARNS, congratulations. I think the section has some very good club papers and I read them all. Traffic: (Apr.) W3EGJ 281, WA3PXA 203, KB3DT 139, K3CR 130, WB3GXG 108, KA3BMU 107, N3EE 101, W3AS 96, N3AIU 84, N3BKV 83, AC3N 74, W3YQ 59, N3FM 57, WB3GUK 45, K3SMB 41, WA3ONT 37, W3NGO 36, WA3UNX 35, W3MML 27, W3SMV 27, W3KMZ 25, N3KB 24, WB3JDI 23, W3RUL 21, KA3BFC 20, WB3JGD 12, N3ASJ 10, KA3DEH 9, W3KJH 8, W3TF 8, AF3B 8, W3KUN 6, W3TTN 6, W3LOD 5, W3SN 5. (Mar.) W3NEM 192

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. Asst SCM: W9RYU.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0300	196	60
Ill Phone	3915	2130 Dy	123	30
NCPN	3915	1200/1700 Dy	112	66
IEN	3940	1400 Su	6	4

DRN9 100 percent stations: W9NXG W9HOT W9JIJ WD9EVV WB9WGD WD9FDB. 9RND 100 percent stations: W9HOT W9JIJ K9BVE W9TLU WB9WGD WD9FDB. Dan Hoover Memorial Net — W9VEY had a QTC of 7 during 4 sessions. Congratulations go to the following for their upgrades: to Extra, KB9BR; to General, KA9ICS KA9IDP KA9KJR; to Technician, KA9KOL; new Novice: KA9KKD. W9HOW is looking for members to start a 10-10 chapter in Quincy. The Western Ill ARC participated in the March of Dimes walkathon on April 25th. The Adams County ARES provided communications for the Blessing Hospital between floors when their telephone system was knocked out during a storm on April 6. Lake County, with K9KZN and N9AZA as net controls, provided communications for two simultaneous charity events, the Heart Assn 20 mile marathon and the walkathon, on April 26th. On May 2, the Southern Ill Univ ARC handled communications for the Heart Fund Road Run in Carbondale. Also in Carbondale, the St. Louis office of the Nat'l Weather Service conducted a Weather Spotting class at the SIARS meeting on May 13th. WD9EBQ has been using 2-meter and 75-meter links to the St. Charles, MO weather service office to provide advanced weather information for Southern Ill. The Knox County tor, KB9RC, was found April 13 by WD9FBE W9KM and KA9GGU. It's good weather for foxhunts. Kankakee and Streator had great success with tracking storms using 2m. W9QBH discussed amateurs interfacing with ESDA during the Ill Emergency Services Management Assn meeting in Springfield on May 2nd. A good example of adjacent county cooperation occurred May 2nd when the Piatt County ARES with WD9EED as net control provided communication for the 10,000 meter Sage City Run. Both Piatt Co. and Dewitt Co. with W9KXN and the ARES members from there manned checkpoints and kept in contact with ambulances and first-aid stations along the route. Great job fellows. WB9EDP is starting an Apple Computer Net and is interested in a VHF AMSAT Net, for more information write him. With deep regrets, K9RBW a Silent Key on April 27th, will be sadly missed by the Illiana Repeater System. The 12th annual Danville Hamfest will be on Sept. 5 & 6th at the Georgetown Fairgrounds. Talk-in will be on 22/82 or .52 simplex. The SARA Hamfest will be August 30th at Carterville. Traffic: (Apr.) W9NXG 288, W9HOT 288, W9JIJ 240, K9BVE 143, W9TLU 128, WD9EVV 100, W9OYL 99, WB9JSR 98, K9JTD 75, KB9X 64, K9PNG 60, WB9WGD 54, K9EEA 44, WD9FDB 43, W9LNQ 43, W9OK 36, WB9OFO 36, KN9BAM 32, N9TN 30, W9HBI 27, WB9EDP 16, N9BJQ 13, AA9R 12, WD9EBQ 10, W9KR 9, WD9EED 4, W9SSP 4, WD9HZF 3, K9LFM 2, AA9D 2, W4IZI 2. W9KSU 1. (Mar.) K9EEA 85. (Feb.) KEEA 83.

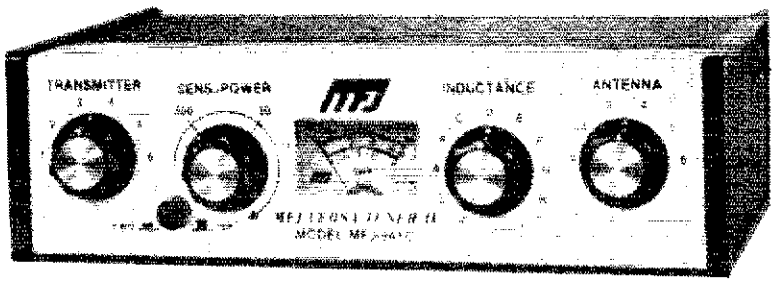
INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9OYY, OIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF. Net reports:

Net	Freq.	Time/UTC	QNI	QTC	Time	Sess.
ITN	3910	1330/2300 Dy	2249	277	1846	60

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



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Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

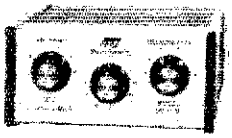
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+$4), like 941C less balun. **MFJ-945, $79.95** (+$4), like 941C less antenna switch. **MFJ-944, $79.95** (+$4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$44.95 (+$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $54.95 (+$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $34.95 (+$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2 range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$199.95 (+$4)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

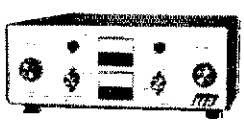
Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $179.95 (+$10), similar but less SWR/Wattmeter.

MFJ-984 VERSA TUNER IV



MFJ-984

$299.95 (+$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $209.95 (+$10), like 984 less ant. switch, ammeter. **MFJ-982, $209.95** (+$10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $179.95** (+$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V

MFJ-989

$319.95 (+$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf 6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

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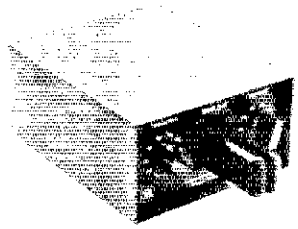
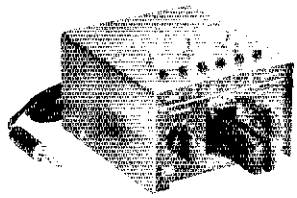


IAMBIC KEYER No. SSK-1-K $105.00

The Nye Viking Iambic Keyer combines all the excellent features of Nye's popular Super Squeeze Key with the superb reliability of Cmos integrated circuitry. The exclusive form-fitting, extra-long paddles make for tireless keying and provide an easy "change of pace" without changing key adjustments.

A Nye Viking 404 audio oscillator and speaker is included for monitoring and practicing keying. The unit will key either negative or positive keyed transmitters up to 200 ma. at 250 volts. A switch on the rear of the chassis determines the polarity. Output is terminated in a shielded cable with standard ¼" phone jack. A switch is provided to allow tune-up and slow speed hand keying with the dash paddle. It also simulates the old-fashioned bug keying when in the test or "tune-up" position.

The keyer operates on an internal Nicad 9V battery that is rechargeable with a plug-in 115VAC charger.



MEMORY KEYER No. SKM-001 $184.50

The Nye Viking Iambic Memory-Keyer features a 1024-bit memory, plus our popular SSK-1-K Keyer, all in a handsome, compact, top-of-the-desk package!

SKM-001 Features Include:

All Cmos ICs including memory chip • Automatic return to play-back after recording eliminates accidental erasure of recorded message • In the record mode, the clock does not start until the first character is keyed. Puts beginning of message in first bit of memory. In play-back, message starts the instant button is pressed • Internal Nicad battery maintains memory months without recharging • All push buttons on top for ease of operation • Your choice of 4,256-bit memories, 2 512-bit, or 1 1024-bit memory, at the flick of a switch • Repeat switch and a "reset" button. Memory also resets if keyer paddle is operated • Five to 50-word-per-minute speed control • 404 tone generator with loud speaker, volume control and on-off switch • Combination tune-up switch and output polarity switch allows keying any transmitter up to 250 volts at 200 mills, positive or negative • Manual dash control switch allows key to function the same as an old-fashion bug, or permits hand key operation by keying sideways or by laying keyer on its left side.

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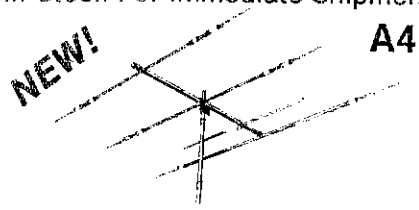

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Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
One memory per band, for storage of your favorite frequencies on each band. Dual VFO system built in standard at no extra cost. 200W PEP input — powerful punch on SSB/CW. Receiver preamp built-in. Noise blanker (selectable time constant) standard. VOX built-in. Large RIT knob for easy mobile oepration. 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.

CALL FOR PRICE AND AVAILABILITY

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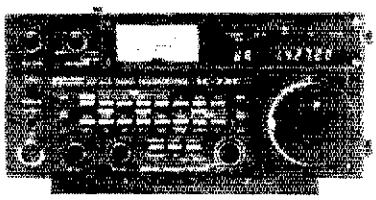

NOW AVAILABLE FOR IMMEDIATE SHIPMENT

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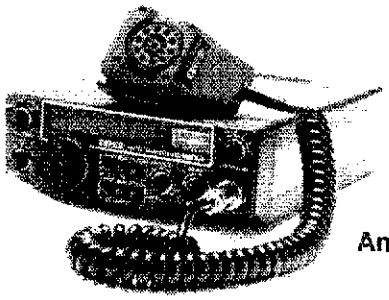
IC-255A 25W, 2M FM

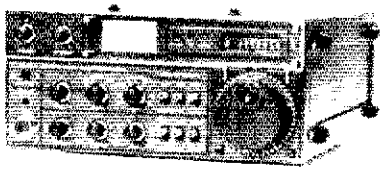


143.800-148.195 MHz, 25W FM. Dual VFO's with 5 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

SALE $339.
Amateur Net $389.

Optional Encoding Microphone Available

IC-251A 2M ALL MODE



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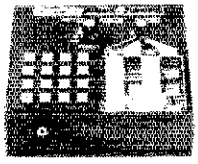

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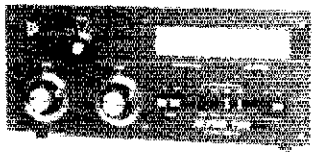

YAESU FT-101ZD MARK III

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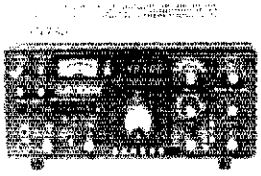

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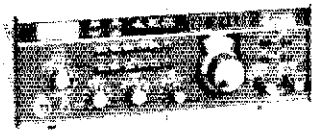

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QIN	3655	1430/0100/0400 Dy	764	432	2205	89
ICN	3708	0014 Dy	147	27	603	30
IPN	3910	2130 Dy	987	114	877	30
IWN	3910	1315 Dy	1136		408	30

Hoosier VHF nets report: ONI 4099, QTC 194, Bulletins 41, Time 4688 minutes for 20 nets. 9RN QNI: W9JUJ W9QLW W9EI N9HZ WA9QCF WB9UYU N9AEI W9XD WD9GXW K9WWJ. QTC 423 in 1250 minutes. CAND QNI: WB9WRC W9JUJ K9CGS W9QLW. QTC 939 in 30 sessions. Appts: OBS N9TV, ORS W9LBE, EC N9CBC Wells County, DEC for Orange, Crawford, Washington, Harrison, Scott, Floyd, Jefferson, and Clark Counties — K9TE. Silent Keys: WA9GJZ WA9PLG WD9EDC WD9DZJ. EC reports: WB9VIW K9UJK WD9DVA N9AJM W9MJI WB9WWB WA9OHX N9AST KB9VD KA9FDF WB9PXT W9QWI WA9KWH WB9VEI W9RTH N9BLK KB9UU K9TE N9AHP N9CBC WB9HLE K9BRF. Congrats to the Madison and Marion County RACES for their fine communications effort for the March of Dimes walkathons. Congrats to CARC for its work for The May Day Medley. Congrats to KB9IT and KB9DE for their commendation from the NWS. Tnx to all WET NET. Indiana Radio Clubs by counties: Benton, Brown, Blackford, Boone, Carroll, Clay, Crawford, and Davies none. Cass County Radio Club Inc W9LVY, pres. Clark County ARC N9AOJ, pres. Clinton County ARC K9DGS, pres. Northeastern Indiana ARC WB9VDK, pres. Laughery Valley ARC WD8NMZ, pres. A big thanks to all ARES groups that worked with INCERT in the May 2nd emergency test. Particularly Allen, Fayette, Hancock, Lake, Madison, Marion, Gibson, Vandenburg, and Wayne County ARES organizations. There are some problems with INCERT but in general it was a successful test. May will be a big month for WA9LGQ Indianapolis Red Cross with the centennial and the 500 Race Parade. Congrats to WB9TIZ, Lake County Ham of the Year. Traffic: (Apr.) W9JUJ 902, W9FC 259, WB9UYU 247, W9QLW 193, K9SIG 135, N9AEI 116, W9EI 116, W9QYY 79, W9WKM 74, WA9OCF 69, K9FZX 67, W9PMT 53, K9DCX 52, K9WWJ 40, WB9AWI 36, KB9VD 32, N9PS 28, N9CDQ 25, W9XD 25, KB9UU 22, N9BJX 18, K9OUP 18, WB9OTX 13, K9CGS 12, W9RTH 12, K9TKE 12, N9CBC 11, WA9KWH 11, W9ZGC 11, W9ZW 11, WD9EXI 10, WD9ART 10, W9IRT 10, WA9OHX 10, W9URO 10, K9DIY 9, W8LKU 9, WA9AXF 8, W9UPI 8, W9EUP 7, W9BUQ 6, W9WEI 5, WB9YAY 5, N9AST 4, N9BLK 4, W9DLF 4, WD9DRM 4, W9ATG 2, W9BDP 2, WA9JNC 2, KB9WI 2, W9POF 2, WD9CIV 1, WD9DWD 1, W9KMY 1, WA9OKK 1. (Mar.) WB9UYU 159, WA9PKL 2, WA9LHP 2.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3985, 1230Z QNI 1002, QTC 1095, WB9YPY. BEN 3985, 1800Z QNI 679, QTC 166, WB9ESM. WSBN 3985, 2300Z QNI 1038, QTC 383, WD9ESZ. WNN 3723 0000Z QNI 240, QTC 56, N9AUG. WSSN 3662, 0030Z QNI 185, QTC 64, N9BYK. WIN-E 3662, 0100Z QNI 363, QTC 171, W9YCV. WIN-L 3662, 0400Z QNI 234, QTC 99, K9LGU. XPO 3925, 1801Z, QNI 306, QTC 42, WA9NIX. NWTN 3419.4 0030Z QNI 501, QTC 42, WB9YPY. Gr. Bay 7271.12, 0230Z Wed, QNI 38, QTC 0, WB9NRK. WB9NRF has Advanced. Sorry to report W9VFO W9JLU as Silent Keys. WA9CNH is now N9BZY. KA9CVE is now KB9WC. KA9KHV new Novice, wife of K9GDF. WA9BZW received 125 DXCC. WD9AJA has Extra. KA9ACC has General. WB9SOJ is now KB9WK. N9BMI has General. New Novice Green Lake area KA9KKH. Don't forget WNA picnic at Kiwanis Park Waupaca July 12. WB9SMM is now DEC for Southeastern Wisconsin. 3985 will be used for reporting severe weather in the state, these reports will have top priority when nets are in session. As a member of the nets are you supporting them? New officers WVRA: WB9JGA, pres.; WA9SQN, vice pres.; WB9LAI, secy.; W9KQN, treas.; K9KSA W9NA AD9N, bd. members. K9CFA (blind) ran traffic into West Bend after tornado. Sorry to report W9DND lost his XYL. Traffic: (Apr.) KA9CPA 2065, WD9ESZ 357, N9AUG 339, WB9YPY 267, N9AZI 244, W9CXY 220, W9YCV 215, N9BYK 173, K9FHI 141, W9UCL 112, WD9DHF 97, AG9G 97, WB9YPZ 94, W9DND 93, K9GDF 71, WB9PKL 69, K9AKG 67, W9DM 65, WA9WYS 65, K9UTQ 63, W9IEM 58, WB9ESM 56, WD9AJA 55, KB9NG 49, KA9HPQ 46, W9SO 43, W9LDO 41, WB9JSW 39, W9KTG 39, K9LGU 39, K9AQ 37, W9FDY 37, WA9GGH 37, W9UW 37, WD9FRI 36, AD9X 36, N9BDL 33, KB9CV 31, WA9ZTY 29, K9JPS 28, WA9HXM 27, K9HDF 26, WB9WNA 25, WB9ABF 24, N9BCX 24, KA9EMF 23, KA9GYD 23, W9IHW 23, WB9WHQ 23, K9UU 20, KE9C 19, WB9ICH 19, W9CJE 18, WA9YVC 17, KB9FM 16, KA9GBE 11, N9CP 10, KA9IKR 6, KA9IHR 4, W9SK 3. (Mar.) WD9DHF 164, WD9IUX 113, K9UTQ 48, KA9GBE 14.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØQIT. STM: AFØO Net reports:

Net	Time	Freq.	QNI	QTC	Mgr.
MSN/1	2330Z	3685 kHz	303	93	AFØO
MSN/2	0300Z	3685 kHz	115	14	KØJCF
MSPN/N	1710Z	3945 kHz	481	35	WAØAIN
MSPN/E	2245Z	3929 kHz	968	200	KCØT
MNAMWXN	2315Z	3929 kHz	457	282/35	WDØCGM
MSSN	2215Z	3710			
RARES	Roches		121	22	KØTS

A special event station celebrating St. Cloud, MN 125th birthday was held at KCØT's QTH April 24th thru April 26th using the St. Cloud ARC call sign, WØSV. Operators were WØBF KBØMB KØIR WDØBGX WAØOTO WBØHOX KCØT and others stopping by. The station made approximately 460 contacts. Anyone making a contact during this time can have a special certificate for the price of a s.a.s.e. Thanks are extended to all who helped at the station and to all those stations who contacted them, thus making the event a resounding success. The section congratulates new Novices KAØKMC and KAØKNE, both of Wilmar; also the following upgrades: Novice to Tech: KAØJCH KAØABF WAØBVK. General to Advanced: NØCGG WDØDEF WDØBGS WDØAIM NØBTQ KAØCAO; Novice to General: NØCGH formerly KAØEFN KAØBQC; Advanced to Extra: KBØMC WDØAKS WDØAKT WBØZQZ. Keep an eye out for further new licensees and upgrades next month. The section also commends ADØS Merrifield, MN, who recently completed a DXpedition to the Pacific and put Kingman Reef on the air for 13,300 contacts and Palmyra for 4,600 contacts. The Palmyra total was kept low due to band conditions. He kept in touch with his family through the efforts of KBØEJ and AFØT in Brainerd. I'm sure all amateurs who contacted ADØS fully appreciate the time and expense involved in putting these QTH's on the air. Traffic: (Apr.) WAØTFC 295, KBØMB 262, WØHZU 197, AFØO 150, WBØHOX 148, WDØCGM 122, WØDFX 120, NØBUY 101, KCØT 85, KØPIZ 64, KØJCF 53, WAØAIN 40, KØCSE 39, WØDFX 35,

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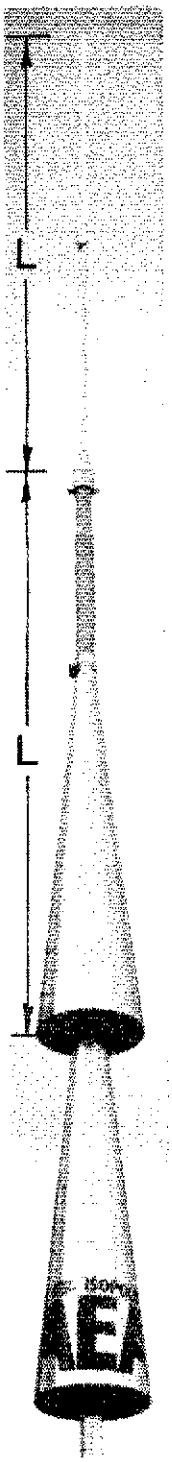

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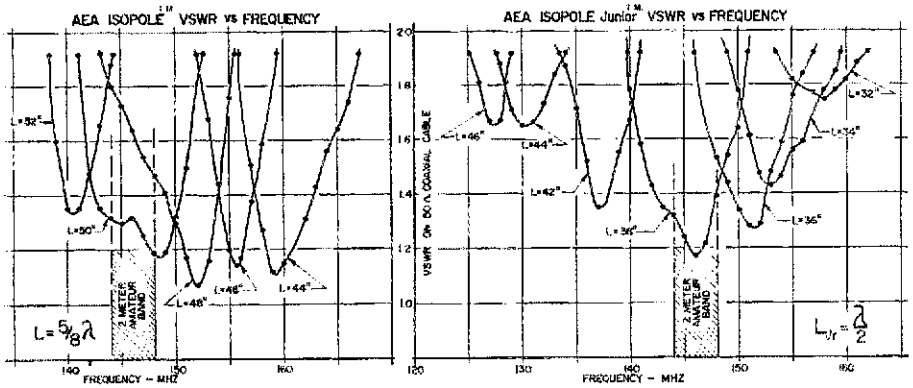
The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. 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**)

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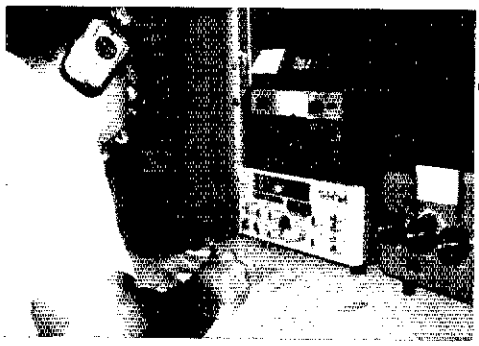
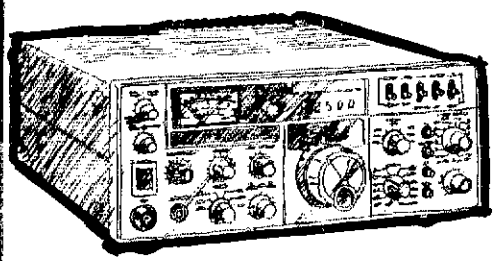


VP5RFS 10,000 QSO's in one week by KC5EA and (shown) N5AU



FT-107M

K5ZD operating N5AU to 1,600 QSO's on 10 meters during ARRL DX contest

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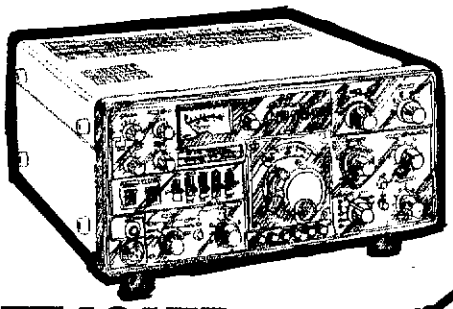
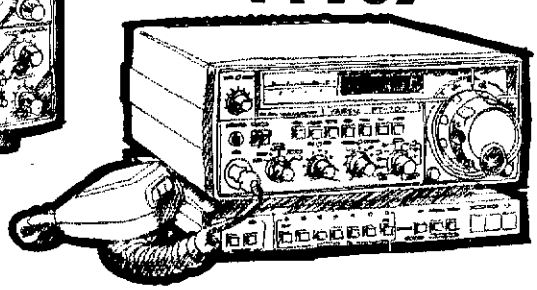
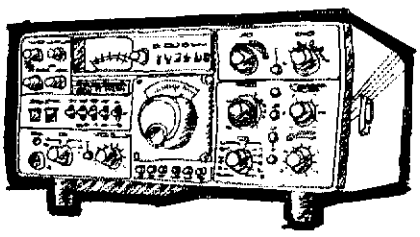


FT-101ZD MARK III

FT-707





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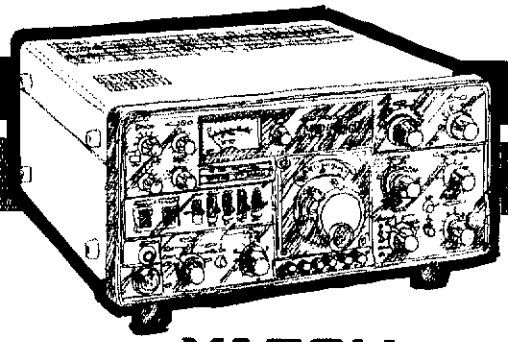

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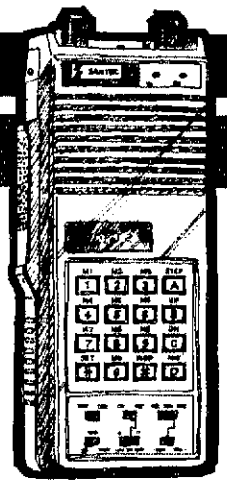
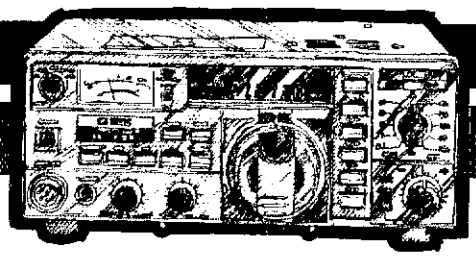


SANTEC HT-1200

4W power, 4-modes scanning, Keyboard input with 10 memories



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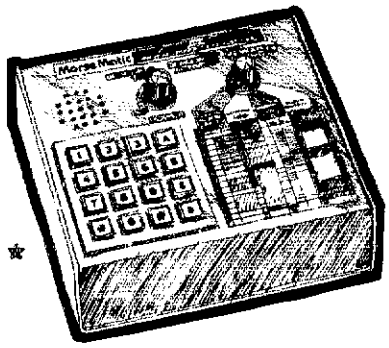

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WAØYVT 19, KAØEPY 17, NØBRC 9, NØBSG 7, AFØQ 2. (Mar.) KØTS 14, NØJP 6.

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — Congrats to new Novices at Grand Forks, KAØKRA and KAØKOD. Thanks to all the ECs that responded by sending messages to American Red Cross Centennial Convention at Fairfax, VA. Most meetings of AR clubs in late March and April were about Skywarn and to be ready when Governor Olson proclaimed May 3-9 as Disaster Preparedness Week. WØLHS of RRRA Club has made up a Repeater Directory of ND. If your repeater isn't listed let him know. WBØQGG is now active in Hettinger 2-M. WDØHPX is now NØCOU. The new ARRL affiliated radio club is the SIOUX ARC of the University of ND. The pres. is KAØCYB. Congrats and welcome to the fraternity. They also put out a newsletter. Hope to see a good attendance at International Peace Garden. You can get more information from Ramsey ARC. Traffic: WAØRWM 98.

SOUTH DAKOTA: SCM, Erwin C. Heimbuck, KØOTZ — During the past few weeks several people have upgraded. Congrats to all of them. The new Rapid City 34/94 machine is up and running and doing a fine job from all tests and reports. WØPUF and AAØF have the 432 EME station working and managed to make 12 contacts during the EME test. The Northern Hills ARC provided communication to help out the sponsors of the Spearfish Air Show. Note to all who send in their reports by mail, please get them off as soon as possible, the mail is slow. I would like to publicly say a big thank you to WØMZI for picking up all the traffic for me. Thanks a great big bunch. Traffic: WAØTNM 147, KØAIE 121, WØHOJ 117, WDØBMR 102, WØDVB 94, WAØUEN 92, WAØVRE 78, WØKJZ 60, WØMZI 50, WBØOMF 30.

DELTA DIVISION

ARKANSAS: SCM, Dale E. Temple, W5RXU — SEC: K5TML. NMs: WB5WWA W5MYZ W5POH WA5AWA. Nets: Arkansas Razorback Net 3.995 0030 dy. OZK 3.760 0100 dy. Arkansas Phone Net 3.937 1200 M-S. Mockingbird Net 3.928 2230 M-F. Saline County Amateur Radio Club 28.765 0230 M&T. This is my first OST article as new SCM. WB5WWA is new Net Manager Arkansas Razorback Net effective April 1. Need suggestions for SEC. K5TML has requested resignation as soon as replacement can be found. Thanks to WA5LGN for his service as Net Manager ARN. Will appreciate news and suggestions for this article. Traffic: WB5GQH 47, W9YCE 25, W5MYZ 17, W5KL 6.

LOUISIANA: SCM, Jim Giammanco, N5IB — Congrats to WD5GKP and W1QFY who received certificates of appreciation from the New Orleans Police Dept. for their work during hurricanes. 18 other MTARC members were mentioned in a letter of thanks. Also, congrats to K5OR and W5ZPA for attaining 5BDXCC. In Baton Rouge, 15 students have completed their code tests in BRARC Novice classes. Everyone had a great time at the BRARC Hamfest. W5LVX was presented the BR Award, and W5OVV the Stan Preston Award. LARC had a CPR course for members, families, and friends. A local hospital provided the instructor. Several club groups have been actively studying for FCC "plain language" rules, and have filed comments with the Commission. Remember that the deadline for comments is fast approaching. As you read this, hurricane season is officially here, even though there was some activity as early as May. This is a good time to make a thorough check of your emergency equipment.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	263	139	K5TL
LTN	3910 kHz	6:30 P.M. Dy	184	39	N5EK
LSN	3703 kHz	7:30 P.M., M-F			WD5EAE
LRN	3587.5 kHz	6:30 P.M. Su	15	5	N5RB
		8 P.M. W			
LEN	3910 kHz	8:00 P.M. Sun			

Traffic: K5TL 211, W5VMY 93, WD5FLM 79, N5RB 77, WB5UVX 65, N5BFV 56, WD5GKP 53, KA5DLV 42, N5IB 22, K5WOD 19, N5ADF 14, WD5CWK 10, KAØCSM 1.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. MSN expanded to five nites Mon thru Fri. Congrats to upgrades: Gen. KA5s FKT HQZ KZX. Adv. KA5s EDW FDE. Extra KC5EY. JARC graduated 12 Novices, tnx to WD5BSJ and KA5FDD. Hernando Club to begin Novice classes soon. New appt: Frequency Coordinator, WD5DCI. Akerman and Inverness repeaters worked on and coverage is great. Freq. Ack 147.72/12, Inv. 147.78/18. New calls: WA5JWD now N5DDV, WB5PDG now N5DFC, KA5AFT now KC5LK, WB5YEE now KC5MN. CAND (W5KLV) sess 30, QTC 939. DRN5 rep 100 percent by N5AMK W5EDT. DRN5 (WB5YDD acting) sess 30, QTC 387. MS rep 90 percent by N5AMK W5EDT WD5EYM WB5HAS W5HKW KB5W. MSBN (WD5EYM) sess 30, QNI 1935, QTC 63. MN (WB5HMW) sess 30, QNI 554, QTC 13. MTN (K5OAF) sess 30, QNI 110, QTC 62. MSN (KA5GGG) sess 11, QNI 35, QTC 3. RACES (N5AMK) sess 4, QNI 143, QTC 0. GSEN (KB5W) sess 22, QNI 478, QTC 101, QNC 13. CAEN (KA5AGD) sess 4, QNI 96, QTC 3. Traffic: KB5W 369, W5EDT 111, K5OAF 48, N5AMK 45, WB5SNB 23, WD5EYM 20.

TENNESSEE: SCM, Earl Leonard, KB4G — STM: WB4PRF. SEC: W4NZW. As you know, one of the main justifications for the existence of our great hobby is the fact that we perform a public service. A lot of activity across our state could possibly use our help to provide special communications. A few of these that come to mind are "The Walk for Mankind," Special Olympics for the handicapped and other special public events where we amateurs can have an opportunity to show our capability in supplying special communications. Take a look around your town or city for the chance to lend your services in special communications, then spread the word among your fellow amateurs and you will be surprised at the help you can get to perform these "Public Services." Appointments: KA4PHL NM Clarksville Amateur Transmitting Society Net (CATN). Traffic nets: LF: 78 sessions, 4391 QNI, 252 QTC; VHF: 114 sessions, 2730 QNI, 589 QTC; CW: 60 sessions, 775 QNI, 318 QTC. CW Net Honor Roll: TN — NG4J W4DDK WB4ZSZ W4WXH; TSN — KA4BSG N4DZW N4EAM WA4IDN NG4J KY4L WA4LXP W4MRD KC4MW KA4OVE KA4PWU N4EFB KA4RJC KA4RUE KC4UH WB4YSN W4ZJT. Congratulations for another record for TSN. Thanks for all the help. See you on the nets. Traffic: (Apr.) NG4J 529, W4DDK 402, W4WXH 252, W4MRD 247, W4OGG 218, W4ZJY 213, WB4BKF 193, WB4PRF 173, WD4SIG 117, WA4IDN 68, KY4L 37, WD4NJR 30, W4PFP 30, KC4MW 27, KA4BSG 25, W4TYV 22, K4WOP 20, W4VS 12, W4EWR 9, W4RUW 9, KA4GSS 7, W4DPO 2. (Mar.) W4VS 8.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU.

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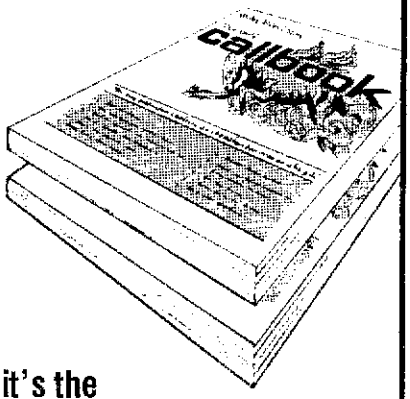

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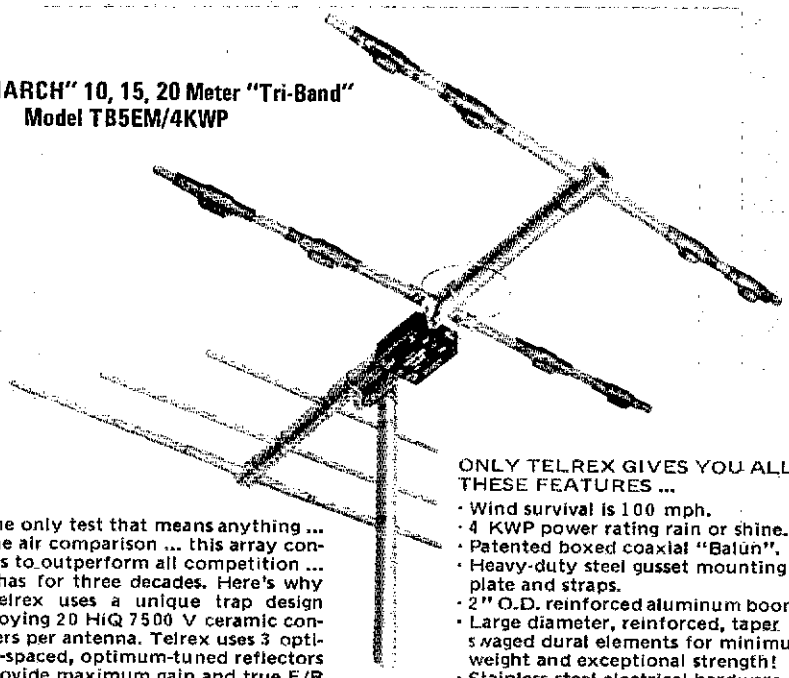

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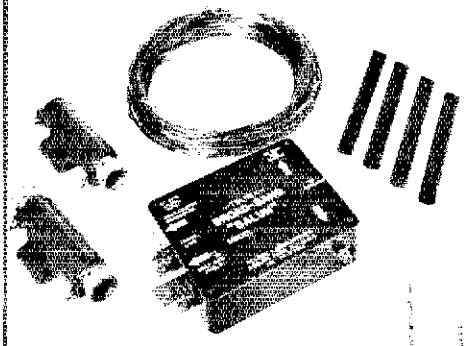

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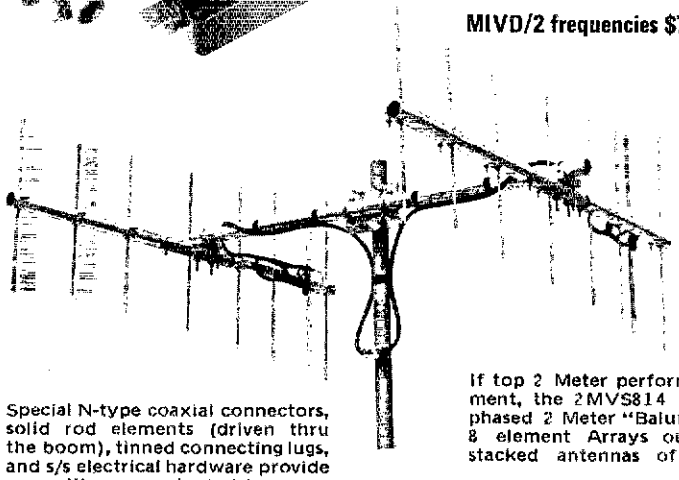

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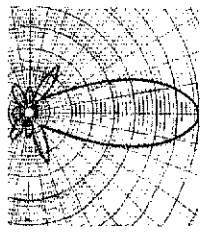

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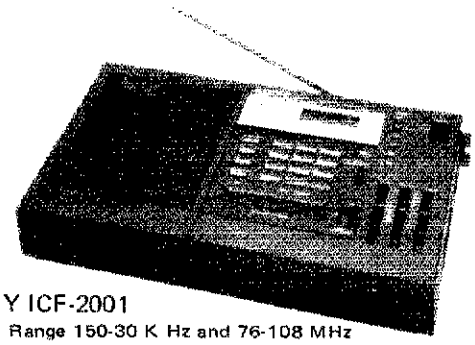

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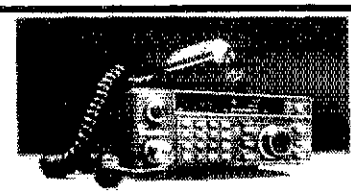

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KENWOOD'S TR-7850 2 meter FM mobile transceiver has the most features for maximum operating versatility, the TR-7850 has a 40W output. Frequency selection is easier than ever, and the transceiver incorporates advanced memory developments for storage and recall of repeater offsets, priority, and scan. The front-panel pad also functions as an autopatch DTMF encoder on transmit.

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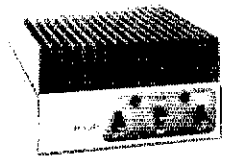

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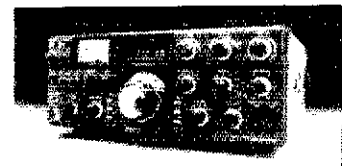

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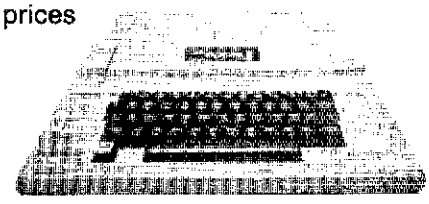

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Wilson M29 2mtr. 9 element	$24.95	Bearcat 211 Scanner	$249.95	Hustler G-7-144	$99.95
Wilson M211 2mtr. 11 element	$29.95	Alliance HD-73 Rotor	$109.95	CDE 3 Amp P/S	$24.95
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Avanti 2 mtr. "on the Glass Antenna"	$29.95	Dentron AT-3K	$229.95	Kenwood R-1000	Call for Price

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Net	QNI	QTC	Net	QNI	QTC
KRN	565	39	MKPN	981	105
KTN	1070	184	KNTN	405	123
KYN	119	280	KSN	190	57
Bares	74	5	SEKEN	20	1
TSTMN	401	44	CARN	206	23
KPON	41	2	4AHES	46	4
5ARES	81	5	6AHES	130	1
PAEWTN	349	34			
9RN-D	100%		CAN-D 100%		

PSHR: KA4GFU KA4MZY KB4OZ KA4SAA/N KZ4G. K4DZM and KB4OZ received PSHR award. KA4TSP is new 8 yr old YL in Knisley. KA4MZY, net mgr D9RN. New SEC, N4EEL, Shepherdsville. KA4JNIM has graduated from Berea now portable 9 at Purdue University. Lexington test will be Aug. 9 at new location. WA4UQA active OBS. Traffic: KA4MZY 127, KC4VB 111, K4YZU 105, KA4GFU 101, K4JLX 83, KC4XM 83, KB4OZ 76, WB4BSC 51, KC4WN 60, WB4APC 58, WD4IYI 54, WA4SWF 54, KS4V 50, KZ4G 44, WA4JTE 44, KC4AV 35, WA4EBN 31, KA4SAA 31, WB4AUN 27, WA4AVV 26, KA4MBF 25, K4MHL 19, KA4MDJ 17, WA4GAL 16, WD4JTO 16, WA4YPO 16, WB4ARF 14, WD4COF 13, WB4UQI 13, WA4AGH 12, W4CDA 12, KA4IKH 11, K4HOE 10, W4PKX 10, K4AVX 6, WD4CJQ 5, WD4IYH 4, N4EEL 3, KU4A 1.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V DECs: KC8DN K8RGT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ K8ZJU

Net	Freq	Time/Day	QNI	Tfc	Sess.	Mgr.
MITN*	3953	1900 Dy	758	340	30	WD8LRT
QMN*	3663	1800 Dy**	1179	350	90	WA8PIM
GLETN	3932	2100 Dy	1017	158	30	K8DTG
MACS*	3953	1100 Dy	546	124	30	K8LNE
MNN*	3722	1730 Dy**	337	102	60	KA8DEZ
UPN*	3922	1700 Dy	643	96	34	WA8DHB
SEMTN*	146.64	2045 Dy	264	51	27	WA8RNB
WSSBN	3935	1900 Dy	504	28	30	WB8SUR
BR	3930	1730 M/S	400	26	24	W8HIN
MEN	3930	0900 Su	124	5	5	W8HIN
VHF Nets 17 rep			1625	50	112	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 1800. GO reports: W8MVR K8NKB W8QG KE8X AC8Y. OBS report: WA8RNB. Silent Keys, with deep regret: WB8EEQ KM8G (ex-WB8CRD) W8WXO. Upgrades: to General, KA8IVH; to Advanced, K8ZJU; to Extra, W8VWY. Callsign changes: WD8ECT to KM8I; WB8FLK to KC8DN; WD8OKU to KC8DU. New NM for MNN is KA8DEZ/N, who replaces WD8BHE, stepping aside after 15 months of fine leadership to give the job to a Novice. New manager for WSSBN is K8GOU. Congrats to new Novices, KA8s MHM MMX MMY and MPM, and to the Branch County "Novice Factory" that produced them. BPL: KA8CPS. Twenty PSHR reports this month. Traffic: (Apr.) KA8CPS 495, AF8V 401, WD8LRT 374, WB8MTD 320, KB8MX 247, WB8YDZ 152, WA8PIM 151, K8KMQ 120, WD8BHE 92, WD8IBY 92, WD8RNQ 90, W8UE 83, K8DTG 82, WA@TAQ 76, WA8DHB 75, W8VIZ 73, K8OCP 61, WB8ITT 60, WB8TTA 55, WD8NKT 54, KE8X 53, WD8OSE 52, W8SCW 51, WD8MJB 49, WB8YRY 48, K8GXV 46, WD8RWR 44, KA@AID 44, KC8DC 42, WB8YWA 42, K8UPF 37, N8BJD 36, K8LNE 36, WD8ROK 33, W8CUP 32, KA8DEZ 31, W8YIQ 31, WB8SYA 30, W8IHX 27, W8JXJ 27, W8HIN 26, WD8RHU 25, K8ZJU 23, WD8IXZ 22, WD8EIB 19, W8VPW 18, KB8GT 15, W8RNQ 12, WB8DJS 11, WB8HPZ 11, K8LUY 11, WA8OAF 11, KF8M 9, W8MOF 9, W8LDS 7, WA8YBP 7, N8BNC 6, KI8O 6, WD8LIP 5, K8DD 4, WB8HSN 4, WA8VBF 4, K8RV 3, W8JUP 2. (Mar.) W8IHX 27.

OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: K8AAZ WD8KBW K8OZ WD8QMP WB8YGW W8EK. Net reports:

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN	439	312	57	6:45/10 P.M.	3.577
BNR	119	66	29	6 P.M.	3.605
ONN	106	25	24	6:30 P.M.	3.708
OSN	248	174	30	6:10 P.M.	3.577
OSSBN	2694	1058	90	10:30 A.M.	3.9725
O6MN	298	49	30	9:00 P.M.	50.160

Sincere thanks to DARA for its hospitality during the three days of the Dayton Hamvention. The Dayton crew did it again, didn't they! And a special vote of thanks to K8AN for his time, effort and the door prizes which combined to make this year's ARES Forum the best-attended within memory. Many folks who have been going to the Hamvention for many more years than I, agreed, and also passed their thanks on to Ralph through me. Mobile ARES communications fever appears to be catching throughout the state. The Hamilton County ARPSC is the latest to buy a truck for conversion to a communications command post. Purchase of the vehicle was made possible by a $10,000 gift from a local insurance company; and other local companies donated enough funds to equip the truck. Repeater and other fixed equipment for the group will also be realized from these donations. Club election: Portage ARC: KB8AB, pres.; WD8MPV, vice pres.; W8WAV, secy./treas.; N8KW, radio officer. Appointments: N8BOY to DEC Ashtabula, Geauga and Lake Counties. WD8PHL to EC Fayette. Upgrades: KB8ZM to Extra.

Local Nets	QNI	QTC	Sess.
BRTN	356	157	30
CCOMF	95	2	8
Firelands Red Cr.	93	5	6
Huron Co. ARC	51	5	4
LCNWARES	1100	188	56
RARA	53	3	4
TATN	470	237	30
TSRAC	921	132	33
VWCEN	45	5	4

(Apr.) K8OZ 516, W8PMJ 353, WA8HGH 280, WD8KFN 235, KB8YS 203, K8AAZ 184, WA8SSI 159, W8MOK 156, N8CW 152, WD8KBW 147, AB8P 142, WB8KKI 137, WB8WTS 134, WB8JGW 132, W8UPD 120, K8AN 112, WD8PEI 104, W8OZK 103, KF8J 100, WB8DMF 96, K8GET 91, KA8KFW 90, WB8MEK 90, W8GGX 87, KA8DJZ 86, WB8UBR 86, N8JR 84, W8EK 82, N8XX 78, WB8SIQ 74, WB8QHU 69, WD8DYW 60, WA8GMT 60, WD8ODV 56, WB8SRC 54, K8JE 51, K8JDT 50, WD8PMW 49, WD8DDE 48, KA8GVZ 48, K8DL 44, K3RC 42, WA8ZID 37, N8BQK 36, WA1QAA 34, K8NJO 34, W8JMD 33, N8AKS 32, W8BHL 32, WD8NEC 32, WA8JNQ 31, WB8AWM 30, WD9HDZ 30, WB8PIY 27, W8MGA 26, WD8QMP 26, WB8YGW 25, K8CKY 24, KK8L 24, WA8QYJ 24, KA8HGH 22, W8WEG 22, WD8MIO 18, WD8NEB 18, WB8SGL 17, WB8QHV 16, WB8SJE 14, W8RG 13, WB8VA 12, WB8MRL 12, K8PYT 12, WB8YUS 12, N8CGM 11, WB8CJU 11, WB8TRK 11, WB8WNH 11, WD8JIK 10,

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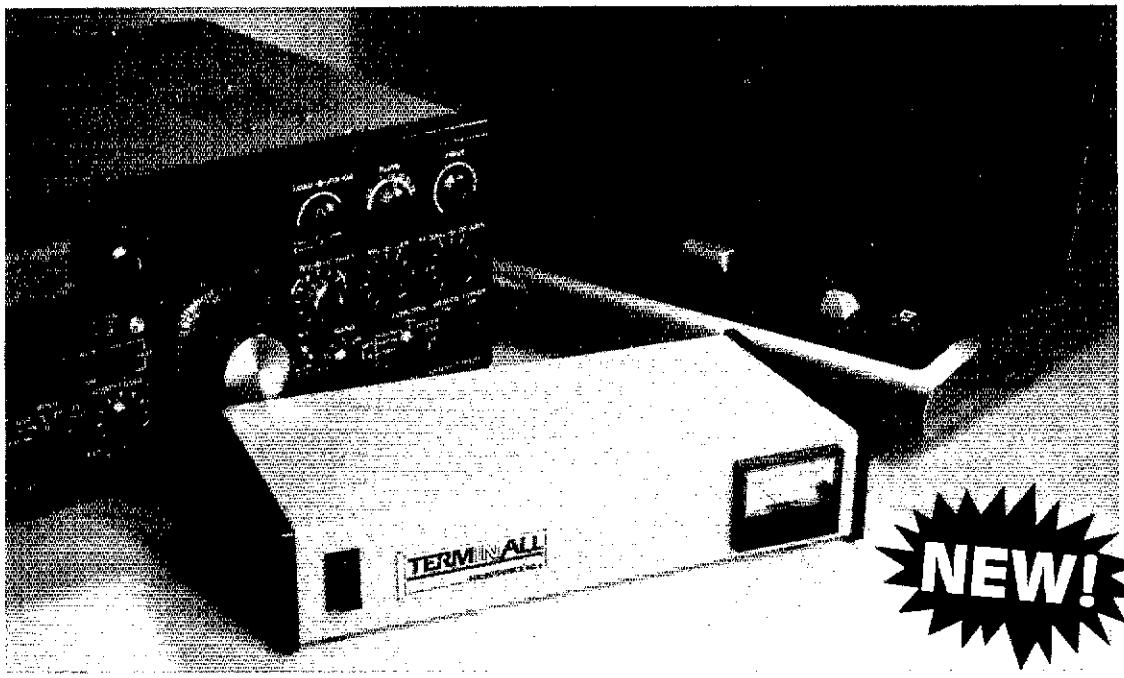

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TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code, Baudot or ASCII. Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII 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.

Superior Performance

TERMINALL can do so much that it's simply not possible to list all the features in this limited space. Here are just some of the highlights:

- **Multi-Level Displays:** Edit window on top to enter transmit text or program messages. Status window displays mode, operating parameters, prompts and error messages. Dialogue window displays received and transmitted text in chronological order. Review window allows examining and editing historical text while receiving or transmitting.
- **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.
- **Hardware clock:** Maintains correct time during all operations, including cassette I/O. User programmable time/date format.
- **Full ASCII capabilities:** Upper and Lower case, control codes, even/odd/or no parity, 6, 7 or 8 data bits, 75 or 110 baud.
- **Multiple user-defined WRU:** For each of four WRU functions, you can select any combination of (1) Initiate sequence, (2) Terminate sequence (including none or timeout), (3) What to transmit back (if anything—including ID in any mode, message, serial number, time/date), and (4) Whether to save on tape or not. WRU functions work in all modes (Morse, Baudot, ASCII).
- **Buffered ASCII** parallel printer output. Select: edited historic text; all text, or WRU activated ("AUTO START") text.
- **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, Keyboard selectable: baud rate, shift, CW ID keying, unshift-on-space, signal invert.
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HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2TM. STM: WA2SPL. ASCM: KB2KW W2IT K2AV. NM: W2WSS WB2IXR N2BDW WB2ZCM WA2SPL WB2HDU W2ZOJ.

Net	Time/Day	Freq.
EPN	2200Z	3902
ESS	2200Z	3590
NYPON	2100Z	3913
NYSPTEN	2200Z	3925
NYS	2300/0200Z	3677
CDN(Troy)	2230Z	146.34/94
HVN(Beacon)	2330Z M-F	146.37/97
HVN(Pearl)	2330Z S-S	144.535/135
SDN(Wht. Plns)	0130Z	147.66/06
SCRN(Catskill)	0000Z	146.135/735

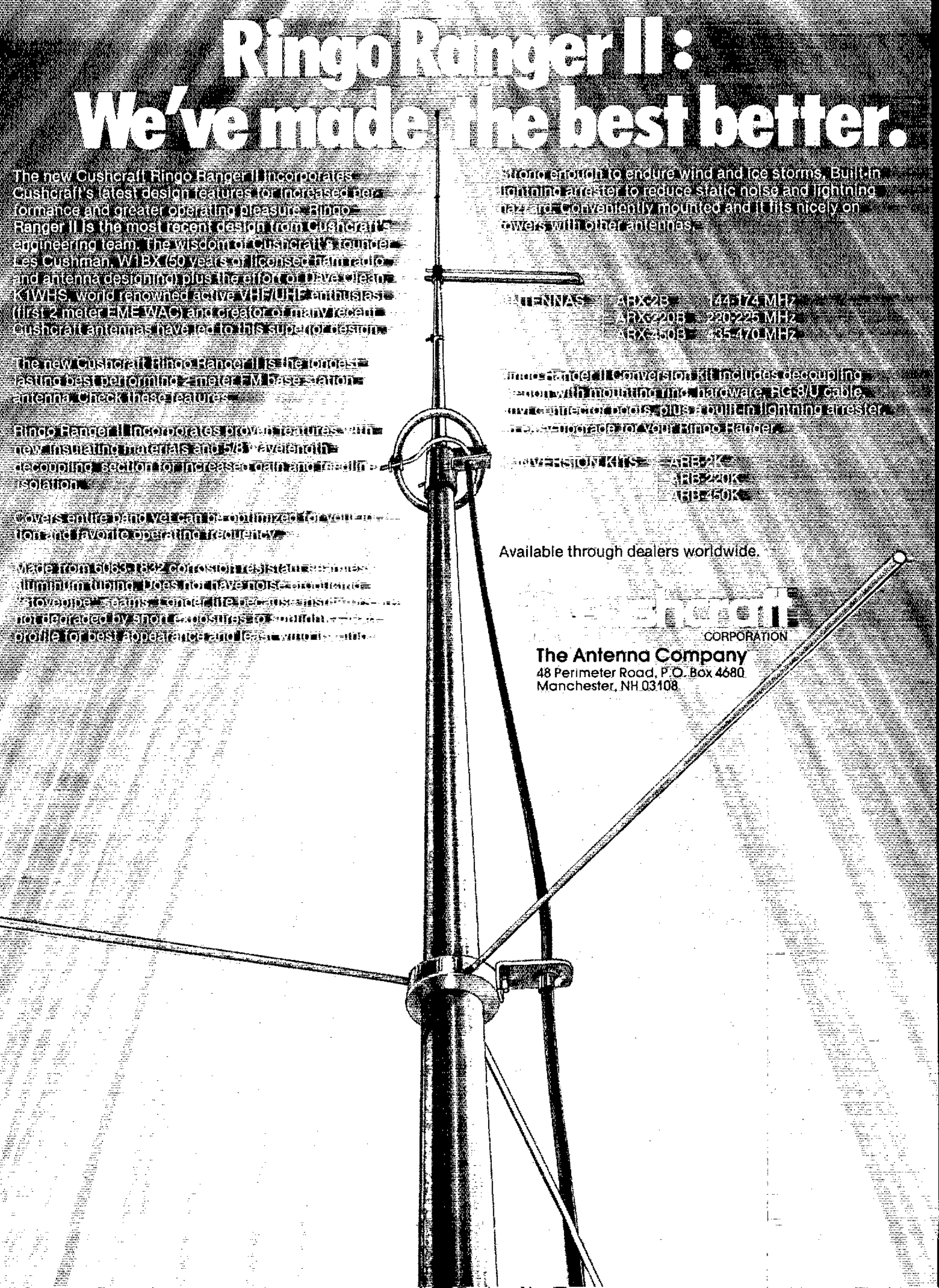
Well here are the results! PD overall: Ulster 14060, Putnam 13620, Westchester 11507, Albany 9663, Rensselaer 5880, Dutchess 5600, Orange 5054, Col/Grn 4347, Schenectady 3934, Sar/War/Wash 3802, Sullivan 2874, Rockland 514; Msg handling: Uls-12060, Put-11780, Dut-11200, Wes-11060, Ren-10960, Alb-10780, Org-10120, Sar/War/Wash 9720, Col/Grn-9660, Sul-9580, Roc-5140; Accuracy: Sch, Alb, Dut, Uls, Ren, Put, Org, Sul, Wes, Col/Grn, Roc, Sar/War/Wash. Congrats to all, especially Ulster and EC W2XL! PSHR: (Mar.) WB2EAG. PSHR: (Apr.) W2BOW W2BIW WB2IXR KB2KW WB2MCO W2YJR WB2ZCM. Traffic: (Apr.) WA2SPL 584, WA2JBC 199, W2BIW 150, WB2ZCM 141, WB2MCO 122, WB2IXR 83, KB2KW 81, KA2CLX 74, N2BDW 66, W2IQK 63, W2YJR 63, W2PKY 56, W2EFU 40, K2MI 37, AA2Y 33, K2HNW 13, WB2OHR 12, N2EF 4. (Mar.) WB2EAG 324, WA2JBO 83, W2IQK 54.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section, please check in: NLI CW 3630 kHz 1900/2200 WB2TQC mgr; NLI PHONE 3928 kHz 1815 WA2SEL mgr; NASSAU VHF 146.04/64 2100 M,W,Sun 2100 WA2SOE mgr; BIG APPLE VHF 147.915/315 M-F 2030 N2BMF mgr; SUFFOLK VHF 144.77/145.37 M-F 2030 N2BKK mgr; LIMARC W2VL 146.25/85 Fri 2045 WA2SOE mgr. All times are local, please try and help out by checking in once in a while. If Newsday won't print it, I will. LIMARC did an outstanding job again this year with the L.I. Marathon, congratulations are in order for all those who helped and participated, and to K2BS, who joins the elite ranks along with W2TE as having actually ran the entire race and finished, not many of us around that can say that. Suffolk County ARC had a fine turnout and a well run FCC exam again, congratulations to all involved, and especially to those who upgraded. WA2UWF is the new EC for Brookhaven Town. She is also very active on the Suffolk County VHF Net. LIMARC has a crystal bank and they have also started a tube bank, contact WA2IMP for details. WA2GBS is back from a trip to Egypt. WA2BGB was invited to speak at a club out in Calif. on her trip to China. Thanks to WA2KKJ and WB2HTW and all the many other stations who were involved in the Easter Seals Walk-a-thon, not enough can be said in the way of thanks for helping. Suffolk County ARC will have a flea market on Sept. 13, with a rain date of Sept. 20, contact WA2SDI for details. Congratulations to KA2EJM and KA2IOU on upgrading to General and KA2GFA and KB2XL upgrading to Advanced. WA2SEL has progressed towards 5BWAS: Ten Mtrs SSB WAS completed and Met reports he needs VT, WV and NC for 15, but still lots of states on the rest of the bands, good luck. WB2DBC reports at least 20 new Novices from their classes at Wantagh Park, contact him for further details on where and when. I wish to thank KA2CNN for all his help along with KA2DBW. KA2CNN has stepped down as ASCM due to his heavy schedule with school, ah yes, I remember how hard it can get, especially holding down a full time job also, best of luck. KA2DBW has stepped down as mgr of the Big Apple VHF Net, N2BMF will take over, please give him all the help and cooperation with the net. Traffic: KA2CLQ 53, K2GCE 52, WA2SEL 38, KA2ELB 32, WB2JAY 19, WB2IDP 18, K2IZ 16, KA2KGH 3.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — SEC: WB2VUF. STM: W2XD. NMs: N2CR N2BOP W2PSU KA2GQO W2UEZ WB2IQJ N2BNB.

Net	Mgr.	Freq.	Time/Days	Sess	QNI	QSP
NJPN	N2CR	3950	6 P.M. Dy	34	538	240
NJN/E	W2UEZ	3695	7 P.M. Dy	30	458	297
NJN/L	W2UEZ	3895	10 P.M. Dy	30	293	139
NJSN	WB2IQJ	3735	6:30 P.M. Dy	30		
OBTTN	N2BOP	72/12	8 P.M. Dy	30	552	152
UCETN	KA2GQO	085/6857	30 P.M. Dy	30	279	55
NJVN	W2TCA	49/49	10:30 P.M. Dy	30	312	163
NWNJVN	N2BNB	90/30	8:30 P.M. Wed	4	51	22
NJRTTY	W2PSU	147.51	Autostart	30	65	6

WA2HEB and N2BQT to Advanced. KA2HLI to Technician. K2AHL had signed a written agreement in 1978 with his neighbors that he would not operate. The judge ruled against him because he had violated this agreement and not because of RFI. In view of this, ARRL decided that they could not help with the appeal and Don has decided not to go ahead with it and will return all monies sent from the ham community. WA2UDT received DLD100 award from DARC. He has had his ticket 20 years in May. KA2IRQ upgraded to General. RAVEN, which is a net that covers the following towns: Oakland, Wayne, Little Falls, Butler, Bloomingdale, Pompton Lakes, Pequannock, Lincoln Park and Kinnelon, has great need for more amateurs to join these nets, especially during flooding of the Ramapo River. Write K2SE for further info. WB2PIR to General and WB2VNF to Tech. New calls: KK2R KK2U and N2CII. KA2CGD and W2NEH, son and father, to Extra. New Novice, KA2MCM. N2BGU to Extra, KA2COO N2GJP to General. KA2LGO to Tech. We regret to report two SKs: KB2AY and K2RAO. On April 5th, 32 RAMARC stations participated in the Passaic County Community College Mini-Marathon. They also participated in the March of Dimes Walk-A-Thon on April 26th. Mark August 15th for their annual flea market. KA2HNQ in intensive care at Pascack Valley Hospital — speedy recovery! WA2TLI attended the Columbia space shuttle launch. KA1KQ WB2DZW to Extra; N2BNV KB2WZ KA2AXY to Advanced. WB2KDG WB2PIR WA2QZS N2BWH to General. WA2BGE recently returned from a tour in BY-Land and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will give a slide presentation entitled "China, Reawakening." Sussex County ARC participated in "Walk America 1981." They used an aircraft over the route with WA6YPX and N2ATE air mobile working with 26 others on the ground. N2BOP to Advanced. W2XD WB2VUF KB2WI attended Indian Point Nuclear plant emergency planning meeting in White Plains, NY. ORTTN has expanded its nightly net coverage by upgrading its repeater antennas and reorienting them on the tower. KA2HAE now N2CLL. WB2RMJ upgraded to General. W2JBI gave an excellent talk about WWV and propagation to the Greenbrook Repeater group. A REMINDER: all traffic reports and news MUST be at my QTH by the 5th of the month. Hope everyone participated in Field Day. N2CR is to be congratulated on a FB job as NM of NJPN as he steps down. W2CC is the new NM. Traffic: (Apr.) W2UEZ 463, N2BOP 244, W2GWS 229, AG2R 222, K2VX 212, W2XD 192, AF2L 98, N2XJ 94, WA7DPK/2 89, KB2WI 84, N2BC 81, KA2GQQ 73, KA2JMH 67, KA2HNQ 56, N2BNB 40, N2BQL 39, KA2GMH 38, N2GM 32, WA8ZNH/2 27, KA2GSX 22, W2CC 20, WB2RMJ 19, W5DTR/2 17, W2NKD 14, W2GD 4. (Mar.) W2GWS 108, N2XJ 68.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K¢CY — SEC: W¢RPK. STM: KA¢X. Hats off to FDARC for assist with reporting of downtown fire. Henry Cty ARES operated during recent pipeline explosion. They were really support your ECs. CIRAS sponsoring Novice Net for IA Vets Home. WB¢QAM qualified for PSHR. Plans going well for 1981 ARRL National Convention. NIARC has new Swan 350 for club stn. After successful Podunk Center operation. W¢ANZ and W¢YBV planning "DXpedition" to SD/ND line. Walkathon in Dubuque, bike races in IA Cy; Drake Parade in DSM shows good ps activity. Keep it up. Clark and Wayne Cty ARES assisted officials with disaster drills. Mt. Pleasant aided authorities with Skywarn exercises. Welcome to IA-NEB PM Net with WA¢AUX, NM. KA¢X and WD¢HND guests at DSM for traffic program. WB¢UPF attended Dayton. N¢AOE now an Extra. New hams in Muscatine: KA¢KDH KA¢KNT KA¢DTO KA¢DTT. WD¢DCO now Advanced. New calls heard: KJ¢H KB¢ZP KB¢XL KB¢XD N¢COL N¢COJ N¢CKP. KA¢JPN upgraded. CAND/DTRN and TEN 100 percent participation. Again more stns assisting. Keep reports coming. See you in DSM Aug 16 and Aug 23.

Net	UTC	Freq.	Day	QNI	QTC	Sess.
75M Phone	1730-2300	3970	M-S	2025	163	52
TLCN	2330-0300	3560	Dy	368	145	60
ICN	0000	3713	M	41	19	12
IA-NEB PM	2130	3978	M-F	108	24	22

Traffic: WA¢AUX 512, K¢GP 110, W¢SS 110, W¢YLS 109, WB¢QAM 96, K¢CY 84, KA¢X 83, AE¢R 74, WD¢HND 66, W¢BW 41, WB¢AVW 30, KF¢D 16, K¢JGI 12, KA¢JQG 13, WA4VWV 6.

KANSAS: SCM, Robert M. Summers, K¢BXF — SEC: W¢KL. NMs: W¢FT W¢OYH WA¢SZS. Kansas Sideband report for April: QNI 1125, QTC 103. Kansas Phone Net: QNI 393, QTC 18. Net controls are reminded again to please get reports into the net managers by the 5th of the month so that they might get their report to me by the 10th. Without the reports it makes it hard to report accurate totals as well as being able to get the report into the League on time. Sorry to hear of the passing of W¢CEM's daughter who fell off a truck. Central States Tfc Net: QNI 1046, QTC 92. Kansas WX Net: QNI 900, QTC 565. Don't forget to make plans to attend the Midwest Division Convention to be held in October at Salina. Early reservations would be a wise decision if possible. Traffic: W¢QMT 132, W¢OYH 110, W¢FIR 102, W¢AM 100, W¢HI 86, K¢EZ 81, W¢FT 72, WD¢ACG 66, K¢EZ 60, K¢BXF 57, W¢KL 44, W¢CHJ 41, WB¢YLP 40, W¢ASY 30, W¢FDJ 15, W¢PB 14, W¢RT 13, W¢RBO 7, W¢OAG 2.

MISSOURI: SCM, L. G. Wilson, K¢RWL — Asst SCM: Joe Flowers, W¢OTF. STM: WB¢LFY. SEC: N¢AJI. This has certainly been the month of the upgrade. KA¢GQP has upgraded to Tech. WB¢ZNG WD¢CGZ and KA¢IVC have all upgraded to General. WB¢LFY WD¢GGF K¢PCK N¢ARH and N¢CKU are now holding Advanced class licenses and N¢CDH and KB¢AB have reached the top with Extra. KA¢E has completed 160-meter WAS. Many area amateurs have just returned from a trip to the Daytona Hamvention and once again congratulations goes out to the Northern Ohio DX Association for all the work and time invested in this annual event. The KC DX Club was well represented in Dayton in a joint hospitality suite with the Northern Ohio DXers and a good time was had by all.

Net	QNI	QTC	Net	QNI	QTC
MEOW	261	9	NEMOE	109	0
CMOEN	105	3	MOSSB	648	60
ACE	57	1	HBN	422	42

K¢RWL is now sporting a new Alpha amplifier. The Eastern Ozark ARC is currently involved in Skywarn operations. The Ozark ARS installed a new 100 ft. repeater tower recently. K¢IEQ and W¢CKK were chosen by the Ozark ARS as "Ham of the Year." Congratulations to K¢TPX on his recent promotion. Traffic: K¢ONK 741, W¢BMA 232, W¢OUD 214, K¢PCK 110, K¢SI 101, W¢OTF 88, KI¢K 41, WB¢LFY 20, KA¢P 12, K¢RWL 5, N¢SS 5, KA¢E 4.

NEBRASKA: SCM, Shirley M. Rice, KA¢BCB — SEC: N¢AIH. STM: WD¢BQG. Our sympathy to family & friends of W¢OHG. Newly appointed ECs: K¢JBL North Platte, AJ¢A Grand Island, WB¢PPF Omaha, K¢GND Lincoln, WA¢BOK Benedict, N¢AJQ Dorchester, KC¢R Blair. If you can help in your co PSE let N¢AIH know. Tnx to all who participated in Operation Red Cross Relay. Congrats to KA¢GVX upgrade to Gen, KA¢FBP Tech, KA¢KPV Novice, & W¢FQB Certificate of Appreciation for service in DX QSL Bureau. Hats off to new Womens Aux. in Ak-sar-ban ARC & Scotts Bluff ARES. Mid-west Amateur of the Year nominations due Sept. 1, let's have another good showing this year from NE. Hear WD¢BQN has extra antenna he'll loan. Traffic: WD¢CID 252.

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	58	366	390	K1EIR
CN(Mar.)			60	280	343	
CPN	915/315	1800/1000 Su	30	119	329	WB2PJU
NENN	3720	1815	30	80	197	WB1CPF
NVTN	28/88	2130				WA1ELA
RTN	13/73	2100 M-Sa	26	80	213	WB1CPF
WCN	78/18	2030	30	113	419	W1DPR

High QNI: CN (April and March) — WB1ESJ WB2PJU K1UQE. CPN — K1EUW KA1KD. Another BPL for

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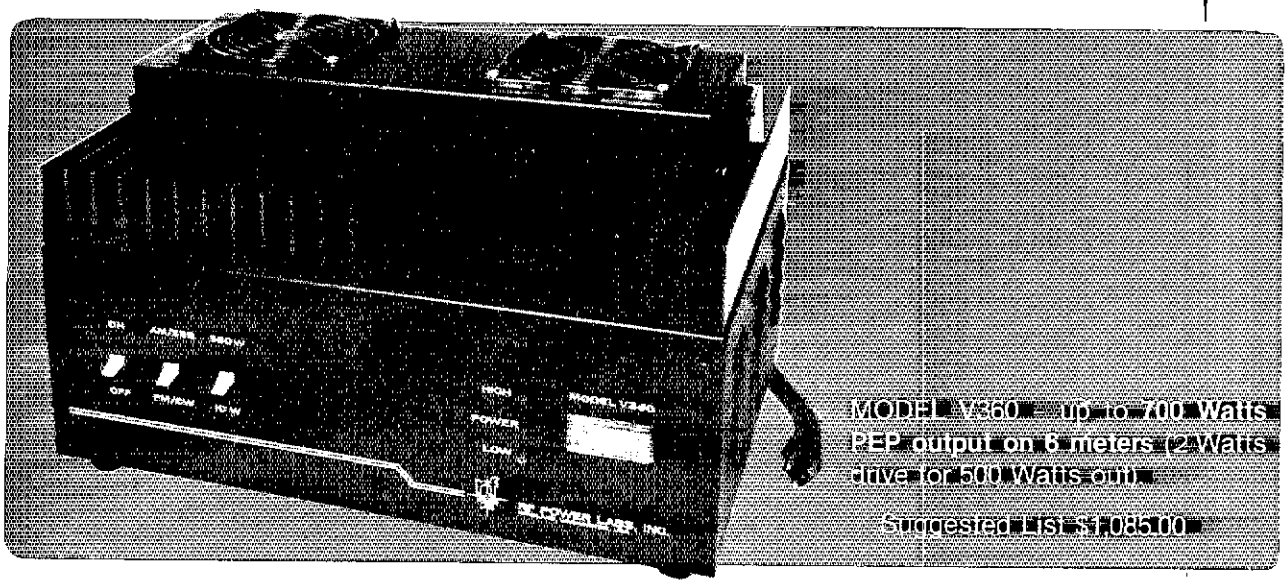

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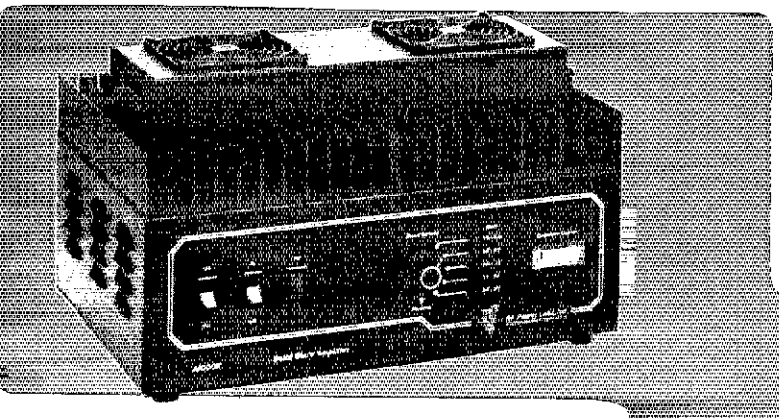

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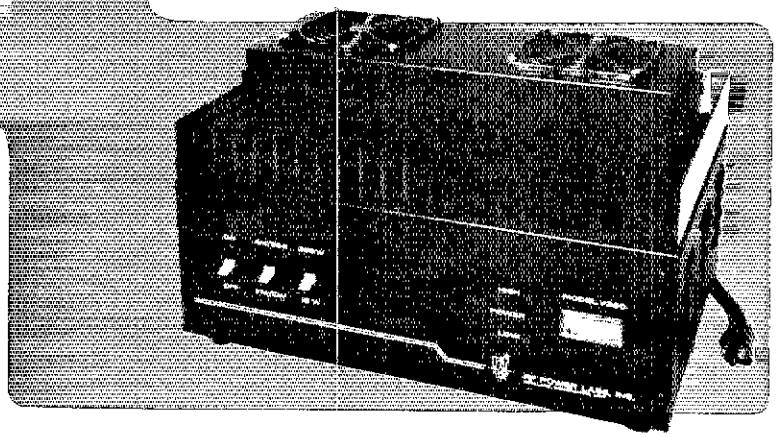
400 Watts Output
144 - 148MHz
Suggested List $1,085.00



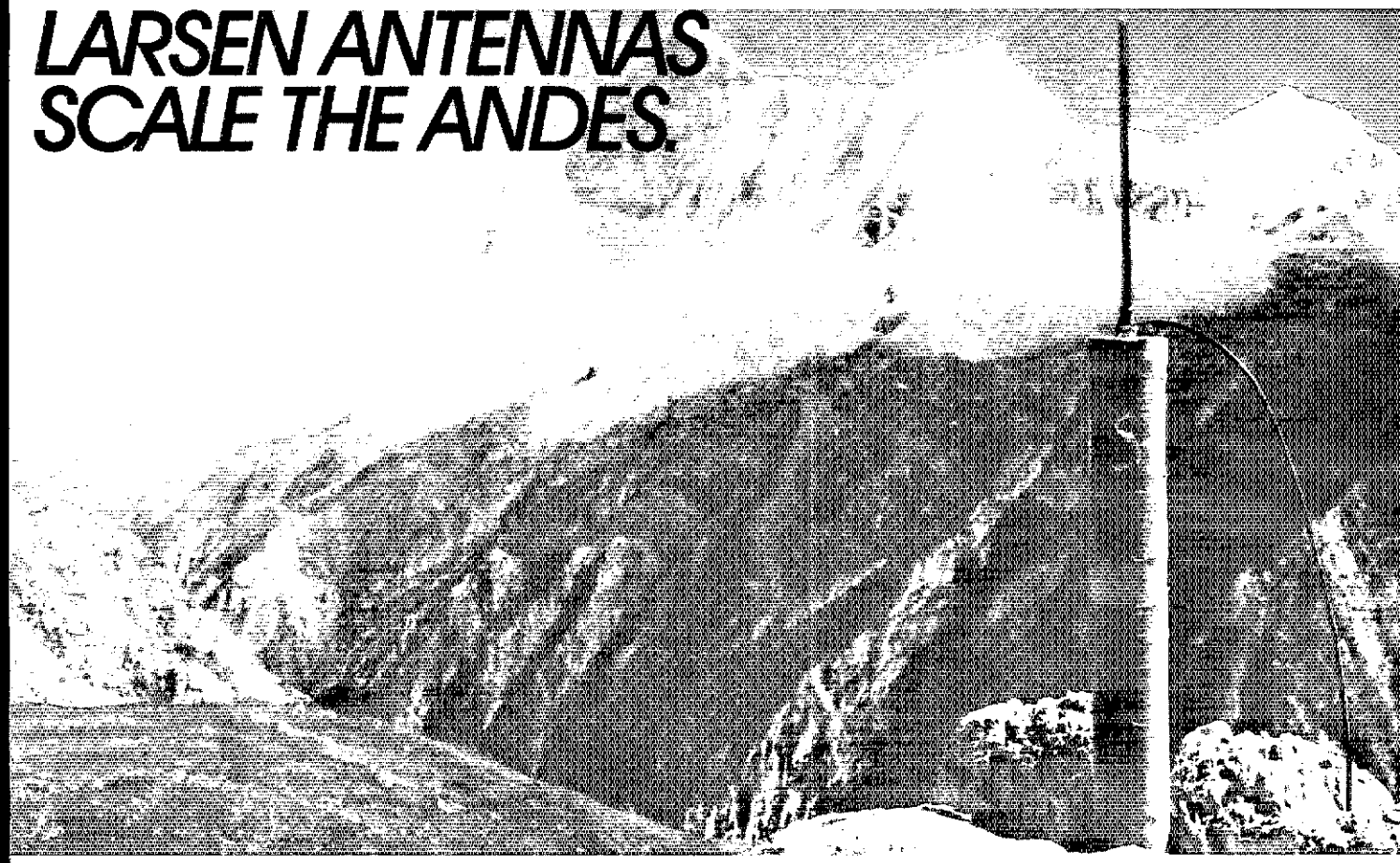
ALSO
Commercial, Military and Scientific amplifiers from 10 KHz to 400 MHz at 400 watts output and 2-32 MHz up to 5000 watts output.

RF POWER LABS, INC.

21820 - 87th S.E. Maltby Industrial Village/Woodinville, WA 98072
Tel: 206-481-8833/Telex No.: 32-1042

*Power supplies are internal on all models shown.

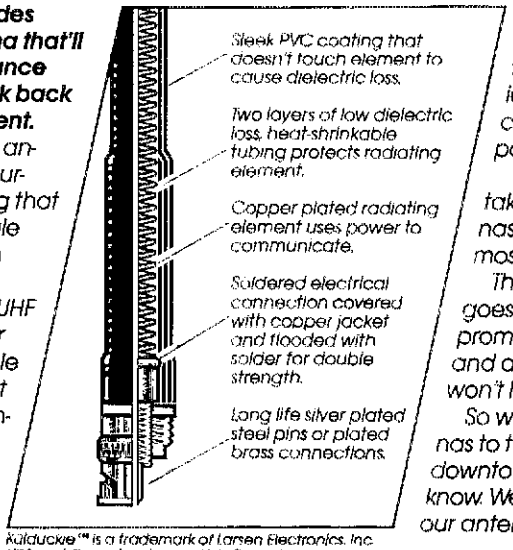
LARSEN ANTENNAS SCALE THE ANDES.



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 Külduckle™ 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 Külduckle portable antenna a sleek finish.



Külduckle™ 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 service too. With prompt delivery, personal attention and a no nonsense warranty that won't leave you high and dry.

So whether you take your antennas to the top of the Andes or to a downtown construction site, let us know. We'd be glad to show you how our antennas will work for you.

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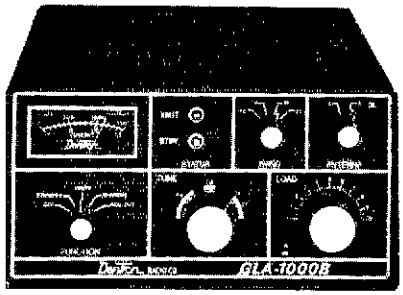
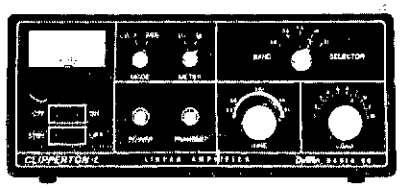
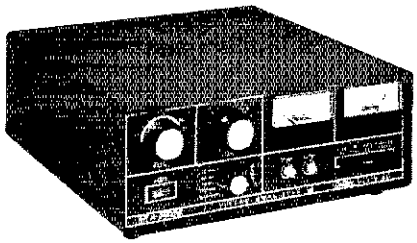
Vancouver B.C., V5T 2C4 Phone 604-872-8517



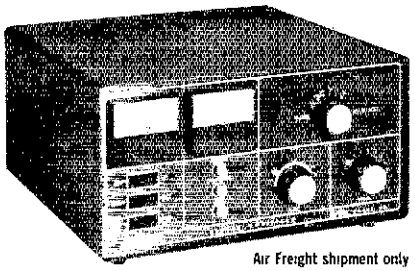
DenTron **GLA-1000B** Linear. 160-15m with some MARS. 1200w PEP SSB, 700w DC CW. (4) D-50A's, tuned input compatible with Solid-State rigs. 125w maximum drive. Size: 5⅜"h×11"w×11"d, 24 lbs.
Regular $399 - ***Sale Price $349.95***



DenTron **Clipperton-L** Linear. 160-15m, 2KW PEP SSB, 1KW DC CW, RTTY/SSTV. (4) 572B's with tuned input. 65-150w drive. 6"h×14½"w×14½"d, 42 lb.
Regular $699 - ***Sale Price $599.95***

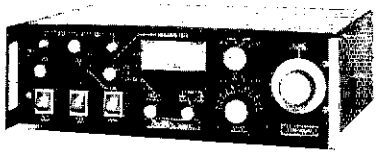


DenTron **MLA-2500B** Linear. 160-15m with some MARS. 2KW PEP SSB, 1KW DC CW, RTTY/SSTV. (2) 8875's, 60-135w drive. 5½"×14"d×14"d, 47 lbs.
Regular $999 - ***Sale Price $799.95***

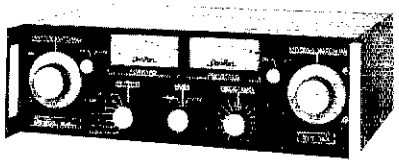


Air Freight shipment only

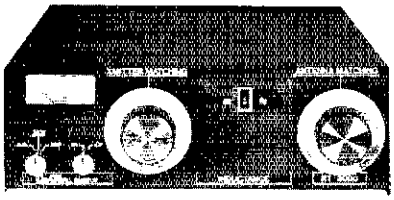
DenTron **DTR-2000L** Linear. 160-15m with some MARS. Legal power limit on SSB, CW, RTTY/SSTV. (1) 8877, 65-125w drive. 7¼"h×14½"w×14½"d, 54 lbs.
Regular $1300 - ***Sale Price $999.95***



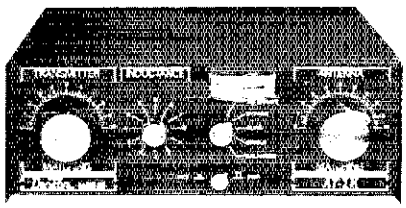
DenTron **DTR-1200L** Linear. 80-15m with some MARS. 1200w PEP SSB, 1000w CW. (2) 572B's, 65-150w drive, tuned input compatible with Solid-State rigs. 5¼"h×17"w (19" w/rack bkts.) × 13"d, 46 lbs.
Regular $665 - ***Sale Price $455.95***



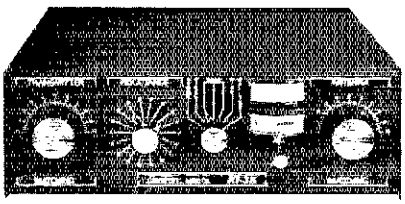
DenTron **DTR-3KA** antenna tuner. 3 KW PEP. 1.8-30 MHz. Tunes coax, balanced line or long wires. Size and style match DTR-1200L linear above. 15 lbs.
Regular $499 - ***Sale Price $349.95***



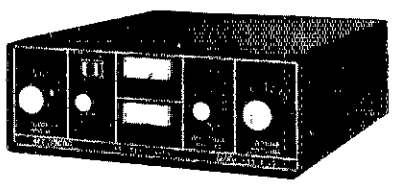
DenTron **RT-3000** Roller inductor tuner. 3 KW PEP, 1.8-30 MHz continuous - tunes coax and wire antennas or balanced line with optional BL-1 balun. Vernier dial, wattmeter. Size: 4"h×12"w×13"d, 10 lbs.
Regular $299 - ***Sale Price $249.95***



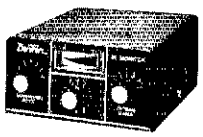
DenTron **AT-1K** 1200w PEP antenna tuner. 1.8-30 MHz will tune coax, wires and balanced line with optional BL-1 balun. Size: 3¾"h×10"w×9½"d, 7 lbs.
Regular $149 - ***Sale Price $129.95***



DenTron **AT-3K** 3 KW PEP antenna tuner. 1.8-30 Mhz - tunes coax, wires or balanced line with optional BL-1 balun. Size: 4"h×12"w×13½"d, 12 lbs.
Regular $259 - ***Sale Price $219.95***



DenTron **MT-3000A** 3 KW PEP tuner. 1.8-30 MHz. Built-in balun & dummy load. Tunes coax, wires and balanced line. Size: 5¼"h×14"w×14"d, 18 lbs.
Regular $399 - ***Sale Price $349.95***



DenTron **Jr. Monitor** tuner. 1.8-30 Mhz, 200w. Balun built-in, tunes coax, wire & balanced line. Mobile bracket supplied.
Available in August
Regular $79 - ***Sale Price $69.95***

ACCESSORIES:

BL-1 balun for AT-1K, AT-1K	$49.50
1 KW 4:1 chassis mount balun	29.50
3 KW 4:1 chassis mount balun	39.50
All Band Doublet 160-10m antenna	29.50
100' 2 KW 470 ohm ladder line	12.00
100' 2 KW 300 ohm transmission line	19.50
SWL flat top (kit)	19.50
Big Dummy 1 KW dummy load w/oil	39.50
Tuned input kit for GLA-1000 (not B)	39.25
CM-1 Tuned input unit for Clipperton-L	59.95
CM-2 Tuned input unit for MLA-2500B	59.95
W-2 Wattmeter (Reg $129.50)	Sale Price 99.00
SWR-1A SWR/Power meter, dual meters	49.50
MC-1 Mobile microphone	29.95

NEW PRODUCTS:

DenTron **Clipperton-V** 500w VHF power amplifier for FM/SSB/CW & AM 144-148 MHz; compatible with Multi-Mode 2m transceivers. Single 4CX-250B, only 2 to 25w drive. Input/output: 2w/190w, 5w/295w, 10w/365w. Built-in continuous duty power supply and RF accuated antenna relay with adjustable VOX delay. Size: 6"h×15"w×17"d, 42 lbs.
Regular $599 - ***Sale Price $539.95***

DenTron **HF-200D** HF transceiver; a refined version of the earlier HF-200A; features a digital readout a redecorated front panel and much more.
Regular $499 - ***Sale Price $449.50***

HF-ACS AC supply *(Reg. $129.50)* ..... ***Sale 119.50***

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WB1CPF! K1AH appointed assistant to SEC W1SY. Sorry to learn that Storrs' most active ham, W1XF, became a Silent Key. K1CE and the Hamptons will be in concert at NOBARC Hamfest on July 11th. N1BDB upgraded to General, WA1GLS, returning after 13 year hiatus, upgraded to Advanced, WB1GXZ, another new Advanced, erecting two-meter "CPN" antenna. K1EFI advanced to Extra. KA2BNV is now N1BLL. Bethel Middle School ARC now on 144 MHz. Eastern Conn ARA Echo Net is plugging along Sundays on 50,530 MHz at 9:30 A.M. Each Tuesday at 8 P.M. the Meriden ARC Net meets on 28.675 MHz and the Tri-City ARC calling frequency opens on 28.965 MHz. CARA Capers' editor, KA1KD, extended Murphy's Law... "In any assembly operation, the part you just put down can't be found." Traffic: (Apr.) WB1CPF 603, K1GF 286, W1EFW 221, W1NJM 154, WB1CRH 130, WB1GXZ 123, WB1ESJ 109, W1XX 75, W1DPR 59, W1BDN 48, KA1BHT 48, KA1DZV 44, K1UQE 44, K1EUW 42, KA1KD 34, KA1KP 34, WA1LOU 21, K1CE 16, W1KV 6, W1CUH 5, W1QV 4, K1OQG 2. (Mar.) KA1KP 41.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW.

Net	Mgr.	Freq	Time(local)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy		
EMRIPN	KA1BJY	3.898	1730/Dy	351	267
EM2MN	KA1CGP	90/30	2000/MWF	210	51
NEEPN	K1BZD	3.945	0830/SN	52	36
HHTN	K1BSO	04/64	2230/Dy	406	189
EMRISS	N1BHH	3.715	2030/Dy	128	41

HELP WANTED — With WA9NEW moving from the area I am in need of an Assistant SCM. The main characteristic of such an individual should be the desire to do the job. He has been handling CD appointment paperwork and has been keeping track of active clubs in the section. If anyone is interested in the job let me know. Norwood Club is buying a tower for use on Field Days. They're usually the club to beat in 3A Class. Algonquin Club held its annual dinner meeting. Massasoit Club has K1MM talk on Sprately DXpedition in '79. Greater Lawrence club planning social picnic. Middlesex club bulletin highlighted father-son team K1OQX and K1NDF. The New England and Novice Net Manager has changed from WB1CPF to WB1GQO. Quannapowitt Club member WA1QQV now KA1OE and also awaiting his Extra class callsign. Whitman Club had Valentines Day Party. Framingham Club had Vince Kajurski from the FCC give a talk. Billerica Club members AK1L KA1FBY W1IHN W1WLW and WB1DFY motored to Dayton for the big Hamvention as did SSRA member WA1TPC. I would like to thank WB7TPY for heading up our Red Cross Traffic Relay. Nominations are open for this year's Public Service Award. Send me a letter of nomination for the ham you think has done the most for public service this year. I'm tired of hearing that the price of QST is going up. When you hear somebody complaining about that on the air do as I do. Remind them of the Outgoing QSL Service. League sponsored gear insurance, benefits to affiliated clubs, DXCC, Field Day, SCMs, STMs, SECs, OOs, NTS, ARES, training aids, movies, antenna ordinance help, reciprocal operating help, blind and handicapped aids, Technical Information Service, Wash Liaison, IARU and the results of WARC. Membership in the League is more than QST. Other mags cost the same and give you only the mag. Think about it! Traffic: (Apr.) N1BHH 653, WA1TBY 315, KA1BJY 193, KA1ON 187, K1BA 165, W1ATX 100, K1BSO 77, W1DMH 48, KA1EMQ 48, K4YX 41, K1BZD 36, KA1CGP 35, W1CE 20, KA1MI 18, WA1FNM 16, W1PJ 6, KA1CC 5, KA1R 5, WB1EDL 4, WA1DXT 1. (Mar.) KA1BJY 171.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ. SEC: KL7IJG. WA1YNZ K1CLF KA1ENM demonstrated ham radio to 5 science classes of 6th graders. WA1BM reports 15 hams in Augusta provided comms for walkathon, also found little girl lost in crowd. Pine State RC handled comms for 8 & 17 mile canoe races & a 5 km footrace in Bangor. Aroostook ARA officers: KA1JC, pres.; WB1DED, v.p.; N1BGO, secy.; N1BJX, treas. PSHR: AK1W 104, W1RWG 103, W1BJ 72, W1JTH 68. Sessions/QNS/QTC: BN 26/799/0, SGN 26/1194/152, SPSN 12/124/15, PTN 31/327/175, MSN 12/81/19, AEN 4/53/3, MPSN 6/51/3. RACES 4/56/3. CMEN 8/120/13. HAMFEST 81 is on schedule! June 20. Traffic: W1KX 169, W1BJ 153, W1RWG 133, AK1W 103, WB1BYR 81, AF1L 65, W1AHM 63, W1HDC 63, AC1G 60, W1JTH 31, W1CTR 22, WA1YNZ 17, WB1DGR 16, N1BCE 14, W1BMX 14, KA1EIW 13, K1TVT 13, N1BCT 11, KA1EKT 11, K1NAN 9, N1BJW 7, KA1CNG 8, KA1ENL 5, WA1ZJL 4, W1EKJ 3, KA1ENM 3, KL7IJG 3, KA1WQI 2, KA1GGE 1.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH & K1OSM. The 1st Great Bay Radio Club Hamfest was a hit, with 850 attending. K1LGQ & KA1BXN now Extra. The Nashua Area Club provided communications for the March of Dimes Walk-a-thon. WA1YQR's OM is WA1YQQ. New officers: GBRA: WA1YQQ, pres.; N1ARR, vice pres.; KA1BXA, secy.; N1AYT, treas. The NHN had 163 check-ins & 145 traffic. K1MFQ worked K1WHS moonbounce so has only 49 states to go. KA1BBI now General and FRN rep. W1FYR added video to RTTY operation. KA1BBG now on RTTY. The NE Teleprinter Net meets on 3620 at 1900 local, Mon-Wed-Fri. Net is looking for Mass & VT outlets. W1BYS en route from Florida to sunny NH. Seen on hyways & byways: K1MRK W1MHD & K1OX. The GSFM net had 639 check-ins & 219 traffic. Keene machine (147.375) Tri State Emergency Net, 4 years operation with 100 percent service. GSPN had 261 check-ins and 73 traffic. K1NH made WAS on 75-meter Geratol Net. NH's 3rd largest tailgate swaptest will be July 18 at Manchester Airport, starting 9 A.M. Details from W1KGZ of NH FM Assn. Have a nice summer. Traffic: K1OSM 229, N1NH 182, KA1CXP 149, W1TN 142, AK1E 92, KA1BBI 90, KB1A 65, KA1BJ 61, W1VTP 56, WB1DKX 52, W1MHX 52, N1ALM 41, W1FYR 27, KA1FWQ 15, KA1CJI 8, K1NH 1.

RHODE ISLAND: SCM, J. Titterington, W1EOF — STM: KA1FE. K1DT resigns as SEC. RIEM 2-mtr. TFC Net reports sessions 22, QNI 208, TFC 38, WA1OSL Net Mgr. KA1EGZ has Extra with new call KD1G and is now an OBS, congrats. By a coincidence, RI now has KB1G, KC1G and KD1G — try running a tfc net with those three calls! KA1FE out to sea when this was written. N1RI starts a coast-to-coast bike ride in May. Just one more report to go for me. Hope you will support your new SCM as much as possible. Try and make the RI QSO Party in August. Have a nice summer. Traffic: W1EOF 387, KC1G 194, KB1G 75, N1RI 29.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Under the guidance of WA1YEH the ARRL-

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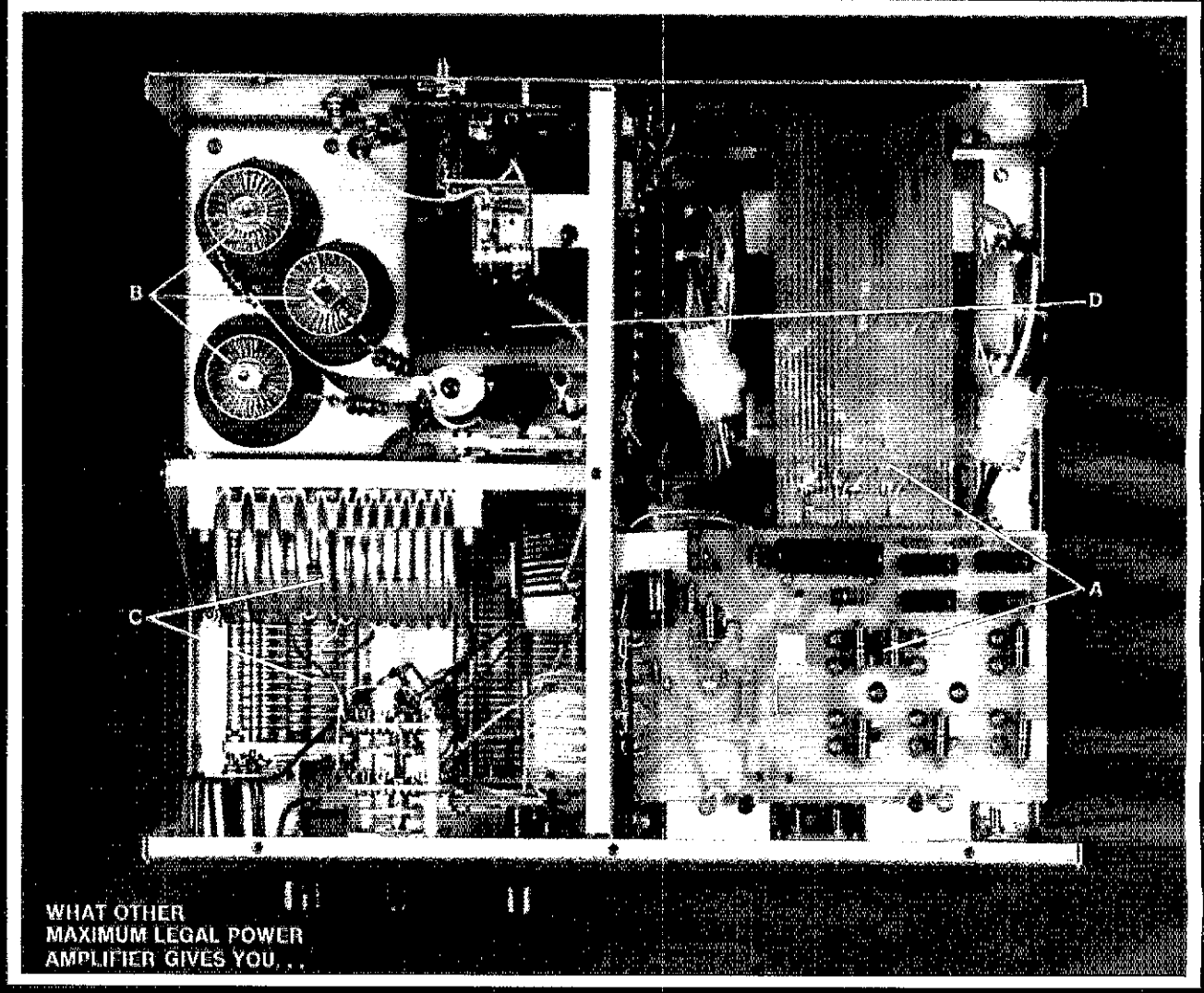

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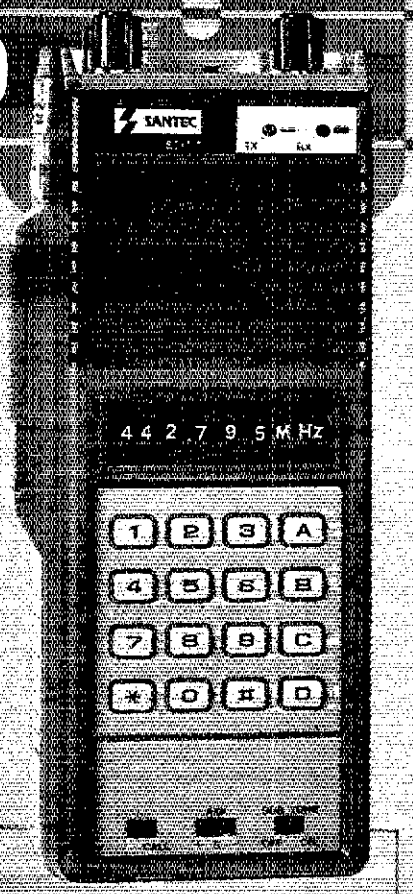


INTRODUCING SANTEC'S ST-7/T

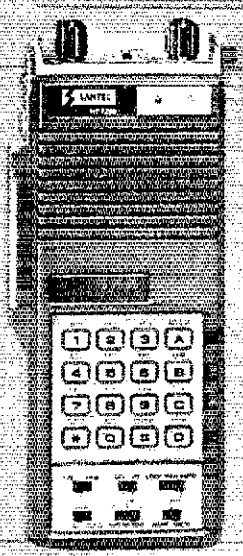
SANTEC•NOLOGY breaks into the 440 band with style! The new ST-7/T synthesizes the entire band in 5 kHz steps, works both up and down repeater splits and does it all right from your hand, with versatile power options of 3 watts, 1 watt or even 50 milliwatts (all nominal), to reach out to where you want. The high power mode of 3 watts radiates on 440 like 5 watts on 2 meters ... and that's a handfull!

Tones? This one has them ... tones and subtones! The 16 button tone pad is a SANTEC Standard at no extra cost, and the ST-7/T's optional synthesized subtone encoder is controlled by the radio's front panel switch.

All the regular SANTEC accessories used with your HT-1200 fit the ST-7/T as well, meaning that you can enjoy both bands fully with a smaller cash investment. Grab the new SANTEC ST-7/T and join the fun on 440 MHz. See your SANTEC Dealer for delivery details*.

2

STILL THE LEADER



SANTEC'S popular HT-1200 is the incomparable 2 meter leader. This little rig is handing over quality, power and features that you'd expect from something nearer the size of a bread box. SANTEC packs a 2 meter ham shack into the palm of your hand!

You can carry, scan, search, 10 memories and fully synthesized key pad control around with you and still get out with a big 3.5 watts (nominal). Compare them apples to anything you want, and settle for nothing less.

*Sale of the ST-7/T is subject to FCC Certification.

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

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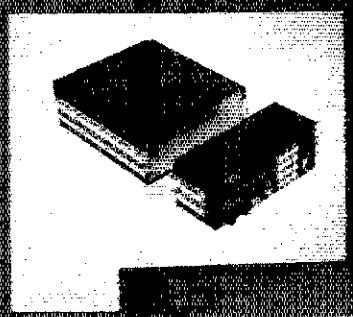

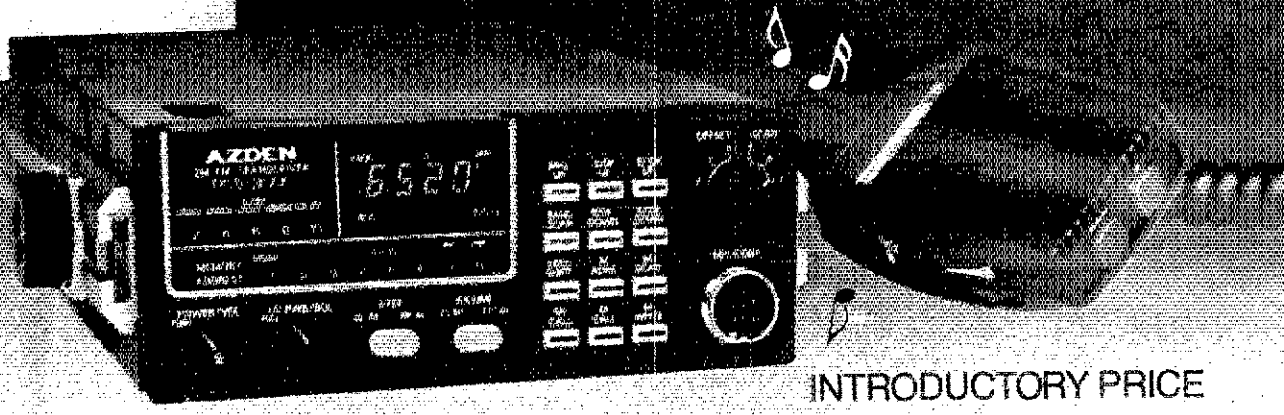

SUPERIOR COMMERCIAL GRADE 2-METER FM TRANSCEIVER

INTRODUCTORY PRICE

$339.00

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 . . . **$39.95**. CS-6R 6-amp ac power supply . . . $59.95. CS-AS remote speaker . . . $18.00. CS-TTK touch-tone® microphone kit (wired and tested) . . . **$45.00**.

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Red Cross Relay successfully sent 17 chapter msgs. Special thanks to WB1ABQ N1ARI WA1CZC KA1BRG W1FRE & W1ELJ for their help — also to any others who aided. Grn Mt. Wireless Society provided communications for March of Dimes in Rutland. 5 new Novices in Rutland: KA1s GPK GPI. GPM GPN & GQX. WB1ABQ is in process of setting up emerg. communication system; vhf-hf tie-ins, working thru rptr & club groups. Anyone interested, please contact WA1ABQ &/or N1ARI. VTSSB 30/525/135; GMN 25/481/38; Garner 26/433/23; VTN 30/112/60; RFD 4/69/24; VPN 5/51/5. VTN 3614 1900 local daily welcomes any cw op from slow to more experienced. Traffic: N1ARI 190, K1BQB 147, WB1ABQ 98, W1RNA 24, AE1T 18.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. SEC: W1JP STM: W1TM. NMs: W1UD WA1ITL W1UPH WB1HIH KA1APR. Liaisons/WMEN W1YI K1JNT W1DOY WA1YYW K1JHC WB1DBN. WMFN getting good marks on QNI, QTC and attending 1:45 and 3:30 sess of FRN. Wedding bells N1AAX/KA1CL2. Congrats new Extra, WA1AWR. We applaud the FB job done by W1DOY with strong CMARA support that supplied all comm for 10,000 square/round dancers in two-day N.E. convention at Worcester auditorium, 10 schools and one campground. Invaluable PR by 51 hams using club stn W1BIM WR1ABO WR1APG. The ARC Centennial Relay gave NTS a good workout, with a notable 33 originations by WB1HKN from Franklin C. PSHR: WB1HIH 103, W1TM 60. Traffic: WB1HIH 210, W1TM 168, W1UD 144, K1JHC 66, W1KK 54, W1YI 53, WA1OPN 41, W1EFC 39, WB1HKN 39, WA1YYW 38, K1IJV 36, W1JP 26, W1ZPB 18, WA1ITL 14, W1UPH 8, WA1MJE 4.

NORTHWESTERN DIVISION

IDAHO: SCM, Lem Allen, W7JMH — Mt. Home Club is reorganizing. Most of the Idaho clubs are planning Field Day expeditions — join your group and help plus have fun! W7IGK is back in Boise for a month or so — welcome home, Ted!

Net	Time/Freq.	Sess.	QNI	QTC
FARM	8 P.M. 3935 ssb Dy	27	1323	34
CD	8:10 A.M. 3990 ssb M-F	22	607	18
IMN	9 P.M. 3635 cw M-F	22	222	82
Rexburg	146.34/94 fm	4	98	0
Mt. Harrison	146.40/147.00 fm	4	99	1
Mini-Cassia	146.52/52 fm	4	18	1

Join a club, the ARES, become active in the community emergency plan. They need you, even if they are reluctant to say so. Traffic: W7GHT 137, AC7P 97, K7JV 74, W7KDB 72, W7JMH 41.

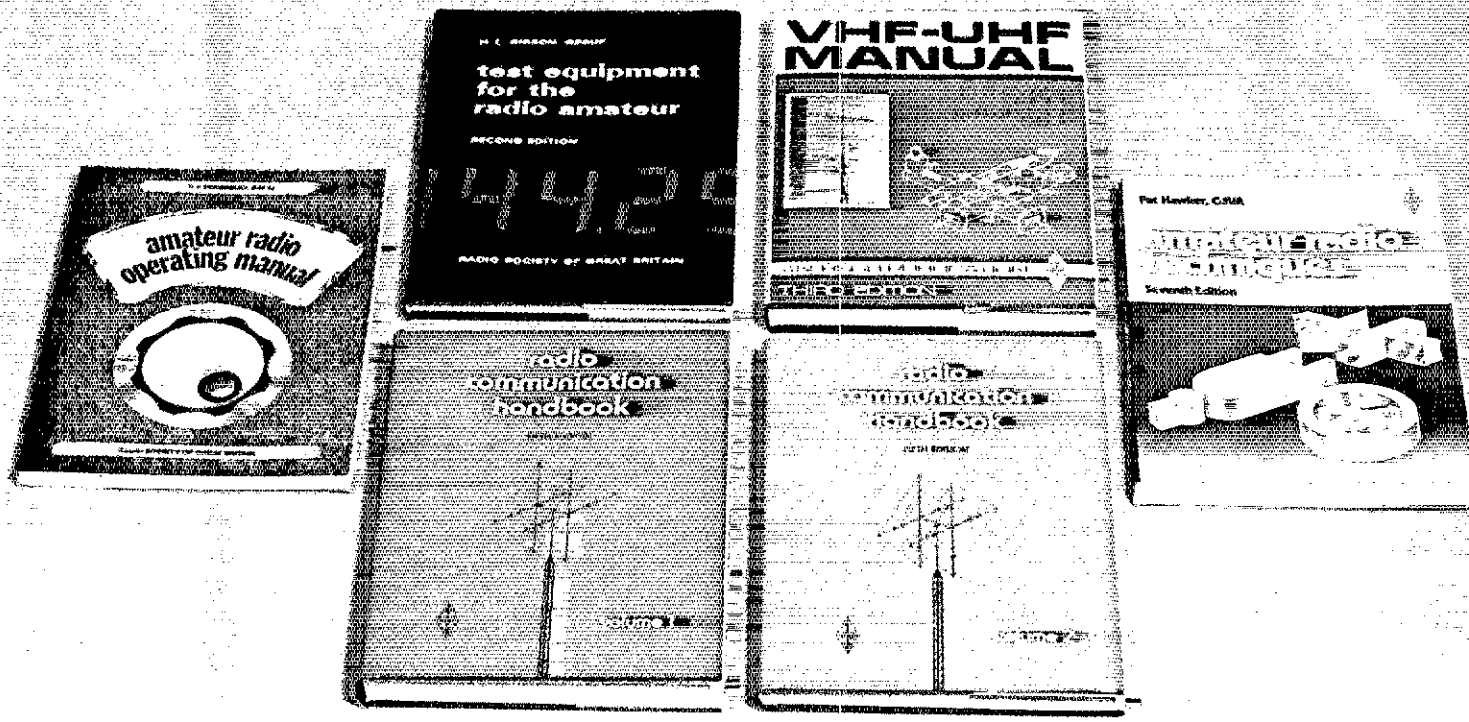
MONTANA: SCM, Les Belyea, N7AIK — WB7DZX in Libby is the new Section Traffic Manager (STM), a position that has been vacant for a few years. Up-grades: WB7STG & KA7AYN to Extra; K7IMM to Advanced, KA7CZJ to General. Many members of the Yellowstone ARC handled traffic for Red Cross during an emergency test at the Billings Airport. Lewistown on 75/15 in good working order, Bozeman 28/88 is back on a mountain top after a 7 month overhaul. By now Livingston should be operating on 31/91. If you would like to work 2-mtr ssb or cw, contact KB7BJ. KB7Q got his long awaited DXCC 6-mtr award (SMIRK). WB7TNH in Great Falls is active on 6-mtrs. Several stations have worked Utah, Washington and VE7-Land on 2-mtr Aurora. FB. The MTN is now on 40-mtr (7240) for the summer, starting time is 0030Z. The SEARC group held a commemorative Field Day for the 105th anniversary of the Battle of The Little Big Horn and had lots of family fun. MTN QNI 944, INM 22, BSN 185. Traffic: WB7DZX 162, W7IXD 53, W7NEG 6.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
OSN	0230/0600 Dy	3587	446	382	KB7JW
OARES	0115Z Dy	3993.5	339	113	W7HLF
OARES	0230Z Dy	3993.5	146	31	W7HLF
WCN	0300Z Dy	3706	369	113	K7ZIG
PTN	0300Z Dy	147.76	569	152	W7LRB
PdxARES	0330Z Dy	147.32	1069	23	K7WWR
LBLARES	0330Z Dy	146.79	829	14	WB7QQH
SOARES	0315Z Thu/Sa	146.94	215	156	KA7DBS

Change BSN Picnic date in last issue to 16 Aug. N7DB received WAJA award on 50 MHz, possibly first mainland USA. Upgrades: N7CJO N7CLN KA7HJT KA7JOH KA7JOC KA7JRC KA7JIF KA7HTO KA7JBC KA7EXI KA7IUG WB7SZL KA7IAX and WB7VZP. Great work and congrats! New Assistant ECs Douglas Co.: W7KIC K7BI W7LNE and W7HKE. NW DX Convention is first weekend in August at Greenwood Inn, Beaverton. Clatskanie ARC manned Salvation Army kettles for one day during holidays and had largest one day collection for 1980. Hoodview ARC officers: WA7IIM, pres.; WB7UFJ, vice pres.; WB7WTD, secy.; W7EAT, treas. New DXCC for WB7VUH. W7FQ awarded Certificate of Merit from BSN net, also WA7GFE received same award. Traffic: (Apr.) W7VSE 603, W7LRB 498, KB7JW 302, K7NTS 205, W7LNE 164, WA7IHS 145, W7TC 128, WB7OEX 124, WA7LGN 101, K7IWD 44, W7OMU 43, W7LT 18, KA7CZG 16, WB7DSK 15, KA7DBS 14, K7WWR 8, KA7EXM 3, W7DAN 1. (Mar.) WB7DSK 3.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. NMs: W7GB W7IEU WA7CBN KA7CSP. Nets reporting: NTN QNI 901, QTC 77; WARTS QNI 2830, QTC 206; NWSSBN QNI 573, QTC 51; WSN QNI 646, QTC 231; EWTN QNI 81, QTC 90; IETN QNI 221, QTC 45; PSTS QNI 145, QTC 90; SCARES QNI 129, QTC 10. W7FJZ has received his PSHR certificate for qualifying monthly for a year. If your FD group worked 3 of the following stations: K7NWS WA7LAW K7LED K7SKW W7DA or W7DK and have received their QSL cards, you quality for a certificate sponsored by the PSCARC. Send a dollar to K7CYZ, 802 South Lawrence St., Tacoma, WA 98404. W7JIE worked SCCA car rally during April. W7JIE also filed 11 IW reports and 3 alerts to FCC. K7RBT and other EARS members provided communications for March of Dimes Walkathon. HAMS Club members and SCARES members also participated in M-o-D Walkathon. WA7RCR on the mend after a recent illness. GTE Amateur Radio Repeater Group received nationwide news coverage of the wedding performed via Amateur Radio. I am not running for reelection this term, so please support and vote for the candidate of your choice. Then support him in his column by letting him know of your activities. If it had not been for the items I have been able to lift from club papers, many of the columns over the past couple of years would have been as short as this one. My apologies to the clubs and the editors for not including any of their news this month, but my schedule gets tighter as summer approaches and we have been getting a greater influx of people in the parks during the past year. I appreciate all the help I



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☐ **VHF-UHF MANUAL** by Dain Evans, G3RPE and G. R. Jessop, G6JP. You will find the *VHF-UHF Manual* jam-packed with practical theory and construction projects for the region above 30 MHz and extending into microwave regions. In fact there are 70 pages contained in the microwave chapter alone! Receivers and Transmitters for these bands are covered in 181 pages. The balance of this 349-page book contains chapters on Propagation, Tuned-circuits, Space Communications, Filters, Test Equipment, Antennas, and a handy Data section. (Since this is a British publication, there is little coverage of the 6-meter band, but many of the 4-meter band projects can be adapted by the experienced amateur for use on 6-meters.) 3rd Edition. Copyright 1976. Hardbound **$17.50.**

☐ **RADIO COMMUNICATION HANDBOOK** 5th Edition. You probably have the ARRL *Radio Amateur's Handbook* in your library. Now you can have a second source of authoritative radio frequency and electronics information at your fingertips. Volume 1 contains 10 chapters (460 pages): Principles, Electronic Tubes and Valves, Semiconductors, HF Receivers, VHF and UHF Receivers, HF Transmitters, VHF and UHF Transmitters, Keying and Break-in, Modulation Systems, and RTTY. Volume 2 contains 13 chapters (318 pages): Propagation, HF Aerials, VHF and UHF Aerials, Mobile and Portable Equipment, Noise, Power Supplies, Interference, Measurements, Operating Techniques and Station Layout, Amateur Satellite Communication, Image Communication, The RSGB and the Radio Amateur, and General Data. Both volumes are hardbound. Volume 1, Copyright 1978, **$20.00.** Volume 2, Copyright 1977, **$18.50.** Both volumes for **$35.00.**

☐ **AMATEUR RADIO OPERATING MANUAL** by R. J. Eckersley, G4FTJ. Get the British side of operating. Besides such chapters as Setting Up a Station, Operating Practices and Procedures, DX, Contests, RTTY and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU callsign allocations, callsign systems for each country, notes on foreign amateur operation, address of licensing administration and the name and address of the National Amateur Radio Society. 189 pages. Copyright 1979, 1st Edition. Soft bound **$10.00.**

☐ **TEST EQUIPMENT FOR THE RADIO AMATEUR** by H. L. Gibson, G2BUP A great addition to the library of the Radio Amateur who builds his own equipment. Beside covering measuring techniques, you will find a wealth of test equipment which you can build yourself. Construction projects range from simple dummy loads and attenuators to a 150 MHz digital frequency counter and timer. You will find simple signal sources for 1296 and 2304 MHz and 10 GHz. Chapter titles and number of pages devoted to each: Current and Measurement—23, Frequency Measurement—23, Wavemeters—19, RF Power Measurement—9, Aerial and Transmission Line Measurements—9, Noise Measurements—8, Components, Valves and Semiconductors—12, Signal Sources and Attenuators—12, Oscilloscopes and Modulation Monitors—8, Power Supplies—3, and Reference Data—8. Copyright 1978, 2nd Edition. Hardbound **$11.00.**

☐ **AMATEUR RADIO TECHNIQUES** by Pat Hawker, G3VA. Contains 800 diagrams and 364 pages of circuit ideas and devices which the author has gathered during 22 years of writing the *Technical Topics* columns in *Radio Communication*. It is not a text or handbook, but an idea book—RSGB's version of ARRL's *Hints and Kinks*, but on a larger and more in-depth scale. Copyright 1980, 7th Edition. Soft cover **$12.50**

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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.

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Model 525 ARGOSY —— $549. Make the right choice, ARGOSY—for the right reasons *and* low price. See your TEN-TEC dealer or write.

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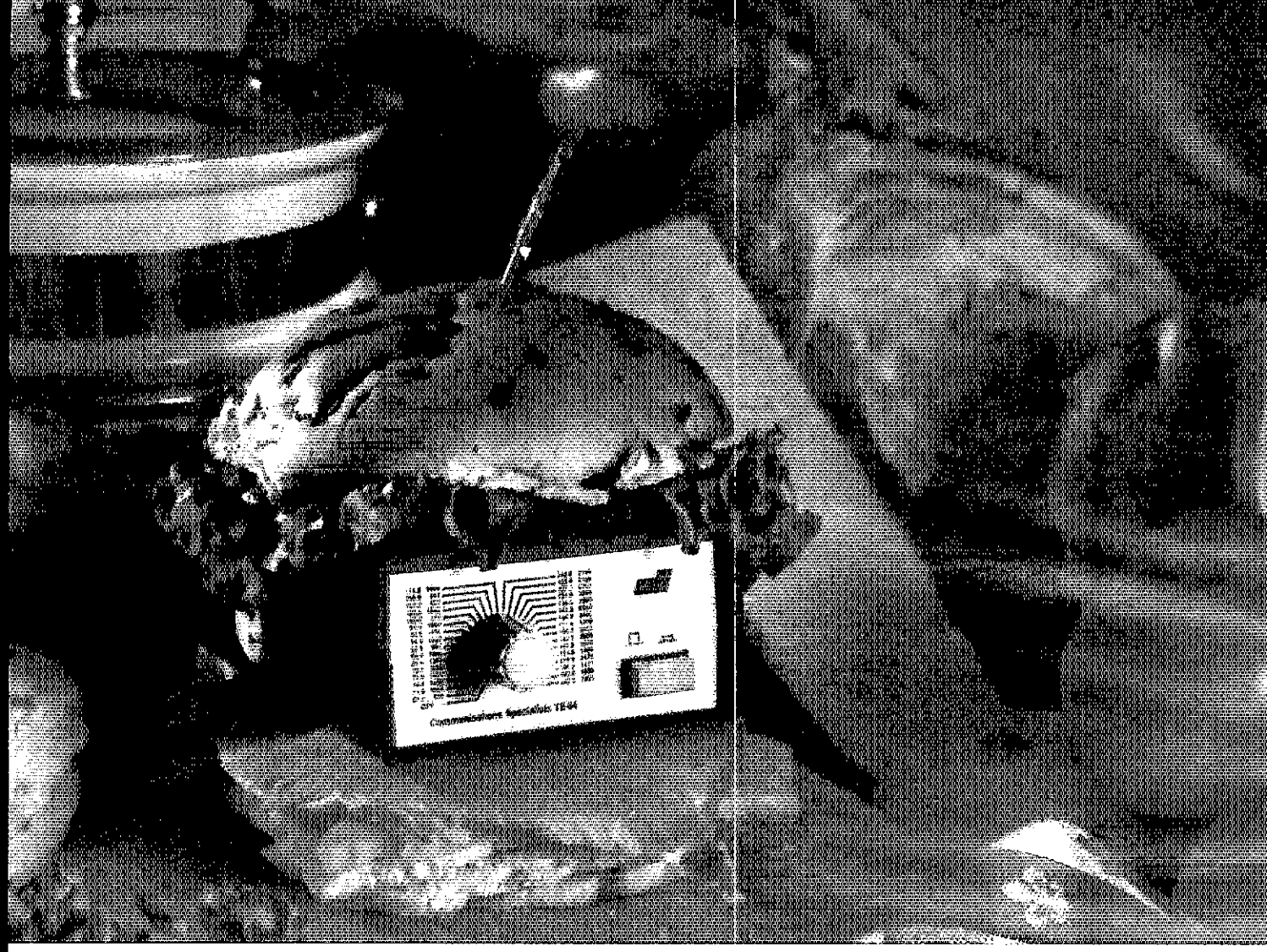

Food for thought.

Our new Universal Tone Encoder lends its versatility to all tastes. The menu includes all CTCSS, as well as Burst Tones, Touch Tones, and Test Tones. No counter or test equipment required to set frequency-just dial it in. While traveling, use it on your Amateur transceiver to access tone operated systems, or in your service van to check out your customers' repeaters; also, as a piece of test equipment to modulate your Service Monitor or signal generator. It can even operate off an internal nine volt battery, and is available for one day delivery, backed by our one year warranty.

- All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- Immune to RF
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
- Instant start-up.
- Off position for no tone output.
- Reverse polarity protection built-in.

Group A

67.0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 1Z	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

- Frequency accuracy, ± .1 Hz maximum - 40°C to + 85°C
- Frequencies to 250 Hz available on special order
- Continuous tone

Group B

TEST-TONES:	TOUCH-TONES:		BURST TONES:			
600	697	1209	1600	1850	2150	2400
1000	770	1336	1650	1900	2200	2450
1500	852	1477	1700	1950	2250	2500
2175	941	1633	1750	2000	2300	2550
2805			1800	2100	2350	

- Frequency accuracy, ± 1 Hz maximum - 40°C to + 85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

Model TE-64 **$79.95**

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The Rig That Filters The Crowd

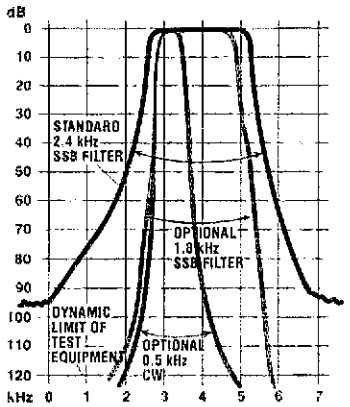
OMNI-C has what it takes to filter the crowds. To narrow the Amateur Radio world right down to the particular signal you want. The selectivity, sensitivity, dynamic range and operational features you need to cut any crowd down to size.
Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

Standard filters include an excellent 8-pole 2.4 kHz crystal ladder filter and, in addition, a 150 Hz active audio cw filter with three ranges (450, 300, 150 Hz).

Optional filters include 1.8 kHz 8-pole crystal ladder ssb filter, 500 Hz 8-pole cw filter, and 250 Hz 6-pole cw filter.

Front panel switches put any optional filter in series with the standard filter for up to ***16 poles of filtering*** for near ultimate skirt selectivity.

Four i-f response curves for ssb and three for cw. That's response tailoring, that's crowd control.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.

Optimized sensitivity and dynamic range. The OMNI sensitivity range of 0.3 μV typical (slightly less on 160 & 80M) combines with a 90 dB dynamic range to provide an ideal balance that will handle any situation from copying a weak signal half way 'round the world to keeping the next-door kilowatt from muscling in. And a PIN diode switched 18 dB attenuator is included for extra insurance against overload.

More crowd-handling features—and all standard equipment.

Built-in notch filter. To drop out unwanted signals or carriers. Tunable from 200 Hz to 3.5 kHz, with a 50 dB notch depth.

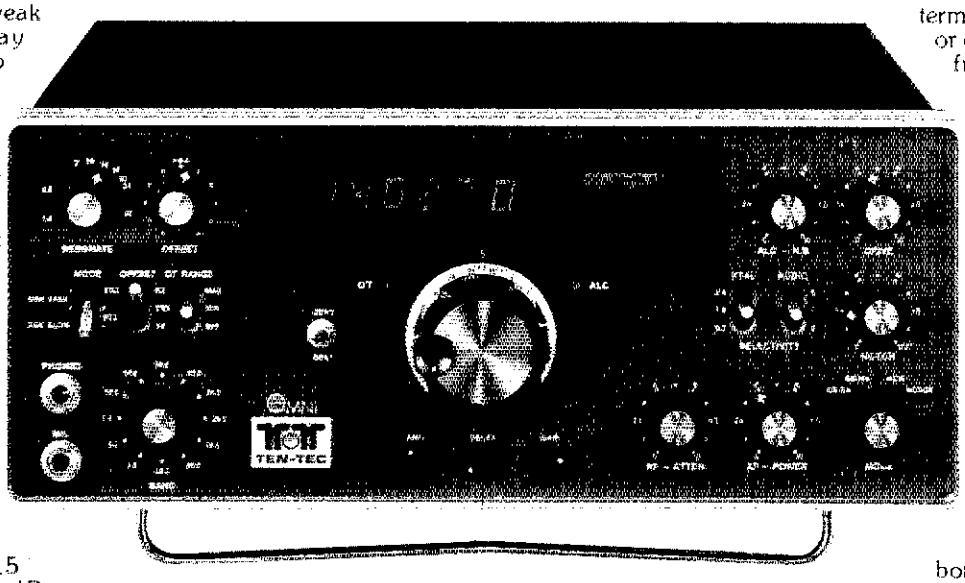
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, ±500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

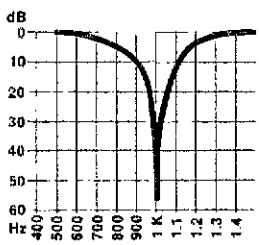
2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any crowd.

All solid-state—from the pioneer, Ten-Tec.



TEN-TEC OMNI-C



NOTCH FILTER PERFORMANCE ADJUSTED TO 1 kHz POINT.

All 9 hf bands—only crystals are needed for 18 and 24.5 MHz bands.

Broadband design for instant band change without tune-up or danger of damage to the final amplifier. Another Ten-Tec *original.*

"Hang" AGC for smoother action.

WWV reception on the 10 MHz band.

Digital readout in two colors, red for the 5 significant places, green for the 6th digit (100 Hz). Instant recognition.

Separate receiving antenna capability. Switch receiver to a common antenna for transceive or separate receive-only antenna; the system also acts as receiving antenna by-pass with an instant break-in linear amplifier or transverter.

"S"/SWR meter, electronically switched.

200 watts input, all bands, with 50-ohm load. 5 year pro-rata warranty.

100% duty cycle on all bands up to 20 minutes. Full RTTY and SSTV power.

Built-in VOX and PTT with front panel controls.

Built-in phone patch jacks for easy interface.

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Adjustable threshold ALC, optimum power for driving a linear. Provides means of working into a high SWR.

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- 2 VFO's built-in standard.

IC-2KL. 50 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.

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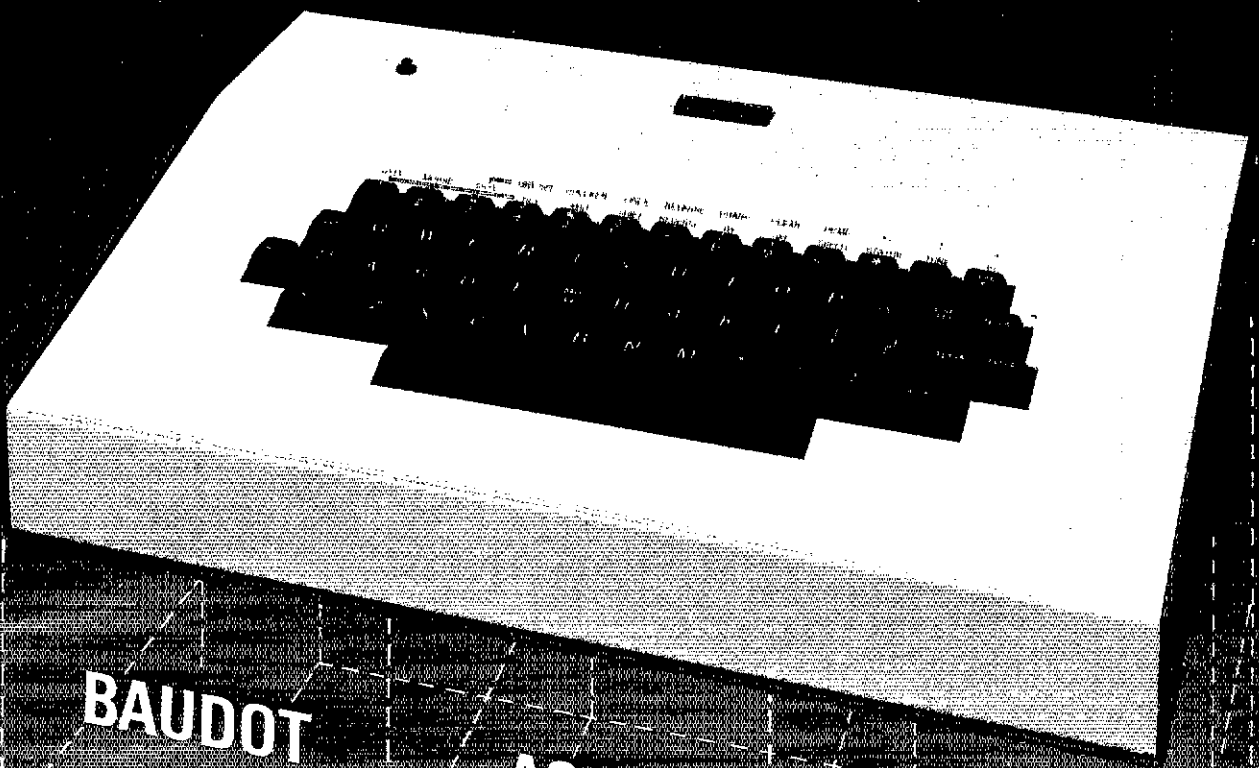

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HOW DID WE DO IT?

Most advanced RTTY systems on the market are designed for multiple applications. As a result, these systems are burdened with exotic features that are rarely used on amateur radio links. These features add to the cost of the equipment and at the same time lessen the reliability and performance.

The 800 does not attempt to double as a hobby computer or a timeshare terminal. It was designed expressly for use as a specialty mode communications terminal for amateur radio, and nothing else. By focusing our attention on this simple concept, we are able to provide a product which works better, costs less, and is easier to operate than those systems which try to do everything and end up doing nothing very well.

ONE EXAMPLE:

The single most important factor which affects RTTY receive performance is the quality of the demodulator. In the 800, we do not allow for a wide variety of shift frequencies through the use of tuneable filters. There are only two shifts which are used in amateur RTTY, and tuneable discriminator filters are both expensive and are poor in performance. The 800 uses separate mark and space discriminator filters for each of these two shifts which are precisely tuned at our factory. Even though the center frequency for the mark filter is the same for both wide and narrow shifts, the bandwidth is different and therefore requires separate filters. By giving careful attention to these details, we can equal or exceed the performance found only in expensive, stand-alone terminal units.

WHAT ABOUT FEATURES?

The Model 800 has all of the advanced operating features such as split-screen word and line editing, message memories, autostart, SELCOM and many others. In addition, the 800 has a complete set of operating aids such as an on-screen status line, graphic tuning indicator, and a side-tone oscillator. For a complete picture of all of the features which the 800 offers, we suggest that you contact us for a full color brochure or visit one of our dealers for a demonstration.

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have received from the clubs and individuals who have taken their time to keep me informed. Traffic: W7DZX 771, WB7TQF 561, K6GXZ 247, W7FJZ 160, W7GB 116, W7IEU 114, N7AFZ 85, KE7I 77, WA7BDD 57, W7BUN 48, KA7AWH 34, W7LG 31, W7ERH 12, W7APS 10, WA7RCH 8, WA7OJI 3.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF VE2AQV/W6 N6DHN. SEC: WB8KQU. W6OA putting more time in on his computer than on handling traffic. Section CAC member K6XQ, using a new IC-720A, the City of Berkeley held an earthquake exercise in which UC's BEARS, EBARC, West Contra Costa RACES & Alameda County RACES participated. ALCO RACES also participated in an East county siren test, the City of Alameda March of Dimes Superwalk, and the Vietnam Vets of CSUH 10 km Run. LARK member N6DOA upgraded to General. Recent new members are KD6RF K6UZM WD6DLL Bill Richards & Terry Rossov. EBARC member W6EJA recuperating from a hip injury. SBARA planning a flea market and trying to get their members to mail in By-Law-change ballots. MDARC provided communications for the 3rd Annual Pinole Marathon. Members with new calls are N6EBO(KA6HET) and N6EBQ(KA6HLY). Traffic: W6OA 95, WB6UZX 23, KA6ERF 8.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. There will be a Nevada Section report in this column each month, but it gets mighty hard when the reports from the members are not being received. Enough said. G4HES visited KA7O this month and W.A.'s in 6 days. KA7O's set up helped some. LVRAC getting ready for Christmas party. Contact WD9CKM for details. By the time you read this, Field Day '81 will be history, but it's time to start on Field Day '82. Many thanks to W7BS for a well done job as liaison with Red Cross on their 100th anniversary celebration. Sierra Hamfest in Reno August 22. Contact W7BS for details. Nevada Sagebrush Net M-F 7:30 P.M. Pacific time on 3906 kHz. Traffic: N7AKX 297, W7BS 90, W7SK 6.

PACIFIC: SCM, Pat Corrigan, KH6DD — SEC, KH6CKJ needs additional help in the Honolulu area for emerg. coord. activities. Please contact him to help. KH6HIJ doing wonderful job with Pac. Tfc Net. W6RNL doing yeoman job on the W6 end of PTN. More participation needed. The Cal-Hawaii Net still on 14340 at 17-1800Z daily with Hono. ARC prexy, KH6JJP very active. ARRL First VP, W8BWJ, (KH6IPY) visited during early May. Congrats to Maui ARES for great job in comm support of Super Walk America and resultant PR in QST, World Radio and other pubs. WA6AMR on Maui now KH6MD. KH6CCL shows up on vht occasionally yet from Big Island. New local club formed in West Hawaii to serve Kona Coast amateurs. We wish them lots of success. Traffic: KH6HIJ 66, KH6JJP 44, KH6DD 14, KH6H 8.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. The Dunsmuir Amateur Radio Club's new officer are: WB6BZN, pres.; WA6RPC, v p./act mgr.; W6IOM, secy./treas. Sacramento amateurs provided communications for the Magical Musical Marathon. Congratulations to N6AUB and KA6JGG on their Advanced tickets and KA6IFF who made General. K6DR won a KT-34 beam at the DX convention in Visalia. Welcome to KB7RC/K6UWR, former SCM and SEC of East Bay, who recently moved to Sacramento. W6GO got his DXCC 300 endorsement and has become a new Official Bulletin Station. Congratulations to WB6KFC who was awarded Senator Hayakawa's Tam of the Month Award for providing communications for overseas military personnel. N6AUB reports that crowd control was provided for the tour of Nevada City. Traffic: (Apr.) W6SX 23, N6AUB 17, W6RSP 17, N6JV 4. (Mar.) N6AUB 15.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Newly licensed: KA6OQI KA6OQP KA6OSY. WB6OOR now KD6HC. Mendocino Co. hams active in walkathon, band review, marathon. WA6WTT/R covering Lake and Mendocino Co. Editor WB9LOZ of San Francisco RC won excellent achievement award from Amateur Radio News Service. SFRC helped in Superwalk; San Francisco ARES in earthquake exercise. Fuddy Duddy Telephoneer (WB6FDT/WR6ACI) first nationwide in Pioneer QSO Party. Sonoma Co. RA has communications trailer almost completed. SCHA and Sonoma Co. ARS active in public service. Humboldt ARC/Far West Repeater Assn. active in Superwalk, two marathons, Tour of Unknown Coast, Great Kinetic Sculpture Race. PSHR: W6RNL. Traffic: W6RNL 219, W6IPL 175, K6TP 108, K6TWJ 67, WA6QXV 10.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst SCMs: WA6YAK W6TRP WA6HIN. New officers of the San Joaquin Net are: N6AM, mgr.; W6CUA, secy.; WB6DAZ, asst. secy. The net meets at 6 P.M. Pacific time on 3918 kHz M-Sat. NCN for April: QNI 1667, QTC 668. K6OZL has 5BDXCC. W6QOE has a mini Quad. Appts renewed: W6DPD OVS, ORS; N6AWH NM, ORS. KA6DHN is NAM. K6LMQ is Extra. KA6LGF N6BFA are Advanced. KA6LGD KA6FWE KA6ONN WB6EGM are Generals. KA6LGR KA6LGL WD6MGI WD6DQA and KA6JJO are Tech. KA6ORC is Novice. The International DX Convention attracted 500 DXers to Visalia and was well attended by SJV amateurs. W6RMC is now on the repeaters. The Fresno Chapter of 10-X meets on Tuesdays at 8 P.M. Pacific time on 28.845 MHz and has an informal net on Saturdays at 10 A.M. same frequency. Traffic: N6AWH 102, WA6YAB 27, KB6CC 16, W6DPD 10, WD6HRS 6, WA6JDB 6, K9YBM 5.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. He reports a quiet month but manages to keep the SCV AREC active. New EC for San Jose Red Cross is KA6R, he represents SCCARA and SCVRS. W6MMG visited W1-Land on vacation and skeds SWOP Net. W6ZHJ increased rig output with new tubes. WB6HBL working mobile on 15 and 40 cw — both hands on the wheel Scott! WA6HAD working JA for their awards and limited operation on NCN. W6ASH and group of 21 participated in March of Dimes Walkathon. W6PRI busy with NCN and traffic. WB6GFJ taking classes on computer programming, but keeps active on EMARC and SPECS nets. Two iron-men of NCN reporting big traffic totals are W6YBV and W8KZJ and they are consistent month after month. WB6LVD, DEC-SCV, reports on a simulated crash of a C-130 aircraft and the many hams participating in the emergency communications. WB6LVD's picture was one of many of the exercise that was published in SJ papers. West Valley ARA will sponsor a 25th anniversary QSO Party on Sept 26 and 27. Looking ahead — Santa Cruz ARC will host the 1982 ARRL Pacific Division Convention on Oct 8-10,

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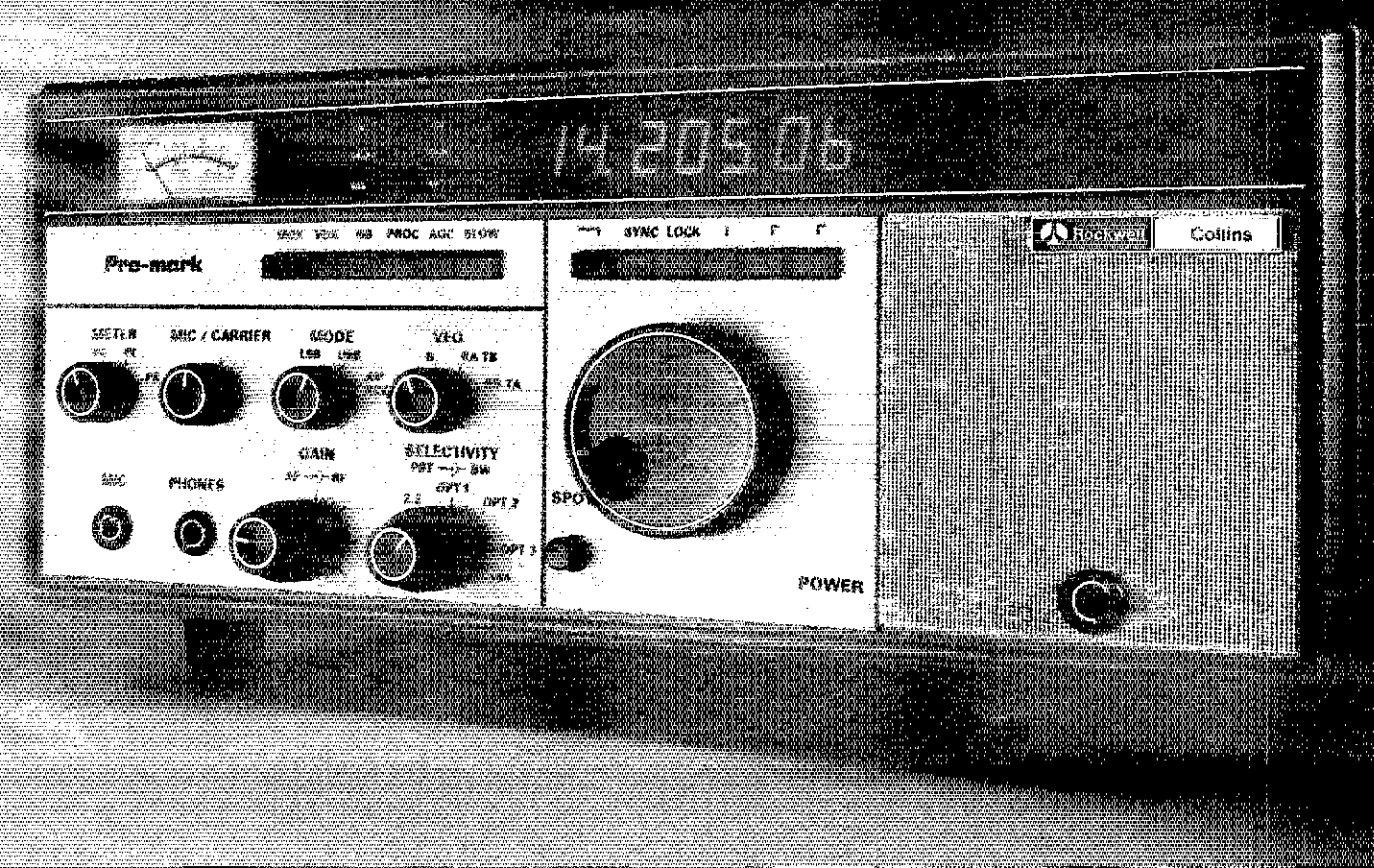

1982. SCCARC reports WA6LOB as a new member and that the turn-out for their Novice class was so large that it was split into two groups. New member of NCCC is N6BZA. SCVRS busy with public service activity. The West Coast uhf conference had a good turn out and N6TX did an excellent job as chairman. New member of GARC is W6GHS. PAARA welcomed new members K6JK and WA6UIM. NPSAC welcomed KA6IRR into their group. Traffic: W6YBV 258, W6KZJ 186, W6ZRJ 38, W6RFF 29, W6PRI 21, W6ASH 8, WA6HAD 4.

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, CNN WD4JJK. Congratulations to new Extras WD4JJK and W8PJS, W4PCN and K4GCN back on air after hospital stays. N4ZH in hospital in NJ after auto accident — our best wishes. Cape Fear ARS held super demo for Rotary Club in Fayetteville — great work. CFARS also provided communications for March of Dimes Walk-America. WE4AT organized Traffic Information Pool (TIP) and first effort was for Cabarrus Club. Good luck to N4BLV — leaving for Richmond. Brightleaf ARC had 11 pass code test in Novice class. Personality of the month: Herb Lacey, N4UE, born Takoma Park, MD. He first held KN3IOS/K3IQS in 1959. Later held W8CEJ WA0DMX WB2LZJ K4FBG and N4UE. Has been in NC ten years and has served as SEC, STM, and now ASCM. He has been active teaching Novice classes for six years and on traffic nets since in NC. Thanks to WD4CNQ for job well done and welcome to WB4WII — new Mgr. JFK Net. Hope you and your club/group benefit from a good Field Day exercise in 1981. Remember the SET is not far behind. Check with your county EC to see how you can help. Traffic: (Apr.) W4EAT 480, AB4V 364, WD4CNR 338, WD4CNQ 281, WB4WII 266, NJ4L 265, WA4UTC 244, AB4S 224, K4DHX 210, NB4L 121, WD4JJK 112, W8PJS 103, WA4SRD 96, KU4W 93, N4CJJ 69, K4MC 68, KC4AM 59, K4FTB 58, W4FMN 51, WB4CYN 50, K4IWW 47, KA4ODX 42, WA4OBR 38, WA4OJU 35, NE4J 29, N4UE 26, KF4R 26, KZ4A 24, WA4PID 23, W4ACY 22, KA4KJI 21, WA4CUD 18, WD4AIE 16, N4BGN 13, WD4LRG 12, W4RVE 12, K4XE 9, W4EHF 8, WA4IHG 7, WB4SLF 5, N4CCK 4. (Mar.) K4MC 6, WB4SLF 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NM: K4PFC W4ODE. A good turnout for the Greenville Hamfest. Congrats to all known upgrades: KA4LRM KA4ONN WD4RMA WD4RJQ KA4ADI KA4PDA N4CBM KA4OGJ N4BRT KA4NKW WD4PLB WD4OEK WD4HIR WD4LQD K4AOH N4AAA N4ENX KA4OPR W4MAF K4PYM WA4BRU W4ILY W4VWW K4ADI. A good turnout for the section and ARES meetings at the hamfest, tnx to all who attended. Check-ins/traffic: Sc SSBN 1211/152; Blue Ridge 2 Meter Net 1664/98; CN 657/299; SC Noontime Net 265/75; Lancaster County 2-Meter Net 208/15; Western SC Emergency Net 85/11; Newberry County ARES Net 75/6; CNN 248/64; Trident ARC ARES Net 79/0; Dixie 6-Meter Net 20/0; SC 2-Meter SSBN 50/0. Traffic: K4ZN 349, W4ODE 251, W4ANK 157, W4NTO 154, K4ZB 91, KA4AUR 70, WB4UDK 59, WA4MIY 55, K4FRX 38, AF4E 31, W4MTK 31, WD4NMF 22, WB8TCT/4 21, W4DRF 12, WA4JWS 12, NC4F 10, WA4MCG 8, WD4DOL 5, K4ADI 4, K4KEP 2, WB4QHP 2.

VIRGINIA: SCM, Luck Hurder, WA4STO — SEC: KZ4K, STM: KY4K. Chief OO: W4HU. Chief OBS: K3RZR. Chief OVS: N4CD. Net stats:

Net	Freq.	Time	QNI	QTC	Sess.	NM
VSBN	3947	6:00	647	680	30	W4NWM
VSN	3705	6:30	420	236	30	WB4KSG
VN	3680	7/10	642	559	60	W4SUS
VLN	3947	10:15	540	314	30	WD4ALY
VNTN	7260	Noon	280	224	30	WD4FTK
WARC	3748	0830/Sun.	42	5	4	K4JST

Hope everyone notes the change in the VSN freq — which is for a six month trial. This will give the Novices and Techs a fair shake at traffic handling for a change. Training sessions will be held after the formal session closes. Busy month for Virginia with 9738 pieces of traffic reported, and a lot of Red Cross activity due to their Centennial. Congrats to new appointees N4YE N4BJX and KD4FP. Also congrats to recent upgrades N4ENU KA4GKZ N4DYL and N4DYN. While warm weather means lessened activity for some, not so for the vhf experimenters. OVS WD4CXU reports increased activity on 432 with strip line amp delivering 340 watts from 10 in. N4CD sez 6 & 2 hopping. WA4EQW expresses pleasure at receiving the first BPL medallion ever with /M engraved on it. Chief OO W4HU reports 36 notices sent by VA OOs during April with WA4HHG topping the list with 16. New SEC KZ4K swamped with files and reports but keeping head above water nicely. WA4STO and KZ4K getting psyched up for VA and WVA mobile operation in the CW County Hunters contest in July. WA1VRL has full wave loop on 75 and N3RC has finished doctoral program. W4KFC keeping regular skeds with W4NQ in Charlottesville. April BPLs to W4JK WA4CCK WB4PNY N4AZI W3BBN KY4K and KZ4K. The Virginia Section is in need of continued input from those wishing SCM appointments, particularly Official Observers and OVS. Contact your SCM for further info on joining the appointee family in the number one section of the ARRL. Traffic: (Apr.) W4JK 855, WA4CCK 756, WB4PNY 638, N4AZI 598, KY4K 563, KZ4K 541, WD4FTK 384, K4JST 372, W3BBN 369, W3ATQ 330, W4SOQ 292, WA4LJI 264, WB4KSG 245, K4KDJ 188, WD4KQJ 177, KA3DTE 175, WA4STO 168, W4SUS 166, K4KNP 158, WD4ALY 155, K3RZR 155, WB4FDT 149, WB4MAE 135, WB4FLT 119, W4UQ 115, N4RF 113, K4JM 108, KA4IUM 105, N4YE 106, K4EJ 101, WA4YIU 79, WA3LVC 69, W4NWM 61, W3BBQ 54, W4PVA 52, N4BJX 51, KA4ERP 49, K8LGA 45, KB4WT 44, KB4PW 43, WA4QWC 37, W4NFA 31, WB4UHC 31, KI4W 29, K4MTX 28, WB4ZTJ 28, K4DHB 25, WB4DOZ 25, WB4ODZ 23, KL7JEO 20, W4YVG 20, N4CIR 18, N4ENU 18, WA1VRL 18, K4VWK 18, WB4KIT 17, W4NLC 17, W4OKN 15, WA4FGJ 13, W4CFV 12, W4KXE 12, WB4RWY 12, N4YQ 12, N4EDE 11, WA4RTS 11, W4LXB 10, WB4ZNB 9, W4KFC 8, WA4TVS 8, W4YE 7, WD4RDF 6, KD4FP 4, N4NK 4, KC4HN 3, N4LE 2, N4DW 1, WA4EOW 1. (Mar.) KB4OF 16, N4LE 10.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR W8FZP KD8G WB8LDY. WV ARRL Conv., July 4 & 5, at Jackson's Mill. Details, contact WB8GDY. Fall QCWA mtg. held in Elkins on 4-13, nice attendance. Chas. area hams provided comm. for 3rd annual Coal River Marathon. Tri plate QSO party held by Weirton hams, very successful. Soon to be heard, "keyboard cw" by W8FG.

Net	Time(Z)	QNI	QTC	Sess.	Freq.
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Midday	1600 Dy	421	42	30	7235

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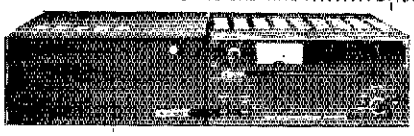
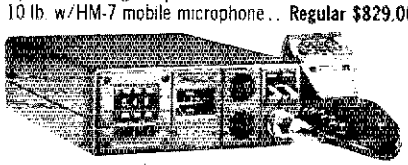
IC-720A Digital HF Transceiver. Transmits on all 9 HF Ham bands, receives 1-30 MHz. Synthesized & all Solid-State, including finals. Output variable 10 to 100w continuous, all bands. Six digit LED readout, dual built-in VFO's, AM, CW, SSB & RTTY filters. Passband tuning, RIT, VOX, semi break-in CW, noise blanker, speech processor & full metering. Has LDA-1 interface for AH-1 or IC-2KL. 13.5 VDC @ 20A max. 4½"h×9⅝"w×12½"d, 17 lbs. Hand microphone incl ..... **Regular $1349.00**

PS-15 Power supply	149.00
PS-20 Continuous duty power supply	179.95
Adapter cord for PS-20/IC-720A	25.00
FL-32 500Hz CW filter	59.50
FL-34 5.2 KHz AM filter	49.50
SP-3 External base station speaker	49.50
Phone Patch	139.00
AH1 5-band mobile antenna tuner	289.00
LDA-1 Interface for 720/IC-2KL/AH1	27.50

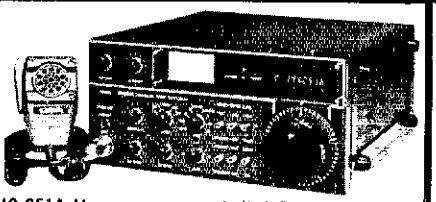


IC-2KL 500W output, 160-15m (incl. WARC) Solid-State, automatic band switching linear for IC-720A, IC-720 & IC-701. With AC supply .. **Regular $1795.00**

IC-730 Compact HF Transceiver 12V, all solid-state, 80-10m coverage including three new WARC bands, 200w PEP input. Fully synthesized for rock solid stability in mobile operation (1 KHz, 100 Hz, 10 Hz frequency steps). Dual VFOs built-in, eight frequency memory storage (one frequency per band), automatic final protection, IF shift with passband tuning optional. Up/down tuning w/optional mic. 3¾"h×9½"w×10⅝"d, 10 lb. w/HM-7 mobile microphone.. **Regular $829.00**



IC-22U 800 channel synthesized successor to the IC-22S. Same case & styling but frequency selection by a pushbutton & thumbwheels. Output 10 or 1W. HM-7 microphone w/clip, mobile mount, DC cord & plugs. 2⅜"w×1½"w×8¾"d, 4½ lbs..... **Regular $329.00**



IC-251A Microprocessor controlled 2 meter All-mode Transceiver for 143.8-148.1999 Mhz, 7 digit display, 10W output SSB/CW, variable 1 to 10W, FM, 3 memories, memory 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 Base Station Transceiver for OSCAR mode B or J & simplex on SSB or FM. Available in 2 versions, 430-440 or 440-450 MHz. Features similar to the IC-251A 2m base station..... **Regular $899.00**

IC-551 All mode, microprocessor cont 6m transceiver, for 50-53.999 MHz, 6 digit display, output variable 1-10w, 3 memory channels w/variable speed scanning and 2 VFO's, noise blanker, 13.8vdc & 117vac 4½"h×9¾"w×10½"d, 14 lb. Like IC-251A... **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

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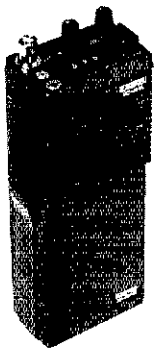
IC-551D same as 551 but output variable 1 to 80W and EX-107 & EX-108 built-in. Requires 13.8vdc @ 18A or matching PS-20 AC supply ..... **Regular $699.00**

PS-20 20A AC power supply	229.00
CF-1 Cooling fan for PS-20	45.00

IC-260A Microprocessor controlled 2 meter SSB, FM & CW Mobile Transceiver. 7 digit LED readout, 1 or 10W output SSB/CW; variable 1 to 10W, FM, 3 memories, memory scan & programmable band scan, 600 KHz offsets plus variable split with 2 built-in VFO's, 13.8 VDC @ 3.5A. Hand mic & mobile mt..... **Regular $499.00**

IC-560 6m All Mode Mobile Transceiver. Features are similar to the IC-260A 2m mobile. .. **Regular $489.00**

IC-255A Microprocessor cont. 2 meter FM Transceiver for 143.8-148.195 Mhz, 25 or 1w output, 5 memory channels w/scan, adjustable rate & auto stop, 600 KHz offsets, 2 built-in VFO's, 13.8vdc @ 5.5A, 7½"w"×2½"h×9½"d, 5½ lbs. w/HM-8 TTP mic.... **Regular $399.00**



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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
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IC-2AT HT w/TTP, nicad & chgr	$269.50	$249.50
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
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-5 required to charge BP-2 & BP-5

IC-ML1 2m mobile amplifier, 2.3W input, 10W output (with IC-2A-2AT use BP-5 pack) **$89.00**

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

BC-10 Memory back-up for 720/551D	TBA
BC-15 Nicads & AC chgr for portables	57.50
BC-20 Nicads & DC-DC charger for ports	57.50
WC-215 Wall charger for BC-20	11.95
IC-3PE 3A power supply/speaker	95.00
IC-3PS AC supply/spkr for portables	95.00
FA-1 2m flexible antenna	9.50
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 mic. for 255A/260A	49.50
HM-10 Scanning mic. for 255A/260A	39.50
SM-2 Electret desk microphone	39.00
SM-5 Electret mic - 251A/255A/260A	39.00
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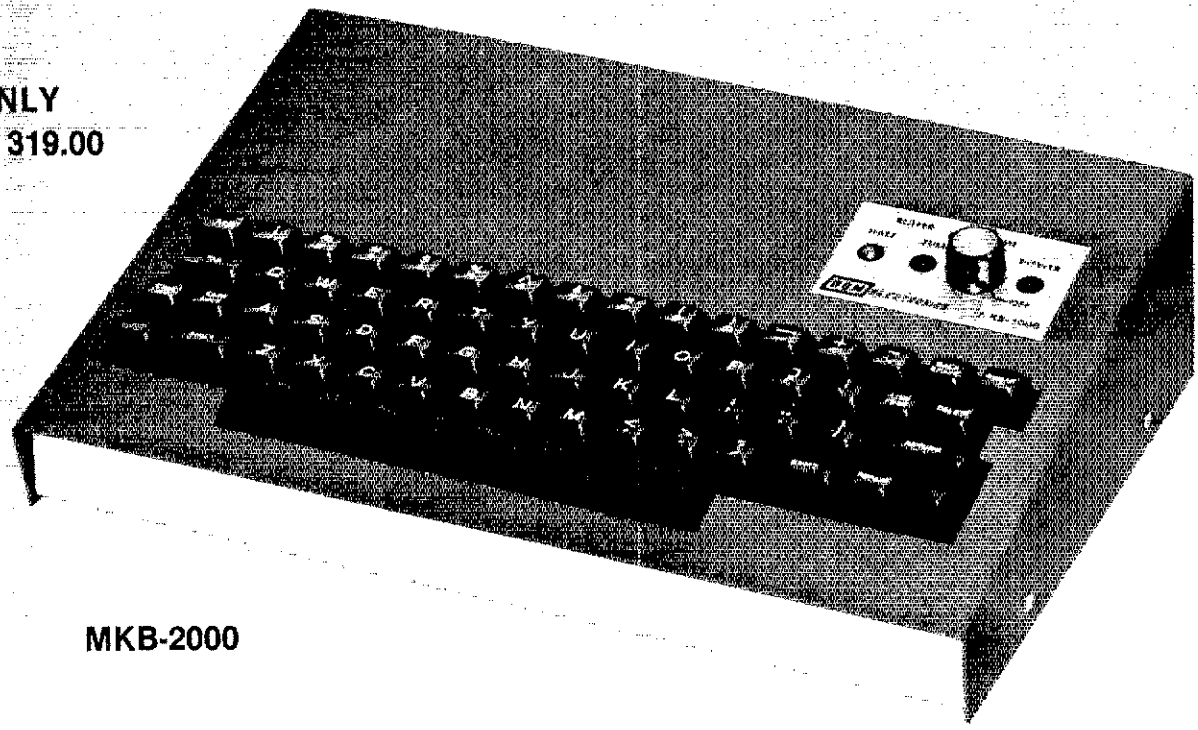

MKB-2000

- 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.
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- Built-in 110 VAC Power Supply
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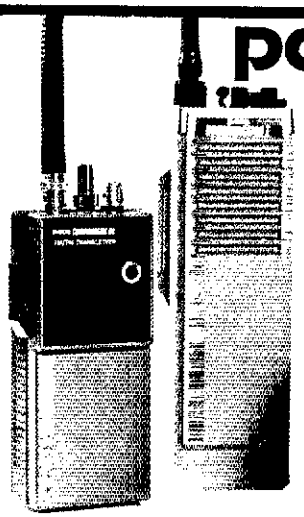

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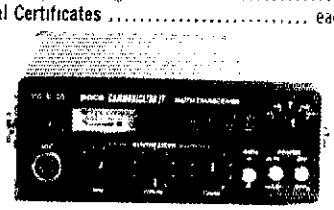
PACE Communicator MX (left)
Compact, 2m hand-held FM Transceiver. 144-148 Mhz, 1 watt, 6 channels with 18 channel capability (6 simplex, 6 at +600 KHz, 6 at -600 KHz), 1 channel installed (146.52 simplex). Only one crystal per channel. Complete with flexible rubber antenna, nicad battery & charger. Size: 2¾"w×6⅛"h×1¾"d, Wt. 16 oz ... **CLOSEOUT $129.95**
Crystal Certificates ..... each 5.00

PACE Communicator I (right)
Hand-held 2m FM Transceiver. 144-148 Mhz, 3 watts with 6 channel capability, 1 channel installed (146.52 simplex). Complete with flexible rubber antenna and battery tray. Nicads and charger not included. Size: 8½"h×2⅛"w×1¾"d, Wt. 1.8 lbs ..... **CLOSEOUT $129.95**

Accessories for Communicator I:
B-1 Nicad Battery Pack (10 AA batteries)..... $24.95
C-1 Desk top AC Charger..... 39.95
Crystal Certificates ..... each 5.00



PACE Communicator II
25 watt, 800 channel 2m FM Transceiver for 144-147.995 Mhz Simplex, ± 600 KHz & + 1 MHz offsets. Requires 13.8VDC @ 5 AMPS. Complete with hand microphone, mobile bracket, base stand & power cables. Size: 2.8"h×6.4"w×11.2"d, Wt. 6.6 lbs ..... **CLOSEOUT $249.95**

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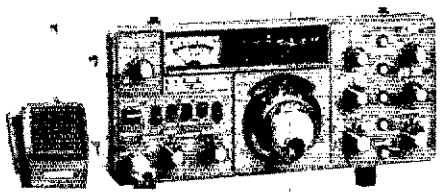

YAESU FT-625RD All-Mode 6 meter Transceiver. 1-25w output (variable). 50-54 Mhz; SSB, CW, FM & AM (8w). Digital plus analog readout. Built-in ±1 mHz offset, noise blanker & AC-DC supplies. Size: 11¼"w×5"h×12¾"d, Wt. 20 lbs. (Regular $895)..... **CLOSEOUT $599**

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Traffic: KD8G 127, KC8C 84, WD8PQG 50, W8JWX 38, WD8AXY 37, K8QEW 31, W8FZP 27, W8CKX 21, W8HZA 21, K8MHR 21, N8CFY 18, W8YP 18, KC9CS 16, N8AJC 15, AI8I 14, WD8DIN 13, KC8CR 12, WB8UDY 12.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NM: WØHXB WØEJD WDØAIT NØAXQ KBØZ. Amateurs in Eastern Colorado have established a wide coverage Severe Weather Net for reporting severe weather conditions to National Weather Service in Denver. The 9 Health Fair held the second week in April was a huge success. Thanks for the many hundreds of hours donated by Amateur Radio operators providing communications for the project. Nearly 60,000 people received free health examinations during the 9 day period. Thanks to the 36 amateurs that helped provide communications for the Mile High Marathon on May 3. The area amateurs did a great job as usual in supporting the March of Dimes Super Walk. This was organized by the ECs of the Denver Metro area. District 27 amateurs provided communications for the Red Cross during a large fire that destroyed several apartments. The SCM along with other amateurs are working with the Division of Disaster Emergency Services to update their Emergency Communications Plan for Colorado. Nets: HNN 30 sess, QNI 1544, QTC 61, Informals 163 QNF 964; CWN 30 sess, QNI 210, QTC 166, QNF 907; Colombine 26 sess, QNI 1134, QTC 61, Informals 163, QNF 964; (Mar.) CWN 31 sess, QNI 269, QTC 215, QNF 890. Traffic: (Apr.) WØWYX 2657, WAØHJZ 1265, NØBQP 1192, KØDJ 331, WDØAIT 300, WØEJD 276, WØHXB 148, WØLAE 71, W5HRS 45, KDØM 38, WØONF 30. (Mar.) WDØAIT 368, WØHXB 206, KDØM 29, KØCNV 16.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WB5NNG and KG5L. Southwest Net (SWN) meets daily on 7.083 kHz at 1930 local and handled 252 msgs with 268 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1900 local and handled 127 msgs with 1095 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 79 msgs with 775 checkins. Yucca 2-Mtr Net handled 29 with 655 checkins. Vy sorry to report passing of W5WGW. Following furnished comm for Roswell Spec. Olympics: WA5USU WB8OTA WD5DMX WB5ORQ & W5BWV. K5WSH is very ill. Wish him a speedy recovery. "Bean Feed" was a huge success. Traffic: W5DAD 298, W5ENI 201, KA5DDW 135, KG5L 86.

UTAH: SCM, Royce Henningson, K7QEQ — I wish to take the time to thank all of the stations that took time to send reports to me for this column. Starting in July, you will need to send them to the new SCM, W7PBV, Norman at 933 S. Cedar Knolls, Cedar City, UT 84720. Norman has been a SEC in the New Mexico and Santa Barbara Sections and SCM in Nevada for 14 yrs. He belongs to Army MARS and QCWA, and has a Drake RT7 with Drake L-7, tri ex tower 51 ft crankup, tri-band beam, RTTY model 28ASR, plus 2-meter gear. Traffic: K7HLR 170, WA7KHE 114, WA7TEH 77, WA7MEL 74, WA7JRC 39, W7OCX 20, W7PBV 3.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. WB7RRZ is new PIA (Public Information Asst.) for the section. Monthly EC reports haven't been reaching the SEC. Newly appointed ECs, please confirm your appointments. New repeater in the Evanston area operating on 146.04/64. The plans for numerous hamfests are progressing, tune into the Wyoming nets for dates and locations. I hope to meet many of you in person at the hamfests this summer. KA7HCO is home recovering from surgery. WB7NHR reports Wyo. Cowboy Net held 23 sess. with 637 QNI & 13 QTC. WAØPFJ reports Wyo. Jackalope Net held 26 sess. with 505 QNI & Ø QTC. Traffic: W7SQT 742, WA7GYQ 307, WB7NHR 172, WØOGH/7 72.

SOUTHEASTERN DIVISION

ALABAMA: SCM: James M. Bonner, K4UMD — SEC: W4IBU. Governor Fob James proclaimed May 10-16th as Amateur Radio Week, ending on Sat. with the Southeastern Convention held in Birmingham May 16-17th. The Mobile ARC held their hamfest May 2-3, everyone had a good time. Huntsville ARC will hold their hamfest Aug. 15-16 at the Van Braun Civic Center in Huntsville, see you all at this one. Field Day was June 27-28th, I hope everyone got out and participated. It's a great exercise and fun too. I will try to have some details later. BARC participated in Walk-America held in B'Ham on April 25th. Stations helping were WA8BWF W7UTR NF4N N4DKF WA4UCT WD4ARZ WB4MEO K4DSO KC4LV W4EVD KA4ANM. You did a real good job. BARC also participated in the annual horse show, helping were KB4IX WA8PWF WA4SAB WD4BXE N4AHN WD4ARZ WA4IIB W4GVD K4IR and WA4RNP. W4CKS and WA4JDH again represented AA Into DRN5 — these gentlemen do our section real proud. AENM net, 3,955 had 2672 QNI, passed 153 messages in 34 sess. AENI reported 29 QNI in three sess. AEND 203 QNI with 29 messages. AENB reported 196 QNI with 101 messages. West Ala. Radio Society (WAARS) new officers: KC4GS, pres.; N4AII, vice pres.; WD4DAT, secy/treas. This is a new club formed in March. They hope to have ARRL affiliation. We will hear more from this club. HARC supplied communications for Bike-A-Thon. Stations helping were WB4RIU WB4EKJ WD4CPF N4CXD N4HKD WD4IRY N4CCW K4JAZ and W4IBU. Traffic: WA4JDH 1029, W4CKS 177, K4AOZ 65, WA4PIZ 59, W4IBU 43, WA4LXP 30, WD4DHI 26, K4UMD 19, KC4GS 10, WB4TVY 8, AA4J 6, KY4H 5, KA4LXP 4.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC: WA4PUP. STM: W4WXA. Chief OBS: W4BIA. GSSB Association President, WB4ZVX, invites section members & their families to the annual picnic to be held at Madison on Saturday July 18th. W4LCB & K4KS continue to run patches for missionaries & MMs on a daily basis. I know that there are many more who do this so let yourself be known. Due to job pressures WA4ZBR had to relinquish his position as NM for GTN. This is a very important net to the newcomers. If anybody cares to lead this net please contact STM, W4WXA. The attendance at the Kennehoochee Hamfest was overwhelming. The sponsors thank all & will continue to hold it at the same place. ARES administrative net was moved to 2230Z due to poor propagation condx at the earlier hour. Congrats to YL of N4BGH on becoming KA4GUC. GSN NM, K4EV, is proud of the many new ONIs & welcomes all cw op's to join them at 3595 at 1900 & 2200 local. Remember you have until July 1st to renew

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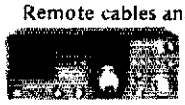

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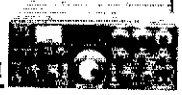

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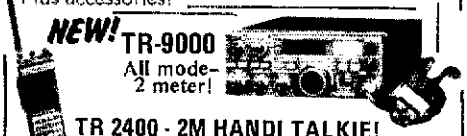

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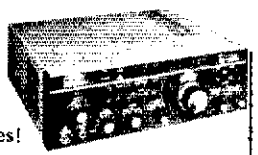

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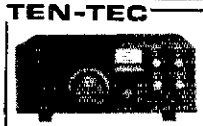

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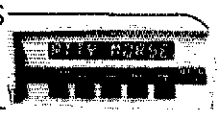

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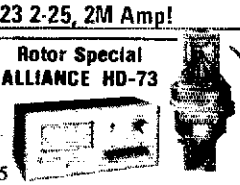

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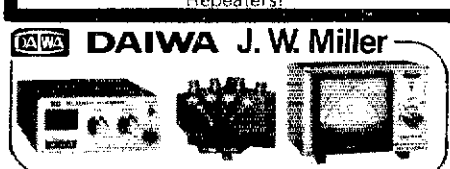

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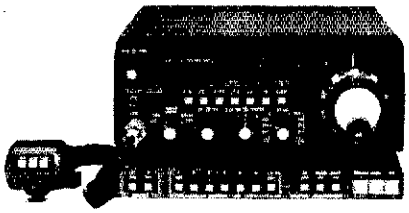
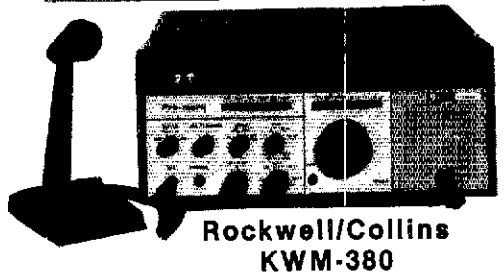
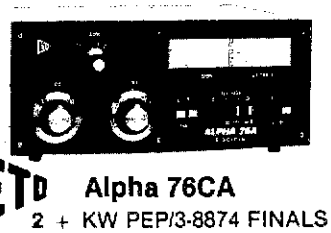


YAESU

FT-101ZD, FT-107M, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM



Rockwell/Collins KWM-380



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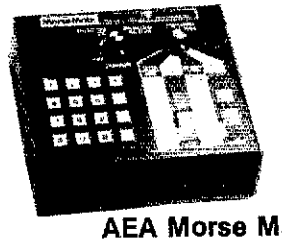

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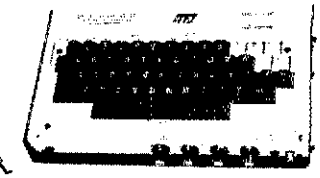
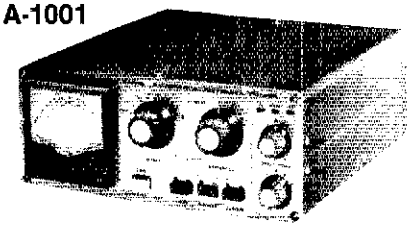
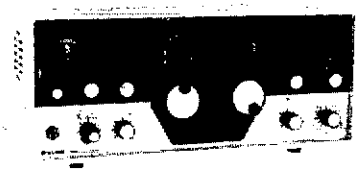
Murch Model UT2000B



MFJ Keyboard 496, 494

DAIWA CNA-1001





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your League membership for up to three years at the current rates. Colquitt County HRS has operational club station tnx to the efforts of K4UPP. KA4FVU now Advanced. WB4HIT received KC4VZ. The ARES program in the section is really starting to jell tnx to the efforts of all in the section. Welcome to W7SCY & YL KA7IZH who moved into 4-Land and located in the Newnan area. WA4PUP really has gotten involved in NVOAD & is coordinator for the section. This is a very important program & he's looking for some help. During disasters this will be invaluable once it is fully operational. Remember to keep the League informed of any hamfest well in advance, at least 3 months to get any publicity. Again tnx to all you fine Georgia hams for the fine cooperation you are giving me. Traffic: W4WXA 313, WA3NAX/4 262, K4AZM 155, W4GH 114, W4PIM 79, K4EV 78, WD4ADV 54, WB4LBM 52, KA4ATM 33, N4UZ 27, W4FIZ 26, K4JNL 19, W4BIA 16, W4HON 13, K4BAI 8, K4PIK 4, WA4PUP 4, W4AAY 2, W4LCB 2.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. NM: N4BZH WD4DNG KF4U. ASCM: WB4QBB W4BSP WA4OEM N4EDH WD4ASW. NFPN now meets at 7:30 P.M. EDT (6:30 P.M. CDT) during the summer. FMSN meets now at 7.085 kHz & TPTN on 7.272 kHz. Congrats to 13 year old KA4RRN who, besides upgrading to General, took 2nd place honors in the Fla. State Science Fair with his project on 40-meter propagation. KA4ATR/R on 146.825/.265 is new rptr in Gainesville. W4DFU/R being relocated on UF campus. WR4ACE back on the air on 22/82. Corry Station ARC of Pensacola provided comm. for Escambia Co Special Olympics. New officers of the Orlando ARC are KC4CT, pres.; KA4ASJ, v.p.; WD4LIM, secy.; WB4AOW, treas. KY4F KC4IA W3SOB W4IWN K4HTZ W4MIX K4TTO W4WLX WØRAO & WD4BEG, dir. Ft. Walton Ham of Year is WD4OGW. New hams there include KA4s TLD TLE TLF. KC4N is new Asst. Dir. SE Div. RTTY popular in Panama City area with N4AVA N4DXC W4WEB K4JJE WD4JFE WD4MAF & WB4IXK active. K2BOQ spoke on antennas at GCARC meeting. NPR RACES group active. New repeaters include 147.87/.27 in Pt. St. Joe on 147.36/.96 in Crestview. The 34/94 machine at Fla. Sherritts Boys Ranch is also active again. N4BFX chaired the Red Cross Message Relay and also passed Extra exam. W4LJL passed his Extra. N4BZH now Advanced. DBARA purchased ARRL fills for promotional purposes. Jax Hamfest and Northern Fla. Convention set for Aug. 1-2 at Orange Park Kennel Club. RANGE provided comm. for Scottish Games events and also downtown parade. Traffic: WD4IIO 900, WD4HIF 818, N4PL 758, W4SIZ 671, N4EDH 561, WB4EXA 278, W4MGO 219, WA4EYU 208, N4EC 198, KF4U 192, W4KIX 113, AA4FG 99, W4JL 85, W4BSP 75, WB4ADL 67, WB4TZR 57, N4BZH 53, N4UF 51, W3IDO 38, N4AXN 35, WA2GIN 19, WA4STZ 19, WB4DTS 9, WA4NMH 8, N4BOY 8.

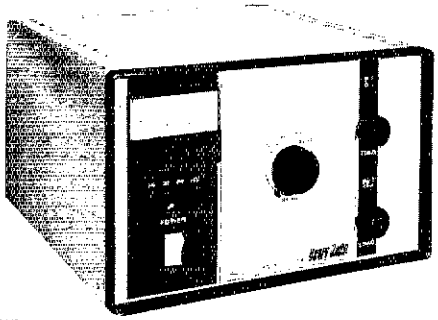
SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. New appointments: WB4AID NM (LO), K4SJA NM (LO), KA4ASZ EC Collier (LO), WA4AYY EC Okeechobee (LO), WB4AID ORS, KA4ASZ ORS, K4EUK ORS, KE4O ORS, AA4BN OES & OBS, K4IEK OBS. There is a common misunderstanding among hams moving to Florida. Many of them think their ORS or other appointment which they received from their previous SCM is still in effect. It is not! When you move out of the section, your field activity appointments are automatically cancelled. You may apply to your new SCM for appointment in your new section. N4KB reports he now has a mini quad up 40 feet. W4BK plans to attend QCWA Board meeting in Dallas in mid-May. St. Petersburg Hamfest May 3rd was a pleasant, friendly, get-together in best possible weather conditions. On April 11th the FMTN held a practice alert. This involved notifying regular FMTN members of simulated emergency activation of the net. The work was spread, mostly by vhf fm repeaters, fanning out from one to the next until essentially the whole state was covered. AF4R of Miami is the master-mind behind this notification plan, operating under the Net Manager WB4AID. July 1st is "switch day" for some of our traffic nets. WA4PFK will give up management of QFN and the new manager will be appointed by Northern Florida SCM. QFNS management will shift to Southern Florida with KA4LNA taking over the reins. TPTN will have an election in May to select a manager for the year beginning July 1st. K4TH has resigned as STM effective June 30th and WA4PFK will assume this post on July 1st. TPTN is now operating on 7272 for summer propagation conditions, while FMSN is on 7085. We expect them to move back to 3940 and 3651 in the fall. The Weather Watch Net, on SPARC Repeater 147.060 at 8 P.M. Thursdays, is enjoying continued popularity. Operators prepare themselves to observe and report severe weather conditions to be forwarded to the National Weather Center, Ruskin, Fla. Meterological advisers include WA2YWK WD4FVY and N4BKD. The hurricane season is upon us. It is now time to ensure that all our emergency equipment and plans are double-checked and ready for any eventuality. Traffic: (Apr.) W3CUL 3134, W3VR 760, K4TH 643, WB4FVV 621, K4SCL 619, WD4AWN 567, NC4H 476, WD4COL 447, WA4PFK 429, W4LX 318, W4NFK 293, WB4WYG 236, WA4EIC 203, VE3BSY 183, W4DVO 182, KE4O 168, KA4ASZ 165, WB4AID 116, KA4LNA 111, K4EUK 110, W4IRA 107, W4GPL 106, KA4FZI 86, W3TLV 86, WB4PIB 79, N4KB 62, W4ESH 50, W4BK 38, WD4CHO 35, WB4GCK 35, W4WYR 34, WA4HXU 33, NJ4O 27, KA4BBA 23, WB4SNX 16, KM4G 10, WB4GSV 10, W4SMK 9, WB4FVN 8, WD4LWT 8, WB4KYE 7, W4JM 2. (Mar.) WD4COL 342, KA4BBA 7.

WEST INDIES: SCM, Julio Negroni, KP4CV — Highlights of the W.I. Section Convention; SE Area Director Frank Butler, W4RH, was the banquet speaker and addressed the hamfest crowd on Sunday at the ARRL Forum... Frank also presented 50 year membership plaque to KP4DJ. NP4D also received a special award for his outstanding achievement in the formation of traffic nets in the section and liaison with the NTS. Conference speakers were NP4AM on FCC Regulations, KP4IS on OSCAR and Satellites, NP4AU on ham application of computers and NP4D on traffic nets. WINS (West Indies Net Slow) celebrating its first year. WP4BDS is the section's first BPL in a long time. PSHR: WP4BDS WP4AOH WP4AWF NP4D KP4U. Traffic: WP4BDS 503, NP4D 393, WP4AWF 342, DP4EMX 236, KP4U 170, WP4AOH 124, WP4ADG 61, KP4DRK 19, WP4BBM 18.

SOUTHWESTERN DIVISION

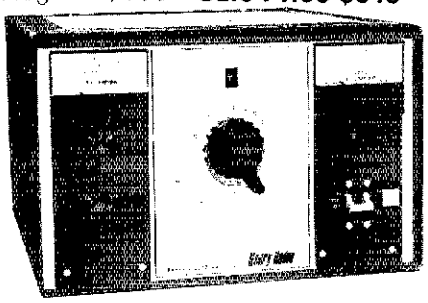
ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. The month of April seems to have been a quiet one. The major activity within the section seems to have been the ARC Message Relay. Thanks to all who assisted. I would like to ask all radio clubs within the section to send

AMATEUR ELECTRONIC SUPPLY *Amplifier Round-up Sale*



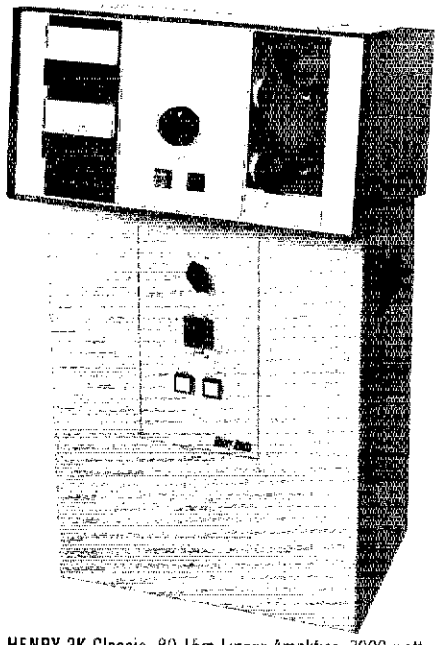
HENRY 1KD-5 80-15m Linear Amplifier 1200w PEP input, 700w PEP nominal output. Single Eimac 3-500Z, tuned input, ALC, conservative rated power supply, built-in antenna relay. Size: 8¾"h × 14"w × 15"d, 48 lbs.

Regular $695 - ***Sale Price $649.95***



HENRY 2KD-5 80-15m Linear Amplifier, 2000 watts PEP input, 1200w PEP nominal output on SSB, 1000 watts CW, RTTY & AM. Two Eimac 3-500Zs, 100 watts drive, tuned input ALC, heavy-duty power supply, full metering, built-in antenna relay. Size: 10½"h × 15"w × 17½"d, Wt. 62 lbs.

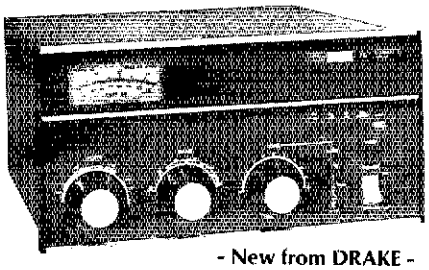
Regular $945 - ***Sale Price $895***



HENRY 2K Classic 80-15m Linear Amplifier, 2000 watts PEP SSB - 1000 watts CW, RTTY & AM. Two Eimac 3-500Zs, 80-150 watts drive, tuned input ALC circuit, heavy duty power supply, fully metered, air cooled, built-in antenna relay. Size: 32¼"h × 16½"w × 15"d Wt. 125 lbs.

Regular $1295 - ***Sale Price $1229***

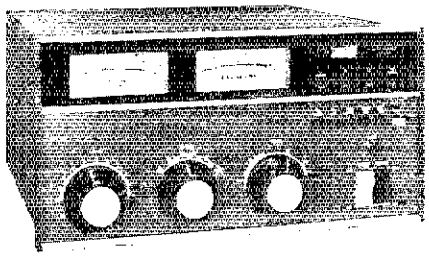
HENRY 3K Classic 80-15m Linear Amplifier, All of the famous Henry amplifier features, a rugged 8877 tube, rugged heavy duty power supply components & special antenna relay for semi break-in CW. ***Tentative - $2695***



- New from DRAKE -

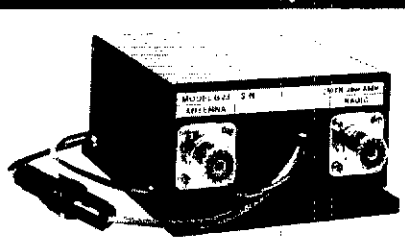
DRAKE L-75 160-15m Linear Amplifier 1200 watts PEP, SSB, 1000 watts CW, AM, RTTY & SSTV. Single 3-500Z, 60 watts drive, tuned input. Built-in power supply, relative power output indication, adjustable AGC, 2-speed fan & bypass switching. Size: 13¾"w × 6¾"h × 14½"d, 42 lbs.

Regular $819.95 - ***Sale Price $729.95***
including 3-500Z tube



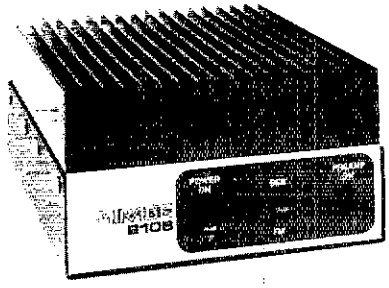
DRAKE L-7 160-15m Linear Amplifier, 2000 watts PEP, SSB & AM, 1000 watts CW, RTTY, SSTV; continuous duty. Two 3-500Zs, 100 watts drive, tuned input. Separate power supply, fully metered, RF wattmeter, adjustable AGC, 2-speed fan & bypass switch. Size: (rt) 13¾"w × 6¾"h × 14½"d, 27 lbs; (ps) 6¾"w × 7⅝"h × 11"d, 42¼ lbs.

Regular $1330 - ***Sale Price $1149***
including (2) 3-500Z tubes



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: 4¾"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/2.5db 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: 5⅝"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: 5⅝"w × 3"h × 12"d, Wt. 5 lbs. 13.6 Vdc @ 20-25 Amps.

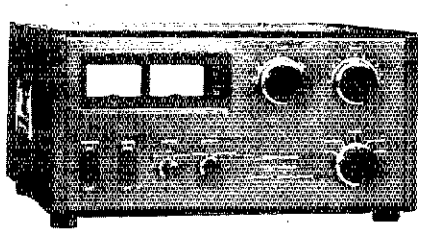
Regular $279.95 - ***Sale Price $249.95***

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. Wt. 5 lbs. 13.6 Vdc @ 12 AMPS.

Regular $319.95 - ***Sale Price $289.95***



KENWOOD TL-922A 160-15m Linear Amplifier, 2000 watts PEP SSB, 1000 watts CW, RTTY. Two 3-500Zs, tuned input, 80 watts drive. ALC, blower with automatic delay, fully metered. Size: 15½"w × 7¾"h × 16½"d. Wt. 68 lbs.

Regular $1199 - ***Sale Price $1069***

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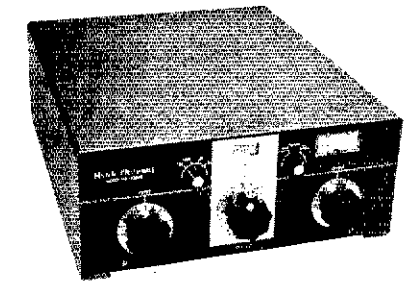

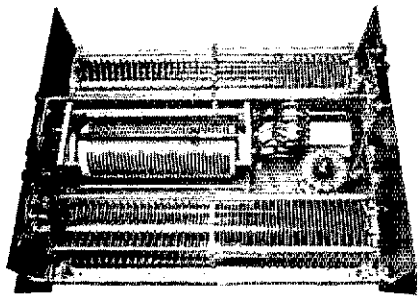

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- 4000 volt capacitors
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- Full legal power on all bands
- Provides an SWR of 1 to 1 to the transmitter
- Gray cabinet, dark gray panel
- 12"w x 15½"d x 5"h
- Shipping weight: 13 lbs
- Price, $248.50 & shipping

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UT2000A - 10-80 meters - $159.95 & shipping
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The most complete directory of Amateur Radio Equipment ever published-over 1,500 products - over 100 manufacturers/distributors. Includes prices, specifications and pictures of transceivers, transmitters, receivers, antennas, towers, tuners, power supplies, microphones, meters, keyers, test gear, SSTV, RTTY, VFO's, and more! No ham library is complete without a current edition of this Directory. BONUS - Included with each edition is a free newsletter containing the latest prices and product information. Order your copy today! All payments must be in U.S. currency drawn on a U.S. Bank. Prices for the 1981 Edition are as follows (includes postage & handling): U.S. & Canada $8.95. U.S. & Canada - First Class $7.95 Foreign (Air) $10.00 Also, a complete set of 78, 79, 80 & 81 Directories is available for $15.00 (U.S. & Canada), $21.00 (Foreign - Air).

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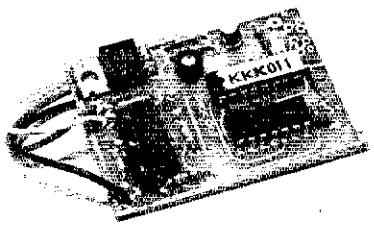

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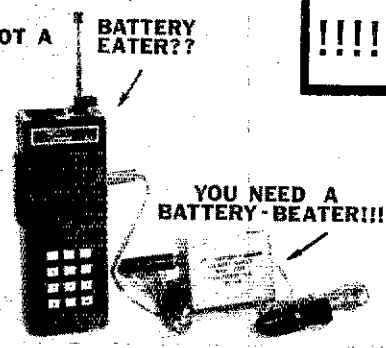

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along a copy of their newsletter to me, so that I can be better informed. Details of Public Service Communications should also be forwarded to me. Do you handle traffic? Often? Sometimes? Rarely? Then your station activity report is needed. Congratulations to W7INP for being awarded ARA Life Membership No. 2. Callsign changes: N0AGM now KB7TY, KA7EPZ now KB7TV, WB7PBD now KB7UF, and KA7BZM now KB7UV. Newly licensed: KA7JWI-Havasu City, KA7KAL-Tucson. W7US has been appointed AMSAT area coordinator for AZ. I regret to report that W7EFV became a Silent Key. (Mar) Cactus Net: QNI 970, QTC 111. (Apr) SWN: QNI 268, QTC 252, QTEN QNI 919, QTC 164. Traffic: (Apr.) W7EP 125, W7LVB 120, W7OIF 109, KB7HA 93, K7MC 63, K7NTG 58, K7NMO 39, N7EH 15, KE7W 11, WA7WEB 8, AC7D 5, W7LBW 5, WA7NXL 1. (Mar.) K7UXB 27.

LOS ANGELES: SCM, Stan Broki, N2YQ — ASCM: N6UK. SEC: WB6FAK. STM: W6INH. Congratulations to the following new appointee's: W6ABW-OVS, OBS; N6BCY-OVS, ORS; and K6OWA-ORS. K6EA has left sunny Calif. and is now in Minn. The following members of the Devonshire division ARES provided communications for the March of Dimes Walk-A-Thon: WA6AQQ N6AWU N6DVZ WD6GYQ K6IYK AA6K WA6MRY W6RPS W6TUQ WB6UJG W86VHS on April 26. N6BCY was control op during the Gordon Bennett Balloon Race. This race used many amateurs throughout the Southern California area for spotting. The United Radio Amateur RC, K6AA, had an exciting trip to Goldstone. W6PVR led the tour of the deep space network. The Romona Radio Club in San Gabriel, K6SIR, now has a new triband beam and a 2-meter beam up thanks to K6SUJ who climbed the pole with KA6KBW and KA6JVJ helping. Club members are encouraged to use the gear. W6VIO QSL cards are on the way for the Voyager I encounter with Saturn. The JPL ARC is planning what may be the last event for several years as Voyager II passes by Saturn this August. Voyager II will be sent on to Uranus with at least a two year travel time before encounter. For those of you that would like to know where the nets are in Southern Calif, the following information is provided. SCN1 7:00 P.M. local time, 3598 kHz, (cw 20 wpm). SCN2 8:15 P.M. local time, 3598 kHz, (cw 13 wpm). SCNV 9:00 P.M. local time, W6TIO/R 147.645/.045 (fm). RN6D 10:45 A.M., 1:45 P.M. and 3:30 P.M., 7275 kHz (ssb). Net control stations can answer your questions. OOs reporting this month: K6CI 2, K4WGW 17, W6TOG 79, K6KA 80. Traffic: (Apr.) W6INH 159, WA6OCM 100, K6OWA 85, KB6FC 78, WA6LVO 48, K6INK 47, K5DY 35, W6NKE 31, K6CL 25, N6DZQ 24, W6BWG 22, KT6D 17, N6DWW 13, KA6ALH 6, W6RO 1. (Mar.) N6BCY 69, K5DY 41. (Feb.) N6BCY 14.

ORANGE: SCM, Fried Heyn, WA6WZO — Asst SCM, WA6WZN. STM: KA6A. Asst STM: WD6CSL. SEC: W6UBO. DECs (by counties): K6GGS (San Bernardino), W6LKN (Riverside), WA6TLE (Orange), WB6YZY (Inyo). New OESs (& AECs): WB6DCB WB6DCC WA6OPS N6DGO. New OO: W6AWF. Thanks to the many ARES members that supported the March of Dimes walkathons and the Gordon Bennett Balloon Race comm: if you did not receive a certificate for your participation, notify the SEC. The Hospital Emergency Amateur Radio Team (HEART) has been organized with 7 hospitals under the leadership of WA6OPS; they have held 2 successful SETs. Current "swap nets": 1 P.M. Sat & Sun 7265 kHz (NC WA6DXJ); 7 P.M. Mon 144.64/145.24 (WD6CMY/R now on Heaps Peak); 7 P.M. Mon 146.4/147.435 (WA6KOS/R now in LaHabra); 8 P.M. Mon 147.69/09 (WR6AAA). For info on "swap meets" contact N6HI. So Org ARA Repeater on 147.045/645 uses the new trustee call, WD6AWP; the club/ARES net will continue on Wed 7:30 P.M. as well as the 9 P.M. daily NTS net (SCN/V). WA6LGC is new treas. of So Cal AR Computer Club (SCARCC) which has a net at 7 P.M. Tue on 144.76/146.36 (WB6YMH/R). West Coast ARC officers: KA6NLY, pres.; N6DSH, v.p.; N6CIO, secy., KA6JXM, treas. W6ELU is the new chmn (while N6QX is on an extended trip) of the Committee for Legal Maritime Mobile Amateur Radio Operations (CLAMMARO); WA6WZO is compiling a roster of West Coast maritime mobile nets. The Org County ARC is sponsoring an AR Explorer Post (#18) whose first pres. is N6DNH. Thru WA6EFW/R (34/94) WB6OFU WA6WYP & K5EDS brought life saving help called in by WB6CUO. Have you written your Senators about Bill S-929 introduced by K7UGA? For more info on S-929, HR 2203 and PR Docket # 80-729 ("Plain Language" rules) contact WA6WZO or WA6TEY.

Net	Freq.	Time/Dy	QNI	QTC	NM
SCN/1	3598 kHz	6:00 P.M.	364	284	K6FI
SCN/2	3598 kHz	7:15 P.M.	300	150	K6PHV
SCN/VHF	147.045/645	9:00 P.M.	415	212	WA6OCA
SCN/RTTY	3637.5 kHz	8:00 P.M.	—	—	WB5EKU

(K5DY SCN Net Manager — KA6A Asst. NM)
Traffic: (Apr.) KA6T 866, N6ANL 472, KN6C 346, WB6QBZ 185, W6NTN 103, WD6CSL 79, KA6A 77, WA6OCA 39, WB6BZZ 33, K6ZCE 33, W6CPB 25, W6RE 18, WA6WZO 7, WB6LGL 4, KI6X 3, WA6WZN 2, KA6HJK 1, N6PE 1. (Mar.) WD6CSL 38.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI, Asst SEC: N6RD. ARES was supported by Escondido ARS, Palomar ARC, and Poway ARS in providing communications for the March of Dimes "Walk America 1981" in northern San Diego County. County-wide there were six routes manned by 85 operators organized by WA6HJJ, Palomar (146.13/73), Poway (147.63/03), RACES (147.795/195) and Mission Hills (145.32) repeaters and simplex freqs were used. Try your hand at handling written message on the following nets.

Net	Time(PT)/Day	Freq. (MHz)	Remarks
SCN-1	1900 Dy	3.598	cw-20 wpm
SCN-2	2015 Dy	3.598	cw-13 wpm
SCN-V	2100 Dy	147.045/645	fm
RN6D	1045/1345/1530 Dy	7.275	ssb
SCN-RTTY	2000 Dy	3.638	RTTY
No. County	2000 Dy	146.13/73	fm

220 Club officers for '81: W6ZAS, pres.; W6KBD, v.p.; WB6SHH, secy.; N6AYY, treas. ARC of El Cajon is new member of San Diego County AR Council. WA6ZKC reports No. County Net met 28 times, handled 80 msgs. Traffic: KT6A 578, W6HUJ 234, KM6I 185, N6GW 153, KB6AI 46, N6AT 40, K6HAP 35, N6RD 33, W6DEY 25, WA6UFY 11.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — Friday, May 8th, 45 ARES members devoted workday to largest-ever earthquake disaster drill in SBAR Co. OES, police, fire, publ. works depts of all cities, welfare dept of Co., all 6 hospitals, ARC joined in parallel scenarios based on 8.3 magnitude quake. Casualty info passed via ASCII data terminals linked by vhf. Six repeaters, various simplex ckts and ht backup served many nets. Critiques included all agencies, States OES, Nat'l Guard, city councils, administrators, radio and TV

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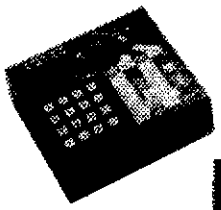
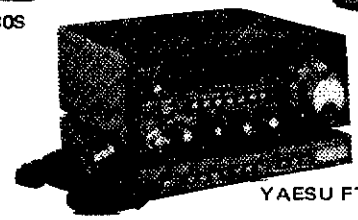
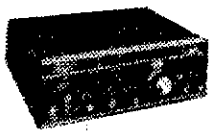

AEA MM-1


KENWOOD TS830S


ICOM IC-720


YAESU FT707


ROBOT 800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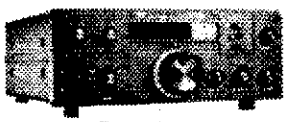
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P-5	C-5	5
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P-91	C-91	9-11
P-10	C-10	10
4P-12	4C-12	12-14
P-14	C-14	14
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media. Response to ARRL's ARES service? Most favorable! Key personnel: N6AJA WD6BNH W6GON WB6HOZ AB6S W1UUQ So. County; KB6PX WB6BWZ No. County; W6RIC KQ6I WB6RVA Ventura Co.; WA6LGC Orange Section; W6TJ Riverside Co. Orange Sctn. Many thanks to repeater owners: N6CFO WB6IYW W6KPS WB6QEV K6TZ N6ZF. Apathy on FCC plain language rules abounds. K2BAH spearheading work on docket in Ventura Co. Lack of leadership by national ARRL felt deeply here. Simi Settlers no 90 members-plan F.D. at Oak Park, Conejo Valley at Rasnow Peak, Poinsettia at Ventura Pier, SBARC at Mesa Park. PSHR: WDØDEX 95, K6YD 82, W6JGS 43, N6YH 16. Traffic: K6YD 171, WDØDEX 120, W6JGS 58, N6YH 34.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: WA5QFD. SEC: W5GPO. STM: W5VMP. NMs: AA5J AE5I KA5IWF. After a very busy tornado season, and many Skywarn nets, it is time to look at our hurricane preparedness. I hope you all gave your emergency power units and portable antennas a good workout at Field Day, and all emergency gear is in readiness. Even if our South Texas neighbors do not require our services on the coast, it is a good possibility that the Texas Dept. of Public Safety will require that we back them up in several locations if their manpower and communications channels become overloaded. Also, the possibility of flooding many miles inland from landfall is a lesson we have learned well in the past. ARES units in all counties should be ready to move on short notice to areas affected. No, I don't have a crystal ball to predict hurricanes, but we have already had our first tropical storm in May, and it makes one wonder what is in store for the Texas coast this fall!! Our ARES organization here in N.TX is growing by leaps and bounds. Get with your local EC and sign up now if you have not registered your capabilities in the past. W5GPO meets the TTN (3981 kHz @ 2300Z daily) and will be most happy to help you start an ARES unit in your area if you are without. PSHR: KC5FX KA5AZK KA5AVQ KA5IWF W5CTZ KA5CFP W5VMP N5BT AJ5F N5CEK KB5UL KK5B and WD5JYI. Denton Co. Public Service Net (146.31/.91) QNI-58. Traffic: W5TI 375, W5CTZ 279, N5BT 258, K5BNH 205, KA5AZK 200, KB5UL 188, AA5J 141, KA5CFP 119, KA5IWF 110, WB5SDD 93, KK5B 90, KC5FX 89, N5CEK 82, WD5JYI 81, AE5I 58, KA5AVQ 50, AJ5F 35, W5ERT 32, K5QKM 25, WB5YYK 22, W5GPO 20, W5VMP 19, K5PC 18, WA5QFD 18, WA5EZT 16, WB5OXE 16, AC5Z 15, K5HGX 12, WA5INJ 8, W5PBN 6.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Report from Guymon shows 5 recent up-grades plus more coming. 72/12 rptr giving excellent coverage of Panhandle, plus neighboring states. Link to Amarillo Weather nearly ready. Altus and Cement groups making good progress on the link to NWS in Oklahoma City. Oklahoma and Garfield County groups active with March-of-Dimes Walkathon. Kay Co. group asisted with annual hospital disaster drill. W5SAG K5FLL WA5UBO WB6NBK & W5ZWM participated. Glad to have WA5ZOO back in Okla. and helping with traffic. WB5NKD and K5TEY both on sick list and are sorely missed. K5RHX Silent Key. W5JJ experimenting with speaker resonance as a cw filter. Quite a few Oklahoma City ops received service pins from Red Cross. 24 OTS; 6 PSHR; 2 OO; 2 OBS reports received this month. Band conditions have been hard on net operations; time change, sun spots and wet weather have worked hardships at time. All nets need your help. Participation in nets and other ps activities help you fulfill Part 97.1. Try it you might like it. Traffic: W5REC 235, W5RB 222, WB5NKC 209, K5CXP 174, WA5RKU 97, W5AS 90, WD5IRB 85, KB5EK 81, WA5OUV 77, WA5FSN 63, WB5EAY 58, W5UYH 58, WB5ELG 54, WD5IFB 49, W5SUG 49, WB5NKD 42, KF5A 36, K5CAY 30, WA5JGU 27, W5VLW 24, W5VOR 24, NØIN 17, W5FKL 6, W5JJ 2.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N. W5SG, OO report this month. Tnx to the 31 stns reporting QTC this month. That's the most in several months. The following made PSHR: KB5TC KB5NX WA5RVT WB5YDD N5TC W5KLV WB5MMI WD5DQR W5SBE WD5GKH WD5AAH N5CHR. Also, congrats to KAØCSM who made PSHR in March, the first Novice to do so since I have been SCM. The TTN, TEX, and 7290 TN held their joint picnic at Kerrville State Park — a great time was had by all. Many Tnx to KA5AZK AK5M N5DAA W5TUK WA5JFZ KB5JL K5GDH and WA5RVT. The visiting was fun, the games challenging, the music was lively, and the food was OUTSTANDING. Please forgive me if I missed credits for anyone. W5SG is getting a "toe-hold" on RTTY. He has an ASR 33, and is going to homebrew a baud rate converter for Baudot to ASCII. N5CDO upped to Extra. The TDXS came in first in the 1980 SS Med. Category — congrats! K5GM having ham time interrupted by home computers. WD5AAH appointed communications chairman of the Brazoria County ARC Disaster Comm. He also coordinated the communications for the Lake Jackson MOD Walk America. W5AIR reports that the Houston regional hdqs. for ARC has their high speed health and welfare traffic system ready for emergency operations. AB5X operated portable/mobile April 23 in support of the Brookshire Police Dept. and the Texas DPS in the aftermath of heavy thunderstorms and one confirmed tornado. Best 73's to all in STX from KD5O who has moved to Ohio. K5RG has been trying to accustom himself to the summer QRN while meeting QTC skeds. KAØCSM is QNO until July in Kansas while he awaits the arrival of a grandchild. CAND went back to two sessions/day effective May 1. W5KLV, OBS, had 9 bulletins, 4 propagation forecasts, 4 DX bulletins, 5 satellite bulletins, 4 CAND bulletins, 182 readings on 14 net. Nice going! Traffic: (Apr.) W5SHN 1280, WB5YDD 730, W5KLV 390, W5TFB 270, KB5TC 232, W5SBE 230, WA5RVT 146, N5TC 125, KB5NX 115, K5HZR 110, WB5MMI 74, KA5GYJ 65, N5CRR 59, N5DAA 42, KC5JL 40, AK5M 31, N5FN 27, K5RG 25, WB5EFJ 24, WD5DQR 21, W5BGE 16, KB5KZ 15, K5OWK 14, WD5DRB 12, AB5X 12, WD5GKH 9, WB5UYV 8, KAØCSM 6, W5AIR 5. (Mar.) K5GM 79, WB5EFJ 32. (Feb.) K5GM 112. (Jan.) K5GM 101.

HAVE an interesting item you think would make a good Stray? Submit it to ARRL Hq. by the 10th of the second month preceding desired publication. If photos are included, use good quality, black-and-white ones. Above all, the material should be of interest to most *QST* readers!

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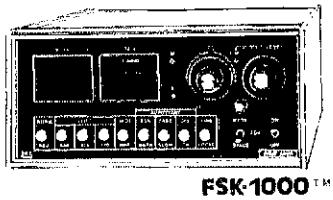

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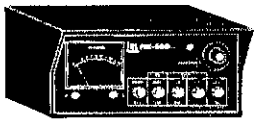

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This RTTY demodulator is designed for computer interface but is a fine stand alone unit:
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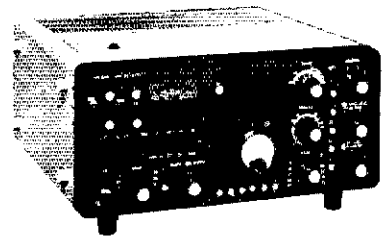

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(1) Advertising must pertain to products and services which are related to Amateur Radio.

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(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.

WARRENARA 24th Annual Hamfest, Sunday, August 16, 1981, KSU-Trumbull campus, Outerbelt/Rt. 45. Huge flea market on lawn; equipment displays/sales inside; meals, snacks sold all day. $4,200 awards TenTec Omni' two TenTec Deltas; three IC-218s; plus hourly awards. Details: QSL WARA, Box 809, Warren, OH 44482.

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. 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.

SOUTHERN ILLINOIS — Shawnee Amateur Radio Association's 25th anniversary Silver Jubilee Hamfest will be August 30 at John A. Logan College in Carterville, Illinois. Offerings include air conditioned flea market — awards, forums, computers, food, refreshments, contests. For details QSL Bill May KB9QY, 800 Hilldale, Herrin, ILL 62948 or 618-942-2511 days.

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 Vegola Avenue, Cheektowaga, NY 14225.

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.

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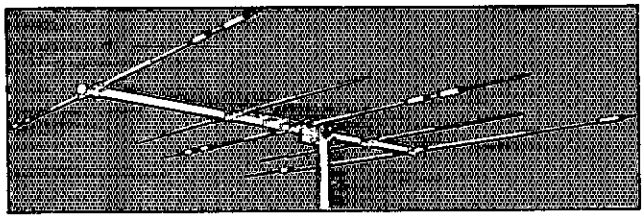
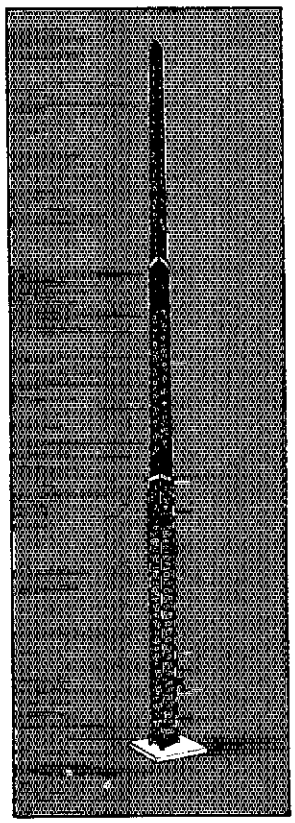


The installation of a ham's first directional antenna system is a memorable event because of the substantial improvement in the capability of the station. You really have to experience using a directional array at your station to appreciate the thrill of improved performance.

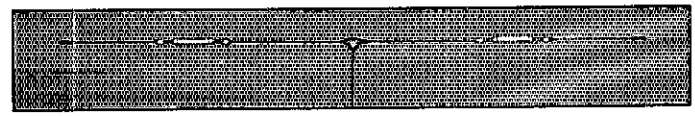
A Hy-Gain TH5DX can do more for operating pleasure than an expensive new state-of-the-art receiver and maximum power amplifier combined. The TH5DX is the result of 25 years of experience in designing and building multi-band beams, and represents a focused effort to optimize performance and reduce size. Hy-Gain Beta Match provides dc ground, optimizing energy transfer to the antenna. Air dielectric Hy-Q traps have also been used. The elements are taper swaged to reduce tubing diameter and weight which greatly reduces wind load.



HG52SS

Self-Supporting Crank-Up Tower

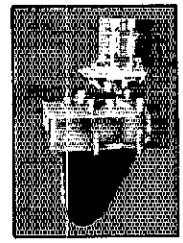
This all steel crank-up tower has an improved guide system which provides a rigid close-tolerance structural support. The ends of the tubes are left open to allow complete hot dipped galvanizing of both inside and outside surfaces after welding as well as unrestricted moisture drainage. It comes complete with base mount and rotator mounting plate and requires no guying. It stands 52' (15.8 m) extended and retracts to 21' (6.4 m).



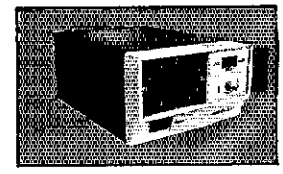
2DBQ Trap Doublet for 40 and 80 meters

This Hy-Q trap doublet provides true half-wave length performance on both frequencies featuring individually pretuned matched traps for each band. Traps are large diameter for exceptionally favorable L/C ratio and power handling ability.

HDR300 Heavy Duty Rotator



This is a commercial /industrial grade rotator with enough reserve strength to easily rotate the TH5DX and more. The good-looking control console features a digital azimuth readout accurate to ±1°.



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One HG10 Heavy duty 10 foot mast
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Three HGCOA Coax extension arms
Two BN86 Broad band Ferrite Baluns

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TH5DX	Tri-Band Antenna	289.95
2DBQ	Trap Doublet for 40 to 80 meters	59.95
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HG10	10 foot mast	56.00
HGCOA	Coax Arms (3)	39.00
BN86	Baluns (2)	31.90
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RADIO CENTRAL ARC will hold its 3rd Annual Hamfest on Sunday, July 12, 1981, from 9 A.M. to 4 P.M. on the grounds of Mt. Sinai Elementary School, Route 25A, Mt. Sinai, Long Island, New York. Awards, food, a grand drawing at 3 P.M. and a cw contest are featured. Buyers $1.50, XYL and Harmonics free, sellers $3. per space. Talk in on WA2UEC repeat 145.150 or 146.520 simplex. For further information, please contact Lew Franklin, WB2VJO, at 516-265-5614. 6 Jackson St. Nesconset N.Y. 11767.

ILLINOIS, Belvedere Hamfest, August 2nd Boone County Fairgrounds Hwy. 76. Camping and tables available. Contact Bob Anderson. 910 W. Locust St., Belvidere 61008 IL. For advance tickets at $2 tel. 544-3215.

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FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

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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
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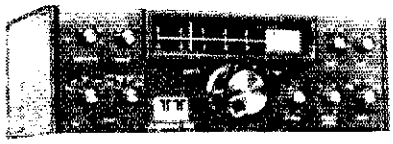
280	Standard Power Supply	149
282	200Hz 6 Pole CW Filter	49
283	Remote VFO Unit	169
285	500Hz 6 Pole CW Filter	45
287	Mobile Mount	TBA
289	Noise Blanker	39
1140	D.C. Circuit Breaker	10



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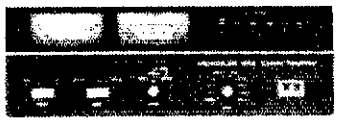
515	Argonant-5W. 80-10mtr. XCVR	$ 399
210	Power Supply	34
206A	Crystal Calibrater	36
208A	Notch/CW Filter	56



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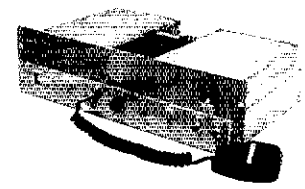

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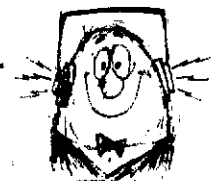

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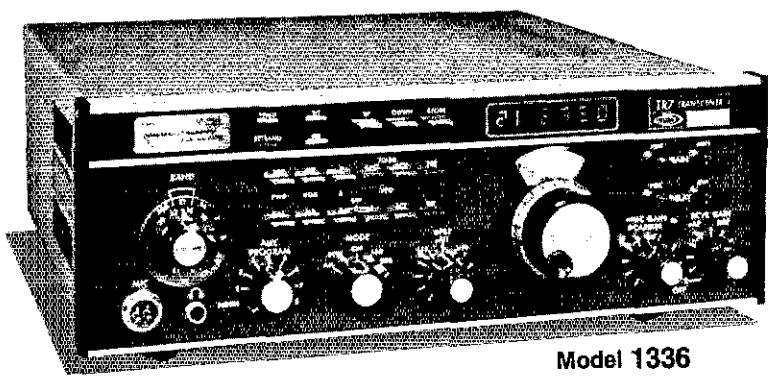

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True Passband Tuning—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

Unique Independent Receiver Selectivity—Space is provided in the TR7 for up to 3 optional crystal filters. These filters are selected, along with the standard 2.3 kHz filter, by front panel pushbutton control, independent of the mode control. This permits the receive response to be optimized for various operating conditions in any operational situation. Optional filter bandwidths include 6 kHz for a-m, 1.8 kHz for narrow ssb or RTTY, and 500 Hz and 300 Hz for cw.

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* NOTE: Transmitter coverage for MARS, Government, and future WARC bands is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz *range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux7* Range Program Board. Prices quoted from the factory. See Operator's Manual for details. (Not available for services requiring type acceptance.)

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QST 781

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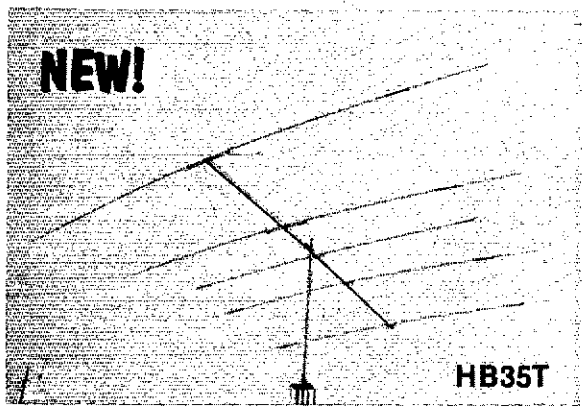

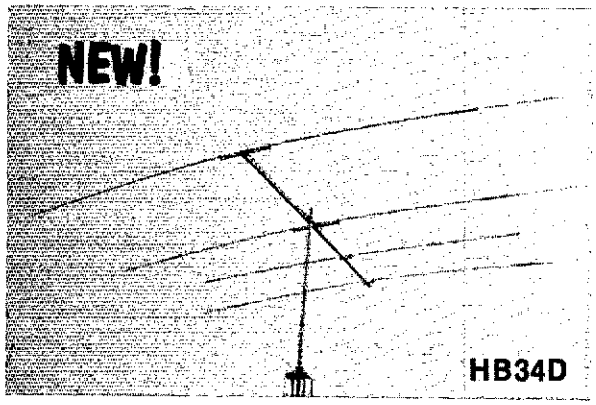

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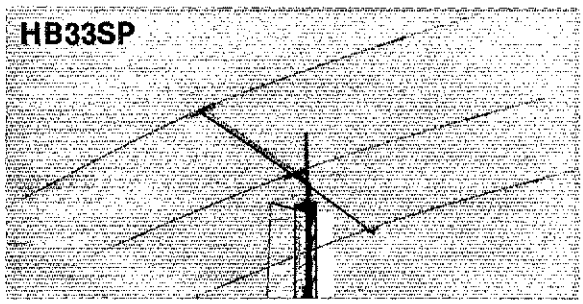

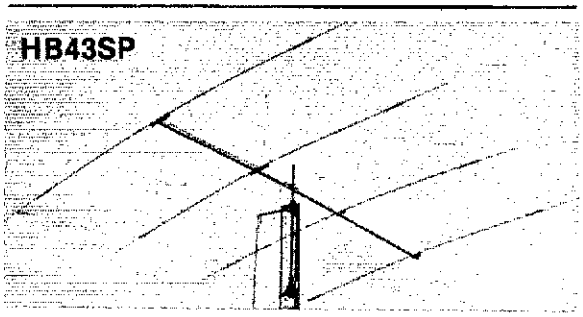

	HB35T	HB43sp	HB34D	HB33sp
Bands	10/15/20	10/15/20	10/15/20	10/15/20
Elements/Band	5 5 4	4 4 4	4 4 3	3 3 3
Max Pwr PEP	3KW	3KW	3KW	3KW
VSWR	1.5	1.5	1.5	1.5
Impedance Ohms	50	50	50	50
Max E1 Length	27'	27'	27'	27'
Boom Length	24'7"	19'8"	16'5"	13'2"
Turn Radius	18'10"	16'9"	15'10"	15'
Wind Area Ft²	7.93	6.62	6.04	4.73
Wind Load (lbs.) @ 80mph	160	132	121	102
Boom Diameter	2"	2"	2"	2"
Mast Size	1½-2"	1½-2"	1½-2"	1½-2"
Weight Lbs	50	38	34	27
Max Wind MPH	100	100	100	100
Balun Furnished	Yes	Yes	Yes	Yes
Gain dBd		CALL FACTORY		
F/B Ratio		CALL FACTORY		
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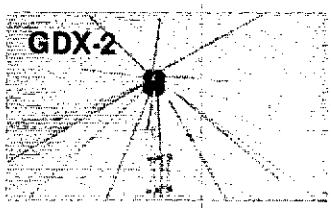

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YC-500S Counter 199

5-26-81

(1) This list was prepared from an inventory taken on the date shown. The quantities vary. In some cases there are several of one item, others, only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. But, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment specials, closeouts, etc. shown on this page.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercard, or Visa; no trades.

	reg.	Now
ATLAS		
RX-110 5-band Ham Rcvr	$259	199
B & W	reg.	Now
3001W Hybrid phone patch	$ 85	69
CES	reg.	Now
210 Thin TTP	$ 39	19
210A Thin TTP	39	19
213 TTP w/auto PTT	50	29
232 TTP mic w/batt	59	39
240 ANI pad w/prog switches	100	69
240A ANI pad	80	49
800-YS Scanner, FT-227R	99	49
CIR	reg.	Now
BPS-200 AC supply	$135	125
SPS-200 AC ps/speaker	165	149
SOC-200 Stn console	295	195
MIC-STA Desk mic	38	29
COLLINS	reg.	Now
32S-3A Transmitter	3673	2673
516F-2 AC power supply	467	367
312B-4 Station console	732	399
302C-3 Wattmeter	557	299
CC-3 Carrying case	297	97
F455Y-40 4 KHz Rcvr filter		50
F455FA-60 6 KHz filt for 75S-3	120	99
F455FA-31 3.1 KHz filt; 75S-3	120	99
CUSHCRAFT	reg.	Now
A14-2 2 el 20m beam Truck	$119	59
AR-25 2m 500w Ringo	34	29
ABW-144 2m Big Wheel ant	39	29
DATA SIGNAL	reg.	Now
Cricket 2 Keyer	$ 75	49
TTP-1 12 digit TTP	59	29
TTP-2 16 digit TTP	69	39
DENTRON	reg.	Now
HF-ACS 2A reg/16A unreg ps	$129	49
PS-10 VOM/wattmeter	49	29
AF-1A Rcv audio processor	199	129
4V 40/20/15/10m vert ant	84	59
80-4VR 80m resonator for 4V	29	25
EIMAC	reg.	Now
100TH Tube	$183	99
ICOM	reg.	Now
IC-245 10w 2m FM Xcvr	$579	269
IC-255A 2m FM (orig model)	389	289
IC-280 10w 2m FM Xcvr	359	299
EX-2 Relay control box		39
KLM	reg.	Now
661 6m Xcvr	$695	499
KENWOOD	reg.	Now
TS-820 Xcvr	1100	699
TS-820 w/DG-1 installed	1323	869
R-300 Shortwave receiver	279	229
TR-7600 10w 2m FM Xcvr	375	279
RM-76 Programmer	125	88
MIDLAND	reg.	Now
13-510A 2m FM synth Xcvr	$399	329
MOSLEY	reg.	Now
CL-36 6 el tribander Truck	$392	292
TA-36 6 el tribander Truck	392	292
CL-203 3 el 20m beam Truck	290	190
STANDARD	reg.	Now
C-118 2m FM HT/batt/cgr	$313	149
C-118/TTP 2m FM HT/TTP	373	189
SWAN	reg.	Now
102BX 6-band Xcvr	1195	895
PSU-6 Power supply	189	169
Astro 150 6-band Xcvr	925	699
WM-1500 Wattmeter	74	59
WM-6200 6 & 2m wattmeter	87	59
117X Basic AC supply	129	99
14-117 DC power supply	239	199
14A DC conv; 350B/D	79	59
14C DC module	119	99
14CP Pos gnd DC module	75	49
14XP Pos gnd DC module	70	39
GMTK Mobile mount	6	4
MTK Mobile mount	11	6
SSMTK Mobile mount	18	9
ST-1 Antenna tuner	189	129
ST-1A Antenna tuner	189	149
TMD Trunk mount only	9	6
TB-3H 3 el tribander Truck	219	149
TELEX	reg.	Now
CM-1320 Boom mic headset	$ 75	59
CS-45 Boom carbon mic headset	64	49
CS-61 Boom mic headset	64	49
CM-1210 Boom mic headset	62	49
CB-1200 Boom mic, 1 phone	59	49
CS-11 Single headphone	33	25
HFR-91 Light single phone	9	6
HFW-91 Light single phone	9	6
HFY-91 Light single phone	9	6
TEMPO	reg.	Now
VBC-3000 NBVM adaptor	$349	299
TURNER	reg.	Now
HL-6 Desk microphone	$ 45	29
YAESU	reg.	Now
FT-107M 6-band Xcvr	1045	799
FC-107 6-band ant tuner	150	119
FT-901D Xcvr	1259	899
YO-101 Monitor scope	320	199
FR-101S Receiver	599	349
FL-101 Transmitter	649	399
LL-301 Phone patch	49	45
XF-31C CW filter for FT-401	45	29
QTR-24 World clock	35	29
FT-625RD 6m Xcvr	895	599
CPU-2500R 25w 2m FM Xcvr	559	329
NC-1 Desk charger	39	29

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Nationwide WATS line: 1-800-558-0411

In Wisconsin (outside Milw. Metro area): 1-800-242-5195

STORE HOURS: Mon, Tues, Wed & Fri 9-5:30; Thurs 9-8; Sat 9-3

KWS-1 Collins, s/n 1069 $500. or trade for 75S-3A 32S-3 and 516F-2 or other S-line. Ron Rausch K5HZ, Route 1, #34 Pine, Benton, AR 72015 501-847-8105 after 7 P.M.

HW-101, HP-23A, cw filter, mike $350, excellent condition. Ten-Tec KR50, $60. Ten-Tec KR-5A, $40. Terry Harvey 1697 Hendrick, Muskegon, MI 49441 616-798-7138.

SELL Hallicrafters FPM-300 MkII with fan & manual A-1 condition. $275. W6OWD ph 415-728-7136.

COLLINS 75A4, 2.1 filter, A1 conditon. $300. Johnson Viking Courier, 500 watt amp, tunes 3-30 MHz, pair 811A's, solid state supply, self contained table top, low drive, class B or C with flip of switch. $175. Johnson Viking 6N2, oscillator, multiplier, amplifier, 150 watts input, 6 and 2 meters, 5894 final, works off 100 watt transceiver supply, needs same voltages as 6146. Mint $50. Cushcraft A432-20T OSCAR antenna, 432-435 MHz, 20 elements. $20. Tektronix 516 Scope needs CRT $100. Certified check or money order, will ship prepaid in U.S. Call or write: Bernard Glassmeyer, W9KDR, Grove Beach, Westbrook, CT 06498. Work 203-666-1541, Home 203-669-4980.

FOR SALE: Ten Tec Argonaut 515 with 206A xtal calibrator, $325 Icom IC202 $125. WA9CUH 715-886-4111.

HEWLETT-PACKARD 41C, wand, printer, card reader, three memory modules, A.M.A. software, 1000 new cards, all manuals plus P.P.C. ROM when shipped. Certified check or money order for $1100. Excellent condition, will ship prepaid U.S. Don Forss, WB9ICU, 414-353-5641, 6747 North 75th Street, Milwaukee, WI 53223.

TS820S, mint in original carton. Low hours, $695 Bob Ensminger, 1121 S. College College Place, WA 99324, 509-529-4350.

SELL: TR-2200A, 8 xtal, duck, $125, HW-8 $115 I ship WB4WXE/KL7 Box 55370 North Pole, AK 99705 488-3909.

SATELLITE EARTH station supplies in stock — Hoosier Electronics your #1 ham radio dealer for the last ten years is now stocking satellite receiving antennas, receivers, LNA's, wire and fittings. Write or call us today for our low quote and try our personal and friendly Hoosier service. Hoosier Electronics, P. O. Box 3300, #9 Meadows Center, Terre haute, IN 47803. 812-238-1456.

RTTY Equipment—for TRS-80 Model III M80 interface with metal enclosure $125—bit-byter interface split screen $100—one set of three Level III ROMs for TRS-80 Model III $125—ASR-33 TTY $200—Joe K4IHP 300 Spalding Drive, Atlanta, GA 30328 404-394-6203.

MADISON Summer specials: Santec HT1200 $299.; Icom IC2AT $249.; Kenwood TR2400 $349.; TR7800 + free BO9 system $399.; Drake TR7/DR7 $1349.; L75 amplifier $629.; IC720A/AC $1298.; TS830S-call; IC255A/TTMIC $339.; IC260A $449.; Cubic 103 $1195.; Yaesu FT707 $699.; FT902DM $1299.; FT101ZD $769.; Bird 43, slubs stock; Belden coax line stock; Amphenol silverplate PL259 $1.; Kenwood service manuals $10.; GE572B $38.; Hustler 3TBA beam $199.; Cushcraft A3 $169.; A4 $219.; Call delivery Icom IC730 $729. All items personal guarantee, prices FOB Houston, subject change without notice. Madison Electronics, 1508 McKinney, Houston, TX 77010. 713-6580268; nite 1-800-231-3057 MWF.

ESTATE for sale: 60 miles from Manhattan near the Long Island Sound a Spanish style ranch. 5 bedrooms—2-1/2 baths—3 fireplaces—large modern kitchen with appliances and tile floors—skylights throughout—finished basement with bar plus many extra. House located on 2.75 wooded acres. Ham paradise: 2 motorized towers (LM470D/SkyNeedle) 70 feet tall. 3 KLM 6 elements monobanders. Private radio room with separate 150A. service. Custom made console and many extras. Write Paul Mazola 227 Main St., Northport, NY 11768 or call Eve. 516-757-7548.

WANTED: Hammartund HQ-100 receivers, prime condition. Send description and price: Savoy Electronics, P. O. Box 5727, Ft. Lauderdale, FL 33310.

MINT Collins station available: 75S3C, round, $850; 32S3 $450; 516F2 $165; 312B4 $175; KWM2A $600. Schaaf, 897 Sunbeam Cir., Oneida, WI 54155. 1-414-434-2938.

IRC's for sale 35c ea. Hill, 3680 Devlin Kingman, AZ 86401.

1981 CALLBOOKS. US $16.50, DX-$15.50, SET $31. Prices include shipping. K4CLA.

FOR SALE: Grebe Synchrophase console, $125. Motorola fm (old), 6 foot cabinet, $75.; Dumont FM, rack, $75.; WWII Super-Pro, $75., completely updated Super-Pro as in CQ article, $300.; CE20A, $50; Lakeshore VFO, $40.; Viking II, VFO, $110.; Viking I, VFO, $100.; BC348M, $80.; Swan 160X etc. $375.; BC610E, $175.; DX100, $75.; Regency scanner, $75.; HQ170 AC, speaker, near mint, $175., Meissner receiver, $25.; small bug, similar Vibroplex Blue Racer, $75.; 180 foot Broadcast tower similar Rohn 55, $1500. Want to buy: Eimac 1000T, Telrex or KLM 80 meter rotary beam or dipole. F.O.B. K8CCV, 216-427-2303, weeknights, 6 to 9 P.M. EDST.

WANTED: small two meter handi-talkie with TTP; crystal or synthesized; preferably mint. AA1U, 203-379-1729.

FREQUENCY Standard 1 MHz, JKTO-41 proportional oven new $45. WØBJ 308-532-3291.

FINEST "C" line around. T4XC #29628, R4C 28677, AC4, MS4, 4NB, 1.8 & 5 filters, 160 xstls, TV3300LP. Shure 444. Original cartons, cables & manuals. Very little use. $950 plus shipping. WB9UQP 414-763-7405.

FOR SALE: Kenwood TS520S with cw filter . . . $525, DG-5 Digital display (just serviced) . . . $125, VFO-520S external VFO $100, SP 520 external speaker $15, AT-200 Ant. tuner with meter $125, MC-50 desk mike $35, DS-2 DC Converter (new) $50, complete rig $900. Will negotiate transportation. All manuals and original containers available. George N1AMD, 932 Boston Post Road, East Lyme, CT. 06333 203-739-8454.

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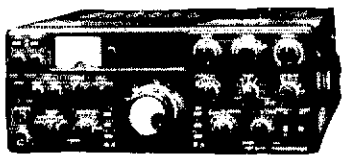
MON, WED, FRI, 6 PM-10 PM CT

TS830S TRANSCEIVER



160-10 METERS, 3 WARC BANDS, NOTCH, VBT, IF SHIFT, BUILT IN AC

LIST	929.00
FILTER	59.00
MC50	45.00
YOUR COST	929.00

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 - 329.00
INTRODUCTORY PRICE
289.00
IC255-A *389.00

ACCESSORIES

HM-8	49.95
HM-9	34.50
HM-10	39.95
PS-15	149.00
PS-20	229.00

DONS CORNER

I'm getting a lot of calls about the new 2 meter radio we hinted at in our ads a few months ago. The IC-22U was introduced shortly afterward, but it isn't the radio I referred to. Hang in there, it's coming.

Speaking of 2 meter gear, ICOM is introducing two new radios this spring; the IC-290 will replace the IC-260 and has improved on such problems as retuning when jumping from FM to Sideband and back. The IC-25A will replace the IC-255-A, with some improvements. It may or may not have the touch tone mike.

The SANTEC HT-1200 is looking better all the time. A carrying case, speaker mike and other goodies should be available when you read this. Also, a longer life battery pack, manufactured here in the U.S. by Gould for Santec, is available NOW. Call me for info.

Be on the lookout for the new antennas (quad-banders, quint-banders?) for the warc bands. Don't forget to check your own antenna for rust, corrossion and loose connections now that winter has passed.

See you next month!

THE KWM-380
SOME AT OLD PRICES - CALL QUICK

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	* 1866.00

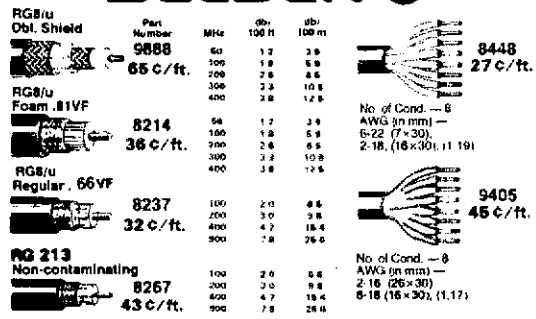
DRAKE

TR7/DR7	* 1349.00

ICOM

IC730	* 829.00
IC720A W/PS	* 1498.00

BELDEN



Belden Mini RG-8 (9258)-19¢/ft.

YAESU FT707
$810.00 LIST

- 80-10 INCL. WARC
- 90 WATTS OUT
- BEST SPECS ON CURRENT MOBILE RIGS
- SOLID STATE LED
- SRF METERS

HANDIES

KENWOOD
TR-2400 * 399.00

SANTEC
HT 1200 * 249.00

MOBILE 2M

KENWOOD
TR9000
ALL MODE * 499.00

ICOM
IC-260A
ALL MODE * 499.00

ET CETERA

Cubic-Swan 102BXA	$999.00
Astro 150A	849.00
Robot 800A	749.00
Mirage B23 1 watt-30 Watt amp	89.95
DSI 5600 A w/Ant/Ac	185.00
Cushcraft A3 Tribander	169.00
Bird 43, Slugs	Stock
CDE Ham-4 Rotor	199.00
Ham X	269.00
FPK Palm 2 Handie with BP/AC	149.00
GE 5728	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
ICOM 255A 2M Synthesized w/TT Mike	339.00
ICOM 260A 2M SSB/FM/CW	449.00
New-Icom IC 720 A AC/mike	1298.00
Bearcat 220 - $329.00	300-399.00
Manual Typewriters Guaranteed to Work	$35.00
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

HEATH for sale, b.o. each. Hf wattmeter-bridge HM-102 and station monitor SB-614, both mint. 617-227-5228 eves. N1BJO.

KENWOOD TS-520SE with 250 Hz cw filter, like new, $475. Yaesu FRG-7 with Gilfer modification and 3 kHz filter, very good, $250. 318-232-7957 leave message. Lee Nelson.

REPAIRS, custom modifications on TR-7, TS-820S 609-587-6071 WA2PYX.

CLEANING HOUSE — Sell assembled Xitex terminal (SCT-100 board, keyboard, and enclosure) $225. Xitex MRS-100 Morse xcvr unassembled kit with PolyPaks keyboard, no cabinet, $125. Pair Unidilla KW-40 dipole coils. New $15. AccuKeyer $15. I pay shipping. WA5QAQ, 211 36th St. Nederland, TX 77627. 713-727-2036 evenings.

SELL: SB101, SB640, HP23A, WE800, SR146, make offer. N2CH 201-227-5518. P.O. Box 1108, Fairfield, NJ 07006.

COLLINS 51S-1, 312B-4 for sale. Excellent condition. W5KX, 1732 Willow Point, Shreveport, LA 71119.

DRAKE, R-4B, T-4XB, AC-4, manuals, used one year, $600, N4ELA, 305-231-6389.

LINEAR Builders send s.a.s.e. for list of goodies and rejoice. W6RW 8600 Skyline Drive Hollywood CA 90046 213-654-3714.

DEFOREST TUBES, original can, felt liner. Unused, tested. (1)DL2 (2)DL4 (1)DV2 (4)DL5 $15 each postpaid. Modern Radio #142 July & Aug. 1931, Davco Manual. Make offer with s.a.s.e. W1COI Box 73 Cheshire, MA 01225.

KENWOOD TS-520S transceiver $525; VFO-520 VFO $120; both for $600; DG-5 digital display $135; Mint. Manuals and cartons. Pickup or Ushp. OSI microcomputer Model C-1P with RF modulator and 8K. John, WB6WIW. 714-842-9142.

FREE AD with subscription (limit 30 words)! Ham buy, sell, trade, want ads. One year, $3. WA4OSR's Rigs & Stuff[tm], Dept. Q7A, Box 973, Mobile, AL 36601.

SELL Wilson MK II with TTP, speaker-mike, recent nicad pack, new condition, $175., Dave 919-467-5240. WA4FEE.

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, N.C. 27101 919-725-7500.

HAM-AD-FEST[tm] every month. Ham buy, sell, trade, want ads. 12 issues, $3. WA4OSR's Rigs & Stuff[tm], Dept. Q7B, Box 973, Mobile, AL 36601.

SPLIT-SCREEN RTTY for TRS80 (Model One) owners! Send/receive program runs on any Level II system through your M80 board. s.a.s.e. for info or $45 (state tape or disk) from Mort Waters, W2NZ, Box 379, Seaford, NY 11783.

CUSTOM SERVICE improved Collins 75S-3B & 75A-4. Overall S/N improved: cascaded mech. filters, nonoverload RF-IF mixer circuits, AGC, & audio LPF resulting in superior receivers, $225 each. S-line filters for 75A-4. Specialist Collins 62S-1 & Drake TR-6. Goda Laboratory, 1815 N. Woodside St., Orange, CA 92665. 714-637-3989.

HP-13 HEATH mobile supply SB-100 & similar. First offer over $75. W1OLP, 617-668-2574.

1943 NAVY Super Pro, 1953 Globe Champion, $300. WA9IYF. 812-273-5379.

YAESU FV901 DM VFO $295, FTV 901R transverter w/6M module — $360, YO-901 multiscope $360, Rohn 25 tower with top section for thrust bearing (48') $135.; Icom 2AT hand held (brand new and never used) $210.; Signal Engineering 6 element ten meter quad $150.; Hygain 205BA (brand new) $200, Homebrew 2 meter kW amplifier — make offer. First money order or bank draft takes. Call 301-672-3872 after 5 P.M. W3GNM.

SELL: Collins KWM2 w/ps, Waters Q-Multiplier/notch filter and DX Engineering speech processor. All mint condx — $550. Drake T4XB and R4B with p/s and Ms4 spkr. All mint condx. $600. Central Electronics 100 V tranlexc (not shippable) $350. Call or write W9ALI, 312-629-5535.

WEATHER Satellite receiving/printing system. Brad Slocum 415-968-4400.

N6RJ 2ND Op, a must for the serious DXer, $6.95 free UPS, Ham Radio Outlet, 1-800-854-6046.

YAESU 2500RK 25 watt 2 meter xcvr. Keyboard microphone. Perfect condx. $250. W6VSQ 916-877-6302.

BRAND NEW Collins CP-1 empty crystal pack $25. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

BIG DISCOUNTS-ETO Alpha amplifiers, Collins KWM-380, Signal-One CX11A, Hy-Gain towers, IC-720A, TS-830S, TR-7/DR-7, all your DX and contest needs. Free UPS most items. Call Ham Radio Outlet, Toll-free, 1-800-854-6046.

ALPHA 76PA, 3 tubes, 10 meters inside and on front panel, mint, $1,600, WA4OSM-K4RV, 803-359-3418.

HAM IV just bought used 1 week, works fine, original carton, $130 pick up or I ship. KB2FS, Fred Kohlrausch, 5 Park Drive, Woodstock, NY 12498.

BUILD ANTENNA tuner for power levels up to 500 watts and from 160 through 10 meters using brand new ARC-5 transmitters, conversion data included, priced at $18.95. Send for gov't surplus catalog for equipment, tubes and parts 50c. G&G Radio, 45 Warren St., New York, NY 10007.

SANTEC HT-1200, Vocom ant., mint $300 K8CV 1-313-549-1846.

hy-gain

Specials & Closeouts, etc.

Tower & Antenna Deal

Get in on **HY-GAIN'S SUPER 5-Bander Promotion.** Once-in-a-lifetime Package Deal available good until August 31st. Call **AES** today and order yours, the complete package will be shipped to you promptly with NO DELIVERY CHARGE within the contiguous 48 States.

Here's what you get!...

HY-GAIN HG52SS 52' Self-Supporting Crank-Up Tower for antennas up to 9 ft² @ 50 mph. All steel with improved guide system for close-tolerance structural support, hand-cranked winch. Inside and outside surfaces hot-dipped galvanized. Requires no guying at rated load, retracts to 21' for weather or service. With base & rotator plates, 10' mast & (3) coax supports.

HY-GAIN TH5DX Thunderbird 5 element triband beam for 20, 15 & 10 meters. Three active elements on 15 & 20m; four active on 10 meters. High average gain and front-to-back ratio; handles maximum legal power. Boom length 18', longest element 31', turning radius 18', wind area 6.4 ft², wt. 50 lbs. Includes BN-86 balun.

HY-GAIN 2BDQ Trap Doublet for 40 & 80 meters, prefuned traps, true half-wave length performance on both bands. Overall length 101'. Includes weatherproof center insulator, end insulators and BN-86 balun.

HY-GAIN HDR300 Heavy-Duty/Digital Readout Rotor. A rugged, dependable rotor with a digital readout console control. Rated for 25 ft² of antenna area, tower mounted. Stall torque: 5000 in/lbs., Braking torque: 7500 in/lbs. Readout out accurate to ± 1°. Mast sizes 1¼"to 3" O.D., requires 8-conductor control cable.

Here's what it costs!...

Model & Description	Ham Net
HG52SS Crank-up Tower	$990.00
HG10 10' mast	56.00
HGCOA Coax Arms (3)	39.00
TH5DX Tri-Band Antenna	289.95
2BDQ Trap Doublet	59.95
BN-86 Baluns (2)	31.90
HDR300 Rotator	499.95
Total Ham Net Value	1966.75
You Pay Only	1366.75

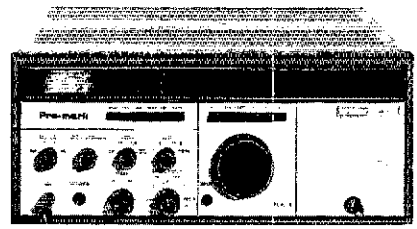
YOU SAVE $600.00

PLUS FREE DELIVERY

master charge — VISA

Order now as quantities limited & prices subject to change without notice. Send Check, Money Order or Call TOLL FREE and use MASTERCARD or VISA. Except on the HY-GAIN tower deal, Sale Prices DO NOT include Shipping Charges.

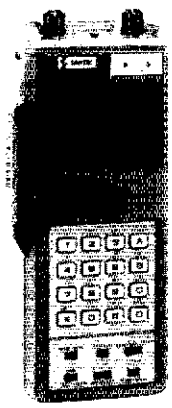
Collins KWM-380



SAVE up to $1000

on certain serial numbered units.

Call for Price - Quantity Limited



ENCOMM

Santec HT-1200

SAVE $60.00

Regular $379 - ***Sale $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
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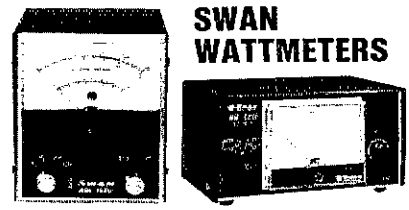
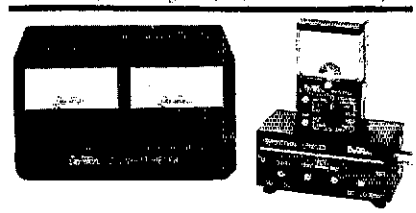


SWAN WM-1500 (left) In-Line Wattmeter. Four scales read zero to 5, 50, 500 or 1500 Watts, forward or reverse. Full scale accuracy better than +-10%. 2-30 Mhz; usable with reduced accuracy up to 50 Mhz. 50 ohms, SO-239's. 6"h × 6"w × 4½"d, 2 lb. *(Regular $74)*..... ***Now $59***

SWAN WM-6200 (right) Through-Line type Wattmeter for 50-150 Mhz. Reads zero to 20 or 200 Watts & VSWR 1:1 to 3:1. Accuracy: +-7% Power, +-5% VSWR. SO-239's, 4"h × 8"w × 5½"d, 3 lb. *(Regular $87)* ..... ***Now $59***



Denlron W-2 Wattmeter. For 1.8 to 30 MHz. Dual meters simultaneously show forward & reflected power. FWD scale 200/2000w, REF scale 200w; 5% accuracy. Remote sensor box, 3½"h × 7"w × 6"d. *(Regular $129)*..... ***Now $99***

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SALE: Penta Labs. PL-172 beam Pentode tube. Carton fresh, never used, with complete use-performance data-curves sheets. John H. Hogan, W7IYM, Box 743, White Salmon, WA. 98672. Phone 509-493-1897.

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SELL KDK-FM-144 synthesized 2-meter rig, 15-W. Excellent condition. No mods! Xmtr tuned to 146-147. $180. Motorola TAD-6170A never opened. $25 Peter O'Dell, KB1N, 7 Brian Rd., South Windsor, CT 06074. 203-666-1541 days, 203-644-3543 weekends.

WANTED Manual for oscilloscope LA265A 6625993 0882 AF 36(600)17409 K5019 0010 MFG 35225. Peter O'Dell, KB1N, 7 Brian Rd., South Windsor, CT 06074 203-666-1541 days.

COLLINS 75A-4 receiver. Very clean, with filters. $325 or best offer. John Werner; 28316 Falmouth; Warren, MI 48089.

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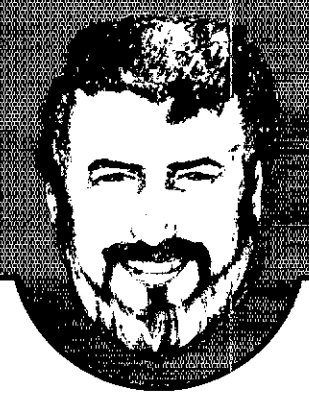

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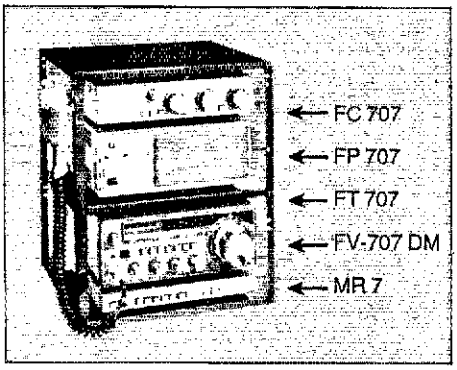

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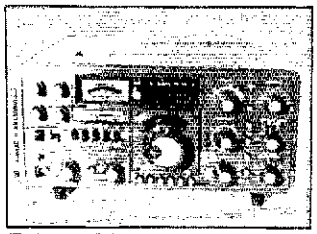

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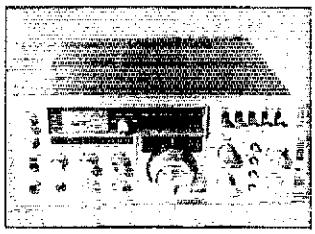

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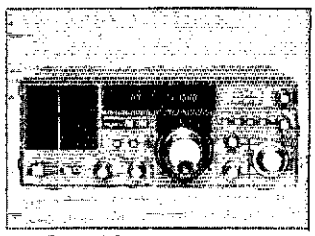

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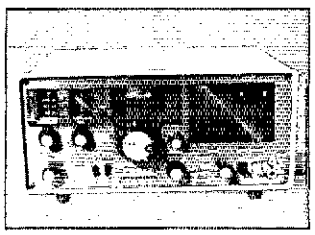

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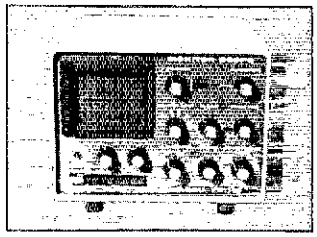

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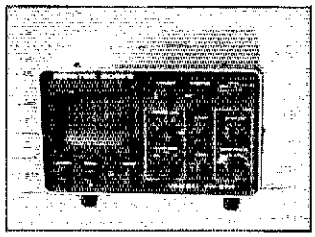

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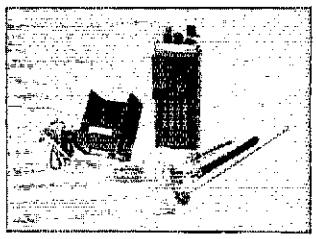

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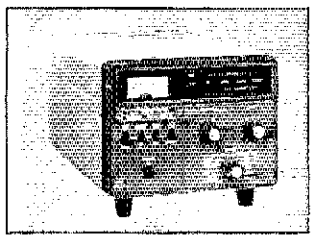

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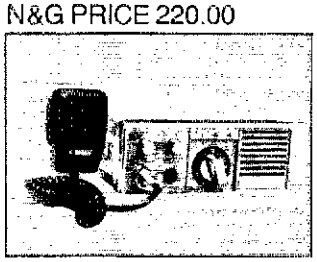

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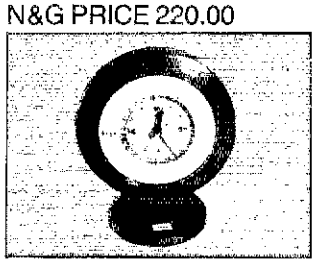

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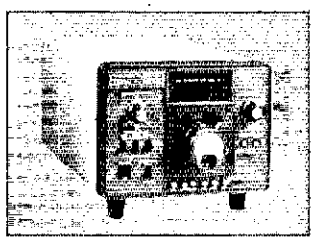

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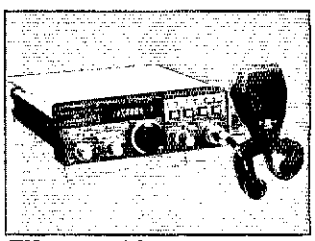

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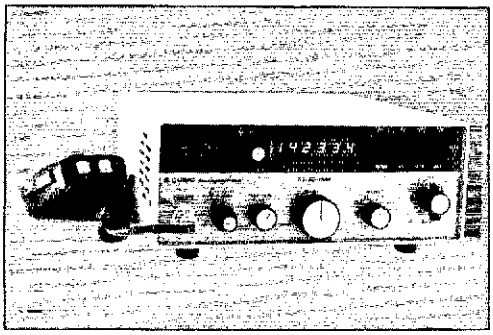

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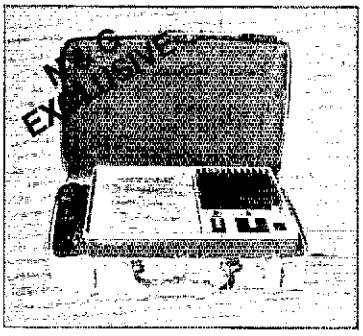

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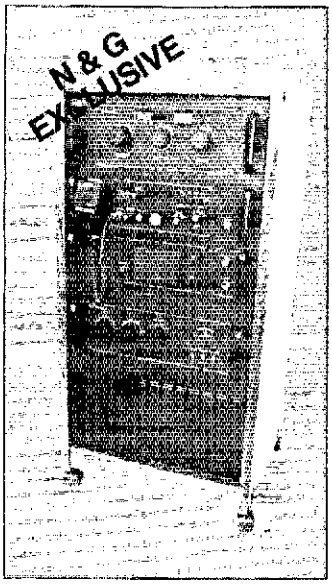

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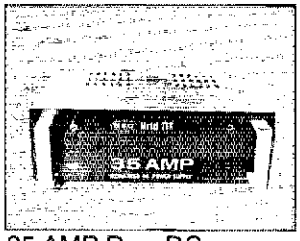

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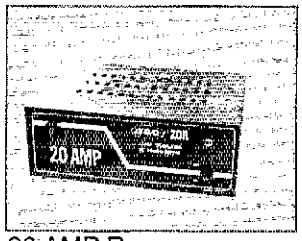

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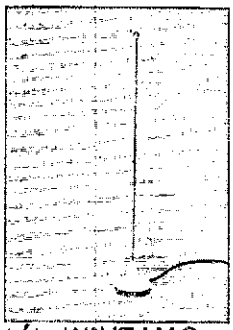

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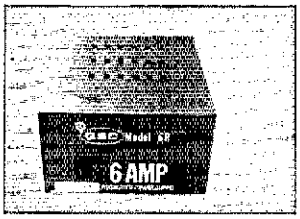

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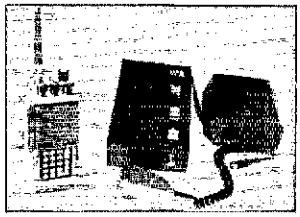

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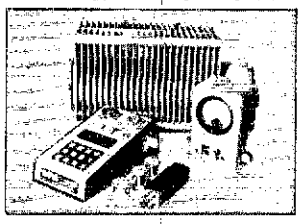

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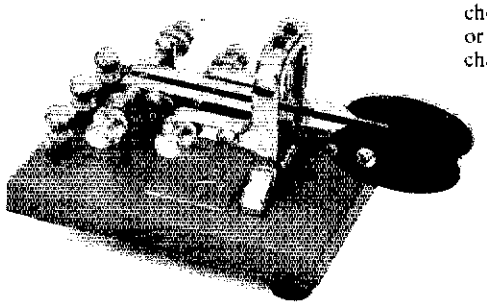

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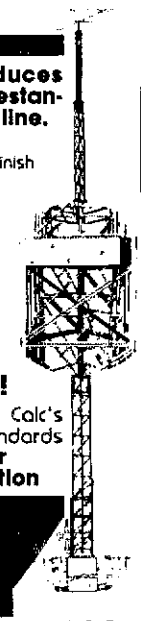

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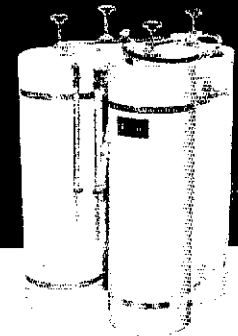

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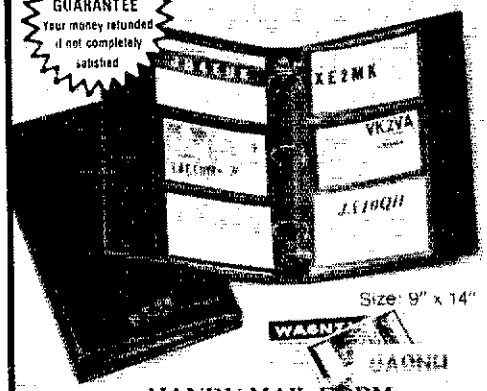

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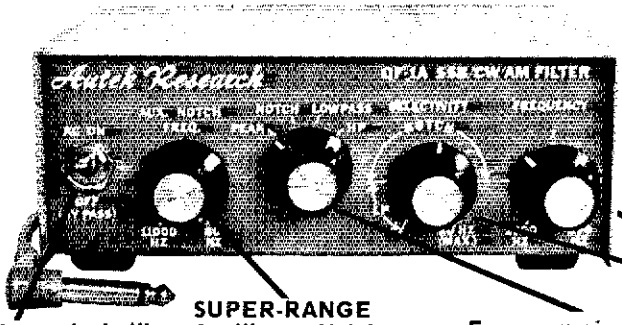

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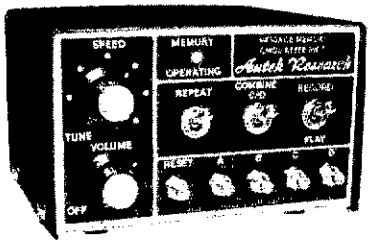
CMOS PROGRAMMABLE KEYER MAKES CW FUN!



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. 6x3½x-5". 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.

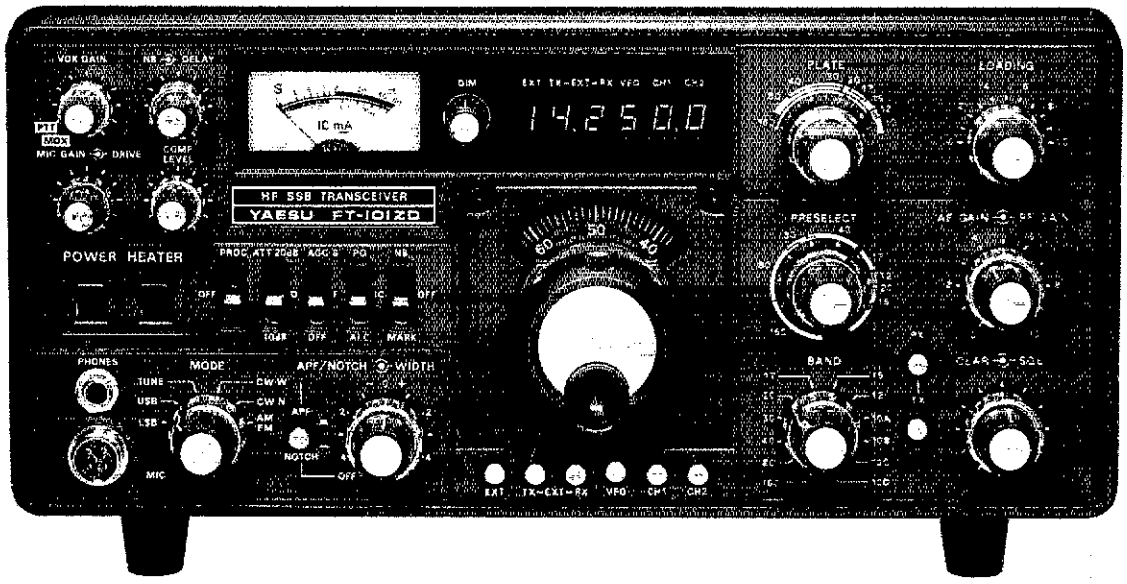
DIRECT MAIL: Your order or request for information will be processed just as fast and with fewer chances for error if you write. PLEASE ORDER BY MAIL. We're best set up for mail. However, if you need to call, our number is (813) 920-4349.

Autek Research

Box 302E ODESSA, FL 33556

THE EVOLUTION OF A CHAMPION!

FT-101ZD Mk III



The FT-101ZD Mk III is the latest chapter in the success story of the FT-101 line. Armed with new audio filtering for even better selectivity, the FT-101ZD now includes provision for an optional FM or AM unit. Compare features and you'll see why active operators everywhere are upgrading to Yaesu!

Variable IF Bandwidth
Using two 8-pole filters in the IF, Yaesu's pioneering variable bandwidth system provides continuous control over the width of the IF passband — from 2.4 kHz down to 300 Hz — without the shortcomings of single-filter IF shift schemes. No need to buy separate filters for 1.8 kHz, 1.5 kHz, etc.

Improved Receiver Selectivity
New on the FT-101ZD Mk III is a high-performance audio peak/notch filter. Use the peak filter for single-signal CW reception, or choose the notch filter for nulling out annoying carriers or interfering CW signals. In the CW mode, you can choose between the 2.4 kHz SSB filter and an optional CW filter (600 or 350 Hz) from the mode switch.

Diode Ring Front End
The FT-101ZD now sports a high-level diode ring mixer in the front end. This type of mixer, well known for its strong signal performance, is your assurance of maximum protection from intermod problems on today's crowded bands.

WARC Bands Factory Installed
The FT-101ZD Mk III comes equipped with factory installation of the new 10, 18, and 24 MHz bands recently assigned to the Amateur Service at WARC. In the meantime, use the 10 MHz band for monitoring of WWV!

RF Speech Processor
Not an additional-cost option, the FT-101ZD RF speech processor provides a significant increase in average SSB power output, for added punch in those heavy DX pile-ups. The optimum processor level is easily set via a front panel control.

Worldwide Power Capability
Every FT-101ZD comes equipped with a multi-tap power transformer, which can be easily modified from the stock 117 VAC to 100/110/200/220/234 VAC in minutes. A DC-DC converter is available as an option for mobile or battery operation.

Convenience Features
Designed fundamentally as a high-performance SSB and CW transceiver, the FT-101ZD includes built-in VOX, CW sidetone, semi-break-in T/R control on CW, slow-fast-off AGC selection, level controls for the noise blanker and speech processor, and offset tuning for both transmit and receive. The Mk III optional FM unit may be used for 10 meter FM operation, or choose the optional AM unit for WWV reception or VHF AM work through a transverter (AM and FM units may not both be installed in a single transceiver).

Full Line of Accessories
See your Yaesu dealer for a demonstration of the top performance accessories for the FT-101ZD, such as the FV-101Z External VFO, SP-901P Speaker/Patch, YR-901 CW/RTTY Reader, FC-902 Antenna Tuner, and the FTV-901R VHF/UHF Transverter. Watch for the upcoming FV-101DM Digital Memory VFO, with keyboard frequency entry and scanning in 10 Hz steps!

Nationwide Service Network
During the warranty period, the Authorized Yaesu Dealer from whom you purchased your equipment provides prompt attention to your warranty needs. For long-term servicing after the warranty period, Yaesu is proud to maintain two fully-equipped service centers, one in Cincinnati for our Eastern customers and one in the Los Angeles area for those on the West Coast.

Note: A limited quantity of the earlier FT-101ZD (with AM as standard feature) is still available. See your Yaesu dealer. FT-101ZD Mk III designates transceivers bearing serial #240001 and up, with APF/Notch filter built in and AM/FM units optional.

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Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 ● (513) 874-3100

"Cents-ational."

IF shift, digital display, narrow-wide filter switch

TS-530S

The TS-530S SSB/CW transceiver is designed with Kenwood's latest, most advanced circuit technology, providing wide dynamic range, high sensitivity, very sharp selectivity with selectable filters and IF shift, built-in digital display, speech processor, and other features for optimum, yet economical, operation on 160 through 10 meters.

TS-530S FEATURES:

- **160-10 meter coverage, including three new bands**
  Transmits and receives (LSB, USB, and CW) on all Amateur frequencies between 1.8 and 29.7 MHz, including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- **Built-in digital display**
  Large, six-digit, fluorescent-tube display shows actual receive and transmit frequencies on all modes. Backed up by analog subdial.
- **IF shift**
  Moves IF passband around received signal and away from interfering signals and sideband splatter.
- **Narrow/wide filter combinations**
  Any one or two of three optional filters . . . YK-88SN (1.8 kHz) SSB, YK-88C (500 Hz) CW, YK-88CN (270 Hz) CW . . . may be installed for selecting (with "N-W" switch) wide and narrow bandwidths on CW and/or SSB.
- **Wide receiver dynamic range**
  Greater immunity to strong-signal overload, with MOSFET RF amplifier operating at low level for improved IMD characteristics, junction FETs in balanced mixer with low noise figure, and dual resonator for each band.
- **Built-in speech processor**
  Combines an audio compression amplifier with change of ALC time constant for extra audio punch and increased average SSB output power, with suppressed sideband splatter.
- **Two 6146B's in final**
  Runs 220 W PEP/180 W DC input on all bands.
- **Advanced single-conversion PLL system**
  Improved overall stability and improved transmit and receive spurious characteristics.
- **Adjustable noise-blanker level**
  Pulse-type (such as ignition) noise is eliminated by built-in noise blanker, with front-panel threshold level control.
- **RF attenuator**
  The 20-dB RF attenuator may be switched in for rejecting IMD from extremely strong signals.
- **Optional VFOs for flexibility**
  VFO-240 allows split-frequency operation and other applications. VFO-230 digital VFO operates in 20-Hz steps and includes five memories and a digital display.
- **RIT/XIT**
  Front-panel RIT (receiver incremental tuning) shifts only the receiver frequency, for tuning in stations slightly off frequency. XIT (transmitter incremental tuning) shifts only the transmitter frequency, for calling a DX station listening off frequency.

More information on the TS-530S 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-240 remote VFO
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- VFO-230 remote digital VFO with 20-Hz steps, five memories, digital display
- TL-922A linear amplifier
- SM-220 Station Monitor
- KB-1 deluxe VFO knob
- PC-1 phone patch
- HS-5 and HS-4 headphones
- HC-10 digital world clock
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters and YK-88SN (1.8 kHz) SSB narrow filter
- MC-30S and MC-35S noise-canceling hand microphones

Specifications and prices are subject to change without notice or obligation.