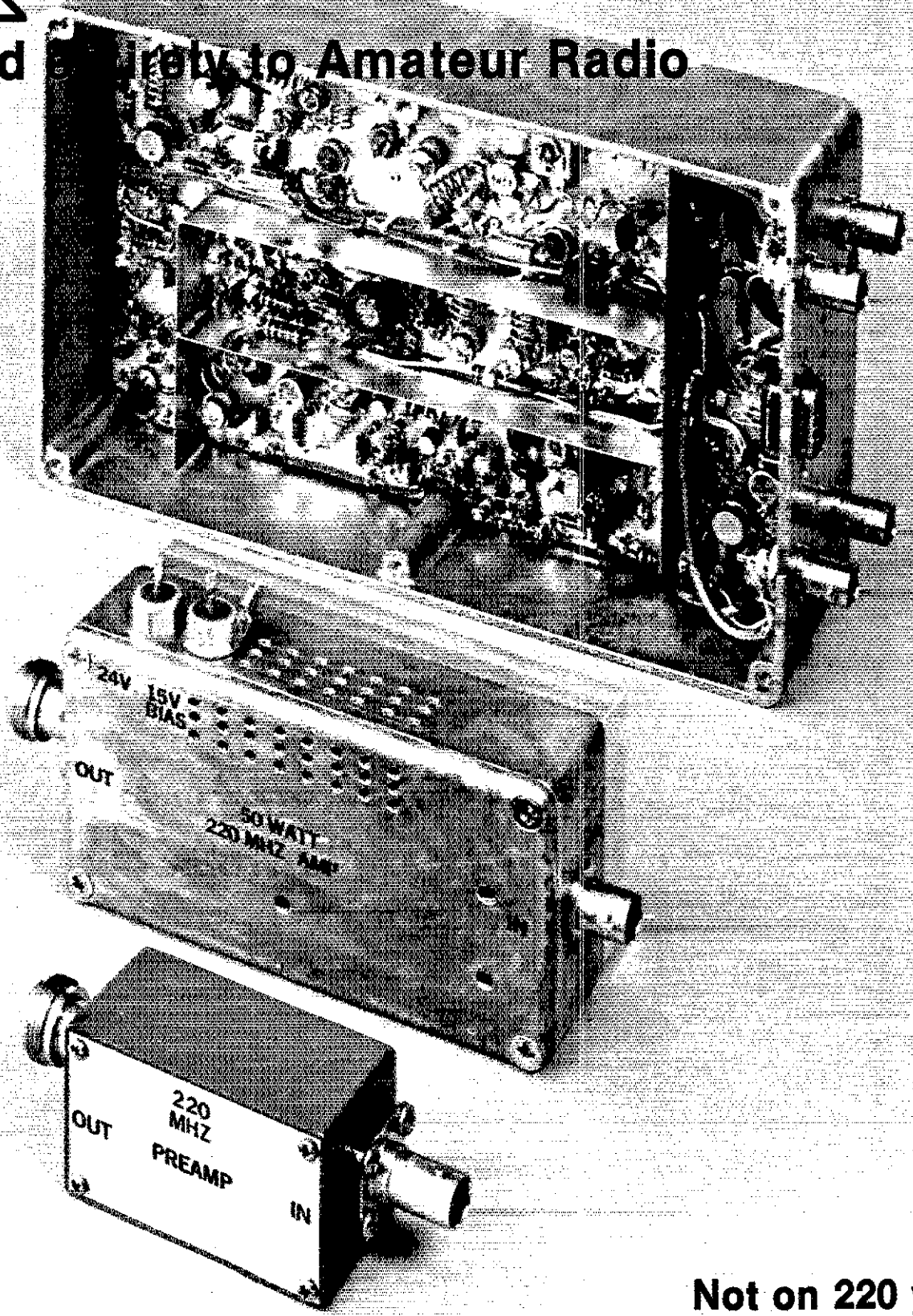
August 1982 $2.50

QST

devoted [illegible]riety to Amateur Radio



Not on 220 yet?

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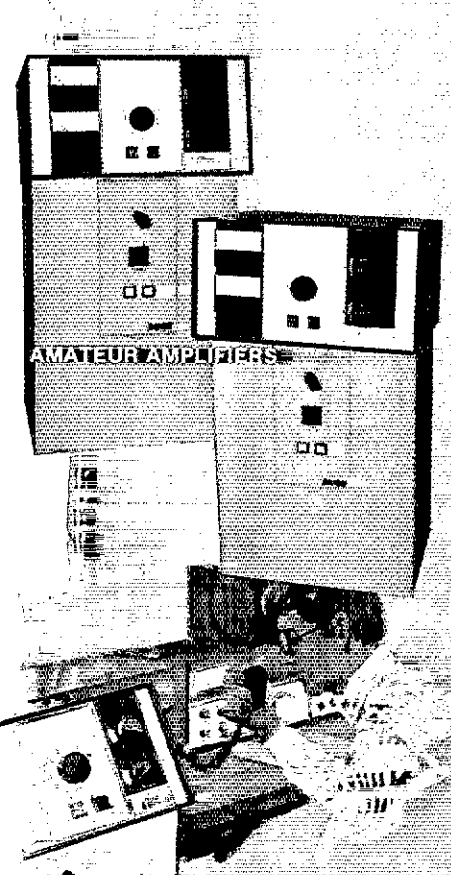
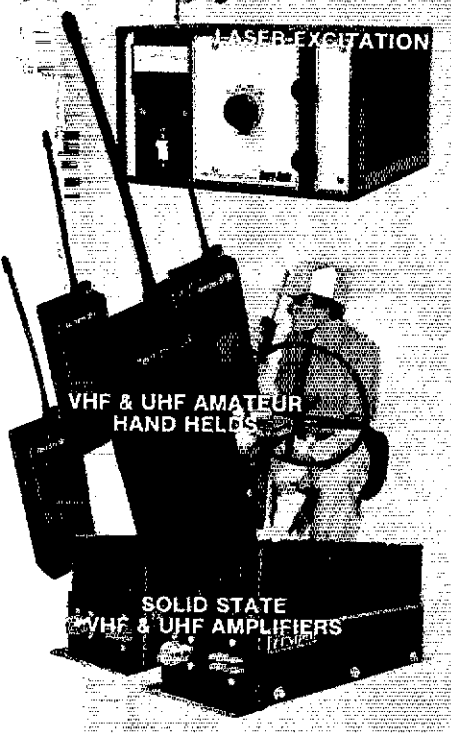
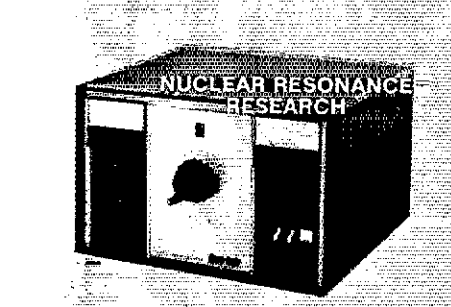


Henry Radio

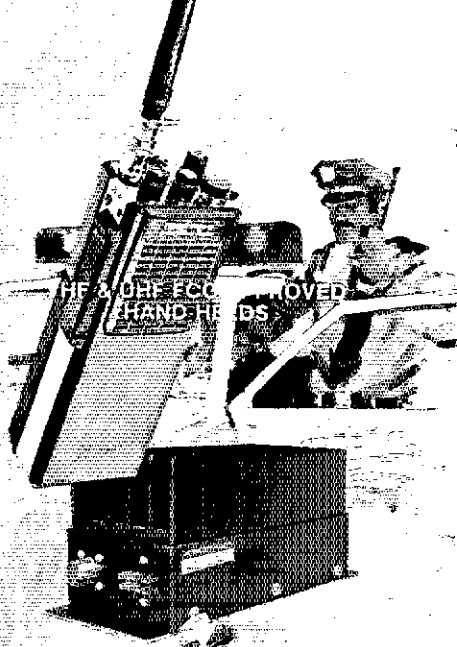
Where superb amateur equipment points the way to tomorrow's technology in high reliability R.F. equipment for commercial, industrial, medical, military, scientific research applications.

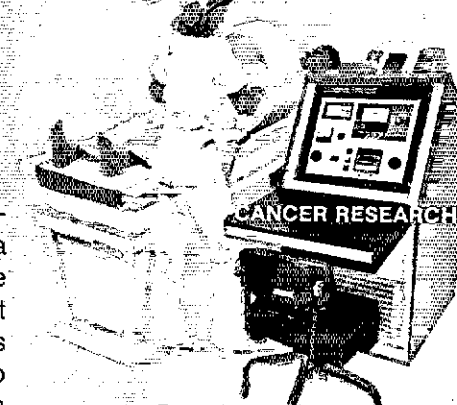


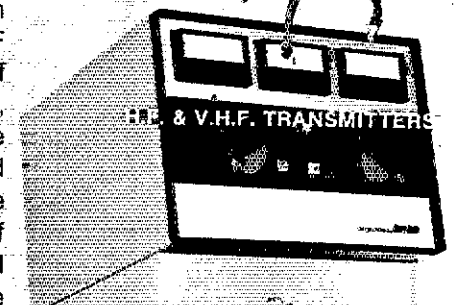


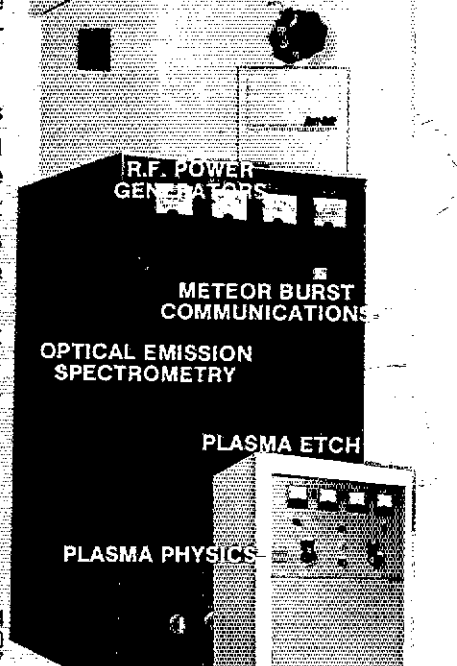
More than half a century in the communications business has made Henry Radio a tradition, and our original commitment to the amateur radio fraternity is no less important today than it was then. Over these many years our products and services have expanded to include a complete line of superb quality 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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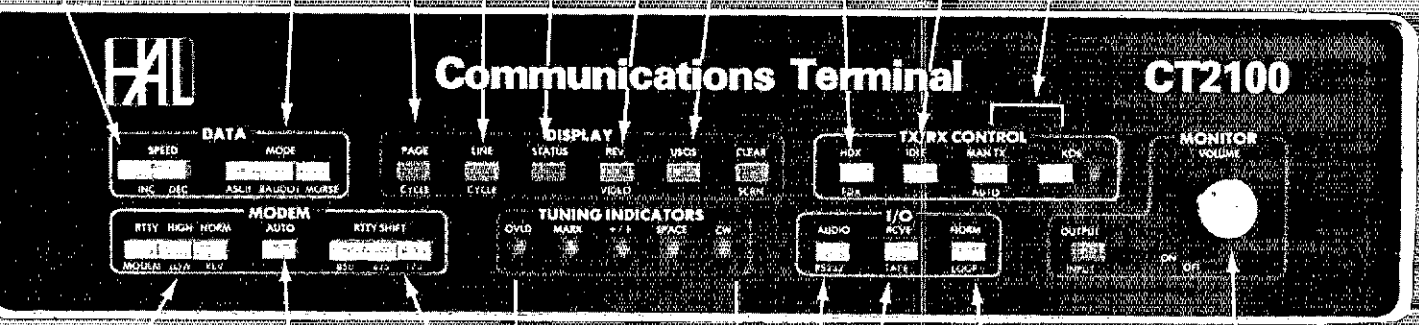
CT2100

HAL Puts MORE Behind The Buttons

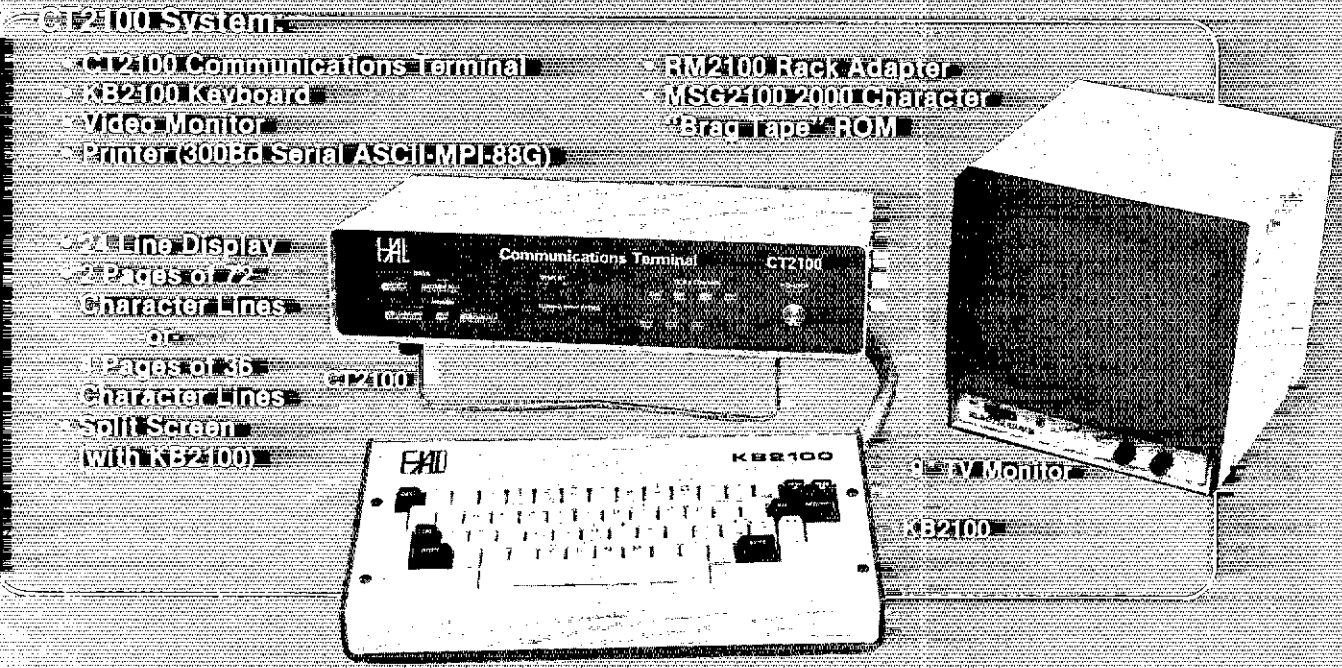
- 45-1200 Baud RTTY
- 5-100 WPM Morse
- Code
- 2 Page Display
- 72 or 36 Character Lines
- Status Indicator on Screen
- Black or White Characters
- Unshift on Space (For Baudot)
- Half or Full Duplex
- Synchronous Idle ("Diddle")
- Auto TX/RX Control



- Four Internal RTTY Demodulators
- High Tones (U.S. Standard)
- Low Tones (ARU Standard)
- 103 Modem (1070/1270 Hz)
- 202 Modem (2200/2200 Hz)
- Auto Mark Hold
- All 3 RTTY Shifts (High or Low Tones)
- LED Tuning Indicators Plus On-Screen Tuning Bar Plus Ext. Scope Connections
- Audio or RS232 Data
- Transmit and Receive With RTTY Loop Devices
- Input Audio From Receiver or Tape
- Audio Monitor For Either Input or Output Signals Internal Speaker Plus External Output

CT2100 System:

- CT2100 Communications Terminal
- KB2100 Keyboard
- Video Monitor
- Printer (300Bd Serial ASCII MPI-88G)
- RM2100 Rack Adapter
- MSG2100 2000 Character "Brag Tape" ROM



- 24 Line Display
- 2 Pages of 72 Character Lines or Pages of 36 Character Lines
- Split Screen
- With KB2100

CT2100

- TV Monitor
- KB2100

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

ICOM Handhelds

2 Meter, 220 or 440 MHz

ICOM's reliable, field proven, handhelds have been the most popular handheld on the market. Here's a few reasons why:

THE TRANSCEIVERS. The IC-2AT features full coverage of the 2 meter ham band. The IC-3AT covers 220 to 224.99 MHz, and the IC-4AT has 440 to 449.995 MHz. Each radio is only 2.6in x 1.4in x 6.5in in size. Excellent audio quality is provided by a quality speaker and an electret condenser microphone. All have battery saving 0.15 watt low power. Touchtone® pad is included.*

STANDARD EQUIPMENT. Each transceiver comes complete — ready to use — with BP3 rechargeable battery, AC wall charger, flexible antenna, earphone, wrist strap, and belt clip...all standard.

THE SYSTEM. Accessories for the handheld series are interchangeable among transceivers. Slide on removable battery packs allow quick changing of batteries. Batteries may be charged while removed from the transceiver.

Battery Pack	Nominal Transceiver Power (watts)
BP2	1.0
BP3	1.5
BP5	2.3

** Also available without Touchtone® Pad*

*** Requires BC-30 Charger*

† Will charge from BC30, BC25U, CP1, or 12 VDC Direct (pack is internally regulated)

†† Accept 6 AA size batteries - Alkaline or NiCd (Do not attempt to charge Alkaline batteries)

ICOM
The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 (206)454-8155; 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 (214)620-2780.

August 1982 *Volume LXVI Number 8*

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

Offices

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

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

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

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

THE COVER

Have a 28-MHz transceiver? Transvert it to 220, and have a blast on vhf!

Contents

It's Time To SANTEC uP

It's time for you to get the best of the excitement of full-feature synthesized handheld operations, and SANTEC/nology hands you the uP-to-the-minute radio whose time has come. Here are just four great reasons why you should SANTEC uP:

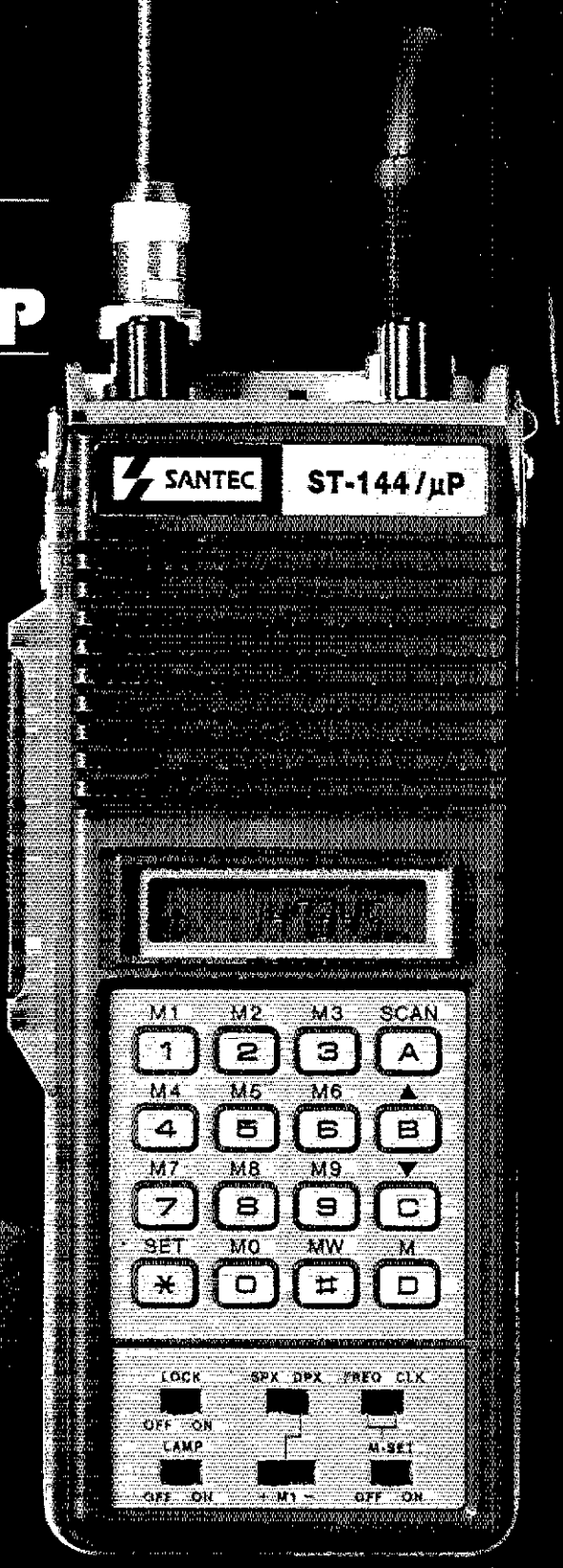
■ **Memory channels store standard repeater offsets or simplex.** Easily programmed and instantly recalled, each memory frequency comes uP with its own offset (plus or minus 600 kHz) or in the simplex mode as originally entered.

■ **Less than 10 ma drain in receive** means more standby time for SANTEC owners. The ST-144/μP saves its power.

■ **High power output when you need it.** You can choose to transmit at 0.1W, 1.0W, or even 3.5W (all nominal), and your SANTEC can reach out through all types of operating conditions.

■ **Outstandingly good warranty and service.** Your SANTEC comes with the back uP that doesn't back down in 90 days: a full two year extended service period, which no one else can match, in addition to the regular 90 day limited warranty for parts and labor.

When it's time to compare features and value, nothing else stands uP with SANTEC. Now that it's time for you to get the best, it's time to SANTEC uP.



Shown with optional SM-1 speaker microphone

Accessories for SANTEC Handheld Radios
clockwise from upper left
- Leather Case (ST-EC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

The ST-144 μP is approved under FCC Part 15

SANTEC™

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 • TLX 79-4783 ENCOMM DAL

Repairs, Parts & Service Available

Export orders invited

All stated specifications are subject to change without notice or obligation

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

Please send me more information about.
- ☐ The ST-144 μP
- ☐ Authorized SANTEC Dealers

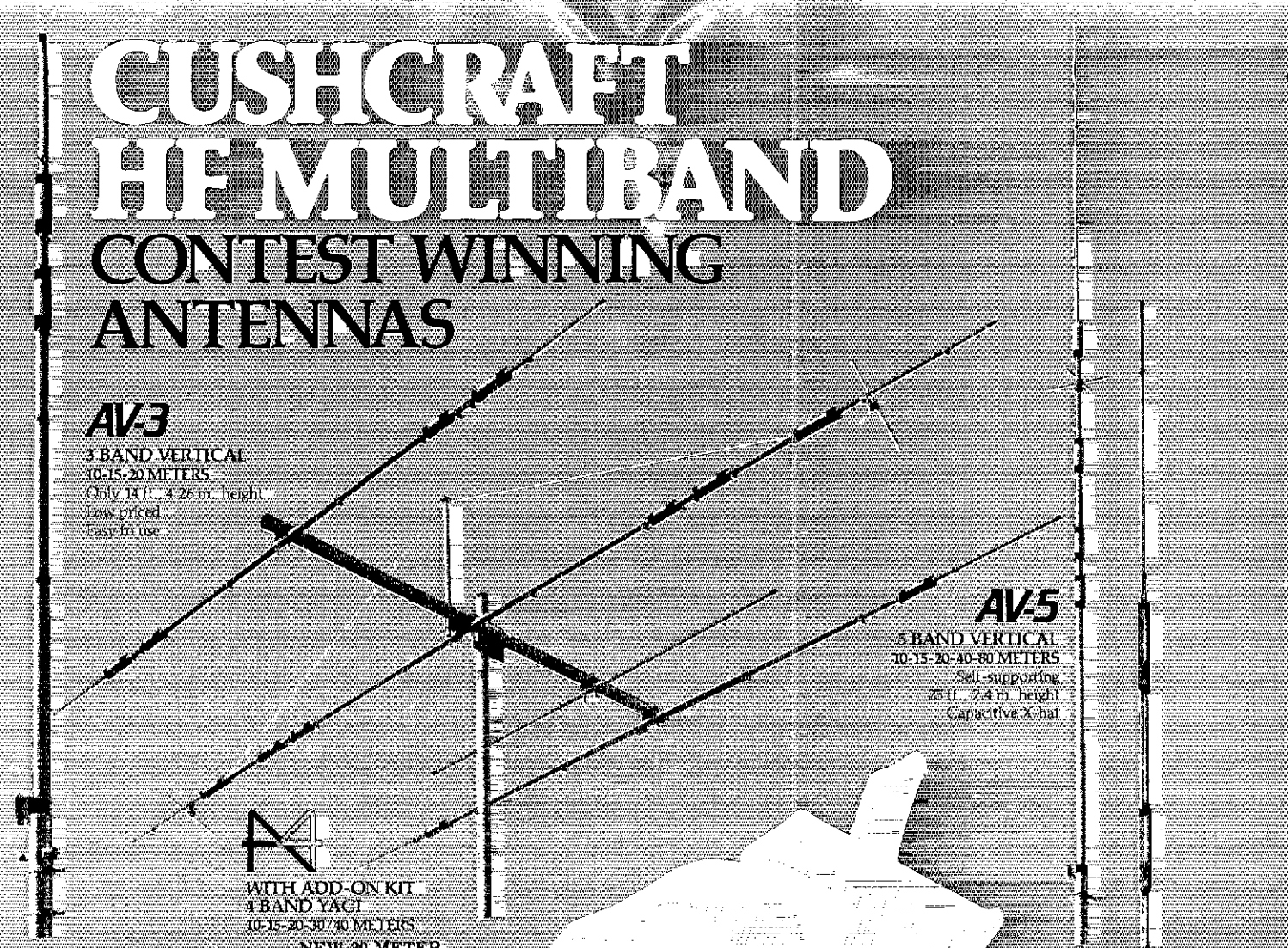
NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

YOU MAY SEND A DUPLICATE OF THIS FORM.

CUSHCRAFT HF MULTIBAND CONTEST WINNING ANTENNAS



AV-3

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

AV-5

5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
25 ft., 7.6 m. height
Capacitive X-hat

A4

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

A3

3 BAND YAGI
10-15-20 METERS

R3

3 BAND VERTICAL
10-15-30 METERS
No radials
Remote tuning
Better than average performance
22 ft., 6.7 m. height

The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.
For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3
Broadband, excellent gain and f/b ratio, 2 kw power rating direct 50 Ω feed, Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m. weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1¼ in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

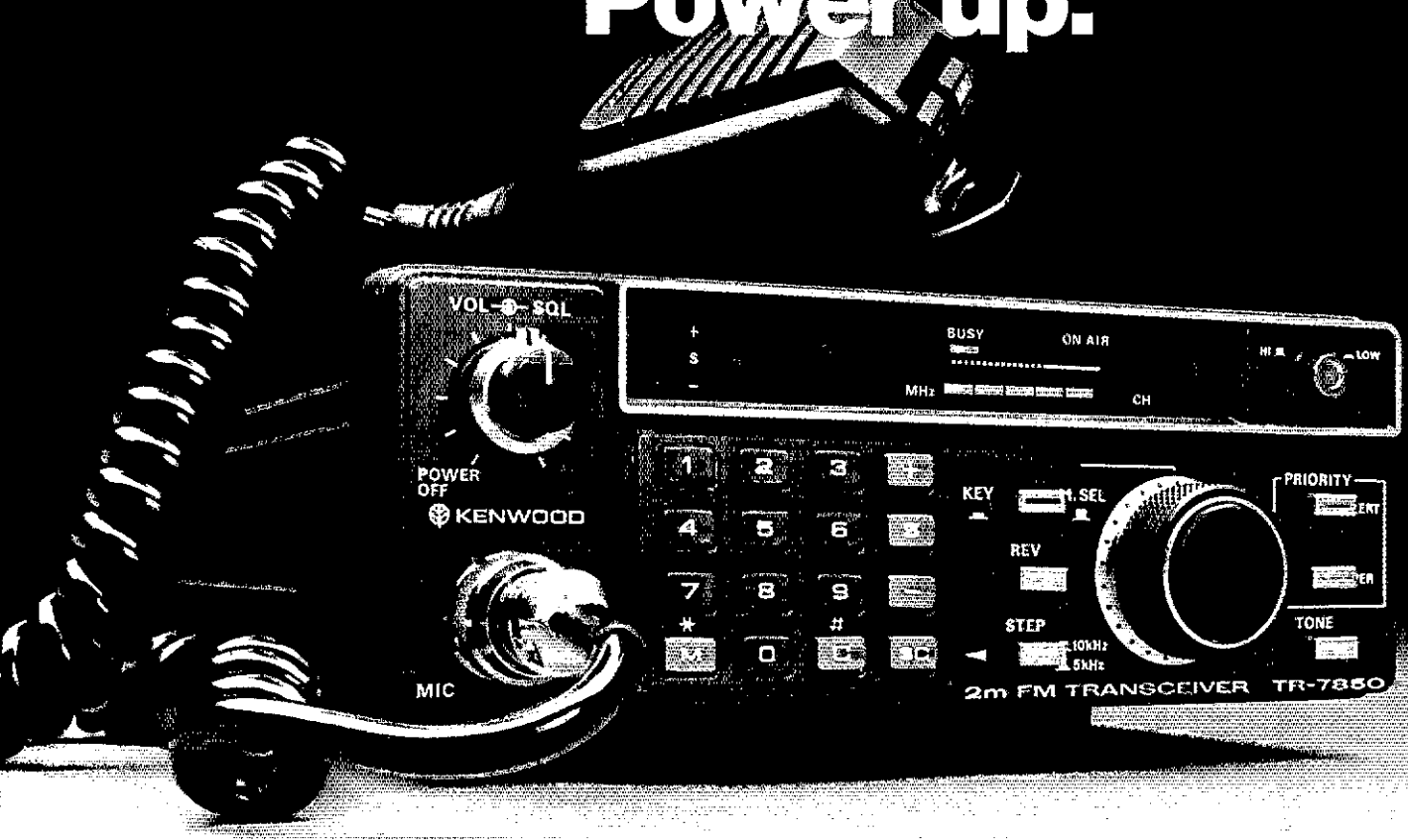
A4
Broadband, excellent gain and f/b ratio, 2 kw power rating, direct 50 Ω feed, boom 18 ft., 5.48 m., longest element 32 ft., 9.7m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1¼" to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.

THE CHOICE, A FAVORITE FOR DX-PEDITIONS

cushcraft
CORPORATION

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

Power up.



40 W, 15 memories/offset recall, scan, priority, DTMF touch-pad

TR-7850

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts RF output. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-pad (DTMF) encoder. A 25-watt output version, the TR-7800, is also available.

TR-7850 FEATURES:

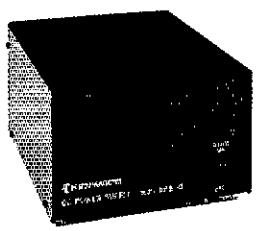
- **Powerful 40 watts power output**
  Selectable high or low power operation. High 40-watt output provides reliable signal for wide area coverage.
- **15 multifunction memory channels, easily selectable with a rotary control**
  M1-M13...memorize frequency and offset (±600 kHz or simplex). M14...memorize transmit and receive frequencies independently for nonstandard offset. M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.
- **Internal battery backup for all memories**
  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood supplied) are installed in battery holder inside TR-7850. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **Extended frequency coverage**
  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Priority alert**
  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.
- **Built-in autopatch touch-pad (DTMF) encoder**
  Front-panel touch pad generates all 12 telephone-compatible dual tones in transmit mode, plus four additional DTMF signaling tones (with simultaneous push of REV switch).
- **Front-panel keyboard**
  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.
- **Autoscan**
  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.
- **Up/down manual scan**
  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).
- **Repeater reverse switch**
  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."
- **Separate digital readouts**
  To display frequency (both receive and transmit) and memory channel.
- **LED bar meter**
  For monitoring received signal level and RF output.
- **LED indicators**
  To show: +600 kHz, simplex, or -600 kH transmitter offset; BUSY channel; ON AI
- **TONE switch**
  To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
  Depth is reduced substantially.
- **Mobile mounting bracket**
  With quick-release levers.

More information on the TR-7850 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Matching accessory for fixed-station operation:
- KPS-12 fixed-station power supply for TR-7850

Other accessories not shown:
- KPS-7 fixed-station power supply for TR-7800
- SP-40 compact mobile speaker



Specifications and prices are subject to change without notice or obligatio

NEW

TS-930S

"DX-traordinary"... superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

A superlative, high-performance, all solid-state HF transceiver, that covers all Amateur HF bands, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.

TS-930S FEATURES:

- 160-10 Meters, with 150 kHz 30 MHz general coverage receiver. Covers all Amateur frequencies, plus WARC, on SSB, CW, FSK, and AM. UP conversion digital PLL circuit.
- Excellent receiver dynamic range. Typical two-tone dynamic range, 100 dB (20 meters, 50-kHz spacing, 500 Hz CW bandwidth).
- All solid-state 28 volt operated final amplifier. Lowest IM distortion. Power input 250 W on SSB/CW/FSK, 80 W on AM. SWR/ Power meter.
- Available with AT-930 automatic antenna tuner built-in, or as an option. Covers 80-10 meters, including WARC bands.
- CW full break-in. CMOS logic IC, plus reed relay. Switchable to semi break-in.
- Dual digital VFO's, 10-Hz steps, includes band information.
- Eight memory channels. Stores frequency and band data. Internal battery memory back-up, est. 1 yr. life. (Battery not Kenwood supplied.)
- Dual mode noise blanker. NB-1, with threshold control, for "pulse" noise. NB-2 for "woodpecker."
- SSB IF slope tuning, allows independent adjustment of the low and/or high frequency slopes of the IF passband.
- CW VBT and pitch control. VBT tunes out interfering signals. CW pitch control shifts IF pass-band and beat frequency. "Narrow-Wide" filter switch.
- Tuneable, peak-type audio filter for CW.
- AC power supply built-in.
- Fluorescent tube digital display, with digitalized sub-scale, in 20-kHz steps.
- RF speech processor.
- One year limited warranty.
- SSB monitor circuit.

Optional Accessories:

- AT-930 Auto. antenna tuner.
- SP-930 External speaker with selectable audio filters.
- YG-455C-1 (500 Hzl or YG-455CN-1 (250 Hz) plug-in CW filters for 455 kHz IF.
- YK-88C-1 (500 Hzl CW plug-in filter for 8.83 MHz IF.
- YK-88A-1 (6 kHzl AM plug-in filter for 8.83 MHz IF.
- SO-1 commercial grade TCXO.
- MC-60A deluxe desk microphone, 8-pin, with pre-amplifier, UP/DOWN switches.

TR-9130

All mode (FM/SSB/CW) 25 watts, plus...!!!

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver. Available with a 16-key autopatch UP/DOWN microphone (MC-46), or a basic UP/DOWN microphone.

TR-9130 FEATURES:

- 25 Watts RF output on all modes, (FM/SSB/CW).
- FM/USB/LSB/CW all mode. Selectable tuning steps of 100-Hz, 1-kHz, 5-kHz, 10-kHz.
- Six memories. On FM, memories 1-5 for simplex or ±600 kHz offset, using OFFSET switch. Memory 6 for non-standard offset. All six memories may be simplex, any mode.
- Memory scan.
- Internal battery memory back-up, using 9 V Ni-Cd battery, (not KENWOOD supplied). Memories are retained approx. 24 hours, adequate for the typical move from base to mobile. External back-up terminal on the rear.
- Automatic band scan.
- Dual digital VFO's.
- Transmit frequency tuning while transmitting, for OSCAR operations.
- Squelch circuit for FM/SSB/CW.
- Repeater reverse switch.
- Tone switch.
- CW semi break-in; sidetone.
- Compact size and lightweight.
- Covers 143.9 to 148.9999 MHz.

NEW

TR-9500

70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi—10 W, Low—1 W. SSB 10 W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.
- HI/LOW power switch, 25 or 5 watts on FM or CW.
- High performance noise blanker.
- RF gain control. • RIT circuit.

Optional accessories:

- KPS-7 Fixed station power supply.
- PS-20 Fixed station power supply (TR-9500 only).
- SP-120 External speaker.
- TK-1 AC adapter for memory back-up.

KENWOOD

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*Executive Committee Member

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Alberta	E. Roy Ellis, VE6XC, P. O. Box 2, RR 1, Fort Saskatchewan T8L 2N7
British Columbia	H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba	Peter Guenther, VE4PG, Box 178, Morris R0G 1K0 (204-746-6502)
Maritime-Nfld	Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario	L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5987)
Quebec	Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot J0H 1Y0 (514-798-2173)
Saskatchewan	W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

Atlantic Division

Delaware	Harold K. Low, WA3WIY, Rte. 6, Box 66, Millsboro 19966 (302-945-2871)
Eastern Pennsylvania	Karl W. Pfeil, W3VA, 211 Schuylkill Ave., Tamaqua 18252 (717-668-3533)
Maryland-D.C.	Karl R. Medrow, W3FA, 702 W. Central Ave., Davidsonville, MD 21035 (301-261-4008)
Southern New Jersey	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	David E. Lattan, WD9EBQ, RR 1, Box 46E, Makanda 62958 (618-529-1578)
Indiana	Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin	Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

Dakota Division

Minnesota	Helen Haynes, WB$\emptyset$HOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota	Lois A. Jorgensen, WA$\emptyset$RWM, Box 55, Abercrombie 58001 (701-553-8724)
South Dakota	Erwin C. Heimbuck, Jr., K$\emptyset$OTZ, 3312 Parkview, Rapid City 57701 (605-348-5433)

Delta Division

Arkansas	Dale E. Temple, W5RXU, 1620 Tarrytown Rd., Little Rock 72207
Louisiana	John J. Meyer, N5JM, 112 Sherwood Forest, New Orleans 70119 (504-482-3493)
Mississippi	Paul C. Kemp, KW5T, 3581 Beaumont Dr., Pearl 39208 (601-939-7612)
Tennessee	John C. Brown, NO4Q, P. O. Box 37, Eva 38333 (901-584-7531)

Great Lakes Division

Kentucky	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	Curtis R. Williams, W5DTR/2, RD 3, Box 175, Fox Run Rd., Califon 07830

Midwest Division

Iowa	Bob McCaffrey, K$\emptyset$CY, 3913-29th St., Des Moines 50310 (515-279-9848)
Kansas	Robert M. Summers, K$\emptyset$BXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri	Larry G. Wilson, K$\emptyset$RWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska	Shirley M. Rice, KA$\emptyset$BCB, 510 East 16th St., Scottsbluff 69361 (308-632-4337)

New England Division

Connecticut	Peter Kemp, KA1KD, 5 Greenwood Ave., Bethel 06801 (203-743-9580)
Eastern Massachusetts	Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine	Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire	Robert Mitchell, W1NH, 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	William Hall, W1JP, Prospect Hill Rd., Brimfield 01010 (413-245-7140)

Northwestern Division

Alaska	Richard Henry, AL7O, P.O. Box 451, Tok 99780 (907-883-5507)
Idaho	Dennis L. Hall, KK7X, 1814 Montana Ave., Coeur D'Alene, 83814
Montana	L. C. "Les" Belyea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon	William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington	Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406 (206-759-9857)

Pacific Division

East Bay	Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada	Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
Pacific	R. A. "Army" Curtis, AH6P, P.O. Box 4271, Hilo, HI 96720 (808-959-8985)
Sacramento Valley	Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco	Robert Odell Smith, NA6T, 320 Park St-P.O. Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley	Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley	Ross W. Forbes, WB6GFJ, P.O. Box 1, Los Altos, CA 94022 (415-948-5193)

Roanoke Division

North Carolina	Ian C. Black, WD4CNR, Rte. 5, Box 79, Murphy 28906 (704-837-5684)
South Carolina	James G. Walker, WD4HLZ, Rte. 2, Box 432, Marion 29571 (803-423-3645)
Virginia	Phil Sager, WB4FDT, 1829 Stanley Pl., Falls Church 22043 (703-734-2987)
West Virginia	Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

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

Southeastern Division

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Northern Florida	Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
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West Indies	Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)

Southwestern Division

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Los Angeles	Stanley S. Broki, 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	Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us . . ."

How Can I Help?

This commentary first appeared in the April 1982 issue of Auto-Call, *the official journal of the Foundation for Amateur Radio.*

In almost any field of endeavor there are those few souls for whom participation is a one-way quest for personal gain or satisfaction, with little thought of making a contribution themselves. In Amateur Radio, fortunately, they appear to constitute a relatively small minority.

Sometimes I make the mistake of assuming that *everyone* is as enthusiastic about Amateur Radio as I am. Recognizing this to be optimistic, I still believe that most of those who become sufficiently active to experience the rewards of our great avocation also develop a sense of commitment and stewardship regarding its status and future.

It is a simple fact that Amateur Radio would long since have ceased to exist were it not for the collective efforts of the amateurs and the friends of Amateur Radio who, down through the years, have taken it upon themselves to nurture and safeguard its best interests. These efforts have not been confined to espousing our case in international conferences, or before the Federal Communications Commission, as essential as that is. Nor are they the sole province of the leadership in our organizations, at any level.

Rather, they have involved a comparatively high percentage of radio amateurs who have taken it upon themselves to bolster the fortunes and brighten the future of the Amateur Radio Service by providing support and services in a variety of ways.

For example, Amateur Radio wouldn't linger long were it not for the steady influx of bright eyed newcomers (of all ages). *Someone* has to help them aboard.

It wouldn't last long if it were not regarded by local, state and federal government as a source of social benefit in one form or another. *Someone* has to earn that recognition.

Neither would it survive without a national spokesman, someone to be watchful and to fight for our interests at both national and international levels.

To this, one might ask: "But how can I help?"

The answer is: "You probably already are helping." But perhaps you'd like to check *your* contributions against the following guidelines that have been suggested for amateurs who want to put something back into the game:

Educate. Convey the message of the value and public contribution of Amateur Radio to your friends, your co-workers, your public officials. Do this through talks and live demonstrations, news accounts, TV and radio interviews.

Help Amateur Radio grow. Assist worthy newcomers into Amateur Radio by conducting training classes, giving code practice.

Get involved. Join a club, become a club officer, an ARRL appointee or a traffic net member, or run for an ARRL office. Produce or assist in preparing a club or net newsletter. Help run a hamfest.

Raise the quality of our service. Provide instruction and guidance on operating practices and ethics to new amateurs (and see if you can find a way to revitalize some of our older ones!).

Help protect our bands. Become an official observer or an intruder watch volunteer.

Join a traffic net. Help with our emergency preparedness posture.

Handle traffic, and worthy phone patches; make friends for Amateur Radio.

Guard your prerogatives in local zoning and tower construction matters, but steer clear of neighborhood flaps over towers and RFI. Solve these problems yourself, out of court; thousands of hams are finding this possible.

Experiment. Try new modes, frequencies and equipment; write an article; help raise the level of our technical contribution and image.

Fix your repeater so it will work through power failures; educate the users to the importance of making a public service contribution, then demonstrate it and offer your services to city or county officials for public event purposes and as a back-up in case of emergencies.

Be an ambassador of good will. Make your international contacts count for something more than just DXCC. Make friends, earn their respect and find ways to help our overseas colleagues.

If you travel, visit foreign amateurs and get to know them in person. Applaud their accomplishments; ask yourself whether you would have done as well in their circumstances; assist them with their equipment problems. If you take part in a DXpedition, try to involve local amateurs if there are any; show them, as well as local citizens and officials, that you appreciate and respect the privilege of operating in their country. Don't show off or press for privileges not normally granted to locals; obey their laws to the letter.

And, finally . . . observe the "Three Bs" of Amateur Radio:

Belong. Support with your membership your local Amateur Radio club and your national society.

Be active. Operate and help demonstrate active and productive occupancy of our valuable frequencies.

Behave. Set a good example on the air. Need it be said? Nonamateurs, including those who will influence our future, may be listening. Free speech doesn't equate to irresponsible speech. — *Vic Clark, W4KFC*

League Lines...

A former amateur in southern California has been convicted and sentenced to jail for continuing to operate after his license was revoked by FCC. Richard Burton, ex-WB6JAC, was found guilty on four counts of operating without a license and two counts of obscenity, and was sentenced to serve six months in jail (with another 7-1/2 years suspended) to be followed by 1500 hours of community service work and 5 years on probation. QST reported his indictment in the July 1982 issue, page 52.

At its July 1 open meeting, FCC has instructed its staff to draft a Notice of Proposed Rulemaking dealing with a codeless Amateur Radio License. This NPRM will propose simply to remove the code requirement from the present Technician class license, with access limited to frequencies above 50 MHz. The present Technician class license requiring code and permitting access to the Novice bands would also remain in force. However, the NPRM will also explore the possibility of a codeless digital license, similar to Canada's Digital Radio Operator Certificate, which requires knowledge of digital theory. Such a digital license could either be the only codeless license or it could be concurrent with a codeless Technician license. The NPRM will be released sometime this fall, and is a proposal only. There will be a comment period during which all interested parties will have a chance to make their views known to FCC.

Multnomah County, Oregon, which surrounds the city of Portland, has proposed regulations establishing maximum limits for human exposure to radiofrequency energy. The ordinance, if adopted, would affect most transmitters; however, a last-minute amendment exempts Amateur Radio transmitters because they are classified as "intermittent sole source emitters." Local Amateur Radio leaders fear, however, that the amendment may be only a partial victory because the County may now consider writing an ordinance focused just on radio amateurs. The local hams have been in touch with League Hq. for assistance.

ARRL President Vic Clark, W4KFC has appointed G. W. "Bud" Hippisley, Jr., K2KIR, of Colden, New York, vice director of the ARRL Atlantic Division. That post was vacated when Hugh Turnbull, W3ABC, was automatically elevated to the office of director following the death of Jesse Bieberman, W3KT. See this month's Happenings column.

The ARRL Hq. Club and Training Department is looking to hire a full-time assistant to work in developing and administering the League's affiliated club program. If you hold a Technician or higher class license, have an ability to write concisely and effectively, and have some experience with Amateur Radio clubs, you may be just the person we want. If interested, please contact Sally O'Dell, KB1O, at Headquarters.

Are you professionally employed in the CATV field? The ARRL CATVI Desk is compiling a list of amateurs who work in the Cable TV industry to serve in an advisory capacity to groups having troubles with CATVI. Please direct your correspondence to Richard Palm, K1CE, ARRL Hq.

Amateur Radio has recently received some "bad press" in some of the print media about how "ham radio operators" have listened to and divulged the contents of Presidential radio conversations from Air Force One. ARRL Hq. has attempted to repair some of the damage by pointing out to these newspapers that this type of activity is not "Amateur Radio." We suggest that anyone seeing a similar story contact the paper or TV/radio station to explain the difference between shortwave listening and Amateur Radio. No one should divulge the contents of Presidential radio conversations if they are heard. To do so is a direct violation of Section 605 of the Communications Act.

Many amateurs are interested in knowing the most recent call signs issued by the FCC and why we don't include this information in QST. Each month the FCC issues a list of newly issued call signs, but because of column deadlines and printing schedules, by the time such a list could appear in QST it would be outdated and superseded by a subsequent list. Members may receive the latest list released by the FCC by sending an s.a.s.e. to Callsign List, ARRL, 225 Main St., Newington, CT 06111.

The ARRL Hq. Technical Department has an opening for a Technical Information Specialist. The job involves answering technical questions by mail and telephone. Other duties may include light laboratory and editorial assignments, as well as giving technical presentations at hamfests and conventions. An amateur license and broad experience with the technical side of Amateur Radio and its literature are required. Contact Jerry Hall or George Woodward at ARRL Hq.

The Senator from Amateur Radio

Most senators represent a state. One represents not only a state, but that "state of mind" called Amateur Radio. *QST* talked with that senator, Barry Goldwater, K7UGA, of Arizona — and hamdom!

Ever since television became a household fixture in the late '40s, interference from nearby radio transmitters has been a fact of life, and a factor in Amateur Radio. Ever since the '50s, by which time hams had licked, pretty much, their part of the problem — harmonics and spurs — poorly designed TV sets, stereos and other home-entertainment equipment have been at the root of the problem. Ever since 1972, when the late Representative Charles Teague of California introduced a bill on the subject, ARRL has been trying to get the Federal Communications Commission the authority to require that home-entertainment equipment be reasonably immune to nearby transmitters. Finally, it looks as though this goal (and some others, such as amateur volunteers to help FCC) will soon be attained.

The prime mover? Senator Barry Goldwater (K7UGA), R-Arizona, chairman of the Subcommittee on Communications, member of the Committee on Commerce, Science and Transportation, and author of S. 929 (Amateur Radio Service and Private Land Mobile Services Act of 1981). With K7UGA's steady eye and firm hand in the forefront, the Senate adopted the measure in September. Since then, a similar bill has been working its way through the House. H.R. 5008 — with the TVI/RFI provisions and volunteerism intact — has been approved by the House Committee on Energy and Commerce. As this is written, it awaits only action on the floor of the House.

In April, ARRL Washington Area Coordinator Perry Williams, W1UED, had a chance to interview Senator Goldwater for publication — but, rather than the senator, K7UGA did the talking!

QST: What led you to sponsor S. 929?[1]

Goldwater: Well, I've had a conviction for a long, long time that, legislated wisely, it makes some improvements in the Amateur Radio field. The fact that I introduced this bill doesn't mean that this is the end of my efforts. This is the beginning, and I'm hopeful that the House will get it over here soon — they promised to — and we'll get it passed. Then we have some further steps that I want to take.

QST: What do you see in the future for another bill?

Goldwater: I've been talking in a very informal way with some of the members of the FCC relative to divorcing Amateur Radio from the FCC as completely as we can. I took my first license exam when I was 13 from a licensed amateur; there was no trouble. I would like to see the licensing turned over to amateurs. Because we are so restricted, and the restrictions are so understood and so well known on frequency, I see no reason for any policing other than the policing that would be naturally done by amateurs; I think we do a better job. Now there are some points at which there will be problems, like what to do when you have infringements of regulations. Those are the points we have to work out. I'm discussing it with them (FCC), and I think we're going to start getting some answers.

QST: Do you have any ideas on the mechanics of a volunteer testing scheme?

Goldwater: No, not yet, but it would be such a relief to the FCC, monetary wise, that they ought to grab it. I have enough confidence in the amateur community.

QST: We're thinking of a program in which you would need a team of three examiners, because one guy might cheat, two guys might agree to cheat, but three guys, never.

Goldwater: That would be up to us.

QST: And we would like the FCC, for the time being anyway, to keep their hand on

[1]Notes appear on page 13.

the syllabus and decide the scope of questions, but we could have a bank of questions on the League's computer and produce exams.

Goldwater: I think it's entirely up to the amateurs to provide a diversification of questions so we wouldn't get into what we now have — these memory books. I think you have to remember, too, that when I first became an amateur, circuitry was not difficult. I think I could sit down here and draw you the old Bradley circuit, and I didn't have any trouble putting a transmitter or receiver together. But with transistors and everything we have today, I don't think we're going to see the day again when we have a great number of hams building gear — although that would be the main objective, really — to get the amateurs back to experimentation.

QST: Part of S. 929 concerns radio-frequency interference and, of course, this is something we've been fighting a long, long time. Have you seen any changes in FCC's attitude toward RFI since the introduction of the bill?

Goldwater: I can't say that I've seen any more than their publication on how to overcome RFI. On the other hand, I've seen a disturbing intensification by the manufacturers to completely absolve themselves of any responsibility, and I told them, "I don't care how successful you are at getting legislation killed, sooner or later you're going to wake up under control of the FCC if your equipment doesn't come up to snuff." And for the life of me I cannot understand these manufacturers' unwillingness to go through a process that can't cost more than $5 a unit. I've done it for $1, and I'm getting a little disgusted with the way they operate. When I introduced my first bill, they came down here en masse and promised me that they would take care of RFI. They've never done a damned thing about it!

QST: Have they trotted out the "big guns" this year? Have you been under pressure?

Goldwater: I haven't been under pressure, but the House, my God. We got rid of our bill from here; they tried to go over there (House) and kill that portion of the bill. I told them that we get another crack at that bill, and if they kill this bill I'll write a *tougher* one the next time. So you might as well go along with it.

QST: It looks now as though Rep. Al Swift (D-Wash.) will add RFI to House Bill H.R. 5008,[2] and they'll change the number to your bill, and then come back and dicker over the details.

Goldwater: There'll be no dickering.

QST: If the bill gets all the way to the President, what happens next? Do you think the industry finally will get off the dime and produce its own standards, or do you think the FCC is going to go all the way?

Goldwater: If the industry thinks they have more clout with the President than I have, let them try it, let them have the chance.

QST: But beyond that, once it gets signed, do you think they'll develop meaningful standards on their own?

Goldwater: Certainly. They have them. Hell, it doesn't take anybody with any brains to solder a resistor in here and put a little condensor in there.

QST: What concerns you most about the state of Amateur Radio?

Goldwater: I think the thing that concerns me most is something we really don't have much control over: the growing sophistication of communications equipment. The growing miniaturization of it to the point that the average amateur doesn't have the wherewithal to obtain and retain the types of things needed to make circuits. I've always liked the Amateur Radio contributions to communications, and I'd say that most of the real improvements in communications have come right out of the hams. But when you look at these miniaturized circuits produced by Bell, and you get 17,000 transistors on a quarter-inch square, for instance, that's something else.

QST: On the other side of it, what bright spots are ahead for the amateur service?

Goldwater: I think, just the opposite, the growing quality of equipment, although it's increasing the price a little faster than I would hope. But the growing quality, the ability of the average ham to buy equipment that will enable him to talk by cw anyplace he wants to, and by voice almost anyplace. Every time we improve communications, the ham benefits. Hell, I've got a 2-meter rig back here. I can speak up into Pennsylvania with it, no problem.

QST: I heard you say "work anywhere with cw." That's a good entry into another question. Do you feel the code requirement should be retained for all kinds of amateurs?

Goldwater: Well, I do. But on the other hand, looking at it in a practical way — and I can tell you they're looking at it — the average ham today never touches a key. Now, if they were willing to provide a codeless license and really restricted frequencies, I wouldn't be too worried about it.

QST: How did you get started in ham radio back so many years ago? Was it 1922 or '23?

Goldwater: Around there. I can never find my license. I got reading in *Popular Mechanics*, or something like that, about a crystal receiver, and I picked up a crystal and a battery and a little earphone, and I could hear Los Angeles. And then I found out about spark gap. I started with a Ford spark coil, then wrapped my own transformer and built a 1/2-kW spark rig. Boy, that hit me all over the room! My first tube transmitter was 20 watts. I had one QSO with Hawaii and one with Iowa, and I just got wrapped up in it.

QST: Your call was 6BPI. How was it in the '60s when Generals Butch Griswold and John Bestic talked you into getting back in?

Goldwater: Well, I kept up with communications all through the war, and I'd fly airplanes over the North Atlantic. I worked at the transmitter as much as they did, so I told them, "If you have a little extra equipment, bring it up and put it in." And by God they did! So the first CQ I sent out I got a fellow back from Florida. I said "this is it," and went back at it.

QST: What's your favorite mode?

Goldwater: I like cw very much. I had an operation on my neck that precluded me from using the old straight key, and I couldn't do it well. Then I got into the

Hanger Flying and Ragchewing with K7UGA

The date was May 28, 1961; the place was Phoenix; the event was the ARRL Southwestern Division Convention. Senator Barry Goldwater, ex-6BPI, was the featured banquet speaker.

After the Senator arrived from Washington (in a jet fighter), he met with ARRL officials, including then-General Manager John Huntoon, W1RW, and Directors Ray Meyers, W6MLZ, Harry Engwicht, W6HC, and myself. When it came time for me to be introduced, I disrupted the formal atmosphere by saying, "Hello, Barry, how are you?"

General Manager Huntoon gulped and muttered, "Ham informality is okay, Carl, but that's carrying it too far!" The Senator relieved the tension by replying, "Carl, what in the hell are you doing here? I didn't know you were a ham!"

Barry Goldwater was my gunnery instructor when I was an Army Aviation Cadet at Luke Field, Phoenix, in November and December 1941. Later, we were in the same ATC Group in Wilmington, Delaware. Neither of us gave any thought to Amateur Radio at that time, for operating privileges had been suspended following Pearl Harbor; flying was our only interest.

Barry flew a P-47 in the first (and only) flight of single-engine pursuit planes to be ferried over the North Atlantic route to England; I was the co-pilot on the C-87 that served as the flight commander's lead ship for the double-V formation. Later, Barry was Operations Officer in the China-Burma-India (CBI) theater of operations.

Since that meeting in Phoenix 21 years ago, our paths have crossed on occasion. It's always a pleasure to have a ragchew, either as an eyeball QSO or on the air, with K7UGA. — *Carl L. Smith, W#BWJ, ARRL/IARU Vice President*

bug, and now I've sort of mastered that. I have no trouble at all with cw, and I do quite a bit of it.

QST: We know you went to Viet Nam and operated the MARS station from there. Have you had a chance to be DX in the ham bands?

Goldwater: I've hammed from the South Pole, and I've hammed from airplanes and aircraft carriers virtually all over the world. I've run phone patches with my wife from the North Pole and from the Mediterranean. I've run ham operations from Iran, South Africa and Taiwan. I'm going to Taiwan in one or two weeks — they have only one or two hams, but they are very active.

QST: How does it feel to be on the other end of DX, to be sought after?

Goldwater: Very thrilling. Of course, for a long time I have had the same problem that a lot of hams like (Retired General) Curt LeMay and others have had. The moment I say "this is K7UGA QRZ," they just load down on you! I remember, we were down in the South Pacific on the *Ticonderoga*, and this fellow had a ham set right on the hanger deck. We worked 1800 stations in about eight hours.

QST: With your call?

Goldwater: Yes.

QST: Do you ever feel you'd like to have an unlisted call sign and just get on the air as "Joe"?

Goldwater: No, but it's getting that way. I don't get on the air as much as I used to. I've had a bad rig here for the last year, and now just last night I found the trouble. Now I have to go home and figure out how to connect it to my new transceiver because the new transceiver doesn't have any power in the relay line. We have a station here in the building, and I've got my own 2-meter rig right here. I had a bigger rig, but it wouldn't work too well. We have W3USS down in the basement. You talk about a hot station — that thing really gets out and drags 'em in!

QST: The 1979 World Administrative Radio Conference in Geneva adopted radio frequency allocations expected to last until the year 2000. Among them are three nice, new ham bands. Two of them we have to wait for the other people to clear, but one of them, 30 meters, is only going to be a shared band. Since it's going to be shared, and we've always got to protect the other fellow, we can start using it. More than 40 countries are already using it, but not us. The problem is that we haven't had ratification of the treaty yet. On the other hand, FCC says they're not going to make any assignments until the treaty is ratified. Do you have any comments on this?

"If we could become better ladies and gentlemen on the air . . . I don't think we'd ever have any trouble." *(Photos courtesy Julian Frerat)*

Goldwater: I'll never forget Herbert Hoover, Jr., who attended [a WARC]. He said, "Barry, we should never attend another conference." He said we go to those conferences, and we have only one friend we can depend on, that that's France. The countries we normally expect help from, we lose. And they send people who don't know what "frequency" means. Now, this last trip we did pretty good. We had qualified people.

QST: We have the WARC treaty, and there it sits. The Foreign Relations Committee is studying it, but hasn't had hearings.[2] Do you think they will ratify it this year, or what?

Goldwater: I am afraid, if it comes up, it will be ratified. What I don't like are the long-range implications. I would hope this would be the last convention. If there are any more, I'm going to the next one, if I'm alive. They gang up on us, and I think it is all we can do to hold on to our priceless old frequencies.

QST: Back to the hobby itself, do you think it has changed over the years?

Goldwater: Yes, I think it's changed.

QST: For better or for worse?

Goldwater: I think worse.

QST: Is that partly because of more people?

Goldwater: More people, but we really don't have that many more. We've got plenty of frequencies. If we could improve our operating techniques, if we could become better ladies and gentlemen on the air — more like we used to be than we are today — I don't think we'd ever have any trouble. I'm not a great believer in nets. I think they use up a lot of time; they use up a lot of space. You don't get rag chewing like you used to have it. You have to scan the whole band to find some vacant place you can call CQ. I'd rather get us back to the old, golden system.

A World War 2 veteran and a retired Major General, U.S. Air Force Reserve, Barry Goldwater, K7UGA, began his political career in 1949 in his hometown of Phoenix, Arizona, where he was elected to the city council on the reform ticket. In 1952, he was elected to his first of five terms in the U.S. Senate. While in office, K7UGA has served on many committees, including the Senate Armed Services Committee and the Senate Select Committee on Intelligence. In addition to being an Amateur Radio enthusiast, he is the author of numerous books, the most recent being an autobiography, With No Apologies. *Senator Goldwater currently divides his time between Washington, DC and Scottsdale, Arizona, where he lives with his wife, Margaret. The Goldwaters have four children and 10 grandchildren.*

Notes

[1]See Happenings, June 1981 *QST*, p. 53.
[2]The RFI provisions *have* been added to H.R. 5008, and it has been approved by the House Committee on Energy and Commerce. As this is written, the bill is awaiting action by the House.
[3]A hearing subsequently was held on May 18.

Next Month in *QST*

- Get ready for fall low-band excitement with two restricted-space antennas that will perform like the big boys.
- Want to use your TRS-80® as a RTTY terminal? Find out how to do it in September *QST*.
- Record-breaking scores confirmed what entrants already knew: Conditions during the June VHF QSO Party were outstanding!

Strays

***QST* congratulates . . .**

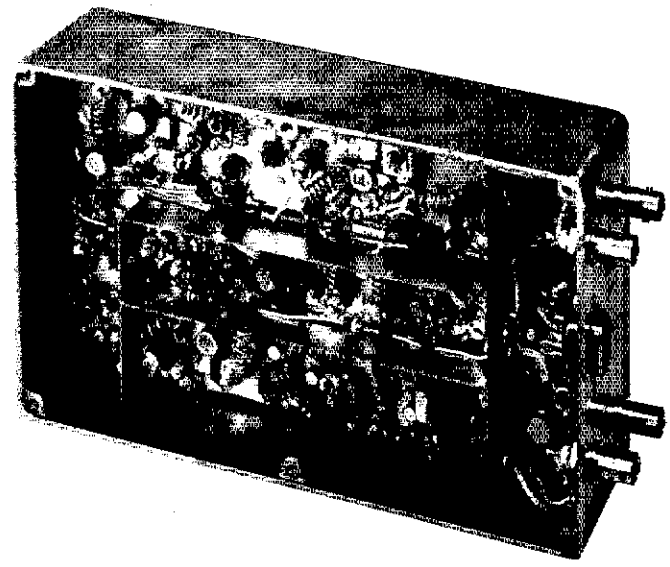
☐ Herbert (Pete) Hoover, III, W6ZH, on being appointed by Governor Jerry Brown to the California Emergency Council, representing the American Red Cross. The council advises the governor on natural, man-made or war-caused emergencies.

☐ Robert N. Dyruff, W6POU, on being elected director of the Southern California Emergency Services Association, a non-profit organization concerned with the preservation of life and the protection of property through preparedness.

I would like to get in touch with . . .

☐ anyone who was a Morse code intercept operator with the Army Security Agency stationed in the Pacific during the 1960s. Peter J. Kuhn, KQ8J, 34367 Pennsylvania, Mt. Clemens, MI 48045.

Explore "220" with this State-of-the-Art Transverter!



Part 1: You've never tried your hand on the 1-1/4 meter band? No equipment? Building this high-performance system could be your ticket to a new band and much excitement!

By Richard Stroud,* W9SR/W9BRN

This modern 220-MHz station is an ideal project for hf operators who want to advance to the higher frequencies. It is great also for dedicated vhf enthusiasts who wish to expand their band coverage. A solid-state transverter forms the basic station, and a low-noise remote preamplifier, a 40-W linear amplifier and a dc supply complete the high-performance system. A system block diagram is shown in Fig. 1. Part 1 of this article covers the transverter construction; the preamplifier, power amplifier and dc supply will be presented in Part 2.[1]

Circuit Highlights

While the transverter was designed for use with the 28-MHz Kenwood TS-820 transverter interface, it can be used with any 28-MHz transceiver capable of delivering +5 dBm (3.2 mW) of power. Rf output from the unit is 5 W, and the receiver noise figure is less than 1.5 dB. The transverter is composed of five sections. For convenience, the low-noise front end and the mixer/i-f amplifier section will be discussed together.

Receiver: The receiver design goal was good sensitivity with minimum susceptibility to overload and intermodulation distortion (IMD). This was accomplished by using a low-noise front end followed by an rf power amplifier, a high-level doubly balanced mixer and a low-gain i-f amplifier. Shown in Fig. 2 is the rf-section circuit diagram, while the mixer/i-f section is shown in Fig. 3.

An Avantek AT25A bipolar transistor is used in the low-noise front end. This is an excellent device for this application because it provides a low noise figure *and* good strong-signal performance. It is available directly from the manufacturer.[2] The input to the AT25A is matched for the optimum noise figure, resulting in a noise figure (measured with an AIL 75 Automatic Noise Figure Meter) of 1.4 dB.

Following the first rf amplifier is a double-tuned circuit. Close spacing (5/8 inch, center to center) between the inductors in this circuit results in inductive coupling.[3] This, and the capacitive coupling of C6, produces a 3-dB bandwidth of approximately 3 MHz. A 2N5109 power amplifier follows the double-tuned circuit. Output from this stage is applied to the mixer.

A PIN-diode-switched SRA-1H diode-ring functions as the receive and the transmit mixer. During receive the mixer input is switched to the amplified received signal, and the output is switched to the i-f amplifier, Q3.

A power JFET (junction field-effect transistor) is used as the i-f amplifier. This device appears as a near 50-Ω termination for the mixer at all frequencies of interest. Proper mixer termination ensures that the mixer IMD characteristics specified by the manufacturer will be obtained. The conversion gain during receive is 32 dB. With −46 dBm input signals at 220.1 and 220.2 MHz, the third-order IMD products at the 28-MHz output are 60 dB below the desired signals.

Transmitter: The transmitter design meets the goals of good linearity and low spurious output. In the transmit mode, the mixer input is switched to the 28-MHz input attenuator and the output is switched to the transmitter predrivers. Each predriver (Fig. 4) contains a 2N5109. These stages have been optimized for linearity. Use of a 440-MHz trap and a harmonic filter ensures good spectral purity.

Dc voltage to the predrivers and the bias voltage for Q4 and Q5 are applied when the companion transceiver is placed in the transmit mode. The bias-circuit components for Q4 and Q5 are located below the circuit board. Component placement is not critical, but the cathode lead of each reference diode should be grounded to a solder lug that is placed under the associated transistor mounting stud. This provides bias temperature compensation.

[1]Notes appear on page 18.

*P.O. Box 73, Liberty Center, IN 46766

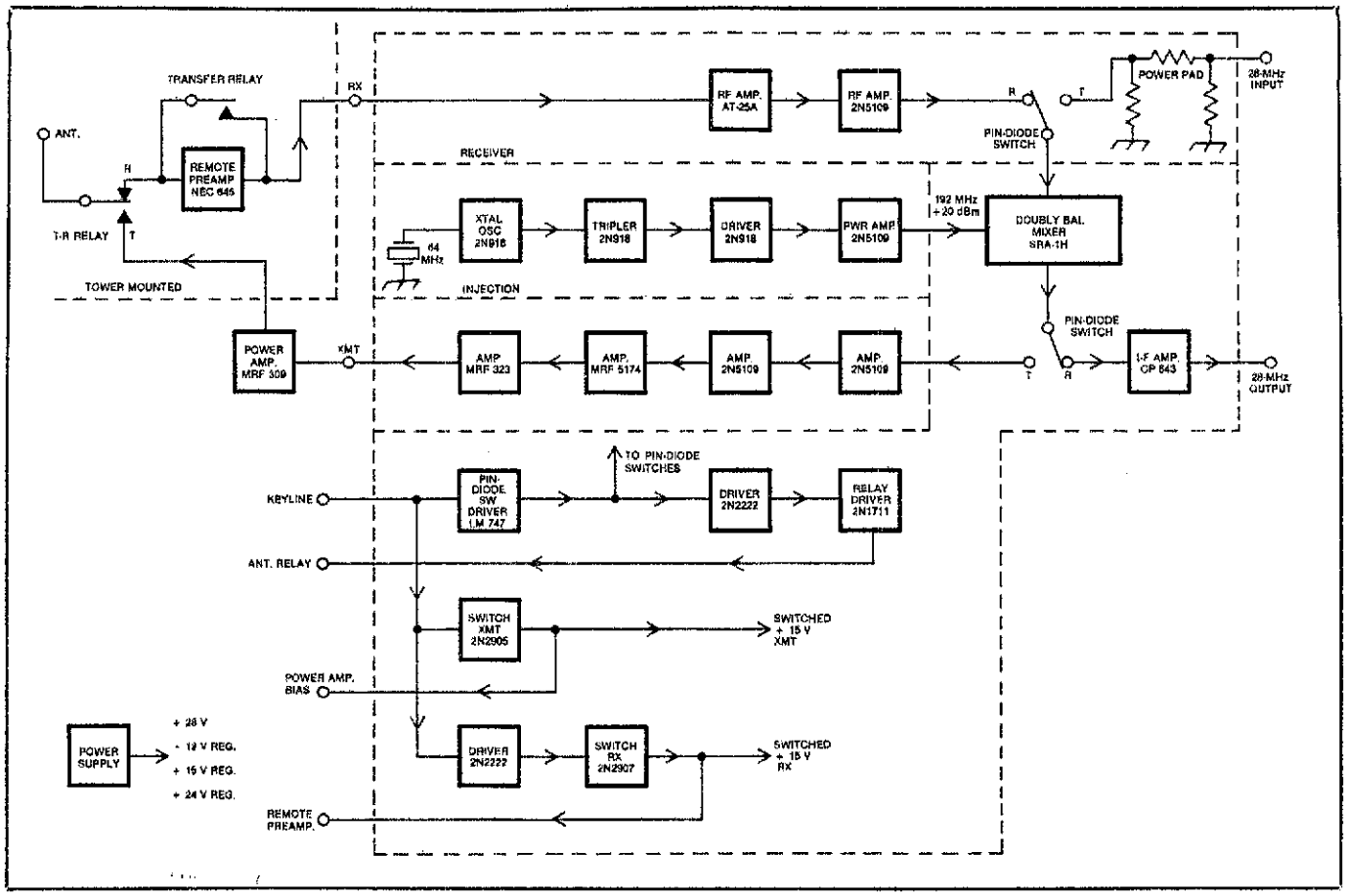


Fig. 1 — 220-MHz station block diagram.

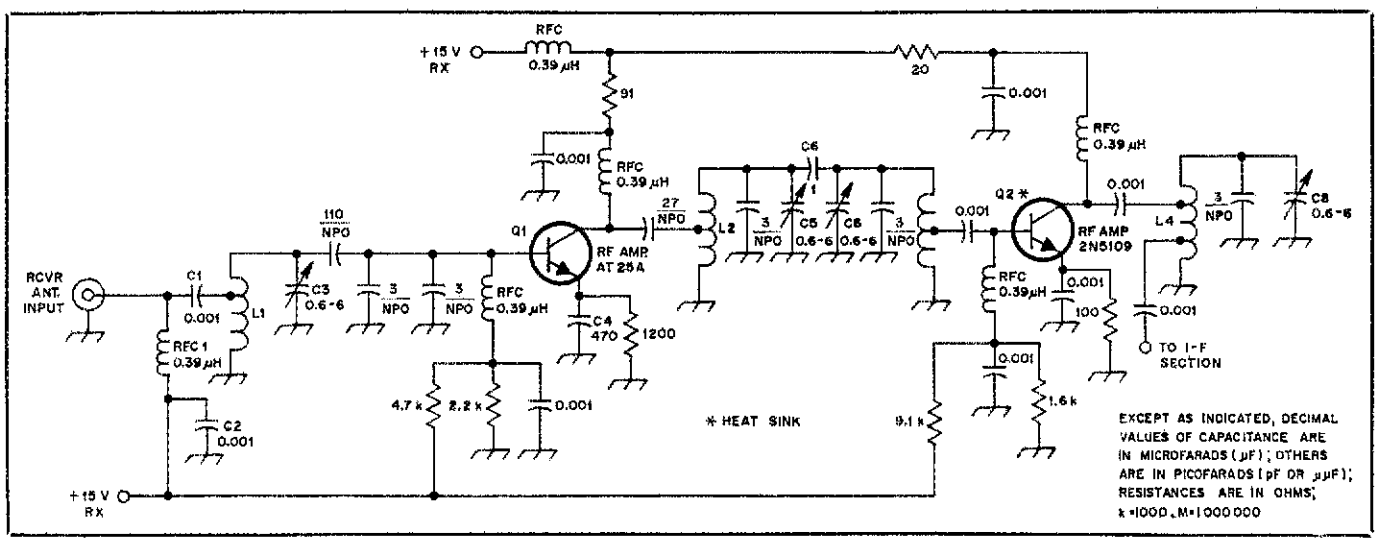


Fig. 2 — Receiver rf-section schematic diagram. NP0 capacitors are miniature ceramic, and 0.001-µF units are low-inductance disc ceramic or equivalent. Unless specified otherwise, resistors are 1/4-W carbon types, and capacitors are rated at 50 V.

C3, C5, C7, C8 — 0.6-6 pF piston trimmer, Johanson 4640.
C4 — 470-pF ceramic chip, ATC, JFD or equiv.
L1 — 4 t no. 18 bus wire, 5/32-in. ID × 3/8 in. long, tapped 2-1/2 t from gnd.
L2 — 6-1/2 t no. 18 bus wire, 5/32-in. ID × 3/16 in. long, tapped at 1-3/4 t from gnd.
L3 — 5-1/2 t no. 18 bus wire, 5/32-in. ID × 7/16 in. long, tapped at 1/2 t from gnd.
L4 — 3-1/2 t no. 18 bus wire, 3/16-in. ID × 1/2 in. long, tapped at 5/8 and 1-1/4 t from gnd.
Q1 — Avantek AT25A (see note 2).
RFC — Miniature rf choke, inductance given in µH.

If you intend to use the transverter without the power amplifier, a filter, such as the one shown in Fig. 5, should be included in the output path. There is ample room near the transverter output connector for filter installation.

Local Oscillator: A 64-MHz crystal oscillator, a frequency tripler and two amplifier stages comprise the local-oscillator (LO) chain. (Fig. 6). The oscillator voltage is regulated at 8.2, and the oscillator output is routed to the tripler through a 50-Ω resistive pad. These measures result in good frequency stability. A 2N5109 power amplifier supplies +20 dBm (100 mW) of LO power to the mixer. This LO level is necessary for good mixer IMD performance.

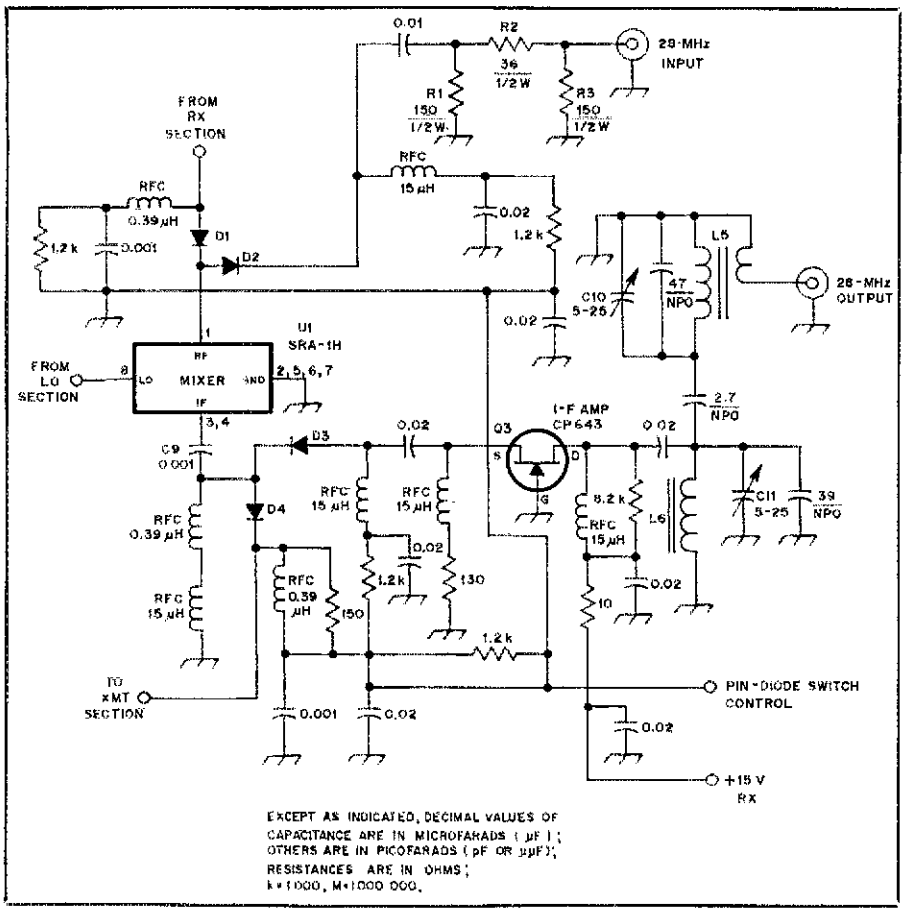


Fig. 3 — Mixer and i-f amplifier schematic diagram. NP0 capacitors are miniature ceramics. Other fixed-value capacitors are low-inductance disc ceramics or equivalent. Unless specified otherwise, resistors are 1/4-W carbon types, and capacitors are rated at 50 V.

C10, C11 — 5- to 25-pF miniature ceramic, Erie, JFD, Murata or equiv.
D1-D4, incl. — PIN diode, Unitrode UM6601, HP 1N5719, Motorola MPN 3401 or equiv.
L5, L6 — 13 t no. 28 enameled wire on a Micrometals T25-6 core.[4] L5 secondary is 2 t closewound over gnd end of primary.
Q3 — CP643 power JFET, Teledyne Crystalonics, 147 Sherman St., Cambridge MA 02140.
RFC — Miniature rf choke. Inductance given in µH.
U1 — High-level diode-ring mixer. Mini-Circuit Labs SRA-1H or equiv.

Switching and Control: Straightforward switching circuits (Fig. 7) are used to control the transverter. An LM-747 dual op-amp is used as the PIN-diode-switch driver. The op-amp sections are connected in parallel to supply sufficient current to the diodes. A 2N2907 saturated switch provides receiver on/off control, and a 2N2905 is used to switch the transmitter voltage and the power-amplifier bias. Grounding the transverter key line through the mating transceiver enables the transmit circuits. The key line is connected to transverter connector pin 4 of the TS-820. Pin 4 is wired to a normally open relay contact (RL-2) that is

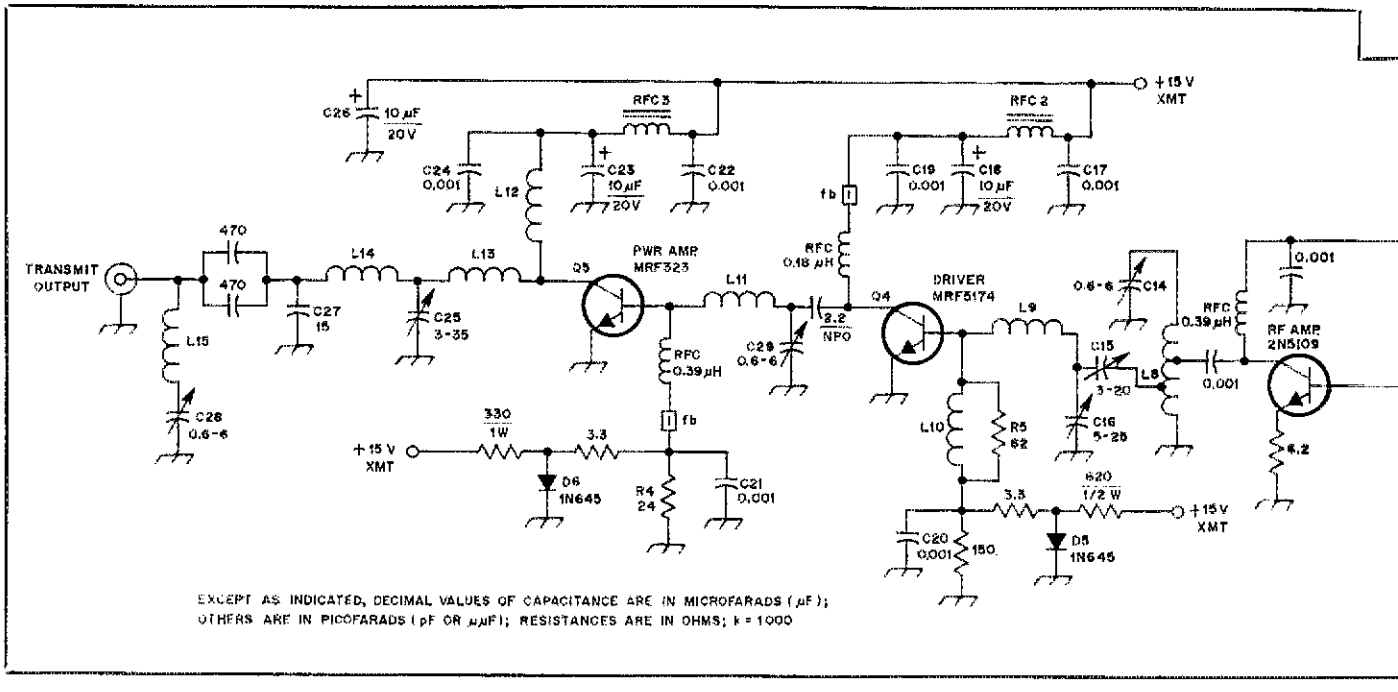
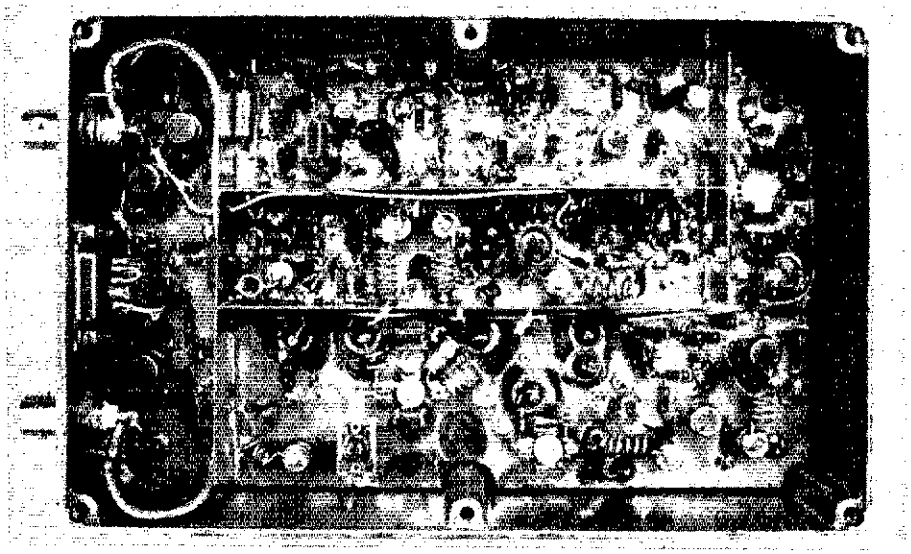


Fig. 4 — Transmitter section schematic diagram. NP0 capacitors are miniature ceramics. Unless otherwise specified, 0.001-µF capacitors are low-inductance disc ceramics, resistors are 1/4-W carbon types, and capacitors are rated at 50 V minimum.

C12, C17, C19-C22, incl. C24 — 0.001-µF feedthrough, Allen Bradley FA5C, Spectrum Control 54 794 001 or equiv.
C13, C14, C29 — 0.6-6 pF piston trimmer, Johanson 4640.
C15 — 3-20 pF miniature ceramic, Erie, JFD, Murata or equiv.
C16 — 5-25 pF miniature ceramic, Erie, JFD, Murata or equiv.
C18, C23, C26 — 10-µF, 20-V tubular electrolytic or tantalum.
C25 — 3-35 pF compression trimmer. Arco 403 or equiv.
C27 — 15-pF dipped mica.
L7 — 5-1/4 t no. 18 bus wire, 5/32-in. ID × 7/16 in. long, tapped at 1/2 and 1-1/2 t. from gnd end.
L8 — 5-1/2 t no. 18 bus wire, 5/32-in. ID × 1/2 long, tapped at 3/4 and 1-5/8 t from gnd end.
L9 — 3-1/2 t no. 22 bus wire, 5/32-in. ID × 1/4 in. long.
L10 — 7 t no. 28 enameled wire wound on R5.
L11 — 5 t no. 18 bus wire, 5/32-in. ID × 7/16 in. long.
L12 — 2 t no. 22 bus wire, 3/16-in. ID × 5/16 in. long.
L13 — 3/4-in. length (total) no. 18 bus wire in a hairpin shape.
L14 — 2 t no. 18 bus wire, 5/32-in. ID × 1/2 in.



Interior view of the 220-MHz transverter. The LO chain occupies the upper center section with the receiver front end immediately below it.

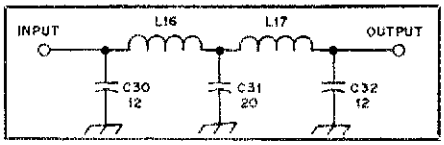
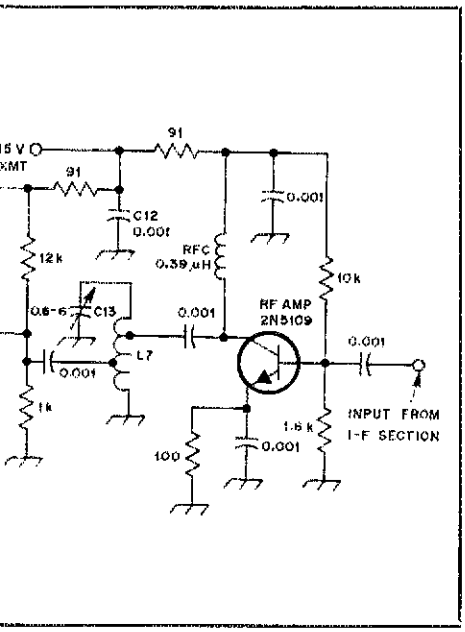


Fig. 5 — Schematic diagram of low-pass harmonic filter. This same circuit is used in the power amplifier (Part 2).

L16, L17 — 5 t no. 20 bus wire, 1/8-in. ID × 7/16 in. long.
C30, C32 — 12-pF dipped mica.
C31 — 20-pF dipped mica.



long.
L15 — 3 t no. 22 bus wire, 1/16-in. ID × 3/8 in. long.
Q4 — Motorola MRF5174.
Q5 — Motorola MRF323.
RFC — Miniature rf choke, inductance given in µH.
RFC2, RFC3 — 1-1/2 t ferrite choke, Ferroxcube VK 200 19/4B or equiv.

grounded during transmit. This contact is normally unused, and wiring it to pin 4 is a simple modification.

A 2N1711 (Q6) is used to switch the antenna relay. It is capable of sinking 250 mA of collector current. The antenna relay should be connected between a suitable voltage source and the collector of Q6. The power supply described in Part 2 has provisions for powering a 28-V relay.

I used separate input and output connectors rather than internal antenna switching to have the flexibility to add a remote preamplifier and a power amplifier. Use of a PIN diode T-R switch was discounted because of the slight loss involved, and because I planned to use a tower-mounted preamplifier and relay.

A remote preamplifier is desirable if a long feed line is necessary, or if you want the minimum noise figure. The transverter has a receiver noise figure of less than 1.5 dB, however, and it will do a commendable job without the preamplifier. If the preamplifier is not used, RFC1, C1 and C2 may be omitted and the input connector may be attached directly to L1.

Construction

Anyone familiar with vhf techniques should be able to duplicate my results without difficulty if the layout shown in the photographs is followed carefully. I built the transverter around many "on-hand" and surplus components; other builders may wish to substitute noncritical components as availability and their junk boxes dictate.

The construction method I used is a good alternative to etched circuit boards when breadboarding and building prototypes. A 1/16-inch thick, double-sided copper-clad board is cut to size and tinned on both sides. Teflon press-fit terminals, inserted at key locations as construction progresses, are used to support component leads. Ground connections are made by soldering directly to the tinned board. Teflon terminals are available in many sizes and styles from surplus outlets. I use 3/16-inch-high units that mount in a 0.089-inch diameter hole. Before inserting the terminal, hand chamfer the hole slightly on the circuit side of the board with an oversized drill bit.

A diecast box (Bud CU247), measuring approximately 4-1/2 × 7-1/4 × 2 inches, houses the unit. The circuit board is mounted above the bottom on 5/8-inch threaded aluminum spacers. I drilled 1/8-inch holes in the bottom to allow adjustment of the piston capacitors. Each transverter section is isolated by 3/4-inch-high tinned brass shields. To avoid unintentional coupling, all coils should be positioned as shown in the photographs. All rf leads should be kept short. Low-inductance 0.001-µF capacitors, connected with short leads, should be used for bypassing. The LO crystal can be held in place by means of GE RTV® silicone adhesive.

All rf input and output connections are made through UG-1094 (BNC type) connectors. The power and control connections are made through a 9-pin jack. Short lengths of miniature coaxial cable connect the receiver input and the transmit output connectors to glass-insulated feedthrough terminals mounted on the shield wall. These terminals are the rf termination points for the receiver and transmitter circuits. The 28-MHz input and output connectors are also attached to feedthrough terminals by miniature coaxial cable. These "feedthroughs" are mounted on the circuit board at appropriate points, and the cables pass under the board to the connectors.

The doubly balanced mixer is located under the circuit board, with the pins protruding into the receiver compartment. Notches at the bottom of the shields near the mixer allow clearance for the lead from L21 and the mixer output-coupling capacitor, C9.

Q3 is mounted by inverting it in a hole drilled in the board (leads on the circuit side of the board). The index tab is then soldered to the board. This provides a good rf ground (the gate is connected to the case) and heat sinking of the device.

Adjustments

A 6-dB resistive pad (R1, R2 and R3) is included in the 28-MHz input line. This pad terminates the transceiver output and reduces the drive power to the correct level for the mixer. If your transceiver output differs from that of the TS-820 (+5 dBm), adjust the pad resistor values to obtain approximately +2 dBm (1.6 mW) at the mixer. Do not exceed 1/2 W of drive, or damage to the mixer may result.

The value of R4 should be selected to provide a Q5 quiescent collector current of 25 mA. Resting current for Q4 should

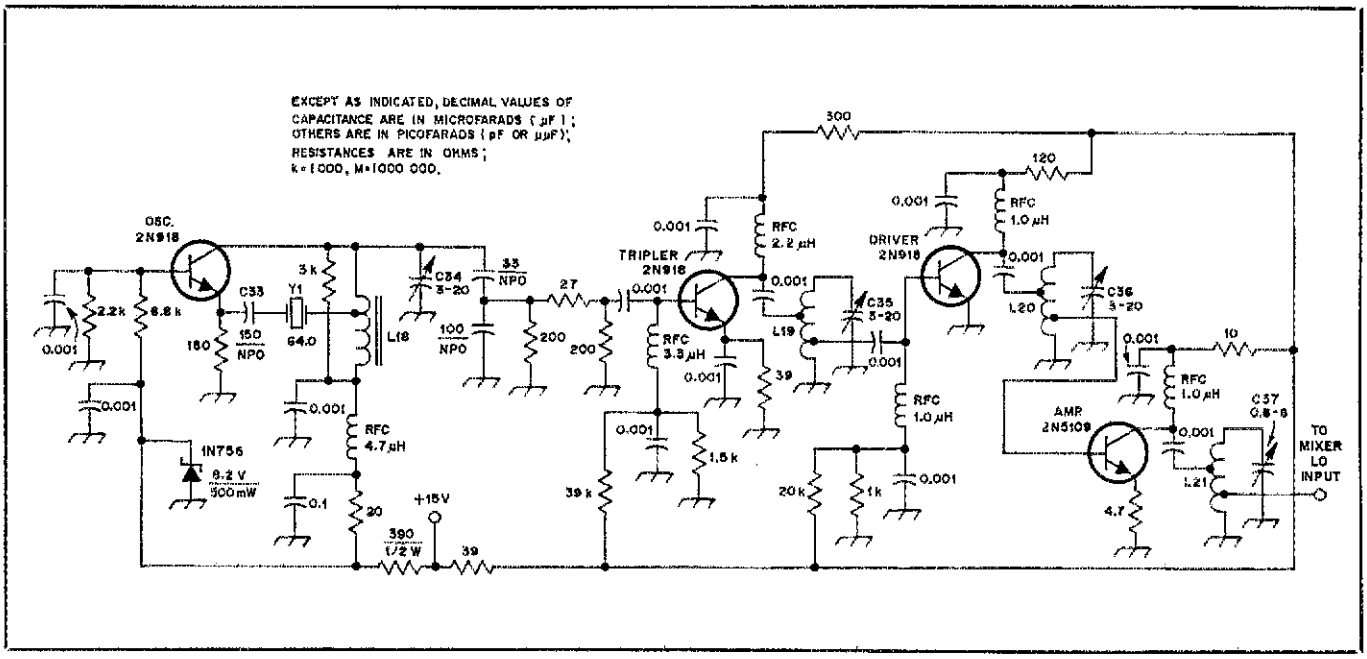


Fig. 6 — Local-oscillator section schematic diagram. NP0 capacitors are miniature ceramic, and 0.001-μF units are low-inductance disc ceramic. Unless otherwise specified, resistors are 1/4-W carbon types and capacitors are rated at 50 V.

C34-C36, incl. — 3-20 pF miniature ceramic, Erie, JFD, Murata or equiv.
C37 — 0.6- to 6-pF piston trimmer, Johanson 4640.
L18 — 11 t no. 28 enameled wire on a Micrometals T20-22 core, tapped at 3 t from gnd end.
L19 — 4 t no. 18 bus wire, 3/16-in. ID × 9/16 in. long, tapped at 3/4 and 3-3/4 t. from gnd end.
L20 — 4 t no. 18 bus wire, 3/16-in. ID × 1/2 in. long, tapped at 3/4 and 3 t. from gnd end.
L21 — 3-3/4 t no. 18 bus wire, 3/16-in. ID × 9/16 in. long, tapped at 3/4 and 1-1/2 t from gnd end.
RFC — Miniature rf choke, inductance given in μH.
Y1 — 64.00-MHz series-resonant crystal, CR80 style, McCoy, Jan Crystals or equiv.

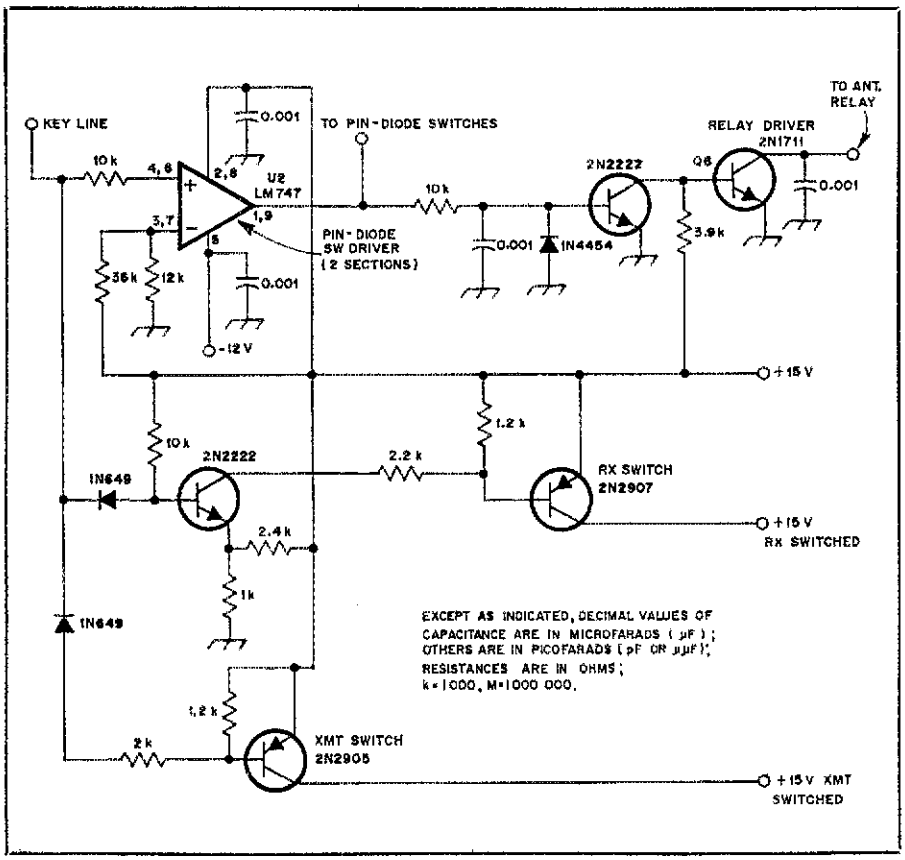


Fig. 7 — Transverter switching and control section. Resistors are 1/4-W carbon types, and capacitors are disc ceramic. U2 is a dual op-amp with the sections connected in parallel.

be approximately 15 mA.

Adjust the harmonic trap (L15 and C28) for minimum output at 440 MHz. This adjustment will interact with the setting of C25 slightly, so both should be optimized for maximum desired output and minimum second harmonic.

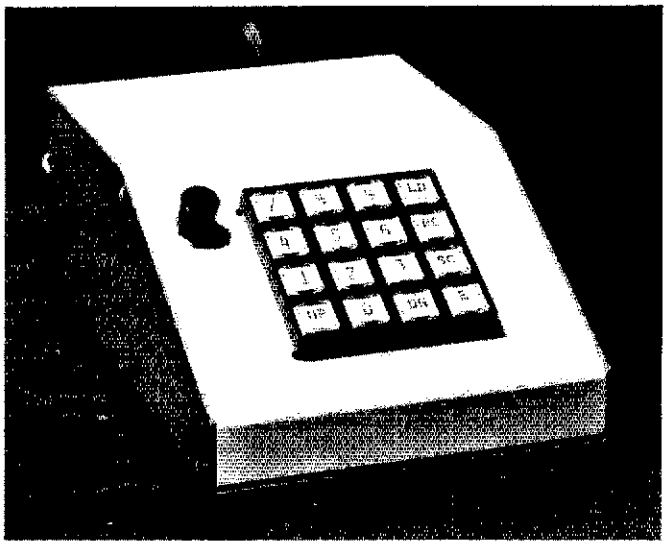
The LO-injection frequency can be adjusted to 192.0 MHz by selecting the correct value for C33. Measure the frequency with a counter connected to mixer-pin 8. As an alternative, the LO frequency can be adjusted until a received signal of known frequency appears at the proper dial point on the 28-MHz receiver. If a high-quality crystal is used, the frequency should be close to 192 MHz with the value shown.

All remaining adjustments are made in the conventional manner; the receive circuits are peaked for best signal-to-noise ratio, and the transmit stages are adjusted for maximum output power. This completes the transverter portion of the system. With it, you are ready to begin exploring 220!

Notes

[1]Part 2 of this article will appear in a subsequent issue of *QST*.
[2]Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051. Approximate cost is $12.
[3]mm = in. × 25.4.
[4]Cores are available from Amidon Associates, Inc., 12033 Otsego St., N. Hollywood, CA 91607.

A Three-Chip Microcomputer for Your Station



Been thinking of computer-controlling your synthesized radio equipment? Here's a microcomputer you can build — and the three ICs cost less than $20!

By Glenn Williman,* N2GW

Up till now, most microprocessor-oriented articles have shown how to interface various commercially available mini/microcomputers to certain pieces of amateur equipment. This is great if you happen to have purchased that particular system. The material may be fun to read and dream about, but how long will it be before you own your own computer system?

A microprocessor (μP)-based controller in the shack has a variety of uses. Fig. 1 shows one possible configuration: an interface to a synthesized vhf/uhf radio. The 16-key pad can control frequency selection and up to five other programmable functions. Provision can also be made, for example, to handle scan interrupt on busy or clear channels.

Assume that you need to control the MHz units, and 10s and 100s of kHz selection, of a synthesized vhf/uhf radio (the 0/5-kHz switch could be used as is). Four output lines for the BCD code and three lines for the counter latch control are required. To expand this to a synthesized hf radio, an additional line would be used so that four inputs to the synthesizer could be had: units, 10s and 100s of kHz, and 100s of Hz, with the MHz decision being determined by the band-switch circuit.

System Configuration

The Micro-3 is designed around a 6802 8-bit μP. This μP is identical to the 6800 with respect to the instruction set, but advantageously has 128 bytes of on-chip RAM, and a clock generator, requiring only the addition of an external crystal (4 MHz maximum) and a power supply for operation. System program memory is in EPROM for design flexibility. A 2516/2716 (single-voltage supply 2K × 8) EPROM is used, which most likely will provide more program memory than required. A single-voltage supply 2508/2708 (1K × 8) could be used, but the 2516 is now cheaper and more readily available than almost all other EPROMs.

The I/O functions are handled by a 6821 PIA (peripheral interface adapter). This IC is identical to the older 6820 PIA, but has TTL interface capability on both A and B registers, and is also more readily available. A block diagram of the system is shown in Fig. 2.

Micro-3 has memory partitioned as follows: RAM is fixed and must be located at 0000 to 007F; program instructions are written in EPROM starting from 1000. Address decoding for the EPROM is simplified by doing this, since address line A12 can then be used to chip select (CS) the EPROM. The VMA (valid memory address) line from the 6802 is NANDed with line A12 to ensure correct timing of the EPROM enable. One NAND gate is required for this, and two other NAND gates are used to debounce the reset line for the 6802 and 6821. The I/O PIA is located at 8000 to 8003; therefore, no decoding is necessary for PIA chip select, since address line A15 is connected to the PIA CS input and address line A12 is connected to the $\overline{CS}$ input.

Assembling the Micro-3

The Micro-3 was built initially on a small wire-wrap pc board, allowing generous foil areas for ground and power connections and thus permitting future changes or additions. The data and address lines were wire wrapped. This method works well and has the advantage of flexibility.

*612 Auth Ave., Ocean, NJ 07712

Once the circuit was debugged, a pc board was designed. No special provisions are necessary, but the more grounding, shielding and bypassing you include the less the potential for EMI. With both the wire-wrap and pc-board versions, there has been minimal EMI generated and the unit is not sensitive to rf energy. The system requires a regulated 0.4-A, 5-V supply. A 5.6-V Zener diode across the supply line helps protect against power supply transients during on/off switching.

The IC-701 Micro-3 System

The IC-701 synthesizer and control circuity accept a modified BCD code input and perform data latching, so only six output lines are required to load four frequency selection units. Two other PIA output lines are used to control up/down tuning, since inputs for these signals are already located on the '701 accessory connector.

The required frequency input data format consists of a load bit followed by five parallel input data bits for each of the four digits to be entered. The digital data must be entered sequentially, starting with the 100s kHz position and ending with the 100s Hz position. This format is shown in Fig. 3. Each channel or frequency consists of five time slots with each data bit being approximately 350 μs long and having an off time of approximately 350 μs between data bits.

Fig. 4 shows all the interconnections between the μP, the EPROM and the PIA. The 6821 PIA A register is programmed as the output register (pins 2 to 9), and the B register (pins 10 to 17), programmed as the input register, acts as a keyboard interface. The interface to the A and B registers of the PIA is shown in Fig. 5. Those resistors on each of the B register lines are terminations used to eliminate in-

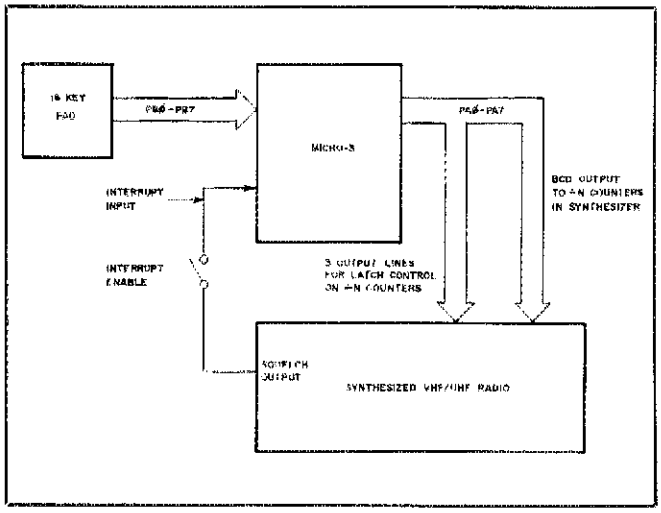


Fig. 1 — A microprocessor-based controller may be used as an interface to a synthesized radio.

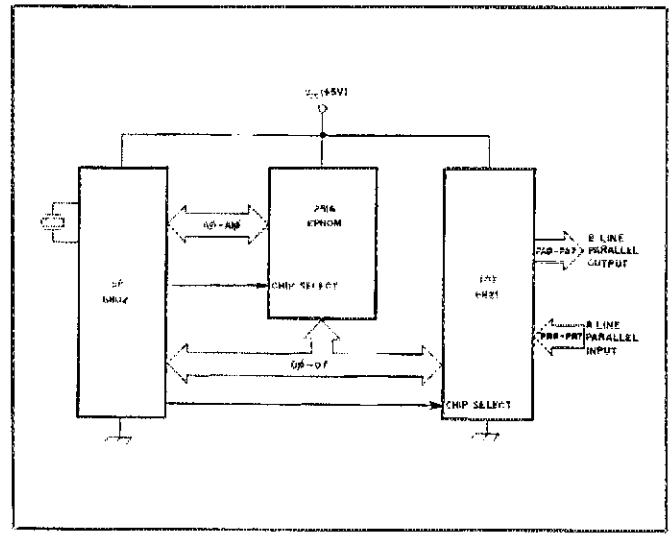


Fig. 2 — Block diagram of the Micro-3 system.

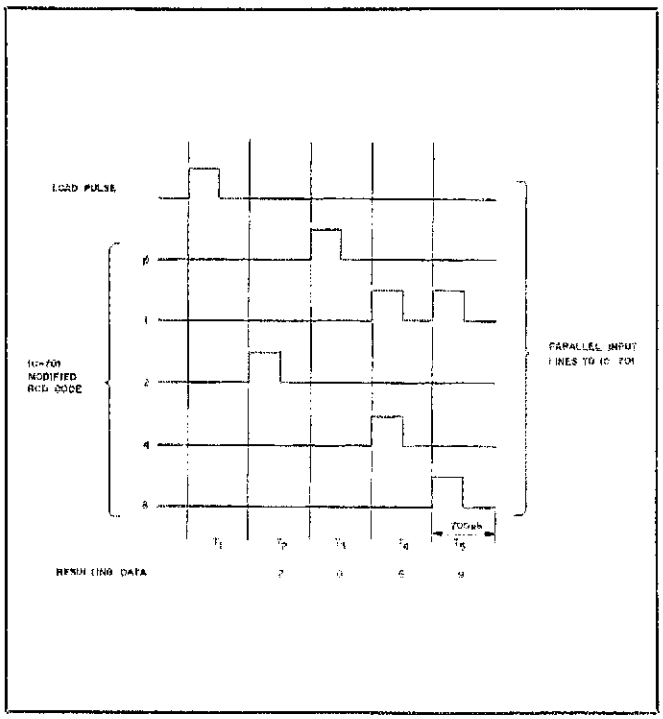
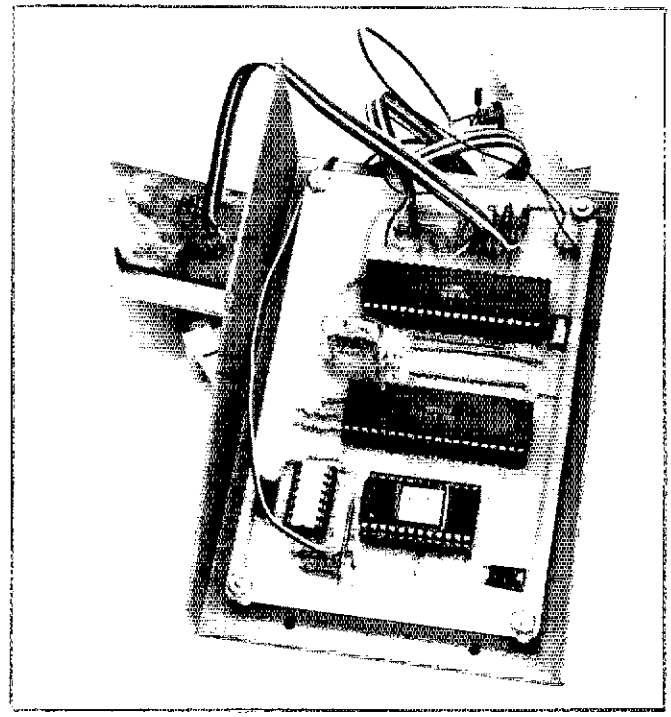


Fig. 3 — Frequency input data format used with the Micro-3 and an ICOM IC-701 transceiver.



This inside view depicts the neat simplicity of the Three-Chip Microcomputer.

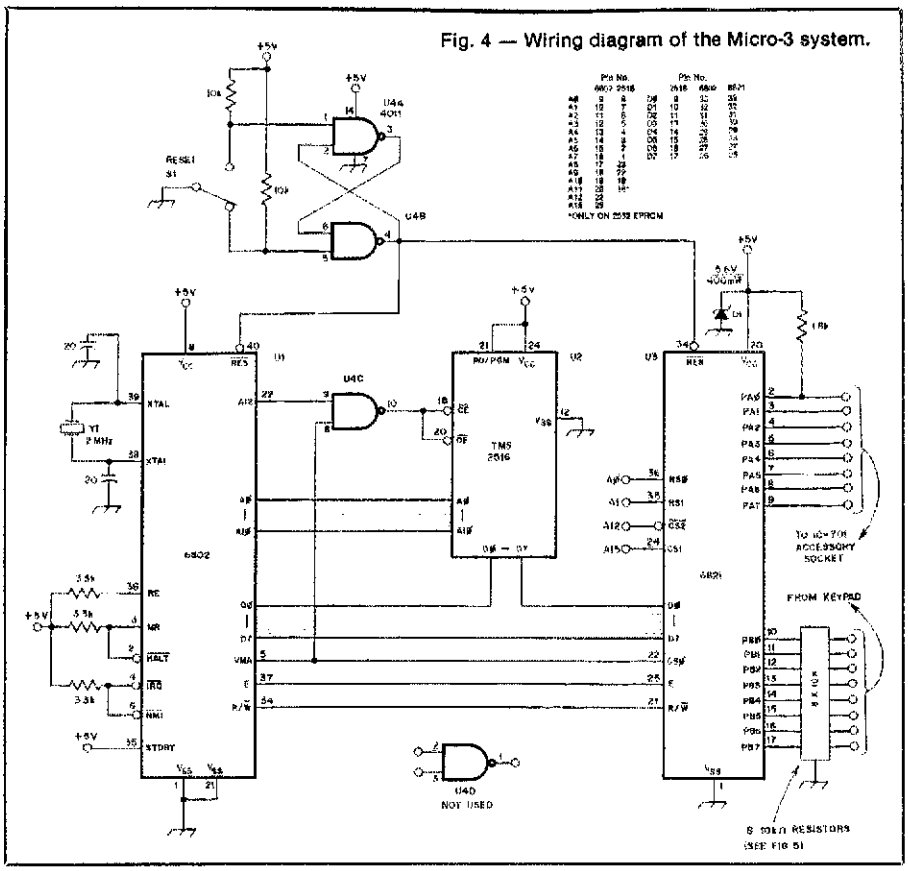


Fig. 4 — Wiring diagram of the Micro-3 system.

put line stray-signal pickup that could be interpreted as keyboard signals. The B register will interface to any 4 × 4 matrix switch arrangement (two of eight connect), and the keyboard routine for the IC-701 program is robust enough to debounce most anything. A 1.8-kΩ pull-up resistor on line PAØ (pin 2) of the PIA is necessary because the internal load in the '701 is slightly more than the drive capability of the PIA.

The IC-701 Program

Since my ICOM IC-701 accepts frequency-control information in a different format than the traditional divide-by-N, multiple-counter type of synthesizer, the software developed initially for the Micro-3 was tailored specifically for that rig.

The program functions are divided into separate subroutines, each responsible for performing a distinct operation. Essentially, the main program waits with a keyboard scanning routine until one of the six function keys is activated. Then it decides which subroutine to access, and the selected subroutine takes over from there. Fig. 6 is a simplified flow chart of the procedure.

Operation of the IC-701/Micro-3 is simple, and the key strokes are explained

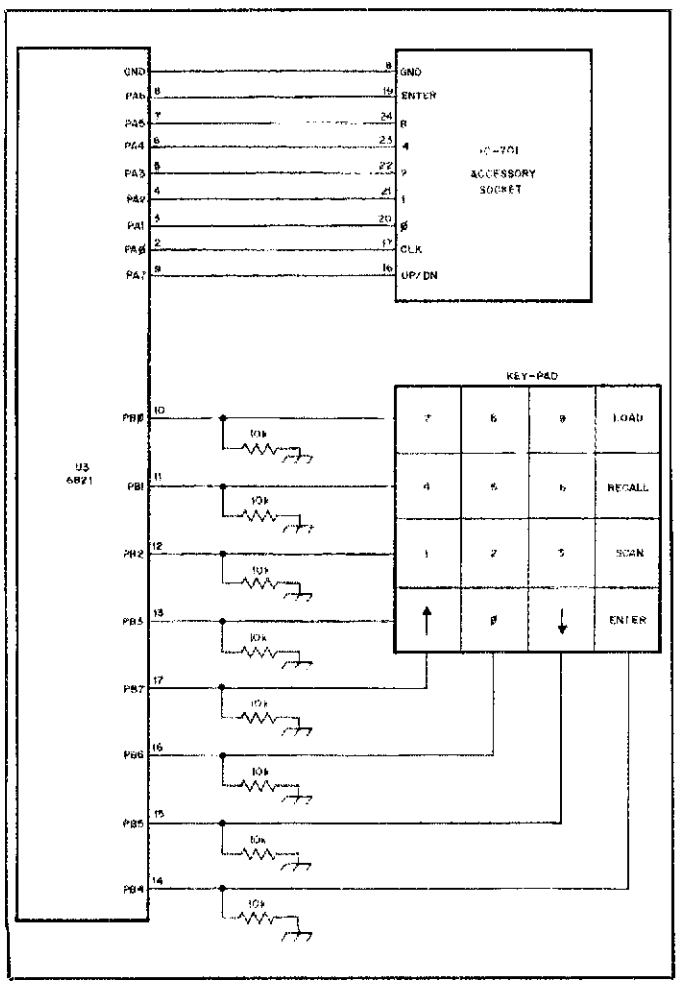


Fig. 5 — PIA A and B register interfacing.

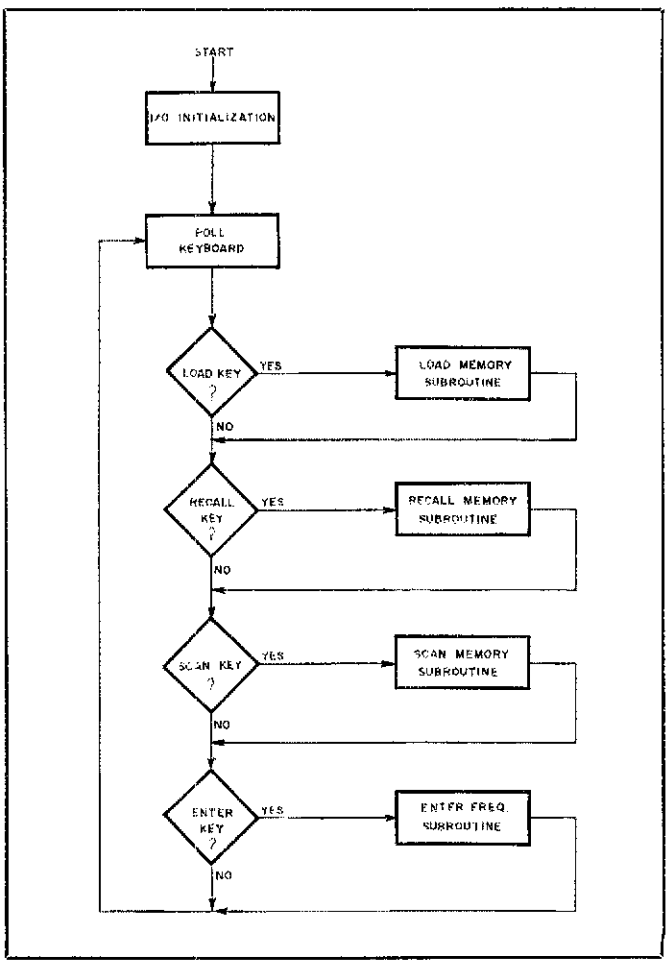


Fig. 6 — Simplified flow chart of the Micro-3 program designed for use with the IC-701 transceiver.

Table 1

Keypad Functions

Key	*Operation*
LOAD	Used for keying in memory locations and frequency to be stored. LOAD 12049 stores 204.9 kHz in memory 1.
RECALL	Recalls frequency stored in a particular memory. RECALL 5 recalls the frequency stored in memory 5.
SCAN	Used to select memory channels to be scanned. SCAN 15 permits scanning memories 1 through 5, and repeats. The lowest memory number must be entered first. An entry such as SCAN 51 will initiate scanning memories 5 through 9 and proceed into invalid RAM; the RESET key may be used to stop the scan function.
ENTER	Permits direct four-digit frequency input. ENTER 2049 enters 204.9 kHz.
↑ ↓	Initiates up or down incremental tuning of the radio. Pressing either key again will stop the tuning.
RESET	Used to stop any of the above functions, and does not alter memory information.

Table 2

Program Listing (Used with the IC-701)

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*A*	*B*	*C*	*D*	*E*	*F*
1000	8E	00	7E	7F	80	01	7F	80	03	86	F0	B7	80	02	86	FF
1010	B7	80	00	86	04	B7	80	01	B7	80	03	CE	00	04	DF	00
1020	BD	10	51	96	04	81	11	26	03	BD	10	83	81	12	26	03
1030	BD	10	94	81	14	26	03	BD	11	AA	81	18	26	03	BD	10
1040	A3	81	28	26	03	BD	11	4C	81	88	26	CF	BD	11	40	20
1050	CA	86	10	B7	80	02	CE	04	FF	09	26	FD	F6	80	02	D7
1060	02	CA	F0	C1	F0	26	07	49	81	00	27	E5	20	E5	8A	0F
1070	97	03	D4	03	DE	00	E7	00	08	DF	00	F6	80	02	D1	02
1080	27	F9	39	CE	00	04	DF	00	BD	10	51	BD	11	DE	DF	00
1090	BD	11	30	39	CE	00	04	DF	00	BD	10	51	BD	11	DE	BD
10A0	10	B4	39	CE	00	04	DF	00	BD	11	30	CE	00	04	DF	00
10B0	BD	10	B4	39	C6	03	86	40	B7	B0	00	86	20	4A	26	FD
10C0	86	00	B7	80	00	86	20	4A	26	FD	A6	00	BD	10	EA	B7
10D0	80	00	08	86	20	4A	26	FD	86	00	B7	80	00	86	20	4A
10E0	26	FD	C1	00	27	03	5A	20	E1	39	81	48	26	03	86	02
10F0	39	81	84	26	03	86	04	39	81	44	26	03	86	08	39	81
1100	24	26	03	86	0C	39	81	82	26	03	86	10	39	81	42	26
1110	03	86	14	39	81	22	26	03	86	18	39	81	81	26	03	86
1120	1C	39	81	41	26	03	86	20	39	81	21	26	02	86	24	39
1130	4F	97	08	BD	10	51	96	08	4C	97	08	81	04	26	F4	39
1140	86	80	97	09	86	81	97	0A	BD	11	58	39	86	00	97	09
1150	86	01	97	0A	BD	11	58	39	96	09	B7	80	00	BD	11	76
1160	96	0A	B7	80	00	BD	11	76	BD	11	7D	C1	88	27	06	C1
1170	28	27	02	20	E3	39	CE	08	00	09	26	FD	39	86	10	B7
1180	80	02	CE	03	00	09	26	FD	F6	80	02	CA	F0	C1	F0	26
1190	07	49	81	00	27	13	20	E7	8A	0F	97	03	D4	03	D7	03
11A0	F6	80	02	D1	03	27	F9	D6	03	39	CE	00	04	DF	00	BD
11B0	10	51	BD	11	DE	DF	05	CE	00	04	DF	00	BD	10	51	BD
11C0	11	DE	DF	08	DE	06	BD	10	B4	DF	0A	BD	12	2A	DE	0A
11D0	9C	08	27	02	20	F0	BD	10	B4	BD	12	2A	20	E6	98	04
11E0	CE	00	0C	81	48	27	42	CE	00	10	81	84	27	3B	CE	00
11F0	14	81	44	27	34	CE	00	18	81	24	27	2D	CE	00	1C	81
1200	82	27	26	CE	00	20	81	42	27	1F	CE	00	24	81	22	27
1210	18	CE	00	28	81	81	27	11	CE	00	2C	81	41	27	0A	CE
1220	00	30	81	21	27	03	7E	10	00	39	96	0C	CE	10	00	09
1230	26	FD	4A	26	F7	39	00	00	00	00	00	00	00	00	00	00
13FE	10	00														

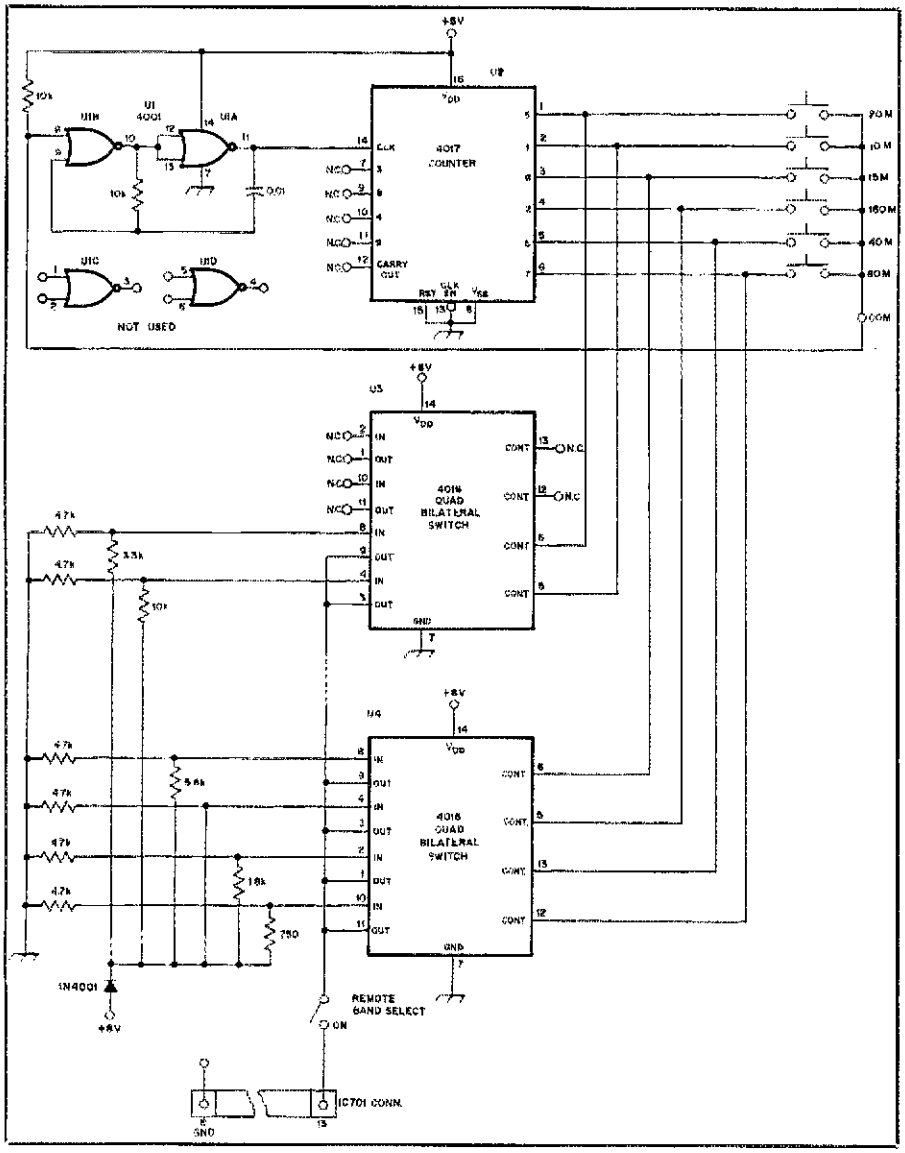


Fig. 7 — Schematic diagram of a push-button band-switching system employed by the author with his IC-701 transceiver. Resistance values are in ohms, k = 1000. Resistors are carbon composition or film, 1/4-W, 5% types.

in Table 1. A program listing is shown in Table 2. Using the LOAD key in sequence with 0 and four digits (i.e., LOAD 01111) will load a time-delay factor used in the scan mode. Using digits from the 9 column will provide about a 1.5-second scan delay; the 8 column, about 3 seconds; and the 7 column, about 6 seconds. Four digits must be entered for the delay factor to be used properly. An entry such as LOAD 09874 is valid, since the first digit (9) determines the scan delay (1.5 seconds).

Summary

I built an earlier version of this controller without the μP, which contained a relatively simple circuit for push-button band switching. This could easily be included for a fully functional digital-control system. The schematic diagram is shown in Fig. 7.

I hope the ideas presented here encourage some experimentation by novice μP users and allow others to use the 6802 system design for their μP-based project that has been waiting on the drawing board. For those interested in using the Micro-3 system described here, a kit is available from the author that includes a drilled and plated pc board, all ICs and sockets, for $38 postpaid. If you are interested in obtaining the IC-701 program, the same kit with a programmed EPROM is $43.[1]

[1]The ARRL and *QST* in no way warrant this offer.

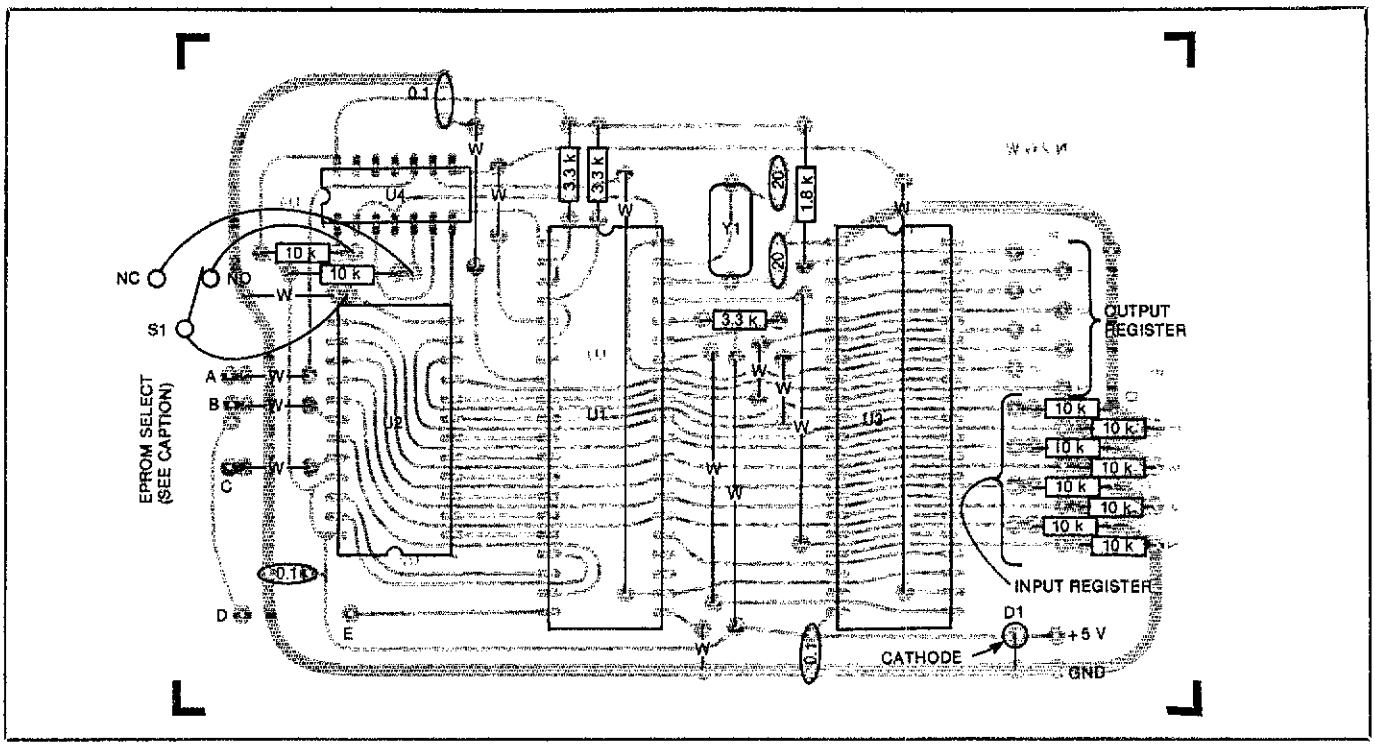


Fig. 8 — Parts- placement guide for the Three-Chip Microcomputer. Parts are placed on the nontoil side of the board; the shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the Hints and Kinks section of this issue.) Resistances are in ohms; k = 1000. Capacitors with whole-number values are in picofarads. Capacitors with decimal-value numbers are in microfarads. W = wire jumper. With 2508 or 2516 EPROMS, jumper A to B and B to C. For 2532 EPROMS, jumper A to C and D to E.

Strays

ATTENTION AFFILIATED CLUBS

☐ All affiliated clubs who have not filed an annual report between January 1 and June 1, 1982 are delinquent. Contact the Club and Training Department if your club has *not* completed a 1982 form or needs a copy. — *Sally O'Dell, KB1O, Club Program Manager, ARRL*

WESTLINK EAST

☐ The Metroplex Amateur Communications Association of Leonia, New Jersey, is providing the only East Coast telephone outlet for the Westlink Radio Network. To hear the latest news on amateurs' activities, FCC decisions and local antenna rulings, call 212-224-1555. To contribute news to Westlink, call 805-251-7180. — *Hank Goldman, WA2OVG*

NEW MICROWAVE FET

☐ General Electric Company scientists have developed a MESFET field-effect transistor (silicon-on-sapphire metal semiconductor) that provides a 6-dB gain with 50% efficiency. It delivers 0.6 watt at 3 GHz. The manufacturer states that this transistor has the highest efficiency yet achieved by a silicon device at 3 GHz. The MESFET is intended, apparently, for use in MICs (monolithic microwave ICs).

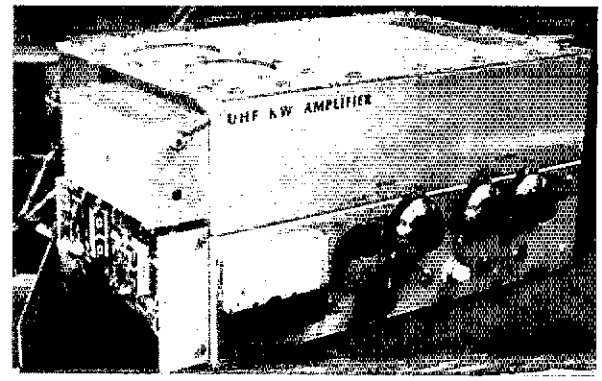
Researchers are striving to develop devices with greater gate lengths (the present unit has a gate length of 1 μm). This should make it possible to produce several watts of power at 50% efficiency. GE contemplates expanding the use of silicon devices to 4 GHz. These developments offer promise to amateurs who are involved with microwave circuit design and communications. The principal scientists in this technological advance are Dr. John Eshbach and Dr. Se Puan Yu. — *Doug DeMaw, W1FB*

ELMER OF THE YEAR NOMINEES SOUGHT

☐ Nominations are being accepted for the 1982 Northern New Jersey Elmer of the Year award. Sponsored by the Northern New Jersey chapter of the Quarter Century Wireless Association, the award is given each year to the radio amateur who is judged to have done the most to help others become Amateur Radio operators. Nominations must be received on or before September 1, 1982. For more information, write to or call Carl Felt, N2XJ, 8 Charles Place, Chatham, NJ 07928, tel. 201-635-7686.

Members of the Radio Society of Great Britain soon will be able to "visit" ARRL/IARU Headquarters, thanks to the efforts of RSGB General Manager David Evans, G3OUF. David carried a complete videorecorder system "across the pond" in late April to chronicle his trip to the Dayton Hamvention and to Newington. Unfortunately, we weren't able to preview the tapes, because European and American television standards are different and the RSGB equipment is, of course, made to the European standard!

The Care and Feeding of Linear Amplifiers for ATV



Your amplifier doesn't like to be fed ATV signals? Careful grooming will give it a healthy appetite for this delectable mode!

By Tom O'Hara,* W6ORG

The increased availability and affordability of video equipment has helped account for the growing number of fast-scan ATVers. Microcomputers, video cassette recorders, color cameras, and video Teletype and cw converters have encouraged hams to want broadcast-quality, real-time pictures. Just receiving a snowy, black-and-white call-letter plate from 40 or more miles away is "old hat." Emphasis today is on getting good-color, snow-free pictures with which to play computer games, coordinate public-service events, or show the latest home movies or videotapes.

Once your 10-watt ATV station is working well, and all the antenna and tower height the wife and neighbors will allow have been put up, thoughts turn to more power. This article covers trade-offs between transistor- and tube-type amplifiers, gives test results of three popular transistor amplifiers, and discusses system considerations to enable you to decide which suits your needs best.

Tubes vs. Transistors

What is the difference between a tube amplifier and a transistor amplifier? Watts are watts, aren't they? Well, if you are using fm or cw, it may not matter. With ATV you need to reproduce the video without degrading the linearity, video-to-sync ratio, or bandwidth (to the point of poor contrast), tearing or jittering, or lack of sound and color. With a-m, the choice of amplifying device must be made with these characteristics in mind, or results can be disappointing.

Let's consider bandwidth first. Uhf power transistors are low-impedance devices (input and output impedances are often around 1 ohm), while tubes have much higher impedances, in the thousands of ohms. This high impedance dictates input and output loaded Qs that limit bandwidth. It also determines the level of sound and color subcarriers, and resolution. Transistor loaded Qs are often below 10 because of the relatively high resistive- to reactive-component ratios. These values determine the matching-circuit strip-line dimensions. Tubes, on the other hand, usually have high grid capacitance and lead inductance — the limiting factor in the values used to make a resonant circuit at 400 MHz. Grid Qs can end up being more than 75 in tubes, such as the 4X150, with all the matching tricks normally employed. In tube amplifiers of this kind, the grid is the major killer of resolution, color and sound. For this reason, many hams end up using their 10-W ATV rig as an rf driver and adding a high-power video modulator.

Linearity is a factor that enables tubes to fare better than transistors, so a trade-off is often considered between bandwidth, (favoring transistors) and linearity (favoring tubes). Tubes are linear up to the abrupt point of limiting in Class C operation, so you can expect good gray scale and little reduction of sync. With transistors, input-to-output gain varies greatly, depending on the power-output level. Generally, the last 3 dB of output increase takes more than 6 dB of input increase. Many hams like this characteristic for ssb because the soft limiting effect gives a higher average power, termed "talk power." Voice recognition suffers little from the peak distortion, and it does improve the signal-to-noise ratio. With video, you must have the sync to enable the TV set to sweep correctly and give a stable picture. Since the sync tip is transmitted at peak envelope power, a transistor power amplifier can compress the sync amplitude to half or less, giving a jittery, torn or rolling picture in the TV. A rule of thumb for using power transistors in the linear mode is to set the peak envelope power at half the manufacturer's rating. For instance, a Motorola MRF648 is rated at 60 W and should be run at 30-W PEP for ATV.

I ran tests using a video-processor amplifier, which enables setting the sync-to-video ratio at any level. Among six TV sets tested, all would lock up with the sync level cut in half. So, as a minimum, set 50% sync compression as the worst case, or 20 IEEE units out of 40. This varies with each TV model and assumes the camera is properly set with 40 IEEE units of sync and 100 units of video. More than 50% of rated PEP can be obtained by use of sync expansion, but more on that later.

Kilowatt ATV

Before we turn to the three tested transistor amplifiers, a discussion of one of the popular tube amplifiers is in order. The K2RIW KW amplifier[1] is available in

*ARRL TA, Fast Scan ATV, 2522 Paxson La., Arcadia, CA 91006

[1]Notes appear on page 28.

kit or complete form from ARCOS.[2] On cw, 10 W of input power from my P. C. Electronics TC-1 transmitter/converter (with no video applied) gave 325 W of output power. The only change I could see in this amplifier over the original K2RIW design was that, rather than the original 4CX250s, the tubes are now Eimac 8930s (100 watts more dissipation each). I stopped testing at 450 watts out (14 watts of drive) because the coaxial cable to my dummy load got very warm to the touch after a few minutes.

The grid loaded Q caused the 4.5-MHz sound subcarrier to roll off 11 dB in the linear mode. Color was almost nonexistent, and the resolution of the 10-W ATV transmitted signal was gone. There is a simple way to overcome this deficiency. With a P. C. Electronics VM-2 grid modulator, the grid loaded Q does not restrict the transmitted-video bandwidth. This leaves only the plate circuit loaded Q to roll off the response.

The modulator was put into a chassis and mounted to the side of the amplifier, as shown in the lead photo. A P.C. Electronics FMA5 sound subcarrier board is mounted in the covered box. A short piece of RG-174/U cable connects the modulator with the amplifier grid circuit. Best results were obtained with −65 V grid bias and no video applied. The modulator is clamped to the video sync so that, regardless of what is in the picture or the average picture level, the power level at the sync tips remains constant. With the 10-W drive, I got 325 W of output power, and then added video. I measured about 250 W of output after adjusting the video gain for best contrast, just above white limiting. The average power on the wattmeter will change, decreasing for a predominantly white picture and increasing for a principally black picture, but the peak envelope power will remain constant at 325 watts.

Amplifiers are best compared by stating PEP, because this eliminates modulation type as a factor. With clamped or dc-restored video modulators, this is as easy as removing the video and reading the power directly from a wattmeter. I will state power as PEP, or power as read on a wattmeter with no video modulation applied. The wattmeter will read PEP in the cw case (no modulation) with a clamped video modulator.

Fig. 1 shows how the P. C. Electronics VM-2 modulator is connected to the K2RIW/ARCOS amplifier. Q3 was added for improved clamping and linearity, and to set the bias point. The plate Q is still high enough to warrant fine adjustment of the plate and output tuning to the high-sideband side of the response. The roll off is just about 1 to 2 dB at the sound subcarrier, and can easily be compensated for by a little extra 4.5-MHz injection. Color is down about 1 dB and is not degraded noticeably except in weak reception cases. Resolution is great, with the TV set i-f bandwidth being the limiting factor (most are only 3 to 3.5 MHz). A resolution rule of thumb is 75 to 80 lines per MHz. I let this amplifier run for 1/2 hour continuously at 325-W PEP, and it seemed to be loafing. So, for a really strong signal, I can recommend this unit, but suggest high-level modulation for quality video work.

50-Watt Triode Amplifier

The old faithful 2C39 (and newer variations) also makes a good linear amplifier. These tubes can give full bandwidth in grounded-grid operation if the plate line is modified to a half-wave section. All cavities have a loaded Q that is much too high for good bandwidth, if they are 1/4-wave lines. They are physically very short because the internal capacitance of the tube is high. Again, this limits the resulting Q that can be achieved without loading the tube down so far as to make the stage gain too low.

The flat plate line (1/2-wave circuits) allows a much lower loaded Q, seems to work better, and is quite simple to build. You can tell a 1/2-wave line from a 1/4-wave line by the tuning capacitor placement. The 1/4-wave line capacitor is placed next to the tube plate and resonates with the tube plate capacitance. The 1/2-wave line has the tuning capacitor at the end opposite the tube, and usually the B+ rf-choke connection is near the middle of the line.

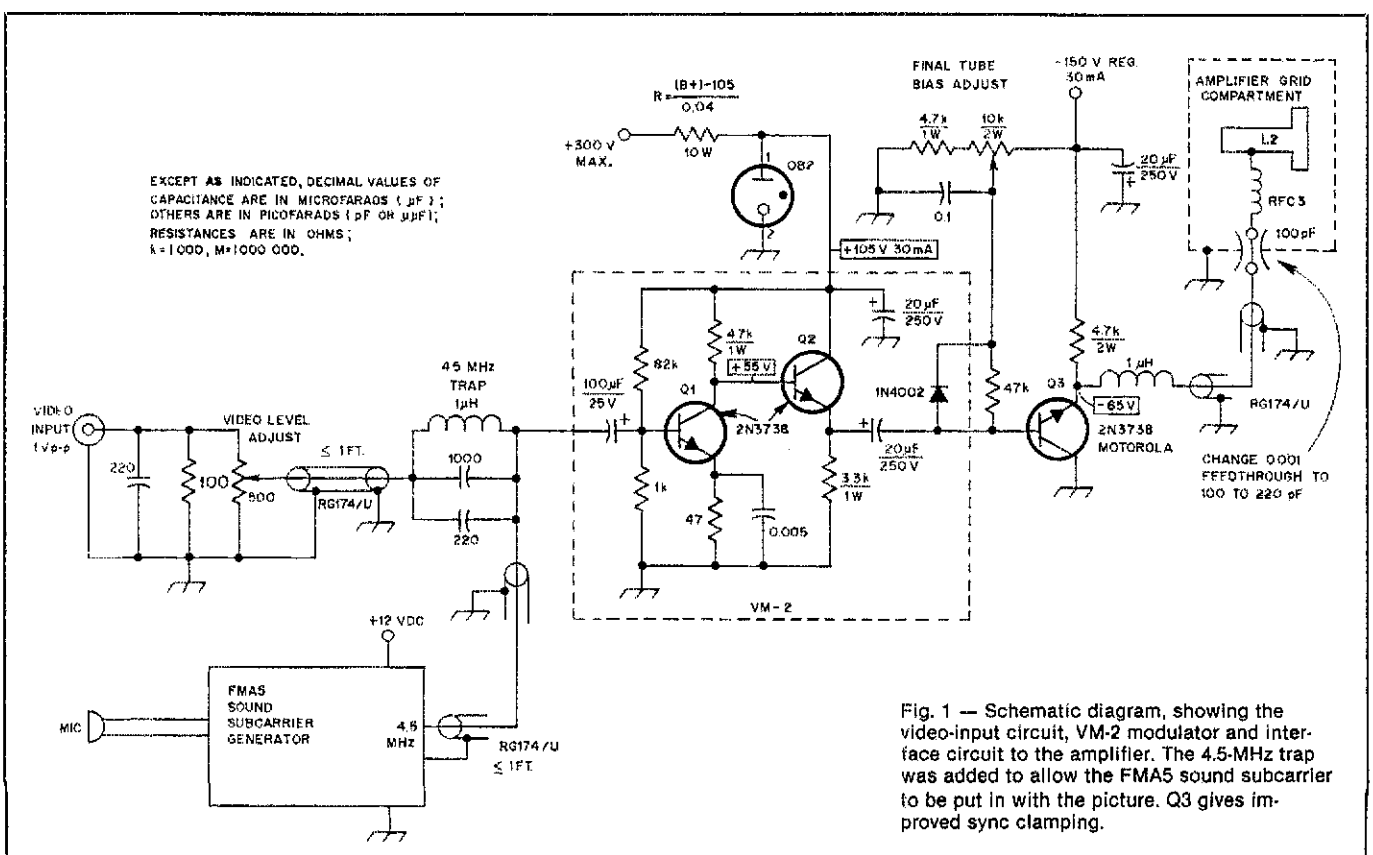


Fig. 1 — Schematic diagram, showing the video-input circuit, VM-2 modulator and interface circuit to the amplifier. The 4.5-MHz trap was added to allow the FMA5 sound subcarrier to be put in with the picture. Q3 gives improved sync clamping.

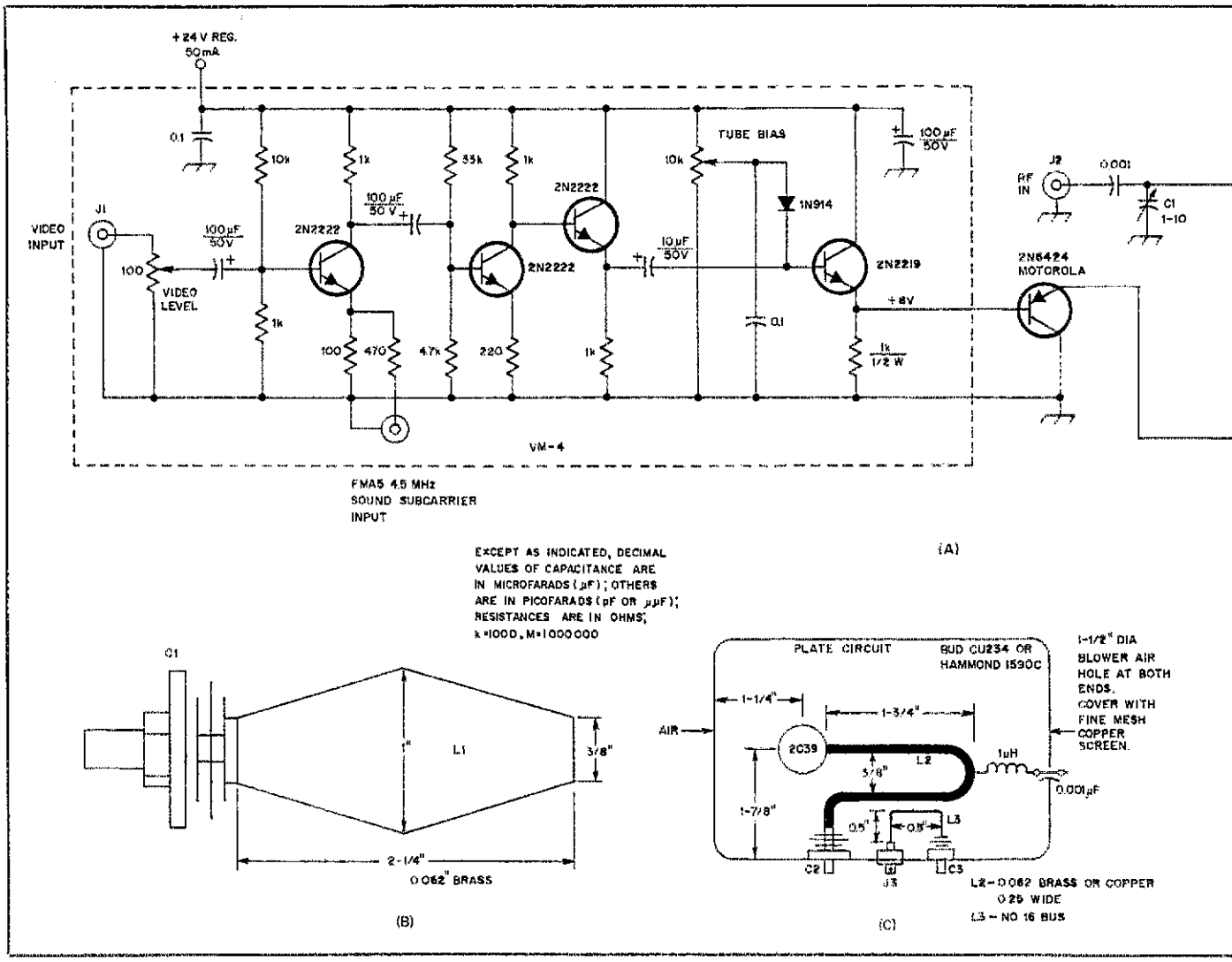


Fig. 2 — Schematic diagram showing a VM-4 modulator with an added 2N6424 transistor as a cathode modulator for a 2C39 amplifier tube. The grid is grounded for dc and rf to provide stability and efficiency. Operating bias is set by means of a 10-kΩ potentiometer on the VM-4 modulator. The 6-V filament transformer must be isolated from ground so that it doesn't attenuate the video. mm = inches x 25.4

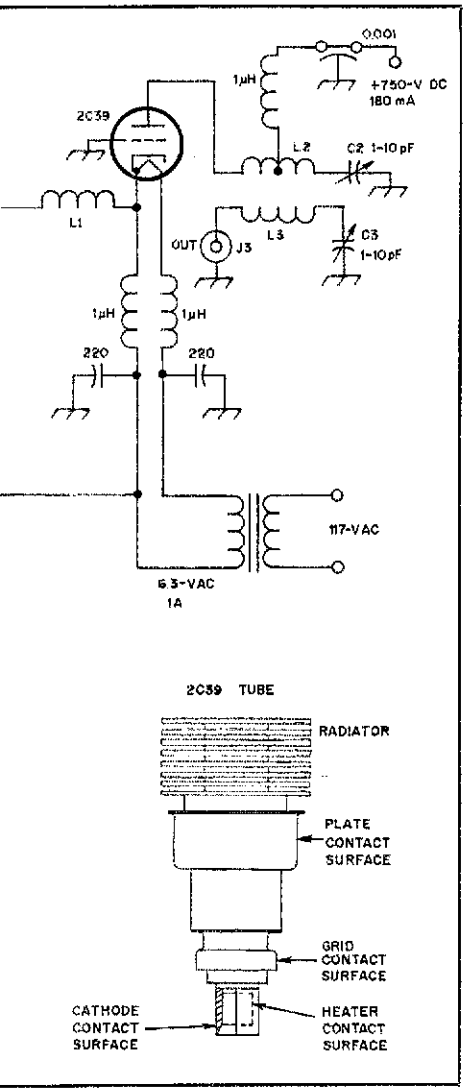
Tests on a Sota EDL432P amplifier, which has a 1/2-wave line, gave good linear sound and color with 50- to 60-W PEP out and 4- to 5-W PEP drive. These units are no longer being built, but the test proved the principle. Many long-time ATVers are familiar with the Motorola T44s, which use a 1/4-wave line and only give about 200 lines of resolution, with poor color and sound. The 2C39 tubes from these rigs can be used to provide nice 50-W linear amplifiers or cathode-modulated final amplifiers (Fig. 2).

The conversion description basically involves removing the housing, discarding the plate line, and removing the grid capacitor. The grid must be dc-grounded for video stability and rf efficiency. The cathode tuned circuit is also changed to lift it above ground. A 100-Ω, 5-W potentiometer can be used to set the tube operating bias at 10 mA under no-drive conditions, or, if high-level cathode modulation is desired, a P. C. Electronics VM-4 modulator can be inserted and the on-board, tube-bias potentiometer used. A blower is necessary at these power levels to keep the tube cool. The cathode is close to 50-Ω impedance as is, so a simple low-loaded-Q tuned circuit is put in for fine adjustment and does not affect the linear-mode video bandwidth significantly. The existing T44 plate line can be used if top-quality color and sound are not important to you. Or, you can build a video equalizing amplifier ahead of your modulator to compensate for the higher plate loaded Q. I think the change to a 1/2-wave line is much easier, and you can build it for best efficiency at the ATV frequency, rather than taking the lower efficiency of the existing 1/4-wave line designed for the 450-to 470-MHz commercial band. To make a nice neat assembly, the top cage can be replaced with a Hammond 1590C or Bud CU234 diecast aluminum box. Actually, it might be cleaner to use the T44 2C39 socket assembly and discard the rest. After all, the hard-to-get part is the concentric-ring socket assembly and mount. It can all be put on a chassis with blower, 750-V, 180-mA power supply, and may be self-contained with a 5-W exciter.

Solid State Amplifiers

Transistor amplifiers have the advantage of wide bandwidth. All three amplifiers I tested showed very little change in output power when switched between 439, 434 and 426 MHz. For an area that has many ATVers, all wanting to get on the air at the same time, it is as easy as flipping the frequency switch to QSY if the favorite calling frequency is busy. There is no need to retune. The color and sound are not degraded because of the low-Q matching circuits typical of these high-power uhf devices.

The other side of the coin is poor linearity. If you look at the input-power versus output-power curves of some of the popular uhf power transistors (Motorola RF Data Manual, for example) you will notice that the curve bends quite a bit, especially as the maximum-power point is reached. This nonlinearity will cause gain compression at the high-power end of the



signal (sync pulse and black levels). The average picture level will shift in favor of the darker shades of gray. Some people may actually prefer this picture, but, unless the system is adjusted to compensate for the compression, there may not be a stable picture if the sync is not at a sufficient level.

Different biasing methods can make small improvements in linearity, but only at the low-power end of the curve. A common-emitter rf-power amplifier with the base dc biased to ground through an rf choke may be considered Class C, but as drive is applied it may quickly approach Class B with a near 180 degree conduction of the rf sine wave. For ATV this would show up as turning the lighter shades of gray into white. A bias that allows a trickle of collector current ensures conduction at the low power modulation swing, providing a full range of grays and white.

Broadcast TV transmitters often have linearity-adjustment circuits in their modulators to compensate for any nonlinearities in the transmitter. For ATV, the most important part of getting a good picture to another ATVer is to have the TV receiver lock up to the transmitted sync. Included on the P. C. Electronics TXA5 exciter/modulator pc board is a sync-stretcher circuit that detects the incoming camera video sync, separates it from the video, and pulls up the modulator output only during sync time. This results in an output waveform that has much more sync than the camera is putting in. Rf-amplifier sync compression is thereby equalized (Fig. 3). The PEP output can be brought up from around 50% of the saturated power capability of the uhf power transistor to roughly 80%. The video portion does not have to be stretched because the maximum power point, or black level, is approximately the 50% point on the power curve, and goes downward, staying in the linear portion.

Tested Amplifiers

The three amplifiers sent by manufacturers to be tested for ATV were: a Microwave Modules MML432-50-W amplifier with a built-in receive "preamp" from Spectrum International, a KLM PA15-110CL 100-W amplifier and the Mirage D1010 100-W amplifier. All are basically the same type, consisting of a pair of power transistors in push-pull on a strip-line board. They all require an external regulated 13.8-V dc supply. The internal T-R relay or the PIN diodes switch automatically from receive to transmit, using rf sensing. All ATV PEP levels are given with full sync stretching; if you use an amplifier without sync stretching on ATV, try running it at 50% of full rated power.

Microwave Modules MML432-50

This unit took 5-W PEP drive to give 40-W PEP out on ATV. It has a single CTC CM50-12, which drew 8 A at 13.8-V dc. For fm or cw, the full 50-W output will require 10 watts of drive. The receive preamp is listed as a BFR34A on the schematic, but turned out to be an NE021. It provided 14.5 dB of gain and a noise figure equal to that of the popular MRF901. T-R switching is done by detecting some of the rf and activating a small relay, which turns on some UM9401 PIN diodes. The documentation that came with this unit was poor. While the basic schematic is given, the parts may be a little different. The diagram shows an 8-A fuse in the B+ line, but there is no fuse in the circuit! The "klutz" who always reverses the red and black power leads will have a "crispy critter" for an amplifier. I suggest you add a fuse in this line. Also, nowhere on the schematic or in the literature does it say which of the 5 pins on the DIN plug is the B+, or which one is ground. You have to open the case and trace the circuit to be sure. Pin 3 is ground, pin 5 is +13.8-V dc, and pin 1 can be grounded for push-to-talk with an ssb rig. The rf sensing does not have a switchable time constant for ssb. The amplifier does perform well and will give superior station performance if mounted at the antenna rather than in the shack.

100-Watt Transistor Amplifiers

The KLM and Mirage 100-W transistor amplifiers are similar and will be discussed together. Both use Motorola MRF648 60-W transistors in push-pull, driven by a single transistor. The Mirage unit uses a Motorola 25-W device (MRF644) as the driver transistor, and the KLM uses a TRW J03037 37-W driver transistor. The Motorola transistor curves show it to be loafing and linear at the required 20-W output level. It is well underrated at 25 W. The TRW device, on the other hand, is internally matched for zero reactance from 450 to 512 MHz, and is rated at 37 W full output with lots of compression. It's hard to say what the linearity is at 20 W, since the curves are not given in the TRW catalog. The Mirage amplifier also has a resistive input pad.

The KLM unit ran best at 65- to 70-W PEP with only 2.5 W of drive and full sync expansion, to give at least 50% sync output. The Mirage gave better than 75% sync at up to 90-W PEP output with 4 W of drive. Efforts to push it to the full 100-W output with 5 or more watts of drive just flattened the sync pulse. For fm or cw, 10 watts is more than enough to fully saturate either amplifier. The KLM unit had a maximum output of 100 W, but the Mirage amplifier delivered over 110 W.

Current draw at 70-W PEP was 15 A with the KLM, and 17 A at 90-W PEP with the Mirage. My Astron RS-20M 20-A power supply served well on ATV, but the 35-A version was needed for fm.

Antenna Mounting

If you consider that a 100-W signal in the shack will lose half the power going through 75 feet (23 m) of Belden 8214 foam dielectric RG-8/U cable to the antenna, the Microwave Modules amplifier will deliver the same power to the antenna when mounted next to it. Not only that, you will not have to adjust the bias potentiometer on your 10-W transmitter for 5-W output, since the 3-dB loss in the coaxial cable will take care of it. But the big plus is the extra 3 dB gained by the preamplifier on receive. Why give the guys watching your pictures all the benefits of your new system when you can double your station sensitivity on receive, too?

There is the effort and special considerations for mounting the box on the tower, but there are always practical trade-offs for improved performance. The amplifier will have to be mounted in a weatherproof aluminum box with a 13.8-V regulated supply. Even though the heat given off is lower with ATV, the amplifier will have to be silicone-greased

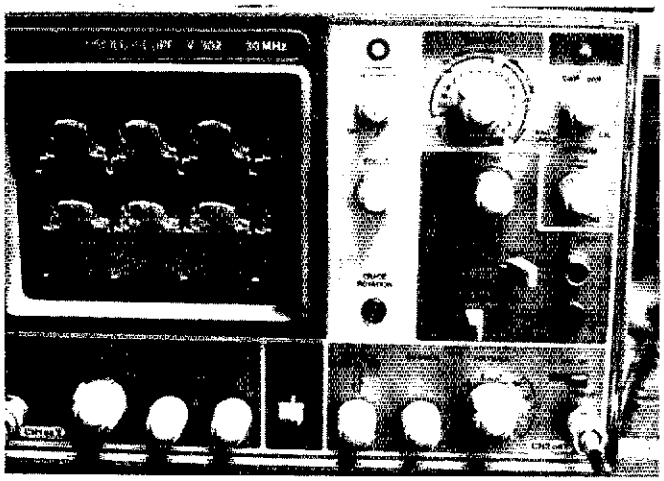


Fig. 3 — Oscilloscope used to observe the video waveform. The lower trace is the video signal as it comes out of the sync stretcher. The upper trace is the signal from the Mirage D1010-N amplifier.

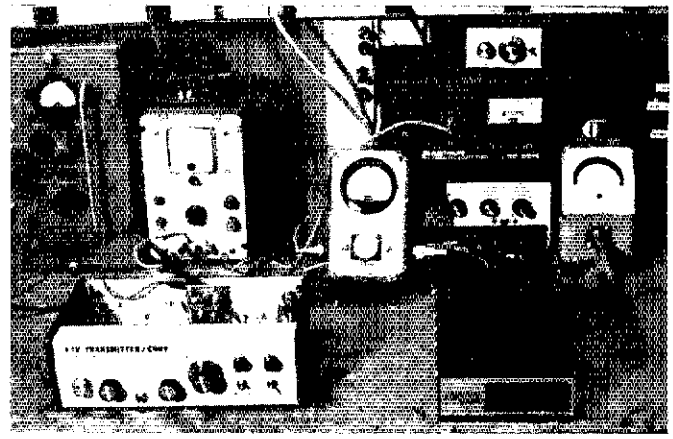


Fig. 4 — Setup used to test the three transistor amplifiers. Shown left to right is a TC-1 transmitter/converter with a DM-1 detector/monitor to sample the sync-stretched waveform, a Bird 43 Thruline wattmeter, the amplifier under test, another DM-1 inline to monitor the output waveform, and a Bird Termaline wattmeter/dummy load.

and mounted against the aluminum box. Use the rule-of-thumb temperature test! After the amplifier has been on a few minutes put your thumb on the heat sink. If, after gritting your teeth, and with tears forming in your eyes, you can hold your thumb on it, it will probably be okay. The power supply should also be tested for temperature rise, but aluminum angle brackets and direct mounting should do it. If running 117-V ac up the tower bothers you, try running the 20-V ac at 8 A between the power transformer in the shack and the bridge rectifier and regulator at the amplifier.

Why does the power supply have to be right next to the amplifier for ATV? Most regulated power supplies are designed for presenting a low impedance at the terminals, with good line and load regulation for 120-Hz ripple. With a-m, the load varies at the modulation rate. This amplifier draws 8 A at 13.8-V dc during sync pulses and at maximum signal levels, but draws only a few hundred milliamperes for the white level. It would not be so bad if we only transmitted vertical blanking pulses 60 times per second, because the big filter capacitors, regulator devices and time constants do a good job at these frequencies. But the current changes at video rates up to 5 MHz. The larger the filter capacitance, the higher the impedance at any given frequency above the audio range. This is caused mainly by the internal inductance and by what is called "equivalent series resistance." Add to that the small but significant resistance and inductance in the leads between the amplifier and the power supply, and a scope on the B+ supply at the amplifier will show a few volts of ripple that look like horizontal sync and video.

This ripple is another cause of sync compression, besides the normal gain curve of the uhf power transistors. Consider that the gain of the transistor is going to be much lower if the ripple component on the 13.8-V line swings down as much as 2 V to 11.8 V during the horizontal sync pulse. There are two ways around this problem; both things should be done, if possible. The only capacitors in the amplifier are for low-frequency stability in the uhf power transistors. They usually consist of a good quality bypass for 450 MHz, a 0.1- or 0.01-μF unit for the vhf frequencies and a 22-μF unit for hf and lower frequencies. But these won't do a thing for frequencies between 3 kHz and 500 kHz. Before I added 100-μF and 470-μF capacitors (25 V), the circulating current in the Mirage amplifier was too much for the 22-μF unit after 10 minutes of continuous video at 90-W PEP. Next, the power leads should be as short in length and as large in wire size as possible to ensure a good regulated supply. Anything over 3 feet (1 m) may be too long, so building a supply next to the amplifier is ideal.

Test Setup

The test setup consisted of a P. C. Electronics TC-1 Transmitter Converter with the sync stretcher built into the TXA5 exciter modulator, a DM-1 rf demodulator to sample the driving video waveform, a Bird Model 43 Thruline wattmeter with a 25-W, 400- to 1000-MHz slug and the amplifier under test. Also included were another DM-1 to sample the high-power video waveform and a Bird Termaline wattmeter with a 100-W, 400- to 1000-MHz slug and dummy load (Fig. 4). The sound subcarrier was shut off to display a clear video-only waveform on the dual-trace 30-MHz scope.

To set up any amplifier without a scope or a DM-1 demodulator, try this procedure:

1) Add the sync-stretcher parts to the TXA5 exciter, or the P. C. Electronics SS-1 sync-stretcher board to your transistor modulator.

2) Remove all video from the modulator input. The sync stretcher will put out sync if the video is still connected but turned down. Also, turn the 4.5-MHz subcarrier injection-level potentiometer to minimum.

3) Rotate the bias potentiometer, which controls the clamped PEP power output, to minimum (fully ccw).

4) Turn on the amplifier and the transmitter. Slowly rotate the bias control until just reaching the suggested PEP output for best ATV operation.

5) Now, the video can be reconnected and the video gain can be increased slowly for the best picture. Turn the sync-stretcher control cw for a good, stable picture. For most amplifiers this is fully cw or within 10 degrees of full rotation, and there is some interaction with the video-gain control. Turn the 4.5-MHz subcarrier-injection potentiometer back to the original position.

Linear, full-bandwidth, a-m video requires a little extra care and consideration. Whether you select a tube or a transistor amplifier to throw your pictures farther and clearer, I hope the results of these tests will help you achieve good, stable video.

My personal thanks to Mel Farrer, K6KBE, at KLM; Ken Holladay and Everett Gracey, WA6CBA, at Mirage; John Beanland, G3BVU/W1, at Spectrum International; and Fred Merry, W2GN, at ARCOS. The loan of their off-the-shelf amplifiers made this study possible.

Notes

[1]R. Knadle, Jr., "A Strip-Line Kilowatt Amplifier for 432 MHz," *QST*, April 1972, pp. 49-55 and May 1972, pp. 59-62.

[2]ARCOS, P.O. Box 546, 35 Highland Dr., East Greenbush, NY 12061.

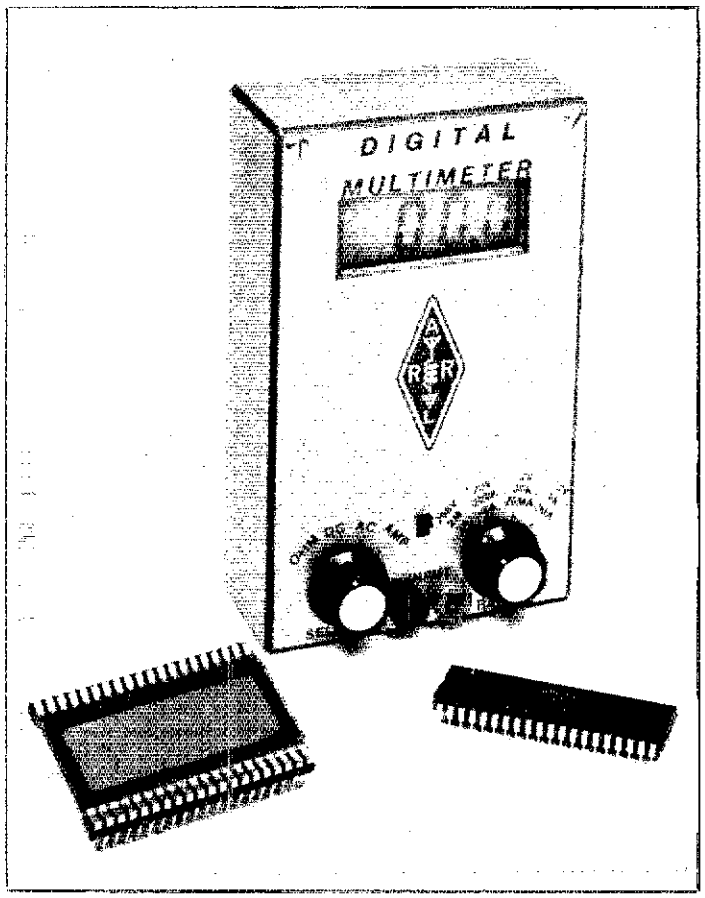
References

Rusgrove, J. and G. Woodward, eds. *The Radio Amateur's Handbook* (59th edition). Newington: The American Radio Relay League, Inc., 1981.

A good continuing source of ATV information is *A5*, P.O. Box H. Lowden, IA 52255.

BEGINNER'S BENCH

Learning to Work with Integrated Circuits, 1982 Style



Ever wished you had a digital multimeter? We'll show you how easy it is to build one and learn about modern ICs at the same time.

By Bob Shriner,* WAØUZO and George Collins,** KC1V

It is well known that one of the best ways to learn is by *doing*. This idea prompted the 1976 *QST* series, "Learning to Work with Integrated Circuits."[1] It was an outstanding series and is still recommended reading today. The "doing" part of the series involved the construction of a digital voltmeter/frequency counter. Both of these are handy items in the ham workshop, but the meter contains over 25 integrated circuits (ICs), weighs 4-1/2 lb and consumes 5 watts of power.[2] Today, six years later, the world of integrated circuits has changed — drastically. Using the same learn-by-doing approach, let's examine some modern ICs.

We could have entitled this article "Learning to Work with Integrated Circuits, LSI Style," because LSI (large-scale integration) ICs represent the technology of today. The "large" in LSI refers to the number of components (such as transistors) formed on the IC "chip" or substrate. LSI devices contain several hundred to a few thousand components. Most LSI ICs are digital rather than analog in nature, although some combine both types of circuitry on the same chip. Many functions for which LSI devices have been designed were, in the past, performed with standard TTL (transistor-transistor logic) or CMOS (complimentary metal-oxide semiconductor) devices, such as the 7400- and 4000-series ICs. It takes large numbers of these small-scale-integration (SSI) devices to implement complex functions, such as a multimeter or a frequency counter. This made the equipment large, expensive and power-hungry. The introduction of LSI ICs has solved these problems in many cases.

"Great, but what can *I* do with LSI?" For one thing, you can build a digital multimeter weighing just 10 oz that will operate (for over 200 hours) from a 9-V transistor-radio battery. Oh yes; the meter will fit easily into your coat pocket! Our "doing" project this month is the construction of just such a meter. Along the way, we'll look at how you can apply these LSI marvels to your own projects.

Our workshop project is a 3-1/2 digit multimeter with a liquid-crystal display (LCD). With it you will be able to accurately measure ac and dc voltages and currents. You can also measure resistances as low as 1 Ω. Other features include automatic zero adjustment and automatic polarity indication.

First, how do we find out about the various LSI devices that are available and how to use them? You don't need a library of data books from every IC manufacturer to locate the more popular LSI ICs. Many electronic-component suppliers' catalogs are good sources of information about new ICs. Often, along with the device number, the manufacturer and the price, a brief description of each IC is given in the catalog. This can help you "zero-in" on appropriate devices. The next step is to obtain data sheets (and application notes) from the manufacturers. These contain all the important specifica-

[1]Notes appear on page 33.
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**Basic Radio Editor

tions, and will be essential when you start designing LSI ICs into your own projects.

Selecting the IC

For this project, the Intersil[3] ICL 7106 looked promising. It is described as a 3-1/2 digit, single-chip A/D (analog to digital) converter. A quick look at the data sheet showed that it is exactly what we needed. Intersil provides detailed application information, making the job of applying the 7106 to our multimeter project easy. All the active components needed for our project are contained in the 7106. It consists of over 2000 tran-

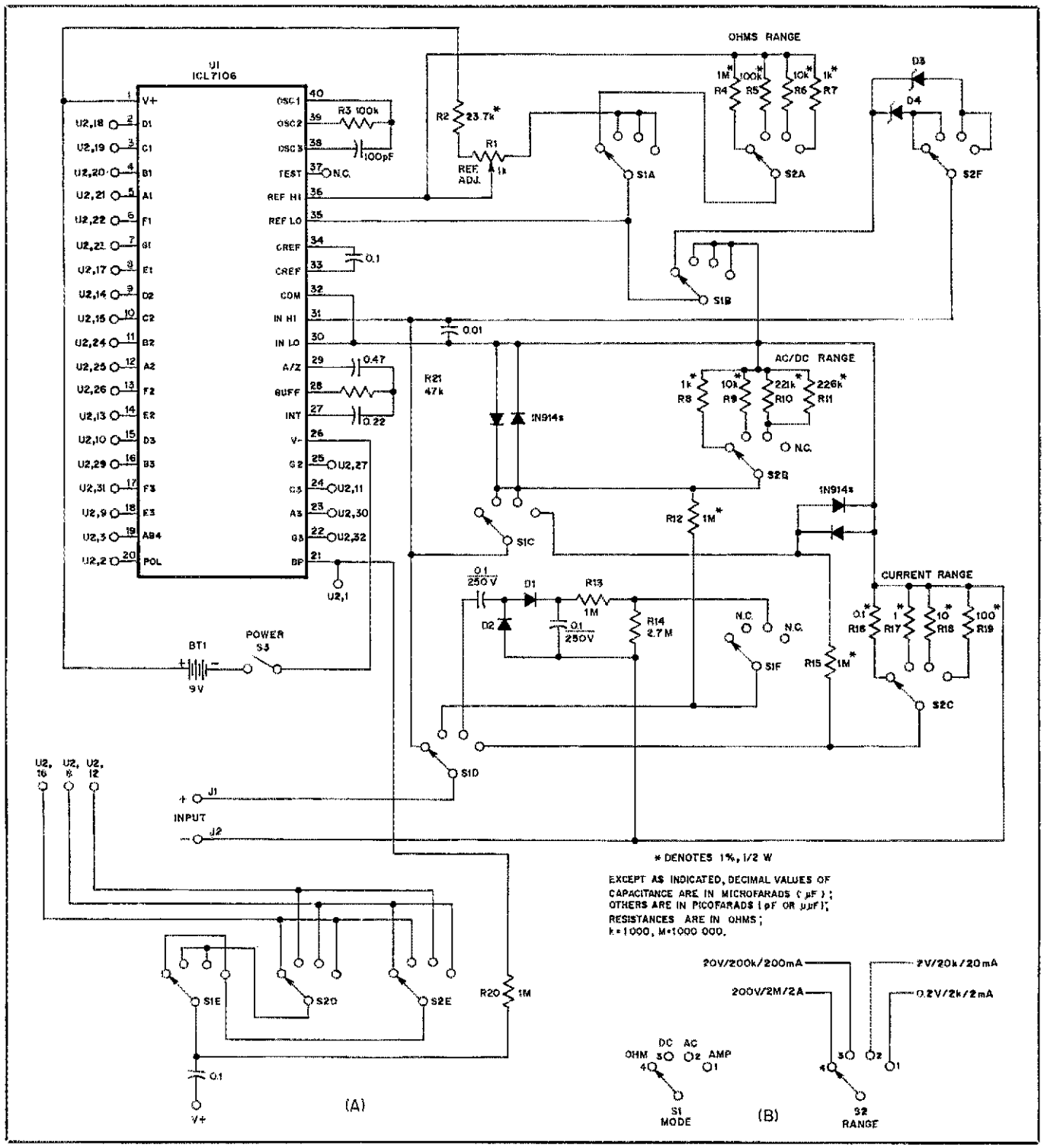


Fig. 1 — Digital multimeter schematic diagram (A). S1 is shown in the OHMS position, and S2 is shown in the 2-MΩ position. The switch-position numbering (B) corresponds to the numbering used in Fig. 3. Resistors marked (*) are 1%, 1/2-W units; others are 5%, 1/4-W carbon types.[5]

BT1 — 9-V transistor-radio battery.
D1, D2 — 1N4007 silicon rectifier diode.
D3 — 1N5228B 2.5-V, 1/2-W Zener diode.
D4 — 1N5231B 5.1-V, 1/2-W Zener diode.
J1, J2 — Banana jack.
R1 — 1-kΩ, 10-turn, pc-mount potentiometer.
S1, S2 — 6-pole, 4-position rotary switch, Mouser[6] no. 10WR064 or equiv.
S3 — Miniature slide switch, spst, Mouser no. 10SP008 or equiv.
U1 — Intersil ICL 7106 single-chip A/D converter.
U2 — 3-1/2 digit liquid-crystal display, Hamlin 390 23 155 or equiv.

sistors and other components on a semiconductor chip about the size of a match head. A 40-pin dual-in-line package houses the chip. One important reason for selecting this IC is the type of display with which it is designed to be used. The LCD used with the 7106 consumes very little power, making it ideal for battery-powered equipment.

Circuit Description

The A/D converter used in the 7106 is known as a dual-slope integrating converter. This converter type is highly accurate, but relatively slow. In our application, speed is not an important factor, and the 3 conversions-per-second rate at which the 7106 is operated is satisfactory. In fact, if the rate were too high the display would be difficult to read. The conversion rate (and the display update rate) is controlled by an internal oscillator. The oscillator frequency is determined by the value of R3 and the capacitor connected to pins 38, 39 and 40 of U1 (see Fig. 1). A frequency of 48 kHz gives us the desired 3 conversions-per-second rate and also yields optimum rejection of line-frequency (60 Hz) noise.

With an analog voltmeter, you measure voltage directly. This is not the case when you are using a digital meter. Instead, the unknown voltage is compared, in the A/D converter, to a known reference voltage. The output from the converter is equal to the *ratio* of the two voltages. For example, if we chose a 50-mV reference and the voltage we are measuring is 150 mV, the ratio is

$$\frac{150\ \text{mV}}{50\ \text{mV}} = 3.00 \qquad \text{(Eq. 1)}$$

To determine the unknown voltage value, we multiply the ratio by the reference value

$$3.00 \times 50.0\ \text{mV} = 150\ \text{mV} \qquad \text{(Eq. 2)}$$

If we had to multiply the display reading by some number every time we made a measurement, we would soon be using our analog meter again! Fortunately, we can solve the problem by choosing the reference voltage carefully. If the reference is a multiple of 10, we can take care of the multiplication simply by moving the decimal point. If, instead of a 50-mV reference, we use 100 mV and position the decimal point properly, the meter will read directly in millivolts.

$$\frac{150\ \text{mV}}{100\ \text{mV}} = 1.50\ (\text{or } 150\ \text{mV}) \qquad \text{(Eq. 3)}$$

S1E, S2D and S2E are used to select the correct decimal-point position as we change ranges and modes.

Our reference-voltage choice also determines the full-scale meter sensitivity. With a 3-1/2 digit meter, the largest ratio that can be displayed is 1.999 (left-most digit is called a half digit because only 0 or 1 can be displayed there). With a 100-mV reference, our maximum reading is 199.9 mV. This is rounded off and referred to as 200 mV full-scale.

An internal regulator maintains the voltage between V+ (pin 1) and COMMON (pin 32) at 2.8 V. This is used to supply the reference voltage by connecting a divider (R1 and R2) between these pins. By adjusting the divider, the reference voltage can be set to the required 100-mV value.

To extend the full-scale reading to higher voltages, a range divider (R8 through R12) is used. The resistance values have been selected so that the desired full-scale voltage results in 200 mV being applied to the meter input.

To use the basic meter as an ammeter, we measure the voltage drop across a series resistor (R16 through R19). The full-scale current is determined by the value of the series resistor selected. Alternating current and voltage are measured by converting the input to a dc voltage. A half-wave voltage doubler (D1, D2 and the 0.1-μF capacitors) is used for this conversion. The dc voltage from the doubler is equal to the peak-to-peak ac signal value. R13 and R14 are used to scale the dc voltage so that our meter reading will reflect the ac-input rms value.

When measuring resistance, the reference voltage is not needed. Instead, a known-value resistor, or standard, is placed across the REF input, and the unknown resistance is connected across the unknown input. The standard and unknown are connected in series through D3 or D4 (depending on the resistance ranges), and a current is passed through the two resistances. A voltage drop is developed across each resistance and, because the same current is flowing in both, the ratio of the voltage drops is equal to the resistance ratio. We can select any resistance range we like, simply by changing the standard resistor value. The full-scale reading is always twice the value of the standard resistor. D3 and D4 are needed to ensure that the voltages developed at the IC inputs are within the correct range.

Diodes across the input are used to protect the IC from excessive voltage. The auto-zero and integration capacitors (pins 39 and 27) must have good dielectric properties. The Mylar capacitors we used have proven to be satisfactory.

Construction

To simplify construction, we have used an etched-circuit board.[4] This eliminates a "rat's nest" of wires between U1 and the LCD (Fig. 2). Only the connections to S1 and S2 require point-to-point wiring. These connections are shown pictorially in Fig. 3.

Part of every home-construction project is packaging the finished equipment in a case or cabinet. It seems that every builder has his or her favorite style of enclosure, and you can package this multimeter almost any way you like. We used a homemade circuit-board case for the unit shown in the photographs. This makes a compact and inexpensive enclosure. One advantage of this construction style is that you can tailor the case to fit your project, rather than making your project fit someone else's

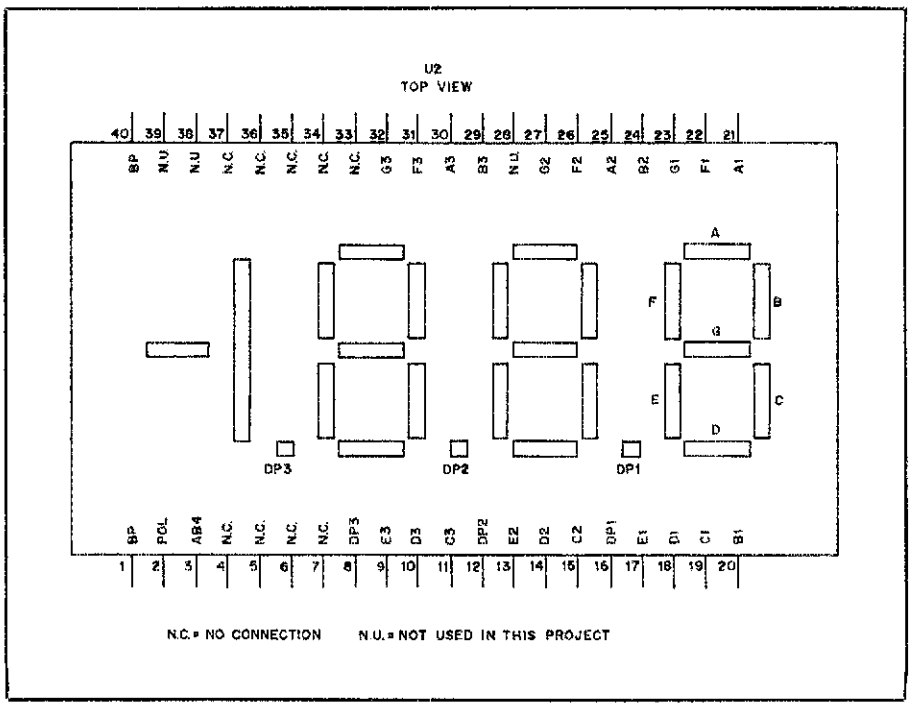


Fig. 2 — Pinout of the LCD. Display is shown as viewed from the top (viewing side). The right-hand digit is number one.

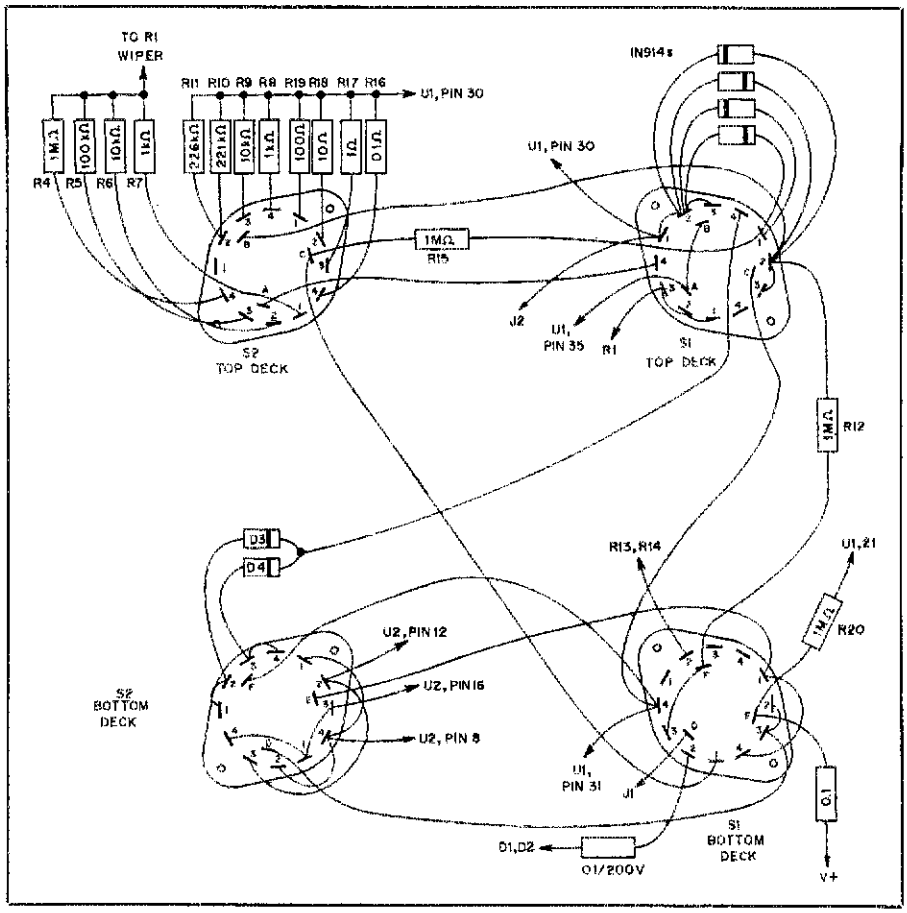


Fig. 3 — Pictorial wiring diagram of the multimeter. The switches are shown as viewed from the rear. Each switch section has three poles, and the arm of each pole is labeled with a letter. These letters correspond to those used in Figs. 1 and 5.

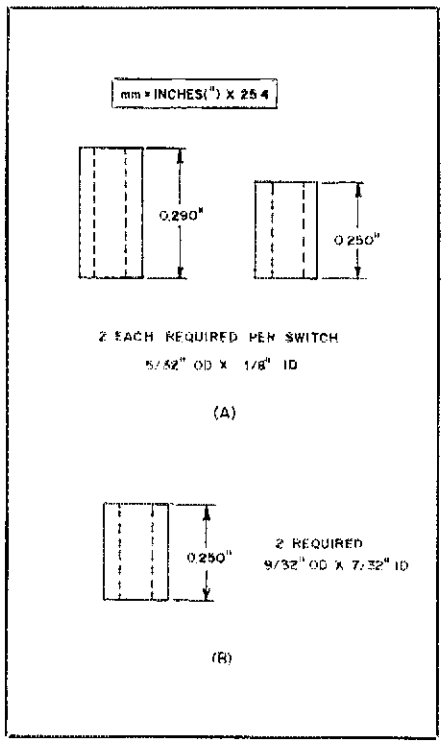
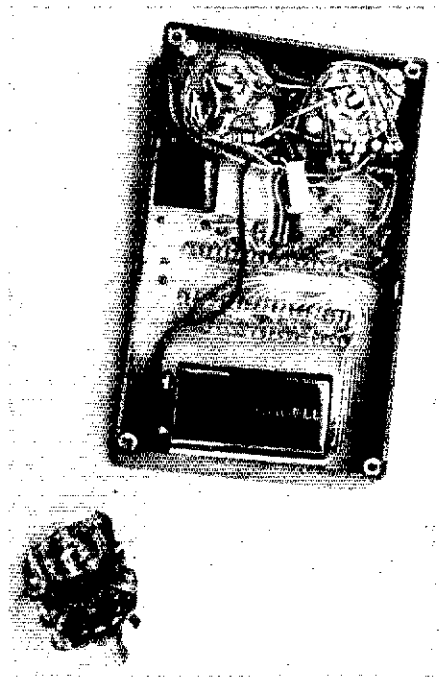


Fig. 4 — Six spacers are required for each switch. Those shown at A are placed over the switch screws. The larger spacers (B) are placed over the switch shaft.



Inside view of the digital multimeter. The battery is held in place by means of double-sided adhesive tape. Also shown is an unmodified switch. The loop portion of each terminal is cut off before the switch is wired into the circuit. R20 is not shown (see Fig. 5). A pad for this resistor is included on later circuit boards.

case. With a little practice and careful workmanship, you can produce attractive circuit-board cases using simple hand tools. If you choose another type of enclosure, be sure to plan the mounting details before you begin assembling the meter.

Our first step is to prepare the switches for mounting on the circuit board. Carefully disassemble one switch. You will need to make six spacers shown in Fig. 4. These can be made by filing the original spacers to the correct lengths. Two more 1/4-inch-long spacers will be required later. These can be made from 5/32-inch diameter metal tubing available at many hobby stores.

After preparing the spacers, place the switch detent assembly on the component side of the board. Pass the switch screws through the board, and then place one of the longer spacers over each screw. Orient the first switch section as shown in Fig. 3 and slide it into place. Now, drop a short spacer onto each screw and place the large-diameter spacer over the switch shaft. Place the remaining switch section in position. Check to make sure you have assembled the sections correctly, and then put the nuts on the screws. If the spacers are the correct lengths, and all the parts are in the proper positions, the screws will extend about 3/16 inch beyond the surface of the nuts. Cut or file the screws flush with the nuts. Be sure to remove any filings that fall into the switch. Repeat this procedure for the second switch. When you have finished, a final check against Fig. 3 and the photographs is a good idea. The last switch-assembly step is to cut off the loop portion of each switch terminal. These loops are not needed; removing them allows us to mount the switches closer to the sides of the case. You can easily solder wires and component leads to the remaining tabs. First, tin the tab and the wire. Place the wire in contact with the tab and heat them with your soldering iron. Most of the time you will not have to apply additional solder. Always keep your soldering iron tip clean and tinned.

You can now begin mounting the components on the circuit board. Start with the resistors and capacitors that are located on the top (component side) of the board. This is a good time to install the three jumper wires and S3 (see Fig. 5). Use a small amount of quick-setting epoxy cement to fasten the larger capacitors to the circuit board. Next, install the LCD (U2). It is mounted slightly above the board surface. In this way the display face will fit flush against the case front panel. Here is a simple way to ensure that the display is positioned in exactly the correct location: Place a mounting nut on each switch shaft and screw them on approximately 1/4 inch. Slip the LCD in place. Be sure it is oriented properly. It's no fun unsoldering 40 IC pins, so check it carefully! You can see the display digits by viewing the LCD in reflected light (hold

the display at an angle to your light source). Place the front panel in position. Use no. 4-40 hardware and two 1/4-inch-long spacers to secure the panel to the circuit board near the display. By turning the switch mounting nuts, adjust the panel-to-board spacing until it is 1/4 inch at each end. Secure the panel with two more switch nuts. Put the unit face down on your bench, and tap the display pins gently to seat it against the panel. Solder *one* LCD pin in each row and recheck the alignment. If all is well, solder the remaining pins.

U1 can be installed next. While it is difficult to damage this IC, some precautions are worthwhile. Static is your greatest enemy at this point. Don't walk across a carpeted room and then pick up the IC! Touch a grounded surface before handling the IC. Use of a grounded-tip soldering iron is advisable. Once the IC is soldered in place, it is relatively safe from static damage. Before you solder all 40 pins, double-check the position against Fig. 5.

Each wire that connects a circuit-board pad to a switch terminal is routed through the hole between the switches. Use no. 28 solid-conductor insulated wire for these connections. It is wise to use wire with color-coded insulation, as this makes circuit tracing easier. It's also a good idea to record the color code of each wire on your schematic diagram for future reference.

After connecting all the wires that go to and between the switches, install those components that mount on the etched side of the board. Put in the resistors (last) that connect to S2. Pieces of slip-on insulation should be placed over any resistor leads that might short circuit to another lead or to the switch. Most of the resistors used in this meter are 1%-tolerance types. There are five color-code bands on these resistors. The first, second and third bands are the significant figures, and the fouth band is the multiplier. The last band is always brown. Generally, the first is narrower than the others. A 221-kΩ resistor is coded: red (narrow band), red, brown, orange, brown. If you are not sure about a resistor value, check it with a VOM (volt-ohm-milliammeter) to determine the approximate value.

Attach temporary test leads to S1 (in place of the leads going to J1 and J2), and you are ready to test your multimeter. Short the test leads together, and check to see that the meter reading is zero on all ranges. This meter has no zero adjustment (the IC "takes care" of it for you), so if you don't obtain a zero reading it's time for a little troubleshooting. Most likely, the problem is a wiring error. A thorough inspection should reveal the source of the trouble.

Next, you must set the reference adjustment, R1. This is the only adjustment required, but it is an important one. The meter accuracy depends on how precisely you can make this setting. If possible, borrow a digital voltmeter known to be accurate to 1% or better for use as a reference. Connect the reference meter between U1 pins 35 and 36. Adjust R1 until the reference meter reads 0.100 V (100 mV). That finishes the calibration, and you are set to go!

"I can't borrow a precision voltmeter. What do I do?" Don't worry, there is a way to adjust the multimeter without a second meter. All you need is a fresh carbon-zinc flashlight battery. The open-circuit voltage at the terminals of an unused cell is close to 1.54. To calibrate your meter, place the MODE switch in the dc-voltage position. Connect the test leads to the battery, and adjust R1 for a reading of 1.54 V (set the meter to the 2-V full-scale range). That's all there is to it.

You'll want to check the operation of the other ranges and modes before putting your multimeter in the case. A regular VOM can be used for this. Because we used 1%-range resistors, you can be fairly certain that the multimeter is accurate if the readings are within 10% of the VOM readings.

Even with all the features offered in this meter, you can be sure someone is wondering why we didn't include a frequency counter. Remember what we said about projects of your own? Perhaps an LSI IC frequency counter would be just the right project for you to learn a little more about ICs — LSI style!

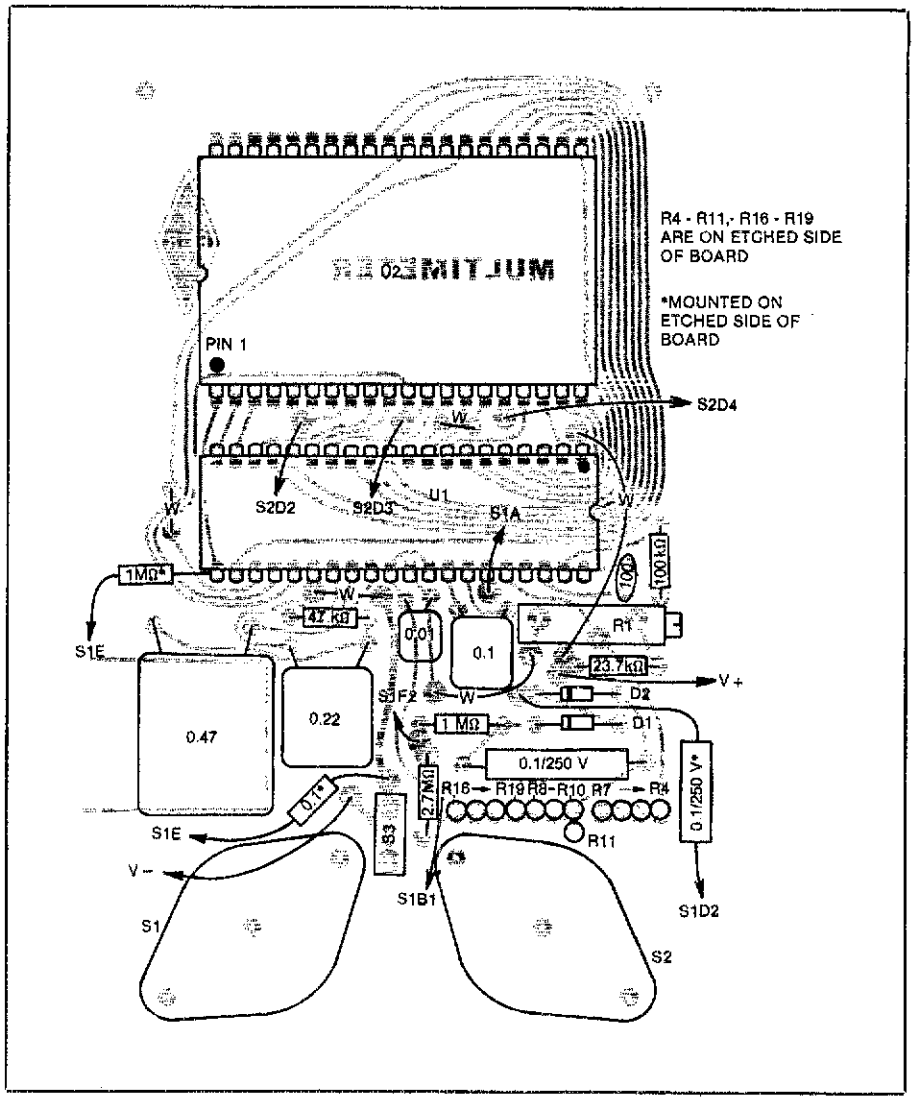


Fig. 5 — Full-scale parts-placement diagram. The circuit board is shown as viewed from the component side. Gray areas represent an X-ray view of the unetched copper. A number of components are mounted on the etched side of the board; these are marked (*).

Notes

[1] J. L. Hall and C. Watts, "Learning to Work with Integrated Circuits," *QST*, Jan. through Oct. 1976 and June 1977.

[2] kg = lb × 0.454; g = oz × 28.4.

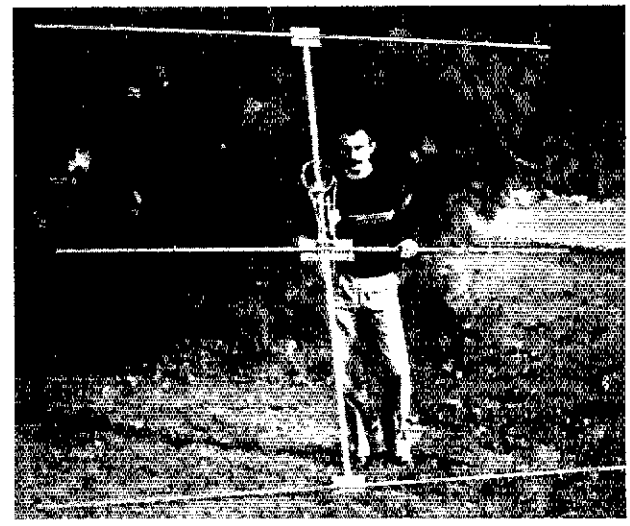
[3] Intersil, Inc., 10710 N. Tantau Ave., Cupertino, CA 95014. Intersil components and data books are available from Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002.

[4] Circuit boards, negatives and complete parts kits for the digital multimeter and the circuit-board case are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

[5] Precision resistors and other components are available from Mouser Electronics, 11433 Woodside Ave., Santee, CA 92071.

[6] See note 5.

Go for the Gain, NBS Style



Ever wonder why some vhf Yagis seem to have that extra oomph? Learn about the NBS formula for success!

By Dennis J. Lusis,* W1LJ

Have you been in a vhf pileup lately? If so, then you recognize the demand for high-performance antennas. While a number of excellent commercial Yagis are available, the home builder is often left to outdated designs that provide marginal performance by today's standards. This article introduces a generation of gain-optimized Yagi antennas originally described by Viezbicke in *National Bureau of Standards Technical Note 688.*[1] These antennas have been reproduced for use in the amateur vhf and uhf bands with excellent results. Construction guidelines are provided for a 3-element, 50-MHz NBS Yagi that may be used for fixed-station or portable use. Additional data provided allows the builder to construct a larger 50-MHz array, or one for another vhf or uhf band.

The NBS Yagi

Since its conception in 1926, the Yagi-Uda antenna,[2] commonly known as the Yagi, has become the most widely utilized directive array in vhf and uhf communications. Many technical reports have been published regarding the proper tuning of Yagis. Until recently, practically no information was available regarding how element diameter, element length, spacing of the elements, boom diameter and overall length affect the gain. The National Bureau of Standards (NBS) attempted to determine these relationships in their study. Viezbicke's report describes the results of testing carried out for nearly a decade by the NBS at its Sterling, Virginia, and Table Mountain, Colorado, antenna test ranges. The results were used later by others such as Lawson and Reisert[3] who used the data to verify computer-generated models of Yagi performance. Although discrepancies exist between the Lawson and the NBS findings, the greater number of similarities between computer and empirical data add credibility to both.

NBS Test Procedures

All NBS modeling was done at 400 MHz. The test antenna was placed at the receiver end, and was separated approximately 1000 feet[4] from the transmitter and its antenna. Both antennas were mounted 3 wavelengths (λ) above ground. The test Yagi was compared to a reference dipole position 5 λ to one side, and at the same height as the Yagi. The test Yagi and the reference dipole were matched to 50 Ω and compared using a calibrated step attenuator. Gain was reproducible to within 0.2 dB throughout the test.

NBS Test Results

The NBS antenna testing provided useful information for antenna builders. Here, for the first time, experimenters could determine how dimensional aspects of their designs would interact and ultimately affect the performance of their antennas. A complete overview on how all design parameters interact is beyond the scope of this article; the reader is referred to *NBS Technical Note 688* for more detailed information. For convenience, the element dimensions yielding maximum gain for vhf and uhf Yagis are given in Tables 1 through 4. These lengths were calculated from the NBS test results. Element spacing for the various arrays are shown in Fig. 1.[5] Note that the tables specify exact boom and element diameters. Strict adherence to these dimensions will result in a Yagi of exceptionally high gain. If the builder wishes to construct a Yagi from available materials differing in size from those specified, he should consult Table 5 and the charts in Figs. 2 and 3 for conversion data.

Using the Conversion Charts

It has long been known that the diameter-to-wavelength ratio of a supporting boom affects the tuning of Yagi elements. Determining the characteristics of this effect was one of the primary objectives in the NBS study. Fig. 3 illustrates how optimum element length varies with boom diameter changes. When boom diameter increases, elements must be lengthened proportionately to remain at optimum length. For example, using 50.1 MHz as a design frequency, let us see exactly how much element length must be increased for given increases in boom and element diameter.

Table 1 gives a 3-element, 50-MHz Yagi boom length of 7 ft. 10 in. (0.4 λ), and a diameter of 1-1/4 in. Element diameter is 1/2 in. We would like to substitute a 2-1/2 in. diameter boom, and 3/4-in. diameter elements. To calculate the proper element lengths for any NBS Yagi, the following information must first be specified:

$$\lambda = \frac{299.01}{50.1\ \text{MHz}} = 5.97\ \text{m or } 235\ \text{in.} \qquad \text{(Eq.1)}$$

(The velocity of light is expressed as 299.01×10^6 m/sec.)

Element diameter (d): 0.75 in. Element diameter, expressed in terms of wavelength (d/λ)

$$\frac{0.75\ \text{in.}}{235\ \text{in.}/\lambda} = 0.0032\ \lambda \qquad \text{(Eq. 2)}$$

Boom diameter (D): 2.5 in. Boom diameter, expressed in terms of wavelength (D/λ)

$$\frac{2.5\ \text{in.}}{235\ \text{in.}/\lambda} = 0.0106\ \lambda \qquad \text{(Eq. 3)}$$

After calculating these values, refer to

[1]Notes appear on page 38.
*ARRL Assistant Technical Editor

Table 1

NBS 50.1 MHz Yagi Dimensions

Boom Length	Boom Diameter	Element Diameter	Ref	Driven	Dir. 1	Dir. 2	Dir. 3	Dir. 4	Dir. 5	Dir. 6	Dir. 7	Dir. 8	Dir. 9	Dir. 10
7' 10"(0.4 λ)	1-1/4"	1/2"	9' 7-3/4"	9' 1-3/4"	9' 1 3/8"									
15' 8-1/2"(0.8 λ)	2"	3/4"	9' 7"	9' 1-3/4"	8' 9-5/8"	8' 8-7/8"	8' 9-5/8"							
23' 6-7/8"(1.2λ)	2"	3/4"	9' 7-3/4"	9' 1-3/4"	8' 10-1/4"	8' 8-7/8"	8' 8-7/8"	8' 10-1/4"						
39' 3-3/8"(2.2λ)	2"	3/4"	9' 7-3/4"	9' 1-3/4"	8' 11"	8' 8-1/8"	8' 6-1/2"	8' 4-5/8"	8' 3"	8' 3"	8' 3"	8' 3"	8' 4-5/8"	8' 6-1/2"

meters = 0.3048 × feet
mm = 25.4 × inches

Table 2

NBS 144.1-MHz Yagi Dimensions

meters = 0.3048 × feet
mm = 25.4 × inches

Boom Length	Boom Diameter	Element Diameter	Ref	Driven	Dir. 1	Dir. 2	Dir. 3	Dir. 4	Dir. 5	Dir. 6	Dir. 7	Dir. 8	Dir. 9	Dir. 10	Dir. 11	Dir. 12	Dir. 13	Dir. 14	Dir. 15
5'5-9/16"(0.8λ)	1"	3/16"	3'4-5/8"	3' 2-3/16"	3'1-1/2"	3'1-3/8"	3'1-1/2"												
8'2-5/16"(1.2λ)	1"	3/16"	3'4-5/8"	3' 2-3/16"	3'1-1/2"	3'1-1/8"	3'1-1/8"	3'1-1/2"											
15'1/4"(2.2λ	1 1/4"	3/16"	3'4-13/16"	3' 2-3/16"	3'1-15/16"	3'5/8"	3'	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	3'	3'5/8"				
21'10-1/16"(3.2λ)	1 1/2"	3/16"	3'5-1/16"	3' 2-3/16"	3'1-15/16"	3'1-3/8"	3'13/16"	3' 3/16"	3'	2'11-5/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"	2'11-3/8"
28'8-1/8"(4.2λ)	1 1/2"	3/16"	3'4-1/2"	3' 2-3/16"	3'1-5/8"	3'1-5/8"	3'1-7/16"	3'11/16"	3'9/16"	3'3/16"	2'11-7/8"	2'11-5/8"	2'11-5/8"	2'11-5/8"	2'11-5/8"	2'11-5/8"	2'11-5/8"		

Table 3

NBS 220.1-MHz Yagi Dimensions

meters = 0.3048 × feet
mm = 25.4 × inches

Boom Length	Boom Diameter	Element Diameter	Ref	Driven	Dir. 1	Dir. 2	Dir. 3	Dir. 4	Dir. 5	Dir. 6	Dir. 7	Dir. 8	Dir. 9	Dir. 10	Dir. 11	Dir. 12	Dir. 13	Dir. 14	Dir. 15
3'6-15/16"(0.8λ)	1"	3/16"	2'2-1/16" 2'2-3/4"	2'1"	1'11-13/16" 2'1/2"	1'11-11/16" 2'3/8"	1'11-13/16" 2'1/2"												
5'4-3/8"(1.2λ)	1"	3/16"	2'2-1/16" 2'2-3/4"	2'1"	1'11-13/16" 2'1/2"	1'11-9/16" 2'1/4"	1'11-9/16" 2'1/4"	1'11-3/16" 2'1/2"											
9'10"(2.2λ)	1"	3/16"	2'2-1/16" 2'2-3/4"	2'1"	2'1/16" 2'3/4"	1'11-5/16" 2'1/16"	1'10-15/16" 1'11-5/8"	1'10-1/2" 1'11-1/4"	1'10-1/8" 1'10-7/8"	1'10-1/8" 1'10-7/8"	1'10-1/8" 1'10-7/8"	1'10-1/8" 1'10-7/8"	1'10-1/2" 1'11-1/4"	1'10-15/16" 1'11-5/8"					
14'3-11/16"(3.2λ)	1 1/4"	3/16"	2'2-1/16" 2'3"	2'1"	1'11-13/16" 2'3/4"	1'11-9/16" 2'7/16"	1'10-15/16" 1'11-7/8"	1'10-1/2" 1'11-7/16"	1'10-5/16" 1'11-1/4"	1'10-1/8" 1'11"	1'9-7/8" 1'10-13/16"	1'9-7/8" 1'10-13/16"	1'9-7/8" 1'10-13/16"	1'9-7/8" 1'10-13/16"	1'9-7/8" 1'10 13/16"	1'9-7/8" 1'10-13/16"	1'9-7/8" 1'10 13/16"	1'9-7/8" 1'10-13/16"	1'9 7/8" 1'10 13/16"
18'9-5/16"(4.2λ)	1 1/2"	3/16"	2'1-11/16" 2'2-3/4"	2'1"	1'11-5/8" 2'11/16"	1'11-5/8" 2'11/16"	1'11-7/16" 2'1/2"	1'10-7/8" 2'	1'10-3/4" 1'11-13/16"	1'10-1/2" 1'11-9/16"	1'10-5/16" 1'11-3/8"	1'10-1/8" 1'11-3/16"	1'10-1/8" 1'11-3/16"	1'10-1/8" 1'11 3/16"	1'10-1/8" 1'11-3/16"	1'10-1/8" 1'11-3/16"	1'10-1/8" 1'11 3/16"		

Table 4

NBS 432.1-MHz Yagi Dimensions

meters = 0.3048 × feet
mm = 25.4 × inches

Boom Length	Boom Diameter	Element Diameter	Ref	Driven	Dir. 1	Dir. 2	Dir. 3	Dir. 4	Dir. 5	Dir. 6	Dir. 7	Dir. 8	Dir. 9	Dir 10	Dir. 11	Dir. 12	Dir. 13	Dir. 14	Dir. 15
2'8-13/16"(1.2λ)	1"	3/16"	1'1-15/16"	1' 23/32"	1'17/32"	1'11/32"	1'11/32"	1'17/32"											
5'1/8"(2.2λ)	1"	3/16"	1'1-15/16"	1' 23/32"	1'21/32"	1'3/16"	1'	11-3/4"	11-17/32"	11-17/32"	11-17/32"	11-17/32"	11 3/4"	1'					
7'3-15/32"(3.2λ)	1"	3/16"	1'1-15/16"	1' 23/32"	1'9/16"	1'11/32"	1'	11-3/4"	11-5/8"	11-17/32	11-13/32"	11-13/32"	11-13/32"	11-13/32"	11-13/32"	11-13/32"	11-13/32"	11-13/32"	11-13/32"
9'6 25/32"(4.2λ)	1"	3/16"	1'1-3/4"	1' 23/32"	1'7/16"	1'7/16"	1'11/32"	1'	11-7/8"	11-3/4"	11 5/8"	11-17/32"	11-17/32"	11-17/32"	11-17/32"	11-17/32"	11-17/32"		

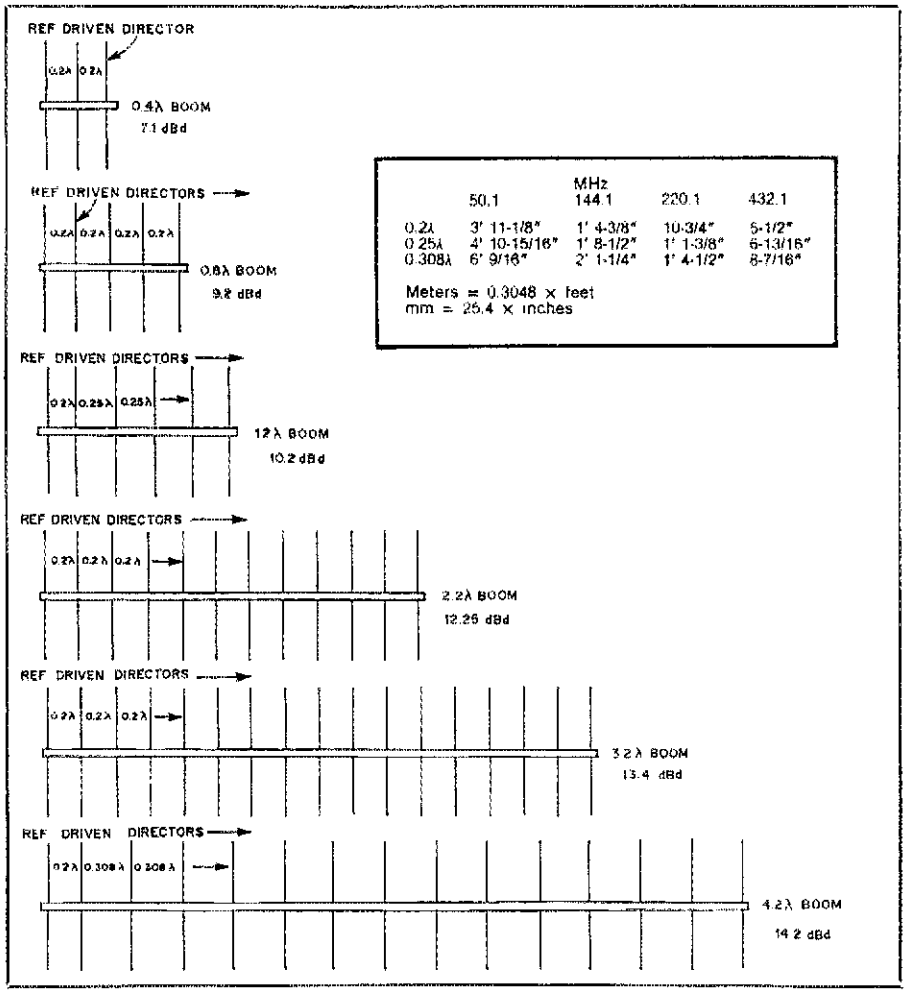


Fig. 1 — Element spacing for the various Yagi arrays, in terms of boom wavelength.

Table 5

Optimized Lengths of Parasitic Elements For Yagi Antennas of Six Different Lengths

		Length of Yagi in Wavelengths					
		0.4	0.8	1.20	2.2	3.2	4.2
Length of Reflector λ		0.482	0.482	0.482	0.482	0.482	0.475
Length of Director, λ	1st	0.442	0.482	0.482	0.432	0.482	0.424
	2nd		0.424	0.420	0.415	0.420	0.424
	3rd		0.428	0.420	0.407	0.407	0.420
	4th			0.428	0.398	0.398	0.407
	5th				0.390	0.394	0.403
	6th				0.390	0.390	0.398
	7th				0.390	0.386	0.394
	8th				0.390	0.386	0.390
	9th				0.398	0.386	0.390
	10th				0.407	0.386	0.390
	11th					0.386	0.390
	12th					0.386	0.390
	13th					0.386	0.390
	14th					0.386	
	15th					0.386	
Spacing Between Directors, in λ		0.20	0.20	0.25	0.20	0.20	0.308
NBS Claimed Gain Relative to Half-Wave Dipole in dB		7.1	9.2	10.2	12.25	13.4	14.2
Design Curve (See Fig. 2)		(A)	(C)	(C)	(B)	(C)	(D)

Element diameter = 0.0085λ
Reflector Spaced 0.2λ behind driven element

Table 5, which provides the optimized lengths of parasitic elements for Yagis of six different boom lengths, as shown in Fig. 1. (Note that these values are based on a specific element d/λ of 0.0085, and are not yet compensated for boom diameter.) Find the Yagi boom length that you want to work with at the top of Table 5. In our case, it is 0.4 λ. The numbers 0.482 and 0.442 listed below represent the lengths of the reflector and the director, respectively. Mark these two values on the graph found in Fig. 2. These points should be placed along reflector and director design curves "A" which correspond to the 0.4-λ Yagi. Notice that both points fall exactly on the vertical design reference line at d/λ = 0.0085.

To determine what our element lengths should be, refer back to Eq. 2. This equation states that our Yagi has an element d/λ of 0.0032. Draw a vertical line on the graph in Fig. 2 from the point d/λ = 0.0032, found on the horizontal axis. Since both the reflector and the director points fall exactly on the vertical line d/λ = 0.0085 in the design example, it is a simple matter to determine our "new" element lengths. Mark the two points where the vertical line d/λ = 0.0032 intersects reflector and director design curves "A." The element lengths may now be read from the scale on the left:

Ref. = 0.487 λ
Dir. = 0.457 λ

This example, using the 3-element, 0.4-λ Yagi is quite simple because both the director and reflector points fall directly on the vertical design-reference line. Element lengths for the five longer Yagis require a slightly different technique to be determined. Take the 5-element, 0.8-λ antenna, for example. Because this antenna has multiple directors (of varying lengths) there will be more than one point to plot along director design curve "C." It is first necessary to plot all the points and, using a set of dividers, measure the distance between each point on the design curve and the vertical reference line at d/λ = 0.0085. You must then transpose these distances away from the new vertical line that represents your particular Yagi element d/λ. Just be sure to mark the distance off on the proper side of the line, for some points will lie to the left, and others to the right! Also, be sure to plot the new points on the proper design curve "A"-"D." After all points have been plotted, the new element lengths may be read directly from the scale on the left, as in the previous example.

So far, the procedure I have outlined deals strictly with compensation that is necessary because of varying element diameter. Boom diameter also has a considerable effect on optimum element length. The NBS Yagi is not complete without taking this into account.

Referring to Eq. 3, we know that our boom D/λ = 0.0106. The graph in Fig. 3

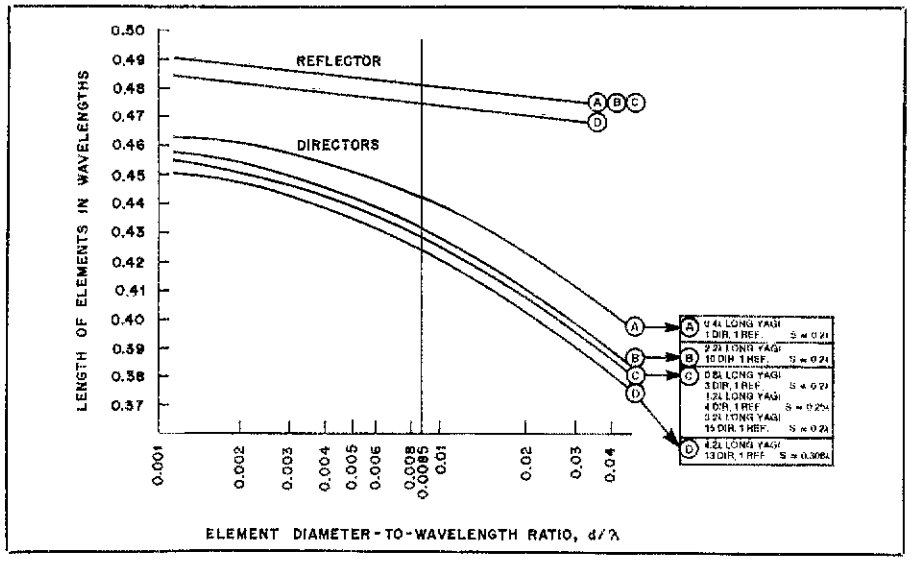


Fig. 2 — Curves showing the relationship between element diameter-to-wavelength ratio and the element length for different Yagi arrays.

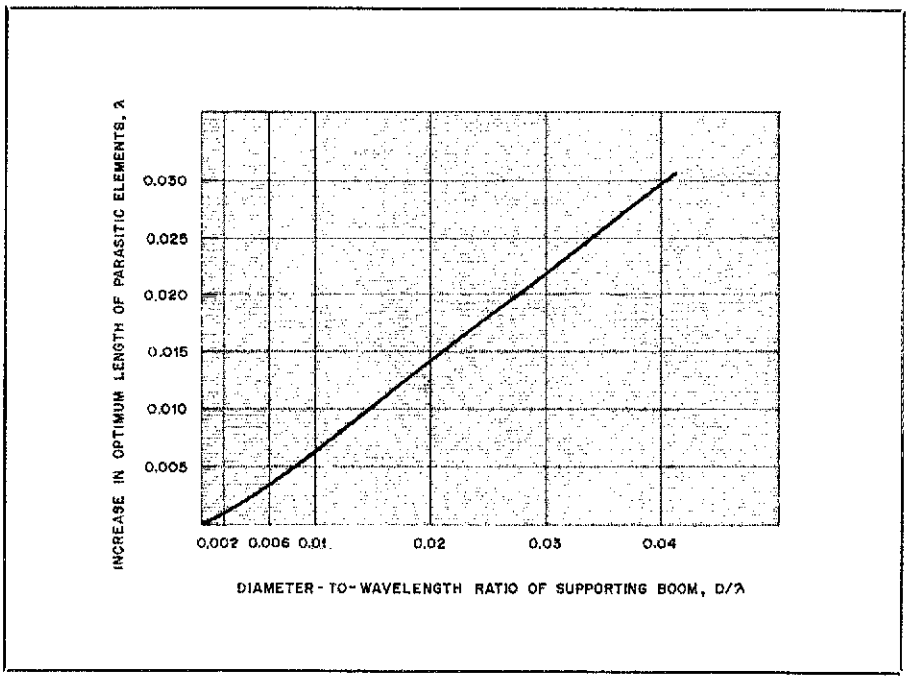


Fig. 3 — Curve showing the effect of a supporting boom on the length of Yagi elements.

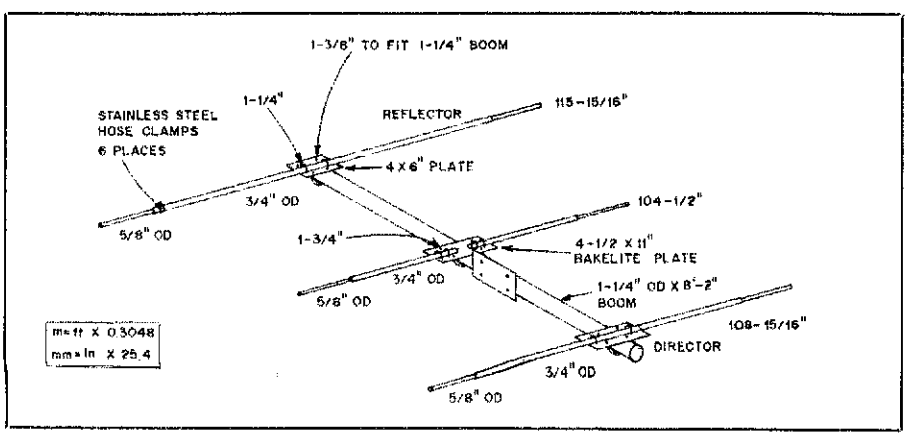


Fig. 4 — Dimensional drawing of the 3-element, 50-MHz Yagi described in the text.

indicates that, with this boom D/λ, it is necessary to lengthen all elements by 0.0065 λ to remain at optimum length. Simply add this amount to the previously determined element lengths for our 3-element, 50-MHz Yagi. The final, optimum parasitic element lengths are:

Ref. = 0.487 λ + 0.0065λ = 0.4935λ
0.4935λ × 235 in./λ = 115.97 in.
Dir. = 0.457λ + 0.0065λ = 0.4635λ
0.4635λ × 235 in./λ = 108.92 in.

No mention is made concerning driven-element length, because the choice of matching system exerts considerable influence on it. Standard methods for determining driven-element lengths can be used, or the measurements found in Tables 1 through 4 can be used as starting points. An in-depth discussion of driven element/feed systems may be found in *The ARRL Antenna Book*.[6]

The W1LJ NBS Yagi

To illustrate the procedures described in this article, I constructed a 3-element Yagi for the 50-MHz band. No special attempt was made to procure materials of the exact dimensions called for in Table 1. A quick look through the ARRL laboratory junk box turned up enough scrap aluminum for the project. Elements were fashioned from 3/4-inch OD tubing, with short pieces of 5/8-inch OD tubing telescoped in the ends for fine adjustment. Overall dimensions can be seen in Fig. 4. Boom-to-element clamps were made of scrap heavy-gauge aluminum plate, U-bolts and plated muffler clamps. Likewise, the boom-to-mast plate was made from aluminum plate — only heavier gauge than used on the element clamps. Construction details can be seen in Fig. 5. The 8-ft 2-in.-long boom was salvaged from a piece of 1-1/4 inch OD heavy wall aluminum electrical conduit.

Feed System

A hairpin feed system was chosen for the Yagi.[7] Because it is balanced, this type of feed tends to prevent pattern skewing and unwanted side lobes. Details of the hairpin construction can be seen in Fig. 6.

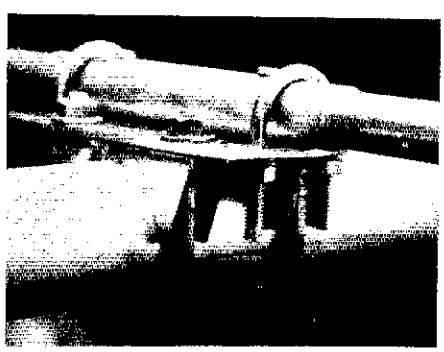


Fig. 5 — Photograph illustrating the element-to-boom clamp. Heavy-gauge scrap aluminum, U-bolts and plated muffler clamps were used to make up the assembly.

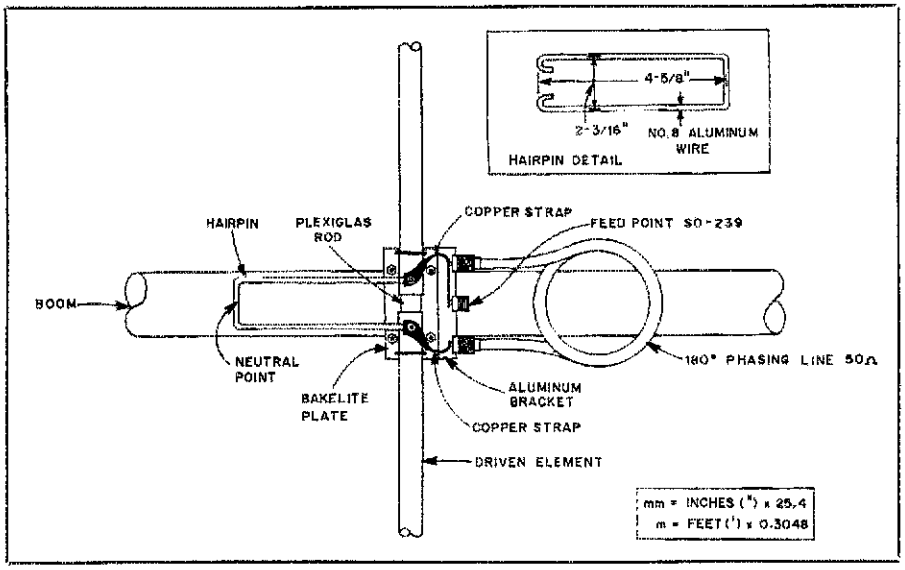


Fig. 6 — Detail of the hairpin matching and the feed system used with the 3-element, 50-MHz Yagi. Coaxial phasing-line lengths are discussed in the text.

The driven element and the feed assembly are insulated from the boom through the use of a 3/16-inch-thick bakelite mounting plate. Plexiglas rod is used as an insulator between the two halves of the driven element. An aluminum bracket is used to mount the three SO-239 connectors to the bakelite plate. The hairpin is made from no. 8 aluminum grounding wire, and is connected across the split element halves. The hairpin is electrically neutral at the exact center, and either may be fastened to the boom at this point or allowed to hang freely. A coaxial 1/2-λ phasing line is also connected across the driven element halves to provide a 180-degree phase shift between them. For cable with a 0.8 velocity factor, the phasing line should be 7 ft, 10-3/8 in.; for cable with a 0.66 velocity factor, 6 ft, 5-3/4 in. These phasing-line lengths will remain constant for any of the 50-MHz Yagis in Table 1. Hairpin and driven-element length must be determined experimentally for Yagis with different numbers of elements. It should be noted that with a hairpin match the driven element will be considerably shorter than specified in Table 1. Both parasitic elements were lengthened slightly from the Table 1 dimensions, as previously determined.

Performance

Upon completion, the 3-element NBS Yagi was installed at a 75-foot level above the ARRL Hq. building. The Hq. operators' club station, W1INF, was used to test and evaluate the antenna. A quick check indicated a good match at 1.25:1 VSWR. Delivering under 10 watts to the antenna, it took only a few minutes to see the exceptional performance the Yagi would provide. My first contact was a 6-to 10-meter crossband QSO with SM6PU! A few moments later the Yagi was rotated west, and a score of W6 and W7 stations were contacted. All signal reports from the West Coast were 59+. Not bad for less than 10 watts! A week of casual operating with never more than 50 watts to the antenna snagged the following prefixes: TF, HK, 8P6, T32, XE, KL7, EL, C5 and my best DX — AH8 in American Samoa! Although my signal was not quite as strong as those of the "kilowatt boys," I was never far behind in the pileups. In short, the gain seems very good, especially when one considers how small the Yagi is. The NBS data claims a gain of 7.1 dB over a dipole. Keep in mind that the NBS Yagi is optimized for maximum gain. The claimed front-to-back ratio is between 15 and 20 dB — not an extremely high figure, but acceptable for most vhf work. An outstanding feature of this Yagi is the clean and symmetrical pattern, which may prove to be a more valuable measure of performance than front-to-back ratio.

I would like to thank ARRL Hq. staff members Gerry Hull, AK4L, Pete O'Dell, KB1N, and Bernie Glassmeyer, W9KDR. They provided much help in constructing, tuning and installing the 3-element, 50-MHz Yagi.

Notes

[1]P. Viezbicke, "Yagi Antenna Design," NBS Technical Note 688, U.S. Department of Commerce, Washington, DC., Dec. 1976.

[2]H. Yagi and S. Uda, *Proceedings of the Imperial Academy*, Feb. 1926.

[3]J. Lawson, "Yagi Antenna Design: Experiments Confirm Computer Analysis," *Ham Radio*, Feb. 1980, pp. 19-27. J. Reisert, "How to Design Yagi Antennas," *Ham Radio*, Aug. 1977.

[4]m = ft × 0.3048; mm = in. × 25.4.

[5]Tables 1 through 4 and Fig. 1 are taken from *The Radio Amateur's Handbook*, 59th ed. (Newington: ARRL, 1981).

[6,7]G. Hall, ed., *The ARRL Antenna Book*, 14th ed. (Newington: ARRL, 1982), Chapter 5.

Strays

TA PROFILES

☐ ARRL Technical Advisor Roy Hejhall, K7QWR, joined our official consultant family five years ago. During this period, his expertise in rf-power semiconductor devices and circuits has been invaluable to the League and to Amateur Radio. He has contributed many articles for *QST*, and is the recipient of a Cover Plaque award (*QST*, March 1972). Roy has also written technical articles for leading professional publications, and has been a technical speaker at ARRL conventions and at numerous radio-club meetings and hamfests.

Licensed as WØTRH in 1954, Roy now holds an Advanced class license. Vhf and uhf fm (including linked remote-base systems) are his primary interests in Amateur Radio. He is a Life Member of ARRL, with memberships in QCWA, the Arizona Repeater Association, the Motorola Amateur Radio Club and the Saguaro Amateur Remote Base Association.

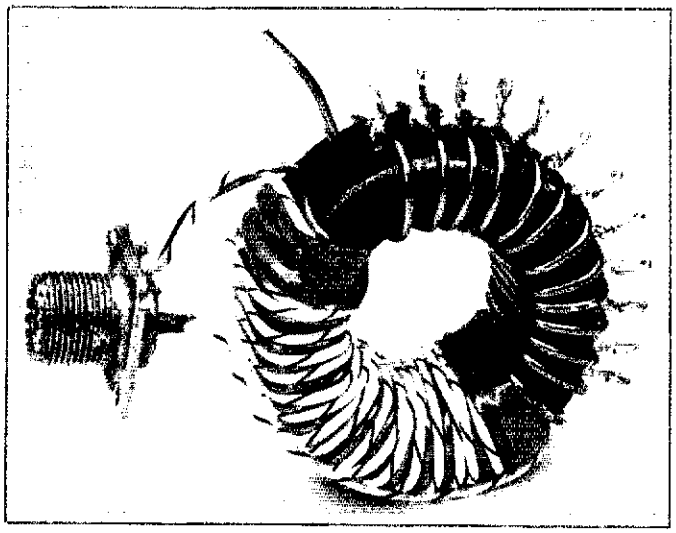
Roy received his BS degree from the U.S. Naval Academy. He now resides in Phoenix, Arizona, and is the principal staff engineer for the Motorola Semiconductor Products Sector. For 20 years he has been involved in product-development engineering (vhf and uhf bipolar and field-effect power transistors), starting as a member of the engineering team that introduced the first 15-W, 50-MHz transistor (the 2N2947). Roy enjoys music, photography and sharing his Amateur Radio activities with his XYL (WB7RPB). — *Marian Anderson, WB1FSB*

We don't know whether K7QWR's big smile was caused by a recent success in some job-related work with the test gear in the picture, or if it's because the 5 o'clock whistle just blew and he's thinking of firing up his fm mobile rig. But Roy smiles a lot, and he is definitely one of the "good guys."

I would like to get in touch with . . .

☐ owners of Collins KWM-380 rigs who are using Alpha amplifiers. Andrew Caughey, Jr., W8QIT, 15256 Levan Rd., Livonia, MI 48154.

A "Multipedance" Broadband Transformer



A tapped broadband transformer helps solve problems in experimental work. Here's a toroidal type that covers a wide range of impedance transformations.

By Doug DeMaw,* W1FB

Is a multi-impedance transformer a scientific wonder? Shucks, no! The concept is as old as electronics, but is often overlooked by amateur experimenters. Being an inveterate experimenter myself, I find it useful to have as many "fudging" tools in the workshop as possible. Certainly, a broadband switchable-impedance transformer qualifies as an important piece of test apparatus. Furthermore, this type of device can be used for determining the necessary number of turns for a fixed-ratio transformer that will be put to permanent use in a circuit.

Applications

A variable-impedance transformer can be used to approximate the value of an unknown impedance within its matching range. It is necessary only to know one of the two impedances with which we are dealing. For antenna work we can generally assume that the feed line to the transmitter or receiver is 50 ohms, although in some cases it may be 75 ohms. This becomes our known factor, and a fixed number of turns are laid on the transformer core to comprise the 50- or 75-ohm winding. Although an rf noise bridge or a sophisticated rf impedance bridge can be used to measure unknown impedances, they require associated items of test equipment and ac or dc power to operate them. The variable-impedance transformer needs nothing other than a VSWR indicator, thereby making it more convenient for field use.

I find my greatest application for the transformer in experimental work with antennas. Many times when a new idea is being tried, the impedance of the antenna feed point is unknown. The variable-impedance transformer provides a match to 50-ohm coaxial line and gives me a reasonable idea of what the feed impedance is. I can then leave the transformer in the line and test the antenna under transmitting and receiving conditions. Later, if I consider the antenna worth using over a longer period of time, the transformer can be replaced with a suitable matching network, or I can wind a fixed-ratio transformer and install it at the feed point. Practically, the gadget is a time-saver.

Another application for the transformer would be between the exciter and a linear amplifier, if the amplifier did not present a suitable impedance to the exciter. The correct transformer tap point would be selected to provide a low VSWR.

Construction Notes

I elected to wind a transformer that would handle the output from a 1-kW transmitter. Therefore, if I wanted to leave the unit in the line for extended on-the-air testing, it would accommodate the full power from my station without arcing or saturating. Owing to the high flux densities of powdered-iron cores over ferrite ones (per unit cross-sectional area), the former was chosen. The circuit is shown in Fig. 1. The core is an Amidon (Micrometals Corp.) jumbo T-225A-2, which is roughly equivalent to a pair of T-200 cores stacked one on top of the other.

The fixed-value winding has an X_L of 200, four times (recommended) the 50-ohm level at which it will be used. If the lowest operating frequency is to be 3.5 MHz, the required inductance of the winding will be 9 μH (17 μH for use at 1.8 MHz). The A_L factor of this toroid core is 275, which requires a winding of approximately 18 turns for an X_L of 200 ohms. This is determined by

$$\text{turns} = 100\sqrt{L/A_L}$$

where A_L is the manufacturer's index, and L is in μH. Hence, for use at 1.8 MHz, the fixed winding would require 25 turns. The tapped winding (secondary) would have to be increased accordingly to provide the range of impedances represented in Table 1.

The blank core should be wrapped with a layer of 3M brand glass epoxy tape or something of equivalent dielectric strength. This will help to prevent arc-over and abrasion of the windings. The tapped winding is laid on the core first. My transformer (see photograph) has only 12 taps, and was set up to give transformations upward from 50 ohms. However, each turn can be tapped to obtain a range from less than 50 ohms to greater than 50 ohms. Table 1 contains data for a transformer with 27 taps. The enamel insulation is scraped from the winding at each tap point. Then, a short piece of heavy bus wire is formed into a loop and soldered to the winding at each tap point.

The fixed-turn winding of the transformer is wound last. The turns lie between the turns of the larger winding. I used some Teflon-insulated no. 18 wire I

*QST Senior Technical Editor

had on hand. This is recommended to provide a high degree of insulation between the two windings. Alternatively, one might use Teflon sleeving over enameled copper wire, or glass epoxy tape could be wound over the larger winding (beneath the fixed winding) to isolate the windings. A durable version of this transformer could be had by encapsulating the completed transformer in casting resin of good dielectric quality. I have had good results with the resin sold by Tandy Corp. The terminals of the transformer would need to be brought out of the mold for access later on. A coating of silicone grease will prevent the resin from adhering to the terminals.

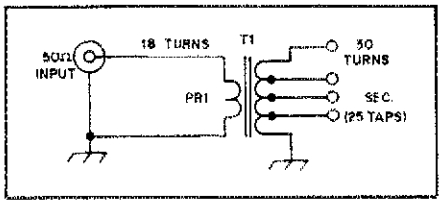


Fig. 1 — Schematic diagram of the variable-impedance transformer.

Table 1

Approximate Load Resistance and Transformation Ratio of the Broadband Transformer

Turn No.	*Impedance Ratio (approx.)*	*Load Resistance (Ω) (approx.)*
5	13:1	3.85
6	9:1	5.55
7	6.6:1	7.57
8	5:1	9.87
9	4:1	12.50
10	3:1	15.43
11	2.5:1	18.80
12	2.2:1	22.22
13	1.9:1	26.25
14	1.6:1	30.51
15	1.4:1	34.72
16	1.2:1	39.85
17	1.1:1	45.35
18	1:1	50.00
19	1.1:1	55.70
20	1.2:1	61.72
21	1.4:1	68.00
22	1.5:1	74.70
23	1.6:1	81.63
24	1.8:1	88.88
25	1.9:1	96.45
26	2:1	104.32
27	2.2:1	112.50
28	2.4:1	120.98
29	2.6:1	130.00
30	2.8:1	139.00

Numbers have been rounded off in some instances. Values are based on a fixed impedance of 50 ohms at the transformer input. Higher step-up ratios can be had by increasing the number of turns on the transformer secondary. This may be necessary for obtaining a matched condition between some exciters and the input of a power amplifier.

Application

When one is dealing with low impedances, it is important to keep the leads to the transformer taps as short as possible. The slightest amount of lead length will introduce reactances that can confuse the results of measurements. This means that a switched version of the transformer should be laid out carefully to avoid unwanted stray inductance or capacitance.

The most accurate test results will be had if the fixed-value winding (50 ohms) is terminated in a known 50-ohm resistance. A 6-dB pad can be built easily for inclusion in the line to the transformer primary. It must be capable of accommodating the power of the signal source. A pad made with 2-watt resistors would be entirely suitable for use with a 2-watt transmitter during antenna-matching experiments. A pad of this type is shown in Fig. 2, which contains a block diagram of a typical test setup for using the transformer.

Having a multi-impedance transformer in your workshop could prove useful for a variety of test applications. Try one — you might like it!

BIBLIOGRAPHY OF MAGNETIC CORE REFERENCES

Technical Papers

DeMaw, D. "The Practical Side of Toroids." *QST*, June 1979.

Sevick, J. "Simple Broadband Matching Networks." *QST*, Jan. 1976.

Turrin, R. "Application of Broadband Balun Transformers." *QST*, April 1969.

Books

DeMaw, D. *Practical RF Communications Data for Engineers and Technicians.* Indianapolis: Howard W. Sams & Co. (no. 21557), 1978.

DeMaw, D. *Ferromagnetic Core Design & Application Handbook.* Englewood Cliffs, NJ: Prentice-Hall, Inc., 1981.

Polydoroff, W. *High-Frequency Magnetic Materials.* New York: John Wiley & Sons, Inc., 1960.

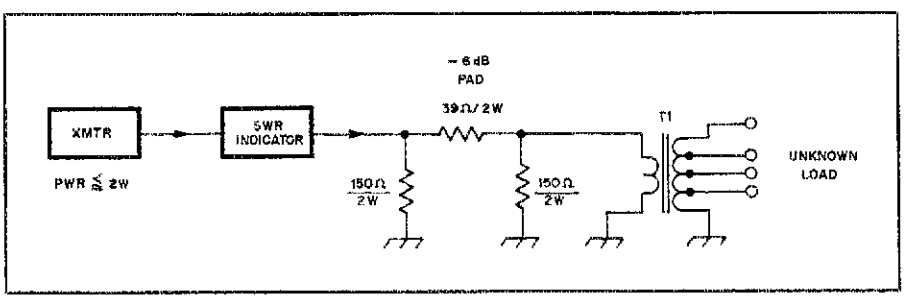


Fig. 2 — Hybrid diagram showing a typical arrangement for using the transformer discussed in the text. Values for the resistors in the 6-dB pad are given to the nearest standard values. Noninductive carbon resistors should be used, with the pigtails and connecting leads as short as possible.

Strays

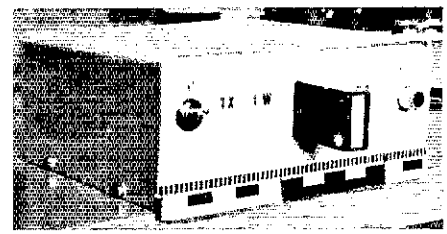
QRP, DL STYLE

☐ Many times we have heard about the masterful work done by the elves in the Black Forest, and the photographic example seen in this Stray might easily suggest that the equipment was built by those famous gnomes in Germany. Not so, but the equipment was built in DL-land, by Adolf Vogel, DL3SZ.

Building one's own radio gear is a popular pastime abroad, perhaps more so than in the USA. Adolf says that most of his transmitters have been homemade for years, but he couldn't resist constructing the "Little Joe" universal QRP rig from August 1981 *QST* ("Experimenting for the Beginner").

Adolf uses the QRP transmitter on 40 meters along with three FT-243 style crystals. The package size is approximately 12 × 12 × 45 mm. With his micro power he has worked the USA, Europe and other DL stations. He worked N3EA and received an RST 339 report. Adolf says that N3EA was a "Big Joe" station, running a kW into a 3-element Yagi!

Adolf says further that the *QST* article was very helpful for newcomers, and the project will be discussed at the local DARC meetings. Keep up the good work, Adolf. And, just think what your "Little Joe" could do if you had a 3-element, 40-meter Yagi to use with it! — *Doug DeMaw, W1FB*



This rig may not be the work of elves, but, judging from the excellent results Adolf Vogel, DL3SZ, gets with his homemade 40-meter QRP transmitter, the unit may indeed be charmed. *(photo courtesy DL3SZ)*

MOVING? UPGRADING?

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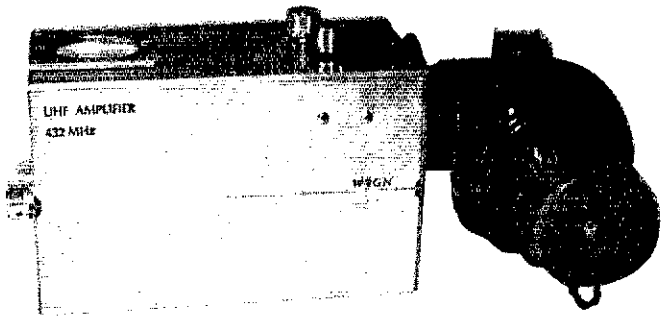


Phase III with a Tetrode UHF Amplifier

Build a 70-cm amplifier with the power to reach the new generation of high-flying satellites.

By Fred J. Merry,* W2GN

Are you ready for the AMSAT-OSCAR Phase III satellites? The first one, Phase III B, should be up soon. A lot of fun and DX can be yours if you take advantage of this exciting mode of communication. Fig. 1 is a block diagram of the W2GN Phase III earth station. By using different i-fs for transmit and receive, I can listen while I transmit.

We don't know how much power it will take for reliable contacts through the new satellite. AMSAT suggests a 100-watt output amplifier with a 13-dBd gain antenna on an az-el mount. With 50 ft of RG-8/U feed line, that should give you about 1000 watts of erp.[1] We will know if this is the right amount only after the satellite is in operation.

Today the cost of a solid-state, 100-watt output uhf amplifier with power supply makes a homebuilt 4CX250 or 8930 tetrode tube amplifier seem attractive. A tetrode amplifier will deliver 300 watts of output with less than 10 watts of drive. The tube amplifier is no more difficult to construct than a solid-state version, and some amateurs may already have many of the parts. That is why I built this amplifier for 435-MHz satellite uplink communications.

To minimize line losses, the amplifier can be placed in a remote, weatherproof location, such as an attic. (See Fig. 1.) The transmitting converter should be located next to the amplifier. A downlink bandpass filter and low-noise receiving preamp or converter can be installed at the same location. This puts the rf circuitry where it belongs — near the antenna.

The amplifier is a simple circuit. See Fig. 2. Any of the 4CX250 series or similar tubes are suitable. If a purchase is required, the 8930 seems to be the best bargain. It has the same electrical characteristics as the 4CX250R, but the anode is larger (2-inch diameter).[2] The

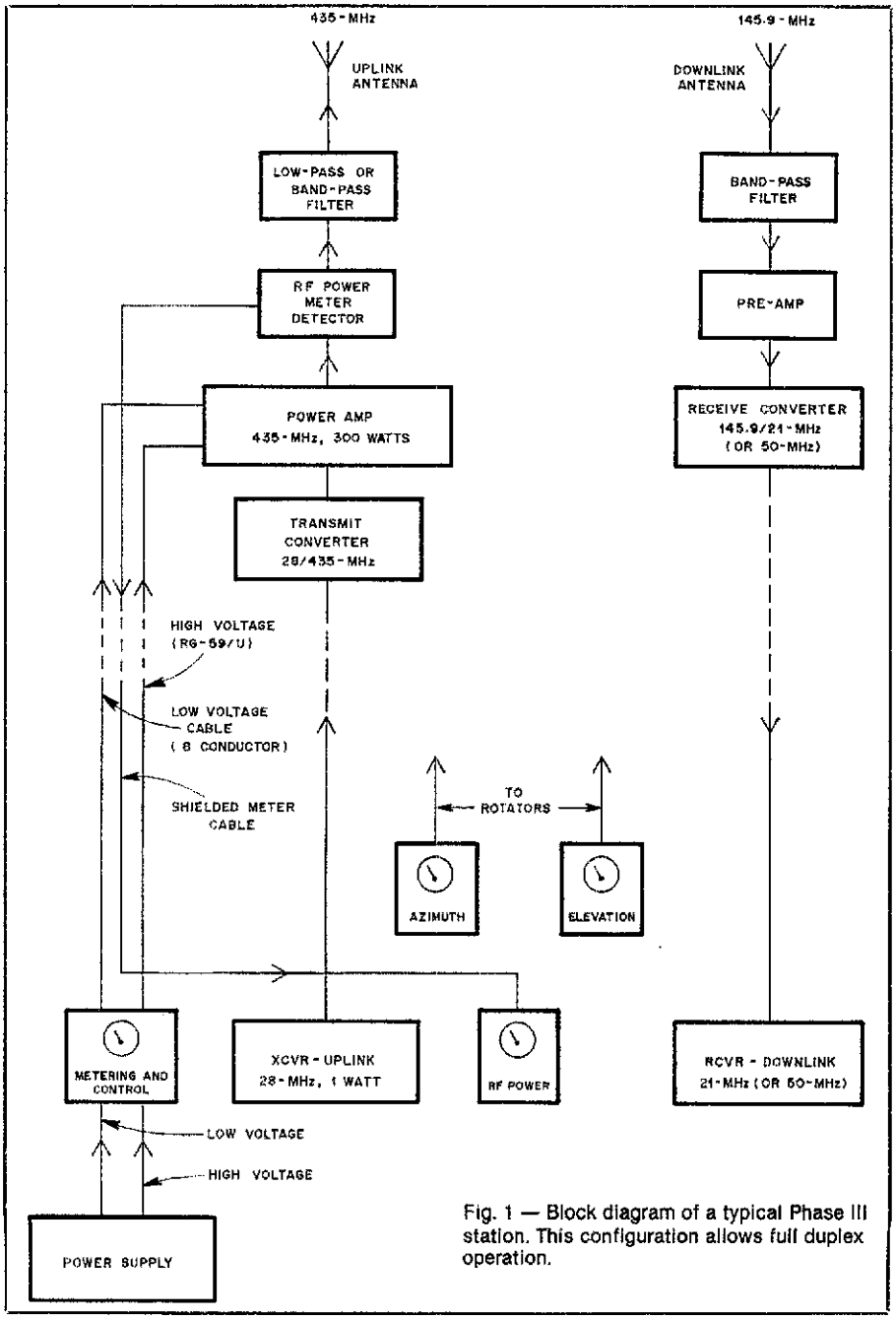


Fig. 1 — Block diagram of a typical Phase III station. This configuration allows full duplex operation.

[1]Notes appear on page 44.

*35 Highland Dr., East Greenbush, NY 12061

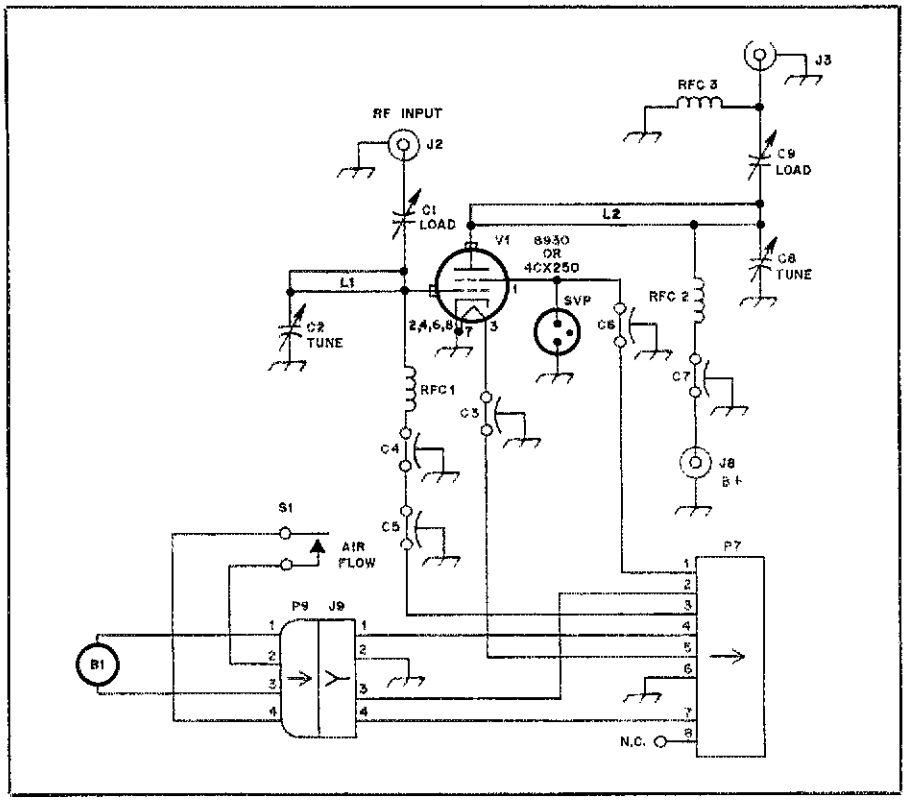


Fig. 2 — Schematic diagram of the uhf amplifier.
B1 — 100-cfm blower (Dayton 4C443 or equiv.).
C1, C2 — See Fig. 5.
C3-C6 — 0.001-μF feedthrough capacitor.
C7 — 0.001-μF, 4000-volt feedthrough capacitor.
C8, C9 — See Fig. 6.
J1 — Multipin socket (Cinch S-304-AB or equiv.).
J2, J3 — Chassis-mount, N female connector, UG-58A/U.
J4 — High-voltage connector (Amphenol UG-931/U or equiv.).
L1, L2 — See Figs. 5 and 6.
P1 — Multipin plug (Cinch P-304-CCT or equiv.).
P2 — Multipin plug (Cinch P-308-AB or equiv.).
RFC1, RFC3 — 5 turns no. 16 enam. 1/4 inch dia., 1/2 inch long.
RFC2 — 5 turns no. 16 enam. 1/4 inch dia., 1 inch long.
S1 — Air-flow switch.
SVP — 470-volt surge-voltage protector (Siemens B2-B470 or equiv.).

grid and plate circuits are strip lines, tuned and coupled by flapper-type capacitors. A surge voltage protector (SVP) is used in the screen-grid circuit. If the voltage exceeds 470, the SVP conducts and lowers the potential to almost zero.

Construction

The amplifier is built on two 5 × 10 × 3-inch chassis (Bud AC-404 or equiv.). The top is made of 3/16-inch-thick aluminum. To ensure that the two chassis and the top and bottom covers line up, lay out the top, drilling 1/16-inch pilot holes. Use the top as a template for drilling pilot holes in the top and bottom of the upper chassis, the top and bottom of the lower chassis and the bottom cover.[3,4]

See Figs. 3 through 9. When all drilling and punching is completed, begin the assembly. Position the tube socket (Eimac SK630A or equiv.) so that the connections to the screen and heater are as short as possible. Install two 1-1/2 inch long Teflon rod supports (tapped 8-32 on each end) for the plate and one for the grid line. The chimney is made by rolling up two pieces of 1-11/32 × 12 × 0.01-inch Teflon. The units are spliced end to end with Teflon adhesive tape, which is also used to secure the roll. See Fig. 8.

Connection of RFC2 to the plate line is made at the 6-32 tapped hole. A 1/4-inch

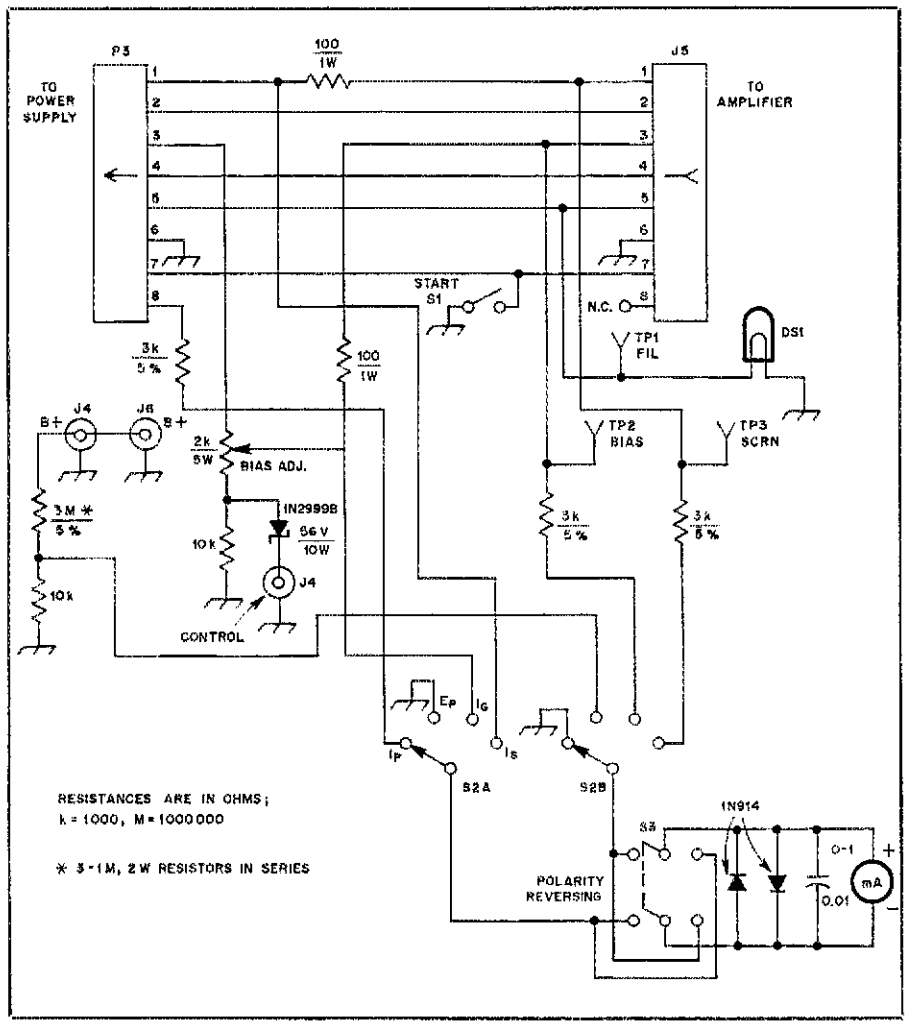


Fig. 3 — Schematic diagram of the metering and control unit. Resistors are 1/2-watt composition types unless otherwise specified.
DS1 — 6-V pilot lamp.
J1 — Multipin socket (Cinch S-308-AB or equiv.).
J2, J3 — High-voltage connector (Amphenol UG-931/U or equiv.).
J4 — Phono jack.
P1 — Multipin plug (Cinch P-308-AB or equiv.).
S1 — Spst toggle switch, spring return.
S2 — Two-pole, 4-position rotary switch, nonshorting contacts.
S3 — Dpdt toggle switch, spring return.

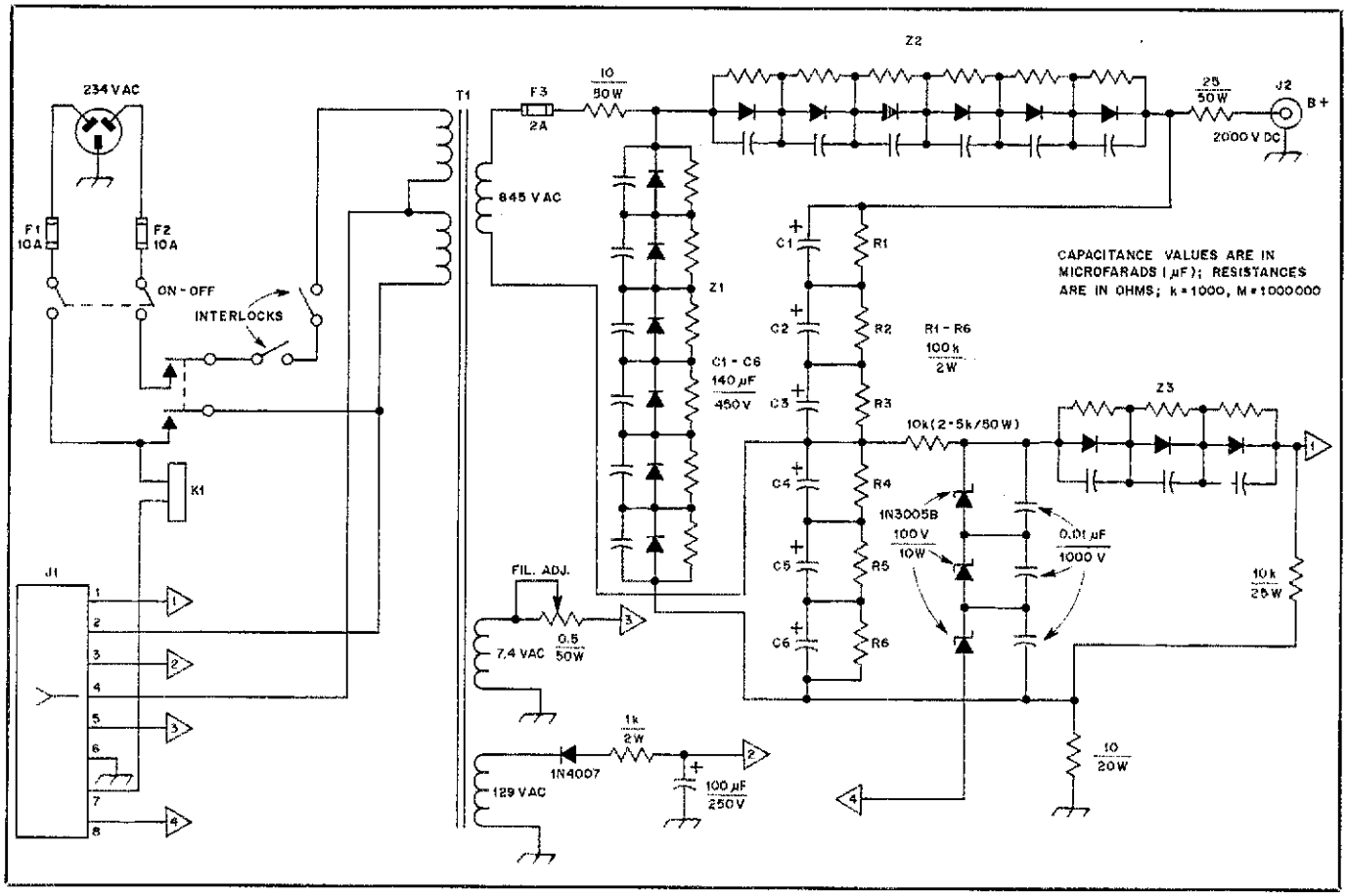


Fig. 4 — Schematic diagram of the power supply.
J1 — Multipin socket (Cinch S-308-AB or equiv.).
J2 — High-voltage connector (Amphenol UG-931/U or equiv.).
K1 — Dpst relay, 15-A contacts, 117-V coil.
T1 — Transformer, dual 117-volt primaries, wound for W2GN by H. E. Johnson and Assoc., Inc., 211 S. Ewing Ave., Clearwater, FL 33516.
Z1, Z2 — Six series-connected 1000-PIV, 2.5-A diodes, each shunted by a 0.01-µF disc-ceramic capacitor and a 470-kΩ, 1-watt resistor.
Z3 — Three series-connected 1N4007 diodes, each shunted by a 0.01-µF disc-ceramic capacitor and a 470-kΩ, 1-watt resistor.

screw is installed in the hole with the head on the bottom of the line. On top, a nut secures a no. 6 lug to which RFC2 is connected. This arrangement allows the plate line to be removed without a soldering iron.

The power supply, and the metering and control units are built in separate chassis. That allows the metering and control unit to be moved readily from the operating position to the amplifier location for tests and adjustments.

Test points are provided in the metering and control unit for measuring bias, screen-grid and heater voltages. A momentary-action start switch is used to energize the power relay (located in the power supply chassis). The air-flow switch is used to keep the power relay energized during operation. The milliammeter has 0 to 1 and 0 to 3 scales. The full-scale values are I_p = 1 A, I_g = 100 mA, I_s = 100 mA and E_p = 3000 volts. A polarity-reversing switch allows metering of negative screen and grid currents, which are characteristic of the tetrode amplifier under certain operating conditions. A four-position switch is indicated for S2 in Fig. 3. You may want to use a switch with more positions. Those additional inputs could be used to meter other parameters, such as relative output power. I elected to use a commercial wattmeter, with the detector at the amplifier output and the meter at the operating position. (See Fig. 1.)

I have designed several protective features into this amplifier (Fig. 4). The operation of the SVP was explained earlier. Current through the SVP, should it "fire," is limited by two 5-kΩ series resistors. Z3 protects the 1N3005B Zener diodes from high voltage on the screen lead. The 10-kΩ resistor at the cathode of Z3 sinks 30 mA to ground so that screen voltage will not go out of regulation when current is negative. Finally, a 2-A fuse and 10-Ω resistor protect the diode stacks in the power supply, while a 25-Ω resistor in the B+ lead protects the tube from excessive current. I learned to add these features the hard way.

Using the Amplifier

Once the project is assembled, you are ready to interconnect the units and begin testing. With power applied, but no rf drive, adjust the bias control for 50 mA of plate current. The 0.5-Ω resistor should be adjusted for 5.6 volts at the heater.

Apply about 2 watts of excitation. Plate current should increase as the grid tuning control is adjusted. Plate and grid loading controls should be set at midrange. Adjust the plate tuning control for maximum output. Plate current should read about 200 mA and the output will be 50 to 80 watts. Increase the drive to 5 watts and optimize the settings of the GRID TUNE, PLATE TUNE and LOAD controls for maximum output.

Continue to increase drive and tweak the adjustments until the desired power output is obtained with minimum plate current. Keep the plate loading on the heavy side. It is important that the PLATE LOAD control be optimized with the amplifier delivering full output. I tuned my amplifier for best efficiency at 500 watts of output and then varied the drive level. The results are shown in Table 1. The amplifier should be operated only briefly under these conditions. (The plate dissipation for an 8930 is 350 watts.) I reoptimized the adjustments for 300 watts of output; input was 600 watts with 7 watts of drive.

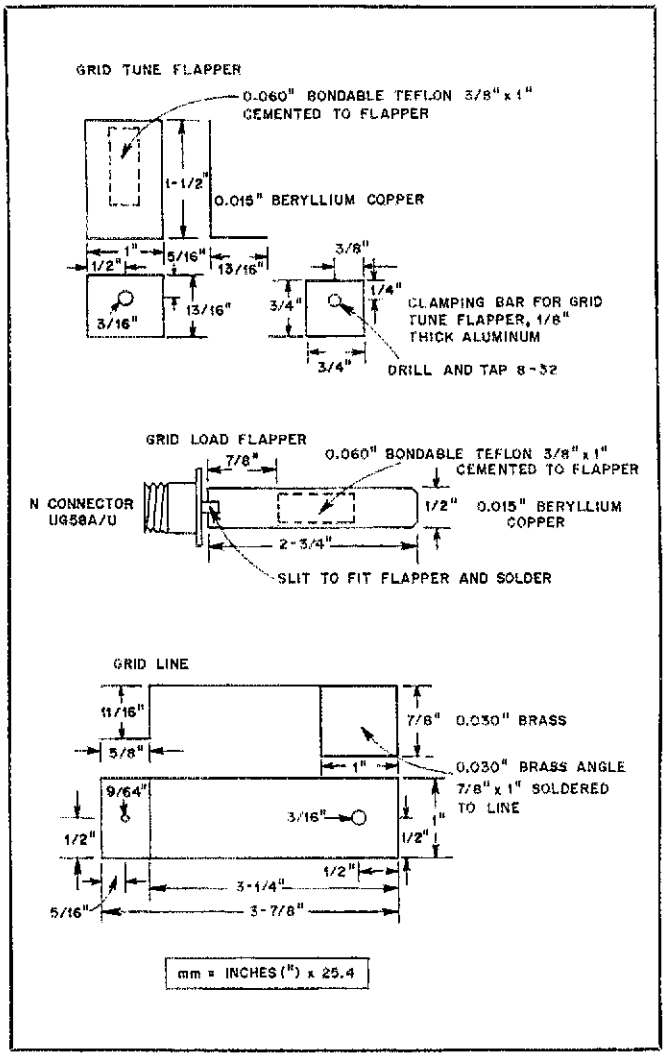


Fig. 5 — Mechanical details of grid-circuit components.

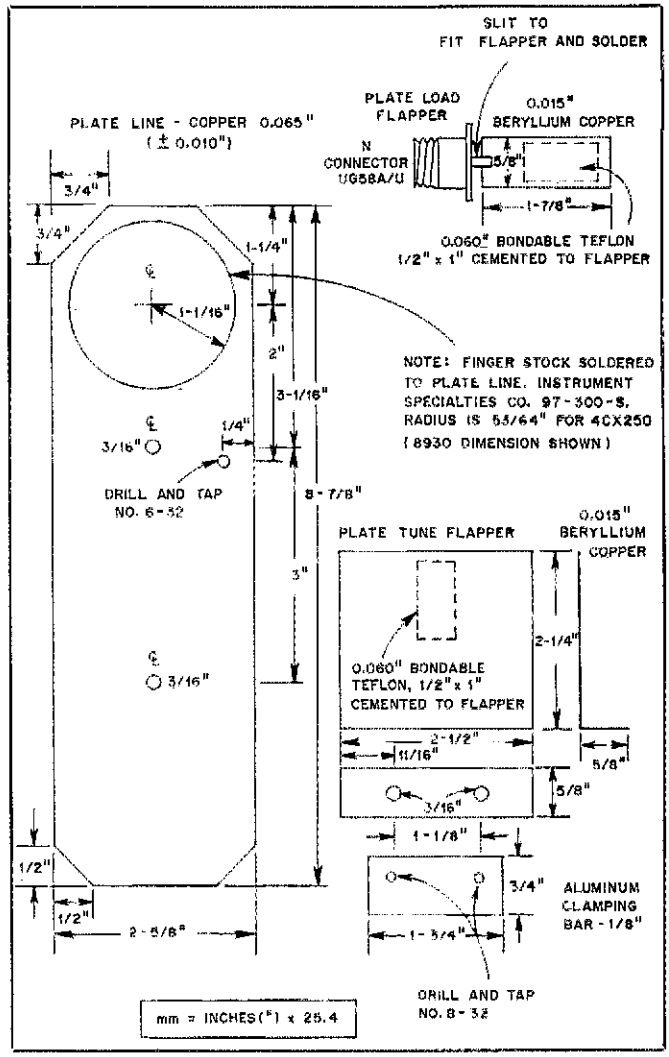


Fig. 6 — Mechanical details of plate-circuit components.

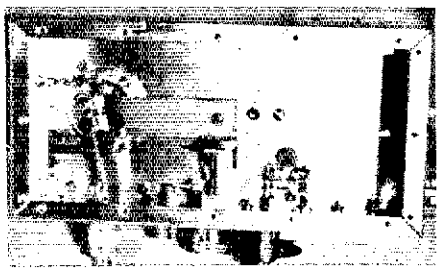


Fig. 7 — Bottom view of the amplifier showing grid-circuit components.

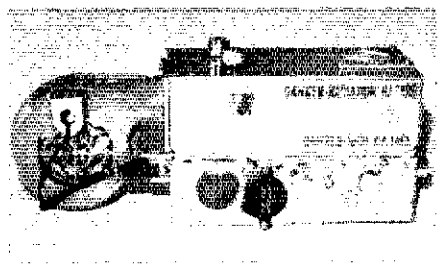


Fig. 9 — The rf portion of the completed amplifier.

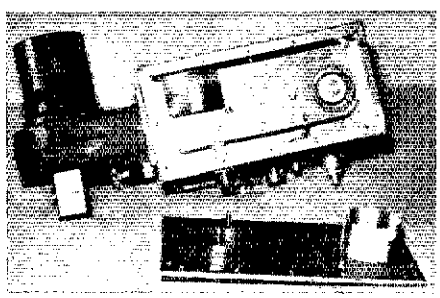


Fig. 8 — Top view of the amplifier showing plate-circuit components. The top cover is in the foreground.

I made extensive tests of the amplifier early in 1980. Further tests were made in the ARRL laboratory during December of 1981. There are no detectable spurs or harmonics when using a low-pass filter on the output.

Starting in 1980, I began demonstrating the amplifier at various meetings and hamfests. Since then I have been using it regularly on 432 MHz. Performance has been completely satisfactory in every respect. I sure hope the Phase III B satellite is in orbit soon. I'm ready! Are you? QST

Table 1

Operating Conditions for the Tetrode Amplifier

Tuned for maximum efficiency at 500 watts of output. Voltages: plate, 2000; screen, 300; grid, −56; heater, 5.6.

Drive Power (watts)	*Plate Current (amperes)*	*Output Power (watts)*
0.0	0.050	0
2.5	0.200	100
5.0	0.290	200
7.5	0.390	300
10.0	0.440	400
12.5	0.500†	500

†[Editor's Note: When computing the input power of a grounded-grid amplifier, the rf drive power must be added to the dc plate power because some of the drive appears at the output. With 12.5 watts of drive, the unit can be loaded to a plate current of 493 mA for a power input of 1 kW at 2000 volts. The actual PEP input under the conditions listed in Table 1 is 1012.5 watts, which is suitable for ssb service.]

Notes

[1]m = feet × 0.3048

[2]mm = inches × 25.4

[3]For additional construction ideas see R. T. Knadle, Jr., "A Strip-Line Kilowatt Amplifier for 432 MHz," *QST*, April and May 1972, pp. 49-52 and 59-62, 79.

[4]S. J. Powlishen, "A Grounded-Grid Kilowatt Amplifier for 432 MHz," *QST*, October 1979, pp. 11-14.

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

QRP PERSON'S VSWR INDICATOR

☐ I needed to shrink the bulk of the radio-gear package for a 1982 Hamcation to Barbados. One of the items that could be greatly reduced in size was the VSWR indicator. Fig. 1 shows the end result, referenced to a U.S. 25-cent piece.

*Assistant Technical Editor

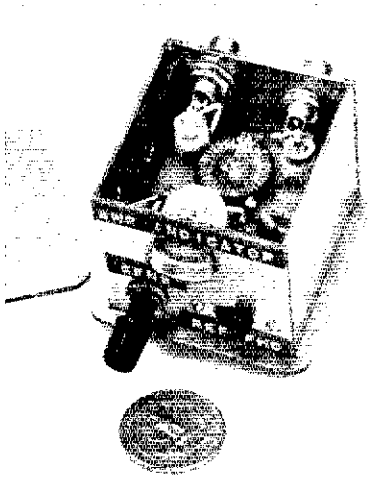


Fig. 1 — Photograph of the assembled VSWR indicator in the homemade pc-board material box. A commercial cabinet or a Minibox can be used to obtain a more professional effect.

The circuit (Fig. 2) is fashioned after the classic Walter Bruene model that was described some years ago in *QST*[1] and revisited by W1FB in a 1969 *QST* article.[2] The principal difference in this circuit from some other ones is that a two-turn link is wound on T1 to increase the low-power sensitivity of the instrument. Normally, a single wire is passed through the center hole of the toroidal transformer for sampling the 50-ohm transmission line.

Most of the components I used were garnered at hamfest flea markets. A miniature fm tuning meter is used at M1. It has a 100-μA movement, but microampere meters of other full-scale characteristics will work nicely in this circuit. A miniature slide switch is used for S1, while nulling trimmers C1 and C2 are surplus pc-mount trimmers. Piston trimmers can be used in place of the units shown for C1 and C2. The type chosen should be mechanically stable and capable of withstanding at least 87 volts rms (typical maximum voltage for 150 watts at 50 ohms). Greater voltages may be present in a mismatched system. Use care in choosing the capacitors, with special attention to the *minimum capacitance* available. Only 2 or 3 pF of capacitance should be needed when the bridge is nulled for 50-ohm use.

[1]W. Bruene, "An Inside Picture of Directional Wattmeters," *QST*, April 1959, p. 24.
[2]D. DeMaw, "In-Line RF Power Metering," *QST*, Dec. 1969, p. 11.

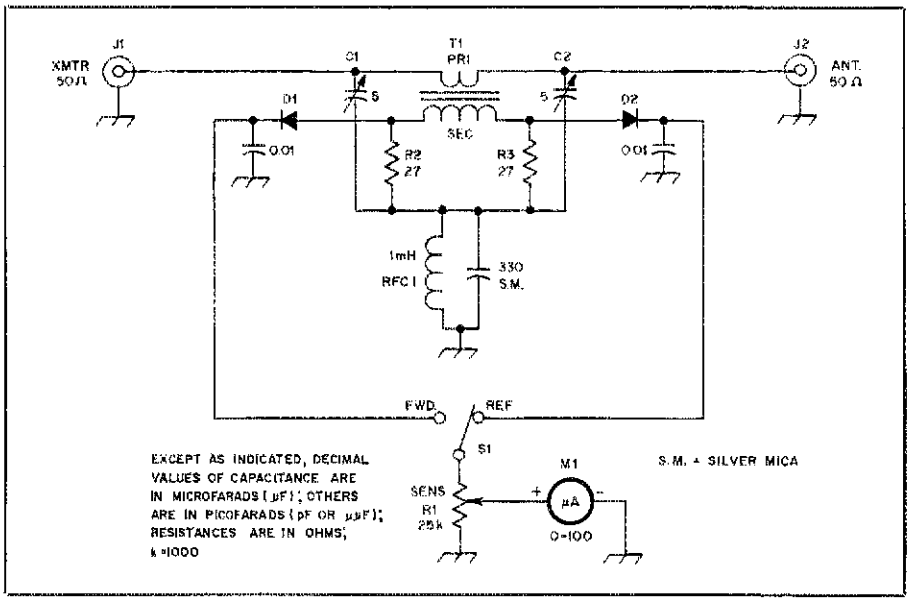


Fig. 2 — Schematic diagram of the VSWR indicator. Fixed-value capacitors are disc ceramic except those marked with S.M., which are silver mica. R2 and R3 are 1/4-watt carbon-composition units.

C1, C2 — Miniature pc-mount air trimmer (see text).
D1, D2 — Silicon switching diode, 1N914 type, matched for equivalent forward resistance (use an ohmmeter).
J1, J2 — Single-hole-mount phono jack.
M1 — Miniature 50- or 100-μA dc meter (see text).
R1 — Linear-taper miniature control, 25 kΩ.
RFC1 — Miniature 1-mH rf choke.
S1 — Miniature spdt slide or toggle switch.
T1 — Toroidal transformer. Secondary: 60 turns no. 30 enam. wire on an Amidon, Radiokit or Palomar T68-2 powdered-iron core. Primary is two turns over secondary winding.

Double-sided pc-board material is used for the case. It is soldered together along the inner seams of the walls and the base plate. The top plate is tacked to the case, using one solder blob on each side. This should be done after the circuit has been adjusted and is considered ready to use.

I supported the pc board[3] in the box by means of a single standoff post, directly under T1. The rear edge of the pc board butts firmly against the back wall, as shown in the photograph. Be sure to connect the ground foil of the pc board to the box walls. I used two short lengths of bus wire for the purpose. A glob of noncorrosive RTV sealant is placed in the center hole of T1 to keep the transformer in position. Similarly, I glued M1 to the front panel by means of quick-drying contact cement. Four adhesive-backed plastic feet are attached to the bottom plate of the instrument. I used Dymo® tape labels to identify the controls and the input/output jacks on the rear of the box.

Adjustment is done by connecting a 50-ohm resistive termination to the antenna jack, applying rf energy to the transmitter jack and adjusting R1 for a full-scale reading (S1 in the FWD position). Next, switch S1 to REF and adjust the trimmer that causes the meter reading to change (one of the trimmers will be unresponsive in this setting). Set the trimmer for minimum meter deflection. It should read zero. Next, reverse the cables at J1 and J2. Put S1 in the REF position. Apply rf energy. The meter should read full scale. Switch S1 to FWD and adjust the remaining trimmer for minimum meter reading (again, it should fall to zero). The bridge has now been balanced for 50 ohms. This set of adjustments should be done on 20 or 15 meters to ensure proper high-range performance.

When using the instrument, always adjust R1 for a full-scale reading with S1 in the FWD mode. Adjust the antenna or antenna-matching network for the lowest reading attainable with S1 in the REF position. A zero reading in REF will be equivalent to a VSWR of 1:1.

My tests show the instrument is suitable from approximately 1 watt to 150 watts. It is not designed for power levels in excess of 150 watts. It will function properly from 1.8 to 30 MHz. It may look ugly, but it's small! — *Doug DeMaw, W1FB, ARRL Hq.*

[3]Pc boards for the VSWR meter are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81001. The ARRL and *QST* in no way warrant this offer.

A BROADBAND 80-METER INVERTED V

☐ I have a solution to the problem of constructing a broadband antenna for 75 and 80 meters. My antenna consists of two inverted Vs, connected to a single 50-ohm coaxial-cable feed line. My version uses one antenna cut to resonance at 3512 kHz and another at 3790 kHz.

I have experimented with different angles between the two Vs, and the optimum broadband condition seems to occur at maximum

separation, 90° to each other. The apex of my antenna is at a height of 65 feet (20 meters), and the legs all come down at about a 45° angle. In addition, there seem to be no directional effects with this antenna. — *Tim Cotton, N4UM, Plantation, Florida*

[Editor's Note: See a related article by Lawson, Nov. 1970 *QST*, p. 17.]

GASOLINE-ENGINE POWER SUPPLY

☐ When Dwight and Ann Mueller were planning to spend a year in the Alaskan wilderness, they needed a small, portable power supply.[4] Dwight built a gasoline-engine-powered unit that included a 12-V automobile alternator and a 2500-W, 117-V alternator (Fig. 3).

A 5-hp engine is used to drive either the 12-V or the 117-V alternator. The pulley sizes are the same on the engine and both alternators. Full output from the 117-V unit was achieved at 3500 rev/min, and at a slightly slower speed for the 12-V alternator. Both alternators were never driven simultaneously, but this should be possible if a slightly larger pulley is used on the 12-V unit so it can be run somewhat slower than the 117-V alternator. A larger engine may be needed if both alternators are to be driven at once, but a smaller one would be sufficient to run only a 12-V alternator.

Fig. 4 shows how this device can be wired with an automotive voltage regulator to maintain the charge on a 12-V battery. The Muellers' installation had meters and a battery inside the cabin. Large gauge wire must be used between the alternator and battery. — *Roger Barnard, WA0HAM, Mercer Island, Washington*

[4]R. Barnard, "An Alaskan Adventure," *QST*, March 1982, pp. 54-55.

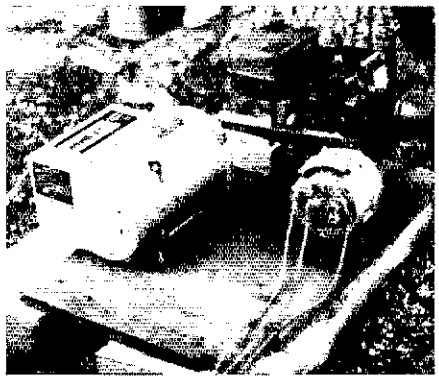


Fig. 3 — Photo of a gasoline-engine power supply for 117-V ac and 12-V dc.

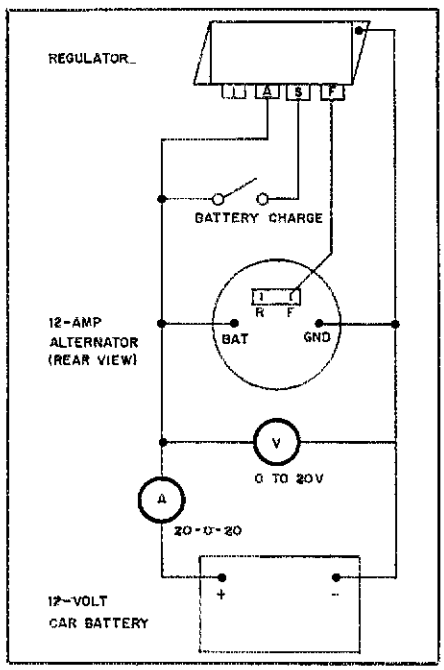


Fig. 4 — Sketch of the connections used to maintain the charge on a 12-V battery. The battery can be used to power a small transceiver and even some 12-V lamps for reading.

INDOOR-ANTENNA SUPPORT

☐ After moving to an apartment that has a restriction against outside antennas, I decided to try my 2-meter beam indoors. I mounted the antenna on a wooden pole, and fastened the pole in a Christmas-tree stand. This provides a sturdy, small, portable support. The results from my second-floor apartment are gratifying. My "armstrong" rotator easily points the beam in any direction, and stands the antenna flush with the wall and out of the way when not in use. — *David J. Tomaszek, WD4CBZ, Hialeah, Florida*

A 2-METER J BEAM WITH TRIGONAL REFLECTOR

☐ This antenna was developed as a combination of ideas from two previous *QST* articles.[5,6] I wanted a beam antenna with vertical polarization, and I wanted to avoid the problems of fastening a conventional Yagi type of antenna directly to the metal mast above my tribander.

The vertical J-driven radiator (and boom-support piece) is constructed from odd lengths of 3/4-in. conduit that I welded together.[7] The matching stub is welded to the radiator by means of a bracket formed from scrap iron. I use a radiator that is more than 7 feet long, but any additional length below the stub (58 inches from the top) raises the antenna higher above the mast. The main boom is made of 3/4-in. PVC pipe, and the secondary boom is 1/2-in. PVC pipe. The directors and reflectors can be copper tubing, aluminum rods, hard-drawn copper wire or any similar material. Fig. 5 gives dimensions and construction information.

I found the best feed point by trial and error, using an SWR indicator. The coaxial-cable center conductor and shield were attached to the radiator and the matching stub. The points of attachment were moved up and down until the lowest SWR reading was obtained. These adjustments were made at ground level.

With the beam mounted on my tower, I was able to access a repeater about 50 miles away. The signal received from the repeater almost pinned the S meter. Access had been impossible with a 1/4-λ vertical at the same height. I am very pleased with the results from this antenna. — *Jack Ratzlaff, VE7DDS/VE5, Regina, Saskatchewan*

[5]J. McDonald, "A J-Driven 2-Meter Beam Antenna," *QST*, Nov. 1979, p. 32.
[6]V. Quaresima, "A Tri-Yagi for 50 MHz, *QST*, June 1980, pp. 14-15.
[7]mm = inches × 25.4.
m = feet × 0.3048.
km = miles × 1.6.

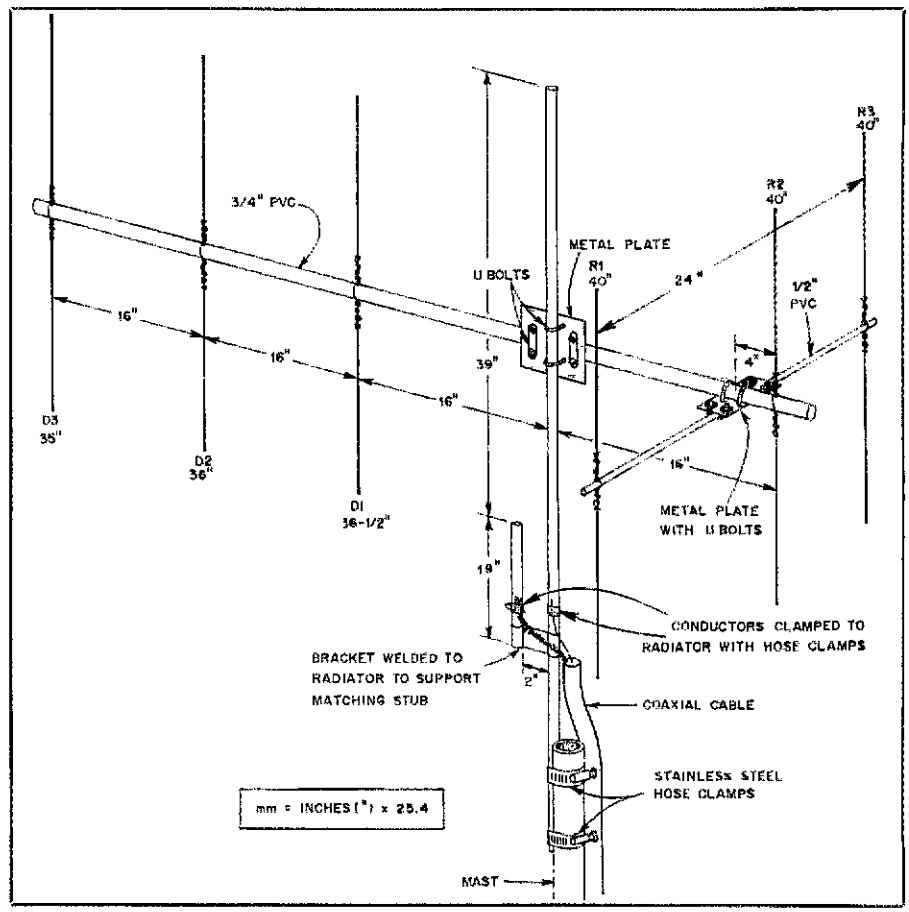
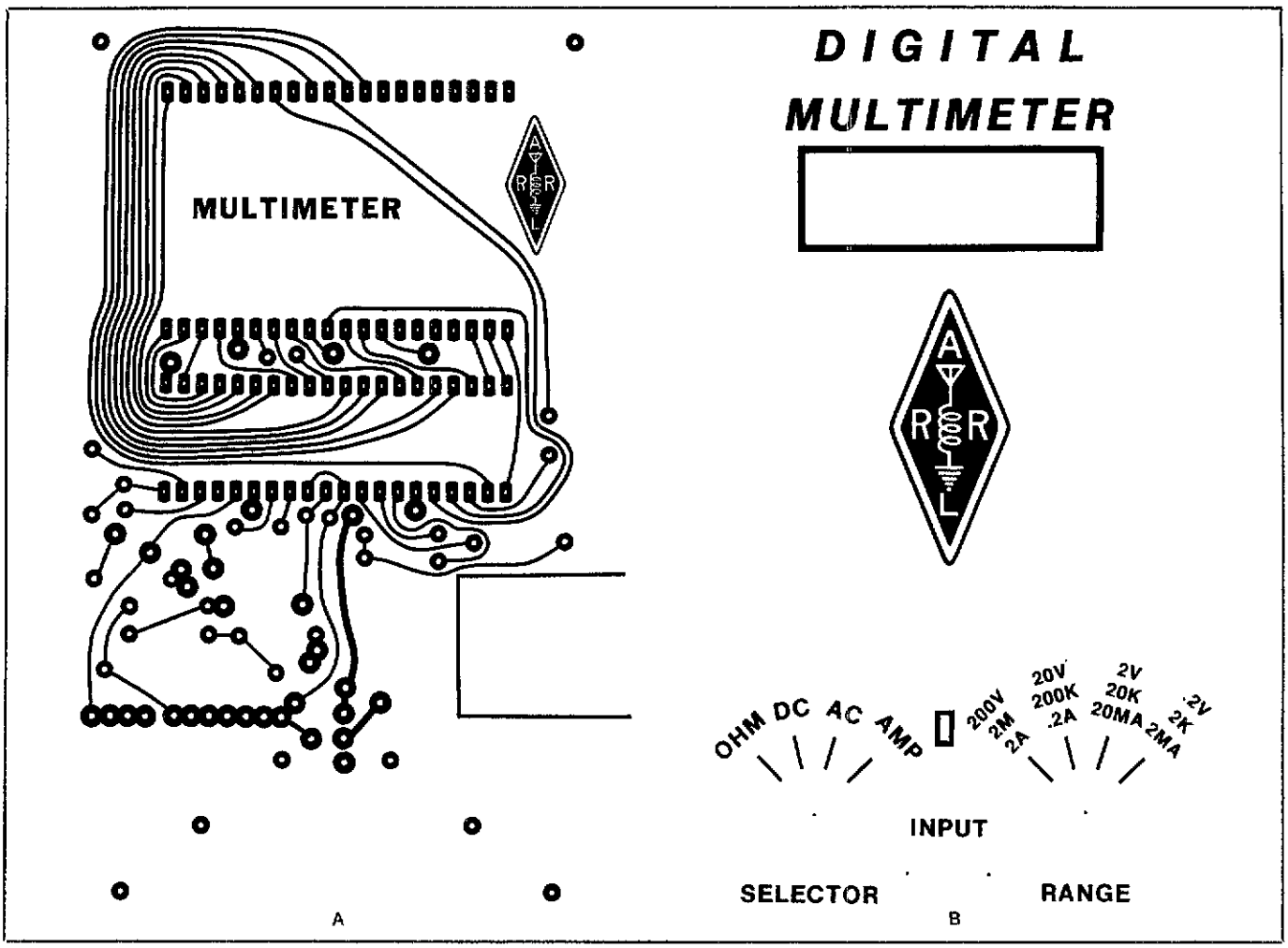
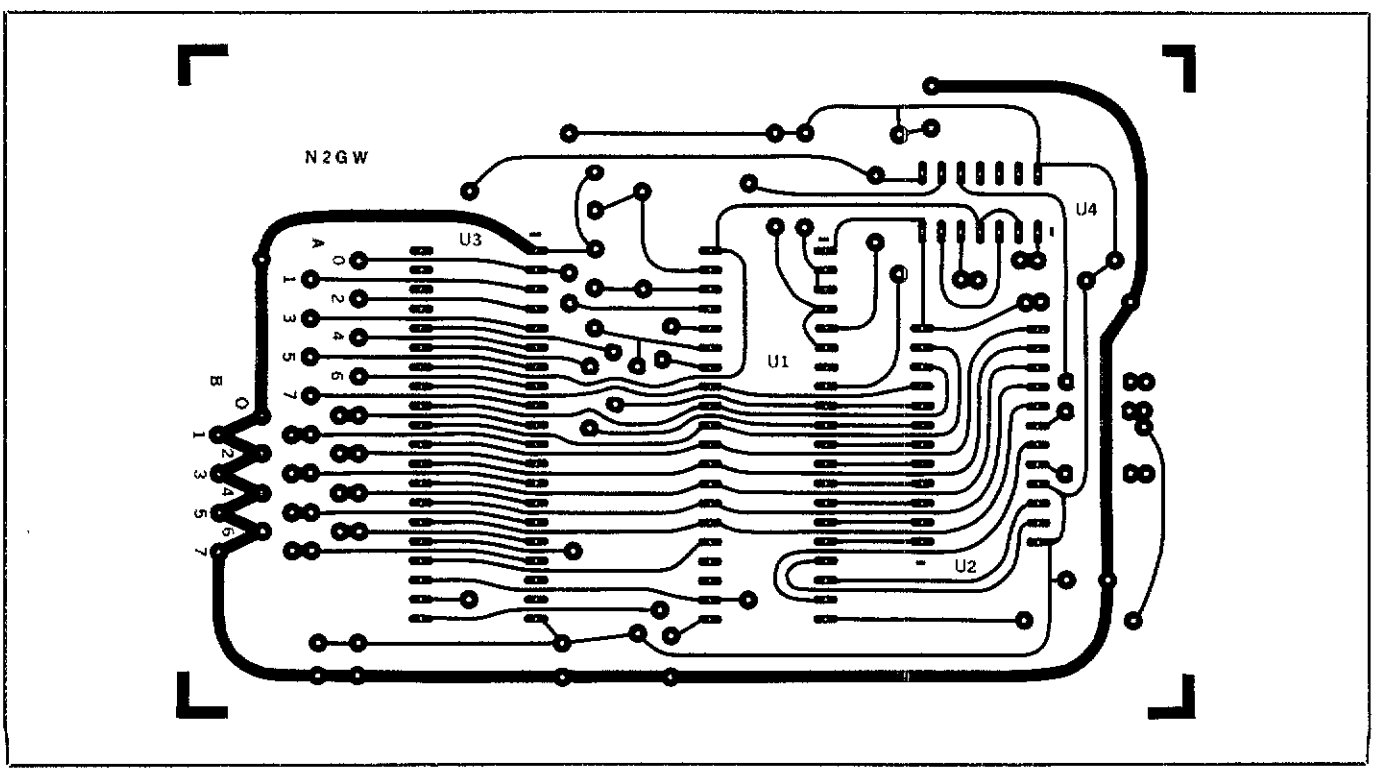


Fig. 5 — Dimensions and construction details are shown for a 2-meter J beam using a trigonal reflector.



Etching patterns for the Digital Multimeter circuit board (A) and case front panel (B). At A the black areas represent unetched copper, viewed from the etched side of the board. At B the black areas represent etched copper. A parts-placement diagram appears on p. 33.



Circuit-board etching pattern for the Three-Chip Microcomputer (see the parts layout of Fig. 8, p. 23 of this issue). Black represents copper. The pattern is shown at actual size from the foil side of the circuit board.

Product Review

Conducted By Paul K. Pagel,* N1FB

ICOM IC-720A HF Transceiver

☐ A compact, full-featured hf transceiver, the ICOM IC-720A covers all amateur bands from 1.8 through 30 MHz, including the 10-, 18- and 24-MHz WARC frequencies. It incorporates a general-coverage receiver tuning 0.1 through 30 MHz in 1-MHz segments. Cw, usb, lsb, a-m or RTTY (fsk) operation is selectable by front-panel push-button controls. The matching IC-PS15 ac-operated power supply provides 13.8 V dc at 20 A, and is connected to the transceiver by a 2-1/2 foot† cable. The power supply is switched by the transceiver.

The review unit included the optional SM5 electret-condenser desk microphone with a built-in preamplifier (powered by the transceiver) and the optional FL-32 500-Hz cw filter. Other options available include the SP3 external speaker (the '720 has a built-in 2-1/2 inch round speaker), HP1 headphones, an MB5 mobile mounting bracket, a BC-10A memory backup power supply and an FL-34 a-m filter.

Among the features standard on the '720 are a digital readout, an rf speech processor, a VSWR indicator, receiver incremental tuning, a noise blanker, band-pass tuning, an rf attenuator, VOX with separate cw and ssb delays, a selectable tuning rate and two built-in VFOs.

Frequency Control

The IC-720A operating frequency is determined by a microprocessor-controlled phase-locked-loop (PLL) local oscillator. Tuning is available in 10-, 100- and 1000-Hz steps, selectable from the front panel. Tuning in the 10-Hz-per-step mode is a bit slow (1 kHz per knob revolution), but it gets around the very noticeable frequency changes found in the 100-Hz-per-step mode. During normal operation, either the 10- or the 100-Hz setting is used, while a touch of the TS (tuning speed) button switches to 1-kHz steps for making larger frequency excursions. A dial-lock control locks the VFO at the displayed frequency, preventing unwanted frequency change through accidental operation of the tuning knob. Red LEDs indicate when the TS and the dial lock functions are in use.

One feature not found on most radios is the method of band selection. Instead of a conventional band switch, the '720A employs a multisection, motorized rotary switch controlled by front-panel push buttons. The band switch control circuit can be accessed remotely through a rear-panel connector. When power is first applied to the transceiver, the band switch steps around to 7.100 MHz (15.000 MHz in the general-coverage mode) from wherever it was when the rig was last turned off. The UP control will move the operating frequency to the next higher amateur band (10 MHz), while the DOWN button will move the frequency to the next lower band (3.5 MHz). In the general-coverage mode, the controls move the receiver frequency to the next higher (or lower) 1-MHz segment. Whenever the band is changed in the HAM mode, the transceiver will always arrive 100 kHz up from the bottom of the selected band (3.600, 7.100, 14.100 MHz, etc.). In the GENERAL-COVERAGE mode, the frequency will move up or down exactly 1 MHz; for example, if you are listening on 16.372 MHz, a touch of the UP button will change the frequency to 17.372 MHz. The motorized switch is loud enough to wake family members sleeping in the next room, so beware of the late-night DX chasing!

The '720A incorporates two separate built-in VFOs, both controlled by the main tuning knob. Through proper operation of the front-panel push-button controls, the following arrangements are possible: transceive on VFO A; transceive on VFO B; receive on A, transmit on B; receive on B, transmit on A. The VFOs may be set to frequencies on different bands, but split operation (selected by the SIMPlex/DUPlex push button) is available only on the same band; the rig will not transmit on one band and receive on another. Another push button will automatically set both VFOs to exactly the same frequency, eliminating much knob-twirling when split operation is needed in a hurry, as when you stumble across that rare DX station who has just announced that he's listening "up 5."

The RIT control, activated by a front-panel push-on, push-off switch, will vary the received frequency ± 800 Hz. A red LED above the frequency display indicates when the RIT is activated. As the rig comes from the factory, the RIT will pulse off each time the main tuning knob is moved, but this feature can be deactivated by an internal switch. Any receiver frequency change made with the RIT is *not* indicated on the display.

The displayed frequency does not change during transmit. In addition, indicators on the left-hand side of the display indicate which mode and which VFO (A or B) is in use. A thorough reading of the operating manual is encouraged because, in the GENERAL-COVERAGE mode and on the 28-MHz amateur band, the displayed frequency and actual operating frequencies are different at the band edges. For example, at the lower edge of the 15-MHz general-coverage segment, the display will read 15.000.8 in the lsb or cw mode, but the actual operating frequency will be 16.000.8 because of the way the frequency "rolls over" from 15,999.99 MHz at the high end and returns to 15.000.00 MHz on the display. By the same token, on the 28-MHz ham band, for a displayed frequency of 28.000.8 on cw, the transceiver is actually operating on 29.000.8. Don't be surprised if you hear ssb signals when tuning around the low end of 10 meters; they're perfectly legal ssbers operating around 29 MHz.

Receiver

The '720A uses a dual-conversion superheterodyne receiver with the first i-f at 39.7315 MHz and the second i-f at 9.0115 MHz. There are separate RF and AF GAIN controls. The PBT (passband tuning) control is moderately effective in eliminating adjacent-channel interference. Agc operation is selectable from the front panel. The slow or "normal" setting is intended for ssb operation, and features a

*Assistant Technical Editor

hang-age characteristic, while the FAST setting is intended for cw work. The receiver also features an ATTenuator control. When the ATT switch is depressed, the rf amplifier is removed from the circuit and a 10-dB attenuator is inserted in the receive line. The built-in noise blanker (NB) is somewhat effective against pulse-type noise, such as ignition noise. Care should be taken when using the noise blanker, however, because strong signals tend to overload the receiver with it switched in.

Front-panel push buttons also provide for mode selection. The choices include CW with the 2.3-kHz ssb filter; CW-N with the optional 500-Hz filter; AM; SSB-N, which automatically chooses the proper sideband for the band of operation; SSB-R, which gives the reverse sideband; and RTTY. CW and CW-N are on the same push button, as are SSB and SSB-R. The function of each switch is controlled by the FUNC button, much like the function button on a calculator.

Shortwave listening with the '720 is a joy. Normally used amateur antennas provide satisfactory reception on all of the shortwave bands, and their sensitivity is every bit as good as on the ham bands. At lower frequencies, the receiver is somewhat picky about antenna impedance. A matching network is required on the a-m broadcast band. At my QTH, the receiver would pick up only the strongest local broadcast station, when using an 80-meter half-wave dipole without a matching network.

For serious SWLing, the optional a-m filter probably should be used. The standard 6-kHz filter is rather broad, making crowded-band reception difficult at times. The optional FL-34 5.2-kHz a-m filter has a better shape factor, providing better selectivity.

Transmitter

The '720 incorporates a solid-state broadband transmitter, providing about 100 watts of output on each band. No tuning is required. The finals are SWR-protected; if the load connected to the transmitter is other than 50 Ω, the transmitter power output is reduced. I found that the power output started to drop off at an indicated SWR of about 1.8 to 1. The input SWR on my linear amplifier is greater than that on some bands, so the '720 would not drive the amp to the full legal input power.

The finals are cooled by a quiet fan that runs whenever the rig is in the transmit mode. If the finals get hot during extended operation, the fan will run continuously until the temperature reaches an acceptable level. If the temperature reaches the point where it will hurt the '720, the fan shifts to a faster speed. Should this occur, the instruction manual advises that you stop operating and find the cause of the problem.

Front-panel controls include a MIC GAIN control and an RF POWER control, which also turns the built-in rf speech processor on and off. On cw and RTTY, the RF POWER control allows continuous adjustment of the output power from about 7 watts to maximum. On ssb and a-m, with the processor in use, the MIC GAIN control sets the clipping limits while the RF POWER control sets the drive level.

The '720 has a built-in VOX that also provides semi break-in on cw. The VOX GAIN, ANTI-VOX and separate DELAY controls for phone and cw are located under a panel on the top cover. VOX operation is smooth, and the T-R relay is quiet. The separate delays are nice because, once set, they don't require much adjustment.

When the review unit first arrived, I noticed a problem with the cw waveform: The transmitter would continue to generate rf after the keyer pulse stopped, effectively altering the ratio between the transmitted dots and dashes. Listening in another receiver, this made the cw sound "soft," and, at speeds of 20 wpm or more, the signal was extremely difficult to copy. ICOM recommends changing R15 on the main circuit board from 47 kΩ to 10 kΩ. This fix eliminated the problem. However, because of the crowded circuit boards and the vague board layouts, this modification would best be attempted by an experienced technician.

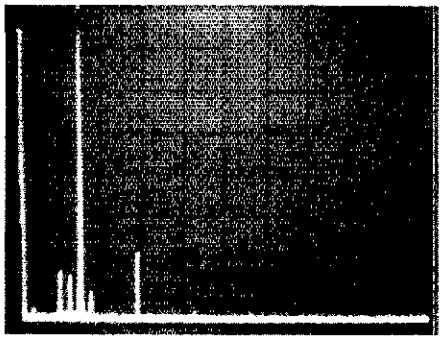


Fig. 1 — Worst-case spectral display of the IC-720A. Vertical divisions are each 10 dB; horizontal divisions are each 10 MHz. Output power is approximately 100 watts at 14 MHz. All spurious emissions are at least 58 dB below peak fundamental output. The IC-720A complies with current FCC specifications for spectral purity.

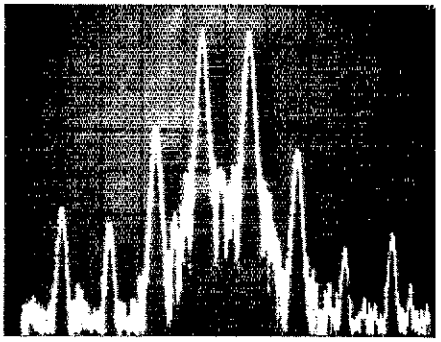
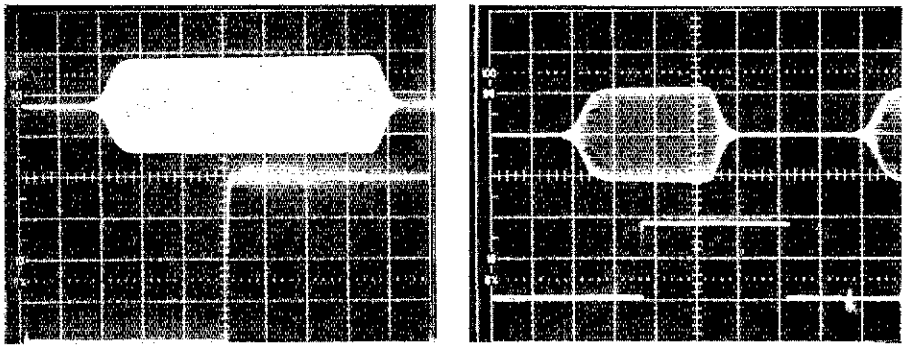


Fig. 2 — Spectral display of the IC-720A during the transmitter two-tone IMD test. Third-order products are 28 dB below PEP output and fifth order products are about 52 dB down. The seventh-order product is higher than the fifth at 48 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated input power on the 20-meter band.



(A) (B)

Fig. 3 — At A, keyed cw waveform of the IC-720A prior to modification. Horizontal divisions are each 5 ms. The lower trace is actual key closure, while the upper trace is the rf output envelope. Heavy weighting is experienced by the elongated envelope. The rf output envelope, after modification, is shown at B.

Other Features

A large-scale, multifunction meter takes up a chunk of the front-panel space. In receive, this meter functions as an S meter. Because of the widely varying meter sensitivity (see specification table), this meter isn't too useful on 160 and 80 meters. Requiring only an 11-μV signal for an S9 reading, almost every signal is at least S-9, and many signals "peg" the meter. On transmit, the meter indicates ALC, relative power output or collector current, depending on the position of the front-panel RF/ALC control and the meter switch under the top-cover access panel. The meter also serves as an SWR indicator.

The rear panel, although primarily a heat sink for the final-amplifier transistors, contains an impressive number of input/output terminals. There is an SO-239 antenna connector, a 1/8-inch key jack, a 1/8-inch external speaker jack, a ground terminal, a dc power input and a fuse holder. The '720 includes receiver input and receiver antenna output RCA-type phono connectors for use with an external preamp or a separate receive antenna (e.g., a Beverage antenna for 80 or 160 meters). The MEMORY phono jack is for the connection of an exernal 9- to 12-V dc supply, to hold the operating frequency in memory in case of a power failure. The LOW BAND ANT (RL) phono jack serves two functions. By changing internal

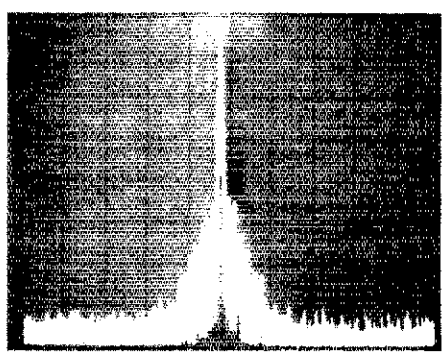


Fig. 4 — Synthesizer noise about the carrier. This photograph was taken with the IC-720A operating at 60 watts of output on 14 MHz. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz.

ICOM IC-720A HF Transceiver, Serial No. 05082

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: Ham band — 1.8-2.0, 3.5-4.1, 6.9-7.5, 9.9-10.5, 13.9-14.5, 17.9-18.5, 20.9-21.5, 24.5-25.1, 28.0-30.0 MHz; general-coverage receiver — 0.1-30 MHz in 1-MHz segments.	As specified.
Modes of operation: Ssb, cw, RTTY, a-m.	As specified.
Readout: 6 digit.	1/2-in. high, 6-digit fluorescent-blue display.
kHz/turn of knob: Not specified.	100/10/1.
Frequency resolution: 100 Hz.	As specified.
Backlash: Not specified.	Nil.
RIT range: ±800 Hz.	As specified.
Receiver attenuator: 10 dB.	Not measured.
S-meter sensitivity (μV/S9 reading): Not specified.	160 m, 12; 80 m, 11; 40 m, 80; 20 m, 90; 15 m, 100; 10 m, 120.
Transmitter rf power input: 200 W, cw; 200 W PEP, ssb; adjustable.	Greater than 100 W output all bands.
Harmonic suppression: Better than 40 dB.	−58 dB (see photo).
Third-order IMD: Not specified.	−28 dB (see photo).
Spurious suppression: Better than −60 dB.	−63 dB (see photo).
Receiver sensitivity: Less than 0.25 μV for 10 dB S+N/N.	Receiver dynamics measured with optional FL-32 500-Hz i-f filter installed.
Color: Gray/green.	
Size (HWD): IC-720A — 4-3/8 × 9-1/2 × 12-1/4 inches;† IC-PS15 — 4-3/8 × 7 × 11-1/2 inches.	As specified.
Weight: 16.5 lb.	As specified.

	80 m	*20 m*
Noise floor (MDS) dBm:	−132	−132
Blocking DR (dB)	noise limited	
Two-tone 3rd-order IMD DR (dB), worst case:	97	92
Third-order intercept:	+13.5	+6

†mm = in. × 25.4, kg = lb × 2.2, and m = ft × 0.3048.

jumpers, this jack serves either as a T-R relay control (for an external amplifier) or as a low-band (1600 kHz and below) antenna input. The TRANSVERTER SCOPE (ALC) phono connector can be used for any one of the following by changing internal jumpers: either as the TX output for a transverter; or access to the 39.7 MHz i-f for observation on a scope; or ALC input from an external amplifier. A 24-pin ACCESSORY socket provides many input/outputs, including RTTY keying, transverter control and external band switching.

Operation

The first thing I noticed when getting ready to operate the '720 was its size. For such a small transceiver, the front panel contains many controls, and these controls take some getting used to. For example, I was so "tuned-in" to a conventional band switch that it took a long while to get familiar with the push-button scheme.

Initial hookup also posed some interesting choices. Should I set the LOW BAND ANTENNA (RL) jumpers for the a-m broadcast antenna or for the relay control? I often use an external amplifier for DXing and contesting, but I also like to DX the a-m broadcast band. Taking off the covers to change the jumpers each time is a chore, so I opted for the relay control.

On cw, I noticed that, although it was difficult to overload the receiver front end, the high synthesizer phase-noise level generated with strong signals in the passband made weak-signal copy difficult. Even with the optional cw filter installed, the selectivity could have been better. The rig just doesn't make it on the low end of 40 at night.

I like the ability to reduce the output power to just a few watts for QRP operation. I also liked the feel of the controls and switches. They have a definite "quality" about them that makes the '720 a pleasure to use. The cooling fan and the T-R relay are quiet.

In summary, the IC-720A is a nice radio for general-purpose use. It is small and quiet, and has just about any feature you would want built in.

Price class: IC-720A, $1349; IC-PS15, $229; FL-32, $60. Available from: ICOM, 3331 Towerwood Dr., Suite 307, Dallas, TX 75234. — *Mark Wilson, AA2Z*

YAESU FT-680R 6-METER MULTIMODE TRANSCEIVER

☐ As this review is being written, Ole Sol continues to stir up the ionosphere. The 50-MHz band is still producing worldwide DX in this late portion of cycle 21! When the F_2-layer DX finally dies, sporadic E (or E_s) will still provide DX excitement for many 6-meter operators. During the review period, a few of the Hq. gang used the '680R in conjunction with a 3-element home-built Yagi to earn an "almost" 6-meter WAC (missing only Asia!) for the Hq. operator's club station, W1INF.

The Yaesu FT-680R is a fully synthesized, microprocessor-controlled, 6-meter transceiver that operates on cw, ssb, a-m and fm. Maximum input power is specified as 20 watts, and frequency coverage is from 50 to 54 MHz. This transceiver is a 6-meter version of the Yaesu FT-480R, which appeared in this column in October 1981.[1]

Features

Microprocessor control in the '680R provides many features, and allows flexibility not found in the older 6-meter designs. The digital VFO system features discrete tuning steps of 0.01, 0.1, 1, 20 and 100 kHz, depending on the operating mode and tuning-rate selection. Four memory channels are available, and in the fm mode these may be scanned for a busy or clear channel. A priority function allows one memory channel to be used as a priority frequency. In the priority mode, the radio will "monitor" this priority channel and alert the operator when it is in use.

Probably the most important feature of the transceiver is the small size. It easily can be located under the dash of small cars, or be placed in a briefcase for a business trip. To ensure versatility, Yaesu has ganged many of the control functions together, which allows for the small front panel. A complete description of each function of the controls of the Yaesu FT-480R was given in the October 1981 review by Wilson. The '680R SAT switch allows the transceiver frequency to be changed while the unit is in the transmit mode. This feature is very useful when operating through an amateur satellite — but amateurs have no satellite allocation on the 50-MHz band!

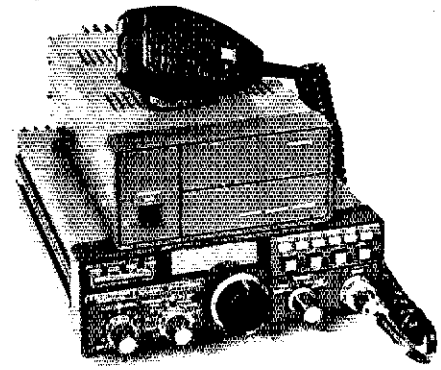
Other Features

As in the 2-meter version, the '680R has an input for both tone-burst and Continuous Tone-Coded Squelch generators. An optional FTS-64E tone generator, which will synthesize 32 different CTCSS or tone-burst frequencies, is available. The tone input is located on the rear panel, which also has 1/8-inch jacks for the cw key, an external speaker and a 2-pin dc power connector along with an SO-239 antenna connector.

Installation and Operation

During the review period the FT-680R was operated in fixed, mobile and portable environments. Fixed operation was from W1INF, in conjunction with a 3-element homemade NBS Yagi.[2] This system worked well, and the receiver dynamic range was put to the test, as there are many 6-meter operators living very close to ARRL Hq.! Only the *very* strong local

[1] M. Wilson, "Yaesu FT-480R 2-Meter Multimode Transceiver," *QST*, Oct. 1981, pp. 46-47.
[2] D. Lusis, "Go for the Gain, NBS Style," pp. 34-38, this issue.



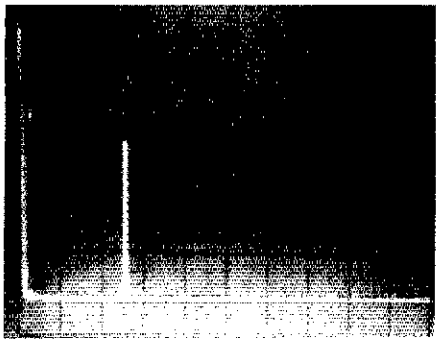


Fig. 5 — Spectral display of the FT-680R. Vertical divisions are each 10 dB; horizontal divisions are each 20 MHz. Output power is approximately 10 watts at 6 meters. The fundamental has been reduced in amplitude approximately 33 dB by means of a notch filter; this prevents analyzer overload. All spurious emissions are approximately 70 dB below peak fundamental output. The FT-680R complies with current FCC specifications for spectral purity.

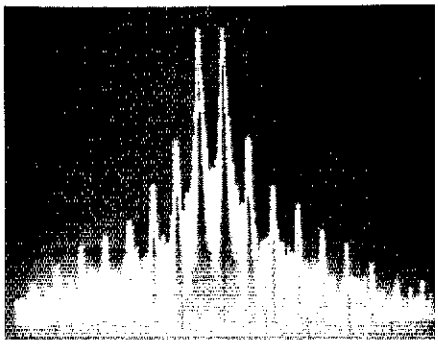


Fig. 6 — Spectral display of the FT-680R output during the transmitter two-tone IMD test in the SSB mode. Third-order products are approximately 33 dB below PEP and fifth-order products are approximately 45 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transmitter was being operated at rated input power on the 6-meter band.

Yaesu-Musen FT-680R 6-Meter Transceiver, Serial No. 020460

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 50.000-53.999 MHz.	Same.
Operating modes: Usb, cw, a-m and fm.	As stated.
Frequency display: Blue-fluorescent digital display	As stated.
Power requirements: 13.8-V dc at 5A.	As stated.
Transmitter rf power output: Not specified.	Greater than 10 W on ssb, cw and fm; 4 W carrier on a-m.
Transmitter third-order IMD: Not specified.	Approximately −33 dB (worst case).
Spurious suppression: Better than 60 dB.	> −60 dB.
Harmonic suppression: Not specified.	> −60 dB.
Frequency stability: Not specified.	Less than 100 Hz from a cold start to one hour later.
Receiver audio power output: 2 W at 10% THD.	1.3 W into 8 Ω.
S-meter sensitivity: Not specified.	Relative type, 27 μV required for full scale deflection.
RIT range: Not specified.	± 10 kHz.
Receiver sensitivity: Ssb, 0.5 μV for 20 dB S/N; fm, 0.35 μV for 20 dB QS; and a-m, 1.0 μV for 10 dB S/N.	Receiver dynamics measured with a 2.4-kHz i-f bandwidth; Noise floor (MDS): −136 dBm Third-order IMD dynamic range: 81 dB Blocking dynamic range: 111 dB.
Size: (HWD) 2.4 × 7 × 9.4 in.†	
Weight: 6.4 lb.††	
Color: Not specified.	Tan body with gray front panel.

†mm = in. × 25.4. ††kg = lb. × 2.2.

signals overloaded the receiver front end. The one fault in the '680R that makes it difficult to use is the slow delay time of the receiver age. Sometimes when DX stations were calling, the local splatter would cause the age to decrease the sensitivity of the receiver enough to mask the DX station calling. Mobile operation of the transceiver was flawless, except for the noise-blanker performance. It never seemed to be of any help with ignition noise during use in several vehicles.

Portable operation with the FT-680R was done from several mountain tops in the Connecticut area. Power consumption is a little too much for a dry-cell battery pack to handle, so an automobile dc supply or an ac supply/generator is the best bet. As in base-station operation, the receiver was never really "crunched" by signals other than the strong local ones. I was impressed by the synthesizer in the transceiver; the lack of severe synthesizer noise was evident.

Conclusions

I found the transceiver to be a "workhorse." It was used as an exciter for lab testing, as a portable contest rig and as a source of excitement for the off-duty Hq. staff when working 6-meter DX. At one point during the review period the unit required major repair. A high-voltage spike from the optional FP-80 13.8-V supply destroyed a few semiconductor devices in the '680R, but the unit was soon repaired by Yaesu. Yaesu cautions that the power supply switch should not be used as the ON/OFF switch for the transceiver.

Strictly from an operator's viewpoint, I found the transceiver to be somewhat cumbersome to operate, but once the layout is understood the performance is appreciated. I would recommend to anyone looking for a new 6-meter "box" to take a serious look at the FT-680R. The FT-680R is sold by Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723. Price class is $520. — *Gerry Hull, AK4L*

New Products

DUFFY ENTERPRISES TOOL-AID®

☐ A new product of possible interest to hams is Tool-Aid. It looks like candle wax and is intended to create a temporary bond between components of almost any kind during assembly. A common application is in starting small screws or nuts in tight places. The substance is applied to a screwdriver tip; when the screw is picked up, it sticks to the tip. If a small part is dropped inside a chassis, Tool-Aid can be used on a screwdriver tip or probe tip to retrieve the part. The material doesn't leave any mess, and only a small amount is needed to achieve a good grip. Tool-Aid is available from Duffy Enterprises, 2212 Bedford St., Johnstown, PA 15904. Price per package: $3.99. — *Sandy Gerli, AC1Y*

CERMETEK TELEPHONE LINE INTERFACE

☐ The Cermetek Microelectronics, Inc., CH1810 is a stand-alone, direct-connection device that was primarily designed to allow data terminal equipment to be connected directly to the telephone line. This device has received FCC approval under Part 68. FCC recertification is not required when integrated into systems, provided the included label is externally attached; it contains the registration number and ringer equivalence.

The CH1810 can be used as a telephone-line interface in a variety of environments. These include use with modems, answering machines, FAX machines, auto dialers, burglar alarms, remote metering devices, etc. Pc-board mountable, the DCPH (Direct Connect Protective Hybrid) occupies less than 5 square inches† of space. Connection to the DCPH is made by means of 0.1-inch-on-center pins. A ±12-V power supply is required.

These devices are manufactured by Cermetek, Inc., 1308 Borregas Ave., Sunnyvale, CA 94086, and are available from P and L Associates, P.O. Box 481, East Setauket, NY 11733. Price class in 1 to 9 quantities: $95. — *Paul K. Pagel, N1FB*

†mm^2 = $in.^2$ × 645.16.

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

WHEN IS A BALUN A "BALUN"?

☐ It is important to recognize that a 4:1 or a 1:1 balun (balanced to unbalanced) is essentially a broadband transformer. It needs to be if it will be called upon to perform the prescribed function of joining an unbalanced transmission line to a balanced load.

Assuming that a balun or any broadband transformer is designed correctly, and that it does not introduce appreciable unwanted reactance in the system, it will function well into a resistive load. This is not difficult to realize in circuits where the load remains relatively constant, such as in the case of a solid-state Class-A driver being transformer-coupled to the bases of two transistors in Class-A amplifier service. Furthermore, broadband transformers are used mainly at low impedance levels (say, under 500 ohms) if proper performance is expected. Also, the bandwidth of a balun is governed by the design, and, with proper attention to leakage and stray reactance, it can provide the expected performance over several octaves. Not all baluns meet this criterion. A balun can be tested for bandwidth by placing an SWR indicator between it and a transmitter. The balun (or other broadband transformer) is terminated in the appropriate resistance (noninductive). The balun is then "swept" over the intended operating range, band by band, and the VSWR is noted. Ideally, it will remain 1:1, or nearly so, if all is as it should be. High VSWR readings indicate poor performance. It is wise to check this before committing a balun to an antenna system. This is particularly important when magnetic-core baluns are employed (ferrite or powdered-iron); if the VSWR is high, and so is the rf power, core saturation can occur. If this happens in an antenna system, the balun will generate harmonic energy and can be damaged permanently. Also, the effective inductance of the balun coil will change, which can contribute further to inferior performance.

There are other considerations when a broadband transformer is used in an antenna system. Typically, an amateur antenna presents a resistive condition at resonance. This can be at some discrete frequency within a band, or at a very narrow segment of a given band. If that resistive characteristic is of the proper value for the transmission-line impedance, all will be okay. But, at either side of that frequency there will be a reactive condition. This will affect the performance of the transformer and can make the VSWR seen at the transmitter end of the line much worse than it would be without a balun in the system. Proof of this phenomenon is seen in Tables 1 and 2. Table 1 shows the VSWR of a commercial triband Yagi when a 1:1 balun was connected to the balanced feed point. The transmission line was 60 feet[1] of 50-ohm aluminum-jacketed Hardline. The Yagi was adjusted for the cw portions of each band (20, 15 and 10 meters). Note that the apparent antenna resonance appears to be outside the low end of each band. Also, the VSWR bandwidth is very poor.

Table 1
VSWR Measurements for Yagi Antenna with Balun

Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
14.000	1.3:1	21.300	4:1
14.100	1.7:1	21.400	6:1
14.200	2.2:1	28.000	1.5:1
14.300	3:1	28.100	1.6:1
		28.200	1.75:1
21.000	1:1	28.300	1.85:1
21.100	1.6:1	28.400	2:1
21.200	1.85:1	28.500	2.47:1

VSWR measurements were taken with a Bird Thruline wattmeter for a commercial triband Yagi with 60 feet of Hardline. A commercial 1:1 balun was installed at the antenna feed point, and the antenna was adjusted for operation in the cw portions of the three bands.

Table 2
VSWR Measurements for Yagi Antenna with Decoupling Coil

Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
14.000	1.5:1	28.000	1.4:1
14.050	1.3:1	28.050	1.35:1
14.100	1.3:1	28.100	1.3:1
14.200	1.57:1	28.200	1.3:1
14.300	1.9:1	28.300	1.22:1
		28.400	1.22:1
21.000	1.5:1	28.500	1.23:1
21.050	1.3:1	28.600	1.3:1
21.100	1:1	28.700	1.43:1
21.200	1.4:1	28.800	1.57:1
21.300	2.54:1	28.900	1.75:1
21.400	4.44:1		

VSWR measurements were taken with the same antenna and conditions specified in Table 1, but with the balun replaced by an RG-8/U decoupling coil, 8 turns (solenoidal), 6-in. ID.

Table 2 contains VSWR data that was obtained from the same antenna, one day later, with the commercial balun removed. It was replaced by a coaxial decoupling coil (8 turns of RG-8/U cable, solenoidal-wound, 6-in. ID). This type of device is recommended by a number of beam-antenna manufacturers to prevent feed-line radiation. Note that the VSWR now "bottoms out" well within each band, and that the VSWR bandwidth of the antenna has increased markedly.

Tables 1 and 2 clearly illustrate the undesirable effects caused by the balun. Obviously, there was a sufficient reactance present to disturb the system performance. This is especially true of the 10-meter performance.

The losses must be considered also. When a balun is attached to an improper load, it can be subjected to considerable heating, depending on the amount of rf power supplied to the antenna. Heat causes losses and, if severe enough, it can destroy the balun. I have experienced high levels of heat in balun coils with only 100 watts of rf power when attempting to couple a balanced transmission line to a Transmatch. This was most prevalent when the line reflected a fairly high impedance to the balun.

If you've had problems with baluns, perhaps your balun isn't a *balun* in your particular system. These problems apply even to dipole antennas, and the lower the operating frequency (160 and 80 meters especially) the worse the problem, because of the restricted antenna bandwidth. — *Doug DeMaw, W1FB, ARRL Hq.*

[1]mm = in. × 25.4; m = ft × 0.3048.

*Assistant Technical Editor

Feedback

☐ In "TS-830S Final-Amplifier Current Monitoring," (*QST*, October 1981 Hints and Kinks) an incorrect pin number is given. The first sentence in the third paragraph should read: " . . . solder R4 and R5 between V2 pin 4 foil and the ground foil."

☐ Please note this correction by author Palmer to Fig. 7 of "Refining the SB-104," March 1982 *QST*. Delete the wire joining pc board connections 14 and 2. This wire is adjacent to the 0.1-μF input coupling capacitor.

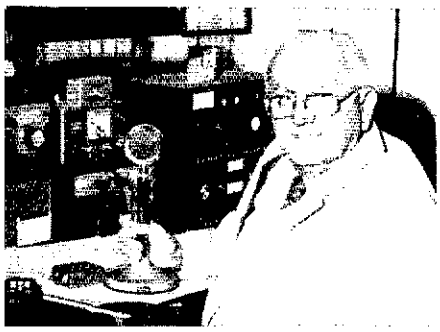
☐ Owing to nonuniformity in the characteristics of transistors and ICs, some builders of the "Bare-Bones CW Superhet" in June 1982 *QST* may have less than the desired 2 V pk-pk of LO injection to the mixer. If this is the case, delete the 4:1 balun (T7 of Fig. 4) and replace it with a 1-mH rf choke. The 0.1-μF output capacitor then connects directly to the collector of Q10. Also, change the 100-pF coupling capacitor between Q9 and Q10 to a 470-pF value. These changes do not apply to the VXO model. Also, if audio feedback is noted when using 8-ohm or other low-Z phones, add a 0.1-μF capacitor between pins 3 and 7 of U1.

☐ The article, "New Life for ARRL Sections" (June 1982 *QST*), contains an error which may confuse the reader. On page 54, at the beginning of the last full paragraph in the third column, the italicized words "*Section Emergency Coordinator*" are superfluous and should be deleted. The paragraph is a continuation of the discussion about the *State Government Liaison*.

☐ In "Results, 1981 Simulated Emergency Test," published in June 1982 *QST*, the report of Bexar Co. EC WA5RNV was inadvertently overlooked. Total points for the Bexar Co. ARES was 456, which gives Southern Texas a corrected total of 1670 points. Also, the Lee Co., Iowa, SET total, as reported by WBØVYG, was 99 points. The Iowa Section's adjusted total is now 1381 points.

☐ The sunspot number listed on page 73 of June 1982 *QST* should be 107, not 110.

Meet Eddie Miller, W5EXI: Instructor of the Year, 1981



The Herb S. Brier, W9AD, Memorial Instructor of the Year Award goes to an outstanding teacher who will be remembered by his students for many years to come.

By Steve Pink,* KF1Y

Ham radio is a great, worthwhile and enduring hobby because of people like Eddie Miller. He has been licensed since 1935, and, during all these years, has contributed more back to the hobby than he has taken for himself. — Carole Allen, W5NQQ

I first met Eddie when I was in my early teens and ham radio was only a glorious fantasy. Eddie taught theory then, as he still does, in plain, straightforward language, and it didn't take long for his enthusiasm to push the mysteries of Ohm's law through the barrier of my confusion. — Graham Smith, K5MPB

These are but a few of the many comments we received in praise of Eddie Miller, as Amateur Radio teacher and Instructor of the Year. The Lake County (Indiana) Amateur Radio Club, in cooperation with the ARRL Club and Training Department, recently awarded the fourth annual Herb S. Brier,[1] W9AD, Memorial Instructor of the Year Award to Edward G. (Eddie) Miller, W5EXI, for his outstanding effort on behalf of his students and Amateur Radio.

An Instructor for 36 Years

Eddie Miller teaches Amateur Radio licensing classes in Lafayette, Louisiana, for the Lafayette Amateur Radio Club and the Arcadiana Amateur Radio Association. Over the last 36 years, more than 500 students have received licenses and upgraded through Eddie's courses. "His untiring patience, enthusiasm and willingness to provide help is legendary among amateur operators in the Lafayette area," says Charlie Melancon, KC5HL, whom Eddie guided into ham radio. And the young people of southwestern Louisiana have also benefited from Miller's teaching expertise. "I am now an Advanced class license holder," comments Pierre De Hosse, KA5DKG, in praise of our Instructor of the Year, "and, at the age of 16 I think I have accomplished something of a feat that could not have been done without the guidance of Eddie Miller."

Miller's success as a teacher can be explained by his philosophy of making radio theory come alive for his students through his hands-on approach. "The class is taught in a room that contains a fully equipped amateur station," says Miller. "Teaching prospective hams with ham gear as a tool makes blackboard instruction much easier. I give many demonstrations, and I let the students handle resistors, capacitors and other articles that we study. Putting resistors in parallel on the blackboard is easy after it has been done on the table. When theory is used to explain observed facts, theory becomes enjoyable."

Eddie's career in ham radio began in 1935, when, as a young assistant professor of Physics at the University of Southwestern Louisiana, he witnessed an older colleague's cw QSO. Eddie built a buzzer for himself and, with a code key presented to him by his amateur colleague, began to prepare himself for his FCC ticket. Within a year, he received his call, W5EXI, which he has been proud to hold ever since. Almost immediately after receiving his license, he became an "Elmer" to anyone who wanted his help in becoming a licensed ham. "Demand for his services became so great that he decided to organize a free class in ham radio for his own convenience and in order to stretch himself far enough to help more and more," recounts Alton Broussard, W5VAQ, a friend of Miller since they were Boy Scouts together in Louisiana 49 years ago. "From then on, to this very day, Eddie has offered at least one class a year either on his own or under the sponsorship of the Lafayette Amateur Radio Club, which he helped organize in 1951."

Although Eddie no longer teaches full-time in the Physics Department at the University, he still teaches part-time there and at the Vocational Technical School in nearby Crowley. This school, realizing the educational possibilities of Amateur Radio, has sponsored Eddie's instruction for three years, and every class has filled to the maximum. When not teaching classes, Miller is busy passing traffic (mostly in Spanish to Central and South America), contesting and providing support for the Lafayette Civil Defense Advisory Board in the form of organizing operating personnel and donating equipment from his own shack.

The hams of Lafayette, Louisiana, are looking forward to many more years of Eddie's teaching. In the words of one of his students, Francis Broussard, WB5LWP: "Eddie Miller is just too good an instructor to retire. If you have trouble finding W5EXI on the ham bands on Tuesday nights, it's because he is conducting yet another Novice class."

Runners-Up

First runner-up this year is Rex Schwartz, KØQW, of Minneapolis, Minnesota. Rex has taught over 400 students in the last five years in his home, in schools and at the Courage Center

[1]Herb S. Brier, W9AD, was, for many years, the Novice editor for *CQ*. Despite illness, he devoted a lifetime to Amateur Radio: tutoring students, writing articles, building equipment and operating. His dedication was boundless, and his efforts introduced thousands to the exciting world of ham radio. In 1978, the Lake County ARC established the Instructor of the Year Award to honor instructors who have carried on the good work of W9AD.

*Training Program Manager, ARRL

Herb S. Brier, W9AD, Award

1978 Sam May, AD7F
1979 Dr. Arthur Smith, N3DR
1980 Dan Hoover, W9VEY
1981 Eddie Miller, W5EXI

Radio Camp in Minnesota, sponsored by the Courage Handi-Ham System. This accomplishment is all the more impressive since Schwartz himself is blind! But lack of sight does not keep Rex from instilling a great enthusiasm for ham radio in his students. Henry Davis, KAØKFR, puts it this way: "He is an inspiration. Rex treats his students on an individual basis. He makes himself available most anytime to help with any problem beyond anything one would expect. Rex is a very special person; he approaches life in a way that is contagious.

Rex, a minister, conducts worship services at Camp Courage in the summer. An avid traffic handler, ragchewer and public service advocate, Rex is also the current president of the Minneapolis Radio Club. Rex's philosophy is captured by his goal to "provide an atmosphere that allows students to leave the class with a sense of curiosity as they continue to explore the fascinating and intriguing world of Amateur Radio."

Second runner-up is Bill Shrader, W7QMU, of Medford, Oregon, who, since 1970, has guided more than 300 students to new ham radio licenses. Bill's extraordinary personal qualities as an instructor can be seen in the praise Bob Hale, KA7DWX, one of Bill's students, gives to him: "Bill has the patience of a saint and is always ready, willing and able to handle questions and equipment problems. It should be known that just having someone like him to lean on, with his expertise, is invaluable to the ham community." Shrader's on-the-air activities include DXing, DXpeditioning to a number of countries, and public service through ARES. Bill is also the ARRL Section Communications Manager for Oregon.

Honorable mentions go to Peter Kemp, KA1KD; Glen Means, WBØMUU; and Gordon West, WB6NOA. Hats off to these instructors who have given so much to Amateur Radio teaching.

Nominations are Open for 1982

We wish to extend hearty congratulations to this year's winners. If you know of an instructor who exemplifies the very best in Amateur Radio teaching, please write to us at the Club and Training Department. The winner, determined by a committee at Headquarters, will receive an engraved plaque in his or her name. With this award, the Lake County Amateur Radio Club and ARRL extend recognition to outstanding instructors in Amateur Radio.

Strays

REACHING POTENTIAL HAMS

How do we lure more people into the ranks of licensed amateurs? There have been a number of articles and editorials on various aspects of this subject. Everything from massive public relations and advertising efforts to special bands with reduced licensing requirements, and even overall reduced licensing requirements, have been espoused at one time or another.

The answers probably lie in some combination of ideas. Certainly, public relations and media coverage have been effective in some situations. The exact combination that will be effective for any one local ARC depends a lot on the local situation. The Podunk Junction ARC, with 10 members and an annual budget of $20, for example, can't manage as much as a big-city club with hundreds of members and thousands of dollars.

All hams are different. That is, we all became hams for our own reasons and at different times in our lives. There is no one common denominator; rather, there are many common factors for groups of hams. We all have our own pet theories concerning the best way to attract new blood to our hobby.

These pet theories are often rooted in the history of our own ham experiences. If we had our first introduction via a booth at a shopping mall, or by way of a chance visit to someone's home and shack, then that is often the very best method we can conceive of.

My introduction to the world of ham radio was via a gift from the estate of a favorite uncle. At 12, I was the puzzled recipient of a beat-up Hallicrafters SX something-or-other superregen shortwave receiver. Being a confirmed bookaholic, I searched the library shelves for something to guide me amongst the bewildering variety of strange signals that little thing brought into my bedroom.

The first book I found was a copy of *So You Want to be an SWL* by Len Buckwalter. The second was Len's companion volume, *So You Want to be a Ham.* To make a long story short, these led in succession to a couple of dog-eared ARRL Handbooks, a General class ticket and, eventually, a career in electronics.

The point is this: The local public library and school libraries can be another resource, and a good one at that, in the effort to expand the ranks of Amateur Radio operators. Don't laugh! Some people still read.

How do we use this potential resource? The first step is to see what the local public library already has on the shelf. This is likely to be somewhat disappointing, as many libraries will have either nothing or a few sadly outdated ARRL Handbooks. It may be somewhat harder to check the collection at school libraries. Most schools take a dim view of strangers showing up during school sessions, so be sure to call in advance.

Next, talk to the librarians to determine what may be possible. In the best cases, the library may have sufficient resources to purchase the books you might suggest. In most cases, the library will be able to accept either donations of funds for purchase of specific volumes, or donations of the books themselves. Obviously, some basic books are needed, but it isn't necessary to limit horizons only to the beginner.

An interesting volume is the *Basic Book of Ham Radio* by the editors of *Consumer Guide.* I would definitely recommend it, along with the *ARRL Operating Manual.* Several excellent publications teach electronics theory for amateurs. One of the books in this class should be included, along with a good code course for the record and tape section of the library, and some sort of license manual, which should be updated periodically. [Editor's Note: A complete line of publications for the beginner to the advanced is available from ARRL, including a set of books for libraries that can be obtained at half price. For more information, write to the Circulation Department, ARRL, 225 Main St., Newington, CT 06111.]

Perhaps a copy of the *Basic Book of Ham Radio* could be placed with each junior high and high school library in the area, and a more complete collection donated to each public library. While we're at it, why stop with a collection of basic books? The list of books to consider for an expanded collection is virtually endless. Since this amounts to enlightened self-interest, it just might be possible to get members to donate some of their hard-earned dollars. If not, don't despair. There are other ways to go about getting the necessary funds.

A little investigation may reveal a source of backing in the local business community. Not only would donating books to the library be good community relations, it could result in increased business for certain types of establishments or manufacturers. This angle could be especially fruitful if the library allows bookplates naming the donors to be placed in donated books. These should also name and locate the club so that interested people can contact the club. Also, consider some type of news release when donating the books; a newspaper article with pictures of the club officers and a contact address would be ideal.

However you do it, I believe you will find your time well spent, even if all that can be managed is a couple of introductory volumes in the main branch of the public library. — *Bill Graham, N8BMK, Lexington, Kentucky*

Happenings

Conducted By W. Dale Clift,* WA3NLO

U.S. Amateurs Still Denied Access to 10-MHz Band — League Efforts Continue

It has been over two years since the conclusion of the general World Administrative Radio Conference, held in Geneva, where new bands at 10, 18 and 24 MHz were established for the Amateur Radio Service. Over 40 countries now permit their amateurs to operate on the new 10-MHz band; the United States, however, is not one of them.

The ARRL, hoping to secure early access to the 10-MHz band (10.10-10.15 MHz), filed a petition with the FCC in March 1981 urging that the Commission study and adopt standards for operating on the new band. Earlier this year, the FCC dismissed the League's petition, RM-3855, because the FCC claimed it had no authority to implement any provision of the WARC agreements unless the United States first ratifies the WARC Final Acts. ARRL has since filed an Application for Review to reverse the dismissal of the League's petition and to obtain an immediate, temporary pre-ratification allocation of the band to the Amateur Radio Service on a secondary, non-interference basis. (See June 1982 *QST*, page 61.)

Recently, ARRL representatives traveled to Capitol Hill, both to testify and to learn as much as they could about why ratification of the WARC Treaty has been stymied. (See July 1982 *QST*, page 52.) There appears to be substantial dissatisfaction among several U.S. senators with the way our government prepares for world radio conferences and with the way these conferences are conducted. Senator Harrison Schmitt (R-New Mexico) has been one of the leading critics of U.S. policy in this area.

While ARRL representatives were on Capitol Hill, Senator Schmitt delivered a seven-page statement to the Senate Foreign Relations Committee urging that the U.S. delay ratification. Though the paper seemed at first to demolish any chance for U.S. amateurs getting the 10-MHz band anytime soon, part of the statement gave new hope. The Senator said that he was fully aware that many users of the radio spectrum are anticipating the use of additional and new frequencies authorized by the Final Acts. The statement that really caught the attention of the League was, "Furthermore, this delay will not mean that the United States cannot proceed to implement the provisions of the Final Acts. We are presently proceeding with various activities necessary to conform U.S. operations with the provisions of the Final Acts."

ARRL President Vic Clark wondered if Senator Schmitt had heard that the FCC disagreed with him. On June 2, President Clark sent the following telegram to Senator Schmitt:

> We are aware of your request that the Senate delay advice and consent to ratification of the WARC-79 Treaty. Having actively participated at WARC-79, we appreciate the need to develop coherent U.S. telecommunications policy at highest levels; however, the Amateur Service was successful at WARC-79 in obtaining important new frequency assignments to facilitate public service and experimental communications, now in use in over 40 countries worldwide. We agree that delay in ratification of WARC-79 need not preclude interim allocations established by the Treaty, but we have been informed by the FCC that such frequency allocations must await ratification. Your assistance in obtaining from FCC interim operating authority for these new amateur frequencies will be greatly appreciated.
> /s/ Victor C. Clark, President
> American Radio Relay League
> 1302 18th St., N.W.
> Washington, DC 20036

President Clark also sent a similar Mailgram to Senator Barry Goldwater (R-Arizona). Like Senator Schmitt, Senator Goldwater believes that it may not be in the best interest of the country to ratify WARC-79 at this time. President Clark wanted Senator Goldwater to know that we agreed with his view that delay in U.S. ratification of WARC need not preclude interim operating authority for the new amateur WARC bands.

The League is greatly concerned that the FCC's continued delay in allowing U.S. amateurs access to the new 10-MHz WARC band is damaging to the leadership and credibility of this country as a proponent of the Amateur Radio Service. The League will continue to put its best effort toward obtaining the use of the new WARC bands for U.S. amateurs, thereby making it possible for us to join our overseas compatriots in the use of these new bands.

AMTOR PETITION FILED BY LEAGUE

The ARRL has recently filed a petition requesting the FCC to permit radio amateurs to use the digital teleprinter code known as "AMTOR" in the high-frequency bands. The Commission has designated the petition RM-4122.

AMTOR is an automatic, highly reliable, request-repeat radioteleprinter code that was developed for commercial maritime use. It is commonly known in commercial services under the trade name Sitor. AMTOR was coined to describe the amateur use of this teleprinter method. An Amateur Radio teleprinter station using AMTOR could transmit data in blocks consisting of three characters, pausing after each block to receive from the other station either an acknowledgment or instructions to retransmit the same data. Because data transmission and acknowledgment alternate in a time-sharing manner, duplex frequency operation is unnecessary.

AMTOR's greatest benefit is error-free copy at the receiving station. Even under marginal and fading high-frequency propagation conditions, reliable communications using AMTOR are possible. Under marginal conditions, amateur stations using conventional radioteleprinter codes often must engage in time-consuming requests for repetitious transmissions. Data is then blindly repeated, or sometimes lost. With AMTOR, the equipment *automatically* slows down during signal fading and resumes normal speed during periods of signal consistency. Microprocessor circuitry is used to generate AMTOR signals.

An important secondary benefit of AMTOR is that stations will be able to see immediately the effect reduction of transmitter power has on sending speed. This will make it especially easy for amateurs to carry out the provisions of the Amateur Rules requiring that they use the minimum transmitter power necessary to carry out the desired communications. Use of low power and reduced interference will be normal by-products of AMTOR operation. Yet, it will still be easy for third stations to ascertain whether a particular frequency is occupied by stations using AMTOR. Both the "sending" and "receiving" stations will appear to be transmitting an audible "chirping" sound continuously. Inadvertent interference resulting from a third station being unable to hear one station because of propagation conditions is prevented.

So that no question should arise as to content-monitoring difficulties by amateurs and by the FCC's enforcement personnel, the League proposes that the standard transmission speed and block timing be adopted exactly as specified in the International Telecommunication Union CCIR Recommendation 476-2.

ARRL members wishing to learn more about AMTOR should read "Amtor, an Improved Error-Free RTTY System," which appeared in the June 1981 issue of *QST*, page 25. The League also wishes to recognize the extensive and helpful participation of Mr. Bill Meyn, K4PA, in the preparation of this petition to the FCC.

PENNSYLVANIA ANTENNA BILL IN TROUBLE

The Amateur Radio antenna bill introduced into the Pennsylvania House of Representatives (H.B. 1779) has run into a quagmire. It is stalled in the House Committee on Local Government and will likely die there unless greater support for the bill in shown by the state's radio amateurs. H.B. 1779, introduced by Representative Benjamin H. Wilson, WA3ACB (R-144th District), seeks to relieve

*Deputy Manager, Membership Services, ARRL

radio amateurs throughout the state from zoning restrictions on their antennas, except for regulations pertaining to safety. See May 1982 *QST*, page 54, for details.

Earlier this year, ARRL General Manager David Sumner, K1ZZ, wrote a letter to all ARRL-affiliated clubs in Pennsylvania urging support of the legislation's goals. The latest news that the bill may be in trouble prompted Sumner to write another letter to the Pennsylvania clubs, this time with an attachment giving the names and addresses of the members of the Local Government Committee. With the present session of the Legislature drawing to a close, Pennsylvania amateurs have little time in which to get the bill out of committee.

SECOND NOTICE — ARRL ELECTIONS

Attention all ARRL members! Nominations are now open for candidates for ARRL director and vice director in each of the following divisions: Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf.

What do ARRL directors and vice directors do?

The ARRL Board of Directors is the governing body of the nonprofit, educational and scientific corporation chartered under the laws of Connecticut as the *American Radio Relay League, Incorporated*. The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and services that will be made available to the membership. There are 16 directors, who are elected by the membership on a geographical basis. Half of the directors stand for election in the even-numbered years, half in the odd. At the same time directors are elected, vice directors are also chosen, who can fill in when directors are unable to serve. For this reason, candidates for vice director must meet the same requirements as the candidates for director.

Who is eligible to run for director or vice director?

For a candidate to be eligible for the office of director or vice director, he or she must submit a nominating petition bearing the signatures of 10 (or more) full members of a division naming him or her as a candidate for director or vice director. The petition must be received by League Headquarters no later than noon on August 20, 1982. Each candidate must also provide information (on a form provided by Hq.) that will allow the Executive Committee of the Board of Directors to determine the eligibility of the candidate in accordance with the provisions of the ARRL Articles of Association and By-Laws, and a statement of not more than 300 words setting forth the candidate's qualifications, which will be included with the ballot mailed to members. The candidate's 300-word statement will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of the statement will be grounds for disqualification by the Executive Committee.

The nominee must reside in the ARRL division he or she seeks to represent. He or she must also be the holder of at least a General class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full member of the League for a continuous term of at least four years 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 intended 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.

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 on request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned Full Members of the 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 1983-1984 term.
(Signature . . . . Call . . . . City . . . . ZIP . . . . Date . . . .)

Who is eligible to vote?

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that division who were in good standing on September 10. The ballots will be mailed no later than October 1 and, to be valid, must be returned to Headquarters by noon, November 20. A group of nominators can name a candidate for director, for vice director, or for both, but there are no "slates" as such. Each candidate appears on the ballot in alphabetical order.

Absentee Ballots

All ARRL members who are licensed by FCC or DOC but temporarily residing outside the U.S. or Canada are eligible for Full membership. These members overseas who arrange to be listed as Full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held.

Even within the U.S., Full members temporarily residing outside the ARRL division they consider home may now notify the Secretary of the League prior to September 1, giving their current *QST* address and the reason why another division is being considered home (for instance, holding an amateur call appropriate to the division). So if your home division is the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf, but your *QST* goes elsewhere, please let the ARRL Secretary know, as soon as possible but no later than September 10, so you will receive a ballot for your home division.

What if one person is nominated for both director and vice director?

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 of the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

The Incumbents

These persons presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year: *Central* — Edmond A. Metzger, W9PRN, and Kenneth A. Ebneter, K9EN; *Hudson* — Stan Zak, K2SJO, and Linda S. Ferdinand, N2YL; *New England* — John C. Sullivan, W1HHR, and Richard P. Beebe, K1PAD; *Northwestern* — Mary E. Lewis, W7QGP, and Mel C. Ellis, K7AOZ; *Roanoke* — Gay E. Milius, Jr., W4UG, and John C. Kanode, N4MM; *Rocky Mountain* — Lys J. Carey, KØPGM, and Marshall Quiat, AGØX; *Southwestern* — Jay A. Holladay, W6EJJ and Peter F. Matthews, WB6UIA; *West Gulf* — Raymond B. Wangler, W5EDZ, and Thomas W. Comstock, N5TC.

In Summary

Petitions need 10 or more signatures of Full members and are due at League Headquarters by noon, August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1983.

Additional Information

Nominees or, indeed, any member, may obtain a copy of the ARRL Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials. Interested persons should write or call ARRL Headquarters, 225 Main St., Newington, CT 06111, tel. 203-666-1541.

For the Board of Directors:
July 1, 1982
David Sumner, K1ZZ
Secretary

CHICAGO HAMS STRAIGHTEN OUT ANTENNA ORDINANCE PROBLEM

In March 1982 the Chicago City Council almost passed a new ordinance that would have severely restricted any antennas or towers. Chicago hams organized opposition to the proposal and were fortunate to get the help of an experienced antenna/tower and zoning attorney, Jim O'Connell, W9WU. With O'Connell's help, the Chicago hams got the Council to amend the ordinance. Now there is a specific exemption for Amateur Radio antennas and towers.

However, there turned out to be a catch. The Chicago Building Code is quite strict, and not all installations are approved. The city's structural examiner requires that all antenna installations be sturdy enough for Chicago weather conditions.

Getting the structural examiner's approval is difficult. The Building Department was used to free-standing, commercial duty towers; a crank-up for a private, Amateur Radio tower in a back yard was unknown territory. Dennis Mitchell, WA9IVU, began to plan his assault for getting permission to erect a tower. After much discussion with Sam Polonetzky, WB9RDE, an Illinois registered professional engineer, and several long-distance phone calls to the manufacturer of his antenna, Hy-Gain, Dennis finally had enough blueprints and charts to make a successful application to the Building Department.

The patience and assistance Dennis received from Clyde Blyleven and his staff at Hy-Gain paid off. His HG-70 HD was accepted by the structural engineer, and, as this is being written, it is the only ham tower in Chicago approved under the new ordinance. We are happy to report that on June 7 the base was set for the new tower at WA9IVU's QTH.

JESSE BIEBERMAN, W3KT

ARRL Atlantic Division Director Jesse Bieberman, W3KT, became a Silent Key on May 28, 1982. A native of Philadelphia, he spent his working life teaching in its school system following his graduation from the University of Pennsylvania. Besides meeting many radio amateurs at numerous conventions, meetings and hamfests, it was not uncommon to see him with some of his former students, many of whom were members of the school radio club that he started. He is remembered not only as a dedicated teacher, but also as a very thoughtful person, always sensitive to the feelings of others. During World War II, he served as an officer in the Signal Corps.

He was a volunteer manager of the Third Call Area QSL Bureau for 33 years and a Vice Director for 10 years before his election as a Director in 1980. An active amateur for more than 60 years, he held several offices in the Frankford and Southern Chester County Radio Clubs.

During his tenure as Director, Jesse maintained close contact with the members of the Atlantic Division and did his best to represent their needs and interests. As a member of the ARRL's International Affairs Committee, he participated in the 1980 International Amateur Radio Union Region 2 Conference at Lima, Peru, where he served as one of the committee chairmen.

In recent years his Amateur Radio activities included contesting and DXing, and weekly schedules with his daughter, Jane, W3OVV/6. His untiring efforts on behalf of the Amateur Radio Service will be greatly missed. Amateur Radio operators, especially those who knew him, have lost a very good friend. All join in extending their heartfelt sympathy to his family. — *Hugh Turnbull, W3ABC*

Jesse Bieberman, W3KT

ARRL MEMBERSHIP FUND ESTABLISHED FOR DISABLED AND ELDERLY PERSONS

The ARRL Foundation has established the Jesse Bieberman Memorial Fund, in honor of the late ARRL Atlantic Division Director, W3KT, to provide ARRL memberships for deserving disabled and elderly radio amateurs and prospective amateurs who otherwise would be unable to afford to join or reapply for membership in the League.

This fund, which is being established at the request of Jesse's widow, Inez, is a particularly appropriate way to honor Jesse. While he was director, Jesse spoke eloquently of the financial problems facing many disabled persons of all ages. Minute 112 of the March 1982 Meeting of the ARRL Board of Directors partially addressed this concern when the Board, on motion of Director Bieberman, voted to study the possibility offering a membership at reduced cost to disabled persons.

Contributions to the Fund should be made payable to the ARRL Foundation, and addressed to: Jesse Bieberman Memorial Fund, ARRL, 225 Main St., Newington, CT 06111. All contributions will be acknowledged to the donor and to the Bieberman family.

HUGH A. TURNBULL, W3ABC, BECOMES ATLANTIC DIVISION DIRECTOR

Upon the death of Jesse Bieberman, W3KT, Hugh A. Turnbull, W3ABC, of College Park, Maryland, became the ARRL director from the Atlantic Division. ARRL President Vic Clark, W4KFC, has appointed G. W. "Bud" Hippisley, Jr., K2KIR of Colden, New York, as vice director to fill out the remainder of Hugh's term.

Hugh has been an active radio amateur since 1932, and is retired from employment with the National Aeronautics and Space Administration as a relief tracking-station director. His 37-year engineering career also included employment with the FCC and Voice of America. He holds degrees from Lafayette College and West Virginia University, and is a Registered Professional Engineer.

In addition to holding an Amateur Extra Class license, Hugh holds various commercial licenses. His Amateur Radio activities include contesting, DX and just plain rag chewing, in addition to involvement with several of the local amateur organizations in the Washington, DC area.

FCC REVOKES LICENSE OF JONATHAN BANQUER, WA1ZVS

FCC Administrative Law Judge Lenore G. Ehrig has revoked the station license of Jonathan A. Banquer, WA1ZVS, of 19 Beechwood La., New Haven, CT, and has suspended his General class license for the remainder of its term. According to Judge Ehrig, Banquer failed to respond to questions directed to Banquer on January 15, 1982. Finally, on April 1, 1982, the FCC's Private Radio Bureau filed a Motion for Summary Decision.

Judge Ehrig granted the FCC motion after finding that Banquer had made transmissions containing vulgarities and "references to excretory organs and sexual activities." The obscene transmissions were made from 5:50 P.M. to 6:03 P.M., at a time when it was likely that children who are licensed radio amateurs would be listening. The frequency used was 3965.10 kHz.

The Commission has determined that the transmission of radio communications containing certain explicit words and other language relating to excretory or sexual activity patently offensive to listeners falls within the prohibition of 18 U.S.C. 1464. Banquer's over-the-air transmissions cannot be treated the same as words spoken in private, words spoken in public, or printed words. The Courts, Congress and the Commission have recognized that radio communications are different. Scarcity of spectrum space, the consequent necessity of licensing and the pervasive nature of radio distinguish them from other modes of communication and expression.

The Judge then directed the Secretary of the FCC to serve a copy of her decision on Mr. Banquer by Certified Mail, Return Receipt Requested. In the event exceptions are not filed within 30 days after the release of the Summary Decision and the Commission does not review the case on its own motion, the Summary Decision becomes effective 50 days after its public release. Once this decision becomes effective, the licensee must forward to the Commission his revoked license. Operation of a radio station after revocation of license subjects any person operating such station to the penal sanctions specified in Section 501, 47 U.S.C. 501 of the Communications Act. — *FCC Summary Decision released May 12, 1982*

FCC REVOKES LICENSE OF KENNETH L. GILBERT, KB6TG

Assistant Chief FCC Administrative Law Judge Thomas B. Fitzpatrick has revoked the license for Amateur Radio station KB6TG, licensed to Kenneth L. Gilbert, 704 Kingsford St., Monterey Park, California, and has suspended Gilbert's operator's license for the remainder of its term. In an initial decision issued May 17, Judge Fitzpatrick concluded that evidence in the case showed that during March 1981 Gilbert repeatedly and deliberately interfered with other Amateur Radio operators, a serious offense that alone merited revocation and suspension of the licenses. Additionally, the judge said that during that same time period Gilbert violated another FCC rule by transmitting indecent language over the airwaves.

The proceeding was initiated in September 1981 by the FCC's Private Radio Bureau, which ordered Gilbert to show cause why his licenses should not be revoked and suspended.

Unless an appeal is filed within 30 days or the Commission reviews it on its own motion, the initial decision will become effective 50 days from its release. — *FCC News Release dated May 26, 1981*

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

ARES

Floods, train derailments, forest fires and tornadoes. Unexpected situations do occur, and when they do, there's a role for amateurs to play. Most reasons for amateurs becoming involved in emergency communications are obvious, but lately we've been handed a new one. At WARC '79, IARU representatives strongly emphasized the public service aspects of Amateur Radio. As a result, delegates, representing their governments, endorsed Amateur Radio. They preserved all existing Amateur Radio bands and added three new ones. Now, we find we have a debt to repay, a debt we can repay through public service, particularly in time of emergency.

So why go with ARES? ARES is the Amateur Radio Emergency Service. It consists of hundreds of local groups, all with their own local emergency coordinators (ECs). District emergency coordinators (DECs) and section emergency coordinators (SECs) bind local groups into larger groups that are able to assist in case of province-wide or even nationwide emergency. ARES is League-sponsored. It is North America-wide. The services of the National Traffic System are at its disposal. ARES uses time-tested, standard procedures. It is already well-established in most parts of Canada and the U.S. It is well-respected by agencies such as Canadian and American Red Cross — because it works.

How do you start a local ARES group? First, contact your SEC and tell him that you're interested. If you're not sure who he is, contact your section communications manager (SCM). His or her name and address appears in every issue of *QST*. Your SCM or SEC can tell you what's been done in your area. He can also send you valuable material. Next, choose a small, reliable group to help you get things organized. Take a survey of your area. What agencies would be called in an emergency? What kinds of communications setups do they have? What is the range of those setups? How could your ARES group assist them?

Now, round up your actual ARES members. Remember that ARES is not limited to League members. Find out what kinds of equipment your members have, and how many have hand-held transceivers, mobile rigs and even base stations that can operate on emergency power. Repeaters are indispensable in an emergency. Determine the exact coverage pattern of the repeaters that your group would use. How far will your members be able to communicate using those hand-held radios, mobile rigs and base stations?

Once this is done, it's time to make up *the plan*. The best ones we've seen take up several dozen pages in a looseleaf binder. Such plans list ARES members, addresses at home and at work, and telephone numbers. They contain organizational and callup charts, and maps that show the locations of police and fire departments, ambulance services and hospitals. Other maps show repeater coverage and potential sites of permanently installed antennas and even ARES base stations. Such plans also include a job description that clearly indicates the purpose of the group ARES provides *backup communications only* — when requested.

When the plan is done, take it to your local disaster committee. Every municipality in Canada should have one. Don't just settle for approval. Go for inclusion in their plans. Give the committee a demonstration of how quickly you can call up your ARES members. Show them how well those 2-metre hand-held radios work, particularly from inside buildings. Most people, including members of local disaster committees, don't know much about Amateur Radio. Almost always, they are impressed.

There's one nice thing about ARES. Once the group is organized, it's not a lot of work for anyone. In the course of a year, there will be several test callups, perhaps a mock disaster arranged by the local disaster committee and, of course, the annual ARRL Simulated Emergency Test (SET). But none of these activities are really time-consuming. Most are fun, and all are useful practice for the members of your ARES group. *(Compiled with notes from VE3GV)*

CRRL NEWS

☐ Ontario SEC Jack Strangleman, VE3GV, represented CRRL and ARES at CONCOM '82, Emergency Planning Canada's emergency communications conference held in Arnprior, Ontario, May 26-28. Jack came to the conference with a position paper, overhead transparencies and packages of materials for the delegates. From what we've heard, the delegates were suitably impressed. As a result of Jack's presentation, many emergency relief agencies across Canada have now become interested in using ARES for backup communications.

☐ About 40 amateurs, almost all from southern and eastern Ontario, and five DOC officials, attended the CARF National Amateur Radio Symposium, held May 29 in Scarborough, Ontario. VE3CDM and VE3GRO represented CRRL. Topics discussed included proposed U.S. phone-band expansion, reciprocal operating with Japan, VE3HWN's 220-MHz band plan, and RFI involving cable television. CRRL representatives had no difficulty endorsing the ideas presented. People were friendly; discussions were positive. It was a worthwhile day.

☐ Want to promote Amateur Radio? CRRL has cassette recordings of seven 30-second public service announcements, suitable for broadcast on your local radio station. They touch on all aspects of Amateur Radio and feature well-known personalities Gary Owen, Bill Bixby, Dick Van Dyke and Lorne Greene. The recordings were prepared in cooperation with Montreal radio station CJAD, and they're available to you, free, if you can use them. Write to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

☐ In April, Andy McLellan, VE1ASJ, and his helpers at the CRRL Central QSL Bureau in Saint John, New Brunswick, processed 68,000 cards. In May, they processed an additional 57,000. When not sorting cards, Andy is very active on the air. He was one of the first Canadians on the new 10.1- to 10.15-MHz 30-metre band. On the first weekend the band was available, Andy worked 125 stations in 24 countries, and also was reportedly the first VE to work all continents on the band.

DOC NEWS

☐ There has been some confusion concerning the modes permitted on the new 10.1- to 10.15-MHz band. Information in last month's *QST* and CRRL Bulletin 22 is correct. Amateur class licencees may operate A1 emission only. Advanced Amateur class licencees may operate A1 and F1 emissions. Remember that 10.1 to 10.15 MHz is exclusively *amateur* in Canada, but amateur use is secondary to *fixed* services in other countries. Please avoid interfering with the commercial stations on this band.

☐ DOC has informed CRRL that, effective April 1 of this year, amateurs who pass any portion of the Advanced Amateur examination may retain credit for that portion indefinitely. In the past, there was a time limit of one year. The one-year limit continues to apply to those who pass a portion of the Amateur examination and who wish to retain credit for that portion.

HELP NEEDED

Garry Hammond, VE3GCO, is preparing a slide show on Canadian DXers. If you're into DX, Garry would appreciate slides of you at your rig, your antenna farm, or whatever. He would also like your blank QSL card. Send all material to Garry at 5 McLaren Ave., Listowel, ON N4W 3K1. Please send it soon. Garry must have this presentation ready for the 1982 Radio Society of Ontario Convention in October.

Back in December, Ross Carruthers, VE3CEA, presented the 1981 Florida Skip plaque on behalf of *Florida Skip* Editor Andy Clark, W4IYT to winner Marshall Killen, VE3KK. Marshall won the contest with 4950 points, the highest score anywhere in North America outside of Florida. *(VE3GT photo)*

*163 Meridene Cr. W., London, ON N5X 1G3

International News

Conducted By Richard L. Baldwin,* W1RU

KAMCHAI CHOTIKUL, HS1WR

We regret to report the June death of Kamchai Chotikul, HS1WR. General Chotikul was president of the Radio Amateur Society of Thailand, and was also prominent in the organizational work of IARU Region III. In April, he was an active participant in the 1982 triennial conference of Region III, held in Manila, The Philippines. In addition to his administrative leadership in RAST and IARU, he had an outstanding Amateur Radio station, and entertained many visiting amateurs at his home in Bangkok, Thailand. Amateurs all over the world will join with us in expressing sympathy to his wife and family. Those who wish can write to Mrs. Chotikul, c/o RAST, GPO Box 2008, Bangkok, Thailand.

IARU REGIONAL SECRETARIES

All readers of this column are urged to maintain liaison with the regional secretaries of IARU — the sharing of information about what is happening with international Amateur Radio in each country is important so that we can be prepared for whatever the future might bring, and so that we can more easily solve common problems.

In Region I, the secretary is Eric Godsmark, G5CO, who can be reached via the Region 1 IARU office at "Pebblemead," Mantle St., Wellington, Somerset TA21 8AR, England.

In Region II the secretary is Pedro Seidemann, YV5BPG, whose address is P.O. Box 2253, Caracas 1010 A, Venezuela.

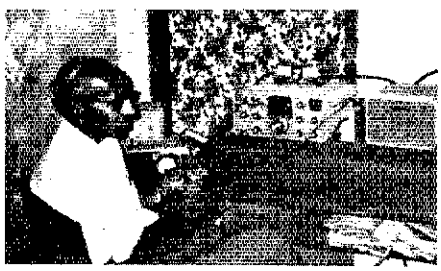
In Region III the secretary is Masayoshi Fujioka, JM1UXU, P.O Box 73, Toshima, Tokyo 170-91, Japan.

BAHRAIN AND INDIA VISITED BY WØBWJ

IARU Vice President Carl Smith, WØBWJ, subsequent to the Region III conference of IARU in Manila in April, visited a number of other IARU societies in key areas of the world. Two of those countries were Bahrain and India, where he met with prominent government officials and with officers of the IARU societies. Photographs of these valuable meetings are reproduced elsewhere on this page.

*International Affairs Vice President, ARRL

In April 1982, IARU Vice President WØBWJ met with his Excellency Tariq Almoayed, minister of information of Bahrain and president of the Amateur Radio Association Bahrain. Also present was ARAB Secretary Ian Cable, A92BW. Left to right are WØBWJ, His Excellency Tariq Almoayed and A92BW.



While in India during April, WØBWJ visited with and took this photo of M. G. Karnik, VU2CK, president of the Amateur Radio Society, India, operating the club station in New Delhi.

WARC BANDS BEACON OPERATION

The experimental beacon operation from KK2XJM, licensed to W4MB, is currently on frequencies selected to be close to the optimum working frequency for selected areas. From July 16 through August 6, Australia was to be one of the selected areas, while from July 13 through September 3, it was to be Africa. Beacon frequencies will be selected from 10.140, 18.108 and 24.930 MHz using the propagation predictions published in *QST*. Generally, one of the two highest frequencies will be used when it is daylight at the midpoint of the path, and one of two lowest when it is night. The station will be operated in the beacon mode each Friday, Saturday and Sunday. For information, QSLs or special test schedules, contact Bob Haviland, W4MB, 2100 S. Nova Rd., Daytona Beach, FL 32019, USA.

WEST GERMAN RECIPROCAL LICENSING CALL SIGNS

The authorities of the Federal Republic of Germany have adopted a very sensible modification for the composition of call signs to be used by visitors. Visiting radio amateurs will generally have to use their home call signs preceded by the relevant prefix — DL/(German highest class); DH/(restricted class); or DC/(vhf class). Thus, a U.S. Extra Class license holder would sign DL/W1RU (and a few stations worked that call-sign combination in late April!). It is a very sensible arrangement — and is especially valuable during contests — as it immediately identifies in which country a station is operating. This change by the Federal Republic of Germany stems from an IARU recommendation at the IARU Region I conference of Miskolc-Tapolca in 1978, and we hope that eventually other administrations will follow suit.

HAM FAIR '82

Amateurs traveling in Japan during August of this year may wish to visit Ham Fair '82, to be held in the Tokyo International Export Center, which boasts of having the largest fairgrounds in the Far East. Sponsored by the Japan Amateur Radio League, this may be the largest Amateur Radio gathering in the world, with an expected attendance of 35,000. This year will mark the 30th anniversary of the reopening of Amateur Radio in postwar Japan, and Ham Fair '82 will have many features commemorating the occasion. There will be many technical events, fox hunting, a cw contest, a flea market (big!) and lots of equipment displays. This writer has been both to Dayton and to a previous Ham Fair, and was again reminded of the sameness of radio amateur all over the world.

Ham Fair '82 will be held August 20-22, open each day from 1000 to 1800, at the New Hall, Tokyo International Export Center. Adult admission is 600 yen, which is about $2.50. Further details can be obtained from the JARL Publicity Section, P.O. Box 377, Tokyo Central, Japan.

Strays

NINTH SOVIET AMATEUR RADIO SATELLITE LAUNCHED

☐ On May 17, 1982, two Soviet cosmonauts aboard the orbiting Salyut 7 space station launched a 62-lb Amateur Radio satellite. The satellite, ISKRA-2, was put into orbit by passing it through an air lock chamber. This is the first satellite ever launched from a space station — an historic first for Amateur Radio. ISKRA-2 was built by students of the Moscow Aviation Institute.

ISKRA-2 carries a transponder, a memory device, a command channel and a telemetry system with a beacon on 29.578 MHz. The transponder has an input of 21.230 to 21.270 MHz and an output of 29.580 to 29.620 MHz, with a power output of 300 mW or 1 W. Earth station uplink power of 200 W is recommended. A reading of the R channel telemetry will indicate the transponder is on if the numbers are higher than 10. The cw call sign is RKØ2. A complete cycle of telemetry would be:

RKØ2 RØ5 DØ4 G83 U63 W61 K53 OØØ

(50-baud RTTY — same as cw lasting 60 seconds)

RKØ2 1RØ5 ID9Ø IG9Ø IU51 1W63 IK63 IOØØ

RKØ2 NRØ5 ND6Ø NG41 NU36 NW35 NK64 NO62

RKØ2 ARØ5 AD64 AGØ2 AU83 AWØØ AKØØ AOØØ

The student command centers in Moscow and Kaluga are processing the incoming telemetry; reports may be sent via Box 88, Moscow.

The lifetime of ISKRA-2 will be short because of the low 350-km altitude. The orbital period, one complete revolution of the earth, is 91.1 minutes. Inclination from the equator is 51.6°, and the longitude increment is 23.1°.

AMSAT is offering a new satellite antenna to the one who comes the closest to guessing the reentry time of ISKRA-2. Send your estimates to Bernie Glassmeyer, W9KDR, OSCAR Program Manager, ARRL.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Third Party Traffic Jams

Third-party traffic, historically, has been one of the so-called "gray areas" of the Rules where there is much room for interpretation. The topic is a perennial favorite around local radio clubs, and on the bands. This month, we'll attempt to penetrate the cloak of mystery surrounding third-party traffic, and to dispel some of the myths, legends and folklore that abound.

Q. How does FCC define third-party traffic?

A. Third-party traffic is defined in Section 97.3(v):

> Amateur Radio communication by or under the supervision of the control operator at an amateur radio station to another amateur radio station on behalf of any one other than the control operator.

Q. What does this mean in plain language?

A. A third-party message is one the control operator (first party) of your station sends to another station (second party) for anyone else (third party). Third-party messages include those that are spoken, written, keystroked, keyed, photographed, telephoned or otherwise originated by or for a third party, and transmitted by your Amateur Radio station live or delayed. A third party may be a person permitted by the control operator to *participate* in Amateur Radio communications (refer to Sec. 97.79[d]). Third-party traffic may also take the form of a phone-line interconnection, commonly known as phone patch, or autopatch.

Q. What are the FCC Rules pertaining to third-party traffic?

A. Section 97.114 states:

> The transmission or delivery of the following amateur radiocommunications is prohibited:
>
> a) International third party traffic except with countries which have assented thereto.
>
> b) Third party traffic involving material compensation, either tangible or intangible, direct or indirect, to a third party, a station licensee, a control operator, or any other person.
>
> c) Except for an emergency communication as defined in this part, third party traffic consisting of business communications on behalf of any party. For the purpose of this section, business communications shall mean any transmission or communication the purpose of which is to facilitate the regular business or commercial affairs of any party.

Section 97.3(w) defines *emergency communication:*

> Any amateur radio communication directly relating to the immediate safety of life of individuals or the immediate protection of property.

Q. What do the international (ITU) regulations have to say about third-party traffic?

A. In Article 32 of the International Radio Regulations, Geneva, 1982, paragraph 2733 states: "It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties." Paragraph 2734 adds, "The preceding provisions may be modified by special arrangements between the administrations of the countries concerned." This last provision opens the door to international third-party-traffic agreements. See the Public Service column, June 1982 *QST*, for a current list of countries that have third-party-traffic agreements with the U.S.

Gray Area Interpretations

Q. May I, a General class licensee, retransmit via my station the transmissions of a Technician's 2-meter signal over the 20-meter General phone band?

A. When a Technician's signals enter the 14-MHz band at a General class licensee's station, the operation involves third-party traffic to the General class licensee. Such operation is permitted under Sections 97.79(d) and 97.114 of the Rules, which do not specify the manner in which the third-party traffic is received for relay: by mail, telephone, in-person, *or by 2 meters.* All third-party-traffic rules apply, of course, so the Technician (for the record, a third party at the General's transmitter) could not communicate with countries not holding third-party agreements with the U.S. via this operation (Secs. 97.79[d] and 97.114).

Note: The above applies to *manual* retransmission only; e.g., holding the 20-meter transmitter mike to the 2-meter receiver speaker. Retransmission by *automatic* means is permitted for stations in repeater or auxiliary operation only (Sec. 97.126[a]).

Q. On checking into a traffic net the other night, I was asked to handle a message originated in the U.S. and bound for a person living in a country that does not have a third-party-traffic agreement with the U.S. I realize, of course, that I must not relay the message via a ham in that country. But, may I route it for ultimate delivery to a ham in another country that holds an agreement with the U.S. and with the addressee's country?

A. Yes. The FCC, and the third-party-traffic rules, are concerned with the *borders* of the countries involved. That is, as far as you are concerned, the third-party message crosses the U.S. border, and the border of the second party's country that holds an agreement with the U.S. The FCC is not concerned about the location of the message's origination or destination; they are concerned with the manner in which the third-party traffic is handled (Sec. 97.114).

Q. What is a "simplex" autopatch; is it legal?

A. An autopatch is simply a device that facilitates automatic interconnection of Amateur Radio stations to the public telephone system. Most are employed with repeater systems to provide users with quick phone access to police or fire officials. FCC allows this privilege to promote the amateurs' ability to serve the public interest.

A "simplex" autopatch is a similar device that is generally employed for the private, exclusive use of an individual ham, and is normally installed at the ham's home shack. However, many of these "simplex" (one-frequency) autopatches are operated illegally. Such operation is permitted *only* when a control operator is on duty at the control point of the station that is interconnected to the phone system (97.79[d]). Additionally, the potential for abuse is great; autopatch privileges were never intended to provide amateurs with private "phone booths." One should always bear in mind the bases and purposes of Amateur Radio when making an autopatch. *Think before running that patch!*

ARRL Counsel on FCC Rule Inquiries

The League frequently hears of inquiries made to the FCC staff from amateurs asking if an autopatch to order services would be justified by certain hypothetical circumstances. These amateurs ask, for example, "Supposing my car breaks down where there is no telephone available; can I use the autopatch to order towing services?" The FCC staff can only respond in the negative, citing the FCC rules and the ITU Regulations, which specify that Amateur Radio is for persons ". . . interested in radio technique solely with a personal aim and without pecuniary interest." The only justification for such a call would be for an emergency involving the immediate threat to life or the immediate protection of property.

These numerous requests for declaratory rulings could be dangerous to the Amateur Radio Service. They may give the staff the erroneous impression that amateurs are misusing their stations as mobile telephones. Furthermore, it gives the overall impression that amateurs, both as individuals and as a community, are incapable of making sound judgments as to what constitutes a true emergency. Instead of demanding that the FCC make the judgment for you in advance, keep the rules in mind. If and when you are confronted with a breakdown or whatever, act as a reasonable, prudent person would act under the circumstances. Make your own best judgments as to whether the situation calls for emergency action. If you do make the call, be prepared to justify it to your fellow amateurs and, if complaints are received about you, the FCC. — *Chris Imlay, N3AKD, ARRL Counsel*

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

*Assistant Manager, Membership Services, ARRL

Correspondence

Conducted By Peter R. O'Dell,* KB1N

EXPANSION VIEWS AND BLUES

☐ I work a lot of cw and find much of this frequency spectrum set aside for this purpose not being used to its full potential. Some people are sure to raise a lot of hell about this phone-expansion issue. However, we can point to the fact that not enough amateurs are making use of a lot of this frequency spectrum. We can still expand the phone bands without it terribly upsetting the apple cart. My vote is to get the FCC to take immediate action and alleviate a lot of QRM by expanding the already overcrowded phone subbands. — *Edward T. Mitchell, NØAKT, Monument, Colorado*

☐ We would like to go on record as opposing Docket 82-83. We do not approve of phone-subband expansion on any band for any class of license. The downward migration of foreign phone operators would displace the important cw public service nets, cause overcrowding in the cw portions of the bands and, no doubt, bring on pressure to eliminate the 25-kHz Extra Class cw subband — just about the only real advantage to striving for mastery of cw. — *Ralph A. Sadler, KC7IG and Ruth M. Sadler, N7DEN, Phoenix, Arizona*

☐ It is rare to talk with a station abroad who is not running a commercial radio that is state of the art. They also have amplifiers and antenna systems comparable with those in the United States. There is no indication that American amateurs operating the 14,150- to 14,200-kHz subband would create any burden on foreign operators. Fact of the matter is, if you listen to the frequencies between 14,100 and 14,200 kHz, you will find very little usage in that section. — *R. J. Motley, Alpine, California*

☐ I do not agree that there should be any more expansion of radiotelephony at the expense of radiotelegraphy. I believe the suggested expansions would definitely have a deleterious effect on our radiotelegraphy operations domestically. — *Barbara Anne Murnane, WB1EHS, Springfield, Massachusetts*

☐ This would be a great year to do away with rules that came into being in the 1930s. The Golden Age of Amateur Radio was not prior to WWII. It is right now! I don't expect this to change. The Golden Age of Amateur Radio will always be the "right now" for those with their eyes open. — *Dick Sands, KB4CD, Atlantic Beach, Florida*

☐ I believe the use of the 14,150- to 14,200-kHz range for phone operation is one of the greatest possible incentives to upgrade one's license. It saddens me to admit it, but ssb is vastly more popular than cw. While the Extra Class operators have exclusive use of 25 kHz of the 20-meter cw band, they presently have no exclusive 20-meter phone-band frequencies. For those who prefer ssb (and most seem to), there is very little incentive to upgrade beyond the Advanced class license. The assignment of the 14,150- to 14,200-kHz segment to Extras only would do more to encourage upgrading than anything I can think of. — *Charles T. Allen, W5DV, New Braunfels, Texas*

☐ The only nice thing I can say about *QST* is that it did publish the details of the many proposed changes in FCC Docket 82-83 and how to comment to the FCC. Thanks to *QST* I have a small chance of countering the ARRL "Extra-biased" proposals. — *John L. Holmes, KB9YU, Muncie, Indiana*

☐ I agree with ARRL as to the allocation of the frequencies 14,150 to 14,200 kHz — at least 25 kHz should be for Extra class amateurs only. The Extra Class amateurs need more area on the ham bands for their exclusive use. I feel the General and Advanced class groups have quite enough band privileges now, and it might help give them more incentive to upgrade to Extra. Also, it could be very confusing to have the General class above 14,275 kHz and below 14,200 kHz, with Advanced and Extra in between. — *Martha A. Silver, NY4H, Raleigh, North Carolina*

☐ The phone bands should be expanded and the subbands reassigned in a contiguous manner according to operator privileges. Expansion of U.S. phone bands may for a short time cause some complaints from foreign operators, but overall it should improve operations by aligning U.S. frequencies more closely with foreign bands. — *Frank M. Dick, II, WA9JWL, Anderson, Indiana*

A CRITIQUE

☐ Current *QST* contents, with few exceptions, are a bloody bore. My ARRL membership is continued mainly for information on any FCC rules changes, which I now note I can get in *73*, which is a much more readable publication, despite our howler friend, Wayne Green — or maybe because of him.

Your overwhelming jungle of contents, club activities, awards and sweepstakes add up to a rather tiresome-looking mess. I pity the grown men on your staff who have to wade through and tally up all this stuff, and wonder how long it takes their brains to atrophy.

You inform us in the May editorial that it became possible to work DX on phone in the 1930s. Let's be accurate. My friend Gerald Marcuse, G2NM, one of the founders of the BBC, was running a dandy schedule on 20-meter phone to Australia and New Zealand in 1924-25. Many DX stations were using loop or Heising modulation at that time on 20 meters. I put the first U.S.-South Africa signal across to Cape Town from (U)1SW to FO-A3Z in 1927 . . . and had many other DX voice QSOs in that era. The above is, of course, a bit critical, I feel justifiably so. — *John M. Murray, W1BNN, Bloomfield, Connecticut*

MIND REPEATING THAT?

☐ The new *Repeater Directory* is the best ever, and the first one for which the phone didn't start ringing two days after publication with things such as, "Watsamatta with those turkeys, anyway? Since when did Royal Oak move to the U.P.?" I feel no shame when I stand there at a hamfest and sell it. — *James R. Seeley (SCM MI), WB8MTD, Springport, Michigan*

WOOF WOOF

☐ After exhaustive research, I have found what is probably the origin of the word "ham." The great genius in electronics, Stilton Cheseborough, invented the silent tuner and the right and left sidebands, which doubled the efficacy of our spectra; he happened to be of Cockney origin.

As a prominent speaker at conventions and symposiums, he would refer to amateur operators as "ham hops." This usage spread, but on this side of the Atlantic "ham hops" was confused with "ham hocks." So, in the interest of clarity, we dropped "hops" and used only "ham." — *William M. Burdette, Jr., KA3HUS, Salisbury, Maryland*

MAILING QSLs FOR AN AWARD?

☐ I get the distinct impression that you consider Certified Mail safer than ordinary mail. That is a misconception. Certified Mail, whether or not with return receipt, is given no special consideration and goes along with other mail, taking the same chances of loss. It only serves to give the sender proof that it was mailed and received, if the addressee claims nonreceipt. A Certificate of Mailing is a less expensive proof of mailing, if that is all that is needed.

If safety is your primary concern, not simply proof of mailing, then there is nothing better than Registered Mail. It is placed in separate bags, watched over and signed for at every transfer point. It can be traced every step of the way, if the addressee claims nonreceipt, and usually it can be recovered if it has gone astray. There is no safer way, unless maybe UPS.

Insured Mail is also given no special consideration and goes along with regular mail. Insured material is not watched over or handled more carefully or in any way treated differently from any other material. I guess the Post Office is fairly confident, because insurance fees are very low — but note that they go up only to a value of $400. If the item is worth more than that, Registered Mail can be used at a much higher postage rate.

Before you mail something, check with a PO employee, but be sure you talk to somebody knowledgeable. If they know all about IRCs, they are knowledgeable. — *Ted Chernin, KH6GI, Honolulu, Hawaii*

STRUCK BY OUR COVERAGE

☐ I was insured for my radio equipment with an ARRL policy when lightning hit. I referred it to the insurers and was promptly paid in full for repairs needed. There was a minimum of red tape. I would recommend all hams get this insurance, which does not cost that much. If not for theft, then get it for lightning. There is no complete defense for lightning. — *Clement Bourgeois, Jr., N5ADK, Erath, Louisiana*

*Public Information Officer, ARRL

On Line

Conducted By Stan Horzepa,* WA1LOU

In QSO with a Computer

Want to QSO with a computer? Set your RTTY equipment for 100 wpm Baudot, and tune to 14.0975 MHz. Almost any time of day, depending on your location and 20-meter propagation, one of the computers that occupies that frequency is accessible.

How can you QSO with a computer? Computers are smart, probably smart enough to hitch a ride down to the local FCC field office and pass the Amateur Extra with flying colors. But, as of now, the FCC is not licensing computers, so the computers have to find "fronts," that is, licensed amateurs who are willing to lend their call signs to the computers so the computers can operate on 14 MHz.

Actually, a handful of industrious hams have interfaced their personal computers to their Amateur Radio equipment. Whenever they are at their QTHs, they power up their systems, and anyone with the means is able to converse with their systems on '975.

I am aware of four systems that are currently active: WA1IUF (CT), WA1URA/4 (FL), WBØTAX (MO) and WB7QWG/9 (IN). Here, in the garden spot of the Naugatuck Valley, I am able to consistently access WA1URA/4's system down in Miami. So, I will use Frank's system as an example of how to access an on-the-air computer.

First, it is very important to be on frequency. Most of the systems are crystal-controlled; if you are off only a few hundred hertz, you will not be able to access the system. If your radio drifts, you are going to have problems.

Monitor the frequency for a few minutes to check that no one else is using the system. Also check that your own transmissions will not interfere with another user's reception of another system. If all is clear, you are ready to access. For WA1URA/4, I send the following sequence: WA1URA/4 DE WA1LOU RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY URAZW carriage return and line feed (CR/LF), I switch off the transmitter and monitor the frequency. If I did everything correctly, WA1URA/4 will acknowledge my successful access with: DE FRANK WA1URA/4 (MIAMI) — ON COMPUTER CONTROLLED "AUTO-RESPONSE" NNNNN, ACCESSED BY YOUR STATION: 0020Z 06/09/82, CW ID.

An explanation of the access sequence is in order. The call signs make it legal. URAZW (CR/LF) is the command that asks the system to acknowledge a successful access. The string of RYs allows Frank's autostart to activate his system. Most systems are on autostart and require the reception of a few seconds of Baudot code before turning on the rest of the system. If I had sent the URAZW (CR/LF) command without the preceding string of RYs, the autostart may not have yet activated the system and the command would not have been received. So, each transmission to a computer must be prefixed with an RY string.

Once you are able to access the system, you can use other commands to control the computer. Each system has a unique set of commands, so that when a user tries to access one system he will not inadvertently access another system. Let's get back to WA1URA/4 and examine its command structure. Its commands permit WA1URA/4 to perform the following operations:

(1) Acknowledge a user's successful access of the system as described above. (2) Allow a user to store a message in the computer for future retrieval by other users. (3) Allow a user to retrieve messages or bulletins stored in the computer. (Frank usually has current ARRL bulletins and instructions for using his and other systems in storage.) (4) Allow a user to delete a message. (5) Send a user a list of all of the messages in storage.

That simple set of commands makes '975 an interesting place to hang out. There is a lot of information being passed between the computers and users. It is another dimension of our versatile hobby that everyone should sample and explore.

PX

Beginning with this installment of On Line, program listings offered in this column may be obtained from ARRL Hq. If you desire a particular program, send an s.a.s.e. (preferably no. 10 business size) to ARRL, Dept. PX, 225 Main St., Newington, CT 06111. Request the desired program according to the catalog number assigned in the following list.

Catalog No.	*Program Name/ Author*	*QST Reference*
1	Direction-Finding Program — K7VBY	Oct. 1981
2	Standard Resistor Values — WA3SKC	Dec. 1981
3	10-10 Program — KC4OC	Dec. 1981
4	Deluxe QSL Program — WA1LOU	Feb. 1982
5	Amlog — N5GE	April 1982
6	Microcomputer Code Practice — KB2XM	June 1982

[Note: If you request more than one program, include additional postage (and a larger envelope.]

USERS' GROUPS: ATARI AND SINCLAIR

Do you use an Atari 400 or 800 microcomputer? How about the Sinclair ZX80 or ZX81 microcomputer? If your answer is in the affirmative to either question, you may be interested in participating in the radio amateur users' groups that were organized recently for these machines.

The Atari Microcomputer Net Amateur Radio Operator Users' Group meets at 1600Z each Sunday on 14.325 MHz. The net has over 70 active members, and has developed some interesting programs, such as an OSCAR/RS tracking program with real-time graphics that display the position of a satellite on the globe.

The Atari group also publishes a newsletter, *Ad Astra* . . . The first edition of the newsletter contains 16 pages of hardware and software tips for Atari users, as well as one user's first impressions of the Kantronics "The Interface," which permits the Atari microcomputer to transceive Morse, Baudot and ASCII. To receive the newsletter, an annual donation of $10 is sought to offset the cost of printing and mailing. The net coordinator is Jack McKirgan, II, WD8BNG, 4749 S.R. 207 N.E., Washington C.H., OH 43160.

The Sinclair Amateur Radio Users' Group, the QZX Net, meets Wednesdays on 14.345 MHz at 10 P.M. EDT. Net control is W9CQD. All amateurs who own ZX-80 or ZX-81 microcomputers are welcome to participate in the net and share their experiences using the Sinclair machines.

Marty Irons, K2MI (46 Magic Circle Dr., Goshen, NY 10924), is the users' group coordinator. He is also the editor of *QZX*, a monthly newsletter devoted exclusively to the exchange of technical information about Amateur Radio applications for the Sinclair. The newsletter is unique in that it is limited to radio amateur Sinclair owners who are willing to contribute to the newsletter once every four months (as well as help pay for printing and mailing expenses). Those who receive *QZX* must be active supporters, which makes for a very lively, information-filled newsletter.

The April issue contains page after page of users' input — there is something for everyone. Also, included are a number of program listings, such as a RTTY Receive Program that fits in 1k of Sinclair RAM! If that sounds interesting, you'll have to get in line. "Subscriptions" to *QZX* are currently limited to 250, and that number is filling up fast. You may have to wait until a subscriber drops out before you can receive *QZX*. The wait, if any, is worth it.

STILL MORE NETS!

New radio amateur computer nets are popping up every day. It's hard to keep up with them, but let's try. The third installment of the Computer Net Directory is contained in Tables 1 and 2.

Table 1

Landline Nets

Name	*Location*	*Telephone*
AMSAT Software CBBS	Austin, TX area	512-852-8194
Fort Mill RBBS	South Carolina	803-547-6576

Table 2

Radio Nets

Name	*Freq. (MHz)*	*Day*	*Time*	*Mgr.*
Atari	14.239	Su	2300	
Atari Microcomputer Net	14.325	Su	1600	WD8BNG
QZX Net (Sinclair)	14.345	Th	0200	W9CQD

Sources: K2MI, KD4IL, WA5WDB, *W5YI Report*, WD8BNG.

*72 Stiles St., Waterbury, CT 06706

How's DX?

Conducted By Ellen White,* W1YL/4

Alphabet Soup

One of the most persistent questions around these days in our field of DX (other than the "list," of course!) concerns prefixes. New ones surface, old ones are changed. Even with the use of the current ARRL DXCC List (s.a.s.e. to Hq. for your copy, please) and with access to the master ITU prefix list, it often gets pretty hairy to know rapidly if that *J* prefix is in the Caribbean or in Africa, if *H* is in Central America or the Pacific, or that *T* designator might be in Africa, the Pacific, or even Cuba! Where to turn the beam; aye, there's the rub!

Last April, at the big DX bash in Visalia, an interesting NCDXC handout addressed a lot of the immediate questions. If you've been inactive a few weeks or months in current-day DXing, you may find the material in Table 1 a useful adjunct to your operating tools. The Northern California DX Club, Inc., notes that these were the prefixes most asked about on the local club repeater.

Following the prefixes listed in Table 1 are locations and, in parentheses, the old designator. Unofficial prefixes are noted with an asterisk. 6L6, anyone?

Table 1

NCDXC Unusual-Prefix List

A22, Botswana (A2)
A71, Qatar (A7X)
AH1-AHØ, see KH1-KHØ
CF-CK, CY-CZ, Canada
EA-EH, Spain
H31, Panama
H44, Solomons (VR4)
H5,* Bophuthatswana, S.A. Homeland (ZS)
HD, Ecuador
HG, Hungary
HT, Nicaragua
HW, France
J2, Djibouti (FL8)
J3, Grenada (VP2G)
J5, Guinea-Bissau (CR3)
J6, Saint Lucia (VP2L)
J7, Dominica (VP2D)
J8, St. Vincent (VP2S)
KH1/AH1/NH1/WH1, Baker, Canton, Howland
KH2/AH2/NH2/WH2, Guam
KH3/AH3/NH3/WH3, Johnston
KH4/AH4/NH4/WH4, Midway
KH5/AH5/NH5/WH5, Palmyra
KH5, Kingman
KH6/AH6/NH6/WH6, Hawaii
KH7/AH7/NH7/WH7, Kure
KH8/AH8/WH8, American Samoa
KH9/AH9/NH9/WH9, Wake
KHØ, AHØ, NHØ, WHØ, Northern Marianas
KP2/NP2/WP2, American Virgin Islands
KP4/NP4/WP4, Puerto Rico
P41/P42, Netherlands Antilles (PJ2/3/4/9)
P47, Sint Maarten (PJ5/6/7/8)
S4,* Ciskei, S.A. Homeland (ZS)
S8,* Transkei, S.A. Homeland (ZS)
SV5, Dodecanese
SV9, Crete
SVØ, foreign hams in Greece, Crete, or Dodecanese
T2, Tuvalu (VR8)
T4, Cuba
T4,* Venda, S.A. Homeland (ZS)
T5, Somalia (6O)
T3Ø, West Kiribati (was T3A, T3K, VR1, Gilbert & Ocean Islands) includes Tarawa, Makin, and Ocean
T31, Central Kiribati (Was T3P or VR1, British Phoenix), includes Canton and Phoenix Islands
T32, East Kiribati (T3L/VR3, Christmas or Line Islands)
TK, France
V2A, Anguilla (VP2A)
V3, Belize (VP1)
V9, Venda (see T4)
VK9N, Norfolk
VK9X, Christmas Island (Zone 29)
VK9Y, Cocos Island
XJ-XO, Canada
XQ, Chile
Y21-Y99, East Germany (DM)
YT-YU, YZ, Yugoslavia
Z2, Zimbabwe (Rhodesia, ZE)
ZV-ZZ, Brazil
1A,* Knights of Malta
4K, Russian Polar Stations
4M, Venezuela
4N, Yugoslavia
4T, Peru
6D-6J, Mexico
6T-6U, Sudan
8J, Japan

HEARD UPDATE

IDXF reports considerable progress in arrangements for the early-1983, eagerly awaited Heard Island DXpedition, shared by hams, mountaineers, photographers and scientists. The ship *Anaconda II* has been selected — one with previous Antarctic experience and one of the largest charter vessels presently based in VK. The call that will arouse the world of hamdom will be VKØHI. More interesting details available from IDXF at Box 117, Manawakin, NJ 08050.

SK

Though documented elsewhere, it is with a heavy heart that I report the passing of two friends and hams of world repute — the top-of-the-list DXCCers, W3KT and W2PV. Both Jesse Bieberman and Jim Lawson will continue to be legends in the fields of DXing, contesting, antenna research, service to Amateur Radio and decency of human behavior.

FOUR POINTS OF SCOTLAND

The Clyde Valley DX Group, GB4GM, will man a sideband expedition on all bands from the four extreme points of mainland Scotland, with each location issuing a distinctive QSL (confirmations from all four locations will entitle the successful candidate to claim the main expedition award). The schedule starts/ends at 1200Z as follows: *Mull of Galloway* (extreme south), August 8-10; *Ardnamurchan Point* (extreme west), August 12-14; *Dunnett Head* (extreme north), August 16-18; and *Buchan Ness* (extreme east), August 20-22. Cards via RSGB.

CANADA

The June How's DX item, How Many Countries Are in the World, listed several by country size. The item in question was patterned after an *Action Line* item at the beginning of the year. Needless to say, your author has pointedly asked that column where they lost Canada, our great neighbor to the north, with an area second in size only to the Soviet Union and ahead of China and the USA.

*19620 SW 234 St., Homestead, FL 33031

CATCH-22 AWARD

Rules for the brand new Hong Kong Award noted in this column last month are now available. Read on!

Applicants must submit verified evidence of two-way contact with other Amateur Radio stations located on the 22nd parallel of latitude North (see list below). A contact with a Hong Kong station is obligatory. Only contacts after January 1, 1980, are valid. Endorsements for mode and band may be requested. The award comes in 3 classes based on contacts with at least 15 countries, at least 20 countries, all 25 countries. Processing fees require $7 U.S., or equivalent currency. All awards will be returned airmail, and upgrade stickers may be applied for with a fee of $1 U.S. Address: HARTS Awards Manager, G.P.O. Box 541, Hong Kong.

Catch-22 Countries

1) VS6 Hong Kong
2) CR9 Macau
3) BY China
4) BV Taiwan
5) XV Vietnam
6) XW Laos
7) XZ Burma
8) S2 Bangladesh
9) VU2 India
10) A4X Oman
11) A6X U.A.E.
12) HZ Saudi Arabia
13) ST Sudan
14) SU Egypt
15) 5A Libya
16) TT8 Chad
17) 5U Niger
18) 7X Algeria
19) TZ Mali
20) 5T5 Mauritania
21) CN Morocco
22) C6 Bahamas
23) CO Cuba
24) XE Mexico
25) KH6 Hawaii

BRAILLE DX SERVICE

This service provides a monthly cassette recording of current DX activity, expeditions and important QSL information. It also features the Kansas DX Association monthly newsletter and a current ARRL DXCC listing in Braille or on cassette (including prefix changes a la the lead this month!). A personal QSL manager is provided for outgoing cards. Membership is simply a one-time donation of $2 to provide for the blank cassettes. Support this noble service and spread the word to your visually impaired ham friends. Full details from Phil Scovell, AFØH, 8347 West Sixth Ave., Lakewood, CO 80215.

THE CIRCUIT

☐ Greenland: 1000 years ago, Eric the Red was condemned to leave Iceland for three years, and he made for Greenland. To commemorate his arrival in OX3, all Greenland hams are allowed to use OX9 followed by the OX3 letters during August. The only station with a very special call will be the club station, OX3JUL, using OX9V, as it was in this area that the legendary Eric the Red settled. The "OX9" will only be used this month and, perhaps, in 2082!

☐ The correct QSL route for VP1MK is NØBNY. The *Callbook* route for VP1MK is incorrect. The right address is 2770 S. 13 St., Omaha, NE 68108. Please include an s.a.s.e. for same-day turnaround. Cards go via his Dad, WØOJU.

☐ Kuwait News: G4BWP and G6BQU are unable to obtain licenses (none are being issued), but they've been lucky enough to be able to operate as second operators/9K2BE on the condition that they deal with the cards. They've arranged with G4GIR to be manager. Please do *not* mail confirmations for contacts with them to Kuwait, but do note that all 9K2BE

One the left is Sergio, KP4L, with Sam, FG7AS/VP2, in front of KP4L's QTH and beams. *(photo by N4TO/KP4)*

cw and contest activity cards must be sent via G4GIR. Derrick, G4BWP, notes that he personally will handle cards for the late 9K2DR (Box 1100, Safat, Kuwait).

☐ Last year, W1JTI operated from the Faroes as /OY, but this year he will be sporting the call OY1KH. Cards may go via the 1982 *Callbook* address of Box 184, Torshavn, DK3800, Faroe Islands (although he will be operating from Klaksvik, one of the Northern Islands). Cards received direct with return postage equivalent will be answered via air with special stamps. QSLs via the OY bureau will be accepted. Leon notes that Marin, OY7ML, planned activation of OY6FRA, the club station, for WPX with a substantial multieffort.

☐ AD1S/N5DLM Pacific DXpedition in August is planned as follows: Aug. 4-8, the Federated States of Micronesia (previously the Eastern Carolines), KC6, operating from Yap; Aug. 8-11, Republic of Belau (previously the Western Carolines), KC6, operating from Koror, Palau; Aug. 11-14, Saipan, the Marianas, KHØ; and Aug. 14-16, Majuro, the Marshalls, KX6. Two stations will be operated on all bands 10-80, cw and ssb. QSLs to AD1M. This type of expedition is expensive, and contributions are always welcome. Those helping out will receive a photo postcard from Yap, "The Island of Stone Money," as a token of their appreciation.

☐ K9MK/5, Mike Krzystyniak, 6061 Dunson Ct., Watauga, TX 76148, manages cards *only* for K9MK/VP2A and K9MK/V2A. Mike says that NØDH/7 is manager for V2AMK, K9LA/V2A, N9PI/V2A, K9DX/V2A, VP2MKD and VP2MMP.

☐ W3ICM would like to volunteer his services as a QSL manager in a unique way, limited to Christian missionaries and religious stations. Interested? Check with Fred Matos, 1029 Harbor Dr., Annapolis, MD 21403.

☐ Almost 11 years ago WB5BIR worked XU1AA, and he is still looking for a pasteboard. Any help out there? Check with Allen R. Brier, WB5RIR, 6505 Westheimer, Apt. 241, Houston, TX 77057.

☐ YJ8DX, early June '79, goes to N1DX. Dr. (John) from that trip is now at KC4AAA, and hopes to be QRV for some contests, as well as RTTY.

Last October's GD5DLW Isle of Man operation netted an all-band total of 3200 contacts in 48 hours. Taking turns were Wolf, DL7RT (left), and Holger, DL7SP. Special thanks from the crew to Mr. and Mrs. Cowin, and Alex, GD3HQR, for outstanding support from the beautiful farm, "The Carey."

☐ Through the end of July, Spain commemorated the world soccer championships by allowing substitution of the prefixes AM for EA, AN for EB, and AO for EC.

☐ AH2E on Guam has officially closed down, with KT2H being Mark's new call. AH2E cards go via N9AVY, pasteboards for WH2ABE, KA1BRH/KG6 and VP2MPW go to Mark Wilson, 21 Haggerty Rd., Potsdam, NY 13676. Other notes from Mark: He has all the VP1MPW logs, with the exception of those for the 1977 ARRL DX Test, which seem to have disappeared. He also would like Eastern European operators to take note of the fact that his old Guam address was not ever that of their QSL Bureau. Please do *not* send confirmations for Guam contacts to that address (Box 23892 GMF, Guam 96921).

☐ Raves from K1BJ anent the hospitality of 3B8CF. Pete's operation in ZS6 and 3B8 get confirmed via Pete Powers, 48 McCormack Ave., Medford, MA 02155.

☐ W5TZN is still looking for QSL tips for A2CDS 3/78, C21NI 4/78, FH8CY 11/75, VR8O 6/78 and ZE6JL 3/78, via W. L. Walker, Rte. 3, Box 203, Ada, OK 74820.

☐ The March operation by VP2EFS, VP2ELP and VP2EGP all go via WA1GSO.

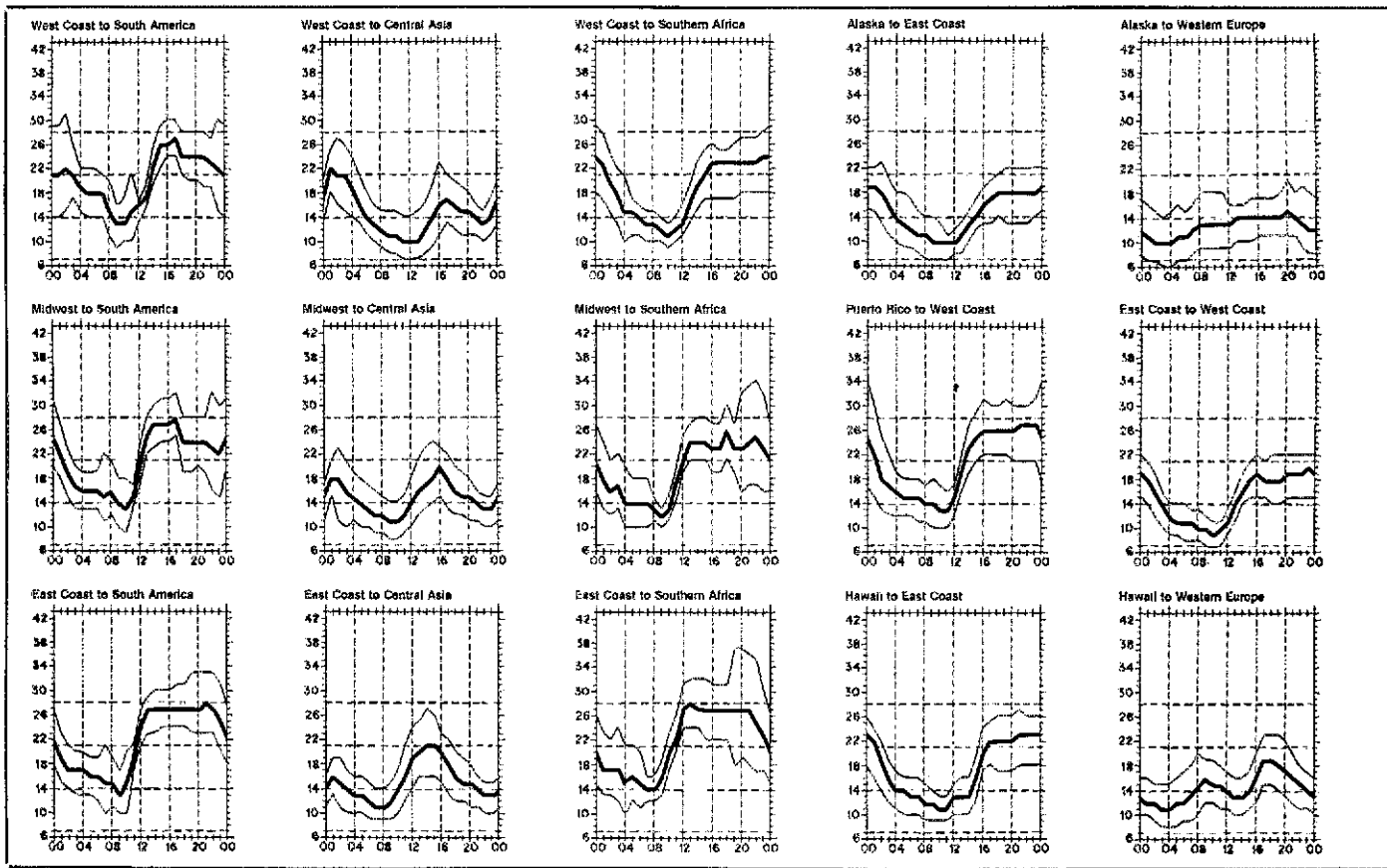
☐ NØBH says, please, he isn't a QSL manager for *any* station.

☐ The World's Fair Station at Knoxville, Tennessee, WA4KFS, should be lively on all bands/modes. Usual s.a.s.e. via the manager, W4PKM.

☐ Still need a card for K4BEO/CE3 (1977/78), N4VV/CE3 (1978) and CE3XV (1978/79)? If so, QSL via N4VV, SR5, Box 559B, Madison, VA 22727.

☐ Any unsatisfied demand for replies to QSLs to 5W1BZ, operational June 1978 to November 1980, 6-160 meters, should now go to his latest address: P. B. Lake, ZL1AIZ, 12 Brasenose Pl., Tawa, Wellington, New Zealand.

☐ W3BH feels that W7KSG is "out of luck" re



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

Alex Taylor, Squadron leader in the Australian Air Force, operating from Cocos Keeling as VK9YA. *(Thanks KB9EZ)*

PZ5JR, a literacy worker, operates mostly from the jungle in Suriname, using an Atlas-210X powered by a small car battery. Every couple of months Bob is on from Paramaribo, where he makes good use of a Heath SB-302/401 and a Wilson-33 at 45 feet. QSL via his Dad, K3BYV.

5A2TZ cards. Bob notes that 5A2TZ was a military communications and MARS station at Wheelus AFB, Tripoli, Libya, and he feels that all the USAF logs have since "gone west." He comments, additionally, that QSLing was a huge problem. Unassigned ops had to pay for their own postage, and, with incoming cards averaging 8000-10,000 monthly, costs became prohibitive.

☐ All of this hard work getting the cards reminds me of W0PXW's one liner: "The biblical Job probably would have had a different reputation if he had ever tried to get enough cards for DXCC."

QSL Corner

Administered by Joan Becker, KA1IFO

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

Our tnx to W9NUF and W9LNQ for their information.

A22GM (N4FD)
CR9D (OH5VD)
EA2JH/ZA (EA2OP)
EF5SSC (EA5BAA)
FO8HI (WB6GFJ)
FO8HL (WB6GFJ)
FR7BP (W0AX)
GJ3ZAY P.O. Box 146, Cambridge, England
HH2A (AJ9D)
HL1SF P.O. Box 162, Seoul, Korea
I0DUD (HV3SJ)
J28AZ (I8JN)
J3AUT (W8UVZ)
J6LLF Box 660,Castries, St. Lucia, Windward Islands
J6LZA (K4LTA)
OK7MM (OK3TMF)
TL8CK (F6EWM)
VP2ED (AD8J)
VP2ES (K8CV)
VP2VFI (K1IJU
YB0PG (KB5AS)
YJ8NKO (JH7OHF
ZL1AFU (N5TX
ZS1XR (N7RO)
3D2VU (DF7CC)
5B4IJ (OE8PSK)
5H3BH Bjorn Humble, Box 4358, Dar es Salaam, Tanzania

QSL Manager Volunteer

N4DDQ

SPECIAL NOTES

☐ The efficient QSL Forwarding Service by the late Jesse Bieberman, W3KT, has been discontinued, effective June 6, 1982. Mail received after this date will be returned to sender. Cards already at the service will be handled promptly, but no more will be accepted.

☐ Anyone needing a QSL from JY9AF should QSL to KB7UI/JY, 4173 East Medlock Drive, Phoenix, AZ 85018.

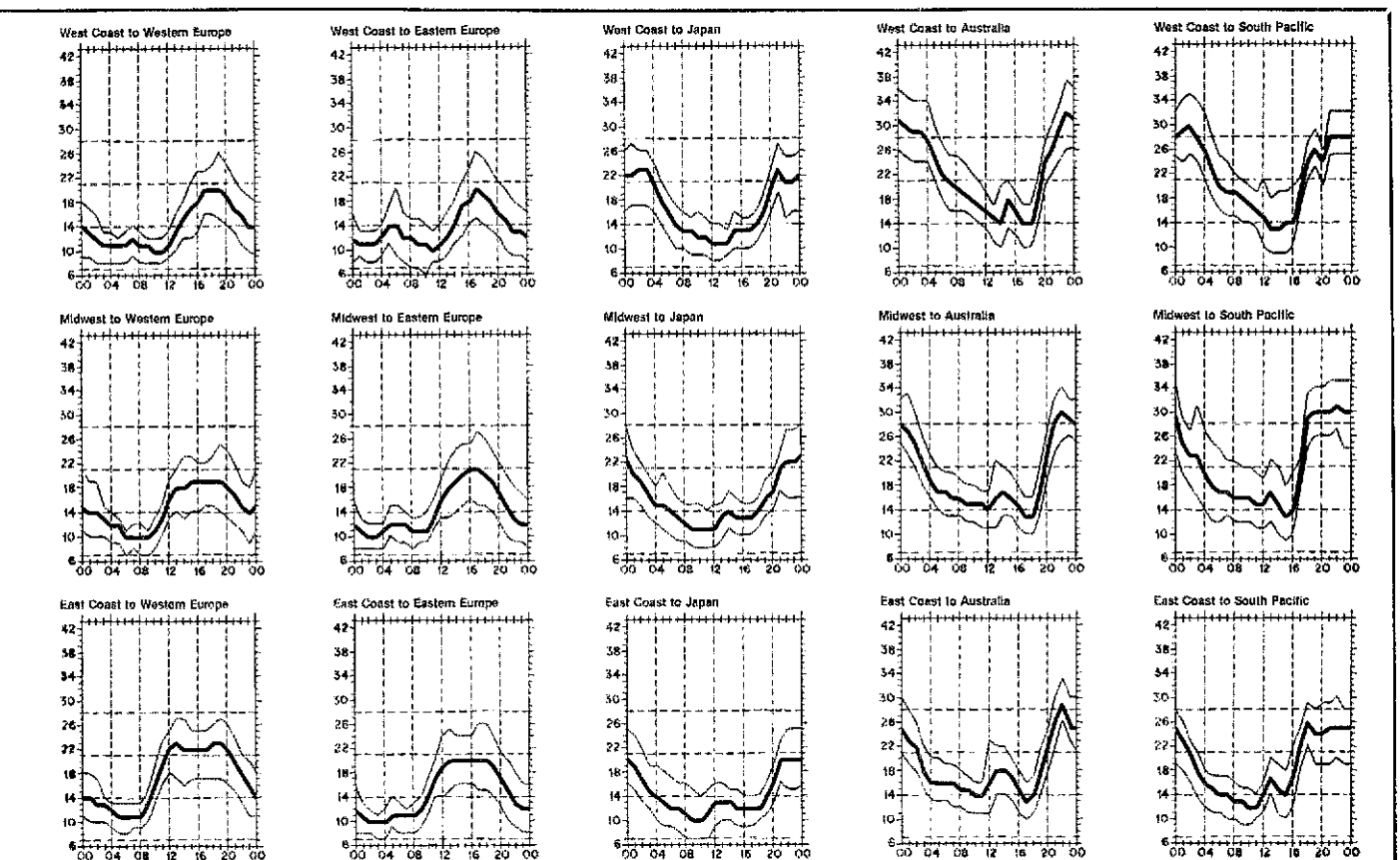
☐ The stations in parentheses are *not* managers for these stations:
Not Manager for any stations (N6NW)
FG7AS/FS7 (W1KK)
VS5AM, VS5PW, VS5MC (DK5JA)
VU2YK, VU2RAK (W2YTO)

☐ Address change, effective immediately. The Amateur Radio Society of India, P.O. Box 3005, New Delhi 110003, India.

March 1982 QSL Corner, page 71, contains information on the operation of the ARRL Membership Overseas QSL Service.

June 1982 QSL Corner, page 73, contains information and addresses for the Incoming Bureaus.

For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for August 15 to September 15, 1982, assume a sunspot number of 97, which corresponds to a 2800-MHz solar flux of 145.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 1 through April 30, 1982. 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

CX2CS/227 G5DSD/102 ON7DR/111 YU3TSR/161 KK2I/292 K4WHN/253 WA5TOD/111 KB8SC/112 KA9FGD/100
DF3FK/118 HA1KSS/109 ON8XA/331 YU3TZR/102 KM2H/103 KB4LK/133 KB6BP/143 KC8C/105 KB9II/162
DF4ZL/231 HB9BXE/128 OZ4HAM/102 ZS2JS/109 W2FB/254 N4BAA/202 KB6DV/112 KD8K/110 KB9MO/226
DF8LY/100 JA1FO/101 PA3ADG/107 ZS3TL/106 WA2SVS/225 ND4Z/102 N6BVG/156 KJ8Q/109 KD9G/108
DJ2RF/185 JF1HYF/113 SK3HK/104 6Y5HN/101 WA2TUJ/103 NG4W/110 N6UU/120 KK8M/112 W9MP/100
DJ2SS/112 JH1BSR/249 SM4IKL/203 9Q5MA/110 WB2JKJ/100 NX4B/112 W6ABT/308 N8AVW/101 WN9JAT/124
DJ3IW/225 JK1DSR/108 SM4JSF/101 K1BPN/101 WB2TUH/100 WA4CJH/101 AF7T/102 W8BCE/103 WA9VLK/104
DL1BL/104 JF2JRC/120 SM6HCJ/169 KA1BYS/110 K3WUR/101 WB4FSS/103 K7CHA/104 W8MFB/107 KA@DRL/110
DL3GX/106 JA3GIY/123 VE2DUN/106 KA1CGL/106 KA3CUE/110 WD4ISQ/100 K7EV/116 W8NE/269 KB@NL/232
DL3OP/151 JA9CGW/270 VE2DVI/101 N1APE/114 KD3T/105 N5CPD/101 KC7MG/102 WB8WZT/168 KC@DW/115
F3KT/177 KH3AB/159 VE3DR/294 N1BAA/105 N3ST/165 N5EBD/116 KK7Y/131 WD8QXF/111 KK@R/118
F5AI/130 KP2A/D/118 VE3MUN/106 W1OGZ/117 W3BH/100 N5NR/265 N7BUP/102 WD8RNC/125 WA@UWS/252
F6FHO/205 OA8AX/100 VE7DIO/110 W1SXX/110 W3QEI/100 W5NUT/PJ7/122 K8NWD/265 K9BJ/298 WB@YJT/125
FP@GBG/113 OK1AJR/126 VP2VEN/109 K2WR/100 W3QHF/107 W5URW/104 K8QXB/258 K9MX/109 WD@FNZ/109
G3MYO/107 ON4YN/269 YU2RA/268 K2HWY/106 K4FPF/103

Radiotelephone

AP2HB/105 G4JVV/104 PY5ACP/103 K1BPN/101 KB3HV/102 K5VR/116 N6VO/185 K8KJO/252 KA9ABC/107
DF2MP/107 HC2HX/100 PY8ANE/131 KE2C/271 N3BDZ/100 KD5GB/118 WA6LIJ/104 K8NWD/258 KA9HVM/104
DF2SU/150 HI3AMF/123 SM4IKL/184 KK2I/287 N3BOB/125 N5BDE/104 AF7T/102 KA8IBO/150 KB9II/160
DJ6DW/123 HK8BVN/218 SM6KOK/122 W2HVW/108 KB4LK/132 W5NUT/PJ7/121 K7EV/107 KB8SC/106 KB9PT/101
DK2WF/135 HL1WR/100 VE3FDK/112 W2RSO/102 KE4AC/156 W5URW/103 K7LYT/100 KC8KD/109 N9ABH/105
DK4AP/183 KH3AB/114 VE3KSF/107 WA2SVS/225 N4DDK/125 WB5IUU/100 K7VYQ/109 KR8N/248 K@DNI/144
DK9NT/119 JH1BSR/249 VP2VEN/109 WB2JKJ/100 N4ETA/104 WB5QMZ/109 KA7AYN/123 W8BCE/102 N@CXV/100
DL3OP/143 JK1DSR/108 VY1AL/100 WB2QFH/103 ND4Z/102 K6JCK/101 KB7HH/139 W8QHG/108 W@WFB/162
F6FFA/229 JA9CGW/257 ZS3TL/101 WB2TKU/106 W4KAO/107 K6OCY/125 WA7IZR/103 WA8SAE/113 WA@GUD/100
F6FWH/110 LA7ZN/103 9Q5MA/110 KA3BTH/109 WA4EXW/100 K6PKO/102 K8DHK/106 WB8WZT/106 WA@UWS/215
G3IMW/111 PA3ATZ/109

CW

DJ3IW/109 JA1HGY/203 SM4IKL/113 YU3TVQ/173 WB1DSS/100 N3ST/127 WB4ZBI/100 W6YMH/108 KD9G/100
DK8RG/103 ON4SH/119 VE4AEX/105 YV5AGS/133 KK2J/103 K4XP/116 N5UD/175 KB7HH/180 KA@ADF/102
DK9KJ/112 ON4YN/194 VE7DIO/105 W1OGZ/104 AF3T/101 KC4UB/100 KB6BP/116 K8QXB/203 KA@O/110
DK@ZR/121 PY1WDS/109 VK2BFJ/115 WA1RTC/111 N3AKD/100 KE4AC/104 W6ENZ/100 KC8C/100 N@BUI/103
KH3AB/116 SM3LGO/156 XE2AAU/107 WA1TPR/117

160 Meters

W4PZV W5SUS

RTTY

YB2BLI

5BDXCC

JF1PJK JA5DQH KA4BFT YU7GMN DF6CY W2ARQ K7NO UQ2PP OK1DKR
SM6CTQ EA4MY KN6M DL7RG DK2WH EA8QL VO2CW UB5UCH W3GOH
AC@A SM6BXV N4BPP I4EAT W9RY OY5NS

Endorsements

Mixed

AH2E/249 OZ7OP/319 K1GVW/191 K2AGZ/334 W3DDG/227 AI5I/300 W6NCR/133 KR8N/248 W9CH/348
DK5PR/321 PY5CA/254 K1HMO/301 K2SX/272 W3QLW/301 K5RE/293 W6NPY/308 N8DE/287 W9DS/250
DK8AX/265 PP5YC/311 K1HZ/310 KB2RC/200 WB3CZK/227 K5RW/299 W6OB/310 W8AH/357 W9HK/341
DL1RB/300 SM3BIU/288 K1LEC/200 K2KIQ/125 WA3LJP/290 K5VR/210 W6QNA/346 W8AN/187 W9NGA/311
DL9YC/272 SM3LGO/168 K1WB/261 K2HVM/163 K4ELV/200 KA5ELC/150 W6SC/334 W8ANM/192 W9SC/302
EA4MY/310 SM4CTT/300 N1ZZ/302 K2NJ/295 K4GLA/325 KA5FLX/187 W6TC/322 W8BKP/340 W9TA/301
EA7AXA/197 SM6KQK/181 KE1K/225 K2YGM/298 K4ISV/300 KA5GJO/164 W6US/320 W8DJI/134 W9TKR/330
EI7CC/165 SM7BRO/199 N1AFC/226 W2CC/315 KE4I/329 KC5M/260 WA6EZV/228 W8ZCK/335 W9TY/302
G2AMV/220 SM7HCW/276 N1GL/321 W2CML/200 N4DDK/141 KC5XA/204 WA6HAT/236 WB8ZNM/245 WA9USE/279
G3EFS/230 SM@BTS/179 W1BU/305 W2IY/215 N4KE/320 N5FJ/157 WA6TKT/226 WD8KEO/151 WB9JLL/175
G4FCT/133 TG4NX/301 W1BMR/223 W2MIG/316 N4NX/311 N5FW/307 WB6FGI/219 AK9Z/159 WB9NOV/276
G3GMY/151 TI2BEV/151 W1ESN/302 W2OKM/359 NT4W/216 W5JO/130 WD6EQP/250 K9AZG/202 WB9OTX/225
GM4FDM/189 VE1CAW/204 W1GKJ/293 W2REH/321 W4CZU/310 W5ODD/251 AF7M/251 K9BIL/275 WD9DID/151
HB9AIB/240 VE3IPR/299 W1GVZ/280 W2YD/323 W4FDA/321 W5WF/137 K7CQ/291 K9FN/321 WD9IRO/125
HB9AQS/128 VE3MV/276 W1KGH/329 WA2AHP/125 W4FX/342 W5YZ/282 W7RV/334 K9IW/302 AB@S/182
I5JFG/238 VE4ADV/231 W1WEF/278 WA2CBB/331 W4KA/311 WB5FCO/155 K7ZR/318 K9KU/316 KI@O/227
JA1HGY/279 VE8AQZ/123 W1YL/315 WB2ZEL/236 W4MGX/293 WB5UFR/218 KA7AUH/300 K9PQG/314 K@BJ/290
JA1SJV/297 VK3YL/346 WA1EOT/310 AE3T/321 W4OMQ/301 WB5WDG/144 KA7AYN/129 K9QFR/300 K@BS/328
JF1VST/202 XE1AZ/177 WA1FSD/126 AF3T/267 W4OYI/200 WB5YKD/251 KA7V/125 K9RF/325 K@NN/260
JA3KWJ/303 XE1GBM/301 WA1KUL/279 K3GYD/315 K4PT/203 WB5ZGP/280 N7RO/328 K9TI/281 K@RWL/281
JA4CTL/203 YO3AC/326 WA1TPR/291 K3HBP/249 W4RW/200 WD5ABG/225 W7LFA/331 KA9FYZ/127 KA@FPK/201
JA8CFR/253 YU2CCB/283 WB1DQC/297 K3RT/300 W4VUL/227 K6ELQ/226 W7TVF/311 KB9JF/251 KD@B/231
JA8GZV/283 YU2CDS/300 AF2C/256 KA3R/250 W4WKQ/150 K6UD/314 W7YKN/242 KC9CQ/230 KJ@M/290
KP4BJD/251 YU3QI/301 N2AMS/200 KB3MC/200 W4YJ/359 K6WR/346 WA7JSC/232 KG9J/274 KM@Q/125
LA7JO/310 YU3HA/331 N2AP/312 KB3OM/229 W4YK/197 KA6CJL/124 K8NN/315 N9AAP/263 W@BX/254
LA7SI/180 Z23JO/261 N2BIM/264 KB3TE/218 W4ZEI/163 KA6DXY/151 K8IP/332 N9AMF/283 W@CZE/216
LU8BA/270 ZL1BIL/304 N2CPE/200 KE3A/284 WA4ICB/134 KD6AP/155 K8PYD/326 N9ANR/213 W@JLC/216
OH2LP/176 ZL4LZ/301 N2HS/124 KG3L/203 WA4MFS/284 KN6M/285 K8VFV/284 N9CAP/128 W@KZV/291
OK1MP/343 3D6AX/224 N2WS/250 KI3L/251 WA4VDE/306 W6DPD/271 K8ZO/279 N9CPW/176 W@YCR/289
OK3IF/200 4X4DK/359 KJ2N/243 N3ANP/205 WB4CQL/126 W6DSY/177 KA8IIC/125 N9DJ/271 WA@KHW/281
ON4SH/200 K1AR/295 KA2CFH/173 N3US/306 WB4KGL/300 W6GMF/344 KB8BS/290 N9KV/301 WA@QID/148
ON6OS/299 K1DP/290 KA2AVW/144 W3AFM/354 WB4OSN/301 W6LEN/214 KB8LH/170 W9AG/324 WD@GML/256

Radiotelephone

CT1ZW/301 I@MBX/300 VP2MO/201 KC2BW/250 K4WHN/252 KC5M/258 N7RO/322 WD8PFI/187 W9DMH/289
CX2CS/221 JF1VST/199 XE1GBM/300 KC2Q/199 K4XG/315 KC5P/177 W7FDJ/297 K9BIL/265 W9DS/143
D4CBC/271 JA3KWJ/295 XE1LCH/260 W2BHK/284 KA4FQZ/225 KC5XA/202 W7LFA/331 K9BJ/281 W9KXF/135
DF4ZL/230 JF3ILZ/253 ZL1BIL/304 N2BIM/257 KC4BR/260 W5ODD/139 W7YKN/241 K9FN/315 W9NIO/225
DF5SL/183 JA8GZV/275 ZL4LZ/301 W2CC/314 KN4F/201 W5OPZ/124 WA7JSC/231 K9FYZ/305 W9QQ/312
DJ7AX/129 LU4MEE/270 ZS6JM/351 W2CML/200 N4AKO/166 W5RJC/271 WA7WLT/151 K9IW/295 W9TA/295
DJ@XJ/176 OE2WJL/228 4X4DK/359 W2MIG/314 N4AOC/191 WA5CST/225 WA7ZWG/290 K9KU/295 W9TY/212
DK8AX/261 OK1MP/330 K1IAG/171 W2OKM/357 N6APW/198 WD5ABG/225 K8NN/298 K9PQG/308 W9WHM/355
DK8JS/203 ON6OS/258 K1WB/215 W2REH/255 N4AVB/291 K6UD/304 K8PYD/322 K9QFR/300 W9ZNY/250
DL7OD/305 OZ3FC/141 KE1K/215 W2YYL/344 N4BAA/183 K6WR/346 K8VFV/284 K9RF/316 WA9IVU/174
EA3BDE/199 OZ7OP/318 N1ALR/203 WA2CBB/270 N4KE/317 KD6BE/177 K8ZO/276 K9TI/266 WB9NOV/272
EA7AXA/196 PP5YC/308 N1GL/196 WA2VJL/150 N4NX/306 KD6PZ/201 K8ZZO/272 KA9GRL/202 WB9ZAH/265
EI7CC/250 PY5CA/253 N1ZZ/260 WB2RRB/154 NR4S/149 W6DPD/271 K8ZZU/248 KB9IS/280 WD9EWT/169
G3HUR/225 SM7HCW/263 W1ESN/280 WB2TKY/256 NT4W/216 W6NCR/132 K8BBS/289 KB9JF/243 WD9HAW/280
G3YJI/290 SM@JOQ/168 W1GKJ/255 WB2VPV/272 W4LCL/263 W6SN/290 KB8LH/164 KB9MO/225 K@BS/328
G4BAL/178 TG4NX/299 W1ZT/154 WB2ZEL/234 W4WKQ/125 W6US/273 N8DE/213 KF9J/273 K@VRW/289
G4FCT/133 TR8DX/173 WA1EOT/290 AF3T/286 W4YJ/356 W6VZZ/270 W8AH/357 KG9J/272 KD@B/229
GM4FDM/110 VE3AZU/227 WA1KUL/277 K3LDE/200 WA4MFS/266 WA6EZV/228 W8NAM/192 N9AAP/257 N@BZE/125
HB9AQS/127 VE3DOU/252 WA1TPR/285 K3LUE/201 WA4QMQ/290 WA6QCO/150 W8JXM/325 N9AMF/281 W@BX/116
HB9BRC/227 VE3FJE/308 WA1WWH/157 K3RT/269 WA4QQV/204 WB6FGI/219 W8NDJ/226 N9ANR/212 W@CZE/213
I2WTY/284 VE3HDC/201 WB1DQC/297 KE3A/278 WA4VDE/304 WB6ZNV/199 W8NK/200 N9CAP/128 W@LXZ/178
I3VRV/315 VE3IPR/294 K2HVM/126 N3US/296 WB4KGL/295 K7CQ/269 W8YEK/315 N9CPW/176 W@RHZ/150
IV3YRN/292 VE3KGK/248 K2NJ/234 W3FDP/302 WB4OSS/319 K7DS/290 WB8ZNM/244 N9DJ/201 W@RTB/202
I5JFG/227 VE3LRU/129 KB2ED/203 WB3ABS/254 WD4JEQ/150 KA7AUH/298 WD8KEO/150 N9LE/280 W@ZRA/226
I5JHW/118 VE3MR/342 KB2MY/226 K4FCW/160 K5UKN/317 KB7TW/203 WD8MQJ/202 W9AG/264 WB@TQW/255
I8INW/285 VE3MV/276 KB2RC/200 K4ONF/277 KC5CR/150

CW

DF9FM/170 OZ7OP/218 W1JR/281 W2MIG/284 AG4S/249 WA4MFS/186 K7ZR/281 K9BIL/138 K@JCF/226
DK5PR/225 SM6CST/253 W1YY/280 W2REH/200 K4XG/257 WA4QMQ/170 WA7OBH/122 K9IW/266 K@RWL/192
DL3RK/225 SM6HCJ/156 K2LFL/125 WA2CNF/126 KE4I/295 WB4OSN/254 K8PYD/261 K9TI/233 N@JC/153
JA1ELY/292 SM7HCW/198 K2NJ/199 K3KA/281 N4KE/202 K5RW/292 K8ZH/288 KB9RM/152 W@JLC/201
JA1SJV/136 TG4NX/252 K2SX/229 KA3R/199 N4NX/290 K6TS/163 N8DE/208 KG9J/184 W@JSN/161
OK1MP/261 VE3IPR/214 KA2DIV/136 KI3L/183 NN4B/124 W6LEN/159 W8AH/307 N9DJ/134 W@YBV/175
OZ1FRR/252 K1WB/184 KB2FS/126 W3GG/203 W4CZU/225 W6TC/290 W8AN/175 AI@O/201 WD@AVG/125
OZ7BW/286 W1GKJ/141 W2IY/200 AA4AR/206 W4WJ/282 AF7M/181 AK9Z/150

YL News and Views

Conducted By Jean Peacor,* K1IJV

Edna Thorson, NØYL

Edna Thorson, better known as Eddy, lives in the rural Minnesota town of Grand Meadow. In a calculated effort to bring a greater variety of people into her life, Eddy asked a ham friend about Amateur Radio. Her friend in turn told Ned Carmen, WØZSW, who paid Eddy a visit shortly thereafter. The loaned receiver, tape recorder, code tapes and assorted books that Ned provided found Eddy sending forth her first radio message in June 1967 as WNØRRA. She sent: "Would you believe this is my first transmission?" The reply: "Yes, I would." In Eddy's words, "Oh well, I'll improve." This all happened during the formative years of the Handi-Ham System. Eddy was one of the original three to become licensed. Ned Carmen became the founder of the system.

Eddy met Sr. Alverna O'Laughlin in 1967. At the time, Sr. Alverna lived in the Motherhouse in Rochester, Minnesota, where she and several other nuns were working toward Amateur Radio tickets. Eddy was invited to tour the Motherhouse shortly after she received her license. Never will she forget the delightful surprise she received at lunch that day: a cake decorated with WNØRRA in her honor. Sr. Alverna, now WAØSGJ, is currently educational services coordinator for the Courage Handi-Ham System.

Eddy's license timetable includes General in 1968, Advanced in 1969 and Extra Class in 1970. Her love of cw and the 80-meter band soon found her active in traffic handling. She served as route manager for Minnesota's slow-speed net for 18 months. She went on to become assistant SCM in charge of cw nets. Route manager of the Minnesota Section cw net followed for a year. Eddy became one of Minnesota's main traffic handlers for six straight years — from 1968 through 1974. She has been the recipient of assorted public service awards — having handled some real emergencies for local people.

Eddy now has a booming business repairing and dressing antique dolls. She also makes original dolls — leprechauns, dwarfs, gnomes and the like. Her business activities do not allow her the on-the-air time she once had; thus, her term, "a has been." But Eddy's no has-been! She is presently trustee of WØZSW, Courage Center radio station. NØYL is a familiar call to all stations on Minnesota's cw net, which she QNIs regularly. Her tutoring of many blind students at different Handi-Ham Radio Camp sessions has led to Novice licenses for many. She makes code practice tapes for those wanting them. She follows through with on-the-air QSOs until the newly licensed overcome those first Novice hurdles.

Grand Meadow, Minnesota, may still be a rural town, but it's definitely been put on the map by Eddy Thorson. All it took was one YL looking for a greater variety of people in her life.

Eddy Thorson, NØYL, at the Camp Courage spring convocation with Byron Equiguren, WD9IAN, a professor at the Hadley School for the Blind. *(photo courtesy Courage Handi-Ham System)*

RESULTS, YLRL'S 33RD YL/OM CONTEST

This was the 33rd year of the YL/OM Contest. Hearing the many familiar calls of those who participated year after year made it seem like "old home week." It is equally fine to see so many newcomers' calls among the results. Special congratulations to Peggy Malto, KA4FVU, for winning the Gold Cup in the phone portion. This is Peggy's second Gold Cup in a row.

YL/OM Contest Results — Cw

YL			*OM*	
VP2VFV*	28,755	Gold Cup	W9LNQ*	1062
F6GNC*	16,393	Second Place	VE3KUC*	833
WA2WHE*	16,372	Third Place	W7ULC*	810

YL CW

*WA2WHE** 16,372; WA2NFY* 2572; *W3CDQ* 638, *K8ONV/4** 11,325 WA4SRD* 9450; *AD6Z** 5801; N7DHA/6* 948; *W8YL** 13,545; WA8YPY* 3200; *N9AIB** 1595; WA9EZP* 1400; *WDØCHZ** 292; *DL3SAR** 210; *F6GNC** 16,393; F2SQ* 1200; *LA6ZH** 2275; *OZ7YL** 1680; *VE3GTI** 6102; *VK3KS** 8772; VK2SU* 82; *VP2VFV** 28,755; *YU7JDE** 1539.

OM CW

*W1HOZ** 600; W1BL* 570; W1PEG 357; KA1CLV 132; W1OPJ* 45 *W2UAP** 318; W2AAU 272; WB2EZG* 80; W2WSS 30; *WA3EXX** 499; AE3H* 31; *NX4C** 498; W4VP* 450; AA4FF* 403; K4GSX* 403; *AD5F** 210; W5EIJ 168; *W6BIP* 528; W6ZT 440; N6PE 35; *W7ULC** 810; W7RD* 112; WA7BTZ 9; *W8UMP** 600; K8LWP* 61; W8TSF* 20; *W9LNQ* 1062;* W9CA* 31; K9GDF 25; *KØBM** 630; WBØBJP* 446; WAØCTX* 137; *DK3OI* 90; *I1MM* 500; IT9AGA* 135; *JH3AIU* 4; *LU1EWL* 1; *OZ7JZ* 117; OZ1DKG 1; *PAØGSN** 37; *SM5RH** 90; *VE3KUC** 833; VE3JKE* 427; *VK3XB** 20; *YU7SF* 80; YU7FN 49; YU7ORQ 30; YU3TE 16.

YL/OM Contest Results — Phone

YL			*OM*	
KA4FVU*	128,196	Gold Cup	AA4FF*	1377
WA4KOP	110,385	Second Place	W3IEZ*	805
WB7FDE	103,118	Third Place	DL1RA	779

*Country Club Dr., Monson, MA 01057

YL Phone

*KA1JC** 14,535; WB1ACA* 14,107; KG1F* 12,937; WB1CZC* 9900; KA1ZD 851; *WA2NFY** 3690; KA2ESQ* 3117; KA2EAY 2538; W2EEO* 656; *KA4FVU** 128,196; WA4KOP 110,385; WA4SRD* 13,795; K8ONV/4* 840; W4LYC* 412; *N6EZN** 11,793; *WB7FDE* 103,118; KQ7Y* 39,785; *K8PXX* 3864; *DF9YY* 41,112; DK5WQ 13,566; DL3SAR 11,978; DL8BBI* 1683; DF3BN* 743; *F5RC** 308; *I2LVN** 25; *PA3BLA* 374; *VE7DKS** 11,812; *VE3GTI** 5407; VE3NBY* 1007; *VE4ST** 660; *VK2NQI** 4200; VK3KS* 160; *VP9IX** 52,362.

OM Phone

*W1HOZ** 400; W1BNS 336; KF1B* 165; W1PEG 143; *W3IEZ** 805; WA3EXX* 228; AE3H* 137; W3ARK 108; *AA4FF** 1377; W4XT* 776; WB4UBD* 522; K4GSX* 480; N4FKF* 101; W2HAE/4 4; *K5SVC** 570; AD5F* 488; WA5DTK* 400; W5EIJ 100; *W6BIP* 638; K6XO* 90; N6PE 16; *W7ULC* 700; KB8GH** 280; KD1E/8* 165; *W9LNQ** 400; W9CA* 280; *KØETA** 625; WBØCGJ* 400; *DL1RA* 779; DL8QS* 37; *G4DZI** 120; *I1MM* 143; *OK1AGN** 191; OK3YK* 56; OK1KZ 16; OK1PFM 8; *OZ1DAF** 40; *VE4MG** 425; *VK3XB** 11; *YO4BXX* 20; YO8BSE* 12; YU1OYD 36; YU7AJD* 5.

*Low Power. Calls in italics are certificate winners.

YARDS OF MEMORIES

Carol Baxter, K3RSL, of Newton Square, Pennsylvania, has yards of memories of her Amateur Radio career. She has a "crying towel." When Carol first became licensed at age 15, she was very active on 10 meters. Whenever a QSO turned to the problems of Amateur Radio — be it TVI, rig problems or whatever — Carol always countered with, "I'll lend you my crying towel." A year later, what had been a joke became reality when she purchased yards of linen toweling and labelled it "Ye Old Crying Towel." (See this column, *QST*, July 1963. At the time of that write-up, more than 90 hams had signed her towel.)

Later, Carol went into nursing, but she kept up with Amateur Radio activities. She is now married and the mother of two children, but hams' interest in her towel has never ceased. The towel goes with her to all radio club events; it always draws a crowd. On returning home, all signatures are traced with colorful liquid embroidery for permanency.

Since it has been in existence for 19 years, Carol's crying towel is an addition to Amateur Radio's history. Strangers have knocked on her door wanting to sign it. One-upsmanship has blossomed forth with the addition of cartoons and pictures to the towel in some instances. There are some Silent Keys among the signatures, now.

In 1981, Carol and her crying towel were subjects of articles in *Worldradio* and *News of Delaware County*. At age 16, she started something that has yards of memories today — a real collector's item, and something that has added to the fun side of ham radio for many.

K3NL signing K3RSL's Crying Towel. *(photo courtesy K3RIH)*

Hamfest Calendar

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

†**Alabama:** The Huntsville Hamfest, sponsored by the Huntsville ARC, will be held at the Von Braun Civic Center, 700 Monroe St. NW, Huntsville, on Aug. 21-22. Hours are 10 A.M. to 4:30 P.M. on Aug. 21 and 9 A.M. to 3 P.M. on Aug. 22. Free admission. Civic Center and city parking garage charge $1 for parking. Meetings, forums, bingo for the women. Tours arranged if enough interest. Talk-in on 34/94. For further information: Don Tunstill, WB4HOK, tel. 536-3904; Jim Brashear, WB4EKJ, tel. 852-3214; Graham Gallemore, K4FTY, tel. 852-7831; Frank Emens, W4HFU, tel. 852-0537.

California: The Valley of the Moon ARC third annual "Ham" Breakfast and Swapmeet is Sunday, Aug. 8, from 9 A.M. to 4 P.M., at the Sonoma Community Center, 276 East Napa St., Sonoma. Full breakfast served from 9 A.M. to noon. Waitresses will serve people manning swap tables. Swap table set up from 8 A.M.; swap spaces renting for $5. Total of 100 spaces — only 30 tables available on first-come basis, so bring your own table. Admission, $1; children and women free. Open auction at 2 P.M., computer display and demonstrations, operational 10-meter fm station, Sonoma Valley Quilters table and amateur television display. Talk-in on 147.47 simplex, and 146.13/73. For further information, call Darrel, WD6BOR, tel. 707-938-8086. Swap space reservations, write, enclosing $5, to VOMARC, 358 Patten St., Sonoma, CA 95476.

Connecticut: Sixth Annual Hamden Radio Club/WELI Flea Market, Aug. 15, starts at 9 A.M., at Radio Towers Park, Benham St., Hamden. For info, call 203-467-3258 or 933-6563.

Connecticut: The Natchaug ARA will hold a giant flea market, Sunday, Sept. 12, 9 A.M. to 4 P.M., Elks Home, off Rte. 32 and Rte. 6, Willimantic. Advance tables $5 until Sept. 1; at the door, $7. Admission $1. Free parking, prizes. Talk-in on 147.30-147.90 and 52. For further information, contact Clifton Pease, 268 Main St., Willimantic, CT 06226, tel. 203-456-1432, after 4 P.M.

Delaware: The seventh annual New Delmarva Hamfest will be held Sunday, Aug. 15, at Gloryland Park, Bear, 5 miles south of Wilmington. Admission is $2.25 in advance, $2.75 at the gate. Tailgating is $3.50. Limited tables available under pavillion, but bring your own to be sure. Many prizes, food and drinks available. Talk-in on 13/53 and 52. For more info and a map, send s.a.s.e. to K3HBP, Stephen Momot, 14 Balsam Rd., Wilmington, DE 19804. Make checks payable to Delmarva Hamfest, Inc.

Indiana: The Tippecanoe ARA will hold its 11th annual hamfest in Lafayette on Sunday, Aug. 15, at the Tippecanoe County Fairgrounds, Teal Rd. and 18th St. Grounds open at 7 A.M. Tickets are $3. Features will include a large flea market, dealers, fun, refreshments and prizes. Talk-in on 13/73 and 52. For advance tickets and additional information, write to Lafayette Hamfest, Rte. 1, Box 63, West Point, IN 47992.

Indiana: The 7th annual Marshall County ARC Hamfest will be held Sunday, Aug. 29, from 8 A.M. to 2 P.M., at the Marshall County 4H Fairgrounds, Argos. Dealers setup at 6 A.M. Commercial exhibits, flea market, refreshments, prizes. 8-foot tables available, $3. Building is 60 × 120 ft, with 36,000-ft^2 flea market next to building. Talk-in on 07/67, 52 and 222.9/224.5. For information or reservations, write to MCARC, Box 151, Plymouth, IN 46563.

†**Iowa:** The Iowa 75 Meter Net Hamfest will be held at River Valley Park in Ames on Aug. 15. No admission charge. For further information, contact Lovelle Pedersen, WBØJFF, 2327 W. Rainbeck Rd., Hudson, IA 50643.

†**Iowa:** The Des Moines ARA will hold its annual Hawkeye Ham and Computerfest on Aug. 22, from 9 A.M. to 5 P.M., at the air-conditioned Veterans Memorial Auditorium, off I-235, in downtown Des Moines. Admission in advance, $3; at the door, $3.50. Ample parking available. Amateur and microcomputer dealers, large indoor flea market. DMRAA consignment table available with 10% of sale price to DMRAA. Enter homebrew contest. Prizes throughout the day. Nearby attractions include Des Moines Science Center, Art Center, Adventureland, Botanical Center, the Iowa State Fair and shopping centers. Talk-in on 34/94 and 22/82. For tickets, motel reservations or additional information, write to DMRAA, Box 88, Des Moines, IA 50301.

†**Kansas:** The Kansas Nebraska Radio Club and NCK Repeater Club Hamfest will be held Aug. 14-15 at the Cloud County Community College in Concordia. Admission charge $3.50. For further information, contact Wendell D. Wilson, chairman, tel. 913-243-2872.

†**Kansas:** The Wichita Hamfest, sponsored by the Wichita ARC, will be held on Sunday, Sept. 12, from 8 A.M. to 4 P.M. at the Salvation Army Camp Hiawatha, 1601 W. 51st St. North, Wichita. Advance admission is $3.50; at the door, $4. ARRL Forum, general updates on ham technology, large flea market and many prizes. Talk-in on 34/94. For further information and advance tickets, write to Kelly Walker, WBØOCK, 3501 E. 55th St., Derby, KS 67037.

†**Kentucky:** The 1982 Central Kentucky ARRL Hamfest is scheduled for Sunday, Aug. 8. *New location:* Scott County High School, Longlick Rd. and U.S. Rte. 25, Georgetown, only minutes from I-75 or I-64. Technical forums, awards, flea market. Lots of good parking, air-conditioned facilities. Admission $3.50 in advance, $4 at the gate. No extra fee for flea market. Talk-in on 16/76. Information or tickets in advance, BGARS Hamfest, P.O. Box 4411, Lexington, KY 40504. Co-chairmen: Ernie Cohen, K4DHN, and Don Page, WD4HPL.

Massachusetts: The Worcester Polytechnic Institute Wireless Assn. Autumn Ham Radio Flea Market will be held on Saturday Sept. 11, from 10 A.M. to 3 P.M., on the WPI Campus, Institute Rd., Worcester. Admission is $1. Tables in advance $5; at the door, $10. Contact: Bob Demattia, AK1J, 15 Guilford Rd., Milton, MA 02186, tel. 617-696-1682.

Michigan: Sixth Annual Five County "Swap-N-Shop," sponsored by the Genesee County RC, the Bay Area ARC, the Lapeer County AR and Repeater Club, the Saginaw Valley ARA and the Shiawassee ARA, will be held on Sunday, Aug. 29, from 8 A.M. to 3 P.M. (setup at 6 A.M.), at the Bentley High School, 1150 Belsay Rd., Flint. Food concession, free parking, prizes. Tickets are $2 per person in advance, $3 at door; children under 12 free. Tables, 8 foot — $6 each. For table reservations contact: Perry Baker, WA8THK, 3605 LeErda St., Flint, MI 48504, tel. 313-789-7309.

†**Missouri:** SCARC Hamfest '82, sponsored by the St. Charles ARC, will be held in St. Louis (Wentzville) on Aug. 22. Doors open at 6 A.M.; parking $1. ARRL Forum, cw contest, forums, flea market, cakewalk, food and drink, exhibits. Talk-in on 07/67 and 52. For information, write to Bill Turner, WAØABI, 528 Morgan St., St. Charles, MO 63301, tel. 314-925-1307.

†**New Jersey:** The Ramapo Mountain ARC, WA2SNA, presents its 6th annual flea market on Aug. 21, at the Oakland American Legion Hall, 65 Oak St., Oakland, 20 miles from the GW Bridge. Talk-in on 147.49/146.49 and 52. Indoor tables, $6.50; tailgating, $3. Admission $1; nonham family members free. Many prizes. For information, contact Walt Zierenberg, WD2AAI, 344 Union Ave., Bloomingdale, NJ 07403, tel. 201-838-7565.

†**New Jersey:** The West Jersey RA will hold their 4th annual hamfest (formerly held at McGuire Air Force Base) at the Super 130 Drive-In Theatre, located on Rte. 130 across from Willingboro, on Sunday, Aug. 22, from 8 A.M. to 3 P.M. Outdoor selling spaces are $2.50; bring your own table. Many prizes. Famous QLF contest with the special WJRA QLF key will be at 1 P.M. Admission is $2.50; women and children are free. Talk-in on 75/15, 87/47 and 52. For further information or to order advance tickets, write to Mary Lou Shontz, N2CLX, 107 Spruce La., Rte. 16, Mount Holly, NJ 08060, at tel. 609-267-3063. Please include s.a.s.e. with request.

†**New Jersey:** The Gloucester County ARC hamfest will be held at Gloucester County College, Tanyard Rd., Sewell, on Sunday, Aug. 29, from 8 A.M. to 3 P.M. (7 A.M. for tailgaters and dealers). Admission is $2 in advance, $2.50 at the door; $6 for tailgaters and dealers (includes 1 free admission). Speakers, seminars, FCC exams, contests, prizes. FCC exams will be given for Technician through Extra. Please write or call for details. Free parking, handicapped parking, food and beverages, indoor/outdoor spaces available. Talk-in on 78/18 and 52. For further information and reservations, write to GCARC Hamfest Committee, P.O. Box 370, Pitman, NJ 08071. Telephones: Day — 609-456-0500 or 609-338-4841; evening — 609-629-2064.

†**New Jersey:** SCARC "82" sponsored by the Sussex County ARC, will be held at the Sussex County Fairgrounds, Plains Rd., off Rte. 206, Augusta, on Saturday, Sept. 11, starting at 8 A.M. Admission is $2; women and children free. Indoor table, advance $5 each; at the gate, $6 each. Outdoor space, as needed, advance $4; at the gate, $5. Prizes, food and refreshments, parking, large indoor and outdoor selling areas. Information and reservations from Lloyd Buchholtz, WA2LHX, 10 Black Oak Dr., RD 1, Vernon, NJ 07462, tel. 201-827-6062.

New York: The Northern Chautauqua ARC is pleased to announce that the 4th annual Lake Erie International Hamfest will be held in Dunkirk, on Saturday, Aug. 21. Plenty of outside and indoor flea market space. Talk-in on 25/85 and 07/67. Contact Ron Warren, WA2LPB, for more information and tickets.

New York: The Suffolk County RC 5th annual flea market will be held Sunday, Sept. 12, at the Odd Fellows Hall, Jayne Blvd., Port Jefferson Station. Rain date is Sept. 19. Prizes, food and drinks. Buyers, $1.50 each; women and children, no charge. Sellers, $3.50 each including car and driver. Talk-in on 145.21/144.61. For additional information, contact Floyd, WA2SDI, tel. 516-234-9376, after 6 P.M.

†**North Carolina:** The Shelby Hamfest, sponsored by the Shelby ARC, will be held at the Cleveland County Fairgrounds, Shelby, on Saturday, Sept. 4, from 6 A.M. to 5 P.M., and Sunday, Sept. 5, from 6 A.M. to 3 P.M. Admission is $3 in advance and $4 at the door. Special activities during our 25th anniversary hamfest; also, crafts for the women, and a church service on grounds Sunday morning. Camping facilities with full hook-ups. Talk-in on 28/88. For further information, contact Greg Horne, WA4YBP, tel. 704-842-6456 or Betty Switzer, N4CBN, tel. 704-482-4256.

†**Ohio:** The Union County ARC hamfest will be held at the Union County Fairgrounds in Marysville on Aug. 21-22. Admission is $2 in advance and $3 at the gate. For further information, write to Gene Kirby, W8BJN, 13613 U.S. 36, Marysville, OH 43040.

†**Ohio:** The 40th anniversary Findlay Radio Club Hamfest will be held at the Hancock Recreational Center Arena, 3430 N. Main St., I-75 Exit 161, Findlay, on Sept. 12 from 6 A.M. to 5 P.M. There will be an evening program on the 11th. Advance admission is $2; at the door, $3. Inside tables available at $5 each; trunk sales at $2 per space. Prizes, exhibits, programs and large flea market, dealers, manufacturers. Educational forums, DX forums, demonstrations, 10-10 forums. Talk-in on 75/15 and 52. For information and reservations, write to Findlay Radio Club, P.O. Box 587, Findlay, OH 45840.

Pennsylvania: Tioga Co. PA ARC 6th annual Amateur Radio Hamfest will be Saturday, Aug. 21, from 8 A.M. to 4 P.M., at a new location on Island Park, just off U.S. Rte. 15 in Blossburg. Flea market, food, free camping, auction, prizes. Talk-in on 19/79 and 52. For more information or advance tickets write: Tioga Co. ARC, P.O. Box 56, Mansfield, PA 16933, or contact: Paul Sando, KC2AZ, 606 Reynolds St., Elmira, NY 14904 on 19/79 or 96/36.

Pennsylvania: The Central Pennsylvania Repeater Assn. 9th annual Hamfest/Computerfest will be held Sept. 5, at the Harrisburg Farm Show parking lot, off U.S. Rte. 81, Cameron St. exit. Follow the signs to the Farm Show Building. Gates open at 8 A.M. 66,000 ft^2 of indoor space available for those wishing to sell — $5 per 10-foot space. Registration, $3; tailgating, $1. Talk-in on 144.87/5.47, 16/76 and 52. For more information or a map, contact Irvin Sanders, K3IUY, RD 3 Box FA53, Harrisburg, PA 17112, tel. 717-469-2185.

Prince Edward Island: Prince Edward Island International Amateur Radio Convention, "Convention '82," will be held at the University of Prince Edward Island, Charlottetown, August 20-22. Speakers, panel discussion, display booths. Accommodations for approximately 400 people on campus, as well as several motels within a few miles of the university. For information, contact Ed Smith, VE1BZR, Chairman, Convention '82 Committee, P.O. Box 1232, Charlottetown, PEI C1A 7M8, Canada.

†**Tennessee:** The Lebanon Hamfest, sponsored by the Short Mountain Repeater Club, will be Sunday, Aug. 29, at Cedars of Lebanon State Park, U.S. Hwy 231, Lebanon. Outdoor facilities only; exhibitors bring your own tables. Food and drink available. Talk-in on 31/91. For further information, contact Mary Alice Fanning, KA4GSB, 4936 Danby Dr., Nashville, TN 37211.

Texas: The 1982 Summer Session of the Texas VHF-FM Society will be held Aug. 13-15 at the Nassau Bay Motor Inn, NASA Road 1. This is a vhf, uhf and out-of-this-world family-oriented program. Pre-registration award: final date for pre-registration is Aug. 1 (postmark date). Outdoor flea market, exhibits, seminars, talks, distributors and manufacturers

†ARRL Hamfest
*Convention/Travel Coordinator, ARRL

all day Saturday and until noon on Sunday. Special tours of NASA. ARRL seminar. Lists of family activities and eating facilities available at desk. Flea market spaces limited; available at $3 for one day or at $5 for both days on a first-come, first-serve basis at start of convention. Bring your own table, chairs and umbrella. Preregistration is $5; $6 at the door. To preregister, send fee to: Texas VHF-FM Society Summer Session, c/o P.O. Box 73, Texas City, TX 77590. Checks payable to Texas VHF-FM Summer Session. Motel reservation directly to Nassau Bay Resort Motor Inn, stating you are attending Texas VHF-FM Society Summer Session to obtain special rates. This event is sponsored jointly by the Tidelands ARS, the Johnson Space Center ARC, and the University of Texas Medical Branch, Emergency Communications Group. The meeting and related events will be held at the Nassau Bay Resort Motor Inn, 1600 NASA Blvd., Houston, TX approximately 25 miles south of downtown Houston. For further information and preregistration, write to Texas VHF-FM Society Summer Session, c/o P.O. Box 73, Texas City, TX 77590.

Texas: The 1982 Golden Spread Hamfest and Convention will be held Aug. 14-15 at West Texas State University Student Activities Building in Canyon. Preregistration $5; $6 at the door. Activities include swapfest and tech sessions, commercial displays, Navy and Army MARS meetings, and QCWA meetings. Prizes, and an award for pre-registration will be made. This annual event is sponsored by the Panhandle ARC of Amarillo. Further information available from PARC, P.O. Box 10221, Amarillo, TX 79106.

†**Vermont:** The annual Burlington ARC, Inc., hamfest will be held on Aug. 14-15, at the Old Lantern Campgrounds, Charlotte. Admission is $4. Speaker Saturday night, prizes, cw contest, tower-raising contest, fox/hound hunt, model-airplane show, QSL card contest and the annual American/Canadian tug of war. Talk-in on 34/94, 01/61, 28/88 and 52. For further information, write to Burlington Amateur Radio Club, Inc., P.O. Box 312, Burlington, VT 05402.

†**Washington:** Radio Club of Tacoma "HAMFAIR 82," Aug. 14-15, Pacific Lutheran University Campus, 122nd and Park Ave., Tacoma. Prizes, technical seminars, flea market, commercial booths, VHF tweak-and-tune clinic, Loggers Breakfast, ARRL meeting, repeater forum and much more. Talk-in on 88/28. Contact Grace Teitzel, AD7S, 701 So. 120th, Tacoma, WA 98444, or tel. 206-564-8347. — *Conducted By Marjorie C. Tenney, WB1FSN*

Coming Conventions

August 6-8
Northwestern Division/Rocky Mountain Division, West Yellowstone, Montana

August 7-8
Louisiana State, Shreveport

August 7-8
North Florida Section, Jacksonville

August 22
Illinois State, St. Charles

September 11-12
Georgia State, Warner Robins

ARRL NATIONAL CONVENTIONS

October 7-9, 1983	**July 20-22, 1984**
Houston, Texas	**New York, NY**

LOUISIANA STATE CONVENTION
August 7-8, 1982, Shreveport

The ARRL Louisiana State Convention/Hamfest will be held by the Shreveport ARA on Aug. 7-8, 1982, from 9 A.M. to 5 P.M. on Saturday and 8 A.M. to 3 P.M. on Sunday. The hamfest will be held at the Downtown Shreveport Convention Center. Free admission. The entire hamfest will be air-conditioned, including the dealer and flea-market areas. Bring the entire family and enjoy forums and non-ham activities planned for both days. Something of interest for everyone. An all-you-can-eat shrimp boil is planned for Saturday evening.

Motel accommodations are available within walking distance of the convention center. Camping facilities are only minutes away. Talk-in will be on 22/82 and 63/03 repeaters. For additional information, write: KC5JM, Alice Lewis, c/o SARA, P.O. Box 7033, Shreveport, LA 71107.

See you there!

ILLINOIS STATE CONVENTION
August 22, 1982, St. Charles

The Fox River Radio League will again host the ARRL Illinois State Convention as part of its annual hamfest. Known as one of the oldest, friendliest and best-run hamfests in the area, this year's event will be even better. Plans are being set for a couple of contests, and forums on DX, ARRL, RTTY, video communications and CATVI, in addition to exhibitions of new equipment and our ever-growing flea market. The flea market is both indoors and outdoors, with the first parking space or table free. Additional spaces or tables are $2 each. Indoor flea market tables can be reserved in advance for $3 each.

All other activities are indoors and not subject to the vagaries of the weather. An indoor shopping mall with three movie theaters is located one block south of the fairgrounds for any nonham members of your family.

Exhibitors, dealers and flea-market operators contact: G. R. Isely, WD9GIG, 736 Fellows St., St. Charles, IL 60174. Tickets are $2 advance, $3 at the gate. For advance tickets, send an s.a.s.e. to: J. Dubeck, KA9HQY, 1312 Bluebell Ln., Batavia, IL 60510.

Special Events

Spirit Lake, Idaho: WB7SGU will operate from 1600Z *July 31 and Aug. 1*, during the town's 75th anniversary celebration featuring limited hydroplane racing. Operation on 21.300. Special QSL for s.a.s.e. to: WB7SGU, Star Rte. - Box 251, Spirit Lake, ID 83869.

St. Catharines, Ontario: Niagara Peninsula ARC will operate VE3ROW *Aug. 1-8* in celebration of the 100th anniversary of the Royal Canadian Henley Regatta. Operation on 160-10 meters. Special QSL for log data to: NPARC, P.O. Box 692, St. Catharines, ON L2R 6Y3, Canada.

Indianola, Iowa: Warren ARS will operate WØRPK from the 12th annual U.S. National Hot Air Balloon Championships in Warren Co. on the following times and dates: 1200Z *Aug. 1* until 0300Z *Aug. 2*; 1200-1500Z and 2300-0300Z *Aug. 2-6*; 1200Z *Aug. 7* until 0300Z *Aug. 8*. Frequencies: 25 kHz up from lower General class phone- and cw-band edges; 25 kHz up from lower Novice-band edges, 80-40-10 meters. Special QSL for s.a.s.e. to: WARS, Box 357, Indianola, IA 50125.

Philadelphia, Mississippi: Neshoba ARC will operate N5DUZ from 1900-0100Z *Aug. 4-6* from the Neshoba Co. Fair. Frequencies: phone and cw, upper 25 kHz of each band; some Novice operation. Special QSL for s.a.s.e. to: N5DUZ, P.O. Box 702, Philadelphia, MS 39350.

Doylestown, Ohio: Silvercreek ARA will operate WD8PNF from 1600Z *Aug. 7* until 0400Z *Aug. 8* in honor of skunk day. Operation on lower end of 40-20-15 meters. Certificate for large s.a.s.e. to: KA8MPH, 1241 Comet Rd., Clinton, OH 44216.

Mt. Davis, Pennsylvania: Somerset Co. ARC will operate AK3J from the highest point in Pennsylvania from 1800Z Aug. 7 until 1800Z Aug. 8. Operation in lower 25 kHz of General class phone bands and Novice cw bands. Certificate available from: SCARC, Box 468, Somerset, PA 15501.

Swannanoa, North Carolina: Morganton ARC will operate K4VLY from 1600-2400Z *Aug. 10* during the annual 4-H Summer Camp Program in Buncombe Co. Frequencies: phone — low end of 80-, 40-, 20-, 15-meter General class bands; cw — center of Novice bands. Special QSL for s.a.s.e. to: NG4E, 117 N. Chestnut St., Morganton, NC 28655.

Clute, Texas: Brazosport ARC will operate KA5KRI from 1500Z *Aug. 13* until 0300Z *Aug. 15* from the Great Texas Mosquito Festival. Frequencies: phone — 25 kHz up from lower General class band edges; cw — 25 kHz inside Novice bands. Special QSL for s.a.s.e. to: S. Ray, 319 Pine, Lake Jackson, TX 77566.

Alliance, Ohio: Alliance ARC will operate on Aug. 13-15 during Carnation Week. Phone and cw operation planned. QSL info will be given on the air.

Millersburg, Pennsylvania: Berry's Mountain ARC will operate W3TS from the *Falcon* and the *Roaring Bull*, two stern wheel, wooden ferry boats serving the area, from 1200-2400Z *Aug. 14*. Frequencies: phone — 3.910 7.245 14.295 147.24/84; cw — 7.045 7.125 14.045. Certificate available from: W3TS, D. Michael, RD 1, Box 144, Lykens, PA 17048.

Crown Point, New York: Schenectady ARA will operate K2AE on *Aug. 14-15* from the fort to commemorate the first construction by British and Colonial troops in 1759. Operation in lower 10 kHz of General class bands. Special QSL for s.a.s.e. to: P.O. Box 6, Alplaus, NY 12008.

Logan County, West Virginia: Logan Co. ARC will operate WD8KWC from a mountain top from 1600Z *Aug. 14* until 1600Z *Aug. 15*. Stations working WD8KWC eligible for Mountain State Award. Frequencies: phone — 25 kHz up from lower General class band edges; Novice — 3.725 and 7.125 on the hour. Certificate for large s.a.s.e. to: B. Napier, RFD 1, Box 198, Chapmanville, WV 25508.

Norwalk, California: Norwalk ARC members will operate during the city's 25th anniversary celebration from 1700Z *Aug. 21* until 0100Z *Aug. 22*. Frequencies: 14.285 21.375 28.725. Certificate for QSL card and 2 first-class stamps to: KA6GBI, 15541 Crossdale Ave., Norwalk, CA 90650.

Dudley Castle, England: Dudley ARC will operate GB4DAR from 2100Z *Aug. 20* until 1200Z *Aug. 23* celebrating the club's 21st birthday. Special QSL available from: Alan Johnson, G4FWR, 41 Elmhurst Dr., Kingswinford, Brierley Hill, West Midlands DY6 8LY, England.

Marion, Virginia: Smyth Co. amateurs will operate W4KON from 0000-2100Z *Aug. 21* in celebration of the county's sesquicentennial. Frequencies: phone — 10 kHz up from lower General class band edge on 80-40-15 meters; some Novice activity. Certificate for large s.a.s.e. to: K. Sturgill, P.O. Box 526, Marion, VA 24354.

Whitehall, Michigan: N8CUH will operate during daylight hours *Aug. 21-22* during the White Lake Maritime Festival. Frequencies: phone — 7.250 14.300; cw — 21.150. QSL for large s.a.s.e. (include contact no.) to: N8CUH, 724 E. Slocum St., Whitehall, MI 49461.

South Bass Island, Lake Erie: Huron Co. ARC will operate WA8HUR from 1000Z *Aug. 21* until 0000Z *Aug. 22* from Perry's Victory and International Peace Memorial commemorating the 169th anniversary of the Battle of Lake Erie. Frequencies: phone — 3.910 7.250 14.280 21.360 28.550 146.52; cw — 40 kHz up from lower band edge; Novice — 3.720 7.115. Special QSL for s.a.s.e. to KF8O.

Walnut Grove, Minnesota: AR Assn. of Bloomington will operate WDØGOL from 1400Z *Aug. 22* until 1400Z *Aug. 23* from the "Little House on the Prairie" site. Operation on all bands, cw and phone, planned. Certificate for s.a.s.e. to: P.O. Box 20174, Bloomington, MN 55420.

Kingston, Jamaica: Jamaica ARA will hold its annual Field Day from 0300Z *Aug. 28* until 2000Z *Aug. 29*. Good chance to work Jamaica on all bands, phone and cw.

Flush, Kansas: KS State Univ. ARC and Manhattan Area ARS will operate WØQQQ from this location in Pottawatomie Co. from 0000-2359Z *Aug. 29*. Frequencies: phone — 3.892 14.292; cw — 7.112 21.112. Certificate for s.a.s.e. to: WØQQQ, Electrical Engineering Dept., KSU, Manhattan, KS 66506. — *Conducted By Mark J. Wilson, AA2Z*

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by August 15 to make the October issue.

*Assistant Communications Manager, ARRL

In Training

Conducted By Steve Pink,* KF1Y

AN INSTRUCTOR'S LIBRARY

Every devoted teacher feels the need to have in-depth and up-to date knowledge of his or her field. The ARRL instructor is no exception. A large part of achieving a mastery of a subject is having the right books for study and reference. The following informal bibliography may help you choose the books you need as a devoted instructor of Amateur Radio. For our purposes, we can distinguish between two types of books: those that are directly concerned with getting a particular ham radio license, and those more comprehensive books for study and reference that cover topics in a systematic and thorough manner.

Books for Licensing

Tune in the World with Ham Radio is the League's Novice licensing text. This package contains a book that not only prepares the students for the Novice exam, but leads them into the practical world of ham radio all the way to that first QSO. A cassette tape that teaches the Morse code to 5 wpm is included.

The Radio Amateur's License Manual (78th edition) is the text for courses covering Technician through Extra Class. Clear and careful explanations on each point in the FCC Study Guides are presented, along with study questions that will prepare your students for their FCC exams. To supplement the study questions, try the *ARRL Q & A Books* for the Novice, Tech/General and Advanced/Extra levels. Their practice questions and explanations should round out your students' preparations for the test.

Books for Reference and In-Depth Study

The *Radio Amateur's Handbook* is the ARRL's most comprehensive guide to Amateur Radio theory and practice. A copy of a recent edition is a must for the well-read instructor's bookshelf. Along with its state-of-the-art construction projects, the *Handbook* contains in-depth explanations of the theory needed to pass the exams. With this deeper understanding, instructors can make electronics and radio science come alive for their students. A more profound knowledge of the subject matter will allow instructors to answer more easily the probing questions of curious students. From dc circuit theory to microwave oscillators, the *Handbook* supplies the coverage that knowledgeable teachers should have at their fingertips.

The League also publishes a number of books dealing with particular areas of Amateur Radio theory and practice, and you may want to have some of these on your bookshelf. The brand new *ARRL Antenna Book* (14th edition) is the latest word on antennas, transmission lines and wave propagation for the radio amateur. Each FCC exam syllabus, from Novice through Extra Class, contains a category on antennas and feed lines; the *Antenna Book* provides an in-depth treatment of each of the subtopics in this category.

Solid-state devices and circuits containing these components are subjects that appear in the FCC Study Guides for the Advanced and Extra Class exams. Reports from the field are that some of the most difficult questions on the tests are on these topics. *Solid State Basics* and *Solid State Design for the Radio Amateur* contain a wealth of information for the instructor of higher-level license courses. The first of these lays a firm foundation in the theory of solid-state devices and introduces the student to circuits containing bipolar transistors, field-effect transistors, operational amplifiers and digital integrated circuits. The second book delves directly into the theoretical and practical aspects of solid-state circuit design. Although this excellent book contains much more than is minimallly necessary for any FCC exam, the background it can provide for the instructor of higher-level license classes makes it well worth studying. The chapters on receiver design and advanced receiver concepts are especially relevant to the Extra Class syllabus.

These are only a few of the reference books and study manuals you may want to have in your library. If you, the ARRL instructor, have any comments on the instructional quality of any of these materials, or if you wish to point out valuable material in other reference books, drop us a line at the Training Branch. We appreciate your input.

NEW HELP IN LEARNING MORSE CODE

As a service to our instructors involved in teaching Morse code, we report an opportunity offered by Advanced Electronic Applications, Inc. For a limited time, this firm will offer its new BT-1 Basic Trainer for Morse code at cost to clubs. The retail price of the BT-1 is approximately $80, and AEA plans to reduce this price to clubs by about 50% until later this year, perhaps November or December. An advertisement for this device appears on page 146 of July *QST*. Inquiries should be directed to the firm on your club letterhead stationery by the club secretary. Their address is: Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036, tel. 206-775-7373. Letters may be addressed to the president, Mike Lamb. If you call, you may ask for him or George Buxton. Either gentleman will be pleased to give you the details.

*ARRL Training Program Manager

Club Corner

Conducted By Sally O'Dell,* KB1O

SHOW THE WORLD AMATEUR RADIO

An exhibit helps a club do many things, from informing the public to stocking Novice classes. Clubs planning an annual event draw attention to Amateur Radio. Bob Campbell, W1HXR, describes his club's experiences.

"Amateur Radio is Here" was the message on the marquee of the Nashua, New Hampshire shopping mall at the Fourth Annual Mall Show, sponsored by the Nashua Area Radio Club (NARC). The sign, highly visible to travelers, highlighted the theme for this year's show: "Amateur Radio is . . . " Selecting a unifying theme that provides focus for the event — from the initial promotion to the show itself — is an important factor in any show's success. Posters and signs advertise the show and describe the various exhibits to the Mall shoppers.

"Amateur Radio is Field Day" was the message underlying a continuous slide presentation chronicling Field Day '81 for the benefit of curious passersby. (NARC was first in New England and second in the U.S. last year.) The ubiquitous Model 15, a perennial attraction among the exhibits, was no exception this year. Its persistent clacking caught the attention of many visitors, drawing them within earshot of enthusiastic club members who answered questions and demonstrated equipment.

The Novice station, operated by club members, drew its share of attention. Spectators were fascinated as one operator deciphered Morse code and wrote the translation on a large display board, while another handled the key. Apparently not all of the onlookers were strangers to cw. One club member claimed that someone in the crowd kept shouting out the letters he missed. Each year the club runs free Novice classes for would-be hams. The Mall Show is a source of new recruits for classes timed to begin shortly after the exhibit. This year, 27 exhibit visitors attended the first class. As an added incentive, graduates will receive free memberships in the club. WB1FFZ, the club special-event station, operated on 80 through 2 meters. Eighty contacts were logged and confirmed with a QSL card designed for the occasion. Mall visitors originated messages to friends and relatives, keeping operators busy demonstrating traffic-handling procedures.

The exhibit drew licensed amateurs, as well as the general public. New Hampshire traffic handlers gathered at this year's show for the first time. Thirty-seven hams and family members met at the display, and adjourned to a nearby restaurant for lunch. The group included representatives and managers from the New Hampshire Section Net, the Granite State Phone Net, the Granite State FM Net and the First Region Net.

Local Amateur Radio dealers supported the exhibit with equipment loans and literature: Tufts Radio, a Robot Slow-Scan TV system; and Heathkit, the HW-101. ARRL Hq. supplied information on operating and public service communications. [Editors Note: An exhibit kit is also available, on request, to all clubs preparing a display. It contains a limited number of handouts and ideas on setup and promotion. Give us advance notice — at least two weeks — for your request to be processed.] The club distributed current and past issues of its bulletins.

What does it take to plan and organize an event like the Nashua Mall Show? According to Rich Royer, W1HZN, the show's coordinator, you start with a motivated club membership, and apply modern management techniques. "Getting volunteers is no problem," he says. "The Mall Show has become a tradition." Breaking the job down into small, well-defined tasks is important. No single volunteer should feel overwhelmed. Typically, volunteers will contribute more than they are assigned to do. Ten separate committees deal with everything from antennas to publicity; individuals get to work in areas related to their interests.

Planning, a key ingredient of the show's success, starts a year ahead of time by reserving the date with Mall officials. After four years the effort has become an institution, but nothing is taken for granted. The final task of each year's show is to get on the Mall's calendar for the following year. About four months before the exhibit, detailed planning and promotion start with the formation of committees and the distribution of assignments. Posters placed in areas frequented by amateurs alert the troops. On-the-air discussions of preparations over repeaters fuel additional interest. During the final month, the tempo picks up. Committee meetings, held weekly, solve last minute crises on a daily and hourly basis.

Finally, the big day arrives, and the show is under way. Club members and the public cluster around the exhibits. Fragments of conversation drift by . . . "got my ticket years ago. I forgot how much fun it was. Maybe it's time to get back on the air. . . Is the code really hard to learn? Where do I sign up for your Novice course? . . . Why didn't you do it this way?" . . .

And suddenly it's over. After an exciting two days of being the center of attraction for casual shoppers and future Novices, the weary committees face the unglamorous task of disassembling stations, antenna systems, tables and exhibits. The tedium is relieved somewhat with kibitzing and postmortems over the repeaters.

Approximately 55 of the club's 115 members participated in some phase of preparations for the exhibit. Most of them attended the regular club meeting the following Monday night to hear guest speaker Vic Tagliaferro, senior engineer from the Boston FCC office, talk on the importance of active and well-organized clubs to the future of Amateur Radio. After a lively question-and-answer session on regulatory issues, the club turned to business: "Well, the Mall Show is over. What are we doing about Field Day?"

Remember these steps to running a successful exhibit:

1) Be sure your club supports the project.

2) Select a unifying theme, and build your exhibit around it.

3) Select a location, and clear *all* the administrative trivia with the proper authorities.

4) Contact ARRL Hq., early, for materials.

5) Contact local dealers for support.

6) Carefully plan station layout and specific equipment.

7) Schedule operator's and booth participants' time (with backups and contingency plans, if possible).

8) Gather all materials in advance (use categorical checklists!)

9) Have a good time!

*Club Program Manager, ARRL

Silent Keys

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

W1ACS, Roy E. Johnson, Worcester, MA
W1BBU, Frank B. Hales, Waterbury, CT
W1BFB, Howard D. Allen, East Greenwich, RI
W1CRB, James F. Enos, Lenox, MA
W1DB, Nicholas S. Lefor, Storrs, CT
*W1DHX, Francis C. Sheehan, Fort Worth, TX
WB1ESC, Robert D. Johnson, Shelton, CT
WB1FRK, William J. Devito, North Bridgton, ME
W1K1H, Francis Racine, Pascoag, RI
W1MPP, Eunice R. Thompson, Orange City, FL
W1UFL, Edward T. Driscoll, Andover, MA
K1WPS, Morris "Murray" Bugen, Marblehead, MA
W1YKB, George S. Storm, Braintree, MA
W2AEL, Walter T. Cocker, Union, NJ
W2AUI, Joseph E. Pero, Whiting, NJ
KA2FIS, Onnalee A. Gessin, Pittsford, NY
KA2GIA, Stephen F. Harer, Clifton, NJ
WA2IQA, Edward V. Cullen, Sea Girt, NJ
WA2JNI, Carl L. "Fred" Kappus, Patterson, NY
WA2YQQ, William J. Kunkel, Liverpool, NY
W3BWC, Sterling E. Simonds, Millsboro, DE
W3CP, Samuel Miller, Philadelphia, PA
WA3DDS, Edward J. Wagner, Feasterville, PA
K3HTR, Ernest L. Heffley, Connellsville, PA
*W3KT, Jesse Bieberman, Malvern, PA
W3RTB, Casimar S. Kowalski, Ambridge, PA
W3TN, David B. Fell, Gaithersburg, MD
*K3UTQ, William H. Thompson, Pittsburgh, PA
KA4AVQ, Orrin C. Shane, II, Palmetto, FL
WA4BOC, William A. Shutt, Jr., Nashville, TN
KB4CC, Leland W. Pack, Detroit, MI
K4FEZ, C. Elbert Asch, St. Simons Island, GA
K4FPA, William R. Tippett, Merritt Island, FL
W4GHU, John C. Cripps, Sr., Hialeah, FL
W4GMR, Thomas F. McEvoy, Miami Springs, FL
W4HFZ, Charles A. Richard, Decatur, AL
WB4HGS, John H. Sabat, Greensboro, NC
WA4ITS, Young L. Graben, Oxford, AL
K4JDL, John P. Hall, Holiday, FL
W4ME, Kenneth A. Gennett, Winter Park, FL
WB4MME, Wesley J. Hunsberger, Temple Terrace, FL
W4MVA, William J. Dunford, Birmingham, AL
W4NBY, John T. McWatters, Sr., Titusville, FL
W4PAV, Harold E. Dee, McLean, VA
K4RW, Dr. Donald A. Wilbur, Sr., Largo, FL
WB4SQK, Eugene E. Dixon, Bremen, GA
W4XF, William T. Alexander, Miami Springs, FL
WB4ZYC, William G. Young, Sanford, FL
W5EWF, John H. Schulte, Hondo, TX
W5MXC, Ernest D. Gaw, Shreveport, LA
W5ONS, Herbert L. Vogt, Victoria, TX
WA5PBX, George E. Cope, Sr., Little Rock, AR
W5QV, Ernest F. Shawver, Houston, TX
WB5RYC, Lester W. Wolford, Jr., Baton Rouge, LA
W5SA, Dr. Elmer A. Volzer, Sr., Albuquerque, NM
ex-W5YYR, William A. Kelly, Amarillo, TX
W5ZA, Eunice F. Falconi, Roswell, NM
W6ACS, P. Stuart Bennett, Sun City, CA
WA6DPI, Stanley L. Smith, San Bernardino, CA
KA6DZO, William Craig, Los Altos Hills, CA
K6ER, Joseph Spatafore, Sacramento, CA
WA6HQD, Alexander R. Montgomery, Yucaipa, CA
W6HXB, Charles R. Newman, San Bernardino, CA
*WB6JON, Robert G. Mott, Santa Cruz, CA
W6JRV, Stanley J. Simpson, Lakewood, CO
W6KBT, Edmund A. Johnston, San Diego, CA
WB6KGK, Lawrence G. Kriner, Los Angeles, CA
W6RIN, John E. Knaul, Los Angeles, CA
WB6TCX, Edward M. Truedson, Hemet, CA
W7CAA, Alexander F. Janowitz, Seattle, WA
K7CFG, Marvin D. Gordon, Tacoma, WA
K7DBO, Thomas A. Rommel, Seattle, WA
*W7EAS, Richard H. Mussen, Portland, OR
K7EFF, Lester Mullins, Omak, WA
K7EJ, Henry W. Wickenhiser, Sun City, AZ
W7KJX, James R. Godward, Arizona City, AZ
K7NHO, Harry E. Lay, Jr., Snohomish, WA
WA7PVL, Wallace F. McKnight, Helena, MT
W7RYZ, Thomas H. Gibson, Butte, MT
KA8ARI, G. Edward Allebach, Cleveland Heights, OH
KA8AUL, John M. Holt, Jr., Brighton, MI
W8AZJ, Roy K. Bolenbaugh, Logan, OH
W8DBC, Grant E. Makinson, Dayton, OH
W8DYH, Kenneth F. Conroy, Richmond, MI
W8OSU, Nicholas Vangoff, Dearborn, MI
W8RB, Albert E. Miller, Olmsted Falls, OH
*WB8YNB, Jerry C. Schwinnen, Delphos, OH
WB8ZOP, Edith M. Sheward, Upper Sandusky, OH
ex-K9AVW, James E. Flynn, Scottsdale, AZ
K9ENS, Harold R. Hambridge, Rockford, IL
WA9EQM, John W. Morrison, Rockford, IL
W9GG, Richard D. Wehrheim, Sr., Wilmette, IL
W9NGW, Lyle E. McNulty, Bolingbrook, IL
K9QIL, Ernest P. Jensen, Milwaukee, WI
K9SYO, William D. Sieck, Evanston, IL
W9VBH, Edward S. Black, Sr., Talluta, IL
KØAJU, John C. Shultz, Kansas City, MO
KØBRS, Loyson G. Troth, Bellevue, NE
WØCDV, Claude H. Stevens, Minneapolis, MN
WAØCKA, William D. Lynch, Neosho, MO
WBØDLP, Carroll W. Baker, Minot, ND
WAØDSO, Charles "Chuck" Nanna, Arnold, MO
KØDUF, David L. Reed, Kansas City, KS
WØEWD, Charles J. Minners, St. Louis, MO
WAØGAR, Hubert H. Hamilton, Fort Madison, IA
WØGFK, George R. Underwood, Lincoln, NE
WØHH, Don T. Wright, Lamar, MO
WAØIBC, Sidney R. Lida, Shawnee Mission, KS
WAØJAR, Aaron J. Clem, Osseo, MN
WØLZO, Leo S. Weiler, Hastings, NE
WØNNQ, Alfred E. Reilley, Ft. Collins, CO
KØOOU, Clifton L. Hall, Rapid City, SD
WBØSFA, George L. Bond, Isabella, MO
WØTXP, Denzil O. Cooper, Liberty, MO
VE1BQO, Ralph E. Newey, River Herbert, NS
VE2BTW, Bernard Dupont, Montreal-Nord, PQ
VE3CYK, John W. Woodfield, Cambridge, ON
VE7AAJ, John D. Bews, Kelowna, BC
VE7BF, Edwin R. MacIntyre, Nanaimo, BC
VE7DIC, George R. L. Banfield, Victoria, BC
VE7JC, John A. Casilio, Victoria, BC
HS1WR, Kamchai Chotikul, Bangkok, Thailand

*Life Member, ARRL

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

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

50 Years Ago

August 1932

☐ Hidden among the editorial items: During a heavy (1932-style) love scene at a New England *"talking-*movie" theatre, the audio was taken over by "Hello CQ — this is double you won blah-blah-blah, etc., etc." It shattered the illusion, spoiled the show. Technicians summoned found something had gone wrong with the bias in an amplifier, and a ham a block away was fed over the sound system. "Interference on receiving apparatus of modern design?" asks Editor K. B. Warner. "Not on your life. We call it the rebroadcasting of an amateur station for entertainment purposes without his consent, in violation of paragraph so-and-so of the regs!"

☐ "Short-Wave Receiver Selectivity to Match Present Conditions" by Technical Editor Jim Lamb is one of the most significant contributions to c.w. reception ever published. The 12-page constructional article tells how, for the first time, to eliminate the *audio* image (double tuning of c.w. signals) that everyone had accepted up to this time. The key, i.f. selectivity *and* offset heterodyne oscillator at the second detector, is a brand-new concept. It took a little while (like ten years or so) for the idea to get across to everyone.

☐ George Grammer's Part II of "Building a Low-Cost 1750-Kc. 'Phone-C.W. Transmitter" describes the r.f. portion of the rig. Two '46 tubes in parallel are used in the output amplifier, running 40 watts input.

☐ Bill Lippman, Jr., W6SN, writes about "W6USA — Amateur Radio at the Olympics." This description of a southern California W6 promotion of a "super station" (for those days) reads like a "Who's Who?" and a "What's What?" of top operators and radio gear. International traffic was relayed for Olympic participants by such well-known stations as HC1FG, VK2OC, VE2CA, OM1TB and others.

☐ Clint DeSoto, W1CBD, describes "A High-Output Amplifier for the Battery Receiver." The pair of 2-volt filament '49 tubes delivers 3-1/2 watts audio with 180 volts of battery plate supply.

☐ Reuben Isberg, W9YAA, tells in "Making Practical Use of Grid-Bias Modulation" the goods and bads of this economical system in these days of Class-B enthusiasm.

☐ In the "Amateur Radio Stations" section, the rigs at W8AXJ, W9AA (Cy Read in Chicago) and W1PH (Ed Hayward in Massachusetts) are typical of the period. One or two 210s or even a 203A or 852 in the transmitter, and a homemade regenerative or a commercial Super Wasp receiver.

25 Years Ago

August 1957

☐ "N.B.S. Equatorial Region V.H.F. Scatter Research Program for the I.G.Y." by Kenneth Bowles, KØCIQ, and Robert Cohen, of the Bureau of Standards, tells how the 50-Mc. gang will have South American beacon stations available for monitoring during the International Geophysical Year.

☐ Modest G. R. Norberg, WØORZ, describes "The Norberg Crud-O-Ject," a simple dual-triode arrangement for changing the audio passband of a receiver. It involves adjustable feedback and a series L-C circuit.

☐ In answer to many requests for an "all-band mobile" transmitter design in the 60- to 90-watt class, Vern Chambers, W1JEQ, presents "The A.R.R.L. Model 6-60-90 Mobile Transmitter." This well-designed a.m. rig provides for either crystal- or remote-VFO control, and a choice of crystal or carbon mike.

☐ "A Simple Halo for 2-Meter Mobile Use" by Louis D. Breetz, W3KDZ/W8QLP, tells how the author feeds a halo (for horizontal polarization) with a vertical car antenna acting as a single-wire feed line. Adjustment procedure is given for tuning the system and finding the proper feed point on the halo.

☐ Louis Gerbert, W8NOH, describes "A 50-Mc. Converter for the 75A-Series Receivers." The 3-tube crystal-controlled unit uses a 6BS8 cascode r.f. amplifier, a 6U8 mixer/oscillator and a 6AM4 cathode follower into the Collins at 26-30 Mc.

☐ Lew McCoy, W1ICP, helps the newcomer get his act together by discussing "Controlling Your Station With One Switch." The article was triggered by a visit to a Novice station where the two hands of the operator were not enough to switch quickly from receive to send and back again.

☐ "African Field Day" by (radio and TV star) Arthur Godfrey, K4LIB, is his account of a big-game hunting trip in French Equatorial Africa, and how portable ham gear helped make it a memorable experience.

☐ "DX Operating Tactics" by Dick Baldwin, W1IKE, is subtitled "As Seen From the DX Operator's Point of View." The author wrote to a number of DXpedition operators, Ws and others, and asked a number of questions. The response was excellent, and the compilation and conclusions make for very interesting reading. — *Byron Goodman, W1DX*

Results, Fifth ARRL EME Competition

By Mark J. Wilson,* AA2Z

The antennas at N7NW.

Another increase in activity marked the Spring 1982 ARRL EME Competition. A total of 87 stations sent in entries, but typical of most contests, this number represents less than 50 percent of the stations on during the activity. Still, the number of entries is up from last year's 68. The average QSO total for single-op stations is up, too — 23 this year compared to 19.5 last year and 19 the year before.

The 2-meter band played host to most of the top scores. As expected, K1WHS was the heavyweight again this year. Dave worked 124 stations on 144 MHz, and still found time to work 8 stations on his new love, 220 MHz. Kudos also to WA1JXN/7 and SM7BAE for fine 2-meter efforts. WB5LUA was rather ambitious this contest, completing 144-, 220-, 432-and 1296-MHz QSOs as a single operator. DL9KR made his usual fine showing on 432 MHz, but his score was a bit lower than last year's. Activity on 220 was up from last year by a few stations, and 1296 was populated by at least 13 adventurous souls. Each year brings more and more activity.

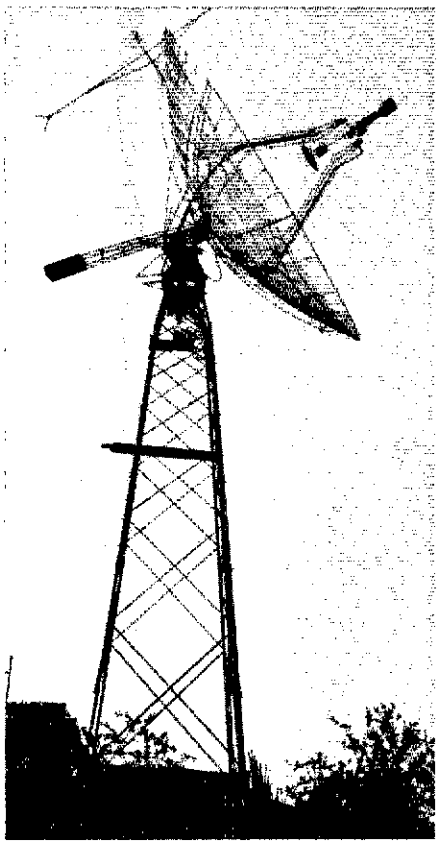
WBØTEM, assisted by WBØPJB, led the multiops with a fine effort on three bands, followed closely by YU1AW. K2UYH, winner of the multiop class for the first four years, didn't have the time to devote — partially because of his expedition to KM4Q in Kentucky — and came in third.

The ARRL EME contest is moving to the fall to take advantage of better conditions and to allow for antenna construction during the warm months. If you have any specific suggestions for timing or format, please drop a line to the contest branch at ARRL Hq. Here's your chance to structure the contest as *you* want it.

*Assistant Communications Manager, ARRL

Band Leaders

	Single Op	*Multiop*
144 MHz	K1WHS	WBØTEM
220 MHz	K9HMB	WBØTEM
432 MHz	DL9KR	G4EZN
1296 MHz	G3LTF, SM6CKU	OK1KIR



I2COR's 8-meter dish for 432 and 1296.

KE5C completed seven QSOs on 144 MHz with this station and four Yagis.

WA1JXN/7 — number 2 single op and "the" station on 144 MHz from Montana.

SOAPBOX

There are so many vhfers in this country that haven't the faintest idea what DX can be worked on 2 M! The *real* shame is that many of them are at or very near EME capability. Anyone interested in finding out about EME should contact KI7D about receiving the *Lunar Letter* and/or listen nightly on 3.818 or weekends at 1600Z and 1700Z on 14.345 for the EME nets (WA1JXN/7). Always a fun contest. Seems to coincide with aurora each year, though. Would like to see states as multipliers rather than districts (N7NW). Aurora and high winds curtailed operating time (G3LTF). Scheduled contacts should not count the same as randoms (N9AB). Faraday rotation made things difficult for a fixed-polarization station (JA9BOH). Obviously, a four-antenna station does not attract callers (DJ5DT). Winds in excess of 100 mph here. Some of the stronger signals were WA8ONQ, K1WHS, G4DZU and WA1JXN. I'm impressed with what my four-Yagi station could do, however (WAØLSH). New array going up this summer — 16 × 26-ft boom quagis (W5UN). I stalked WBØTEM for 45 minutes before success at 1:30 A.M., HI! (KB7Q). Only able to operate several hours; copied many stations (WA4MVI). Made my first and second EME contacts ever during the second weekend of the contest! (K8EUR). My results were not terribly exciting, not nearly as exciting as when I put 110 V ac into the 5-V dc bus on my keyer (WA9ACI). First time I heard an EME signal was 15 minutes before the contest started (WBØPJB, opr of WBØTEM). This year, the QRM came from visitors who wanted to hear how signals reflected from the moon sounded (F9FT).

Scores

Scores list: Call, score, stations heard, stations worked, multipliers, band (A - 144 MHz; B - 220 MHz; C - 432 MHz; D - 1296 MHz).

Single Operator

K1WHS	514,800	129	124	33	A
		8	8	6	B
WA1JXN/7	214,600	84	74	29	A
SM7BAE	200,100	69	69	29	A
WB5LUA	188,000	12	12	11	A
		2	2	2	B
		24	24	19	C
		9	9	9	D
DL9KR	158,600	66	61	26	C
SM2GGF	151,200	70	63	24	A
N7NW	143,000	55	55	26	A
JA6CZD	125,000	50	50	25	C
G3LTF	112,000	28	28	17	C
		12	12	11	D
F9FT (F5SE,oprs.)	105,600	44	44	24	C
KR5F	92,400	60	42	22	A
OH7PI	86,100	41	41	21	A
K4QIF	85,800	24	24	19	C
		9	9	7	D
N9AB	80,500	39	35	23	C
HB9SV	80,000	15	9	8	A
		32	23	17	C
VE2DFO	79,000	70	42	19	A
SM0ERR	72,000	36	36	20	C
F6CJG	71,400	34	34	21	A
N4GJV	68,000	83	34	20	A
Y22ME	60,800	40	32	19	A
UA1ZCL	55,800	31	31	18	A
DK4XI	52,800	37	33	16	A
SM3AKW	51,300	27	27	19	C
YU2RGC	51,000	34	34	15	C
KA@Y	49,400	26	26	19	C
JA9SOH	47,600	30	28	17	C
WA8ONQ	45,900	34	27	17	A
W6ABN	45,600	37	24	19	C
YU3USB	44,800	29	28	16	A
DJ5DT	43,200	44	24	18	A
OK3CTP	43,200	27	27	16	C
DL7YC	39,100	23	23	17	C
K1MNS	34,500	38	23	15	A
LX1DB	34,500	18	18	11	C
		5	5	4	D
K8WW	19,600	14	14	14	C
OH7RJ	19,200	18	16	12	A
WA@LSH	15,400	18	14	11	A
VK5MC	14,300	10	10	8	C
		3	3	3	D
SM6CKU	13,200	13	12	11	D
W1JR	10,400	13	13	8	C
W5UN	9900	11	11	9	A
SM4DHN	9000	10	10	9	D
DF7VX	8800	11	11	8	C
G4DZU	8800	22	11	8	A
KB7Q	7200	16	9	8	A
K7KOT	7000	10	10	7	A
WB7DTI	6400	8	8	8	A
JH1QFX	6300	9	9	7	C
K9XY	6300	13	9	7	A
VE7BBG	6300	9	9	7	D
K9HMB	5600	8	8	7	B
ZS6NG	5600	8	8	7	C
KE5C	4900	7	7	7	A
WA4MVI	4900	3	3	3	A
		4	4	4	C
UA3TCF	4800	42	8	6	A
N6AMG	4200	7	7	6	A
UB5JIN	4200	32	7	6	A
WB3ESS	3600	12	6	6	C
WB8PAT	3600	8	6	6	A
WA3USC	3000	6	6	5	A
K@UDZ	2500	5	5	5	C
W@VB	2500	6	5	5	B
KL7WE	1200	7	4	3	C
W@RWH	1200	7	4	3	A
VK8ZT	900	18	3	3	C
W@RAP	900	3	3	3	C
K8EUR	400	2	2	2	A
EA3ADW	100	1	1	1	A
F6DRO	100	3	1	1	A
K2QR	100	11	1	1	A
KB9NM	100	5	1	1	A
WA9ACI	100	10	1	1	A

Multioperator

WB@TEM (+ WB@PJB)	279,500	48	41	22	A
		8	6	5	B
		26	18	18	C
YU1AW (+ YU1s BB, OAM)	250,800	27	27	15	A
		39	39	23	C
K2UYH (+ KA1GT, N3AIH, WA3JUF)	158,100	42	42	23	C
		9	9	8	D
G4EZN (+ G3s CWI, YGF, G4JNX)	114,400	44	44	26	C
OK1KIR (OK1s DAI, DAK, DKW, AKF, EX, PG, oprs.)	99,900	38	24	16	C
		14	13	11	D
F6BSJ (+ F8s FTN, GBY, HLC, HLD, F8OP)	73,500	38	35	21	A
G3WDG (+ G4KGC)	37,800	10	10	8	C
		11	11	10	D
F6DTE (+ F6EMT)	35,200	89	22	18	A
I2COR (I1NU, I2s TFI, YID, IW2ATM, oprs.)	33,600	21	18	13	C
		3	3	3	D
DF@EME (DJ4UR, DJ8QL, DL5FAU, oprs.)	17,600	14	14	9	C
		2	2	2	D
KM4Q (+ K2UYH, W3HQT, W4UDH)	5400	9	9	6	C
JA4BLC (+ JH4GJY)	900	4	3	3	C
N8GN (+ W8SFH, WB8KDF, WB7ABP)	400	15	2	2	C

Non-Amateur Equipment

K3NSS (W1ZX, opr.)	47,500	25	25	19	C

SWL

VE5JQ (1stn - 144 MHz)

Rules, September VHF QSO Party

September is almost here. The September VHF QSO Party is the perfect time to apply what you learned during the January VHF Sweepstakes, the June VHF QSO Party and the UHF Contest. Whether you learned where to point your antenna for a new multiplier or found that you need a better preamp on receive, there's no better time than the September contest to try out something new.

The rules for the September contest are the same as the June contest.

Be sure to send an s.a.s.e. early for a set of contest forms, including the new summary sheet reflecting the single-band categories (form CD-68, R482).

Rules

1) **Object:** To work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

2) **Contest period:** Begins 1900 UTC Saturday, Sept. 11 and ends at 0600 UTC, Monday, Sept. 13. Operate no more than 28 out of the 35 hours. Off time must be in increments of 30 minutes or more. Listening time counts as operating time.

3) **Categories:**

(A) Single Operator: one person performs all operating and logging functions.

(1) *Multiband.*

(2) *Singleband:* Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Name of section. Must be acknowledged by both operators for credit by either. A one-way exchange does not count.

5) **Scoring:**

(A) Score 1 point for 50- or 144-MHz QSOs; 2 points on 220 or 420 MHz; 3 points for higher uhf bands. Multiply the sum of these points by the total number of different ARRL sections plus different DXCC countries (*not* included in an ARRL section) worked *per band.* Note that KP4, KP2/KV4 and KG4 are in the West Indies section; KH6, KH2, etc. are in the Pacific section. Crossband QSOs do not count. Aeronautical mobile stations may not be counted for section multipliers.

(B) Stations may be worked once per band, regardless of mode. Example: W6XJ (San Diego) works A16V (San Joaquin Valley) on 50, 144 and 220 MHz. This gives W6XJ 4 points (1 + 1 + 2) and also three section multipliers. W6XJ may contact other SJV stations on these bands for contact points, but no additional section multipliers.

(C) Foreign stations may work only stations in ARRL sections, giving their country name in exchange.

6) **FM restrictions:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted.

(B) Only these recognized simplex frequencies may be used: 144.90 to 145.10; 146.49, .55 and .58 and 147.42, .45, .48, .51, .54 and .57 MHz. This restriction prohibits use of all repeater frequencies, including 146.76 and .94. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(C) Use of the national calling frequency, 146.52 MHz, is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting contest QSOs. The intent of this rule is to protect the national calling frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

7) **Miscellaneous:**

(A) Fixed, portable or mobile operation under one call from one ARRL section only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(B) Only one signal per band (6, 2, 1-1/4 etc.) at any given time is permitted, regardless of mode.

(C) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least a mile).

(D) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHZ. Even then, a complete, different station must exist for each QSO made under these conditions.

(E) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmissions (e.g. laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest.

9) **Awards:**

(A) Single Operator

(1) Top single operator score in each ARRL section.

(2) Top single operator on each band (50, 144, 220, 432, and 1296-and-up categories) in each ARRL section where significant effort or competition is evidenced. [Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.] For example, if WB1FVS has the highest single-operator all-band score in the Connecticut section and his 50- and 220-MHz scores are higher than any other CT single op's, he will earn a certificate for being the single-operator section leader *and* endorsement stickers for 50 and 220 MHz.

(B) Top multioperator score in each ARRL section where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

10) **Disqualifications:** See January *QST*, page 92.

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

The Importance of Regular and Complete Reporting

Each month I receive upwards of 100 or more reports. They come in all shapes and sizes, as well as degrees of detail. Some are written in a manner that makes them readily usable. Others are not as easy to adapt to form a concise and interesting account of the event in question. Some speak of openings that took place on some unspecified date, at some unspecified time. Occasionally, they even fail to mention the band involved. In a few cases, however, reports are very detailed, with minute-by-minute accounts. Some vhfers submit copies of their logs. Usually, those who do this keep very meticulous logs. No matter what its form, the more detailed and complete a report is, the better it is for use in putting together an interesting and readable account of an opening or an informative description of an experiment.

Not all reports, however, no matter how good, find their way into print in The World Above 50 MHz, and therein lies a problem. A few of the better reporters have ceased sending material, apparently believing that their inputs are not appreciated. Nothing could be further from the truth. All reports are welcome, and most are useful. Unfortunately, however, because of limited available *QST* space — a situation over which I have no control — I cannot put into print every piece of material, no matter what its quality and interest level.

Whether or not a letter or card is reflected in the column, I do read them all. Most are useful in putting other reports pertaining to the same event into perspective, and hence are very helpful to me in my efforts to generate a coherent account. But that's only one way in which reports may be of value. Over the seven years that I have had the pleasure of conducting The World Above 50 MHz, I have saved all material that even approaches providing information relating to propagation, or gives details of experiment or an especially noteworthy piece of equipment.

Some of this data has been furnished to those studying a specific type of propagation or chronicling a major opening. A prime example of this was the case of Mel Wilson, W2BOC, who spent over 40 years poring over sporadic E data and generated much useful information as a result. Some of the data Mel used for his study came from material I had sent him. Naturally, the more complete the information was, the better it was for his purposes as well as mine. Following his death last spring, the work he was doing is being continued by his son, Steve, W2CAP/1. Steve has asked that I forward to him the E_s reports I have on hand, as well as future ones, and I am only too happy to accommodate him.

Another instance of column input material that I was able to furnish for propagation studies is that supplied to K9AKS, W3EP/9 and W9IP for their work on the huge 1979 tropo event, which boosted so many September VHF QSO Party scores.

So, you can see that your inputs are useful whether or not your call appears in these pages. They are all the more useful if they are complete with times, dates, locations of stations worked or heard, as well as the location of the reporting station. It is best if times are expressed in UT (or what we are accustomed to calling Z). It is best, also, if locations are in terms of longitude and latitude; if not, a major city and the distance and direction from it should be noted.

In his request for sporadic E data, W2CAP also makes a plea for inclusion of comments on what was heard, as well as a listing of the stations contacted. He stresses that recording the fact that a particular area is working another area may be especially valuable in his attempt to locate the reflecting medium responsible for the propagation, as well as to determine its ionization density.

To provide guidance in reporting the kind of information that I and others can best use, I have designed a special new reporting form. Naturally, use of this form is not mandatory, but it would ease my task if column input material is submitted on it, especially those reports dealing with openings, listings of stations worked, etc. The new form should be available by the time this appears in print, so please drop me an s.a.s.e. requesting it, and I will send one back by return mail. Because of the high costs that would be involved in providing large numbers of the forms, it is requested that you make a number of copies for future use. Please do not confuse this form with those designed for updating the various standings boxes. They are completely different in design and purpose. The new form is for reporting day-to-day activities, especially noting unusual propagation events and experiments, such as the maintenance of long-haul schedules or results of work on the higher-frequency bands, particularly in the microwave range.

Incidentally, I now have a slightly redesigned version of the 2-meter-and-up standings box report form. These are also available for an s.a.s.e. Please specify what form, or forms, you want. You would be surprised at the number of people who make me guess! To expedite delivery of all mail, please use my new ZIP code. It is 20866. Use of the old one may delay things considerably.

ON THE BANDS

50 MHz — If I continually use the same adjectives to describe 6-meter conditions, please excuse me. The propagation gods have been so kind to us over the past few years that I have run out of appropriate words to convey an appreciation of the good fortune that has been coming our way. I'll just have to trot out the old reliables, "fabulous" and "terrific," in an attempt to relate the events of late May and the first half of June. There is always the possibility that what we have been experiencing is normal for this time of year, and that the available DX is the result of heightened resident activity in interesting places, along with several well-timed DXpeditions. Whatever the cause of the good fortune, we'll take it!

Three such well-timed DXpeditions certainly provided some spice to the ARRL June VHF QSO Party and to the days surrounding it. K1FJM's sojourn to Antigua as V2ADX was certainly a great success. Particularly on Sunday evening of the contest, Pete was heard doing a land-office business. It is reported that, for the QSO Party, he ran up a total of 206 contacts in 41 sections, as well as 8 countries.

Another popular contester was Saint Pierre station FP0GZZ, operated by K1TOL.

The third trek I am aware of, was made by that intrepid 6-meter DXpeditioner, W6JKV. This time, Jim journeyed to Isla Revilla Gigedo, off the west coast of Mexico, and succeeded in putting that rare DXCC country on the 6-meter map. This time, as opposed to his previous trips as C5AEH, 3D2JT and A35JT, he did not have the benefit of high power and big beams. But that lack cannot be blamed on him. He had planned to have available his usual cache of equipment, but fate, in the form of airline baggage handlers or customs officials (it's not quite clear which), was to dictate otherwise. He arrived on the island with only a 10-watt exciter and a simple vertical antenna. This he used during the contest, nevertheless, managing to make a goodly number of contacts. W5UWB and WA4GBE/5, both in Texas, W6XJ, near San Diego, along with W7KMA and XYL WB7TOV, and several other Phoenix area stations, are known to have been among them.

But ham ingenuity would not be denied for long. Jim found some scraps of wire from which he fashioned a 3-element Yagi using dimensions radioed on 6 meters by W7KMA. This improved things markedly, and on Monday, June 14, he worked quite a few additional stations. But the big break came the following day, his last on the island, when a really good multihop opening took place. Jim lost no time in working many stations in the eastern U.S. and VE1. Thanks to his considerable effort, some 100, including this conductor, now have a new 6-meter country, and a rare catch on any band to boot!

It is now clear that the path from the East Coast to the Azores can be negotiated this time of year. There had been scattered reports that CT2EE had heard some stateside 6-meter signals. But early in the evening of June 10, about 2300Z, W3IWU, near Philadelphia, called on the phone to report having just completed a crossband contact with John. When I came up on 28.885, CT2EE reported that he was hearing VE1YX at S-9 plus 20 dB, and that he had worked quite a string of VEs, W1s, W2s and W3s via the 10- to 6-meter route over the previous hour. About an hour later, some of us heard the ZB2VHF beacon quite weakly. The following evening, at about the same time, CT2EE heard stations in Florida and Virginia.

K8EFS provides a summary of what was heard and worked at his Michigan QTH betweeen May 31 and June 16. It includes J6LOV on the final day of May, C6ADV and a YV4 on June 6, the FY7THF beacon the following day and a contact with KH6IAA on June 8. June 9 brought FP0GZZ, and the next day the other half of that DXpedition, FB0HBL. On June 13, Andy hooked up with VE8BY at 0500Z, following the big aurora earlier (see the 2-meter section). He also worked C6ADV, VP5D, H18WPC and V2ADX later the same day. On Monday, following the contest, he worked XE1JJU/XF4, and on the 16th heard TI2NA. This represents only the DX highlights and doesn't even touch on the U.S. and Canadian stations heard and worked.

Many reports mention the period around June 6-8 as being particularly good. One of these is KB7Q Bozeman, Montana. Gene notes lots of East Coast double hop on the 8th, plus C6ADV. Altogether, he made some 80 contacts that day. WA3DMF, near Washington, comments that he worked DL3ZM/YV5

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

70-Cm Standings

For WAS holders, listing is WAS number, call, state and call areas worked. For others, call, state, U.S. states worked and call areas worked. Call areas are the 10 U.S. call areas plus KH6 and KL7, plus each VE and XE call area, plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. Those not showing some indication of activity or interest in remaining in the standings over the last two years have been deleted.

WAS Holders

1	WØYZS*	MO	12
2	K2UYH*†	NJ	12
3	K5JL*†	OK	12
4	WB5LUA*	TX	40
5	W5FF*	NM	18
6	W1JR*	MA	12

AD1C*	MA	33	10
K1PXE	CT	25	11
K1FO	CT	23	8
K1LPS*	VT	20	12
W1XJ	RI	15	5
W1GXT	MA	13	6
W1HDQ	CT	11	4
N1AIS	MA	11	4
K2RIW*	NY	28	12
W2VC	NJ	25	8
K2LGJ*	NY	24	10

W2BLV	NJ	24	7
W2DWJ	NJ	21	7
W2AZL	NJ	21	7
W2PGC	NY	20	10
W2CNS	NY	19	10
WA2FGK	NJ	18	7
K2YCO	NY	17	6
WA2FUZ*	NY	17	8
K2OVS	NY	16	5
N2EO	NY	13	5
K2SHB	NY	12	5
WA2TIF	NY	12	5
WA2YWP	NY	12	6
WA2PVV	NY	10	5
K3QCQ*	PA	30	10
W3RUE	PA	29	10
W3OZ*	MD	25	9
K3WHD*	PA	25	9
W3IP	MD	25	7

K3IUV	PA	19	5
N3AHI	PA	18	7
W3UJG	MD	16	6
K3HCE	MD	16	5
W3XO	MD	13	5
WA3DMF	MD	8	5
WB4NMA	GA	17	6
WB4EXW	NC	17	6
K4GL	SC	16	7
K4QP*	AL	12	8
WD4MUO	VA	12	5

WD4CXU	VA	11	4
K4KAE	SC	8	2
W5UKQ*	LA	24	9
W5HN	TX	23	7
WA5HNK	TX	16	6
K5JRH	TX	15	4
N4JS/5	MS	13	5
K5LLL	TX	11	6
WA5TBE	TX	9	3
W5DC	LA	8	—
WA5YOU	LA	5	2
W6ABN*		40	34
WB6NMT*		8	7
W7JF*	MT	15	11
W7LUX	AZ	5	3
K7ICW	NV	4	2
WA7JUO	NV	3	2

K8WW*	OH	44	12
WB8BKC	MI	29	9
W8IDU	MI	27	8
WA8VPD	MI	22	8
K8AXU	OH	20	8
WB9SNR	IL	33	11
W9JIY	IN	28	9
W9UD	IL	28	9
WA9HUV	IL	27	10
W9AAG	IL	27	8
K9XY*	WI	21	11
K9SM	IL	17	7
KØTLM*	MO	42	21
WØRAP*	IA	30	19
KAØY*	IA	28	9
WØDRL	KS	24	9
KØDAS	IA	23	7
KØVXM*	SD	21	11

WØOHU	MN	20	6
KØALL*	ND	19	8
WØLER	MN	18	6
KØCJ	MN	17	6
WØVB	MN	17	6
WØPW	CO	15	5
WBØIUT	NE	13	4
KØWLU	SD	10	3
WAØNOK	MO	9	3
WØSD	SD	7	2
KL7WE*		8	6
VE7BBG*†		39	32
VE4MA*		23	28
VE2DFO		12	7
VE3AIB		11	7
VE1RC		3	2
JA9BOH*		18	31

†Indicates WAC
*Indicates some EME contacts

on the 7th. On the 6th, at 2311Z, WA1OUB New Hampshire worked KH6IAA, along with many western U.S. stations. WA1AYS, in the Boston area, also found June 6 to be very productive. Steve nabbed two new countries, PJ2JM and J88AR. He also completed contacts necessary for the Canada Award by virtue of working VE4AII. In addition, stations from all 10 U.S. call areas went into his log, and a KH6 (probably KH6IAA) was heard. I also have received a report that K1IKN worked KH6IAA at 2348Z on the 8th.

WB8TGY comes up with an interesting QRP yarn. One day in June, while mobiling near his QTH of Lansing, Michigan, Mark heard an ssb "CQ" from KL7GLK on 50.225. Eager for an Alaska contact, he went back to the call, only to learn that KL7GLK was operating portable at Annapolis, Maryland, and running just 15 mW of output. That should certainly represent a new low in power on 6 meters!

K5ZMS announces the results of SM1RK's search for the first to have worked and confirmed 50 countries on 50 MHz. The winner of the special trophy is LU3EX. Congratulations are certainly due to Alfredo, who is one of the old-timers of 6-meter DXing. Close on his heels were JA1RJU, JA6RJK and KH6IAA. With this, SM1RK is instituting a new certificate available to anyone able to show proof of contacts with 50 different DXCC countries. For details, send an s.a.s.e. to K5ZMS, 7158 Stone Fence Dr., San Antonio, TX 78227.

W2AXU notes, with the dawning of another E_s season, the number of broad signals on the air. Most often, the problem is simply one of mike gains being turned up too high. It seems that all too many people do not understand that their meters should not kick up as high on voice peaks as they do during key-down cw operation. Turn those gains down, gang. You will sound better, and you will make life much more pleasant for other inhabitants of the band.

2 Meters — Like its lower-frequency cousin, 2 meters has had its share of excitement over the weeks from late May through mid-June. The aurora that occurred both Saturday and Sunday during the June VHF QSO Party turned the band into a madhouse of cw and ssb signals. It was one of the best auroras in a long time, a result of eruptions from the largest spot group observed on the sun since October 1957. Contest section totals were significantly fattened as a result of the super conditions. Tropo during that weekend was only fair to poor, however, at least for the eastern part of the country, so the buzz propagation was welcome indeed.

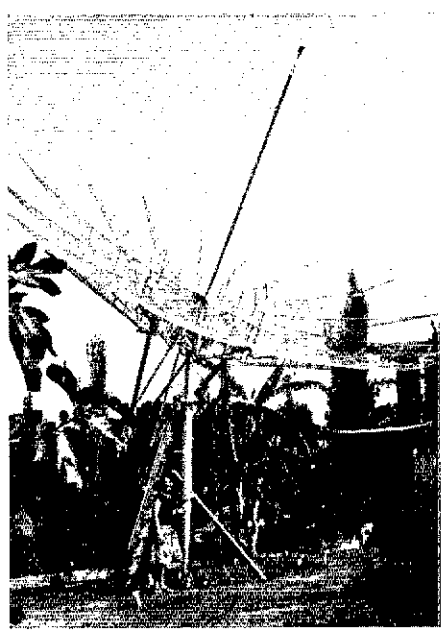
There was some quite good tropo noted at other times during the period, so that mode was present to provide its share of fun, if not at the most opportune time. There were also some scattered reports of E_s, as might be expected this time of year.

Although I could get an idea of what the aurora was doing for East Coast contesters merely by listening, it's interesting to receive a report from the West to see how it was affecting operation in that part of the country. It was received certainly even more gratefully out there than back East, as vhfers there have greater distances to cover and fewer sections that can be worked by more consistent means.

KB7Q Bozeman, Montana, files one such report. Gene used the aurora to work stations in Washington, Idaho, South Dakota, Oregon, Alberta and British Columbia, in addition to his own state.

WØFY St. Louis notes an interesting phenomenon during the aurora. Joe says that, while it was in progress, he experienced a pulse-type noise on both 2 meters and 70 cm. It seemed to fade up and down with the 2-meter signals. He heard no aurora signals on the higher band. It was definitely a pulse-type noise, as his blanker was partially effective in eliminating it. Has anyone else observed this type of noise in conjunction with aurora?

Reports of E_s have been somewhat sparse, but the E layer has provided some openings, nevertheless. For example, W5UWB Kingsville, Texas, southwest of Corpus Christi, says that June 6 produced a 15-minute session to Minnesota. Worked, beginning at 2130Z, were WBØNHD, KØHGP, WØMDL, WBØKOR and WØPN. W3IWU, near Philadelphia, mentions working Illinois and hearing a Texas station via E_s at around the same time.



The 7-meter (23-ft) dish at ZL1BJQ. Dave is receiving 16 dB of sun noise with this installation. Details of construction for this type of antenna appear in the new *ARRL Antenna Book*. (*photo via W4HHK*)

The Higher Bands — The intense aurora that turned 6 and 2 meters into a mass of QRM during the June QSO Party was also felt on 1-1/4 meters and even up to 70 cm. This conductor spent quite a bit of time trying to work VE3ONT on 1-1/4 meters, but the 10 watts on this end was not quite enough to do the job. However, others were more successful in grabbing extra sections on one or both bands. One example is W3OZ, near Frederick, Maryland, who reports working WB9SNR and W9ZIH, both Illinois, and hearing VE2DFO on 70 cm around 2250 on the 13th. I am sure there will be many more reports coming in after the deadline for submission of the material for this month's column has passed.

One mode of propagation that was not much in evidence during the contest was tropo. However, it was good on several occasions in the weeks just before the affair. I guess we can't have everything! VE3EMS notes one of the better tropo sessions. This, which he terms a "lake tropo," occurred during the evening of May 25, and produced 1-1/4 meter contacts with WA8EUU, K8MD and WA8HTL, Michigan; W9SR Indiana (S-9 plus 20 dB); W8DJY southern Ohio; and VE2DFO.

Peter says that activity on Tuesday evenings, the established gathering time for 1-1/4 meters, has been improving over the past few months. When he can't find terrestrial stations to work, VE3EMS is still hard at it. In May, he completed 1-1/4 meter EME contacts with K9HMB and KAØY. The latter's 42-ft dish (See May 1982 *QST*) enabled a 5-minute QSO during which the normal EME sequencing was unnecessary.

From one of the best tropo areas in the world, the Gulf Coast, W5UWB reports that, during the first week of June, conditions were good from his location, southwest of Corpus Christi, to Florida and Georgia, as well as closer points along the Gulf. On the 8th, he worked a number of stations on 70 cm, and W4ODN in Florida on 23 cm. Signals on the higher band were strong enough over the 730-mile path to enable them to use phone, with W4ODN on ssb and W5UWB on a-m running his varactor tripler.

K3QCQ Lebanon, Pennsylvania, writes giving information on his recent activities. After recovering from a long illness last year, Bill got busy and completed his RIW-type 70-cm amplifier. Output is now up to 600 watts. This, coupled with a new preamp (reducing noise figure from 1 dB to 0.4 dB), along with the eight 19-element RIW arrays mounted inside four 19-element 2-meter Boomers (which has been up for several years), has really put him in the moonbounce business. Sun noise now normally runs 12 dB, and a number of stations, including K2UYH, W7FU, W5HUQ/4, W4WD/7, WB5LUA, W6ABN, K5FF and JA6CZD, have been worked. Bill hopes that his success in mounting his 70-cm EME antenna inside of his 2-meter array will dispel any doubts that some have held about the feasibility of this arrangement. [I have seen others also use this scheme with good success. WB6NMT is one. — Ed.] Also in the works at K3QCQ are big plans for 23 cm. So far, Bill has a 0.5-dB converter going, along with a transmit section producing about 1 watt. He plans a single 7289 to drive the OZ9CR ring amplifier, which he already has. A 24-ft dish and polar mount are planned for installation by fall.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Contest Operation

With the UHF Contest almost upon us and the September contest only a month away, now seems a good time to review microwave operation under contest conditions. One feature of contest operation on the microwave bands is that it often takes place away from the home QTH. This often brings into play the well-known phenomenon that equipment which has been operating perfectly for years will suddenly fail when taken out of doors! Lack of familiarity with the site and the equipment can lead to additional problems, and this is especially likely to be the case with large multioperator contest groups. Let's take a look at the most common problems that prevent microwave contacts from being made, and how they can be dealt with.

The major problems are: (1) faulty receiving system, (2) faulty transmitting system, (3) lack of frequency coordination, (4) incorrect beam headings and (5) high path loss. Now, how do we deal with them?

Faulty receiving system. You don't hear the station you have a sked with, so how do you know if your receiver is working? The answer is to build a weak-signal source so that you can always check out your receiver. This can also deal with problem 3 if you calibrate the source beforehand. A very simple calibrator is a 48-MHz crystal oscillator driving a diode multiplier. This will give outputs on 144, 432, 1296, 2304, 3456, 5760 and 10,368 MHz, with decreasing output on the higher bands. A very simple oscillator-multiplier chain should give outputs audible through 2304 MHz. A waveguide multiplier, such as described in this column previously (November 1981), can be used for the higher bands. If you don't hear any signals on the band, and you can't hear your own weak-signal source, then you can be pretty certain that you have a receiver problem.

Faulty transmitting system. This time the station you are trying to work can't hear you. Is it your transmitter that is at fault? If you have a fully independent receiver, you can listen for your signal on that. If you can't hear yourself, then the other station certainly won't. A second check is an in-line power meter. This need not be an accurate device, but simply something that will tell you if power is going out. For example, I have found that a Bird Thruline wattmeter with a 500- to 1000-MHz, 500-W slug will give a positive indication of power at 2304 MHz, though the value indicated will not be correct (with my particular system I see about 60 W indicated with only 5 W of output power, though this may differ from meter to meter). A simple stripline power meter, such as has been described in this column (November 1980), will work up through 3456 MHz. It does not have to be left in line if it has attenuation; it can be inserted only when there is a doubt about the transmitter functioning properly. An absorption wavemeter can also be very useful, just to make sure that the power you see on your power meter is on the frequency that you think it is!

Lack of frequency coordination. How do you know that you are listening or transmitting where you think you are? The use of a crystal calibrator, as described above, can calibrate your receiver. The calibrated receiver can then be used to calibrate your transmitter.

Incorrect beam heading. Among the items of basic equipment that every microwave station should have are a good set of maps and a method of determining which way the antenna is pointed. This can be with the aid of a compass or a calibrated azimuth indicator. A method of determining beam headings from latitude and longitude data was covered in the June 1981 New Frontier column. Let's suppose that, despite pointing the antennas as accurately as possible, signals are still not heard. What next? Assuming that the transmitter and receiver are known to be working and operating on the correct frequency, the next thing to do is set up a liaison link between the two microwave stations on another band, for example on 144 MHz. One station, preferably the one with the higher erp or higher gain antenna, transmits on the microwave frequency and listens on the liaison frequency while slowly rotating his microwave antenna. The other station listens on the microwave frequency and transmits information on the liaison frequency about the received microwave signal strength. In this way, the transmitting station can peak his antenna on the receiving station once some signal is received. This procedure is especially useful for lining up antennas when one station is running high power and/or a high-gain antenna and the other is running low power and/or a low-gain antenna.

High path loss. There is not much that can be done about this except the adoption of an operating procedure to be followed by both stations. If items 1-4 above have been dealt with, all that remains is to try harder! The adoption of strict transmit-receive sequences of a fixed duration, say two minutes, helps considerably (learn from EME operation). Signal levels may vary by 5 to 10 dB over a 30-minute period, so keep trying!

1296 MHz NEWS

The Texas-Florida path has been worked again on 1296 MHz, this time on June 9, between W4ODW and N5BBO at a distance of 730 miles. W4ODW was running 75 W 4 × 10-element quagis, and N5BBO 25 W to a pair of 28-element loop Yagis.

24 GHz NEWS

The first DL-OE contact on 24 GHz was made in January this year over a path of 134 km. The German stations, DL8RAH, DL9RAH and DJ4YL, had 4 mW of output to a 60-cm dish, and the Austrian stations, OE2BM, OE2GKM and OE2JG, had 1 mW of output, also to a 60-cm dish.

EASTERN VHF/UHF CONFERENCE

The eighth Eastern VHF/UHF Conference was held on May 26 in Boxboro, Massachusetts. Here are the results of the Noise-Figure and Antenna-Gain Measuring Sessions.

*103 Division Ave., Millington, NJ 07946

Preamplifiers and Converter Noise Figures

1296 MHz (3.0 dB second-stage noise figure for PA)†

K2UYH	Dexel 1503 PA	0.8 dB
W1JR	Avantek AT8110 PA	0.8 dB
VE3CRU	MGF 1200 GaAs FET PA	1.0 dB
K2UYH	HP 2201 PA	1.3 dB
AF1T	NE21889 GaAs FET PA	1.5 dB
WA2GFP	MGF 1200 GaAs FET PA	1.6 dB
W1OOP	64535's with quadrature hybrids PA	2.0 dB
WA2GFP	Bipolar PA	2.1 dB
K2UYH	MGF 1200 GaAs FET PA	2.2 dB
K2UYH	NE700 GaAs FET PA	2.5 dB
VE2SH	Microwave Modules PA	2.8 dB
W1JR	SOTA converter	3.1 dB
AF1T	MRF 901 PA	3.2 dB
VE3CRU	Microwave Modules Converter	3.3 dB
W1UHE	MGF 1200 GaAs FET PA	3.3 dB
W1XP	MRF 901 PA	3.8 dB
VE2SH	Microwave Modules converter with Microwave Modules PA	4.2 dB
VE2SH	Microwave Modules converter	4.6 dB
WB1CJT	3SK97 GaAs FET PA	4.9 dB
W1JR	MRF 901 PA at high current	5.0 dB
W1XP	MRF 901 PA	6.3 dB
VE2SH	Microwave Modules converter	11.9 dB

2304 MHz (4.9 dB second-stage noise figure for PA)

W1OOP	64535 two stage PA	2.2 dB
W1GAN	NE70083 GaAs FET PA	1.65 dB
W1GAN	FMT 4005 PA	3.65 dB
W1JR	FMT 4005 Converter	4.9 dB

Antenna Gain

1296 MHz

G3BVU	4 28-element Spectrum International loop Yagis, stacked 22 in.	21.1 dBi
W1JR	45-element homebrew loop Yagi	20.0 dBi
VE2SH	45-element loop Yagi (VE3CRU)	19.5 dBi
W1OOP	49-in. dish with coffee can feed	19.3 dBi
W1JR	23-element F9FT Yagi	18.6 dBi
WA1VUW	38-element loop Yagi	18.2 dBi
W1FC	24-element loop Yagi	17.9 dBi
W1XP	32-element, extended-expanded collinear, 15 years old	15.6 dBi
N1BWT	Reference horn	††15.4 dBi
WA1VUW	W2IMU dual-mode feed horn	12.7 dBi
W1JR	Reference horn, 1 to 2.3 GHz	11.9 dBi
WA2GFP	Coffee can feed	10.2 dBi
K3PNL	4-element Yagi	9.9 dBi
N1BWT	13-element, W2OQH-type Yagi	8.9 dBi

2304 MHz

W1JR	32-in. dish	23.5 dBi
W1JR	44-element homebrew loop Yagi	21.2 dBi
N1BWT	15-element Yagi	15.5 dBi
W1JR	Reference horn, 1 to 2.3 GHz	14.2 dBi
N1BWT	Reference gain horn	††13.5 dBi

†PA = preamplifier
††Reference standard

Public Service

Conducted By Robert J. Halprin,* K1XA

. . . And in This Corner — TCC

TCC? That must be the agency regulating communications in Transylvania, right? Wrong. TCC stands for the Transcontinental Corps, which is the top of the pyramid of the ARRL National Traffic System (NTS).

NTS consists of several levels of nets — local, section, region and area — all bound together for traffic interchange by designated liaison stations. TCC takes care of inter-area traffic but TCC is not a "net." TCC is a group of amateurs specifically recruited by TCC directors for the purpose of transferring traffic from one NTS area to another so that it can receive subsequent handling in its area of destination.

As with NTS itself, TCC operates seven days a week, linking NTS cycles, following a published function sequence. TCC functions have a formal window time period within which they must be accomplished. However, specific times (within that window), and frequencies/modes used on the individual TCC schedules, are worked out in advance by TCC directors and the TCC stations concerned, in accordance with propagation conditions, station availability and other factors, always with the objective of providing the best service possible on an organized, systematic basis. Most TCC functions occur as out-of-net schedules, when the counterpart stations can optimize band and mode. TCC operators must have good signals, above-average operating savvy and multiband/mode capabilities to be effective in their role.

The technical details of the many TCC functions will not be discussed here. For a comprehensive treatment of TCC, consult the *Public Service Communications Manual* (available from Hq. for an s.a.s.e.). To get a basic idea as to how TCC actually works, we'll take a look at just one of the TCC functions, consisting of two steps, designated by the letters "O" and "U". The conductor previously held down an "O" schedule, and thus has some familiarity with it.

Let's say you live in San Diego and decide to send a radiogram to Gerry Cooney, of Huntington, New York, congratulating him on a nice try at the heavyweight title. You enter the message by way of a local 2-meter fm net, and, to make a long story short, your message eventually reaches its last stop in the Pacific area, namely the Pacific Area Net (PAN). In other words, your message has run out of nets in the Pacific area. What happens to your message?

No cause for alarm. TCC station U is standing by on PAN for the purpose of collecting all eastbound traffic. He or she has been given this assignment for this particular day by the TCC director. Station U gets your message (and all others destined for the East Coast). As soon as the PAN net control excuses him from the net, he goes off to meet station O at their prearranged frequency and time. Stations O and U meet, the traffic is sent and acknowledged, and the rest is history. Station O disperses the traffic on the various levels of nets in the eastern area, and, before you know it, Mr. Cooney is being cheered up by your good wishes. Ideally, he should receive your message that same night. More about this in a moment.

The U/O exchange is one of many TCC schedules that occur at various times of the day and night, dispatching traffic in different directions. Your conductor used to be station O on Mondays. (Then the U/O transfer occurred at 6:30 P.M. Eastern time on 20 meters. Now, the U/O meets earlier). If all went well, if conditions were decent and a minimum of fills were required, there was time available for the writer to expedite the traffic by taking the radiograms directly to various eastern-area ssb- and cw-section nets that meet in the 6-7 P.M. time frame. The alternative was the 7:45 P.M. region net and/or the 8:30 P.M. area net (meaning the traffic would not reach a delivery net until 10 P.M.), which made same-night delivery doubtful.

TCC operatives are free agents in the traffic game. They are authorized to go to any level net to clear their TCC traffic as part of their official function. When your hypothetical message is taken by station O to the New York City-Long Island cw Net, which opens at 7 P.M., the Cooney-gram will ideally be delivered that same evening. And with the cooperation of section net control stations, a TCCer can visit several section nets in the same evening, thereby expediting delivery.

The key word is cooperation. Cooperation is crucial. Net Managers and controls take note: A TCC station will not report into your net unless he has a specific purpose in mind — to clear traffic expeditiously. For this reason, TCC stations should not be forced to suffer benign neglect. TCC stations are working against the clock, so they should always be given VIP treatment by the net control. Simply put, the TCCer should be cleared of traffic immediately.

Furthermore, whether or not there are outlets for his traffic aboard is not the TCC person's problem — it's the net's problem. Should there be no outlets available at the time, the net control should direct an unoccupied net station to take the traffic off the hands of the TCCer. This should be done promptly. In this way, the TCC station will be free to go on his way to another section net, which will further facilitate the rapid movement of traffic to its destination.

A disclaimer: Should a given TCC sked run long, so that reporting into section nets isn't possible, the "offenders" are not taken out and shot. Nor are they forced to go 13 rounds with the champ. Training amateur operators in the handling of written traffic, participating in directed nets and developing an appreciation for the system concept is just as important as the rapid movement of traffic from origin to destination in NTS. As mentioned in a previous column, we are not competing with Ma Bell. The idea here is that the chance to make the movement of traffic more rapid, when the opportunity presents itself, should not be squandered.

So, when a TCC station comes a-calling on your net, perhaps with a reply from Gerry Cooney, don't make the poor TCCer eat static. Clear him promptly. A TCC operator has a pressing time schedule and needs your cooperation to do his job properly. And when he does his job properly, the efficiency of the entire National Traffic System is that much greater.

NWA AWARDS PROGRAM

The National Weather Association has announced its awards program for 1982, and, as was the case last year, organizations and members of the Amateur Radio community may well qualify for recognition under two of the award categories. Those two categories are:

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

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

Narrative nominations, with comments or endorsements as might be applicable, should be forwarded to: Mr. Edward J. Maree, Chairman, NWA Awards Committee, 25 Hillcrest Dr., Pembroke, MA 02359. Nominations should be received by the NWA committee prior to September 30, 1982. The presentation of award plaques and possible honorable mention certificates will be made at the National Weather Association's annual banquet.

If you need any additional information on this program, feel free to contact me by mail or telephone. My office number is 617-861-2552. — Darell R. Whitehead, Member, NWA Awards Committee, 11 Patterson Rd., Bedford, MA 01730.

PUBLIC SERVICE DIARY

☐ Nondalton, Alaska — Jan. 29. KL7GLH checked into the 75-Meter Motley Group Net and requested medical assistance for a health clinic patient suffering from severe internal infection. KL7GG arranged for a phone patch to be completed to Anchorage Hospital, which supplied the needed info. When the communications link between Anchorage and Nondalton faltered, AL7CW and KL7MY relayed further medical traffic until the patient was evacuated the next day. (AL7O, SCM Alaska)

☐ Chaco, Paraguay — May 9. ZP2CJ, a registered nurse in Chaco, called for help on 15 meters because a patient he was attending needed additional medical treatment and the local doctor could not be reached. WB9OTX, in Indiana, answered the call, and contacted a doctor in his town. WB9OTX then connected

*Deputy Communications Manager, ARRL

the Hoosier doctor with ZP2CJ by phone patch. ZP2CJ described the patient's condition and past medical history, and the doctor was able to make a diagnosis and to prescribe medication and treatment. (WB9OTX, AEC Ripley Co., Indiana)

☐ Altus, Oklahoma — May 11. A tornado swept through southwestern Oklahoma and northcentral Texas, causing extensive damage to many homes and farms. Over 30 hams from around the stricken area provided the Altus Civil Defense office with information about storm-related damage during the net established on WR5ANX/R. An additional net on 75 meters was used to relay info to the Red Cross headquarters in Oklahoma City. (WA5FSN, SCM Oklahoma)

COMMUNICATIONS SERVICE OF THE MONTH

☐ To set the stage for the story, much of Arizona is mountainous, with some peak elevations as high as 12,760 feet. This is particularly true of the north central part, where many square miles are higher than 5000 feet, and contain rocky crags, mountains, mesas and timbers. Several days of heavy snow, fog and low cloud ceiling present a real problem for ground and air rescue crews searching for lost aircraft.

All of these ingredients were present on Sunday, February 7, when at 7:20 P.M., N7AHS, operator of Flagstaff Aviation, and three passengers left Phoenix Sky Harbor Airport on a routine flight to Flagstaff (7000 feet elevation), 150 miles to the north. A few minutes later, he was in QSO on 2 meters through the Wildflower repeater, 144.75/5.35, with his wife, WB7EDK, at their home in Flagstaff. At 8:00 P.M., he called her again, but his voice was garbled, and shortly faded out. She responded, but heard nothing further from him. When his arrival in Flagstaff became overdue, she notified the Civil Air Patrol and WB7UTI (Flagstaff) through the Mingus Mountain repeater 147.60/00. In the meantime, the weather continued to deteriorate, with low ceiling and very poor visibility.

Monday morning, word of the disaster spread fast among the amateurs on the low bands, 2 meters and 450 MHz. Many hams in central and northern Arizona were offering help. K7LLX, at Cottonwood, 48 miles south of Flagstaff, set up as net control and maintained order on the Mingus repeater. CAP Major WØETI set up a command post at Rimrock Airport to organize air rescue patrols. The sheriffs of Coconino, Yavapai and Maricopa Counties proceeded to man ground rescue patrols at Flagstaff, Prescott and Phoenix.

K7SHX volunteered as liaison with CAP, sheriffs and other authorities at Rimrock, to obtain, relay or forward any information on weather and road conditions, and so forth. WB7UTI, WA7UJG and several other stations served as liaisons with sheriffs, departments of public safety, and other agencies in their areas.

A possible ELT signal was heard in Oak Creek Canyon, north of Sedona (a major tourist attraction because of the rugged, red-colored rocks), but a fix could not be obtained owing to low ceilings, which grounded most planes. On Monday, N7CDH, KA7IOG and KA7IZX left Phoenix at 5 P.M. to meet sheriff's deputies near Stoneman Lake, 35 miles northeast of Flagstaff, to check out the lights they had seen Sunday night about the time the plane had disappeared. They searched the area until 2:30 A.M., and returned home.

Tuesday morning, the CAP command post was moved to Sedona Airport, 30 miles south of Flagstaff, to permit the handling of more search planes, because of the larger airport and more central location in the general search area. A complement of five amateurs (KB7FA, W7JAE, WA7OBJ, W7OEZ and N7CUA) was assigned to assist WØLTI in the air search effort along with a multitude of message handling for various authorities. K7LLX (along with WB7UTI and WA7UJG) served as net control, as well as handled message traffic for the sheriffs in their communities. The snow, fog and low-ceiling conditions held most search-and-rescue efforts to a minimum.

Wednesday afternoon, the New Mexico State Police Emergency Services Council of Albuquerque offered their services. This is a group of 20, including 13 hams and several students from New Mexico Tech. Fifteen made the trip to Flagstaff; five remained at headquarters to man low-band equipment for contact with the rescue group. Rescue teams from Coconino, Yavapai and Maricopa Counties also volunteered their services. The offers were accepted, and the teams went into action on Thursday. In fact, the New Mexico group of 15 men and 27 units of equipment drove most of the night through snow and rain storms to assist in the search.

The Coconino County Sheriff assigned the New Mexico and Phoenix groups to the number-one suspect area — Turkey Butte, 25 miles southwest of Flagstaff. K7LLX kept in contact with W5LOR at rescue base and individual groups working out of the base. W1OQ was with the Maricopa group, and maintained contact with K7LLX through the Mingus repeater. The Yavapai group from Prescott worked the Sycamore Canyon area, north of Cottonwood. Another ground group with KB7AL was in the area about 20 miles southwest of Flagstaff. At the same time, CAP had 23 aircraft flying grids and also concentrating on the Turkey Butte area.

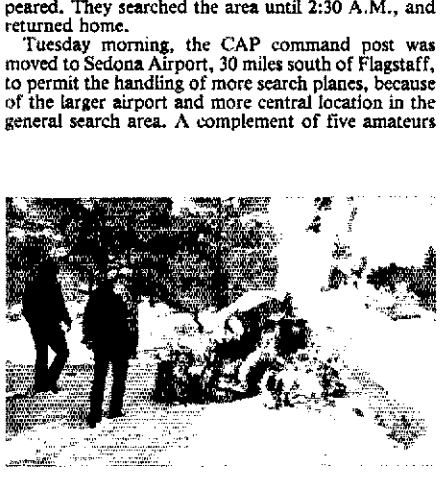
Friday, the picture remained unchanged with the hams filling every communications opportunity presented and rendering a very valuable service to the public, the families involved in the tragedy, and officials guiding the rescue operations. The CAP complement included 24 fixed-wing planes and six helicopters, plus several other private planes.

Saturday was the first day of sunshine and clearing skies, with an all-out emphasis on the air search. Friday's complement of aircraft was again pressed into service. The helicopter pilot for broadcast station KPNX in Phoenix made several trips over the Sedona-Flagstaff area. About 2:30 P.M., he made a pass through Oak Creek Canyon and spotted a wrecked plane, five miles north of Sedona and two miles west of Oak Creek Canyon highway 89-A. He notified CAP control at Sedona Airport and directed CAP officers and Coconino sheriff's deputies to the crash site. There were no survivors. The search was terminated, and word of finding the plane and occupants was announced on the local news.

In addition to the active participants, many hams offered information on weather changes, plane movements and identification. Another large group of hams monitored 147.60/00 and remote base N7CQ 448.575/443.575 during the entire week — some 12 to 14 hours per day — and assisted the effort with their moral support and silence to avoid congestion on the frequency. Also, hams handled traffic on the low bands and called K7LLX from all over the U.S. to inquire about the emergency and to offer their assistance. In addition, Arizona and California hams handled traffic through other repeaters, particularly in Wildflower, Williams, Needles, Payson and in the Phoenix area.

This was an outstanding display of cooperation among amateurs, regardless of group or affiliation, for the express purpose of aiding distressed people and those endeavoring to assist in a tangible way. Summing up, this was the greatest cooperative effort in northern Arizona during the life of 2 meters.

We are proud of the work done by so many amateurs. However, we are closely reviewing the week's activities to determine what improvements might be made, and thereby render even better service in future emergencies. — *George E. Miller, W7JLY*



Hams provided communications in the search for a lost aircraft. See Communications Service of the Month. *(photo by Jerry Foster, Sky 12, KPNX Phoenix)*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For May, 40 SEC reports were received, denoting a total ARES membership of 19,735. Sections reporting were: AL, AK, AB, AZ, AR, CO, CT, DE, ENY, GA, IN, KS, ME, MI, MN, NE, NH, NLI, NFL, NNJ, NTX, OH, OK, ON, ORG, PAC, SV, SDG, SK, SC, SFL, STX, TN, UT, VA, WA, WV, WMA, WNY, WPA and WI.

REPEATER LOG

According to reports received between May 21 and June 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
WA1KGQ						1				1
K1FFK							1			1
N1AGV	1									1
K1ZJH	1									1
WA1EJM							1			1
K2QIJ							3	4		7
W2AET						1		1		3
W2VL						16				16
WB2ZII						2		6		8
WB2ROL								1		1
WR2AGH								1		1
WA2LVW							1			1
W3VRZ	1						1	1		3
W3UER			1	1	3	1		3	1	10
N3AIA					3				1	4
N3BFL					1				5	6
WR3ADW								2		2
K3PSP									1	1
NN4N	2				1					3
WB4QES	1		1	1	12	1				1 17
WA4SWF	1					1				2
K4NLX								1		1
W4ATD	1									1
WD4JXR								1		1
W4ANB								2		2
WA4LYF								1		1
KA4EPS								2		2
K4ILW									1	1
WR4AMJ								2		2
WB4BZF					1					1
W4DPH					1					1
W5RVT	3		1			2				6
W5GIX			1			12				13
WD5EEI								1		1
WD5IYT									1	1
WD5EFY									1	1
WD5CAA									1	1
WR5ANX										1 1
KH6HHG						1			1	2
W6GNS						1				1
WD6FGX			1			6		1		8
W6IYY						5		1	4	10
W6CX						2				2
WD6AWP						5		1		6
AH6P									1	1
WR6AGO								1		1
WA6ZQH								1		1
WB6BJO								1		1
WR6ABY								1		1
WR6AEN								1		1
W6ASH								1		1
WB6IIY					1					1
K6LY			1							1
WA6SUW								1		1
W6ESI	1									1
W6UU	1									1
WB6ADZ	1									1
KC7FA						3	1	1	4	9
WB7TPY	1					3	2	35		41
W7WGW					1	3				4
K7OMR						2	1		1	4
W7HSG					1	3		1	1	6
K7CC						4	1		4	9
WC7ATT								3		3
WR8ARB	2					2				4
K8DDG								5	3	9
K8WNJ							1	1	4	6
W8NXD							1	1		2
W8CCI								1		1
W8GH									1	1
WR8ADO	1					1				2
W8EWD	2									2
WR8ANC	1									1
WR9ADQ	2									2
W9EBN									1	1
WA9ITU									1	1
WR9AEB	1									1
WR9ACD	4									4
WØVQR	1								1	2
WDØBQM						1			1	2
WØMME	5					2			1	8
WØKUJ	4					1		2		7
WRØAEV	3							1	1	5
WRØAFT	1							2		3
WBØSBH								1		1
WBØRSJ								1		1
WBØHSI	1									1
WAØWBU	1									1
WØILO	1									1
WBØFPI								1		1
Total	45		6	7	99	7	6	98	47	2 315

NATIONAL TRAFFIC SYSTEM

World's Fair traffic is heavy some nights on RN5/c4, reports N4MD. PAN/c1-2 now meets on 14,282 kHz. W4ZJY is now assistant manager, CAN/c4. The following received RN7/c2 certificates: KA7ELI N7IZ WB7DZX WA7LGN WB7TQF KA7AID K7OVK N7CSP WB7OGA K7TWZ WA7CTS KA7AOB WA7JEB KF7R K7SUX N7AFY W7ZB N7BGY N7BGG WB7WVD WB7TNH K7AF W7FJZ VE7FB VE6CHK WA7IHS W7AMR VE7FAZ VE7COA VE7QC. TCC-P/c4 Director KØDJ suggests awarding a year's supply of Coors to anyone who can improve conditions on 20 meters. Any takers?

May Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	888	28.0	612	92.5	
CAN	31	735	23.7	.439	100.0	
PAN*	56	696	12.4	.344	84.4	
Region Nets						
1RN	58	245	4.2	.252	72.0	93.5
2RN	62	323	5.2	.315	82.3	100.0
3RN	31	213	6.9	.351	93.0	87.1
4RN	62	565	9.1	.410	78.8	100.0
RN5	31	472	15.2	.433	96.4	100.0
RN6	59	573	9.7	.345	74.2	90.3
RN7	78	998	12.8	1.134	94.9	85.5
8RN	49	172	3.5	.279	66.1	100.0
9RN	60	327	5.5	.324	100.0	100.0
TEN	29	223	7.6	.231	76.3	100.0
ECN						74.2
TWN	62	300	4.8	.374	66.1	77.4
TCC						
TCC Eastern	104[1]	456				
TCC Central	75[1]	354				
TCC Pacific	100[1]	382				
Cycle Four						
Area Nets						
EAN	31	1562	50.4	1.275	93.5	
CAN	31	1038	33.5	.962	100.0	
PAN	31	1261	40.7	1.166	98.4	
Region Nets						
1RN						90.3
2RN	90	527	5.9	.444	96.4	96.8
3RN	62	294	4.7	.421	95.2	96.8
4RN						100.0
RN5	62	723	11.7	.454	93.6	100.0
RN6	62	768	12.4	.433	100.0	98.4
RN7	62	754	12.2	.983	98.2	100.0
8RN	59	357	6.1	.345	87.0	90.3
9RN	62	521	8.4	.443	97.0	100.0
TEN	57	286	5.0	.321	64.9	100.0
ECN	62	234	3.8	.355	82.2	87.1
TWN	62	576	9.3	.425	92.3	96.8
TCC						
TCC Eastern	101[1]	626				
TCC Central	55[1]	400				
TCC Pacific	114[1]	829				
Sections[2]	7564	35,374	4.7			
Summary	8996	54,032	6.0			
Record	10,319	50,268	18.4			

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (230): APSN ATN (AB), ATEN (AZ), NCTN (CA), CARES CEPN CN CRACES CWN CWXN HNN (CO), CN CPN RSN WCN (CT), DEPN DTN NC2MN SEN (DE), MDD (DE/MD), CCEN FAST FMSN FMTN FPON FPTN GN MCEN PEN QFN QFNS SPARC SWFTN TPTN (FL), GCN GSSBN GTFCN (GA), ICN ITEN TLCN (IA), BSN IMN MSN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN QKS QKSSS (KS), 3ARES 4ARES 5ARES 6ARES 11ARES 13ARES BARES CARN CCEN KEN KNTN KRN KSN KTN KYN KYPON LCARES MKPN PAEWTN PAWN SEKEN TSTMN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN (MA/RI), MEPN MMN MTN WRIN (MB), AEN CMEN MPSN PTN SGN SPSN (ME), APN (MR/NF), MACS MITN MNN QMN UPN (MI), MTN (MS), ACE NEMOE (MO), NSN (NV), 4ARES CFARS CMN CNCTN JFK M2MEN NCSSBN RARS THEN (NC), CN CSN (NC/SC), MNARES NCHN NE40 NE75 NMPN NSN PARC2MN PVTN SARES WNN (NE), GSFM GSPN MCEN NHN (NH), JSARS MCN NJN NJPN NJSN NJVN OBTTN SOCTN TCETN (NJ), CNYTN EPN HVN NLIPN NYPON NYS SDN STAR WDN (NY), ALERT BARF BN BRTN COARES HCARES LCNWOARES MCTN O6MN OSN OSSBN OSSN TATN (OH), OFON OLZ OPEN OWN (OK), KTN LN OLN OPN OSN (ON), BSN ORARES OSN PDXARES PTTN SOFM WCN (OR), D3ARES D6ARES EPA EPAEPATN PFN WARCVTN (PA), WQVUARES (PQ), A2MN BR2MN GPD2MN LC2MN SCNTN SCSSBN Y2MN (SC), TNCW TNPN TNVN TSRN (TN), BARCEN HATN TEX TSN TTN (TX), BUN UCN (UT), STARES SVEN VEN VLN VN VNTN VSBN VSN WARC (VA), VTN (VT), EWTN NWSSB PSTS SCARES WARTS WSN (WA), BEN BWN NWTN WIN WNN WSBN WSSN (WI), WVARES WVFN WVHN WVMDN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	124	83.8	912	456
TCC Central	93	80.6	708	354
TCC Pacific	124	80.6	762	382
Summary	341	81.7	2382	1192
Cycle Four				
TCC Eastern	124	81.5	1252	626
TCC Central	62	88.7	762	400
TCC Pacific	124	91.9	1628	829
Summary	310	87.4	3642	1855

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (May) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, AH2M, K2s KIR PH, KB2HM, KO2H, N2s CER YL, W2s CS XD ZOJ, WB2s IQJ MCO, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE1WF, VE3s GOL HTL. Central Area (W9JUJ, Director) — KA4MZY, W4OGG, WD4HIF, W5s CTZ KLV TFB URN, N5AMK, WB5YDD, K5s BNH KJN, W9s JUJ NXG, WB9WGD. Pacific Area (WØHXB, Director) — KV5U, W5JOV, K6s OWA UYK, KN6C, KT6A, KU6D, N6GIW, W6s FAS HAP JGS, KF7R, KO7V, W7s DZX GHT VSE, WA7WQE, WB7s DZX TQF WOW, KØDJ, KBØMB, NØs ACW CXY, WØs EJD HXB, WBØMTA, WDØAIT, VE6CHK. *Cycle Four* — Eastern Area (W2CS, Director) — W1s EFW QYY TM, N1NH, WB1CPF, W2s CS FR GKZ XD ZOJ, WA2SPL, N2YL, AH2M, KF2T, W3s ATQ FAF PQ, WB3GZU, W4UQ, K4ZK, N4KB, WA4CCK, WB4s PNY UHC, AB4V, W8PMJ, K8JQ, WB8MTD, AF8V, N8XX, VE1WF. Central Area (W5GHP, Director) — W4s WXH ZJY, K5s GM TL, N5TC, W5s RB TFB, KB5W, W9NXG, WB9UYU, AEØR, KØEZ, WØs AM HI. Pacific Area (KØDJ, Director) — N6FTQ, W6s EOT VZT, KN6C, KT6A, K7s HLR KSA, KN7B, W7s AK DZX EP GHT LYA VSE, WA7GYQ, WB7NHR, N7AKX, KØs BN DJ, KCØD, WØs GMO HXB OGH, WDØAIT, VE7ZK.

Independent Nets (May 1982)

1	2	3	4
Amateur Radio Telegraph Society	31	548	210
Central Gulf Coast Hurricane	31	148	1803
Clearing House	31	85	321
Early Bird	31	1042	404
Empire Slow Speed	30	41	375
Midwest RTTY	31	35	247
Hit and Bounce Slow	31	88	298
IMRA	26	578	1192
Mission Trail	31	91	1174
New England Novice	31	75	357
North American SSB Traffic	26	149	314
West Coast Slow Speed	31	221	443
20-Meter ISSB	26	732	510
75-Meter ISSB	31	522	1033
7290 Traffic	45	799	2728

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll May 1982

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.

175
WB7WOW
156
WD8LRT
139
K5CXP
136
NG4J
131
W4GPL
128
W9YCV
127
WD4HIF
126
WB3GZU
123
KE4OI
WB7DZX
122
WA4PFK
VE3HTL
121
WØOYH
KA3CDQ
120
WA5RVT
119
KI1M
117
N4BZH
WA4JDH
115
WB1HIH
114
KA1ON
113
WØOTF
112
K4SCL
WA4QXT
W1IDK
KV5X
111
KB2HM
110
WA1TBY
109
W4WXH
108
K4JST
107
W1TN
WB5YDD
WB1GXZ
W7VSE
WB2MCO
W2MTA
N7BGY
KT6A
106
WD8RHU
WD9ESZ
WB7TQF
W2GLH
KK5B
KB5W
KA3DLY
105
W2AHV
KT6D
WB2EAG
K1JHC
104
W2XD
WB2IQJ
N8DTZ
103
KY4U
102
WA7LGN
WD4CNQ
W5DTR
KC5NN
101
WP4AOH
W2AET
AG2R
100
W4CKS
NI6A
AF8V
99
WD4AWN
WD5JYI
WB4WYG
AK1W
98
K7GXZ
97
WB1CPF
W6NTN
VE3GOL
N5AMK
KA4GFU
K3CR
96
WA3WIY
KA4MGQ
W7LNE
NW4P
N2BOP
KS7I
KA4AUR
94
WA4CCK
W5CTZ
K2ZM
N8DSW
KA8CPS
K3JL
93
N7GV
N9BYK
KAØJQG
KA9IKR
92
W4ANK
91
W1KK
KA4ASZ
KA5KRI
W2YJR
K9BVE
K8KQJ
90
W6HUJ
VE3DPO
KB5NX
WØKJZ
KA3GJT
K4VWK
K4EV
WBØHOX
89
WD8IBY
W8VPW
N2BNB
KC5SF
KB4QZ
KA6BNW
AG9G
88
KA4MGR
WD9EBQ
KA9HPQ
WA4SRD
KB5EK
87
WAØTFC
WB6QBZ
W4OGG
KD4PJ
KA5HDT
KA1T
86
W2ZOJ
WB2PKG
85
N5TC
N4EDH
W2BIW
W9DM
84
WA4EYU
WB3FKP
N4PL
WB2IDJ
KA4SAA
83
WØHXB
N7DNG
82
WA1VRL
W5GHP
N5EFG
KB3LF
K2VX
AC3N
81
WB5MMI
N5BT
80
WA3EHD
WA4EIC
W5WZ
K6UYK
WB4WII
KB3UD
KA5DLY
WØOGH
79
VE3WM
N3CKQ
KØSI
WA2CUW
KB3XO
KA1BBU
78
W5VMP
AK2E
K3RZR
77
W3VA
N2CER
K6YD
76
NP4D
KA4BCM
75
WA3WQP
VE3GT
N4DZW
N2BLX
KØDJ
AJ5F
74
N1BPD
73
WA2ARC
W3DKX
KA7ELI
72
VE3KK
KV5N
KE1U
KA2GSX
K4ZN
71
N7BGW
KB2KW
KCØCL
KA2JMH
KA2GOH
70
N1NH
WB7OEX
WB1ABQ
WA8PIM
69
VE5HG
N9ATP
AD7G
68
WD4BSC
WB9WGD
WA2YBM
W7EP
W4HON
W2LWB
67
WA7DPK
66
K5TL
65
WB2OWO
WA6QCA
W9TLU
KN6C
KD5P
WD9FRI
N2BDW
KC5FX
KA3DTE
64
WA4LXP
KF4U
KS2G
KB4LB
WØOUD
KA3FJM
63
WA2KOJ
W1RWG
WA5QFD
KA2BHR
62
KAØCUF
WB4NTW
N4GIY
WA8DHB
K2ZVI
W6RNL
N1ARI
KY4K
KA5AZK
61
WD5GKH
WA4JTE
W9JIJ
W7LG
N4UF
N4ELP
WB4TZR
N3ADU
KE4DA
KC4LA
60
WB5LBR
KC4HN
KA2NMA
WB4AID
57
KA2HNQ/T
49
KA2GTE/T
48
WD4SIH/T
47
KA8NCR/N
43
KA9GBG/N
N2CPX/T
WB2TWQ/T
42
WB3HWX/T
WB2ANK/T

Brass Pounders League May 1982

A BPL Medallion (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: KA2KVZ.

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
NØBQP	32	1441	276	827	2576
KA9CPA	37	1164	140	839	2180
WAØHJZ	30	1280	30	839	2179
NG4J	560	109	622	31	1322
W9JUJ	1	517	516	11	1045
WA4JDH	1	479	436	11	927
W5SHN	37	421	430	17	905
WØACH	20	420	440	0	880
WB7WOW	12	384	410	54	860
AL7BX	0	452	375	0	827
KL7JKW	6	444	375	2	827
W7DZX	4	386	374	6	770
KT6A	1	367	375	23	766
W5TFB	1	362	279	2	744
W7VSE	5	352	355	10	722
WB7TQF	73	287	298	32	690
WA2SPL	76	223	331	7	637
KC5AS	0	508	102	15	625
KE4OI	0	265	308	22	595
WB1CPF	174	131	257	6	568
WD4HIF	3	260	273	26	562
K8NCV	21	258	276	3	558
KL7LA	6	198	336	17	557
WB3GZU	30	235	262	28	555
WB5YDD	9	256	217	43	525
WB7DZX	3	232	257	28	520
WA1TBY	0	245	248	14	507
WB2EAG	1	274	227	4	505
WB3GZU (Dec.)	88	929	997	135	2199
K6UYK (Apr.)	138	210	164	7	519
Multioperator station:					
KL7AA	1400	0	1400	0	2800
BPL for 100 or more originations plus deliveries:					
K7GVY	186				
W5DPA	148				
KH6B	102				
KA3CDQ (Dec.)	112				
Multioperator stations:					
K3CR	215				
WA4SGF	162				

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

Those Guys Vs. Us Guys

There are two kinds of radio amateurs: "those guys" and "us guys." Some people refer to "those guys" as "youse guys." Makes no nevermind. They're all the same — ornery, cantankerous, always ready to criticize, especially when it has to do with League activity. "Those guys" see ARRL Hq. as always doing the wrong thing, seldom on the right side of any issue. Whatever their pet peeve, the League is to blame. If they're not still fighting the incentive licensing war, then their name was misspelled on a DXCC certificate. Or the repeater coordinator wouldn't grant a particular repeater frequency pair. Or they received an OO notice 25 years ago. Or they remember when the tube tables were not in the *Handbook*. Or . . . well, you fill in the blank to any of a thousand different reasons why they have joined the ranks of "those guys."

On the other side of zero beat, you have "us guys." They faithfully check into their section or local net regularly, hold office in the local radio club, send League bulletins on the local repeater, encourage others to join the League, and do a host of other good works while waving the ARRL flag. "Us guys" are so wrapped up in League affairs that they don't understand how anyone can refuse to show up for an ARES drill or help out on Field Day. "Us guys" are sometimes so bonkers on the League that their spouses sometimes wish that lightning would strike the antenna, rendering the station permanently QRT.

Before any of "us guys" out there puff up too much in righteous smugness, or some of "youse guys" think this is a stinging attack on malcontents, read on. The object of this critique is to examine the distinct possibility that the viewpoint of "those guys" is at least partially justified.

The dominant home for "us guys" traditionally has been the ARRL field organization. This highly effective structure has been the very foundation of the League in addressing collective public service responsibilities. Thus, we see over a *million* (yes, a million!) message handlings a year reported on the NTS (National Traffic System) and independent traffic nets. Elaborate statistics of these activities are maintained and dutifully reported in *QST* and net bulletins. Honors are bestowed in the form of official appointment certificates, net certificates, the Public Service Honor Roll and the Brass Pounders League. Public service incidents safely resolved by repeater communicators number about 5000 per year, and those are only the ones reported! The League's Amateur Radio Emergency Service (ARES) boasts some 60,000 members who spend countless hours responding to the direction of some 2000 tireless Emergency Coordinators. All this under the aegis of ARRL, which funds these necessary and rewarding activities to the tune of some $80,000 per year. In other words, "us guys" are not sitting on our collective hands. But what about "those guys"? Why are they not under the ARRL umbrella? How do they view all this?

As righteous as the above activity may be, "those guys" do not perceive themselves as part of the action. And they're not. Their concept of Amateur Radio does not jibe with the flag wavers. What's wrong with that? Nothing! It is the diverse nature of ham radio that makes the hobby (and service!) so appealing. Everyone does not feel compelled to answer the call to the same degree and in the same manner as the hard workers in the present field organization. Can the scope of the amateur volunteer sector be broadened to reach out the hand of friendship to some of "those guys"? And can this ecumenical gesture be accomplished without compromising our present public service efforts?

The League's Long Range Planning Committee recognized this "us" and "them" schizophrenia and recommended a course of action to break down the artificial nulls in the radiation patterns that tend to isolate us.[1] In so doing, the League must play an advocate's role and speak to the concerns of the multitude of interests — your interests — in Amateur Radio, not *just* those presently under the League's organizational tent.

Many radio activities can be successfully conducted solo within the confines of one's own shack or workshop. It doesn't take any formal organization to heat up a soldering iron or engage in a rag chew on 75 meters. But it does take an organized team effort to provide communications for a parade or to rescue flood victims. It takes organization to ensure that everybody calls "CQ Field Day" the last weekend of June rather than any old time one feels like it. It takes a coordinated League effort at every level to see that the interests of radio amateurs are adequately represented in Washington before FCC, and before state legislatures. It takes organization to send bulletins, watch for intruders on the airwaves, provide interesting club programs, DF those engaging in malicious interference, share technological advances and disseminate information to the public. It is this host of organizational endeavors that potentially touch on the radio lives of every radio amateur. It is these organizational activities, as envisioned by the Long-Range Planning Committee, that an *expanded* volunteer field organization should pursue vigorously. It need not — indeed it must not — be a case of meeting these broad objectives to the degradation of our traditional traffic-handling and emergency-preparedness institutions. Rather, it's an opening of the door to the fresh air of greater organization activity, many of which we pursue now in a somewhat disjointed manner.

We need not fear the section structure concept already approved by the Board in principle and presently undergoing refinement in its implementation. Rather it is a challenge to convert some of "those guys" to "us guys." Better yet, with the League's field organization as the advocate for *all* organized Amateur Radio endeavors, we can put the "us versus them" syndrome on the skids. United under the single all-encompassing ARRL banner, "us guys" and "those guys" can become "we guys."

*Communications Manager, ARRL

[1] D. Sumner, "New Life for ARRL Sections," *QST*, June 1982, p. 53.

Working all states (WAS) is difficult enough. Many, of course, have even qualified for 5-band WAS. But the first to qualify on nine (that's right, nine!) different amateur bands is Joe Reisert, W1JR (left), receiving his 432-MHz WAS plaque from Communications Manager John Lindholm, W1XX. Other bands previously conquered are 160 through 2 meters. This outstanding operating achievement was honored on May 15 at the Eastern VHF/UHF Conference in Boston. Congratulations, Joe! *(photo by K8EFS)*

SCM ELECTION NOTICE

To all ARRL members in the Missouri, Southern New Jersey, Quebec, South Carolina, Western Pennsylvania, Eastern Massachusetts, Saskatchewan, Nebraska and New York City-Long Island 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 St., 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 . . .).

Amateur Radio Satellite Schedule

Date (UTC)	AMSAT-OSCAR 8 Ref. Orbit, Mode	AMSAT-OSCAR 8 Time (UTC)	AMSAT-OSCAR 8 EQX W. Long. (Deg.)	Soviet RADIO 5 Time (UTC)	Soviet RADIO 5 EQX W. Long. (Deg.)	Soviet RADIO 6 Time (UTC)	Soviet RADIO 6 EQX W. Long. (Deg.)	Soviet RADIO 7 Time (UTC)	Soviet RADIO 7 EQX W. Long. (Deg.)	Soviet RADIO 8 Time (UTC)	Soviet RADIO 8 EQX W. Long. (Deg.)
1 Aug.	22,454J	0022	79	0021	158	0149	182	0154	183	0153	181
2 Aug.	22,468A	0027	80	0016	159	0134	180	0144	182	0150	182
3 Aug.	22,482A + J	0031	81	0010	159	0118	177	0135	181	0147	183
4 Aug.	22,496X	0035	82	0005	159	0103	175	0125	181	0145	184
5 Aug.	22,510A	0040	83	0159	189	0047	173	0115	180	0142	185
6 Aug.	22,524A + J	0044	85	0154	189	0032	170	0106	179	0139	185
7 Aug.	22,538J	0049	86	0149	190	0017	168	0056	178	0136	186
8 Aug.	22,552J	0053	87	0143	190	0001	166	0047	177	0133	187
9 Aug.	22,566A	0057	88	0138	190	0145	193	0037	176	0130	188
10 Aug.	22,580A + J	0102	89	0133	190	0129	191	0027	175	0128	189
11 Aug.	22,594X	0106	90	0127	190	0114	189	0018	174	0125	189
12 Aug.	22,608A	0110	91	0122	191	0058	186	0008	173	0122	190
13 Aug.	22,622A + J	0115	92	0117	191	0043	184	0158	203	0119	191
14 Aug.	22,636J	0119	94	0111	191	0028	182	0148	202	0116	192
15 Aug.	22,650J	0123	95	0106	191	0012	179	0138	201	0113	193
16 Aug.	22,664A	0128	96	0101	191	0156	207	0129	200	0111	193
17 Aug.	22,678A + J	0132	97	0055	191	0140	204	0119	199	0108	194
18 Aug.	22,692X	0137	98	0050	192	0125	202	0109	198	0105	195
19 Aug.	22,706A	0141	99	0045	192	0109	200	0060	197	0102	196
20 Aug.	22,719A + J	0002	75	0039	192	0054	197	0050	196	0059	197
21 Aug.	22,733J	0007	76	0034	192	0039	195	0040	195	0056	198
22 Aug.	22,747J	0011	77	0029	189	0023	193	0031	195	0054	198
23 Aug.	22,761A	0015	78	0023	193	0008	190	0021	194	0051	199
24 Aug.	22,775A + J	0020	79	0018	193	0151	218	0011	192	0048	200
25 Aug.	22,789X	0024	80	0013	193	0136	216	0002	191	0045	201
26 Aug.	22,803A	0028	81	0007	193	0120	213	0151	221	0042	202
27 Aug.	22,817A + J	0033	82	0002	193	0105	211	0142	220	0039	202
28 Aug.	22,831J	0037	84	0156	224	0050	209	0132	219	0037	203
29 Aug.	22,845J	0042	85	0151	224	0034	206	0122	218	0034	204
30 Aug.	22,859A	0046	86	0145	224	0019	204	0113	217	0031	205
31 Aug.	22,873A + J	0050	87	0140	224	0003	202	0103	216	0028	206
1 Sept.	22,887X	0055	88	0135	224	0147	229	0054	216	0025	207
2 Sept.	22,901A	0059	89	0129	225	0131	227	0044	215	0022	207
3 Sept.	22,915A + J	0103	90	0124	225	0116	224	0034	214	0020	208
4 Sept.	22,929J	0108	91	0119	225	0101	222	0025	213	0017	209
5 Sept.	22,943J	0112	92	0113	225	0045	220	0015	212	0014	210
6 Sept.	22,957A	0116	94	0108	225	0030	218	0005	211	0011	211
7 Sept.	22,971A + J	0121	95	0103	225	0014	215	0155	240	0008	211

Orbit predictions by Project OSCAR, K1HTV, KA1GD and W9KDR. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or the AMSAT nets. Tuesday — East Coast and Mid States at 9 P.M. and West Coast at 8 P.M. local time on 3850 kHz. Saturday — International at 2200 UTC on 28,878 kHz. Sunday — International at 1800 UTC on 21,280 kHz and 1900 UTC on 14,282 kHz. OSCAR 9 orbits are no longer listed — because of its low altitude, long-range predictions are not always accurate. Use W1AW and AMSAT Bulletins for weekly updates. OS operation are Monday and Thursday — Mode A. Tuesday and Friday — Modes A + J. Wednesday is reserved for authorized experiments or recharge of the batteries. Do not operate through the OSCAR or RADIO satellites on Wednesday UTC. *Do not use more power than is needed to operate through the OSCAR or RADIO satellites.* Your downlink signal should never be stronger than the satellite's telemetry beacon. *Reduce your uplink power* to prevent overload causing 10 dB attenuation of received signals. Advise operators whose signals are stronger than the telemetry beacons.

Orbit numbers will not be used for the Radio satellites.

Satellite	Period (min.)	Increment (deg.)	Inclination (deg.)	Height (km)
OSCAR 8	103.1693	25.7945	98.79	919
RADIO 5	119.5555	30.0157	82.95	1682
RADIO 6	118.7174	29.8061	82.95	1632
RADIO 7	119.1966	29.9260	82.94	1654
RADIO 8	119.7640	30.0679	82.95	1681

RADIO 3 and RADIO 4 orbital data will not be listed because these satellites are for Soviet experiments. QSLs and telemetry reports should be sent to Box 88, Moscow.

Spacecraft Frequencies

	Uplink	Downlink	Beacon
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400- 29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz
RADIO 5	145.910-145.950 MHz	29.410- 29.450 MHz	29.330/450 MHz
RADIO 6	145.910-145.950 MHz	29.410- 29.450 MHz	29.410/450 MHz
RADIO 7	145.960-146.000 MHz	29.460- 29.500 MHz	29.340/500 MHz
RADIO 8	145.960-146.000 MHz	29.460- 29.500 MHz	29.460/500 MHz
RADIO 5 ROBOT	145.826 MHz	29.331 MHz	
RADIO 7 ROBOT	145.835 MHz	29.341 MHz	

RADIO 3 and RADIO 4 are for experiments only to be announced by USSR.

OSCAR 9
Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry. Interspersed with a carrier or continuous carrier.
Vhf Beacon — 145.825 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
Uhf Beacon — 435.025 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
S-Band Beacon — 2401.0-MHz nbfm ±10 kHz. ASCII, Baudot, voice, afsk and Morse.
X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use lhcp.

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 s.a.s.e., to ARRL Hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

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 10, 1982.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1982. Returns will be counted November 23, 1982. SCMs elected as a result of the above procedures will take office January 1, 1983.

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, 1983.

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

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the Vermont section as a result of notices in January and February *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following election was conducted for a two-year term of office beginning July 1, 1982:
Balloting Results: In the Santa Clara Valley Section, Ross W. Forbes, WB6GFJ, received 500 votes and Rodney J. Stafford, KB6ZV, received 199 votes. Mr. Forbes is declared elected.

The following were elected for a two-year term of office beginning October 1, 1982:

Uncontested:

Connecticut — Peter Kemp, KA1KD; *Idaho* — Dennis L. Hall, KK7X; *Ohio* — Allan L. Severson, AB8P; *South Dakota* — Fredric Stephan, KCØOO; *Southern Florida* — Richard D. Hill, WA4PFK; *Western New York* — William W. Thompson, W2MTA.

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 84. 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.

Strays

QST congratulates . . .

☐ Robert V. C. Dickenson, W2CCE, of Berkeley Heights, New Jersey, who received the National Cable Television Association's 1982 President's Award for Engineering excellence in recognition of his long-time work in developing data-transmission products for use in cable television systems.

I would like to get in touch with . . .

☐ amateurs who are interested in joining the Dungeons and Dragons net on Saturdays at 1500 UTC on 28.720 MHz. Michael Frost, KA9JOX, net control, P.O. Box 1008, Riverside, IL 60546.

☐ amateurs who are interested in FAX operation on the hf ham bands. Hisataka Sumioku, JA2OL, 1560 Kamiokamoto, Takayama City, Gifu, Japan.

☐ any Collins owners who are interested in starting a club in order to pool resources, share information and have QSO parties. John Werner, WB8IPG, 26316 Falmouth, Warren, MI 48089.

☐ any hams who collect auto license plates, especially ham call plates. Mike Sullivan, N7DNU, W. 120 Waverly Place, No. 2, Spokane, WA 99205.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

AUGUST

3

West Coast Qualifying Run, 10-35 wpm, at 0400Z Aug. 4 (9 P.M. PDT Aug. 3). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7-8

ARRL UHF Contest, July *QST*, page 73.

YO DX Contest, July *QST*, page 84.

12

W1AW Qualifying Run, 10-35 wpm, at 0200Z Aug. 13 (10 P.M. EDT Aug. 12). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Aug. 3 listing for more details.

14-15

European DX Contest (WAEDC), cw, July *QST*, page 84.

New Jersey QSO Party, July *QST*, page 84.

KCJ Single Operator CW Contest, July *QST*, page 84.

21-22

Alaskan QSO Party, sponsored by the Alaska DX Assn., from 0200Z Aug. 21 through 0200Z Aug. 23. Phone and cw; work stations once per band and mode. Exchange signal report and QTH (judicial district for AK stations; state, province or DXCC country for others). Non-AK stations also send serial number. Suggested frequencies: 10 kHz inside General class bands, both phone and cw. AK stations count 2 points for QSOs on 20-15-10 meters, 5 points on 160-80-40 meters. Multiply by states, provinces and DXCC countries worked per band. Non-AK stations count 5 points per KL7 QSO on 20-15-10 meters, 10 points on 160-80-40. Multiply by number of AK judicial districts worked per band (max. 4 per band). Awards. Mail logs by Oct. 1 (enclosed large s.a.s.e. for results) to: Alaska DX Assn., KL7AF, P.O. Box 1614, Kodiak Island, AK 99615.

SARTG RTTY Contest, no rules received.

AS Magazine UHF FSTV Contest, no rules received.

22

W1AW Qualifying Run, 10-35 wpm, at 2000Z (4 P.M. EDT). See Aug. 12 listing for more details.

28-29

All Asian DX Contest, cw, June *QST*, page 94.

Alabama QSO Party, sponsored by the Chattahoochee Valley ARC, from 0000Z Aug. 28 until 0400Z Aug. 29. Work stations once per band and mode. Work portables and mobiles again as they change county. AL-to-AL QSOs permitted. Exchange signal report and QTH (county for AL stations; state, province or country for others). Suggested frequencies: phone — 3.965 7.265 14.285 21.365 28.565; cw — 65 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count 1 point per QSO. AL stations multiply by total states, provinces and countries worked. Others multiply by total AL counties worked. Awards. Mail logs by Sept. 30 (include large s.a.s.e. for results) to: Johnny Royster, WA4VEK, P.O. Box 494, Fairfax, AL 36854.

Occupation Contest, sponsored by the Radio Assn. of Erie, from 1800Z Aug. 28 until 2400Z Aug. 29. Phone and cw. No repeater QSOs. Exchange signal report, occupation (engineer, salesman, teacher, etc.) and state, province or country. Suggested frequencies: phone — 50 kHz down from upper band edge; cw — 50 kHz up from lower band edge. Count 1 point per QSO; one multiplier for every 3 QSOs with persons having similar occupations (e.g., 3 QSOs with engineers and 6 QSOs with salesmen equals 9 QSO points and 3 multipliers). Awards. Mail logs by Oct. 1 (include large s.a.s.e. for results) to: Chris Robson, KB3A, 6950 Kreider Rd., Fairview, PA 16415.

Ohio QSO Party, sponsored by the Cuyahoga Falls ARC, from 000Z Aug. 28 until 2400Z Aug. 29. Work stations once per band and mode, phone and cw. Exchange signal report and QTH (county for OH stations; ARRL section or country for others). OH stations count 2 points per OH QSO, 5 points for others. Multiply by total OH counties (max. 88), ARRL sections and DXCC countries worked on all bands. Non-OH stations count 5 points per OH QSO and multiply by total OH counties worked on all bands. QSOs with W8VPV count 25 points; QSOs with CFARC members count 10 points. Awards. Mail logs by Sept. 29 (include large s.a.s.e. for results) to: W8VPV, P.O. Box 6, Cuyahoga Falls, OH 44222.

SEPTEMBER

1

West Coast Qualifying Run, 10-35 wpm, at 0400Z Sept. 4 (9 P.M. PDT Sept. 3). See Aug. 3 listing for more details.

4-5

Corona 10-Meter RTTY Contest, sponsored by the Deutscher ARC, from 1100-1700Z Sept. 4. Exchange signal report, serial number and name. Class A for single/multiop; Class B for SWL. 10 meters only; work stations once only. Count 1 point per QSO and multiply by sum of DXCC/WAE countries and W/VE/VK call areas. Mail results within 30 days to: K. Zielski, DF7FB, P.O. Box 1147, D-6455 Erlensee, Federal Republic of West Germany.

Four Land QSO Party, sponsored by the Brightleaf ARC, from 1800Z Sept. 4 until 0600Z Sept. 5 and 1300Z Sept. 5 until 0100Z Sept. 6. Work stations once per band and mode; work portables and mobiles again as they change counties; work stations fixed and again if they go port or mobile. Four-land stations may work each other. Exchange signal report and QTH (county and state for 4-land stations; state, province or country for others). Suggested frequencies: phone — 3.940 7.260 14.340 21.360 28.600; cw — 3.575 7.055 14.070 21.070 28.090; Novice — 10 kHz up from lower band edge. Four-land stations count 1 point per QSO; multiply by total states/provinces/countries worked. Others count 2 points per QSO and multiply by total 4-land states *and* 4-land counties worked. QSOs with W4AMC count 5 points for everyone. Awards. Mail logs within 30 days (enclose large s.a.s.e. for results) to: Bob Knapp, W4OMW, 105 Dupont Circle, Greenville, NC 27834.

IARS/CHC Contest, cw, sponsored by the Certificate Hunters Club of Glendale, California, from 0000Z Sept. 4 until 2400Z Sept. 5. Phone weekend Sept. 18-19. Single operator only. Work stations once per band; no repeater or cross-mode QSOs. Exchange signal report; CHC members also send membership number. Count 1 point per QSO and 1 point per country worked (per WAN list). Multiply by total number of CHC members contacted. Awards. Mail logs within 30 days to: IARS/CHC Hq., P.O. Box IARS, Glendale, CA 91206-7609.

8-10

YL Howdy Days, sponsored by the YLRL, from 1800Z Sept. 8 until 1800Z Sept. 10. Women operators only. Exchange status (member or nonmember of YLRL). Work each station once only, regardless of band or mode. Count 2 points per member, 1 point per nonmember QSO. No multiplier. Entries must be received by Oct. 11 by: Sandi Heyn, WA6WZN, 962 Cheyenne St., Costa Mesa, CA 92626.

11-12

ARRL September VHF QSO Party, this issue, page 73.

European DX Contest, phone, July *QST*, page 84.

G-QRP-Club Activity Period, see Feb. *QST*, page 88, for details.

13

W1AW Qualifying Run, 10-35 wpm, at 0200Z Sept. 14 (10 P.M. EDT Sept. 13). See Aug. 12 listing for more details.

18-19

IARS/CHC Contest, phone, see Sept. 4-5 listing.

CAN-AM Contest, phone, sponsored by the Ontario Contest Club and the Canadian DX Assn., from 1800Z Sept. 18 until 1800Z Sept. 19 (cw contest Sept. 25-26). Three classes: single op (all band, single band and QRP); multiop, single transmitter (includes single-op club stations and guest ops); club competition. Multiops may operate entire 24-hour period; single ops operate 20 hours with one or two off-times. Mark times off in log. Exchange signal report, serial number and QTH abbreviation. U.S. stations transmit postal abbreviation of state name (CA, CT, MA, etc.); U.S. Caribbean possessions use CN suffix; U.S. Pacific possessions use PC; Canadians use NF (VO1, VO2), NB NS PE (PEI) SI (Sable or St. Paul) PQ ON MB SK AT BC NW YU. VE/W QSOs count 3 points; W/W and VE/VE QSOs count 2 points. Multiplier is sum of states, possessions, Canadian provinces, territories and islands worked (max. 65) per band. Stations outside home call area must sign portable designator. Phone and cw sections of contest are separate, but total of both modes will be used for overall competition. Club secretary must submit list of all members eligible and their scores. Mail entries by Oct. 19 (Oct. 26 for cw) to: Yuri Blanarovich, VE3BMV, Box 65, Don Mills, ON M3C 2R6, Canada.

College Radio Scrimmage, sponsored by the Penn State ARC, from 2200Z Sept. 18 until 0400Z Sept. 19. Ssb only. Entry classes: alumni stations, college stations. Single transmitter only. Work stations once per band. Exchange school name and the last two numbers of the year you did or will graduate (e.g., Harvard 77). Suggested frequencies 5 kHz up from lower General class band edge. Score is number of QSOs multiplied by the number of different colleges worked. Mail logs (include large s.a.s.e. for results) to: Penn State ARC, 202 Engineering Unit E, University Park, PA 16802.

New Mexico QSO Party, sponsored by the Albuquerque DX Assn., from 1800Z Sept. 18 until 2100Z Sept. 19. Work stations once per band and mode. Cw in the cw subbands. Exchange signal report, serial number and QTH (county for NM stations; state, province or country for others). Suggested frequencies: phone — 3.900 7.270 14.300 21.370 28.570; cw — 35 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count 2 points per phone QSO, 3 points per cw QSO. NM stations multiply by total states/provinces/countries worked; others multiply by total NM counties worked per band and mode. Awards. Mail entries by Oct. 15 (include large s.a.s.e. for results) to: K5QQ, 1005 Morina Court NE, Albuquerque, NM 87112.

North American Sprint, cw.

Scandinavian Activity Contest, cw.

Washington State QSO Party

22

W1AW Qualifying Run

25-26

CAN-AM Contest, phone.

Delta QSO Party

Italian YLRC Contest

Maine QSO Party

Massachusetts QSO Party

North American Sprint, phone.

Scandinavian Activity Contest, phone.

*Assistant Communications Manager, ARRL

Section Activities

Coordinated By Jim Clary, WB9IHH

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: VE6XC. ASCM: VE6AMM. STM: NM-ATN. ANM-APSN: VE6ABC. ECs: VE6AGH VE6AFO VE6AMM VE6AHC VE6FV VE6ABC VE6ASL VE6AVV. Many planning on taking in the ARRL/CRRL Midwest Convention in Saskatoon. Contacts on the new 10 MHz band are being reported. NARC geared up for FD in June and supplying comms for the National Bike Championships on 2 July. Other comms projects being developed for trial races in Sept. VE6EO reports that VE6NB headed up a display for the tenth anniversary of the New Horizon Program with equipment, ARRL certificates and QSL cards. We understand it was quite impressive. Traffic: VE6CHK 132, VE6ABC 21, VE6ARN 6, VE6QN 3, VE5XC 3.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Missed last month. This young fellow and his bride of 24 years toured the south western states on their second honeymoon. BCEN has kept their activity up with poor band conditions. B.C. Phone, 3755 kHz reports high 160, low 98, avg 129, total QNI 4004. VE7CB spent time in hospital. VE7LL's XYL Peggy broke her hip, mending slowly. VE7BIR has been appointed Pacific Asst. Dir. CARF. VE7RSI, 147.33, elected new officers, and plans frequency split change and increase in its service requesting our support, & also its members. Traffic: VE7FAZ 130, VE7ZK 85, VE7FB/M 20, VE7BNI 12, VE7BZI 8. (Apr.) VE7ZK 93, VE7CDF 38, VE7FB 21, VE7BZI 14, VE7BNI 13, VE7COA 11.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: JP. SEC: HK. STM: RO. NMs: VJ TE NM ACX. Band conditions have been bad, and all nets have suffered. VE4HW has been appointed as net manager for the new cw net on 40 meters, which meets daily at 7:15 P.M. local time. The net is called CTN, for Canadian Traffic Net, and it short cuts the other regular routing. This and other matters will be brought up at the Saskatoon convention. End of July, the appointments will all be brought up to date and computerized by VE4AFO. It's probably a first in Canada. MEPN QNI 768, QTC 15, sess. 31. MTN QNI 92, QTC 30, sess 30. WRIN QNI 229, QTC nil, sess 9. MMN QNI 388, QTC 31, sess. 31. Traffic: VE4TE 34, VE4AAD 25, VE4ACX 22, VE4PG 21, VE4ID 20, VE4JA 18, VE4AJE 9, VE4CR 6, VE4XN 6, VE4TL 5, VE4AFO 3, VE4MP 3, VE4ADS 2, VE4AED 2, VE4CF 2, VE4GB 2, VE4FK 1, VE4NE 1.

MARITIME/NEWFOUNDLAND: SCM, D. R. Welling, VE1WF — ASCM: VO1FG, NMs: VO1JN VE1WF. SEC: VE1EI. Hospital: VO1CA. Congrats to all who recently passed the DOC exams and now have their calls. Hear a few of the VE1s on the new 30-meter band. Seems to be a good band for local and DX work. Congrats to VE1EE who recently celebrated 50 years as an amateur with a new FT 707. New repeater reported in the Rothesay NB area. VE1BCR, on 147.93/33. The SCM presented the film "World of Amateur Radio" at an Air Cadet Inspection. Well received. I am available to attend club meetings during the coming year. Please forward requests with alternate dates due shift skeds. APN sess 31, QNI 121, QTC 15, time 215. Traffic: VE1XF 89, VE1WF 85, VE1LCR/RO 22, VE1BKM 20, VE1BZC 2.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. STM: VE3GFN. Best wishes to our new STM, VE3GFN. He needs no introduction as he is active on all levels of the NTS. Please give him all your support in this important appointment. VE3ONT, the Toronto VHF Society station, is in their 10th year of operation, active mainly in the vhf contests. VE3DSS and VE3EMS continue to provide interesting OVS reports each month. VE3EMS advises prospective EMEers to try 220 MHz. There are 16 permanently active including Alaska and Ontario with more to be on this summer. The level of difficulty is the same as 2 meters but antennas are smaller. Smith Falls ARC did a band up job with their special events station CZ3SFR. Shows what a small club can do when everyone works together. VE3OT beaming these days as his 12-year-old son became VE3MGX. New ORS-VE3JSM. VE3ASH, who has performed yeoman service with the Bruce ARC over the years, has been promoted to the Nuclear Training Center at Rolphton. Congrats to VE3FOE who was honoured by Scarborough Township for his contributions to Amateur Radio over many years. South Western Ontario Repeater District formed to plot the future of amateur repeaters in the Sarnia, Chatham, Leamington and Windsor areas, and they will be coordinating with other such groups in Ontario and the US. VE3INQ creating lots of 160-meter interest with his Canadian Top Band News. VE3BZU is the new prez of the Southern Ontario Chapter of QCWA. I have received several complaints concerning non-delivery (or dead ending) of formal traffic. If you are unable to deliver or relay a message within 48 hours, please send the orginating station a service message advising this and request further instructions. New amateurs are VE3s NGD NGC NLG while VE3LQH has her Advanced. New members of CARTG are VE3s DZK EP GQV JAD JNO TM YG. Traffic: VE3HTL 236, VE3GOL 199, VE3KK 167, VE3DPO 122, VE3CYR 121, VE3HGJ 89, VE3GT 85, VE3GNW 64, VE3JRT 52, VE3KCZ 52, VE3KXB 46, VE3JSM 31, VE3FPI 26, VE3WG 26, VE3EWD 24, VE3BZB 20, VE3DUK 20, VE3AJN 14, VE3WM 14, VE3LNN 11, VE3KLX 10, VE3EFX 7. (Apr.) VE3GFN 67, VE3AWE 43, VE3LNN 8.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. West Island amateurs are organizing an ARES group with help of Protection Civile, to prepare for an emergency. VE2AQU is the coordinator. The Montreal hamfest will be held at St-Hacinthe on August 15. VE2FJT, une nouvelle amateur (yl) de la Mauricie. Traffic: VE2PJ 79, VE2EDO 75, VE2EC 51, VE2FFE 25, VE2FSA 20, VE2EKC 16, VE2GAG 16.

SASKATCHEWAN: W.C. Munday, VE5WM — STM: VE5QY. SEC: VE5II. NMs: VE5DC VE5HG VE5OI VE5MP. Fourteen members of the Moose Jaw ARC provided comms for the 35th annual Kinsmen Band Parade on May 22 in downtown Moose Jaw. In Regina, nine members of the Regina ARC provided comms on May 22 and 23 for the Tom Drop Memorial Tennis Tournament. The Melfort ARC recognized the service to Amateur Radio of a long time ham, VE5PD, and presented him with a plaque. The Sonningdale vhf repeater VE5SON is doing fine business operating on 146.010/146.610 MHz. Traffic: VE5BAF 19, VE5HG 19, VE5WM 3.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3WIY K3JL W3DKX. A Mini-expedition to Fort Delaware, Pea Patch Island was organized and operated by KB3HZ KB3PD N3ACU N3ARU and N3ARV. They operated hf and 2-meters. New upgrades Kent ARC: KL7LG to Advanced; KA3JHU a new Novice. Congrats. AF3R and N3AYI were making plans to go to Japan, then to Korea, and they intend to do some operating. They said they were going to give as many contacts to DE stations as possible. Hope you get yours. DTN QNI 279, QTC 47. DEPN QNI 58, QTC 13. SEN QNI 37, QTC 38. N.C. Co. 2-Meter Net QNI 48, QTC 2. Traffic: WA3WIY 64, W3QQ 62, W3DKX 51, K3JL 46, N3AKC 43, WB3DUG 37, WA3PWT 19, W3WD 19, WA3DUM 10, W3FEG 10, K3ZXP 7, N3AXH 3, KA5DIJ 2. (Apr.) W3PQ 114, WA3DUM 8.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: K3JSZ. DEC: AA3C K3QXC KB3QW N3BFL N3CJP W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	459	165	31
EPA	3610	7/10 P.M. Dy	403	207	59
PFN	3958	5:30 P.M. Dy	252	207	31
PTTN	3610	6:30 P.M.Dy	—	—	—

Local and vhf nets reporting (QNI QTC sess): D3ARESN 252 21 5, D6ARESN 22 1 4, WARCVTN 39 8 4. OO reports: KB3XO N3BFL W3GOA W3GTN W3GVR. OBS reports: K3EBZ KB3VV W3CL W3VA WA3ENE. OVS reports: N3BFL W3GOA. PSHR reports: KA3DLY KA3EJG KA3GJT KB3LF KB3UD KE3U W3GOA W3VA WA3EHD WA3WQP WB3FKP. New appointment KA3EJG to ORS, congrats. New gear: KA3DLY-TS830. Upgrades: KB3LF to Extra, and KA3GWG to Tech. N3BFP is now KC3AU. N3BFL, DEC for District 5, looking for an EC for Wayne Co. interested hams, please contact him or WA3PZO. KB3XO sez OO work slow, tfc down but deliveries up and now getting ready for FD. KA3DLY QRL with NCS, liaison and tfc in general. KE3U reports Holmesburg ARC participated in March of Dimes Superwalk and City of Phila. simulated disaster drill by providing comms for these events. W3CL is feeling much better after surgery. WA3CKA's garden growing very well and he can't wait until the tomato season arrives. The Delaware-Lehigh ARC annual banquet was a huge success, and K2BPP gave excellent presentation on trip to South Pole. Traffic: WA3WQP 262, KB3LF 173, KB3UD 142, KA3GJT 132, WA3EHD 123, W3DP 122, W3VA 80, KA3DLY 78, KB3XO 77, WB3FKP 50, WB3KUZ 44, W3TWV 39, WA2WXM/3 21, N3BFL 20, KE3U 19, W3AQN 16, KA3EJG 16, W3CL 14, W3ADE 9, K3KW 7, W3PTM 7, AF3Z 7, WA3CKA 6, K3EBZ 4, K3OXC 4, N3AKQ 2. (Apr.) W3ADE 26, KB3VV 23.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — STM: WB3GZU. SEC: WA3TAI. KA3R has an OO report. W3IK is off on the travel circuit. KJ3E, ex-WB3UD, rediscovered the NTS and 2-letter callsigns. WB3KJT had his traffic total increase with organization! The new slate at Goddard ARC: KA3HDO, pres.; WB2TNC, v.p.; KA3BUZ, treas.; KA3DAK, secy. W3CDQ proudly displays her YL WAS/CW and YL WAC/CW certificates. Congrats. KA3T finished successful school year, working the midnight electrician shift. He takes that fateful step 26 June. WB3LTA's bulletins continue to serve. W3ZNW has no comment on daylight time! KC3D is a QCWA man for life. WA3MLW has the Washington County Net perking. W3DQI is on full summer schedule. W3LDD is still chasing DX. KB3WL is finding that things are picking up. W3OYY is back to cutting grass. WB3BFK would be busier if the bands would allow! KA3CDQ wants more of you on the MTN at 7:30 local 3735 kHz. Just got the word that K3ORW went back to work full time. N4DR likes the higher power on his 10 MHz beacon. W3UT joins those who find work interferes with the hobby! Of course WB3GZU has been back to earning a living for some time! WA3VPL's son N3CJQ and the entire Severn School ARC will do the FD up brown. K3ONU was the mastermind along with the Easton AR Assn providing comms for the 2-mile swim, 20-mile run and 50-mile bike race. Congrats-you guys didn't have to run! Net/Manager sessions/traffic/QNI avg., WC 2 Mtr/WA3MLW 4/2/23.4; MDC PON W3OYY 5/6/17.4; WR PON/WB3BFK 22/20/15.4. MTN/KA3CDQ 21/27/4.0: MEPN/WB3GZU 30/124/26.5. No toppers but WB3BFK W3DKX WA3IHW W3LDD K3ONU K3ORW and WA2YFM missed 3 or less. MDD/W3PQ March 62/215/6.6. Brass W3FA W3UT K3JL. April 60/169/7.2. Brass W3QQ W3FA and K3JL. Traffic: WB3GZU 555, W3FA 151, W3UT 102, KA3CDQ 102, K3ORW 96, W3DQI 37, WB3BFK 31, KB3WL 19, WB3KJT 14, WA3VPL 14, N4DR 12, W3LDD 8, WB3LTA 8, KA3T 7, W3ZNW 5, KC3D 4.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: N2CER. Congrats to our new Section Traffic Manager Ted Wood, N2CER. He's taking over a job last filled by KF2U, who has moved to Germany. It is a job which I did myself since KF2U's resignation but which I gladly now turn over to N2CER. He has been involved with traffic handling in SNJ since late in 1980, when he was licensed as a Novice. Since that time he has become one of the most active and respected traffic handlers in the whole state, and has proved his proficiency on both the cw and phone nets. He is also serving as the assistant manager of the 2nd Region Daytime nets. The old saying "if you want something done well, give it to a busy person" sure applies. I'm sure all the active hams in SNJ join with me in wishing N2CER much success in the new career!!! A reminder that the 23rd annual New Jersey QSO Party will take place the weekend of August 14-16. Exact details may be found in QST Contest Corral or by writing Englewood ARA, Box 528, Englewood, NJ 07631-0528. Traffic: WB2IQJ 498, N2CER 308, WB2PKG 89, WA2CUW 45, KA2GTE 30, WA4JRP 26, KA2KTR 15, WB2GFM 14, WB2LCC 10, KA2GSL 9.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ASCM: W2GLH. DECs: WA2AIV KA2BHR WB3CUF WA2DHZ WB2NAO. Appt. ORS-N2DC.

Net	Freq.	Time/Day	QNI	QSP	QND
NYS/1	7077	1000/M-S	187	95	31
NYSCN	3677	1000/Sn	38	15	5
THIN	3913	1600/Sn	21	—	3
NYPON*	3913	1700/Dy	666	296	31
NYSPTEN	3925	1800/Dy	671	89	31
ESS	3590	1800/Dy	375	41	30
OCTEN*	34/94	1830/Dy	518	65	30
Q Net	31/91	1830/Dy	456	2	31
STAR/E*	99/39	1830/Dy	81	50	27
WDN/E*	04/64	1830/Dy	500	97	31
NYS/2*	3677	1900/Dy	335	173	31
OSWARES	75/15	1900/Sn	—	—	5
OCAN	34/94	1930/T	—	—	4
SLVARES	31/91	1930/Sn	42	—	5
JCARCN	10/70	2000/Dy	560	12	31
OARCN	25/85	2000/W	77	0	4
VHFTHIN	04/84	2000/Sn	55	—	4
WIN	04/64	2000/M	(SKYWARN)		
WNYECN	3955	2000/3 Sn	(A.R.E.S.)		
BRVSN	055/655	2100/Dy	261	0	31
CNYTN*	90/30	2115/Dy	433	51	31
STAR/L*	325/925	2130/Dy	90	23	24
WDN/L*	04/64	2130/Dy	747	174	31
NYS/3*	3677	2200/Dy	289	262	31

*NTS nets. Central New York SKYWARN Sundays at 1830 on 3913 kHz and it covers Cayuga, Jefferson, Lewis, Madison, Oneida, Onondaga and Oswego Counties, using six repeaters with alert on 145.695. Public Service Honor Roll: W2AET N2BLX W2GLH KA2GOH WB2IDS WA2KOJ W2MTA W2ZOJ. Club officers: Ogdensburg ARC-KN2COG KA2CEO WA2RXO; Massena ARC-N2CEF KB2OJ WB2JAB; Auburn ARA-WA2ITJ WA2JGO KC2OX K2JOD; Ft. Hermiker ARC-KB2BK WB2QBO WA2BBE KA2ILI. Reports: OO-WB2MMB 10; OBS-K2KWK W2GLH; OVS-WA2TXB 6M E-skip, K2QR 4 EME QSOs. Comms: Auburn ARA Bike-A-Thon; Boonville ARC Bike-A-Thon. HAMFESTS: Sept. 11 Hamburg; Sept. 18 Seaway at Louisville; Sept. 25 Elmira; Oct. 2 Syracuse. Have a FB summer. Traffic Handlers' Picnic at Newark Valley on weekend of Aug. 14. Thanks to WA2AIV, host at Batavia LO meeting. Potentially, there are six new, additional Section appointments starting next year. See page 53, June QST. Those interested in serving, please contact W2MTA. No BPL in May. Traffic: W2MTA 308, W2AET 227, WB2IDS 214, W2ZOJ 179, KO2H 171, WB2OWO 146, KA2BHD 109, N2BLX 98, W2GLH 84, KA2GOH 76, KA2BCH 61, KA2CLT 59, KG2D 53, AF2K 52, KA2BHR 49, W2FR 42, WA2HSB 41, K2RN 38, N2ABA 33, WA2KOJ 27, WA2RXO 24, WB2SGI 23, W2GJ 22, N2ARD 17, KA2DBD 16, WB2QIX 14, WA2SMZ 12, WB2LJK 11, WA2AIV 6, K2VR 6, WB2NAO 4, KA2LHO 1. (Apr.) WB2LJK 25.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB. ASCM/STM: N3EE. NMs: AC3N N3ADU W3NEM W3MML. SEC: AB3Q.

Net	Sess.	QNI	QTC	kHz	T/D
WPACW	31	340	237	3585	7:00 P/D
WPAPTN	31	571	150	3983	6:15 P/D/
WPA2MTN	31	430	101	146.28/88	8:00 P/D
NWPA2MTN	29	464	6	146.04/64	9:00 P/D
PFN	31	252	276	3958	5:30 P/D

It was with great sadness when we heard of the passing of Jesse Bieberman, W3KT. I had the great pleasure to spend several days attending some of the clubs with him in the Pittsburgh area, and it was a most enjoyable week. He and his wife Inez were very gracious to my wife and me. He was a fine gentleman and amateur. Our deepest sympathies from the members of the WPA section. New Novice: KA3JGN; Tech: KA3HOW WB3CEM KA3HTA KA3BNP KA3JAR; General: WB3PBH KA3GLL KA3GBK KA3COY KA3GLD KA3IIO N3BIQ KA3ICZ; Advanced: KA3ITP WB3HZZ KA3BLJ WB3EFQ. Congrats to all. Please send me a notice of new calls or changes. It is not always easy to pick them out of club papers. If you want to participate in ARES, AB3Q can give you a list of DECs and ECs in your area. If you do not have an EC, perhaps you would volunteer to take the responsibility to get your area involved. Appointments are available for the asking, but you must be active. Traffic: K3CR 490, N3ADU 334, AC3N 218, N3CKQ 131, N3EE 78, N3FM 76, WA3QNT 65, W3SMV 56, K3SMB 41, WA3UNX 35, KA3FJM 29, KB3NV 29, W3MML 27, W3NGO 26, K3HCT 25, K1IC 25, KB3UO 25, W3KMZ 24, W3RUL 20, KA3CDV 17, K3LTV 17, W3OKN 17, KA3BGC 15, W3KUN 14, K3TUA 13, W3SN 11, N3BKU 9, N3BKV 9, N3KB 9, K3VQV 9, W3TTN 8, KF3V 3, W3AHH 2, W3LOD 1. (Apr.) KA3CDV 31. N3BKV 16. W3KUN 15. KB3NV 12.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. ASCM: WD9EBQ.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0330 Dy	220	62
IL Phone	3915	2130 Dy	94	31
NCPN	7270	1215 Dy	38	22
NCPN	3915	1700 Dy	97	26
IEN	3940	1400 Sn	6	5
ITN	3705	1900 Local Dy	31	30

D9RN 100% stations: W9NXG WB9WGD WB9RGA. DRN9 (CAND) 100% stations: WB9WGD W9NXG W9HOT. W9VEY Memorial Station, with WA9RUM and WB9OVF as net control stations, had a QTC of 9 during 4 sessions. The SIARS Southern Illinois ARS provided outstanding public service during the Marion, Il tornado of the Memorial Day weekend. From the first report by the EC W9CJX to the Red Cross Relief Operation directed by ASCM WD9EBQ, the ARES activities were according-to-the-book. The clubs in Southern Illinois have had speakers and films about the techniques of tornado spotting. They also have had considerable ex-

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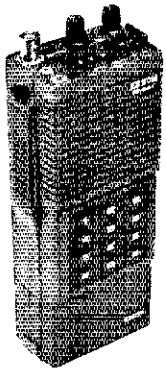

Model shown is IC-2AT

2 METER FM
IC-2AT
(Touchtone™)
IC-2A
(Regular)

•

220MHz FM
IC-3AT
(Touchtone™)
IC-3A
(Regular)

•

70CM FM
IC-4AT
(Touchtone™)

•

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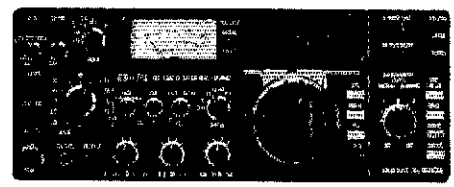
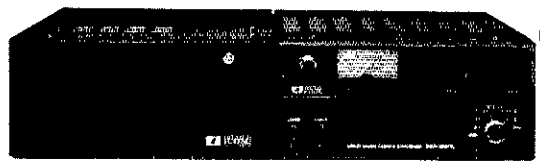
NEW! IC-740

Brand, sparkingly new! Here, in one handsomely appointed package, a host of features long in demand by the truly discerning operator.

LOOK AT ALL THESE RECEIVER PARAMETERS w/panel or top control.
• RF pre-amp, in/out • RF gain • Noise blanker w/variable width & level • Adjustable I-F shift • Pass-band tuning • XII filter, in/out • Notch filter • AGC w/adjustable time constant & on/off • Squelch on SSB • Tone • Audio gain • 5, CW filter options

AND THESE TRANSMITTER CONTROLS AND FUNCTIONS:
• Mic. gain • VOX w/adjustable gain & delay • Speech compression • Optional FM capability • Dual VFO's w/3 tuning rates, split operation and memory • Analog freq. control w/incremental tuning TX, RX or both • Full metering: S units, Rel. RF out, Compressor level, ALC & Collector current plus VSWR • Operating voltage, 13.8VDC • Optional built-in AC supply • 1.8-29.7MHz inc. 10-10.5MHz.





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IC-2KL LINEAR AMPLIFIER

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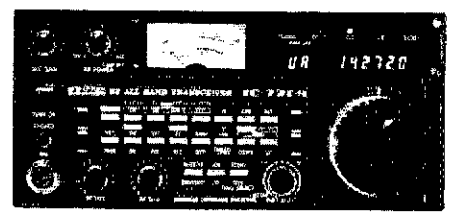
IC-720 A ALL-BAND TRANSCEIVER

All 9 bands • All solid state • Broadband tuned • Digitally synthesized w/10Hz resolution • Two VFO's • General coverage receiver, 0.1MHz to 30 MHz (no transmit on general coverage). • Simplex, duplex • RIT • 100W pep output on SSB, 100W CW & RTTY, 40W AM • Digital readout • Passband tuning • Operating voltage, 13.8VDC @ 20A • Dozens of other desirable features.

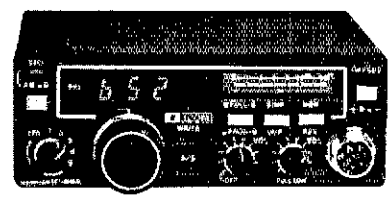


IC-730 MOBILE TRANSCEIVER

Small! Only 3.7"H, 9.5"W, 10"D. Fits most mobile operations • 10-80M coverage including new WARC bands • Tuning speed selectable, 1kHz, 100 Hz or 10 Hz • Dual VFO system • One memory per band. Store favorite frequency • RIT • 200W pep input SSB, CW, 40W out, AM • Digital readout • Speech processor • I-F shift tuning • Receives WWV • Fully solid state • Automatic, final protection under high SWR conditions.

IC-25A 2 METER FM TRANSCEIVER

• Very small package 2"H, 5½"W, 7"D with 25 watt punch! • 5 memories • Priority channel • Touchtone™ microphone standard. Full band scan/programmable scan (set your own limits) memory scan • 2, VFO's with data transfer standard • Two tuning rates, 5kHz (A-vfo), or 15kHz (B-vfo).



FREE SHIPMENT, ALL OF THE ABOVE ITEMS, UPS (Brown)

Store addresses and phone numbers are given on opposite page.

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FT-208R

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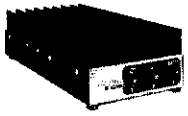

2 METER AMP
B-1016
10W IN, 160W OUT.

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B-3016
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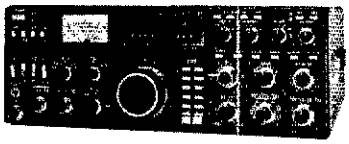
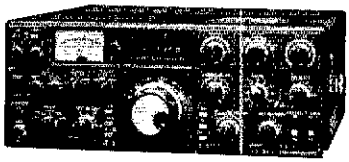


TS-930S

TR-2500

TR-7730/MC46

TS-830S



BARGAIN PACKAGE

TS-830S	Transceiver
SP-230	Speaker
YK-88C	CW filter

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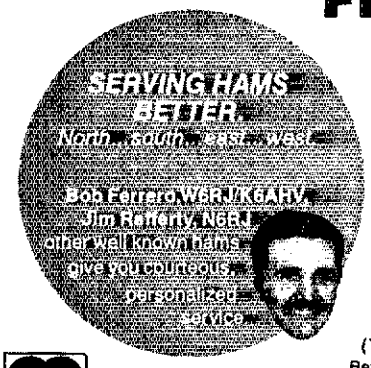

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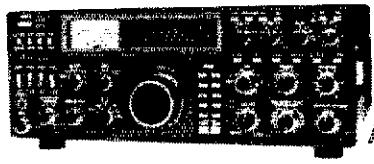

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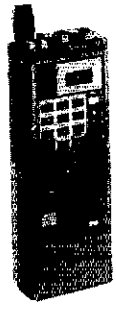
Amateur Net $1799.00

Superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

TR2500



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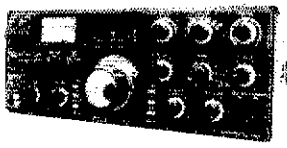
Amateur Net $329.95

Full stock of accessories available.

TS-530S



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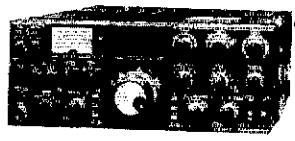
An excellent choice for the budget minded operator.

TS-830S

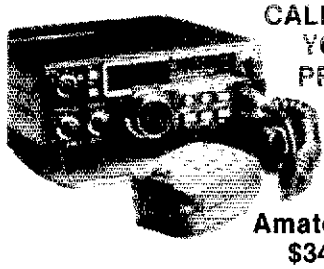


CALL FOR YOUR PRICE

Amateur Net $949.95

An outstanding performer.
Full range of matching accessories available.

TR-7730



CALL FOR YOUR PRICE

Amateur Net $349.95

An incredibly compact, 25W, 2M FM mobile transceiver with 5 memories, memory scan and band scan. With encoding microphone.

R-1000

SALE $369.00

with free ups surface

Amateur Net $499.95

Easy to operate communication receiver covering 200 KHz to 30 MHz.

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FT-208R

Full Stock of Accessories Available

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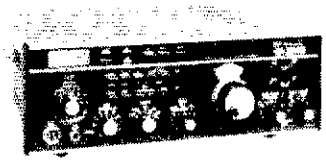
Amateur Net $359.00

DRAKE TR7 A



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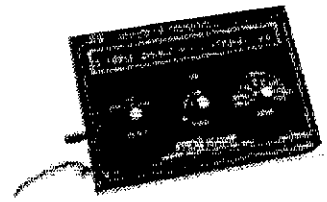
AEA 2M ISOPOLE SALE

- Achieve maximum attainable gain for a twin 5/8 wavelength antenna.
- Patterns independent of mounting or feedline length.
- Greater than 9 MHz band width.
- Completely weather protected matching network and RF connections.
- Easiest to assemble. Mounts on standard TV master (NOT SUPPLIED).

SALE PRICE $29.95
Amateur Net $39.95
Other models also available

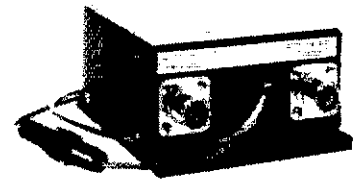
AEA mba READER



Morse, Baudot, and ASCII code reader with full 32 character vacuum fluorescent display

SALE PRICE $265.00
With Free UPS Surface
Amateur Net $299.95

MIRAGE B23 AMPLIFIER



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Automatic antenna change over
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ICOM SPECIALS

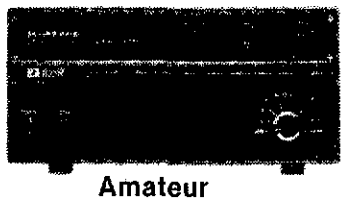
IC-730 THE AFFORDABLE MOBILE HF TRANSCEIVER

CALL FOR YOUR PRICE

Amateur Net $829.00

Truly an exceptional buy. Measures only 3.7"(H) x 9.5"(W) x 10.8"(D) Dual VFO's with 1 frequency memory per band. Covers 10-80M including the new WARC bands. 200W PEP input.

NEW! AT-500 AUTOMATIC ANTENNA TUNER



Amateur Net $449.00

No adjustments necessary when changing frequency or bands. Fully automatic. Compatible with IC-730 and IC-720A.

MINICOM IC-25A

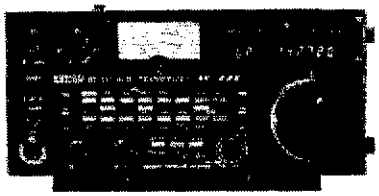
Full featured 2m FM transceiver in a very compact package. 25W too!

CALL FOR YOUR PRICE

Amateur Net $349.00

Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

IC-720A HF TRANSCEIVER



CALL FOR YOUR PRICE

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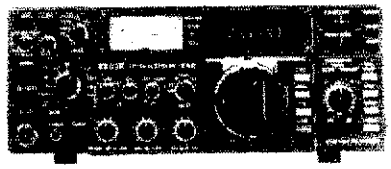
Available with all accessories

NEW FROM ICOM, IC-740

Extensive Versatility for the Serious Operator



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Contains the most asked-for features in a HF base station. 160 thru 10M amateur band coverage, 10-100W output. Many features including adjustable noise blanker, pass band, tuning, notch filter, adjustable AGC, squelch, optional FM and optional internal AC supply.

IC-3AT/IC-4AT

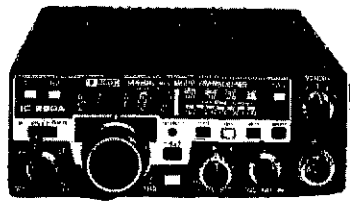
A 220mHz or 450mHz handheld based on the very popular IC-2A/2AT. Compatible with all 2A accessories. IC-3AT (shown) with 16 button encoder.

SALE $269.00

with Free UPS Surface

Amateur Net $299.95

IC-290A 2M ALL MODE TRANSCEIVER



SALE $429.00

Amateur Net $549.00

5 memories with priority and scan/squelch on SSB. Dual VFO's for FM operating ease. Encoding microphone included.

LIMITED TO STOCK ON HAND

THE VERY POPULAR IC-2A/IC-2AT

IC-2A
Am. Net $239.50
(Shown)

IC-2AT
Am. Net $269.50
(with encoder)

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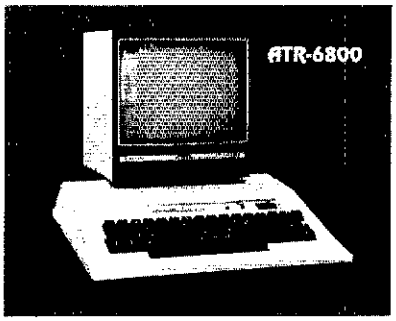
perience with public service events, fund raising walk/run-a-thons, civil war re-enactment weekend and weather service related contacts. Therefore, it is understandable that the procedures used during the tornado were the application of past experiences. The 2-meter repeaters in that area have negated the relative low density of hams by providing an easy interaction between clubs and towns. No matter what their profession, everybody has 2 meters in addition to their main rig. The variety of activities in the area serves as no boundary as to the limits of public service that they provide. Hats off to Southern Illinois Amateur Radio Operators and their leaders for the example that they set for the rest of the state. From all over the state the reports are flooding in, "hams provide public service" is the subject. The media tries to get the name of the club or organization correct but the result is the same. No matter who you are or what group you belong to, you will be always be hams. The CENDIS ARC provided comms for the canoe races, the Memorial Day boat races, and then had fun with the Tri-County Foxhunt. The Central Illinois ARC provided comms for the Special Olympics and Recreational run. WA9RUM was net control for the Cancer fund drive bike-a-thon. The Egyptian RC in Madison Co. provided comms during Diabetics Assn. Bike-a-thon and during the time that two barges ran into the Alton Dam. Grundy Co. ARES participated in a mock school bus disaster. KA9KKD reports that she offers full support to her OM during his improvements to the antenna farm. She mowed the grass around the tower the day before the antenna party, so that the tools and hardware could be found easier if they fell into the grass. In the process, she cut all the feedlines. He forgave her and spliced them together. Now, she won't complain any more for all the time he spends on working on antennas. Bulletins: WD9EBQ 266. Traffic: K9BVE 384, W9HOT 314, W9JIJ 101, N9DR 97, W9NXG 89, N9AJE 81, WB9WGD 73, W9TLU 70, W9OK 57, KN9BAM 50, W9HBI 39, W9KR 31, W9HLX 23, WD9EBQ 22, W9LNQ 21, WD9HZF 20, WD9CJB 18, K9EHP 16, K9ORP 14, WB9RLX 10, W9SSP 7, WA9RUM 6, KA9GJN 2.

INDIANA: SCM, Bruce Woodward, W9UMH – SEC: W9UMH. STM: W9JUJ. NMs: ITN-W9QYY; QIN-KJ9J; ICN-WD9CSZ; VHF-W9PMT; IWN-K9DCX; IPN-W9WKM.

Net	Freq.	Time/UTC/Dy	QNI	QTC	Sess.
ICN	3910	1330/2300	2083	264	62
QIN	3655	1430/0100/0400	704	372	92
ICN	3708	0015	74	21	30
IPN	3910	2130	984	99	31
IWN	3910	1310	1747		31

Hoosier vhf nets: QNI 5619, QTC 194, QTR 8036, bulletins 48 for 23 nets. D9RN 100%, 327 QTC in 60 sess. IN stns: W9JUJ K9CGS W9URQ KA9EIV KJ9J WB9MIK, 9RN QTC 572 in 1255 mins. In. stns: W9JUJ W9QLW W9EI N9HZ K9WWJ WD9GXW KJ9J WB9UYU WA9QCF KK9K. CAND 735 QTC in 31 sess. 100% IN W9JUJ KJ9J AB9A. Appts: ORS-N9AEI W9BDP W9DKP W9ENU K9FG WD9GXW K9KTB WA9OKK W9UPI W9URQ KB9WI W9ZW, ECs: W9VP, Carroll Co; K9UJK, Delaware Co.; N9AHP, Dubuise Co.; N9AM, Lagrange Co.; N9AJM, Marion Co.; WD9BHR, Pulaski Co.; K9LMH, Parke Co.; WD9BKA, Owen Co.; K9DGS, Clinton Co.; OO: K9LSB. QIN NM: KJ9J. SEC: WB9ZQE. Yes, I'm giving up the job after 8 years as SEC, two of them as both SCM and SEC. I hope that everyone supports WB9ZCE like they have me and that Indiana remains number one in public service. Silent Key: W9TGX. Additional news letter received this month from Red Cross ARC, edited by KB9HH and from RARA edited by KA9ABR. Thanks to WD9HII and the Fort Wayne RC for fine evening at their banquet. I enjoyed WB9WXL's program very much. Muncie and Wabash had fine hamfests this month. This month Illinois had severe tornado damage. WD9DVA and Evansville were lucky, but they worked hard this month as did the whole state. WD9DVA and I wish to thank KA9EIV WB9NOD and KA9FMD for their efforts. I appreciate WA9OKK's efforts in behalf of the Wet Net. Congrats to K9DCX for his National Weather Service Award. Congrats to WB9OTX for his help with medical emergency between Paraguay and Versailles, IN; Also, for his assistance to a fellow Hoosier who wintered at the South Pole. He ran weekly phone patches home. We seem to be very short of NCSs on 3910. Any volunteers would be appreciated. Traffic: W9JUJ 1045, W9FC 361, WB9WYU 215, KJ9J 189, W9QLW 159, KM9B 118, W9QYY 99, W9URQ 91, W9EI 82, W9UMH 71, K9FZX 68, KK9K 64, W9WKM 61, KB9HH 57, W9PMT 51, K9DCX 47, WA9QCF 41, KK9N 36, WA9YIF 35, WD9HII 32, K9WWJ 25, WB9AWI 24, WB9MIK 24, W9JZV 21, KA9FFO 20, WB9ZQE 20, N9AEI 19, WA9OKK 18, N9PS 18, W9UEM 18, N9CQS 16, KK9D 16, WA9OHX 14, WB9YAY 12, N9AST 7, W9BDP 7, W9DKP 7, WD9DWD 7, WD9EXI 7, W9UPI 6, K9OUP 3, W8LKU 2, W9RTH 2, WD9EPU 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI – SEC: W9OAK. STM: K9UTQ. BWN 3984 1115Z QNI 1211, QTC 1382 WB9YPY. BEN 3985 1700Z QNI 641, QTC 144 WB9ESM. WSBN 3985 2200Z QNI 918, QTC 369 WD9ESZ. WNN 3723 2300Z QNI 148, QTC 16 KA9HPQ. WSSN 3845 2330Z QNI 165, QTC 40 N9BYK. WIN-E 3662 0000Z QNI 367, QTC 183 W9YCV. WIN-L 3662 0300Z QNI 307, QTC 117 K9LGU. XPO 3925 1731Z QNI 290, QTC 31 W9AKY. NWTN .34/.94 2330Z QNI 615, QTC 49 WB9YPY. Gr. Bay .72/.12 0145Z Tue. QNI 10, QTC 1 WB9NRK. WCWTN .31/.91 2330Z QNI 395, QTC 36 N9AUG. New Novices Madison area KA9MNG KA9MQR KA9MTV KA9NAT. N9BMP WB9QCY and WB9TOC are receiving Electrical Engineering degrees. New officers U.W. Madison Badger ARS are: WB9PYE, pres.; AC9C, v.p.; WB9VJU, secy.; KA9BZK, treas.; WB9YSE, station engineer; N9BMP, elected life member. We welcome WA9YVC back from Arizona. W9YCV had his first cw QSO through OSCAR 8 with N2AA. Four members of WARAC have DXCC: N9AU W9YCV KA9AAB K9WTF. Vice Director K9EN presented Certificate of Affiliation to Northland ARC at Ashland and to Flabeau ARC at Phillips. BWN certificates to WA9OAY KA9JUX WA7GSM KA8FJD N8BMC WA9WCZ N9AFZ. Sorry to report K9THR a Silent Key. KA9HOW is now KN9U. BPL to KA9CPA. (Hamtrix) Traffic: KA9CPA 2180, WD9ESZ 449, WB9YPY 281, W9CXY 228, W9YCV 253, K9GDF 171, K9FHI 165, KC9KQ 129, WD9FRI 128, W9UCL 89, N9BYK 87, W9IEM 79, W9DND 67, WA9WYS 63, KA9HPQ 59, W9KTG 58, KA9IKR 56, WB9ESM 53, W9CBE 51, W9LDO 48, WB9ICH 45, N9AUG 43, K9UTQ 43, K9HDF 42, AG9G 39, WB9JGA 36, N9BDL 35, WB9JSW 35, W9IHW 34, K9JPS 34, K9AKG 33, KB9NG 33, N9BCX 32, KC9GW 32, W9SO 32, WA9YVC 30, WA9ZTY 30, KG9B 29, WB9PKL 27, WD9BKT 25, N9DCF 25, KB9GO 25, K9ANV 24, N9ATP 23, KA9GYD 21, WB9NRK 20, W9FDY 19, WD9IMZ 19, W9SFL 19, KA9IHR 15, N9CP 11, W9UW 11, KB9FM 10, WD9DNQ 8, KE9C 7, WB9LKC 7.



MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION

AMATEUR RADIO COMMUNICATION AT ITS FINEST

Both Systems Provide

• SIMPLE DIRECT CONNECTION to your Transceiver. • COMPLETE SYSTEM, built-in Demodulator & AFSK Modulator with keyboard programmable tone pairs. • SPLIT-SCREEN operation with keyboard selectable line location. • LARGE, TYPE AHEAD text buffer. • TEN, programmable message memories, plus ID's WRU & SELCALs. • RANDOM CODE generator & hand key input for practice. • Baudot 60 to 132 WPM. • ASCII 110 & 300 baud. • SYNC-LOCK MODE for improved ASCII operation. • RECORDER INTERFACE FOR "BRAG-TAPE" or recording off-the-air. • CODE CONVERTED Printer output in Baudot or ASCII. • SSTV/GRAPHICS transmit. • FULL 63 KEY Computer grade keyboard.

You won't find as much well thought out programming, circuitry, and features anywhere, at any price! The ATR-6800 combines the best of both worlds, an easy to use video system for CW/RTTY/SSTV with automatic station control and a stand-alone computer with expandable memory & full instruction set in Motorola assembly language. Add the BASIC language option package and you'll have the unique combination of an RFI proof computer and ultimate RTTY/CW HAM station. And don't forget "easy to use." All of us at Microlog are RADIO ACTIVE on RTTY, so there's a lot of personal attention to detail and ease of operation. "Stick-on" command listing and video status display will get you on the air quick and sounding like a pro.

There's a certain thrill to using efficient, reliable digital communications equipment on the air. That's the fun of RTTY. Spice up your Amateur Radio operation with the silent video system that does it all, the Microlog ACT-1. Even if you own a home computer and are considering an outboard interface/program, remember, we've put it all in one RFI tight enclosure that's ready to go as soon as you power up. And, with the "Battery-backed" memory option, you won't even lose your pre-programmed messages if there's a "blink" in the A.C. The ACT-1 has features that the competition doesn't even have on the drawing board! Check for yourself, you could spend a lot more and still come up short.

ATR-6800 vs ACT-1

The most often asked question we hear is "What's the difference between the ATR & the ACT-1?" The ACT-1 is a dedicated system for RTTY/CW/SSTV. It provides all the functions and features you need for a multi-mode station. Along with this superior "ON-the-AIR" performance, the ATR-6800 extends your operation into the realm of automatic station control and computer programming. Plug-in applications modules expand the ATR's memory to add new HAM oriented programs which are enabled by simple keyboard commands. By adding the BASIC option package, you'll have pre-programmed full community mailbox, contest dupe sheet, personal station log, message editor, BASIC computer language and 16k of battery-backed (non-volatile) memory. We also provide a subroutine list so that you can write programs to directly control the ATR-6800 in easy to use BASIC language. The ATR-6800 then is the expandable, "do everything" system where your imagination is the only limit! The ACT-1 is designed for the HAM who needs the essentials of a complete video system for digital communications.

TECHNICAL SPECIFICATIONS ATR-6800 & ACT-1

INPUTS

Speaker Audio	100mv min.
Digital	TTL, Keyer, Hand Key
**RS232	± 12V, 330 Ohm Source

OUTPUT TO TRANSMITTER FOR CW/RTTY/SSTV

+ Voltage Keying	+ 40VDC @ 300ma Max.
– Voltage Keying	-150VDC @ 50ma Max.
**Mercury Relay	200VDC or 2 amp @0VA Max.) N.O. & N.C.
T/R Change Over	ATR — Relay ± 30V @ 2 amp N.O. & N.C. ACT-1 — Transistor + 12VDC @ 300 ma. GND on XMT
AFSK Tones, Range	Keyboard Programmable 600 Hz to 3000 Hz
AFSK Tones, Level	Mic Compatible 30-50mv Audio
Slow Scan	Mic Compatible Audio, Sync 1200 Hz, Black-1500 Hz, White-2300 Hz

MISCELLANEOUS CONNECTIONS

RS 232	± 12VDC, 330 Ohm Source Impedance, Negative Mark
Printer Driver	ATR — • Hi-speed RS-232 upto 2400 Baud • Slo-speed Baudot & ASCII Floating Relay for Current Loop Switching ACT-1 — • Slo-speed Baudot & ASCII Transistor Switch + 40VDC @ 100 ma. • Optional Hi-speed ASCII RS232 @ 2400 Baud.
Tape Recorder "Brag Tape"	Mike ≈ 100 mv Audio Speaker ≈ 200 mv Audio
Scope	Horizontal and Vertical Outputs to Scope for RTTY Tuning Aid
Morse Speed Tracking	Automatic or Speed Lock

VIDEO OUTPUT
1 Volt Peak to Peak, Negative Sync Composite Video (American Standard) European standard available upon request.

VIDEO FORMAT

Normal	24 lines, 40 characters per line
Zoom	12 lines, 20 characters per line
Black on White or White on Black	Keyboard selectable
Display Split Screen	Any location Line 0 (Off) to Line 20, Keyboard selectable
SSTV	3 lines, 6 characters per line + graphics

TEST MESSAGES: Quick Brown Fox and RYRY's in Baudot, U*U* in ASCII, VVV in Morse.

SYNC: Transmits "Blank-Fill" in RTTY and ST in Morse when text buffer is empty and unit is in transmit. Keyboard command on/off

UN-SHIFT on Space: Automatically shifts back to "LETTERS" upon receipt or transmission of space. Keyboard command on/off.

REAL-TIME CLOCK: Keyboard set, always on screen display, hours, minutes, seconds. Can also be inserted in transmit text buffer by keyboard command

WORD WRAP AROUND: Prevents splitting words at the end of a line. Works in receive as well as transmit.

CODE PRACTICE: Random 5 char generator sends at any speed you set via the keyboard. Hand-Key input allows use in code practice oscillator that will also read your sending!

STATUS DISPLAY can be called up to show the condition and control commands for 20 programmable parameters, such as AFSK tone freqs, UNOS, printer, etc. Useful as a 'HELP' command in case you misplace the manual. There's also a constant "TOP-LINE" display of Time, Mode, Speed, & Code in use.

DETECTION MODES

Direct	Phase correlation detector with AGC controlled bandpass filter (100 Hz nominal width — 800 Hz center frequency)
Demodulator	Computer program enhanced dual tone demod. Primary tones fixed @ 2125/2295 Hz, Secondary tones variable @ 500 — 3000 Hz.
**Terminal	RS232 compatible half duplex or full duplex up to 9600 Baud

DATA RATES

Morse	5-199 WPM Keyboard selectable in 1 WPM steps Auto speed tracking or speed on receive
Baudot	All standard 45, 50, 57, 74, 100 Baud (60, 66, 75, 100 and 132 WPM)
ASCII	110 & 300 Baud normal & synclock using Internal Modem. ATR adds speeds up to 9600 Baud.
Slow Scan	8 seconds per frame

OUTPUT OPERATING MODES

Symbol	Character ouputs when typed
Word	Words sent after "Space Bar"
Line	Line sent after "Return"
Buffer	Send entire contents of text buffer

TUNING INDICATORS

Audio Ref. Tone	800 Hz Keyed Regenerated
Visual	LED on Mark (Keydown)
Scope	Tuning ellipse for RTTY

PROGRAMMABLE MEMORIES

Here is:	10-40 character messages (400 total) or *10-80 character messages (800 total) battery backed
ID:	15 characters maximum in standard ID and 17 in RTTY ID
WRU:	Up to 15 characters
Selective Call:	ATR — 4 memories, up to 15 characters each. ACT-1 — 2 memories for printer on and printer off

COMPUTER CAPABILITY

Memory	Standard unit has 4000 bytes of RAM for user program. Basic package adds 16K.
Language	Basic or Motorola M6800
Commands	Input; Output; Load; Go with Break Point; or Normal Basic
Tape Interface	Store Programs on Audio Cassette

POWER
115 VAC, 60 Hz 60 VA Max, Act-1, 30 VA Max (230 VAC, 50 Hz optional)
12 volt version available
External input for charging expanded battery backnd memory. 8-15VDC @ 10 ma. max.

MECHANICAL

ATR-6800:	
Size	14¼"W x 12¼"D x 4"H
Weight	15 lb.
ACT-1:	
Size	17.8 W x 3H x 9.5D
Weight	7 lb.
ATR-6800 & ACT-1:	
Color	Beige Top, Black Base
Material	AL5052 Aluminum Alloy

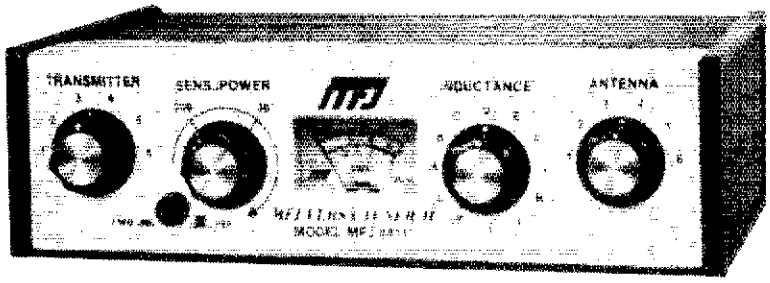
*Standard on ATR, Optional on ACT-1
**Standard on ATR, Not available on ACT-1

MICROLOG CORPORATION —18713 Mooney Drive—Gaithersburg, MD 20879 (301)258-8400

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER

MFJ-900

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

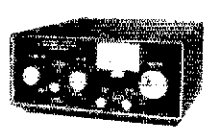
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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- **Products ordered from MFJ are returnable within 30 days for full refund (less shipping).**
- **Add shipping & handling charges in amounts shown in parentheses.**

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MFJ ENTERPRISES, INCORPORATED

Box 494, Mississippi State, MS 39762

MFJ Super Keyboards

5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, ORZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII, 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, + 300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded, RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1¼"H (front) x3½"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+ $3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+ $3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+ $3).

110 VAC ADAPTER. $7.95 (+ $3).

BENCHER IAMBIC PADDLE. $42.95 (+ $4).

A PERSONAL TEST-

Give the MFJ-496 or MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC, or mail check or money order for **$339.95** for MFJ-496, **$279.95** for MFJ-494, **$39.95** for MFJ-53 AFSK module, **$29.95** for MFJ-54 Loop Keying module, **$29.95** for MFJ-61 Clock module, **$7.95** for the 110 VAC adapter and **$42.95** for Bencher Paddle. Include $5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today.

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Box 494, Mississippi State, MS 39762

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: KNØJ. STM: ADØS. ASCM: KCØT. Congrats to the following upgrades: NØDUQ KAØHLW NØDTR KAØNFF. General; KCØNF WBØNZB KCØHR, Extra. Congrats to the Duluth ARC for a fine Swaptest and to the St. Paul ARC for putting on a very successful Swapfest. Hope all had fun. The weather net will take July & Aug off. See them in Sept. New officers for St. Paul ARC: WBØWIQ, pres.; WØKMR, v.p. They have picnic set for Aug 1. The Faribault swapfest set for June 16.

Net	Freq.	Time	QNI	QTC	Mgr.
MNWX	3929	6:15	496	353	WDØCGM
MSPN/E	3929	5:30	1065	145	KCØT
MSN/1	3685	6:30	296	82	WØDM
MSN/2	3685	10:00	141	54	KØJCF
MSPN/N	3945	12:10	565	40	WAØAIN
MSSN	3710	7:00	101	9	WBØWXU

Traffic: WAØTFC 406, WBØHOX 261, WØHZU 170, KAØJUX 157, WØDFX 129, WDØCGM 102, KAØIAQ 99, KAØEPY 98, ADØS 72, WØDM 67, KCØNF 54, NØCLS 51, KØJCF 50, WØGRW 48, WØISJ 48, WBØNZB 44, WAØAIN 35, WDØBGS 23, KAØHLF 20, WØMFW 15, WBØBIN 15, WAØYVT 14, WØDUW 13, NØJP 12, KAØJQO 9, NØDUQ 8, KØIR 8, KNØJ 7, WBØWXU 6, KAØARP 5.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. ORS: WØCAQ. NM: WAØCRH. Williston ARC: KØAYS, pres.; KBØLD, v.p.; KØRDF, secy/treas. UND Sioux ARC: KAØMMH, pres.; NØDLT, v.p.; NØND, secy/treas. Peace Conference Special event was held April 16-18 with 375 QSOs. Congrats to new Novices of BARK ARC: KAØs NTZ NUA NUB NUC NUD NUE NUF NUG NUH NUI NUJ NUK NIP. New hams of Minot are: KAØs NYP NYN NYO K6JWI. North Dakota Slow Speed CW Net (NDSN) is scheduled to start Sept. 4 at 2300 UTC on 7.145 MHz at no faster than 10 wpm. Net manager is KD4PS of Minot. Our sympathy to family of WBØDLP. Best wishes to NØBQY and his new XYL. N3CRM is now NØDSR. AEØY has been assigned to another USAF base. See you all at ARRL Dakota Division Convention Sept. 17-19 at Moorhead MN.

SOUTH DAKODA: SCM, Erwin C. Heimbuck, KØOTZ — Well, the results are in and I congratulate KCØOO for accepting the position of SCM. I hope that you will give him the same fine support that I received from the majority of you out there. I also congratulate WØKJZ for her support thru all of my trials and omissions. I have never intentionally slighted anyone, however, I am sure that there have been omissions. WØKJZ has been very active as an Official Bulletin Station, and has not missed PSHR once since I have been SCM. Net reports were received from NMs KØTVJ WØKJZ WAØVRE and WØHOJ. I thank them all for their activity and support. I have enjoyed my tenure as SCM, however, I wish I had more time to devote to it. I wish KCØOO the best of luck. 73, Erv. Traffic: WØHOJ 169, KØAIE 107, WØKJZ 65, WAØVRE 60, WØMZI 43.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC: WB5IGF. MARC had special events station at Riverfest. Clinton RC has new Novice classes. Tune in on 146.34/.94 for severe weather info. MARC was 1st in phone multiop November Sweepstakes. Hope everyone had a good Field Day. NWAARC held mock disaster June 15 at Fayetteville. NWAARC also held FB hamfest in Rogers on May 15. CAREN provided comms for Boat Races in Little Rock on May 31. W5KL has new rptr tower up 90 feet. Razorback Net 1,000 checkins, 51 QTC, 513 mln. OZK 105 checkins, 14 QTC, 336 min. Mockingbird 685 checkins, 22 QTC, 9 hours. Ark. Phone Net 562 checkins, 39 QTC, 1023 min. Traffic: W5AZJ 65, W5TUM 53, W5QFU 47, W5UAU 12, W5KL 10, W9YCE 6.

LOUISIANA: SCM, John Meyer, N5JM — ASCM: KC5SF. STM: W5GHP. Looking for a spot with a late summer hamfest? Consider Shreveport where fun and fellowship join hands on Aug. 7 & 8. Further south, the USS Kidd, a new permanent river attraction, is docked safely, thanks to the BRARC. Federal budget cutbacks will limit future FCC license exams at hamfests, so make other plans. Welcome to these new Novice grads: KA5s: NHS NHT NHU NHV NHW NHX NIH NII and OBR. Why not check into the LSN and build your code speed? WA4MUW is new DEC for the Troop D parishes. Any other volunteers? Thanks to Congressman Tauzin for his support on HR 5008 which improved RFI standards in consumer electronics. Goodbye TVI? The DDXA is learning how to hunt and peck with the aquisition of nine Apple II computers. KB5AS now DXing QRP style since his 4-1000 died. K5TL is gone fishing for the summer, and KC5SF is running LAN til they stop biting and K5TL returns.

Net	Freq.	Time	Mgr.
LAN	3815	7 & 10 P.M. Dy	KC5SF
LTN	3910	6:30 P.M. Dy	N5ANH
LSN	3703	7:30 M-F	WD5CWK
LRN	3587.5	6:30 P.M. Sn	W5GHP

Traffic: W5LQ 194, W5GHP 187, K5TL 174, KA5HDT 146, KC5SF 128, W5VMY 81, WB5LBR 69, WA5TQA 47, N5ANH 40, AC5R 29, WD5CWK 14, KD5MA 11, K5WOD 11, WA4MUW 3, KB5AS 1.

MISSISSIPPI: SCM, Paul Kemp, KW5T — SEC: K5QNE. STM: KB5W. Freq Coord.: WD5DCI. New repeater on in Yazoo City on 146.03/63. Week of June 21-27 proclaimed Amateur Radio Week to coincide with the state proclamation. FCC was well received in Jackson this month. Several upgrades. The ones at press time are: Advanced W5TKX and KA5ERI. Congrats to them and to all others who made it. Looking forward to good results on Field Day this year. CAND (W5KLV) sess 31, QTC 735 MS rep. 100%. DRN5 (WB5YDD) sess 31, QTC 472, MS rep. 100%. MTN (K5OAF) sess 31, QNI 152, QTC 67. MSBN (WD5EYM) sess 31, QNI 2162, QTC 89. MN (WB5RMW) sess 30, QNI 583, QTC 20. CAEN (KA5AGD) sess 5, QNI 113, QTC 3. GSEN (KB5W) sess 21, QNI 176, QTC 36. MSN (KA5GGG) sess. 17, QNI 79, QTC 17. Traffic: N5AMK 483, KB5W 475, K5OAF 163, W5HKW 95, W5LSG 30, W5WZ 28, KD5P 20.

TENNESSEE: SCM, John C. Brown, NO4Q — STM: K4YOL. SEC: K4TKQ. It is appropriate at this time to note in this section that the SCM has indicated to President Clark, W4KFC, of ARRL that the Tennessee section will change to the new Section Manager concept with the 1983 year rather than at the end of the current term. That will mean that there will be six new positions for appointment on the section staff. The job description of the new positions are found on page 54 of the June, 1982 *QST*. New blood is needed in these new positions. The end of the "N" call for section extra calls is about on us? Where next? Keep up the fine work, fellows. The DX bunch

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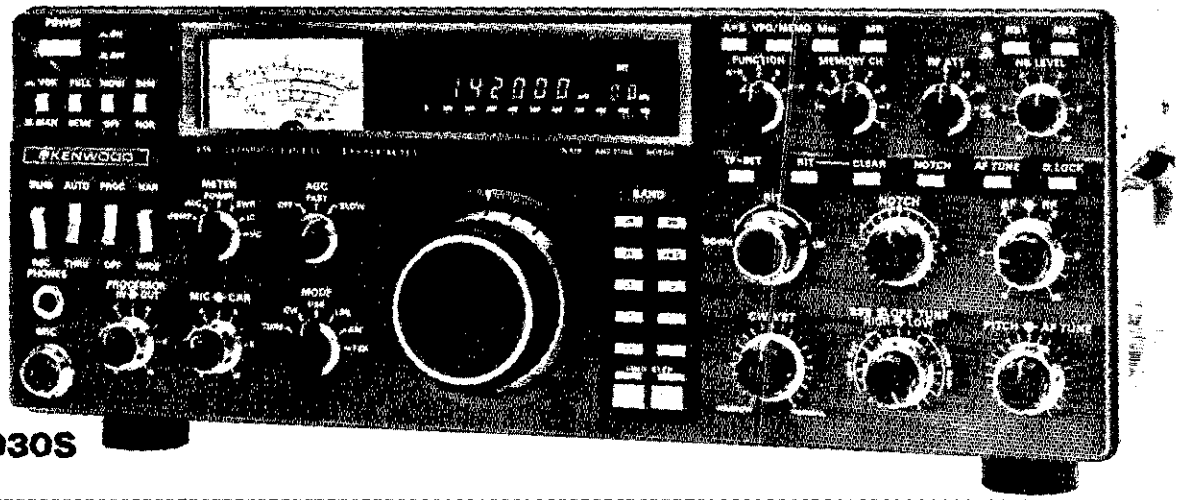

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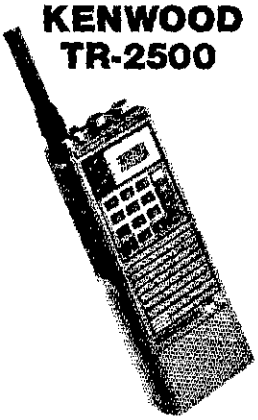

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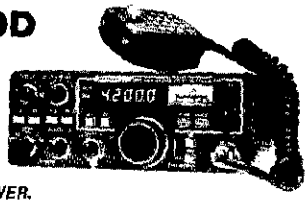

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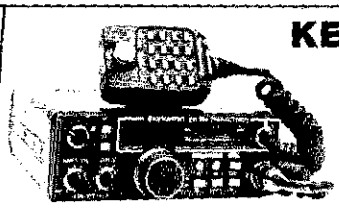

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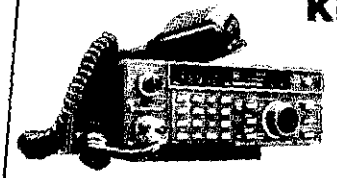

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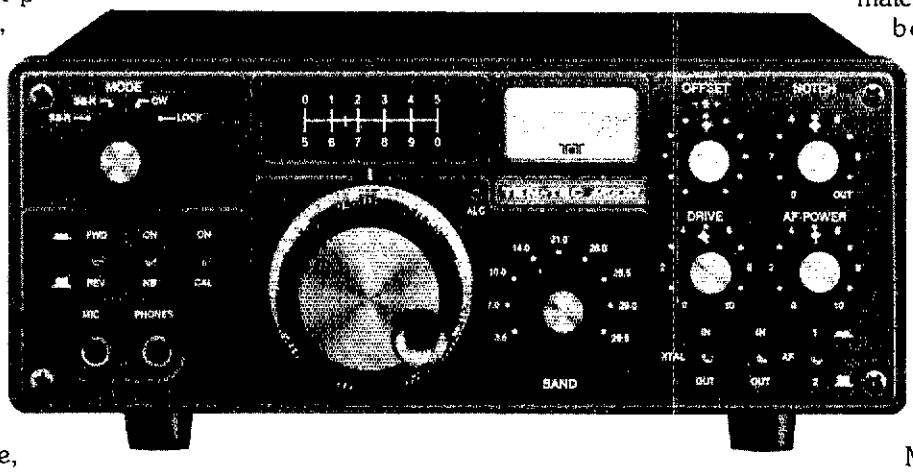

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should look at the W1AW bulletins on Friday UTC for all the latest info for new places and countries. The TSN Honor Roll for the month is: N4EAM N4EFB N4GJK NG4J KA4PWU WA4UCE WB4YSN. The section had a total of 2304 traffic count on station activity. The champ of the traffic was NG4J with over 1/2 the total, 1322. Come on, fellows and gals. Section traffic: LF sess. 91, QNI 3907, QTC 228; VHF sess 128, QNI 2872, QTC 573; CW sess 56, QNI 498, QTC 199; RTTY sess 30, QNI 60, QTC 7. We need more people to try their hands on the cw and RTTY modes of operations. There were six nets that did not turn in reports. You are cheating yourself and net members when no report is made. If you are going to the World's Fair, make plans to spend some time and operate the WA4KFS station. Have current copy of the ticket to show of "NO". Traffic: NG4J 1322, W4WXH 374, W4OGG 159, W4ZJY 116, W4DDK 59, N4DZW 56, N4EFB 30, KA4BSG 28, KE4OL 23, WD4SIG 22, NM4W 22, W4PFP 21, WB4TDB 18, WD4GYT 15, WA4GLS 10, W4RUW 9, WD4EKA 8, W4EWR 6, W4TYV 5, W4PSN 4, W4DPO 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: WA4UQA.

Net	Freq.	Time/Day	QNI	QTC	Sess.	Mgr
KRN*	3960	0630 M-F	534	44	22	WA4IUW
MKPN*	3960	0830 Dy	1136	113	31	WA4JTE
KTN*	3960	1900 Dy	917	109	31	WD4BSC
KNTN*	3727	1900 Dy	296	75	41	KB4OZ
KYN*	3600	2000 Dy	178	72	31	K4JLX
KSN*	3600	2200 Dy	212	97	31	KC4WN

*All nets NTS. Other public service nets reporting were: BARES CCEN CARN 4ARES 5ARES 6ARES 11ARES 13ARES PAWN KPON PAEWTN SEKEN TSTMN LCARES 3ARES, for a total of 165 sess., 218 QTC, 2600 QNI. New appts: ORS:WA4EFG WD4IYI WD4IYH KA4SKV WA4YPQ K4AXE. PSHR: KD4TY NW4P KA4GFU KA4BCM KB4OZ N4ELP WD4BSC KA4SAA WA4JTE. WA4SAC now has new EXTRA ticket and DXCC. NW4P is QRL at Morehead Univ. River Cities ARC will operate from three states on Aug. 28. Traffic: WA4JTE 153, KA4MZY 129, NW4P 113, KA4GFU 92, KC4WN 88, KA4SAA 81, KB4OZ 74, WB4APC 72, WD4BSC 65, KZ4G 54, KA4BCM 49, WD4IYI 46, K4HOE 41, K4MHL 41, W4WQV 34, KD4TY 30, WB4AUN 25, WA4AGH 22, WA4YPQ 22, W4PKX 21, KS4V 19, WD4CJQ 17, WA4JAV 17, WA4SWF 16, N4ELP 15, WB4ILF 15, WA4AVV 14, N4GD 13, WA4GAL 12, KA4SKV 12, NN4H 9, K4AXE 8, WD4CQF 8, KA4MBF 8, KA4GBZ 6, NZ4L 6, WA4SAC 6, WA4UIV 6, WD4IYH 5.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: WD8RHU. DECs: K8BTH N8CUH WD8MBB K8RCT W8VWY. NMs: WA8DHB N8DSW K8LNE K8KMQ WD8LRT WA8PIM W8SCW WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	QTC	Sess.	Mgr
QMN*	3663	1800 Dy**	1065	392	93	WA8PIM
MITN*	3953	1900 Dy	623	288	31	WD8LRT
GLETN	3932	2100 Dy	993	104	31	WD8LSV
MNN*	3722	1730 Dy**	365	103	62	N8DSW
MACS*	3953	1100 Dy**	539	93	31	K8LNE
UPN*	3922	1700 Dy	617	81	38	WA8DHB
WSSBN	3935	1900 Dy	405	31	31	WB8SUR
BR	3930	1730 M/S	331	19	26	WB8ZGP
MEN	3930	0900 Sn	168	14	5	WB8ZGP
TASYL	3922	1900 M	42	5	5	KM8E

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. Vhf nets 6 rpts, QNI 583, QTC 10, sess. 34, mgr WD8NKT. 3932 is MI emer. freq. Traffic Workshop Sn 3953, 1600. ARES net Sn 3932, 1730. Silent Keys, with deep regret: KB8CA, WA8ASK. OO reports: WB8IKJ AC8Y. Welcome to new DEC K8BTH, who takes the place of retiring KC8DN as head of SEMICO, our "original" multi-county NWS/SKYWARN organization. Congrats to new Extras KC8EO and WD8IBY, and to new Novices KA8s PFL PFM PFN PFS PFR PFQ and PNX, all from Branch Co. WD8RNQ is now KV8U. WA8DHB reports upgrades in the U.P.: to Tech, KA8KDN; to Advanced, KA8CEO WA8HJM WD8OII WD8ORQ WD8OWA; to Extra, KC8KG W8MAR; and new Novice, the bride of U P. DEC K8RCT, is KA8PCC. New ORS appointments: N8DSW N8DTZ K8KQJ. BRARC member KB8LU is writing the monthly SSTV column for *Worldradio*. I'm getting many questions based on K1ZZ's article on the upcoming League reorganization (June, 1982 *QST* pg. 53). Yes, Michigan will be among the first to adopt the modernized volunteer organization structure, beginning Jan. 1, 1983. To be able to be a part of the beginning of this long-needed, well and carefully planned reorganization is a once-in-a-lifetime opportunity, one which I welcome, as should any member who cares deeply for the League and for Amateur Radio. Can you see yourself in this new picture? A few of the new leadership assignments already have been filled, at least tentatively. However, I would welcome inquiries from all qualified persons who might wish to serve under the new structure. These are exciting times. It always has been *your* League, but soon it will become much more so. Traffic: KA8CPS 346, WD8LRT 262, N8DTZ 179, K8KMQ 170, N8DSW 149, AF8V 142, WA8PIM 137, WB8MTD 127, K8KQJ 119, WD8RHU 114, WD8MJB 99, WB8YRY 98, WB8YDZ 93, K8JXV 90, N8BNC 84, WA8DHB 79, KB8MX 78, W8IHX 67, WD8IBY 63, W7LVB 61, KV8U 58, W8PDP 57, W8SCW 53, W8VPW 51, W8TBP 46, K8LNE 45, W8ECK 42, K8OCP 41, WD8EIB 40, W8VIZ 37, W8YIQ 34, KS8P 29, W8QHB 27, KA8NCR 24, N8BBY 23, K8KCF 23, WD8DEP 23, KB8GT 22, KE8X 22, K8UPE 16, WB8DJS 15, WB8JXJ 15, KT8G 14, KU8H 13, KI8O 12, W8SIW 10, W8LDS 9, WB8ITT 7, W8RNQ 7, W8URM 7. WD8JQL 6, W8JUP 6, K8ZJU 6, WB8TPM 3, W8LOU 2, KF8M 1. (Apr.) W8IHX 80.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW WA8DYX W8EK WA8GMT KF8J WD8KFN WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	343	208	62	6:45/10 P.M.	3.577
BNR	187	51	29	6 P.M.	3.605
ONN	---	---	---	6:30 P.M.	3.708
OSN	160	85	30	6:10 P.M.	3.577
OSSBN	2366	1022	93	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
OSSN	213	94	31	6:45 A.M.	3.577
O6MN	477	19	29	9:00 P.M.	50.160

Our gratitude goes to SEC K8AN and his panel, WB8JGW K8JE and N8COU (plus the youngest speaker, N8COU's 7-year-old son), for an outstanding ARES forum at the 1982 Dayton Hamvention. K8AN so outdid himself with doorprizes that even I won one — a club jacket from Cincinnati. I'll certainly stand out amongst my area's red, yellow and blue club jackets with my new Cincy orange. Nice to hear Mt. Vernon again on OSSBN

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153BAS 3el 15m	$68.80
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KLM antennas may be shipped from California or Texas, Freight Collect. Most require truck shipment. Call for details.

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5BTV 5 band trap vertical ... $99.00

Mobile antenna resonators:

	std	super
10m	$10.00	$15.00
15m	$10.00	$15.00
20m	$12.00	$18.00
40m	$15.00	$21.00
75m	$17.00	$32.00
BM-1 bumper mount		$16.95
MO-1 fender mount mast		$22.36
MO-2 bumper		$22.36
CGT-144 2m colinear w/mount		$46.70

SANTEC ST-144μP

August Special $285.00

SANTEC Accessories In Stock

YAESU FT-102

CHECK OUR SUPER PRICE

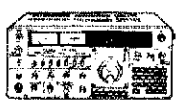
CALL!!

The Newest in Competition Grade Radios.

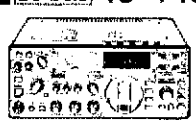
FT-ONE

Top of the Line

It's what the Competition is trying to Equal!



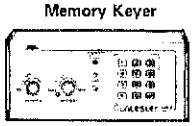
ICOM IC-740



The NEW I-Com Transceiver

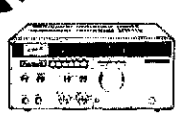
AEA CKZ

The Serial Number Memory Keyer



Other AEA Products Available

KWM-380



CALLING AND CAN'T GET THROUGH?

In their infinite wisdom, the phone people require that we have twice as many lines as people to answer them. Just be patient and try again later; we aren't going belly-up any time soon. Also, we can't keep someone down here to answer the phone at night or on weekends, and we're too busy to answer the WATS on Saturdays.

TEXAS FOLKS

Please note that we're open until noon on Saturdays just for you. Visitors are welcome, too. We're in Keystone Park Shopping Center, across from Texas Instruments. Look for us under our two towers.

TELREX ANTENNAS

WARNING: These antennas are not for the faint of heart. They are heavy. They are large. They are expensive. **They also work.** These antennas require truck delivery and come in large boxes.

	WT.	Area
10m523 5el 10m beam	64lb.	4.5
10m636 6el 10m beam	86lb.	6.0
15m532 5el 15m beam	95lb.	10.0
15m845 5el 15m beam	140lb.	14.0
20m436 4el 20m beam	108lb.	12.0
This is a custom antenna.		
20m536 5el 20m beam	113lb.	13.5
20m546 5el 20m beam	n/a	n/a
This is a custom antenna.		
20m646 6el 20m beam	176lb.	17.0
40m329 3el 40m beam	110lb.	12.6
40m346 3el 40m beam	177lb.	13.8
T85EM 5el tribander beam	49lb.	7.0
T86EM 6el tribander beam	85lb.	10.0

Call for pricing – F.O.B. Dallas.

ROHN TOWER

25G 10 ft. section	$40.50
45G 10 ft. section	$91.90
25AG4 top sec., req. bearing	$54.00
45AG4 top sec., req. bearing	$103.00
GA25G guy bracket with bars	$22.00
GA45G guy bracket with bars	$43.00
SB25G short base section	$19.00
SB45G short base section	$43.00
EP 2534-3 3 hole equalizer plate	$9.95

Self Supporting Towers

HBX56 56 ft. self support	$336.00
HDBX40 40 ft. self support	$249.00
HDBX48 48 ft. self support	$305.00

Our BX series towers include the base stubs. Beware those who charge extra for them. Also, freight collect from Dallas may save over freight pre-paid because of varying distances and routing. Drop ship or factory pick-up prices may be higher due to factory pricing policies. West Coast/Rocky Mountain prices may be 10% higher depending upon shipping point. Call for firm quote before ordering.

ROHN FOLD-OVER TOWERS

FK2548 48 ft. 25G foldover	$699.00
FK2568 68 ft. 25G foldover	$869.00
FK4544 44 ft. 45G foldover	$981.00
FK4564 64 ft. 45G foldover	$1170.00

Freight prepaid on foldover towers. Sales tax may be applicable in some areas. West Coast/Rocky Mountain prices 10% higher.

HY-GAIN CRANK-UP TOWER

HG-52 SS 52 ft. self support	$777.50
HG-54-HD 54 ft. self support	$1287.50
HG-70-HD 70 ft. self support	$2187.50

Above shipped from Lincoln, NE. Sales tax required in some areas, freight collect on some items. Call for details on these and other Hy-Gain items.

PHILYSTRAN GUY CABLE

This is RF transparent, sun resistant, guy cable. Avoid those hours of putting insulators into steel cable. Enjoy the advantages of freedom from unwanted resonances that can soak up your radiated RF energy.

HPTG 4000 4000 lb. test cable	$.44/ft.
HPTG 6700 6700 lb. test cable	$.60/ft.
9901LD potting head	$4.99
9902LD potting head for 6700 lb.	$5.49
Socketfast potting compound	$9.00/pt.

TOWER HARDWARE

3/16" EHS steel guywire	$.12/ft.
1/4" EHS steel guywire	$.15/ft.
3/16" ccm cable clamp	$.29 ea.
1/4" ccm cable clamp	$.39 ea.
3/8 x 6" TBE&E turnbuckle	$5.39
1/4" th thimble	$.24 ea.
3/16" preformed guy grip	$1.75
GAS604 screw anchor	$12.00
GAR604 concrete guy anchor	$12.00
M200H 2" x 10' steel mast	$37.00
500D guy insulator	$.85
502 large guy insulator	$1.80

Note: Some items too large for UPS shipment. Call before ordering to check shipment mode.

HY-GAIN PACKAGE # 1

TH7DX ... 7el Tribander
HG 52SS ... Self Supporting Tower
Ham IV ... Rotor
COA ... Coax Arms (3 Furnished)
HG-10 ... 10 ft. steel mast
HG-TBT ... Thrust Bearing

Your Price!!! $1,381.00
FREIGHT PRE-PAID!!!

May require 4 to 6 weeks delivery. Sales tax may be applicable in some states. Shipped from Lincoln, NE. Cashier's check or money order in advance required—no credit cards. Sorry, no substitutions on this package.

HY-GAIN PACKAGE # 2

HG-52-SS ... 52 Ft. Crank-Up
HG-10 ... 10 Ft. Mast
HG-TBT ... Thrust Bearing
HG-COA ... (3) Coax Arms
Ham IV ... Rotor

ALL FOR ONLY $1,090 !!!

Shipped from Lincoln, NE. Allow 4 to 6 weeks for delivery.

ROTORS

Ham IV	$175.00
T2X	$247.00
HDR300 for LARGE arrays	$386.00
Alliance HD73	$94.00

CABLE

Saxton RG213 50 ohm coax	$.31/ft.
RG 11/U 75 ohm coax	$.31/ft.
LDF4-50 Andrews HELIAX®	$1.40/ft.
8 cond. rotor cable	$.18/ft.
8 condHD rotor cable (for 150+ ft.)	$.36/ft.
Mini 8 52 ohm small coax	$.16/ft.

Heliax® cannot be shipped by UPS as it cannot be coiled tightly enough to conform to size restrictions without damage.

CONNECTORS

Amphenol PL259 (Silver Plated)	$1.25 ea
Amphenol 82-61 type n	$2.85 ea
Andrews L44U UHF female	$15.80 ea
Andrews L44PUHF male	$15.80 ea

CLEARANCE SPECIALS

Limited to quantities on hand.

Drake TR5	$657.00
Drake PS75	$161.92
Hal ST6000-H	$599.00
Hy Gain TH6DXX	$225.00

Sorry, we can't accept personal checks for mail orders, and can't ship C.O.D. Due to the Yen rate, manufacturer's whims, increasing costs, and the 90 day lead time, all prices are subject to change without notice or obligation: they may go up or they may come down.

Quantity discounts begin at 100 units, except for cable and tower hardware.

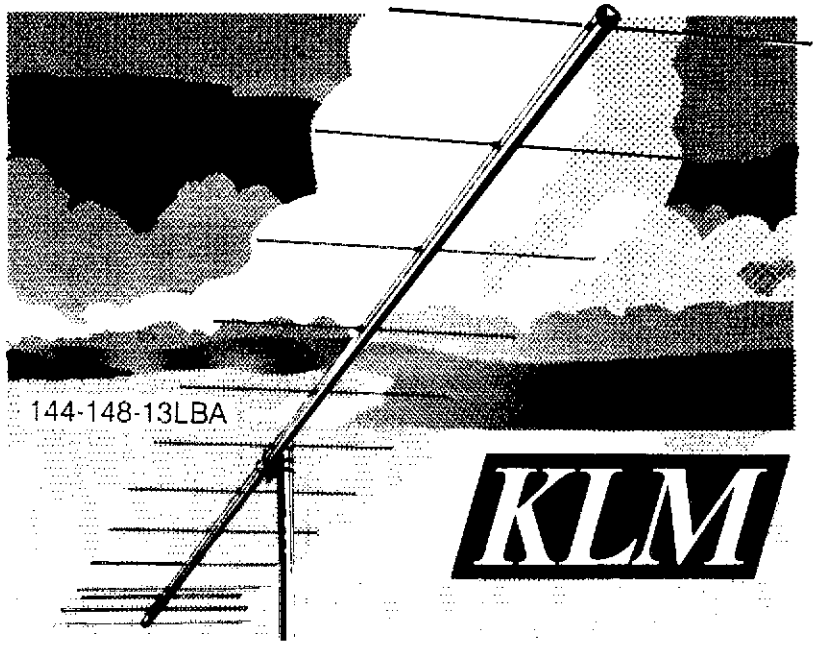
PLEASE NOTE:

All drop ship orders, Hy-Gain tower orders, and Rohn foldover towers require payment by cashier's check or money order in advance. We won't accept credit cards for those items only.

CALL TODAY 1-800-527-3418

In TEXAS — Call 1-214-699-1081 (See, it's easy and free, at least to you!)

or visit us at 13929 North Central Expressway, Suite 419 • Dallas, Texas 75243

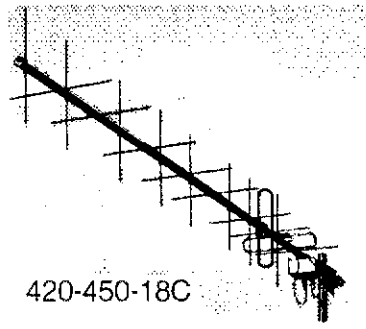


KLM

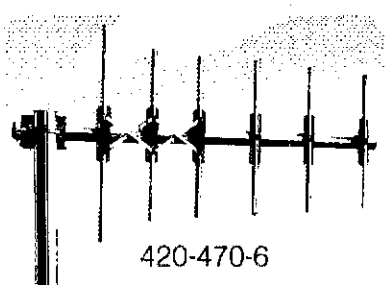
WHY SETTLE FOR HALF THE BAND?
Enjoy super-gain, low VSWR, and FULL COVERAGE, 144 through 148 MHz, with less weight and windload. Dual-driven elements, balanced feed for a better match and clean pattern.

Bandwidth:	144-148 MHz	Balun:	2KW 4:1
Gain:		Boom:	21' 5/1½"
VSWR:	1.2:1 & less	Windload:	1.6 sq ft
Beamwidth:	28°	Weight:	9 lbs

CIRCULAR POLARIZED For the Phase IIIB satellite and terrestrial DX, ATV, and FM. Minimizes multipath and flutter fading. Rugged symmetrical construction.



Bandwidth:	420-450 MHz		
Gain:			
VSWR:	1.5:1 & less		
F/B:			
Baluns:	2KW, 4:1 (2)	Windload:	5 sq ft
Boom:	88"/1"	Weight:	3.6 lbs



IDEAL for point-to-point and repeater control. Rear-mounted, vertically polarized, compact. Continuous coverage, 420-470 MHz. Direct coax feed suitable for most installations.

Bandwidth:	420-470 MHz		
Gain:			
VSWR:	1.2:1 & less		
Boom:	2"/1" O.D.	Beamwidth:	60°
Weight:	1.2 lbs	F/B:	

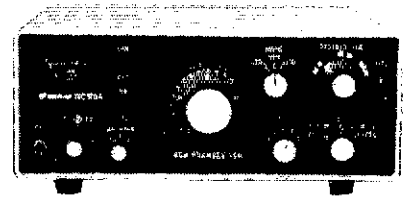
SEE YOUR KLM DEALER:

KLM Electronics, Inc. P.O. Box 816, Morgan Hill, CA 95037
(408) 779-7363

(((GO)))

HI-POWER MOBILE 235 WATTS INPUT

SWAN® 100 MXA



- All solid state.
- 80, 40, 20, 15 & 10 (28.5-29.0).
- With Mobile Mounting Bracket.
- 1 Khz dial Calibration.
- Direct 12 VDC operation.
- VOX, NB & Calib. built-in.

Use with Vista XXR 115 VAC/12 VDC P.S. for fixed station use . . . . . $ 99.00
Hand held mobile mike. . . . . $ 16.00

$429.00

Add $10.00 shipping & handling Cont. U.S.A.

HAM RADIO CENTER
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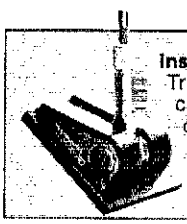
Call toll-free
1-800-325-3636

"We have intolerable spring generated RF noise in our mobile rig"

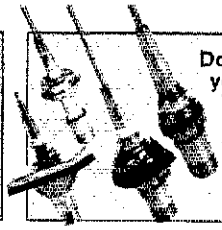
"Our antennas are lasting less than six months on these high vibration vehicles"

Revolutionary DURA-FLEX™ shock mount solves both problems.

- **DURA-FLEX™ neoprene elastomer**—first significant advance in antenna shock absorption technology in 25 years.
- **Completely eliminates RF noise** in radio systems generated by metal-to-metal contact with conventional steel springs.
- **Drastically reduces whip vibration** which can damage or break steel spring equipped antennas on high-vibration vehicles or in off-road environments.
- **Solid brass adaptors** molded into neoprene...braid totally isolated through center cavity.
- **Thoroughly field tested** in extreme environments of heat, cold, humidity, and abrasion.
- **Five models available** for 2 meters, 220 MHz and UHF operations, rooftop, trunk lip and magnetic mounts.



Installation problems? Try our unique Avanti capacitively-coupled on-glass mobile antenna. Mounts on glass—no damage to vehicle.



Don't advertise your mobile rig! Try our disguise antennas for both 6 and 2 meters... any vehicle!

the antenna specialists co.

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we design solutions.

in the person of KC8UR. Lots of new Advanced licensees on the air since the recent FCC swoops thru Ohio. Upgraders include: KC8UR KA8MEB N8DMQ KA8HOE WD8QAC KC8UZ KC8UQ KC8UO WD8AYE. Congrats to new Extras KC8FC KA8JTU and WB8ZTV. Club elections: OhKyln-WB8RSC, pres.; WD4OFJ, v.p.; K8DHK, corr. secy.; WD8JAJ, recg secy. Knox Co. Rptr Assn.-N8CIY, pres.; W8NLQ, secy/treas. EC appointments: KC8GI, Trumbull Co.; W8KVK, Athens Co.; KR8I, Butler Co.

Local Nets	QNI	QTC	Sess.
ALERT	62	2	4
BARF	154	79	29
BRTN	505	234	31
CCOMF	92	3	3
LCNWOARES	744	119	51
MASER	159	15	4
Medina Co.	291	25	30
RARA	76	—	4
TATN	355	144	31
TSRAC	955	89	36
VWCEN	39	1	4

Traffic: K8NCV 558, K8BYR 358, W8PMJ 303, WA8GMT 289, WD8KFN 281, WA8HGH 207, W8QZK 196, K8OZ 186, N8BQK 181, AB8P 172, WD8KBW 143, WD8MIO 135, K8YUW 128, WD8DMF 118, KF8J 115, WB8UBR 101, K8JDI 97, WD8ODV 95, K3RC 94, WD8RIB 94, W8SKP 92, W8WEG 86, W8MOK 85, WD8DYW 83, N8KSU 81, W8GGX 80, N8XX 79, WB8RSM 75, K8JE 67, KA8MEB 67, W8EK 64, N8CJS 63, WB8YTD 63, W8UPD 61, K8AN 60, KC8JI 60, W8TP 56, WB8FWF 50, WD8IKC 50, WB8JGW 49, N8AUH 47, WB8QHU 47, WD8IJP 46, WB8QHV 46, WD8RZG 43, N8BZC 42, WB8SIQ 42, W8TXV 37, KA8DJZ 36, WA8ZID 34, K8NJQ 32, N8DAD 31, K8DL 31, KA8IUK 30, N2NS 30, KA8GJV 27, KK8L 27, WB8YTQ 26, WA8SSI 24, N8CW 20, WD8RGS 20, WB8MRL 18, N8CWU 17, KA8GGZ 17, WD8JAJ 17, WD9HDZ 16, WD8NEC 16, KA8PHB 15, W8RG 15, AF8C 14, WD8OJL 14, WB8QXN 14, KA8GMF 13, WB8KKI 13, W8UQY 13, KA8KFW 12, W8ZM 12, K8CKY 11, WB8KWD 11, WB8WNH 11, WD8OYK 10, WD8OYO 10, WA8HED 9, WD8IQJ 9, N8CGM 8, WD8QAC 8, KA8HGH 7, AF8O 7, KB8YS 7, KA8DGO 6, WA8TSX 6, N8AJU 5, W8BHL 5, WB8NHV 5, W8OQL 5, WB8TRK 5, K8CMR 4, WD8EKI 4, KA8HUZ 4, WB8NTR 4, K8VOY 3, KA8NXD 1. (Apr.) K8OZ 259, N8JR 48, W8FUP 20, WB8NTR 6, WB8YUS 5, W8DYF 3.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. NM (CW): N2APB WB2EAG W2WSS. NM (SSB): WB2MCO K2KQC. NM (RTTY): W2ODC. NM (FM): WB2ZCM N2BDW K2ZVI WB2HDU. News from clubs: Overlook Mtn. ARC and Ulster Co. RACES with WA2s KLV MBB RUW KPF, N2s AVN BHQ FS, KA2KVZ K5NA, WB2s ECA OXY, W2s ZW XL, KE2A. AK2H provided comms for the World Hunger Walkathon on 8 May. Albany ARA reports WB2BZE is Silent Key. Rip Van Winkle ARS reports that WA2GVC is retiring as editor of newsletter, and Pete and Sue Tannebaum will be taking over. Comm. Club of New Rochelle and Westchester Emer. Comm. Assn. provided comms for the International Youth Soccer Tournament on the Memorial Day weekend! My thanks to all who took the time to attend the ENY staff meeting. Hope all had an enjoyable Field Day. I have a request out for anyone who would like to be appointed as an ASCM for DX, vhf operation, projects or other similar activity to contact me. Perhaps we can get more info on these topics into the column. Sorry WB2HDU is resigning as EC for Sullivan. Enjoy the rest of the summer! April PSHR: WB2EAG. April BPL: WB2EAG. BPL: WB2EAG WA2SPL. PSHR: WB2MCO WB2EAG K2ZM W2YJR W2BIW AK2E KB2KW WA2YBM N2BDW K2ZVI N2CPX WB2TWQ. Traffic: WA2SPL 837, WB2EAG 505, WA2JQL 150, K2ZM 140, WB2MCO 120, WA2JBO 87, N2BDW 84, W2BIW 82, KB2KW 80, K2ZVI 64, AK2E 61, W2YJR 55, WA2YBM 39, K2MI 26, AG2X 26, AA2Y 24, N2CPX 21, W2SWA 17, WB2OHR 15, WB2SON 14, WB2TWQ 12, N2CSX 6, K2HNW 3. (Apr.) WB2EAG 665, K2HNW 17.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY.

Net	Freq.	Time/Dy	NM
NLI CW	3630 kHz	1900/2200	K2GCE
NLIPN	3928 kHz	1815	KS2G
NLS	3720 kHz	1930	WB2EUF
NCVHF	6.04/64	2100 MWTh	N2BZL
BAVHF	7.915/315	2030 M-F	N2BMF
SCVHF	4.775/.37	2030 M-F	WA2ARC
LIMARC	6.25/85	2100 F	N2BZL
ESS	3590 kHz	1800	W2WSS
NYS	3677 kHz	1900/2200	KA2CTU
NYS	7077 kHz	1000 M-S	WB2EAG

Note: All times are local. Please try and help out by checking in whenever you can. Plan now to attend the Hudson Division convention being held at what used to be the Playboy Club at Great Gorge, NJ, Oct 29-31. Time is running out to get tickets. WB2IWJ is now KV2O. Congrats to the ops at Grumman's WA2LQO who helped put the club over the top in the November ARRL Sweepstakes. K2GCE became a member of the Society of Wireless Pioneers. W2LWB has started in as a NCS on one of the sessions of NLICW. NLIPN welcomes W2TZO. KS2H is now living in Brooklyn, and has been granted an experimental license by the FCC to conduct research into auroral distortion and other propagation phenomena on 10.1-10.15 MHz, 18.068-18.168 MHz and 24.89-24.99 MHz, A1 and A3J with 100 watts ERP. His call sign is KM2XDX, and he will begin operations shortly. Metroplex held their annual picnic in Leonia, NJ. W2PB is now living in Babylon, Gt. South Bay ARC helped with the Babylon town 10k run. Many thanks to WB2HTW and the many people who helped with the Explorers Olympics held at SUNY Farmingdale. I will try to list the other calls as space permits. WB2DQH visited with WB2PUG in Daytona, FL. There will be a Bike-a-thon held in Oct. It will cover 100 miles. We (WA2UWF K2IZ and a few others) will need help with comms. If you can offer any time it would be appreciated. KS2G ran traffic back home via Shenandoah Valley Emergency Net (SVEN) while "portable 4" during May vacation in Virginia. Traffic: W2AHV 105, W2GKZ 90, WA2ARC 58, K2GCE 55, W2LWB 51, W2DBQ 45, KH2B 25, K2IZ 23, KA2NMA 15, KS2G 12, KV2O 3, WB2IDP 2.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC AG2R N2BNB N2BOP KA2GQQ KA2HNQ WB2IQJ W2PSU.

Net	Freq.	Time	Sess.	QNI	QSP
NJPN	3950	6 P.M. Dy 9 A.M. Sn	36	452	114
NJN/E	3695	7 P.M. Dy	31	163	133

Ringo Ranger II

Simply the best

The best combination of gain, bandwidth and low angle radiation for simplex or repeater operation.

Quick easy assembly and installation

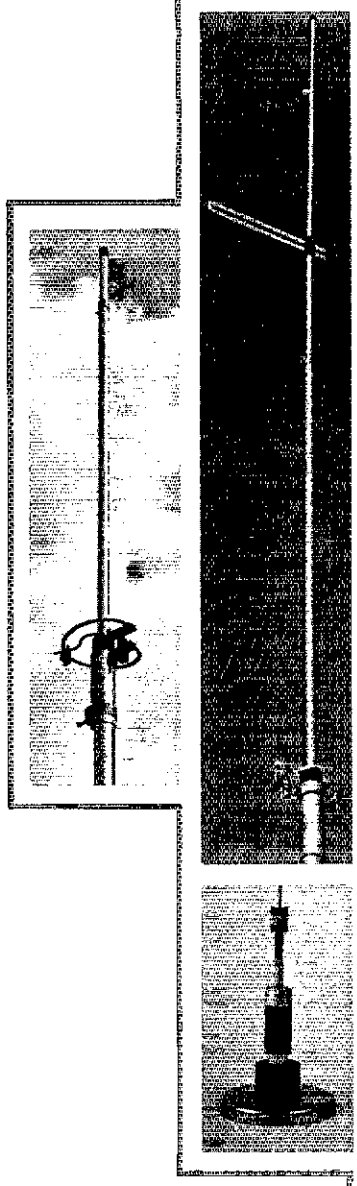
Mount anywhere with compact dimensions and neat appearance

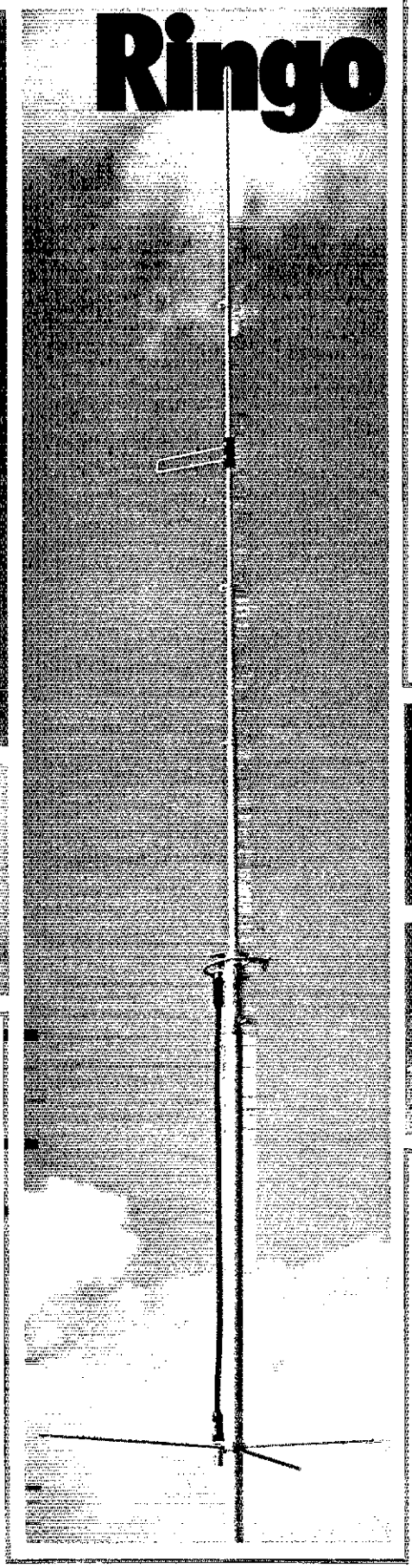
Proven performance and durability in all environments

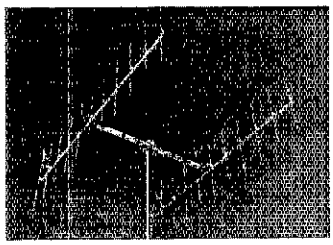
Complete FM band coverage

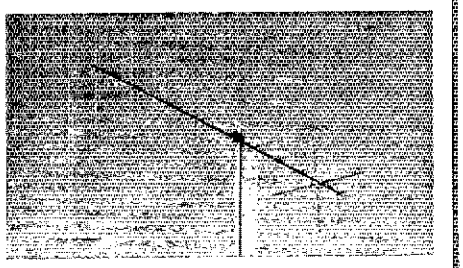
One year warranty

Cushcraft antennas created the FM antenna revolution by making the best performance and value available to every ham. We continue to set the pace with a broad line of antennas for every FM application. Tune across the band and you will find the overwhelming majority of hams using one, two, or more Cushcraft antennas. The reason is very simply that they are the best. Now is the time for you to enjoy the value of a Cushcraft antenna. See your nearby dealer today.









RINGO RANGER II

ARX-2B	134-164 MHz
ARX-220B	220-225 MHz
ARX-450B	435-450 MHz

RINGO RANGER

ARX-2	134-164 MHz

RINGO

AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

MOBILE ANTENNAS

MS-147	144-148 MHz	Magnetic Mount
TS-147	144-148 MHz	Trunk Lip Mount
MS-220	220-225 MHz	Magnetic Mount
TS-220	220-225 MHz	Trunk Lip Mount

YAGIS

A147-4	145.5-148 MHz	4 Element
A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
A449-6	440-450 MHz	6 Element
A449-11	440-450 MHz	11 Element

CROSS YAGI

FOR CW/SSB and FM
A147-20T 144-146 MHz Horizontal
145.5-148 MHz Vertical

Cushcraft CORPORATION

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NJN/L	3695	10 P.M. Dy	31	108	73
NJSN	3735	6:30 P.M. Dy	31	140	125
QBTTN	72/12	8 P.M. Dy	31	590	100
TCETN	855/255	7:30 P.M. Dy	31	217	47
NJVN	49/49	10:30 P.M. Dy	31	344	97
NJRTTY	147.51	Autostart	—	—	—

Your SCM is finally back from AZ, and will write one more issue of NNJ then off to Arizona for a permanent QTH (doctor's orders). Thanks to all members in NNJ for your great help in making my job easier. I'm not sure who the SCM will be, but I hope it's W5DTR who was an SCM in Arkansas and who did an excellent job for me while I was away. The QCWA NNJ chapter is looking for that "Elmer of the Year". Anyone in NNJ send your recommendations to N2XJ by Sept. 1st. He or she must be a resident of NNJ. Each nomination should be accompanied by a statement (500 words or less). Don't forget the 23rd Annual NJ QSO Party: August 14 (see last month's *QST* for details). TCRA News: upgrades to Tech.-WA2SIK; to General-KA2MCM; to Advanced-WB2LAH K4YN (ex-W2KHK). KA2KIR & W2LF now Silent Keys. Ramapo Forty-Niner: KB2JJ has been teaching Amateur Radio at the Upper School in Englewood Cliffs. He presently has 10 students. The RMARC 220 repeater (223.34/224.94 MHz) WA2SNA/R is now configured for packet radio. The digital portion is using the VADCG Terminal Node Controller board running AMRAD software and a Bell 202 1200 Baud modem. Use of this "packet" repeater facility by all area amateurs is invited. For further details send inquiries with s.a.s.e. to Ramapo Mtn ARC, P.O. Box 364, Oakland, NJ 07436, attn: W2FPY. Please note the RMARC flea market date: August 21, American Legion Hall, 65 Oak Street, Oakland, NJ. Talk-ins 147.49-146.49 repeater and on 146.52 simplex. Metroplex news: Upgrades-WA2VQE & KA1EIN to Advanced; KA2KQR to Tech.; WA2MHQ & N2CON to Extra. K2TGS picked up a Spanish speaking Argentine calling "break-break emergency..." Barry, who speaks Spanish, knew then of the first fighting on the Falklands/Malvinas. WA2ZRT, after 20 years, is now KT2R. Meadowlands ARA: N2BMN operated aboard the sub USS Ling on May 8. From Piscataway probably the youngest YL in that area at 10 years old is KA2PMV, daughter of WA2RMZ & N2ATO. An OM and XYL team in Glen Rock are new hams, KA2PGD & KA2OTY. WA2UDT has completed 5BWAS. W2JIO is back from the hospital where he had a large kidney stone removed. Novice course announcement: The Nutley ARC Novice course starts Sept. 20th at 7 P.M. at the Nutley Red Cross, 169 Chestnut St., Nutley. Contact N2CXX. Traffic: KB2HM 258, K2VX 183, W2XD 159, AG2R 143, N2BNB 86, N2XJ 74, KA5DLV/2 60, KA2JMH 57, N2BOP 55, KA2HNQ 53, KA2GSX 41, W5DTR 40, W2UH 30, KC2MM 25, W2ZEP 16, WA7DPK 15, WB2ANK 13, N2BC 13, KC2AK 11, W2CC 10, WB3HWX 10, WA2OPY 6. (Apr.) WA2OPY 6.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K$CY — SEC: W$RPK. STM: KA$X. NMs: W$YLS WA$AUX WB$AVW WD$HND. Lots of summer activities. Watch for the Special Event Station at the "National Balloon Races" in Indianola. Mt. Pleasant will be operating from the "Old Threshers Reunion" in September. Let's support these fine efforts. Des Moines Hamfest August 22nd, see you there. The Quad Cities Club made 1800-plus contacts from the Mississippi Bridge Memorial Station. W$RPK and K$CY have obtained the Satellite WAS. New EC from Muscatine will be KA$ADF. ARES participated with Red Cross in Waukee tornado simulation. We shall all miss Silent Keys W$NTA and W$CPC. New Novices are: KA$NGE KA$NOW KA$NNQ. New calls: N$BLA/KS$X, WB$UPF/KC$SC, KA$LML/N$DRQ. If you are interested in a position in the new section reorganization, let me know. Excellent FD participation, keep reports coming in. Train derailment with dangerous cargo subject for Mt. Pleasant drill. ATV in Iowa growing to more than 30 active stations. Novice classes beginning in Waterloo. Have a great summer.

Net	Freq.	Dy	UTC	QNI	QTC	Sess.
TLCN	3560	Dy	2330/0330	381	174	62
75M Phone	3970	M-S	0000/1730	1854	103	52
ICN	3713	TThS	0000	47	75	12

Traffic: WA$AUX 281, W$SS 260, AE$R/KA$X 120, W$YLS 103, KA$JQG 97, K$GP 69, K$CY 59, WD$HND 49, WB$QAM 48, KA$GBG 43, W4JL 41, WB$AVW 30, KA$ADF 31, KC$SC 29, W$BW 21, N$CWQ 8, KB$OZ 8, KA$JPN 6, K$ZQ 5.

MISSOURI: SCM, L. G. Wilson, K$RWL — ASCM: W$OTF. STM: KM$L. SEC: N$AJI. Numerous weather nets have been in operation recently throughout the state. KC$CL, in Adrian, watched as a tornado approached his home, and he operated until he lost power. During the storm, his QTH received damage, and the QTH of W$KCW was destroyed. We all owe these people who give so much of their time a big thanks. Congrats to new Novice, KA$NRL, and to KS$F N$DSS KC$QV and N$DVH on recent upgrades. KA$CFX is now sporting a 4-element quad at 60 feet. If lack of news is any indication of how many hams are gearing up for Field Day, this ought to be a big one.

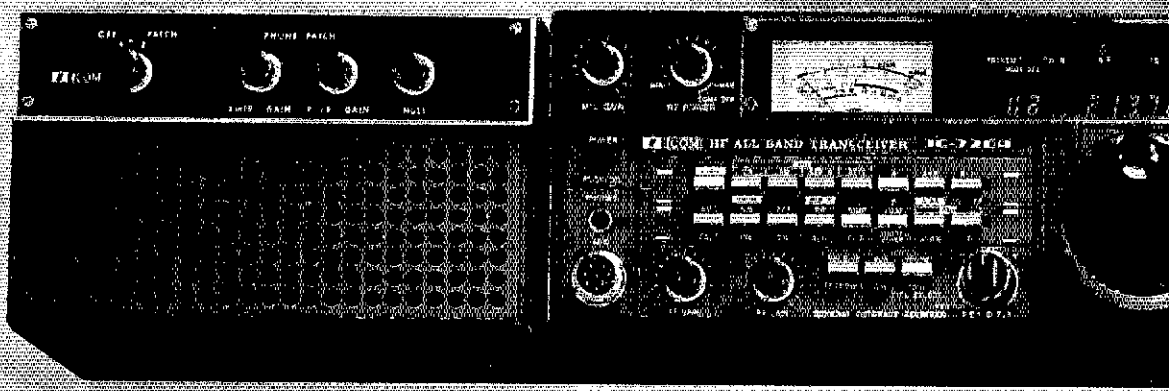
HBN	333	23
MON	139	108
MON 2	137	61
ACE	43	1
MEOW	518	58
CMEN	103	2
NEMOE	97	3
MOSSBN	556	69

Traffic: KC$AS 625, K$SI 157, KI$K 117, W$OTF 85, W$BMA 78, K$PCK 75, K$BM 69, W$NUB 58, W$OUD 56, KC$CL 55, K$RWL 5, KM$L 4.

NEBRASKA: SCM, Shirley M. Rice, KA$BCB — SEC: N$AIH. STM: WD$BQG. Our sympathy to the friends and family of W$NJL & W$FQB. W$FQB was SCM for NE 1944-46, past pres of AK-SAR-BEN ARC, licensed in 1922 & instigated the 911 system. It was an honor to have spent time in his home & his presence. Congrats to new Novices-KA$NOU KA$NOV KA$NJF KA$MHO; Tech-WD$DKF; Adv-W$ZYJ WD$AES KA$JLH. Hats off to W$NIK, NM for 27 yrs. of West NE Net. AK-SAR-BEN ARC presented W$QON & XYL with a resolution recognizing their work for the club & the amateur community. They are now life members of the club. Food for throught from HAM HUM! "A good thing to remember and a better thing to do — work with the construction gang & not with the wrecking crew!" Traffic: K$DKM 59, WB$GOB 28, W$HOP 27, W$ZNI 22, KA$BCB 15, WA$PCC 12, WB$GWR 11, W$NIK 11, WB$GMQ 7, W$DJU 6, WA$DXY 6, K$SFA 4.

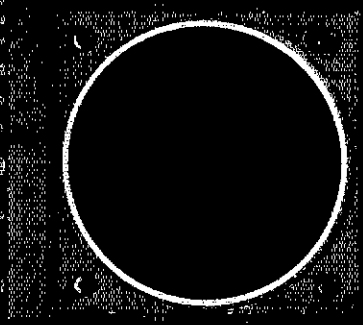
ICOM Automati

Interchangeable Accessories, Automat

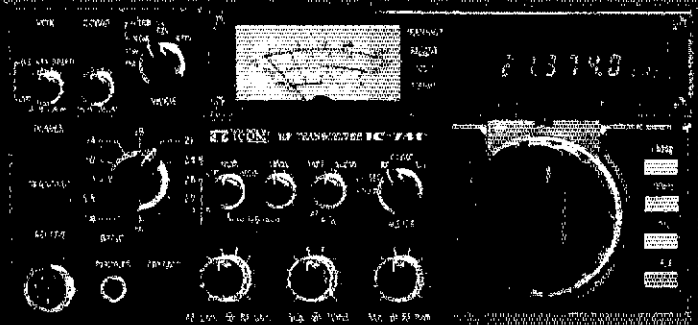


Phone Patch
for IC-720A/IC-730/IC-740

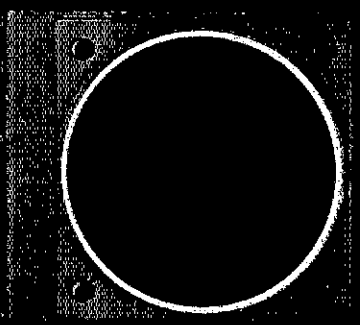
IC-720A HF Transceiver
160-10 meters, 100KHz - 30MHz RX
100W SSB/CW/RTTY



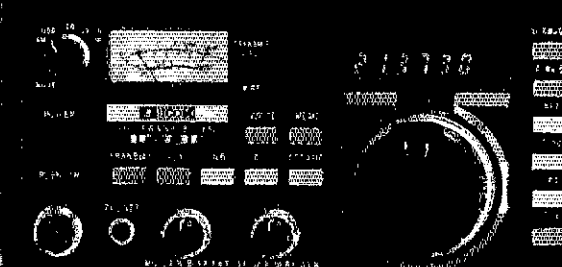
IC-SP3 External Speaker
for IC-720A/730/740



IC-740 HF Transceiver
160-10 meters. 100W, SSB/CW/RTTY/
FM (option)



IC-SP3 External Speaker
for IC-720A/730/740



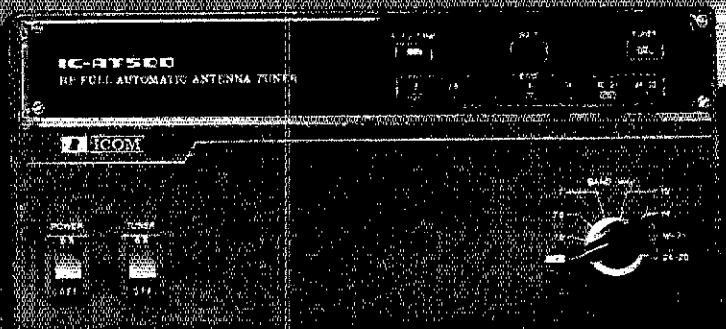
IC-730 HF Transceiver
80-10 meter Ham bands, compact
mobile, 100W, SSB/CW/AM

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 (206)454-8155/3331 Towerwood Drive, Suite 307, Dallas, TX 75234 (214)62

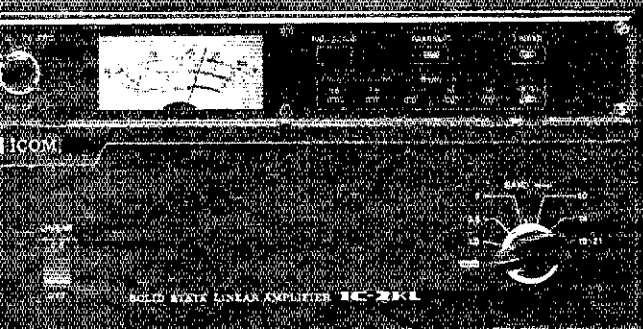
HF Systems.....

andswitching / Tuning / Antenna Selection

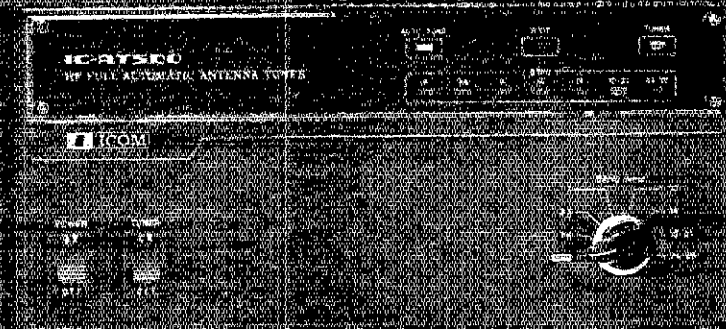
IC- Linear Amplifier
2KL meters, 80 W in/500 W out,
obandswitching



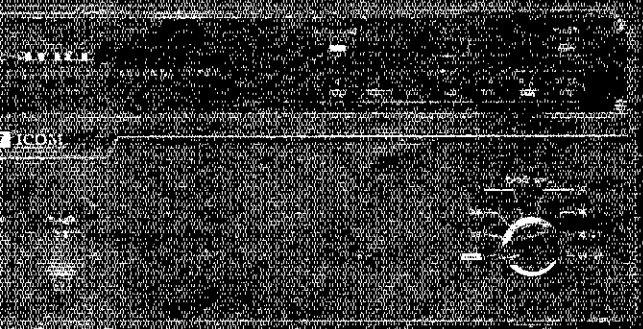
AT500 Automatic Antenna Tuner
160-10 meters, 500 W capacity



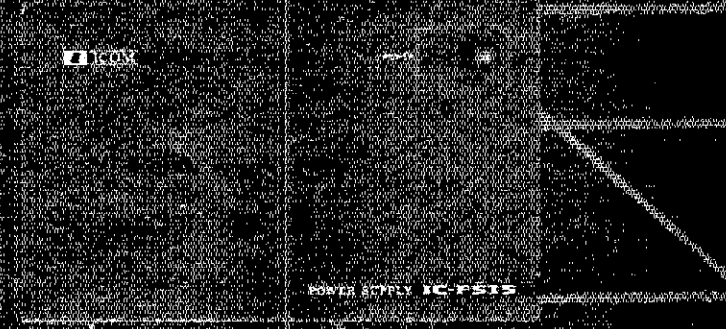
-2KL Linear Amplifier
)-15-meter, 80 W in/500 W out,
obandswitching



AT500 Automatic Antenna Tuner
160-10 meter, 500 W capacity



T100 Automatic Antenna Tuner
-10 meters, 100 Watt Capability



PS15 Power Supply
12 VDC/20A Base AC Power for 720A/730/740

e IC-SP3, IC-2KL, IC-500 and IC-AT100 are also
mpatible with the IC-701.

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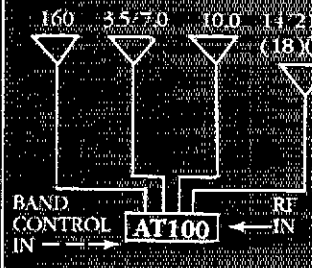
The Systems

Custom Complete Your HF Station

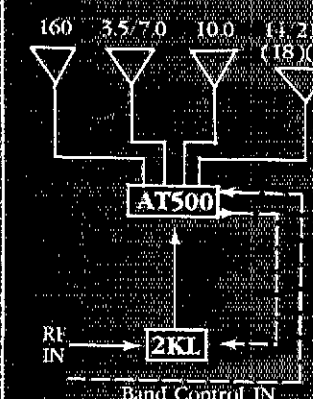
	IC-720A (BAND CONTROL ↓ / RF OUT ↑)	IC-740 (BAND CONTROL ↓ / RF OUT ↑)	IC-730 (BAND CONTROL ↓ / RF OUT ↑) w/LDA INSTALLED
FREQ COVERAGE (MHz)	1.8—2.0 3.5—4.1 6.9—7.5 9.9—10.5 13.9—14.5 17.9—18.5 20.9—21.5 24.5—25.1 28.0—30.0	1.8—2.0 3.5—4.0 7.0—7.3 10.0—10.5 14.0—14.35 18.0—18.5 21.0—21.45 24.5—25.0 28.0—29.7	— 3.5—4.0 7.0—7.3 10.0—10.5 14.0—14.35 18.0—18.5 21.0—21.45 24.5—25.0 28.0—29.7
GEN. COVERAGE RCVR	100KHz—30MHz	—	—
RCVR SENSITIVITY (10dB QUIETING)	0.3uv	0.15uv (w/ PREAMP)	0.15uv (w/ PREAMP)
RCVR SELECTIVITY (-6dB SSB/CW) KHz	2.4/0.8 (PBT)	2.4/1.4 (PBT)	2.4 (IF SHIFT)
RCVR SELECTIVITY KHz (-6dB CW NARROW)	0.5	0.270	0.600 (140Hz w/AUDIO FILTER)
PWR SUPPLY VOLTAGE ICOM SUPPLY	12VDC PS15	12VDC PS15 OR OPTIONAL INTERNAL SUPPLY	12VDC PS15
WEIGHT (lbs)	16.5	23.1 (w/ INTERNAL SUPPLY)	14.1
SIZE (mm) HxWxL	111x241x331	111x286x374	94x241x275
FILTER OPTIONS MODEL/FREQ/WIDTH (#) (MHz) (KHz)	FL32—9—0.5 FL33—9—5.2	FL44—0.455—2.4 FL45—9.0—0.5 FL52—0.455—0.5 FL53—0.455—0.25 FL54—9.0—0.27	FL30—9.0—PASSBAND TUNING FL44—0.455—2.4 FL45—9.0—0.5
OTHER OPTIONS	ALL FEATURES STANDARD	MARKER (EX241) FM (EX242) KEYER (EX243) BUILT-IN POWER SUPPLY (EX238)	MARKER (EX195) LDA (EX202) CW AUDIO FILTER (EX203) TRV (TRANSVERTER SWITCHING UNIT) (EX205)

100 WATT STATION



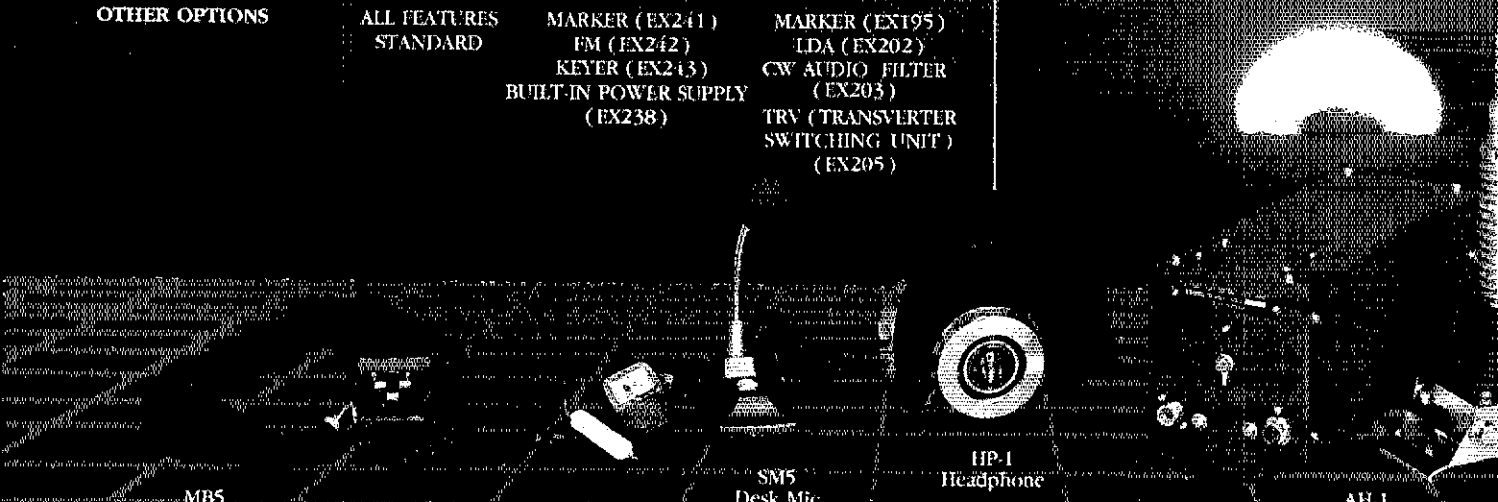
IC-AT100
80-10 mtrs
100 W in
0.5dB loss
Autotuning

500 WATT STATION



IC-AT500
160-10 meters
500 W IN
0.5DB loss
Autotuning

IC-2KL
50-80 W IN
500 W OUT
160-15 mtrs
Broadbanded



MB5 Mobile Mount

TIMTO Scanning Mic (740/730)

BC10A AC Memory Backup

SM5 Desk Mic

HP-1 Headphone

AH-1 Autobandswitching Mobile Antenna

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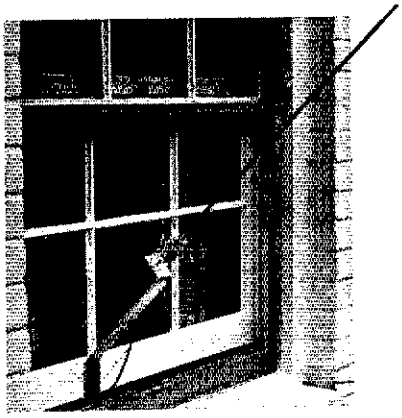

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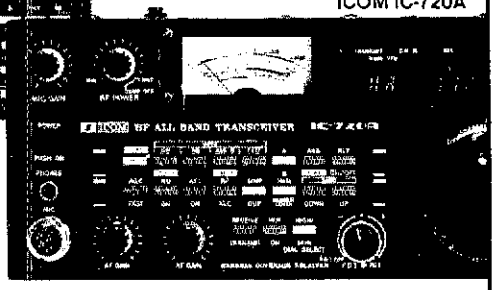
One thing is for certain. A ham will never get the run around from Harvey. If we don't have something in stock, we say so and will order it for you —or—tell you where to get it. However, we are sincerely dedicated to the ham community and, as a result, our expansive inventory means that, more than likely, we will have what you are looking for *in stock.*

Yaesu FT-One



ICOM IC-720A

AGA	*Gotham Antennas*			
Alliance	*Grundig*			
Antenna Specialists	*Henry Radio*			
Astron	*H.M. Electronics*			
Bearcat	*Icom*			
Bencher	*Kantronics*			
B&W	*K.D.K.*	*J.W. Miller*	*Ritron*	*Trilectric*
Centurion	*Larsen*	*Mirage*	*Russell*	*System One*
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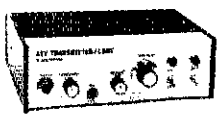

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SEE CH. 14 1982 ARRL HANDBOOK.

The ultimate team...the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

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COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

• Frequency Synthesized for crystal-controlled stability • VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed • Resolution to 10 Hz • Three programmable fixed frequencies for MARS, etc. • Split or Transceive operation with main transceiver PTO or RV75

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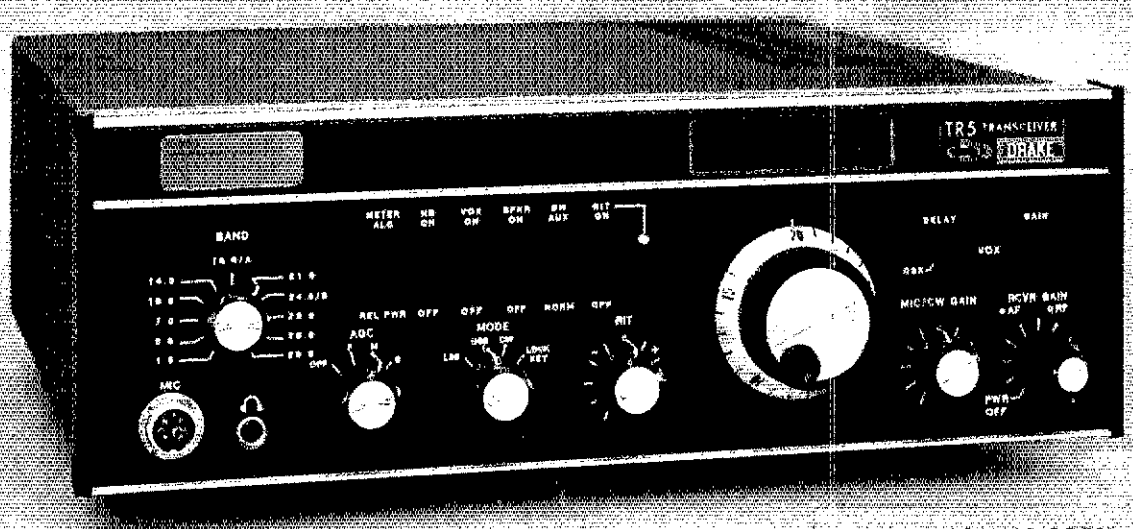
* Patent pending

New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO
featuring the Drake "VRTO"

• Frequency Synthesized for crystal-controlled stability • VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed. • Resolution to 10 Hz • Three programmable fixed frequencies for MARS, etc. • Split or Transceive operation with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E...

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The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

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When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

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LEARNING YOUR NEW LANGUAGE: The Morse Code — why every ham knows it; how to learn it the right way.

UNDERSTANDING BASIC THEORY: Easy-to-learn explanation of electronic theory and what you need to know to qualify for a Novice license.

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NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — STM: K1EIC. SEC: K1WGO. ASEC: KA1AMK K1AH.

Net	Freq.	Time-Local	QTC	QNI	NM
CN	3640	1900/2200	235	305	K1EIR
CPN	3965	1800/1000 Sn	114	341	WB1AIU
NVTN	28/88	2130	—	—	WA1ELA
WCN	78/18	2030	37	378	W1DPR
RTN	13/73	2100	59	252	WB1ESJ

Hi QNI: CN-WB2PJU K1UQE W1EFW K1EIR. Upgrades: Gen-N1BOG KA1HYL KA1GSY; Tech-KA1HYB. N1BYX will be /DH for the next six months. A BIG TNX to all ARES/NTS groups and individuals for your quick response to our flooding emergency the weekend of June 5/6. Tfc handler AD1O will be off to MIT this fall, with WA1UAX going QSY to Georgetown U. to study law. Congrats to AA2Z on his recent marriage to HQ staffer Jean Gontarz. New SARC officers: KA1ESH, pres.; W1TKG, 1st v.p.; KC1A, 2nd v.p.; K1UVR, secy.; KA1BHT, treas.; W1BDN, chap. BPL: WB1CPF. A hearty welcome to WB1ESJ, new NM of RASON, and to KA1VHO to NTS. K1XA bk on 2-mtr fm. CRIS is expanding into Fairfield Co. SMAG award to WB1FYN for outstanding service to area hams. WA1LOU & KA1KD having fun with their new TET's. New Tri-City ARC officers: A1tV, pres.; KA1BB, v.p.; N1AMD, cor. secy.; KA1DFI, rec. secy.; KA1GQU, treas.; Tri-City Novice Net 3740 7 to 8 P.M. TW/Th eves. FARA's Dogwood festival activities were big success. KA1FHR has been busy homebrewing vhf equipment. Murphy's Marauders get it together on 3860 Thursdays. K1UAT/Staples HS (AD1O) provided comms for the MS Bicycle Tour on June 13. USS Croaker special events station very busy putting CT on the map and giving a special thrill to guest op Joey O'Neil. KC1A is having fun with his new keyboard. CPN ops take note: In the event of poor 75-meter band conditions the alternate frequency is the AREA repeater 147.315. Bethel Mid Sch ARC has five new Novices. Traffic: WB1CPF 568, W1EFW 215, WB1PJU 153, K1UQE 98, N1BPD 67, KA1BHT 55, K1AQE 34, K1EIC 33, KA1KD 33, WB1ESJ 26, WA1UAX 26, W1BDN 25, W1DPR 18, W1QV 10, W1CUH 5, N2BQA 1, W1FAI 1, K1OQG 1.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	468	329
EMRIPN	KA8BJY	3.949	1730/Dy	327	229
EM2MN	N1BNI	23/63	2000/Dy	419	137
NEEPN	K1BZD	3.945	0830/Sn	89	19
HHTN	K1BSO	04/64	2230/Dy	534	218
EMRISS	N1BHH	3.715	2030/Dy	193	81

As SCM I am looking for some help. Under the new section organization I will be able to make more appointments to enhance the effectiveness of the ARRL in East MA. This is an opportunity to make the ARRL more visible and effective on the local level. Rather than try to talk someone into doing something they really don't want to do I am looking for volunteers. In the next few months I will try to highlight some of the appointments in the hopes that some of you may be interested. There will be small budgets for these activities. One of the appointments is a "Club Liaison". This person would be involved in communicating with clubs and in general being aware of their activities. A possible outgrowth of this may be a Council of Eastern Mass Radio Clubs, which would mean coordinated activities such as flea markets, auctions and maybe even a hamfest in years when there is none in Boxboro. Interested? Let me know. The Framingham club has awarded its scholarships for this year. They are to: James Reisart, AD1C, $200; Ed Saywer, KA1CFC, $200; Ron Achin, WB1FLT, $50; Steve Ketler, WA1WFA, $50; Andrea McCarthy, KA1DZN, $50. Congrats to the recipients as well as to the club and specifically to N1GB who chaired the committee. Quannapowitt club was visited by Division Director W1HHR. They are also planning a trip to League Headquarters. Greater Lawrence club member WB1CMG running classes and turning out students who are upgrading. Thanks also to N1ABB and XYL for gracious use of their QTH for the classes. Algonquin club officers are K1ZFH, pres.; WA1YHE, v.p.; KA1MX, SEC; WA1UDH, treas.; W1BK, activities; KA1CLV, editor. Wellesley club had KA1IU give a talk on Smith Charts. They also did two public service stints on the same day: a bike-a-thon and a road race. Colonial Wireless Club provided comms for Lexington's Patriots Day Parade. Traffic: WA1TBY 507, N1BHH 324, KA1BBU 150, KA1ON 130, WA1LPM 128, W1IDK 118, N1AJJ 113, WA1DXT 86, KA1EMQ 58, K1GN 53, N8TM 46, W1DMH 43, WB1GQO 40, KE1U 35, K1BZD 33, KA1MI 30, W1ATX 19, W1CE 15, WA1FNM 8, KC1P 8, W1CZB 6, K1LCQ 5. (Apr.) WB1GQO 57.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. Mid-Coast Amateur Radio Repeater Club's annual meeting at Warren elected K1VVT, pres.; W1RJP, v.p.; KA1FKS, secy/treas. W1BMX and WA1PXO responded to an emerg call from W1ZLF (Ct) and, together with assistance from Coast Guard, located a party on sailing sloop SPRITE. PSHR: AK1W W1RWG. Nets: Sess./QNS/QTC: Pine Tree 52/437/174; SeaGull 26/909/145; Aroostook Emerg 4/46; Somerset Pub Svc 13/98/9; RACES 4/2/47. Appointments: W1HDC, NM PTN; N1BJW, NM Late PTN. Traffic: AK1W 233, W1KX 155, N1BJW 107, WB1BYR 82, W1RWG 60, KA1TJ 46, W1AHM 45, W1HDC 40, K1NAN 36, KA1GGE 34, W1BMX 30, KA1AVU 22, WB1EIL 22, KL7IJG 19, N1BCE 11, WA1YNZ 10, W1CTR 8, KA1EIW 7, K1NIT 6, KA1FTL 5, W1OTQ 5, WA1ZJL 4, KA1ENL 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM W1VTP. Summer is here. The monsoons are over. Not much news, but here goes. Just came from Gov. Gallen's office where he read the proclamation for Amateur Radio Week. He was impressed with call-up on Concord & Mt. Washington rptrs. N1NH gives excellent talks on traffic to radio clubs. KI1M's brother received call of KA1ISL, but FCC replaced it with KA1IUD three weeks later. This has happened to about 10 others in NH. WA3BZM has new TH7 for new tower. Congrats to new XYL KA1ITR. The Navassa DXpedition was featured in *Time* in May 3rd issue. Have a nice summer. Traffic: W1TN 396, N1NH 310, KI1M 139, W1GUX 124, K1IR 79, K1YMH 73, KA1CJI 58, KB1A 57, W1VTP 57, KA1BJ 54, AK1E 53, K1OSM 35, W1CUE 23, W1MHX 22, N1ALM 21, W1ALE 17, K6UXO 15, WA3BZM 14, WA1HOB 10, W1NH 4. (Apr.) K1YMH 85, W1CUE 54, N1BOF 20.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Conn Valley FM Assn. hamfest/flea mrkt 09/26/82 at King's Ridge Ski area 0900-1700 hrs. New Novices: KA1IPG & KA1IQT in Vershire; KA1IUN in Bradford. BARC hamfest, Charlotte Aug 14 & 15. VSB

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31/484/68; Carrier 27/423/26, GMN 26/387/46, VTN 28/117/55, RFD 5/99/11, VPN 5/89/6. Next month will have the VT FM Tfc Net (VFMN) that began operation June 1st on W1KOO repeater Mt. Mansfield. As reported previously, this 2 mtr fm is a beginning of the planned tie-in of VT 2 fm for tfc & emergencies, by operators who can work two or more repeaters. Strictly tfc with hf outlet daily connections. Traffic: K1BQB 99, WB1ABQ 70, W1RNA 69, KA1GID 66, N1ARI 36, W1KRV 36, N1CBT 2.

WESTERN MASSACHUSETTS: William J. Hall, W1JP — Your SCM has updated appointment records and issued endorsements where applicable. About 10 appointments were dropped because activity reports had not been received. Those of you who hold OO, OBS, OVS, OES should send me monthly activities reports by mail or radiogram. ORS send reports to STM, and DEC/EC to SEC. OBS WA1MJE sez he is escorting scout troop to New Mexico in late June. OVS K1SF reports spectacular E_s opening 15 May. Worked C6A and HI8 on 6M and 2 FL stns on 144. Hope you caught the June 7 opening. NM KA1T launched his sailboat in Narragansett Bay in May. ACC W1YI reports the U. Mass ARC is relocating W1PUO and received donation of 6- & 2-meter gear from W1ZI. Mt. Tom ARA fielded 24 ops to cover St. Pat's Day parade in Holyoke. It was the 9th straight year for W1UWX and W9RJL, the 7th for W1CJK. Congrats to W1KK on his appt as NM for Western MA Fone Net. ARES still going strong with 39 net sessions, 2 drills and 2 wx with QNI of 418. PSHR: WB8HIH K1JHC W1KK KA1T. Traffic: KA1T 283, W1UD 260, WB1HIH 240, KA1CDC 87, K1JHC 73, W1KK 63, K1PUG 54, KB1W 51, KA1ZV 48, WA1OPN 20, W1JP 11, WA1DNB 5, W1BVR 4, W1ZPB 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Richard Henry, AL7O — ASCM/SEC: AL7AC. STM: WL7H. Congrats to KL7LA KL7JKW AL7BX and KL7AA for attaining BPL. New officers for AARC are: AL7AW, pres.; KL7LO, v.p.; KL7VF, secy.; KL7HM, treas.; KL7PQ, activities manager. KL7CQ active as ever training and recruiting new hams. In fact, he has just started a Novice class for 35 boy scouts and CAP cadets. KL7GNP made the QSL bureau available to the hams in SE Alaska when he travelled in the area for thirty days. KL7AF nearing 5BWAZ. About two dozen Alaskans have acquired the "WAT", but if you don't have your "WANOPO" you better talk into North Pole for details. Traffic: KL7AA 2800, AL7BX 827, KL7JKW 827, KL7LA 557, KL7LO 75, WL7N 54, AL7BV 10.

MONTANA: SCM, Les Belyea, N7AIK — New officers for the Libby ARC (LARK) are W7HAH, pres.; WB2OSW, v.p.; KA7FVP, secy/treas. Call changes, W7JYW (of contest fame) is now KS7T, KC7IK now KS7U, KA4DQV now KC7UJ, WB7QZQ now KC7UC, WB7QZO now N7DYE. Upgrades reported, WA7GJQ to Extra, N7ARA & WB7QZQ to Advanced, KA7MAC & KA7AHB to General, WB7QZO to Tech, KA7MWP KA7NHP and KA7NDP made Novice. Congrats to all. W7IDK tells of 8 new Novices from his class. The Lower Yellowstone ARC must be doing something right as they have well over 40 members, up from only 6 a few short years back. The Hi Line ARC installed a 2-meter transceiver in the Havre ambulance. KØPP reports that the Anaconda repeater has a new freq of 147.62/02. KB7Q administered a Novice test to a gal who taught herself the Morse Code in only ONE DAY! Now has the call of KA7NNY, and she also happens to be the wife of the SCM. Attn club newsletter editors — If your club wishes to receive newsletters from other clubs, make sure they get one of yours.

Net	Sess.	QNI	QTC	NM
MTN	21	797	70	K7TQM
MSN	5	64	1	KB7SE
IMN	21	186	87	K7JV
BSN	13	174	7	WB7UTJ

PSHR: WB7DZX. BPL: WB7DZX. Traffic: WB7DZX 520, N7AIK 30, W7JMX 8, W7HAH 4, W7LBK 2.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: K7WWG.

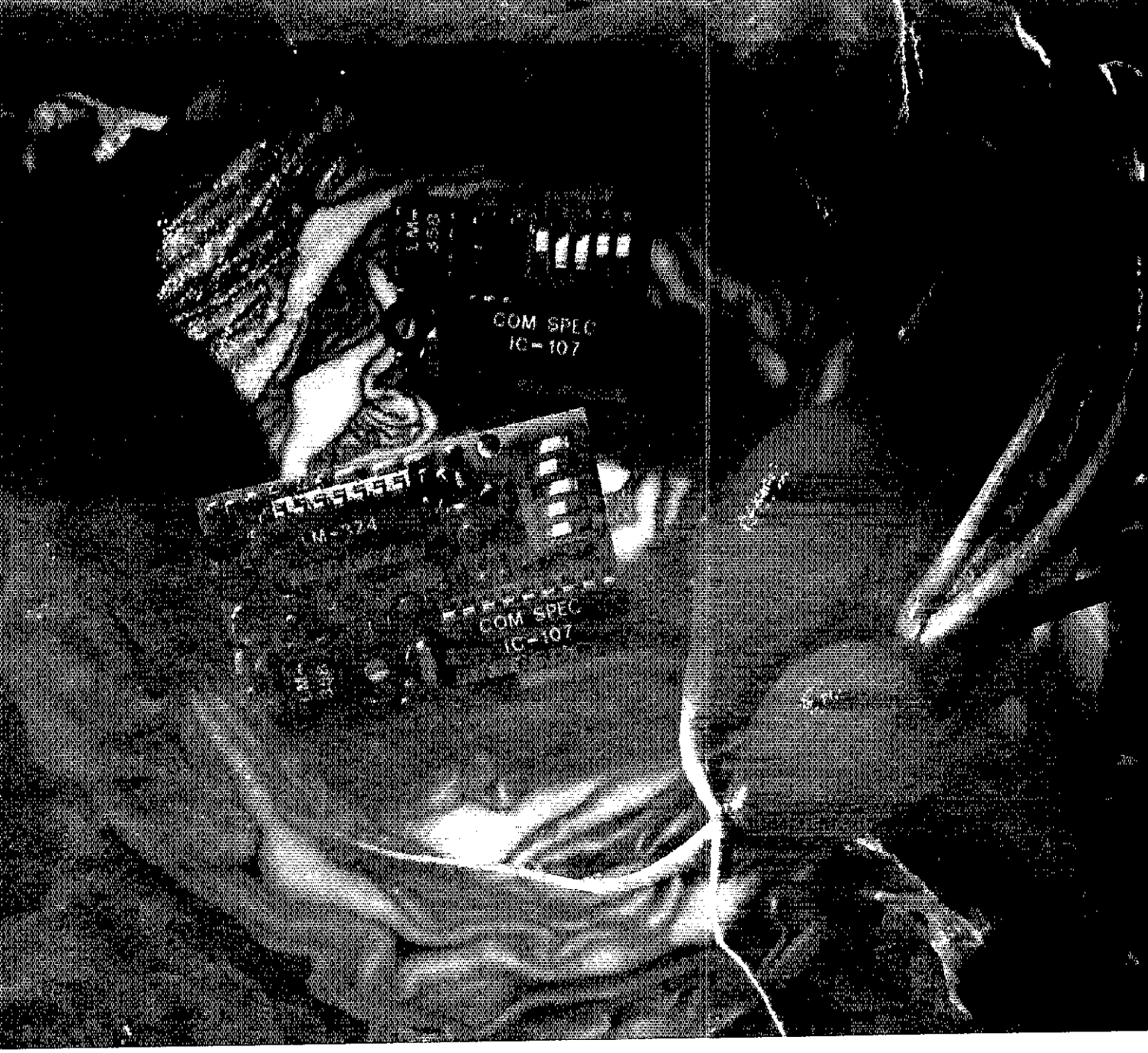
Net	Time/Day	Freq.	QNI	QTC	NM
OSN	0230/0600Z Dy	3587	654	519	KA7ELI
BSN	0145Z Dy	3908	900	39	W7FQ
OARES	0115Z Dy	3993.5	590	155	W7HLF
PTTN	0330Z Dy	146.76	282	31	W7LRB
PdxARES	0330Z Dy	147.32	1393	21	K7WWR
SOFM	0330Z T	146.64	142	22	W7FDU

OSN constantly increasing checkins and traffic along with PdxARES. GOOD WORK! Upgrades: Gen-KA7KBJ KA7CTY KA7JFQ N7DXI N7DUX; Adv-KA7GLW N7DJE N7CZS; Extra-KA7KIS. New calls: KC7SR KR7Z KC7SX KA7MZZ KA7NCR KA7NBV. Congrats to all of you! WB7SIC won first in OTVARC "Rusty Key" contest. The Oregon convention was a huge success. Co-chairmen WB7SIC and W7GWC and their teams did one heck of a job. W7ALM, who was licensed 66 years, was at the convention dinner. KC7SR getting into traffic handling full scale. K7WPC has new DXCC. N7DB no. 2 in VHF Sweepstakes for Oregon. Hoodview ARC Novice Party organized by W7TWL/KA7CED. Lightship Columbia project going FULL STEAM by Sunset Empire ARC. OBS stations doing a good job getting bulletin on section nets. Traffic: W7VSE 722, K7GV 323, W7LNE 192, WA7LGN 189, K7NTS 178, W7ZB 138, N7BGY 132, KA7ELI 103, KI7Y 86, WB7OEX 78, W7BEG 52, KC7SR 48, W7TC 48, WA7IIM 30, N7BGW 21, W7LT 21, W7HLF 19, KA7AID 18, K7WWR 12.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Freq.	Time(Z)	QNI	QTC	Sess.
NWSSB	3945	0130	582	36	31
PSTS	145.33	0030/0530	144	102	62
WARTS	3970	0100	2639	286	31
SCARES	147.18	0330	22	1	5
EWTN	146.64	0030/0430	82	78	40
NTN	3970	1830	619	66	31
WSN	3590	0145/0445	625	232	61

W7LG & Clallam Co. ARC helping on various RUNS, using Pt. Angeles rptr. Victoria/P.A. Internat'l picnic 8-1-82 in P.A. N7CT trying to work BY1PK. Evergreen ARS provided comms for Rhody Festival. K7RBT WB7BIL & WB7UGF provided only comms for Jeff. Co. Sheriff on S & R mission. WA7RCR rpts 4 OO advisories for May. Wash. State Amateur Radio Week set for Sept. 13th thru 19th. Wash. State QSO Party Sept. 17-19 (PDT), sponsored by Boeing Emp ARS. K7RS has rules and logs. Clark Co ARC rpts Ft. Vancouver hf a great success. W7BG & WB7VBK, 1982 chairman & assistant, will do it again in 1983. WB7NYN & WB7ESV head up comms team for police for July 4th activities. ARRL PIA W7CKZ story on ARES/NWS weather net



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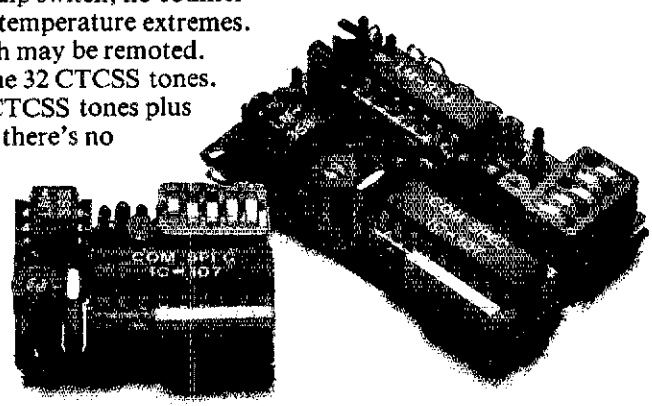

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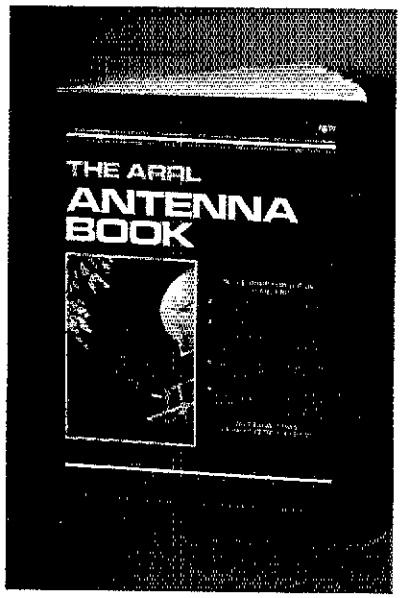

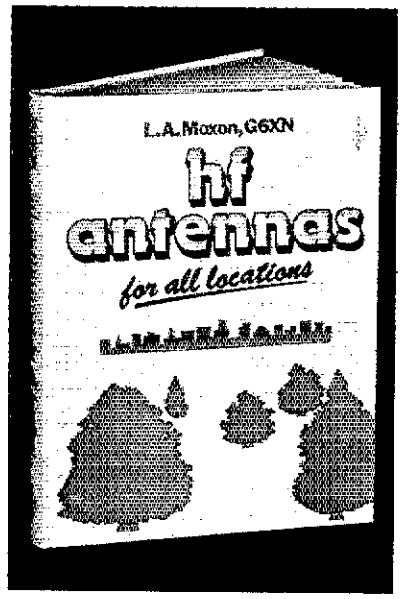

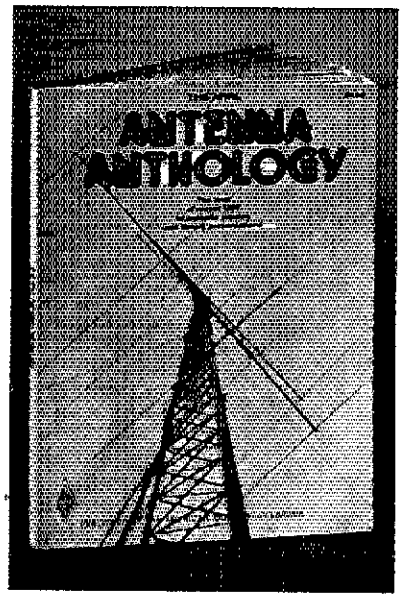

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is published in NOAA magazine. W7RGD W7KKN & WA7RWK are mentioned as well as the valuable benefits to the NWS. Lower Col. ARA W7DG's W7FON rcvd QCWA 100 Yr. Award (age plus yrs in QCWA = 100). Congrats. LCARA recognized W7ZHZ at Old Timers Night for his contributions to ham radio. Garage sale netted big bucks tnx to KA7CRS KA7CRO KA7LCB KA7JVW & XYL and N7CFA & XYL. Yakima ARC QSO party commemorating Mt. St. Helens eruption logged 127 QSOs & one emerg. Good show. W7EKM presented pictures of DXpedition with W7ISX to Barbados at RA of Skagit Co. meeting. Dial Twisters held annual banquet May 21st. Last mtg. June 2nd and will meet agn in Sept. They plan radio booth at fair again this yr. WB7OGA & KA7BQI are in charge. KA7CSP, EC for In. Emp. VHF. rpts 24 ARES mbrs assisted at Armed Forces Day/Lilac Fest. activities, and 33 hams at Bloomsday Run & 4 at bed race. WA7KMY presented talk on ways to dispose of PCB and told of the proper care of NiCads. WA7GHE, Pierce Co. ARES EC, K7SSC & RC of Tacoma mbrs worked on Heart Run, Special Olympics, & Lincoln Bowl Fest. K7AFU is heading up Puyallup River Race. K7GYP won 1st prize (Kenwood TR-7800) at Bremerton Hamfest. W7ERH enjoys VHF expo. to 4400' elev/4 elmts & 2 wts. Traffic: WB7WOW 860, W7DZX 770, WB7TOF 690, N7CSP 257, K7GXZ 214, KS7I 205, N7AFY 170, W7LG 164, W7HNA 144, WA7JEB 130, W7GB 105, N7DNG 101, WA7BDD 76, K7CTP 69, N7ANE 68, W7IEU 58, AD7G 57, W7BUN 43, KR7F 40, N7DDP 22, KC7NA 18, WA7RCR 18, K7OZA 17, W7APS 16, KD7G 13, K7OXL 5, K7RBT 5, W7ERH 4. (Apr.) AD7G 87.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — ASCMs: W6ZF N6DHN VE2AQV/W6. SEC: W6LKE. STM: NI6A. ALCO RACES provided comms for the "Human Race" at Lake Merritt in Oakland with K6JNW in charge. LARK had W6BIP as their speaker on the causes & cures of Amateur Radio interference. Their Novice course had 5 graduates, all of whom are anxiously awaiting their licenses. HARC's Novice course had all nine participants pass a surprise code test given by WD6CAZ & they're awaiting the written exams. Their new members are KA6TNV WB6QVG & WB6EYA. SBARA recent upgrades are KA6RTV to Tech & KA6BWK to Gen. Their newest members are: N6DUQ WD6FZF WA6IRZ & OM/YXL team W6SHF/KA5OKY. MDARC members provided comms for the March of Dimes "Superwalk" & a multi-hospital emergency drill. EBARC has started a Novice cw class with instructor WD6DLR. They also have a cw practice net on 21115 each Wed. at 8:00 P.M. Traffic: NI6A 410, K6APW 87, WB6UZX 36.

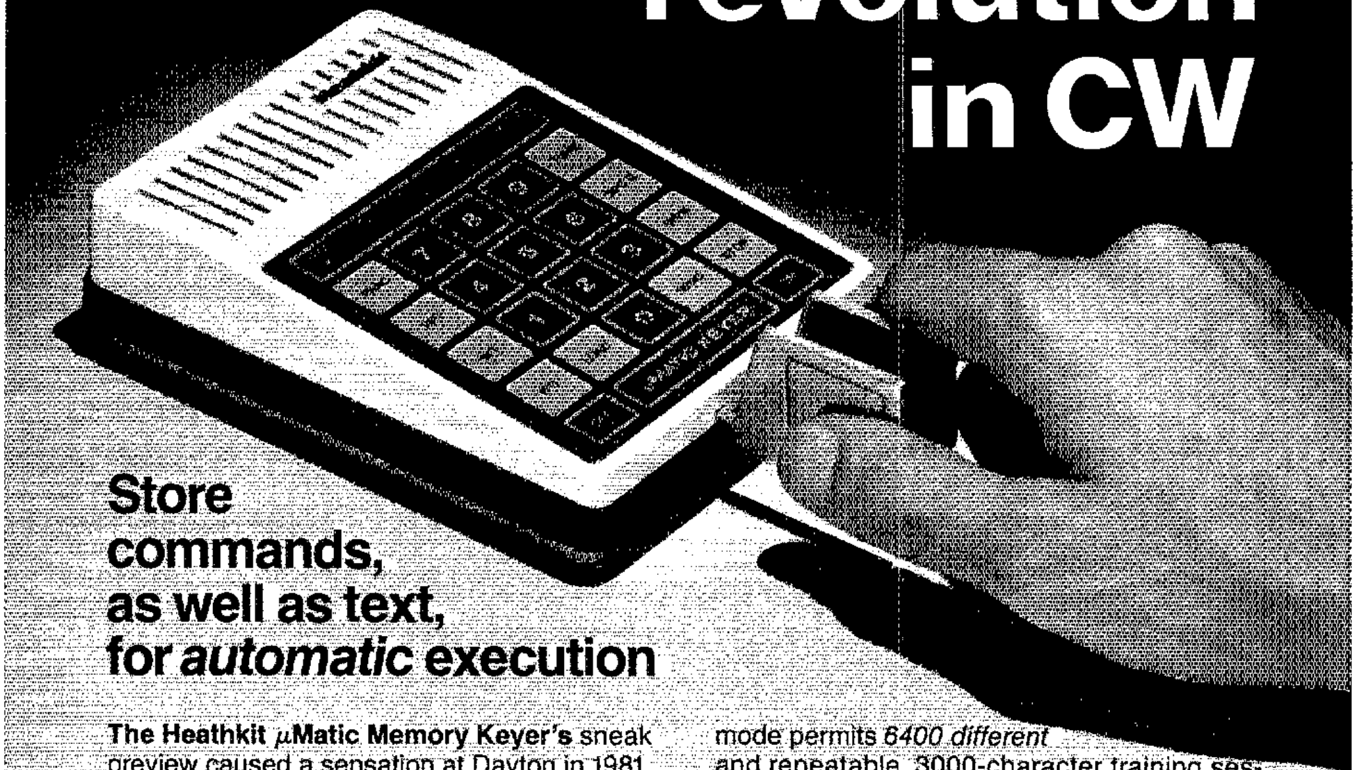
PACIFIC: SCM, Army Curtis, AH6P — SEC: KH6B. ECs: Hawaii-AH6K; Maui-KH6H; Oahu-KH6NP; Kauai-KH6S; Guam-KH6ITL. Aloha and hafa adai to all of the Pacific. Be sure and listen to the OBSs in your area for the latest ARRL bulletins. At this time, KH6HHG/R transmits every Monday evening at 7:00 P.M. on the .16/.76 machine in Kahalui, and KH6B transmits every afternoon at 4:00 P.M. on 1890 and 7290 kHz. If you enjoy this service, please contact the station operators and let them know. If you would like to become an OBS, please contact me. KH6BFZ has been sending code practice sessions on his 147.81/.21 rptr in Kaneohe MWF evenings at 7:30 P.M. If you would like more of this please call him. Traffic: KH6B 205, KH6JJP 24, AH6P 2.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. New officers for the J.I. Sabin Pioneer RC are: WB6DQP, pres.; WA6NIV, v.p.; W6TEE, treas.; WA6NDZ, secy.; W6JDT W6TID, dir. WB6POQ is the new Asst. EC for East Yolo Co. K6QIF has once again taken over the job as EC for Sacramento Co. N6AUB hosted about 45 members of the Cal/Hawaiian Net at his QTH. The YLRL held picnic at Bidwell Park in Chico. The Yolo Co. ARES along with amateurs from Sacramento, Napa and Lake Cos. provided comms for the annual Davis Double Century Bike Tour. Eighteen Redding area amateurs provided comms when chemical tanker truck overturned north of that city. Traffic: W6RSP 85, KE6NO 51, N6EPG 25. (Apr.) KE6NO 3.

SAN FRANCISCO: SCM, Bob Smith, NA6T — SEC: KE6CD. STM: K6TP. Capt BIP and Crew, GQC UG GZT TW TR, cruised the bay on the SS Jeremiah O'Brien with the radio room in full manned state. Field Day preparations are going well with SFRC, MARC, SCRA, and HARC-FWRA, going to be active. Far West Rptr System is back up and running with six rptrs and a 450-146 remote on Mt. Shasta, all intertied. RFI bills are almost law. It's out of both the Senate and House committees. Latest news from SCRA tells of AG6C and the graduating of 12 new Techs, all YLs, Gud work!! SFRC is discussing revamping the W6PW rptr with remote rcvrs, etc. Should cover the City with about 90% coverage. VIP programs taking shape in Mendocino and Sonoma Cos. Should be of help to CDF in fire season. Del Norte ARC is raffling off another beef for the rptr fund. Traffic: W6NL 405, W6IPL 166, W6RNL 107, K6TP 98, K6TWJ 73, WB6RTE 14, W6GGR 4, WB6MJT 2.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. Ross Forbes, WB6GFJ, was elected Section Communications Manager for SCV and took office July 1st. Please give him your cooperation, and send all activity reports to him for July onward. His address is on Page 8 of *QST*. Next month will be my last report as SCM, but will represent you as Vice Director, Pacific Division. W6RFF and W6ZRJ attended SCM and NTS meetings in Fresno. W6ZM is active again after his recent illness. N6EVD and N6EVL were attacked while anchored off Truk Island, both were injured. The SCCARC announces it is Not Too Early to pre-register for the Division Convention in October! W6LLO gave a presentation to FARS on hardware and software to allow SSTV with an Apple computer. The SCVRS had K6AEP give a similar talk on RTTY, ASCII, cw and SSTV using the TRS-80. KB6ZV and KA6R are spearheading a drive to change the San Jose antenna height limits (35 ft). If you can help contact either one. W6RFF spoke before the Rotary Club of San Jose-North on ham radio. WA6LNV and XYL are proud parents of a daughter, Paula Marie. New members of PAARA are W6PRG and W6WQX. Gabilan ARC were busy with the Gavilan Bike Tour and the Gilroy Garlic Festival. KB6GV has taken over as the Program interface for the VIP program of the Calif Dept of Forestry in Morgan Hill. Anyone interested in joining the VIP program contact KB6GV. KA6IVL (ex-KE6JK) is now NJ6L. W6GKY AA4RE KB6GV and WA6WBN were involved in comms at a big fire in San Martin. SLVARC is applying for affiliation with the ARRL, and looking into incorporating the club. W6SYM will be operating as OE3ZQC. Traffic: W6YBV 332, W6KZJ 161, W6RFF 31, W6ZRJ 19, W6CF 2. (Apr.) W6ZRJ 58.

The Memory Keyer that started a revolution in CW



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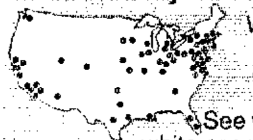

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ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: NB4L.

Net	Time	Freq.	Sess.	QTC	QNI	NM
CMN	1245Z	3927	31	196	452	W4EAT
JKFN	2330Z	3923	29	149	649	WB4WII
THEN	0130Z	3923	31	223	900	WA4OBR
CSN	2300Z	7115	30	59	193	KA4AUR
CN	0100/0400Z	3574	62	321	560	AB4S

If May QTC totals don't look so good to you, you should have been there. It's not so strange we had a low count; it's strange we had any count at all. The challenge was kinda fun for a while, but fighting that kind of band condx got old in a hurry. And is it worth it? This station, like many others, tried to fool Mother Nature and second guess a lightning storm. Ms. Nature won. Damage here light and repairable. Hope yours was too. Club activity high in May. Reports from all over section of bike-a-thons, raft races, parades and other P.S. activities. Major news for NC this month-the LPM at Raleigh. RARS did their job so well that all our energies could be directed toward work at hand. No problems with accomodations, food or geography. Seems unfortunate when a job of that nature is done well: the work that goes into it seldom shows. This participant did notice and appreciated the image built for the section by the hard-working RARS group. High point of meeting was a recall petition for yours truly initiated by Blair, Tom and Chuck for a tiny mistake in this column a couple months back. Seems I got the wrong club at the wrong location for a mini-Dxpedition. A small thing but NE4J was going to get physical 'til Blair and Chuck had their brilliant idea. It all ended happily, through, when W1XX, from Hqs., ruled that a petition of that nature had to be submitted on something other than toilet tissue. But I was worried for a while 'specially after XYL WD4CNQ signed the thing. There was considerable air clearing by pointed and intelligent questions directed at League Officials concerning restructuring plan. Need for same made clear. Efficacy of presented idea still in some doubt. Details in upcoming *QST*. My thanks for participation and support from NC section members. Traffic: WD4CNR 257, KD4PJ 213, WD4CNQ 201, WB4WII 174, NB4L 170, W4EAT 165, KU4W 140, AB4S 136, WA4OBR 79, WD4LRG 70, N4GGI 64, NT4R 63, N4CYG 61, KA4KJI 54, KF4R 54, W8PJS 47, WA4SRD 45, WB4CYN 28, N4CJJ 27, WB4YZF 26, KZ4A 23, KA4DHP 20, N4CCK 16, W4EHF 16, WD4LOO 13, WA4TTS 13, KA4LKF 9, KA4ATK 8, W4RVE 8, N4UE 5, K4FTB 1. (Apr.) KF4R 143.

SOUTH CAROLINA: SCM, Jimmy Walker, WD4HLZ — ASCM: WB4UDK. SEC: K4SUG. STM: W4ANK. NMs: K4PFC KC4LA KD4PJ. I attended League Planning Meeting '82 in Raleigh with W4PED. K4LNO received 5BWAS plaque. Fifteen members of Spartanburg ARC received public service certificates for their performance during January '82 winter storm. WB4NBK reported no 6-meter activity as yet, but expects sporadic E season to begin soon. Get your rigs ready. WB4SOD accepted Assistant Net Namager. KA4NVO accepted Deputy Net Manager of SC Noon Time Net, and KD4PJ will become Net Manager of CSN June 1. Checkins/Traffic: SCSSB 1118/131, CN 560/291, SC Noon Time 291/85, CSN 193/52, Blue Ridge 2502/90, Greater Pee Dee 980/112, Anderson 876/38, Western Carolina 496/33, York 276/70, Carolina State Line 73/4, Newberry 71/2. Traffic: K4ZN 244, W4ANK 224, W4NTO 105, W4FMZ 79, K4ZB 61, K4FRX 55, KC4LA 55, KA4LRM 23, WB4UDK 23, WA4MIY 17, W4DRF 16, WA4JWS 16, NN4N 10, K4LYU 5.

VIRGINIA: SCM, Phil Sager, WB4FDT — ASCM: K3RZR, SEC: WB4UHC. STM: KY4K. Chief OO: W4HU. Chief OBS: K3RZR.

VNTN	Noon	7240
Va SSB Net	6 P.M.	3947
Va Slow Net	6:30 P.M.	3705
Va CW Net	7 & 10 P.M.	3680
Va Late Net	10:15 P.M.	3947

SVEN reports sess 30, QNI 490, QTC 60. STARES net reports sess 35, QNI 613, QTC 47. The Virginia traffic community was grieved to hear of the passing of "PN", K4KNP. "PN" had been active in traffic handling since the 1930s under his former call W1AYC and had been active here in Virginia since the mid 1950s. "PN" was probably the most active station in the Va CW Net over the last 25 years. "PN" had a particular "Great Lakes swing" to his bug which was truly unique, and which has now fallen silent. Former PAM W4JMA now living in Madison, WI. Another former PAM, WA9NEW, has moved from MA to Raleigh, NC. *QEX*, the new Experimenters Newsletter published by ARRL, is being edited by our own W4RI. The recent League Planning Meeting in Raleigh had WD4FTK K3RZR KA3DTE K4LMB NN4I WA4EQW WB4PNY WA4PBG W4GF W4RI WB4FDT N4MM W4UG and SEC WB4UHC in attendance. The 1982 VA section Distinguished Achievement Awards have been awarded to WA4PBG WB4UHC and K4JST for their ourstanding contributions to the Virginia Section. Director W4UG conducting a Roanoke Division Newsletter competition to select the best newsletter/club bulletin issued in the Roanoke Division. There are a number of different categories. For further information contact him. Traffic: WB4PNY 359, W3ATQ 334, WA4CCK 223, WD4FTK 221, K3RZR 211, WA4LJI 185, K4KDJ 183, K4JST 180, NT4S 157, W4NWM 147, KA3DTE 110, KY4K 110, WB2RBA 105, N4YQ 104, KA4IUM 94, NN4I 87, K4VWK 72, K4DHB 67, W3BBN 58, KB4PW 57, W4HIR 56, W4UQ 55, WA1VRL 51, WB4FDT 48, NW4O 45, K4RC 41, WB4UHC 34, W4NFA 32, W4PVA 30, KC4HN 28, WB4ZTJ 24, W3BBQ 23, KA4JXZ 19, WB4DOZ 18, N4EBU 15, KI4W 14, NC4B 13, WB4ODZ 11, N4EPO 10, W4LXB 10, WB4MAE 10, WB4RWY 10, N4FNT 8, N4LE 8, K4MLC 8, WB4KIT 6, NT4U 6, W4DM 5, KM4X 5, WA4TVS 3, WD4KQJ 2, WB2OMZ 2, WB4RDV 2, N4DW 1, WA4EQW 1, W4TZC 1. (Apr.) W4CFV 10.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — ARES/RACES members assisted with comms during flooding in Kan., Ral. and Fay. Counties. W8PZT is first pres of newly formed Lewis Co. ARC. Twelve were present at first meeting. Nice going Fes. So. Appalachian Wireless Society of Bluefield is now League affiliated. K8LZ has earned his 5BDXCC. Congrats. New Novices are: KA8PNK KA8OOJ KA8OVL KA8OOK. KA8OOI is now Tech. KA8MDB now had Adv. Nets: WVN QNI 110, 31 QTC: WVFN 442 QNI, 114 QTC; WVMD 438 QNI, 53 QTC; WVNN 43 QNI, 7 QTC; KFC 123 QNI, 6 QTC; KARC 114 QNI, 1 QTC; PARA 44 QNI, 2 QTC; WV Hillbilly Net 139 QNI, 12 QTC. Traffic: KD8G 93, KA8GHF 71, W8YP 45, K8KT 43, W8FZP 41, N8AJC 40, KC8CR 40, K8MHR 40, K8QEW 16, W8CAL 11, W8CKX 7, WB8UDY 6,

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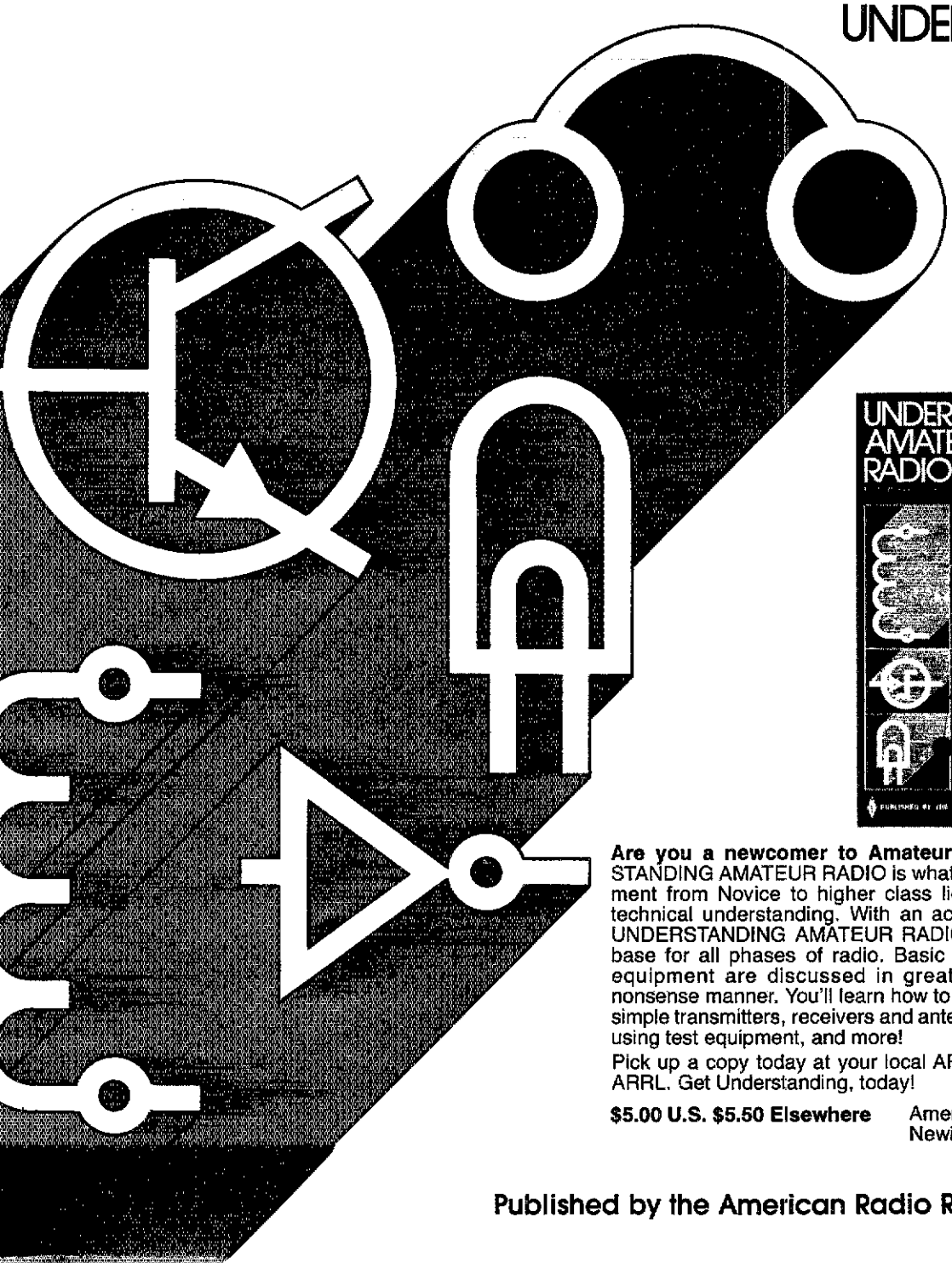

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ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, W0ACD — SEC: K3PUR. STM: WD0AIT. NMs: W0HXB W0LAE WD0AIT W0EJD WA0RYL. With summer comes the many swapfests and get togethers in the amateur fraternity. The latest in this section was held in Loveland June 5, the Superfest IV arranged by the Northern Colorado ARC and sponsored by the ARRL. It was very well attended with over 300 registered amateurs. There were several technical sessions and a lot of gear sold or traded. Thanks to the workers for a job well done. We are looking forward for next year. The Boulder ARC will host the BARCfest Sept. 26, which in the past years has been a very successful. In July I hope to visit some of the clubs in the south, August the west, and Sept. the east part of the section. The Weather Bureau has made available for showing serveral films on floods and severe weather which should be of interest to groups interested in emergency public service communications. If any club has interest please let me know. If you have handled formal traffic during the month be sure to let me know so it can be reported. Columbine sess 26, QNI 979, QTC 77, inf. 194. QNF 1001: HNN sess 31, QNI 1609, QTC 120, inf. 185, QNF 1272; CWN sess 30, QNI 167, QTC 234, QNF 725. Traffic: N0BQP 2576, WA0HJZ 2179, W0ACH 880, K0DJ 461, W0HXB 359, W0ACD 183, N0CXI 183, W0EJD 173, KB0Z 122, W0LAE 119, WD0AIT 80, W0NFW 18, K0CNV 12.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WA5UNO KB5LU W5VFQ. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 226 msgs with 219 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 115 msgs with 909 stations in. New Mexico Breakfast Club meets daily on 3.939 kHz at 0700 local and handled 61 msgs with 926 checkins. Yucca 2 Mtr Net, 147.78/.18 handled 29 msgs with 829 checkins. Caravan Club 2 Mtr Net, 147.66/06 handled 7 msgs with 133 checkins. Sorry to report the passing of W5IXZ of Roy. Congrats to W5IPR on new Extra Class. FB QCWA Mtg with abt 30 out. Good club newsletters from Socorro, Las Cruces and Silver City. Traffic W5DAD 268, KV5U 231, W5ENI 81, W9OBV 48, KB5LI 25.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. STM: W7OCX. WIMU August 6-8 ARRL Joint Rocky Mtn Div and Northwestern Div Convention at West Yellowstone. W7OCX is retiring as BUN NM and Utah Army MARS State Director after 25 years of service to Each. Thanks for a job well done, Col. Sampson. WB7TUR now N7DWB. UARC has T-shirts, hats and jackets for members. KA7IMV has computer and RTTY gear plus new tower and beam. N7BNC says 20 of the UARC class passed their Novice test. W6BAY is living in Enoc. WA7ARC WA7FHS W7KOR and W7PBV handled traffic for Utah CAP and sheriff's officers and FAA on downed aircraft near Pioche. K7KEQ and W7PBV handled traffic for the Friendship Boat Cruise. KA7NFD and KA7NDC was issued to Cedar City ham. Which will he keep? N7CQT has upgraded to Advanced. N7DAG & KA7MNX QNI to UCN from Roosevelt and N7CQT from Vernal. WA7HHE has his tower up. When does the beam go up? W7PBV is liaison between Nevada and Utah Civil Defense offices. Traffic: K7HLR 227, WA7KHE 120, WA7MEL 92, WB5TJP 63, WA7JRC 48, W7CKF 29, WA7UJP 28, W7RO 27, W7OCX 21, KO7H 13, W7PBV 9.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. STM: W0OGH. Looking forward to seeing all of you at the Wyoming Hamfest, July 17 & 18 at Meadow Lake, west of Buffalo. Other activities this summer include the High Plains Round-Up and the High Plains AR Rendezvous, both on the weekend after Labor Day. Recent upgrades include WB7AXA to Advanced, KA7KSZ to Technician, and WB7UWY to Advanced. Congrats to all. WTN held 28 sess. with 72 QTC & 85 QNI. Wyo. Cowboy Net held 22 sess. with 549 QNI & 33 QTC. Wyo. Jackalope Net held 25 sess. with 463 QNI & QTC. WTN meets Sn T & Th 6:00 P.M. MDT, 3720± until further notice. Traffic: WB7NHR 268, W0OGH 210, K7SLM 42.

SOUTHEASTERN DIVISION

ALABAMA: SCM, H.H. Wheeler, W4IBU — SEC: N4DMA. STM: WA4PIZ. ASCM: legal-KA4WVU; publicity-N4DRV. An edited edition of N4DMA's article, "The Three Seasons of January", appeared in AMATEURADIO, an ARRL publication for media release. BirmingHamfest a great success as was the ARRL forum. The SEC is proposing a new format for the ARES to provide a better weather alerting system to encompass all the NWS stations. The NWS Director supports the plan. The WARC frequencies may soon be ratified if all goes well. N4DRV and N4DMA were selected by the division director to serve as members of the Advisory Committee. W.L. Mathews, WA4ZVJ, is frequency coordinator for the state. Contact him if you change a repeater frequency or install a new machine. Field Day will be history as you read this. Hope you and your club did well! Many clubs who get my newsletter are not reciprocating. Let me hear from you on local activities and changes in the officers or addresses. DON'T BE SHY! KE4BH is now Extra Class. Many other upgrades and new Novices around the state, but too many to mention them all. Congrats! Many clubs have provided comms for civic functions. Again, too many to mention but thanks to all! Alabama was represented 100% on CAND by W4CKS, DRN5 100% by WA4JDH W4WJF NW4X W4CKS & W4IBU. Traffic: WA4JDH 927, W4CKS 150, WA4LXP 87, K4AOZ 66, W4IBU 63, WD4DHI 24, NW4X 22, K4HJX 14, WB4TVY 14, KY4H 12, WA4OEA 9, W4WJF 8, WA4HRV 6, K4UMD 3, W4DGH 2.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — SEC: WB4HXE. ASEC: K4SWJ. STM: W4WXA. Chief OBS: W4BIA. The members of the Atlanta RC have to be commended for the excellent job they did for the SE Division Convention and Hamfestival. This was their 50th, and, on behalf of the League, were presented with a proclamation stating so. The Georgia State Convention will be held held in Warner Robins on September 11 & 12. Once again I remind all who are planning a hamfest for next year to please notify W4RH, our S.E. Director, so that they can go on record to keep down any conflicts. To all of you within the section who received plaques and pins for the many years of ARRL membership, hearty congrats. Owing to poor propagation conditions the GSSB net was moved to 7:30 EDT. Gwinnett Co. ARS furnished comms for March of Dimes Walkathon and parade. BGMRC aided Health Fair and raised funds for the club with successful flea market. Conyers ARG had float in Loyalty Day Parade & reported good PR. Hartwell ARS set up for their annual marathon run. Proud to note

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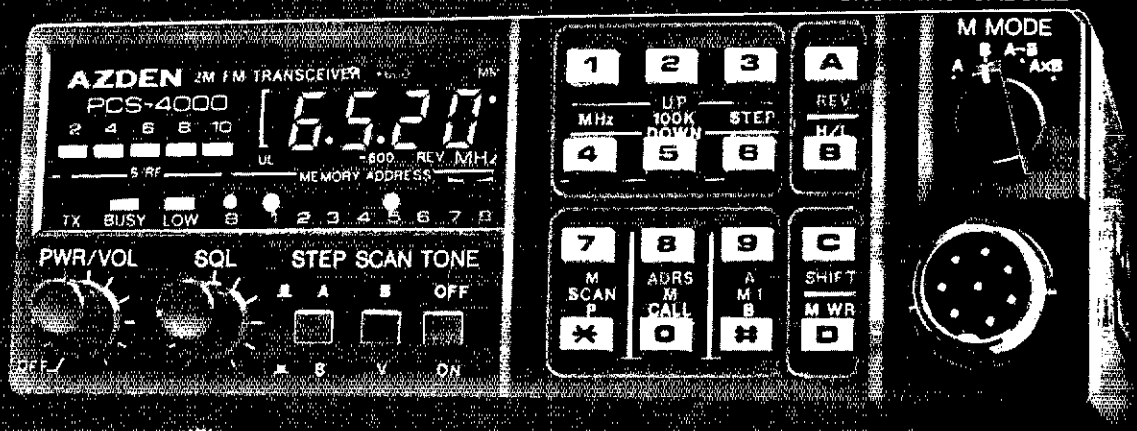

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that the S.E. DX Club is 100% ARRL affiliated. Any more clubs in the section in that category? If so, please let me know. The Albany 10-meter repeater is up & running. Input is 29.58 MHz, output 29.68 MHz. Get on & give it a try. Want info on 10-meter fm, contact WA4GKI or N4CB. Field Day '82 is over. Please get your forms in ASAP. 73. Traffic: W4WXA 197, WB4NTW 180, K4EV 52, K4JNL 39, N4BIM 22, W4HON 20, K5TF 20, K4NM 18, W4PIM 17, W4BIA 16, KC4WL 16, AK4T 14, N4UZ 5, K4PIK 4, KA4ATM 3, AA4EI 2, K4BAI 1.

NORTHERN FLORIDA: SCM, Billy F. Williams, Jr., N4UF — The new SEC is Cameron Magnon, W4UEA (Rt. 1, Box 516; Dunnellon, FL 32630). He previously served as EC and DEC. Pse send all EC reports to him by the 8th of the month. ASEC is Walt Rike, KE8O (18 Pinewood Dr. E, Holiday, FL 33590). He is president of the Gulf Coast ARC, and has served as EC-West Pasco. NVOAD liaison is Rudy Hubbard, WA4PUP, of Milton. New ECs are W4IIR, Citrus Co.,) and WD4RJI (Marion Co.) New NM for QFNS CW Net is WA4QXT of Casselberry. Orlando ARC elected KC4TC, pres.; N4EDQ, v.p.; WB4AQW, treas.; KD4NT, secy; W4UFY KC4EO K4DEE KY4F W4DNU W3SOB, directors. N4FJD is bulletin editor for expanded *Listening Post*. Orlando Centre-Plex will be new site of 1983 Orlando Hamcation with 70k Sq. ft of exhibit & table space. KA4UMX was voted Orlando Ham of the Month. In Jax, KA4UYD was elected NOFARS secretary. The Tri-County ARC had nice mail traffic station and display. 162 radiograms originated for Mother's Day. W4PTT's DX Column in *Balanced Modulator* has new look with computer printer, his latest acquisition. Pensacola and Five Flags ARC planning hamfest for Sept. 12th. KA4DLC has new TH7DXX, and WB4QBB operated WB4SKI to 1st place SS finish in NFL. TARS put several rare counties on the air. KN4Y KA4DBZ W4MLE NS4V W4GAA KC4N K4VRT & N4WA went on expeditions to Jefferson, Liberty & Gulf Counties. KA4LCJ upgraded to Tech. KA4VNS of LMARS took top honors for 4th District in NR. WD4AKL running LMARS Traders Net at 1930 local on 147.45 MHz. Hams provided comms for the Bahia Shrine Temple gigantic parade and the national convention in the Orlando area. W4MH awarded for his work with the "Turkey Group." GCARC took part in 4-county simulated hurricane test. Most FL traffic and emergency nets were on alert for Hurricane Alberto, which fortunately missed most of FL. Traffic: WD4HIF 582, N4PL 359, WA4SGF 324, WA4QXT 258, WA4EYU 251, N4EDH 147, N4ADI 125, WD4IIO 110, KA4MGQ 108, N4BZH 105, WB4GHU 99, WB4ADL 89, KF4U 88, N4GIY 72, W4MGO 69, WB4TZR 60, W4KIX 52, KA4MGR 52, KB4LB 46, KB4T 36, KD4OZ 28, WB4DTS 28, WB4WOO 27, WD4GUZ 25, WA4STZ 24, W3IDO 21, W4DTV 18, N4UF 18, KE4PO 17, N4ESM 12, WD4HDP 12, N4AXN 10, KA4RBY 7, K4DHX 5, WD4RIQ 5, KA4NPI 2, WB4YQP 2, WD4NVJ 1. (Apr.) W4KIX 67, N4AXN 30.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — ASCM: W4KGJ. SEC: KB4OW. STM: WA4PFK. June 1st was the official beginning of the hurricane season and we had Hurricane Alberto threatening Southwestern Florida by June 3rd. He buffetted Dry Tortugas and Key West. Hurricane warnings were issued for Naples and Fort Myers area. KB4OW placed the section on Condition I, standby alert, at 6:20 P.M. Although section-level nets were never called into emergency session, many Radio Amateurs monitored their net frequencies, particularly 3940 kHz, while keeping abreast of weather reports from many sources. Alberto was a "minimal hurricane" with maximum sustained winds of 80 mph, not a dire threat. He was watched carefully, and with each pass of the GEOS satellite was seen to diminish in strength. By 6:30 A.M. June 4th he was no longer a hurricane. KB4OW cancelled Condition I at 7 A.M. WB2OUK, EC of Lee County, had activated Lee County ARES/RACES Net during the alert with 13 operators. KA4ASZ, EC of Collier County, had activated Collier Emergency Net with 20 operators. So the effect of Alberto was to focus our attention on alerting procedures and hurricane preparedness. All NMs should review the standby plan for net activation during emergencies — the one we use during SET. This same plan should be used for real emergencies insofar as applicable. Be responsive to needs of the SEC. Any Radio Amateurs not yet registered in ARES should contact their EC and get on his rolls. The ECs in SFL are: Brevard County North, WB4WYG; Brevard South, KB4OW; Broward, WB4KKG; Charlotte, WB4ITH; Collier, KA4ASZ; Dade, W4IYT; DeSoto, KA4CPS; Glades (We need a volunteer), Hardee, KE4DA; Hendry, AA4BN; Highlands (How about you?), Hillsborough, KR4X; Indian River, (Vacancy: Help!); Lee, WB2OUK; Manatee, WD4CRR; Martin, K4ZK; Monroe, K4URX; Okeechobee, WA4AYY; Osceola, WD4PGG; Palm Beach East, WD4BCC; Palm Beach West, K4SJA; Pinellas, W4GPL; Polk, WB4FVV; Sarasota, K4CGX; St. Lucie, WB4NOZ. K5IHH reports his latest acquisition is an IC-551 all-mode 6-meter set. He is having a ball with DX band openings. KE4DA is a proud Elmer, reporting N4GPJ and KA4NDB upgraded to General. Welcome to Peace River Valley Amateur Net, newest local net to qualify as part of National Traffic System. Our congrats to WD4BCC who reports ARES members in Palm Beach East jumped from zero to 80 in 2 months. Good work, but this info concerning March activities was received May 8th. All station activities reports and news items, to be useful, must reach me by the 5th of the month. For example, I "go to press" on June 5th with all reports received for May activities. Traffic: KE4OI 595, K4TH 424, WA4PFK 345, KY4U 298, K4SCL 277, K4ZK 240, W4GPL 224, W4NFK 223, WB4AID 188, WA4EIC 161, KE4DA 145, KA4ASZ 144, WD4AWN 115, KE4O 97, W4DL 90, K4IA 85, WB4WYG 85, N4ET 77, WA4GYR 63, K4EUK 59, W8BZY 58, WA4HXU 57, W3TLV 47, WD4CHO 42, WB4MPJ 42, W4ESH 34, WB4GCK 33, K5IHH 31, W4IRA 29, KA4BBA 28, KC4OT 24, AA4BN 22, KA4FZI 22, WA4IQO 20, N4KB 17, KB4OW 16, WB4FVN 14, W4LVA 10, WB2OUK 10, W4WYR 9, KA4RWV 7, W4SMK 6, WD9AEP 4, W1DLP 4, K4JM 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — WINC report by WP4AOH. WINC set a new record with 407 QNI in May. This was done on NP4D's repeater (146.315/915). NP4D rcvd a Certificate of Merit for traffic passed on WINC. WP4AMA and WP4BPD rcvd Certificates of Merit for perfect attendance in May. NP4L has been having perfect attendance for 3 consecutive months. She will soon be QNI on WINS, and recently rcvd 20 wpm certificate from ARRL. KP4EOR KP4EMX KP4EKG and KP4AOH are active on 144.15/144.200 MHz ssb and cw. Our beacons are aimed to the US from 2300Z to 0200Z. NP4D reports his repeater will move to 146.295/895 about July 1st. KP4EU from Bayamon is welcomed as new QNI to WINS. PSHR: KP4DJ NP4D WP4AOH. Traf-

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XF8.9HCN 350 Hz CW filter..... 50.00
YM-34 Desk microphone..... 31.00
YM-35 Scan noise canx mic..... 20.00
YM-36 Noise canx mobile mic..... 20.00
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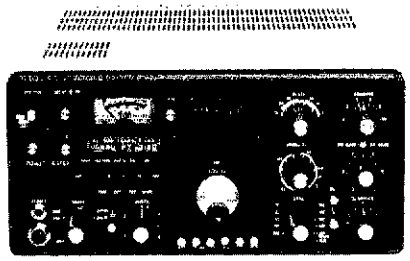

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YR-901 CW/RTTY decoder..... 730.00
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FT-127 220 FM 12 ch. xtal xcvr..... 299.00
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SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP, NMs: WA7KQE WA7FDN. The month or May saw members of the TRA provide comms for the Camp Wildcat Triathalon. Participants were: WA7JCK AF7M K7OMR WB7VOM W0YOY WA0NNC K7CRN KB7KZ KA7IZC WB7OBF KC7HU WB7VOF. Back in April the following SARC members provided comms for the TAB Fitness Race: WB7FDF KA7AKK WB7ETR KA7AFW K7NZA WB7EMZ. All club reports received indicate that there will be a large number of AZ groups in the field participating in Field Day. W7KMA reports working five new countries on 6M. OPRC reports the following Novice calls: KA7MZQ KA7NID KA7NIB KA7NIC KA7NGN KA7NDF. WB7ORP has been appointed DEC for Yuma Co. W7KAX reports Mojave Co. for Yuma Co. ARES members participated in search for an elderly person. Pima and Mojave Cos. ARES members participated with others in state ES sponsored emergency exercise; tnx W7KAX and K7NTG. WA7NXL reports making 5BWAS and celebration 20 yrs on the air. ATEN: QNI 880, QTC 136. SWN (Apr): QNI 223, QTC 208. Traffic: W7EP 203, K7UXB 117, K7NTG 36, WA7KQE 29, W7OIF 21, K7NMQ 16, N7EH 12, KO7Y 9, W7LBW 6, WA7YUL 6, WA7NXL 5, N5CVT 3, W7DQS 3, K7GLA 1.

LOS ANGELES: SCM, Stan Broki, N2YQ — SEC: N6UK. STM: K5DY. Congrats to AA6O and KD6NL on their new OO appointments. The Southern District ARES and the Associated Radio Amateurs of Long Beach successfully supported the Gordon Bennett Balloon Race. Many operators participated including AK6Y N6BCY K6OCS N6LB and many others. W6SD is preparing with the Santa Clarita ARC for an outstanding Field Day this year. The call will be W6SD this year for the event. K6AGF Tri-County ARC is preparing for Field Day at the Naval Station in Norco. W6VIO, JPL ARC, received first place in the Los Angeles Section for the SSB part of Sweepstakes. Ops were N6MP W6ABW & W6LZP. Monrovia Days were supported by the San Gabriel Valley ARC. WB6QFE WB6NQD and WA6LJO were helped by many ops on the parade route. Pasadena RC members supported the Altadena Old Fashioned Days Parade. W6KA call was used by the ops on 2-meter and 20-meter stations demos. WD6CKN and N6LL organized the effort, assisted by N6MJ K6JRR W6ZPV KE6JI and WB6UWA. Downey ARC supported the March of Dimes Walkathon. OO reports: K6KA 80, K6CL 5. Traffic: K6UYK 412, KT6D 98, N6DZQ 89, WA6OCM 74, AD0A 32, WD6CZW 27, K6CL 18. (Apr.) K6UYK 519.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. STM: KN6C. SEC: W6UBO. DECs (by counties): K6GGS (San Bernardino), W6LKN (Riverside), WB6JBI (Orange), WB6YZY (Inyo). EC WB6SEL will now share leadership of San Bernardino Co. RACES Dist. #3 with EC WA6ZVS. Coverage includes Crestline area with W6DFF appointed EC for the Big Bear area (RACES Dist. #5). WB6FRB appointed EC Hemet/San Jacinto area (Riverside Co. RACES Dist. #4), with N6BAE staying on as AEC (&OES). KA6RRR, secy & editor of West Coast ARC, appointed OVS. KA6LQL, AEC ARES liaison from MESAC, appointed OES. New officers: Mesa Emergency Services Auxiliary Communications-KA6LQL, pres.; KA6KIL, v.p.; WA6WQJ, secy; WB6CFY, treas.; WB6NOA, comms officer; KD6KQ, asst C.O.; N6FM, rptr trustee. Big Bear ARC-WB6BGI, pres.; KA6HBN, v.p.; W6DFF, secy; W6DQO, treas. Radioclub Latinoamericano De California (RALAC)-WB6JYJ, pres.; KA8AKL, v.p.; WD6EAY, secy; TG9CB/6, treas. NC8C, P.R. Hughes Microelectronics System Division Employee Assn ARC-W6JI, pres.; WB6KHY, v.p.; WA5NYJ., secy; WB6GGF, treas. Pike Pique Field Day CW Beer & Pizza Society ruled by King AA6DP announced Class 1-A FD effort. Bishop ARC provided comms for "Mule Days" & "Arabian Horse Race", thanks to KA6HII WB6YZY KA6RCM W6DHK KA8ARG KA6BGE and other ARES members. Fullerton RC held annual star party with about 50 attending at the desert home of N6PY. Morongo Basin ARC provided emergency comms between CHP and the hospital. Thanks to W6NMR WD6FMP W6IF K6MFE & WB6PAH. Inland Empire RTTY Network announced ASCII net 8 P.M. Thursday on club repeater WB6ZIR/R, 145.12 (−.6), which also supports computer mail boxes of WA6MJS (TRS-80) and WB6UUT (Apple II). Anza ARC members WB6NSX N6CFN N6ETE & KA6LYX designated "Communication Specialists" in the US Coast Guard Auxiliary. AES WA6OSP announced over 25 hams supported North Orange Co. multi-hospital disaster drill where 250 injuries were simulated. Packet radio big success at SW Div. Convention. For info contact SCM. Tri-County ARA holding hamfest /picnic at LA Fairgrounds Aug. 7 from 7 A.M.- 1 P.M. with talk-in on 146.825 (−.6).

Net	Freq.	Time/Dy	QNI/QTC	NM
SCN/1 (>20)	3598 kHz	7 P.M.	373/345	K6FI
SCN/2 (<13)	3598 kHz	8:15	306/135	K6HAP
SCN/V (FM)	145.645 (−.6)	9 P.M.	524/357	WA6QCA

Traffic: KN6C 294, WB6QBZ 242, W6NTN 174, WA6QCA 81, W6RE 49, K6XI 40, K6ZCE 30, K6JT 24, W6TKV 9, KA6BNW 8, WA6WZO 6, W6CPB 5, WB6FRB 4, WA6WZN 3.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. HAM-COMP '82 held in San Diego, Jun 4-6, was huge success with 4000 attendees. Co-sponsored by the San Diego Computer Society and San Diego County Council of Amateur Radio Clubs, it represented a marriage of Amateur Radio and computers. Recent upgrades: Advanced-WD6AOZ WA6CQW. ARES held its 2nd annual picnic on May 16. Tnx to KM6S and the Convair ARC for a very successful event. The Red Cross 15K run saw ARES 220 MHz oprs providing comms. A disaster drill in Rancho Bernardo used Poway ARS operators at the command post and mass care centers. KA6IEN directed the comms. K6DS holds only WAMO Century II award of the ARC of El Cajon. NG6Z is tackling cable QRM on 145.25 MHz. Improve your emergency readiness by learning the fine art of message handling on the North County Traffic Net (nightly at 2000 on Palomar ARC 13/73). The net met 30 times in May handling 124 messages. Traffic: KT6A 766, W6HUJ 348, K6HAP 195, KM6I 150, KU6D 144, KB6AI 78, N6AT 53, K6AE 7, N6GW 1. (Apr.) K6HAP 149, KB6AI 89, K6AE 8.

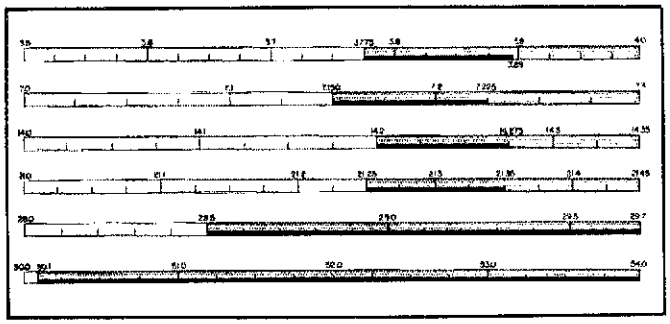
SANTA BARBARA: SCM, Robert N. Dyrutt, W6POU — ARRL Pres. Clark, W4KFC, met with sctn officials over 2-day SW Div. conv. re proposed League changes. (See 6/82 QST pg. 53 by K1ZZ). W6POU re-elected for 2nd term as SCM. Div. ARES/NTS mtg leading to statewide hf alerting freqs. via ass't dir. AE6N. Systems "go" for largest-ever all cities/SBar Co. quake disaster trng exer. 6/21.

Generals Get HF SSTV

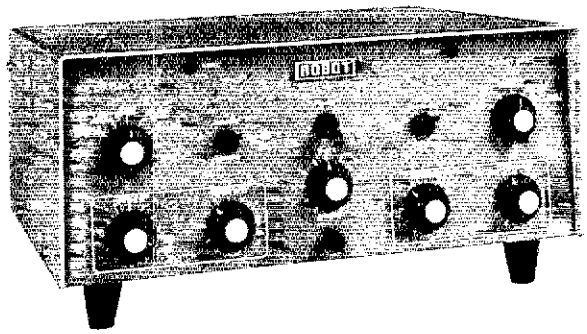
The FCC has amended its rules to allow general class amateurs to operate SSTV on any frequency where they are authorized voice transmission. The action by the Commission occurred on 24 November, and while no effective date was given, it is expected to become effective in January or February of 1982.

FCC Opens General Class Phone Bands to SSTV

The FCC recently approved a proposal (Docket #80-252) to allow the transmission of television (SSTV) on all amateur radio frequencies above 3.775 MHz where voice transmissions are currently allowed. This resulted in opening up the general class portions of all phone bands to SSTV without impairing the special bands set aside for Advanced and Extra Class licenses. The frequencies now available for SSTV are shown in the accompanying band allocation chart.



With this new ruling there are no longer any restrictions on using SSTV on the same bands you've been working phone. By adding a Robot Model 400 Scan Converter to your station for just $795 you can transmit and receive visual data without having to change frequencies. Not



only can you transmit and receive high quality pictures of your station, and yourself, but pictures of your new car, your family, and even pictures of minute items like coins or stamps.

We estimate a 25% to 50% increase in the number of SSTV stations within the next 12 months, and the majority of hams having SSTV by the late 1980s.

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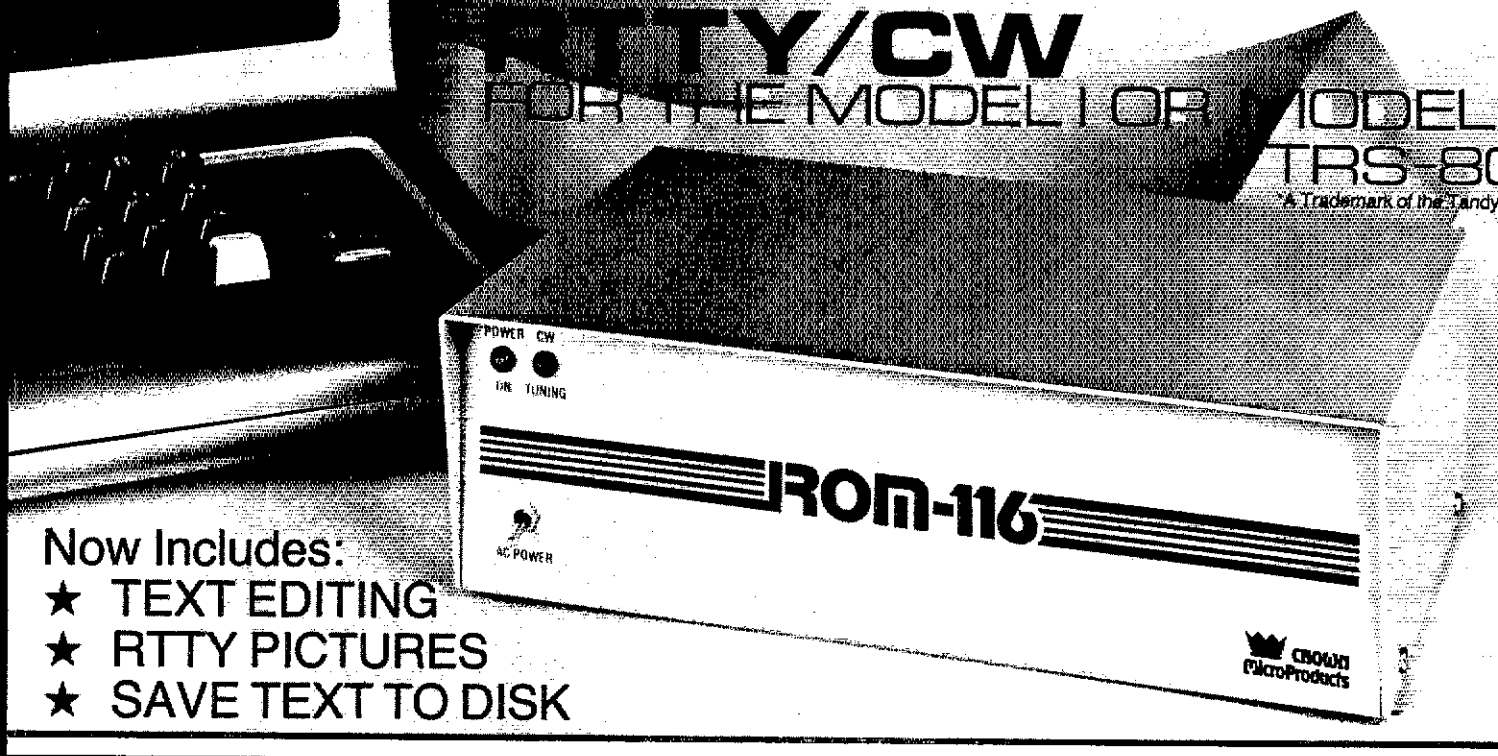

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FEATURING:

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Phones "out" for all publ. & private agencies. Offices of Emerg. Svcs (OES) coord. present from Riverside, San Diego, Ventura Cos. as amateurs provide comms. Computers linked across state to OES offices by W1UUQ. Local opns headed by ECs N6AJA & KA6Q plus over 40 ops on Monday. SLO Co. ARES holds weekly trng with state CDForestry VIP exercises as fire season opens. Hvy beach tourist traffic. Memorial Day called up ARES to support sheriff's SAR & Medic teams under WA6KDH. W6MSG completed Baja 500 race comms. His solar stn in cont. opn. since fall w/o commercial power. PG&E nuclear facility siren test advanced to Aug. 7. Many hams are needed. SBar Co. Sheriff office thanks ARES ops for SAR comms during lost plane search. ARES will be given pager for alerts. Ventura Co. March of Dimes 100 mile Sea-to-Summit bike-a-thon a success thanks to many hams led by WB6RVA who also helped SBar Bicentennial Parade comms which was led by N6CJL plus 10 ops. Greg Scott, W6GHY, named Public Relations Ass't from 1,000 Oaks. SC ATV Club's WA6MVD released new Const. & By-Laws. WA6RDA produced 6.2 MHz IF subcarrier demod. sound board for 2-5 GHz satellite rcvg system. WB6RDV new SBar ARC pres. plus 12 bd. mbrs. Lompoc ARC actively sypported Satellite ARC hamfest 6/13. Simi Valley members of Valley Good Guys ARC outdid themselves again with Conv. Gazette-52 page special by cast of dozens incl. Amer. Red Cross Chapt. Mgr. Irv August! WA6OHX strummed harp at hosp. suite. K6QYL hosted ARRL officials at S.D. Yacht Club dinner mtg re SPAR-Soc. for Preservation of AR. W6HWK rpts good attendance. Regular Tues ARES net on SMRA 146.88. KA6QPT designed 6-tone keytone alert decoder for xcvr. KA6EPF designed battery charger. Space shuttle comms from JPL W6VIO relayed to locals by WA6OBT & WB6RHQ. Condor RA W6TLG portable rptr at convention linked 135 miles to home. WA6MBZ completed draft paper on use of data processing by ARRL section mgrs. KE6CA won TS-830S at Fresno Hamfest. N6FSF wkg DX via antenna mast which rises 100' from hole via garden hose pressure! Traffic: K6YD 117, W6JTA 20, W6JGS 19.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Mark down the last weekend in Sept. (25th & 26th) on your calendar, as the Wichita ARS presents its first annual hamfest in Wichita Falls. Send for info to: WARS Hamfest, P.O. Box 4363, Wichita Falls, TX 76308. Lots of activities are planned, along with an inside flea market. K9MX is returning home to Illinois from duty at Ft. Hood. Spike was a very active OO and NTS member. We will miss ya, sir! It saddens me to report the passing of W6OLC and K5DM. The West Texas ARC of Odessa meets first Thurs. at Bronco Chev. at 2000L. Pres. is KB5MM; v.p. is K5IID; sec/treas is N5AQU. Coming up Aug. 13-15 is the annual Golden Spread Amateur Convention and Hamfest at the Student Activities Center of the West Texas State Univ. at Canyon, TX. KC5MO got a nice write-up in the Terrell Tribune for his public service work during the Paris tornado. Now that Field Day is over, it is time to hold all emergency gear in readiness for quick mobilization as the hurricane season has come in like a lion, almost on cue the first week of the official season. We may be called upon to relocate down along the coast, at a DPS office in our area, or to cover flooded areas inland from the storm. All coordination will happen on 7290 kHz (day) and 3961 kHz (night) by W5GPO. The folks in Albany, Breckenridge, and Ft. Worth can attest to the fact that hurricanes *do* affect Northern Texas on occasion. Let's be ready to move! New EC out Nolan Co. way (Sweetwater) is K5ISD. W5GPO reports that 47 Emergency Coordinator volunteers are needed to fill all the remaining vacant slots in our section. Also there are two District EC slots open in the Tyler/Longview and Waco/Temple areas that desperately need to be filled. Let W5GPO know of your interest. The new repeaters at Decatur and Bowie received their acid test during SKYWARN activities this spring and worked like champs linking the NWS in Ft. Worth and Wichita Falls together, and providing vital spotter info direct to the field over many miles. Repeaters in Sherman, Bowie, Weatherford, Boyd, and Waxahachie have increased the the forecast capability of the Ft. Worth NWS ten-fold over previous years. The Dallas EOC is installing a remote radar terminal on the Corsicana doppler radar station that will be available to the entire NTX. SKYWARN Network next season. The Dallas ARC has just placed a well-equipped emergency van into service. Self-contained vehicles of this type increase our effectiveness in times of comms emergency by cutting response time. A job well done, DARC! PSHR: KA5AZK N5BT KC5NN WA5QFD WD4SIH WD5JYI KC5FX AJ5F KK5B W5VMP. Traffic: N5BT 221, KA5AZK 192, WD5JYI 111, K5BNH 86, K9MX 86, KC5FX 69, W5ERT 46, AJ5F 45, W9OYL 43, KC5NN 41, WD4SIH 41, KK5B 32, WA5QFD 28, WA5EZT 27, K5HGX 24, W5VMP 23, K5PC 19, KV5J 10.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — ASCM: W5REC. SEC: W5ZTN. NMs: WA5ZOO WD5IFB WA5OUV KV5X. All these guys are hard working net manager and deserve your support. Net operation can be rewarding. All nets need more help as net controls or just plain checkins. The Weather Net can always use more weather reporting stations. Altus and Mangum ops helped with a 'Fun Run' recently. MORI group had a prominent booth at the Tinker Field Open House, FB. Ponca City is remodelling a 4-wheel drive truck to use as emergency vehicle. Much bad weather in the form of tornados, wind and heavy rain and flooding kept many of our people busy. Also, took its toll of antennas around the state. K5WG has new 40M antenna in the air. W5UYH moving to new location near Tulsa. WD5JCE newest EC; Shawnee ARC is latest affiliated club in state. This brings us to 20. Clubs can okay a major part in promoting Amateur Radio in many ways. Traffic: W5REC 259, K5CXP 197, KV5X 184, W5RB 168, KA5CXW 162, W5AS 155, KB5EK 120, W5VXU 98, WD5IFB 73, WB5ELG 66, WB5EAY 62, WA5OUV 59, N5EIH 48, W5UYH 39, WA5FSN 34, W5SUG 29, W5VLW 29, W5VOR 22, WA5ZOO 15, NØIN 14, WB5LSW 5, W5JJ 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — SEC: WA5RVT. STM/ASCM: N5TC. Vhf station reporting: K5LA. BPL: W5SHN W5TFB WB5YDD and the Houston ARC Stn W5DPA with 146 originations and 2 deliveries by a single op, KB5HC; he did all of the on-the-air message handling from the National Science Fair in Houston's Astrodome. Texas was represented 100% on DRN5 by W5URN N5AMH W5CTZ W5SHN W5KLV W5TFB N5CRU WD5CIC N5DAA K5KJN W5PON WA5RVT N5DFO KD5JX and WB5YDD. STX was represented 100% on CAND by W5URN WB5YDD W5KLV N5AMH W5SHN N5CRU W5PON KC5JL N5DAA

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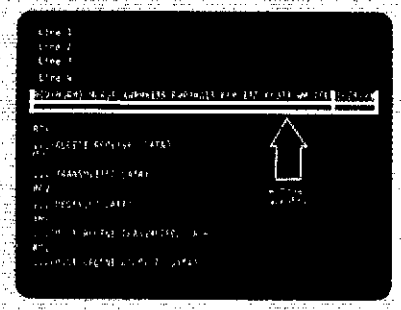

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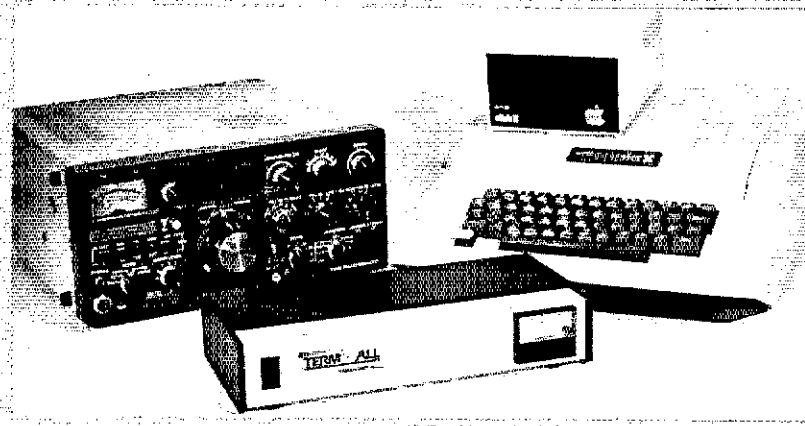

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W5TFB KB5TC and K5KJN. Thanks a bunch, fellers. Port Arthur ARC handled comms for the Bum Phillips Golf Tournament in Jefferson Co., an annual event for Hughen School for Crippled and Adults; the shut-ins were able to watch the affair via amateur TV. The Jefferson Co. ARC provided comms for the Confederate Air Force's Local Chapter Air Show at Jefferson Co. Airport. Our OBS Superstar, W5KLV, gave 159 readings of 54 bulletins on 9 nets. ORS/OBS N5FN advised that he likes the new section organization. Traffic: W5SHN 905, W5TFB 744, WB5YDD 525, W5KLV 421, W5CTZ 332, W5DPA 296, KV5N 192, N5TC 110, WB5MMI 100, WA5RVT 70, K5RG 48, KB5NX 42, K5HZR 40, W5KR 36, KA5KRI 32, WD5GKH 28, W5BGE 24, N5EFG 19. (Apr.) K5RG 33.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

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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.

CQ and QST 1950-1982 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues, all other 30 cents each including USA shipping. Send SASE, chronological order and payment to W6LS, 2814 Empire Avenue, Burbank, CA 91504. Available issues and refund sent within one month.

YAESU OWNERS — join your International Fox-Tango Club — now in its eleventh year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out — get 1982 top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325MHz), more. Go Fox-Tango! To join, send dues to FT Club, Box 15944, W. Palm Beach, FL 33406.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

INTERESTED in QRP? Full information for large s.a.s.e. QRP/ARCI, Box 12072, Capitol Station, Austin, TX 78711.

HAMBURG, New York - Ham-O-Rama '82 - Friday, September 10th 6:00 PM-9:00PM and Saturday, September 11th 7:00AM-5:00PM at the Erie County Fairgrounds near Buffalo, New York. New equipment displays, computers, technical programs, ladies programs, valuable awards and more! Tickets $3.50 advanced or $4.50 gte. Children under 12 free. Outside flea $3 per space. Inside flea $10. per space. Talk-in 146.31/91. Advanced ticket deadline September 1st. S.A.S.E. to Dave Baco, WA2TVT, 130 Vegola Avenue, Cheektowaga, NY 14225.

ARRL Virginia State Convention and Tidewater Computer Show-Hamfest - Electronic Flea Market Oct. 9-10 at the Virginia Beach, VA Pavillion. Dealers, special displays, forums, computers, satellites, special XYL programs, XYL bingo and lounge. Free Jitney Bus to the beach. Admission $3.50. Advance ticket drawing for hand held transceiver plus many valuable awards. Flea market tables $5 one day, $8 both days. Commercial flea market tables $15 both days. Commercial booths $30 both days. Info and tickets, write Jim Harrison, N4NV 1234 Little Bay, Norfolk, VA 23503, 804-587-1695.

THE NORTHWEST Ohio Amateur Radio Club will host their 6th annual Hamfest on Sunday October 10, 1982 at the Allen County Fairgrounds in Lima, OH. Heated, indoor, two buildings, tables available $5. full, $3. 1/2. Advance tickets $2.50. Tickets at door $3. Camping available. Doors open 6:00 AM. Talk-in 07/67, 63/03, 34/94, 52/52. Write N.O.A.R.C. P.O. Box 211, Lima, OH 45802.

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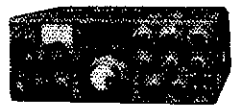
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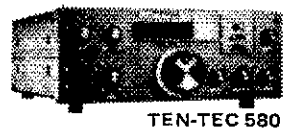
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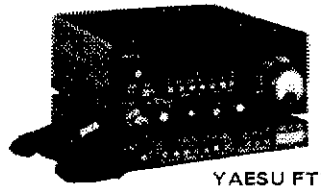
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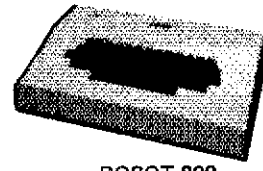
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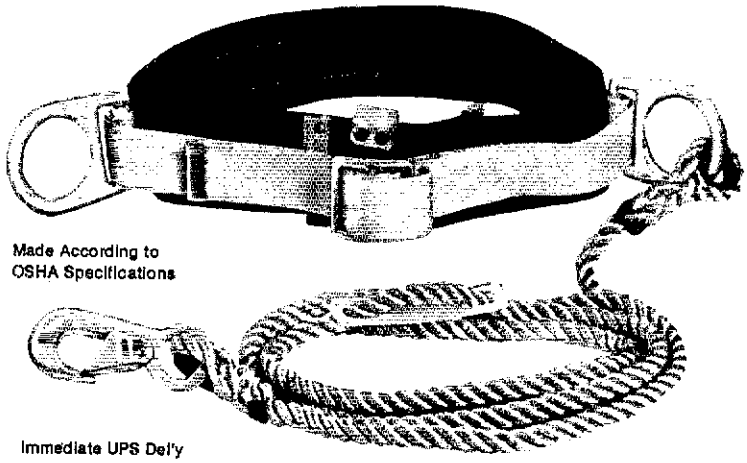
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NJ Computer Show/Fleamarket (fourth show). Sat./Sun. Sept. 11-12,-Holiday Inn (North) - Newark - Exit 14 NJ Turnpike. Buyers $3., Sellers $8./space. In case of rain-held indoors (150 tables). W2TGH, 201-297-2526, Kengore, 3001 Route 27, Franklin Park, NJ 08823.

CINCINNATI Hamfest: The Original Forty-Fifth Annual-Sunday September 19th, 1982, at Stricker's Grove on State Route 128, one mile west of Venice (Ross) Ohio. Exhibits and booths, awards, food and refreshments available. Flea Market (radio related products only), Hidden Transmitter Hunt, entertainment and sensational air show by the Hawks. Admission and award ticket $5. For further information-Lillian Abbott K8CKI, 317 Greenwell Road Cincinnati, OH 45238.

SOUTHERN Illinois — Shawnee Amateur Radio Association's 26th Hamfest will be September 12 at John A Logan College in Carterville, Illinois. Offerings include Air Conditioned Flea Market - Awards - Forums -Computers Refreshments - Contests. For details QSL Bill May KB9QY, 800 Hilldale, Herrin, IL 62948 or 618-942-2511 days.

ILLINOIS: Sept. 18 & 19, The Peoria Area Amateur Radio Club presents Peoria Superfest '82 at Exposition Gardens, W. Northmoor Rd., Peoria, IL. Tickets $3 advance or $4 gate. Gate opens 6:00 AM, commercial building 9:00 AM. Talk-in 146.16/76 call W9UVI. Forums, latest Amateur and computer product displays, huge free flea market, free ladies bus to Northwoods Mall on Sunday. Full camping facilities. Sat. night informal get together at Heritage House Smorgasboard 8209 N. Mt. Hawley Rd. For tickets and info SASE to Superfest '82, 5808 N. Andover CT, Peoria, IL 61615.

INDIANA: The Grant Co. Amateur Radio Club will hold its Hamfest Sept. 11 at McCarthy Hall Marion, Indiana. Major awards. $2 advance $3 gate. Talk in 146.19/79 146.52 simplex. Tickets/information contact WB9YHF Beecher Waters RR 1 Box 357 Converse, IN 46919.

SEPT. 26, LIMARC, Long Island Mobile Amateur Radio sponsors the 28th ARRL Hamfair '82 at the Islip Speedway, Islip, NY. Islip Ave (Rte. 111) just south of Exit 43, Southern State Parkway or South from Exit 56 or the L.I. Expressway. No reservations needed, over 350 exhibitors. Information call Sid Wolin, K2LJH, 516-379-2861 or Hank Wener, WB2ALW, 516-484-4322. Talkin 146.85. Many awards will be made during the Hamfair. 9 AM to 4 PM. General Admission $3, exhibitors $5 per car space.

SIXTH Annual Hamden Radio Club/WELI Flea Market. Starting 9 AM. August 25 at Radio Towers Park, Benham Street, Hamden. Dealers; $5 at gate. Preregistration $4. $1 admission. For infor call 203-467-3258 or 203-933-4628.

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FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

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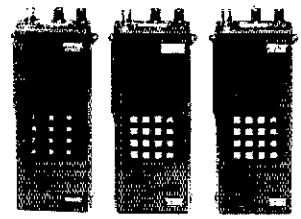

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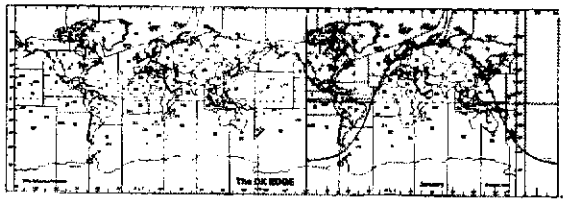

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HAMMARLUND, National and Hallicrafters receivers, tubes, odds and ends. SASE for four-page list. W9VZR, 4527 North Bartlett, Milwaukee, WI 53211.

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SELL: Atlas 210X; power console, digitizer, manual-$500. WB4TMP,Box 2757, Key West, FL 33040 (mint condition).

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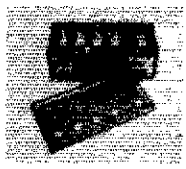

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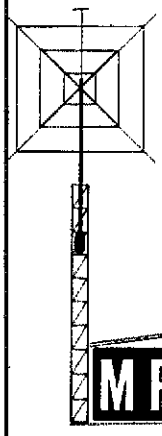

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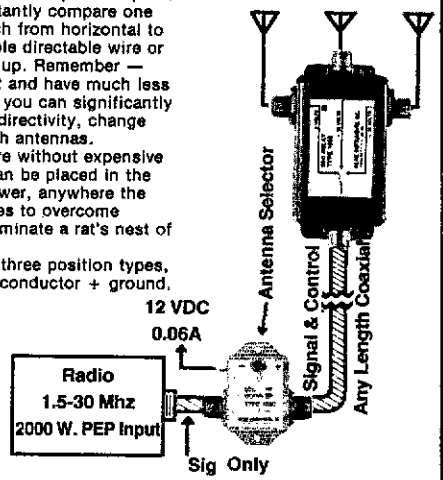

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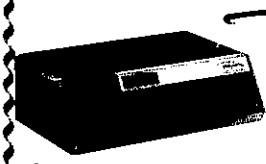

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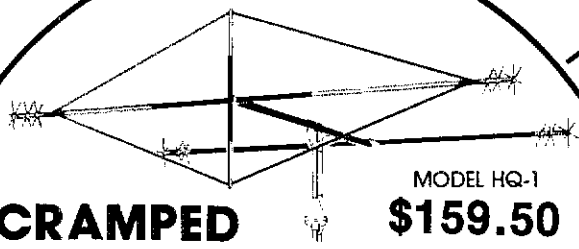

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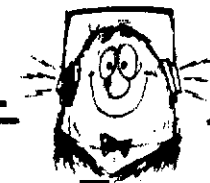

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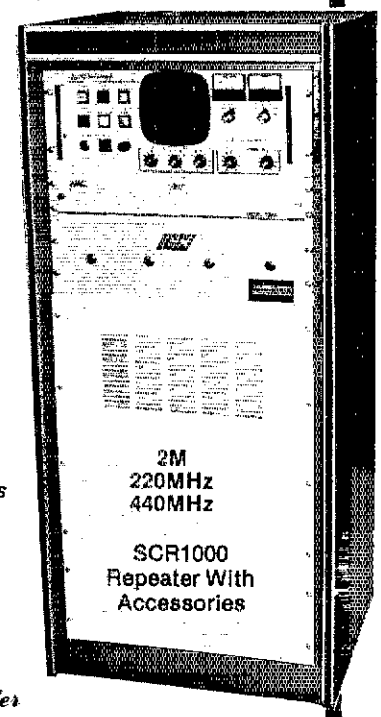

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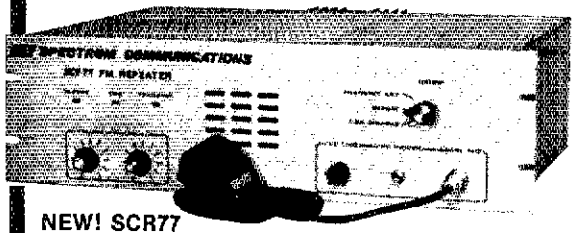

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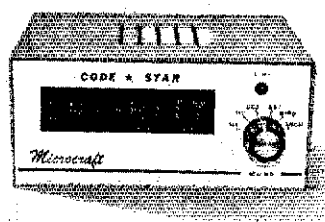

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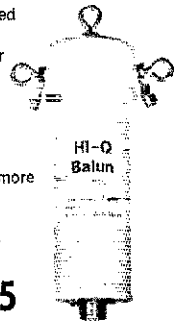

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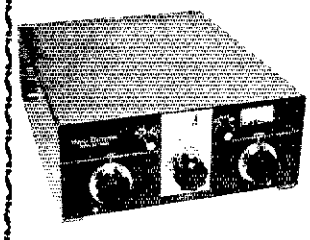

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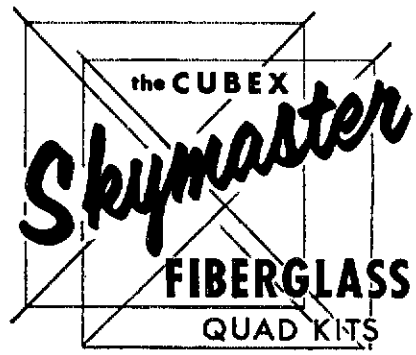

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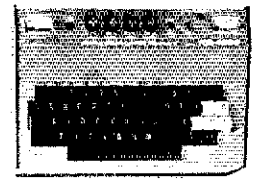

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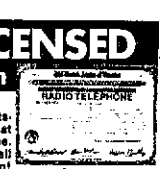

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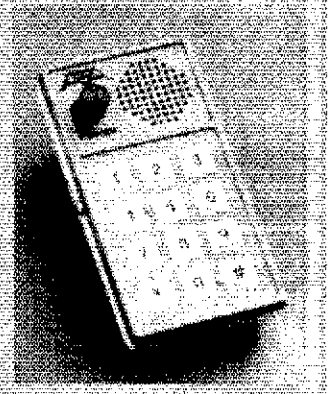

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*Education Technology & Services, see page 81 October 1981 issue of Ham Radio Magazine.

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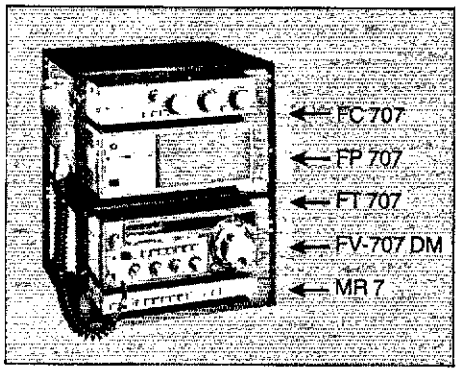

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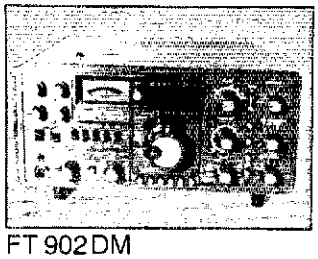

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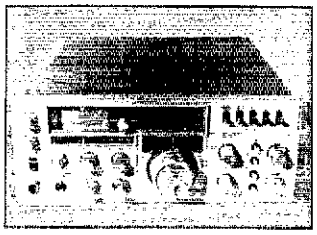

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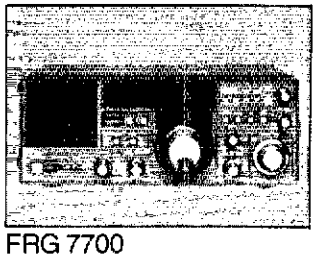

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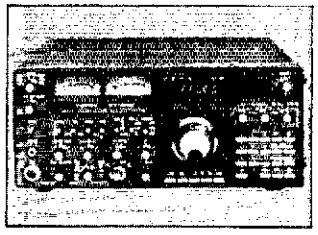

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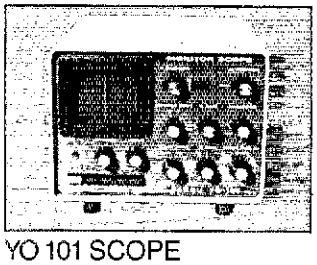

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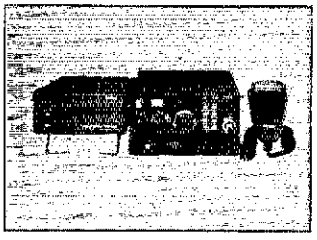

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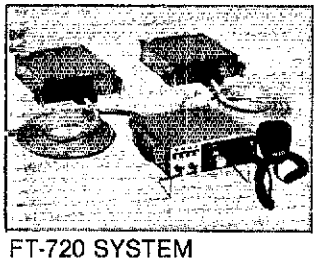

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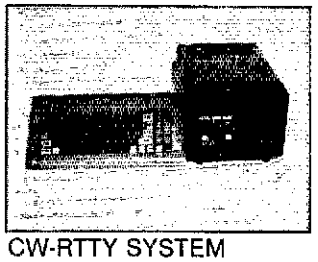

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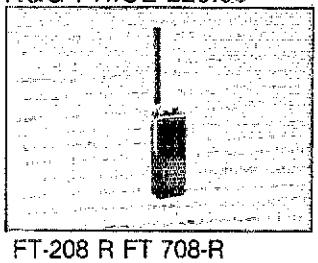

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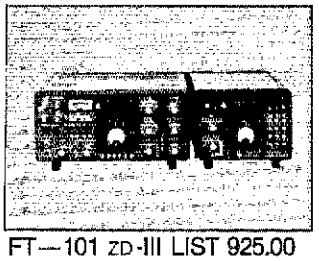

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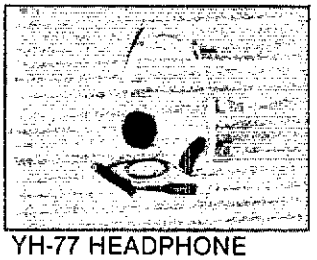

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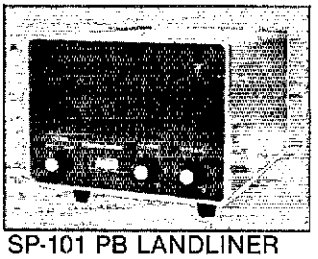

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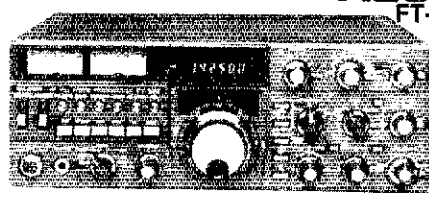

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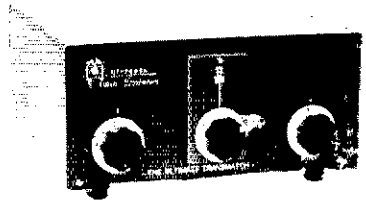

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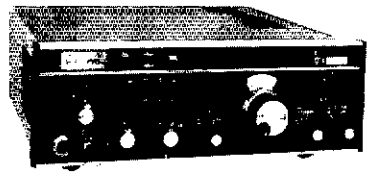

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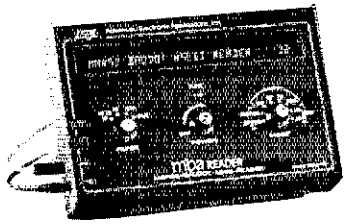

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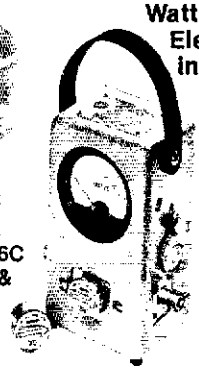
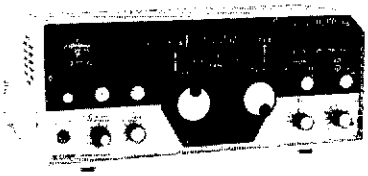
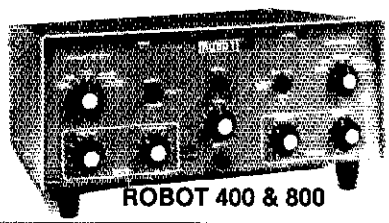


AEA 144 MHz,
AEA 440 MHz
ANTENNAS

BIRD
Wattmeters &
Elements
in stock



ASTRO 103 150A & 100 MXA
DIPLOMAT 150



ROBOT 400 & 800

SANTEC
HT-1200,ST-7/T
ST-144/UP

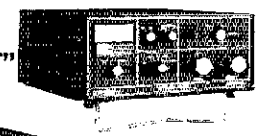
TEMPO
S1, S2,
S4, S5

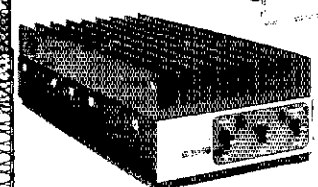
ICOM
IC2AT
IC3AT
IC4AT

YAESU
FT-208R
FT-708R

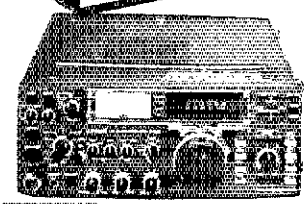
DIGITAL
FREQUENCY
COUNTER
Trionyx
Model TR-1000
0-600 MHz
Digimax-Model D-510 50Hz-1GHz

DENTRON
"Clipperton T"



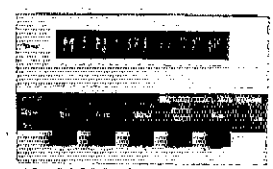


MIRAGE
B-23,
D-1010,
B-1016



ICOM IC-720A, IC-730, IC-740
IC-25A, IC-251A, IC-2KL, IC-451A

HY-GAIN
TOWERS
ANTENNAS &
ROTORS



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SUNBELT QTH, utilities $100/mo, 2 yr average. 2100 ft², 3 br, 2b, lr, dr, breakfast room. All new custom kitchen Amana countertop range, GE oven, Whirlpool dish washer, utility room with cupboards, 2-car garage/workshop, Genie opener, paneled Ham Shack, large fenced yard, grass, fruit trees. Tower/antennas may be included. K5WXR, 610 Newberry Road, Socorro, NM 87801 505-835-2375.

YAESU FT-707 with 600 Hz cw filter, FP-707 power supply, FC-707 antenna tuner, mike. Mint. $775. WB7VOO, 602-298-4820.

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DRAKE 2B + 2BQ, 2NT, and Heath HG10 VFO, $229; Heath IO-12 scope,$20; Regency HR2B, $70; Drake TC-2, $200. All in very good conditon. Dave, WA9FPH, Route 2, Box 67A, Brooklyn, WI 53521. 608-835-7110.

WANT Appleby's book "Mahlon Loomis". W9LL, 178 Eighth, 60016.

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MICROWAVE MODULES summer sale on "factory specials". MMt144-28 $169, MMt435-28(S) $239, MMt1296-144 $327, MML144-25 $83, MML144-100 $214, MML432-50 $199, MML432-100 $379. Limited quantity available. 12 month factory warranty (except power transistors). Cash with Order only, Air Mail del'y $5 extra per item. Spectrum International Inc., P.O. Box 1084Q, Concord, MA 01742.

Jobs for Hams

ANALOG/DIGITAL Design and Test Engineers: Engineer will explore employment opportunities, no cost to you, anywhere in U.S.A. Need only rough draft resume and salary. Carl Steavenson, P.E., K6WZ, 13638 Sproule, Sylmar, CA 91342.

EXPERIENCED QSL Manager seeks work. Will be available beginning Sept. To reside in the Presidio San Francisco area for 3 years. Answer to Julie Gallaway c/o Clifford M. Johnson 3179 Nottingham Ave. Merced, CA 95340.

ORTHO Diagnostic Systems, Inc., is establishing a new research facility in Cambridge, Massachusetts for the long-term study of fundamental medical diagnostic methods. There are currently entry level openings for Biophysists/Bioengineers with strong innovative abilities to assist in the development of new diagnostic instrumentation. This position requires a thorough knowledge of the design of electronic circuitry and instrumentation at the component level and includes both analog and digital technologies. Submit resumes to Robert A. King, Ortho Diagnostic Systems, Inc., Cambridge Research Laboratory, 195 Albany Street, Cambridge, MA 02139. An Equal Opportunity Employer.

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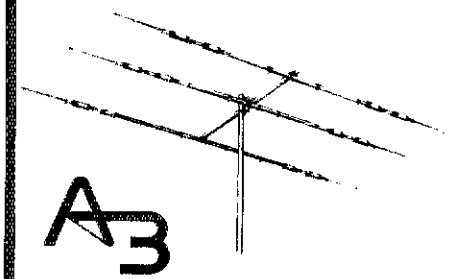

A3

3 BAND YAGI
10-15-20 METERS

List Price ~~$249.95~~
Special Price $179.00!

A3

Broadband, excellent gain and f/b ratio, 2 kw power rating, direct 50 Ω feed, Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m., weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1¼ in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

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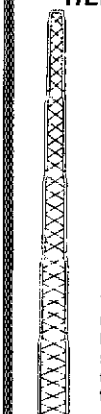

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These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And – Save even more – include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

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RM KIT	Roof Mount w/Stub Tuned Radials	$ 39
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CUSHCRAFT

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A743	40 mtr. Add-on Kit for A3 Antenna	$ 69
A744	40 mtr. Add-on Kit for A4 Antenna	$ 69
R3	New Motor Tuned 20/15/10 mtr. Vertical	$229
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20-3CD	3-El. 20 mtr. Beam	$179
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10-3CD	3 El. 10 mtr. Beam	$ 76
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A50-5	5-El. 6 mtr. Beam	$ 65
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214B	14 El. 2 mtr. "Boomer"	$ 69
214FB	14-El. 2 mtr. FM "Boomer"	$ 69
228FB	28-El. 2 mtr. FM "Power Pack"	$109
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220B	17-El. 220 MHz "Boomer"	$ 75
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 63
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20 El. 2 mtr. Satellite Antenna	$ 69
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TH3JRS	3-El. Triband Beam	$159
TH2MK3S	2-El. Triband Beam	$139
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155BAS	5-El. 15 mtr. "Long John"	$169
105BAS	5-El 10 mtr. "Long John"	$119
204BAS	4-El. 20 mtr. Beam	$219
203BAS	3-El. 20 mtr. Beam	$119
153BAS	3-El. 15 mtr. Beam	$ 72
103BAS	3-El. 10 mtr. Beam	$ 59
DB1015AS	3-El. 10/15 mtr. Beam	$159
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66BS	6-El. 6 mtr. "Long John"	$ 99
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HUSTLER

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KLM

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TA-33	3-El. Triband Beam	$199
TA-33 Jr.	3-El. Triband Beam	$149
TA-36	6-El. Triband Beam	$309
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HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
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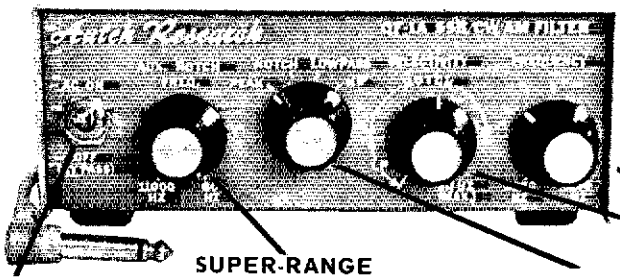
Only $73 ppd. U.S.A.



115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

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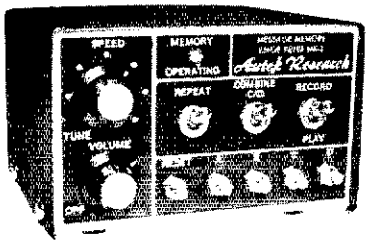
Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $104.50 ppd. U.S.A.

Our classic MK-1 should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES, TRIGGERED CLOCK, IAMBIC, SELF COMPLETING, JAM PROOF.** 5 to 50+ **WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect 9-14 **VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS.

- ☐ **QF-1A Filter at $73.00**
- ☐ **MK-1 Keyer at $104.50**
- ☐ **ME-1 Expander for MK-1 at $35 [factory installed]**
- ☐ **ME-1 Owner installed at $25 [save $10]**

Add 5% tax in Fla. Add $3 each to Canada, Hawaii and Alaska. $3 for UPS air. Add $18 each elsewhere [shipped air].

Enclosed is $ _____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Send to Autek Research, Box 302, Dept. E., 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.

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REPUTATION: Don't take our word. Ask on the air for a personal recommendation.

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FT-230R: QUITE A SIGHT! (AND EASY TO SEE, TOO!!)

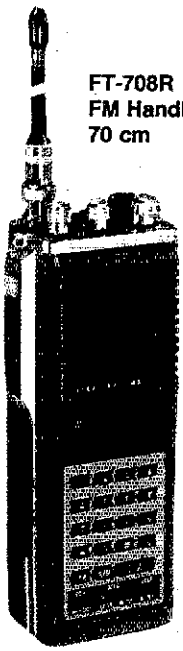
Sporting an all-new Liquid Crystal Display, the FT-230R is Yaesu's high-performance answer to your call for a very affordable 2 meter mobile rig with an easy-to-read frequency display! The FT-230R combines microprocessor convenience, a sensitive receiver, a powerful yet clean transmitter strip, and the new dimension of LCD frequency readout. See your Authorized Yaesu Dealer today — and go home with your new FT-230R!

SALE SUBJECT FCC CERTIFICATION

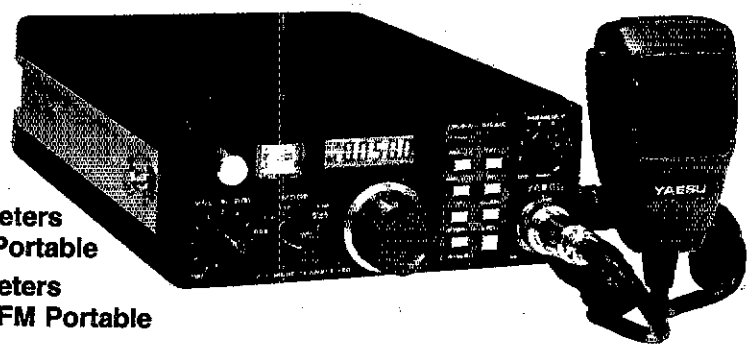
- LCD five-digit frequency readout with night light for high visibility day or night.
- Two VFOs for quick QSY across the band.
- Ten memory slots for storage and recall of favorite channels.
- Selectable synthesizer steps (5 kHz or 10 kHz) in dial or scanning mode.
- Priority channel for checking a favorite frequency for activity while monitoring another.
- Unique VFO/Memory Split mode for covering unusual repeater splits.
- Up/Down band scan plus memory scan for busy or clear channel. Scanning microphone included in purchase price.
- Full 25 watts of RF power output from extremely compact package.
- Built-in automatic or manual tone burst.
- Optional synthesized CTCSS Encode and Encode/Decode boards available.
- Lithium memory backup battery with estimated lifetime of five years.
- Optional YM-49 Speaker/Microphone and YM-50 DTMF Encoding Microphone provide maximum operating versatility.

FT-208R
FM Handheld
2 Meters

FT-708R
FM Handheld
70 cm



And don't forget! Yaesu has a complete line of VHF and UHF handheld and battery portable transceivers using LCD display!!!



FT-290R - 2 Meters
SSB/CW/FM Portable

FT-690R - 6 Meters
USB/CW/AM/FM Portable

YAESU
The radio.

Price and Specifications Subject To Change Without Notice or Obligation

482

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Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

"Comm-packed."

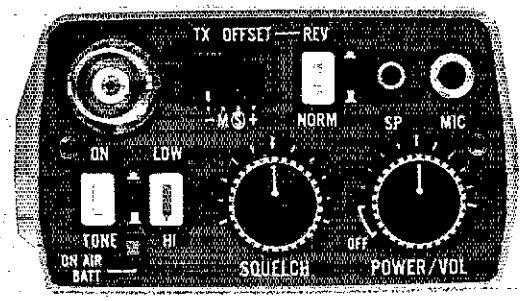
BIG performance... small size... smaller price!!!

TR-2500

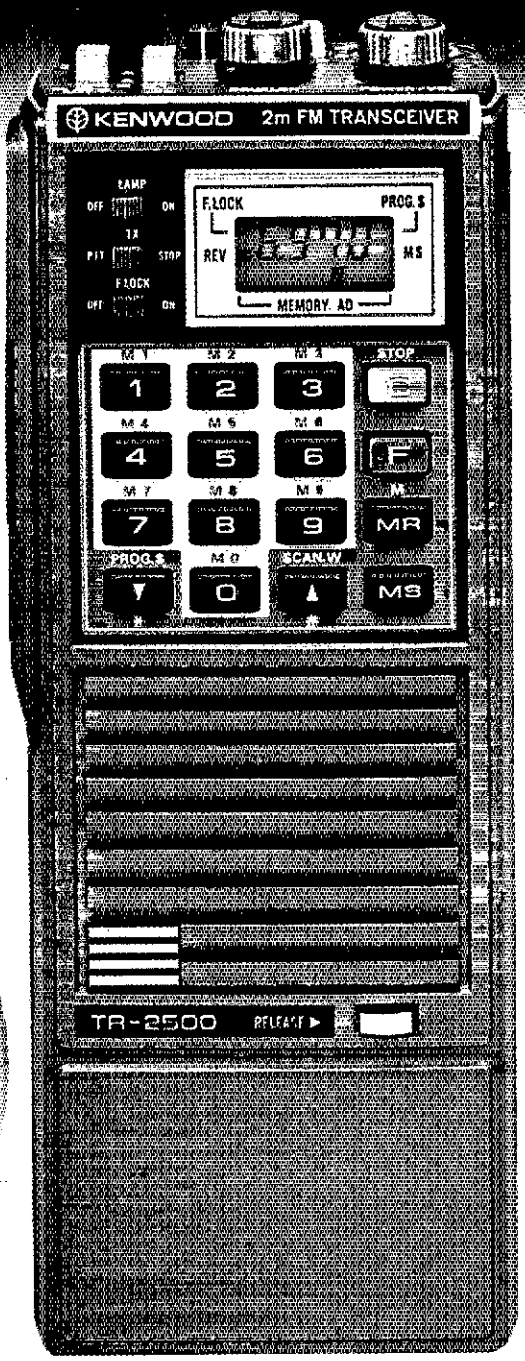
The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

TR-2500 FEATURES:

- **Extremely compact size and light weight**
  Measures 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches). Weighs 540 grams (1.2 lbs) with Ni-Cd pack.
- **LCD digital frequency readout**
  Shows frequencies and memory channels, four "Arrow" indicators.
- **Ten channel memory**
  Nine memories for simplex or ±600 kHz offset. "M0" memory for non-standard split frequency repeaters.
- **Lithium battery memory back-up**
  (Estimated 5 year life.) Maintains memory when Ni-Cd pack is fully discharged or removed.



- **HI/LOW power selection**
  2.5 watts or 300 mw.
- **Memory scan**
  Scans only channels in which frequency data is stored.
- **Programmable automatic band scan**
  Upper and lower frequency limits and scan steps of 5-kHz and larger.
- **UP/DOWN manual scan**
- **Built-in tuneable sub-tone encoder**
  Tuneable (variable resistor) to desired CTCSS tone.
- **Built-in 16-key autopatch encoder**
- **"SLIDE-LOC" battery pack**
- **Repeater reverse switch**
- **Keyboard frequency selection**
- **Extended frequency coverage**
  Covers 143.900 to 148.995 MHz in 5-kHz steps.
- **Optional power source**
  Using optional MS-1 mobile or ST-2 AC charger/power supply, radio may be operated while charging. (Automatic drop-in connections.)



Actual size

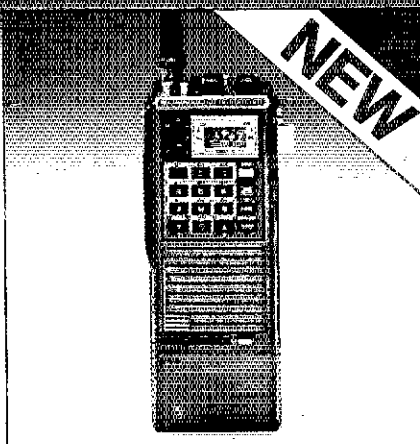
- **High impact plastic case**
- **Battery status indicator**
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.

Standard accessories include:

- Flexible antenna with BNC connector
- 400 mAH Ni-Cd battery pack
- AC charger

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply



TR-3500

70 CM FM Handheld

- 440-449.995 MHz in 5-kHz steps
- TX OFFSET switch keyboard programmable ±5 kHz to ±9.995 MHz
- 1.5 W/300 mW HI/LOW power switch
- Auto. squelch position on squelch control
- Tone switch for TU-35B optional programmable CTCSS encoder
- Other features include 10 memories, lithium battery memory back-up, programmable automatic band scan, memory scan, UP/DOWN manual scan, repeater reverse, 16-key autopatch, keyboard frequency selection, slide-lock battery.

Subject to FCC approval.

- VB-2530 2-M 25 W RF power amp., w/cables, mtg. brkt. (TR-2500 only)
- TU-1 Programmable CTCSS encoder (TR-2500 only)
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only)
- PB-25 Extra 400 mAH Ni-Cd battery
- PB-25H Heavy-duty 490 mAH Ni-Cd battery
- BT-1 Battery case for manganese/alkaline AA cells
- SMC-25 Speaker-microphone
- LH-2 Deluxe leather case
- BH-2A Belt hook
- WS-1 Wrist strap
- EP-1 Earphone

More information on the TR-2500 and TR-3500 is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

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Specifications and prices are subject to change without notice or obliga