QST

August 1988 $3.00

devoted entirely to Amateur Radio

1988 ARRL NATIONAL CONVENTION

YOU ARE INVITED—SEPT 9, 10, 11

Page 3

PORTLAND, OR
"The City of Roses"

AMATEUR

A WONDERFUL WORLD OF RF

BY

HENRY RADIO

MILITARY COMMERCIAL INDUSTRY SCIENTIFIC

Since 1927 radio amateurs have known Henry Radio as their reliable source for every kind of radio equipment. It still is for tens of thousands of amateurs throughout the free world.

Quietly during the last twenty-five years, Henry Radio has also become the premier source for high power RF amplifiers. . .not only for amateurs but for many different services. . . .Communications, HF-VHF-UHF, Industrial, RF Plasma generation for laser excitation, Vacuum Sputtering, Etching, Nuclear Magnetic Resonance, Photo-Emissions Spectrometry, Mass Spectrometry, Laboratory, VHF Micro-meteor communications. If you need RF power in the two megahertz to 500 megahertz range with levels from 100 watts to 20,000 watts, Henry Radio may be your most reliable source.

Recent projects include:

10,000 watt 41 MHz Meteor Burst
U.S. Air Force

10,000 watts 60 MHz
U.S. Air Force

2,000 watts 45 MHz
numerous customers including SHAPE Headquarters, U.S. Dept. of Interior, The Mitre Company, M-A Com, Etc.

2,000 watts 13.5 MHz
Plasma generator for vacuum etching, many customers.

1,000 watts 13.5 MHz
Same application as previous listing

5,000 watts 13.5 MHz
Same application as previous listing

5,000 watts various Marine HF frequencies
Shore station

10,000 watts 30 MHz
Laser Excitation, Allison Co.

5,000 watts FM Broadcast
Caribbean Communications

3,000 watts 350 MHz
Western Research

4,000 watts 145 MHz VHF
Point-to-Point — Indonesia

3,000 watts 320 MHz
Pulse for Satellite Test station, Hughes Aircraft

5,000 watts 400 MHz
Pulse for Laser Excitation, University of California

2,500 watts 27.12 MHz
to ignite Argon Torch Photo-Emissions Spectrometry — Switzerland

20,000 watts 13.5 MHz
Test amplifier, vacuum tubes

2,000 watts 27.12 MHz
Mass Spectrometry, VG Isotopes, England

2,000 watts 13.56 MHz
Sputtering — Munich, Germany

3,000 watts 6 MHz
Shortwave AM — Broadcast

2,000 watts 70 MHz
Airborne Radar Research, England

4K Classic Amateur Amplifiers
Worldwide

If you have a requirement for high power RF, please call Ted Shannon, Meredith Henry or Ted Henry and don't forget, Henry Radio still produces the world's broadest line of fine Amateur amplifiers!

Henry Radio

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Toll free order number: (800) 877-7979 TELEX: 67-3625(Henradio) FAX (213) 826-7790

KENWOOD

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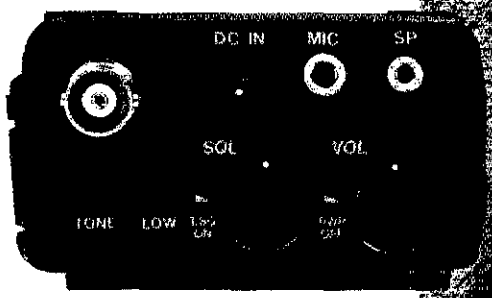
220 MHz TH-315A Here Now!

This HT Has it All!

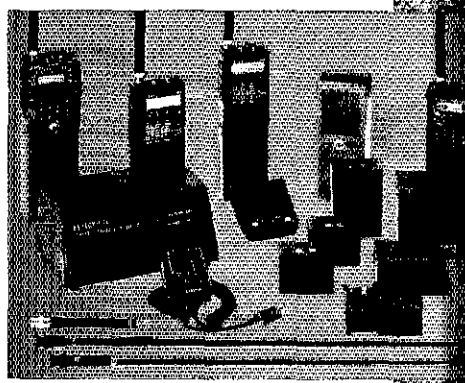
TH-215A/315A/415A

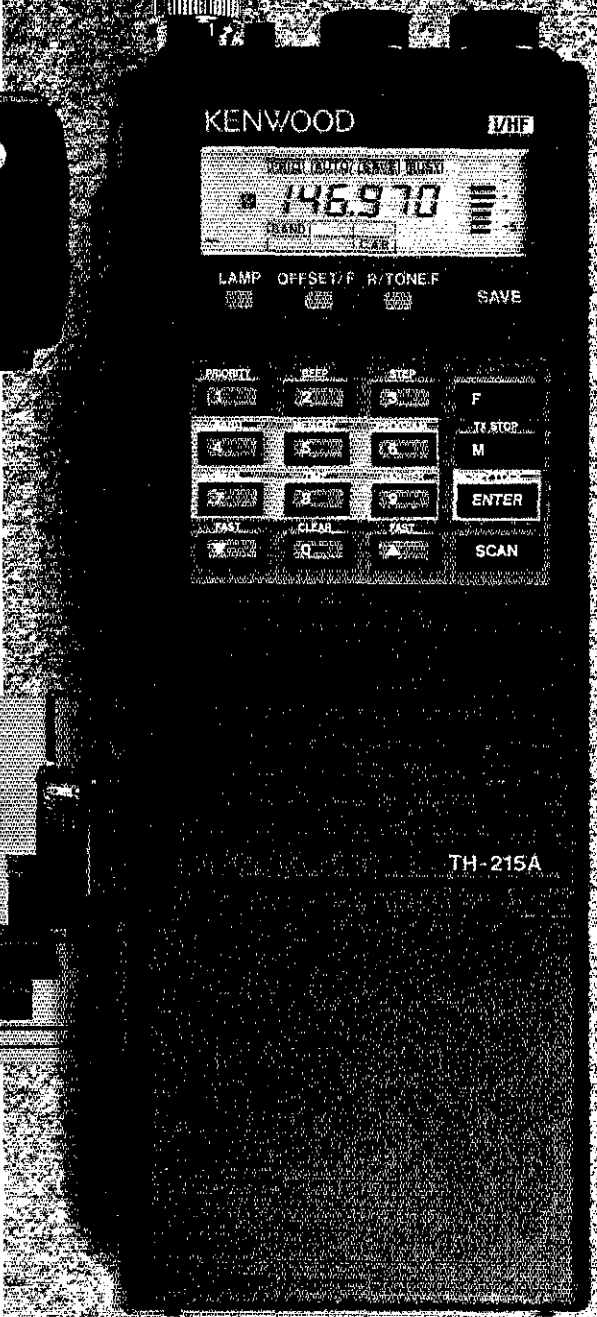
Full-featured Hand-held Transceivers

Kenwood brings you the *greatest hand-held transceiver ever!* More than just "big rig performance," the new TH-215A for 2 m, TH-315A for 220 MHz, and TH-415A for 70 cm pack the most features and the best performance in *a handy size. And our full line* of accessories will let you go from hamshack to portable to mobile with the greatest of ease!



- **Wide receiver frequency range.** Receives from 141-163 MHz. *Includes the weather channels!* Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-315A covers 220-225 MHz, TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. *Optional NiCd packs* for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.**
- **Odd split, any freqency TX or RX, in memory channel "0."**
- **Nine types of scanning!** Including new **"seek scan" and priority alert.** Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.





Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 compact battery charger • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier (1-4 W input) • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V extra DC cable • PG-3D cigarette lighter cord with filter

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

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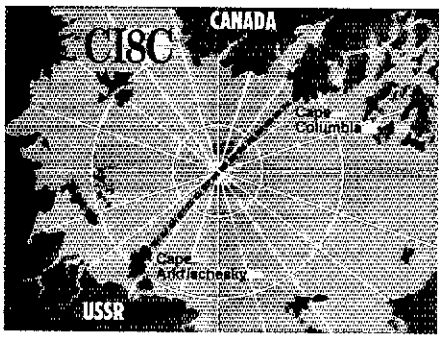
P.O. Box 22745, Long Beach, CA 90801-5745

ICOM

IC-761 HF Transceiver

1988 Canada/USSR Trans Polar Ski Trek



"For more than three months, under the most exacting conditions, the Icom equipment performed superbly in support of the Polar Bridge Expedition... Icom equipment was our first choice."

– Barry Garratt VE3CDX/VE8CDX/4K0DX, Chief Operator/North Pole 28
1988 Canada/USSR Trans Polar Ski Trek

ICOM IC-761
ON TOP OF THE WORLD

The Canada/USSR Trans Polar Ski Trek did not include leeway for second best. That's why they chose Icom's IC-761 HF transceiver. With amateur radio as the sole means of communication in their 1,240 mile venture across the frozen Arctic, exceptional performance and dependability were vital to their mission. Just as they are to your globe-spanning home station activities.

THE COMPLETE HF TRANSCEIVER!
Includes: • Built-in AC power supply • Automatic antenna tuner • 105dB dynamic range • Exceptionally low phase noise • 100W output on most modes • 100% duty cycle • High stability crystal oscillator • Self-calibrating SWR bridge • Multiple filter selection • Dial or front keypad frequency selection • 32 memories • All bands, all modes with general coverage receiver • Passband tuning • IF shift • Built-in iambic keyer • Semi or full QSK rated at 60WPM • Built-in wide/narrow SSB and CW filters.

BEST IN RELIABILITY!
Field proven top performance backed by a one-year warranty and four North American service centers. Icom's IC-761... when there is no room for second best.

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First in Communications

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ICOM CANADA, A Division of ICOM America, Inc.,
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

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OUR COVER

The 1988 ARRL National Convention is a stepping-stone to many other exciting things to do and see in the Pacific Northwest—and Mount Hood is only one of them. See you in Portland! Photos courtesy R. Keebler and Al Berg, WB7SIC. W1AW photo by W2ABE.

CONTENTS

August 1988
Volume LXXII Number 8

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

R4

GROUND RADIAL VERTICAL

10, 15, 20 METERS

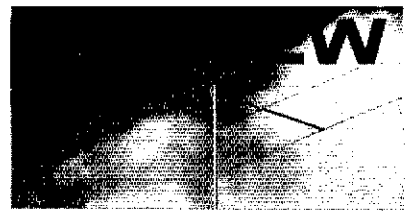
[illegible]-generation electrical half wave- [illegible] Developed from the very successful [illegible] new design features for easier [illegible] plus improved performance.

[illegible] gives optimum current distribution [illegible] radiation and excellent DX communi- [illegible] using high performance antenna features [illegible] in apartments, condominiums or on small city lots. Even if you have plenty of space, R4's combination of neat appearance and DX capability make it ideal for your ham station.

The new R4 design has a broadband solid state impedance matching network for full coverage of all four bands. Frequency selection is completely automatic. There are no moving parts or remote tuner. The only connection required to the antenna is your 50 ohm coax. The unique counterpoise ground uses four 48" long by 100" diameter stainless steel rods. This system gives excellent RF decoupling for mounting in any location from ground level to roof top. Make R4 your compact choice for a full-performance no-compromise HF vertical antenna.

[illegible]

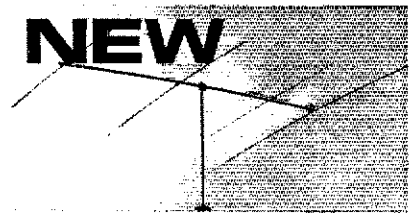
Frequency: 10, 12, 15, 20 meters
Gain: excellent
Low angle radiation
360° radiation pattern
Broadband impedance matching
Hi Q frequency selecting traps
SWR: 1.2-1 typical
2:1 SWR bandwidth: 10M-1.7 MHz 12M-100 KHz
15M-450 KHz 20M-350 KHz
Power handling watts: 1800 PEP
Connector: UHF Female SO-239
Self-supporting
Height: 18 ft. 5.5 M
Weight: 8 lbs. 3.7 Kg
Mast mount, in (cm): Min.-Max. 1.5 (3.8)—1.75 (4.44)



12 METER 4 ELEMENT SKYWALKER

Enjoy the most popular WARC band. Whether your interest is friendly rag chewing or operating awards and DX-ing, the Cushcraft 12-4CD is designed to punch your signal through on this active new band.

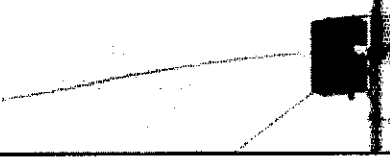
Forward Gain	excellent
Front to Back Ratio	excellent
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	19 ft 10.5 in (6.1 m)
Turning Radius	15 ft (4.6 m)
Wind Surface Area	4 ft² (.46m²)
Weight	21 lb (9.5 kg)



A4S THE PREMIUM 10-15-20 METER BEAM

The A4S is the true high performance tribander. Precisely tuned high power traps, carefully selected element lengths and proper spacing combine to make A4S the preferred antenna. It has pinned boom sections and formed aluminum brackets to keep elements straight under all conditions. All hardware and clamps are stainless steel.

Forward Gain	excellent
Front to Back Ratio	excellent
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	31 ft 4.5 in (9.6 m)
Turning Radius	18 ft (5.5 m)
Wind Surface Area	5.5 ft² (.51 m²)
Weight	37 lb (16.8 kg)



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THE ANTENNA COMPANY

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DX-cellence

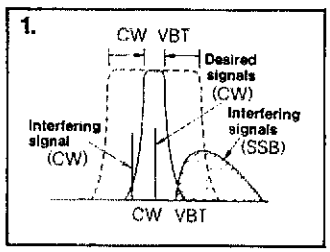
#1 Rated HF!

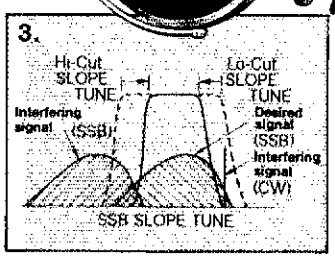
TS-940S

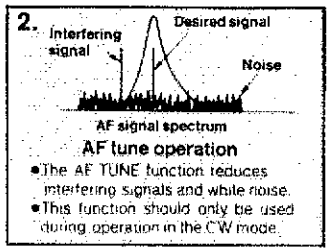
Competition class HF transceiver

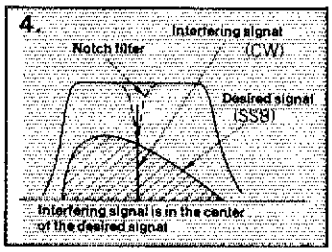
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference lighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

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

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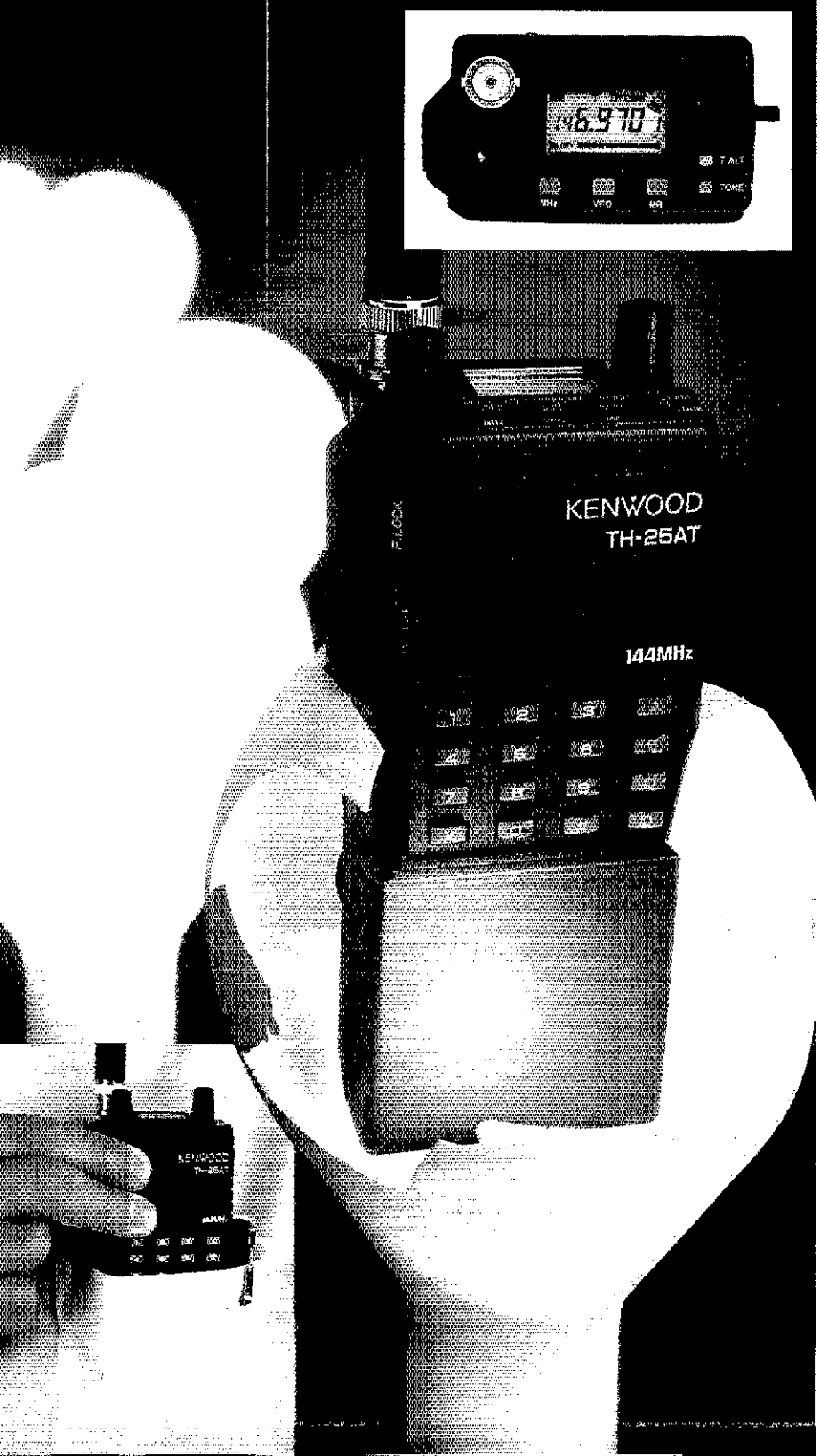
TH-55AT 1200 MHz Here Now!

Compact Breakthrough!

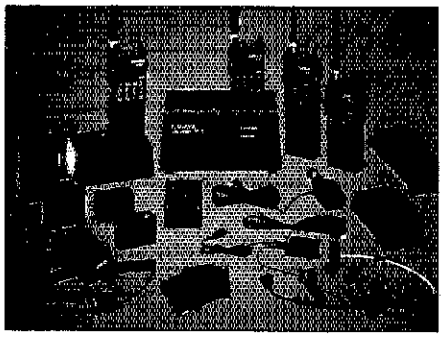


TH-25AT/45AT

New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)
  TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder /decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



Optional accessories:

• **PB-5** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6** 7.2 V, 600 mAh NiCd pack • **PB-7** 7.2 V, 1100 mAh NiCd pack • **PB-8** 12 V, 600 mAh NiCd for 5 W output • **PB-9** 7.2 V, 600 mAh NiCd with built-in charger • **BC-10** Compact charger • **BC-11** Rapid charger • **BT-6** AAA battery case • **DC-1/PG-2V** DC adapter • **HMC-2** Headset with VOX and PTT • **SC-14, 15, 16** Soft cases • **SMC-30/31** Speaker mics. • **TSU-6** CTCSS decode unit • **WR-1** Water resistant bag

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*Executive Committee Member

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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 67 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

Atlantic Division
Delaware — Robert J. Pegritz, KC3TI, PO Box 7921, Newark 19714 (302-737-7236)
Eastern Pennsylvania — Kay C. Craigie, KC3LM, 128 Berkeley Rd, Devon 19333 (215-688-5045)
Maryland-DC — Philip E. Battey, W3FZV, 3330 Jones Bridge Ct, Chevy Chase, MD 20815 (301-656-5591
Southern New Jersey — Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)
Western New York — William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-642-8930)
Western Pennsylvania — Otto Schuler, K3SMB, 3732 Colby St, Pittsburgh 15214 (412-231-6890)

Central Division
Illinois — David Carlson, AA9D, PO Box 123, South Elgin 60177
Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd, Indianapolis 46220 (317-251-5606)
Wisconsin — Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

Dakota Division
Minnesota — George E. Frederickson, KCØT, RR #2—Box 352, South Haven 55382 (612-558-6312)
North Dakota — Roger "Bill" Kurtti, WCØM, Rural Route—Box 34, Rock Lake 58365 (701-266-5646)
South Dakota — Roland Cory, WØYMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

Delta Division
Arkansas — Dale E. Temple, W5RXU, 1620 Tarrytown, Little Rock 72207
Louisiana — John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)
Mississippi — James N. Davis, KK5Z, PO Box 332, Senatobia 38668 (601-562-6051)
Tennessee — Harry Simpson, W4MI, 1830 Macaulay Ave, Memphis 38127 (901-357-8148)

Great Lakes Division
Kentucky — John A. Thernes, WM4T, 60 Locust Ave, Covington 41017 (606-331-0331)
Michigan — George E. Race, WB8BGY, 3865 Gibbs Rd, Albion 49224 (517-531-4758)
Ohio — Jeffrey A. Maass, K8ND, 9256 Concord Rd, Powell 43065 (614-873-3234)

Hudson Division
Eastern New York — Paul S. Vydareny, WB2VUK, 259 N Washington, North Tarrytown 10591 (914-631-7424)
NYC-Long Island — Walter M. Wenzel, KA2RGI, 373 Fifteenth St, West Babylon 11704 (516-957-5726)
Northern New Jersey — Robert R. Anderson, K2BJG, 69 Page Dr, Oakland 07436 (201-337-9644)

Midwest Division
Iowa — Robert W. Walstrom, WØEJ, 7431 Macon Dr NE, Cedar Rapids 52402 (319-393-8982)
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Benton C. Smith, KØPCK, 3301 Sinclair, Rte 3, Box 196-A, Columbia 65203 (314-443-5168
Nebraska — Vern J. Wirka, WBØGQM, 3106 Vinton, Omaha 68105 (402-341-4572)

New England Division
Connecticut — Richard Pechie, KB1H, PO Box 265, Dayville 06241
Eastern Massachusetts — Barry Porter, KB1PA, 47 Erin Rd, Stoughton 02072 (617-341-2639)
Maine — Bill Mann, W1KX, PO Box 377, Pittsfield 04967-0377 (207-487-2737)
New Hampshire — William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-882-0021)
Rhode Island — William Foss, KA1JXH, 70 Mayfair Rd, Cumberland 02864
Vermont — Peter G. Drexel, AE1T, RR1, Box 186, Jericho 05465-9716 (802-899-4268)
Western Massachusetts — William C. Voedisch, W1UD, 240 Main St, Leominster 01453 (617-534-6256)

Northwestern Division
Alaska — Dianne Lee Marshall, AL7FG, One Dog Path, Ester 99725
Idaho — Don Clower, KA7T, 5103 W. Cherry Ln, Meridian 83642 (208-888-7020)
Montana — Kenneth G. Kopp, KØPP, Box 848, Anaconda 59711 (406-797-3340)
Oregon — Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland 97225 (503-297-1175)
Washington — Brad Wells, KR7L, 1290 Puget Dr, E, Port Orchard 98366 (206-871-6546)

Pacific Division
East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)
Nevada — Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Pacific — Wayne Jones, NH6GJ, PO Box 794, Wahiawa, HI 96786
Sacramento Valley — Robert H. Watson, W6IEW, 10994 Clinton Bar Rd, Pine Grove, CA 95665 (209-223-0101
San Francisco — Robert Odell Smith, NA6T, 320 Park St—PO 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 — Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

Roanoke Division
North Carolina — W. Reed Whitten, AB4W, 1208 Oxford Place, Cary 27511 (919-467-7464)
South Carolina — James G. Walker, WD4HLZ, Rte 1, Box 5395, Marion 29571 (803-423-3645)
Virginia — Mark Witt, NN4I, 113 Par Dr, Salem 24153 (703-387-3623)
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25313 (304-776-4352)

Rocky Mountain Division
Colorado — William "Bill" Sheffield, KQ0J, 1444 Roslyn St, Denver 80220 (303-355-2488)
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4581)
Utah — James R. Brown, NA7G, 865 Manchester Rd, Kaysville 84037 (801-544-0056)
Wyoming — James E. Raisler, N7GVV, 1102 East 9th St, Gillette 82716 (307-686-0794)

Southeastern Division
Alabama — James M. Spann, Jr, WO4W, PO Drawer X, Demopolis 36732 (205-289-1400)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2858)
Northern Florida — Royal V. Mackey, N4ADI, 161 Shell Point W, Maitland 32751 (407-644-5905)
Southern Florida — Richard D. Hill, WA4PFK, 3800 SW 11th St, Fort Lauderdale 33312 (305-583-6932)
Puerto Rico — Jose A. "Tony" Purcell, KP4IG, Urb Tomas Carrion, Calle 2, #95, Juana Diaz, PR 0066 (809-837-2975)
Virgin Islands — Ronald Hall, Sr, KP2N, PO Box 3987, St Thomas 00801

Southwestern Division
Arizona — James E. Swafford, W7FF, 5906 W Miramar Dr, Tucson 85715 (602-298-7793)
Los Angeles — Phineas J. Icenbice, Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186)
Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Thomas I. Geiger, W2KVA, 428 E Grant St, Santa Maria, CA 93454 (805-866-1359)

West Gulf Division
North Texas — Phil Clements, K5PC, 1313 Applegate La, Lewisville 75067 (214-221-8873)
Oklahoma — William E. Goswick, K5WG, 12717 S 124th E Ave, Broken Arrow 74011 (918-369-2115)
South Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

THE AMERICAN RADIO RELAY LEAGUE, INC

The American Radio Relay League, Inc, is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

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

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

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA
Telephone: 203-666-1541 Telex: 650215-5052 MCI, MCI MAIL (electronic mail system) ID: 215-5052
FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

"It Seems to Us . . ."

On We Grow!

ARRL reached an important milestone in April. We closed the month with more FCC-licensed radio amateurs on the membership rolls than at any time in our 74-year history! We're continuing to net several hundred new members per month; every time a new Full Member signs up, he or she sets a new record. The previous high-water mark occurred in 1978, in the wake of the CB boom and at a time of $12.00 annual dues.

While the many challenges we face make this hardly a time to rest on our laurels, it's worth reflecting for a moment on what's been done that has contributed to the League's health and growth.

First and foremost, today's ARRL is a more responsive, participatory organization than ever in its history. In some organizations, growth leads to alienation of the individual member who feels increasingly isolated from the center of activity. We've addressed that problem, for the most part successfully, by restructuring both the ARRL Field Organization and the Board's committee structure to provide greater opportunities for membership participation and input. Volunteers at the ARRL section level have new opportunities to work on behalf of Amateur Radio, and are shouldering those responsibilities vigorously and effectively. Members who have a special concern about League policy can reach the right people to make sure their views are taken into account. Increasingly, members see the League not as a faceless monolith, but as a structure through which they can get things done. As ARRL President Larry Price, W4RA, who is himself a volunteer, has said: " 'The League' has no mind or will of its own; its policies and actions are those of its members, who express their will through their elected representatives on the Board. The healthy growth in membership the League has enjoyed during the past three years is not simply a measure of radio amateurs' satisfaction with their national association. Even more, it represents an increase in the League's most important resource: its people."

Second, the League has taken a responsible, assertive position on the issue of Amateur Radio growth. Following the massive outpouring of sentiment against FCC proposals for a no-code amateur license (a sentiment that was properly reflected in the policies of our democratic organization), ARRL found in Novice Enhancement a formula for encouraging growth that already-licensed amateurs did not find threatening. Thanks mostly to the fun they've discovered on 10 meters, Novices and Technicians are upgrading in record numbers. *Tune in the World* sales have been strong ever since Novice Enhancement was announced, but for a while we (along with the commercial publishers of Novice study guides) were wondering where the books were all going; prospective hams were entering that end of the pipeline, but weren't coming out the other. Now that's changed, and Gettysburg is issuing new licenses at an ever-increasing rate. While not a panacea, Novice Enhancement has been a marvelous tonic with very little in the way of discernible side effects.

We've also been sensitive to the fact that membership can be a "pocketbook" issue. Thanks to the efforts of staff and volunteers alike, and to improvements in Headquarters productivity, we've managed to keep the annual dues rate unchanged since 1981. In fact, an over-65 member pays less for a three-year membership today than it would have cost in 1979!

Finally, in spite of these economies we're providing improved member services—beginning with a more colorful and interesting *QST* and continuing through the whole gamut of other publications and membership benefits. In some cases a particular service may cost something beyond the basic membership dues, in fairness to other members who don't share that need and shouldn't have to pay for it through their own dues, but most members find that even then the costs are remarkably low.

In short, while the League is far from perfect, more radio amateurs than ever before view ARRL as an effective spokesman, leader and provider of services for the Amateur Radio community. In return, we who serve the League in staff or volunteer roles are deeply appreciative of the support you have expressed through your membership and participation. If there's something about the League that you don't like, please tell us; if there's something you do like, please tell others! With a growing, involved, caring membership, there's nothing Amateur Radio needs that League members can't do.—*David Sumner, K1ZZ*

A high-performance HF rig... with a great receiver and full-power transmitter. Light in weight and low in price.

This is Yaesu's FT-747GX.

Whether you're a novice or a veteran, it's a great way to start. And a great way to go.

DX ready. The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30 MHz.

And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

Multimode versatility. The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit—great for watching 10-meter repeaters.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW *and* AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

Lightweight construction. Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7¼ pounds! With the loudspeaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when used with a heavy-duty power supply.

Available options. FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic, Solid-State Linear Amplifier. TCXO-747 Temperature-Compensated Crystal Oscillator. FAS-1-4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket.

Discover the price/performance leader. Check out Yaesu's low-cost FT-747GX at your Yaesu dealer today. Because now, Yaesu puts priceless DX into *your* price range.

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice.

YAESU

Fill your logbook. Without emptying your pocketbook.

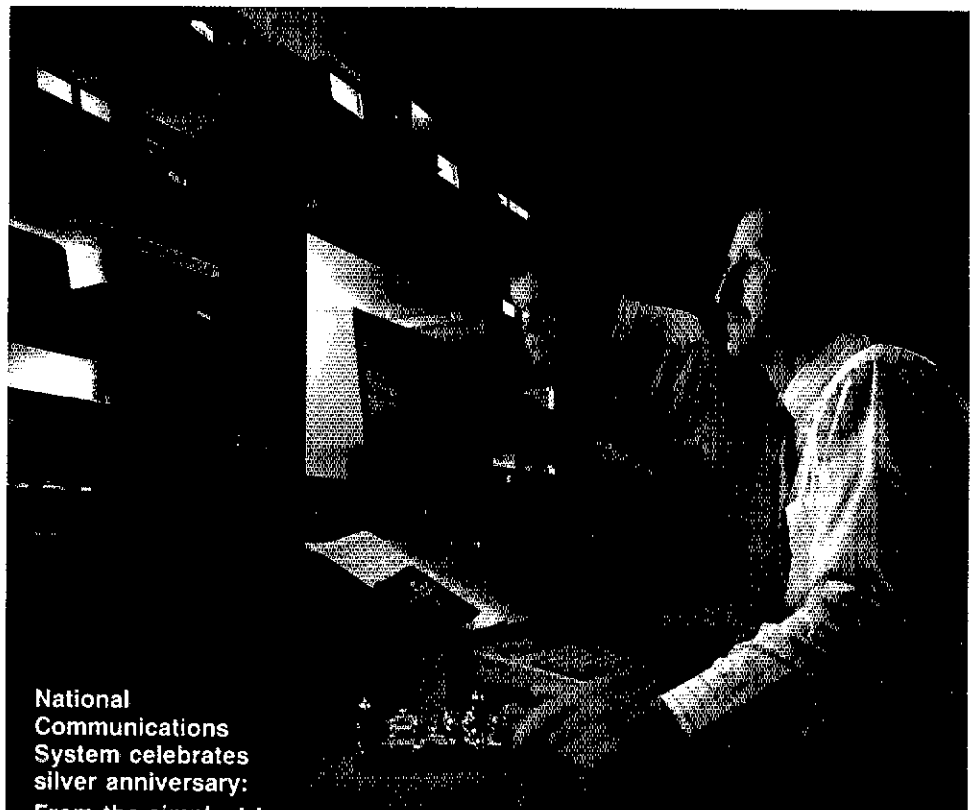
UP FRONT in QST

It's a Bird!

The AMSAT Phase 3C satellite was successfully launched at 1119 UTC on June 15, becoming AMSAT OSCAR 13 when the spacecraft was separated from the launch vehicle. ZL1AOX, in Howick, New Zealand, decoded the beacon telemetry without error about three hours after launch.

The first of three kick motor burns was at 1857 UTC on June 22, while the satellite was over the Indian Ocean. The burn, which was successful, resulted in an increased inclination of five degrees and an increase of perigee to 1000 km, according to the satellite's telemetry.

The transponder, with the potential to provide a sophisticated and exciting new means of DXing, should be available for use by mid-to-late July. For the latest information on AO-13, tune in to W1AW bulletin transmissions (the W1AW schedule appears in this issue, page 99).



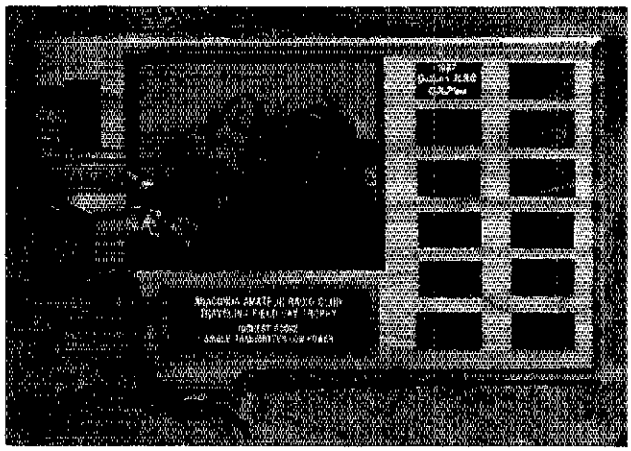
National Communications System celebrates silver anniversary: From the simplest to the most advanced forms of HF radio communications, the NCS's National Coordinating Center stands ready to respond to any emergency-preparedness telecommunications requirement. To commemorate their anniversary, the NCS will operate special-event station N2CCY on August 21. For more information, see the article beginning on page 68 and the listing in Special Events on page 104, both in this issue. (*photo by Greg Pease*)

Boost That Signal

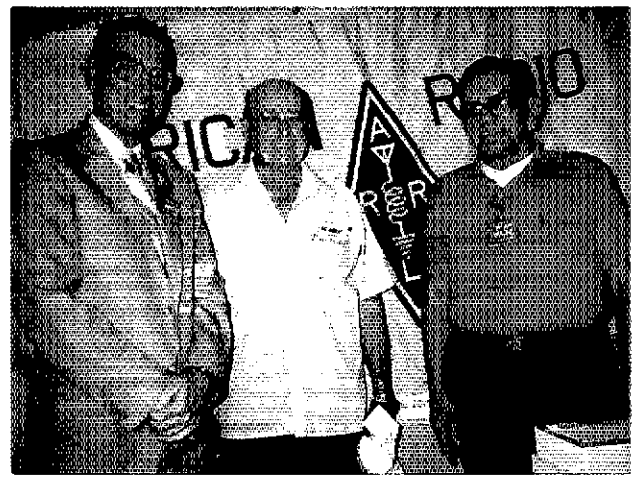
Need a little more zing from your hand-held to hit that distant repeater or for weak-signal work? Try one of the 25 W amplifiers for 2 meters or 220 MHz described by WA3JUF on page 15 of this issue. Both include optional preamps so you can give your receiver a helping hand as well.

Project Outreach: Speakers at Project Outreach, held at NASA's Jet Propulsion Laboratory in Pasadena, California, included astronaut Tony England, WØORE; ARRL First Vice President Jay Holladay, W6EJJ; and AMSAT President Vern Riportella, WA2LQQ. The event, sponsored by Yaesu USA, was designed to encourage teachers to use Amateur Radio as an education vehicle. (*photo courtesy WA2LQQ*)

DX dreams: Been thinking about making a DXpedition to some exotic island? Then you'll want to read N3JT's article on page 65 of this issue. In it you'll find tips on going in proper DX-pedtion style *and* on a budget, as well as learn some of the pitfalls of DXpeditions and how to avoid them. (*photo courtesy N3JT*)



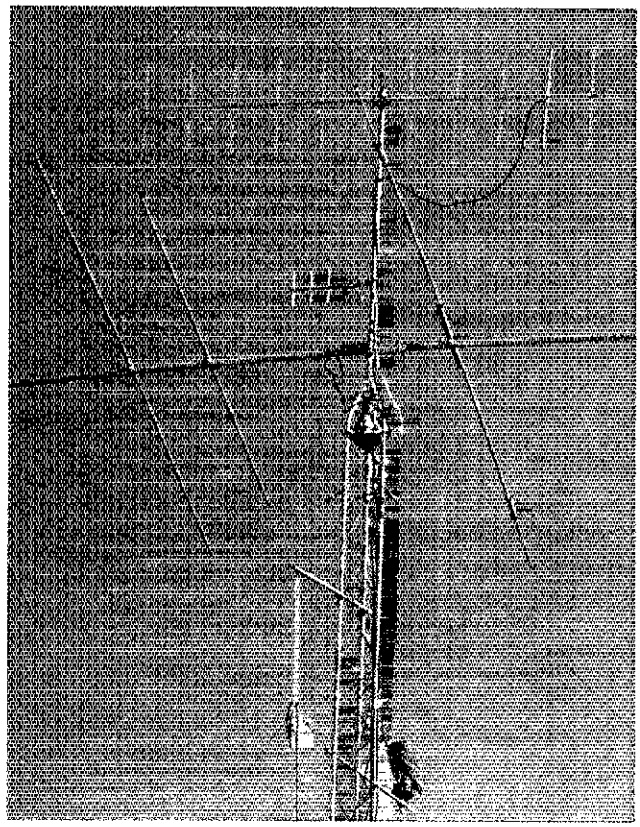
Field Day incentive: The Anaconda ARC traveling Field Day trophy goes to the Montana Section Field Day entry with the highest score in the single-transmitter, low-power category. The trophy, first presented in 1987, provides an incentive for groups in the Montana Section to participate in Field Day, as well as helping with club publicity. (*photo courtesy KØPP*)



73, y'all: Prose Walker, W4BW (center), reminisces with ARRL Southeastern Division Director Frank Butler, W4RH (left), and Georgia Section Manager Eddy Kosobucki, K4JNL. Many readers will remember Prose as a former Chief of the FCC Amateur and Citizens Division. Following his retirement in 1975, he moved to Florida, where he is still active and, Eddy reports, sharp as a tack, as always. (*photo courtesy K4JNL*)

Another success story: The recent 12-week Novice class given by the Kings County Radio Club (Brooklyn, NY) was a success—all 14 students are now licensed Novices. The instructors were KB2ARU, N2FOW, KA2NNQ, K2AAZ, WB2COL, N2EZL and KW2V. The club began another Novice class in April—another 100 percent success rate in the making? (*photo courtesy KW2V*)

Where's the fire? When the Genesee County (Michigan) ARES needed to move one of its two emergency repeaters, a problem arose: How to move a long antenna and heavy steel tower section to the top of the new building, since neither the stairs nor elevator would work. The obvious way, pulling them up the side, was ruled out due to the building's all-glass construction. Since ARES has worked closely with the local fire department for years, its Genesee Township Station 1 provided the solution. The ladder was moved into position, the antenna and tower were slid up the ladder, and then everyone went out for a cup of coffee. (*photo courtesy W8WN*)



A day owl? No, actually it's a 24-hour owl, on duty around the clock to keep birds from landing on the tower of Joe Rubino, WA4MMO, of Cocoa Beach, Florida. (The photo of KK6C's antenna on page 11 of June 1988 *QST* shows the effects of doing without a guard.) While not real, the owl, a gift from Genie Lazowska, KC4YB, does prevent untoward "loading" of Joe's antenna. (*photo courtesy WA4MMO*)

Need a lift?

Want to learn more about vertical antenna systems and how to improve yours? KB8I discusses the effects of height and various types of radial systems on vertical antenna performance in his article on page 35 of this issue.

A change of climate: George Allison, K5IJ, of Honolulu apparently wanted a change of pace (and climate!) when he recently made a DXpedition to the South Pole. George reports that the temperature was a balmy 17 below zero (Fahrenheit), which made the LCD display on his hand-held vanish until he warmed it up! (*photo courtesy K5IJ*)

League Lines

Congress has become involved in the ARRL's fight to preserve amateur frequencies, especially the 220-222 MHz portion of the 220-MHz band presently threatened by FCC Docket 87-14. Two nonbinding "sense of Congress" resolutions have been introduced—in the Senate by Pete Wilson (R-CA) and in the House by Robert Dornan (R-CA 38th Dist). The resolutions say that amateur emergency communications abilities should be supported, and government agencies should not reduce amateur frequency allocations used for these purposes.

ARRL members should immediately write their representatives in the House and Senate, asking them to cosponsor Senate Concurrent Resolution 127 or House Concurrent Resolution 317. For further details, see the article on page 60.

The World Above 50 MHz: If you are interested in VHF/UHF and above, please complete the readers' survey contained in this month's The World Above 50 MHz column. ***We need your input on how we may better serve you!***

DXCC Reminder: Amateurs interested in applying for the new single-band DXCC awards are reminded to be sure to use the new award applications available from HQ. These forms, which are also now used for the standard DXCC awards as well as the new awards, should be *completely filled out* to ensure proper processing of your application. To request the new DXCC application form "package" (containing MCS forms 16, 164, 216 and 253), send a business-size SASE with two units of first class postage to HQ. For complete details concerning the new DXCC awards program, see page 51 of April *QST*.

The Board's Membership Services Committee announces a QSL card contest. Object? Design a unique distinctive ARRL member QSL card to be available through interested QSL card printers. "Amateur" as well as professional submissions are encouraged. Please send your design to ARRL Member QSL Card Contest, c/o ARRL HQ, by October 1. A plaque, *QST* recognition, choice of ARRL publication and a stock of QSL cards (of course!) await the designer of the winning entry. Graphic artists, sharpen your pencils!

Interested in assisting the FCC with amateur-to-amateur difficulties? ***The Amateur Auxiliary to the FCC's Field Operations Bureau still needs volunteers*** to spend a few hours a month monitoring for rules infractions and technical problems that cause on-the-air difficulties, and occasionally to provide survey data on overall Part 97 rules compliance. Also needed are amateurs who can monitor a wide variety of digital emissions and frequencies at or above VHF. Contact your ARRL Section Manager (see page 8) or Luck Hurder, KY1T, at HQ, for further information.

Radio Amateur Callbook, Inc, reports that because of a computer programming error ***in the 1988 Callbook supplement, all Novice licensees are incorrectly shown as Advanced.*** The supplement (Volume 66, No. 2) therefore cannot be used to determine the license class of these licensees.

Attention Net Managers! The 1989 ARRL *Net Directory* registration deadline is September 1. If your net is listed in the 1988 edition, it will be run again automatically in the 1989 edition. If your net is not listed or the information needs to be updated, ***please advise us using a net registration card (FSD-85), available from HQ, and send it to HQ by September 1.*** Following the September 1 registration deadline, we will compile new listings and forward copies to all Section Managers for review with their Net Managers, Section Traffic Manager and Section Emergency Coordinator.

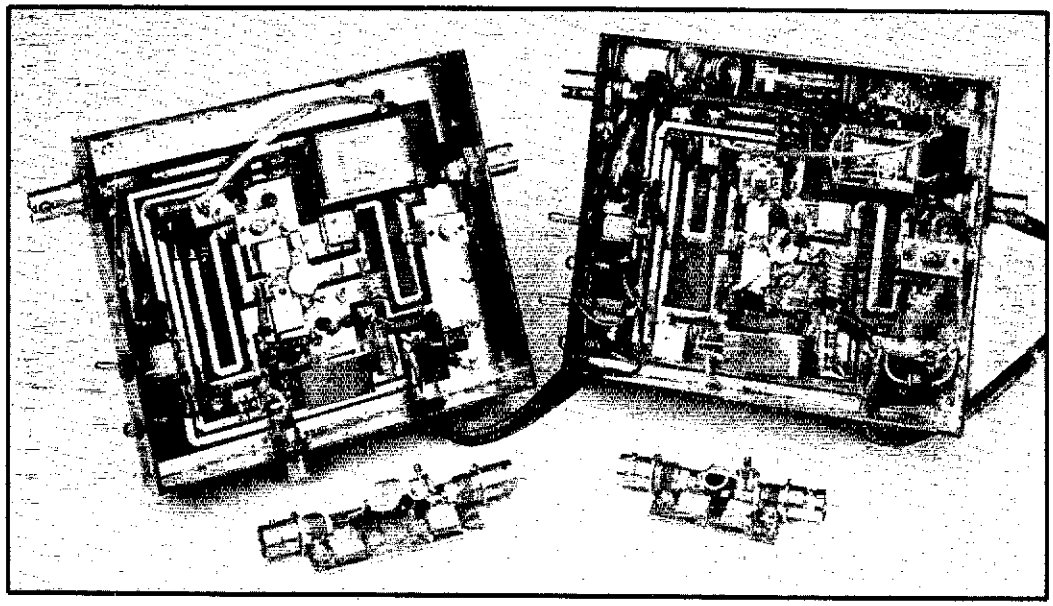
Cancelling a call sign of a Silent Key: ***The FCC no longer deletes the call signs of Silent Keys unless their cancellation is specifically requested.*** Since the term of an amateur license is now 10 years, plus a two-year grace period, the family of the deceased amateur could continue to receive correspondence, based upon FCC records, for that period. In order to avoid this unwanted correspondence, families of deceased amateurs are urged to send the license, or a letter if the license cannot be found, to FCC, Consumer Affairs Office, Gettysburg, PA 17325, requesting its cancellation.

It's still not too late to plan to ***attend the ARRL National Convention*** in Portland, Oregon, September 9-11! For further details, see July *QST*, page 55.

VUCC above 300 GHz: Effective September 1, the VHF/UHF Century Club (VUCC) is available for laser contacts above 300 GHz. The minimum number of grid squares to qualify is five (5) between licensed amateurs using coherent radiation on transmission and employing at least one stage of electronic detection on receive. Plaques are offered to the first five qualifiers.

The ***USSR/Canada Polar Bridge Expedition*** ended as the 13 skiers walked ashore Ward Hunt Island, Canada on June 1. A short wrap-up appears on page 64.

25-Watt Linear Amplifiers for 144 and 220 MHz



Do you need more punch from your hand-held or portable rig for 2 meters or 220 MHz? These little amplifiers can supply it!

By Dave Mascaro, WA3JUF
RD 1, Box 467
Ottsville, PA 18942

Many hams have 2-meter and 220-MHz hand-held rigs and low-power portable SSB rigs these days. Unfortunately, many of these radios have limited usefulness because of their low power output. Also, as hand-held radios get smaller, so do the NiCd packs that power them—a few long-winded transmissions on high power and the battery is dead! The low-power mode is usually good only for short-range simplex operation, or repeater use when you're close to the repeater. High-capacity battery packs are available for most hand-held rigs, but using them takes away the size and weight advantage of today's smaller hand-held transceivers. Some rigs offer the option of removing the battery pack and plugging the unit directly into 12-V dc, which gives you a small, lightweight rig, but you're still stuck with relatively low power.

The solution to this problem is the addition of a linear amplifier. An amplifier after the hand-held transceiver or portable rig that can give you 25 to 30 W of output power (depending on the output of the driving rig) without imposing large weight, cost and current-drain constraints is a great addition to your VHF station. An amplifier also allows you to use the same low-powered rig in the house and in the car with high power output. You can mount an amplifier under the seat or in the trunk of your car, and minimize the possibility of theft by taking the radio with you when you leave the car.

Amplifier Design

The amplifiers described in this article are capable of 25 to 30 W of RF output for the drive power available from common hand-held and portable rigs. The 2-meter and 220-MHz designs are so similar that we can describe them both in one discussion. The differences in the designs are covered in detail. Design, assembly, tuning and use of the amplifiers is virtually identical for both versions. Both versions even use the same PC board! (Note that two different boards are shown in the lead photo—they were prototypes of the final board design.)

Receiving preamplifiers are included in both units. They, too, are quite similar, differing only in some component values.

This power amplifier uses a single SD1274 bipolar transistor manufactured by Thomson Components/Mostek Corp.[1] The device is operated class AB for all-mode operation. Nominal dc power-supply voltage is 13.8. The amplifier will operate on any dc supply voltage between 12 and 14.5 (the typical automobile supply voltage range).

The main amplifier PC board is a microstripline design on standard 1/16-inch-thick, double-sided, G-10 fiberglass-epoxy board. Input and output tuning capacitors are provided for maximizing gain and power output in a given band segment. If desired, the amplifiers can be tuned for broadband operation with only a slight reduction in power output across the operating frequency range.

The 2-meter and 220-MHz amplifiers are narrow-band designs. The 2-meter version gives 25 W output for 2 W of drive from 138 to 150 MHz, with a single tuning setting. When tuned for narrow-band operation, the amplifier gives about 20 W output for 1 W of drive. With the Kenwood TH-21AT on high power, my 2-meter amplifier puts out 25 W. On low power, I can adjust the amplifier for a maximum narrow-band gain, which gives about 7 to 8 W output. Efficiency is 50 to 60%, depending on tuning and power output.

The tuning range of the 220-MHz amplifier is 200 to 230 MHz. When tuned for narrow-band operation, the amplifier gives about 16 W output for 1 W of drive.

[1]Notes appear on p 21.

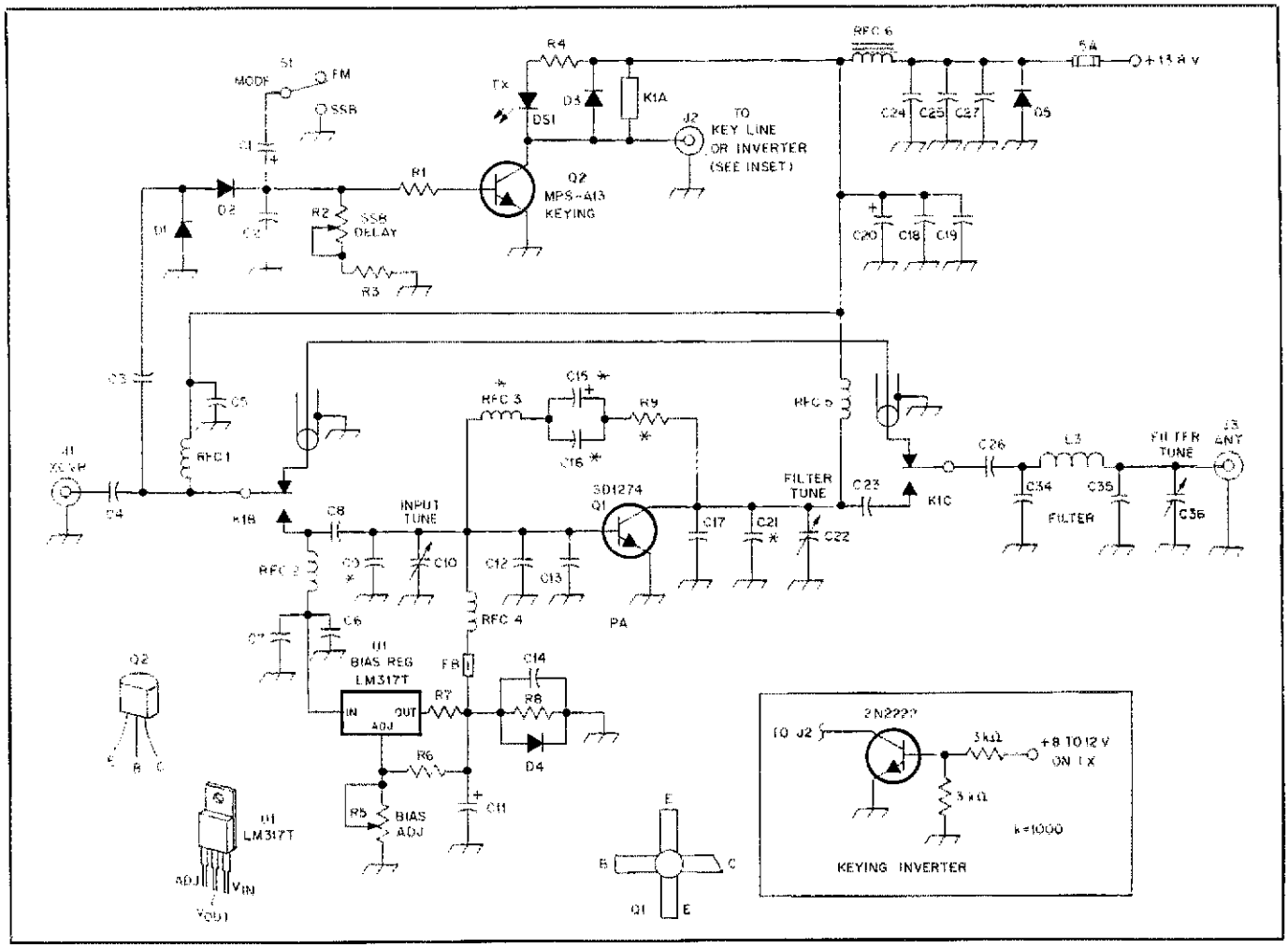


Fig 1—Schematic of the 25-W VHF amplifiers. The 5-A fuse is included in the power lead (external to the amplifier). Be extremely careful when mounting the power transistor—see text for precautions. In the parts list below, values for the 220-MHz version are given in parentheses where they differ from those in the 2-meter version. Asterisks indicate parts not used in the 220-MHz version.

C1—15-μF, 6-V dc.
C2—470-pF disc.
C3—2-pF silver mica.
C4, C23, C26—270- to 470-pF silver mica or Unelco.
C8—270- to 470-pF (100 pF) silver mica or Unelco.
C5, C7, C14, C16, C19, C24—0.01-μF disc.
C6—0.22-μF disc.
C9—43-pF silver mica or Unelco.
C10—Arco 404—4 to 60 pF (Arco 403—4 to 40 pF).
C11, C15*—1-μF, 15-V tantalum.
C12—180-pF (120-pF) Unelco.
C13, C18—220-pF Unelco.
C17—68-pF (51-pF) Unelco.
C20—10-μF, 35-V electrolytic.
C21*—33-pF silver mica or Unelco.
C22—Arco 404—4 to 60 pF (Arco 402—1.5 to 20 pF)
C25—0.1-μF disc.
C27—0.001-μF disc.
C34, C35—25-pF (18-pF) Unelco.
C36—10-pF trimmer.
D1, D2—1N4148 or 1N914.
D3, D4—1N4001 or equiv.
D5—ECG 581 or equiv.
DS1—LED.
FB—Ferrite bead.
K1—Omron LZN203-UA-DC12 DPDT relay.
L3—3 turns (1 turn) no. 18, closewound, 0.2-in. (¼-in.) ID.
Q1—Thomson/Mostek SD1274.
Q2—MPS-A13 NPN Darlington.
R1, R4—1.5-kΩ, ¼ W.
R2—500-kΩ, 10-turn potentiometer.
R3—10-kΩ, ¼ W.
R5—100-Ω miniature potentiometer.
R6—270-Ω, ¼ W.
R7, R8—10-Ω, ½ W.
R9*—15-Ω, ¼ W.
RFC1, RFC2, RFC4—0.47-μH molded choke.
RFC3*—0.15-μH molded choke.
RFC5—6 turns (5 turns) no. 16 enam, ¼-in. ID.
RFC6—VK200/4B ferrite choke.
S1—Miniature SPDT toggle.
U1—LM317T voltage regulator

Miscellaneous

2 BNC or N connectors (see text).
4 × 4 × 1½-in. heat sink.
5-A fuse and in-line holder.
2 × 1-in. scrap of thin sheet brass.

Driving the amplifier with my ICOM IC-3AT on high power (about 1.5 W), the amplifier puts out 20 W. With the IC-3AT on low power (about 150 mW), I can tune the amplifier to give 4 W output. Efficiency is about the same as the 2-meter version.

The saturated power output for both versions is more than 35 W in FM operation. The maximum FM power input is 4 W. Minimum power input for proper RF-sensed keying operation is 100 mW.

The Power-Amplifier Circuit

See Fig 1. K1 is similar to relays used in VCR RF circuits. I have switched up to 40 W at 2 meters and 35 W at 220 MHz with these relays. They present a good match to 50 Ω. The loss through the amplifiers (when not in use) resulting from these relays is less than 1 dB. This is typical for 2-meter and 220-MHz amplifiers.

In addition to switching the transmitted and received signals, the relays also switch the dc supply voltage. In the transmit mode, K1 switches 13.8 V dc to the input of the bias regulator, U1. The regulator IC and its associated resistors (R7, R8) and bias diode (D5) supply a stiffer bias voltage to the base of Q1 than the more-common voltage-divider bias networks. This low-

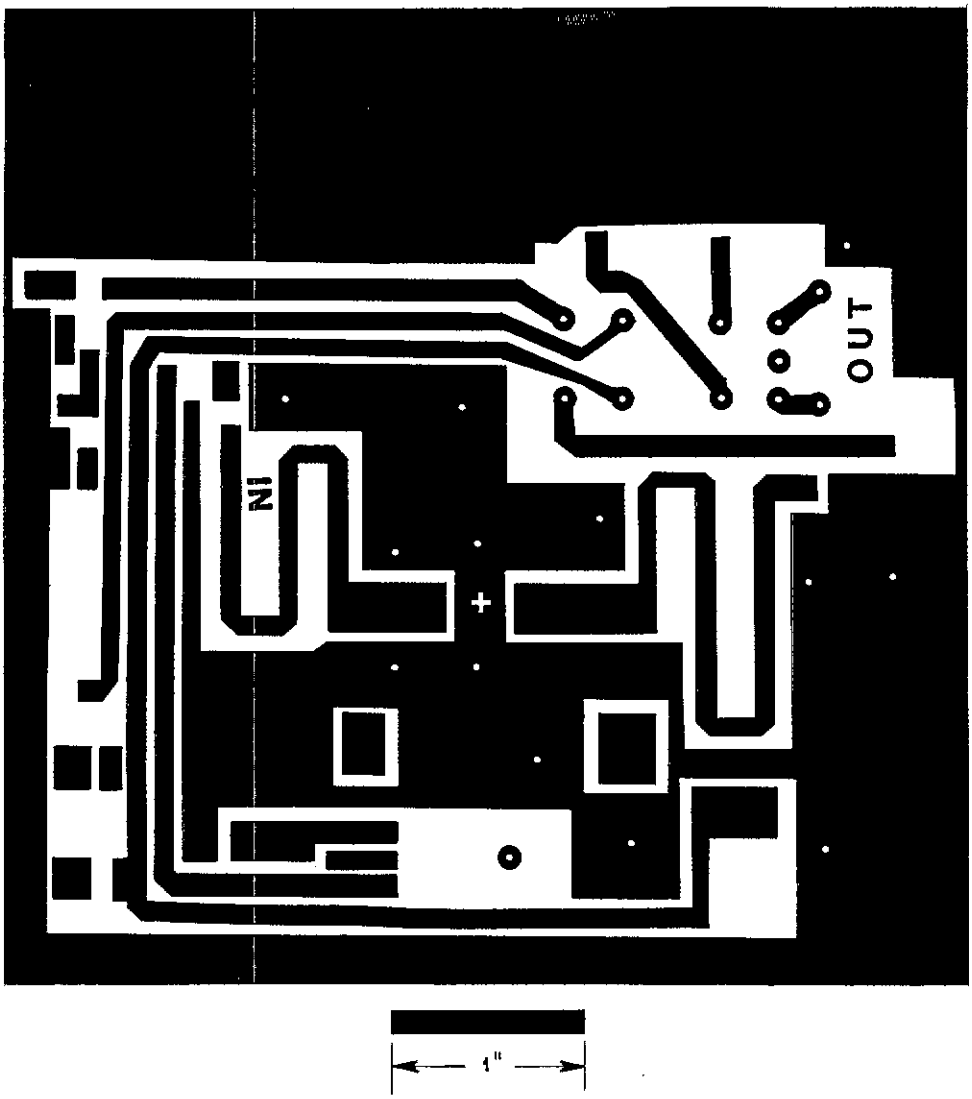


Fig 2—Main PC-board layout for the 2-meter and 220-MHz amplifiers. Artwork is full scale. Because this is a microstripline design, do not change the geometry or routing of board traces. The board must be drilled for rivets, mounting hardware and transistor mounting at the locations marked. The transistor-mounting hole is 0.38-in. diam and should be drilled at the + near the center of the PC board. All other holes (except for the relay-mounting holes near the output microstripline) are for rivets and no. 4-40 mounting hardware.

impedance bias source keeps the bias voltage constant over the range of RF drive levels. With a voltage-divider bias network, bias voltage can be upset by the base-emitter rectification (self bias) developed by the RF driving signal. In such a case, overdriving the amplifier causes the base bias to decrease, resulting in non-linear amplification. This effect is limited with the regulator-type bias circuit used in these amplifiers.

TR switching is accomplished by an RF sensing circuit. A small amount of RF is sampled by C3 and rectified by D1 and D2, which turns on keying transistor Q2. Q2 pulls in K1, which switches the amplifier into the line.

When S1 is in the SSB position, a short drop-out delay is added in the RF-sensed-keying circuit to keep the amplifier keyed during brief pauses in speech. This delay is adjustable by varying R3. In the FM position, no delay is needed. S1 does not change the class of operation of Q1—it merely switches in the delay circuit.

The switching relays are wired so the amplifier can remain in-line at all times, with or without the supply voltage connected. Applying the supply voltage allows you to use the amplifier and preamp. Without the supply voltage connected, all transmitted and received signals pass through the amplifier.

The spectral output of these amplifiers is quite good, but to ensure clean signals, I've added filters to the output of each unit. Although there isn't much extra room for the filter components inside the amplifier cabinet, you can mount them on the back cover or in another small enclosure. The filters, shown in the title photo, are very simple to build and tune.

Construction

Each amplifier consists of two PC boards: the power-amplifier board and the preamp board (if used). After the PC boards are etched, holes are drilled with a no. 50 bit for installation of tinned grounding rivets at all RF and dc grounds (see Fig 2).[2] Install the rivets on the board as follows: After inserting the rivets, flare the inserted end with an awl. Next, flatten the rivet by tapping it lightly with a hammer, using an anvil or other solid surface under the PC board as a support. Solder the rivets on both sides of the PC board. Alternatively, pieces of wire can be soldered through the board—but because the wires will not be flush with the board, mounting the heat sink may be difficult.

Drill the holes for Q1 and the board-mounting screws as indicated in Fig 2. No holes are needed for component mounting because all parts are mounted on the trace side of the PC board. All the components except the preamp board are mounted next. (The preamp board is mounted after the amplifier has been tested, to prevent possible damage to the preamplifier.) Connect a piece of miniature 50-Ω Teflon® or RG-58 coaxial cable between K1 and the amplifier-input microstripline (see Fig 3).

After drilling or milling holes for Q1 in a suitable heat sink (see Fig 4), tap the mounting holes in the heat sink for no. 4-40 hardware, and mount the PC board to the heat sink. Trim the four leads of Q1 to about half their original length to make mounting easier.

Q1 can be mounted in one of several ways. The distance between the underside of the leads of Q1 and the heat-sink mounting area of Q1 is larger than the thick-

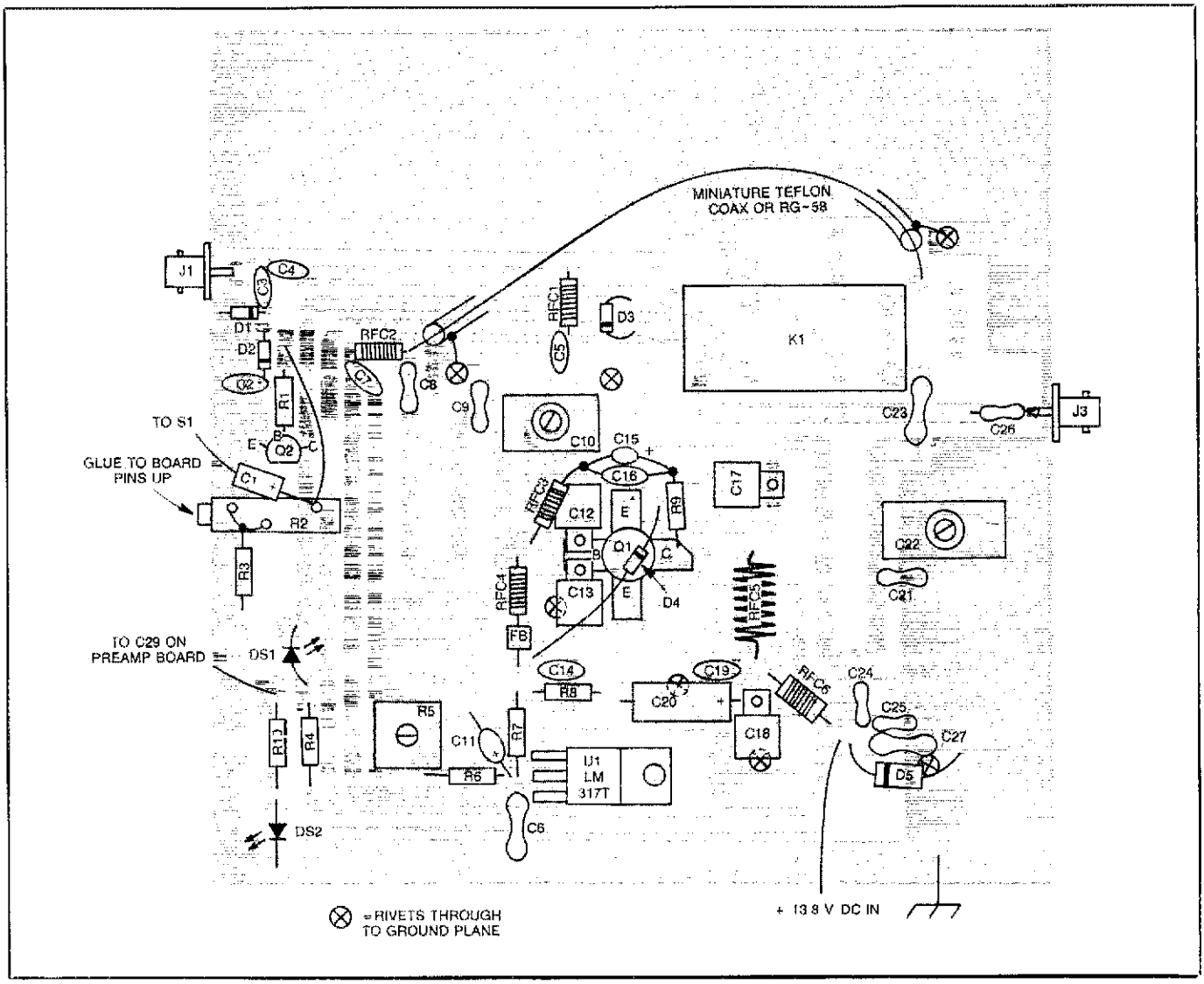


Fig 3—Parts-placement diagram for the VHF amplifiers. All parts are mounted *on the foil-trace side* of the PC board. The power-transistor mounting stud passes through the board and into the heat sink. D5 is epoxied to the ceramic cap of Q1. R2 (10-turn potentiometer) is epoxied to the PC board as indicated, with the pins facing up.

ness of 1/16-in. G-10 board material. Because of this, the heat sink must be milled (see Fig 4), or small pieces of copper or brass must be soldered under each lead of Q1 to make up the difference in height. Alternatively, a second piece of G-10 material can be cut to the same size as the amplifier PC board and used as a spacer between the PC board and heat sink.

Be careful not to crack the body of Q1 where the leads of the device meet it—this can release beryllium-oxide (BeO) dust, *which is lethal.* The leads of the transistor can be bent down slightly to the PC board without affecting RF performance, but *never* force them in the opposite direction after the transistor has been tightened to the heat sink. Mount the transistor to the heat sink *first*, then solder its leads to the board, and *not vice versa.* Use thermally conductive compound between Q1's mounting surface and the heat sink.

Cut a piece of hobby-store sheet brass about as wide as the bias regulator IC and twice as long as the body of the device. This will be a heat sink for the bias regulator. When mounting the regulator IC, use thermally conductive compound between it and the brass sheet, and between the brass and the main PC board. After tightening the IC hardware to the PC board, bend the brass sheet in a U shape over the IC, leaving enough clearance for heat to escape between the IC and the brass heat sink. This heat-sink arrangement can be seen near the bottom center of each amplifier in the lead photograph.

The Preamplifier Circuit

The high gain and low noise figure (NF) of a GaAsFET preamp are not necessary in amplifiers in this power class. I designed the preamp circuit (Fig 5) to use an inexpensive U310 FET. It has more than enough gain to overcome the losses of the amplifier switching circuits and the feed line to the amplifier. The preamp has more than 12 dB gain and noise figure of about 2 dB.

When S2 is closed, K2 closes, activating the preamplifier by applying the dc supply voltage to the drain circuit of Q3 and to the preamp ON LED, DS2. In the transmit mode, K1 switches off the supply voltage to K2, allowing K2 to drop out.

The preamp circuit is optional, and I didn't include it on the main amplifier PC board. If you're not going to build the preamp, solder foil-tape or wire jumpers between the two points on the main amplifier PC board where the preamp connects during assembly.

Building the Preamplifier

The schematic of the preamplifier circuit is shown in Fig 5. As mentioned earlier, although some component values differ between the 2-meter and 220-MHz versions, the two are essentially the same in all other respects. Components that have different values for the two versions are marked with

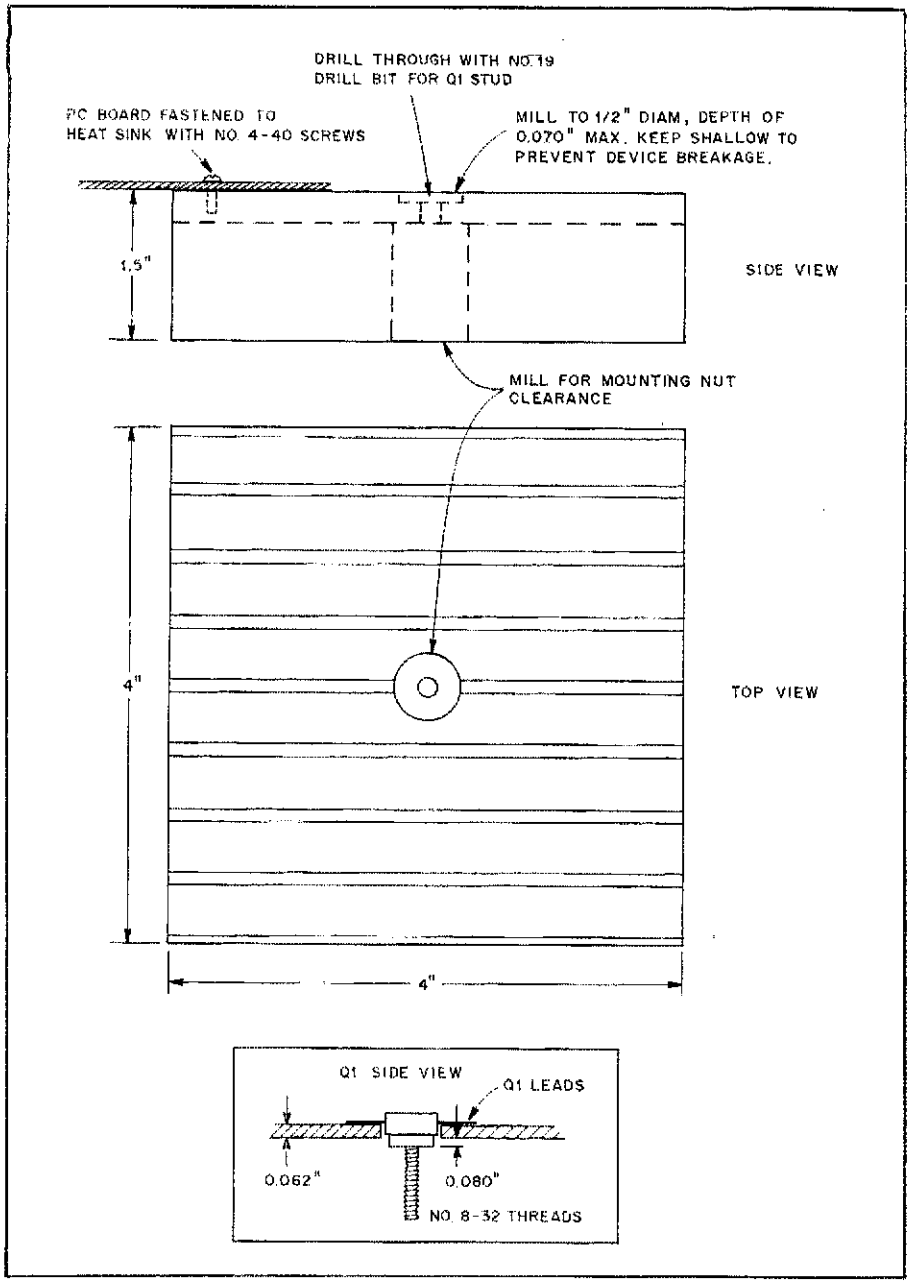


Fig 4—Heat-sink drilling dimensions for the VHF amplifiers. Overall heat-sink size isn't critical, but should be close to the dimensions shown. As an alternative to milling the heat sink to accept Q1, a piece of 1/16-in. double-sided PC-board material can be used as a shim. Be careful not to stress the transistor lead-to-body connections during mounting.

asterisks on the schematic and the parts list. Unlike the main amplifier PC board, most preamp components are mounted through the board and soldered on the bottom side. The PC-board layout and parts-placement diagrams are shown in Figs 6 and 7, respectively.

As with most FET VHF preamplifiers, a shield is necessary between the input inductor and the active device. Solder a piece of scrap brass sheet to the ground foil between these circuit elements. (This preamp shield can be seen in the right-hand amplifier in the lead photo, just behind L1.)

After building the preamplifier, tune it for maximum gain with a signal generator or an on-the-air signal. If one is available to you, use a noise-figure meter and tune the preamp for best NF.

Building the Output Filters

I built the output filters for each amplifier on scraps of PC-board material. The construction is shown in the title photo. After building the filters, it's a good idea to use some silicone sealant on the coil (especially in the 2-meter filter) to hold the coil turns in place. Install the filter in a suitable enclosure, or in the amplifier cabinet.

To tune the filters, you'll need a receiver capable of receiving the second harmonic of the fundamental (288 MHz for the 2-meter filter, and 440 MHz for the 220-MHz filter), and a signal generator or an on-the-air signal. Connect the filter between the antenna (or signal generator) and the receiver, and tune C36 for minimum second-harmonic signal level.

Enclosures

I used the main amplifier PC board as the top cover for the unit (with the heat sink mounted on it). I made the sides and bottom cover of the enclosure from PC-board material. The side walls are soldered to the amplifier board, and the bottom cover is attached to the side walls with small brackets (also made of PC-board material) soldered to the bottom cover. Alternatively, the amplifier can be mounted in an aluminum enclosure.

Although I used BNC connectors for RF input and output, N connectors can also be used. Make the connections from the input connector to the PC board with a piece of no. 16 wire or a 1/8-inch-wide strip of brass to the input microstripline. At the output, connect dc-blocking capacitor C26 between the microstripline and the antenna connector. Check the board for proper component placement and good solder joints, and get ready to tune up the amplifier!

Amplifier Tune-Up

As with the amplifier-circuit design and description, the tune-up procedure is very similar for both. The only difference is the exciter you use. Here's how to tune either version.

Disconnect RFC4 from the base of Q1. Connect a voltmeter to the free end of RFC4. Apply 13.8 V dc to the amplifier supply voltage leads. Using the voltmeter, verify that R5 is mounted so that output of U1 increases with clockwise rotation of R5. Turn R5 fully counterclockwise (minimum U1 output voltage). Reconnect RFC4.

Set the quiescent (no-drive) current to Q1 as follows: Disconnect one end of RFC6 and connect an ammeter in series with it. Apply 13.8 V dc to the amplifier through a 5-A fuse. Turn the preamp off. *Do not apply RF drive during this adjustment.* Using a clip lead, ground the collector of Q2. This should actuate K1. Check the TX LED, DS1, for operation. (If K1 actuates and the TX LED does not light, the LED may be installed in reverse.) Slowly adjust R5 for an idling current (through RFC6) of 75 to 100 mA. The amplifier should be stable; instabilities are indicated by erratic variation of Q1's quiescent current as R5 is adjusted.

Disconnect the ground lead of Q2. Q1's collector current should drop to zero. If the collector current does not drop to zero, the amplifier is unstable. If all is well, remove the ammeter and reconnect RFC6. If the amplifier is unstable, check all bypass capacitors and solder connections.

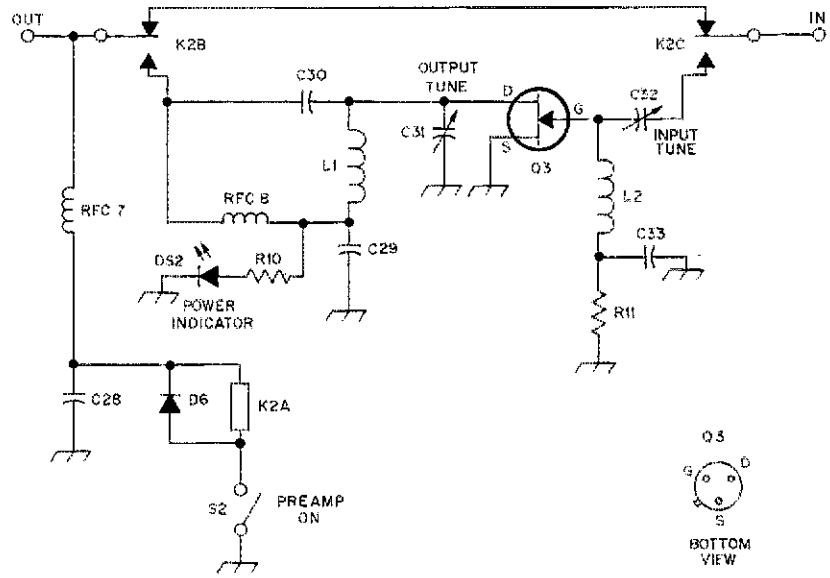
Apply about 100 mW of drive to the amplifier and check that the COR and delay circuits work properly. Adjust C10 and C22 for maximum power output. Increase drive power and retune for maximum output.

Fig 5—Schematic of the preamplifier circuit. K2 is identical to K1 on the main amplifier board. S2 and DS2 are mounted on the front panel of the amplifier. In the parts list below, values for 220-MHz version are given in parentheses where they differ from those of the 2-meter version.

C28, C29, C33—0.01-μF disc.
C30—2-pF silver mica.
C31, C32—20-pF trimmer.
DS2—LED.
D6—1N4001.
L1, L2—5 turns (4 turns) no. 16 enam, 0.3-in. ID.
K2—Omron LZN203-UA-DC12 DPDT relay.
Q3—U310 FET.
R10—1.5-kΩ, ¼ W.
R11—91-Ω, ¼ W.
RFC7, RFC8—0.47-μH molded choke.
S2—Miniature SPDT toggle.

Miscellaneous

1 × ½-in. strip of thin sheet brass



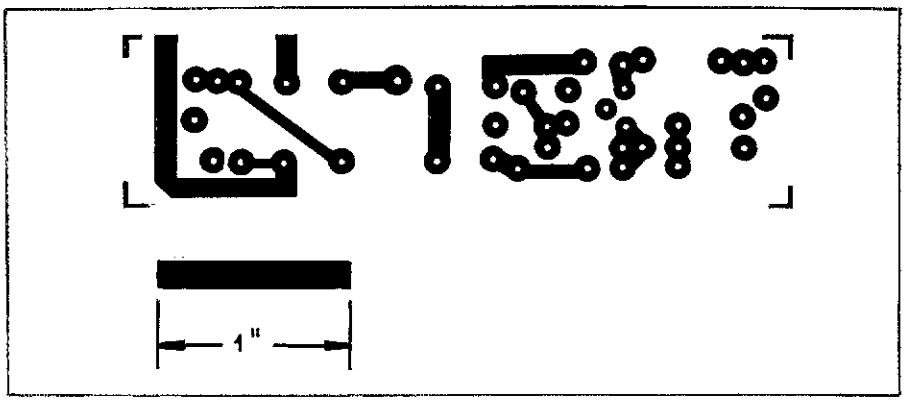


Fig 6—Full-size PC-board layout for the preamplifier circuit. Unlike the power-amplifier PC board, most of the preamplifier components are mounted on the non-trace side of the board.

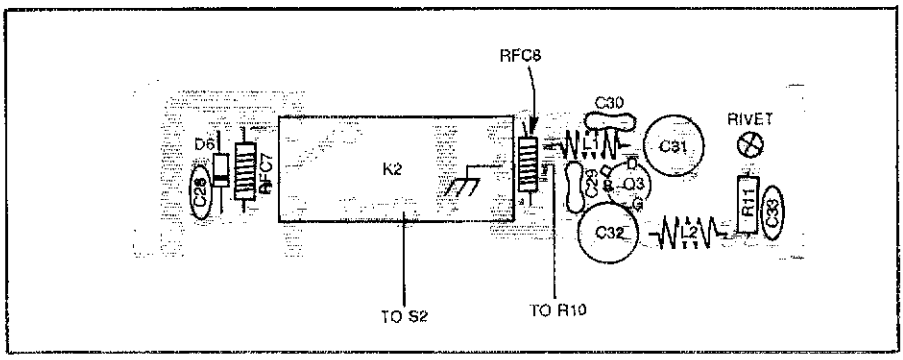


Fig 7—Parts-placement diagram for the VHF preamplifier. Mount all components on the unetched ground-plane side except for C30 and C31. Use a drill to clear the foil away from all mounting holes on the ground-plane side of the board (except for through-board ground connections). Solder all ground connections on *both* sides of the PC board (see text for rivet-installation instructions). Solder a brass-strip shield to the ground foil between L1 and Q3 on the component side of the PC board.

After final assembly, tune the amplifier for the desired frequency and power level.

Final Assembly

The preamplifier board can now be installed on the main PC board. Mount the preamp on its edge (refer to the title photo and Fig 3) and solder the input and output microstriplines in place. Solder the ground foil of the preamp board to the ground foil of the main board in a few places to support the preamp board. Connect S2 and DS2 to the preamp board with hook-up wire (see Figs 5 and 6 for connection points). Apply power and check for proper operation of S2, K2 and DS2.

The enclosure can now be painted if you wish. Use masking tape to cover the connectors and heat sink. (Mount the LEDs and switches after painting.) You may want to add stick-on rubber feet to the bottom cover to keep it from sliding around and being scratched.

Amplifier Operation

The 2-meter amplifier works very well with my Kenwood TH-21AT hand-held and ICOM IC-202S SSB/CW transceiver. I use one in my shack and one mobile—both at more than 25 W output. I drive the 220-MHz version of the amplifier with an ICOM IC-3AT (in its high-power mode).

Limit the amplifier power output to 25 W during linear operation. *All SSB amplifiers have a rated linear power output that should not be exceeded, even though the amplifier may be driven above that level. To keep your signal clean, do not overdrive any amplifier.* For exciters with fixed power outputs that would overdrive the amplifier,

(continued on page 21)

New Books

COMMUNICATIONS RECEIVERS: PRINCIPLES AND DESIGN

By Ulrich L. Rohde and T. T. N. Bucher. Published by McGraw-Hill, Inc, New York, NY. First edition, 1988. Hardcover, 6¼ × 9¼ inches, 608 pages, $59.50.
Reviewed by Wes Hayward, W7ZOI

Radio amateurs with more than a passive interest in the design of communications receivers are quite familiar with the work of Ulrich Rohde, DJ2LR. He has published numerous papers in the amateur journals, with most aimed at the design of high-performance receivers. Ulrich's articles are a guaranteed source of circuits to tickle the imagination of the receiver designer. Hence, I was excited to learn that he has completed a book on receiver design. Rohde is joined by coauthor T. T. N. Bucher, an experienced engineer who has spent much of his career designing receiving equipment at RCA.

Communications Receivers: Principles and Design is specific to communications receivers, with emphasis on high-performance designs, and some circuits of interest to the amateur are missing, including some broadcast receivers and the popular direct-conversion designs. Treatment of the various designs is generally broad, with considerable discussion devoted to FM and pulsed digital communications as well as the SSB/CW receiver. The designs discussed in the book cover frequencies up through the UHF spectrum.

The book begins with two chapters that outline the basic theory needed for a receiver discussion. Modulation forms and receiver block diagrams are presented in the first chapter. Numerous terms and concepts are defined and reviewed in Chapter 2. These include cross modulation, intermodulation, selectivity, noise figure, dynamic range and spurious outputs. The discussion of receiver characteristics in this chapter also serves as a preliminary guide to fundamental measurements needed to evaluate a receiver.

Chapter 3 is entitled Receiver System Planning. The familiar cascade of stages is considered, illustrating the calculation of system noise figure and intercept point. Spurious responses are discussed, complete with charts that can be used to locate the causes of such responses. Although the chapter contains some filter-design information, it is generally too brief to be useful. The discussion does include time-sampled filters, analog-sampled (bucket-brigade), surface-acoustic-wave (SAW) and digital filtering techniques. Considering the increasing interest in digital methods, further tutorial information could have been justified here.

Chapter 4 includes a brief but interesting discussion of antennas. Of special interest are the small active and passive antennas often used with commercial receivers. Chapter 5 continues with a discussion of amplifiers. The discussion of two-port amplification methods in this chapter was so brief that it would be difficult to apply, however. The discussions of AGC systems and gain control of individual stages were more complete.

Passive and active mixers are discussed in Chapter 6. An analysis of intermodulation distortion in mixers is included. Local-oscillator design and frequency control are discussed in Chapter 7, and several oscillator circuits are included. Greater coverage of direct digital synthesis (DDS) techniques would improve this chapter.

Demodulation and demodulators are covered in considerable detail in Chapter 8. AM, FM, PM and pulsed-data demodulators are all discussed.

Chapter 9 is devoted to receiver circuits not covered in earlier chapters. These include noise blankers, squelch circuits and automatic-frequency-control loops. Diversity reception using multiple receivers is detailed. This is followed by a discussion of adaptive receiver processing.

The final chapter is entitled Receiver Design Trends. As we might expect, more and more receiver functions are being performed by digital circuits. The impact of this movement is discussed in this chapter. Of equal significance to the digital trend, computer-control methods are becoming more prevalent in receiver design. System simulation is also discussed in Chapter 10.

Communications Receivers: Principles and Design is an interesting survey of modern receiver architecture and concepts. Traditional analog circuits have not been neglected, but the evolving importance of digital techniques is clear throughout the book. Although radio amateurs will be interested in several specific sections of this book, the volume is probably better suited to readers with formal receiver-design backgrounds. The individual chapters are well referenced, an asset to the reader seeking additional information or more fundamental discussions of the topics covered.

25-W Linear Amplifiers

(continued from page 20)

use the loss of a length of RG-58, or a discrete attenuator, between the radio and the amplifier to prevent overdrive. The gain of the preamplifier (if used) will overcome the attenuator or cable loss during receiving.

When using any amplifier or transverter in the shack, it is a good practice to "hard key" it. Hard keying is simply forcing the amplifier or transverter into the transmit mode with a switch closure or an applied voltage. To do this, run a keying line from the exciter to the amplifier. (Ground the collector of Q2 to hard key these amplifiers.) I added a phono jack to the 220-MHz amplifier to facilitate hard keying. If a positive voltage is used for keying, a 2N2222 transistor inverter can be used between the transceiver and the collector of Q2 (see the inset in Fig 1).

Summary

These amplifiers have served me well in the car and at home. After building one of these amplifiers, you'll probably find what I did: They're so handy to have around, and so easy to build, that you can't build just one!

Notes

[1]Thomson Components/Mostek Corp, Semiconductor Division, Commerce Dr, Montgomeryville, PA 18966. Thomson transistors are available through RF Gain, Ltd, 100 Merrick Rd, Rockville Center, NY 11570, tel 516-536-8868 or 800-645-2322.

[2]The following parts are available from Frontier Microwave, RD 1 Box 467, Ottsville, PA 18942: 100+ tinned rivets: $2; relays (K1, K2): 2 for $8. Prices include shipping. The ARRL and *QST* in no way warrant this offer.

QEX: THE ARRL EXPERIMENTERS' EXCHANGE AND AMSAT SATELLITE JOURNAL

A surprising number of earth satellites can be seen—*with your eyes*—using little or no equipment. Even very small satellites can be seen through binoculars under favorable conditions. You may be surprised to learn that even satellites at geosynchronous altitudes (22,300 miles) can be observed given well-chosen observational conditions! Get the low-down on the "high up" in July's issue.

The July issue of *QEX* includes:

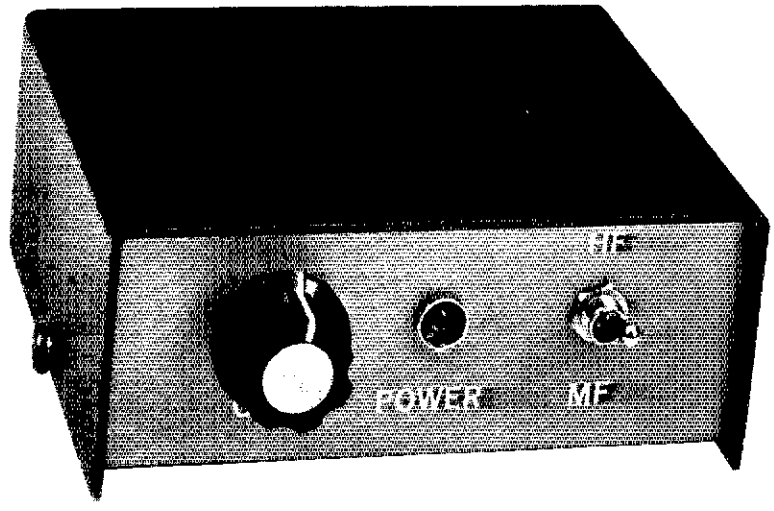
- "Your Window For Visually Observing Satellites," by Vern Riportella, WA2LQQ
- "Algorithms and Methods for SITOR/AMTOR Systems," by Paul Newland, AD7I
- ">50," by Bill Olson, W3HQT
- "VHF+ Technology," by Geoff Krauss, WA2GFP

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL/AMSAT members is $8 for 12 issues; for nonmembers, $16. There are additional postage surcharges for mailing outside the US; write to Headquarters for details.

Preamplifier for 80- and 160-M Loop and Beverage Antennas

Small receiving loops, Beverage and "snake" antennas need a boost. This preamplifier offers variable gain from 0 to 40 dB.

By Doug DeMaw, W1FB
ARRL Contributing Editor
PO Box 250
Luther, MI 49656



Have you experimented with low-noise antennas on 160 or 80 meters, only to find yourself shortchanged with respect to received-signal strength? Low-noise receiving antennas are a compromise to transmitting antennas, owing to their small size or proximity to ground. Good results are possible with these special antennas when we place a low-noise preamplifier between them and the station receiver. I make the gain of my preamplifier adjustable. This enables me to set the received-signal level at the same strength it has from the transmitting antenna. It is not uncommon to find that a signal is 20 or more dB lower in strength on a receiving antenna than it is when using the transmitting antenna for receiving. This is particularly true of small loops or short on-ground wire antennas.

A Low Noise Figure is Vital

We need to be aware that the incoming DX signal picked up by a receiving loop or other low-noise antenna is quite weak. This means that the receiving preamplifier must have a low noise figure, lest the noise from the preamplifier mask the weak incoming signals. It is the same game we play at VHF and UHF, except that our concern at those frequencies is for the noise figure (NF) of the VHF receiver front end.

Because of the foregoing facts it is prudent for us to design our low-band preamplifiers as though we were working at VHF; the same rules should be applied. Furthermore, it is wise to include an RF GAIN control in the preamplifier. This enables us to set the amplification at a level that approaches normal reception. Too much gain, on the other hand, can degrade the receiver dynamic range. This causes overloading and IMD in the receiver front end.

Circuit Information

Fig 1 shows the schematic diagram of my preamplifier. A grounded-gate JFET is used at Q1. It provides approximately 10 dB gain. This input circuit has a very low noise figure (approximately 2 dB), which is entirely adequate for our needs on 80 and 160 meters. Also, the grounded-gate hookup for Q1 offers unconditionally stable operation (no self-oscillations).

The input circuit for Q1 has a characteristic impedance of 200 Ω. This makes it convenient to use a broadband 4:1 input transformer, T1. T1 provides a match between a 50-Ω antenna and the preamplifier. I chose the 50-Ω feed impedance for loop and Beverage antennas. Also, this allows the preamplifier to be inside the radio room, rather than in the field, since coaxial cable feed is feasible. The 50-Ω input characteristic is also useful when we place a 50-Ω band-pass or high-pass filter ahead of the preamplifier. This may be necessary in locales where strong commercial BC stations are nearby. Signals from those sources can overload the preamplifier and cause IMD within it.

D1 and D2 are included for front-end protection. It is not uncommon for energy from the transmitting antenna to be picked up by the receiving antenna. This can cause catastrophic events within the preamplifier! D1 and D2 conduct at 0.7 V, thereby shorting the input circuit when strong signals are present on the receiving antenna.

A tuned circuit is used in the Q1 drain circuit. It is resonant on 80 meters when S1 is open. C1 and L1 comprise the 80-meter resonator. R3 is connected across L1 to broaden the frequency response (lower the Q). C2 is switched in parallel with C1-L1 for 160-meter reception. The additional capacitance of C2 tunes L1 to 1.8 MHz.

A Motorola MC1350P RF/video-amplifier IC is used at U1. This inexpensive 8-pin chip provides up to 40 dB gain in the MF and HF spectrum. The IC input impedance is on the order of 2 kΩ. Therefore, C5 is a small-value capacitor. This prevents the input circuit of U1 from loading the C1-L1 tuned circuit.

R8, R9 and R10 form a bias network that is adjustable by virtue of R8, a panel-mounted control. The IC bias is varied from +3.3 to +6.0 volts when R8 is adjusted. This alters the stage gain from 0 to approximately 30 dB with the component values listed. R9 and R10 are necessary to prevent the gain-change range from being constricted at one end of the control adjustment. Maximum gain occurs at +3.3 V.

A 10:1 broadband transformer is used at the output of U1. R5 is used in parallel with T2 to help establish a fixed-value load. The T2 impedance ratio is set for a 50-Ω receiver input characteristic.

Construction Notes

The circuit of Fig 1 is assembled on a single-sided PC board.[1] I chose a small aluminum box in which to house my circuit, as shown in Fig 2. The box is a Ten-

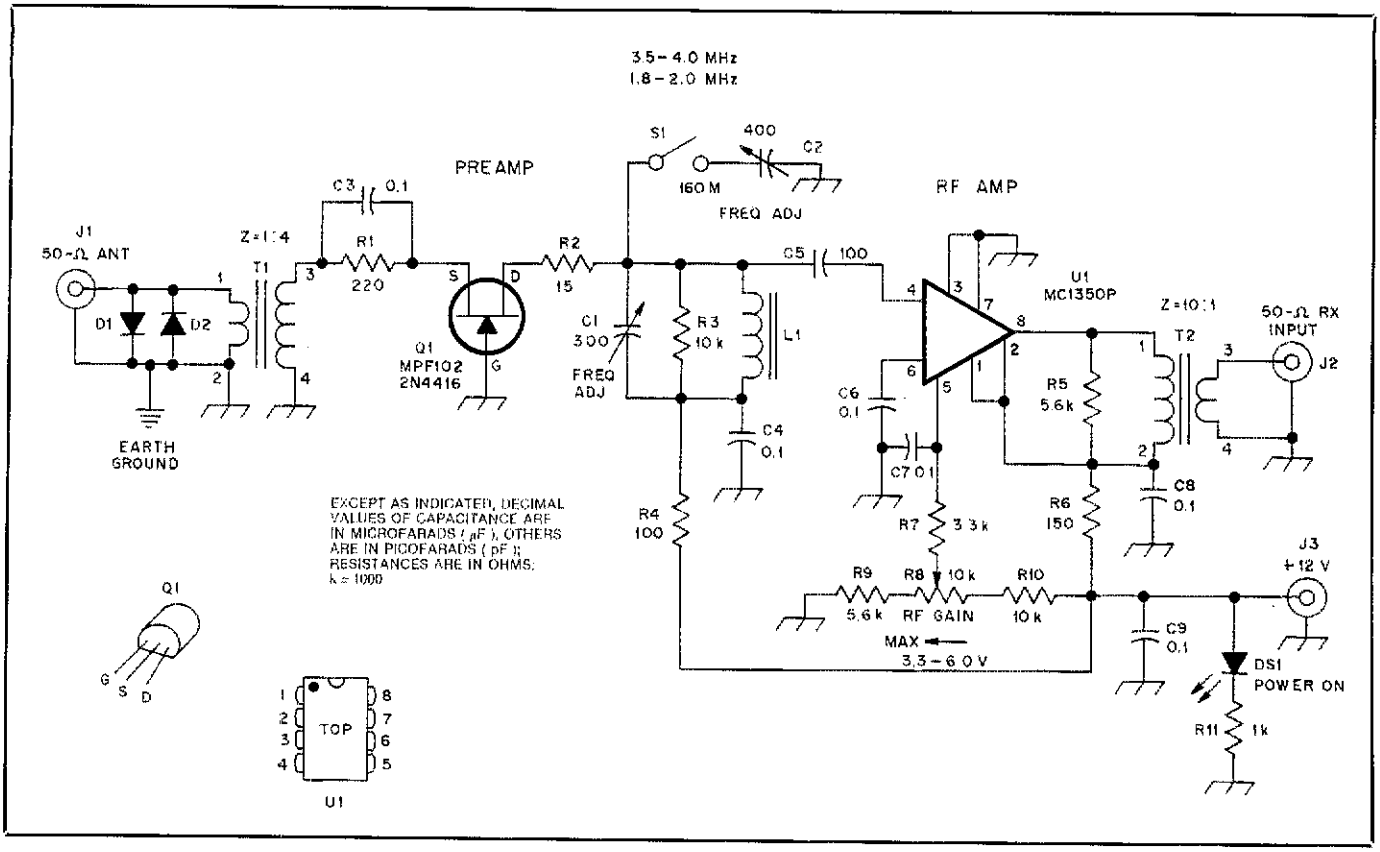


Fig 1—Schematic diagram of the two-band preamplifier. Fixed-value capacitors are disc ceramic or mini-chip types. Fixed-value resistors are ¼-W carbon composition. DS1 and limiting resistor R11 are outboard from the PC board (front panel).

C1—Mica compression trimmer, ARCO no. 427 or equiv.
C2—Mica compression trimmer, ARCO no. 429 or equiv.
D1, D2—Small-signal silicon diode, type 1N914 or equiv.
DS1—Green or red LED, Radio Shack no. 276-69 or similar.
J1, J2—Single-hole-mount phono jack.
J3—Dc male connector, coaxial type.
L1—Toroidal inductor, 20 μH. Use 19 turns of no. 26 enam wire on an Amidon Associates FT-50-61 core (125 μ).
R8—Miniature carbon-composition control, linear taper, panel mount.
S1—Miniature SPST toggle.
T1—Broadband toroidal transformer. Primary: 10 turns of no. 26 enam wire on an Amidon FT-50-43 core (850 μ). Secondary: 20 turns of no. 26 enam wire over primary winding.
T2—Broadband toroidal transformer. Primary: 30 turns of no. 28 enam wire on an Amidon FT-50-43 core. Secondary: 10 turns of no. 28 wire over primary winding.

Tec TP-15 with a plain aluminum case. The dimensions are 1½ × 3¾ × 3 inches (HWD). I sanded the box, then painted it with gray automotive primer. The light sanding provides grooves that help the paint to adhere better. The top cover is painted black to provide a two-tone finish.

[Notes appear on p 24.

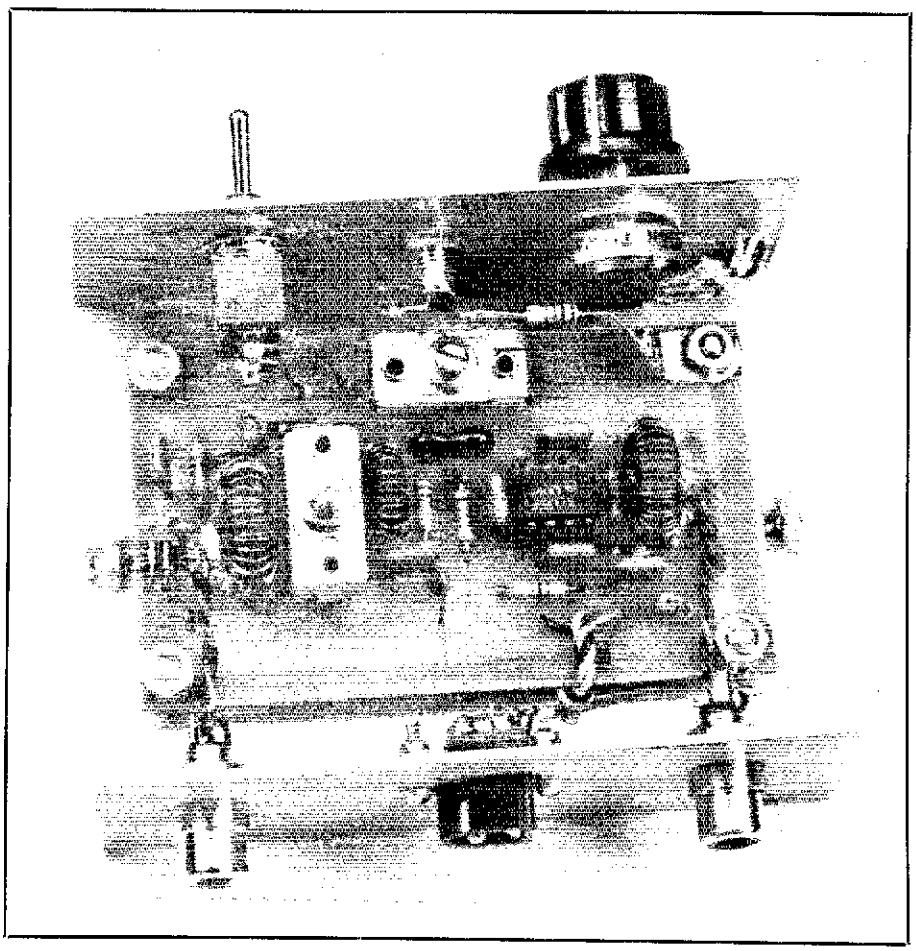


Fig 2—Interior view of the preamplifier assembly. Note the short leads from S1 (upper left) to the PC board. See text.

Clear lacquer is used on the top and bottom covers after the press-on decals are in place. Four adhesive-backed plastic feet are affixed to the bottom of the box. It should be a simple task to fashion a homemade enclosure from pieces of double-sided PC board. The sections may then be joined by means of solder.

S1 should be located close to the connection points on the PC board. Use short leads to join the switch to the board. I used twisted lengths of hookup wire (two wires) for joining the antenna input and receiver output PC pads to J1 and J2. This serves as low-impedance line, thereby eliminating the bother of stripping RG-174 mini-coaxial cable. In a like manner, the three wires that join R8 to the PC board pads are twisted before installing them.

The PC board is mounted to the bottom of the box by means of short metal spacers and no. 4 screws and nuts. This improves the effective grounding of the board. Plastic spacers are not suitable for this purpose, unless a ground wire is run from each corner of the board ground foil to the chassis. A photographic etching template is given in Fig 3, and a parts-placement guide is presented in Fig 4.

Checkout and Operation

I use a surplus 12 V dc plug-in wall transformer to power my preamplifier. Current drain is on the order of 25 mA, which suggests the practical use of a NiCd battery for powering the unit.

My initial tests were done with a URM-25 signal generator and a Yaesu FT-101E. The preamplifier was inserted between the two test units. The receiver was set at 3550 kHz and the generator adjusted to provide a test signal. I first adjusted C1 for maximum signal response at 3550 kHz. Next I closed S1 and adjusted the generator and receiver to 1.9 MHz. C2 was then tweaked for maximum signal response.

With the circuit of Fig 1, I can plainly hear a 0.01-μV signal from the URM-25. A 0.1-μV signal is very loud in the FT-101E, and when R8 is set for maximum gain the 0.1-μV signal deflects the S meter to S3 (the receiver is calibrated for 50 μV at S9). Without the preamplifier in the line, a 0.1-μV signal is audible, but it does not deflect the S meter.

These tests indicate a low NF and high overall gain for the preamplifier. Performance with a small coaxial loop antenna is excellent on 160 meters. R8 is set to provide the same S-meter reading for a given signal when switching from the transmitting antenna (5/8-wavelength inverted L and ground radials) to the receiving loop. I have heard no spurious signals when using the preamplifier. However, I live 30 miles from the nearest BC station. City dwellers may want to add a band-pass filter of the type described in the *ARRL Electronics Data Book*.[2] Details for a number of 80- and 160-meter filters are published in that book.

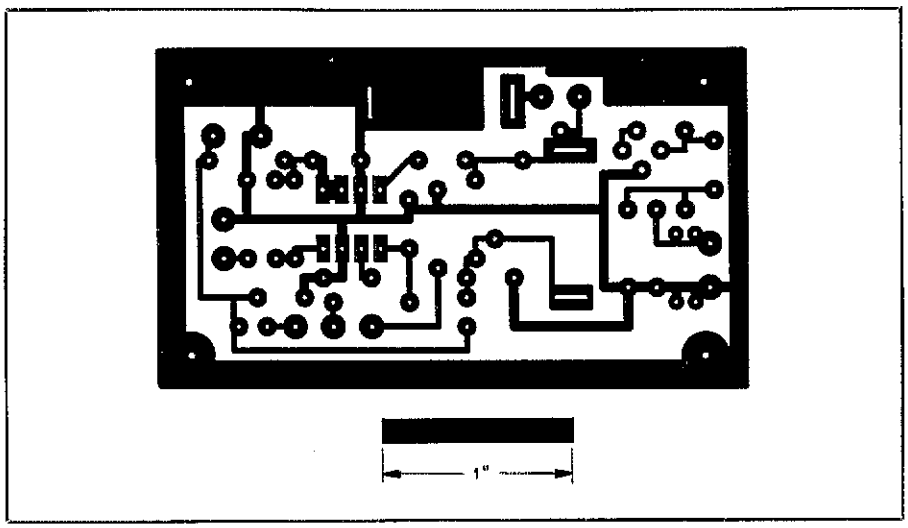


Fig 3—Circuit-board etching pattern for the preamplifier. The pattern is shown full size from the foil side of the board. Black areas represent unetched copper foil.

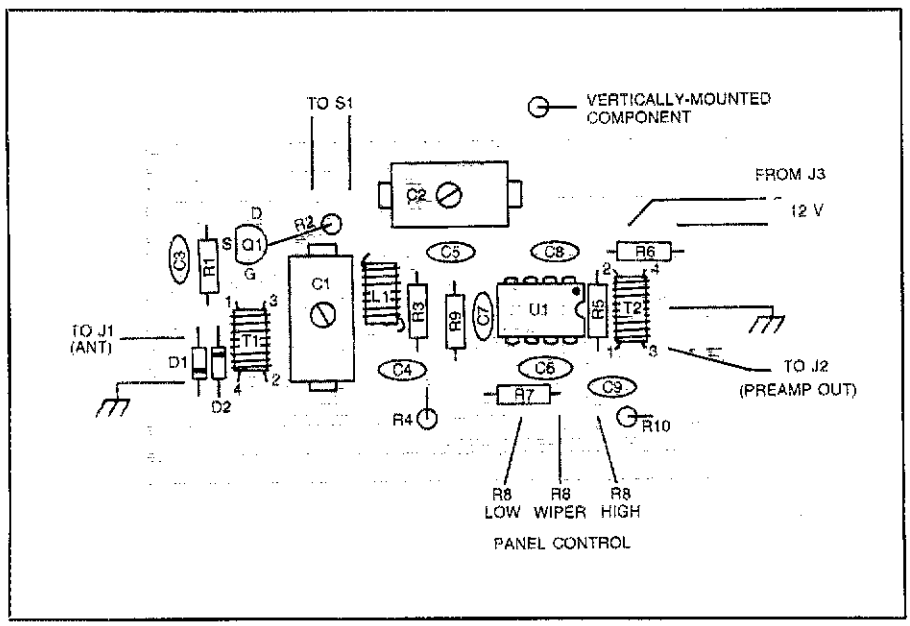


Fig 4—Parts-placement guide for the preamplifier. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern.

Tag Ends

The components for this project are not difficult to locate. C1, C2, Q1 and U1 are available from Circuit Specialists.[3] The toroid cores may be obtained from Amidon Associates.[4] The remainder of the components are available at Radio Shack stores.

I do not advise eliminating Q1 from the circuit, even though U1 can be set up to give 40 dB gain. The MC1350P IC is a trifle too noisy to be suitable as the sole amplifying device in a low-noise system. Keep all leads short and direct when you build the preamplifier. Long leads can cause instability, which in turn will ruin the noise figure of the preamplifier.

Notes

[1]Etched, drilled and solder-plated PC boards are available for $2.25 from FAR Circuits, 18N640 Field Ct, Dundee, IL 60118.

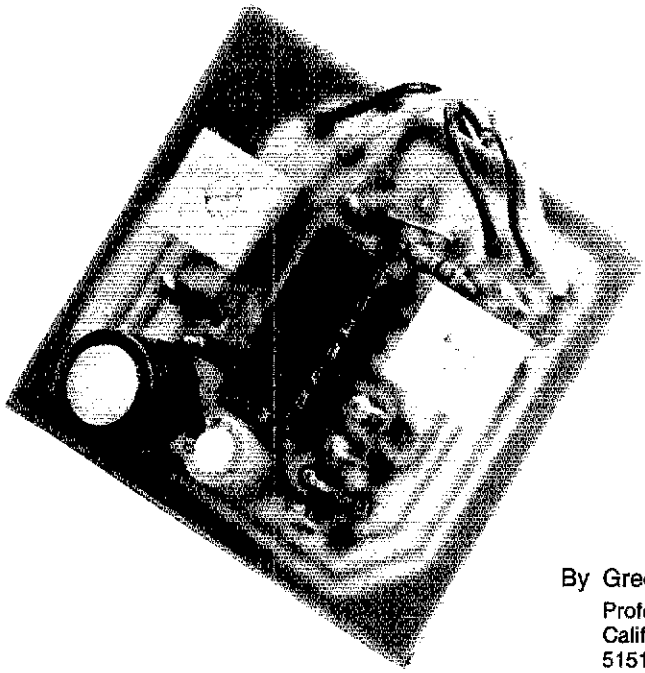
[2]D. DeMaw, Ed., *ARRL Electronics Data Book* (Newington: ARRL, 1976).

[3]Circuit Specialists, PO Box 3047, Scottsdale, AZ 85257.

[4]Amidon Associates, 12033 Otsego St, North Hollywood, CA 91608.

Strays

☐ anyone with a schematic or manual for a Bearcat Scanner Model 210XL. H. L. Allison, W5CZP, 612 N 10th St, Paragould, AR 72450-2819.



A Versatile Timer/Controller

Timed cooling fans, event sequencing, delayed-action lighting—how many control problems can *you* solve with this simple building block?

By Gregory Graham, Ed D, NR6C
Professor of Technology
California State University, Los Angeles
5151 State University Dr
Los Angeles, CA 90032

This timer circuit was developed to meet a specific need: Our local repeater needed a cooling-fan controller. We didn't want the fans to run all the time, and we didn't want the fans to turn on for very short transmissions. Once the fans *did* come on, however, we wanted them to *stay* on until the repeater equipment had been sufficiently cooled. The solution, a simple comparator-based timer/controller, can be used to control devices other than fans, so I'll use the term *controlled device* instead of *fan* as we discuss the circuit.

Circuit Design

See Fig 1A. The circuit is based on an LM339 quad comparator IC and two RC networks. The first RC network (R6-R7-C1) determines how much time passes before the controlled device switches on after the push-to-talk (PTT) terminal is grounded. The second RC network (R9-R10-C2) determines how long the controlled device continues to run after the PTT terminal is ungrounded (nominally 2 to 4 minutes in our repeater application). These delays can be adjusted independently of each other. R1 and R2 set the threshold voltage for all four comparators at half of the supply voltage.

As simple as the timer/controller is, it allows our repeater fans to "run smart." The turn-on delay assures that fans do not start if the repeater comes up for a brief call or transmits just to identify itself (that is, for less than 20 seconds). If the repeater transmitter is active for more than 20 seconds, however, the fans come on and *stay* on for a few minutes after the transmitter turns off.

Construction

Various construction methods (PC-board, point-to-point, dead-bug, and so on) can be used to build the timer/controller. Whatever method you use, try to

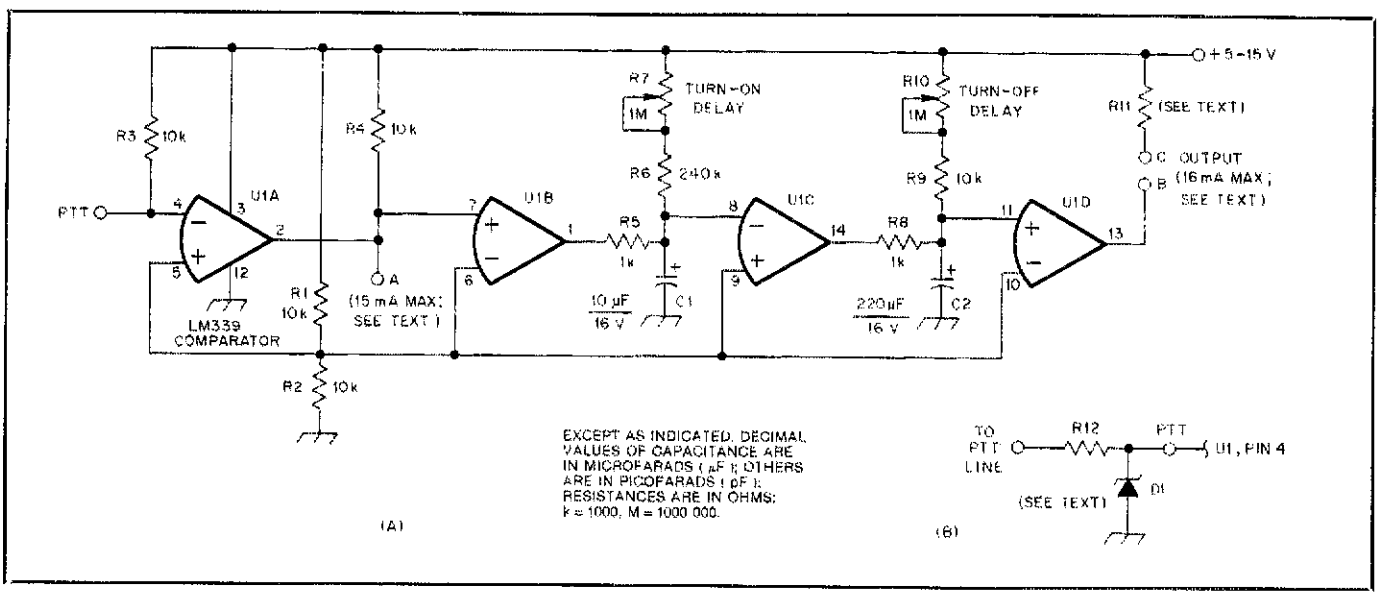


Fig 1—Schematic of the timer/controller. See the text for how to apply the optional circuitry at B. Resistors are ¼-W, carbon-film units; capacitors are electrolytic.
D1—Zener diode; see text. R7, R10—1-MΩ trimmer potentiometer. U1—LM339 quad comparator IC.

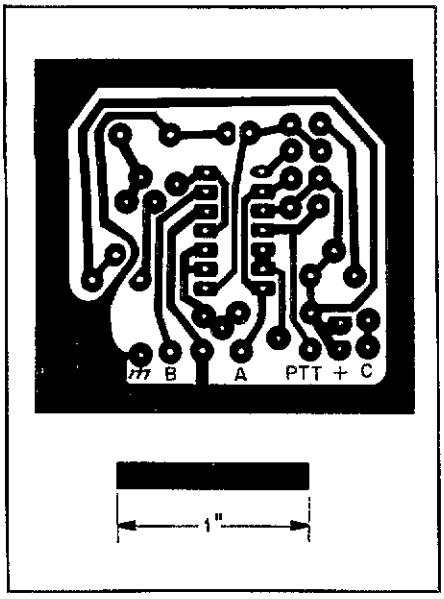


Fig 2—Circuit-board etching pattern for the timer/controller. The pattern is shown full-size from the foil side of the board. Black areas represent unetched copper foil.

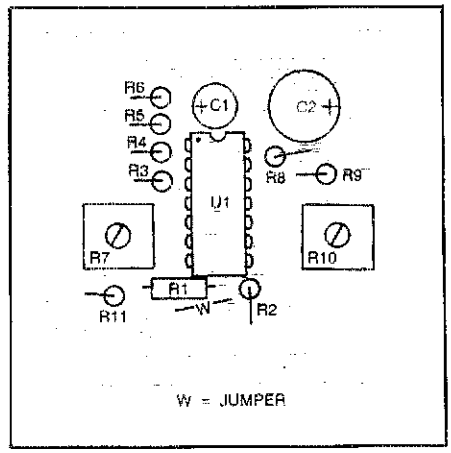


Fig 3—Parts-placement guide for the timer/controller. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. As shown in the title photo, the PC board is designed to take square, flat-to-the board potentiometers at R7 and R10. The board layout does not include space for optional components D1 and R12; if used, these parts must be mounted external to the board.

minimize capacitive coupling between the input and output leads of each comparator: The high gain of the comparators can cause oscillation if there is too much coupling between these leads.

Fig 2 shows a PC-board layout for those who wish to build the circuit on a PC board; Fig 3 shows the parts-placement diagram for the board. The small size of the circuit board allows it to be mounted inside an equipment cabinet or even directly on the controlled device.

If necessary, you can substitute components of different value for those specified for the RC networks. For instance, a 22-μF capacitor is used at C1 on the board shown in the title photo; the circuit works fine and can be adjusted to the desired turn-on delay even though the parts list specifies a *10*-μF capacitor for C1.

Application Notes

The LM339 is specified to work over a wide supply range (2 to 36 V dc), but I suggest that the timer/controller circuit be operated at between 5 and 15 V because of the voltage ratings of C1 and C2. Although the LM339 can withstand input voltages higher than the supply voltage, I recommend that the voltage at PTT not be allowed to exceed supply by more than a volt or two. Thus, if the circuit to be connected to PTT operates at, say, 8 V, the timer/controller circuit can operated at a supply voltage between 8 and 15. If, in your application, PTT must be connected to a point at a voltage *greater* than supply, protect U1A with a Zener diode (D1 in Fig 1B) with a voltage rating just above supply (6.8 V with a 5-V supply, for example). A series resistor (R12) may be needed in some applications to keep the Zener diode from drawing too much current from the PTT line. Do not allow PTT to go more negative than −0.3 V at any time.

Point A in Fig 1A (the open-collector output of U1A) goes high when PTT is grounded and can be used to control an external device that requires neither a turn-on nor turn-off delay, such as an elapsed-time meter or an ON THE AIR indicator. The current-sinking capability at point A is 15 mA, maximum.

Points B and C comprise the device-control output of the timer/controller. Point B is the open-collector output of U1D (maximum current-sinking capability, 16 mA). Point C is connected to supply via R11 and can be used to furnish drive current to the controlled device. (Choose R11's value according to your application, keeping the current-sinking capability of U1D in mind.) In our repeater-fan application, U1D controls a solid-state relay; the relay, in turn, controls the fans. Solid-state relays generally require a control voltage of 2 to 36 at 15 to 20 μA dc; such levels are easily handled by U1D. (Fig 4 shows one method of mounting a solid-state relay directly to a fan.) If you use a solid-state relay, I recommend using shielded cable between the timer/controller and the relay's control inputs to avoid false triggering of the relay by noise or RF.

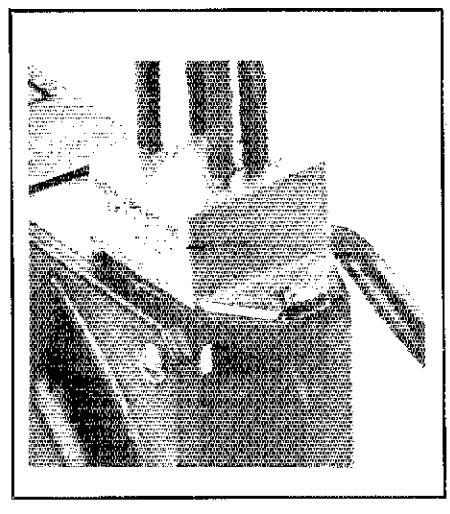


Fig 4—One method of mounting a solid-state relay to a fan. The relay is secured to the fan by means of a small metal bracket. The bracket is held to the fan with no. 4-40 hardware and bent at both ends to trap the relay mounting flanges. Heat-shrinkable tubing prevents accidental contact with the relay's ac and control terminals.

If you use the timer/controller to switch a low-current inductive load, such as a relay solenoid, be sure to protect U1D against voltage spikes by connecting a silicon diode across the load. Install the diode with its cathode end toward point C and R11.

Conclusion

This simple RC-based timer/controller circuit can do much more than control fans. For instance, you may be able to use it around the shack as part of an intrusion-alarm system, or to control delayed-action lighting or power-supply sequencing. Whatever your application, the timer/controller can do its job so quietly and reliably that you may forget it's there!

Gregory Graham, Ed D, NR6C, has taught for 23 years in the California State University System, primarily in the area of manufacturing. He currently teaches robotics, computers and automated manufacturing.

A radio amateur since 1979, Dr Graham enjoys DX, HF, VHF and UHF operation. He operates a home-built 220-MHz repeater that includes an autopatch and links at 10, 6 and 2 m, and at 23 cm. In addition, Dr Graham is an avid T-hunter, Official Observer and Volunteer Examiner.

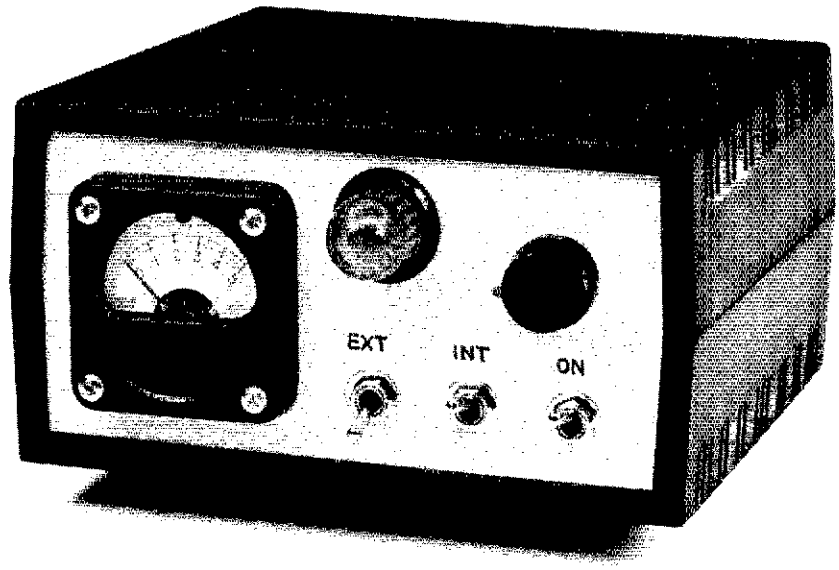
Strays

I would like to get in touch with...

☐ anyone with information on the operation of a JAN 725A, particularly for use on amateur frequencies. Bob Cromwell, KC9RG, 227-1 S Grant St, West Lafayette, IN 47906.

☐ anyone with a service manual or schematic for a Pace Communicator I 2-meter transceiver. Unit was imported by Pathcom of Harbor City, California. Ed Deptula, KA3OTT, PO Box 751, Havertown, PA 19083.

A Sensitive Integrating Squelch Circuit



Squeeze new contacts out of band openings you'd otherwise have missed! With this simple receiver accessory, you can easily catch 10-m and VHF band openings!

By Mark Mandelkern, KN5S
5259 Singer Rd
Las Cruces, NM 88005

Sporadic-E propagation is appropriately named: Although there are seasonal and other indicators, you never know *exactly* when the band is going to open.[1-3] This is true for 10 and 6 meters, and even more so for the higher-frequency VHF bands. Even when you know there are E clouds above, and are busy working 10 or 6 meters, you want to be alerted to those rare 2-meter short-skip openings, some of which last only a few minutes. What you need is a receiver squelch circuit—like this one—that will sound the alarm. You're sure to find a need for it during the coming F_2 season so you'll be sure to catch any possible 6-meter openings.

Many older receivers do not have squelch systems, and built-in squelch circuits may not be as effective as you'd like them to be. They may show poor response to very weak signals, and react unduly to short noise pulses. That's why I developed the squelch circuit described here. It's not meant to provide receiver quieting during communication, but acts as a band-opening alarm for weak-signal CW and SSB work.

Circuit Features

The squelch circuit I devised connects between the receiver's audio-output jack and a speaker, requiring no modifications to the receiver or transceiver. This accessory operates from a 12 V dc wall transformer for fixed-station use, or from a battery for portable or mobile operation. I wanted the squelch unit to be portable so I could use it with my 2-W, 6-m IC-502A transceiver, which I like to take along on camping trips.

[1]Notes appear on page 29.

The heart of the circuit is an op amp integrator that has a memory and a slow reaction time. Thus, a short-duration noise pulse has little effect on the circuit, but a weak signal—if present for a few seconds—has a *cumulative* effect, and eventually charges the integrator enough to trigger the alarm circuit.

You never know* exactly *when the band is going to open...

The integrator charging rate depends on the signal strength and its duration. A strong signal reaches the trigger level almost instantly. The memory action operates even between words on SSB, or dots and dashes on CW. This enables you to hear weak signals that might otherwise go unnoticed. The integrator charge is maintained for a few seconds after the signal level has dropped, keeping the circuit triggered.

When the squelch is triggered, audio is fed to the speaker, and a panel lamp lights. A buzzer and/or remote signal indicator can also be triggered if desired. The external alarm jack can be used to ring a bell in the kitchen, flash all the lights in the house, or control just about anything you'd like.

The squelch circuit requires no modifications to the receiver or transceiver.

Circuit Description

Refer to Fig 1. Receiver audio is routed through the SQUELCH ON/OFF switch (S1) to relay K1, which controls the audio output to the speaker. A miniature, reverse-connected transistor audio-output transformer (T1) steps up the audio signal voltage, and a THRESHOLD control sets the level for the detector, D2. The detector output drives the noninverting input of the integrator (U1A), which drives the integrator output high. With no incoming signal, the integrator output is held low by the presence of a small bias voltage on the inverting input, which also provides a discharge and reset function.

The integrator output feeds the noninverting input of a comparator, U1B. With no signal present, bias on the inverting input keeps the comparator output low. When a signal drives the integrator output above the comparator reference level, the comparator's output goes high, actuating the relay, K1.

Circuit Details

C2 and D2 form a peak detector. U1A's high input impedance provides a time constant that is long enough for the peak signal level to charge the integrator during an entire audio cycle, even with a weak signal that is above the bias level for only a small fraction of a cycle.

The R1/C1 time constant, and the level of the detected signal above the bias, determine the charging rate. Discharge rate is determined by R1/C1 and the bias level. U1A acts as a current source during charge, and as a sink during discharge. The bias on the inverting input of the integrator is kept at the lowest practical level to obtain high sensitivity at low-volume levels, still

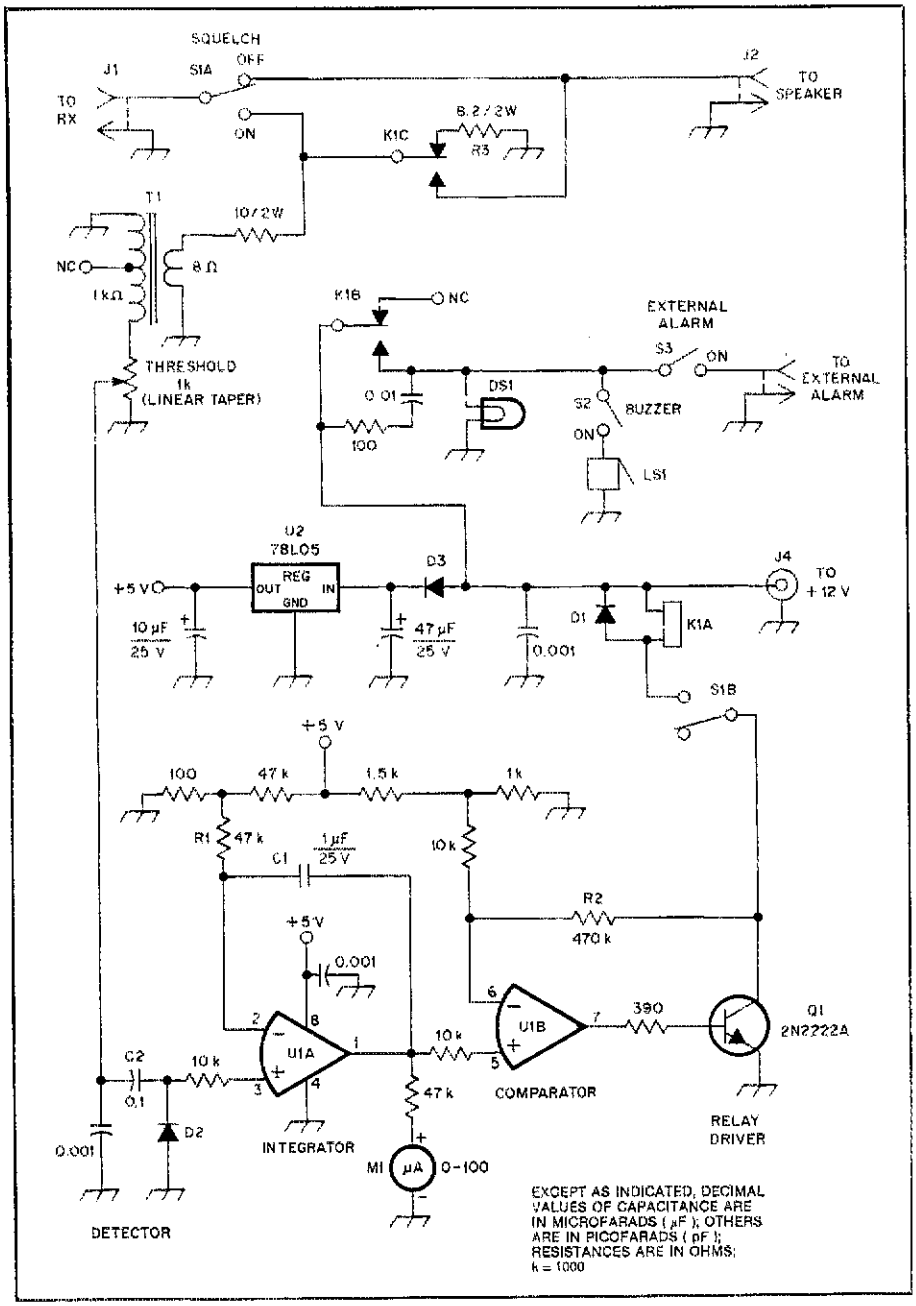


Fig 1—Schematic diagram of the integrating squelch circuit. (RS numbers in parentheses are Radio Shack® stock numbers. Equivalent parts may be substituted in all cases.)

C1—Nonpolarized, low-leakage ceramic, Mylar® or polyester (RS 272-1055).
D1—1N4003 or equiv.
D2—1N270, 1N34A (RS 276-1123) or equiv germanium diode.
D3—1N914 silicon diode.
DS1—14-V pilot lamp, no. 1813 (100 mA) or no. 1815 (200 mA).
J1-J3, incl—Phono jacks.
J4—Dc power jack (AL type DCJ and mating plug DCLID used here).
K1—DPDT, 12 V dc relay.
LS1—Piezoelectric buzzer (RS 273-060).
M1—0-100 µA meter; other ranges can be used; see text.
S1—DPDT switch.
S2, S3—SPST switch.
T1—Transistor output transformer, 1-kΩ CT pri; 8-Ω sec (RS 273-1380).
U1—LM358N dual op amp.
U2—78L05 regulator.

allowing for the input offset specifications of the op amp.

When the relay is *not* actuated, R3 provides a load for the receiver audio output, keeping the signal level to the detector constant whether the squelch is triggered or released. Without this resistor, the speaker load would reduce the input to the detector, causing the relay to cycle on and off. The value of R3 is properly matched to the speaker impedance if the meter pointer, when slowly climbing past the threshold point, does not change speed when the circuit triggers.

Table 1
Component Suppliers

AE Allied Electronics, 401 E 8th St, Fort Worth, TX 76102, tel 800-433-5700.
AL All Electronics, Box 567, Van Nuys, CA 91408, tel 800-256-5432; in California, 800-258-6666.
CS Circuit Specialists, Box 3047, Scottsdale, AZ 85257, tel 602-966-0764.
DK Digi-Key Corp, Box 677, Thief River Falls, MN 56701, tel 800-344-4539.
FR Fair Radio Sales, Box 1105, Lima, OH 45802, tel 419-227-6573.
ME John Meshna, 19 Allerton St, Lynn, MA 01904, tel 617-595-2275.

To prevent relay chattering, feedback resistor R2 introduces a bit of hysteresis for stability. This is not the usual signal-level hysteresis, which results in a loss of sensitivity to weak signals, but a *time* hysteresis. It alters the comparator reference level, but not the integrator threshold level. Although the integrator output must rise to about 2 V to trigger the comparator, it must fall further, to about 1.9 V, to release. Thus, the only effect is that the release time is a fraction of a second longer than the attack time.

Components and Assembly

Parts suppliers are listed in Table 1. Doug DeMaw's article gives many good tips for finding parts.[4] The Radio Shack parts identified in the parts list are posted in their catalog, but local availability may vary.

Surplus resistors are often way out of tolerance. New resistors are available inexpensively in small quantities from DK. I like the lamp holder (PIL-004) from FR because it has a translucent-yellow plastic lens that shines brightly. Lamps are available from AL. The 78L05 regulator (U2) is carried by CS. Of course, you can also use the physically larger 78M05 or 7805 if they're handy. Surplus germanium diodes are often defective and should always be tested before use; they should exhibit a forward-voltage drop of approximately 0.3.

Small surplus meters (for M1) can be purchased for about a dollar; ME has a good selection. Ranges other than 0-100 µA can be used, but will likely require a change in the meter multiplier resistor to yield a full-scale deflection corresponding to 4 or 5 V at the integrator output. The meter scale markings *are of no concern* because you'll only watch the rise and fall of the meter needle, and note the comparator reference level somewhere near mid-scale. (Because of the time delay of the integrator,

the meter is essential to show the trend of the charge for purposes of adjustment, but precision measurement is not required.)

The relay-driver transistor (Q1) can be any NPN type with a 25-V, 600-mA (or higher) rating. I use a piezoelectric buzzer for LS1 because a mechanical buzzer will produce enough QRN in the receiver to hold in the squelch. A 12 V dc, 500-mA wall transformer should handle most relay, lamp and buzzer loads. If you use a remote alarm that requires a large amount of current, or uses a different voltage, it should have its own power supply, controlled by another relay. I use a large, red, automobile brake light with my 2-meter rig squelch unit while I'm operating on 6 meters. That lamp flashes an alarm that cannot be ignored, but does not interrupt a QSO in progress. (This monitoring-while-operating method may require that the TR switching disable the squelch because RF from the transmitter could trigger it.)

Construction is noncritical, and the unit can be built into a small, plastic project box. It takes only about an hour to hand-wire the components, and most of them can be placed on a small piece of perf board. The prototype is shown in Fig 2.

Testing and Operation

With the squelch unit connected to your transceiver, the no-signal reading on M1 should be zero. Now, tune in a steady carrier. The meter reading will begin to rise at a rate that depends on the signal level. With a weak signal, the charge on C1 should take about three seconds to reach the reference level of about 2 V, triggering the comparator. Allow the voltage to rise to a maximum of approximately 3.5 V, and tune away from the signal. It should take about six seconds for the voltage level to fall to the reference level, releasing the comparator. The attack ramp is steeper than the decay ramp, so the integrator charges more from a single dot than it decays between dots.

With the squelch unit off and no signal present, set the receiver audio gain control for the desired speaker noise level. Then, turn the squelch on and set the squelch THRESHOLD control just below the point where M1's reading begins to climb. Best results are obtained with the rf gain control backed off sufficiently to defeat AGC action on weak signals, and with the transceiver noise blanker on. The squelch is switched off during QSOs.

Don't forget—the band won't "open" if we *all* just listen! When conditions seem auspicious, an occasional CQ on the national calling frequency might trip an integrating squelch circuit like this one somewhere out there beyond the skip zone—giving you access to a new state or grid square!

Results

Two versions of this gadget were built and used for over a year on the 6- and 2-meter bands with pleasing results. The integrating squelch deserves a large measure of credit for my working 329 grid squares on 6 meters during the 1987 skip season. Even very weak equinoctial 6-meter transequatorial signals arriving from South America have tripped the squelch when I was far from the rig. The resulting alarms led to contacts with 10 new countries for me.

With careful threshold adjustment, the squelch will respond to signals only 1 dB above the noise. But the real-life performance—the ability to remain quiet with no signal and yet react to the very weakest signal—will ultimately depend on local noise conditions. The squelch *will* tell you when that big truck pulls in the driveway with your new tower!

With the circuit in action, you can work other bands, dig weeds in the garden, or take a snooze. All the while, you can be sure that the integrating squelch won't let you miss anything exciting that might happen on the short skip bands.

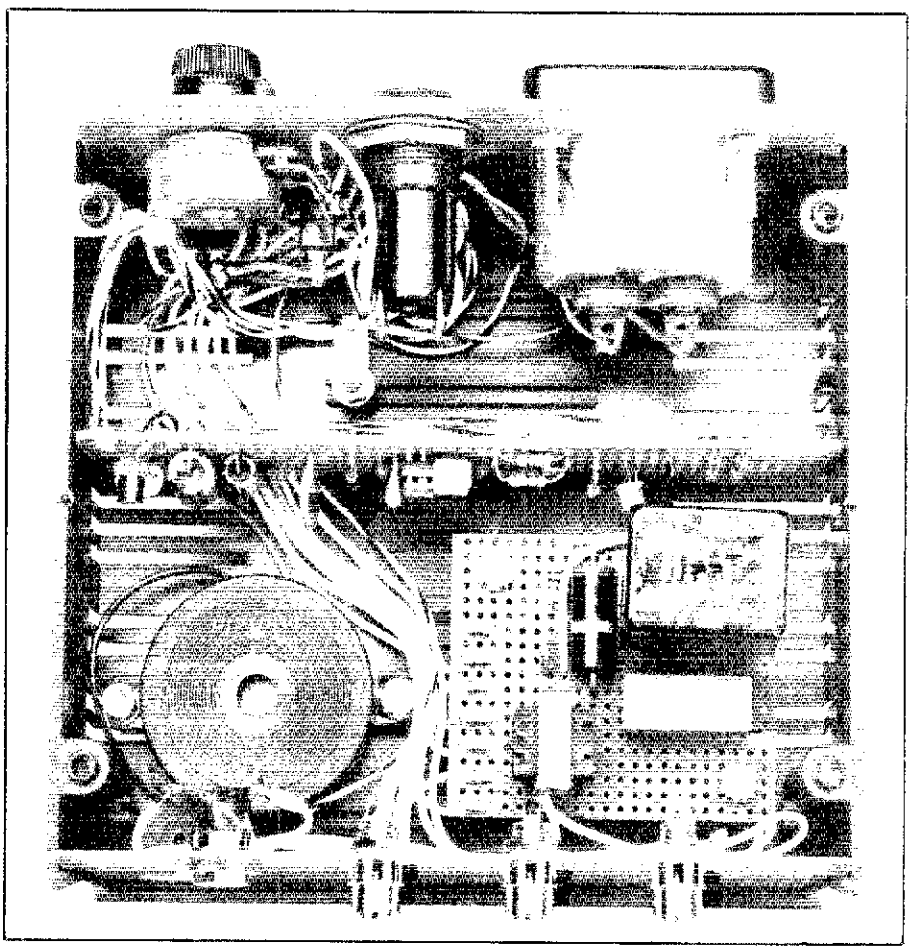


Fig 2—An inside view of the integrating squelch unit. Two small perf boards contain most of the components. The circular, black object at the lower left in the photo is the piezoelectric buzzer. From left to right, the jacks on the rear panel are +12 V (J4), receiver input (J1), speaker output (J2) and the external alarm jack (J3).

Notes

[1]M. Wilson, ed, *The 1988 ARRL Handbook* (Newington: ARRL, 1987), p 22-14.

[2]E. Pocock, "Sporadic-E Propagation at VHF: A Review of Progress and Prospects," *QST*, Apr 1988, pp 33-39.

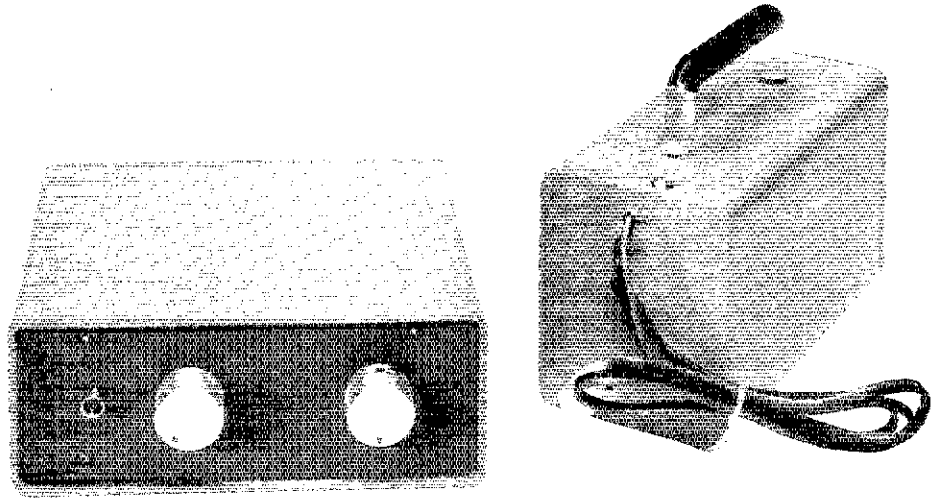
[3]M. Owen, "The Great Sporadic-E Opening of June 14, 1987," *QST*, May 1988, pp 21-29.

[4]D. DeMaw, "Stalking Those Fugitive Components," *QST*, Oct 1987, pp 24-26.

Mark Mandelkern, KN5S, has been looking for sporadic-E band openings for 40 years, since he was first licensed as W9ECV in Milwaukee, Wisconsin. He enjoys working DX, Sweepstakes, 160 meters and VHF contests. Mark holds the Rocky Mountain Division's all-time record score for the June VHF contest. Mark's station is capable of operating on the bands from 160 through 2 meters, including meteor scatter and moonbounce. Seventy percent of his equipment is homemade, and Mark is working toward the goal of making it a 100% homemade station.

Mark holds a PhD from the University of Rochester, and is Professor of Mathematics at New Mexico State University. He's also a frequent contributor to QST.

Build It Yourself–With Plastic



Okay—so you won't attempt making a transistor from raw silicon(!). How about building your own enclosures from plastic materials? It's easier than you think!

By Dennis Kennedy, N8GGI
133 N Lyndale Dr
Westerville, OH 43081

As a long-time Amateur Radio operator and builder, I'd often been frustrated by trying to find a suitable enclosure for a project. For the past 10 years, I've been the co-owner of a custom exhibit-manufacturing firm. Because of this, I've had the opportunity to experiment with various plastics and fabrication techniques that I've found are applicable to Amateur Radio.

As with anything else, the more sophisticated the tools, the easier the job, but the lack of power saws, jointers and other such tools only requires the expenditure of a bit more time to perform a given operation—it doesn't make it any less doable. All it takes is some practice to perfect the techniques.

There are many readily available plastics that are easy to use. I'll show you a few tricks and project ideas that will allow you to build professional-quality custom enclosures that you'll be proud to display.

The Materials

There are several plastic compounds that lend themselves to cottage-industry fabrication. These materials have various properties.

Acrylics

Acrylics are marketed under several brand names: Acrylite®, Lucite® and Plexiglas®. Acrylics are a cast product and are made in sheet, tube and solid rod form in a variety of colors. Because acrylics are cast and have smooth faces, they have excellent optical properties. Although acrylics are somewhat brittle and will chip and crack, they can be easily sawed, drilled, filed or tapped.

The real beauty of acrylics is that they can be chemically welded, using a solvent. This process dissolves the plastic at the joint and fuses the mating pieces into one. Because the joints are not *glued*, but are made into one homogenous piece, they can be incredibly strong, if properly made. Acrylics can also be easily heat-formed—and even vacuum-formed—but, more on specific techniques later.

Polycarbonates

Polycarbonates look much like acrylics and are also manufactured as sheets and tubes under brand names such as Tuffak® and Lexan®. These materials are usually clear, but are also available colored. Polycarbonates are extruded and are consequently not quite as good optically as acrylics. The big advantage of polycarbonates is their very high impact resistance. So, if you want to build a cabinet that will withstand small-arms fire, polycarbonate is your material!

Polycarbonates can be chemically welded with a special solvent, but the joints are not as mechanically sound as those of acrylics. Heat-forming is possible, but difficult, because the polycarbonate *melt* and *burn* temperatures are close together, and the water inherently trapped in the polymer tends to turn to steam bubbles within the material when it is heated. Sawing, drilling and filing are easily done without chipping.

Polyvinylchloride (PVC)

PVC is the familiar material from which much plastic plumbing is made. Some plumbing material is ABS (acrylonitrile-butadiene-styrene) plastic, but for our purposes it's similar to PVC. PVC is usually opaque and colored black, white, tan or gray. PVC is also available in sheet form (a little-known fact); this makes the plumbing shapes much more versatile.

PVC has a low melting point and can be heat-formed easily. The common plastic-pipe cement found in hardware stores is used to make chemical welds. Although relatively brittle, PVC can easily be sawed, drilled and filed.

CAUTION!

All of the plastics mentioned will burn, and the fumes given off are potentially harmful. No appreciable amount of fumes is produced when the materials are merely heated, but the smoke from *burning* materials can be dangerous.

The solvents used to weld these plastics are hydrocarbon based, and the usual vapor and skin irritation precautions should be taken. Simply use your head, work with the materials in a well-ventilated area, read the product labels—and don't drink the solvents.

Product Availability

Most cities have plastics dealers whose

Fig 1—A sampling of the tools used in making cabinets from plastics. (Details on the use of these tools can be found in the text and in the captions for Figs 2 through 5.) In the background is a simple wooden jig made from two blocks of wood faced with hardboard. The gap between the larger and smaller pieces of wood allows for a snug fit of the plastic sheet in between. The hardboard facing acts as an edge guide. In front of the wooden jig is an inexpensive, flexible heating element that operates from the 120 V ac line. The bottle contains solvent, applied by means of the syringe, to chemically bond plastic pieces. The clamps temporarily hold the pieces to be joined. A grease pencil, used to mark the area to be heated, and a tap, used when making joining holes, round out the equipment.

addresses can be found in the telephone book's yellow pages. These firms can sell you the plastics, the associated solvents and small tools required to work with them. The tools include syringes (with nonmetallic needles) for chemical welding, polishes and inexpensive heat-forming elements (see Fig 1).

The best bargains in plastics are often found in the dealer's scrap bins where cutoffs are usually sold by the pound. Make sure you ask the dealer to identify what you are buying, though. Often, scraps don't have the material name printed on the cover paper, and you could wind up attempting forever to weld Lexan with acrylic solvent with little to show for your efforts! For those of you who live in locations with no plastics dealers, United States Plastic Corp sells the things you'll need.[1] I've spoken with them on the phone, and they'll even custom-cut acrylic materials to size.

Fabrication Techniques

Now that we've gotten the boring stuff out of the way, let's talk about how to use these materials. Most of the processes I'll describe use acrylics because these materials are most suitable for general-purpose projects. The basic procedures apply to the other materials, with slight differences that you'll learn about as you work with them.

Cutting

The best tool for cutting plastic is a table saw. If you don't have access to one, a sabre saw can be used, but sometimes the acrylic will fuse together behind the blade. If that happens, try changing to a coarser- or finer-tooth blade to match the speed of your saw. Even scribing and breaking the material can be successful with a little practice.

If you can't use a table saw, you'll simply

[1]Notes appear on page 34.

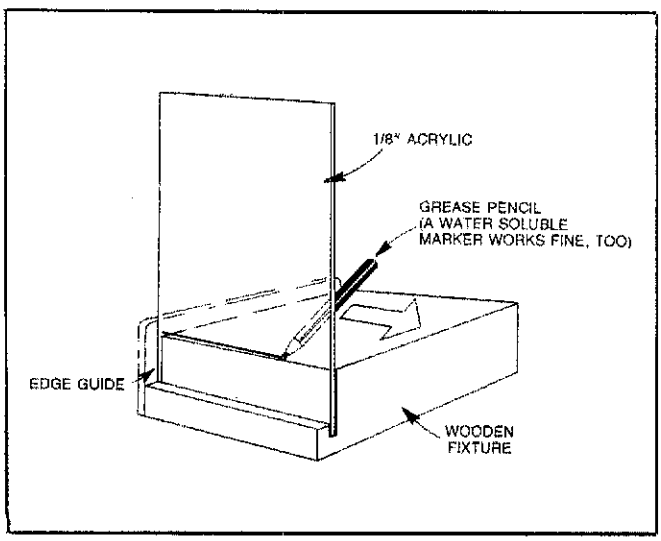


Fig 2—Marking the bend point on the plastic sheet.

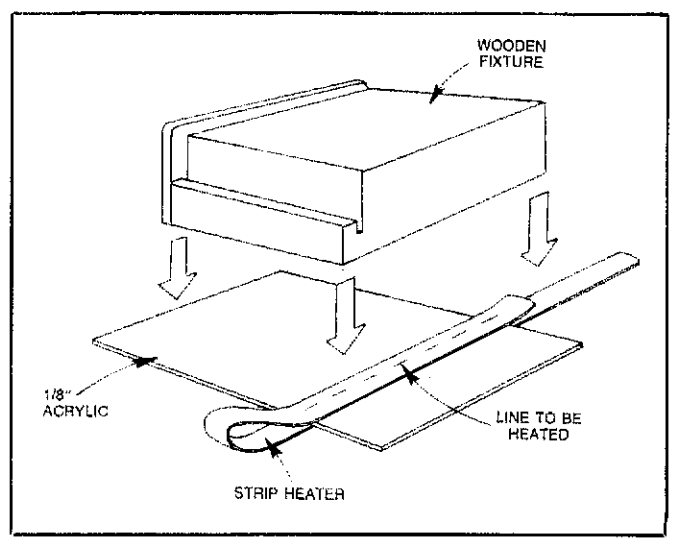


Fig 3—Heating the plastic.

require more time to file and sand straight the edges. For finished sanding of a straight edge, use a spray adhesive to glue a piece of 180-grit sandpaper to a flat surface. Then, move the edge of the plastic piece back and forth over the sandpaper. A 2 × 4 block of wood held alongside the plastic piece will help maintain the plastic piece in a vertical position. If you use a power sander to grind the edges of the plastic, be careful to proceed slowly, and don't heat the acrylic too much. The acrylic can be heat-stressed by overheating. Later, when it's touched by the solvent, it will craze into "billions" of tiny cracks. These cracks won't matter if you're going to paint the plastic, but they're unsightly otherwise.

Heat Bending

Next to chemical welding, heat bending is probably the most useful technique available when working with plastics. Heat bending allows you to really make professional-quality enclosures because you can replace an entire sheet-metal shop with a simple hot wire and get results similar to chemical welding.

Commercially made heat benders use a hot nichrome wire or Calrod® heater to warm a narrow line (marked off with a grease pencil) across the plastic. Inexpensive nichrome heater strips are available at most plastics dealers for about $15. I have also placed two pieces of angle iron or aluminum about ¼ inch apart on a plastic piece to act as a heat shield, and used a propane torch to heat the acrylic. This method requires that you keep the torch moving slowly enough to allow the heat to penetrate the material, but fast enough to prevent the surface from blistering. (If you attempt to heat plastic with an open flame, keep a fire extinguisher handy.) Flip the plastic over and heat both sides to distribute the heat uniformly. Acrylic melts at about 350°F and has the consistency of warm cheese at this temperature. When the plastic becomes flexible at the bending point, bend and keep it in the desired position for about 30 seconds to allow the bend to solidify.

A step-by-step procedure for bending a cabinet half using a heater strip is shown in Figs 2 through 4. Before I describe the procedure, let me mention one trick to making a clamshell cabinet: Start with plastic cabinet halves that are larger than required. After the bends are made, use a table saw to shorten the legs to the exact length needed.

In the following discussion, I'll show how to make a cabinet from 1/8-inch-thick acrylic already cut to size. First, plug in the strip heater, being sure to place it on a sur-

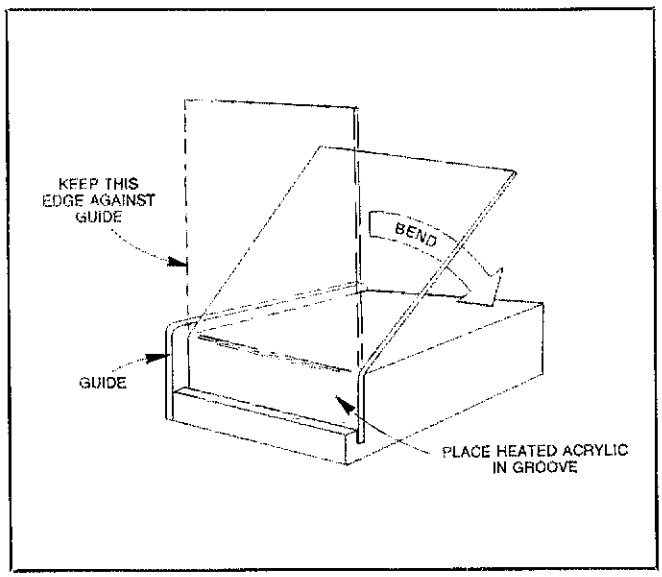


Fig 4—Bending the softened plastic in the jig.

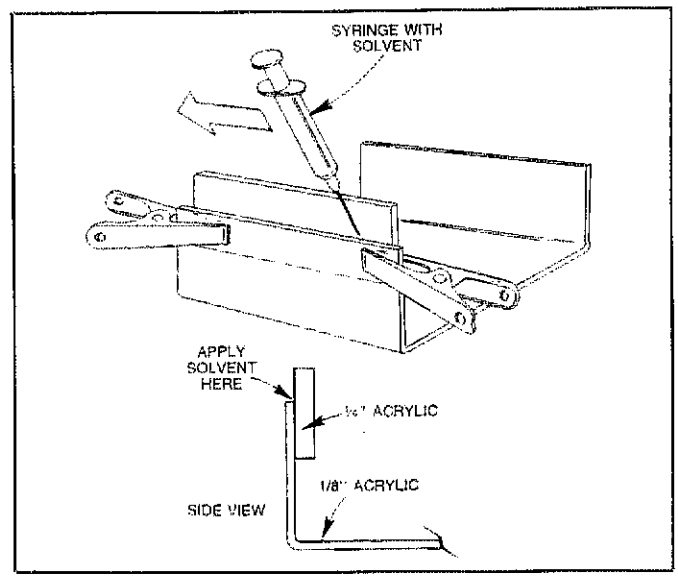


Fig 5—Using a solvent to chemically bond two pieces of plastic.

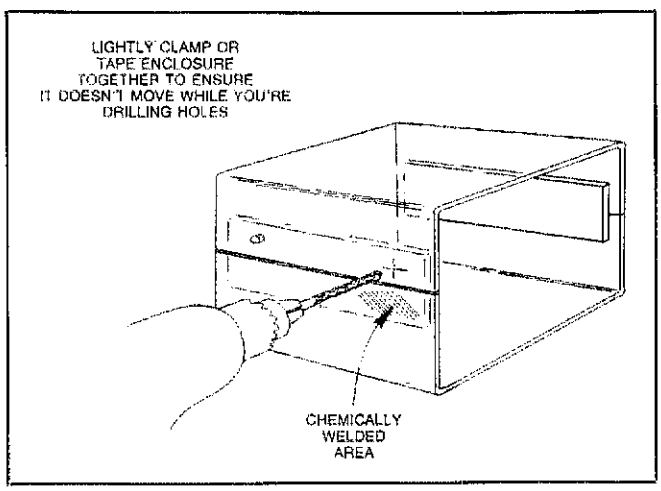


Fig 6—Drilling holes prior to tapping for joining screws. Though not shown in this drawing, the acrylic piece should be backed up with a wooden block to minimize the possibility of splitting the plastic. Make the hole in the outer half clamshell large enough to pass the machine-screw body (see Fig 7).

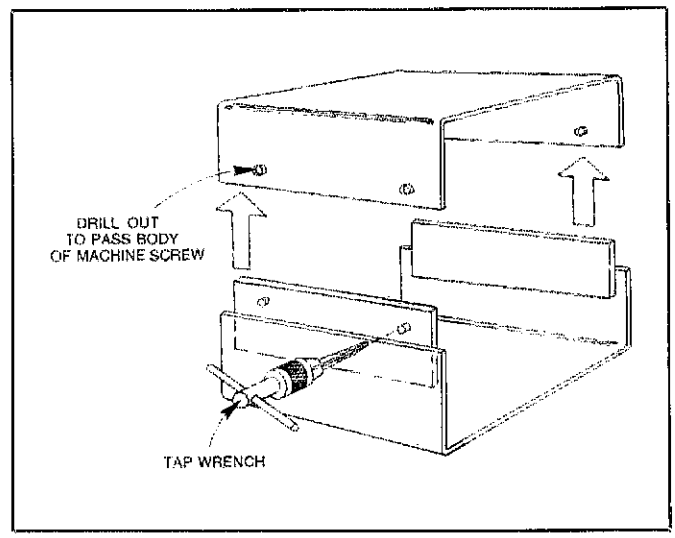


Fig 7—Use the tap only on the *inside* joining piece. The hole in the outer clamshell piece should allow the screw body to pass freely.

face that will not be adversely affected by heat (a wooden surface is adequate). Peel the paper from both sides of the plastic. Place the plastic piece in the wooden jig as shown, and mark the bend line with a grease pencil (see Fig 2).

Lay the marked line on the plastic piece over the center line of the heater (see Fig 3), and fold the heater back on the other side of the plastic sheet. Use the wooden jig (or another object) to weigh down the heater strip, and allow four or five minutes for the plastic to become flexible.

When the bend line is flexible, place the plastic sheet back into the slot of the bending jig (see Fig 4), making sure you have it flat against the front-edge guide. Then, simply bend the acrylic and hold it firmly against the jig for 30 to 40 seconds. You've now formed one leg of a cabinet half. Simply repeat the process to make the other leg, then do the same for the other cabinet half. If the bends don't match exactly, don't worry; the cabinet-joining screws will pull them into line.

Chemical Welding

Next, we'll join the two cabinet halves. Fig 5 shows how this is done. It's simply a matter of chemically welding a joining piece to the *inside* of one of the cabinet halves.

The trick in using acrylic solvent is to make sure that the pieces to be joined fit tightly. (The solvent, which has the consistency of water, will not weld the acrylic properly if there are gaps between the plastic pieces.) Clamp the pieces to be joined. You can use masking tape instead of the metal clamps shown, but in any case, don't let the solvent bleed under the tape or clamps. Using a syringe (available from your druggist or plastics dealer), sparingly add the solvent to the joint of the plastic pieces. The solvent will travel along the joint by capillary action, and you will see it push out the air as it goes. The solvent works relatively slowly, and the joint takes about half an hour to become reasonably strong.

If you spill some solvent, or if it runs out of the joint, let it evaporate. Wiping the spilled solvent will result in a larger blemish because the solvent etches the plastic on contact.

Drilling and Tapping

Like metals, acrylics can be drilled and tapped (see Figs 6 and 7), but the drilling speed must be controlled so that the plastic doesn't melt. Use a silicone lubricant, oil or even liquid detergent on the tap to reduce the probability of melting the plastic. Acrylic material tends to grab at the bit as the bit exits the back side of the plastic. This can chip the material and cause great consternation. To avoid this, place the plastic on a piece of wood and keep pressure on the plastic while drilling. Hole saws can be used to make larger openings, but remember: The greater the tool diameter, the greater the velocity at the cutting edge. So, work slowly—or stop often—to keep the plastic from melting. Routers can also be used to make large openings, or make straight cuts using a guide rail.

Using machine screws in tapped holes is the best way of attaching front panels or making removable pieces with acrylic plastic. Acrylics can be tapped easily. Again, use a lubricant to prevent melting the plastic. I recommend you don't use thread sizes smaller than no. 8-32.

Projects

Two of the projects I've built are shown in the title photo and Figs 8 and 9. One is a NiCd battery pack, the other a custom enclosure for a piece of equipment to be built on perf board.

The NiCd Battery Pack

The battery case (Fig 8) is made from two C-shaped halves that were bent and welded to two strips of ¼-inch-thick acrylic that bridge the joints on the inside of the box halves. The handle is made from 1/8-inch-diameter rod that was chemically welded on to the cabinet top. Two tabs of ¼-inch-thick material are welded to a removable top. The tabs are tapped to accept the no. 10-24 machine screws that secure the package. A series of battery holders (from Radio Shack®) are pop-riveted back-to-back and fit inside the case. The whole unit took about 60 minutes to assemble using saws, jointers and a heat bender. With some experience, the same job could be completed in a couple of hours using hand tools.

Clamshell Enclosure

This design features removable front and rear panels, and grooves for supporting a circuit board. The clamshell construction aids in the installation of transformers, speakers and so on.

Fig 9 shows the enclosure partially assembled. To make this cabinet, the two

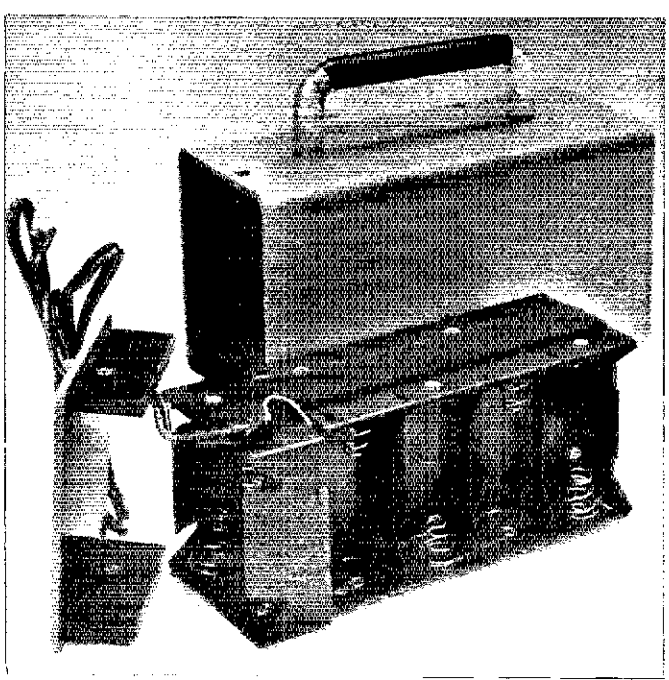


Fig 8—A view of the disassembled NiCd battery pack.

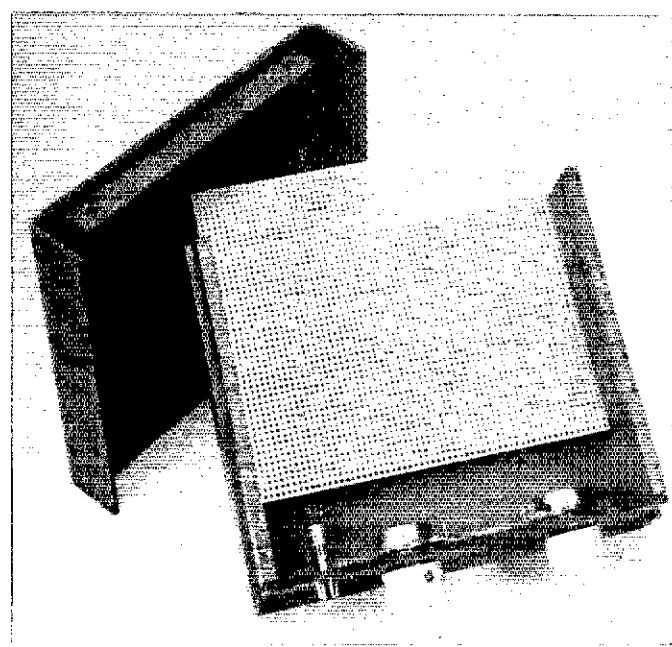


Fig 9—One custom enclosure that is designed to accept a slide-in circuit board.

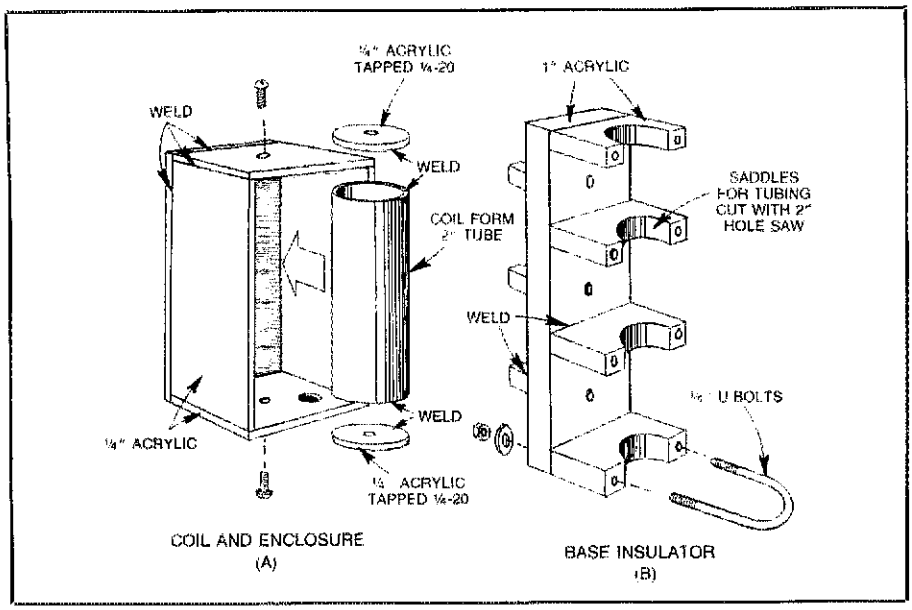


Fig 10—An exploded view of the base insulator for the vertical antenna. The coil form is housed in the rectangular box (at A) (cover not shown here). At B, the antenna base support insulator. The rear of the assembly is attached to the support pipe (see Figs 11 and 12), and the antenna base secured by means of U bolts to the front of the assembly.

C-shaped halves are heat-bent. The ¼-inch-thick joining rails are first slotted on a table saw (to accommodate the circuit board) before being welded to the bottom cabinet half. Then, the joining rails are drilled and tapped. Finally, the rails for attaching the front and rear panels are welded to the cabinet halves and drilled and tapped.

Vertical Antenna Insulator and Coil Housing

When I built my 5/8-λ vertical, I needed a base insulator and a loading-coil housing (see Figs 10-12). The logical solution was to use acrylic plastic because of its good dielectric properties and weatherproof characteristics.

The loading coil is wound on a 2-inch-diameter piece of acrylic tubing (see Fig 10A). Discs of ¼-inch-thick acrylic are drilled and tapped at the center to accept no. ¼-20 machine screws, then chemically welded to each end of the tube.

The coil enclosure is cut from ¼-inch-thick black acrylic. (I could have used clear plastic, but who wants to look at a coil?) The box is 4 inches wide and deep, and its interior height is slightly greater than the overall length of the coil form. Holes are drilled in the top and bottom of the housing to mount the coil and provide for coaxial cable entry and exit.

I mounted the coil enclosure to the antenna support pipe through holes in the back of the box, then installed the coil using no. ¼-20 stainless-steel bolts at the top and bottom. A dab of silicone sealant on the bolt head assures there won't be any leaks.[2]

The base insulator (Fig 10B) is fabricated from pieces of 1-inch-thick clear acrylic. (One nice feature about acrylics is that if you need a thicker piece of material, you can just weld together pieces until you get what you need.) The insulator is drilled to accept the mounting bolts that secure it to the support pipe, and the U bolts that secure the base of the antenna.

Once the electrical connections were made and the coil taps placed for lowest SWR, I simply taped the acrylic cover to the box using 2-inch-wide vinyl tape. The coaxial form for the balun (see Figs 11 and 12)—the large cylinder at the rear of the antenna—is made from a piece of 6-inch-diameter acrylic tubing with a ¼-inch-thick piece of sheet acrylic welded to one end for mounting. The coaxial cable is held in position with cable ties run through holes in the acrylic tube.

This antenna installation has performed admirably for over two years. The antenna *is* guyed, however. I doubt the base insulator could stand up to the wind-load stresses of an unguyed vertical antenna.

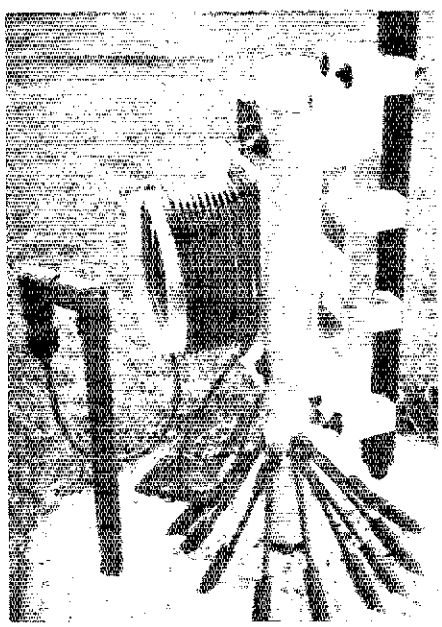


Fig 11—A view of the vertical antenna's base insulator, supporting pipe and coaxial balun. In this photo, the coil enclosure is hidden from view on the opposite side; see Fig 12. The radials for the vertical antenna can be seen emerging from the ground at the base of the support pipe.

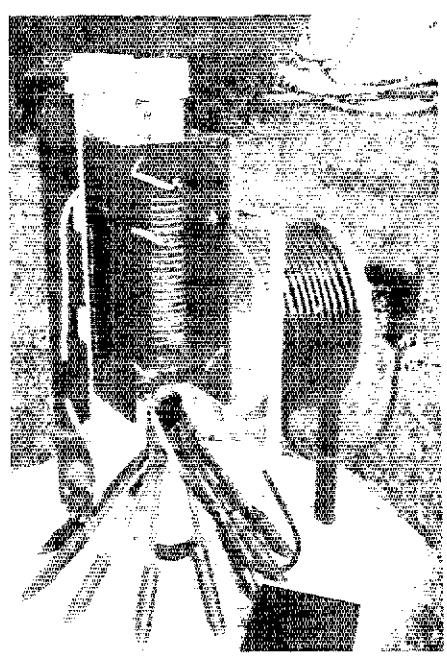


Fig 12—For this photo, the coil enclosure cover has been removed. The support plate for the balun assembly is a hefty piece of acrylic.

Summary

Once you've gained some experience in working with plastics, you'll find that your imagination is your only limitation. Drawers, instrument stands, dust covers and computer accessory housings all are relatively easy to construct.

Notes

[1]United States Plastic Corp, 1390 Nuebrecht Rd, Lima, OH 45801, tel 419-228-2242.

[2]Some provision should be made to allow condensed water vapor to escape from the enclosure. See Hints and Kinks, "To Seal Or Not To Seal," QST, Feb 1988, p 39.

Dennis Kennedy, N8GGI, was first licensed in 1960 as K8UKU. He holds a BA in Industrial Design from Ohio State University. Dennis served for two years as a First Lieutenant in the US Army Signal Corps, spending one year as a tactical radio officer in Vietnam. Dennis is the co-owner of Boss Display Corp of Columbus, Ohio, designers and fabricators of trade-show and science-museum exhibits.

Elevated Vertical Antenna Systems

Is your vertical-antenna system performance up to snuff? If not, maybe it needs a lift—in elevation above ground, that is!

By Al Christman, KB8I
Electrical Engineering Dept
Grove City College
Grove City, PA 16127

For many years, standard broadcast stations have used vertical monopoles (towers) as transmitting antennas. These monopoles are required by the FCC to have extensive ground systems, usually consisting of 120 or more buried radial wires that are used to simulate a perfectly conducting image plane beneath the monopole. The length of the radials is generally ¼ λ, although longer radials are often used. Electromagnetic energy leaving a radiator travels through space until reaching the earth's surface, where it flows through the soil to the radials, and then back to the antenna feed point.

Background

The FCC mandate requiring the use of many buried radials is apparently based upon the findings of three RCA engineers: Brown, Lewis and Epstein. These men carried out extensive tests on buried-wire radial ground systems in the mid-1930s and published their results in a now-classic paper in the *Proceedings of the Institute of Radio Engineers*.[1] In this 1937 paper, a single test was performed wherein the radials were laid upon the surface of the earth rather than buried in the soil. The conclusion was that "this ground system is about as good as an equal number of buried wires."[2] The experimenters' normal procedure was to bury the wires to a depth of about 6 inches.[3] Although this work was done at a frequency of 3 MHz, the results were quickly applied by AM broadcasters to their own part of the spectrum (540-1600 kHz), and buried radials have been used in AM-broadcast antenna systems ever since.

I recently studied elevated vertical antenna systems to determine how well they perform compared to conventional ground-mounted systems. My computer-modeling results indicate that an elevated vertical monopole antenna with four elevated horizontal radials provides more power gain at low elevation angles than does a conventional ground-mounted monopole with 120 buried radials.

The frequency of operation for my analyses was 3.8 MHz, and I used ground constants σ (conductivity) and ϵ_r (relative permittivity) that simulate average-soil electrical parameters. The computer program I used for this work was NEC-GSD, a *Method of Moments* code developed by engineers at the Lawrence Livermore National Laboratory.

In agreement with the findings of Arch Doty, K8CFU, I believe that the use of elevated, rather than buried, radials provides superior performance, because it allows the collection of electromagnetic energy in the form of *displacement currents*, rather than forcing *conduction currents* to flow through lossy earth.[4]

The Computer Analysis

The first step I took was to determine what effects, if any, would be caused by changing the depth at which the ground radials were buried. I used NEC-GSD to model a ¼-λ vertical monopole with 120 buried ¼-λ radials. The operating frequency was 3.8 MHz, and I modeled the system with average ground (σ = 0.003 S/m and ϵ_r = 13).[5]

For the NEC model, the antenna was constructed of no. 12 wire (radius = 1 mm) and metal conductivities were adjusted to simulate an aluminum monopole mounted on a 2-foot steel ground stake with copper radials. As the burial depth of the radials was increased from 2 to 6 inches, the power gain of the antenna decreased only slightly (see Table 1), as did the ground-wave field strength. (Note that the reactive portion of the input impedance may be altered by adjusting the length of the monopole or by making it thicker in relation to the radials.) I used the vertical-monopole antenna system with 120 radials buried 2 inches deep as a reference standard for comparison with the other antenna systems discussed in this article.

I repeated the procedure described above using four buried radials, rather than 120. The results are given in Table 2. As before, slightly lower power gains and field strengths were calculated as radial depth increased. Compared to the 120-radial cases, monopoles with only four buried radials have much higher ground losses, as evidenced by

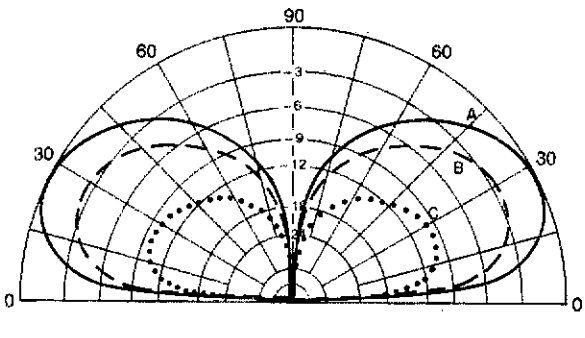


Fig 1—Elevation-plane radiation patterns for ¼-λ vertical monopole antenna systems with 120 buried radials (A), four buried radials (B) and a ground stake only (C).

[1]Notes appear on p 42.

Table 1

Power Gain and Electric Field Strength for Vertical Monopole Antennas with 120 Buried Radials

Elevation angle (degrees)	Calculated power gain (dBi): 120 radials buried 2 in.	120 radials buried 4 in.	120 radials buried 6 in.
0	−∞	−∞	−∞
5	−6.14	−6.15	−6.16
10	−2.40	−2.41	−2.42
15	−0.86	−0.87	−0.88
20	−0.17	−0.18	−0.19
25	+0.06	+0.04	+0.03
30	−0.02	−0.03	−0.04
40	−0.83	−0.84	−0.85
50	−2.37	−2.37	−2.37
60	−4.68	−4.69	−4.69
70	−8.13	−8.14	−8.14
80	−14.13	−14.14	−14.14
90	−158.38	−158.45	−158.51
Vertical electric field strength (mV/m)	33.16	33.10	33.06
Input impedance (ohms)	39.87 + *j*22.0	40.18 + *j*22.49	40.44 + *j*23.02

Table 2

Calculated Power Gain and Electric Field Strength for Vertical Monopole Antennas with 4 Buried Radials

Elevation angle (degrees)	Calculated power gain (dBi): 4 radials buried 2 in.	4 radials buried 4 in.	4 radials buried 6 in.
0	−∞	−∞	−∞
5	−8.82	−8.84	−8.85
10	−5.08	−5.10	−5.11
15	−3.54	−3.56	−3.58
20	−2.85	−2.87	−2.89
25	−2.62	−2.65	−2.66
30	−2.70	−2.72	−2.74
40	−3.52	−3.54	−3.55
50	−5.06	−5.08	−5.10
60	−7.37	−7.40	−7.42
70	−10.83	−10.86	−10.87
80	−16.84	−16.86	−16.88
90	−169.74	−169.99	−170.17
Vertical electric field strength (mV/m)	24.37	24.31	24.27
Input impedance (ohms)	74.48 + *j*33.69	74.73 + *j*34.04	74.93 + *j*34.39

Table 3

Calculated Power Gain and Electric Field Strength for Elevated Vertical Monopole Antenna Systems

Elevation angle (degrees)	Calculated power gain (dBi): 4 radials height = 5 ft	4 radials height = 10 ft	4 radials height = 15 ft	4 radials height = 20 ft	4 radials height = 25 ft	4 radials height = 30 ft
0	−∞	−∞	−∞	−∞	−∞	−∞
5	−6.40	−6.22	−6.09	−5.97	−5.82	−5.60
10	−2.69	−2.53	−2.43	−2.34	−2.23	−2.06
15	−1.19	−1.08	−1.03	−1.00	−0.96	−0.85
20	−0.56	−0.50	−0.53	−0.59	−0.64	−0.64
25	−0.41	−0.43	−0.54	−0.71	−0.89	−1.02
30	−0.57	−0.68	−0.91	−1.22	−1.56	−1.87
40	−1.59	−1.93	−2.45	−3.13	−3.92	−4.71
50	−3.38	−3.99	−4.88	−6.05	−7.46	−8.87
60	−5.94	−6.85	−8.15	−9.92	−12.06	−13.72
70	−9.61	−10.80	−12.50	−14.87	−17.55	−18.05
80	−15.77	−17.15	−19.16	−21.97	−24.67	−23.45
90	−157.37	−154.72	−152.32	−150.20	−148.37	−146.88
Vertical electric field strength (mV/m)	32.19	32.94	33.49	34.00	34.66	35.55
Input impedance (ohms)	38.64 + *j*8.60	36.06 + *j*3.37	3.77 + *j*0.59	31.35 − *j*1.17	28.82 − *j*2.05	26.51 − *j*2.08

reductions in gain and field strength, and by increases in input resistance. Much of the power radiated by the 120-radial antennas is now wasted heating the soil in the four-radial systems. Variations in azimuth-plane gain were negligible (0.01 dB or less).

The elevation-plane radiation patterns for vertical monopole antennas with 120 radials, four radials and no radials (ground stake only) are shown in Fig 1. The pattern shape remains essentially constant, but the pattern size (gain) depends upon the quality of the ground system. All of the vertical electric field strengths in the tables were normalized for an applied power of 1 kW at the feed points of the antennas, and were calculated at a distance of 1 mile and a height of 5 feet above ground. [This normalization procedure allows the pattern values for the different antenna configurations to be compared directly at any given elevation angle—Ed.] At this height the electric field is almost entirely surface wave (ground wave) rather than sky wave. I concluded from this comparison that if radials must be buried, more radials are better than a few radials in order to minimize losses. Also, it's helpful to keep buried radials as close as possible to the ground surface.

The next system configuration I modeled was a vertical monopole radiator with four horizontal radials—all elevated above the earth's surface. I found that low-angle power gain and field strength increase as the height of the antenna system is increased. Also, the gain at somewhat higher angles decreases as the antenna is raised (see Table 3). Note that the power gain at take-off angles below 15° increases continually as the antenna height is raised from 5 feet to 30 feet, but the gain at a take-off angle

of 20° reaches a maximum value at a height of around 10 feet, and then decreases as the antenna is moved higher.

Compared with the reference 120-buried-radial system, the four-radial elevated antenna system reaches parity (equivalent performance to the reference) at low angles at a height of about 15 feet above the surface of the earth. If the antenna is raised further, a secondary high-angle lobe will develop as the antenna height approaches ¼ λ; gain at very low angles continues to increase. Variations in azimuth-plane gain are quite small, even with only four radials in the antenna system.

Antenna-System Geometry

The physical layout of the basic elevated-radial antenna system I modeled is shown in Fig 2. The monopole and the outer ends of the radials are supported by conductive masts. The height of the radial-support masts is the same as the elevation of the radials above ground, but these masts are separated laterally from the tips of the radials by six inches. The central mast supports the monopole, and it is also the same height as the radials. Each mast is attached to a two-foot-long ground stake that is driven fully into the earth.

The masts and ground stakes are made of steel, the radials are copper, and the monopole is constructed of aluminum, as before. All conductors are no. 12. The four radials are electrically connected directly to the top of the central mast, but are insulated from all other support structures. The outer conductor of the coaxial cable is also connected to the four radials at the top of the center mast.

This antenna arrangement allows significant current to flow on the central mast, so I also modeled the system with a slightly different feed-point design. In this second elevated-radial model, I isolated the central mast from the radials in order to reduce current flow on the mast.[6] As shown in Table 4, the isolated antenna system yields a small improvement in ground-wave field strength values, and more power gain at low elevation angles. There is only a slight change in feed-point impedance. Fig 3 shows the elevation-plane radiation pattern for an isolated four-radial

Table 4

Calculated Power Gain and Electric Field Strength for Isolated Elevated Vertical Monopole Antenna Systems

	Calculated power gain (dBi)					
Elevation angle (degrees)	*4 radials height = 5 ft*	*4 radials height = 10 ft*	*4 radials height = 15 ft*	*4 radials height = 20 ft*	*4 radials height = 25 ft*	*4 radials height = 30 ft*
0	−∞	−∞	−∞	−∞	−∞	−∞
5	−6.33	−6.01	−5.74	−5.50	−5.27	−5.06
10	−2.62	−2.32	−2.08	−1.87	−1.67	−1.50
15	−1.12	−0.87	−0.67	−0.51	−0.37	−0.26
20	−0.49	−0.30	−0.16	−0.07	−0.02	+0.01
25	−0.33	−0.21	−0.16	−0.17	−0.22	−0.32
30	−0.49	−0.46	−0.52	−0.64	−0.82	−1.08
40	−1.51	−1.70	−2.01	−2.44	−2.99	−3.66
50	−3.29	−3.74	−4.37	−5.20	−6.23	−7.48
60	−5.85	−6.58	−7.57	−8.85	−10.43	−12.21
70	−9.52	−10.50	−11.83	−13.55	−15.58	−17.30
80	−15.67	−16.84	−18.41	−20.44	−22.65	−23.65
90	−157.35	−154.72	−152.47	−150.61	−149.07	−147.80
Vertical electric field strength (mV/m)	32.47	33.71	34.82	35.86	36.86	37.82
Input impedance (ohms)	38.19 + *j*8.46	35.06 + *j*3.52	32.59 + *j*1.38	30.54 + *j*0.26	28.74 − *j*0.35	27.15 − *j*0.64

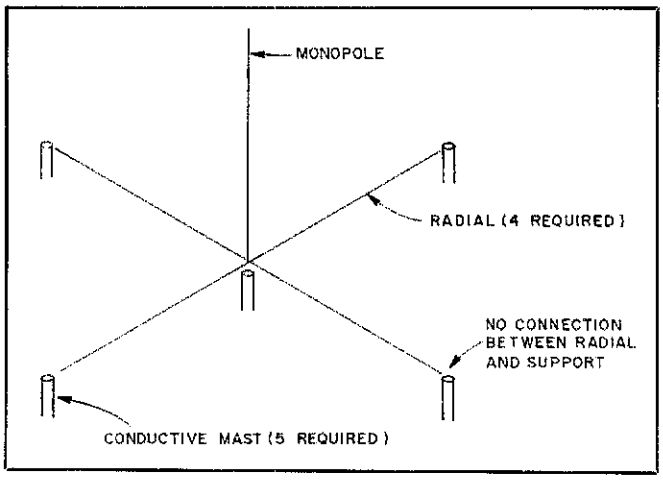


Fig 2—Physical layout of a four-radial, elevated vertical-monopole antenna.

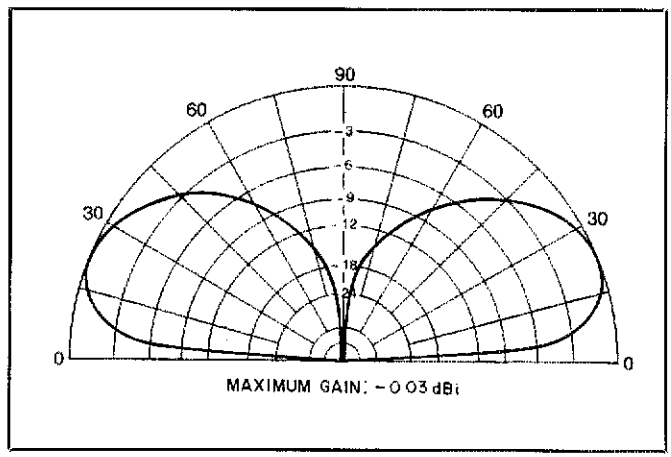


Fig 3—Elevation-plane radiation pattern for a four-radial, elevated vertical-monopole antenna isolated from the support mast (feed-point height = 15 feet).

Table 5

Calculated Power Gain and Electric Field Strength for Isolated Vertical Antenna Systems with 4 Shortened Radials and/or Shortened Monopoles

	Calculated power gain (dBi)		
Elevation angle (degrees)	*1/8-λ monopole 1/8-λ radials*	*1/8-λ monopole 1/4-λ radials*	*1/4-λ monopole 1/8-λ radials*
0	– ∞	– ∞	– ∞
5	–6.88	–6.44	–6.20
10	–3.15	–2.74	–2.53
15	–1.62	–1.27	–1.09
20	–0.95	–0.67	–0.54
25	–0.74	–0.55	–0.49
30	–0.84	–0.77	–0.77
40	–1.71	–1.94	–2.09
50	–3.32	–3.93	–4.22
60	–5.72	–6.75	–7.14
70	–9.25	–10.66	–11.13
80	–15.31	–17.01	–17.51
90	–154.24	–146.52	–160.29
Vertical electric field strength (mV/m)	30.44	32.05	33.02
Input impedance (ohms)	8.25 – *j*653.45	7.0 – *j*541.76	36.32 – *j*136.61

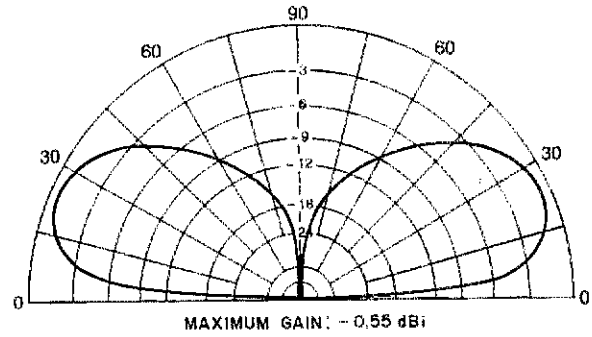


Fig 4—Elevation-plane radiation pattern for a two-radial, elevated vertical-monopole antenna isolated from the support mast (feed-point height = 15 feet).

Table 6

Calculated Power Gain and Electric Field Strength for Isolated Vertical Antenna Systems with 2 Radials

	Calculated power gain (dBi)					
	1/8-λ monopole 1/8-λ radials			*1/8-λ monopole 1/4-λ radials*		
Elevation angle (degrees)	*Azimuth angle (degrees)*			*Azimuth angle (degrees)*		
	0	*45*	*90*	*0*	*45*	*90*
0	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞
5	–7.13	–7.05	–6.96	–7.75	–7.59	–7.32
10	–3.41	–3.31	–3.22	–4.09	–3.87	–3.58
15	–1.89	–1.78	–1.67	–2.68	–2.37	–2.04
20	–1.24	–1.11	–0.98	–2.17	–1.74	–1.35
25	–1.05	–0.90	–0.74	–2.18	–1.59	–1.11
30	–1.18	–0.99	–0.81	–2.54	–1.77	–1.18
40	–2.13	–1.86	–1.60	–4.09	–2.83	–1.98
50	–3.83	–3.46	–3.13	–6.52	–4.66	–3.51
60	–6.32	–5.85	–5.43	–9.75	–7.26	–5.83
70	–9.93	–9.37	–8.88	–13.96	–10.95	–9.28
80	–16.05	–15.42	–14.88	–20.41	–17.11	–15.29
90	–151.54	–151.54	–151.54	–144.30	–144.30	–144.30
Vertical electric field strength (mV/m)	29.61	29.87	30.16	27.59	27.96	28.88
Input impedance (ohms)	8.63 – *j*780.88			9.20 – *j*544.24		

antenna system at a height of 15 feet.

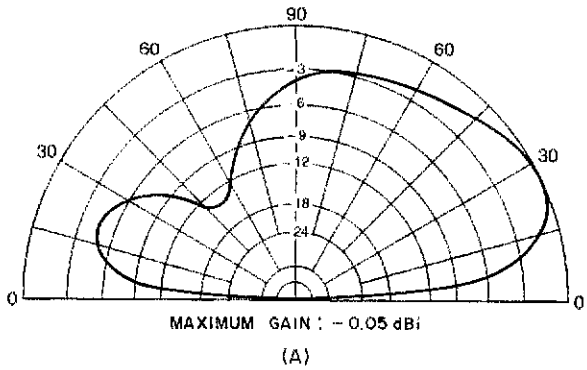
Modifications to the Basic Elevated-Radial System

As I've shown, the performance of the full-size, isolated, elevated antenna system consisting of a ¼-λ monopole and four ¼-λ radials at a height of 15 feet is competitive with a conventional 120-buried-radial, ground-mounted antenna. This section describes the results of modeling exercises I conducted with various combinations of shortened monopoles and/or radials. Table 5 shows what can be achieved with a mixture of 1/4- and 1/8-λ elements.

Perhaps surprisingly, the best performer of this group is a 1/4-λ monopole with four 1/8-λ radials. This configuration provides more signal strength than the other variations, and also has an input impedance closer to 50 Ω. [Note that this configuration provides the best performance of the *modified* configurations, but does not perform as well as a full-size elevated ¼-λ radiator with four ¼-λ elevated radials—Ed.]

To find out what impact on system effectiveness would be suffered by reducing the three-dimensional antenna system to two dimensions, I next modeled elevated-radial monopole antenna systems with only two radials. The results are shown in Tables 6 and 7. The ¼-λ monopole with two ¼-λ radials appears to be the best in this group, and is actually superior to the best of the four-radial "half-pints" previously described (in Table 5). The elevation-plane radiation pattern for this antenna configuration is shown in Fig 4.

Jack Belrose, VE2CV, suggested that I model some "Field-Day Special" antennas using an elevated monopole with just a single radial. The results are presented in Tables 8 and 9. These hybrids put out a mix of vertically and horizontally polarized radiation. They produce both low- and high-angle radiation, and exhibit front-to-back ratios as high as 12 to 15 dB at some takeoff angles. The full-size version (¼-λ elements) appears to work the best, and its feed-point impedance is much more favorable for 50-Ω feed lines than the rest of the



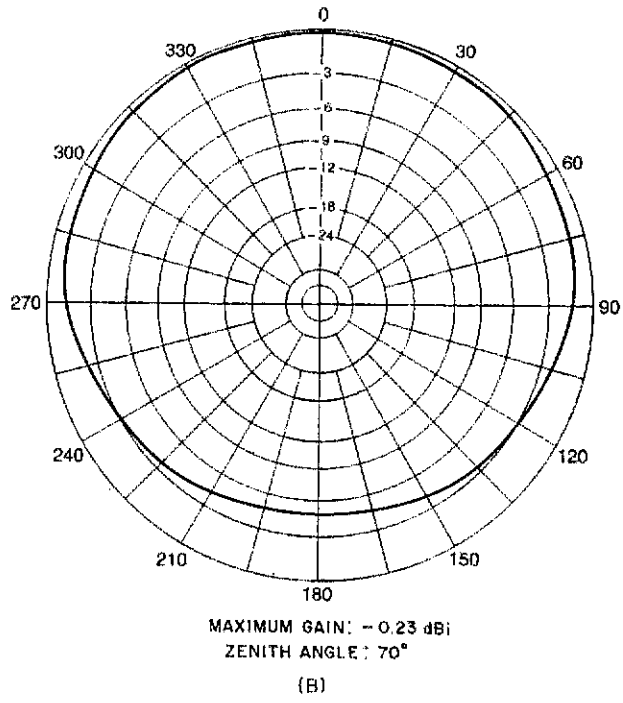


Fig 5—Elevation-plane (A) and azimuth-plane (B) radiation patterns for a one-radial, elevated vertical-monopole antenna isolated from the support mast (height = 15 feet).

bunch. Fig 5 shows the radiation patterns of this antenna.

Arrays

Many hams use phased-vertical arrays for 80-meter DXing, and elevated-radial antenna systems should lend themselves nicely to such applications. Table 10 lists power-gain and field-strength values for both the two-element end-fire (cardioid) array and the very popular four-square array, when constructed from individual four-elevated-radial building blocks. These antenna-system configurations are shown in Figs 6 and 7, and the patterns are shown in Figs 8 and 9.

Soil Types

As the electrical quality of the soil becomes worse, an elevated-radial antenna system must be raised progressively higher above the earth in order to reach performance on par with that of the reference 120-buried-radial vertical monopole. If the soil is very highly conductive, the reverse is true. At AM broadcast frequencies (1 MHz), my modeling studies have shown that adequate heights are 10 feet for very good soil, 16 feet for average soil and 23 feet for very poor soil.

This reveals another interesting aspect of using the elevated-radial technique: as the operating frequency decreases, the height at which system performance approaches that of the reference-standard system also increases for a given soil type. In other words, an elevated-radial 160-meter antenna would have to be higher above the earth than its 80-meter equivalent in order to obtain comparable performance over the same ground.

Table 7

Calculated Power Gain and Electric Field Strength for Isolated Vertical Antenna Systems with 2 Radials

	Calculated power gain (dBi)					
	1/4-λ monopole 1/8-λ radials			*1/4-λ monopole 1/4-λ radials*		
Elevation angle (degrees)	*Azimuth angle (degrees)*			*Azimuth angle (degrees)*		
	0	*45*	*90*	*0*	*45*	*90*
0	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$
5	-6.29	-6.25	-6.21	-6.12	-6.03	-5.90
10	-2.61	-2.57	-2.53	-2.48	-2.36	-2.22
15	-1.18	-1.13	-1.09	-1.10	-0.95	-0.78
20	-0.64	-0.58	-0.53	-0.64	-0.43	-0.22
25	-0.60	-0.53	-0.46	-0.69	-0.42	-0.16
30	-0.90	-0.81	-0.73	-1.12	-0.77	-0.44
40	-2.26	-2.13	-2.00	-2.81	-2.22	-1.72
50	-4.43	-4.25	-4.07	-5.43	-4.53	-3.81
60	-7.41	-7.16	-6.93	-8.90	-7.63	-6.68
70	-11.45	-11.14	-10.86	-13.40	-11.78	-10.63
80	-17.87	-17.52	-17.19	-20.11	-18.26	-16.97
90	-157.65	-157.65	-157.65	-149.71	-149.71	-149.71
Vertical electric field strength (mV/m)	32.72	32.84	32.97	33.35	33.67	34.15
Input impedance (ohms)	36.81 $-j263.26$			34.92 $+j0.83$		

Summary

My studies on vertical monopole antennas using the NEC-GSD computer

Table 8

Calculated Power Gain and Electric Field Strength for Isolated Vertical Antenna Systems with 1 Radial

	Calculated power gain (dBi)							
	1/4-λ monopole 1/4-λ radial				*1/4-λ monopole 1/8-λ radial*			
Elevation angle angle (degrees)	*Azimuth angle (degrees)*				*Azimuth angle (degrees)*			
	0	*45*	*90*	*180*	*0*	*45*	*90*	*180*
0	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞
5	–6.07	–6.25	–7.30	–9.52	–5.91	–6.08	–6.60	–7.53
10	–2.36	–2.52	–3.55	–5.96	–2.21	–2.38	–2.90	–3.88
15	–0.87	–1.00	–2.01	–4.75	–0.74	–0.91	–1.44	–2.49
20	–0.23	–0.33	–1.33	–4.54	–0.14	–0.30	–0.86	–2.02
25	–0.05	–0.11	–1.09	–4.97	–0.01	–0.17	–0.76	–2.08
30	–0.14	–0.16	–1.14	–5.92	–0.19	–0.36	–0.99	–2.51
40	–0.76	–0.71	–1.69	–9.36	–1.17	–1.36	–2.12	–4.24
50	–1.55	–1.49	–2.49	–13.82	–2.70	–2.93	–3.89	–7.02
60	–2.19	–2.20	–3.20	–11.80	–4.54	–4.85	–6.07	–10.72
70	–2.64	–2.77	–3.65	–7.82	–6.55	–6.94	–8.37	–14.10
80	–3.12	–3.28	–3.86	–5.35	–8.69	–9.08	–10.31	–13.70
90	–3.92	–3.92	–3.92	–3.92	–11.12	–11.12	–11.12	–11.12
Vertical electric field strength (mV/m)	33.21	32.43	28.69	22.90	33.98	33.35	31.49	28.52
Input impedance (ohms)		49.56 +*j*16.56				40.65 –*j*485.47		

code indicate that a radiator elevated 10 to 20 feet above ground and having only four elevated horizontal radials can outperform a ground-mounted monopole with 120 buried radials. At 3.8 MHz, an elevation height of about 15 feet is adequate for average soil, while a lower height is satisfactory for shorter wavelengths. Higher elevation above ground is necessary over soil with poorer electrical characteristics and at lower operating frequencies.

I will be doing field studies to verify the computer predictions (preliminary tests during Field Day showed very promising results). If the information gathered from NEC is correct, the construction cost and complexity of effective vertical-monopole antenna systems can be greatly reduced over that of comparable buried-radial systems now widely in use. At the same time, ease of installation and low-angle gain will be increased. The elevated-radial technique appears to be equally valid in the medium-frequency broadcast band and at the lower end of the HF range, so perhaps the ground-plane vertical is "the antenna for all bands"!

Table 9

Calculated Power Gain and Electric Field Strength for Isolated Vertical Antenna Systems with 1 Radial

	Calculated power gain (dBi)							
	1/8-λ monopole 1/8-λ radial				*1/8-λ monopole 1/4-λ radial*			
Elevation angle (degrees)	*Azimuth angle (degrees)*				*Azimuth angle (degrees)*			
	0	*45*	*90*	*180*	*0*	*45*	*90*	*180*
0	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞	– ∞
5	–8.54	–8.88	–10.84	–17.05	–6.96	–7.28	–8.33	–10.58
10	–4.76	–5.01	–6.79	–13.72	–3.19	–3.50	–4.54	–6.90
15	–3.13	–3.29	–4.88	–12.93	–1.61	–1.90	–2.92	–5.47
20	–2.31	–2.36	–3.75	–13.42	–0.85	–1.12	–2.14	–4.93
25	–1.86	–1.80	–3.00	–14.95	–0.52	–0.77	–1.79	–4.90
30	–1.63	–1.46	–2.48	–17.44	–0.48	–0.69	–1.71	–5.21
40	–1.41	–1.10	–1.82	–17.11	–0.83	–1.03	–2.08	–6.55
50	–1.19	–0.87	–1.42	–10.19	–1.58	–1.78	–2.88	–8.36
60	–0.88	–0.69	–1.16	–5.93	–2.52	–2.75	–3.89	–9.51
70	–0.59	–0.56	–0.99	–3.32	–3.56	–3.82	–4.91	–8.99
80	–0.52	–0.59	–0.89	–1.72	–4.68	–4.92	–5.68	–7.49
90	–0.85	–0.85	–0.85	–0.85	–5.97	–5.97	–5.97	–5.97
Vertical electric field strength (mV/m)	24.75	23.45	18.09	9.90	29.95	28.79	25.48	20.18
Input impedance (ohms)		23.49 –*j*527.41				12.22 –*j*1004.27		

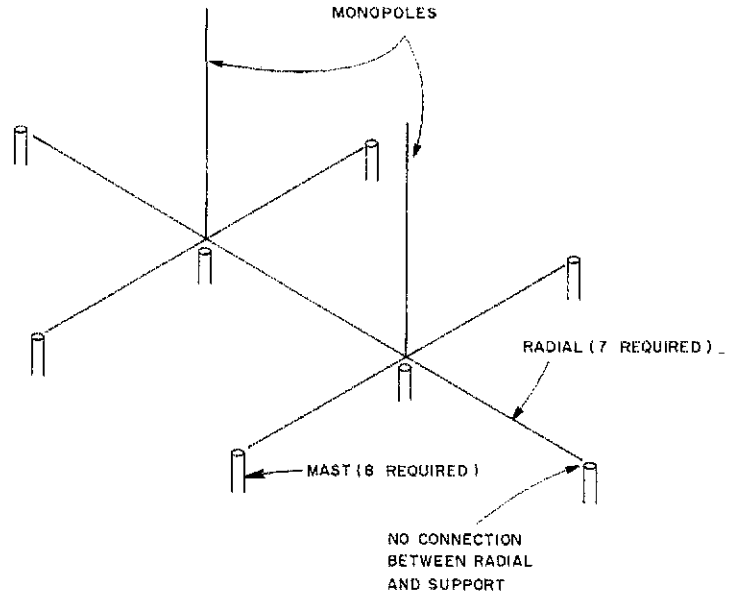


Fig 6—Physical layout of an elevated, two-element phased-vertical array (feed-point height = 15 feet).

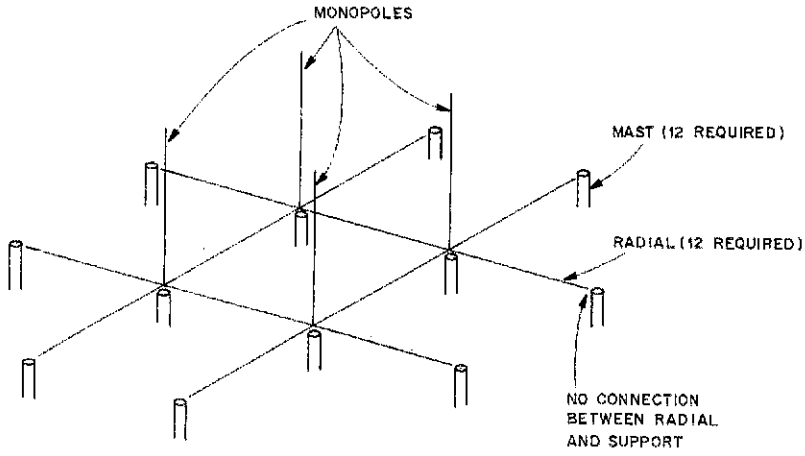
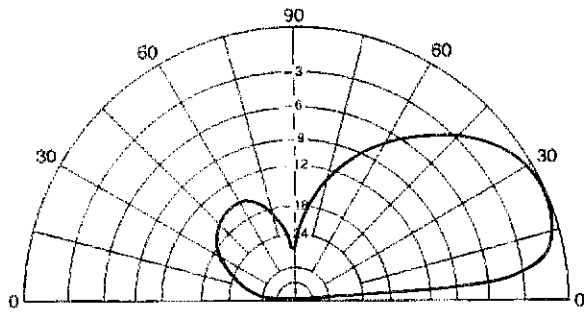


Fig 7—Physical layout of an elevated, four-square phased-vertical array (feed-point height = 15 feet).

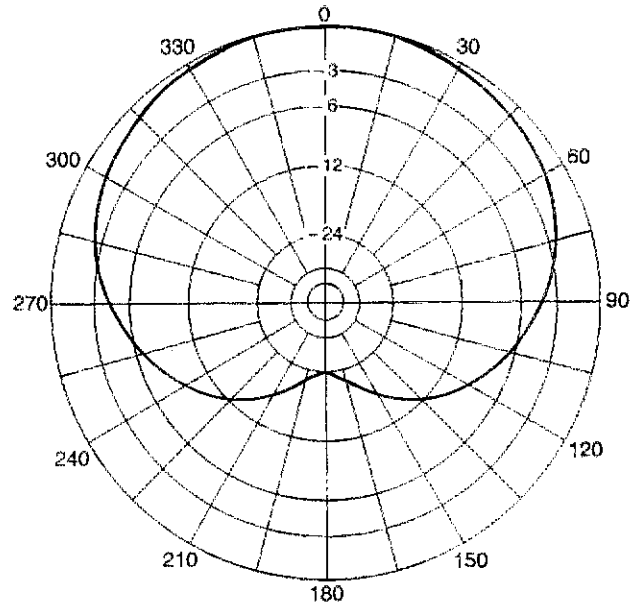
Table 10
Calculated Power Gain and Electric Field Strength for Isolated Phased-Vertical Antenna Systems

	Calculated power gain (dBi)							
	2-element cardiold array				*4-element 4-square array*			
Elevation angle (degrees)	*Azimuth angle (degrees)*				*Azimuth angle (degrees)*			
	0	*45*	*90*	*180*	*45*	*90*	*135*	*225*
0	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$
5	−2.45	−2.96	−6.18	−32.85	−0.50	−3.29	−13.87	−37.32
10	+1.23	+0.69	−2.53	−27.61	+3.16	+0.39	−9.94	−33.19
15	2.66	2.07	−1.16	−23.74	4.54	1.82	−8.15	−31.06
20	3.20	2.55	−0.70	−20.42	5.03	2.36	−7.17	−29.65
25	3.23	2.51	−0.76	−17.68	5.00	2.40	−6.61	−28.67
30	2.92	2.10	−1.20	−15.51	4.63	2.11	−6.33	−28.00
40	+1.51	+0.47	−2.91	−12.70	3.17	+0.85	−6.33	−26.44
50	−0.76	−2.06	−5.57	−11.57	+1.08	−0.94	−6.71	−22.02
60	−3.87	−5.40	−9.11	−11.93	−1.29	−2.89	−7.10	−16.70
70	−8.01	−9.69	−13.60	−13.99	−3.61	−4.66	−7.35	−12.58
80	−14.06	−15.65	−19.44	−19.06	−5.65	−6.17	−7.48	−9.66
90	−25.00	−25.00	−25.00	−25.00	−7.53	−7.53	−7.53	−7.53
Vertical electric field strength (mV/m)	51.39	48.35	32.99	1.89	64.86	46.34	12.90	0.81
Input impedance (ohms)	19.61 + *j*7.41		51.07 + *j*33.71		9.68 + *j*2.78	36.8 − *j*4.47	36.8 − *j*4.47	66.62 + *j*47.2



MAXIMUM GAIN: 3.26 dBi
AZIMUTH ANGLE: 90°

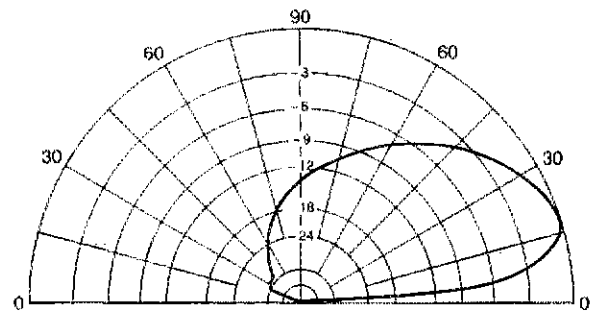
(A)



MAXIMUM GAIN: 3.20 dBi
ZENITH ANGLE: 70°

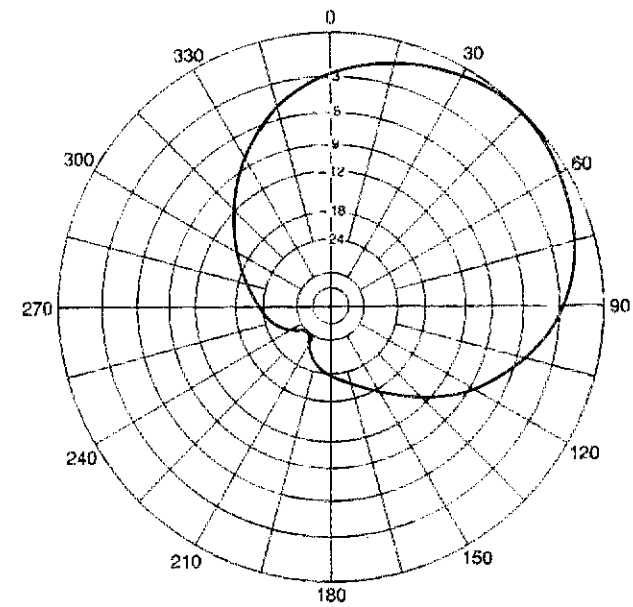
(B)

Fig 8—Elevation-plane (A) and azimuth-plane (B) radiation patterns for an elevated, two-element phased-vertical array (feed-point height = 15 feet).



MAXIMUM GAIN: 5.07 dBi
AZIMUTH ANGLE: 45°

(A)



MAXIMUM GAIN: 5.03 dBi
ZENITH ANGLE: 70°

(B)

Fig 9—Elevation-plane (A) and azimuth-plane (B) radiation patterns for an elevated, four-square phased-vertical array (feed-point height = 15 feet).

Notes

[1]G. H. Brown, R. F. Lewis and J. Epstein, "Ground Systems as a Factor in Antenna Efficiency," *Proceedings of the Institute of Radio Engineers*, Vol 25, No. 6, Jun 1937, pp 753-787.
[2]"Ground Systems . . .," p 784.
[3]"Ground Systems . . .," p 769.
[4]A. Doty, "Improving Vertical Antenna Efficiency," *CQ*, Apr 1984, pp 24-31.
[5]G. Hagn, SRI International, Arlington, VA, private communication.
[6]Because the coaxial transmission line feeding power to the antenna must extend vertically along the center mast, some means of preventing the flow of antenna current on the outer surface of the cable shield must be used to isolate the feed line from the vertical support structure. This can be done by using a transformer at the feed point, or by placing suitable ferrite material around the outside of the transmission line (a choke balun).

Reference

A. M. Christman, "Vertical Monopoles with Elevated Ground Systems," *Proceedings of the Third Annual Review of Progress in Applied Computational Electromagnetics*, Naval Postgraduate School, Monterey, CA, March 1987.

Al Christman has been a licensed Amateur Radio operator since 1974. Al earned BS and MS degrees in mineral preparation and mining engineering at Penn State University, and BSEE and MSEE degrees at West Virginia University. He has served on the faculties of Mt Vernon Nazarene College (teaching physics and electronics) and Ohio University (teaching courses in the EE program). Al's career has included stints as a chemical engineer (while he was serving in the US Army) and as a mining engineer for US Steel Corp. Al is presently a PhD candidate in the electrical and computer engineering program at Ohio University, Athens, Ohio.

In addition to his amateur license, Al holds an FCC General Class Radiotelephone Operator's license and spent several years as an FM broadcast engineer and consultant.

Conducted By Mark Wilson, AA2Z
Senior Assistant Technical Editor

Heathkit SA-2550 Remote Antenna Matcher

Reviewed by Doug DeMaw, W1FB

"I wish I had a motor-driven remote variable capacitor for SWR adjustments at the antenna feed point." Is this a thought that has entered your mind? If so, the answer to your musing may lie in the Heathkit® SA-2550 remote matcher. I had fun building and testing this kit, and it works nicely for remote control of the effective antenna length, or for matching the feed line to certain types of antennas.

The SA-2550 has three modules. Two of them—a plug-in wall transformer and control box—are used in the ham shack. The third module, designed for mounting at the antenna feed point, is a metal box that contains a 500-pF transmitting-size variable capacitor that is operated by means of a reversible low speed dc motor. The control box has a center-off toggle switch. Moving the lever in one direction causes clockwise rotation of the motor. Moving the switch lever in the opposite direction (from OFF) results in counterclockwise rotation.

Heath engineers recommend that the remote assembly be mounted at the feed point of dipole and vertical antennas to permit adjusting the SWR within a given amateur band. Examples of these applications are shown in the assembly manual. More on this later.

Matcher Circuit

Fig 1 shows the three circuits that comprise the SA-2550 and how they connect to one another. (I redrew the circuit to conform to *QST* style. Its designators do not conform to those in the Heath assembly manual.) Although a three-wire primary circuit is used, I am disappointed to find no fuse in the system (safety first!). Installation of a primary fuse for T1 is impractical, owing to the structure of the plug-in transformer.

Ac voltage from T1 is rectified by D1 and D2 to provide plus and minus voltages for the motor, M. S1 is used to route plus or minus voltage to M for changing the direction of the armature.

You will notice in Fig 1 that there is no earth ground for this system. The chassis ground for the control box and remote unit is part of the transmission line. I see no reason why the chassis of the control box can't be grounded in the shack. I did this, and it did not disturb the performance of the system. But, there should not be an earth ground connected to the case of the remote box, since chassis ground for that assembly is, in some instances, common to part of the antenna.

Blocking capacitors (two) are used at J3 to isolate the system from dc ground via J3. This prevents a short-circuit on the dc supply line in the control circuit. RF chokes (three) are used to prevent RF energy from following unwanted paths within the system. You can see that the circuitry is simple. This makes the SA-2550 easy to construct and check out.

You must provide a two-wire control cable, plus the 50-ohm coaxial cable that connects the transmitter and control box, and the control box to the remote unit. The SA-2550 is for use from 1.8 through 30 MHz. Power-handling capability is specified at 1500 W PEP SSB and CW when the SWR is less than 3:1.

Applications

The instruction manual contains a section on applications. Included are a number of drawings that show the matcher as part of various antenna systems. I do not agree with some of the antenna theory presented in the manual, and a few of the suggested applications leave something to be desired. This does not mean that the SA-2550 is not a good and useful unit, though. It has a number of possibilities that are not mentioned in the manual. I will cover some of them here.

Figs 2A and 2B show recommended applications that are illustrated in the Heath manual. Heath engineers recommend that you make the antenna 5 to 15 percent longer than is dictated by the formulas 234/f(MHz) or 468/f(MHz) for finding the approximate radiator length in feet. You can get the impression that there is no need to first ensure a proper system match to 50-ohm line. Therefore, I must assume that the Heath illustrations are based on a 50-ohm match *before* the SA-2550 is introduced to the antenna system. I think it is vital that the system be prematched to 50 ohms.

The theory of operation is that if you make the radiator longer than the resonant length, X_L (inductive reactance) will result. C1, the motor-adjusted variable capacitor in the remote box, presents X_C (capacitive reactance) in series with the X_L. C1 is adjusted until the X_C cancels the X_L. This brings the match back to the desired 50 ohms. In theory, this method permits you to cover all of an amateur band by elimi-

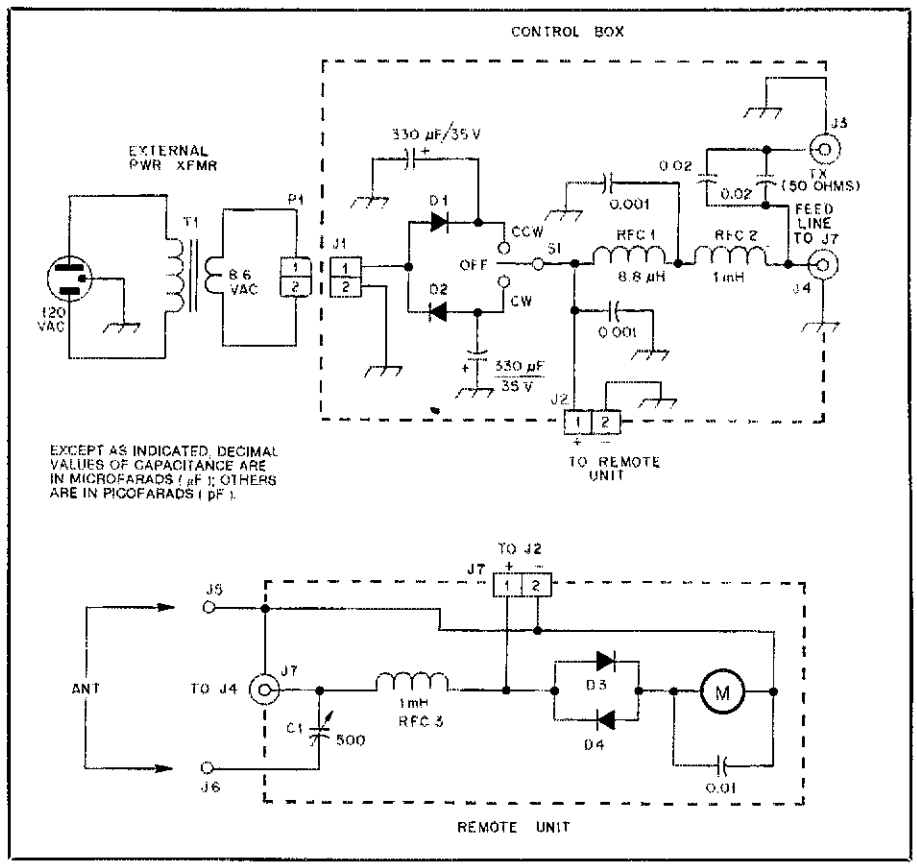


Fig 1—Schematic diagram of the SA-2550 control circuit. Part designators have been changed to conform to *QST* style and differ from those shown in the assembly manual. See text for circuit description.

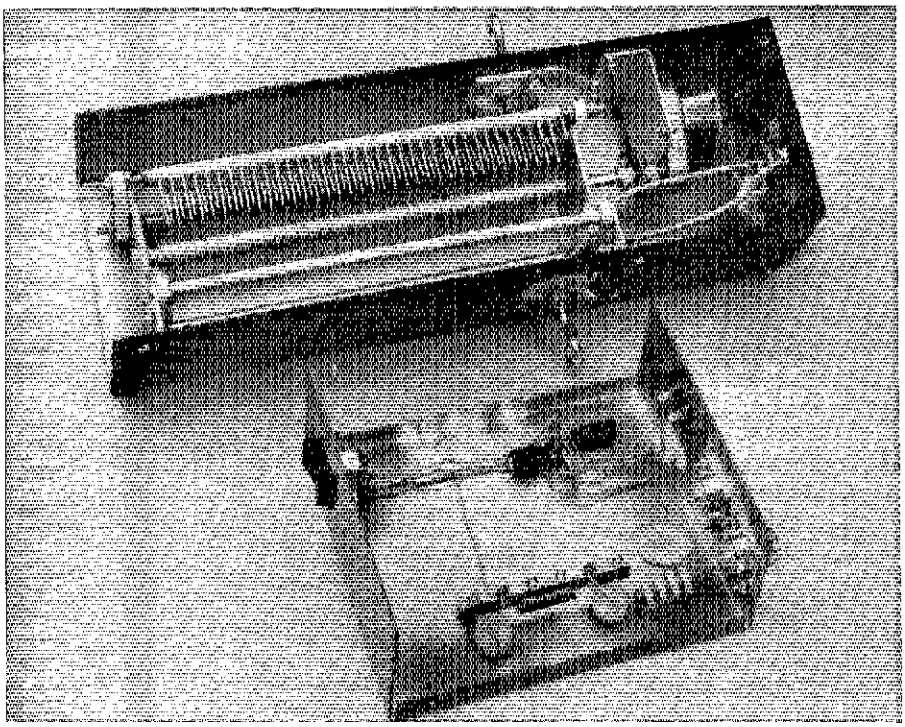


Table 1

Heath Model SA-2550 Remote Antenna Matcher

Manufacturer's Claimed Specifications

Operating frequency range: 1.8 to 30 MHz.

Input impedance: 50 ohms.

Input power capability: 1.5 kW (CW and SSB) at less than 3:1 SWR.

Dimensions (height, width, depth): control box, 2-9/16 × 5-1/2 × 6-15/16 inches; remote unit, 16-15/16 × 8-1/2 × 3-13/16 inches.

Weight: control box, 1 lb; remote unit, 5.6 lbs.

nating unwanted X_L and providing a resistive termination for the feed line.

Example A of Fig 2 shows how this may be done with a vertical antenna. Antenna B shows Heath's suggestion for using the matcher with a dipole or inverted-V antenna. Note that only one half of the dipole is tuned via C1. In other words, one half of the antenna remains reactive by virtue of the increased length. (Example C shows the correct way to deal with this situation: *Two* capacitors are required to cancel the X_L in a dipole—one in each dipole wire. In any event, the matcher must be used with antennas that are ¼ wavelength long, or odd multiples of ¼ wavelength. It is not suitable for use with ½-wavelength end-fed antennas, or with antennas that are multiples of a half wavelength long.

Figs 2D and 2E illustrate excellent applications for the SA-2550 that are not mentioned in the Heath manual. Example D shows how you can use the matcher as a gamma-match capacitor on a shunt-fed vertical. C1 has sufficient capacitance to serve this need from 80 through 10 meters. For use on 160 meters, you may need to place a fixed-value transmitting capacitor in parallel with C1. Normally, a match on 160 meters requires less than 1500 pF. C1 can be adjusted remotely to help maintain a low SWR from one end of a band to the other.

An inverted L (popular on 160 and 80 meters) may be made somewhat longer than usual (Fig 2E). This permits the use of C1 for adjusting the SWR for a low value across a given amateur band. T1 is shown as a matching transformer that provides an SWR of 1:1 for 50-ohm line. (The impedance of the inverted L is on the order of 15 to 30 ohms, depending on the ground system and other factors.) You may prefer to use an LC matching network in place of T1.

Finally, Fig 2F shows how a radiator may be made shorter than ¼ wavelength for use with the SA-2550. A small loading inductor increases the electrical length of the radiator to create inductive reactance. C1 of the SA-2550 cancels the inductive reactance at the operating frequency.

Detailed information about how to adjust your antenna for use with the remote matcher is provided in the instruction booklet, so I will not repeat it here. There are many potential uses for the SA-2550. For example, how about using C1 in combina-

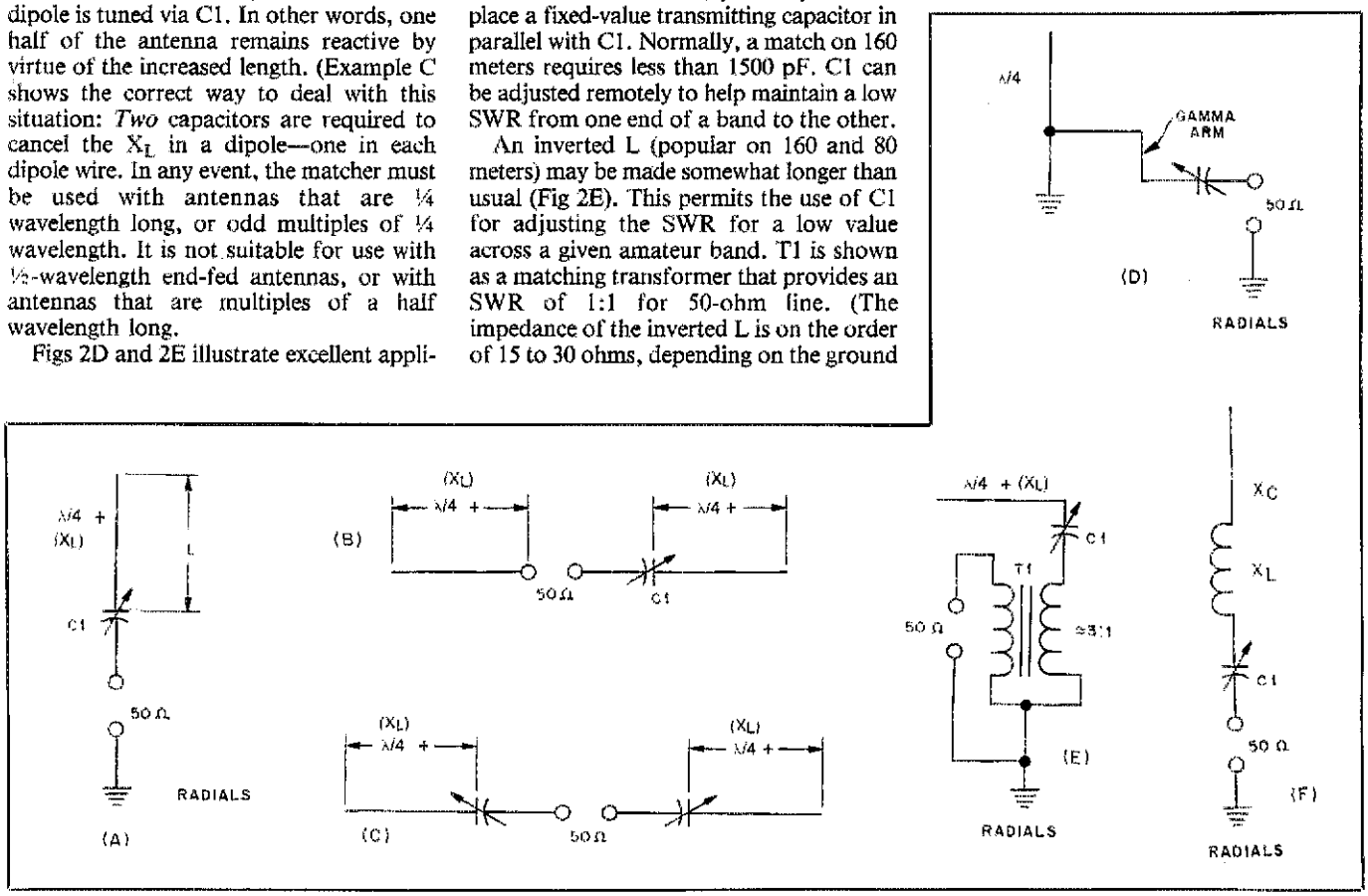


Fig 2—These examples show some situations in which the SA-2550 may be used for remote antenna matching. These systems are discussed in the text.

tion with a suitable inductance to form a *remotely tuned L network* for antenna matching? The coil can be housed near the remote box in a weatherproof container. A remote relay can be added for changing coil taps.

Possible Improvements

In its present form, the SA-2550 provides no visible indication of the position of C1 of Fig 1. C1 is set at midrange when installed at the antenna feed point. Tuning is done while observing the SWR from within your ham shack. Perhaps the next model may include a sensor circuit that will enable you to observe the degree settings of C1. This would make quick adjustment when changing bands or frequencies within a band more convenient. An accessory kit might be offered to permit the system to be used as an L network.

Assembly Notes

Assembly time should be on the order of 5 to 6 hours if you are familiar with kit construction. The most detailed part of the job is assembly of the large variable capacitor, but this is fun! There are very few wires to cut and solder, so you should not be bored by having to measure and trim numerous wires. The step-by-step assembly instructions are clearly written in considerable detail. The pictorial assembly drawings are excellent.

I consider the SA-2550 a quality unit that has many potential uses for remote adjustment of antennas. It may be the solution to one or more of your antenna problems. My tests were done with antennas configured as shown in Figs 2D and 2E, and I had good results.

Manufacturer: Heath Company, PO Box 1288, Benton Harbor, MI 49022, tel 800-253-0570. Price class: $120.

CREATIVE DESIGN CLP5130-1 VHF/UHF LOG-PERIODIC ANTENNA

Reviewed by Bart Jahnke, KB9NM

Over the past 50 years, log-periodic antennas have seen much service on the bands below 50 MHz. Although some amateurs have constructed home-brew log antennas for VHF/UHF bands, commercially made log-periodic VHF/UHF ham antennas are rare. Recently, however, Japanese antenna manufacturers have brought log-periodic antennas back into the limelight—and US importers have decided to share these products with consumers.

Creative Design Co (Create) manufactures three versions of a VHF/UHF log-periodic antenna for the US market. All three models are similar, differing primarily in the frequency ranges covered. The antenna reviewed here, the CLP5130-1, covers 50 to 1300 MHz. The CLP5130-2 covers 105 to 1300 MHz, while the CLP5130-3 works from 90 to 220 MHz.

The CLP5130-1 uses 25 elements on a 5-foot, 9-inch boom to cover all of the ham bands from 6 meters through 23 cm with low SWR. Assembled, the antenna weighs only 11 pounds. The longest element measures 9 feet, 10 inches, and the antenna is UPS shippable. Create supplies a 4-foot coaxial cable with PL-259 connector to run from the feed point to the main feed line.

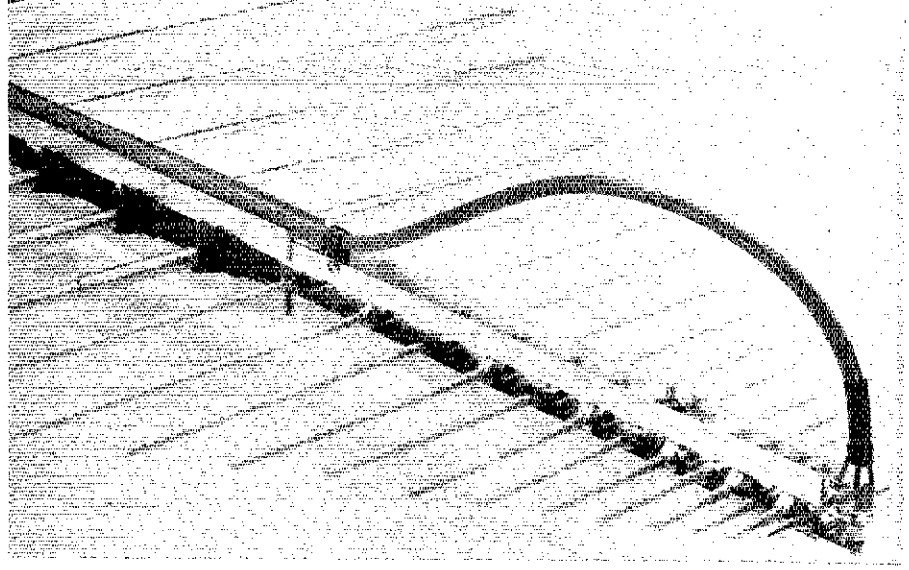


Table 2

Creative Design CLP5130-1 VHF/UHF Log-Periodic Antenna

Manufacturer's Claimed Specifications

Frequency range: 50 to 1300 MHz.
SWR: 2.0:1 or less.
Boom length: 5 feet, 9 inches.
Mast diameter: 1½ to 2 inches.
Maximum power capability: 500 W PEP.
Wind survival: 90 mi/h.
Weight: 11 lbs.

Construction

The boom of the CLP5130-1 is made from two pieces of aluminum channel stock. Elements are sandwiched between the two halves of the boom. The CLP5130-1 is supplied with a partially preconstructed front element assembly. Elements 2 through 13 are riveted so that they are properly positioned on the boom, although they are folded back almost parallel to the boom for shipping. All that's required to align these elements is to pivot them so that they are perpendicular to the boom, and use a 3 mm × 8 mm machine screw, washer and nut to lock each element in place.

Element number one is not part of the prefabricated front element assembly. This element is part of a bracket that also provides a mechanical connection for the feed line. I found it difficult to insert the machine screws into the tapped holes in element number one. I recommend that these holes be tapped to allow the use of no. 4-40 hardware if you have problems.

All of the remaining elements mount in black plastic insulators sandwiched between the boom halves. Sheet-metal screws hold the elements in the insulators and make electrical connection.

Construction took about three hours. All of the materials appear to be of good quality, and I had no problems except for fitting some of the screws as mentioned previously.

Installation

This antenna lends itself to horizontal or vertical installation. For additional weatherproofing in vertical installations, element caps (plugs) have been provided for the hollow elements (which point skyward) to prevent the accumulation of water.

I installed the CREATE CLP5130-1 log periodic on a 10-foot Radio Shack® mast in my backyard. (I'm an apartment-dweller ham who can't erect 200 feet of tower on the landlord's property.) The antenna was later raised to the rooftop—about 30 feet in the air.

In my installation, I decided to use a *good* low-loss feed line—Andrew ½-inch Superflex Heliax®. You need only one feed line, so it might as well be a good one so you get as much signal as possible to the antenna. Remember, this antenna isn't the high-gain variety—instead it's designed for broad bandwidth.

SWR for the CLP5130-1 measures less than 2:1 on the 50, 144, 220, 432 and 903-MHz bands. I didn't try it on 1296 MHz.

While the antenna was still at the 10-foot level, I used it to operate in the ARRL 144-MHz Sprint contest. Activity levels seemed quite good and yielded over 40 contacts, with the farthest station being over 325 miles away. I must mention that this testing was not done from a mountaintop. In fact, it was done from nearly sea level, as my location is alongside the Connecticut River. Similar RF tests were made on the 50, 220 and 432-MHz bands with equally good reports and performance. I tried the antenna on 903 MHz and worked a few local stations, but its gain did not approach that of a single-band antenna designed for the band.

Six meters with the CLP5130-1 has been

fun. I've worked quite a few stations on sporadic E, and I've heard a number of early morning scatter signals as well.

I even had good luck using the log periodic as a 2-meter uplink antenna for RS-11. The wide beamwidth makes tracking the satellite a snap.

Although the CLP5130-1 is rated for 500 watts, I was limited to solid-state amplifiers and no more than 160 watts output. My measured SWR compared closely with the manufacturers specifications.

The CLP5130-1 allows me to be active on many VHF/UHF bands, yet it takes up a minimum amount of space. Although the gain and performance of this antenna can't compare to long-boom, monoband Yagis, I've made quite a few contacts with locals and with stations in faraway grid squares. In my apartment situation, where I can have but one antenna, it's ideal. If you're planning to install a VHF/UHF antenna for use with FM/repeaters, weak-signal SSB/CW or scanners (or even for television reception), the CLP5130-1 is worth serious consideration.

Distributor: Orion Hi-Tech, PO Box 8771, Calabasas, CA 91302, tel 800-255-7020. Price class: $239.

A & A ENGINEERING'S SMART BATTERY CHARGER

Reviewed by Paul K. Pagel, N1FB

☐ A & A Engineering offers a modified version of Warren Dion's (N1BBH) Smart Battery Charger.[1] The kit (A & A no. 150) can be purchased in any of several versions for specific voltages and charge currents. If at some time you want to change the charger's voltage and current delivery, you can do so by making a couple of simple wiring changes and component substitutions; a table included with the documentation provides you with the necessary information. The Smart Battery Charger will deliver charging voltages of between 6 and 24 at currents up to 1 A. The standard output current is 500 mA; you simply add another shunt resistor to increase the output current level.

This charger is designed to be used with lead-acid or gelled-electrolyte batteries. The charger controls the bulk charging rate, tapers and limits the overcharge voltage and maintains the battery at the float level. (If these terms are unfamiliar to you, refer to the article referenced in note 1.) The Smart Battery Charger can be left connected to the battery indefinitely, and will not overcharge it.

The cabinet supplied is similar to one Radio Shack® model (RS 270-253). You have to do the cabinet work; no holes are predrilled or punched (except for those for the cabinet feet), and no panel labels are supplied. I recommend that the chassis work be done before mounting any of the components on the PC board. All drilling dimensions are given in decimal inches, as are drill sizes. So, unless you have drills sized that way (I have a numbered drill set), it's helpful to have a drill gauge that provides you with a cross reference.

If you drill the holes according to the template, everything will fit perfectly. Making the required chassis holes is a relatively simple task for all but the power on/off switch. The switch supplied is an illuminated, push-in, locking-tab rocker switch that requires a rectangular mounting hole. Making such a hole in a flat piece of aluminum is easy with the aid of a nibbling tool, but with the front and rear panels already formed, I found it difficult to use the nibbling tool. Eventually, I had to resort to using some flat files to make the hole reasonably symmetrical. Using a switch that mounts in a round hole is a much simpler approach and is less time consuming. Unless you really want the rectangular rocker switch, I suggest you substitute a toggle switch, and drill another round hole for a power indicator; the PC board has provisions for adding a power-on LED.

The cabinet is made of soft aluminum with a light-gray finish, and the top is made of steel painted in black-crackle. Because the body metal is soft, it's easy to work, but it's also easily bent if you're not careful. Proceed slowly when drilling holes and enlarging them.

The paint on my charger cabinet body flaked off easily. Once started, the paint lifted from the aluminum like the thinnest of tissue papers. Because of this, I stripped the finish and repainted the cabinet. (I briefly considered an alternative covering: Using adhesive-backed shelf paper. But I decided against that because of earlier bad experiences I'd had with that material. You must be careful when tightening nuts on panels covered with adhesive-backed paper, otherwise the paper twists and you wind up with a wrinkled panel.)

Documentation for the kit consists of two 8½- × 11-inch sheets of paper printed on both sides—not a Heathkit® construction manual by any means, but complete in every detail. If you're a novice builder, it's worthwhile to examine the instruction sheets and familiarize yourself with the components and their eventual placement before taking a drill or soldering iron in hand. When I first looked at the drilling template (none are full-size) for mounting the power transformer and PC board, I was under the impression that the transformer and PC board were supposed to be mounted across the width of the cabinet. That's not so, because the pass transistor (mounted on the PC board) needs to be attached to—but insulated from—the cabinet's rear panel, which acts as a heat sink.

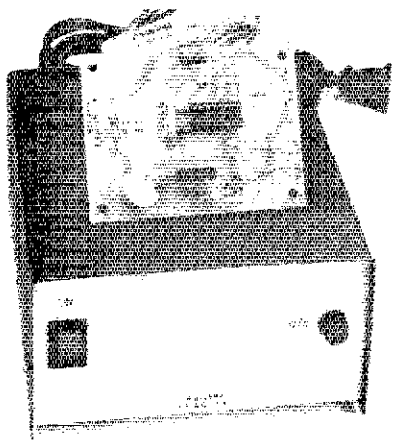
While on the subject of the pass-transistor mounting, here's a tip: Before you solder the transistor to the PC board, temporarily mount the circuit board in place and check to make sure the hole in the transistor's mounting tab aligns with the screw hole in the cabinet's back panel. If you make the transistor leads too short, the mounting holes won't line up.

Stuffing the PC board is a snap. The board is high quality and well tinned, so solder flows readily onto it. To provide flexibility, the board is supplied with additional shunt-resistor mounting pads and three pairs of jumper pads. The choice of jumper positions, number of shunt resistors and the values of certain components are selected from notes and a table on one of the instruction sheets. This enables you to configure the charger to your output voltage and current requirements. The PC board has pads that can be used to connect an ammeter and/or voltmeter to the circuit.

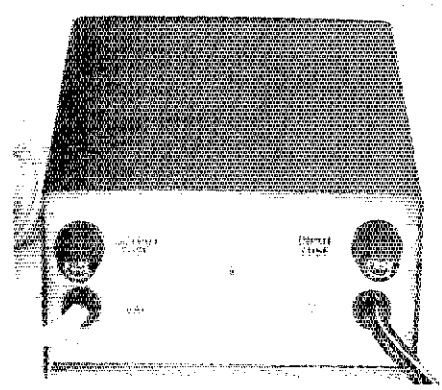
I used rub-on transfers to identify the panel-mounted components. Then I sprayed the cabinet body with three coats of satin-finish polyurethane to protect the finish and panel labels.

The Smart Battery Charger is available from A & A Engineering, 2521 W La Palma, Unit K, Anaheim, CA 92801, tel 714-952-2114. The standard kit is a 12-V, 500-mA unit. Price: $49.50 each. For 6, 14 or 24-V chargers, add $1 and specify the charger voltage desired. Include $3.50 for shipping and handling.

[1] W. Dion, "A New Chip For Charging Gelled-Electrolyte Batteries," *QST*, Jun 1987, pp 26-29. See also Technical Correspondence, *QST*, Oct 1987, p 38.



This photo shows the finished front panel, with the PC board and power transformer ready to be installed in the cabinet. I made the component, pad and jumper identifiers on the board with a permanent-ink marker—they're not on the A & A board.



The rear panel of the charger. The screw in the center of the cabinet is used to secure the pass transistor to the panel, which acts as a heat sink.

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

VARIATIONS ON THE PL-259 THEME

Editor's Note: It's safe to say that most radio amateurs install, or will have installed, at least one UHF-series coaxial plug (a solder-on PL-259 or its crimp-on equivalent) during their ham careers. It's also a pretty sure thing that most hams will have read and followed the standard PL-259 installation procedure (described in *The ARRL Handbook* for umpteen years)—at least once. As if all those niggling insulation-measuring and -stripping instructions aren't bad enough, though, soldering the cable braid to the connector requires considerable heat—and the connector doesn't always take solder before the cable dielectric (insulation between braid and center conductor) is destroyed! Result: Frustrated hams look for solderless (or, at least, reduced-heat) means of installing solder-on UHF plugs to coaxial cables.

Hints and Kinks' most recent example of this phenomenon came to us from Bruce M. Haldeman, KG6QY.[1] As soon as Bruce's hint made print, additional H & K readers responded with *their* variations on this popular subject. This month, Hints and Kinks presents these stories, and several related items already on file, in a group. Afterward, we'll review the pros and cons of nonstandard PL-259-installation techniques in general.

An Expansion on the KG6QY Method

☐ Re Bruce Haldeman's connector-installation technique [see note 1—Ed.], I have always installed PL-259s to 0.405-inch coax (such as RG-8) this way. I've found a method that increases the ease of threading the plug onto the cable jacket. Simply cut four small V-shaped pieces, 90° apart, out of the cable jacket before folding the braid over the jacket (see Fig 1). This

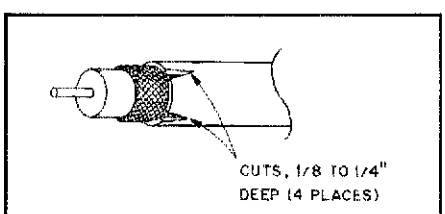


Fig 1—James Viele reports that removing four small sections of the cable jacket makes Bruce Haldeman's PL-259-installation suggestion even easier to implement. See text.

allows the jacket to compress into a sort of taper that makes threading the connector onto the coax much easier. Also, I've found that it's not necessary to unravel the shield if this is done: You need only push the shield back over the cable jacket. A razor blade or utility knife works fine for making the cuts.—*James Viele, N8IRL, 161 Fox St, Hubbard, OH 44425-2122*

"Solderless Solder-On" Connectors: Iffy

☐ The solderless PL-259 application technique shown in October 1987 Hints and Kinks may appear to work at first, exhibiting low resistance and a low SWR, but long-term results will probably be disappointing. On all too many service calls, I've found such connections on CB, amateur and even commercial installations. The complaints included erratic SWR, noisy reception and reduced communication range. These problems became noticeable more quickly at VHF/UHF than at MF/HF. (In my opinion, use of such "solderless solder-on" connectors may also compromise lightning protection and open the door to TVI.)

The standard PL-259 installation procedure results in electrical and mechanical integrity, but it subjects the cable dielectric to high heat. I get around this by sliding a small piece of chewing-gum foil between the dielectric and braid after exposing the braid. The foil deflects heat from the dielectric during soldering. Use a high-wattage soldering iron (100 W or more) and good-quality solder to tin the braid. Slide or screw the connector onto the cable. Next, heat the connector body (with that high-wattage soldering iron) and apply solder sparingly. (A high-wattage soldering *gun* with its tip removed works well at this step: Press the tip-support tubes against the connector and press the trigger. Result: Current from the gun passes through the connector, heating the connector directly. Be sure you apply sufficient pressure to the gun before pressing the trigger or sparks may fly!) Connectors installed in this manner have outlived the cable on which they were installed.—*Burton W. Armbrust, WB8EBS, ARRL Assistant Technical Coordinator, 628 Woodward Ave, Iron Mountain, MI 49801*

Another Way of Installing PL-259 Coaxial Connectors

☐ I have always considered it a challenge to insure a positive braid connection to coaxial connectors until I developed this technique: Notch the back edge of the connector or reducer with a file. Then, solder the twisted shield braid to the notch.

For RG-58, RG-59 or "Mini 8" cables, file a single notch in the reducer (UG-175 [RG-58], UG-176 [RG-59, Mini 8] or equivalent). When using larger cables, file two diametrically opposed notches in the rear of the connector barrel, comb out the braid wires, separate them into two bundles and solder one bundle to each notch. Cut off the excess braid with side cutters and file the joint(s) flush. Sample assemblies are shown in Fig 2.—*Art Zavarella, W1KK, 1702 Main St, Agawam, MA 01001*

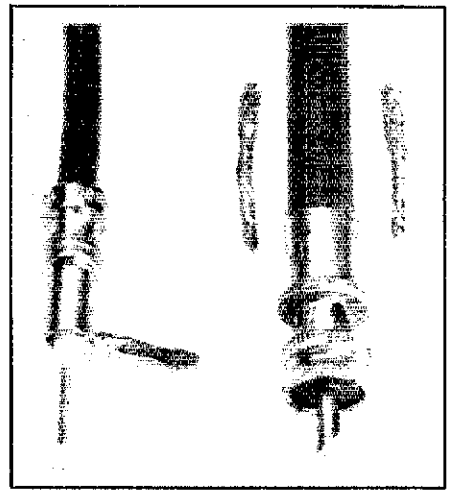


Fig 2—Art Zavarella's PL-259-installation hint. Left: Mini-8 foam-dielectric cable installed in a UG-176 reducer. This assembly is ready for removal of the extra braid wire (one bundle) that protrudes from the bottom edge of the reducer. At right: a PL-259 installed on RG-8 cable. The extra braid wire (two bundles) has already been cut off and the solder joints have been filed flush. For outdoor use, be sure to seal the cable jacket to the connector with epoxy or RTV sealant. See text.

Assembling PL-259 Connectors to RG-8 Cable

☐ Here's *my* technique for assembling a PL-259 to cable:

1) Remove 1.8 inches of the cable sheath as shown in Fig 3, and unravel the braid back to the sheath.

2) Separate the braid strands into two equal bundles and twist each bundle tightly. The bundles should be diametrically opposite. Tin the ends of the bundles. Next, bend and cut the bundle ends as shown.

3) Remove all but 0.6 inch of the exposed cable dielectric. Tin the end of the center conductor, retwisting the center-conductor strands first, if necessary.

4) Slip the connector coupling ring on the cable—with the ring facing in the correct direction! Next, insert the end of the cable into the connector body, feeding each of the two shield bundles through its own (diametrically opposite) holes in the connector body. As always, slip the tinned cable center conductor into the PL-259 pin.

[1]Bruce M. Haldeman, "PL-259 Installation Hints," Hints and Kinks, Oct 1987 *QST*, p 36.

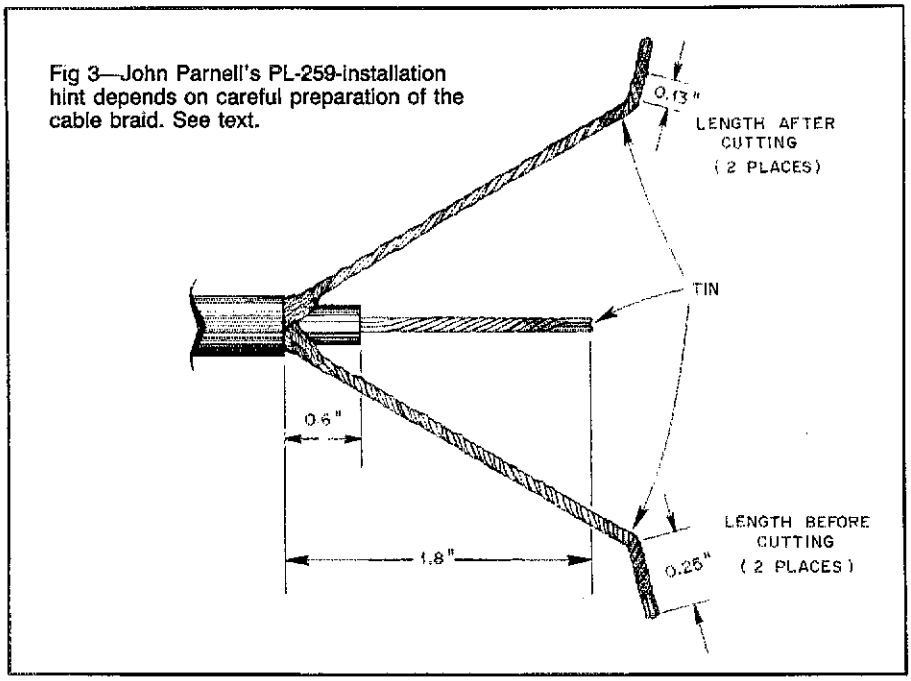


Fig 3—John Parnell's PL-259-installation hint depends on careful preparation of the cable braid. See text.

Put the cable into the connector until the cable sheath butts against the connector body.

5) Heat the connector body with a high-wattage soldering iron and continue to push the cable into the connector until the dielectric passes the soldering holes in the connector body. (Continue to pull the braid bundles through the soldering holes as the cable moves further into the connector. Use pliers to avoid being burned.)

6) Wrap the shield bundles around the connector body (in the soldering-hole well). Cut them off after about 1/6 turn.

7) Solder the shield bundles in the soldering-hole well. Solder the center conductor to the connector pin.

8) When the connector has cooled, retrieve the coupling ring and assemble it to the connector body.—*John Parnell, KQ3E, 15 Del Rio Dr, Yardley, PA 19067*

Installing PL-259s at K1RH

☐ Assembling these connectors can be quite a problem for hams of all ages and experiences, especially when a UG-175 or -176 reducer must also be used. Many alternatives have been proposed to the standard procedure. The loose braid strands involved with some of these alternatives can cause problems. Here're two PL-259-installation techniques (one for each size of cable) that eliminate loose braid strands and provide excellent electrical contact and physical strength, in addition to good cosmetic appearance with no braid showing.

For RG-8 cable: Disassemble the PL-259 connector and slip the coupling ring over the cable. Be sure the ring is facing in the right direction!

See Fig 4. Remove 1-1/8 inches of the cable jacket, being careful not to cut into the braid. Make certain that the shield is *not unbraided*, then tin the entire exposed portion of the braid. Using a copper-tubing cutter, cut through the tinned braid and about halfway through the cable dielectric at a point ¾ inch from the free end of the cable. Using a utility knife, carefully cut through the remainder of the cable dielectric, being careful not to cut or nick the center conductor. Remove the excess braid and dielectric. Tin the exposed center conductor.

Slip the connector assembly over the center conductor and, *holding the cable steady*, turn the connector clockwise so that it is threaded onto the cable jacket. (Assistance from a pair of slip-joint pliers may be necessary at this point. If so, grasp the connector between its solder holes and tip on the knurled portion of the connector.) As you do this, you'll see the tinned braid creep into sight through the solder holes. Once the shield has moved just beyond the holes, you're ready to solder it to the connector. (Note: Depending on the diameters of the particular cable and fittings you use, it may be difficult to turn the connector onto the cable. If this is the case, apply a *very small* amount of petroleum jelly to the cable jacket. Be careful not to get any lubricant on the cable braid, because it will interfere with the soldering necessary to complete the installation. After you screw the connector onto the cable, wipe off any remaining lubricant. Caution: Lubricants other than petroleum jelly may eventually soften the cable jacket.)

There are two methods of soldering the

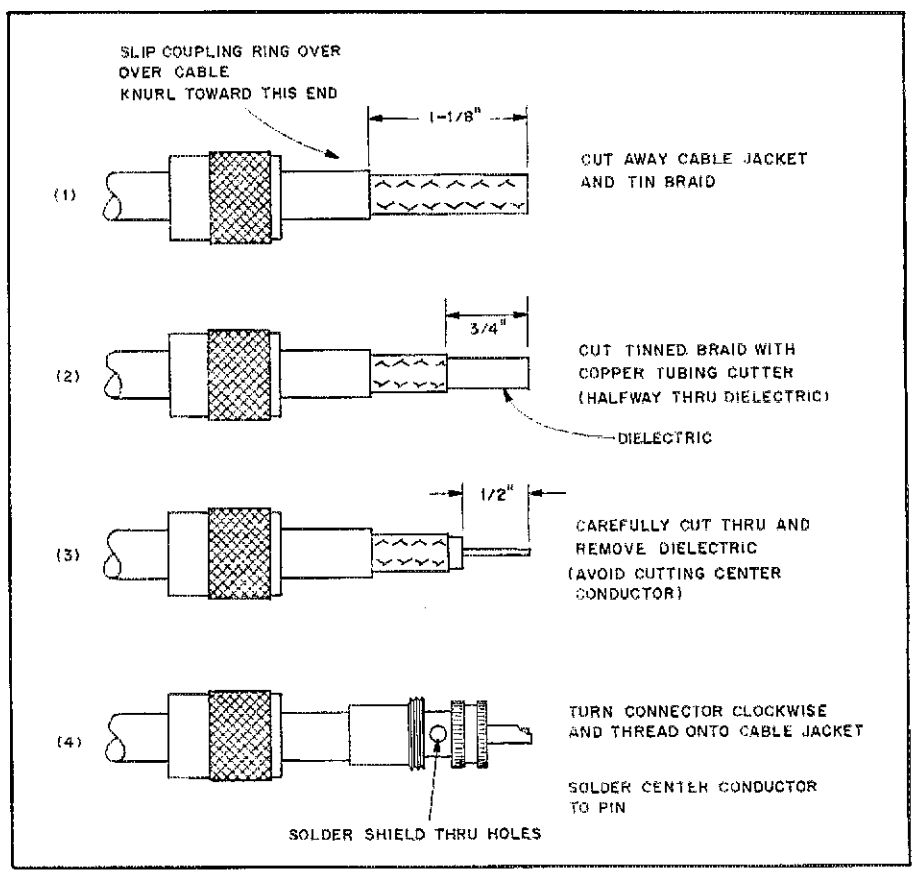


Fig 4—Ralph Hirsch's technique for installing a PL-259 on RG-8 coaxial cable. See text.

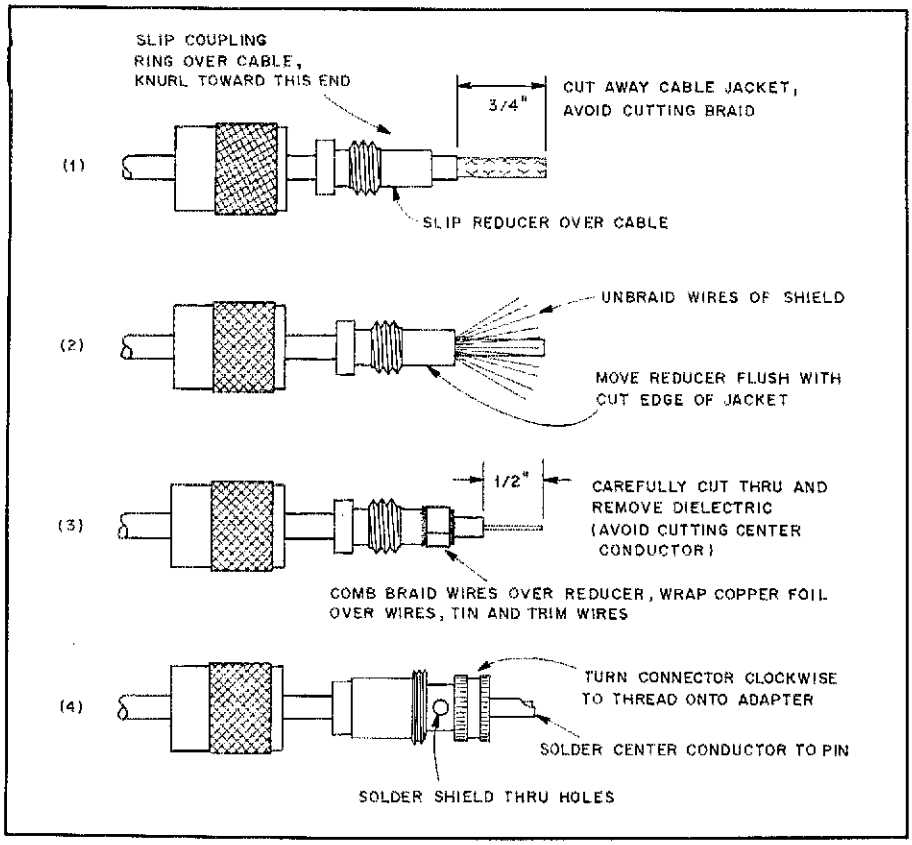


Fig 5—The Hirsch method as applied to RG-58 and a UG-175 reducer. The secret of this procedure is the copper foil used in step 3. See text and Fig 6.

shield to the connector. One is to use a small, pointed soldering iron and let the solder flow through the solder holes onto the tinned braid. If your iron will not work for this, use your high-wattage gun or iron to melt a small pool of solder in the holes, making sure that the surrounding metal is thoroughly heated. (Usually, the solder will not flow *through* the holes; instead, it pools in the holes. While the solder is still molten, use a wooden match stick to push the solder through the hole and into contact with the tinned cable shield. Next, reheat the solder so that it flows onto the tinned shield.) Further application of heat to the connector body should also cause some of the solder on the cable braid to melt, providing more braid-to-connector contact than just afforded by the solder at the holes.

Next, solder the cable's inner conductor to the connector pin, being careful not to get solder on the outside of the tip. Using an ohmmeter, check the cable/connector assembly for center-conductor continuity and shield-to-conductor shorts. If all checks out, assemble the coupling ring to the connector and your cable is ready for use.

For RG-58 cable: Because RG-58 is smaller in diameter than the PL-259, a UG-175 reducer must be used. This means further that a different connector-installation procedure must be followed than that appropriate for RG-8.

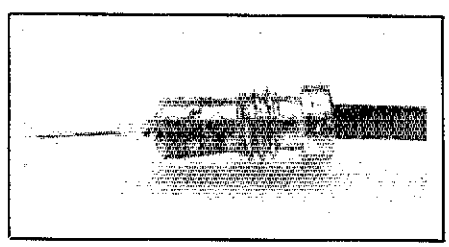


Fig 6—This reducer/cable assembly is ready to be turned into the connector body. Note the soldered copper foil cap at the narrow end of the reducer.

See Fig 5. Slip the coupling ring over the cable. Be sure the ring is facing in the right direction! Next, slip the UG-175 reducer over the cable with the thin portion of its barrel toward the free end of the cable.

Remove ¾ inch of the cable jacket, being careful not to cut the braid. Using an awl or ice pick, *completely unravel* the exposed braid. Move the reducer up the cable to where the thin end of the reducer barrel is even with the point where the jacket was removed. Carefully comb the shield strands back over the reducer barrel, spacing them as evenly as possible. Wrap a 1½-inch length of 3/16-inch-wide self-adhesive copper foil (stained-glass foil is suitable)[2] around the end of the reducer barrel so that the foil adhesive holds the strands firmly in place where they are folded over the end of the barrel.

Being careful not to melt the cable dielectric, solder the shield strands to the foil. Start as close to the dielectric as possible and continue over the foil to the other edge of the foil so that the shield strands are soldered to both edges of the foil. Keep the solder coat as thin as possible. The result is a small solder cap (the foil) with unsoldered wires underneath. Using a utility knife or razor blade, trim off any excess shield strands. (Do not attempt to lift these strands; cut through them against the barrel. You'll probably cut through some excess solder, but you should have no trouble with this step because solder and wire cut easily.)

Strip ½ inch of dielectric from the cable center conductor. (Fig 6 shows the assembly at this point.) Grasping the thick end of the reducer, and keeping the soldered cap firmly against the end of the cable jacket, screw the connector body onto the cable (clockwise), making certain that the cable center conductor moves into the connector pin. As with the RG-8 installation procedure, don't twist the cable or the reducer—hold them steady while you screw on the connector body. When the soldered cap just clears the conductor holes, solder the cap to the connector body using the technique described for RG-8 cable.

Solder the cable center conductor to the connector pin and trim off any excess wire. Check for continuity and short circuits, screw on the coupling ring, and the job is complete.—*Ralph M. Hirsch, K1RH, 172 Newton Rd, Woodbridge, CT 06525*

PL-259 Installation

☐ The time-honored method of terminating a PL-259 coax connector when using a UG-175 or UG-176 reducer has always bothered me, particularly with regard to the amount of heat necessary to melt the solder for a reliable connection. The method in question involves folding the braid back over the sleeve of the reducer, then turning the reducer into the body of the PL-259 and applying solder through the holes in the PL-259. The PL-259 has to get mighty hot before solder will flow into it properly!

I discussed this method, and my doubts as to the wisdom of applying so much heat to the assembly, on the air with a friend of mine, Ken Guge, Sr, K9KPM. Ken told me of *his* method, which is much simpler and safer. I've since used his idea myself and found it to be everything that he indicated.

To use Ken's method, tin the very end of the UG-175 or -176 reducer (the thread-

[2]A kit containing enough copper foil for several cables is available from the author for $1.50 and a large SASE. The ARRL and *QST* in no way warrant this offer.

less end) and slip the reducer onto the cable. Strip the cable back as in the standard method [see page 37-13 of the *1988 ARRL Handbook*—Ed.]. Next, *don't* fold the shield braid back over the reducer as in the standard method. Instead, unbraid the shield with a pointed tool so that it fans out radially from the center conductor. Tin the fanned braid from the center outward for about ¼ inch. Using diagonal cutters, trim the tinned braid to within about 1/8 inch of the cable jacket. Slide the reducer up to the tinned braid. Using moderate heat, solder braid to the tinned end of the reducer.

Strip and tin the cable center conductor as called for in the standard PL-259 assembly method. Using two pairs of pliers—one on the reducer collar and the other on the PL-259 body—turn the reducer/cable assembly into the PL-259 as tightly as possible. Solder the cable center conductor to the PL-259 pin, and the job is finished—in half the time necessary to do it using the standard method, I'll bet! (If you feel that a soldered bond between the reducer and the PL-259 is necessary, solder the joint at which the reducer and connector body meet. This step should not be needed, though, if you turn the reducer into the PL-259 tightly enough.)

There's a further advantage to using the K9KPM method: The PL-259 and reducer can be disassembled and reused with a minimum of bother. If you give Ken's method a try, I think you'll like it as much as *I* do. In fact, it almost makes PL-259 installation fun! (Well, I did say *almost.*)—*Dave Miller, K9POX, 7462 Lawler Ave, Niles, IL 60648*

Pros and Cons of "Solderless Solder-On" Connectors

☐ What's the purpose of seeking alternative methods of installing PL-259s? Bruce Haldeman put it succinctly in October 1987 *QST*: The goal is an installed connector having "all the integrity of a soldered connection, but with none of the usual headaches." It's safe to say that thousands of PL-259 users will use, are using, or have used, some form of "solderless solder-on" PL-259 in their radio installations. What are the pros and cons of using such connectors?

Pros: Relative ease of installation; greatly reduced chance of damage to cable dielectric by soldering heat; greater likelihood that the connector can be reused.

Cons: Unsoldered joints can deteriorate rapidly with age, especially when subjected to the elements and/or cable movement. The resultant poorly conducting joints can cause increased line loss, SWR anomalies, harmonic generation during transmission, and noise and intermodulation distortion during reception. "Solderless solder-on" techniques that do not preserve the cable shield *around the entire circumference of the cable* can allow signals to leak out of the cable and flow on the *outside* of the shield—a highly undesirable condition.

Discussion: One reason for the increased popularity of nonstandard PL-259-installation techniques may be that the UHF-series hardware commonly available nowadays is nickel plated. When UHF connectors were first introduced—and when the standard PL-259-installation technique was developed—silver-plated PL-259s were standard. (Foam-dielectric cable—which melts much more readily than standard RG-8, and which is another reason why nonstandard PL-259 installations are widespread—*didn't* exist then.) Silver takes solder readily; nickel does not.

Once out of their protective wrapping, silver-plated connectors, especially old ones, are easy to spot: They're usually tarnished. *Resist the urge to clean them.* Silver oxide is an excellent conductor; removing the tarnish just prepares another layer of silver for oxidation—and later removal by you, if you're of the "gotta get the tarnish off" persuasion. Chapter 24 of *The 1988 ARRL Handbook* (page 24-6) suggests that silver solder may give best results with silver-plated PL-259s; standard tin-lead "electronics" solders work well, however.

The best way to install PL-259s is the standard way. Well-soldered joints avoid the semiconductor effects common in poor mechanical joints because *alloying* occurs where solder meets the base metal. The best way to solder to a nickel-plated brass connector is to file, sand or steel-wool it down to brass before soldering.

Yes, soldering the cable shield to the PL-259 body takes considerable heat—and *practice* if you intend to do it well every time. But connector installation is a job *worth* doing well. Use a soldering iron or gun rated at 100 W or more—more is better. (Burton Armbrust's chewing-gum-foil hint may be of help in preserving foam cable dielectric during soldering.) Note: As far as I know, *PL-259s were never intended to be reusable.* The best medicine for a suspect, botched, or short-circuited PL-259 is a one-way trip to the trash barrel. Recovering an installed PL-259, especially if a UG-175 or -176 reducer is involved, can require enough heat, acrobatics and dangerous fumes that you'll probably wish you'd thrown out the bum connector in first place!

The best crimp-on coaxial connector is one designed for the purpose. Crimp-on connectors *are* available, at least for RG-58, RG-59 and Mini-8 cables; consider using one of these instead of a "solderless solder-on" PL-259. (Incidentally, if it's "solderless" or "crimp-on," it's not *really* a PL-259—no matter what the package says!) In my opinion, though, even designed-for-application crimp-on connectors are a second-rate alternative to *soldered-on PL-259s.*

Whatever connectors you use, seal them against the elements if you use them outdoors: Water can rapidly degrade and destroy coax if it gets inside the cable. If your station includes any crimp-on or "solderless solder-on" RF connectors, though, look to them first if you notice any of the symptoms listed above.—Ed.

CORRECTION TO THE FREQUENCY-MEASUREMENT HINT

☐ In "How to Measure Frequencies with Your Rig's 10-Hz-Resolution Frequency Display" (*QST*, July 1988, pages 45-46), I goofed in writing step 4 of the instructions on page 46. The third sentence of step 4 *should* read "Toggle back and forth between VFOs A and B and adjust VFO *A* until the pitches match as closely as possible." The original step 4 is incorrect because it tells you to adjust the pitch of the *standard* station's carrier (VFO B) instead of that of the signal being measured (VFO A).—Ed.

NEOPRENE FOAM AIDS KEYER-PADDLE STABILITY

☐ My Bencher keyer paddle slipped sideways too easily for my liking, and I didn't want to use one of the clamps resorted to by some CW operators. By experiment, I confirmed that merely increasing the area of contact between the paddle feet and a smooth surface would not significantly reduce the slippage.

I solved this problem by replacing the stock paddle feet with 1-inch-square pieces of thin neoprene foam mounted on 1 × 1 × ¼-inch pieces of plywood. Now, my Bencher is immovable to anything short of a violent swipe!—*David C. Frost, VE7FJE, 6269 Elm St, Vancouver, BC V6N 1B2*

PREVENTING SCRATCHES FROM MAGNETIC-MOUNT ANTENNAS

☐ For many years, I accepted car-finish scratches caused by my magnetically mounted 2-m mobile antenna because the victim was my old station wagon. The purchase of a new car, however, made me reexamine this problem! Some newer magnetic mounts incorporate protection for the vehicle finish, but I didn't want to purchase a new mount for this reason alone. The solution is simple: Place a small polyethylene bag around the magnetic mount. If necessary, cut a small hole in the bag to pass the antenna element.

Before taking the antenna for a drive, test it to be sure that the magnetic attraction between car roof and mount is strong enough to secure the antenna with the plastic bag in place.—*George G. Manning, K2RRR, Amberlands #27-E, Croton-on-Hudson, NY 10520* ☐

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

PASSIVE FILTER DESIGN

☐ In the interesting article, "A New Breed of Receiver,"[1] Gary mentions the need for audio-frequency band-pass filtering when using the phasing method of SSB generation. Gary used four cascaded sections of passive LC low-pass and active RC high-pass filtering. For the sake of simplicity, the first and third sections of the passive filter use two 88-mH inductors and normalized component values.[2]

I would like to recommend a special 7th-degree elliptic low-pass design (using surplus inductors). This information has been published several times,[3-7] but apparently is still unfamiliar to those needing this type of filter.

The recommended 7th-degree elliptic low-pass filter design is unique in that inductors L4 and L6 (see Fig 1) have the same value. This is not normally the case in elliptic filter design, but serves to simplify filter construction. Thus, L4 and L6 can both be 88-mH inductors, and L2 will have some larger value, depending on the reflection coefficient used. Or, L2 can be an 88-mH inductor, and L4 and L6 be of some smaller value.

If this type of elliptic filter is used in Breed's receiver, it should follow U8 and replace the existing filter. The output of U9B should connect directly to the 0.047-μF capacitor at U9D, eliminating the Chebyshev low-pass filter entirely. This placement of the new filter is recommended so any hum pickup will receive maximum attenuation from the four stages of active high-pass filtering.

Readers may also be interested in my article, "Designing LC Filters Using the SVC Filter Tables."[8] I will be happy to send a copy of the material referenced in note 5. Please include a 4 × 9-inch envelope with 45 cents postage with your request.—*Ed Wetherhold, W3NQN, 102 Archwood Ave, Annapolis, MD 21401*

EXTENDED DOUBLE-ZEPP CALCULATIONS

☐ John Reh's article, "An Extended Double Zepp Antenna for 12 Meters,"[9] is interesting from both a technical and constructional point of view; I found the 3-dB-gain figure attractive. But I wanted to build the antenna for 20 meters instead of 12 meters. Using John's article and performing some research in the *ARRL Handbook*, I reworked the calculations and came up with the following formulas. I thought other *QST* readers who wanted to build EDZs for other frequencies might find this information useful.

- A constant (984) is used to determine the electrical length of a wire in feet: W(ft) = 984/f, where f is the desired operating frequency in MHz.
- The overall length of each leg is calculated by

$$L = W \times 0.64 \quad \text{(Eq 1)}$$

- The 450-ohm open-wire matching line for a single EDZ is calculated by

$$M(sgl) = 52/360 \times 0.95 \times W \quad \text{(Eq 2)}$$

The 450-ohm line is made of no. 18 wire spaced 1-inch center to center. The line has a velocity factor of 0.95. For phased EDZs, the following calculations apply:

- The length of the 11-degree matching line is calculated by

$$M(pha) = 11/360 \times W \times 0.95 \quad \text{(Eq 3)}$$

- The length of the 4-degree matching stub is calculated by

$$S(pha) = 4/360 \times W \times 0.95 \quad \text{(Eq 4)}$$

- Spacing for phased EDZs is W/8.

The input impedance of the dipole (142 $-j$ 555) was calculated for no. 14 wire. The *ARRL Handbook* defines the characteristic impedance of no. 12-14 wire as 500-600 ohms at a height of 10 to 30 feet. If you use other wire sizes for the dipole itself, the matching section length may require changing, so start with a longer matching section and trim it as required.

For a 20-meter EDZ, the numbers worked out this way: The antenna has an overall length of 88 feet and a 9.53-ft matching section. A 10-m phased EDZ looks quite easy to build, and should exhibit a gain of 8 dB over a dipole. I'm not sure if this design approach will work for 2-meter-band antennas, but the dimensions look quite manageable.—*Bob Mandeville, N1EDM, 94 Florence St, Brockton, MA 02401*

WHAT IS AN RF GROUND?

☐ *RF ground* is a vague term: People claim they know what it is when they see it, but can't define it. Many radio amateurs are easily misled by untruths about RF grounds. What follows is by no means the last word on RF grounding, but should help fill a void in the radio amateur's literature.

In my opinion, an RF ground is something that presents a low impedance at all frequencies of interest on the desired ground surface. *All frequencies of interest* usually means just the transmission frequency and all spurii. *Spurii* usually include harmonics, but may include mixing products. The *ground surface* is the tricky part. *What* do you want to be at ground potential? Surely you don't expect your microphone to be at ground potential on all frequencies, do you? Think about it: A coiled microphone cord is a bigger radiator than many "rubber duck" antennas! With proper matching, you could probably make

[1]G. Breed, "A New Breed of Receiver," *QST*, Jan 1988, pp 16-23. See also Feedback, *QST*, Apr 1988, p 47.
[2]J. Hardy, *High Frequency Circuit Design* (Reston: Reston Publishing Co, 1979), Chapter 4, Table 4-2, Normalized component values for Chebyshev filters, 5th order, 0.5 dB.
[3]E. Wetherhold, "Low-pass Speech Filter Using Surplus Inductors," *QEX*, Jun 1983, pp 10-11.
[4]E. Wetherhold, "Simplified Elliptic Lowpass Filter Construction Using Surplus 88-mH Inductors," *Radio Communication*, Apr 1983, pp 318-321 and 323.
[5]E. Wetherhold, "Elliptic Lowpass Filter Design," *ham radio*, Feb 1984, pp 20-28.
[6]William I. Orr, *Radio Handbook*, 23rd ed (Indianapolis: Howard W. Sams, 1987).
[7]E. Wetherhold, "Inductance and Q of Modified Surplus Toroidal Inductors," *QST*, Sep 1968, pp 36-39.
[8]E. Wetherhold, "Designing LC Filters Using SVC Filter Tables," *QEX*, June 1988, pp 8-10.
[9]J. Reh, "An Extended Double Zepp Antenna for 12 Meters," *QST*, Dec 1987, pp 25-27.

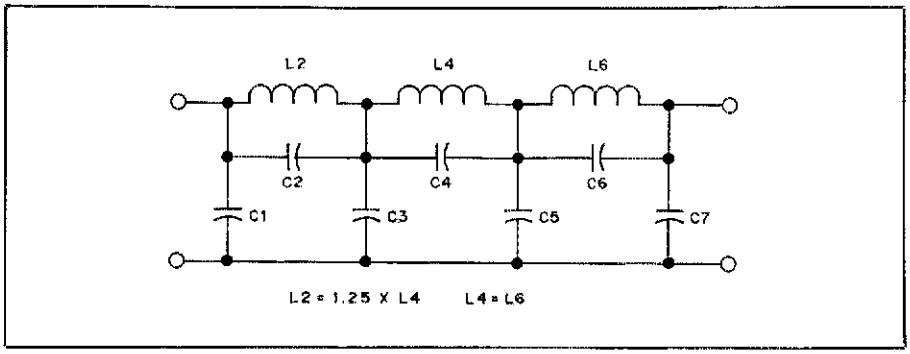


Fig 1—Schematic of a typical 7th-degree elliptic lowpass filter. Inductor values are discussed in the text. Also, refer to the literature referenced in notes 3 through 7, inclusive.

a better antenna out of the mic cord shield! In this case, *low impedance* means "small reactance and resistance." Some radio amateurs just look at the resistive part of the impedance and forget about the reactance, which often is huge!

The *size* and *shape* of conductors are very important in evaluating a ground surface. Take, for example, a tall, thin aluminum structure that is grounded at one end. No matter how well you ground that one end, the structure still radiates and receives RF energy—that's why it's called an *antenna*. The shape that offers the lowest impedance is a sphere. (The Earth is a pretty good approximation of a sphere.) Size is also important—you wouldn't expect a metal-covered tennis ball to present a low impedance on 160 meters.

Now that we have some idea what a ground should be, the question remains as to how to achieve it. It's pretty ridiculous to have to buy a large metal sphere the size of the Earth just to get a good ground (although it would work well!). The closest practical approximation—a short, thick wire connected to the Earth—works pretty well as long as the wire is much shorter than a *wavelength*. Notice that I said *wavelength*. If you expect your "good RF ground" to eliminate the second harmonic of a 10-meter signal (56 MHz), you need a wire *much shorter* than 8 feet long. (No, *four* feet is *not* much shorter, and would not work. In fact, a 4-foot "grounding wire" hooked up to the Earth might be a good *radiator* at 56 MHz. *Much shorter* means 2 feet or less in length—at 56 MHz, that is.)

Following this line of reasoning, it may seem impossible to get a good ground at UHF. Actually, you can get a good ground at UHF by using a large metal plate, which is often called a ground plane. A large, flat surface also presents a low impedance at UHF. (Yes, a "flat Earth" would work just as well as a spherical one—at least in terms of grounding—if you were far enough from its edge.)

But if you live in a second-floor apartment (as I do), how do you get a good HF ground? First, you should determine whether or not a ground is needed. (An ac ground should be considered a necessity for those operating equipment from commercial power lines.) Many antennas, however, such as dipoles and loops, operate just fine without an RF ground.

As for TVI, many amateurs mistake TV fundamental overload as a grounding problem. (It is highly unlikely that TV sets will ever be designed to operate in a strong RF field.) First, install a high-pass filter on the TV set. If the transmitter is indeed radiating energy on a TV channel, try to improve the transmitter shielding, and try an absorptive harmonic filter (See the *1988 ARRL Handbook*, p 40-9). Grounding will help if the chassis or mic cord of the rig is hot with RF. In this case, a quarter-wave, tuned counterpoise will provide grounding at one frequency (and its harmonics) on a small surface area. Grounding may or may not help situations involving RF feedback. It may be easier to dissipate and isolate the RF from various cords and wires using ferrite beads and toroids.

Some people have asked me about measurement techniques for evaluating RF grounds. Well, if you connect a meter between two points that are at the same RF voltage, you may get a nonzero reading anyway! The meter leads can act as a loop antenna that can be expected to pick up RF fields. If you find an easy way around this problem, let me know about it.—*Zachary Lau, KH6CP, ARRL Lab Engineer*

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

Feedback

☐ Author Paul Newland, AD7I, reported a couple of errors in his article "The AD7Iambic Cheap Keyer," *QST*, Jun 1988, p 38. In the sidebar, Cheaper's Circuit Operation, on p 40, the last sentence in the third paragraph should read: "This is because U1A and U1D are configured as inverters." Also, in the fourth line of the last paragraph in the sidebar, the diodes referred to should be D1, D2 and D3, not D4, D5 and D6.

☐ Refer to "An All-Band, 1500-Watt-Output 8877 Linear Amplifier," *QST*, Oct 1986, p 26, Table 2. L3 and L4 are each wound on three T225A-2 cores. A typographical error in June's Feedback item on p 52 incorrectly identified the cores as *L2* and L4. *(Tnx Dick Cunningham, W3UJD.)*

☐ Please refer to "Estimating Toroidal Core Characteristics," Technical Correspondence, *QST*, Jul 1988, p 48. A radical sign is missing at the right of Eq 9. It should be:

$$N = \sqrt{\frac{L}{1.23}} \quad \text{(Eq 9)}$$

New Products

NAVAL ELECTRONICS HT AUDIO BOOSTER

☐ Naval Electronics' HTS-1 is an amplified, 3½-inch oval speaker designed to provide room-filling audio output from a hand-held radio. The unit has 10 dB of audio gain, is housed in a die-cast enclosure and is supplied with a 5-foot cable with a ¼-inch plug on the radio end. A battery saver circuit in the HTS-1 turns the speaker amplifier off after audio input is removed for more than 10 seconds. An audio-sensing circuit turns the amplifier back on when audio is applied. The unit is powered by an external 5- to 15-V source or by 4 AA cells. NiCd cells can be charged in the

HTS-1 during operation from an external power source. An LED indicates amplifier status. Manufacturer's claimed specifications are as follows: Maximum audio input: 100 mV; Input impedance: 100 Ω; Frequency response: 200 to 15,000 Hz; Audio output: 1 W (in a 4-Ω speaker). Price, $29.95. More information is available from Naval Electronics Inc, 5417 Jetview Cir, Tampa, FL 33634, tel 813-885-6091.—*Rus Healy, NJ2L*

ENGRAVED CALL-SIGN DISPLAY

☐ An attractive and sturdy call-sign plaque made of brass, with your call sign silk-screened on a glass cover with a red, green, blue or black velvet backdrop, is available for $24.95 postpaid from WA9YWJ Products, Inc, 907 Baxter Ave, Superior, WI 54880, tel 715-394-4418.—*Rus Healy, NJ2L*

New Books

FERRELL'S CONFIDENTIAL FREQUENCY LIST

Reviewed by David Newkirk, AK7M

Compiled by Geoff Halligey. Published by Gilfer Associates, Inc, 52 Park Ave, Park Ridge, NJ 07656. Seventh Edition, 1988. Softcover, 6 × 9 inches, 376 pages, $19.95.

If you own a general-coverage receiver or an MF/HF transceiver that includes a general-coverage receiver, you've probably already discovered that the frequencies between Amateur Radio bands are packed with radio services. With the exception of short-wave broadcasting stations, however, identifying the many stations you hear between the ham bands can require much more detective work than just waiting for an ID or news to come up on the hour!

Ferrell's Confidential Frequency List is the seventh edition of Gilfer Associates' well-known guide to HF nonbroadcast/nonamateur stations. The title is appropriate: About 85% of the book is devoted to a list of such stations from 4000 to 27,998 kHz, inclusive. The list's six columns detail frequency (usually to the nearest 100 Hz); emission mode and related information (frequency shift and transmission speed for RTTY stations, for example); call sign or identifier, if known; location; service; and remarks pertaining to station schedule, ownership and purpose. The frequency listing is interrupted at intervals to indicate band limits—where, for instance, a fixed-service band ends and a maritime-mobile-service band begins. The list also includes a few out-of-band broadcasting stations—"at about every 50 kHz, where they exist"—that can be used as markers by listeners using receivers without digital frequency displays.

But the *CFL*—as quite a few short-wave listeners have come to call it—isn't just a list of stations by frequency. The Introduction explains how to use the list and includes a discussion of communications—some of them quite mysterious—commonly heard at HF. Also included are seven maps (one showing NAVAREAs [the 16 world zones for which maritime navigation warnings are issued], one showing world time zones, and five showing International Civil Aviation Organization HF areas) and three lists (call signs [call signs in alphanumeric order, with station location and service], frequency allocations by frequency [from 1600 to 28,000 kHz, inclusive], and frequency allocations by service).

How useful is this book? I'll just say this: Not long after the review copy hit my desk, I bought *my own* copy so I could add notes to the *CFL* without defacing the review book! Why do I annotate my *CFL*? For one thing, I've found that information about a given station or frequency is more "re-findable" in the *CFL* than it is in my listening log! Reason no. 2: Like *any* list of frequencies assigned in today's busy radio spectrum, the *CFL* is a work in progress. In this connection, the book concludes with a request that changes and updates to the *CFL*'s content be sent to the *CFL* editor in care of Gilfer Shortwave. I figure that I can't send 'em in if I don't write 'em down.

If *you* like to explore radio goings-on between the HF ham bands, your copy of the seventh *Ferrell's Confidential Frequency List* may be as dog-eared as mine *will* be by the time the *eighth* edition comes off the press!

GUIDE TO UTILITY STATIONS

Reviewed by David Newkirk, AK7M

By Joerg Klingenfuss. Published by Joerg Klingenfuss Publications, Hagenloher Str 14, D-7400 Tuebingen, Federal Republic of Germany. Sixth (1988) edition, 1987. Softcover, 9-3/8 × 6-5/8 inches, 494 pages and three fold-out maps, $24.95.

Many SWLs call nonbroadcast/nonamateur stations *utility* stations, and the *Guide to Utility Stations* derives its title from this term. The core of the *Guide* is a listing, in frequency order, of nonbroadcast/nonamateur stations from 9 to 30,000 kHz, inclusive. (Note: This portion of the book concentrates on the spectrum from 1605 to 30,000 kHz, inclusive. Only 30 stations are listed below 1605 kHz; all of these are between 15 and 150 kHz. Thus, the *Guide* doesn't cover LF/MF beacons and CW coast stations in the vicinity of 500 kHz.) The four columns of this listing show frequency (to the nearest 100 Hz); call sign or identifier; station name and International Telecommunication Union (ITU) country/geographical symbol; type(s) of modulation used (type-font variation is also used to convey this information; for example, RTTY stations are shown in bold) and, if applicable, the frequency on which the station responds to calls. For RTTY and FAX stations, this column may include details of the traffic monitored and/or schedule information. The list is interrupted at intervals to indicate band limits.

The *Guide* lives up to its name by providing far more information than that condensable into a listing of stations by frequency. Here are the highlights:

- Frequency allocations. Extracts from the ITU *Radio Regulations* (RR) concerning frequency allocations from 9 kHz to 150.05 MHz, inclusive, including the ITU Table of Frequency Allocations and applicable footnotes for this range.
- Extracts from the ITU RR concerning the identification of stations, including a listing of call-sign-formation possibilities by service.
- List of international call-sign prefix allocations.
- List of utility stations in alphabetical order by call sign, with name, ITU country/geographical symbol and operating frequencies for each station.
- RTTY press services in alphabetical order by country; within each country listing, by frequency. Each frequency entry shows call sign, operating schedule and language of transmission.
- RTTY press services in chronological order by time of UTC day. Each listing shows originating agency, transmission language and frequencies used.
- Meteorological RTTY stations in alphabetical order.
- Meteorological FAX stations in alphabetical order.
- NAVTEX (navigation and weather warnings, and urgent information) transmissions on 518 kHz.
- Phonetic alphabet and figure code.
- Q code.
- Z code.
- Signal reporting (SINPO and SINPFEMO) codes.
- Designation of emissions. Extracts from the ITU RR concerning emission designations and how they are derived.
- List of ITU abbreviations for class of station.
- Terms and definitions as used in the ITU RR.
- ITU Aeronautical Mobile Service (AMS) regulations, including the AMS Frequency Allotment Plan (by areas).
- Extracts from the ITU Maritime Mobile Service (MMS) regulations, including a table of frequency usage (station and emission type, and channel spacings) in the MMS bands.
- Telegram format regulations and telex abbreviations.
- Country list and addresses of utility stations.
- Abbreviations used in the *Guide*'s frequency list of utility stations and in radio traffic.
- Three fold-out ITU maps: (1) Major World Air Routes Areas; (2) Regional and Domestic Air Routes Areas; and (3) VOLMET (aviation-weather-transmission) Allotment and Reception Areas.

Whew! There's a *lot* of information in the *Guide* above and beyond that pertaining to the mere identification of signals. I find such a presentation refreshing because I like to know *why* I'm hearing a station in addition to knowing *what* I'm hearing. (When I got involved with short-

wave listening in the late 1960s, books like the *Guide to Utility Stations* were next to nonexistent—and so was my knowledge of how radio is organized on an international scale.) The *Guide*'s coverage of the regulatory aspects of nonbroadcast/nonamateur HF communication is of particular importance to SWLs who wish to take advantage of excellent general-coverage receivers and multimode communications processors to intercept and demodulate commercial RTTY, TOR/SITOR, FAX and related transmissions.

If you're addicted to between-the-hambands HF listening, the *Guide to Utility Stations* belongs right beside your receiver.

WHICH BOOK SHOULD I BUY?

This month, New Books contains reviews of two books that cover the same topic—nonbroadcast/nonamateur stations—in different ways. What these books have in common—a frequency listing of such "utility" stations—is probably their major draw. Compared on this basis, is one book preferable to another?

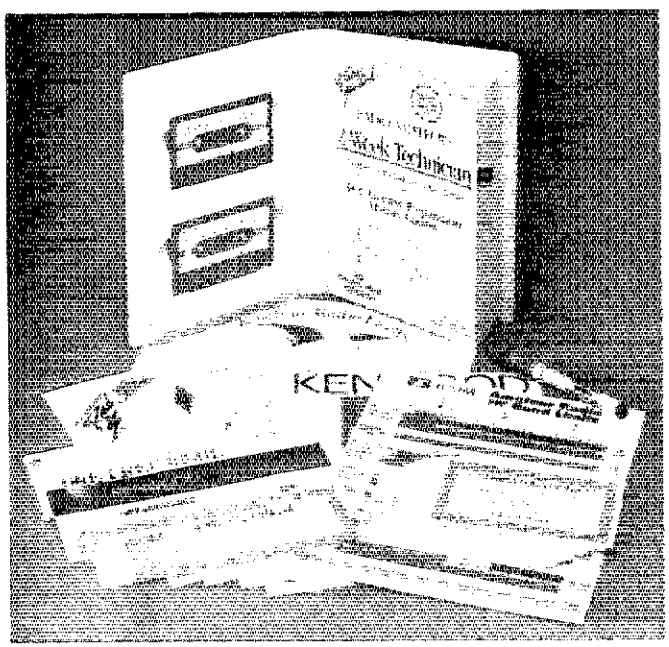
I think not. It's safe to assume that no single information source, not even ITU publications, lists every active station in a given segment of the HF range. Both of the books reviewed this month include information gleaned by worldwide monitors, yet their listings differ. For instance, the Europe-based *Guide to Utility Stations* ("the most actual, comprehensive and reliable manual in existence," according to one of its rear-cover blurbs) does not contain a listing for NAA, the US Navy's powerful 10.130-MHz RTTY station at Cutler, Maine. North American hams who frequent 30 meters are quite familiar with this station; it's listed in Gilfer's *Confidential Frequency List*, too. On the other hand, I can tell that monitor/writer/publisher Klingenfuss works hard to keep the *Guide* up to date because he noticed that the Italian Navy's IDR8, 3039 kHz—formerly one of my favorite low-end-of-the-HF-range European markers—went silent shortly after the 1987 *Guide* was published. The Gilfer book doesn't cover frequencies below 4 MHz.

I offer these examples not to pit one book against the other—a useless exercise—but to emphasize the point that if you're interested in nonbroadcast/nonamateur activities at HF, *both* of these books, in addition to any other serious efforts at covering this subject, deserve a place in your listening post. Changing technology, propagation conditions and station fortunes make HF usage so variable that SWLs need as many reliable information sources as they can find.
—David Newkirk, AK7M

New Products

GORDON WEST'S RADIO SCHOOL TECHNICIAN CLASS LICENSE COURSE

☐ Radio School's Technician class course is designed to help the Novice class licensee prepare for the upgrade to Technician class. The course is geared exclusively to the Technician class license, and is composed of a book and two audio cassettes that contain theory and regulations for the Technician class license test, including recorded sounds of RTTY and packet-radio signals, and VHF propagation modes (such as tropospheric ducting). Also included with the course are $50 in coupons toward Amateur Radio equipment, and charts of HF and VHF spectrum allocations. Price, $19.95 plus $2 shipping ($4.95 plus $1 shipping for the book, charts and coupons only). Available from Radio School dealers or direct from Gordon West's Radio School, Inc, 2414 College Dr, Costa Mesa, CA 92626, tel 714-549-5000.—*Rus Healy, NJ2L*

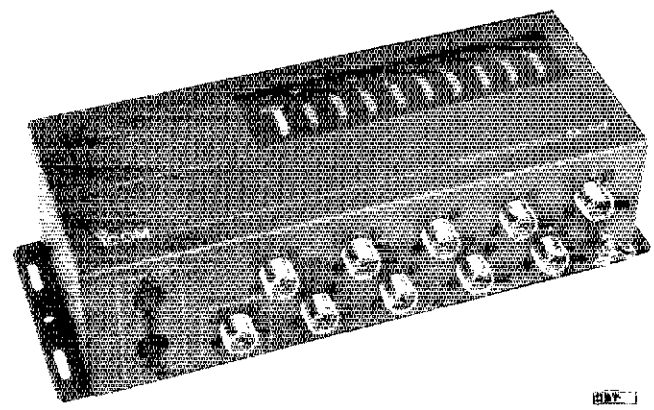


ICOM IC-3210A DUAL-BAND FM MOBILE TRANSCEIVER

☐ ICOM has added another FM mobile transceiver to their popular line. The IC-3210A covers the 144- and 440-MHz amateur bands, has full-duplex cross-band operating capability, runs 25 W output on both bands, and has 20 memory channels and one call channel per band. The memories store transmit operating frequencies and offsets, and subaudible tone. Programmed band scanning and memory scanning are available. The programmed-scan mode scans between two preset end frequencies, and during memory scan, all memory frequencies (except those you lock out) or memories on either band can be scanned. Other IC-3210A features include repeater-input monitoring capability and priority frequency watch. For more information, contact ICOM America, Inc, 2380 116th Ave, PO Box C-90029, Bellevue, WA 98009-9029, tel 206-454-8155.—*Rus Healy, NJ2L*

ICOM EX-627 AUTOMATIC HF ANTENNA SELECTOR

☐ ICOM has introduced an automatic antenna selector designed to match their line of MF/HF transceivers. The EX-627 (shown below) can select up to nine antennas, and handles 1 kW of RF power (into a load with an SWR of less than 3:1) from dc to 30 MHz. Input and output impedances are 50 Ω unbalanced. The EX-627 is capable of manual antenna switching (for use with non-ICOM MF/HF gear). A jumper matrix allows quick programming of which antenna(s) are to be selected for a given band of operation. Dc power requirement is 13.8 V at 90 mA, and if used with an ICOM transceiver, dc is supplied to the EX-627 through the supplied accessory cable that connects to the rig. Suggested price, $315. For more information, contact ICOM America, Inc, 2380 116th Ave, PO Box C-90029, Bellevue, WA 98009-9029, tel 206-454-8155.—*Rus Healy, NJ2L*



A W1AW Vignette:

The Night the Governor Came to Call

Here's a tale of a time when Murphy took the night off, much to the relief of everyone involved!

By Charles R. Bender, W1WPR
Chief Operator, W1AW

Every once in a while, an idea emerges that at first seems terrific. Because of one complexity or another, such great ideas sometimes never come to fruition.

Such would seem to have been the fate of the League inviting Connecticut's Governor, the late Ella Grasso, to visit W1AW and possibly get on the air and talk with a few amateurs.

Surprisingly, the offer was accepted. It seemed like a natural to tie the visit with Amateur Radio Week and the amateur satellite program. So, it was arranged that Mrs Grasso would visit W1AW on Tuesday evening, October 28, 1975, and make some contacts, if possible, via OSCAR 6. Orbit 13879 would be within range that evening between 7:40 and 8:01 PM local time, which would leave us a scant 21 minutes to access the satellite.

But then the "what ifs" took over. What if the equipment didn't work, or we couldn't access the satellite, or if everything worked fine but there was nobody to contact? What if the Governor was late and we missed the pass? If ever there was a golden opportunity for things to go wrong, this was it!

It had not occurred to me that governors had security staffs. I was therefore somewhat surprised when, a few days before the 28th, a couple of large men appeared and identified themselves as security officers. They looked over the station, wanted to know exactly what our plans were, who would be here, and so on. Apparently we made a good impression, as the only restrictions imposed were a parking ban in the immediate vicinity of the station and that no one would be allowed to enter after the Governor arrived.

On Sunday evening, W1AW conducted a dress rehearsal, and several stations were contacted on the corresponding orbit, so it looked like, barring unforeseen complications, everything should go okay. The station was configured such that the Governor would sit at one operating position with just a microphone and speaker in front of her. The control operator would be at a separate position and would operate the transmitter, receiver and antenna rotator controls, and make the necessary identifications.

The big evening arrived! The first hurdle was cleared when the Governor arrived 10 minutes *ahead* of schedule. She was introduced to the dignitaries and League staff present, and then took her seat at the controls. This was a south-to-north pass, so the antennas were aimed to the south. Everyone waited with bated breath as the acquisition time neared. Finally it was 0045Z and the passband suddenly came alive. There was YV5ZZ in Venezuela coming through loud and clear! Contact was quickly established and the Governor exchanged pleasantries with him. Not a bad way to start a gubernatorial WAC or DXCC! Next, W3BWU near Pittsburgh called in, and was followed by W4NUL/5 in Oklahoma. By this time the Governor was obviously enjoying herself. A few more short contacts were made (with W5VY, WØCY, W1NU and W1FTX) before the satellite passed beyond the northern horizon. There was a collective sigh of relief as "Murphy" was nowhere to be found; everything had worked out perfectly!

The late Gov Ella Grasso

The Governor expressed her thanks to all involved and made a quick exit, undoubtedly to tackle more pressing affairs of state. But it was a visit that will be long remembered as part of the proud history of the Maxim Memorial Station.

How to Contribute to the W1AW Renovation Drive

"The Night the Governor Came to Call" is part of the rich and colorful history of the Maxim Memorial Station, a station that has served the Amateur Radio public nonstop through daily code practice transmissions, amateur news bulletin service and general on-the-air operating for the past 50 years. Today, the W1AW installation needs to be completely refurbished, inside and out, so that these services can continue to be provided into the year 2000 and beyond. As indicated in April *QST* and succeeding issues, we need your support to make it happen for a new dedication scheduled for 1989. Here's how to contribute to the W1AW Fund Drive:

- **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St, Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.
- **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Please be as generous as you can to help W1AW maintain its leadership on the frontlines of Amateur Radio technology. Thank you.

Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing $1000 or more.
- *Hiram Percy Maxim Club:* Contributions of $500-$999
- *W1AW Century Club:* Contributions of $100-$499
- *W1AW Booster Club:* Contributions of up to $100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than $1000.

Thanks, W1AW . . .

● *Enclosed please find my check as a contribution to the W1AW Renovation Fund.*

W1AW has been on the air almost exactly the same length of time as I have, and has been worth a lot over the years as a source of information plus a lot of other things including code practice. I don't think I would be able to stay with the high-speed Russian DX artists if it were not for a lot of hours spent listening to code practice from Connecticut!

I doubt if I can make another 50 years, but I hope W1AW can. Regards—Paul A. Freeland, W9FF, Ladd, IL

● *I am enclosing a check for the W1AW Renovation Fund.*

Good luck with your project. W1AW and QST *have certainly been good to me for about 28 years! 73*—Flora Johnson Kramer, WØRLR, Ojai, CA

● *Please find enclosed a check to help rebuild the W1AW Headquarters station.*

Back in the sixties I was pleased to have bought a few bricks for the ARRL Headquarters building.

In August of 1989, I hope to celebrate 60 continuous years of membership in the ARRL.

What a wonderful organization! 73—W. O. "Andy" Anderson, W5UBU, Deming, NM

● *It is a pleasure to send you a contribution, all I can spare, but a token of my appreciation for the wonderful service you provide radio amateurs, young and old.*

I particularly have availed myself of the code practice sessions and qualifying runs and am trying to earn my 30 and 35 WPM decals.

If each and every ham would send in a contribution, think of how easily the renovations could be financed.

Don't thank me. Let me thank you.—Peter T. Hulth, Jr, KB4RJZ, Smithfield, NC

● *My contribution towards the W1AW renovation is enclosed.*

The renovation is very much needed, so that visitors will see a state-of-the-art working Amateur Radio station.

I'm happy to be able to contribute! 73—Kay Craigie, KC3LM, Devon, PA

● *Here is a small thank you for all the help you have been to me: First the code practice (without which I would not have a license), then the bulletins and DX news. I'll be listening for the next qualifying run. Keep us informed of your progress.*—Kevin B. Haywood, N4QVC, Dublin, GA

● *As a small lad living in the mountains of West Virginia during the early sixties, I first discovered Amateur Radio, the addiction to which has never slackened. My mentor, Andy Timberlake, W8MN, introduced me to the ARRL and to W1AW.*

I copied CW and studied How to Become a Radio Amateur *and the* License Manual *until I passed my Novice exam in 1963. Your code practice transmissions helped me clear the 13-WPM hurdle and then the 25-WPM hump. Your call evokes the altruistic spirit of Maxim. The American Radio Relay League and Amateur Radio led me to jobs as radio announcer, US Air Force radio op, industrial electronics sales rep, and finally to a career as a communications officer in the Foreign Service.*

Please accept the enclosed check as a token of my appreciation for services rendered to me and the amateur community through the past 50 years. 73—Dave Heil, J52US (K8MN), Communications Programs Officer, Bissau/Dept of State, Washington, DC

● *Best wishes for successful fund drive for W1AW.*

We sincerely appreciate all you are doing on behalf of ham radio operators worldwide. It is a privilege to be a member of the ARRL. 73—Dolph H. Grolock, Jr, KB2AW, Spencer, OK

Kilowatt Club Contributors

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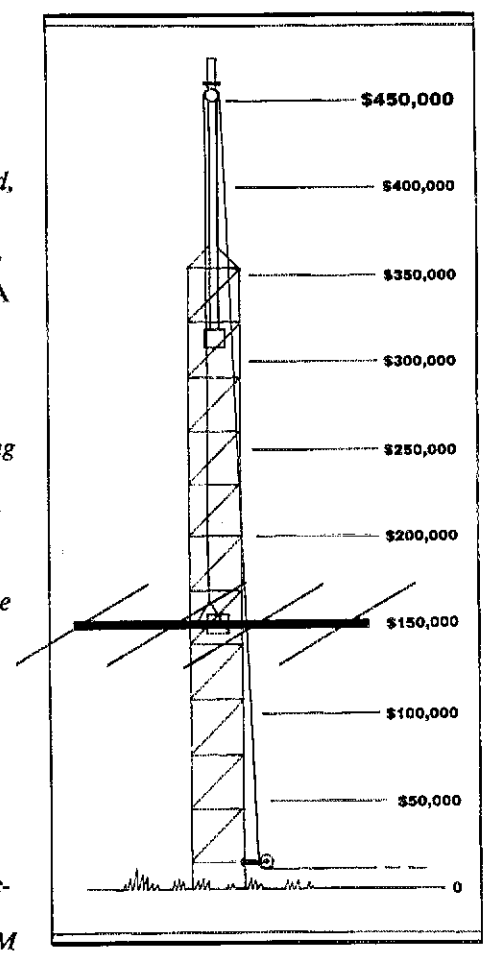


Elmers Who Made a Difference

Amateurs never forget their Elmers. Three hams fondly remember Harold, Harry and "Daddy-O" for the inspiration and guidance they gave.

Harold Derusha, W2DFV: A Special Relationship

During the early years of life, there are individuals and activities which influence and shape a person's character and direction in life. For some, the individuals may be their parents, a minister or a teacher, and the activity may be a sport, a particular subject in school or even a hobby. This is dedicated to all those who have held out their hand to help another, and to the wonderful world of Amateur Radio.

The Three Rs

My early school years had little meaning other than learning the necessary mechanics of the three Rs. My parents, like many others, decided that I would go to college and have it better than they did. They never seemed to understand that college is not for everyone and that an education without direction is meaningless.

Don't get me wrong; I have great parents and they have always been very supportive, although they could never see what Amateur Radio could do for me (sound familiar?). In fact, they thought it would have a negative effect by taking up my time, time that should have been devoted entirely to studying and preparing for college.

A Spark is Kindled

My first exposure to electronics and radio was at age 10, when I put my first crystal radio together. It was an AM broadcast radio with a cat's whisker (that's a diode detector to you younger folks) and a large coil. I didn't know a thing about Amateur Radio at the time; as far as I was concerned, a ham was something we had for Sunday dinner.

It was some years later that the spark was rekindled one afternoon while playing baseball at the local park. A ball was hit over a hedge into a yard. My friend Bill (now K2NJ) and I went around the hedge to get the ball and were confronted by an elderly man holding out the ball. "Did you lose this?" he asked. We could see by his smile that we weren't going to get yelled at, and we thanked him for getting the ball for us.

Bill and I noticed two unusual-looking antennas (a 10-meter three-element beam and a 20-meter dipole), so we asked him what they were. "Those are my ham antennas," he replied. We asked him what they did and he said, "Come on in the house and I'll show you my ham shack." From that moment, there were two 14-year-old boys who would never be the same again.

Harold's ham shack was in the basement, where we were greeted by his wife, Tess. Like Harold, she had a big smile; she got us cookies and milk while Harold showed us his equipment. He had a DX-100 transmitter, an NC-300 receiver and a sign proudly displaying the call sign "W2DFV."

Harold Derusha, W2DFV, in his shack in 1970. (*photo courtesy WA4ETN*)

Harold turned on the equipment and began pounding out a CQ on his home-made brass key. When he completed the CQ, the receiver came to life and we heard a reply of dits and dahs. Harold said he had made contact with a station in Germany and that he was exchanging signal reports and handles (I thought a handle was something on a pot to keep you from burning your hand). Well, after that Bill and I knew we wanted to be hams and would do whatever it took to make it happen.

Harold told us we had to pass a code and theory exam at the FCC in order to get on the air. He told us about the license manual and offered to help us learn the code and theory.

Harold, a retired tool and die maker, was 65 when Bill and I met him. Along with his electronics knowledge, he could make anything out of steel and wood, a valuable skill to early hams since their equipment was home brew. I liked to listen to Harold tell stories of the old days when spark-gap transmitters and battery-powered breadboard equipment were state of the art. The early ham had to be resourceful and imaginative, since he couldn't just run down to the nearest radio store and buy a receiver and transmitter. Harold was no exception—his shack was full of home-brew equipment.

Mom and Pop Derusha

As I learned from Harold, a close bond developed, with Harold and his wife becoming like a second set of parents. I called them Mom and Pop Derusha and was treated like a son. Harold was always patient and supportive, and told me that school should always come first. With the help and support of this wonderful man, Bill and I got our Novice licenses and assembled our first meager stations. Our transmitters were constructed of parts from discarded TV sets. My receiver was the only piece of commercial equipment I had, bought with money I saved from my paper route. I made many contacts using my home-brew equipment and will never forget my early years in Amateur Radio.

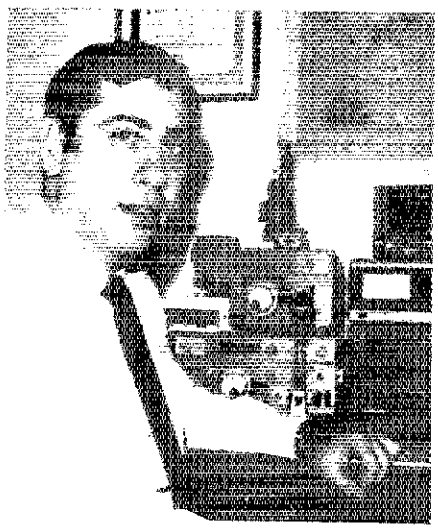
Bill and I went on to get Extra Class licenses and have been active radio amateurs for the past 25 years. By the way, I did go to college, and Bill and I both work in the field of communications.

As the years went by, Harold and I always maintained our special relationship, even though we were separated by many miles. I guess I will never know what direction my life would have taken if I had never met Harold and been introduced to Amateur Radio, but I do know that I am a better person today for having known him and having become a ham. Harold became a Silent Key five years ago, but his spirit lives on in all those who knew him and were touched by his kindness and understanding.

I hope by writing this that I can, in some small way, express my gratitude and appreciation to the man and the hobby that have meant so much in my life. I only hope that some day I may be able to reach out to help another find what I have enjoyed over the years.—*Bob Varone, WA4ETN*

Bob Varone, WA4ETN, was first licensed at age 16 in 1963 with the call WN2GLI, and became WB2GLI when he upgraded. When he moved to Fort Lauderdale, Florida, he received his present call. He moved to Lilburn, Georgia in 1981 and upgraded to Extra Class in 1983. Bob enjoys the low bands and can usually be found in the middle of pileups on SSB, CW or RTTY.

Bob credits Amateur Radio as being responsible for finding his vocation, electronics and communications, at an early age. His 22-year career so far has included everything from computers to satellite earth-station electronics and antennas.



Taking a break from operating is Bob Varone, WA4ETN. (*photo courtesy WA4ETN*)

He is currently Operations Manager of the Meeting Channel for US Sprint, which provides videoconferencing services. Communications links are provided by fiber optics and, in the case of overseas connections, by satellite.

Active with the Gwinnett Amateur Radio Society, where he serves on the repeater technical committee, he is also Assistant Chief Volunteer Examiner Coordinator for the Central Alabama VEC, Inc and runs one test session per month.

Harry Davis, W3FDY: In the Beginning

They tell me Amateur Radio is a hobby. Someone who is interested in electronics, in tinkering and playing with radios is a candidate for this hobby. Some people think of it as a mode of communication or a way of knowing people in far-off lands.

Whatever it is to each person, it had a beginning, and usually that beginning started with an Elmer. An Elmer, or beginning, is someone or something that started us in the world of Amateur Radio. My Elmer's name is Harry. I was first introduced to Harry by radio.

My First Radio

In 1963 my grandfather gave me an old RCA receiver. It was from the 1940s and about 4 feet high; if you can remember an old Bill Cosby routine where he explains about listening to the Phantom on an old radio with a million knobs, a big clock-like face and only one knob that worked, that was my first radio. With a little tinkering, I got some of the other knobs to work and was able to listen to medium-wave and shortwave, including 75-meter phone.

I can vividly remember hearing W3FDY, Harry, every Saturday morning, talking to his ham radio buddies. Their conversations were magical to me. In listening to those voices, I learned many things about radio. I lived through many crazy experiments with their antennas and reverberations on AM. I learned about the individuals, their voices, their likes and dislikes, and even their troubles.

Harry's Mountain

It seems somehow odd, but I felt I knew these people, especially Harry. He always had an opinion about everything. Some guys called him "The Voice of Parkbury, Pennsylvania." And his ham shack, Studio B as he sometimes called it, sounded like an amazing place to be. It was on "Harry's Mountain," which I always thought was a tale.

To a 12-year-old boy, all of this was quite an experience. I enjoyed those Saturday mornings. I learned the spirit of Amateur Radio on the air. This is where I was injected with "the bug."

Time went by swiftly. The old RCA bit the dust. I started high school, and it wasn't until 1969, while in the Navy, that I got my ham ticket.

But it's the way with all Elmers that you never forget. In 1985, while driving down I-95 to work and listening to the local repeater, I received my first déjà vu of that RCA receiver and Harry; I heard this familiar voice talking to someone on the radio. I thought to myself, "I know that voice from somewhere."

It was Harry, W3FDY, 20 years later. Of course, Harry didn't know me, but I sure remembered him. I related this story to him that day and was late for work, but it was worth it. It isn't every day that you talk to your Elmer, the person who gave you the initiative 20 years ago to get involved in this wonderful, crazy hobby. I also found out that in those 20 years, Harry has instilled that spirit in hundreds of people like me by giving code classes and teaching ham radio to anyone who was willing.

About a year later, I finally met Harry face-to-face. It was at a picnic at his mountain. Yes, he does live on a mountain and has a marvelous display of Amateur Radio equipment from the past to the present. And there were many of Harry's friends there, the other voices I listened to years ago. For me this was quite a thrill, something I will never forget.

So this is one story of what an Elmer is. Sometimes it may take 20 years to find out, and perhaps some never will, but as long as Amateur Radio goes on, we will have them. Thanks, Harry.—*Jim Lanahan, WA3PHT*

Jim Lanahan works for Diamond State Telephone in his home state of Delaware. Jim describes his work in data and fiber optics as "on the edge of technology and very exciting."

Jim is active in RACES, his local Del Traffic Net, community fund raisers and athletic events. Other events he has been involved in include providing communications for Hands Across America and the Ladies' Professional Golf Association.

A Tribute to "Daddy-O" Kawamoto

Most hams worthy of the name can recall a certain person in their life—a mentor, Elmer or elder—who left an indelible imprint during their formative years.

In my case, this was one Mr Tadao "Daddy-O" Kawamoto, a man more reminiscent of a Sumo wrestler than a high-school electronics teacher. "Daddy-O" was, of course, our interpretation of Mr Kawamoto's first name, although upon first setting eyes on him it was considered the better part of wisdom to address him as Mr Kawamoto.

But this was 1969, and anyone or anything representing authority was subject to the scrutiny of the more enlightened generation of which I was part. Besides, as it turned out, Daddy-O had a heart of gold and had resigned himself to the fact that his name would be eternally mispronounced.

I had moved, and entered my new Southern California high school in the middle of my sophomore year, and electronics soon took priority in my curriculum. I was just getting into loudness at the time, and I was hoping to learn how to build the ultimate sound system with which to fry my cerebrum; Amateur Radio was about the farthest thing from my mind.

I had been given fair warning about Daddy-O's class being tough; the guy even had the audacity to mark down exam grades for spelling and grammatical errors. Who ever heard of an electronics teacher caring about spelling? Fortunately for me, spelling was one of my academic strengths, but it still bothered me that a budding electron jockey could be cut down in the prime of life for using lousy grammar.

Our first assignment for the new year was to plot the field-strength patterns for a dipole antenna radiating a carrier at about 4 GHz. Daddy-O explained that a bolometer would be used to actually measure the radiated field. Until that time, I had thought that a bolo was some kind of lasso used by cattlemen in Argentina, but if this Sumo wrestler thought he could measure radio waves with leather straps and iron weights, who was I to argue?

Upon further investigation, I discovered that a bolometer was nothing more than a piece of wire that absorbed radio waves and changed resistance. I had enough electronics under my belt to know what resistance was, but this radio-frequency stuff was pretty new to me.

Daddy-O ordered a couple of the more senior students to roll out a rack full of

electronic equipment. After the rack was in place, they were ordered to fire up the reflex klystron. Naturally, I had never heard of this either.

After a couple of minutes, these anointed students followed Daddy-O's instructions to check a few weird parameters like repeller voltage, and an even more mysterious thing that went by the code name "VSWR." Obviously, VSWR was Japanese for "watts."

The elder students then called Daddy-O over to take a look at the mystery meter. The Sumo wrestler frowned, disappeared into a cabinet in the corner of the room, and returned with a ball-peen hammer. He then confirmed my deepest suspicions by giving the waveguide which fed the dipole a sound rap with the hammer. I had seen the secret of Japanese technology revealed before my very eyes!

After a few more hammerings, Daddy-O smiled broadly, obviously proud of having beaten this VSWR demon into submission. It would be a couple of years before I would know exactly what had transpired between Daddy-O and waveguide, but the act had forever settled in my consciousness the fact that things are not what they seem, as Daddy-O would frequently point out.

The Hook is Set

Now that we had the kinks out of the test setup (or rather, put into it, depending on one's point of view), we were ready for the hard part. We commenced with the tedious process of taking dozens of field-strength measurements at various distances and orientations with respect to the dipole. When at long last we plotted the results on polar graph paper, I was astonished that the results exactly matched the picture in the textbook. I wasn't exactly sure what we had done, but I knew I was hooked. This RF stuff was really different. And for the first time in a long time, something I was involved with worked the way it was supposed to!

As far as I know, Daddy-O was not a licensed amateur, but his many years of experience as an engineer in a Japanese electronics firm made him a master of the practical. His many rules of thumb took the tedium out of learning electronics, although admittedly they annoyed the chemists in the class who were used to carrying calculations out to 10 decimal places.

One of the benefits of his former occupation was his ready access to truckloads of cheap electronic components, notably brown epoxy transistors. He would make frequent pilgrimages to his old firm in Japan for the sole purpose of bringing us goodies to fry on the test bench.

One of Daddy-O's dreaded "pop quizzes" was the infamous black-box test. The Master would assemble a variety of basic components in a sealed container with only two leads protruding. Our assignment was to draw a schematic of the hidden circuit after performing some basic tests on the box. I remember one student, in frustration, connecting a set of 110 V ac "funny-jumpers" to the leads of the box in question, which immediately exploded. He then nonchalantly wrote "electrolytic capacitor" on his answer sheet. Daddy-O, in characteristic fashion, gave him an "A."

A Touch of Class

The highest honor that could be bestowed by Daddy-O on a project was that of "having class." Only once during my tutelage did one of my projects earn that distinction. Ironically, that project was a VSWR meter. Perhaps it wasn't ironic after all; Daddy-O could make the most obscure concepts come to life.

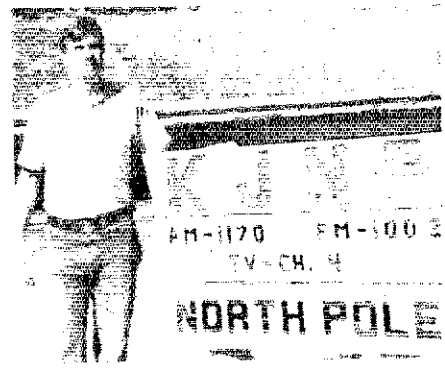
One of the items Daddy-O used to make RF come alive was a huge Lecher wire mounted on the sidewall of the classroom. The Master would astound us all with his running commentary as he would slide a light bulb along the wire's 25-foot length. Probably no other demonstration convinced me as much that radio was the only possible occupation. Where else could you do so much with so little? More importantly, Daddy-O's demonstrations showed us that there was a certain degree of order in the universe, a concept that was vitally important at that time in our lives.

A lot of electrons have gone through the RF bridge since those wonderful days in the Master's classroom. In fact, the entire microelectronic revolution has seen its birth and adolescence since that time. I have long since lost track of Daddy-O.

This is a day when heroes are in short supply. I was fortunate enough to have one at the right time in my life.

"Daddy-O" Kawamoto had class.—*Eric Nichols, KL7AJ*

Eric Nichols, KL7AJ, built his first crystal radio at the age of eight, and soon graduated to phono oscillators, broadcasting his wisdom to his neighbor's AM radio. He was temporarily distracted from radio by the discovery of motors, chemistry, skateboards and high fidelity.



Missionary radio station KJNP (in the background) and its chief engineer, Eric Nichols, KL7AJ. (*photo courtesy KL7AJ*)

After moving to Southern California, his interest in "real" electronics was resurrected by the object of this article. He received his Novice license in 1972. His second contact was with KL7GSC in Egegik, Alaska. This was Eric's first hint that someone might actually live up there. After two years of less-than-enthusiastic attendance at El Camino College, he decided that he had had enough concrete and thought that Egegik sounded more like the place he would like to be.

Eric finally ended up at KJNP, a 50,000-watt missionary radio station in North Pole, Alaska. Eric became chief engineer of the station in 1977, and he has held that position for 11 years, as well as doing announcing and just about everything else that can be done at a radio station.

Eric's favorite band is 160 meters; he especially appreciates the fact that in Alaska there is enough room to do some serious antenna work on that band, unlike the situation in Southern California. He would like to break the 50 WPM mark, but is stuck at around 45. Until then, however, he's decided to direct some of his energies towards writing a history of Amateur Radio in Alaska.

Strays

I would like to get in touch with...

☐ members of the 574th-565th Signal Aircraft Warning BNS for a reunion Sep 16-19 in Charleston, South Carolina. For details, write Angel M. Zargoza, W6ZPR, 1571 9th St, San Bernardino, CA 92411.

☐ anyone interested in collecting antenna end insulators. John Kruk, K3KR, 407 Irwin St, Lock Haven, PA 17745.

☐ anyone who has IBM-compatible software to send Cyrillic Morse code characters, possibly with Cyrillic print on screen. Jim Talens, N3JT, Box 19346, Washington, DC 20036.

☐ anyone who has a manual for an Eico model 430 oscilloscope. Tim Anderson, KØOR, 1545 Detroit Ave, Hot Springs, SD 57747.

☐ former members of the University of Illinois (Synton) ARC interested in receiving a club alumni newsletter. David Buyer, WD9AKV, Synton ARC, W9YH, University of Illinois, Electrical Engineering Bldg, 1403 W Green, Urbana, IL 61801.

☐ anyone who served on the USS *Chester* in the radio and radar division during WW II for the purpose of having a reunion in September. Charles Koon, WB5HES, 307 Delmont Ave, Sherwood, AR 72116.

☐ former OSS—COMMO veterans. Jim Ranney, W4KFR, 2640 Turkeyfoot Rd, Covington, KY 41017 or Joe Blahunka, W9RCJ, 317 E 2nd St, Lockport, IL 60441.

☐ anyone with an assembly/instruction manual for a Heathkit Impedance Bridge. Walter Bernath, K4UAS, 158 Buckingham Rd, Winston-Salem, NC 27104.

Congressional Resolutions Support Amateur Radio

By Phil Sager, WB4FDT
Regulatory Information Branch Manager, ARRL

Congress has become involved in the ARRL's fight to preserve amateur frequencies, especially the entire 220-MHz band presently threatened by FCC Docket 87-14. Nonbinding resolutions have been introduced in both houses of Congress which express the "sense of Congress" that it supports Amateur Radio and its frequency allocations as vital for emergency communications and public-safety purposes. These resolutions, Senate Concurrent Resolution 127 and House Concurrent Resolution 317, were introduced by California Senator Pete Wilson and Rep Robert Dornan of California's 38th District, with Rep Nancy Johnson from Connecticut's 6th District as original cosponsor.

Senator Wilson, in his remarks introducing the Resolution, commended amateurs for their public service work in providing communications during large forest fires in 1987. "Asked to help with communications by the California Department of Forestry and the US Forest Service, groups of amateurs belonging to the Amateur Radio Emergency Service left their families and jobs to assist with the vital job of maintaining communications links. As always, the amateurs worked as volunteers, donating their time, and in some cases risking their well-being, to help in the emergency." Senator Wilson also noted that much of the communications were conducted on the 220-MHz band.

Rep Dornan, in his extension of remarks published in the *Congressional Record* June 23, stated that "the Amateur Radio Service should be supported in its emergency communications efforts in every way possible," and criticized FCC Docket 87-14, which proposes to reallocate the bottom 2 MHz of the amateur 220-MHz band. Rep Dornan commented, "The use of the 220-225 MHz band during the numerous fire emergencies in the Western United States in 1987 is a good reason why the 220-222 MHz band should not be taken away from the amateur service," and he cited examples of amateur packet networks using the 220-MHz band in California.

Rep Dornan has also sent a letter to each Congressman detailing the public-service activities of amateurs and asking them to join him as a cosponsor of the resolution.

A Chance to Say Thanks (or Please)

ARRL members residing in these districts may want to send a thank you to their Representative on their QSL card; amateurs in other districts may want to use a QSL card for a request to support Amateur Radio through cosponsorship of H Con Res 317. As of July 1, there had not been time for other Senators to join Mr Wilson as cosponsors of S Con Res 127.

Why not spend two more QSLs and urge your two Senators to get aboard, too? Short messages are fine for this purpose; no lengthy explanation is needed.

Here are the Representatives who have signed on as cosponsors of H Con Res 317, as of July 1, 1988: Nancy Johnson (R-6th-CT), John Rowland (R-5th-CT), Amory Houghton (R-34th-NY), Edolphus Towns (D-11th-NY), Delbert Latta (R-5th-OH), George Hochbrueckner (D-1st-NY), Dennis Hastert (R-14th-NY), Bill Schuette (R-10th-MI), Robert Roe (D-8th-NJ), Frank Horton (R-29th-NY), Robert C. Smith (R-1st-NH), Clay Shaw (R-15th-FL), Peter DeFazio (D-4th-OR), Earl Hutto (D-1st-FL).

Rep Dornan introduced the Congressional resolution supporting Amateur Radio.

In his letter, the ARRL is commended for its support of the resolution and he notes that ARRL "serves as the principal representative and spokesman for the Amateur Radio Service before Federal, state and local government agencies."

Sense of Congress Resolutions are not legally binding, but do indicate Congressional opinion on a subject. There is no debate and usually no need for a "mark-up" session by committee. To increase the chance that the Resolution will pass, a majority of each House should agree to be cosponsors—218 congressmen and 51 senators.

This is where you, our members, come in. *It is important for each of us to write our Senators and Congressman, asking him or her to be a cosponsor of Senate Concurrent Resolution 127 or House Concurrent Resolution 317.* Your letter should emphasize the public-service activities of amateurs in your area. Newspaper stories about Amateur Radio activities should be included. Even though the Resolution is not legally binding, there is no question that, if passed, it will influence the FCC and other policy makers in Washington and would discourage future attempts to reallocate amateur frequencies to other services.

Senator Pete Wilson of California introduced a counterpart resolution in support of Amateur Radio to the Senate.

(continued on page 76)

The ARRL/VEC "Test-Takers' Q & A"

What to expect when the VE says, "You may now begin. . ."

By Steve Place, WB1EYI
Manager, Volunteer Resources

You walk into the test session thinking quietly to yourself, "I know the code. I know the theory. I know I've prepared well." You slip into a seat a few rows back from the front of the room. Everyone else looks busy. And everyone else seems to know what he's doing. Uh oh.

"Ahhhh. . .excuse me, yeah, you. . .the fellow with the badge. . .should I be doing something?" The VE asks you to QRX a minute and resumes thumbing through a stack of yellow papers.

An unwelcome thought creeps into your mind: "Oh great—do I, ahhh, really know what I'm doing?" You glance quickly around the room. "What're *these* guys doing?" Uncertainty starts to gnaw away at your confidence. The butterflies begin.

> **Butterflies:** (1) a feeling of hollowness or queasiness caused esp. by emotional or nervous tension or anxious anticipation[1]; (2) the last thing you need when you're about to take an exam.

Knowing what to expect can go a long way toward grounding that renegade flight of pre-exam butterflies. No less an authority than Dr. V. E. Sessions himself prescribes a healthy dose of authoritative information to set your mind—and your stomach—at ease.

Before the Session

Q. How can I be sure I've studied the right stuff?

A. Decide what license class you're shooting for. Then, determine what exam elements you'll have to pass (see Table 1). Get your hands on a good license manual that contains *the right version* of the question pools; that is, *the question pool that will be in effect when you will take the exam* (see Table 2).

Q. How do I find out when and where the exam session will be?

A. Ask a member of your local radio club or put a query out over your local repeater or traffic net. If no one there knows, you're in an unusual area! After that, you could ask either your ARRL Section Manager or Division Director. They're listed on page 8 of the latest issue of *QST*.

If all else fails, send a business-size self-addressed stamped envelope to the ARRL/VEC Office requesting a list of exam opportunities, stating when and where you'd like to test. You'll be given the date, location and person to contact for detailed information on each upcoming session.

Q. Do I have to register for a session in advance, or may I just walk in?

A. The ARRL/VEC leaves that to the discretion of the VE Team. Some less experienced VE Teams prefer that all their candidates preregister. Old hands at VE testing, however, more often opt to treat everyone as a walk-in. The Team Contact for your session will let you know what to do.

Table 1

Test Elements Required for Each License

License	*Required Elements*
Novice	1A, 2
Technician	1A, 2, 3A
General	1B, 2, 3A, 3B
Advanced	1B, 2, 3A, 3B, 4A
Extra	1C, 2, 3A, 3B, 4A, 4B

Table 2

Studying the Right Question Pool

The lifespan of a particular question pool is three years. After that time, a revised version of the pool is put into use for another three years.

The Next Revision of Element. . .	*Will Be Put Into Use On. . .*
4B	November 1, 1988
2 and 3A	November 1, 1989
3B and 4A	November 1, 1990

Before that date, exam questions will be taken from the revision being used now. After that date, exam questions will be taken from a new revision. When you buy a license manual, make sure it contains the question pool that will be in use when you test.

In response to the needs of our more active VE Teams, the ARRL/VEC Office recently geared up to stock more than 220 of them with enough new exam versions to last for several sessions.

Q. But at the moment, all I want is my Novice. Do I have to pay for the test at a VE session?

A. If all you want is your Novice, why wait for a VE session? As soon as you're ready, any *two* General Class or higher licensees who are 18 years old or older and not related to you can administer the 5-WPM code test and 30-question Element 2 Novice written test to you—at *any* time and place that's convenient! VE Teams have their hands full with upgrade testing. Though they'll usually try to accommodate Novice-only candidates, doing so is, at best, inconvenient. If tested, though, Novice-only candidates do not have to pay a test fee.

Q. What should I bring to the exam session?

A. The original plus a photocopy of your current Amateur Radio license; the original (not a photocopy) of any other licenses or certificates you'll use as credit proof for test

[1]Webster's New Collegiate Dictionary, G & C Merriam Co, Springfield, Massachusetts, 1981.

elements previously completed (see Section 97.25 of the FCC Rules, Examination credit); two forms of positive personal identification; and the examination fee (the fee under the ARRL/VEC during 1988 is $4.55). The VEs will review the original documents and return them to you immediately. The license copy will be attached to your Form 610 when you have earned an upgrade. You'll also need two sharpened No. 2 pencils for copying the code test or filling in the answer sheet for the written test; an eraser (yeah, I know, you've never made a mistake); two pens for filling out FCC Form 610s; and a calculator with fresh batteries if you're so inclined (but be prepared to clear all memories for the VEs).

During the Session

Q. Who does the testing at an exam session?

A. A Team of at least three accredited VEs. You can tell VEs who are accredited under the ARRL/VEC program by their distinctive credentials: laminated, clip-on badges with name, call sign and accreditation-expiration sticker. At most sessions you'll also find a number of helpers whose job is to keep things running smoothly and help put you, the candidate, at ease. Often members of the sponsoring club or testing organization, helpers may or may not be accredited VEs.

Q. What if I have to use the rest room during an exam?

A. Ah, yes... Mother Nature beckons at the most inopportune times. Be forewarned that you will not be permitted to leave the examination room until you have turned in your test. If you have a genuine emergency, however, *at the VE Team's discretion* you may be escorted to the restroom by a Team helper or a VE not directly involved with administering the exam. If this is not acceptable to you, before leaving the room you'll have to turn in your test; it will be graded regardless of the number of questions you've left unanswered. There are no exceptions. Plan ahead.

Q. What test elements should I expect first?

A. Usually, code tests are given first, followed by written tests. Check with the Team Contact for the session at which you'll test. In accordance with the FCC's March 1, 1988 "Instructions to VECs," telegraphy (code) test Elements are administered in descending order of difficulty (20 WPM, 13 WPM and then 5 WPM). Written test elements are given in ascending order of difficulty (2, 3A, 3B, 4A and then 4B).

Q. Can I take only the code test (or written test) half of an upgrade and leave the other half for later?

A. Yes. You'll be given a Certificate of Successful Completion of Examination (CSCE) for *element* credit only.

Glossary of Key Terms

ARRL/VEC—an entity that came into being when ARRL entered into an agreement with the FCC to coordinate the efforts of administering VEs in all 13 FCC-defined regions.

CSCE—Certificate of Successful Completion of Examination

FCC Form 610—official "license application" form; all three administering VEs must sign for upgrades; two examiners must sign for the Novice license.

VE—Volunteer Examiner; a *person* who holds an Advanced or Extra Class license and has been accredited by a VEC to administer exams. [Extra Class VEs may administer all exam elements; Advanced class VEs may administer only exam elements 1A, 2 and 3A.]

VEC—Volunteer Examiner Coordinator; an *organization* that has entered into an agreement with the FCC to coordinate the efforts of VEs in preparing and administering exams for Amateur Radio license.

Table 3

Consecutive Characters Needed for Code Test Solid Copy Criterion

Code Test Speed	*Consecutive Characters*
5 WPM	25
13 WPM	65
20 WPM	100

Note that letters count as one character; numerals, punctuation marks and prosigns count as two characters.

Q. What can I expect the code test to be like?

A. If you are prepared, you should expect the test to be fun! ARRL/VEC code test tapes are generated with accurately timed computer-controlled keying at an audio pitch of 725 Hz. The code-test master tapes are recorded with a unique keying waveshape filter specially designed by ARRL engineers to make the best sounding, most easily copied code recordings we can produce. The Element 1A 5-WPM test is recorded with Farnsworth spacing, that is, each character is generated at 13 WPM but the between-character spacing is increased so that the overall speed of the text is 5 WPM. This has proved to be more easily copied than pure 5-WPM timing. The Element 1B 13-WPM test and the Element 1C 20-WPM test consist of code sent at pure 13-WPM and 20-WPM spacing respectively.

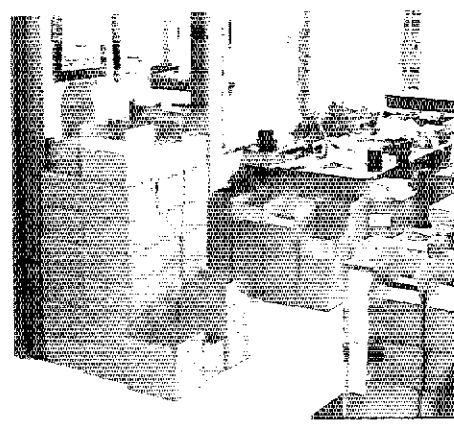
ARRL/VEC code tests begin with spoken instructions and one minute of practice text at the appropriate speed, followed by further spoken instructions. The actual test is then introduced by two sets of three Vs. The text is at least 5 minutes of plain-language Morse code at the required speed in the format of a simulated QSO. You are responsible for knowing these 43 characters: the 26 letters of the alphabet, the numerals 0 to 9, the period, comma, question mark, slant bar, double dash ($\overline{BT}$), and the prosigns $\overline{AR}$ and $\overline{SK}$.

At ARRL/VEC coordinated sessions you'll be given a blank code-copy sheet on which you can transcribe the text that is sent. When the test run is complete, you'll be given a quiz sheet with ten fill-in-the-blank questions based on that text. You should answer each question by writing down exactly what you copied. Precise accuracy counts. Words and call signs must be spelled exactly as sent. If "New York" is sent, you must write "New York." Writing "NY" would be an error. A passing mark is 7 or more answers correct out of a possible 10.

If you answer fewer than 7 of the 10 questions correctly, don't despair. There's still hope! If the VEs find at least one minute of solid copy (an unbroken string of correctly copied characters that represent one minute or more of text—see Table 3), you pass. Thus, it's to your advantage to write down the entire text of the test as completely and legibly as possible. The "solid copy" criterion has salvaged many an otherwise bungled code test.

Q. Do I have to take a sending test?

A. No. In 1983 the FCC stated that it



125,000 exam booklets, tens of thousands of FCC Form 610s and mountains of boxes, answer keys and answer sheets nearly buried the ARRL/VEC staff alive. Code-test tapes and quizzes, and new summary and reporting forms were yet to arrive!

accepts as valid those code tests that are based solely on receiving, despite the wording of Section 97.27. ARRL/VEC Teams administer tests to determine only their candidates' ability to *receive* Morse code at the prescribed speed.

Q. What will the written exam be like?

A. It certainly shouldn't be a surprise. The questions on your test are taken verbatim from published question pools. There's no reason for you to wait for the exam to see any question for the first time! Learn the material first. Then, using all the questions in the published pools, test your understanding. If you can answer the questions in the current pool, it's a sure bet that you can answer any question you'll see on your exam.

Your ARRL/VEC written exam booklet consists of the proper number of multiple-choice questions taken in the FCC-prescribed proportions from the official, published question pools (see Tables 4 and 5). Before beginning, you'll be asked to enter your name, call sign and license class (if any), address, telephone number, test site, date and signature on the front cover. Then, on the VEs' instruction, you may open the book and begin. You may make calculations and write notes in the margins of your test booklet, but you'll have to mark your final answers on a separate answer sheet. Feel free to go back and check or change any of your answers—there's no time limit (though the VE Team may terminate a session after a reasonable amount of time). Make sure, before turning the papers in, that you have marked only one answer for each question.

Your test passes or fails solely on the basis of the number of correct answers (see Table 4); no additional penalties are assessed for incorrect answers. It is to your advantage to answer even those questions about which you're unsure. Eliminate as many of the incorrect answers as you can and then make your best educated guess from those remaining.

Q. What happens after I'm done?

A. You must turn in all test materials, including test booklets, answer sheets, code copy sheets, code quizzes, and any other scratch sheets you may have. Each element will be graded before the next element is administered. Your VE Team will tell you whether you passed or failed, and how many questions you answered correctly. ARRL/VEC VEs are not permitted to show candidates the test booklets after the test, to debate the answers to any questions, or to advise candidates on which topics they were weak.

If you pass, you have the option to take the next element in sequence or call it quits 'til next time. You'll be issued a CSCE for *upgrade* credit if you've qualified, or for *ele-*

Sample Text of ARRL/VEC Code-Test Tape Instructions

This is the American Radio Relay League Amateur Radio _____ word per minute code test. Please provide all of the information requested on the code test sheet before you turn in your papers to the Examiners.

Before we begin the actual code test, we will send one minute of practice, that's _____ characters. If the volume is not adjusted to your satisfaction, please notify the Examiners. You may use one side of your code copy sheet to copy this practice run if you wish. After the practice run, we will give you further instructions, then begin the actual code test transmission.

So use this practice run to get accustomed to the rhythm of the code. This is the practice run for _____ words per minute code.

[ONE MINUTE PRACTICE AT SPEED]

This concludes the practice run. The Examiners should ensure that everyone can hear comfortably before proceeding.

Now we are ready to begin the test. It will last approximately _____ minutes. When it is over, you will be given a 10-question test based on the material you have copied. A passing grade results from at least 7 out of 10 questions answered letter-for-letter exactly as transmitted. So copy carefully, and put accurate answers on the 10-question quiz. If you fail the code comprehension quiz, you may still pass the code test if the Volunteer Examiners can find at least one minute of solid copy—that's _____ characters at this speed—on your copy sheet. The perfect copy may not include the practice run or the 6 Vs that begin the test. A letter counts as 1 character; numbers, punctuation and procedural signals count as 2 characters each, and of course, spaces do not count.

The code test begins with the letter V sent in 2 groups of 3, and it ends with the procedural signal for the end of transmission. Hand-held radios and chiming watches should be silenced during the test.

It's time to get your pencils ready, and now we're ready to begin the test—so Good Luck!

This is the code test transmission for _____ words per minute code.

[AT LEAST FIVE MINUTES ACTUAL CODE TEST]

This concludes the code test. The Examiners will now distribute the 10-question quizzes. Write carefully and good luck.

Table 4

Questions Used in Each Exam Element

Exam Element	*Type of Exam*	*Number of Questions*	*Number Correct Needed to Pass*
1A	5-WPM Code	10	7
1B	13-WPM Code	10	7
1C	20-WPM Code	10	7
2	Novice Written	30	22
3A	Technician Written	25	19
3B	General Written	25	19
4A	Advanced Written	50	37
4B	Extra Written	40	30

Table 5

Distribution of Questions on Written Exams

Number of Questions Taken From Each Topic by Exam Element:

		Exam Element				
	Topic	*2*	*3A*	*3B*	*4A*	*4B*
(1)	FCC Rules	9	5	4	6	8
(2)	Operating Procedures	2	3	3	1	4
(3)	Propagation	2	3	3	2	2
(4)	Amateur Radio Practices	4	4	5	4	4
(5)	Electrical Principles	4	2	2	10	6
(6)	Circuit Components	2	2	1	6	4
(7)	Practical Circuits	2	1	1	10	4
(8)	Signals and Emissions	2	2	2	6	4
(9)	Antennas and Feed Lines	3	3	4	5	4
Total Questions		30	25	25	50	40

ment credit if you do not meet all the requirements for upgrade.

If you do not pass, or if you qualify only for element credit and not for an upgrade, your FCC Form 610 will be returned to you.

After the Session

Q. What if I don't pass? How soon can I retest?

A. If you fail a written element, no further written elements may be administered to you. At the discretion of the VE Team, you may retake a failed element at the same session *if* the VE Team has another version of that element that you have not yet taken, and *if* the VE Team has the time and resources to administer the additional version, and *if* you pay an additional test fee.

Q. Assuming I pass, can I go on the air immediately with my new privileges?

A. In most cases, yes. If you're already licensed, with a valid CSCE for upgrade credit you may temporarily operate an Amateur Radio station consistent with the rights and privileges of your new operator class (see Section 97.35 of the FCC Rules). If you do not hold a current amateur license, however, you may not operate until you receive your new license from the FCC.

Q. Is the CSCE the same thing as a license?

A. No. As it states in bold print on the ARRL/VEC's CSCE:

> This certificate is not a license, permit or any other kind of operating authority in and of itself. The Element credits and/or operating privileges that may be indicated in the license upgrade notice are vaild for one year from the test date. The holder named hereon must already possess a valid Amateur Radio license issued by the FCC to operate on the air.

Q. Do I have to take all my tests at the same test site or can I test with another Team?

A. You may take your exams from any properly accredited VE Team you wish. You may take one exam from a Team in Tukwila, and your next from a Team in Tonawanda. In fact, you may take one exam from a Team of VEs accredited by one VEC, and the next from a Team of VEs accredited by another VEC.

Q. How long should it take for me to get my license?

A. Roughly six to eight weeks is the norm.

Q. If I don't hear from the FCC or if others who tested at the same session receive their licenses and I don't, what should I do?

A. If it has only been a few weeks since the session, wait a while longer and don't worry. It is common for people who have tested at the same session to receive their licenses weeks apart. If you've waited patiently for eight weeks without hearing anything, though, contact the VEC that coordinated your session.

Questions Often Asked

Q. I have a physical disability that makes taking the tests you've described impossible. Am I simply out of luck?

A. Of course not. Most ARRL/VEC VE Teams, with sufficient notice of your special needs, will gladly make the arrangements necessary to accommodate you. Please note, however, that candidates whose physical disabilities require special procedures must attach a statement to their application, including a physician's certification describing the nature of the disability, as stated in Section 97.26(g) of the FCC Rules. Also, the ARRL/VEC can provide special test materials in some circumstances. For example, we can record code-test tapes at audio pitches other than 725 Hz for candidates who are hearing impaired. If you are in need of special testing assistance, write to the ARRL/VEC for more information.

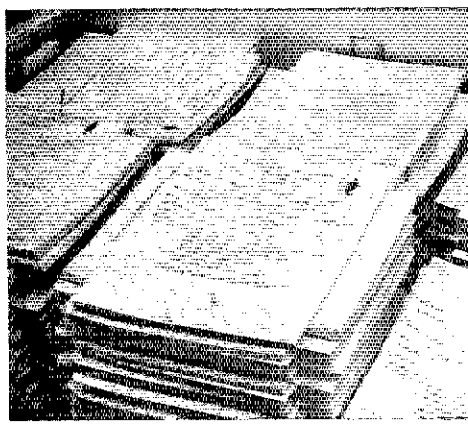
Q. What happens to my test fee?

A. Your test fee is sent to the ARRL/VEC and used to offset necessary and prudent expenses incurred in operating a worldwide testing program. Those expenses are significant. In fact, ARRL/VEC expenses have exceeded testing revenues each year since the ARRL/VEC first entered an agreement with the FCC. Each year, however, we strive to minimize the expense while maintaining the highest level of service possible.

The ARRL/VEC's professional staff of only five people work full time to support the work of your local VE Teams. We provide our VE Teams with everything they need to serve you, the candidate, as effectively as possible.

Q. Is there a place for me in the VE program?

A. Absolutely! Extra Class VEs may administer all exam elements. Advanced Class VEs may administer Elements 1A, 2 and 3A, whether or not Extra Class VEs are present. Recently, more than 50% of the upgrades earned under the ARRL/VEC program have been for Technician—so the role played by Advanced Class VEs is indeed a significant one. Contact the ARRL/VEC office for your ARRL/VEC *Volunteer Examiner Manual*, open-book test and VE application.



The tidal wave of paper that rolled in from our printers was reduced to thousands of 10-booklets-per-stack ripples to be apportioned among participating ARRL/VEC VE Teams in the field.

If you do not yet hold an Advanced class license, you can still contribute to your local VE Team's efforts. You won't be able to sign Form 610s or CSCEs, but you can serve as Team Contact or as a helper during the tests. Contact your local VE Team and let them know you want to pitch in.

We hope this visit with Dr. V. E. Sessions has been painless and productive. If you're prepared—and today's well-crafted license manuals and published question pools leave you no excuse for inadequate preparation—*you will pass the exam*. The butterflies? Forget 'em. If you know your stuff and have a pretty good idea of what to expect, you'll find they've deserted you.

That next higher ticket can be yours. Go for it. Good luck from all of us associated with the ARRL/VEC!

USSR/Canada Polar Bridge Expedition Ends

☐ Thirteen Soviet and Canadian skiers walked ashore Ward Hunt Island, Canada side-by-side on June 1, completing a 91-day, 2000-km trek from Cape Arktichesky, USSR across the North Pole. The group arrived sunburned but in good health. See page 62 of June *QST* for more information.

According to CRRL President Tom Atkins, VE3CDM, the Amateur Radio communications were "monumentally successful" with the exception of the loss of the Canadian ICOM station at North Pole 28, the floating Soviet scientific station. Due to a huge breakup of the ice, a complete hut, clothes, antennas, as well as the radios, were lost. The expedition was prepared, as they had spread out equipment and supplies over the area. The group then relied on the Soviet equipment to carry out their communications.

Atkins, who coordinated the Canadian communications, said it was a truly rewarding experience where the Amateur Radio spirit transcends political considerations. What's next? How about the possibility of a cooperative Antarctic expedition?

Notes on Organizing Your First DXpedition

Been feeling the urge to take off on a DXpedition? Here's how to get the most from your trip by planning carefully and avoiding pitfalls.

By Jim Talens, N3JT
PO Box 19346
Washington, DC 20036

Why would anyone want to travel to a generally unknown international location when there are standard vacation packages to well-known retreats available at the same cost? The answer eludes anthropologists and travel agents alike but seems to present no conceptual difficulty at all for the DXer. The DXer instinctively correlates the difficulty of finding a place in an atlas (particularly if it counts as a separate DXCC country) with overall desirability.

For the DXer who goes a step further, there is nothing to match the thrill of operating from such a "rare" location. The DXer who can locate a place of relative obscurity,[1] get a license to operate from it[2] and return home with logsheets intact has made his mark in the DX universe. While I have not operated in Albania or from a newly formed reef in the South China Sea, I have had some tremendously exciting experiences (and made my earthly mark) by operating from intriguing spots in the Caribbean—with some 15,000 QSOs on CW, SSB and RTTY to show for it! Let me offer some practical insights into how you too can plan and implement a successful vacation-DXpedition and make your imprint in the world of DX.

There are five essential factors to consider in deciding whether a DXpedition is practicable. These are the cost of transportation, meals and accommodations; the choice of country; the feasibility of getting a license; the suitability of the accommodations for radio; and the equipment taken, including antenna. Let's examine each of these.

Cost and Location

It is generally believed that the most significant impediment to organizing a DXpedition is cost, but this is not necessarily so. Certainly, if you have just signed a new mortgage agreement and a new baby is due in three months, the expenses of any vacation, including a DXpedition, might not be a good idea.

In general, though, if you can afford a vacation away from home, you can probably afford a modest DXpedition. For example, Eastern Airlines recently ran a promotion featuring roundtrip fares of under $249 to a variety of Caribbean islands from Washington, DC. Included was the island of St Martin, FS (adjacent to Anguilla, VP2E). Accommodations vary in price just as with any other vacation; the cost is no higher simply because you are a radio amateur. Meals may even be cheaper, because if you operate in contest style you will be munching on contest cuisine.[3]

(l-r) Pacho, HKØBKX, Jim, N3JT, and Richard, HKØHEU. The newly constructed tower was put to immediate use to support laundry! (*photos courtesy N3JT*)

Most of us usually take vacations with someone, typically an XYL or YL.[4] A nonham companion on a DXpedition will be a benefit to the radio operation only to the extent that person is willing to assist in radio-related tasks, such as untangling twisted radial wires (if you use a vertical antenna and if the radials become twisted!). Romance, with candlelit meals overlooking the sea and midnight walks along starlit beaches (when 80 meters is open to Europe), mixes with an all-out effort in a DX contest like oil and water.

But there can be more to the DXpedition, even a contest effort, than radio. In the case of my visit to Anguilla in October, which overlapped the CQWW SSB contest weekend, I agreed with my YL beforehand to limit my total contest operating time to 20 hours, with the remainder of the visit devoted to snorkeling, exploring and stargazing. True, I did not tally a record high score,[5] but we had a wonderful time! In short, it is possible to find reasonably rare locations for a DXpedition at affordable cost with a compromise program of activity that need not lead to a domestic relations counselor.

If you don't think in terms of the rarity of Albania and don't necessarily plan on setting a new contest record, you are on the way to passing the first two hurdles towards your first DXpedition: location and cost. Let's now move to the third hurdle, the license.

Getting a License

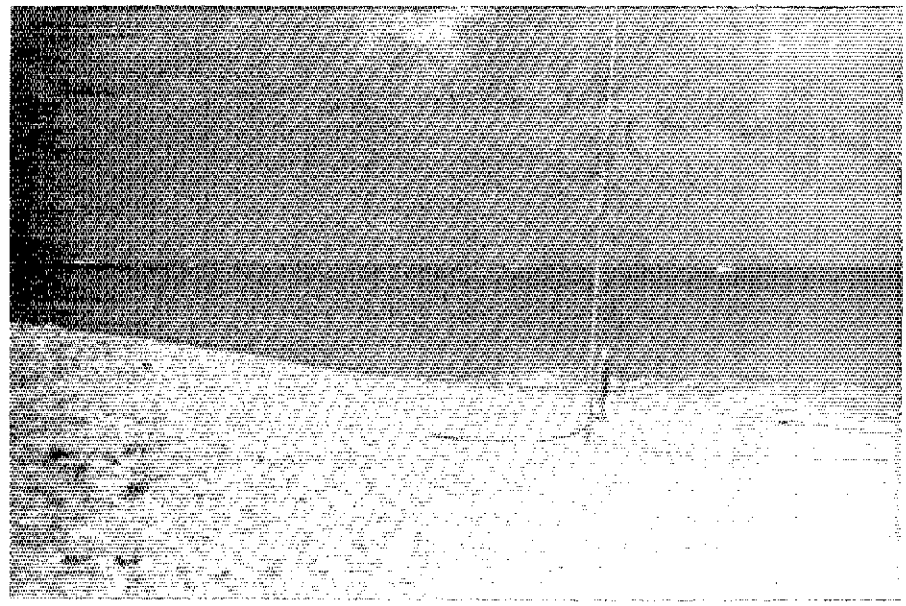
Getting a license to operate need not be a difficult matter. Many countries derive revenue from the issuance of guest licenses. In fact, a number of countries issue guest permits even though they do not have reciprocal agreements with the United States. The greatest problem in securing permission to operate, once you learn from the ARRL whether a particular country offers guest licenses, is submitting the required paperwork far enough in advance.

For example, if you were considering operating from St Martin, you would first get a French permit via Paris, which might take six months. With the French permit in hand you would then apply through Guadeloupe for the St Martin permit, another few months. This kind of delay, while not necessarily the rule or even always the case for St Martin, must be considered in the planning process. A bargain airfare

[1]Notes appear on page 67.

is of little use if you can't get the guest license until months after you return home!

An example of easy licensure is Anguilla, which issues a license any weekday to licensed amateurs for $20.[6] Other countries, like Colombia, require many pages of documents, including a police report, notarized statements from the Consulate, photographs and a fee. The application package must be sent to the Colombia Radio League headquarters in Bogota with a cover letter in Spanish. The League presents the package to the Ministry of Telecommunications for processing. Having a friend in Bogota who can wander by the League office occasionally may shorten the processing time! The bottom line is that getting a reciprocal license can require planning, patience and finesse, or it can be quite easy. Now we turn to the matter of picking a place to stay.



The view along the beach at Shoal Bay on VP2E at low tide. Passersby thought the object in the foreground was a device for attracting fish. [Did it work, Jim?—Ed.]

Accommodations

There is no better DXpedition than in the N3JT "preferred" style: Flying to the DX location and being met by a ham friend who helps you check into your hotel (or his guest room) and then ushers you into his station; all you need do is put on the headphones and make contacts! Even with this style it is gauche not to spend some time greeting the host's family and generally displaying at least a shade of social grace before switching on the rig. In the case of my recent visit to HKØ (San Andres Island), I was privileged to use a friend's station, but we also erected a new tower and tribander, constructed a new low-band antenna system, attempted to repair an amplifier, socialized with ham and nonham friends and neighbors, and assembled an RTTY station.

An alternative style of arranging accommodations, and by far the most practical for most proposed DXpeditions, involves a call to your travel agent or a tourist bureau. This was how I found suitable lodging on Anguilla, VP2E. I contacted the Caribbean Tourist Bureau in New York and made a list of hotels that seemed to be located along the western coast of the island, facing the States. Juggling price and location, I was able to narrow the selection to two possibilities. One was already fully booked; the other had one remaining suite. A reservation request was dispatched by the travel agent "conditioned" on permission to install a vertical antenna at water's edge. The confirmation arrived a few days later but with no mention of the antenna or permission. The travel agent assured me there would be no problem. I wondered if these would be "famous last words."

We arrived at the hotel late in the afternoon. The manager greeted us and showed us immediately to a unit on the first floor, about 15 meters from the water. She then wished me good luck in the forthcoming contest! In my enthusiasm to get on the air, I routed the coax through a cactus patch adjacent to the shack, but made the mistake of trying to leap over the cactus to save a few steps—forgetting that I had not practiced the broad jump in over 20 years. One advantage of being within crawling distance of the ocean is the availability of a sufficient quantity of cool, soothing salt water!

Equipment

The vertical antenna was then assembled[7] and six radials were stretched along the beach and into the water, buried a few inches in the sand to prevent passersby from tripping. But within a few hours, the incoming tide pulled the radials out of the sand and neatly distributed them about the base of the antenna. Perhaps because the salt water was only inches below the feedpoint, and thus served as a ground plane, the antenna continued to perform perfectly, especially on the 10- through 40-meter bands. It was, however, aesthetically unacceptable to leave the radials in that state. My companion assisted with the radial reassembly. She also explained to passersby that the antenna was not a device for attracting fish, a most useful public relations exercise.

In sum, if you aren't going to visit a friend and use his established station, when you choose a place to stay keep in mind access to a suitable antenna site—adjacent beach, rooftop, hilltop, railing on the desired side of the building, and so on.[8] Remember, while a rare prefix effectively adds 10 dB to your signal, an antenna planted on the southeast side of a mountain on a Caribbean island will guarantee you will return home with more books read and fewer QSOs made.

On the matter of equipment, I took a TS-430 and power supply (borrowed from a local ham) with me to VP2E. I recommend any small transceiver that you can easily carry anywhere you go. Before departure make sure you know what line voltage is available and use the necessary adapters or make the needed modifications to the power supply to accommodate your host country's power system. Remember to take extra fuses and be prepared to shut down to protect the equipment if the line voltage exceeds your equipment's specifications. I took a small voltmeter with me and monitored the voltage at all times.

I packed the equipment in the original double boxed shipping cartons, wrapped each carton with heavy rope and attached handles to the ropes. The handles are important. In loading and unloading baggage for the short boat trips between St Martin and Anguilla, the baggage handlers treated everyone's luggage like boxes of lemons, tossing them blithely from dock to deck. But cartons with ropes and handles are naturally easier to handle, so the baggage handlers were unwittingly much gentler with my rig. The cartons are also much easier for you to carry. I took the rig aboard every flight as hand baggage to minimize the potential for loss or damage. (The collapsible vertical antenna was packed in a 1-meter-long carton and went as check-in luggage.)

Stress Reduction

Apart from these five essential factors, a few hints are worth mentioning to help you avoid unnecessary stress and encourage you to optimize satisfaction from your operating effort. Vacation travel under the best of circumstances is not necessarily troublefree. DXpeditions, by their very nature as extraordinary ventures, can compound the potential for problems. Enroute to HKØ last November, my luggage missed the Miami to Cartagena connection and did not arrive with me at San Andres. In my

baggage were important components for my operation, including the computer I expected to use for logging, wire antennas for low-band use and my trusty key. I was nearly apoplectic, not to mention increasingly "ripe," by the morning of the second day there. Finally, later that day, everything arrived safely.

These occurrences are not uncommon, especially when traveling to developing countries. It is important to retain confidence and composure. Consider them learning experiences. Leave home with a flexible attitude, a reserve of patience and a good book! You'll find the inconveniences that unfold less traumatizing and the trip will be more rewarding.

Benefits

My earlier experience at HKØ, in 1986 during the CQWW SSB contest, led me to consider an alternative to recording thousands of QSOs by hand. I always found the logging process tedious during the contest and afterwards had difficulty reading my own handwriting. The solution I found was the N4ZR "Winner's Edge Software," which was tailored for my application to allow dupes.[9] Dupes during a DXpedition-contest operation take more time to resolve in real time than to purge after the contest when the computer can simply identify and drop them. Responding to dupes during deep pileup conditions tends to be distracting and reduces the contact rate until you "get back into the groove."

The software I used also contained 23 pre-programmed CW messages as well as single-entry logging capability, ie, I only had to enter the other station's call and message into the computer and the QSO was immediately logged onto disk. During the entire CQWW CW contest I never used a pen or pencil to record any of the 4000 QSOs made. All I carried home with me were two floppy diskettes (wrapped in foil for protection, of course)—no paper! The resulting logs were neatly printed, the dupes easily identified and eliminated. I had solved my logging problem! I also found that after the contest I was not fatigued and my eyes were not strained as they had been in other contests following so many hours of printing call signs in those molecular logsheet spaces.

There were several other indirect benefits of my DXpedition. In response to a need for a way to key the transmitter by the output of the computer, I designed and built a universal computer-to-transmitter interface that includes an adjustable weight control to compensate for effects of equipment keying, sending speed and skip conditions on the dot- or dash-to-space ratio.[10] This was the first time I had developed a needed device for general use, quite a satisfying experience. Finally, with an AIR-1 borrowed just before my departure, I activated RTTY for the first time from HKØ, making some 475 contacts on that mode.

The next time you get the urge to try your hand at the "other end of the pileup," call your travel agent. Your DXpedition location doesn't have to be difficult to find on a map or expensive to visit. When you've decided where you want to go, contact the ARRL for reciprocal licensing information. If you plan a little ahead and use some ingenuity, you may find a unique solution to a technical problem or even be the first to activate a DX country on a mode like RTTY or packet. When you return home you'll wonder why you hadn't done it all sooner. Bon voyage!

Notes

[1]Obscurity may be defined as "unknown until seen on the official ARRL DXCC Countries List."

[2]A license is a piece of paper, papyrus or other organic material, or stone tablet, that suggests a grant of operating privileges issued under apparent authority of a person or band of persons accepting payment therefor. Consult ARRL DXCC rules for legal criteria of acceptance.

[3]Contest cuisine is anything you can eat without having to get off the operating chair, or catch. From my experience it is soft drinks with caffeine, simple sandwiches or dishes that can be consumed without adversely affecting the QSO rate. A less obsessive operating style permits leaving the operating position for limited periods to dine with friends or a traveling companion.

[4]Because I had a "two-for-one" pass from Eastern (earned from taking other flights), I was able to take my YL at no additional charge.

[5]The score was high enough to win Anguilla! Some 3700 QSOs with 168 countries were made.

[6]Many countries will not issue licenses by mail. You must appear in person at the specified government office, complete the paperwork and pay for the permit. If you enter the country carrying radio equipment, you may be asked to show your license. Two responses can work: Entrust the equipment to the care of the authorities at the point of entry until you can return with the permit, or politely show your home license and mention the name of the officer in charge of that country's licensing department. Keep in mind that the customs authorities are concerned about payment of duty on the equipment that "may not find its way back home," or the possibility of the use of the equipment for unlawful purposes. It is best to discuss (by telephone or letter) these issues with someone who lives there or has been there recently.

[7]I had practiced assembling and disassembling the antenna innumerable times at home to be sure there would be no problem when I got to VP2E. Despite the practice, an engineering degree and a full set of directions, I could not figure out how to get the sections together. (I now attribute the problem to a variety of nearby distractions.) Fortunately, my YL offered several useful hints that saved the day.

[8]Sometimes you can set up station at a location away from your hotel, using a borrowed or rented storage battery. Bring plenty of sunblock and insect repellent.

[9]Other software packages that perform similar function are readily available.

[10]If you have need for such an interface, drop me an SASE and I will be pleased to send you information.

Strays

***QST* congratulates...**

☐ the following radio amateurs on 50 years as ARRL members:

- Robert L. White, W1CW, of Homestead, Florida
- Frank L. Curtis, Jr, WØVQC, of Virgil, South Dakota
- Fred A. Linn, W9NZF, of Cedarburg, Wisconsin
- William S. Carley, W3PCB, of Bethesda, Maryland
- Frederick F. Cain, W8GC, of Newark, Ohio

☐ Peter Kemp, KZ1Z, of Bethel, Connecticut, on being selected for the 1988 edition of *Who's Who in American Education*. Pete, who is Coordinator of Technical Education at Bethel Middle School, was cited for his contributions to the development of technology education programs. He also serves on the League's Educational Task Force.

☐ Jeff Jacobsen, WA7MBL, of Logan, Utah, on being named Amateur of the Year by the Rocky Mountain Packet Radio Assn. Jeff was commended for his contributions to the growth and acceptance of packet radio, and will receive a lifetime membership to RMPRA, the first ever awarded, as well as a plaque.

☐ Dr. Leonard Silvern, K6RXU, of Sedona, Arizona on being elected to the first City Council of Sedona. Doc was active in applying PRB-1 in the Village of Oak Creek. He is a Life Member of the ARRL, QCWA and SOWP and a Senior Life Member of IEEE. Doc will soon be active on 15 and 20 meters.

☐ Ira Miller, AG7K, of Tempe, Arizona, on being named a Dan Noble Fellow by Motorola, Inc. The awards, which recognize technical creativity and productive achievements, are given annually to Motorola employees who have made significant contributions.

National Communications System Makes Use of Amateur HF Network

Building on the success of Exercise NIGHT TANGO, SHARES is a new means for hams to help ensure the nation's security during an emergency or disaster.

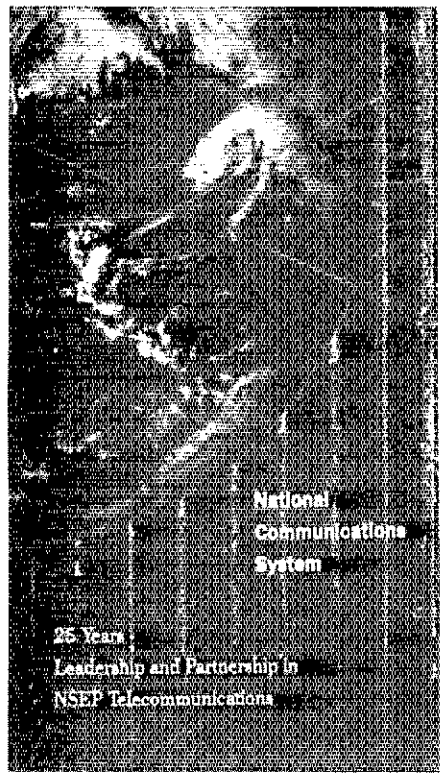
By Col William Hartsell, USAF, N3CHI
Deputy Assistant Manager
NCS Office of Plans and Programs

and Dale Stauffer, N2CCY
NCS Radio Program Manager

It's October 16, 1962. President John F. Kennedy, sitting in the Oval Office, has just learned that the Soviet Union has placed nuclear warheads on the island of Cuba and that additional missile silos capable of housing more warheads are under construction. The President immediately calls in his top civilian and military advisors. Critical messages and information from all sources begin to arrive at the White House. The telephones are ringing off the hook. The sounds of bells on the teleprinter don't stop. It becomes difficult to sort through all of the information or to confirm any of it. As more information arrives, more questions go unanswered. The President and his top officials try to get coordinated information from government departments and agencies all over Washington. They can't get the information they need. Departments and agencies can't coordinate information quickly because their telecommunication and information systems don't interoperate. Real-time communications with the intelligence community and with diplomatic missions abroad are nearly impossible. Days go by. Tension builds. Frustration is high. Finally,...

We all know how this story ends. Thankfully, the Cuban Missile Crisis was resolved without resorting to armed conflict. Throughout the entire ordeal, many important lessons were learned, a critical one being that the ability of the highest levels of the Federal Government to communicate and access time-sensitive information is vital to the national security of our country. Realizing this, the President tasked a National Security Council committee to study the problem. As a result, on August 21, 1963, President Kennedy signed a White House Memorandum establishing the National Communications System (NCS).

The NCS was responsible for providing the "necessary communications for the Federal Government under all conditions ranging from a normal situation to national emergencies and international crises, including nuclear attack." The NCS was envisioned to be comprised of the telecommunication assets of its five original member organizations: the Department of State, Department of Defense, Federal Aviation Administration, General Services Administration, and the National Aeronautics and Space Administration. Its original goal was to link together and improve existing Federal communication systems to establish a single integrated Federal Government communications system.



Part of the QSL card to be used for the upcoming NCS special-event operation (see text).

Single System Unrealistic

It became apparent, however, that creating a single system was an unrealistic goal. Far too many systems were already in existence to be able to interconnect them in an effective or efficient manner. Realizing this, the NCS led efforts to help ensure that future Federal Government systems would be interoperable and developed enhancements to both commercial and government systems to make them more redundant and survivable.

As the years passed, and increasing numbers of systems and services were procured by other Federal departments and agencies, membership in the NCS also increased. Even with this growth, the central theme and mission of the NCS remained. The concept of effective government telecommunications to enable a unified response to any national crisis or emergency was vital to our national security.

Today, 25 years after its inception, operating under new authorities including a Presidential Executive Order and several National Security Decision Directives, 23 Federal organizations are

in the National Communications System. Many important programs, both technical and procedural, are underway.

The most current NCS accomplishments center around a recently approved National Level Program (NLP) for National Security Emergency Preparedness (NSEP) Telecommunications. The NLP is comprised of three programs: Nationwide Emergency Telecommunications Service (NETS), Commercial Network Survivability (CNS) and Commercial SATCOM Interconnectivity (CSI). These three programs are aimed at enhancing connectivity among government users and the use of surviving commercial public switched telephone networks for NSEP purposes. This is extremely important since the Federal Government relies very heavily on commercial networks for its NSEP telecommunication services.

SHARES: Amateur Radio Backup

Another very important and recently approved NCS program is the Shared Resources (SHARES) High Frequency (HF) Radio Program. SHARES is of particular interest to the Amateur Radio community since an opportunity for their participation exists in the near future. Basically, the SHARES Program is designed to establish a national HF radio communications network using the combined HF radio assets of the Federal Government on a shared basis. The program will provide a backup capability for the Federal Government to exchange critical NSEP information using their existing HF radio assets, and as augmented by the amateur radio community.

Any Federal organization may participate in SHARES on a voluntary basis. Through the use of very basic SHARES operating procedures and a SHARES HF radio station directory, emergency messages can be transmitted using the assets of multiple departments and agencies throughout the country.

Currently, there are over 200 HF radio stations operated by 15 Federal organizations in 44 states participating in the SHARES Program. When the first SHARES HF Radio Directory is published this fall, over 600 stations are expected to be listed. This is a major achievement in Federal NSEP contingency communications planning.

No high-frequency radio program would be complete without giving consideration to the Amateur Radio community. It is widely recognized that Amateur Radio operators have been in the forefront of volunteers who respond to crisis and emergency situations. This response has historically been of critical importance during and after major disasters and emergencies. For this reason, in 1983, the NCS undertook a series of HF radio exercises entitled "NIGHT TANGO."[1] The NIGHT TANGO scenario was designed to assess the feasibility of using Amateur Radio operators to support reestablishment and reconstitution of the nation's telecommunications capability. The exercise results clearly demonstrated the significant contributions Amateur Radio operators can make in support of NSEP.

[1]See June 1984 *QST*, page 94, and September 1984 *QST*, page 72, for a report on Exercise NIGHT TANGO III and IV.

As a result of the NIGHT TANGO series in 1986, Military Affiliate Radio System (MARS) and Civil Air Patrol (CAP) facilities were identified as resources directly supporting the SHARES HF Radio Program Concept of Operations. NIGHT TANGO also paved the way for allowing Amateur Radio operators to participate. The range and extent of amateur involvement in SHARES is currently under discussion and more information will be available in the near future.

Hams Provide Critical Link

Here it is, August 1988. Twenty-five years have passed since the inception of the NCS. From those five original members has grown a cooperative effort of 23 Federal organizations striving to enhance our national security by ensuring that the highest levels of our government are able to communicate during critical situations. The NCS now has programs being developed and implemented to enhance the nation's commercial public telephone networks. The NCS also has a major program designed to use existing HF radio assets, and appreciates the vital role Amateur Radio operators play in providing a critical link in the NSEP chain during telecommunication emergencies.

The commemorate its 25th anniversary, the NCS will operate special-event station N2CCY on August 21 (see this issue, page 104). For a look at the NCS amateur station, see page 11 of this issue.

Looking back to the original mission of the NCS, you may ask if we're "there" yet. Our answer is no, but with the involvement of the Amateur Radio community, we're a whole lot closer. QST

Strays

WHAT? *QST* ARTICLES *DON'T* GROW ON TREES?

☐ Nope, not at all. Just because *QST* is chock-full of good technical material doesn't mean there's a bumper crop of good manuscripts just ripening in the orchard. *QST* depends on radio amateurs like *you* to keep other hams up to date on what's happening in Amateur Radio. In fact, the wider the radio realm becomes, the more we need solid articles on modern radio practices and techniques.

Automated test equipment is big in industry; maybe you've been using ATE in your ham building projects for some time now. How about writing up your system for *QST*?

Ham radio's more exciting than ever at 10 and 1.25 meters now that Novices can operate there. If you've just whipped up a smooth new antenna system for one of the Novice bands, *QST*'s the place to tell other hams about it.

Packet radio—you're involved in it, and you're conducting some pretty wild experiments: Voice, pictures, new forms of station control and data transfer. Don't be bashful—get connected to writing for *QST*!

Got questions? (Yes, *QST* pays for feature articles!) Call or write: Technical Editor, *QST*, American Radio Relay League, 225 Main St, Newington, CT 06111, tel 203-666-1541.

I would like to get in touch with...

☐ anyone who knows how to string a dial cord over the pulleys of the National NC-100XA receiver so that the pointer works right. Nathan Bale, WØPXZ, PO Box 1494, Grand Junction, CO 81502.

☐ anyone with info, catalogs or workbooks for the old Massachusetts Radio and Telegraph School. I taught there in 1956-57. Ed Romney, N4DFX, Box 446, Drayton, SC 29333.

☐ anyone that was in the University of Wisconsin US Navy radio school, class #47 (1944). Fred Chapman, W4CHT, 205 Goldvein Dr, Fredericksburg, VA 22401, or 703-786-3786.

☐ any amateurs who attend Quaker meetings (Society of Friends). Paul Thompson, G6MEN, 13 Elmfield Rd, Shrewsbury SY2 5PB, United Kingdom.

☐ any hams who are Deadheads for a Dead sked. David Ferland, KA1RYZ, RD 3, Box 440, Montpelier, VT 05602.

☐ any hams who are Chrysler employees to assemble a list. The group presently has 169 amateurs. Include your name, call, home address and phone number, work location, CIMS address and work phone number. William Bleher, W8GQL, 18678 Nagaunee, Redford, MI 48240.

☐ any hams who served with the 1st Battalion 343rd Infantry, 86th Infantry Division during WW II. Harry Frey, W2IMA, 425 Carriage Rd, Satellite Beach, FL 32937.

This Novice Quiz Ain't So Trivial!

Do you suffer the "Post-Enhancement Novice-Ticket Test Givin' Blues"? Hum a few bars...

By Rosalie White, WA1STO and Steve Place, WB1EYI
Education Activities Coordinator Manager, Volunteer Resources

Got a friend you like but thinks he or she knows more than you on any topic? Didn't you just hate it when you described fixing the problem in your antenna rotor control box, and he told you a solution you should've tried? He was sure it would've saved you two trips up the tower *and* one to the electronic parts emporium. Worst of all, he was probably right!

We all have friends like that. They're smart. We love 'em in small doses. Now and again, though, it's great to shut them up for a while! Here's your chance to show the "know-it-alls" how much they *don't* know! You'll have fun checking yourself on this quiz, and then proving them to be unenlightened. Rattle them on the local repeater during the morning commute, or at the club—present the quiz as the evening's program! You'll be the acknowledged local expert on the subject: administering the Novice class license exam. You'll have information ready for the day someone asks you to handle their exam, information every ham needs. Don't let it go to your head, however, or *you'll* be the infamous successor to the "know-it-all" title.

1) How many examiners does the FCC require to administer a Novice operator license exam?

2) Is accreditation by a Volunteer Examiner Coordinator required before one may administer a Novice operator exam?

3) What are the FCC designations for the Novice written exam element? The Novice telegraphy exam element?

4) How many questions must be on the Novice written exam?

5) What is the required duration of a Novice telegraphy exam?

6) To whom do you, as a Novice examiner, send the Form 610 when the candidate you're testing passes?

7) What is the permissible fee for a Novice exam?

8) Who must prepare the Novice exam?

9) May Novice examiners issue CSCEs to candidates?

10) In FCC telegraphy exams, if each letter counts as one character, what is the character value of a numeral? Of punctuation marks? Of procedural signals?

11) How long must an examiner retain the test papers, including the answer sheet, as part of his station records?

12) How soon after the exam must the examiners complete and mail a successful Novice candidate's Form 610?

13) What materials or devices are Novice candidates normally permitted to use during a Novice written exam?

14) What two things must an examiner tell a Novice candidate who does not score a passing grade on the written exam?

15) How many people must sign a Form 610 application for Novice before a license can be issued?

16) What are five FCC volunteer examiner requirements that you must meet to administer a Novice operator license exam?

17) If a candidate fails the Novice written or code exams, how soon may he retest?

18) How much latitude do you have to rephrase questions from the Novice question pool for the written exam?

19) What are the rules concerning Novice written-test design formats?

20) What Morse code characters are Novice candidates required to know for their 5-WPM exam?

21) Describe three acceptable Novice Morse code test design formats.

22) What does the FCC require from a candidate to pass a 5-WPM Novice code test?

23) What methods may a candidate use to generate Morse code for the 5-WPM Novice code sending test?

24) If the candidate's station location address has no street number, how must he complete the station location box on the Form 610?

25) What is the additional requirement of candidates whose physical disabilities require special procedures?

26) Are Novice candidates required to pass a telegraphy *sending* test in addition to their *receiving* test to earn credit for the Novice telegraphy exam?

27) If you run short of Forms 610, is it permissible to send photocopies to the FCC?

28) How must you select questions from the Novice question pool in designing a Novice written exam?

29) If a candidate came to you for a Novice license exam, what might he submit to you as valid Novice written-test credit?

30) What constitutes valid Novice Morse code test credit?

31) Until what date is the current Novice question pool valid?

32) Which FCC Form 610 revisions are currently acceptable?

SCORING

How do you stack up as a volunteer Novice examiner? Check your answers against those in the answer key on page 72, total the number of questions you answered correctly, and read your "fortune" on the scoring scale below.

Number Answered Correctly	Your ranking as a Volunteer Novice Examiner
30-32	Ham-radio genius at 1:1 SWR (Ahhh, you did know that this wasn't an open-book test, didn't you?).
27-29	You cheated! You've been giving Novice exams all along.
24-26	Not bad! Why are you wasting your time reading this when you could be testing a flock of Novice candidates right now?
21-23	Pssst...You're on simplex...The rest of the world's on duplex. (Don't tell them we tipped you off.)
18-20	Hmmmm...You've survived the "abuse" of one too many midnight Wouff Hong ceremonies.
15-17	On Field Day your club invites you along whenever it's short a dummy load.
12-14	Oooops...You sent the kid next door for a copy of *The National Enquirer* and he came back with this.
0-11	If you gave a Novice exam knowing only what you know now, you'd be cited for inhumane treatment of a Novice candidate.

(Late this fall a variety of sample Novice code tests on cassette tape and Novice written exams will be available from ARRL to General class and higher licensees. These will be free of charge, but include $2.50 for shipping and handling ($3.50 for UPS). You must include your call sign when ordering.)

Where to Place Your Trust

By Mary Schetgen, N7IAL
Assistant Secretary
The ARRL Foundation

You would like to make a sizable endowment to the ARRL Foundation and have decided to make a bequest in your will. This is, of course, an excellent option for making a significant gift to the General Fund, or alternately, designating the establishment of a Foundation memorial scholarship in your name or another's—after your death.

But there's a way during your lifetime to have your endowment be an asset for the Foundation *and* yourself. By establishing a trust or annuity (a form of trust) with the ARRL Foundation acting as trustee, you can earn income on your endowment during your lifetime. Your trust can provide lifetime income for a survivor. The ARRL Foundation becomes the recipient of the trust assets upon your death or that of your survivor(s).

We can help you establish the most favorable structure for your trust and help you obtain information for the best tax advantages possible. By establishing a trust with the Foundation, long-term income and tax benefits are yours and your support of Foundation programs benefits many. If this sounds like a good deal for you, have your attorney call or write the ARRL Foundation. We'll provide complete information upon request.

New Hampshire Club Earns A New Station

In the grand tradition of amateur initiative: The Pine Island 4-H Club ARC of New Hampshire can happily attest to the benefit of applying (and working) for a Victor C. Clark Youth Incentive Program grant. Pine Island Club President Sean Duclos, KA1KGB, reported the many fund-raising activities (bake sales, open house and flea market) his club conducted to raise the seed money for a matching-fund grant. The Foundation's VCCYIP Screening Committee awarded a grant equal to the amount of funds club members raised. This cooperative effort has helped the Pine Island group realize their goal of new club-station equipment and the Youth Incentive Program is pleased to have assisted!

Do you know of an Amateur Radio youth group or school club in your town that would benefit from the Victor C. Clark Youth Incentive Program? Send for full details to: Attn: Victor C. Clark Youth Incentive Program, ARRL Foundation, 225 Main St, Newington, CT 06111.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Dr James L. Lawson Memorial Fund
Amalia Lawson

The Jesse A. Bieberman Meritorious Membership Fund
Rev George Dobbs, G3RJV

The Satellite Program
Douglas C. Fairbrother

The Bill Bennett, W7PHO, Memorial Fund
M. H. Walton, KDØAE
Ruth Bennett & Family
Yuan Bo, BY1QH
Tony & Doris Kato
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Junji Saito, JA7SSB
Bator Sambu, JT1BG
Michinori Tojo, JA4BEX
Joanie Branson, KA6V/7
Gerry Branson, AA6BB/7
Jack Durga, K7JXR
Ed Eckert, WA7GRE
Gene Eggebraten, W7GVF
Bill Goodloe, WA7GWJ
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Chester Kaminski, WA3OKB
Arthur & Bernice Rieders
William G. & Margaret S. Dudley
in memory of David Busick, N5JJ
Albert J. Pelletier, Jr, N4JXU
Larry J. Spangler
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Paul D. McReynolds, W3BDF
David T. Green, N5KEE
Burt J. Bittner, KØWQN
Ben Waigand, WA7YSO
Kurakichi Sawada, JG1DKJ

As received and acknowledged during the month of **May**.

This now-college-age young man held an important Amateur Radio distinction when this photo was taken back in 1976. Can you recall? *Turn to this page next month for the answer!*

Answers to the Novice Examiner Quiz

1) Two. (97.28(b))

2) No. (97.28(b))

3) Written = Element 2, Telegraphy = Element 1A. (97.21(c)(1))

4) At least 30. (97.21(c)(1))

5) At least 5 minutes. (97.29(c))

6) The Gettysburg, Pennsylvania office of the FCC. Do not send Forms 610 to the ARRL or to the ARRL/VEC. (97.28(g))

7) Nothing. It is not permissible to charge a fee for a Novice exam. (97.31(c), 97.33 and 97.36(a))

8) The examiner. He may use valid exams printed by others, such as the ARRL, though the responsibility for ensuring that an exam design is valid lies with the examiner. (97.27(a))

9) No. The CSCE, Certificate of Successful Completion of Examination, is a document used by accredited VEs in the VEC program where it can be used to issue "element credit" on successfully passed elements. (97.28(e))

10) 2 characters; 2 characters; 2 characters (97.29(c))

11) One year from the date of the test. (97.28(d))

12) Within 10 days of administration. (97.28(g))

13) Pencil, eraser and calculator. No books or notes are allowed. You as examiner are responsible for ensuring that the calculator memory is cleared; if you are not convinced that it is, you may forbid the use of a particular device.

14) That he or she has not scored a passing grade, and the percentage of questions answered correctly. (97.28(d))

15) Three, the candidate and the two examiners.

16) A) be at least 18 years old

B) hold a General Class or higher license

C) never have had an amateur license suspended or revoked

D) not own any interest in, or work for, a company making or selling amateur transmitting equipment or license study guides

E) not be related to the applicant

17) Immediately. The examiners may administer another exam provided that it is different from the failed one. (97.27(c)&(d))

18) None. The question itself must be used verbatim, though you may prepare valid multiple choice answers to use with the question.

19) A written examination shall be such as to prove that a person possesses the operational and technical qualifications required to perform properly the duties of an Amateur Radio licensee. The recommended style, and that used by most VECs, is multiple choice with one correct answer and three incorrect distractors. Short answer, fill-in-the-blank, essay or any other valid format that tests the candidate's knowledge may be used. (97.21(c))

20) All 26 letters, 10 numerals (0-9), period, comma, question mark, double dash ($\overline{BT}$), fraction bar ($\overline{DN}$), and procedural signals for end of message ($\overline{AR}$) and end of transmission ($\overline{SK}$). Try to design the exam not to run much over five minutes long. (97.21(b))

21) Typical designs are solid copy of prepared message; fill-in-the-blank questions on the prepared message; multiple choice questions on the prepared message. There is no limitation to any particular design format so long as the exam is such to prove that a person has the ability to send correctly by hand and receive correctly by ear texts in the International Morse code sent at 5 words per minute. (97.21(b))

22) Though the specific exam criteria are not specified in FCC Rules and Regulations, it is common and accepted practice to pass a candidate based on one minute of solid copy of a transmission that is at least five minutes long; or in the case of questions based on the prepared message, at least 70% correct, typically 7 out of 10 questions. Examiners' signatures on the FCC Form 610 attest to the candidate's having demonstrated his ability to send and receive the international Morse code at the prescribed speed. (97.21(a))

23) Sending can be done with a straight key or any other kind of hand-operated key such as a semi-automatic bug. Use of keyboards and computers where the candidate does not form the code elements are not acceptable. (97.29(c))

24) Give a general description of the location, making references to landmarks. A Post Office box, RFD number or General Delivery may not be used.

25) They must attach to their application a physician's certification indicating the nature of the disability, and the name(s) of the person(s) taking and transcribing the applicant's dictation of test questions and answers, if such a procedure is necessary. (97.26(g))

26) No. Though Section 97.21 states that a code test be prepared "such as to prove the applicant's ability to transmit correctly by hand," the FCC stated in a 1983 Report and Order that it will "accept as valid code tests based on receiving only." You as a volunteer Novice examiner do have the right to require a sending test, however. We suggest that you do, not to fail an otherwise qualified candidate, but to use the opportunity to help him in sending easily copied code.

27) Only if the photocopy is made of a blank Form 610 onto the same color paper as the original; any other color paper will be rejected and returned to you by the FCC. All signatures must be original, that is, not photocopied.

28) Select the number of questions specified by the FCC from each subelement; see Table 1. (97.21(c)(1)&(d))

Table 1

Distribution of Questions on Novice Element 2

	Topic	*Number of Questions*
(1)	FCC Rules	9
(2)	Operating Procedures	2
(3)	Propagation	2
(4)	Amateur Radio Practices	4
(5)	Electrical Principles	4
(6)	Circuit Components	2
(7)	Practical Circuits	2
(8)	Signals and Emissions	2
(9)	Antennas and Feed Lines	3
Total Questions		30

29) CSCE for Element 2 from a VEC session, or a Form 610 that had been returned to the Novice candidate who had passed the written but not the code. (97.25(b))

30) CSCE for Elements 1A, 1B or 1C; current commercial radiotelegraph license or permit issued by the FCC, or one held within the 5 years preceding the date that the FCC will receive the candidate's application for Novice license; or a Form 610 that had been returned to the Novice candidate who had passed the code but not the written exam. (97.25(b)&(c))

31) It is valid through October 31, 1989. Beginning on November 1, 1989 Novice exams will be created using questions from a new revision that will be in use for three years.

32) FCC Forms 610 with revision dates of June 1984 or later are acceptable. Note that the Form 610 with a 12/31/89 expiration date requires no modification while other revisions may. Forms dated prior to June 1984 will be returned.

For resolving the finer points of arguments among your buddies—short of pistols at fifty paces—check these resources:

The ARRL Novice Instructor's Guide

The FCC Rule Book, Seventh Edition

and if you're a Volunteer Examiner for the ARRL/VEC, see your

ARRL/VEC Volunteer Examiner Manual

Happenings

Conducted By Phillip Sager, WB4FDT
Manager, Regulatory Information Branch, ARRL

VEC Conference Held in Texas

Jim Clary, WB9IHH, ARRL/VEC Manager, attended the fourth VEC Conference, held in Arlington, Texas on June 3. One of the topics covered was reappointment of members of the Question Pool Committee to new one-year terms; the members are ARRL/VEC, Western Carolina ARS/VEC, Greater Los Angeles ARG and W5YI Report/VEC. The VECs also adopted a formal statement that (to the extent of the VECs' influence) they will strongly urge the utilization of questions, distractors and answers developed by the Question Pool Committee and the ARRL. Two VECs—BEARS of Washington, and Honolulu ARC/VEC—have requested that they be decertified. Both VECs believed that sufficient testing opportunities exist in their respective areas.

This conference was attended by 31 representatives from 12 VECs; the next VEC Conference is scheduled for July 1989, in Gettysburg, Pennsylvania.

SECOND NOTICE—ARRL BOARD ELECTIONS—CALL FOR NOMINATIONS

Attention all ARRL members! Nominations are now open for Director and Vice Director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the two-year term beginning January 1, 1989. From now until Saturday, August 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of a Division, naming a Full member of that Division as a candidate for Director or Vice Director.

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. 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 15 Directors, who are elected by the membership on a geographical basis. Eight of the Directors stand for election in even-numbered years, seven 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.

ARRL voters/members have the privilege and responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection or to decide that someone else could do a better job and work for their election.

The nominee must hold at least a Technician class amateur license, 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 immediately prior to 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. 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. 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.

The nominating petition must bear the signatures of 10 (or more) Full members of a Division naming the nominee as a candidate for Director or Vice Director. The petition must be received by League Headquarters **no later than noon on Saturday, August 20, 1988.**

Headquarters will provide each candidate with election procedures information and a questionnaire that will allow the Executive Committee (EC) to determine the eligibility of a candidate in accordance with the Articles of Association and Bylaws. The questionnaire will require each candidate to furnish information as to his/her occupation and other business activity, age, license class and membership status, under affirmation. A statement of not more than 300 words setting forth the candidate's qualifications and a recent photo may also be sent. This statement and photo will be included with the ballot mailed to members and 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 this statement will be grounds for disqualification by the Executive Committee.

The Executive Committee is scheduled to meet on August 27 for this purpose, so candidates should make sure their information form arrives at Headquarters as early as possible and in any event no later than August 20. (It is in the candidate's best interest, obviously, to get the nomination in early. If there is to be a mid-August nomination for some unavoidable reason, the candidate information, 300-word statement and photo should accompany the nominating petition.)

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 as of September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1, and, to be valid, must be received at HQ by noon on November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher

nomination and running for Vice Director if he or she wishes.

Nominating Form

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

Executive Committee
The American Radio Relay League
225 Main St Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the...Division, hereby nominate...of...as a candidate for Director; and we also nominate... of...as a candidate for Vice Director from this division for the 1989-1990 term.

(Signature...Call...
City...ZIP...Date...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

Absentee Ballots

All ARRL members who are licensed by FCC but are temporarily residing outside the US are eligible for Full membership. Those 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. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the US, Full members temporarily living outside the ARRL Division they consider home may have voting privileges by notifying the Secretary prior to September 10 giving their current *QST* address and the reason that another division is considered home. If your home is in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Divisions, but your *QST* goes elsewhere, please let the ARRL Secretary know as soon as possible, but no later than September 10, so you can receive a ballot from your home Division.

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 Howard S. Huntington, K9KM.

Hudson—Stephen A. Mendelsohn, WA2DHF, and Paul Vydareny, WB2VUK.

New England—Tom Frenaye, K1KI, and Robert Weinstock, KN1K.

Northwestern—Rush S. Drake, W7RM, and William R. Shrader, W7QMU.

Roanoke—Gay E. Milius Jr, W4UG, and John C. Kanode, N4MM.

Rocky Mountain—Marshall Quiat, AG0X, and Hugh Winter, W5HD.

Southwestern—Fried Heyn, WA6WZO, and Wayne Overbeck, N6NB.

West Gulf—Jim Haynie, WB5JBP, and Thomas W. Comstock, N5TC.

Petitions need 10 or more signatures of Full members and are due at 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, 1989.

For the Board of Directors:
May 15, 1988
Perry Williams, W1UED
Secretary

RECIPROCAL CALL ID UPDATE

As reported in last month's column, there is a change in the identification procedures for alien licensees operating under reciprocal agreement with the US. We now have received the official FCC Order, and here is the Part 97 revision.

97.313 is revised as follows: "When the station is operating under a reciprocal permit, the call sign transmitted in the identification procedure must be that issued to the station by the licensing country, preceded by the appropriate letter-numeral designating the station location, separated by the slant mark / or by the word STROKE or SLASH during radiotelephone operations. At least once during each intercommunication, the identification announcement must include the geographic location as nearly as possible by city and state, commonwealth or possession, stated in the English language."

FCC DENIES PETITION

The FCC has denied a petition submitted by Carroll L. Norton, NA4I, which sought to authorize the use of amateur stations for communications between family members, limited to families where at least one person holds an Amateur Extra Class license.

The petition sought to permit the licensee's immediate (non-licensed) family members to act as station control operators, but only for communications with the Extra Class operator. Norton stated in support of his petition that the proposed rule change would enhance Amateur Extra Class privileges and encourage family participation in Amateur Radio.

In denying the petition, the FCC said the Amateur Service should not be used as an "alternative" to other radio services, and secondly, the FCC does not exempt any amateur station control operator from the licensing requirement. Only a qualified person can hold an amateur operator license, as required in the International Radio Regulations of the ITU, and the Communications Act of 1934.

"The petitioner, in effect, seeks to use the amateur service for a purpose not intended (i.e. as a personal radio service) and a primary purpose of the amateur service is to improve and expand our country's reserve of radio operators who contribute to the advancement of communications technology. Only amateur radio operators who possess technical knowledge and operating skills are capable of meeting these objectives. Thus the purpose of the amateur service is best served by the application to all users of a licensing requirement based on demonstrated abilities."

TONY ENGLAND, WØORE, RETIRES FROM NASA

According to AMSAT's *Amateur Satellite Report*, Dr Tony England, WØORE, has announced his retirement from NASA. Dr England will join the faculty of the University of Michigan in Ann Arbor as a Professor of Electrical Engineering. He cited the delay in shuttle flights and a desire to progress toward personal goals as reasons for leaving the program.

WØORE, a geophysicist originally from North Dakota, continued the tradition of hams in space with his amateur Slow Scan TV aboard the Shuttle *Challenger*. The SSTV pictures were seen by amateurs worldwide in July of 1985.

Tony will be involved with satellite research, especially remote sensing, in addition to his teaching duties at the university.

WØORE has been actively involved in the support of Amateur Radio and better education in the space sciences in general, and has been a great role model for would-be astronauts around the world.

With Tony's retirement, the next potential "ham-in-space" will be Dr Ron Parise, WA4SIR, a visiting scientist in NASA, who proposes to include a packet radio experiment aboard the ASTRO-1 mission. This mission has also been delayed while the shuttle program is restructured after the *Challenger* accident in January 1986.

FCC LICENSING STATISTICS

The following is the most current list of new licenses and upgrades from the FCC.

	March	*April*	*May*
Extra	44,617	44,819	45,208
Advanced	98,505	98,403	98,493
General	113,900	113,623	113,648
Technician	95,256	95,810	96,888
Novice	82,705	82,780	82,675
Operators	434,983	435,435	436,912
Clubs	1,913	1,907	1,901
Military Rec	123	123	123
RACES	343	343	342
Total	437,362	437,808	439,278
Licensing Activity			
New Novices	2,407	1,996	2,714
All New	2,733	2,195	3,002
Upgrades			
To Technician	1,466	1,075	1,676
To General	660	428	628
To Advanced	583	396	598
To Extra	429	262	424
Total	3,138	2,161	3,326

NEW ARRL HQ EMPLOYEES

Dennis Dzierzawski, K9EIS, has joined the ARRL staff as Laboratory Supervisor. Dennis is a graduate of the Illinois Institute of Technology, and holds BSEE and MSEE degrees. Dennis has been involved in the design, testing and analysis of electromagnetic interference devices for the past 24 years. In addition to Amateur Radio, Dennis' hobbies include woodworking and music.

Also new to HQ is Kirk Kleinschmidt, NTØZ, who is an Assistant Technical Editor. A graduate of North Dakota State University, Kirk holds a BA degree in Mass Communications/Journalism. He has a background in electrical engineering, broadcast journalism and public relations. Kirk was first licensed at age 14 as WDØBDA. His Amateur Radio interests include contesting, DXing, QRP, and home-brew construction (Kirk says he "prefers home-constructed creations to function the first time").

Welcome aboard Dennis and Kirk!

DARA SCHOLARSHIP RECIPIENTS ANNOUNCED

Dayton Amateur Radio Association (DARA) President Al Torres, KP4AQI, has announced the following 1988 DARA scholarship winners:

Lynn Bailey, KA8PWD, Princeton, West Virginia

Scott Sterling, KA8UGM, Coldwater, Michigan

Ross Lepiane, WG7I, Walla Walla, Washington

David Milthaler, N8FGX, Tipp City, Ohio

Each of these students will receive $1000 toward tuition at the school of their choice. This scholarship is open to any FCC licensed amateur who graduates high school in the year that the award is given. There are no restrictions on license class, or the course of study chosen by the recipient.

Information and application forms may be obtained by writing DARA Scholarships, 317 Ernst Ave, Dayton, OH 45405. Deadline for receipt of next year's completed applications is May 15, 1989.

FCC PROPOSES LABELING RECEIVERS WITH ECPA WARNING—AMATEUR AND ALL OTHER LICENSED SERVICES EXEMPTED

The FCC has proposed, in Docket 88-281, to require what it calls "advisory labeling" of radio receivers which can receive communications protected by the Electronic Communications Privacy Act (ECPA). The labeling would be required only for receivers "intended for use by the general public"; all receivers or transceivers that are marketed primarily for use in the various licensed radio services, and for broadcast reception, are exempt.

The FCC action was prompted by a petition from Regency Electronics. The petition stated the label would be to help educate the public that certain uses of scanners could be illegal in light of the ECPA. Regency suggested that the label should read: "Improper use of this device may violate the provisions of the Electronic Communications Privacy Act of 1986 through intentional unauthorized interception of protected radio communications."

The FCC said that a label "appears to be the simplest and least burdensome method of advising scanner users of the ECPA." The FCC also requested comments on the label and where, if approved, it should be placed and if any additional instructive material should accompany the label.

The ARRL is watching this proposal with more than just passing interest. In 1986 we petitioned the FCC to require that a label be put on home electronic devices which would state that such devices may be susceptible to RFI. The Commission dismissed the petition, on the grounds that such a label would imply that RFI standards had been established when in fact they were in the process of being formulated for television receivers only, not home entertainment devices generally.

REDUCED SUBSCRIPTION RATES ON *ARRL LETTER*

The ARRL Letter is available to many field volunteer leadership officials at a reduced subscription rate of $10. The following is a list of leadership appointees who are currently eligible for this discount: Section Manager (free), Assistant Section Manager, Section Traffic Manager, Official Observer Coordinator, Section Emergency Coordinator, Affiliated Club Coordinator, Public Information Officer, Technical Coordinator, State Government Liaison and Bulletin Manager. Contact Kathy Fay in the Circula-

FCC-Issued Call Signs Update

The following is the FCC listing of "just-issued" amateur call signs as of June 1.

District	*"A" Extra*	*"B" Advanced*	*"C" Tech/Gen*	*"D" Novice*
Ø	WJØK	KEØVZ	NØJKE	KBØCVG
1	NR1U	KC1JS	N1FTJ	KA1SFG
2	WG2L	KE2HH	N2IGT	KB2FWJ
3	NQ3I	KD3IB	N3GHH	KA3TGJ
4	AB4IQ	KM4CH	N4TAD	KC4FRR
5	AA5GA	KG5KT	N5MRD	KB5GOP
6	AA6IV	KJ6HW	N6SIL	KB6YSO
7	WO7N	KF7KV	N7LDS	KB7FFO
8	WG8N	KE8SD	N8JPA	KB8EZH
9	NZ9H	KE9LB	N9HNR	KB9BAB
Alaska	**	AL7JY	NL7OA	WL7BRT
Hawaii	**	AH6JA	NH6PI	WH6BYU
Puerto Rico	**	KP4PC	WP4OT	WP4IAQ
Virgin Is	KP2Y	KP2BN	NP2CO	WP2AGA

**All 2 x 1 calls have been issued in the district.

tion Department at ARRL HQ for details and subscription form.

SUMMER EMP TESTS MAY AFFECT AMATEUR EQUIPMENT IN THE VIRGINA CAPES AREA

The United States Navy announced it is planning to operate the Electromagnetic Pulse Radiation Environment Simulator for Ships (EMPRESS II) in international waters off the Virginia Capes operating area (VACAPES), located about 15 miles offshore from Currituck Light, North Carolina. The purpose of EMPRESS II is to assess the vulnerability/survivability of Navy ships' electrical and electronic systems to EMP exposure. The Virginia Capes site was selected because it offers access to a full range of ships, as well as allowing deep-draft vessels access to the test area, while presenting minimal conflicts with other users in the area. EMPRESS II will be in operation in the Cape area during the summer months of June, July and August, with notices being provided to the public, other maritime users and aircraft regarding its operating schedules. The restricted zone is a two-nautical-mile radius around EMPRESS II, as well as from the surface to an altitude of 6000 feet. The Navy will be providing for independent scientific study of any adverse effects on marine life or ecosystems in the area and, as with previous environmental research related to EMPRESS II, final results will be available to the public.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern Massachusetts, Missouri, Nebraska, New York City-LI, South Carolina, Southern New Jersey and Western Pennsylvania sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

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*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following is suggested:

(Place and date)
Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the...ARRL Section of the...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office.
(Signature...Call...City...ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 P M Eastern Local Time September 9, 1988. Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1988. Returns will be counted November 22, 1988. SMs elected as a result of the above procedure will take office January 1, 1989.

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, 1989.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in January 1989 *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER CHANGES

In the Rhode Island Section, William Foss, KA1JXH, has been appointed to complete the term (until July 1, 1989) of Charles H. DiLuglio, K1DA (resigned).

SECTION MANAGER ELECTION RESULTS

Balloting results: In the Indiana Section, Bruce Woodward, W9UMH, received 485 votes, Martin Hensley, KA9PCT, received 383 votes, and Mike Anderson, KA9LQM, received 255 votes. Mr Woodward was declared elected and his two-year term began July 1, 1988.

The following Section Managers will begin a two-year term October 1, 1988:

Uncontested

Connecticut—Caesar Rondina, N1DCS
Idaho—Don Clower, KA7T
Minnesota—George E. Frederickson, KCØT
North Dakota—Roger Kurtti, WCØM
Oklahoma—Joseph Lynch, N6CL
Southern Florida—Richard D. Hill, WA4PFK
Virgin Islands—Ronald Hall Sr, KP2N
Western New York—William W. Thompson, W2MTA

Congressional Resolution Supports Amateur Radio

(continued from page 60)

Here is the complete text of Senate Concurrent Resolution 127

CONCURRENT RESOLUTION

To express the sense of the Congress concerning support for Amateur Radio and Amateur Radio frequency allocations vital for Public Safety purposes.

Whereas more than 435,000 Radio Amateurs in the United States are licensed by the Federal Communications Commission upon examination in radio regulations, technical principles and the international Morse Code; and

Whereas by international treaty and regulation, the amateur is authorized to operate his or her station in a radio service of intercommunications and technical investigations solely with a personal aim and without pecuniary interest; and

Whereas among the basic purposes for the Amateur Radio Service is the provision of voluntary non-commercial radio service, particularly emergency communications; and

Whereas volunteer amateur radio emergency communications services have consistently and reliably been provided before, during and after floods, tornadoes, forest fires, earthquakes, blizzards, train wrecks, chemical spills, and other disasters:

Now therefore be it
Resolved by the Senate (the House of Representatives concurring), That it is the sense of the Congress that:

1) It strongly encourages and supports the Amateur Radio Service in its emergency communications efforts; and

2) Government agencies shall avoid actions which would reduce amateur radio frequency allocations used for these purposes.

How's DX?

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

LA5HE's Commandments for QSL Managers

1) By agreeing to act as a DX station's QSL Manager, you are assuming the responsibility to assure that everybody who wants a card gets it, in one way or other.

2) All cards received must be checked against the log copies you receive from the DX station. A QSL card should be made out immediately and returned in a routine fashion via the bureau.

3) One of the services of a national society is to provide a QSL Bureau for its members. Be sure to maintain your membership in your national society to ensure proper receipt of cards via the bureau. [Ed Note: ARRL does not require you to be a League member to use the Incoming QSL Service. The ARRL membership supports this service.]

4) Always make sure that your society's bureau is aware of the fact that you are handling cards for a station in a difficult part of the world to assure smooth cooperation from all parties concerned in your own country.

5) If your national QSL Bureau is not automatically accepting cards for, or on behalf of, overseas DX stations, take the necessary action to obtain acceptance before you undertake the responsibility to act as somebody's QSL Manager. This is very important, as the bulk of the world's QSL cards are sent via the bureaus.

6) For more prompt card handling, many avid DXers are prepared to pay postage-plus for the service of a direct card by air or surface. If you are prepared to provide this service, make sure that this information is provided by the DX station, as well as being published in the various DX news bulletins and ham magazines. A good idea is to advise how many International Reply Coupons (IRCs) are required for airmail within your own continent and the rest of the world. (One IRC will always cover surface postage.) If you require self-addressed envelopes, make it known at the same time.

7) For direct replies, never demand more than needed to cover your actual costs. QSL manager are volunteers, and you are expected to do the work out of dedication or pleasure. You should be prepared to accept a small loss, which to some extent will be compensated for by some people sending you postage in excess of what is required. Being a QSL manager is definitely a nonprofit operation.

8) Remember, being someone's QSL manager is a responsibility, not an ego trip.

SEOUL OLYMPICS

The Korean Amateur Radio League will be active Sep 1-Oct 5 at: 6K24SO (Olympic Camp, Seoul); 6K88SO (Olympic Park, Seoul); 6K88BYC, Busan Yacht Center, Busan. Radio amateurs may operate by providing in advance a copy of the operator's license; name, address and date of birth; location, time and date of operation is desired (send to Korean Amateur Radio League, Central PO Box 162, Seoul, Korea). To commemorate the Olympics, all HL stations will be using 88 during the game period. Commemorative awards: Class A—one 6K station and at least one from each of the five HL areas HL1-HL5; Class B—one 6K station or any HL88 station and contacts with HL stations which lead to composition of the word SEOUL with the last letter of the call; Class C—Compose the words SEOUL OLYMPICS with the last letter of calls from any 5 or more DXCC countries including at least one HL station. Application: Proof of contacts Jan 1-Oct 5, 1988; 10 IRCs or $5 US plus your own card (address above). If you're in Seoul Sep 24, be sure to attend the worldwide eyeball party at the Hotel Plaza.

DX SPOTTING PACKET SYSTEM

WB2EKK ("DXing for Little Guns") reports that in early spring of last year the Potomac Valley Radio Club established a Packet Radio DX Spotting BBS, based on an IBM® PC clone with hard disk and interface boards, and DX Cluster software written by AK1A. The call is N2FB, located at the station of W3LPL. John reports that the DX Cluster has really spurred DX activity in the area (even from the honor-roll types who only need Albania!). The system paid off in locating DXpedition operations (VU4GDG, Andamans and PAØGAM/ST) before the pileups got out of hand. The latest software supports showing beam headings and distances to DX countries, showing MUF to DX countries, showing sunrise/sunset times for DX countries and showing oblasts. AK1A can be contacted for information on the software, and W3LPL or N2FB for information on PVRC experience with the system.

BARBADOS

New ARRL member 8P6SG reports that 8P6BBS (Barbados Boy Scouts) has now become fully operational, with its revival made possible by two young amateurs, 8P6SH and 8P6SG. The club station will be fully prepared this year to work with the local Central Emergency and Relief Organization (CERO), in addition to DX and contest operation. The club station will also be conducting Amateur Radio classes in conjunction with the national club station 8P6AW, for its Boy Scouts and other nationals. As part of their community service they will also develop an outgoing QSL Bureau to handle all local outgoing cards.

The station currently uses a Kenwood TS-820, Yaesu FT-101B and Ten-Tec Argonaut 515 (QRP). Antennas consist of a modest 3-element tribander, dipoles for 10-40 meters and a full-wave loop for 80. An 11-meter ground plane has been converted for use on 10/15 meters.

The station was used over the past year during the 9th Caribbean Boy Scout Jamboree (8P6CSJ). During the 30th Jamboree On-the-Air, they signed 8P21BBS (21 years as an independent nation) and 8P75BBS (75 years of scouting in Barbados). If you've contacted any of the mentioned stations, QSL via the bureau 8P6AW, or via Box 64B, "Hazelwood," Upper Collymore Rock, St Michael, Barbados, West Indies.

The Boy Scout station is also interested in hearing from other Boy Scout stations/nets/etc. Current operating times aren't fixed, but the station is operated every Saturday from 1400-2000Z on 10/15/20 meters, CW or sideband.

A TRIP TO THE USSR

The Southern California DX Club *Bulletin* reports on a rare glimpse of the USSR in the form of an outstanding video trip, visiting many ham clubs and individuals throughout the USSR with George, WA6WXD. George had the pleasure of an extended rail/air trip over much of Russia, meeting with many hams and videotaping their ham shacks, families and friends. Prior to his trip, he spent time videotaping scenes around the Los Angeles area, including the TRW swap meet, ham shacks and freeways, while having a friend narrate it in Russian. George was able to show these tapes to the Russian hams on his own battery-powered tape player. What a super idea for any W going overseas.

The legendary ZL2GX (left) with visiting ZLØAAF/VE3UR.

DXPEDISASTER IN VP5-LAND

WB4PJW arrived in the Turks and Caicos last fall, developed a high temperature (with delayed medical help), then found the licensing authority closed weekends with the accompanying Monday a holiday! His application was finally located on Grand Turk, and verbal permission given to operate. 409 stations were worked in spite of his sickness. Arriving home, Jeff still had a temperature and had to spend a week in the hospital. The only bright side was having time to make out the cards. As he says, "If you're brave, try a DXpedition of your own!" No photos; as you might expect, his camera broke!

DXERS BEST SELLERS LIST BY AB0X

(This item in the April 1988 issue of the Kansas City DX Club newsletter created a chuckle in my household! Here are a few of the titles along with their authors.—Ed.)

Alpha for Sale Cheap, E. Z. Cash
How to Measure Small Inductance, Mike Roe Henry
Some Contest Ops Act Like They're Possessed, Bill Z. Bubb
How to Measure Power Output Accurately, Getta Bird
Vibroplex or Bencher: Which is Better? C. W. Keyes
Why I Keep Failing the License Exam, I. Reed Little
Simple Wire Antennas Are Best, Di Polz
Advantages of Crankup Towers, Les Klimbing
Porcelain is Still Best, Enso Laytor
Results of QRP DXing, Colin Weakly
Tall Towers and High Power Really Work! I. B. Louder

Troster's Tips

About QSL Cards

Take pride in your QSL. If you are a DXpedition or DX station, your card will be a permanent reminder of some rare or faraway place. Give thought to design and appearance, and what will be printed on your card (this goes for your home QSL, too).

DXpeditions and DX stations often use attractive multicolored local postal cards or color photographs of the station or location (both rather expensive). Colorful cards beg to be put on the wall. Often the call letters are on the photo side of the card and vital contact information on the flip side. (It is good to put your call in small letters on the back side of the card as well). Many DXpedition cards print descriptions of the location and sometimes a "thank you" for persons/organizations who helped the DXpedition (always a thoughtful idea).

Other cards are plain, with just the call and essential contact information printed on one side. No matter, they still count for a confirmed contact. Simple cards are often chosen when a DXpedition expects to send out thousands of cards—a big saving. Do the best you can within your budget.

A final thought about your personal *home* QSL. Many DXers print the largest call letters the card can take. This will assure that their cards can be seen on the wall in the photos of DX shacks that W1YL/4 runs in this "How's DX?" column! Did you ever see your QSL on a DX shack wall photo? A real thrill. (So, use bigger letters!)

More from W6ISQ in an upcoming issue.

THE CIRCUIT

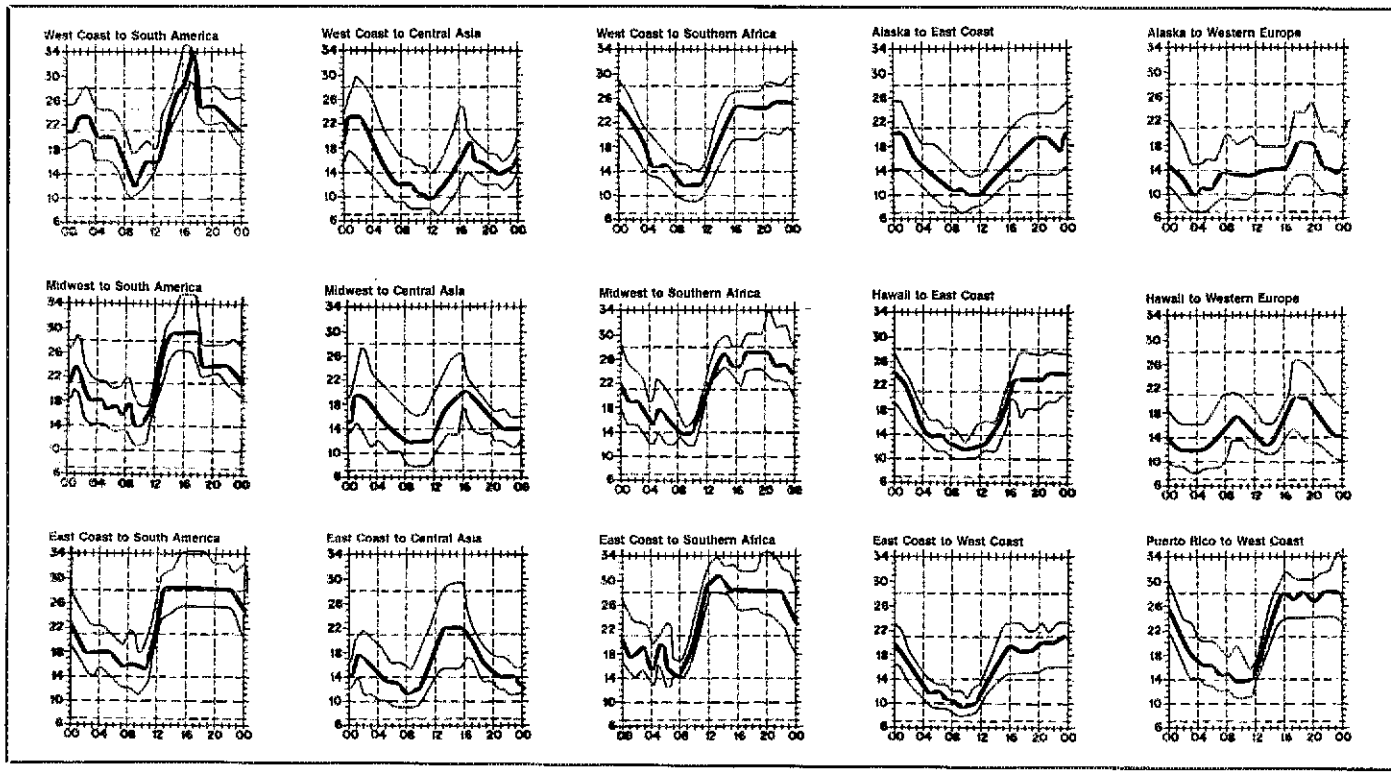
☐ **KH4:** W1DDV started Midway operations last fall with sporadic 80-6 meter operations. He hopes to make Kure and Wake this year. Cards via Dave Perrier, W1DDV, Box 31325, Honolulu, HI 96820.

☐ **Clubs:** New officers for the orange-jacketed South Florida DX Association are Pres WA4YLD, VP N4TL, Sec N2AWM, Treas NV4O.

☐ **Revillagigedo:** XF4CIS was operated by Hector, XE1BEF, last December. Watch out—Hector has the DX bug and is planning a December XF4 return (cards via XE1J).

☐ **8P9EM:** Cards via Chris Pedder, G3VBL, "Thorncliffe," 5 Royalty Ln, New Longton, Preston PR4 4JD, England. (Chris hopes to repeat the 8P6 venture this coming Christmas.)

☐ **8P9:** The ARRL DX Phone for 8P9X was multi-singled by K3KG K3ZR 8P6PW and



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing 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 lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

K4FJ (8P9HR). In Oct '87 8P9HR was assisted by two additional operators (W4NL and N4TX). 8P9HT featured K4BAI for CQWW. Cards to K3ZR for 8P9HQ, K4BAI for 8P9HR/HS/HT/HU, N4TX for 8P9HV, K4FJ for 8P9X.

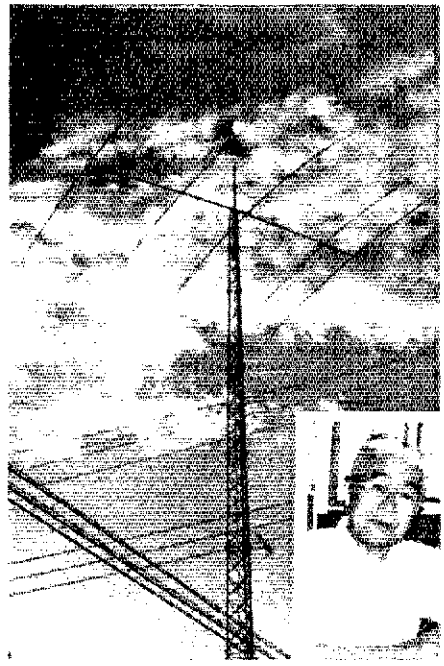
☐ **Help:** WA5ZIJ needs info on CR7CN (April 1973), W9WHM needs the QTH of TZ6CY (Feb 1984) and a routing for 5T5AY (1982). He wonders if anyone knows who the 1950-1960 operators of 9Q2AA and 9Q4AA were.

☐ **Postage:** What with the escalating US postal rates, it makes even more sense to use the ARRL Outgoing Bureau regularly. As the LIDX Bulletin reminds, it is also very handy to use foreign stamps to ease the burden for the DX station. Get information from the DX Stamp Service, 83 Roder Pkwy, Ontario, NY 14519.

☐ **Indian Ocean:** Old-timers remember well the DXploits of V. C. Harvey-Brain (now ZL1BSO). Harvey's book *My Seychelles Years* provides insights into sailing the islands of the Indian Ocean, describing operation from Seychelles and Chagos. NZART's March 1988 *Break In* notes the price at $10, with remittance to V. C. Harvey-Brain, 7 Hamilton Rd, Surfdale, Waiheke Island, New Zealand (check the US price before ordering, please). Thanks to K1ZZ for spotting this tip!

☐ **Portables:** With hostilities continuing in some parts of the world, some pundits think that serious planning might put assorted prospective operations under the heading of "No Brains Atoll."

☐ **PY 88 Awards:** LABRE, the Brazilian Society, offers this award for working PY YLs this calendar year. A CW contact with a PY YL counts 11 points, phone contacts 8 points; 88 points required. Log extracts and 10 IRCs via LABRE DS/SP—YL PY Award, Box 22, Sao Paulo, CEP-1-51, Brazil.



The old master, JH1WIX, licensed since 1924. (The beam is 90 feet high.)

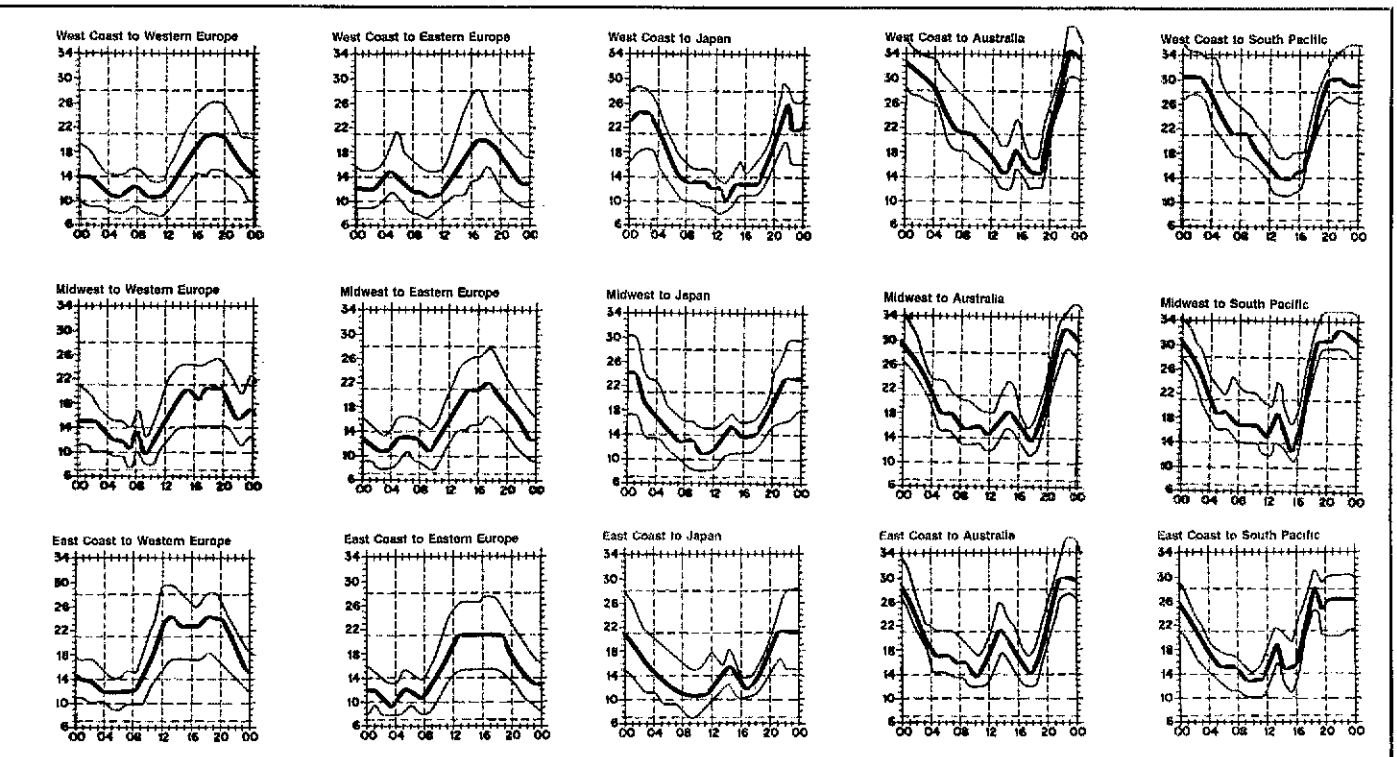
QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or 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.

AT0T	(KE3A)
AT0Z	(W3HNK)
FR4FA	(F6FNU)
HD8D	(N6EK)
HK0BKX	(WB9NUL)
HV3SJ	(I0DUD)
H22H	(5B4MF)
H44X	(H44SI)
JG1RVN/KH0	(JG1RVN)
JW0B	(LA2HFA)
KG4TT	(WI4R)
NH6J/NH0	(JE1JKL)
OK1XC/JT	(OK1XC)
PY0FC	(PY7XC)
PY0FF	Andre Sampaio, Box 1, 53990 Fernando de Noronha, Brazil
PY0FZ	(PY7ZZ)
PY1ZFO/0	(W9VA)
P29MM	(K4MQG)
P40P	(N1CIX)
P40W	(WA4CMS)
TY1LCI	(TR8JCV)
TY1MD	(F6FNU)
T32BH	(F6EXV)
T32JA	(N6CW)
T5GG	(I2MQP)
VI88NT	(VK8RP)
VP2MET	(W1SD)
VP5LJ	(WN5K)
XX9TUE	(CT4UE)
ZF2ME/ZF8	(WB3CQN)
4U0UN	(NA2K)
5T5EV	(DL3KCE)
8Q7VG	(GW3WVG)
6Y6A	(6Y5HN)
9N88ITU	(JA8RUZ)
9X5NH	(DJ6EA)

☐ QSL Corner, June 1988 *QST*, p 72, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, March 1988 *QST*, p 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for August 16 to September 15, 1988, assume a sunspot number of 117, which corresponds to a 2800-MHz solar flux of 162.

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 5-country increments above 300. The totals shown below are exact credits given to DXCC members from April 22 through May 15, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

DJ4YS/280	DL6RAI/298	HG9R/109	KL7CQ/139	NC1U/100	WB2GDD/101	NQ6S/126	KD8NJ/121	NØGNG/141
DK7QW/114	DL9YCA/109	IK2HSW/193	OZ5LN/103	NJ1Q/107	NJ3V/103	WA6BIL/106	KE8FD/118	NCØO/115
DL3FBJ/109	G3YDV/121	JQ1FQU/107	VE4UD/104	W1LWB/214	KJ4YF/103	WA6NUP/111	WD8NMT/233	WØANV/106
DL3OAU/116	HAØMM/220	JA6JPS/305	KA1MPA/106	W2CBA/104	NG4P/102	WN6L/104	WD9DDO/113	

Radiotelephone

DL9YCA/108	IK5DNE/116	PA3EKX/110	WP4AFA/129	K3YQD/110	N6NIG/125	NX7W/127	WD8LVF/125	NT9V/104
GØDEM/100	JK1UNZ/126	SV1TN/108	W1LWB/202	KJ4YF/102	W6ESJ/110	KD8NJ/108	WD8NMT/233	NØGNG/137
I1GJC/218	LU9DUW/104	VK3VNQ/105	K2PK/107	KJ6BI/108	WR6O/105			

CW

DJ4YS/275	OK1DVO/157	WL7BEM/100	KJ4VH/110	AA6CX/107	NX7K/114	W8BIP/100	NØDTN/102	NCØO/112
JA6JPS/223	PT7CG/111	YBØATB/106	WA4SSM/101					

160 Meters

RT5UY/102 N4MM/102

Satellite

N3COG

5BDXCC

WA4MMO	HAØMM	CU3AA	W5IO	N3CWP	DJ9ON	JAØGZZ	K5GE	DL9WW
YU2CCY	WA5BBR	JA5FS	JA4ESR	JE3BIQ				

New Honor Roll Members

Mixed

309

KP4EQF/314

Radiotelephone

310

VE3MRS/315
VE4BJ/320

309

KE4RX/313

Endorsements

Mixed

CP5AA/155	JA3BLN/274	VE4MG/216	N2DL/320	K4LNA/224	K5KT/265	WA6EZV/271	KC8QT/287	KE9F/284
DJ4XA/327	JL3VWI/180	VE6CB/204	NQ2Q/163	K4LNM/358	KE5OD/148	WA6FIT/323	KT8P/287	KR9O/311
DJ6TK/335	JA4FWM/324	VE7IG/338	W2AXZ/300	K4PDV/361	KF5MY/280	WB6OKK/298	N8ATR/300	N9AB/335
DK2BI/326	JA7FS/329	VS6DO/240	W2AZX/345	K4YYL/344	NA5Z/164	KE7X/261	N8CKP/203	NE9K/302
DL1MAJ/287	JA7PL/323	YU2OB/322	W2BOK/360	KA4UPI/225	NY5F/352	NS7Z/313	N8EL/310	NF9Q/304
DL2GBB/186	KH6IJ/359	4X4DK/362	W2CC/324	KE4RX/314	W5KCR/300	NV7J/129	N8FGH/254	NX9R/148
DL7MAT/260	LA9CE/339	K1NLQ/301	W2PPG/337	KI4HL/225	W5NUT/356	W7BG/292	N8FU/300	W9FU/328
DLØKB/139	LU9DUW/125	K1YZW/341	W2QM/359	N4BPP/312	WF5E/350	W7CRT/274	NT8O/291	W9JUV/362
F3RG/211	OE3WWB/331	KA1CSL/156	WA2CBU/278	N4KTY/155	WS5O/254	W7DY/341	W8AKS/205	W9ZM/367
GM3ITN/352	OH2BH/346	KA1EJ/225	K3AV/348	W4DZZ/316	WZ5U/290	W7GN/360	W8CNL/336	WA9BXB/270
HA8KUN/150	OH2QV/349	KA1UT/276	K3UA/323	W4EX/368	WZ5V/266	W7MB/368	W8JBI/362	WA9NUQ/340
HA8XX/251	OH3NM/233	KB1ER/228	KB3OM/290	W4FLA/330	K6DC/361	W7OC/270	W8LKG/310	WA9WYB/270
HB9AHL/324	OH3SG/300	KC1AG/224	KI3L/302	W4MGX/308	K6MA/347	W7ZI/305	W8LNL/200	WB9FFR/142
HB9AQW/328	ON4DM/360	N1CIX/203	N3UN/320	W4OUE/295	K6WR/349	WG7A/201	W8QID/281	WD9IIC/311
HB9BHY/143	PAØLOU/356	N1GL/337	W3BWU/153	W4PG/152	N6HR/330	AI8M/311	WB8FLO/293	KØBFR/206
HB9RX/330	PAØOI/249	W1DGJ/349	W3IOP/304	WA4DPU/310	N6ITY/134	K8BTH/312	WB8K/290	KØBS/333
I1APQ/332	PY3EM/306	W1GUW/308	W3KH/310	WA4UUP/140	NG6W/292	K8CSG/320	WB8VPA/307	KEØDV/253
I1SBU/320	SM3DXC/320	W1HH/355	W3YQ/290	WA4ZNU/194	W6CTL/305	K8EFS/300	WB8YFE/150	KYØA/321
IK8BQE/284	SP7HT/341	W1HX/364	WA3AFS/261	WB4CSK/298	W6GC/331	K8MW/283	WD8NVA/253	NBØH/135
JH1IED/296	UB5WE/329	W1QUS/310	WA3CGE/316	WB4FLB/272	W6LQC/332	K8ZTT/304	AA9U/267	WØCJZ/342
JH1XUP/250	UB5WF/356	W1VV/322	WA3EEE/250	WB4KKA/136	W6ZKM/338	KA8CMR/227	K9HA/309	WØCM/361
JI1HNJ/215	VE3BX/340	K2LQ/322	WB3EFQ/275	WB4YDL/124	W6ZM/354	KC8MK/225	KD9Q/299	WØRT/300
JE2GMO/149	VE3DR/315	N2BSA/175	K4ID/346					

Radiotelephone

DF7QD/270	IKØGPP/281	PY3EM/302	W1GUW/308	W4DZZ/289	K6WR/349	W7GN/350	W8HFK/258	KU9C/175
DJ2UU/279	JH1IED/293	SM3DXC/301	WA1WMS/269	W4GBT/236	KB6ISL/174	WA7KNK/310	W8JBI/350	NE9K/296
DJ4XA/306	JI1HNJ/215	TR8SA/258	K2EWB/227	W4MDX/300	N6AHV/309	WA7OYL/278	W8JJK/301	NX9R/130
DK2BI/324	JA3BLN/262	UB5WE/328	W2CC/324	W4OUE/295	N6ITY/129	AI8M/299	W8LNL/144	W9QQ/322
DL1HH/339	JL3VWI/180	UB5WF/340	WB2EZU/289	W4PDL/353	N6JM/270	K8BTH/308	W8MAW/322	W9RNX/358
DL1MAJ/237	JA4FWM/323	VE2WY/346	K3UA/318	WA4DPU/304	NG6W/280	K8CSG/320	WB8LFO/292	W9WM/253
DL5OAH/151	JA7PL/317	VE3BX/329	KA3LHP/127	WA4ETN/225	W6GTL/325	K8EFS/299	WB8VPA/307	W9ZM/355
EI6EW/206	LA1ZI/330	VE3MR/346	KI3L/293	WA4UUP/133	W6LQC/332	K8MR/183	WD8EOL/126	WA9IVU/293
HA8XX/239	LU1JDL/205	VE4IS/290	N3CWP/269	WD4LJY/227	W6ZKM/338	K8WOW/290	WD8NMV/262	WD9IIC/279
I1APQ/332	OE3WWB/331	VE6AGV/267	N3UN/318	K5KT/257	W6ZM/349	K8ZTT/292	WD8NVA/253	KØBFR/199
I2PQW/280	OE7XMH/150	XE1L/309	WA3CGE/315	KA5KRI/129	WA6EZV/271	KC8KE/274	AA9U/266	KØBS/333
IK2HSW/191	ON4DH/359	YU2OB/283	WB3AMO/185	W5LDH/305	WA6PRS/179	KC8QT/281	K9HA/307	KYØA/292
I4ZSQ/337	ON4DM/360	ZP5MJV/290	AA4XR/159	WD5HYY/198	WB6OKK/296	N8ATR/300	K9LCR/250	NØEUQ/175
I5ISF/294	PAØLOU/317	4X4DK/362	AA4XT/311	WZ5U/290	WB6PSY/303	NA8W/225	KA9TNZ/259	WØCM/361
I8JN/328	PP7HS/287	KC1AG/224	K4PDV/345	WZ5V/266	NV7J/127	NF8W/260	KD9Q/299	WØSFU/341
IK8BQE/282	PY2ED/334	N1CIX/184	K4YYL/341	K6BAG/177	W7BG/291	NT8O/291	KE9F/283	WDØAWL/296
IT9LYF/233	PY3BXW/336	W1DGJ/349	N4MAD/207	K6TEH/251	W7CRT/231	W8AKS/200	KR9O/311	

CW

DJ2GW/254	I5JRR/203	SM3DXC/281	WA2ASQ/150	N4BPP/299	K6LRN/142	W6JTI/174	K8MW/257	KR9O/274
DJ4XA/292	JE2GMO/126	VE3BX/304	WB2TTY/126	NU4B/150	K6MA/269	W6OB/224	K8ZH/311	W9ZM/314
DL1MAJ/172	JA4IYL/127	Z24JS/212	KI3L/268	W4MGX/181	N6JM/225	K7BLU/152	K8ZTT/251	WA9BXB/124
DL2GBB/177	JA7FS/275	AI1N/124	K4GSK/150	WA4DPU/262	NG6W/259	KE7X/256	W8CNL/250	WD9IIC/297
FE2VV/174	JA7PL/292	W1HUE/126	K4MF/253	WB4CSK/273	W6CTL/206	N7EPD/189	KE9A/281	KYØA/175
HA8XX/188	PAØLOU/290	KT2C/150						

RTTY

VE3UR/135 W2FCR/126

160 Meters

W2FCR/142 W3UM/151 KØGVB/119

DXCC Notes

Honor Roll Corrections: Mixed—W6KPC 314/339, W7IYW 314/327, SM6CST 315/330, K2YGM 308/316, K8MPF 308/315; Phone—G3NLY 315/339, W2YYL 316/346.

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

LOCAL ZONING ORDINANCES: BE PREPARED!

☐ When the town council of Dewitt, New York, a suburb of Syracuse, proposed a restrictive antenna ordinance, they did not know that hams in Central New York had a secret weapon: Dr James Mozley, W2BCH, the ARRL Vice Director of the Atlantic Division. Jim's advice was to round up as many hams as possible to attend the town board meeting, wear our call sign badges and be very polite. We packed the Town Hall and it was very impressive.

Bill Thompson, W2MTA, ARRL section manager of Western New York, also came to lend support. I joined Jim and Bill at the local coffee shop and found them going through two briefcases filled with notes. They carefully rehearsed every detail of their plan of action. Later, at the town council meeting, Jim presented our case to the Board with beautiful articulation and sincerity. The opposition just melted away and the proposed antenna ordinance was withdrawn.

I want to thank these two representatives of the ARRL. When we were in trouble, they did not just send a letter, they came here and got the job done. The next time someone asks "What has the League done for you?"... Well, we in Central New York won't forget!—*Michael R. Meltzer, K2SDD, President, Radio Amateurs of Greater Syracuse, Liverpool, New York*

STRAYS SHINE

☐ *QST* ran a "Stray" in the June issue concerning my request for help in locating a terminal program that would run on my CP/M Kaypro 2 computer. I must admit that I wondered if the response would be good and if I would even get one reply.

Well, I must say that I was surprised. As of this writing, I have received seven letters and one phone call, all with offers to help. Most contained lists of programs and all were willing to send copies of their public-domain software. One fellow, ZF2LY, sent me two disks containing some utility programs that I didn't have and included was a modem program that I was able to use.

This fantastic response from my fellow amateurs has been a heartwarming experience for me. I would like to use this forum to thank all of those amateurs who wrote or called with offers of help. You have all helped me to add to my enjoyment of this hobby and you have increased my faith in the people who participate in Amateur Radio. I am very fortunate and proud to be an Amateur Radio operator. —*John M. Ladd, N7HZG, Bainbridge Island, Washington*

THOSE PIONEER VES

☐ I refer to the Editorial in May 1988 *QST*. This is an excellent and timely article which I enjoyed.

However, if I didn't know better, even a second reading would leave me to believe that the first volunteer examining session appeared at the Dayton HamVention® in 1983. How about a tip of the hat to the VEs who pioneered such work? In June of 1954, I passed the Conditional-class license in Roswell, New Mexico, thanks to "volunteer examiners." Certainly the demonstrated integrity of these early examiners must have been a factor in Congress's willingness to take the step forward [in creating the present VE system].—*Cecil D. Cliburn, K4AQO, Fort Walton Beach, Florida*

[Long before the present Volunteer Examiner Program was created, the FCC issued Conditional class licenses to successful candidates if the amateur was physically unable to travel, or if the amateur lived far from the nearest FCC exam point. Amateur "volunteer examiners" administered these examinations. This license was identical to the General class license. The FCC abolished the Conditional license more than 10 years ago and "grandfathered" all Conditional class licensees to General class.—Ed.]

1988 ARRL HANDBOOK

☐ My *1988 ARRL Handbook* just came in. What a masterpiece! For the folks whose technical education stopped with these newfangled tubes, the Handbook is exactly what I have been looking for and I shall spend a couple of years studying it with great care. It's worth every penny and then some!—*Ben Lane, W7FNE/SMØRDE, Sollentuna, Sweden*

ROBBIE ROBINSON, W4QR, SK

☐ I read with great interest the article in "Happenings" on page 68 of June *QST* regarding my old high school classmate "Robbie" Robinson, then 2QR. I was 2OP at the time.

"Robbie" and I played with coherer radio receivers as freshmen in Leonardo High School in New Jersey during 1919 and that is a long time ago! Robbie was, so far as I know, the first Amateur Radio operator to talk to the European continent on a DeForest radiotelephone. I confirmed this with him shortly before he passed away. —*Lt Col John J. Mulhern, N2GOF, Red Bank, New Jersey*

THE DESTITUTE HAM

☐ Having followed with amusement the various pieces of correspondence concerned with the use (or misuse) of the word "destinated," I thought you might be tickled by this little item.

I recently heard a fellow who was turning into his driveway after just having returned from a hard day at a hamfest. He said he was "just about destituted." Now, how could anybody possibly argue about that?—*Andrew P. Jarosik, WA2YKG, Rochester, New York*

CONTINENTAL PHONE PATCHES

☐ Concerning the Washington Mailbox column in June 1988 *QST*, I would like to direct your attention to the nets being run on 20 meters.

Without trying to exaggerate, over any weekend there will be at least 100 requests for two-way patches into Florida, New York and various other locations throughout the continental US. As a member of Navy-Marine Corps MARS, I spend a great deal of time running phone patches. It bothers me to hear amateurs requesting phone patches over the weekend when the phone commercial service rates for the same call are so cheap. It just doesn't make sense.

Our children live in the four corners of the US and we call them every weekend. We talk for 45 minutes to an hour and almost never pay more than $5 per call. Why don't we stop the "local" phone patches and save phone patch facilities for Armed Forces personnel who are stationed outside the US?

While I am writing this letter, I am listening to a station in New Jersey asking for a patch into Florida. I remember when the phone company prohibited the use of patches. I wish the ARRL would say something about making phone patches within the US rather than running an article like the one in June *QST* which I found interesting, but I doubt whether anyone who is looking for a phone patch would read it.—*Lou Halpern, W4NOB, Greenville, South Carolina* QST

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

The World Above 50 MHz—How Can it be Improved?

Regular readers of The World Above 50 MHz are aware that I often solicit opinions on various subjects. But, I have less frequently asked for comments on the column itself and how it might be improved. That time has come. In connection with surveys which will be appearing in many regular *QST* columns, the Headquarters staff and I have prepared a set of questions which we believe will elicit information helpful to me in planning column content as well as assisting those at Headquarters responsible for establishing and maintaining *QST* editorial policies. Your responses will be most appreciated. Please send them directly to HQ, Attn: World Above 50 Survey, c/o Bart J. Jahnke, KB9NM, 225 Main St, Newington, CT 06111.

Either photocopy or answer on a separate sheet.

(circle all appropriate responses)

1) How do you rate The World Above 50 MHz coverage of the VHF/UHF scene?

A. Very complete coverage of all facets

B. Would like greater coverage of one or more of the following:

1. 6-meter news and openings
2. 2-meter news and openings
3. News and openings on the higher bands
4. Moonbounce news and information
5. News on local nets and other regular activities
6. News of FM operation
7. News of ATV operation
8. News of packet operation
9. News of upcoming DXpeditions

2) Do you believe that the various standings boxes, which appear regularly in this column, serve a useful purpose and should be continued?

A. Yes

B. No—Discontinue boxes and use space for other things

3) If the answer to Question 2 is yes, do you believe that the boxes should:

A. Be run more frequently (currently the 6-meter DX and EME Annals appear once a year and the other boxes run twice a year)

B. Be run less frequently

C. Continue on current schedule

D. Be reduced in size by including only stations who reach a particular plateau of achievement

E. Be increased in size to include more stations, especially those just getting started

F. Continue to list old-timers even if they haven't been active for a number of years

G. Require periodic reporting of activity to remain in listings

4) Do you believe that the subjects chosen for the lead material (the first section of each column) are:

A. To the point and appropriately varied

B. Slanted too much toward a few subjects (If so, please specify)

C. Too long

D. Not long enough to properly present subject

E. Even-handed and fair in treating controversial subjects

F. One-sided and biased in treating controversial subjects

G. Too technical

H. Not technical enough

5) How often do you read The World Above 50 MHz?

A. Every month

B. Every few months

C. Occasionally

D. Never

6) Do you currently regularly operate on the bands above 50 MHz? If yes, circle all applicable bands and modes under Question 7.

A. Yes

B. No

7) If the answer to Question 6 is yes, please indicate the bands and modes by circling the appropriate letter(s) below:

A. 6-meter SSB
B. 6-meter CW
C. 6-meter FM
D. 6-meter AM
E. 2-meter SSB
F. 2-meter CW
G. 2-meter FM
H. 2-meter moonbounce
I. 220 SSB/CW
J. 220 FM
K. 70-cm (420 to 450 MHz) SSB/CW
L. 70-cm FM
M. 70-cm moonbounce
N. 33-cm (902 MHz) SSB/CW
O. 33-cm FM
P. 23-cm (1240 to 1300 MHz) SSB/CW
Q. 23-cm FM
R. Higher microwave bands using narrow-band modes, ie SSB or CW
Q. Higher microwave bands using wide band modes, ie FM (List bands and modes)
R. Satellite:
1. Mode A (2 meters to 10 meters)
2. Mode B (70 cm to 2 meters)
3. Mode J (2 meters to 70 cm) Analog or Digital
4. Mode L (23 cm to 70 cm)
S. ATV
T. Other, please specify

8) Please indicate, by writing the appropriate letter(s) the bands and modes (from above) you plan to operate in the next:

A. 6 months _____

B. 1 year _____

9) Please also indicate, in the same manner, the bands and modes on which you are not active and, for various reasons do not plan to be, but, nevertheless, are interested in reading about in The World Above 50 MHz.

10) Do you believe that The World Above 50 MHz is:

A. About the right length to cover the various aspects of operation on 6 meters and above?

B. Requires more page space. If so, how much more? _____

C. Takes up too much *QST* space

11) If the answer to Question 10 is C, would you like to see an abbreviated or eliminated World Above 50 MHz?

12) What features would you like to see more of in The World Above 50 MHz?

A. Station of the month (Pioneers, DXers, contesters, newcomers) [Usually includes short biographical sketch—with photo.]

B. More photographs
C. Larger photographs
D. Lists of VHF/UHF nets
E. Beacon lists
F. Designs for equipment (ie antennas, preamps, amplifiers etc)
G. Greater coverage of the various VHF and microwave conferences
H. Propagation
I. New techniques (equipment or operating)
J. DXing
K. Grid squares
L. Contests
M. FM
N. None of the above

13) Please, briefly, provide any suggestions for improving The World Above 50 MHz not covered in your responses to the questions above.

(optional)—Please include your name, call and number of years licensed with your survey!

Name_____, Call_____

Years licensed_____

1¼-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US call areas plus KH6 and KL7, plus each VE and XE call area, plus DXCC countries not located within the continental limits of the US, Canada or Mexico. In order to make the standings a true reflection of stations currently active on 1¼ meters, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grids in order to remain in the standings or be reinstated, merely an indication of continued interest and activity. WAS holders are listed whether or not they report regularly. However, they are encouraged to update their grids and call areas. Compiled June 10, 1988. Deadline for next update is December 5, 1988.

WAS Holders

1	WØVB*	MN	13	—	
2	WØSD*	SD	—	—	
2	WBØTEM*	IA	—	—	
4	K5FF*	NM	14	—	
5	W5FF*	NM	13	—	
6	WB5LUA*	TX	—	—	
7	VE3EMS*		14	—	
8	W3GPY*	PA	—	—	
9	K9KFR*	IN	—	—	
10	KAØY*	IA	—	—	
	W1JR*	MA	45	15	81
	K1LPS	VT	33	6	28
	W2SZ/1	MA	23	9	55
	K1FO	CT	23	7	—
	AF1T	NH	21	10	—
	W1GXT	MA	17	9	—

*Some states worked via EME.
—Information not supplied.

W1EJ	NH	15	8	—
W1QXX	MA	15	5	21
W1RIL	MA	12	8	25
W1FAJ	CT	12	7	15
WA1JOF	MA	11	5	15
KA1DHO	MA	11	4	14
WB2NPE	NJ	25	10	59
W2PGC	NY	23	10	39
N2WK	NY	21	10	53
K2GK	NY	20	8	53
WB2IEY	NY	17	8	50
N2BJ	NY	16	7	40
K2YCO	NY	14	7	—
KU2A	NY	10	6	22
KD5RO/2	NY	10	4	18
WB3LJK	MD	28	10	56
K3HZO	MD	24	9	37
WA3FYJ	PA	23	10	44
W3RUE	PA	18	11	22
W3XO	MD	17	6	19
KB3QM	DE	16	—	68

W3UJG	MD	15	8	—
AC3T	DE	15	6	13
KA3B	PA	7	4	9
KC4EG	KY	34	9	55
WA4PCS	KY	32	7	—
WD4DGF	TN	31	9	63
WS4F	GA	29	9	51
WA4CQG	AL	26	8	—
WA4SBC	VA	21	7	25
N3AHI/4	GA	20	8	—
K4CKS	GA	13	4	15
W5RCI	MS	32	8	57
K5UR	AR	29	8	89
K5SW	OK	26	8	65
W5HN	TX	23	7	28
WA5VJB	TX	17	6	—
WB5AFY	TX	12	5	39
W5NZS	OK	12	—	25
KE5EP	TX	7	—	9
WA5DBY	TX	3	1	3
N6AMG*		3	3	—

W7JF*	MT	17	9	—
W8IDU	MI	26	8	—
WB8PAT	OH	23	8	42
W8VO	MI	11	7	—
WB9MSV	IL	19	7	47
WØUC/9	WI	8	3	10
KB9NM	WI	5	4	—
KØDAS	IA	29	10	—
KØALL	ND	28	10	—
KØTLM	MO	23	7	53
KØIFL	MO	22	7	50
KCØQR	NE	21	6	48
KFØM	KS	16	5	28
WØRT	KS	12	5	—
WØJRP	MO	4	2	14
VE1UT	NS	7	4	—
VE3LNX		17	9	45

ON THE BANDS

As might be expected this time of year, Sporadic-E dominates the 6- and 2-meter news. For a while, it looked as if the big news was going to be the lack of E_s but the situation changed drastically about June 1. Although there had been a few 6-meter openings before that time, they did not appear to be as numerous, strong or lengthy as in previous years and were almost entirely of the single-hop variety. The 6-meter Sprint Saturday evening, May 21 was dominated by an almost complete lack of openings—at least here in the eastern portion of the country. There was a good north-south opening the evening of May 27 which also produced a 2-meter E-skip session from the Middle Atlantic states to Florida, including the Keys. WA4MJE EL94 was a popular catch during this one. Apparently as part of the same opening, VP5D in the Turks and Caicos Islands caused considerable excitement. From his end, Bob says that he completed 41 2-meter contacts with stations from North Carolina through Indiana beginning about 1800Z and ending about 1930Z.

An account of an interesting 6-meter E_s opening comes from KL7IKV who called the answering machine to report that the path from Anchorage to Japan was open between 0530 and 0610Z May 31. Between him and AL7C, some half dozen JAs were worked during the short session. Back in the lower 48, the evening of May 31/June 1 saw a widespread 6-meter double-hop opening between the East and West coasts and a 2-meter E-Skip opening from Florida to Colorado and Kansas as well as Texas to Ohio, Pennsylvania and Western New York. W5UWB reports completing 14 QSOs in 8 grids between 2315 and 2358Z. Also, WB2QLP/4 Naples, FL EL96 notes working NØEQQ and KAØNNO both DM89 in Colorado at 2358 and NØHXC in Kansas EM17 a few minutes later. Despite these interesting openings, most old-hand observers of the bands were still characterizing this as a "poor season."

That opinion began to change about June 1 and the view was completely put aside by the end of the first week on the month. Both 2 meters and 6 meters literally erupted with history making E-openings beginning about June 5. For the second year in a row, 2 meters put on a demonstration that it is capable of, what most certainly must be classified as double-hop E_s. In this instance stations in Alabama were able to work as far as western Washington. One of such contacts reported to this conductor involved WA4CQG Auburn, AL EM72fo and W7YOZ in the Seattle area, CN87vr. This represents a calculated distance of 2173 miles, which appears to be a new 2-meter North American terrestrial record. WA4CQG gave the time as 0250Z June 6 and said that he was hearing Colorado stations at the time, attesting to the double-hop nature of the propagation. In addition, a number of other contacts were reportedly completed by stations in these two widely separated parts of the country. WA4CQG also reports that the band was open again the following evening, to Colorado and Wyoming—the states he spent so much time working via meteors!

Six meters put on a wild show of its own in the form of an opening from the western states to KL7 and JA. KL7NO was widely worked throughout the West and weak, but numerous Japanese stations put in an appearance from the Seattle area to at least as far south as the Bay Area, and reportedly as far east as Colorado. N7DB Portland, Oregon says that the band was open at least as early as 2030Z on the 5th to Texas and the southeastern states, including Florida. Then it began to swing north including backscatter from nearby northwest stations, with KL7NO being worked at 0528Z on the 6th. Then at 0545, Dave heard and worked JE2AGS. In the next hour-and-45-minutes, two log pages of Japanese stations were worked in call districts 1, 2, 3, 4 and 7. From just north of the Bay Area, K6QXY says that, although having to share time with N6AMG, he managed to work 13 JAs.

The eastern part of the country got its turn the following day, Monday June 6. Six meters sounded promising in the morning, with Boston-area stations easily workable from here in the Washington area. I don't know when the first trans-Atlantic contacts were made that day, but the first overseas station this conductor heard was G3POI who was worked at 1704Z. Signals were not strong, about 52. This was followed at 1705 by G4ASR then PAØOOS, two more Gs, then PA3DOL and PA3AMF. Seven more Gs were worked up to 1746, when signals faded here. That would have been a red-letter day if it had ended there but the old band had more goodies in store. At 2013, the signal of DXpedition station FP/KA3B St Pierre Island burst through. Then, about 2100 the OX3VHF beacon began to be heard, and a few minutes later, the voice of OX3LX. Bo was worked immediately for a new country for this conductor. Then, at 2115Z GW3MI was heard and worked followed by steady stream of Gs, GWs, GJs and two GIs plus LA3EQ. Signals were stronger this time—up to S7. Others

reported working GM and GDs as well, although these new countries somehow eluded me. Nevertheless, GI, LA and OX represented three new countries for W3XO. Altogether, between the two openings, this conductor managed to work 39 different G stations, three GWs, three PAs, two GIs plus OX3LX and FP/KA3B. Others did even better. For example, W3WFM north of Baltimore worked nearly 100 Gs, 3 GIs, 6 GJs, 10 GMs, 15 GWs and 5 PAs, plus EI, LA, F, OX and FP. WB2IFC/4 Chincoteague Island, Virginia writes that he hooked up with 189 European stations using just 12 W to a 5-element beam. The opening reached surprisingly far into the country, as witness reports from several Midwesterners including NN9K EN41, who worked G3SBV and GW3LDS on CW using 10 W to 5 elements; and WBØCQO who heard eight Gs and worked three, also using 10 W to 5 elements. To the south, I know that WA4NJP in Georgia was working the DX, as I could hear his big signal on backscatter. K4CKS, also in Georgia, managed 20 G contacts plus two GMs, three GWs, five PAs, two GIs as well as OX2LX. He notes that several stations not more than 20 miles from him were unable to hear any of the Europeans. Al cites a fine example of the need to maintain observance of the DX window, 50.100 to 50.125. (See The World Above 50 MHz in May *QST*.) Apparently the DX remained in at his location after it faded out in New England and VE1. He says that some of the Is, thinking that the DX was gone, proceeded to turn their beams to the west, and remaining on the same frequency in the DX window, began ragchewing with stateside stations. This made it difficult for him to hear the very weak signals he had to contend with. Like others, K4CKS pleads for a little common courtesy. The fact that the DX did fade in New England before it did farther south is illustrated by a report from New Hampshire station WA1OUB. Bob is always one of the most successful when it comes to working 6-meter DX, especially from Europe. However, his report lists only 37 contacts that evening with the last at 2332Z. He did mention that CT4KQ was still in an hour later. However, the last DX faded in the Washington, DC area about 0130Z. WA1OUB had a compensation, however, in catching another good opening the following morning between 1038 and 1145Z in which he worked 34 more Europeans. He also experienced an opening beginning at 2030Z the next evening in which he caught ZB2/G4VXE, GJ3YHU, CT1DTQ and CT4KQ again. Bob says that CT4KQ was 58 at that time and remained in until about 2200Z. Most of the rest of us did not experience openings of this magnitude on Tuesday June 7.

From the other side of the pond, GJ6OZB called from The Isle of Jersey to inform me that he worked 58 North American stations in 10 states and three Canadian provinces. He also said that the following morning, he worked VE1YX plus a VE3 at 1100Z and KP4CIE at 1330Z. That also fits in with WA1OUB's report, and a report from K5SW near Tulsa. Sam says that at 1139Z June 7, he contacted CT1WW and at 1157Z, FP/KA3B.

Over the next few days, the band was open most of the time but everything seemed tame by comparison. FP/KA3B was in on the East Coast most of Thursday, June 9 as was the VP5D beacon. HH7PV worked a number of stations both Wednesday and Thursday and C6ANY also came on to add some spark. CT1DTQ was heard along the East Coast Thursday morning and CT4KQ during the early evening hours. At the same time, considerable excitement was generated by the appearance of another CW station 9H1BT. I know he was worked for a new country by W2IDZ and his XYL WA2QCE, but who else made the grade, I haven't heard. As this is being written on Friday June 10, a few scattered contacts have been made by P4ØJT (W6JKV's DXpedition QTH in Aruba)—but the big opening to there is still being awaited. More next month.

Not all of the 2-meter news concerns E-Skip. W2RS, who has probably made more moonbounce contacts than any nonmoonbouncer in the world, has more to report. Ray has added his seventh station, K1WHS who runs 24 Cushcraft Junior Boomers. Altogether, using a Mirage B-1016 brick to a single 32-19 Boomer, W2RS has had 17 EME QSOs with the seven stations. In similar 6-meter news, W7HAH has now worked both WA4NJP and W6JKV off the moon using a single M^2 51-foot-long Yagi. Shep reports that he is able to hear his own echoes with this set-up.

Anyone familiar with 2-meter SSB is aware of the fine work done by the Sidewinders on Two, or SWOT, group. Len Hoops, KC5IJ Editor of the *SWOT Newsletter*, writes that, due to increased postal rates and other cost escalations, it is imperative that the organization increase its membership. Please drop Len an SASE at 1704 Glenn Dr, Fort Worth, TX 76131, to receive information on joining. Basically, you must work two SWOT members on 2-meter SSB or CW and pay nominal annual membership dues. Len is particularly anxious to get some of those who have strayed back into the fold and to obtain information on local 2-meter SSB/CW nets whether or not they were ever affiliated with SWOT.

Good news comes from KØTLM concerning WØYZS, who is currently signing SVØFE. Tom writes that SVØFE and SV1DO have received permission to operate 6 meters and both are on the air and have made some contacts. With the great possibility of F2 propagation beginning this fall, that is very good news indeed.

News of the opposite kind arrives from GDØGBA (ex EI9D). Jim writes to report the passing of Harry Wilson, known to numerous 6-meter operators as EI2W. Harry died, apparently of heart failure, April 18. We will certainly miss EI2W's familiar voice during the coming F2 openings to Ireland.

Strays

VALENCIA, VALENCIA, VALENCIA

☐ Rob Wason, WB1EIO, of Peacham, Vermont writes that he had three successive contacts report their QTH as Valencia on 20 meters in May—one in Venezuela, Spain and California!

***QST* congratulates...**

☐ Alan Brazard, WB5MUI, of Houston, Texas on being awarded the Silver Scribe Award at the Energy Telecommunications and Electrical Assn for his first-place technical presentation on Very Small Aperture Terminal providing voice and data communications to drilling rigs.

☐ David Wharton, K3STM, of Hyattsville, Maryland on receiving the honorary title of Shreveport Shipmate for his assistance in providing MARS phone patches for the crew of the USS *Shreveport* during its recent deployment to the Mediterranean.

I would like to get in touch with...

☐ anyone with info on how to make the Heathkit HW-202 transceiver scan. James Christmas, 3914 Haley Rd, Martinez, GA 30907.

☐ anyone who has a manual or schematic for a CIR Astro 200A transceiver. Tom Kuhn, KA5QFH, 17934 Valley Knoll, Houston, TX 77084, tel 713-855-4354.

☐ anyone with an original, complete government manual for a BC-348Q receiver. Louis D'Antuono, WA2CBZ, 88-02 Ridge Blvd, Brooklyn, NY 11209.

☐ anyone with an operating manual and schematic for a ROM card for the Apple II computer. Milton Rich, KA1KHX, Box 133 Ridge Rd, Middleton, NH 03887.

☐ anyone with a manual for the Clegg FM-21 220-MHz transceiver. Scott Burns, N6SGR, 6382 Green Ridge Dr, Foresthill, CA 95631.

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

The Booming of 220 FM

The 220-MHz FM band is booming! In many areas of the FM repeater world, the demand for 220 repeater frequency pairs has exceeded the supply and the frequency coordinators' waiting lists for 220 repeater channels are getting longer.

The 220-MHz boom can be attributed to a number of recent events. Over a year ago, Novice Enhancement occurred, which opened up part of the 220 band to Novices. Not every Novice went out the next day to buy a 220 radio, but enough did to make the Novice presence known on 220.

Another reason that the band is booming is due to the supply of equipment that is now available for the band. Two years ago, there was a dearth of 220-MHz radios. If you wanted to get on 220, the pickings were slim and you might end up with a used Midland or Clegg crystal-controlled box, if you could find one. Things have changed dramatically. Today, there is a wide selection of equipment to choose from including hand-held and mobile transceivers of various shapes and sizes, and there are also multimode base transceivers to let you work weak-signal 220 when you need a respite from the repeater world.

Salvation from the crowded 2-meter FM band is another reason why the population of 220 MHz is increasing. Admittedly, life in the 2-meter FM band can be a rat race. During the commuter rush, the roundtables on some 2-meter repeaters are so large that after you check into the roundtable, it is time to check out when the roundtable comes back to you. Although 220 is booming, life is relatively bucolic when compared to 2 meters and you are able to say more than "WA1LOU, checking in" and "WA1LOU, I'm home...73."

In the past, one reason that the population of 220 MHz did not increase much was that potential 220 users feared that the band would be reallocated to another service. Why spend half a G-note to get on a band that might be used to direct delivery trucks next week?

The desire of outside forces to take over our 220-MHz band has not abated, but hams no longer seem to feel that they are investing in a lost cause by purchasing 220 equipment. Why? Perhaps, some of us are confident, based on our past successes, that Amateur Radio will always be able to fight back the forces that are trying to conquer us...that our cause is just and that the FCC will always see it that way. Let us hope so, but we should never get too complacent and let "Hiram" fight back those forces alone. We all have to pitch in when such a battle looms on the horizon.

Now For Something Completely Different

Speaking of 220-MHz equipment, I saw something completely different this year at the Kenwood booth in Dayton...a brand-new radio hot off the plane from Japan. During the past few years, ICOM and Kenwood have been offering various dual-band FM radios, the dual bands being 2 meters and 450 MHz. Well, the new Kenwood TM-621A radio offers a new dual-band combo: 2 meters and 220 MHz!

I wonder if a 220/450-MHz combo transceiver can be far behind? How about a 2-meter/220/450-MHz box? (Yes, I remember the decade-old triband UV-3 from Drake, but what I have on my wish list is a tribander that will fit under the dashboard of my Subaru...the perfect mating of a compact Japanese radio in a compact Japanese vehicle!)

CQ, CQ, CQ, FM?

The December installment of this column generated a lot of mail—most of it tongue-in-cheek, as the column was intended to be. However, Ray Swan, NV2A, made a good case for his contrary opinions concerning the points expressed back at the turn of the year. For example, Ray suggests that calling CQ on a repeater is justifiable. According to Ray,

> When the first repeaters for VHF and UHF were put on the air, they were few and far between with many folks trying to use them. There was no reason to call CQ. In fact, it tied up the machines with needless verbiage because there were only one or two machines to monitor. Simply putting out your call was all you needed to find someone and move to a simplex frequency for a QSO.
>
> The number of machines has grown disproportionately to the number of operators. That means we have fewer operators listening to far more machines. To find a QSO at certain times of the day now requires scanning the channels. If you put your call out on my channel 1 while my 22-channel scanner is on channel 2, I will never know you were there by the time it gets back to channel 1. So, what is wrong with calling CQ two or three times; then you might be still transmitting when my scanner comes back around?

HAM USES REPEATER TO SAVE TENANTS FROM FIRE

Two off-duty firefighters, Wayne Otto, KB2EEL, and Paul Carlucci spotted smoke and flames pouring from a North Plainfield, New Jersey apartment building in late April. When the two reached the site of the fire, they noticed that the smoke detectors in the building had sounded, but none of the building's 45 residents had reacted to the alarms (when the detectors had sounded in the past, there was no fire). So, the two ran into the building to begin arousing the tenants to evacuate and KB2EEL, who had his hand-held transceiver with him, used it to call Bill Ferguson, WA3BXW, who dialed up the police for Wayne.

Emergency units arrived two minutes after receiving KB2EEL's call, and had the fire under control in less than a half hour. All of the apartment building's tenants escaped injury. According to Wayne, "There were no public phones in the area and we would have lost valuable time looking for a phone, had I not had the radio handy."

KB2EEL frequently reports traffic accidents to the police via the Suburban UHF Association repeater, N2EFO, on 444.500 MHz or the Bristol (Pennsylvania) Emergency Amateur Repeater System (BEARS) repeater, WA3BXW, on 444.200 MHz.—*from Tom Guilfoy, WA3HLC, and* The Courier News *of Bridgewater, NJ*

REPEATER LOG

According to April 1988 reports received, repeaters were involved in the following public-service events: 412 vehicular emergencies, 12 public-safety events, 9 alerts/drills, 7 fire emergencies, 6 medical emergencies, 4 weather emergencies, 2 criminal activities, 1 search and rescue.

The following repeaters were involved (followed by the number of events): K1UN/K1ISR/WA1UCO 2, WA2ZWP 3, W3LIF 7, W5FC 58, K6OS 4, WA6BJY 11, WD6DIH 126, KA6EEK 81, N6ME 150, K8DDG 10, K9MMQ 1.

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

Thermistor Power Metering

When building microwave equipment, it is often desirable to measure the relatively low output power of local oscillators or mixers. One cheap, simple and nearly foolproof way of doing this is by using a thermistor power meter. A thermistor is a device with resistance that depends on temperature. The power meter shown in Fig 1 uses a thermistor to sense the change in temperature of a 50-Ω, 1/8 W resistor used as a load for the power being measured. The 50-Ω load resistor dissipates applied RF in the form of heat, causing the resistor temperature to rise. The thermistor is in contact with the resistor, secured by a spot of epoxy glue. As the temperature of the thermistor rises, its resistance changes (usually, it decreases). When the resistance reaches a steady value, the reading is noted and the RF power removed. A dc voltage is then applied to the resistor. The voltage is adjusted so that the thermistor resistance stabilizes at the same value as that obtained when the RF power was applied to the resistor. Under these conditions the dc power and RF power applied to the resistor are equal and given by:

$$P = V^2 / R \qquad \text{(Eq 1)}$$

A few points to note: The physically smaller the load resistor, the higher and more rapidly its temperature will rise for a given input power, hence, the greater the sensitivity of the measurement system. With a 1/8 W resistor, power levels of 10 mW can easily be measured. The smaller the thermistor bead and leads, the less heat it will absorb and the better it will track the resistor temperature.

There are, of course, some problems with this technique. It assumes that all of the power supplied by the generator is dissipated in the resistor. Any reflected power will not be measured, so a good match is required. Perhaps the best physical layout would be a 50-Ω microstrip terminated by a small 50-Ω chip resistor.

The temperature reached by the resistor/thermistor combination depends not only on input power, but also on ambient temperature. If the circuit is in an enclosed box, some drifting of readings may occur if there is too much heat buildup in the box. Because of this, it is better to measure higher power levels (more than 50 mW) using calibrated attenuators ahead of the power meter. Finally, the system response time is slow (several tens of seconds, depending on the input power and thermal capacity of the system), so it cannot be used as an indicator to "peak" circuits. Nevertheless, I have found this type of instrument quite useful, and it can be constructed for only a few dollars.

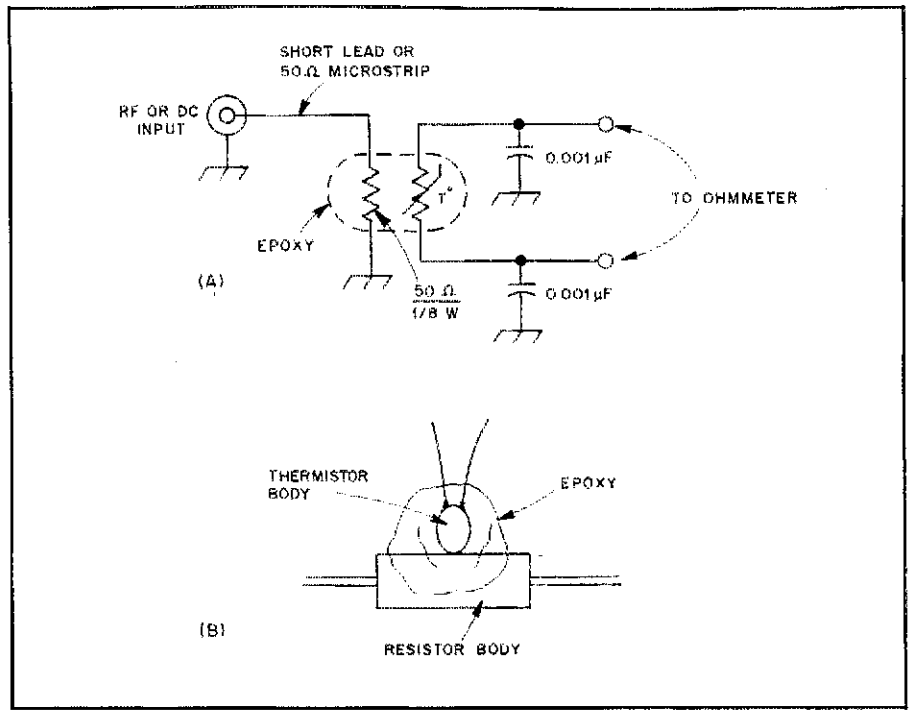


Fig 1—The schematic diagram of a thermistor power meter is shown at A. An ohmmeter is connected to the thermistor leads and resistance drop measured while power is applied to the load resistor, after the load temperature stabilizes. The resistance change of the thermistor from room temperature is then calculated. A dc signal that causes the same resistance change is then applied, and the power level calculated. The smaller the load resistor, the more precise the measurement can be. At B, the method of physical attachment of the thermistor to the load resistor is shown.

Thermistor prices depend on the thermistor used (its stability, materials, construction and so on), but are typically in the $5 range. They may be obtained through local electronic parts distributors. One thermistor I have used is the Fenwell Electronics type 112-503JAJ-B01. Because it has a 0.040-inch bead with very thin lead wires, its thermal mass is small. Its resistance at room temperature is about 50 kΩ, and drops by about 7% when the device is in contact with a 1/8-W, 50-Ω resistor dissipating 10 mW. There are undoubtedly many other thermistor types and brands that would work equally well. A final point to remember is that this measurement technique measures the *total* power delivered to the resistor, including power at the desired frequency and that at all other frequencies (such as harmonics). This should not usually cause problems unless a particularly "dirty" source is being measured!

24-GHz ACTIVITY

ZL2AZQ recently extended the New Zealand 24-GHz DX record by working ZL2AQE over a 126-km path. For comparison, the current US record is 187 km (held by WA3RXM/7 and WB7UNU) and the current world record is 290 km (held by I3SOY/3 and I4BER/6).

10-GHz ACTIVITY IN TEXAS

On April 17, Kent Britain, WA5VJB, and Al Ward, WB5LUA, were quite active on 10 GHz. WA5VJB first operated from a site near Hillsboro, Texas (grid square EM11), while Al operated from his home station in EM13. As is often the case, the path didn't look as good in reality as it did on the topographical maps: A 50- to 75-foot ridge blocked the proposed path. Four sites later, Kent ended up in a wheat field and, after brief cross examination by the local sheriff, set up the equipment and began transmitting. Somewhat disoriented by driving around in fog and mist, Kent had a bit of trouble "finding" Al. Kent finally contacted Al on a bearing

(continued on page 89)

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Enter the Golden Age of Amateur Radio Software

This must be the golden age of Amateur Radio software; this and the previous two installments of On Line have been devoted to descriptions of new software that has been released during 1988 (I guess everyone must have stayed warm last winter by plucking away at computer keyboards). Here are the latest entries in the 1988 Amateur Radio software sweepstakes.

EngLan

EngLan is a computer programming language for people who do not know how or desire to learn how to program a computer. Written by Jerry Gentry, WAØH, EngLan allows you to write simple applications on an IBM® PC-compatible computer by selecting commands from a series of menus. For example, if you wish to clear the computer display at some point in your application, you select "erase the screen" from a command menu.

Compared to other computer languages, it takes less time to learn EngLan, less time to write EngLan programs and programming (syntax) errors are virtually eliminated. (In less than half an hour, I wrote a logging program and had it up and running without error.) Note that EngLan is not intended to compete with BASIC, C or Pascal, but it is intended for writing small (not complex) business and general applications. EngLan is available for $49.95 from Gentry Software, PO Box 4485, Springfield, MO 65808.

Logbook

Logbook is an Amateur Radio logbook program for IBM PC-compatible computers. The program was written in dBASE III Plus® and compiled by Gene Brewer, K16LO. The program is designed to permit the logging of multiple contacts with the same station in order to track each contact for QSL and other purposes. Besides the logging function, the software also includes a separate database called DXCC that can be accessed from within Logbook to refer to antenna beam headings, distances, prefix and zone data.

Logbook is shareware. To obtain a registered copy, send a stamped, self-addressed diskette mailer, blank diskette and $10 to Gene Brewer, K16LO, 933 Forrest Knoll #A18, Ridgecrest, CA 93555. If you would like to register a copy of Logbook that you have obtained from another source, send $20 (registering brings you free future updates, program consultation/customization and $5 rebates when someone else registers using your registered copy of the software as a source).

MacTrak

MacTrak is a satellite tracking and propagation software package for the Apple® Macintosh computer. Besides essential satellite tracking data, there is a "quick-look" feature that tells you what is happening as you sit down to operate, a "schedule" mode that provides a table of "rising" and "setting" times for a particular satellite and a "window" mode that allows you to observe exactly when a satellite is in view of both you and another station. Rectangular, polar and great-circle map displays are selectable and the "view" mode allows you to see the earth as a satellite sees it.

The propagation prediction module allows you to point to any spot on the displayed world map and see the predicted MUF to that point at that time. A click of the mouse displays MUF to that point over a 24-hour period. Other functions include sunset and sunrise time calculations, latitude and longitude, bearing and distance and VHF/UHF grid square locations. Gray-line and a map displaying areas of likely propagation are also selectable. Finally, with a KLM/Mirage Tracking Interface and compatible antenna rotor, MacTrak will automatically steer your antenna. The MacTrak software package is available for $49.45 from Randy Stegemeyer, W7HR, PO Box 1590, Port Orchard, WA 98366.

MacTTY

MacTTY is a terminal-emulation program for the Apple Macintosh computer that is intended primarily for RTTY (Baudot or ASCII) using a simple terminal unit. When used with a packet-radio TNC or multimode data controller, MacTTY may also be used for packet radio and other digital modes.

The program features size-selectable split screens, a 15,000-character type-ahead buffer, canned messages, file receive and transmit to and from disk, the printing of text as it is received, pull-down menu commands, custom menu commands for TNC and multimode controller operation, UTC clock display and text strings that can turn a TNC on and off. The program may also be used for landline data communications. It is available from Summit Concepts, Suite 102-190, 1840 41st Ave, Capitola, CA 95010 for $39.95 postpaid in the US.

PAC-PIX

Bob Corbett, W1CH, is distributing PAC-PIX, a packet-radio graphic send and receive program for IBM PC-compatible computers. The software allows you to send full-color or monochrome pictures or text via packet radio (or a landline modem). Anything that can be displayed on the computer's monitor can be transmitted via packet radio using this software. (Note that stations at both ends of such an exchange must be running this same program). To obtain a copy of the software, send $10 to Bob Corbett, W1CH, 46 Prospect St, Torrington, CT 06790.

Super DX Edge

For a number of years, Super DX Edge has been a popular DX tool for hams who have Commodore 64™ or 128 computers. Now, Super DX Edge is also available for hams with IBM PC-compatible computers. This software calculates daylight paths for 10 through 20 meters and darkness paths for 40 through 160 meters, sunrise and sunset times for any location at any time of year, propagation predictions based on a predicted MUF, antenna beam heading based on great-circle bearing and the distance between any two selected points. It also provides a real-time display of gray line to show the best times for long-path propagation and it will keep time in UTC or any other desired time zone. Super DX Edge for IBM PC-compatible computers is available for $34.95 from Xantek, Inc, PO Box 834, Madison Sq Stn, New York, NY 10159.

Super Morse

Over a year ago, Lee Murrah, WD5CID, began distributing CW, his shareware Morse code training program for IBM PC-compatible computers. Lee has improved CW, renamed it Super Morse and is in the shareware distribution business again. His program is structured to follow the main phases of learning Morse code: learning the characters, building code speed, enhancing code proficiency and measuring progress towards a speed goal. A complete code-teaching function is separate from the code-practice functions. Code practice can be generated from various formats: keyboard entry, disk files, random character groups, words and a simulated QSO. Super Morse can be downloaded from CompuServe's HamNet, GEnie's IBM Roundtable or various computer bulletin board systems. You may also obtain a copy by sending a formatted 360K diskette and a stamped, self-addressed diskette mailer to M. Lee Murrah, WD5CID, 10 Cottage Grove Woods SE, Cedar Rapids, IA 52403.

Strays

***QST* congratulates...**

☐ ARRL Honorary Vice President J. A. "Doc" Gmelin, W6ZRJ, of Cupertino, California on being named Grand Bible Bearer of Masons in California.

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

The AMSAT RUDAK User Terminals

Last month, I introduced the RUDAK transponder on AMSAT's new Phase 3C satellite (which is now in orbit as OSCAR 13). In that column, the AMSAT-DL RUDAK Program Manager, Hanspeter Kuhlen (DK1YQ), explained what the system did and some of the design rationale. In this month's concluding installment, Hanspeter describes suitable RUDAK user terminals.

For most satellite users, the most interesting part of the RUDAK experiment will be the design and installation of their own satellite terminal. As defined in the objectives (see last month's column), one of the main goals of the RUDAK experiment is to enable reasonably skilled individuals to test modern modes of digital communications. This is reflected not only in the selection of moderate bit rates, but also in the design and development of an extremely versatile, easy-to-build terminal.

Over the course of several months, all the necessary modules for the RF and digital unit were designed and tested. Wherever possible, we used off-the-shelf designs in order to avoid reinventing the wheel. PC boards are now available for these modules, and have been successfully beta-tested by several amateurs.

The RUDAK User Terminal consists of two separate sections: the RF and Digital units. Their features can be summarized as follows:

- Operation in *all* satellite modes: CW, SSB, PSK through passband, Fuji-OSCAR 12, reception of UoSAT 1 and 2 bulletins and, of course, RUDAK.
- The RF unit can be used as a general-purpose power amplifier for terrestrial 23-cm communications.
- Using a hybrid PA module, the power amplifier provides 20 W CW output on 24 cm. In combination with a 15 dBi-gain antenna, this power output level is sufficient for reliable data communication via RUDAK and the other satellite modes.
- Conversion of 2-meter signals to 24 cm; a built-in attenuator is capable of accepting 1 W of driving power.
- A 2400 bit/s modulator.
- BPSK demodulators for 400 and 1200 bit/s with biphase and NRZI coding, respectively.
- Compatibility with Fuji-OSCAR 12 formats.
- Built-in TNC.
- Internal switching for space or terrestrial packet-radio operation.
- AMSAT interface to general-purpose computer (Atari® 800XL) for satellite tracking that features automated antenna azimuth and elevation control, satellite telemetry decoding and display of measured engineering-unit parameters, visibility prediction, data communications in AMSAT block format similar to the telemetry blocks of OSCAR 10, and so on. (To the best of our knowledge, the Atari 800XL computer is available in almost any country in the world. This computer was selected for OSCAR 10 satellite-control purposes because of its extremely low price and—even more important [sometimes]—because of its very effective RF shielding. As soon as another computer is operated close to the sensitive satellite receive antenna, this shielding is appreciated even more.)
- Common power supply in the RF unit.

For the digital unit, we selected a so-called modular design. Commencing from a basic version, a station can be expanded step-by-step to include additional functions. The whole setup is shown in

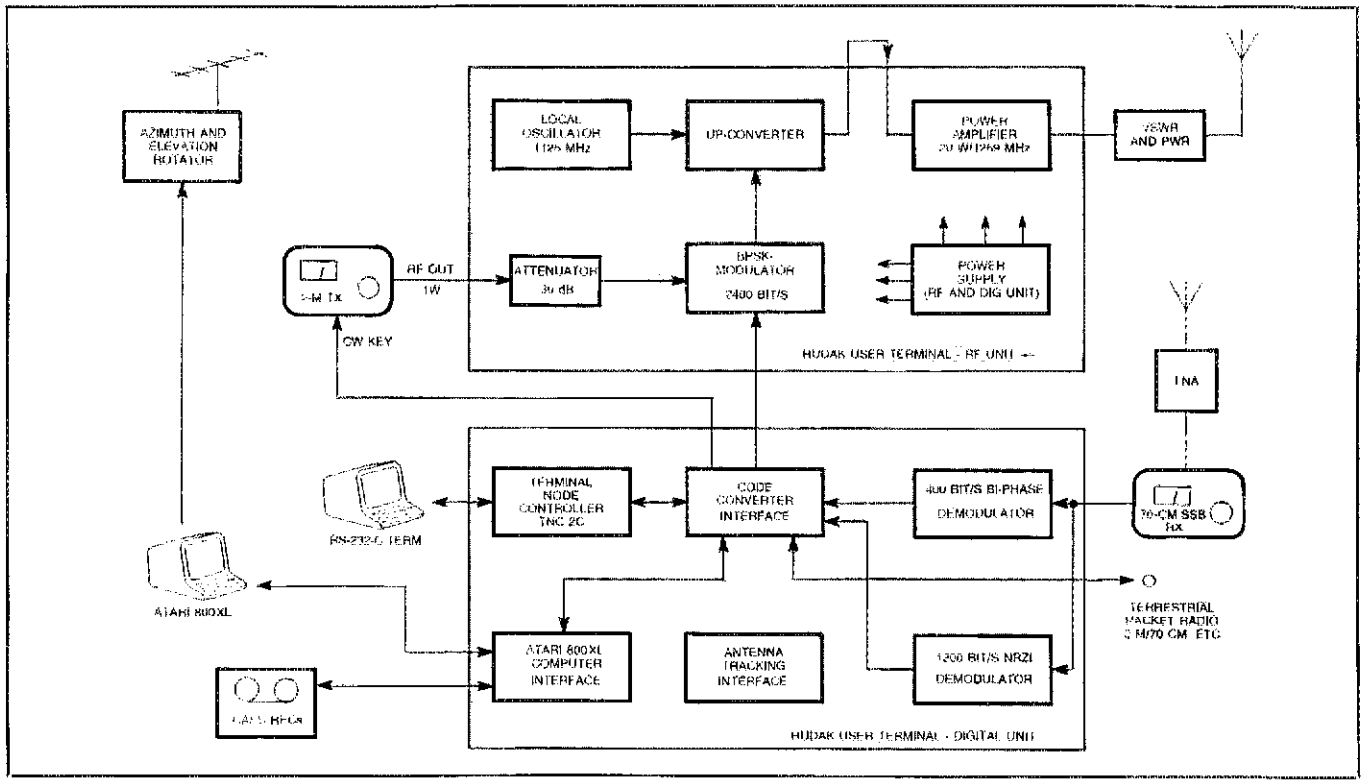


Fig 2—Block diagram of a complete (super-duper) RUDAK user station. Don't let the complexity scare you; you can start off observing RUDAK operations with much less equipment (see text).

Fig 2. This block diagram shows the equipment required in addition to the terminal.

Before becoming concerned by the relatively complex configuration shown in Fig 2, remember that it shows the ultimate—the super-duper—version of an amateur satellite home station. In addition to a receiver and an RS-232-C terminal, the minimum required hardware includes a 400 bit/s demodulator, the code converter and a TNC. This allows you to monitor RUDAK activities as an observer. Such observation (hopefully coupled with hearing a lot of exotic call signs) should definitely motivate you to do more and eventually air your own signal.

Great care and attention has been devoted to keeping the station easy to build, eliminating the need for special tools or machinery. Several components, particularly those in the RF unit, have been built and evaluated in many different design approaches, testing their suitability for amateur construction. The results of these investigations have been compiled in the RUDAK User Manual. This manual provides the necessary background information on all the experimental aspects as well as a detailed description of how to build your own terminal.

The RUDAK Field Test

Because the RUDAK experiment uses several newly developed items (both in the hardware and software areas), a comprehensive field test for all components was mandatory. During this test, the equipment was installed atop a 45-meter-high (148-foot) water tower in Ismaning (near Münich) and provided a test-bed for several amateurs in the Münich area.

The test-bed RUDAK was used exactly as we expected it would be used while in orbit aboard AMSAT Phase 3C. The operation included testing of the satellite main computer (IHU) and the internal communications between the two computers. The equipment configuration of the field test emulates the on-board equipment so that any hardware or other improvements can also be incorporated into the flight package.

Acknowledgments

Many thanks to Dr Karl Meinzer (DJ4ZC) and Werner Haas (DJ5KQ) for their generous support. Thanks also to the fantastic people on the RUDAK team for their excellent and invaluable contributions: Peter Gülzow (DB2OS), Stefan Eckardt (DL2MDL), Gerhard Metz (DG2CV), Knut Brenndörfer (DF8CA), Herrmann Hagn (DK8CI), Heinz Möhlleken (DL3AH), Don Moe (KE6MN/DJØHC) of AMSAT-NA and Robin Gape (G8DQX) of AMSAT-UK.

As you may infer from the foregoing, using the new RUDAK should be challenging and enjoyable, but not overwhelmingly difficult. Our thanks to DK1YQ and his RUDAK team for sharing their project with us. The field of digital Amateur Radio satellite transponders now includes UoSAT-OSCAR 11 (developmental use only), Fuji-OSCAR 12 (Mode JD) and the new AMSAT-OSCAR 13 (formerly Phase 3C).

During 1989, however, the field will truly blossom with perhaps as many as a half dozen new OSCARs of a brand new class of satellites being pioneered by AMSAT-NA. The existence of this new class of OSCAR will do several things. First, it will reassert Amateur Radio in general—and the Amateur Radio space program in particular—as a place where innovative things continue to occur not by happenstance, but by design. This is at once in the best tradition of our hobby, and simultaneously expands the envelope of what we're about. Second, it emphasizes and justifies our collective occupancy of the valuable spectrum (which is, after all, our life's blood) on the basis that we actually *do* advance the state of the art to society's benefit. And third, the new class of OSCARs will provide a basis for unprecedented networking among radio amateurs. Thus, it would be well to take spade in hand *now* and prepare *your* space-comm system for the imminent verdant spring. By this time next year, you may be surprised to find yourself enveloped in a virtual flowering field of new OSCARs spawning possibilities stretching even fertile imaginations.

Stay tuned! Next month, first reports on operating the new OSCAR.

New Frontier

(continued from page 86)

90 degrees from where Kent thought Al *should* have been! An SSB contact followed, with Kent sending a 55 report and receiving a 51 report from Al over the 82-mile path.

Kent then moved on to Lone Oak, Texas, to operate from grids EM22 and EM23. As Kent puts it, "these were just chip shots of 40 and 42 miles [respectively], trading 59 for 55 from EM22 and 59 for 58 from EM23."

Equipment at WB5LUA consisted of a home-brew transverter with a 4-dB NF and 600 mW of output power. His antenna was a backsplash-fed 18-inch dish at 70 feet, fed with a 5.5-dB-loss feed line. WA5VJB used a modified commercial SSB transverter with 240 mW output, and a home-brew preamp (2.5 dB NF). The antenna was also a backsplash-fed 18-inch dish, at about 14 feet, with a feed-line loss of 0.5 dB (WR-75 Flexguide). Al has now completed all the contacts for what is believed to be the first 10-GHz VUCC from a home station. All the contacts were non-line-of-sight except for the one from Al's home grid. (*Adapted from the North Texas Microwave Society* FEED POINT, *May/June 1988*)

2.3-GHz AMPLIFIER

The May/June issue of the NTMS *FEED POINT* newsletter also contains a 2.3-GHz amplifier design by Richard Campbell, KK7B. It uses an HP HFET 1102 to drive an Avantek AT 8140 for 30 dB of gain and 1 W of output at the 1-dB compression point. A microstripline PC-board pattern for the amplifier is also given. The NTMS can be contacted c/o Wes Atchison, WA5TKU, Rte 4, Box 565, Sanger, TX 76266.

LOCAL-OSCILLATOR DESIGN

Those who don't regularly receive *QEX* might like to check out the May 1988 issue. Beginning on p 12, Dave Mascaro, WA3JUF, described a 759-MHz local oscillator intended for use with a 903-MHz transverter, but which could easily be modified for other frequencies. The circuit uses two transistors to provide 94-MHz drive to a 1N914 diode multiplier, followed by a two-pole microstrip filter and a two-stage MMIC amplifier. Output is approximately +10 dBm at 759 MHz. Dave comments that he also uses this design to produce an 828-MHz signal used to drive a ×4 interdigital multiplier to 3312 MHz, providing the LO signal for a 3456-MHz transverter.

1.3-GHz ATV TRANSMITTER

PC Electronics has developed a small 1-W ATV transmitter. The unit is crystal controlled and accepts standard composite video. Price is $299. More information can be obtained from PC Electronics, 2522 Paxson Ln, Arcadia, CA 91006.

10-GHz CUMULATIVE CONTEST

For those who might have missed the announcement in June *QST* (p 102), this year's contest will take place on August 20-21 and September 17-18 from 8 AM to 8 PM local time on each day. Complete contest rules appear in the *QST* announcement.

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

A Public Service Opinion

by Robert Weinstock, KN1K, Director, Transcontinental Corps, Eastern Area, Cycles 3 and 4

1967: I remember the first time I delivered a radiogram. Because I am deaf, I cannot use the telephone. So, at age 13, having just received a message for local delivery, I hopped on my trusty Schwinn and pedaled the five miles to the recipient's home. I knocked on the door, and was greeted by a *big* man, at least 6 feet 4 inches. "Yeah?" he growled. Collecting my wits about me, I stammered, "Um, hello, I'm an Amateur Radio operator, and I have a birthday greeting message for Debbie from her grandmother...." "No kidding!!? Deb-BIE! Come here, there's a surprise for you at the door!" And Debbie, just turned eight, was positively thrilled. Her father asked me in, offered me a Coke, and peppered me with questions. How did I get the message? Did you actually talk with Grandma? Could I call her back by radio? And so on. It was a thrilling experience for them, and for me as well.

1988: I have been a ham for 21 years. I have come a long way from my humble beginnings with a chirpy Johnson Viking Valiant (nicknamed "The Violent") and a Hallicrafters SX-25 receiver with sensitivity and selectivity figures that would make ARRL laboratory technicians weep. Now, I use state-of-the-art everything and operate all the sexy digital modes. And I am *still* involved with traffic handling. But I feel sometimes as if it's a whole new breed of traffic handlers out there, a contentious strain that does only what it has to do. *Time* magazine had a cover story last year entitled, "Why is Service So Bad?" That describes how I feel about some of today's goings-on.

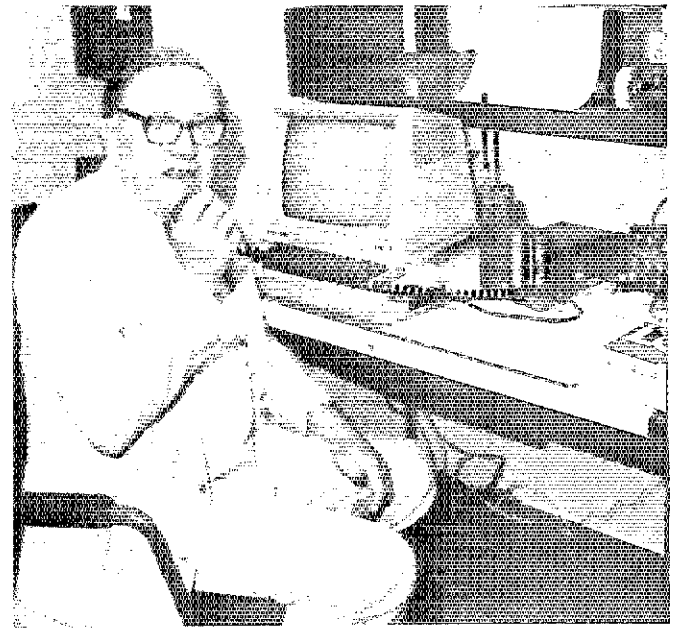
I am actually hearing stories of people who refuse certain kinds of traffic. Packet bulletin board system operators are servicing messages received without telephone numbers, telling the originator in no uncertain terms that this kind of traffic will not be accepted. Some people are refusing to handle specific types of traffic, notably the friendly and much-appreciated greetings that pass between members of the various fraternal organizations (QCWA, OOTC, SOWP, and so on.) Rumor even has it that members of the NTS hierarchy are writing to the Handi-Hams, complaining about the large amounts of traffic emanating from there! Worse, some people are committing the most cardinal sin of all—taking traffic off nets or bulletin boards with no intention of relaying or delivering that traffic.

Lest we forget, "Amateur Radio exists because it qualifies as a service. Throughout our history, we amateurs have established a reputation for public service communication which is of the greatest importance to our continued occupation of frequencies." Dare any individual jeopardize that reputation?

So what if the message is a "mushygram"? Put aside your feelings of embarrassment or derision. The appropriateness of message content is not for you or me to judge. Your job upon receiving a message is to relay or deliver it in a timely fashion. *You* may not get a kick out of "love, hugs, kisses and squeezes" but the addressee certainly will, and he or she will remember Amateur Radio for what it is—a service. So what if a message has no telephone number? You have a telephone book, don't you? Let your fingers do the walking. If the number isn't listed, try directory assistance. It costs money to call 411? Fine. Don't. Just send a message back to the originator, and you've done your job.

The addressee doesn't know the sender? The addressee is a Silent Key? Awkward

Speaking Statewide via a 2-meter repeater network, the Honorable John H. Sununu, Governor of New Hampshire, reads his proclamation setting aside June 4-11, 1988 as Amateur Radio Week in the Granite State. Governor Sununu visited Special Event Station W2ØØNH, sponsored by the New Hampshire Amateur Radio Association. Looking on as the Governor speaks is Warren Rothberg, WB1HBB, president of the NHARA. (*photo by Phil McGann, WA2MBQ, ARRL public information officer, NH*)



Operating one of the five consoles as part of the W2ØØNH Special Event Station in celebration of the Bicentennial of the United States Constitution is Bob Mitchell, W1NH, the station's trustee and retired ARRL section manager for New Hampshire. (*photo by WA2MBQ*)

situations, to be sure. Bear with them as best as you can. Don't become upset with the originator. He or she could not have known. The QCWA, OOTC and SOWP operators usually work from recent *Callbooks*, membership directories and newsletters. They do their best; they put much time and effort into their public service efforts. You should do the same.

You think those "old-fogey-grams" aren't a public service, because they are to hams from hams? Some people will agree with you. But remember that *all* the routine traffic we handle could just as easily be sent by other means. This traffic provides us with practice for emergency situations; it greases the wheel, so to speak.

And when you "kill" traffic with no intention of relaying or delivering it, just what do you think you're doing? You have let down the originator, who has put his or her complete faith in the system—be it the National Traffic System, the packet bulletin board network or the still-developing link between the two. You have deprived other amateurs of the opportunity to provide public service. You have deprived a member of the public, ham or nonham, of an opportunity to see the value of Amateur Radio as a service.

It doesn't matter, you say? Need I recite the list of emergencies in which Amateur Radio has provided a vital link to and from the disaster area? Federal, state and local governments *know* we are there to help. They look to us to provide communication when no other system works. And they are the ones who will support us when we look to maintain our precious frequency allocations.

Traffic handling is as old as the Amateur Radio Service itself. Thousands of amateurs over three-quarters of a century have helped to establish our formidable reputation for public service. It is that tradition, that reputation, more than anything else that ensures the continued growth of the Amateur Radio community. You, as a traffic handler, *must* seek to uphold that tradition and that reputation.

IN SERVICE

☐ Concord, NH—April 16. Despite the odds, a small, dedicated group of hams provided communication for the Concord March of Dimes Walk America fund-raiser. The five-member group provided communications from start to finish which included five checkpoints along a 12-mile route. The radio amateurs assisting were WA1HUM, KB1MM, KB1DL, WB1DNJ and WA1ALM. Despite the cold, snowy weather and short notice to prepare, the radio amateurs did a good job.—*Jack Sheehy, WA1ALM*

☐ Tulsa, OK—April 23. Amateurs from the Tulsa Repeater Organization supplied communications (administrative, safety and security) for the Tulsa Special Olympics. Some operators stayed with Olympic officials while others set up positions at first aid and ambulance stations in case of medical emergencies.—*Merlin Griffin, WB5OSM, EC, Tulsa County*

☐ Humboldt, TN—May 5-6. The City of Humboldt put on a Strawberry Festival with many activities during the first week of May 1988. It attracted participants from other areas of West Tennessee and adjoining states as well. Large parades held both days consisted of floats and school bands. Members of the Humboldt Amateur Radio Club furnished communications coverage which greatly expedited the operation and helped keep events running smoothly.—*Herb Allen, WA4RWK*

☐ Forsyth County, NC—May 14. The ARES of Forsyth County assisted with communications for this year's Annual Steeplechase which was held in Tanglewood Park. Radio amateurs were stationed at gates and were able to notify the park officials when there was a need for supplies, tickets, etc. These operators were also in position to observe anything that may require the attention of the law enforcement officials. A group of radio amateurs was also assigned to shuttle busses that were ready for nearly 20,000 spectators. Radio amateurs were also assigned to the stable area to coordinate the movement of horses to the paddock area in time for the next race. Seventeen ARES members participated in this year's event.—*Thanks to Richard Batte, N4MBI, EC, Forsyth County*

☐ Butler, PA—May 15. The Butler County Emergency Coordinator was notified by a 911 dispatcher that the Red Cross Director was requesting assistance from ham radio operators. A supermarket in downtown Butler was being destroyed by fire. Because of the danger, residents of an adjacent apartment building were evacuated to the nearby YMCA. Telephone service in the area was knocked out by the fire. Emergency traffic was handled on the 147.96/36 repeater and the 443.9 RACES repeater. Radio amateurs operated from Red Cross Headquarters, YMCA as well as from their home stations to relay traffic.—*Ed Napoletan, WB3LKO, EC, Butler County*

☐ Olathe, KS—May 22. Members of the Heart of America Radio Club provided safety and coordination communications for the triathlon which was held within and along the borders of the Heritage Park. The triathlon consisted of a 0.3-mile swim, 10-mile bike ride and 3-mile run. This short triathlon, held for the first time this year, drew more than 400 triathletes. WØAIB served as net control and KØUAA organized the ham participation. —*Mike Bellinger, KØUAA, Public Information Assistant*

SPOTLIGHTS ON SERVICE

Fire Hits Motel in Dayton

A dozen members of the Big Shanty Repeater Group had a real hot time at the Dayton HamVention® this year. On Friday evening, following a hard day of bone-yard picking and a long drive from their home in Marietta, Georgia, the group was resting in their rooms at the Royal Motel in Dayton.

Several members, including Rubins, PU2AJO, and Dave, N4ITV, decided to try their luck on the low bands from the mobile in the parking lot. Shortly after establishing contact with a Brazilian station on 20 meters, someone noticed smoke coming from the motel. Dave, who is a trained paramedic and fire rescue officer in Marietta, suggested the group look for the source of smoke. Soon, the fire was visible, and the Big Shanty Group began to spread the alarm.

Burt, K4BZJ, discovered that the telephone lines to their rooms had been destroyed at his end of the motel. He attempted to call the fire department through a local 2-meter repeater, but was unable to get the message across due to circumstances at the scene of the fire. Meanwhile, Dave, Rubens and other club members, who were outside when the fire started, continued knocking on doors and evacuating guests. The rest of the group members who were still in their rooms were alerted on a 440-MHz simplex calling frequency.

By this time, a group member reached the motel's front office where the telephone service had not been affected by the fire, and a call was placed to the fire department. The radio amateurs continued to help by directing traffic out of the motel and kept fire lanes clear until the fire department arrived to extinguish the blaze.

There were no injuries among the guests. However, two firemen were taken to the hospital for treatment of injuries sustained while fighting the fire. The Big Shanty Repeater Group members who were involved in this emergency were: N4JDO, N4BZJ, KK4ZC, KB4IA, N4ACJ, N4NFP, W4MTA, N4NEQ, PU2AJO, N4ITV, KK4CC and NV4U.—*Ron Gill, NV4U*

Hams Aid in Train Derailment Emergency

Five tank cars on a train passing through Bakersfield, California derailed and overturned on the morning of May 24, 1988. When finally reported to the city fire and police departments, an inspection revealed the tanks to be leaking a volatile toxic substance. The fire department then ordered the evacuation of the adjacent Bakersfield High School, residents in the surrounding area and portions of Mercy Hospital, which was immediately across the tracks from the accident.

The hospital security chief notified Colleen Sherman, N6NIB, hospital liaison for ARES/RACES of the Bakersfield area, to activate her team for emergency use. Within 15 minutes, Colleen had her first hams on the scene. W6GRR, K6APE and N5DPW reported to the hospital security chief and were assigned at communication command posts with the police and fire departments.

During attempts to upright the cars and place them back on the track, a high risk of tank rupture existed. Close communication between on-site work crews and police, fire and hospital officials was paramount. By 8 PM, the emergency was declared over and the support teams were dismissed. Other active radio operators on the scene were W6VMB, N6DTB, W6KAS, and N6NIB. Many others were on standby to report if necessary.—*Colleen Sherman, N6NIB*

Field Organization Reports May 1988

ARRL Section Emergency Coordinator Reports

Twenty-eight SEC reports were received, denoting a total ARES membership of 15,727. Sections reporting were: EPA, GA, IA, ID, MI, MN, MO, MS, NE, NFL, NH, NLI, NNJ, NM, NTX, OH, SD, SDG, SJV, STX, UT, VA, VT, WA, WMA, WNY, WPA, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	110	90.00	530	1067
TCC Central				
TCC Pacific	112	90.32	394	736
Summary	222	90.16	924	1803
Cycle Three				
TCC Eastern	60	96.77	28	56
Cycle Four				
TCC Eastern	114	91.94	476	951
TCC Central	70	82.50	388	822
TCC Pacific	102	82.26	541	1065
Summary	286	85.56	1405	2838

TCC Roster

Eastern Area, Cycle 2: KW1U, Director. K1EIC K1EIR WA1FCD KN1K KT1O W1QYY WA2FJJ W2FR NN2H KA1UBD N2XJ N3AZW N3EMD KK3F NJ3V AA4AT K4DOR WD4FTK N4GHI WB4PNY N4SS W8PMJ WB8YDZ VE3ORN.
Eastern Area, Cycle 3: KN1K, Director. WA1FCD NN2H WA2SPL N3EMD AA4AT KA8WNO K8TPF
Eastern Area, Cycle 4: KN1K, Director. KB1AF W1CE K1GRP W1QYY WA1TBY KW1U W2FR W2GKZ NQ2H KB2HM W2LWB W2RO N2XJ N4GHI KB4N N4SS W4UQ K4WJR K4ZK W8BO W8PMJ N8XX VE3FAS VE3GSQ
Central Area, Cycle 4: K5GM, Director. W5GHP K5GM WB5J AJ5K K5MXQ WZ5N N5TC K5TL W5TNT KB5W W9CBE WB9UYU KA0EPY AI0O KS0U
Pacific Area, Cycle 2: ND5T, Director. W5JOV KU6D N6LHE K6UYK WF6O WA7CBN KF7R W7TGU W7IGC N0HFZ N0IA
Pacific Area, Cycle 4: K0DJ, Director. N2IC ND5T W5QVK K6LL W6EOT W6INH W6VZT NI6A K7GXZ N7CSP W7EP W7GHT W7GL W7VSE KA7CPT KN7B NN7H NR7E K0DJ K0EZ KC0D KJ0G

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	861	27.77	.697	88.7	
CAN	31	644	20.77	.528	100.0	
PAN*	57	500	8.77	.622	91.9	
Region Nets						
1RN	62	525	8.46	.506	85.0	100.0
2RN	59	213	3.61	.301	86.8	96.8
3RN						96.8
4RN	62	482	7.77	.343	76.0	96.8
RN5	62	612	9.89	.408	84.0	100.0
RN6	38	113	2.97	.295	—	100.0
RN7	62	600	9.67	.771	84.1	100.0
8RN	62	260	4.19	.265	94.6	90.3
9RN	62	248	4.00	.331	89.7	100.0
TEN	71	705	9.93	.446	80.0	100.0
TWN						100.0
ECN						51.6
Cycle Three						
Area Net						
EAN	29	133	4.58	.311	75.3	
Region Net						
1RN	31	65	2.10	.220	86.6	79.3
2RN	29	108	3.72	.339	100.0	79.3
3RN						93.1
4RN						62.0
8RN						89.6
ECN						65.5
Cycle Four						
Area Nets						
EAN	31	995	32.10	1.051	96.7	
CAN	31	705	22.74	.936	100.0	
PAN	30	683	22.77	.865	98.3	
Region Nets						
1RN						96.7
2RN	51	164	3.20	.423	74.5	100.0
3RN	62	193	3.13	.315	97.3	96.7
4RN	62	1313	6.15	.290	93.8	100.0
RN5	62	536	8.64	.589	100.0	100.0
RN6	62	368	6.00	.720	97.0	100.0
RN7	59	376	6.37	.705	92.9	98.3
8RN						100.0
9RN	62	366	5.90	.446	94.0	100.0
TEN	62	422	6.81	.575	74.0	100.0
TWN	58	247	4.26	.339	93.1	96.6
ECN						100.0
ARN	31	74	2.38	.073	100.0	90.3

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, CT, DE, EMA, ENY, GA, IA, ID, IL, IN, KS, ME, MI, MN, NC, NFL, NH, NLI, NTX, OH, OK, OR, SB, SC, SFL, SD, SDG, STX, TN, UT, VA, VT, WA, WMA, WNY, WPA, WTX, WV.

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public-service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

182
KA1JXH
151
W7LRB
145
WA4QXT
144
WB2OWO
141
N4GHI
138
N2EIA
136
WB4DVZ
134
N7ELF
128
WA2VJL
127
KA9FFO
126
W2MTA
121
KA9VII
120
N1CXP
119
W2QNL
K4NLK
118
N9BDL
116
N2XJ
KA2F
WX4H
115
KA1FVY
112
W9CBE
W7VSE
K2YQK
WR5O
KA3DLY
111
WA4PFK
N2HIF
109
W7LNE
WB4WII
108
W6INH

107
K8TVG
WA4DJH
NM1K
WB1GXZ
106
WA9VLC
KT1Q
104
WA9VND
WB7WOW
N8HHH
NC9T
AC5Z
KW1U
WB1HIH
103
W4RWB
WF6O
W9YCV
KA1GWE
WA3WIY
WE2G
AA4TE
102
K4ZK
N5AMK
N0FOO
N4EXQ
101
N8EFB
AG9G
WA2ERT
WG7H
KB4WT
WA2JBO
W4ANK
KA2IJBD
100
WA2SPL
99
K5UPN
WA2FJJ
98
WD8KQC
WD5GKH
97
W4PIM
KF5BL
96
N3EMD
WB4WQL
KD8HB
KD7ME

WB4KSG
WB2VUK
N3AZW
N4MEJ
95
N4RT
WB4ZNY
W9LKN
W4JLS
94
N4JRE
93
K2VX
WA4EIC
W4CKS
WA0HTN
KA0ARP
94
W3FA
W0KK
92
W8FPA
WB2RBA
91
W2RRX
WB8JGW
90
KE2GX
K2ZVI
AA4ZV
89
N6NLW
KA2INE
88
KB9LT
87
KA0KPY
KA7EEE
WB7EMO
VE7EJU
KB2BKE
KJ4VT
W3YVQ
86
K8JDI
W7LBK
N4SMB
KB1AF
NJ3V
85
KQ3T
W0OYH
WB8SYA

KA7AID
WB5J
84
KT9I
AA4HT
83
K5CXP
WA3WIY
N6EQZ
N2FIZ
82
WB6QBZ
N3COY
ND2S
WA1JVV
81
N8FWA/T
AJ5F
NB1A
KA1IFC
79
W7GHT
N0DPF
KA9RII
KA2QOO
W1KK
78
WA4RUE
WA0TFC
KA9RNY
N7BGW
NG1A
NV5L
77
K0ERM
W1RWG
KA7SYG
WB4ZTR
76
KA4HHE
W0OUD
WB8R
KJ9J
75
VE7EJW
W5CTZ
74
ND0N
WD0GUF
NN2H
73
N8AEH
WD4KBW

KA8CPS
VE7BNI
KJ3L
WA1TBY
WA3YLO
KA4TLC
72
KF5RD
NQ1P
N2ABA/T
KC2JW
71
KB4LB
NN4I
K4BGZ
KN1K
KC3Y
KI4YV
70
KF4FG
NJ9S
K9ZBM
KB5EPA
N3EGF
KJ3E
69
WA3UNX
WB2OMP
WA6QCA
WZ5N

68
K6UYK
K3JL
KF8J
N7GGJ
NS9Q
N2HLZ
67
W4HON
N2DXP
N8CEI
K3GHH
K2YAI
66
N4PL
N1DHT
65
NO3M
KB4JPN
W1PEX
N2AKZ
K2TWZ
N4KSO
64
KA1KML
WB2FTX
KD8KU
KA4FZI
KD0YL
KD0NH

KI4BR
N6ANQ
W4TZC
NZ5J
WB5FQU
WB5YDD
63
WA8DHB
NC0A
KK4FV
WA4LTO
62
KI6ZH
WB0WNJ
K5MXQ
KA9CTW
61
WA2PAC
N8GPU
WB8KWC
N3DRM
KB4BZA
KA2ZKM
W2GJ
60
AI0O
KA1KP
K4IWW
58
N2ETO/T

57
KA1QFV
55
KB2CYC/T
51
KB0Z
50
KA2JMA/T
KA1NOI/T
N2EVG/T
48
N6FWG/T
47
KA6TNO/T
46
WB1BTJ/T
KB2EPU/T
45
KB2BNW/T
N8HRW/T
42
KA6HJK/T
41
KB6VPI/T
40
KA2UJU/T

The following stations qualified for PSHR during the month of April 1988, but were not listed in last month's column: N8HRW/T, N8GPU/T.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the callsign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	775	798	1270	64	2907
KA0ARP	1001	50	1036	2	2089
WB9YPY	0	995	83	697	1775
W1PEX	42	350	1305	9	1706
WB0WNJ	235	138	629	3	1010
W3VR	304	214	295	36	849
WA4JDH	0	357	392	6	755
KA1IFC	1	330	343	12	686
N2HIF	11	304	355	15	685
W9JUJ	1	311	271	1	584
WF6O	0	272	297	7	576
KT9I	0	243	331	0	574
KW1U	0	318	221	3	542
K4DOR	43	225	265	3	536
WX4H	0	307	222	7	536
KT1Q	0	279	242	6	527
WA4QXT	19	234	221	44	518
N4GHI	53	219	202	40	514
WA9VND	10	279	202	20	511

BPL for 100 or more originations plus deliveries:

K4CY	211
WD4IIO	137
W0FIR	117

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	26	171	276
Central Gulf Coast Hurricane Net	31	87	3459
Clearing House Net	31	372	382
Early Bird Net	31	721	296
Empire Slow Speed Net	30	52	341
Great Lakes Emergency & Traffic Net	31	61	1024
Hit and Bounce Net	31	260	548
IMRA	28	695	1548
Mission Trail Net	31	63	905
NYSPTEN	31	76	511
Southwest Traffic Net	31	226	1699
20 Meter SSBN	26	320	695
75 Meter ISSBN	31	437	1273
7290 Traffic Net	48	480	3118

Washington Mailbox

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

Zoning Ordinances and Restrictive Covenants: Making Your Presentation

All over the country, Amateur Radio operators are increasingly affected by two kinds of antenna restrictions: Zoning ordinances and deed restrictions (also known as covenants or "CC&Rs"). These restrictions often severely limit antennas or ban them altogether.

PRB-1, the Federal preemption of state and local regulations pertaining to Amateur Radio antennas, has provided much relief to many Amateur Radio operators affected by local government zoning ordinances. PRB-1 states that local zoning regulations must be the least restrictive means of accomplishing a valid municipal purpose.

However, PRB-1 can do nothing for those Amateur Radio operators who, through the purchase of a house, implicitly or explicitly accepted restrictive covenants (also called deed restrictions) in a housing development which either restricts or completely bans antennas. In fact, PRB-1 specifically states "our [FCC] ruling does not reach restrictive covenants in private contractual agreements. Such agreements are voluntarily entered into by the buyer or the tenant when the agreement is executed and do not usually concern this Commission." The opinion of the courts has been essentially that it is the decision of the amateur whether or not to live in an area affected by such deed restrictions. In buying the house, the amateur, in effect, agreed to be restricted.

When faced with restrictions, whether they are zoning ordinances or deed restrictions imposed by a homeowners' association, it would be nice if amateurs could simply make a phone call and the restrictions would automatically disappear. Unfortunately, this is rarely the case. Amateur Radio operators are often required to make a presentation before zoning boards and other authorities in order to establish that amateur antennas should not be unduly restricted. To a great extent, the degree of success is directly related to the amount of diplomacy, compromise, attention to detail and concessions made by the amateurs involved. The Washington Mailbox column of January 1988 *QST* discussed zoning ordinances. In April 1988 *QST*, this column discussed deed restrictions. In this month's installment, guidelines are offered for making your presentation before the proper authorities with the goal of obtaining permission to install an amateur antenna at your home.

Do Your Homework

Before making any request or application for a conditional-use permit, special exemption or for homeowners' association approval of your proposed antenna, *always do your homework. Obtain a copy of the regulations or association rules governing your proposed installation. Read and reread all of the pertinent rules and regulations of your development or community.* Know every detail of those rules or regulations which pertain directly to antennas and formulate your request based on their contents.

If faced with zoning restrictions, check with your local office of licenses and inspections (or whatever the local version is called) and find out if a building permit is required. If you do need one, find out all of the details of what must be done to satisfy those requirements. It is not unusual for local governments to require adherence to the *National Electrical Code* ®. Certain codes are very specific about material requirements, wind loading parameters, wiring and so forth.

If you do find that you have a problem, make sure that you have the proper "tools." When faced with a town or city zoning restriction, knowledge of PRB-1 will aid you greatly. It is highly advisable that you obtain the League's "PRB-1 kit" from the Regulatory Information Branch of HQ. This information is available for a large 9- by 12- inch SASE with $1.85 postage attached. For more information on zoning ordinances and their relation to PRB-1, see the Washington Mailbox column in January 1988 *QST*, page 55, and the article entitled "Amateur Antennas Get Federal Protection in PRB-1" in November 1985 *QST*, pages 9 and 60. Information on deed restrictions can be found in the Washington Mailbox column of April 1988 *QST*.

Making Your Presentation

Some local governments require that hearings be held and others require that written consent of the homeowners' association be given. Know what you need before you even approach your local governing body, be it a town or city zoning board or a homeowners' association. Check with local Amateur Radio organizations and with other amateurs in your area who may have had similar experiences.

Building and Electrical Codes

For your own benefit, remember that in many areas of the country, local codes notwithstanding, local governments and insurance companies look for compliance with both building codes and with *The National Electrical Code*® in matters involving antennas and radio equipment. In some cases when a claim arises concerning an antenna and/or radio installation, proof of compliance with building codes and/or *The National Electrical Code* may be required before any insurance claim can be settled.

The following material from *The National Electrical Code* may be useful in your presentation to a zoning board. Be certain that your antenna specifications will meet these and all applicable portions of the Code. The full text is not given here, but the following excerpts may be useful:

810-11. Material. Antenna and lead-in conductors shall be of hard-drawn copper, bronze, aluminum alloy, copper-clad steel or other high-strength, corrosion-resistant material.

810-13. Avoidance of Contacts with Conductors of Other Systems.

810-15. Grounding. Masts and metal structures supporting antennas shall be grounded in accordance with Section 810-21.

810-20. Antenna Discharge Units—Receiving Stations.
(a) Where Required.
(b) Location.
(c) Grounding.

810-52. Size of Amateur Station Outdoor Antenna Conductors

	Minimum Size of Conductors	
Material	*Where Maximum Open Span Length is*	
	Less Than 150 feet	*Over 150 feet*
Hard-drawn copper	14	10
Copper-clad steel, bronze or other high-strength material	14	12

810-57. Antenna Discharge Units—Transmitting Stations.

810-58. Grounding Conductors—Amateur Transmitting and Receiving Stations.

Although some court decisions have held that a decision can not be made on aesthetics alone, aesthetics will most certainly have a significant impact, even if cloaked in other concerns. Homeowners' associations will focus almost exclusively on aesthetics or some combination of aesthetics and RFI. Always give the governing body sufficient information to permit it to make an intelligent decision as well as feel that it is "in control" and exercising its judgment based on full knowlege of the facts.

If RFI is an issue, let them know that it is a well-known fact that, while not prohibited by ordinances or covenants (as that would constitute an infringement on your freedom of use), such antenna installations may cause serious interference problems due to their proximity to both other electronic devices and power lines and conductive surfaces such as aluminum siding. Be sure it is understood that the farther away from the dwelling, by a combination of height and distance, the more beneficial an antenna is in terms of both performance and reduction of possible interference. Comments in this area require treading a very thin line, however, so if you are unsure, *omit them!*

Keep your presentation clear and concise and above all else, simple! In your presentation, do not use technical language. The governing body with which you are dealing does not care about dB gain, SWR, wavelengths, impedance matching or anything else sacred to Amateur Radio operators. They do care about how high or how big the antenna is as well as how easily it might fall and how much damage it could do to a neighbor's home if it does fall. You may also wish to point out that antenna support structures rarely fall or break and if they do, it is not from the bottom.

Emphasize Public Service

Always emphasize the public-service nature of Amateur Radio and the beneficial effect on each member of the community. Remember that it should be presented as a serious avocation rather than "just a hobby." You should show them how having an Amateur Radio operator in the community is a benefit to everyone. If you have previously received any awards or commendations, or have any news clippings with regard to your Amateur Radio public-service activity, include copies with your antenna proposal. Try to anticipate questions and/or objections and answer them before they are asked.

Always refer to Amateur Radio as the "Amateur Radio Service" and to operators as "Amateur Radio operators." Do not use the word "amateur" without being followed by the word "radio." It would be a good idea to follow the style of this article and always capitalize the words "Amateur Radio" and "Amateur Radio Service" when used in text.

Avoid the word "tower." A tower should be referred to as "an antenna-supporting structure." To nonamateurs, the word "tower" may create an image of a huge water or broadcast tower being placed in their backyard. *Also, avoid using the word "ham" in a presentation.* There is nothing wrong with the word "ham"—it is an honorable accolade to us in the Amateur Radio Service, but to the public it can have a negative connotation such as referring to someone or something not worthy of serious consideration.

Some folks, including those on your town's zoning committee or on your community homeowners' association, may not know very much about Amateur Radio. *Part 97 of the Federal Communications Commission rules and regulations can be the single biggest factor in your favor—use it to your advantage.* No matter how familiar you may be with the "regs," read them again and again and use them in your presentation; for example, state the basis and purpose of the Amateur Radio Service, and so on. Also, use all applicable portions of PRB-1 in your presentation. One more thing—make sure that your Amateur Radio license is current and that it shows your current address.

RFI—The Facts, Just the Facts

Local zoning boards and homeowners' associations are concerned with interference. *Remind them that the FCC has sole jurisdiction to regulate RFI.* If confronted with questions regarding interference, cite FCC regulations requiring purity of signals and other such regulations. Again, don't be too technical in your discussion. It has been the opinion of some members of Congress and industry that manufacturers should be obligated to provide a product that won't respond to strong signals not intended for reception by the device. Many manufacturers omit this protection as a cost-cutting measure; but when confronted with the shortcomings of their product, they are usually responsive. Be sure that they understand interference can also come from many nonamateur sources.

Never volunteer that you may be the cause of interference. Simply indicate that if any interference is encountered, that you will be willing to provide assistance by helping to locate the source and in obtaining the information necessary to help correct the problem. Do not attempt to make repairs to your neighbor's home-entertainment devices.

You may be questioned about fears that your antenna will increase the possibility of a lightning strike in your neighborhood. *A properly installed and grounded tower is less likely to be struck than nearby trees or other nearby objects.* The following reference provides more detailed information with regard to lightning and lightning protection: *Lightning Protection Code*, National Fire Protection Association, NFPA 78-83, Quincy, MA, pp 3-26 and 3-27. Amateur publications frequently carry such information.

Be Patient

Do not, short of bona-fide emergency, ignore antenna restrictions and put up an antenna of any kind. Specifically, do not use any type of indoor antenna. Such action may result in the defeat of any future attempt to secure permission for a legitimate outdoor antenna installation. Also, do not operate a hand-held, mobile or any other rig in or near your home until you have secured permission for an antenna. To a neighbor experiencing interference, it does not matter what the source is—you may be blamed.

Don't expect miracles! If you are the first amateur in your development to assault antenna restrictions, you may face many months of correspondence with your local governing body before you see any signs of success. They may even request outside information and assistance from such organizations as the FCC, the National Bureau of Standards or the IEEE. When you have finally thrown in the towel and given up all hope of ever getting on the air again, that big day may come when the long-overdue letter arrives telling you that you may install a particular antenna. Celebrate! You've earned it.

Now, the hardest part of all—Do not operate! Stay off the air for several weeks after the antenna installation has been completed. Do not even operate your hand-held. You are about to be blamed for any and all interference within blocks. *Bear with it.* Be patient and very politely inform anyone who complains that you are not yet operating your station. Above all else, don't tell anyone when you expect to be on the air. After all of the nonsense complaints have died down, begin your operation.

Amateurs must all work together when confronted with antenna restrictions. Only if we work together seeking a reasonable solution will we have any hope of being a successful fraternity rather than individuals fighting a lonesome battle. Over the years, amateurs have proven their ability to work together and that is one of the reasons why the Amateur Radio Service still exists today. By the way, if you have never read *200 Meters and Down*, now couldn't be a better time. Having a firm understanding of the history of the Amateur Radio Service and being able to relate that to the the present can only help the manner in which you present Amateur Radio to others, particularly the public. This includes those who may be casting the deciding vote on your antenna proposal!—*Ralph E. Delligatti, K3CMY, 17651 Amity Dr, Gaithersburg, Maryland 20877*

[An expanded and annotated text on which this column is based is available from the author for $5, which covers copying, postage and handling charges. This month's installment represents the views of the author and not necessarily those of the ARRL]

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

International Round-Up

Thailand

Good news from the Radio Amateur Society of Thailand. New Amateur Radio regulations there were enacted into law in late 1987 and became effective at the beginning of 1988. Some of the salient points are:

- The minimum age for applicants will be 15 years, and applicants should be Thai nationals.
- Qualified foreign residents will be able to apply for reciprocal operating privileges as soon as the necessary treaties have been negotiated with other administrations.
- Security clearance will be required, and applicants must be members of RAST.
- There will be three classes of license—Novice (VHF only, on 2 meters); secondary (HF with Morse); and first-class (with Morse and higher technical requirements).

The Thai Post & Telegraph Department is "keen" on reciprocal agreements, and this is the only way in which non-Thai nationals will be able to operate in the future. RAST hopes that other IARU member societies will encourage their administrations to sign reciprocal agreements with the Thai administration.

RAST recently elected a new committee, headed by the Permanent Secretary to the Communications Ministry, who is himself a long-time radio amateur. He is Sribhumi Sukhanetr, HS1SS.

The elected committee also has several senior officials at the PTT to serve on the committee either in an appointed position, or as advisors. These PTT officials have been active in implementing the new radio regulations. From the IARU standpoint, we note with great interest and enthusiasm that one of the Thai PTT advisors to RAST was a participant in the Amateur Radio Administration course which was held in Tokyo in November 1987. We like to think that this participation has had some helpful effect on the future of Amateur Radio in Thailand.

Amateur TV in Brazil

The television system of LABRE, the IARU member society in Brazil, is completing the construction of a studio in Sao Paulo, from which will be presented live daily programs.

Sao Paulo is a city of 13.5 million, with many repeaters on VHF and UHF. The bulk of Brazilian hams (PY2) are found in the city and surrounding state of Sao Paulo.

TV LABRE, Sao Paulo, will be on the air daily from 1430 on 432/438.5 MHz. It will feature information and news on Amateur Radio activities in Brazil and the rest of the world, as well as films and interviews on general radio communications. More information on TV LABRE can be obtained by contacting the ATV Director, Victaliano Machado, PY2EHV.

QSYing to the HF, Brazil has taken a lead in establishing beacons for the new 24- and 18-MHz bands, operating throughout the day on 24,901 and 18,080 kHz.

WARC-ORB 1988

A World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It—how's that for a mouthful of a title? No wonder it's abbreviated to simply WARC-ORB-88. This WARC will be convened in Geneva on Monday, August 29, and is scheduled to run for a period of five weeks and three days, concluding on October 5. This second session will hopefully complete the work of the first session held in 1986.

Although the agenda does not contain any items that appear to impinge directly on the Amateur Radio Service, IARU will have an observer team there. Not only will the team watch the proceedings carefully but also will continue our policy of becoming acquainted on a personal basis with as many of the top telecommunications delegates as possible. The IARU observers will work in relays—no one of us will be there for the entire time, but there will always be at least two on hand. Scheduled to be there on behalf of IARU for varying periods of time are G3FKM, I1RYS, PAØLOU, SP5FM, YT7MM, W1RU, 7X4MD and 9V1RH.

ITU Plenipotentiary Conference

The WARCs, the World Administrative Radio Conferences, deal with the nitty-gritty administrative aspects of regulating radio on an international basis. But the ITU itself needs a certain amount of administrative work from time to time, and this is accomplished at a plenipotentiary conference, held about every five years. The next one will be held in Nice, France in 1989. At that conference there will be elections of senior ITU officials and establishment of the program of the ITU for the next five years. That is, the plenipotentiary conference of 1989 will decide which WARCs need to be held during the following years. It will most likely be at Nice when the members of the ITU decide whether or not to hold some sort of an allocations conference in the immediate future. ("Immediate" means within five years or so.) International organizations like IARU can send observers to a WARC but not to an ITU plenipotentiary conference. Nevertheless, you can be sure that we'll be keenly aware of what is going on there, and some of us will probably, by some strange coincidence, be found in the immediate vicinity of Nice during that time frame.

Coming Conventions

TEXAS STATE CONVENTION
August 5-7, 1988, Austin

The Texas State Convention is sponsored by the Austin Amateur Radio Club and the Austin Repeater Organization. It will be held at the Austin Marriott Hotel, 6121 N I-35. Saturday features include a flea market, dealer exhibits, technical forums, VE exams; Saturday evening barbeque, which is $9, (advance reservation required). Sunday activities include a general business meeting of the Texas VHF-FM Society, arts and crafts, and a fashion and style show. The Austin Aqua Festival will be nearby. General admission is $5 by advance registration (prior to July 31) and $7 at the door, children 15 and under free. Flea-market tables are $5 each with a limit of 3, first come first serve. Talk-in is on 146.34/94. For reservations contact Don Weiss, KB5PM, PO Box 13473, Austin, TX 78711, tel 512-836-1485.

SOUTHWESTERN DIVISION CONVENTION
September 2-4, 1988, Anaheim, California

Hamcon 88, sponsored by the Orange County Council of Amateur Radio Organizations, will be held at the Disneyland Hotel. Features will include technical sessions and forums, VE exams, Wouff Hong, Saturday night banquet, women's programs, Sunday T-hunt. Also featured will be the newest Amateur Radio equipment, related electronics and computer peripherals. Registration will include validated parking and special hotel rates. For further information contact Len Gerardi, NC6H at Hamcon Inc, PO Box 3695, Huntington Beach, CA 92605.

August 5-7
Texas State, Austin
August 6-7
Northern Florida Section, Jacksonville
September 2-4
Southwestern Division, Anaheim, CA

ARRL NATIONAL CONVENTIONS
Sept 9-11, 1988—Portland, Oregon
June 2-4, 1989—Dallas/Forth Worth, Texas

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext. 283.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.

†**Alabama (Huntsville)—August 20-21.** *Sponsor:* Huntsville ARC. *Time:* Saturday 9 AM-4 PM, Sunday 9 AM-3 PM. *Place:* Von Braun Civic Center in downtown Huntsville. *Features:* dealer show, flea market, forums, license exams, hospitality suite Saturday night, nonham activities, handicap access. *Talk-in:* 146.34/94. *Admission:* free. *Contact:* David L. Reasoner, N4KTY, 3103 Holly Hill, Huntsville, AL 35802, tel (N) 205-883-7629, or Don Tunstill, WB4HOK, 1215 Dale Dr, Huntsville, AL 35801, tel 205-536-3904.

Canada (Brantford, Ontario)—August 13. *Sponsor:* Brantford ARC. *Time:* 8 AM-1 PM. *Place:* Woodman Park Community Centre, 491 Grey Street. *Features:* auction sale, refreshments. *Talk-in:* 146.52, 147.75/15 and 443.025/448.025. *Admission:* $3, kids under 12 free. *Tables:* $4 per table, tables held until 9 AM. *Contact:* Marvin, VE3MWF, PO Box 1661, Brantford, ON, tel 519-442-6298.

Delaware (Georgetown)—August 21. *Sponsor:* Sussex ARA. *Time:* 8 AM-4 PM. *Place:* Delaware Tech, Community College, located on Delaware 18 just ¼ mi from the intersection of US 113 and Delaware 18 W of Georgetown. *Features:* exams. *Talk-in:* 147.675/075, 146.52 and 223.24/4.84. *Admission:* $3 at door. *Tables:* inside tables $5, tailgating $3. *Contact:* Delmarva Hamfest, Rte 2, Box 244G, Georgetown, DE 19947, tel 302-422-1200.

†**Florida (Melbourne)—September 10-11.** *Sponsor:* Platinum Coast ARS. *Time:* 9 AM-5 PM Saturday, 9 AM-4 PM Sunday. *Place:* Melbourne Auditorium just off US 1 in downtown Melbourne. *Features:* commercial exhibits, swap tables, ARRL forums, QCWA, MARS, net meetings. *Talk-in:* 146.25/85. *Admission:* advance $3, door $4. *Tables:* limited to 2 adjacent tables per request. *Contact:* PCARS, PO Box 1004, Melbourne, FL 32901.

†**Georgia (Madison)—August 27-28.** *Sponsor:* Confederate Signal Corps Inc. *Time:* 9 AM-5 PM Saturday, 9 AM-2 PM Sunday. *Place:* I-20 and US 441. *Features:* FCC exams, forums. *Talk-in:* 146.265/865. *Admission:* free. *Contact:* Roy L. Jordan, WB4ILR, 1146 Shoreham Dr, College Park, GA 30349

†**Illinois (Danville)—August 28.** *Sponsor:* Vermilion County ARC. *Time:* Set up anytime after noon on Saturday, Sunday vendors 6 AM, public 8 AM. *Place:* UAW Civic Center, follow I-74 to Gilbert St, North exit. *Features:* flea market, overnight parking, and refreshments. *Talk-in:* 146.22/82. *Admission:* $2 each or 3 for $5. *Contact:* Chris Stonecipher, KA9VMN, RR 3, Box 117, Danville, IL 61832, tel 217-431-0110.

Indiana (Angola)—August 7. *Sponsor:* Steuben County ARC. *Time:* 7 AM. *Place:* Steuben County 4-H Park on Crooked Lake. *Talk-in:* 147.81/21. *Contact:* Steuben County Radio Amateurs, PO Box 252, Angola, IN 46703.

†**Indiana (Indianapolis)—August 13.** *Sponsor:* Shadow of the Pyramids RC. *Time:* 8 AM-4 PM. *Place:* across I-465 from the Pyramids office bldgs. *Features:* forums, auction, tours of ITT Technical Institute, refreshments. *Talk-in:* 144.65/145.25. *Admisston:* advance $1, door $2. *Contact:* David Johnston, 9511 Angola Ct, Indianapolis, IN 46268, tel (D) 317-875-8640, (N) 317-354-2884.

†**Indiana (Valparaiso)—August 7.** *Sponsor:* Porter County ARC. *Time:* vendors 6 AM, public 7 AM. *Place:* Porter County Fairgrounds & Expo Center, take Rte 49, S of US 30. *Features:* walk-in VE testing from 8 AM to 10 AM for all classes. *Talk-in:* 146.175/775, or 146.52. *Admission:* $3.50, under 12 years old free. *Contact:* Jamie Veiner, NS9A, PO Box 1782, Valparaiso, IN 46384, tel 219-763-4988.

†**Iowa (Cedar Rapids)—August 13-14.** *Sponsor:* Cedar Valley ARC. *Time:* Saturday 8 AM-5 PM, Sunday 8 AM-3 PM. *Place:* Teamsters Hall at 5000 J St, SW exit #17 (33 Rd Ave) at I380. *Features:* radio and computer seminars, FCC exams, commercial vendors, flea market, outside tailgating, ladies hospitality room, refreshments. *Talk-in:* 146.16/76. *Admission:* advance $3, door $4. *Contact:* Bob Berridge, WAØSYQ, 2139 Randolph Rd, Marion, IA 52302.

†**Kentucky (Georgetown)—August 14.** *Sponsor:* Bluegrass ARS. *Time:* 8 AM-4 PM. *Place:* Scott County High School on Long Lick Rd, two miles N of Georgetown on US Rte 25. *Features:* VE exams, technical forums, exhibits, refreshments, outside flea market free with paid admission. *Talk-in:* 146.16/76. *Admission:* $5. *Contact:* Ed Bono, WA4ONE, 2077 Dogwood Dr, Lexington, KY 40504, or Bill DeVore, N4DIT, 112 Brigadoon Pkwy, Lexington, KY 40503, tel (D) 606-257-3343, (N) 606-273-8345.

†**Louisiana (Shreveport)—August 13-14.** *Sponsor:* Shreveport ARA. *Time:* 9 AM-5 PM Saturday, 9 AM-3 PM Sunday. *Place:* Convention Center. *Features:* flea market, dealers, forums, VE exams, ladies activities. *Talk-in:* 147.63/03. *Admission:* advance $3, door $5. *Contact:* SARA, PO Box 37632, Shreveport, LA 71133, tel (D) 318-635-4040, (N) 318-686-4401.

†**Maine (Windsor)—September 10.** *Sponsor:* Augusta Emergency ARU. *Time:* 12 noon Friday to 9 PM 9/10. *Place:* from Augusta, N on Rte 32 from Rte 17, or S on Rte 32 from Rte 3 Windsor Fair Grounds. *Features:* meetings, tailgating, walk-in exams, club table, auction, ARES representatives available, camping $3 per unit water/elec available. *Talk-in:* 146.22/82 and 146.10/70. *Admission:* door $2. *Contact:* Arnold Smith, Rte 1, Box 475, Augusta, ME 04330, tel 207-622-2915.

Massachusetts (Dalton)—August 14. *Sponsor:* Northern Berkshire ARC. *Time:* starts at dawn. *Place:* American Legion, Route 9. *Features:* ham radio equipment, computer equipment, refreshments. *Admission:* $1, nonhams and children free. *Tables:* bring your own. *Contact:* Dick Goodman, PO Box 591, Williamstown, MA 01267.

Michigan (Saginaw)—August 28. *Sponsor:* Swap & Shop/Computer Show. *Time:* 8 AM-4 PM. *Place:* International Center. *Features:* free parking. *Talk-*

†ARRL Hamfest

in: 147.84/24 and 146.52. *Admission*: advance $2, door $3. *Tables*: $7.50 from Jim KC5MP. *Contact*: Robert Byler, KA8IIB, 5152 S Morrish Rd #50, Swartz Creek, MI 48473.

Minnesota (St Cloud)—August 14. *Sponsor*: St Cloud ARC. *Place*: Whitney Senior Center (off Hwy 10 into Sauk Rapids via Benton Dr to 9th Ave in St Cloud to Northway Dr, S of the Vo-Tech School; off I-94 to Hwy 15 to Vo-Tech School and Northway Dr). *Features*: refreshments. *Talk-in*: 146.34/94 primary and 147.615/015 secondary. *Admission*: $3, and additional ticket $2. *Contact*: SCARC, Box 141, St Cloud, MN 56302.

Missouri (St Charles)—August 28. *Sponsor*: St Charles ARC. *Time*: 6:30 AM-2:30 PM. *Place*: Blanchette Park. *Features*: dealers, flea market, forums, license exams, family activities, refreshments, handicapped parking available. *Talk-in*: 146.07/67, 146.52. *Admission*: free, flea market $2/space. *Contact*: Eric Koch, NFØQ, 2805 Westminister, St Charles, MO 63301, tel 314-946-0948.

†**Missouri (Springfield)—August 13.** *Sponsor*: South West Missouri ARC. *Time*: 9 AM-4 PM. *Features*: new equipment dealers, flea market, exams, forums, free parking, refreshments. *Talk-in*: 146.04/64. *Admission*: $5. *Contact*: Richard Sanford, Box 11363, Springfield, MO 65808, tel 417-883-9538.

†**Nevada (Reno)—August 20.** *Sponsor*: Reno Area Ham Clubs—SNARS, NARA, WADG. *Time*: 9 AM-5 PM. *Place*: go to Idle Park W of Reno, accessed via Riverside Dr runs E and W held at the California Bldg. *Features*: swap tables, VE exams, refreshments, exhibits, guest speaker Director Rod Stafford, KB6ZV. *Talk-in*: 146.01/61, 146.16/76, 147.90/30, 222.86/224.46, 444.825/449.825, 146.04/64. *Admission*: $3. *Tables*: swap tables $7. *Contact*: E. J. Silva, K7HRW, 3780 Hummingbird Dr, Reno, NV 89506, tel (D) 702-827-8450, (N) 702-972-3933.

New Brunswick (Fredericton)—August 19-21. *Sponsor*: Fredericton ARC. *Place*: University of New Brunswick Campus, Fredericton is one hour drive from the Canada-US border and I-95 at Houlton, ME. *Features*: seminars, forums, flea market, meetings and social events. *Contact*: Fredericton ARC, PO Box 3567, Fredericton, NB E3A 5J8, Canada.

†**New Jersey (Mulica Hills)—August 28.** *Sponsor*: Gloucester County ARC. *Time*: 8 AM-4 PM. *Features*: contests. *Talk-in*: 147.87/27 and 146.52. *Admission*: advance $4, door $3.50. *Contact*: Harry Spiece, NJ2B, tel 609-728-7454 or 609-589-2318.

†**New Jersey (Oakland)—August 20.** *Sponsor*: Ramapo Mountain ARC. *Time*: 8 AM-1 PM. *Place*: Route 208 N to Rte 202 S, right on Oak St to Hamfest. *Features*: refreshments. *Talk-in*: 147.49/6.49 and 146.52. *Admission*: $2, indoor vendors $7, tailgaters $5, nonhams free. *Contact*: Marc Sullivan, WA2S, 20 Gateway Ct, Waldwick, NJ 07463, tel (H) 201-652-8493, (B) 201-652-1318.

†**New Mexico (Alamogordo)—September 3-4.** *Sponsor*: Alamogordo ARC. *Place*: Civic Ctr on First St. *Features*: exhibits, swap tables, VE testing, refreshments, seminars. *Admission*: advance $5 for both days or $6 at door. *Contact*: Larry L. Moore, WA5UNO, 1830 Corte Del Ranchero, Alamogordo, NM 88310, tel 505-437-0145 also can be reached on Southwest Traffic Net on 3935 kHz and Roadrunner Traffic Net on 3939 kHz.

New York (Ithaca)—August 20. *Sponsor*: Tompkins County ARC. *Place*: 4-H Acres just off Rte 13, 5 miles NE of Ithaca. *Features*: free overnight camping, flea market, flea-market space $1, wheelchair accessible. *Talk-in*: 146.37/97, or 146.52. *Admisston*: $3, children under 12 free. *Contact*: Larry King, N2GFW, or Claudia King, N2GFX, Box 227, Etna, NY 13062, tel 607-347-4313.

†**North Carolina (Shelby)—September 3-4.** *Sponsor*: Shelby ARC. *Time*: 6 AM-5 PM Saturday, 6 AM-3 PM Sunday. *Place*: Cleveland County Fairgrounds, 3 miles E of Shelby at the intersection of NC 180 and US 74 Business East. *Features*: VE exams (Saturday), nonham activities. *Talk-in*: 146.28/88. *Admission*: advance $4, door $5. *Contact*: John Ledford, N4GOQ, 3410 Oakcrest Dr, Shelby, NC 28150, tel 704-482-4507.

†**Ohio (Marysville)—August 28.** *Sponsor*: Union County ARC. *Time*: 6 AM-6 PM. *Place*: Just off 33 bypass. *Features*: swap area, forums, license testing, refreshments. *Talk-in*: 147.99/39. *Admission*: advance $3, door $4. *Contact*: Gene Kirby, W8BJN, 13613 US 36, Marysville, OH 43040, tel 513-644-0468.

†**Ohio (Warren)—August 21.** *Sponsor*: Warren ARA. *Time*: 6 AM flea market, and 8 AM for dealers. *Place*: Kent State University, Trumbull campus, Rte 45 in Champion, Ohio. *Features*: nonham programs, refreshments, exams, special-event station W8VTD. *Talk-in*: 146.37/97. *Admission*: $2.50 until August 1; $3 thereafter *Tables*: flea-market spaces $2, other tables $6. *Contact*: Send SASE to WARA, PO Box 809, Warren, OH 44482.

†**Oklahoma (Oklahoma City)—August 5-7.** *Sponsor*: Central Oklahoma Radio Amateurs. *Time*: Friday 6 PM, Saturday and Sunday flea market 8 AM, public 9 AM. *Place*: Lincoln Plaza Hotel. *Features*: flea market, VE exams, MARS, packet radio, banquet Saturday evening, (child care will be available). *Talk-in*: 147.63/03. *Admission*: advance $7, door $8. *Contact*: John Thomason, WB5SYT, #2 East 11th, Suite 19, Edmond, OK 73034, tel 405-340-0168.

Pennsylvania (Lancaster)—August 14. *Sponsor*: Red Rose Repeater Assn. *Time*: vendors 8 AM, public 9 AM-3:30 PM. *Place*: McCaskey High School, exit Rte 30 at Hwy 23 W, drive approximately 1.3 mi and turn left onto Franklin St, and then left onto Reservoir St. *Features*: tailgating, computers, electronics, refreshments. *Talk-in*: 147.615/015. *Admission*: $4, children under 14 free with paying adult. *Contact*: Fred Hammersand, PO Box 5029, Lancaster, PA 17601, tel 717-569-1471.

Pennsylvania (Uniontown)—September 10. *Sponsor*: Uniontown ARC. *Place*: Club Grounds located on the Old Pittsburgh Rd just off Rte 51 and 119 bypass. *Features*: refreshments, free swap & shop with registration. *Talk-in*: 147.645/045 or 144.57/5.17. *Admission*: $3 each or 2 for $5. *Contact*: UARC Gabfest, c/o John T. Cermak, WB3DOD, PO Box 433, Republic, PA 15475, tel 412-246-2870.

†**Pennsylvania (West Mifflin)—August 7.** *Sponsor*: South Hills Brass Pounders and Modulators ARC. *Time*: 8:30 AM-5 PM. *Place*: Community College of Allegheny Co—south campus, Rte 885 just off Lebanon Church Rd. *Features*: dealer area, outdoor flea market, forums, VE exams, refreshments. *Talk-in*: 146.13/73, 146.52 *Admission*: $2. *Contact*: Doug Wilson, WA3ZNP, 185 Orchard Ave, Emsworth, PA 15202, tel (D) 412-338-1890, (N) 412-761-1851.

Rhode Island (West Greenwich)—August 27. *Sponsor*: Hope Valley ARA. *Time*: 8 AM-2 PM. *Place*: West View Inn, Rte 3, take I-95 to exit 5, follow Rte 102 S to Rte 3 N 1½ mi on left. *Features*: flea market, refreshments, VE exams, plenty of parking. *Talk-in*: 147.765/165 and 223.90. *Admission*: free. *Tables*: seller's fee $5 per space, bring your own tables. *Contact*: Ray Ortgiesen, KB1EM, 35 Hornet Rd, N Kingstown, RI 02852, tel 401-885-1364.

Tennessee (Lebanon)—August 28. *Sponsor*: Short Mountain Repeater Club. *Place*: Cedars of Lebanon State Park, US Hwy 231, seven mi S of Lebanon. *Features*: refreshments. *Talk-in*: 146.31/91. *Admission*: free. *Tables*: bring your own, space available on first come basis. *Contact*: Mary Alice Fanning, KA4GSB, 4936 Danby Dr, Nashville, TN 37211.

Texas (Amarillo)—August 13-14. *Sponsor*: Panhandle ARC. *Place*: Camelot Inn, 2508 I-40 E. *Features*: discount motel rates are available but you must specify "Golden Spread Hamfest"; tel 806-373-3600. *Talk-in*: 146.34/94 and 146.07/67. *Admission*: preregistration is $6 with a deadline date of Aug 11. *Tables*: $4 each, available on first come basis. *Contact*: send preregistrations to Golden Spread Hamfest, PO Box 1524, Amarillo, TX 79105-1524.

Vermont (Essex Junction)—August 13. *Sponsor*: Burlington ARC. *Place*: Champlain Valley Fairgrounds on VT Rte 15. *Features*: packet/ARES forums, contests, indoor and outdoor flea markets, free outside tailgating, indoor space available by advance arrangement. *Talk-in*: 146.34/94 or 146.01/61. *Admission*: $4 US, $5 CN. *Contact*: Bob Hall, W1DQO, General Greene Rd, Shelburne, VT 05482, tel 802-985-2235.

†**Washington (Tacoma)—August 13-14.** *Sponsor*: Radio Club of Tacoma. *Time*: Saturday 9 AM-5 PM, Sunday 9 AM-2 PM. *Place*: exit 127 off I-5 and follow signs to Pacific Lutheran University. *Features*: commercial exhibits, flea market, nonham activities, seminars, packet radio, VE testing, banquet Saturday at 6 PM for $10—cutoff date Aug 2, free parking, and much more. *Talk-in*: 147.98/38 and 222.92/224.52. *Admission*: advance $5 by July 26, door $6. *Contact*: Bill Morgan, W7GRP, 206-531-3821.

†**West Virginia (Ripley)—August 13.** *Sponsor*: Jackson County ARC. *Time*: 9 AM-4 PM. *Place*: Ripley Middle School. *Features*: VE exams, flea market, women's activities. *Talk-in*: 147.07/67. *Admission*: $3. *Contact*: Robert DeHart, N8GKJ, Rte 3, Box 229, Ripley, WV 25271, tel 304-372-2211.

Wisconsin (Rhinelander)—August 13. *Sponsor*: Rhinelander Repeater Assn. *Time*: Setup 8 AM, public 9 AM. *Place*: Rhinelander Ice Arena. *Features*: auction 1 PM, VE exams, refreshments. *Talk-in*: 146.34/94 and 144.83/145.43. *Tables*: 4 × 8-foot tables $5. *Contact*: Leonard Bauman, K9RMN, 1312 Dorothy St, Rhinelander, WI 54501, tel 715-369-3296.

Wisconsin (Green Bay)—August 13. *Sponsor*: Green Bay Mike and Key Club Inc. *Time*: vendors 6 AM, public 7 AM. *Place*: Community Service Center, 1673 Dousman St. *Features*: license testing walk-ins accepted, free parking, electronic equipment. *Talk-in*: 147.72/12 and 147.96/36. *Admission*: $1. *Tables*: 8-ft tables $5 (by reservation only). *Contact*: for tables send SASE with name, address, call and check made payable to Green Bay Mike and Key Club Inc, c/o Cathy Strommen, KD9WO, Rte 2, Box 316A, Greenleaf, WI 54126; for testing information contact Larry Siebers, KD9IA, 7077 Weyers Rd, Freedom, WI 54130, tel 414-788-3823.

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

Women's Rights Movements Celebrated by W2CDS

"Elizabeth Cady Stanton moved to Seneca Falls, NY from Boston in 1847 with her three young children; her husband Henry followed later. Accustomed in Boston to an active and stimulating city life supported by household help, Elizabeth Cady Stanton moved to a house she found inconvenient and isolated on the outskirts of the community. Unable to hire adequate assistance to manage the house and with her husband often traveling, she found her life frustrating and limiting. Mrs. Stanton poured out her discontent with women's lot on July 9, 1848, at the home of Jane Hunt in Waterloo... She saw this confinement in all aspects of women's lives—social, legal and religious. Elizabeth Cady Stanton, Lucretia Mott, Jane Hunt, Mary Ann McClintock and Martha Wright resolved to take action and called a convention to discuss women's rights. On July 19 and 20, 1848, over 300 women and men assembled at Wesleyan Chapel in Seneca Falls for the first Women's Rights Convention. This first convention to 'discuss the social, civil and religious condition and rights of woman' was the formal beginning of the women's rights movement still in progress in America today. The history of the movement and of its founders is the focus of the Women's Rights National Historical Park. Legislation establishing the park was signed on December 28, 1980. The park is in the early stages of development in Seneca Falls and Waterloo. The Elizabeth Cady Stanton home...is restored and open to the public. The Wesleyan Chapel...was purchased by the National Park Service in April 1985..."—*Brochure, Women's Rights National Park*

Lou, W2CDS, makes the first QSO on W2 Convention Days Station.

Kay Kingsford, NN2H, SEC WNY, helps to publicize the anniversary of the first women's rights convention.

Every year in July, Seneca Falls celebrates the 1848 Convention with its Convention Days. In 1987, N2ERX suggested that a special-event station would be a good way of getting word of the Women's Rights National Park and Convention Days to the rest of the country. With the help of N2FTP, contact was made with the local Convention Days Committee and representatives of the Park and Women's Hall of Fame, a related but fiscally separate organization located near the Visitors Center at the Park. With their cooperation, a special-event station, W2CDS, was set up in the Wesleyan Chapel which, prior to its purchase by the National Park Service, had been used as a laundromat. Three HF transceivers and a 2-meter station were set up. Coaxial dipoles and a vertical antenna on the roof of the building covered the bands from 80 through 10 meters. The station was operated on July 18-19 by members of the Auburn Amateur Radio Association and the Seneca County ARES.

In keeping with the focus of Convention Days, an appeal was sent out for YL Amateur Radio operators. True to the spirit of Amateur Radio, Kay Kingsford, NN2H, Marilyn Clark, WB2NYP and Marcy Kessler, WA2URE answered the call and operated the station. In an attempt to have more women operating the station, Lou, W2CDS, went on to the grounds of the Park to round up several unlicensed YLs to visit the station and participate. Only after the station had been on the air for several hours, did the participants realize that they had chosen the ideal call for the special-event station. W2 Convention Days Station made a total of 253 contacts which included 35 states and several DX stations. The QSLs which have been received will be displayed in the Visitors Center at the Women's Rights National Park. (Thanks to KC2VB and N2FTP.)

Marcy Kessler, WA2URE, takes her turn at operating W2CDS.

Even unlicensed YLs were recruited to participate in the activities of the special-event station.

Exam Info

TESTING WITHOUT YOUR PAPERS

One question within the VEC program continues to cause many candidates, Volunteer Examiners and VECs no end of grief. That question concerns testing an applicant who wants to upgrade but cannot provide the administering VEs with his/her original license and/or Certificate of Successful Completion of Examination (CSCE).

The problem comes from the FCC's "Instructions for Section II of Application Form 610, item 4A:" "Bring to the examination session and show to your administering VEs the original FCC Form 660 document of your current FCC Amateur Radio License (if you have one)." The purpose of this requirement has solid merit: VEs can then visually verify that the license copy that you provide them (and that will eventually be attached to your upgrade 610 when you pass) has not been altered from what the FCC has on record. But what if you, the applicant, don't *have* the original ticket because it was lost, submitted with another application or simply forgotten?

If you test under the ARRL/VEC program, you will still be allowed to take the test(s) that you desire even if you do not have the actual license (or CSCE, or both) in your possession.

Here's the catch, though: For whatever element(s) you pass at that session that would normally result in an upgraded license, you will be issued a CSCE that indicates *only* element credit. The VEs are instructed to fill out and sign both your Form 610 application and a second CSCE. Both items will reflect your upgraded status. They will then (1) submit both forms to the ARRL/VEC office for holding, and (2) instruct you to provide the ARRL/VEC with the missing document(s) needed to release the 610 to the FCC and the CSCE to you. *Only when you receive the upgrade CSCE may you begin exercising your newly earned privileges.* (Don't forget to use your temporary identifier; they're listed on the back of the CSCE.)

Licenses normally take five to seven weeks after the test date to be issued, but the clock for 610 applications that must be held cannot start ticking until the 610 and current license copy are actually forwarded to the FCC. Don't delay mailing any missing pieces to the VEC office.

This procedure was discussed at the 1988 VEC Conference in Arlington, Texas. Eleven of 12 VECs that attended the conference stated that they also employ this procedure. (The VECs in attendance represented 98% of the testing market, based on May 1988 FCC statistics. There are currently 18 different VECs certified by the FCC to coordinate examinations.)

Speaking of 610 applications, the FCC is spot checking Novice applications to verify that the two VEs signing the back of the form actually administered the tests and signed the applications. If you are an examiner who receives an FCC inquiry, be sure to respond promptly. The FCC is looking to head off any Novice applications that were not submitted in strict accordance with Part 97 regulations. Only those who try to work around the rules have anything to worry about!—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

W1AW Schedule

April 3-October 29, 1988 **MTWThFSSn = Days of Week** **Dy = Daily**

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300, 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300; TThSSn: 2300; S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CDT	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MDT	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PDT	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from June 1987 *QST*, pages 9 and 70" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 70.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2230 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EDT and on Saturday and Sunday from 3:30 PM to 1 AM EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on September 5.

Major reconstruction at W1AW is expected to begin soon. Some or all of the scheduled transmissions and visitor operating periods *may* be preempted at times. Check W1AW bulletins for up-to-date information.

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is given to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-square locators indicated in *italics* for each band listing. Initial qualifiers are shown first, followed by those with endorsements, for April 9, 1988 through June 10, 1988. An SASE will bring you the rules and application forms.

6 m (50 MHz)

100

293 KBØZQ
294 N5CTE
295 KA5DWI
296 KØFKJ
297 N5EPA
298 KDØSU
299 KB8ZW
300 N6CW

W1JR 300
WA1OUB 425
WA1TRE 225
K2OVS 175
N3COG 275
N4MM 375
KB4OLM 175
KA5DWE 125
N5EPA 175
W5FF 425
N5HHS 150
N5HHS/5 300
N5HYV 125
WB5ROR 200
N6CW 300
WB8YFE 250
K9HEK 200
KBØZQ 125

2 m (144 MHz)

100

236 WB4MJE
237 KA5DWI
238 W2HRW
239 KB5RF
240 W5ASH
K4HJE 125
KB5RF 125
WB9MSV 225
WØIZ 150

1¼ m (220 MHz)

50

28 KØIFL

W1JR 80

70 cm (432 MHz)

50

118 G1EHJ
119 WA4PCS
120 N5HVJ
K1FO 220
K4CAW 80
WB9QJR 70

23 cm (1296 MHz)

25

55 AA2Z
56 KF5PE

G4NBS 45
WB5AFY 50

10 GHz

5

29 WB5LUA
30 W6OYJ

Silent Keys

Administered by Nancy A. Slipski

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

N1BZW, Rupert V. Wunschel, Fairhaven, MA
W1HGA, Vernon Dameron, Sr, Brattleboro, VT
KA1HIP, Stanley I. Perry, Presque Isle, ME
W1HKF, Ernest J. Nemeth, Wallingford, CT
W1KJG, Clifton G. Parker, Lake Elmore, VT
KE1Q, Shelton W. Dudley, Jr, Guilford, CT
*W1ULE, John Hines, Cheshire, CT
WA1YUU, Charles E. McClallen, Rutland, VT
WA2ADL, Charles W. Bateman, Wayne, NJ
WB2CHV, August Heins, Greenville, NY
K2DJT, Felix P. Romero, Margate, FL
KB2EUF, William F. Nebus, South Amboy, NJ
W2KKK, William J. Lichte, Highland Lakes, NJ
*WB2QJV, Paul J. Steves, Rio Piedras, PR
K2QZU, Simon S. Spielman, Lawrence, NY
W2RZ, Joseph R. Matteson, Latham, NY
WB2YBL, James E. Young, Scotia, NY
W3AAQ, Carl S. Rumberger, North East, PA
KA3BDY, Lloyd R. Johnson, Cockeysville, MD
WA3BJQ, Helene B. Van Dyke, Philadelphia, PA
WA3ECD, John Bilinecz, Jr, Aliquippa, PA
KF3F, Benjamin H. Ferer, Meadville, PA
W3FZE, Donald D. Brink, Harrisburg, PA
W3HN, Samuel E. Newman, Chevy Chase, MD
W3KED, Albert Gilbert, Baltimore, MD
W3MHH, John R. Wadden, Manassas, VA
W3PFD, George Moore, New Brighton, PA
K4AZ, Herbert A. Nelson, Keystone Heights, FL
W4CNB, Robert Stapleton, Gainesville, FL
K4EC, Benjamin F. Borsody, Sarasota, FL
N4EVQ, Ward Wedlake, Hudson, FL
W4GD, John R. Watson, Memphis, TN
WA4GZQ, Lee Lawrence, Bradyville, TN
W4HFT, Kenneth L. Furcht, Dunnellon, FL
W4HZO, Walter C. Guise, Sr, Lighthouse Point, FL
K4IXH, Stanley L. Pierce, Waldo, FL
WD4JGO, Ferrell W. Blackburn, Warrior, AL
K4KVV, Lewis A. J. Ferrence, Sr, Lighthouse Point, FL
WA4LEX, Walter E. Walker, Nokomis, FL
WA4LLQ, Arthur W. Snow, Pembroke Pines, FL
N4PBS, Abner L. Camp, Franklin, NC
K4QJF, Hoke S. Williford, Montgomery, AL
K4YOX, Gaylord L. Jones, Orlando, FL
*WA5CGF, William C. Higdon, New Iberia, LA
WD5DNR, Leslie G. Rozell, Houston, TX
WD5GCV, William Dunne, Evadale, TX
W5GPZ, Harold S. Windle, Hobbs, NM
W5HLC, Theodore L. Van Pelt, Canutillo, TX
W5JNR, Phillip D. Brady, McComb, MS
KB5LL, Herman E. Haile, Clovis, NM
KC5OS, Henry A. Zerby, Sulphur, LA
N5QQ, Robert L. Robertson, Medford, OR
WB5ZCP, John B. Temple, Lufkin, TX
WD6AWE, Dan Geisinger, Long Beach, CA
K6DFR, Edward L. Miller, Yuba City, CA
W6ECI, James A. Friend, Fair Oaks, CA
K6EY, Adolph J. Schneider, San Francisco, CA
W6EZA, John F. Benn, Castro Valley, CA
WA6HVZ, Nolan S. Beauchamp, Lake Oswego, OR
W6KYJ, Everette H. Vaughan, Las Vegas, NV
*K6MBV, Michael Young, Oakland, CA
WB6MDJ, Richard Dekofsky, Los Angeles, CA
W6OGZ, Carl W. Service, Corona Del Mar, CA
WA6PHQ, Elbert B. Singleton, San Diego, CA
W6PJW, LeRoy A. Bellwood, Lemon Grove, CA
W6QHC, John C. Ritter, San Luis Obispo, CA
WA6RKN, Harlan R. Avakian, Lawrenceville, GA
K6UDK, William A. Pollard, Sacramento, CA
WA6VHZ, Sidney Michaelson, Los Angeles, CA
W6ZSA, Nathan X. Herman, Los Angeles, CA
N7AGF, John E. Wilkinson, Las Vegas, NV
WA7BQN, Earl R. Carroll, Casper, WY
W7GYA, E. L. McCauley, Clatskanie, OR
*W7JMN, Dewaine C. Hardin, Ely, NV
W7KWR, William L. Shields, Sr, Thermopolis, WY
KQ7L, Bernard D. Pollock, Aloha, OR
NC7R, R. L. Beach, Vashon, WA
W7RU, Kenneth M. Polson, Williams, AZ
WA7YOI, Priscilla B. Righter, Bellingham, WA
K8AQS, Robert W. Vail, Newbury, OH
W8BGI, Harold Kelley, Deerfield, OH
KB8CQR, Harold A. Miller, Coshocton, OH
W8CTN, Arnold Kincaid, Rocky River, OH
K8DF, Darrel Furner, Wolf Summit, WV
W8FIW, William V. Moersch, Silver Spring, FL
N8FQP, Ralph D. Urbach, Youngstown, OH
K8IDX, Franklin D. Mitchell, Sebring, FL
K8JTZ, Clarence S. Ragland, Milford, OH
W8LUU, James J. Laky, Lorain, OH
WA8LVD, William D. White, Proctor, WV
W8NKR, William John Engel, Davison, MI
W8NZS, Howard A. Jonard, Southport, NC
K8QFG, Harry N. Miller, Charleston, WV
W8QHB, William J. Volke, Vanderbilt, MI
WA8YLO, Wayne L. Pletcher, Vestaburg, MI
KQ9B, Ray Yoder, Elkhart, IN
WB9BZG, Alfred J. Strong, Zionsville, IN
K9CKG, Edward J. Davis, Chicago, IL
W9HCH, Edwin Tarman, New Paris, IN
WB9HIP, Joe H. Harmon, Jr, Pleasanton, CA
K9JGT, William E. Thompson, Milwaukee, WI
W9KQK, Lorraine P. Place, O'Fallon, IL
W9LQ, Leslie M. DeVoe, Indianapolis, IN
W9OEY, Albert W. Carey, Richmond, IN
WA9RLH, Kenneth L. Mosher, Lewistown, IL
W9TZY, Sylvester Scovall, Alton, IL
W9YGY, Ralph H. Boswell, Mequon, WI
WDØCLC, Roy E. Meyer, Pueblo, CO
WBØEGD, Robert R. Kendall, Waterloo, IA
NØFJB, Helen R. Bogear, Junction City, KS
KØGGM, Robert E. Taylor, Wichita, KS
WØPQW, Paul D. Carufel, Detroit Lakes, MN
KAØWJJ, Guy H. Fritze, Rapid City, SD
G3IFM, Fred Mellon, St Marys, NSW, Australia
S79WHW, William H. Whitworth, Mahe, Seychelles
XE2CZ, Javier Rodriguez Zozaya, Monterrey, Mexico
XE2FH, Medardo Buentello Garza, Monterrey, Mexico
XE2VD, Mario Villarreal Trevino, Monterrey, Mexico
ZS1J, W. H. D. Lucas, Plettenberg Bay, South Africa

*Life Member, ARRL

Notes: 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*.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111.

50 Years Ago

August, 1938

☐ Newer tubes—e.g., the 6K8, 6K7 and 6C8G—permit superhet performance at a regenerative price, as in this month's feature unit by George Grammer, designed with portable and emergency work especially in mind.

☐ Editor Warner drives home the point that 7200-7300 kc. is fully amateur-authorized in this hemisphere, and he cautions any of us who might be concerned about interference to U.S. short-wave listeners seeking European broadcast programs. "Let them squawk their bloody heads off," he says in advising us to continue full use of the segment. "Whose band is it, anyway?!"

☐ A pair of HF100s puts out a hefty signal for W2KPX on 28 and 56 Mc., giving him a taste of two almost totally-different kinds of ham operation.

☐ For heroic work during the Ohio River floods, from his QTH in Harrisburg, Illinois, W9MWC, was chosen winner of the 1938 William S. Paley Award, given annually by the president of the Columbia Broadcasting System. Bob Anderson, W9MWC, ferried his gear in a rowboat 23 miles on a raging river to provide a neighboring town with vital communications.

☐ Five meters does it every May and June, but never so much as this past summer—three and a half pages of *QST* are necessary to chronicle nationwide openings, with some contacts in excess of 1500 miles.

☐ W2NB compares the W8JK beam with a double-Zepp plus reflector, and finds the latter with considerably more directivity—if you can afford the space.

☐ The new Maxim Memorial Station, W1AW, will be in operation shortly, and Communications Manager F. E. Handy extends a cordial invitation to stop by Newington, Conn., for a visit during your next vacation trip east.

☐ VE2KX and W9JID independently came up with new versions of the electron-coupled oscillator circuit, in both cases achieving improved stability through frequency-generator isolation, with two tubes in a sort of push-pull arrangement.

☐ F.C.C. has decreed that we may use any amateur band above 28 Mc. mobile on the high seas—anywhere except in foreign waters. The Commission also announces that amateur station licenses now total 49,600—up from 47,444 a year ago.

25 Years Ago

August, 1963

☐ "We move," is the editorial headline, and all amateurs are invited to visit the new League Headquarters building in Newington, Conn., on the W1AW property—itself brand-new just 25 years ago.

☐ W6PZV built his mobile sideband rig for 7 Mc. alone, not only conserving space (over a multiband unit) but simplifying tuning adjustment as well.

☐ Both electrical and mechanical stability were major considerations in W3TXF's v.f.o. for his 56-Mc. rig, so he doesn't have to "hold his breath" to keep it on frequency.

☐ Bits of plastic and tin cans comprise two lever assemblies W9UZS mounted under his standard bug to give him "finger keying"—or a no-cost actuator for electronic keyers.

☐ Third-party traffic authorization with 4U1ITU at the amateur club of the International Telecommunications Union has been extended through the end of the year.

☐ "Basics for Beginners" starts a new *QST* series aimed at the newcomer with no previous experience beyond turning the knobs of a broadcast or TV receiver. The first installment unravels the mysteries in reading circuit diagrams.

☐ A "must" instrument for the Novice shack is an absorption-type wavemeter, according to W1ICP, who presents a neat and simple design along with calibration information.

☐ W3JNM, Engineer in Charge of the Laurel (Maryland) FCC monitoring station, describes the unit's many responsibilities and activities in policing all radio activity to ensure compliance with regulations.

☐ The League has asked the Federal Communications Commission to reconsider its proposed license fees for amateurs. The ARRL also has filed strong opposition to the proposal of the International Crystal Co. for a no-exam amateur license for operation on portions of 10 meters.

☐ Nearly 10,000 League members have now contributed to the fund drive to finance the cost of the new Headquarters facilities—*W1RW*

Rules, September VHF QSO Party

Rules

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, Sep 10, and ends at 0300 UTC Monday, Sep 12.

3) **Categories**

(A) Single operator: One person performs all operating and logging functions.

(1) *Multiband.*

(2) *Single band:* Single-band entries on 50, 144, 220, 432, 902, 1296 and 2304-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(3) *QRP portable:* Run 10 W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: W1AW in Newington, CT would send FN31. Exchange of signal report is optional.

5) **Scoring**

(A) *QSO points:* Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count three points for each 902- or 1296-MHz QSO. Count four points for each 2.3-GHz-or-higher QSO.

(B) *Multiplier:* The total number of different grid squares worked *per band.* Each 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) *Final score:* Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

6) **Use of FM**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the ARRL *Repeater Directory* may be used for contest purposes.

7) **Miscellaneous**

(A) *Stations may be worked for credit only once per band from any given grid square, regardless of mode.* This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to waive rule 7(C) and use a single different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) 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 the 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.

(D) Only one signal per band (6, 2, 1¼, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) 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.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(I) Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the score listings and compete separately for awards.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest (Oct 12, 1988). No late entries can be accepted.

9) **Awards**

(A) Single operator

(1) Top single operator in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL Section where significant effort or competition is evident. (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 WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader *and* endorsement stickers for 50 and 220 MHz.

(3) Top single-operator QRP *portable* multiband and single-band score in each ARRL Section where significant effort or competition is evident.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evident. Multioperator entries are *not* eligible for single-band awards.

10) **Condition of Entry:** Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

11) **Disqualifications:** See Jan 1988 *QST*, p 86.

VHF-UHF-EME LOG

log sheet 1 of 2

CALL USED WA1KJU/9

ARRL SECTION or COUNTRY WI EN53

50 QSOs per side
Number each new multiplier as worked

FREQ.	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE SENT	COMPLETE EXCHANGE RCVD	LIST NEW MULTIPLIERS	POINTS
144	A3	9/10/88 2049	K9HMB	EN53	EN59	EN52 1	1
		50	WA9QCO		EN51	EN51 2	
		52	WD9AYR		EN51		
		53	W9XA		EN51		
		54	WD9EIX		EN61	EN61 3	
		56	N9EBF		EN52		
		56	WA9OKA		EN63	EN63 4	
		2054	KI9Q		EN62	EN62 5	
		9/11/88 2103	KA9SPC		EN53		
		9/11/88 0125	KØVM		EN42	EN42 6	
		39	WAØTAQ/9		EN61		
		46	N3EML/9		EN62		
		48	N9EMC		EN52		
		49	W9YCV		EN52		
		0150	WBØISK		EM79	EM79 7	

Properly completed sample log sheet.

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (×1)	25	10
144	40 (×1)	40	20
220	10 (×2)	20	5
432	15 (×2)	30	10
1296	6 (×3)	18	3
Totals	96	133	48

Final score = (QSO points) × (total no. grid squares): (6384 = 133 × 48).

Contest Corral

Conducted By Mark R. Burke, KA1MIS
Contest Assistant, ARRL

AUGUST

2

West Coast Qualifying Run, 10-35 WPM, at 0400Z Aug 3 (9 PM PDT, Aug 2). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

6-7

ARRL UHF Contest, Jul *QST*, p 92.

YL/OM Summer SSB Sprint, sponsored by the Young Ladies' Radio League, Inc, 1800-2200Z Aug 6. Open to all licensed OM's and YLs. No crossband operation. Net/repeater contacts do not count. Stations may be worked and counted once per band. Suggested frequencies: 3.940-3.970; 7.240-7.270; 14.250-14.280; 21.380-21.410; 28.580-28.610. Maximum power output: 1500 W PEP. Exchange: Station worked, RS, name, and state/province/country. Entries in log must also show date/time/band/power. Scoring: YLs count only OMs; OMs count only YLs for QSO pts. Stations may be worked once on each band. Total contacts in each band, then add together for total QSO points. Alphanumeric multiplier: Using the last number and the first letter following that number of a call sign; there are a total of 260 combinations possible, ie, a possibility of 26 letters with each of 10 numbers 1-0. W1XZ is a 1X, W2GLB/7 is a 2G, and 9Y4A is a 4A, etc. Add the number of different alphanumeric combinations worked on each band. Add the total for each band together for your alphanumeric multiplier. Low power multiplier: Power output of 200 W PEP, or less at all times, may multiply results by 1.5 (low power multiplier). Total score: total QSO points × alphanumeric multiplier × low power multiplier (if applicable). Certificates will be awarded to the three highest scoring OMs and YLs. Top scoring OM and YL from each district/province/country will receive certificates (must show at least 10 valid contacts on the log). Please print or type logs. No carbon copies accepted. No logs will be returned. All logs must have claimed score, signature and state/province/country of operator. Logs must be received by Sep 6. Mail to YLRL Vice President, Carol Shrader, WI4K, 4774 Thoroughgood Dr, Virginia Beach, VA 23455.

YO DX Contest, sponsored by the Romanian AR Federation, from 2000Z Aug 6 until 1600Z Aug 7. 80- 40- 20- 15- 10-meters, phone and CW. No crossmode QSOs. Classes: Single operator, single band; single operator, multiband; multioperator, multiband. Exchange signal report and ITU zone. YO stations will send two letters indicating their county. Count 2 points per QSO with own continent, 4 points for different continent and 8 points for YO stations. Multiply by sum of YO counties and ITU zones worked per band. Mail entries by Sep 3 to RARF, PO Box 05-50, R-76100 Bucharest, Romania.

Ten-Ten International Net Summer Phone QSO Party, sponsored by the Ten-Ten International Net, from 0000Z Aug 6 until 2400Z Aug 7. Open to all amateurs but only paid-up 10-10 members are eligible for awards. Single operator only. SSB, AM or FM only. Work stations once on 10 meters only. Contacts must be in the phone sub band. Exchange call, name, state and 10-10 number (if member). Count 2 points for each QSO with a member, count 1 point for each QSO with non-member. Final score is total QSO points. Awards. Send logs along with cover sheet and dupe sheet before Sep 1 to City of Lights Chapter, c/o Jerry Frieders, W9ZGP, 1501 Molitor Rd, Aurora, IL 60505.

New York State QSO Party, sponsored by the Salt City DX Assn, from 1600Z Aug 6 to 1600Z Aug 7. New York stations may contact any station; out-of-state stations may contact New York state stations only. 160-10 meters (excluding WARC bands). Contacts of twice per band (1 CW and 1 SSB) permitted. Recommended frequencies include 1815 and 40 kHz up from bottom of all other bands on CW, and phone—1.880 3.880 7.280 14.280 21.380 28.580. Exchange: New York state stations send RS(T) and county. Others send RS(T) and county/state/province/country. A valid exchange requires confirmation of receipt of all information in both directions. NYS portable or mobile stations changing their location during contest may be contacted as if they were a different station in each new county they operate from, that is, both QSO points and multiplier credit apply. Scoring: All stations count one point per 2-way SSB QSO and two points per 2-way CW QSO. Multiply total QSO points by total multipliers (independent of band). For NYS stations, the multiplier is the sum of NY counties, other US states, Canadian provinces and other DXCC countries. NYS mobile stations multiply total valid QSOs by the sum of multipliers earned at each different county of operation. All others, sum of all NYS counties worked (maximum of 62). Certificates to highest-scoring single-op and New York State club operating from a rare NY county, and to the highest-scoring NYS mobile station. Send logs by Sep 27 and SASE for results to Bud Hippisley, K2KIR, RD1 Box 27A, Verona, NY 13478.

13-14

European DX Contest, CW, sponsored by the Deutscher ARC, from 1200Z Aug 13 until 2400Z Aug 14. (Phone contest, Sep 10-11; RTTY contest, Nov 12-13). Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry Classes: Single operator, all band; Single operator, High band (14, 21, 28 MHz only); Multioperator, Single transmitter; SWL. Stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single operators may operate a maximum of 30 hours. The 6 hours of off-time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band. European Country list: C31 CT1 CU EA EA6 EI F G GD GI GJ GM GM-Shetland GU GW HA HB HBØ HV I IS IT JW-Bear JW-Spitsbergen JX LA LX LZ OE OH OHØ OJØ OK ON OY OZ PA SM SP SV SV5-Rhodes SV9-Crete SY-Athos T7 TA1 TF TK UA-1346 UA2/UZ2F UA1-Franz Josef Land UB UC UN/UA1N/UZ1N UO UP UQ UR Y2 YO YU ZA ZB2 1AØ 3A 4U1-Geneva 4U1-Vienna 9H1. The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1307/DA1AA/431). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the orginal QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Deadlines: CW—Sep 15; (Phone—Oct 15; RTTY—Dec 15). Mail to WAEDC-Committee, PO Box 1328, D-8950 Kaufbeuren, Fed Rep of Germany.

14

W1AW Qualifying Run, 10-35 WPM at 0200Z Aug 15 (10 PM EDT, Aug 14). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug 2 listing for more details.

QRP ARCI Summer Daze Sprint, sponsored by QRP ARC International, from 2000Z Aug 14 until 2400Z Aug 14. Phone only. Work stations once per band. Exchange signal report, state/province/country and QRP number if member. Nonmembers send power output. Suggested frequencies: 1.885 3.985 7.285 14.285 21.385 28.385 28.885 50.885. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. Multiply QSO points by states/provinces/countries worked per band by power multiplier (8-10 W output ×2; 6-8 W output ×4; 4-6 W output ×6; 2-4 W output ×8; 0-2 W output ×10). More than 10 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Include a description of equipment with entry. Awards. Mail entry before 30 days after end of contest to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surryse Rd, Lake Zurich, IL 60047.

20-21

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 102.

KCJ Single-Operator CW Contest, sponsored by the Keyman's Club of Japan, from 1200Z Aug 20 until 1159 Aug 21. Single operator, CW, multiband only. No cross-mode, cross-band, repeater or satellite contacts, or contacts with multioperator or non-JA stations. Work stations once per band. Exchange: JA stations send RST and two-character prefecture code; others, RST and two-character continent code (AF, AS, EU, NA, OC or SA). Count two points per JA QSO. Multiply by total number of JA prefectures (47 max) and districts in Hokkaido (JA8) (14 max) in each band. Log should indicate time in UTC, call sign and exchange with multipliers clearly marked. Be sure to include a summary sheet and separate sheet for each band. Mail entry by Sep 31 to Yasuo Taneda, JA1DD, Gyoda Cho 3-9-2-102, Funabashi City, Chiba, 273, Japan.

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug 20 until 0700Z Aug 21 and from 1300Z Aug 21 until 0200Z Aug 22. Phone and CW are considered the same contest. Work stations once per band and mode. CW QSOs in the CW subbands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH (county for NJ station, ARRL Section or country for others). Suggested frequencies: CW—1.810 3.535 7.035 7.135 14.035 21.135 28.135 MHz; Phone—3.950 7.235 14.285 21.355 28.400 50-50.5 144-146 MHz. Suggested activity schedule: phone on the even hours; 15 and 10 meters on the odd hours, 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/VE QSO and 3 points for DX (include KP4, KH6 and KL7). Multiply by the number of ARRL Sections worked (including NNJ and SNJ). Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max 21) worked. Awards. Include an SASE for results and mail logs to be received by Sep 17 to EARA, PO Box 528, Englewood, NJ 07631-0528.

SARTG World Wide RTTY Contest, sponsored by the Scandinavian Amateur Radio Teleprinter Group, 0000Z-0800Z Aug 20, 1600Z-2400Z Aug 20 and 0800Z-1600Z Aug 21. No crossmode QSOs. Bands are 3.5, 7, 14, 21 and 28. Classes: A—single operator; B—multioperator, single transmitter; C—SWL. Exchange RST and QSO number. Work stations once per band. Count 5 points per QSO with own country; 10 points per QSO with different country, same continent; 15 points per QSO with different continent. W/K, VE, VK call areas are considered separate countries. Multipliers are DXCC countries plus call areas in W/K, VE and VK. Final score is total QSO points times total multipliers. Awards. Send summary sheet and separate sheet per band to be received by Oct 10 to Jorgen Dudahl-Lasjon, OZ1CRL, Egebjergvej 90, DK 4500 Nykobing Sj, Denmark.

23

W1AW Qualifying Run, 10-35 WPM, at 2000Z Aug 23 (4 PM EDT, Aug 23). See Aug 14 listing for more details.

27-28

All Asian DX Contest, CW, sponsored by the Japan Amateur Radio League, from 0000Z Aug 27 until 2400Z Aug 28. 160-80-40-20-15-10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No cross signal at any given

(continued on page 103)

Rules, 1988 CRRL Can-Am Contest

Phone: Sep 17, 1988 1800Z-Sep 18, 1800Z. CW: Sep 24, 1988 1800Z-Sep 25, 1800Z. Full 24-hour periods for all categories.

Object: Sponsored by the Canadian Radio Relay League to increase the friendship between Canadian and American amateurs and to provide a means of measuring operating skills and equipment performance.

Categories of Competition

1) *Single Operator* (must be operated by the station licensee).

A) *All Band*

B) *Single band:* Any band can be selected for the single band category. All single-band entries will be judged in one category. It is up to the contestant to select the band that can bring him or her the highest score.

C) *QRP:* A maximum of 10 watts input is allowed for use during the duration of the contest.

2) *Multioperator, single transmitter:* stations operated by more than one operator or a single operator other than the licensee, or a club station.

Bands: 1.8, 3.5, 7, 14, 21 and 28 MHz. US General portion of the bands is recommended for use.

Exchange: Signal report (RS/RST), serial number starting with 001, and multiplier area (MX) abbreviation (ie 59001CT, 599021NY). Multiplier-area abbreviations are the usual two-letter postal abbreviations for the 50 US states, CN for Caribbean (KC4, KG4, KP1, KP2, KP4, KS4, KV4 and their A-, N-, and W-prefix equivalents), PC for Pacific (rest of US possessions and Antarctica). Canadians will use: NL—VO1, VO2; NB—VE1 New Brunswick; NS—Nova Scotia; PE—Prince Edward Island; SI—Sable and St Paul Islands; PQ—VE2; ON—VE3; MB—VE4; SK—VE5; AB—VE6; BC—VE7; NW—VE8; YK—VY1 Yukon.

Multipliers: 50 US states, 2 US possessions (Caribbean, Pacific), 10 Canadian provinces, 2 territories (NWT, YK), 1 island (Sable, St Paul). Maximum 65 multipliers per band. Maximum possible on all 6 bands is 390.

QSO Points: 1) US-to-US, Canadian-to-Canadian contacts count for 1 point on phone and 2 points on CW; US-to-Canadian (and vice versa) contacts count for 2 points on phone and 3 points on CW. The same station may be contacted once on each band and mode.

Scoring: The final score is the sum of the total QSO points from all bands, multiplied by the sum of the multipliers from all bands. Phone and CW sections of the contest are considered separate contests. However, combined score for phone and CW will be used for overall competition. Combined score will be calculated by the contest committee as a result of the addition of phone and CW scores.

Awards: Certificates will be awarded in each multiplier area on both modes in single-operator categories. Top five multioperator stations in each country will receive certificates for high combined phone and CW scores. Where appropriate, the Contest Committee will award additional awards. All scores will be published in *QST*.

Trophies (and Sponsors)

Single operator, Combined—Canadian Champion (ARRL)
Single operator, Combined—American Champion (CRRL)
Multioperator, Combined—Canadian Champion (Albuquerque DX Assn)
Multioperator, Combined—American Champion (*Radiosporting* Magazine)

The trophies will be awarded at the Dayton HamVention®. Log Instructions: All times must be kept in UTC. Indicate multipliers the first time only on each band. Log must be checked for duplicate contacts, correct QSO points and multipliers. Do not use separate logs for each band. Rest periods must be clearly marked in the log. Each entry will consist of log sheets, summary sheets and signed declaration. Entries over 200 QSOs must include check sheets for each band. Official log, check sheets and summary sheets with multiplier tables are available from the Contest Chairman. A large SASE with Canadian stamps (or US stamps not glued to the envelope) will bring samples. Contestants are encouraged to use them as they greatly help with processing of entries.

Disqualification: Violation of national Amateur Radio regulations or rules of the contest, unsportsmanlike conduct, poor signal quality, taking credit for excessive (more than 2%) duplicate contacts or unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. Each incorrectly logged call or exchange will cause the contact to be deleted from the log. Actions and decisions of the Can-Am Contest Committee are official and final.

Deadline: All entries must be postmarked not later than 30 days after the contest and mailed to: CRRL Can-Am Contest, VE3BMV/W2, PO Box 282, Pine Brook, NJ 07058.

Contest Corral

(continued from page 102)

time. Multiops may have a maximum of one signal per band. Exchange signal report and a two-digit number denoting the operator's age. YL stations may end 00. Count 1 point per QSO with Asian stations on 7 through 28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by the number of different Asian prefixes (WPX Rules) worked per band. Note: JD1 stations only on Ogasawara count for Asia. Use separate logs for each band. Mark multipliers the first time worked. Provide a complete summary. JARL Asian Countries list: A4 A5 A6 A7 A9 AP BV BY EP HL/HM HS HZ/7Z JA-JS/7J JD1 JT JY OD S2 TA UA/UN/UV/UW-UZ/RA/RN/RV-RW/RZ9-0 UD UF UG UH UI UJ UL UM V85 VS9M/8Q VU XU XV 3W XW XX9 XZ YA YI YK ZC4 5B4 1S 4S 4W 4X/4Z 7O 9K 9M2 9N 9V and Abu Ail. Enclose SAE and IRC for results. Mail logs to arrive by Sep 30 to JARL, POB 377, Tokyo Central, Japan.

GARTG World-Wide RTTY Contest, part 3, sponsored by the German AR Teleprinter Group. VHF portion is from 1200Z-1600Z Aug 27. HF portion is from 0700Z-1100Z Aug 28. Score HF and VHF portions separately. VHF frequencies are 144, 432 and 1296 MHz; HF bands are 80 and 40 meters. No repeater QSOs. Exchange RST, QSO number, name and QTH; VHF add grid locator. Work each station once per band. Count 1 point per QSO for HF. Count 1 point on 144 MHz, 2 points on 432 MHz and 3 points on 1296 MHz per kilometer worked. Total of QSO points is the final score. Classes: A—more than 200-W output; B—less than 200-W output; C—SWL; D—VHF. Logs must include all information. Mail to be received within 20 days to Wolfgang Punjer, DL8VX, PO Box 90 11 30, D-2100 Hamburg 90, Fed Rep of Germany.

31

West Coast Qualifying Run, 10-35 WPM, at 0200Z Sep 1 (9 PM PDT Aug 31). See Aug 2 listing for more details.

SEPTEMBER

4

LZ-DX Contest, sponsored by the Bulgarian Federation of Radio Amateurs, from 0000Z-2400Z Sep 4. CW only. Work stations once per band. Entry classes: A—single op, multiband; B—single op, single band; C—multiop, all band, single transmitter; D—SWL. Exchange signal report and ITU zone. Suggested frequencies: 3.510-3.560 7.000-7.040 14.000-14.060 21.000-21.080 28.000-28.100 MHz. Count six points per QSO with LZ stations, one point per QSO with stations on the same continent (including the same country) and three points per QSO with stations on other continents. Multiply by the sum of different ITU zones worked per band for final score. Mail logs within 30 days to Central Radio Club, PO Box 830, Sofia 1000, Bulgaria, Europe.

10-11

European DX-Contest, Phone, see Aug 13 listing.

10-12

ARRL VHF QSO Party, this issue, p 101.

11

North American Sprint, CW, sponsored by the National Contest Journal, from 0000Z to 0400Z Sep 11 (SSB Sprint Sep 18). Single operator only. No helpers or spotting nets. No cross-mode. Suggested frequencies: CW— 3.540 7.040 14.040; phone—3.900 7.225 14.280. Work same station once per band. For exchange, send other stations call/your call/your serial number/name/location (state/province/country). Only valid 2-way contacts count and logging must begin with serial number one (001). Scoring: Multiply total valid contacts by the sum of the states/provinces/NA countries to get final score (do not count USA or VE as countries). KH6 is neither state nor country. The eight VE multipliers are Maritime (VE1, VO1 and VO2), VE2-7, and Yukon-NWT (VY1 and VE8). Non-North American countries do not count. Send CW logs to Trey Garlough, WN4KKN, 7609 Hardy Dr, Austin, TX 78757. Send phone logs to Rick Niswander, K7GM, 910 West Claremont, Phoenix, AZ 85013. Send summary, logs, dupe sheets no later than 30 days after Sprint.

12

W1AW Qualifying Run, 10-35 WPM, at 0200Z Sep 13 (10 PM EDT Sep 12). See Aug 14 listing for more details.

17-18

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 102.

Can-Am Contest, Phone, this page.

18

North American Sprint, SSB, see Sep 11 listing.

21

W1AW Qualifying Run, 10-35 WPM, at 1300Z Sep 21 (9 AM EDT Sep 21). See Aug 14 listing for more details.

24-25

Can-Am Contest, CW, this page.

CQ World Wide RTTY DX Contest

Steel City All Mode 10-Meter QSO Party

25-26

Fall Classic and Homebrew Radio Exchange

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **September 1** to make the **November** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Mark R. Burke, KA1MIS
Contest Assistant, ARRL

Poole, England: The Royal National Lifeboats Institution will operate GB2RNL **Jul 30-31** for the benefit of the RNLI. Suggested frequencies: phone—3.750 14.250 21.250 28.500; CW—3.550 7.025 14.075 21.075 28.075. For QSL, send SASE/IRCs to Malcolm A. Williamson, GØRGA, 21 King Alfred Ave, Bellingham, London SE6 3HT, England.

Smith Island, Maryland: The Nanticoke ARC will operate KW3Z from 1800Z **Aug 5** until 1800Z **Aug 7.** Suggested frequencies: CW—40 kHz up from the bottom of the 80- through 10-meter bands; phone—3.860 7.260 14.260 21.360 28.460. For QSL, send QSL and SASE to Joseph H Gardner, K3TLG, 106 Rivershore Dr, Seaford, DE 19973.

Golden Pond, Kentucky: The Paducah ARA will operate W4NJA **Aug 6** during the "Moonshine of Land Between the Lakes" demonstration. Suggested frequencies: phone—7.250 14.325 21.400 24.950 28.400 50.110 144.200; CW—7.125 14.150. For commemorative certificate, send QSL and SASE to N4FFO, 229 Nickell Hts, Paducah, KY 42003.

Easton, Maryland: The Easton ARS will operate WA3GUI **Aug 6-7,** 1400Z-2000Z each day, from the showgrounds of the Eastern Shore Threshermen Collectors Assn. Suggested frequencies: 3.900 14.250. For certificate, send QSL and SASE to Bob Roberts Jr, K3ONU, PO Box 781, Easton, MD 21601.

Twinsburg, Ohio: The Cuyahoga ARS will operate K8ZFR, N8HHG and WB8N **Aug 6-7** from the Twins Day Festival. Suggested frequencies: CW—the lower portion of the General 80, 40, and 20-meter bands; phone—7.230 14.245 28.450 146.22/82. For QSL, send QSL and SASE to Paul Buescher, 1752 Stone Creek Ln, Twinsburg, OH 44087.

Warminster, Pennsylvania: The Warminster ARC will operate WA3DFU **Aug 6-7,** 1400Z-2200Z each day, to commemorate the 100th anniversary of Revolving Door Day. Suggested frequencies: 3.885 7.260 14.260 21.335 28.335 146.550. For certificate, send QSL and SASE to WARC, 136 DeHaven Ave, Penndel, PA 19047.

Hackensack, New Jersey: The Bergen ARA will operate NK2K **Aug 11-14,** 1400Z-2000Z each day, to commemorate the 25th Anniversary of BARA. Operation will be the General portion of the 80- through 10-meter bands. For certificate, send QSL and 9- × 12-in SASE to Warren P. Hager, K2UFM, 31 Forest Dr, Hillsdale, NJ 07642.

Mount Vernon, Ohio: The Mount Vernon ARC will operate K8EEN from 2300Z **Aug 12** until 2000Z **Aug 13** in conjunction with the Dixie Days celebration. Suggested frequencies: 3.860 7.230 14.260 28.485. For certificate, send QSL and SASE to Michael W. White, KC8UZ, 5802 White Rd, Centerburg, OH 43011.

Scottsbluff, Nebraska: The Tri-City RAC will operate WØVQN **Aug 12-20** to celebrate the Centennial of Scotts Bluff County and the Centennial of the Scotts Bluff County Fair. Suggested frequencies: CW—30 kHz above all HF band edges; SSB—3.875 7.242 14.235 21.335 28.335. For QSL and certificate, send SASE to Tri-City RAC, PO Box 925, Scottsbluff, NE 69363-0925.

Alvarado, Texas: The Johnson Co ARC will operate N5DYU **Aug 13** during the Johnson County's 96th "Pioneers and Old Settlers Reunion." Suggested frequencies: CW—30 kHz up from the bottom of the 80- through 10-meter bands; phone—lower portion of the General 80- through 10-meter bands; Novice—28.395. For certificate, send large SASE to Sally Messick, KB5CEE, PO Box 434, Cleburne, TX 76031.

Anchorage, Alaska: The Anchorage ARC will operate KL7AA **Aug 13** during the Run for the Special Olympic Mileage Event. Suggested frequencies: CW—3.510-3.535 7.010-7.035 14.010-14.035 21.010-21.035 28.050-28.150; SSB—3.760-3.875 7.175-7.230 14.150-14.250 21.250-21.320 28.310-28.400. For QSL, send QSL and SASE to John Bierman, KL7GNP, 4304 Garfield, Anchorage, AK 99503 or via the Bureau.

Somerset, Pennsylvania: The Somerset Co ARC will operate NI3D from 1700Z **Aug 13** until 1900Z **Aug 14** from the top of Mount Davis. Operation will be the lower 25 kHz of the General phone bands. For special QSL, send SASE to Ernest Gelpi, NI3D, RD 2, Box 71, Somerset, PA 15501.

Catalina Island, California: The BSA Troop 485 will operate K1EQA/6 **Aug 14-19** from Summer Camp. Operation will be 80- through 10-meter phone. For special QSL, send QSL and standard-size SASE to Troop 485, K1EQA, 28910 Calabria Dr, Agoura Hills, CA 91301.

Warren, Ohio: The Warren ARA will operate W8VTD **Aug 14-21** in honor of the club's 50th anniversary. Operation will be on all SSB and CW bands. Suggested frequencies for Aug 21: 14.250 21.350 28.450. For QSL, send SASE to WARA, PO Box 809, Warren, OH 44482.

Culzean Castle, Scotland: The Mid Lanark ARS will operate GB2NTS **Aug 20-21** to commemorate the 200th Anniversary of the Death of Prince Charles Edward Stuart. For certificate, send QSL to GM3MTH, 9 Ramsey Pl, Old Monkland, Coatbridge, Lanarkshire ML5 5RE, Scotland.

Arlington, Virginia: The National Communications System will operate N2CCY 1300Z-2300Z **Aug 21** to commemorate the 25th Anniversary of the NCS. Operation will be 25 kHz up from the bottom of the General 80- through 10-meter phone and CW bands, packet and RTTY, and FM on 146.400 and 223.400. For special commemorative QSL, send QSL to Dale Stauffer, N2CCY, National Communications System, 8th and South Courthouse Rd, Arlington, VA 22204.

Indianapolis, Indiana: The Legion of Indianapolis DXers will operate KA9OIH 1500Z-2200Z **Aug 20** and 1700Z-2200Z **Aug 21** to commemorate the opening of a new addition to the world's largest children's museum. Suggested frequencies: 3.988 7.288 14.288 21.388 28.388. For certificate, send QSL and 9- × 12-in SASE to Ham Radio Exhibit, c/o Renee Henry, Indianapolis Children's Museum, PO Box 3000, Indianapolis, IN 46206.

Mason City, Iowa: The North Iowa ARC will operate WØQZP **Aug 20-21** commemorating the famous puppeteer, Bil Baird. Suggested frequencies: 7.235 14.235. For special certificate, send QSL and no. 10 SASE to WØQZP, 2911 N Carolina Ave, Mason City, IA 50401.

Winchester, Virginia: The Shenandoah Valley ARC will operate W4RKC from 1300Z **Aug 20** until 1900Z **Aug 21** to commemorate the 40th anniversary of the club. Operation will be 80- through 10-meter CW and SSB and 2-meter FM. For special QSL, send QSL and SASE to SVARC, c/o George A. Stein, NJ3H, PO Box 139, Winchester, VA 22601.

Littleton, Colorado: The Arapahoe RC will operate several stations 1600Z-1800Z **Aug 21** for the annual Fourteeners expeditions. Suggested frequencies: CW—14.060; SSB—14.285. For certificate, send QSL and legal-size SASE to K9AY, 7277 S Clermont Dr, Littleton, CO 80122.

Auburn, New York: The Auburn ARA will operate N2DTG 1300Z-2100Z **Aug 21** from the William H. Seward House Museum. Operation will be the lower CW and phone portions of 40 and 20 meters. For QSL, send QSL and no. 10 SASE to Auburn ARA, N2DTG, PO Box 427, Auburn, NY 13021.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Sep 1** to make the **Nov** issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- × 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Strays

I would like to get in touch with...

☐ anyone who has a schematic for a Knight T-60 transmitter. Nelson Burbank, W9JUM, 1425 Christina, Belleville, IL 62221.

☐ anyone with a manual for a Heathkit Scaler Model IB-102. Edward Nadolny, W9BM, 888 E Schirra Dr, Palatine, IL 60067

☐ anyone with a service manual or schematic for Hickok Tube Tester, Model 533A/600A. Joe Whisnant, W5UGI, 1513 Windy Meadow Dr, Plano, TX 75023

***QST* congratulates...**

☐ G. Stewart Tyler, WA4JUO, of Suffolk, Virginia on being named President of the International Right of Way Association, Old Dominion Chapter 52.

☐ Chuck Dorian, W3JPT, of Washington, DC on being a Vice-Chairman of the Interim Working Party 8/14 (International Radio Consultative Committee) on technical and operating characteristics necessary for compatibility, interoperability and required performance levels for systems in the mobile-satellite services.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Robert J. Pegritz, KC3TI—An important announcement follows: Delaware's ONLY hamfest will be at the Georgetown campus of Delaware Tech on Sunday, August 21st. Many thanks to SARA and all other dedicated troopers who make our "one and only" an excellent outing for the entire family. When the tornado touched down in Smyrna last month, SKYWARN was operating and ham radio spotters were the first to report to Nat'l Wx Svs. A big thanks to Dean, N3FHL, and John, N3ELZ, for a fine net control job. This is the month for the Sea Colony Triathlon in our resort area of Rehoboth Beach. Any takers?? Call KC3TI. Remember those Novice through Extra classes given by your local club. Upgrade and avoid the peer pressure! Congratulations go to our neighboring SM Kay Craigie, KC3LM, on becoming the Division's Amateur Radio Operator of the Year!! DTN stns 345, Tfc 46 in 22 sessns. SEN stns 67 in 5 sessns. Traffic: WA3WIY 52, K3YBW 42, WB3DUG 35, W3QQ 32, K3GRQ 23, K3JL 21, W3FEG 12, KC3TI 10.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM- ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Please send your VE test information for the rest of 1988 to KC3LM now for publication in Section newsletters and packet bulletins. We want to include all sessions, regardless of VEC. We get monthly listings direct from ARRL/VEC, so be sure to notify them of your test sked if your team is in the field-stocking program. Our Assistant Section Managers are people you should know. WA3PZO, former SEC, works with NDMS and FEMA for us. KA3A (former SM) and KO3B (also EC Lycoming Co.) represent the SM in the northeast and northwest parts of the Section. K3ZFD holds a courtesy appointment as chairman of TPARC. The Atlantic Division Convention last May in Rochester featured an outstanding program with leaders of ARRL and CRRL plus experts on many popular operating activities. Harry Stein W3CL, mainstay of the Pack Rats, received the Convention's "Grand Ole Man" award for many years of contributions to ham radio. The Convention's 1988 "Amateur of the Year" award was presented to Kay Craigie KC3LM. Harry and I are both deeply honored to receive such kind recognition from our Amateur family. Welcome Susquehanna Valley ARC to our ARRL Affiliated Club roster. KC3LM enjoyed meeting hams in the northwestern part of EPA at the hamfest in Winfield last June. If you don't find what you need at Mid-Atlantic's Aug. 7 hamfest, try again at Red Rose Rptr Assn's computerfest on the 14th. Warminster ARC's new officers are KY3T, NI3J, KD3BN, and N3ESI. ARRL's Incoming DX QSL Bureaus provide a tremendous volunteer service. Please follow their guidelines carefully and avoid asking for special treatment. For a copy of our Third Call Area bureau's guidelines, send an SASE to C-CARS, POB 448, New Kingstown, PA 17072-0448. WB3IHQ has qualified as an OO. Eastern PA is divided into 10 ARES Districts, each headed by a District Emergency Coordinator who reports to the Section Emergency Coordinator. Our DEC's at press time are KC3B, WB2OOB, W3EEK, KB3UD, N3BFL, KB3JK, KB3OM, WA3JRL, N3ECL, and K3AUS. The DEC's and their county Emergency Coordinators welcome volunteers. If you don't know how to get involved in ARES locally, contact SEC KB3YS for help. Traffic (May): N3AZW 655, N3COY 162, N3CD 144, W3JKX 142, N3DRM 135, KD3AO 75, KA3DLY 60, W3KAG 52, KB3UD 38, KU3R 35, AA3B 33, N3EFW 32, K3WPI 29, W3AQN 27, W4UQ 22, WA2CKA 20, KA3RGF 18, W3CL 15, K3TX 15, W3ADE 14, W3DP 14, W3ZID 13, W3BUR 10, W3VA 8, W3GJC 6, W3HK 3. PBBS: @K3RLI 179, @KB3UD 175, @AG3F 119, @WA3TSW 98, @WA7SSO 39. Nets (May QNI/QTC): EPA 440/137, EPAEPTN 475/153, PTTN 241/82, SEPATN 76/17, D8ARES 66/0, D6ARES 70/15, MARCTN 183/45, MARCARES 64/6.

MARYLAND-DC: SM, Philip Battey, W3FZW—The SM attended the Rochester Hamfest and ARRL Atlantic Division Convention in May and met lots of new and old friends. Hugh, W3ABC, was there as Division Director and most SMs from this and the Hudson Division were there. Interesting were sessions "News from Newington" by K1ZZ and the "League Forum" with W3ABC, K1ZZ, et. al. W2XD talked about the NTS. DX band conditions are getting better and better; you don't need a beam to work lots of stations, and quite late in the day. KJ3E demonstrated a portable packet station at a recent meeting of the St. Mary's County ARA. He and many others love packet. The MD Mobileers ARC and many other groups have packet stations. ACC, WA3YLO, has spoken before several clubs; he's Veep of the Foundation for Amateur Radio in the Washington area. If you have any sort of technical problem, please get in touch with Ken, W3VVN, our Technical Coordinator. The Maryland Slow Net continues to gain new members, and MDD benefits. The Rock Creek, Columbia, and Anne Arundel clubs are busy with special-event activities. CARA has a new 220 MHz repeater on the air and the AARC has a Novice packet bulletin board (W3VPR) on 223.4 MHz. A listing of ham exams upcoming in the DC area appears each month in Auto Call, organ of the Foundation for Amateur Radio. W3FZW participated in the on-the-air Reunion of the Potomac Valley Radio Club. MDC stations worked are W3XE, K3RT, W3ZZ, KC3AG, W3HVM, W3GG, W3TMZ, W3LPL, W3ABC, and W3GN. Planning a Ham Radio event? Check out the new "ARRL Convention and Hamfest Planner," available from the League for $5.00. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/44/281, PON/WB3BFK 26/24/214, MDD/W3FAJ/62/236/533 (TOP BRASS W3FA/80, K3GHH/77, WA3YLO/76, WB3GZU/60), MEPN/N3EGF 30/146/791, HOCARES/WA1QAA 2/0/12, BCN/N3EGF 4/0/18, MAVEN/W3YVQ 1/2/0. PSHR: W3FA 94, W3YVQ 87, WA3YLO 73, KC3Y 71, N3EGF 70, KJ3E 70, K3GHH 67. Traffic: W3IWI 357, KJ3E 177, KC3Y 145, NB3P 145, W3FA 133, K3GHH 112, N3EGF 76, WA3YLO 58, K3NNI 57, W3YVQ 55, WB3BJM 40, W3FZV 34, KX3U 34, WD4MNP 34, KK3F 32, K3ORW 31, W3LDD 28, W3DQI 27, K2EB 27, WB3BFK 22, KT3T 13, W3ZNW 7, WA3GYW 5, KC3DW 4, WA1QAA 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: VACANT. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATC's K2JF, KA2RJA and WB2MNF. VE testing this month: Thursday, Aug. 18 in Bellmawr. See June, 1988, QST SNJ column for further info. I would like to welcome new ECs KA2YKN (Camden) and WB2LNR (Gloucester) to the staff and wish them every success in their new positions. Hams in these counties, please help them out whenever possible. NJ QSO Party is scheduled for weekend of Aug. 20. Contest starts 2000 Z Aug 20 to 0700Z Aug 21 and from 1300Z Aug. 21 to 0200Z Aug. 22. Suggested freq. are 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400, 50-50.5 and 144-146. Suggest phone activity on even hours. Certificates will be awarded to the first place station in each NJ county. Also, the SNJ staff will present plaques to the first place Novice/Tech and non-Novice/Tech finishers in our section, providing more than one entry is received in each category by the EARA. See July QST for full details, or you can contact me. Until next month, very 73. Traffic: WA2CUW 22, WA2HEB 9.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA- ACC: N2EH. BM: K2KWK. OOC: W2AET. PIO: WA2PUU. SEC: NN2H. SGL: WB3CUF. STM: W2GLH. TC: K2QR. Public Service Honor Roll for May: N2ABA, N2EIA, N2EVG, N2FIZ, WA2FJJ, W2FR, W2GJ, NN2H, KC2JW, W2MTA, WB2OWO, KA2QOO, WB2RBA, ND2S, KA2UBD NJ3V, K2YAI, KA2ZKM. Club Officers: Alleghany Highlands W2BYO, KW2J, WB2OQY, K2UOB; Utica: NA2A, WA2AZA, WA2FSU, NA2Q. CONGRATS: Atlantic Division Ham-of-the year KC3LM and Grand Old Man to W3CL; Central NY H-O-Y to KY2F. Events Calendar: Finger Lakes 8/20, Niagara Falls 9/10, Elmira 9/24, Syracuse 10/15. Traffic Handlers' Picnic at Verona QTH K2KIR 8/13.

Net Name	Manager	Time/Day	Freq/Mode	QNI-QSP-QND
NYSEMO	N2AGO	0900 Sn	3993.5 SSB	108-010-05
NYSR	W2MTA	0930 Sn	3530 CW	014-004-05
WDN/M*	WB2OWO	1100 Dy	04/64 FM	398-157-31
NYS/M*	N2EIA	1000 Dy	3677 CW	340-278-31
NYPON*	KA2UBD	1700 Dy	3913 SSB	592-325-31
ESS	W2WSS	1800 Dy	3590 CW	341-052-30
NYSPTEN	KA2Q	1800 Dy	3925 SSB	511-076-31
LCARES	WA2OEP	1800 Dy	7.015 FM	050-000-05
OCTEN/E*	WB2HLY	1830 DY	32/94 FM	731-078-31
Q Net	N2AGK	1830 Dy	31/91 FM	452-001-30
STAR*	NE3B	1830 Dy	13/73 FM	312-056-31
WDN/E*	WB2OWO	1830 Dy	57/17 FM	489-203-31
NYS/E*	KU2N	1900 Dy	3577 CW	288-133-31
BLUELINE	WA2SEF	2000 Dy	93/33 FM	075-005-09
TIGARDS	W2SEF	2000 Sn	16/76 FM	060-005-05
VHF THIN	WB2OWO	2100 TU	04/64 FM	051-000-04
BRVSN	WB2OFU	2100 Dy	6.655 FM	284-002-31
CNYTN	WA2PUU	2115 Dy	90/30 FM	258-062-30
OCTEN/L*	WB2HLY	2130 Dy	28/88 FM	238-040-31
WDN/L*	WB2OWO	2130 Dy	04/64 FM	528-131-31
NYS/L*	KU2N	2200 Dy	3677 CW	293-215-31

*NTS NET. SEC: NN2H recently conducted a staff meeting with District Emergency Coordinators for Western New York. Presently there are 893 members of ARES with 41 Official Emergency Stations appointed, 5 DECs and 34 county Emergency Coordinators in the Section. All ECs are urged to renew contact with agencies in their county, since personnel often change. WNY EC Net on 3955 kHz discontinued, however this frequency will continue use for Section ARES coordination in time of need. Current ARES activity is probing use of packet radio mode. However relative "immaturity" of packet and lack of operators with emergency powered equipment dictate limited use of packet mode with application only for intradistrict communications. Consideration of re-structuring the five ARES districts with relation to packet mode Local Area Net (LAN) structure is not feasible at this time. May Traffic: NJ3V 452, WB2OWO 361, WA2FJJ 353, N2EIA 321, W2MTA 297, KA2UBD 284, N2ABA 190, KA2QOO 172, ND2S 166, KA2DBD 145, NN2H 120, W2FR 103, WB2QIX 96, WB2IJH 92, K2YAI 76, KA2ZKM 72, WB2RBA 70, N2FIZ 69, KC2JW 67, KA2ZNZ 61, K2QR 39, N2EVG 32, W2PPS 27, KA2SJG 21, AF2K 18, W2GJ 17, KA2TWY 7, K2BWK 4. April K2QR 25.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO: N3DOK. ASM: N3DOK.

Net	QNI	QTC	Sess	kHz	T/D
WPACW	217	114	31	3985	7:00P/D
WPAPTN	93	36	31	3983	6:00P/D
KFN	167	84	22	3983	1:00P/M-F
PFN	185	121	31	3958	5:00P/D
WPA2MTN	298	91	31	146.28/88	8:00P/D
NWPA2MTN	589	46	31	44.53/4	9:00P/D
WPARTTYN	3	0	3640		9:00P/D

I am sorry to announce the passing of Frank Grace, W3NR, of Erie, PA. Frank was well known in the North Western Penna. He was very active with the RAE, a member of the QCWA, ARES and RACES. He wrote a column on Amateur Radio for the Erie Morning News. Norma Vanderhoff, as I have been told, will continue the column. I would like to have some reports on how the different counties are working with the National Weather Service. In Allegheny County, things are doing very well altho we miss K3HSE who was very active. We have two operators who on very short notice can move to the weather station. We have equipment, low band and 2 mtr for our use. This is very important in saving time setting up and getting on the air. Contact is made with surrounding Amateurs feeding news from NWS and into the NWS office. It should be mentioned that the Pittsburgh WSFO River forecast office covers about half of Pennsylvania. We need about 500 names to give to the Pennsylvania Dept. of motor vehicles to get a license plate with Amateur Radio on it, call letter plates are available. May traffic: N3EMD 293, KQ3T 270, W3OKN 135, N3AES 100, N3FM 95, N3DBW 91, WA3UNX 86, KC3ET 69, KC3YE 68, K3SMB 56, WA3DBW 47, KA3OEM 34, KC3GO 32, KD3AC 32, W3RUL 29, WA3QNT 19, KA3EGE 16, KC3WJ 12, NO3M 11, N3COR 7, KA3GXT 6, K3LTV 4. (Apr.) N3AES 85, N3CZW 66, K3LTV 15.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. ASM: AA9D.

Net	Freq	Times	(Local Illinois)
ISN	3905	1800	Daily
ILN	3690	1830,2200	Daily
ITN	3705	1900	Daily
CTN	147.69/09	2100	Daily
ILARES	3905	1630	1St & 3Rd Sun
IEN	3940	0900	Sundays
ILPN	3855	1645	M-F 0930 Sun
NCPN	3915	0700	M-Sat
NCPN	7270	1215	M-SAT

Morgan County EC W9OES had an extremely busy and productive month which included attending the American Red Cross national convention in Cincinnati, working with Red Cross officials in the Morgan-Cass-Macoupin Co. area to schedule damage assesment training for ARES members, and handling priority health and welfare traffic from Morgan Co. into the western suburbs of Chicago which was necessitated by the fire in the telephone switching center in Hinsdale. Vince's dedication is a fine example of what real committment as a volunteer is all about. On the subject of the Hinsdale telephone incident, I have had some verbal reports of ARES and other Amateur activity involved in helping to provide emergency public safety communications in the area where local service was out, but I have received no written reports to date. KD4PS, KD9SG, and KA9HDZ taught a PACKET radio seminar this month at McKendree College in Lebanon focusing on the use of PACKET for ARES support and NTS traffic. Support for the meeting was provided by the St. Clair ARC. Traffic: WA9VLC 152, W9HOT 126, NN9M 116, W9HLX 115, NC9T 94, KE9KS 71, N7DOY 65, K9EUI 50, W9LWH 32, WD9CIR 27, KA9CTW 22, W9KR 20, W9UHC 15, W9HBI 12, WA9RUM 11, WD9HQW 11, W9RTD 9, W9VEY/M 9.

INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH, KD9ER. SEC: WD9AVQ. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. PIO: KA9LQM. SGL: WA9VQO. BM: W9OCL. NM: ITN KD9DU QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC.

Net	Freq	Time Daily UTC	QNI	QTC	QTR	SES
ITN	3910	1330/2130/2300	2858	235	1854	87
QIN	3656	1430/0000/0300	586	257	1016	93
ICN	3706	2315	103	26	544	26
IWN	3910		1085		183	31
IWN VHF			870		195	38
VHF NETS			2560	106	3711	129

Appointments: KA9ERT, OO/AA, Crawfordsville; N9FQA, EC Madison County; KA9KTD, DEC, District 7. OO reports rcvd from KA9QYK, KA9PCT, WA9VLK, N9GHT, KA9BYN, KA9DZM. Silent keys: K9VZA, Warsaw; WB9BZG, Zionsville; W9LQ, Indianapolis; WA9EQU, Evansville. BPL: W9JUJ, 0/1, R/311, S/271, D/1. Congratulations to Bruce, W9UMH, our new Section Manager. Bruce's win was announced last May and he took over the reins on July 1. QST deadlines, however, make this report not appear until now. So to those of you who care, this isn't new news. I'm sure that Bruce will do a fine job and I wish him well. The state ARRL organization I inherited had several key people who kept the wheels oiled and turning. While I did a lot, I didn't keep the ARRL state organization going, the hundreds of people who accepted responsibility as ECs, DECs, section staff and the like were the ones who MADE IT WORK! To them I'd like to say "thanks for a job well done!" I hope you give Bruce the same support and sweat that you gave me. The staff appointees shown above include some of Bruce's announced staff changes. Please make sure you send your monthly activity and net reports to W9UMH in Indianapolis. Congratulations to N9FMO, our Vanderburg County EC for the award received from IVY Tech for his work as a Charter Regional Director! Traffic: W9JUJ 584, NR9K 257, NJ9S 188, KJ9J 174, KA9LQM 117, KD9ER 52, W9UEM 48, K9WWJ 42, W9QCF 34, W9ZGC 32, WB9IHR 28, K9ZBM 26, KA9RNY 22, KA9QMI 20, K9SBW 13, K9OUP 12, WB9OZZ 10, W9KMY 10.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9UTQ. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Congratulations to Riverland ARC for renewing their status as a Special Service Club. New Net Manager of Badger Weather Net is KC9CJ, former NM WD9IID moved to Springfield, Illinois, after receiving a job promotion with GTE. Get a copy of the new ARRL Convention and Hamfest Planner and see several pictures of me and tips I wrote on staffing an ARRL booth. Also, check out the new ARRL Special Events Communications Manual article on Operation Santa Claus which describes one of Milwaukee's

(continued on page 110)

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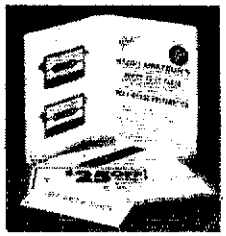

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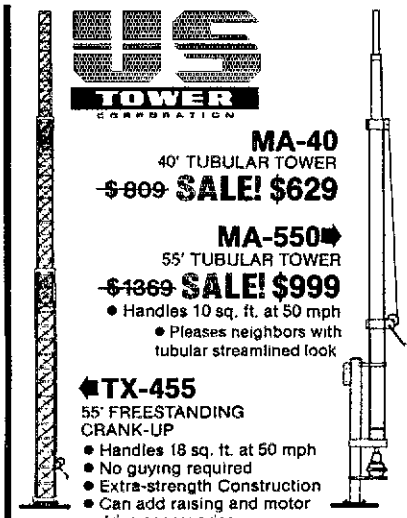

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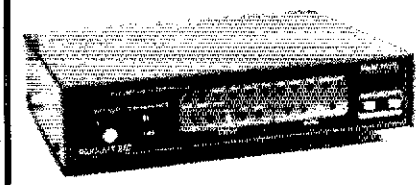

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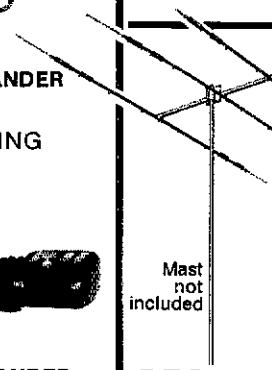

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ARES activities. New ATC and OES is NB9H. The Experimental Aircraft Association Show in Oshkosh lasts until August 5th, be sure to visit the ham shack. August 13th, Green Bay Mike and Key Club Swapfest, Community Service Center on Dousman Street open 7 AM, with exams available. August 13th, Rhinelander Swapfest sponsored by the Northwoods ARC, Gigantic Rhinelander Ice Arena, open for setup at 8 AM, with exams in morning. NB9C says, "Field Day is a reflection of all that is Amateur Radio. It is a diverse combination of a contest, test of our emergency communications ability, social event, time to try new and novel things, opportunity for publicity, having a nice time and more." KA9JDE is updating the Dodge County Hams Roster and is looking for additions and corrections. Affiliated Club Coordinator, KA9FOZ, can send you free information about Special Service Club programs or ARRL Affiliated Club benefits. Check with Official Observer Coordinator, NC9G, about becoming an Official Observer and an Auxiliary Monitoring station. Sorry to report Silent Keys W9EQ and W9SQJ. Bell's Theorem: When a body is immersed in water, the telephone rings. Traffic: WB9YPY 1775, KA9VII 348, W9CBE 324, KA9RII 254, K9GDF 216, W9YCV 212, WA9WYS 124, N9BDL 109, KA9BHL 109, W9UCL 92, W9IEM 92, W9KLN 82, K9AKG 70, N9BCX 67, KA9KLZ 63, K9EP 62, K9FHI 62, AG9G 61, W9NGP 42, NS9Q 35, KA9WWT 30, W9DNQ 12, K9BED 9, W9ODV 6.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—No question but that we're into a hot, dry summer. But with the new sunspot cycle showing some excitement, things aren't all that bad. Especially for those who have their shacks in the basement. And now that the novelty of summer is wearing off, net activity has been picking up. May was a good month—a total traffic count of 5225. Except for last December, this was the highest month total in at least the last twelve months. And this activity produced three BPLs: WBØWNJ, KT9I and KAØARP. Congratulations to all for a great month. Meanwhile, Mel, NØFOO, in Brainerd says he is having touble with his thermometers. He says he can't get them adjusted to Central Daylight time-they are one hour behind in the temperature reading. Any help on that one? With pleasure, we announce the Amateur of the month for May as Paul Bruess, KAØPDM of Minneapolis. Congratulations Paul, and thanks to all and keep up the great work. And from Jim, WØTIV, newly elected officers of the Upper Midwest Chapter QCWA are President: KUØD, Vice President, WØJE; Secretary, WØZWW; Treasurer, WØWY. Also elected were Board members: WØTAT, WØVSA, KØGA, WØUGP and WØIH. Thanks to all the clubs and nets who send me newsletters. They are all excellent and informative, and I really appreciate getting them. One that I enjoy, "Feedline" published quarterly in connection with the Mille Lacs Lake Repeater Net activities. Especially fun is the "Feedline Leaks" column. The rest of the publication is somewhat technical, but you can still get a lot out of it! That's it for now. CU es 73. Jim Swisher, KAØEPY, STM. MN EMERGENCY FREQ 3860 kHz BULLETINS 3860.

Net	Time	Freq	QNI/QTC/Ses	Net Mgr
MSN/1	6:30 PM	3685	287/113/31	WØUCE
MSN/2	10:00 PM	3685	295/55/31	KDØNH
MSSN	6:00 PM	3710	256/33/31	KAØSBY
MSPN/N	12:05 PM	3190	377/231/31	WBØWNJ
MSPN/E	5:30	3860	377/231/31	KCØT
MNWXNT	6:00 PM	3860	224/108/23	KØOGI
PAW	9:00	3925	2804/284/119	WDØBAC

Traffic: KAØARP 2089, WBØWNJ 1010, KT9I 574, KAØEPY 465, WAØTFC 387, WØGRW 223, NØFOO 147, KCØT 58, KØOGI 53, KDØNH 49, NØJP 46, KAØSBY 40, KDØCI 34, WDØGUF 30, KAØPDM 11, WØKYG 9. Total Traffic: 5,225.

NORTH DAKOTA: SM, Bill Kurtti, WCØM. At the writing of this report, North Dakota is in the worst drought since the 1930's, with less than 25% of the normal moisture since last August. This has been the main topic of conversation on the radio here. Sorry to report that WØWIQ and WØECX are now silent keys. Milt (WØECX) was a member of the legislature when the ham license was made law. WAØHUD was driving on Hwy 2 near Granville when he came upon an accident where one person died and two were injured. Bob put out a call on the 146.97 (KØCLD) repeater in Minot. KAØGVJ responded and reported it to the state, and assistance came very quickly. Two lessons from that accident were that the 2 adults in the car were thrown from the car and that one died while the other was not wearing seat belts and was hurt very badly. The baby in the car was in an infant safety seat and was not hurt badly. Whenever you require help or find someone needing assistance, call State Radio; they are trained to get the help needed there FAST. Traffic: KAØFSM 58.

Net	Freq	Time	Ses/QNI/QTC	MGR
GOOSE RIVER	1.990kHz	9AM Sun	5/131/3	WØCDO
DATA	3.885	6:30 Da	27/580/25	KAØFSM

WX NETS TO RESUME IN OCT WØGFE
STORM NET AS NEEDED WCØM

SOUTH DAKOTA: SM, R. L. Cory, WØYMB-ASST SM: NØABE, WAØFPR. SEC: KAØKPY, STM: KDØYL. Mobridge Area ARC have moved their repeater to Tower Hill, 4 miles east of Mobridge, and the result has been excellent coverage. It is on 147.21/81. Lake Area Radio Club of Watertown has been added to the list of clubs in South Dakota that will be operating a "2ØØ" call sign next fall which will bring the total number of SD clubs participating to six. Greg Crossman, WEØD, has been responsible for placing a packet repeater on the PBS tower at Beresford which has given SE S. Dak. reliable packet coverage and given a link into Sioux City and into the national hook-up. Plans are in the mill to install units at Madison and Hetland. We pay our respects to Leonard Nelson, NØAMJ, ARES EC at Yankton who became a Silent Key, a victim of MS. Total traffic reported for May: 642. Traffic: NØDPF 424, KØERM 89, WØMZI 36, KDØYL 30, KAØKPY 27, WBØOMF 24, WØYMB 12.

DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU—ASM: K5UR. SEC: N5BPU. STM: W9OK. ACC: NI5D. SGL: W5LCI. TC: W5FD. OOC: NR5Q. BM: W5LL. PIO: K5TML. Rpt. Coord: WB5FDP. Packet Coord: WD5B. The Arkansas Amateur Community sadly learned of the death of Bill Dauvaul, W5FXQ. We are now in the Dog Days of Summer when severe weather can be a problem. The Arkansas Emergency Net frequency statewide is 3.987.5. Net reports for May 1988: Arkansas CW Net (OZK), Net Mgr. W5MYZ 130 QNI, 9 Tfc, 232 Minutes—Arkansas Mockingbird Net, Net Mgr. WB5YLI, 500 QNI, 20 Tfc, 509 Minutes. Arkansas Phone Net, Net Mgr. W5QFU, 593

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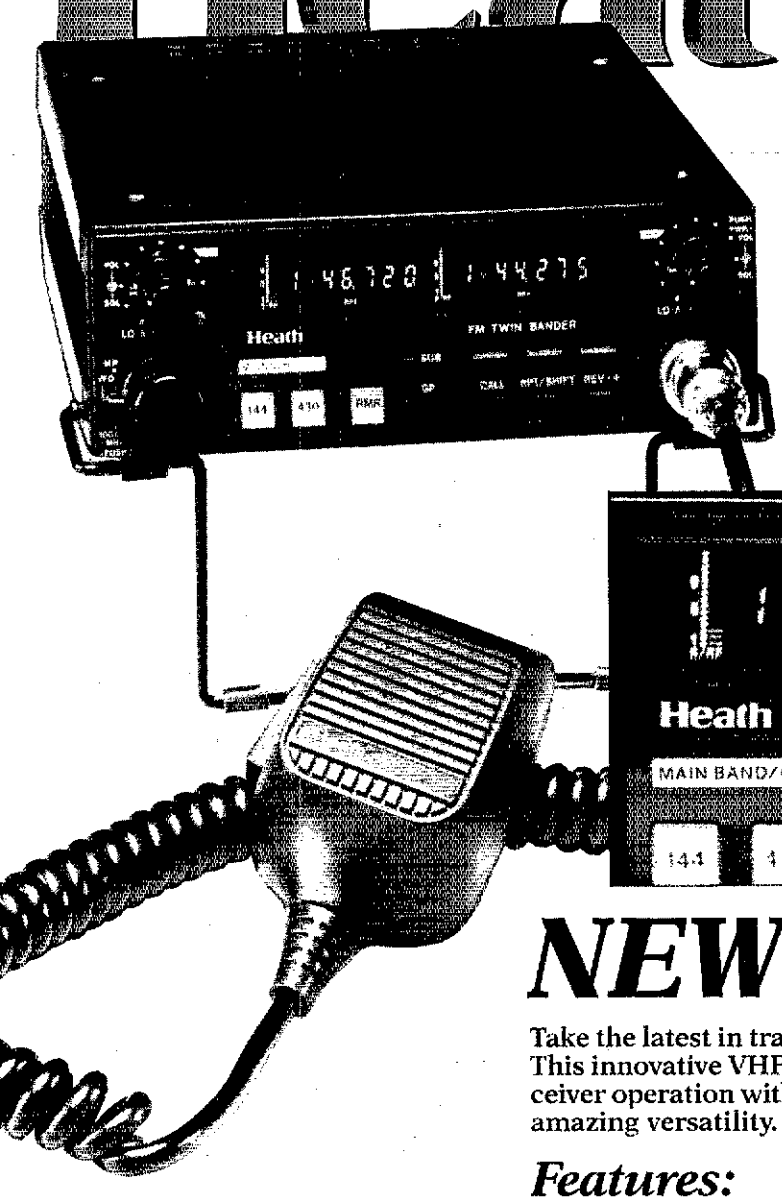

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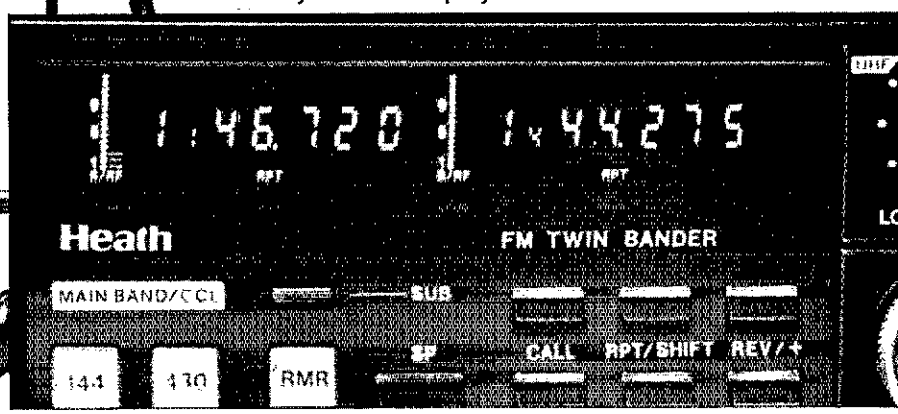

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QNI, 80 Tfc, 547 minutes. Arkansas Razorback Net, Net Mgr. W5QFU, 903 QNI, 81 Tfc, 527 mins.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR-ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: KE5QK. Packet: NE5S. New Orleans VHF Club re-election of officers: Pres. Al-WD5CFC, V.P. John-KV5E, Sec. Robbie-WD5FYE, Tres. Wayne-KO5R. Well done to the Baton Rouge Hamfest in their new location in the Holiday Inn South. They enjoyed a packed house on Saturday and a good turnout on Sunday. They had several new dealers and plenty of swap tables which added to an enjoyable get-together. Repeater coordination was the hot item at the Louisiana Council meeting. Following a lengthy discussion the Chairman appointed a committee to review and recommend changes to the current coordinating procedures. Recommendations are to be discussed at the regular meeting at the New Orleans Hamfest on June 18. One of the more difficult problems are repeaters coordinated for a certain height and power and suddenly it is switched to a new location with the antenna in the heavens and running excessive power to reach both coasts. Other major problems are one-user repeaters and the metropolitan areas having an excessive number of repeaters. We certainly need to cooperate to avoid chaos. 1988 Shreveport ARA officers: Pres. Jack- KA5RIP, V.P. Jane-N5ATK, Tres. Robert-N5GHJ, Sec. Mary Alice-N5HFO. Their SARA Newsletter is one of the best. 73 & GL de "Wondy" - K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K. ACC: NC5Y. VHF/UHF Coord: N5DWU. Packet Mgr. WA5DVV. Congrats to following upgrades: To Tech: KB5FWV, N5MHF, Pappa Simmons (no call yet), KD5FSV, KB5FHG, Bryan Thalman (ncy), Christos notaridis and KB5ENH, who also passed general written exam. Congrats to Tupelo ARC on receipt of special service award from NOAA/NWS. DRN5 (WB5YDD) Sess- 62, rep 97% by N5AMK, N5HGN, W5HKW, KT5Z, KB5W, KE5EC and WB7CQQ. NS5M had two drills (assume wx drills). Congrats to new EC W5EMS in Indianola. Cecil, KA4PKA, doing great job as SEC. Traffic: N5AMK: R-119; S-151, D-1. Total 271. WD5JXT: R-5, D-5, O-20, Total 30. KK5Z: R-1, D-1, Total 2. From W5EPW, BM, ARRL Nr Bulletins: 11 CRRL Bulletins, 2 Propo F'cast Bulletins, 5. NE Miss WX Net (WN5M) Sess 5, QNI 113. MSBN (KF5DE) Sess 31, QNI 1891, QTC 47. ARRL Info Net (KK5Z) Sess 3, QNI 54. Gulf Coast SBN (W5JSH) Sess 31, QNI 989, QTC 11. Miss/Lou/Emerg/Net (N5EZX) Sess 5, QNI 103. Coast ARES (N5LKT) Sess 4, QNI 94.

TENNESSEE: SM, Harry Simpson, W4MI—Assistant Section Managers are W4TYU (East) PIO, K4CXY (West) ACC, WA4GLS (Middle); STM is NG4J, W4SGI is BM, K4UVH is SEC, K4LSP is OOC, N4PQY is SGL and W4HHK is TC. One of these days, I will tell you what all those initials mean. I regret to announce the passing of Johnny Watson, W4GD, of Memphis and Ira Jenkins, WA4RAS, of Dechard. I didn't know Ira, but I am sure he was a good ham and will be missed by his many friends and associates. Johnny was the dean of DX people in the south, with more than 350 countries to his credit. Congratulations to the Humboldt area hams on two fine events—the West Tennessee Strawberry Festival, and the Annual Humboldt Hamfest. KA4MEN, W4IGW, AB4DI, WA4NIF, KA4FML, K4BEZ, WB4EDS, KC4DJE, WA4RWK, K4BNX and KB4GI were highly commended for their activities during the Strawberry Festival, and I join everyone who attended the hamfest in kudos to W4IGW and staff for their handling of the Hamfest. It's not large, but is it ever friendly! Seen in the midst of their enjoyment were K4FZJ, NE4O, WA4HZP, W4TNP, K4CXY, K5OP, WB4KQQ, WA4VVX, Catheryn Brown and many others. Thanks also to W4TYU for representing ARRL at the Knoxville and Cleveland hamfests. He reports that there were good turnouts in both cities. October is going to be busy for me—three hamfests! Memphis is 8 and 9, Gray on 15 and Chattanooga on 29 and 30. Congratulations to Oak Ridge ARC and operators K4LTA, KK4CA, WD4KNS, N4PXV, K4PJ, N4AYN and KR4C on their W2ØSKH operation. They had a total of 1,528 QSOs during the WPX Contest! As you know, I have been pushing the TN CW Net. I think it would be apropos to list those dedicated hams who have helped, and are helping me: AB4CA, AB4DE, K4CXY, K4WOP, KA4BSG, KA4EBU, NG4J, NN4F, W4ATW, W4BAQ, W4DDK, W4EIN, W4MRD, W4PTS, W4TYU, W4VS, W4VVG, W4WXH, W5TNT, WA4JDY, WA4YEM, WB4LAL, WD4SIG, WR5P, K4KP and AB4DP, some more than others, but all appreciated. Thanks to all for your cards, letters and support. Traffic: WA4FMR 123, W4DDK 67, W4MI 40, KA5KDB 39, KE4LS 38, K4WOP 36, W4TYV 33, W4PFP 24, WA4HKU 8, K4SJV 6, W4PSN 5, W4WXH 4.

KENTUCKY: SM, John Themes, WM4T—ASM: KC4WM. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (May) KC4WN has been appointed Assistant Section Manager, effective May 20th so that we may serve the field better. Please give Olen your support. Many amateurs were involved in the recent Middlesboro tornado and the tragic bus accident in Carrollton. My sincere thanks to all who took part, especially KE4YS, KB4PNG, WB4PDD, W4UVT, KC4WN, and WA4IUW. Bars was active with Public Service events on May 21, 28, 29 and 30th. See you at Georgetown!

Net	QNI	QTC	Ses	Mgr
MKPN	1333	134	31	WD4RWU
KTN	593	62	31	WB4LBG
KYN	358	132	62	K4AVX/KZ8Q
KNTN	300	83	40	WA4EBN
TSTMN	460	27	31	KZ8Q
SEKEN	99	1	5	K4AVX
7ARES	54	2	4	WD4PBF
NKEN	114	5	5	W8IIO

SAR (May): K4VHF 177, WD4RWU 103, KI4QH 65, WA4EBN 62, K4AVX 60, N4GNL 42, KA4MTX 41, KB4UJA 29, WA4SWF 23, WD4CQF 13, WA4NOG 12, WB4AUN 5, N4PEK 5, KU4A 2. PSHR: KI4QH 99, N4GNL 81, KA4MTX 67.

MICHIGAN: SM, George E. Race, WB8BGY (@N8FTY)—ASM: WA1LRL (@WA1LRL). STM: WD8KQC (@ WA8URE). SEC: N8AYQ. SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. BM: KE8JG. Please note the addition of home BBS calls for your League Officials listed above. Use the BBSs to keep us informed of your activities. It is my pleasure to announce the appointment of Tom Durfee, KE8JG, as MI Bulletin Manager. Tom is responsible for the MI OBS program. If you would like to be appointed as an OBS for your area, please let him know. He is a regular on the 7 PM MiTN on 3.953 MHz. Tom is looking for help in organizing the Section OBS program. Many of you are already performing this function on your local repeaters and packet radio systems. Become an OBS and receive the recognition and support you deserve. Congratulations to Michigan Amateur Lady of the Year Helen Schmock, W8GJX. U.P. Ham of the Year Award goes to Joe Werden, WD8MJB. Dale Moore, (K8YRD), day was proclaimed by Lansing Mayor, Terry McKane, in recognition of Dale's nearly 25 years as net control for the Lansing area SKYWARN Net. Recipient of the prestigious Central Michigan ARC Zeigenbein Award for 1988 is Don Tillitson, WB8NUS. New Ausable Valley ARC officers are: PRES-N8GWP, VP-KE8LR, SEC-N8IFV, Treas-KB8TS, PR- KA8YWV. New EC appointments from our SEC are: WD8JVQ-Emmet Co, WD8IZH-Cass Co, and K8GUG-Cheboygan Co. It you were involved in Field Day, don't forget to get your score tallied and sent in. The U.P. Net was started by members of the Hiawatha ARC in 1950. Over the years, the net has had many different meeting times and frequencies. Their highest record for monthly check-ins was achieved in Dec. of 1986 with 1,698. Their highest traffic was 386 in Oct. of 1981. Aileen, WA8DHB, has been Net Manager since 1976. Total check-ins for 1987 were 14,650. The UPN is part of the NTS and maintains liaison with QMN, MNN, MACS and the MiTN. Why not add your call to the growing list that check-in to the UPN. A more friendly and helpful group would be hard to find. The U.P. Ham Directory is now available. Contact Aileen, for details. Please support the following MI area Nets:

Net	Freq	Time/Day	QNI	QSP	Ses	Mgr
UPN*	3921	5:00PM Dy	988	78	38	WA8DHB
MACS*	3953	11:00AM M-Sa	343	62	30	K8OCP
MiTN	3953	7:00PM Dy	538	166	31	WD8EIB
QMN*	3563	6:00PM Dy	772	148	92	WB8R
SEMTN	145.33	10:15PM Dy	405	96	31	N8HSC
GLETN	3932	9:00PM Dy	1024	61	31	KA9EIZ
WSSBN	3935	7:00PM Dy	578	36	31	W8NDI

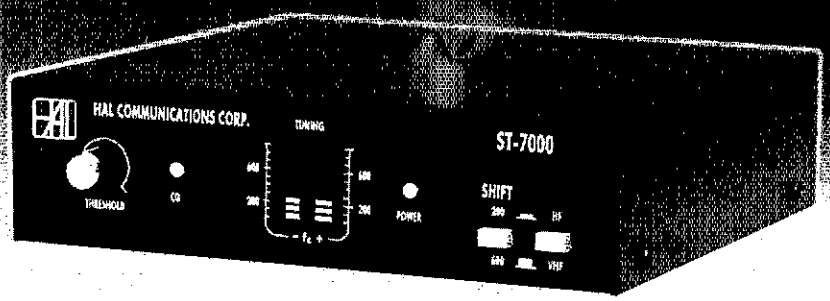
*QMN Fast-6:30 PM Dy; QMN Late 10:00 PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. May traffic as follows: KA8CPS 331, N8HHH 186, K8GXV 100, WD8KQC 98, NW8M 70, WA8DHB 69, WB8R 61, K6HAP 51, KEBJG 50, WB8SYA 46, N8CNY 35, WB8YDZ 35, K8UPE 34, W8YIQ 33, W8EOI 28, W8RNQ 27, K8ZJU 27, W8IHX 22, K8OCP 22, WB8BGY 21, WD8EIB 18, NY8W 17, W8BEZ 12, WD8MJB 11, KI8Q 9, N8FIZ 7, KD8LZ 7, NX8S 6, KA8LAR 6, WA8MVH 5, W8CUP 4, W8LRM 3, W8URM 1. July 30 marks our annual journey to the U.P. Hamfest. Plese join your MI League Leadership at the League forum; find out what is going on in the MI ARRL organization.

OHIO: SM, Jeffrey A. Maass, K8ND (@ W8CQK) Asst SM: David Kersten, N8AUH (@ KB8CI) Phone 216-221-6740; SEC: WD8MPV (@ KB8CI); STM: KF8J (@ N8ET); BM: W8ZM (@ N8NN); ACC: KJ3O (@ KB8CI); TC: KB8MU; OOC: WB8ZCE; SGL: N8CVK.

Net	QNI	QTC	Sess	Time (Local)	Freq	Mgr
BN(E)	222	82	30	1845	3.577	WD8C
BN(L)	168	77	31	2200	3.577	K8TVG
BNR	211	75	31	1800	3.605	W8EK
BSSN	204	67	34	1900	3.873	KD8FW
ONN	166	29	31	1825	3.708	WD8KBW
OSN	262	81	30	1810	3.577	N8AEH
OSSBN	1930	815	93	1030, 1615,1830	3.9725	KA8CGF
OSSN	182	79	31	0645M-F 0800S-Sn	3.577	KA8GJV
Ohio Section ARES NET				1700SUN	3.875	WD8MPV

Hamfests in August and September: Marysville 8/21; Warren 8/21; Findlay 9/11; 20/9 ARC 9/18; Cincinnati 9/18; Champaign-Logan 9/24; Cleveland Hamfest 9/25. Contact Affiliated Club Coordinator KJ3O to list your hamfest on our schedule. Amateur Radio Examinations: Wickliffe 8/6; Columbus 8/6; Ohio Section Conference and Picnic, 8/7 (see below); North Olmsted 8/13; Maumee 8/13; Lisbon 8/20; Warren Hamfest 8/21; Point Place (Toledo Area) 8/21; Canton 8/27; Dayton 9/10; Columbus 9/10; Ravenna 9/10; Maumee 9/10; Portsmouth 9/24; Barberton 9/24; Point Place 9/26. Contact me or Assistant Section Manager N8AUH (phone number above) for details on any session listed above: we can provide names and phone numbers for VE sessions contact persons. The third Annual Ohio Section ARRL Conference and Picnic will be held on Sunday, August 7 in Lou Berliner Park in Central Columbus. This site is located just South of the intersection of I-70 and I-71. We will be discussing ARES, NTS, OO and all other programs of the ARRL Ohio Section, as well as actvities of the ARRL nationally. Details are in the last issue of the Ohio Section Journal; contact N8AUH at the number listed above for additional information. Your local (and State) Disaster Services Agency is changing names, to Emergency Management Agency. State EMA station W8GST, operating from the Ohio Emergency Operating Center in Linworth, OH, is operational each Tuesday evening, often making an appearance on Ohio Section traffic nets. From May 21-25, the American Red Cross held its national convention in Cincy, and Amateur Radio was there! 55 hams provided communications during the event, also demonstrating radio with an emphasis on packet. The Findlay Radio Club has reported a roster total of 120 members, a new record for them! Several clubs in the SW Ohio area (including OH-KY-IN, FARA, NKARC, and Warren County RACES) teamed up to provide communications for the 1988 Juvenile Diabetes Foundation Bike-A-Thon, May 15. Warren County RACES also reports having participated in two Memorial Day parades as well. The 1988 Tour of the Scioto River Valley bicycling event saw 6100 cyclists riding the 2-day, 210-mile course! Central Ohio ARES coordinated communications, with over 75 stations (manned by over 100 Amateurs) along the route. N8XX and the Cincinnati Buckeye Netters provided Mothers' Day message services to the cyclists, originating over 130 messages from Lake White State Park using packet radio. I will discuss this operation in greater detail in next month's column! The stations listed below have practiced their traffic handling skills in preparation for disaster during May 1988. Traffic: K8TVG 284, W8BO 255, W8ZOL 241, K8JDI 213, KD8KU 187, KA8CGF 183, KD8HB 171, W8SKP 149, N8AUH 148, KF8J 137, N8IIP 125, W8EK 122, W8QZK 120, WD8KFN 119, K8IOW 107, WD8IKC 102, WB8JGW 95, K8DHD 91, WA8HED 86, WA8SSI 85, KV8Q 84, KA8GJV 82, N8GEC 79, W8CXM 78, N8FWA 75, K8CMR 71, W8ZM 58, N8AEH 53, KD8FW 50, W8LDU 48, K8OZ 46, KC8YV 46, KC8JV 45,

HF-PACKET DESERVES A GOOD MODEM



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K8ALV 45, KA8YIP 44, NE8X 43, WB8GTX 40, N8CEI 40, WB8KWC 38, KE8CV 37, WD8KBW 35, N8GOB 34, N8GPU 33, WD8RIB 33, N8HSE 32, NC8Q 32, WD8DPZ 32, WB8HHZ 29, WA8GMT 28, KA8DRR 27, W8JLW 27, KD8XL 25, KA8SOM 25, N8CW 20, WA3EZN 19, NW8E 18, WD8CTX 17, K8ES 17, N8CJS 15, N8AJU 15, WD8JAW 15, WD8CSP 15, KA8RIX 14, K8EF 14, KE8DQ 13, W9SWM 12, KB8EIW 11, K8VOY 11, N8HJB 10, KC8UZ 10, WD8JYE 10, KA8SON 9, W8RG 9, W8FPA 9, WD8DKQ 9, N8GZX 8, N8HRW 8, WB8KWD 8, W8GDQ 7, KB8DYW 7, KB8CMW 6, WD8PWG 6, N8FPH 5, K8DXZ 4, W8BHL 4, N8HBF 4, KB8DIL 3, KA8VYT 3, K8CKY 2, KA8UVU 2, KA8OQF 2, WB8A 1, W8XT 1. (Apr.) N8GPU 67, KC8UZ 11, N8HRW/T 10, W8XTG 1.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. TC & OO/RFI: KC2ZO. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. NWSLTR ED: WB2NHC. NET REPORTS FOR MAY(QNI/QSP): AESN 73/0 CDN 616/72 ESS 341/52 HVN 326/47 NYPON 592/325 NYE/E 288/133 NYS/L 293/215 NYS/M 340/276 SDN 259/105. CLUB NEWS: Albany ARA had their annual dinner/dance in May. CCNR completed their plans for Field Day during the May and June meetings. Mt. Beacon heard a report by W2FJT on the National Disaster Medical System. They report new members WC2Y W2EYJ N2HUC K2VPB KB2EBY KE2BX and silent key N1AAF. Overlook Mtn. ARC had a presentation by W2XL on transmitter hunting and report the following who assisted in the World Hunger Walkathon, W2XL AK2H K2KBL KD2NE N2FS N2LL W2ZW WA2RUW WA2SYJ WA2ZNU WB2POM WB2OXY. They also report upgrades KD2LF N2AIV. Congrats. Schenectady ARA viewed the film "The New World of Amateur Radio." They welcome new members WA2ENV KA2KRT KB2DFG KB2FDR WB2KQR N2ICG. They also report upgrades KA2UWI now N2IDY, KB2CFV now N2ICO. West. ARA had two speakers. W2JAJ with a report and demonstration on how the first man-made radio waves were generated and WA2IPM, Brother Bernard who talked about the IMRA. WECA had elections with WB2NHC-Pres. K2ZVI-VP, KB2APX-SEC, K2ZM-Treas. and new directors/committee chairmen N2GAT-Publ. WB2QJA-Digital Modes N2EYX-Social. Dir @ Lge-K2ZM Bylaws-N4OOX. They report new members N2HXY KB2DHT KB2DDX N3EMF WB2RJO and with regret report silent key KD2UO. Yonkers ARC reports upgrades KB2BFV to N2ICM N2FLW and KE2EX and welcome KA2ZDC. MAY BPL: N2HIF. MAY PSHR: N2HIF WE2G WA2JBO WB2VUK K2ZVI WB1BTJ KB2EPU. MAY Traffic: N2HIF 685, WB2VUK 154, K2ZVI 108, K2ZM 48, N2FTR 44, WA2JBO 43, KB2EPU 26, WE2G 25, WA2GYY 15, WB1BTJ 13, K2HNW 11, KA2NGJ 6.

NEW YORK CITY-LONG ISLAND: SM/SEC: Walter M. Wenzel, KA2RGI. ASM:N2GQR. ASM VE:W2NL. ACC:KA2WIJ. STM:K2MT. OOC:NB2T. TC:WA2YNH. BM:W2JUP. PIO:KA2LCC. The following are traffic nets in and around the section that handle NLI messages with the May report figures.

Net	Freq	Time Day	Mgr	Ses	QNI	QTC	QSP
6AVHF	145.350/R	2000 Dly	K2YQK	31	465	93	93
NCVHF	146.745/R	1930 M-F	KB3BKE	31	260	71	71
SCVHF	145.370/R	2000 S-F	KA2IMA	27	265	54	27
NYPON	3.913	1700 Dly	KA2UBD	31	592	353	325
NYS/M	3.677	1000 Dly	N2EIA	31	340	315	276
NYS/E	3.677	1900 Dly	KU2N	31	288	169	133
NYS/L	3.677	2200 Dly	KU2N	31	293	277	215
NLT	28.450	2100 Wed	KB2BKE	4	51	10	8
ESS*	3.590	1800 Dly	W2WSS	31	341	52	
PNS	145.01	24HR Dly	AI2Q-4				N/A
PNS (ALT)	145.03	24HR Dly	WB2IBO-4				N/A

*Independent Net, recognized by NTS, all times are local. Access AI2Q-4 (Packet Node Station) via WB2QBP-2 Net-Rom Node (NRN). If for any reason AI2Q-4 is down, WB2IBO-4 on 145.03 is the official PNS alternate. Access WB2IBO-4 via K2LSX-7 (NRN) or KA2RGI-1 (Digi). Check into the NYC-LI Ten Meter Net (NLT) for additional traffic handling training. Novices please take note that this net is designed for your participation. EXAM SESSIONS: LIMARC-second Saturday of each month at NY Inst. of Technology, Old Westbury - contact Joe, W2NL, 516-541-2450; SUFFOLK COUNTY VE TEAM-second Saturday of each month at Suffolk County Community College, Selden-contact George, WA2VNV, 516-751-0894; GRUMMAN ARC-second Weds. of each month at Bethpage High School, Bethpage-contact Howard W2QUV, 516-354-6861; GREAT SOUTH BAY ARC-normally fourth Sunday of each month (date shifted for holidays) at the Babylon Town Hall Annex-contact Walt KA2RGI, 516-957-5726. If your group holds regularly scheduled license exam sessions and/or classes let me know at least three months in advance so they can be added to the column before the printing deadline. Reminder time: If you can assist with emergency communications for the Long Island Jewish Arts Festival on Labor weekend (Sunday and Monday) please contact me A.S.A.P. so we can get you the proper information and clearance. Also do not forget to volunteer for the New York City Marathon which will be held on November 6. As Steve would be the first to say, "Its never too early to volunteer your assistance with the marathon." If you have not helped yet you do not know what you are missing out on so plan to participate this year. Traffic: N2AKZ 249, K2YQK 159, N2HLZ 124, KB2BKE 122, KE2GX 60, KA2UIU 38, N2GNQ 25, K2TWZ 20, KA2JMA 12, N2ETO 8.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs: N2EXX (SE), N2WM (NW), WB2NQV (SW), N2XJ (Cen and VE). SEC: N2BMN. STM: KA2F. OO/AAC: KA2BZS. ACC: KY2S. SGL: W2KB. TC: K2BLA. BM: WA2UPK and PIO N2WL. The following section level leadership appointment changes and additions are effective 06/88: BM W Dixon N2CXX to ASM (SE area), PIO C Kosman to ASM (SW area), W Murphy N2WM to ASM (NW area), ASM R Moseson, N2WL, to PIO, and E Vandeveide WA2UPK to BM. The addition of area ASMs is intended to improve our field organization in our highly populated section. Other new appointments effective 06/88 are: EC and OES Lambertville KD2RC. OO applicant KB2WI of Ridgewood is, effective 5/88, a member of the Amateur Auxiliary (AA). Appointment endorsements for the next two-year term starting 8/88 are: EC and OES: KU2C Belvidere and KZ2A Lopatcong. ORS: N2DXP. Welcome aboard to two new NNJ ARRL affiliated clubs: Exxon ARS of Elizabeth and Union County College

ARC. Congratulations to the following who were newly licensed or upgraded during May sessions conducted by: Raritan Bay ARC (7/4), Major Armstrong Memorial ARC (6/4), NNJ VE Board (23/11), and Bergen ARA (90/40). Novice (15): H Tempsta, C Freeman, O Kerrera, A Alexander, S Bello, H Bierman, R Bookbinder, D Forshee, E Hicks, A McKenzie, T Offer, E Sandineer, R Scott, J Serriola, and G Steinmetz. Technician (22): KB2EXW, KB2FAM, KB2CRU, KB2FMP, KA2RUA, WA2SDS, KB2AIF, KB2BBR, KB2BMN, KB2EPL, KB2FBK, KB2FND, KB2FJD, KB2FJP, KB2FKB, KB2FKR, KA2HVC, J Ferriola, G Moore, J Alonso, R Bernknopf, and Y Won. General (10): N2IDD, KB2OBW, KB2ERV, KB2FCW, N2HQH, WA2CVM, KB2EBP, KB2FJK, WB2FLP, and R Gorde. Advanced (7): N2DUR, N2IDL, KB2FHI, KB2DEZ, N2HIE, N2ICR and M Assmi. Extra (5): N2HSJ, KB2APD, N2ICK KC2PY, and KC2WY. Total applicants (126). Total New or Up-Grade (59). 46.8% NM's WB2FTX and N2FGC are preparing a booklet on the essentials of traffic handling. Traffic Nets and Statistics for April 1988:

Net	Mgr	Freq	Time	Sess	Ses	QSP	QNI
NJM	WB2ZJF	3695	1000	DY	31	95	244
NJPN	W2CC	3950	1800	DY	34	80	373
NJN/E	NZ2R	3695	1900	DY/P	30	100	233
NJN/L	WA2EPI	3695	2200	DY/P	20	7	52
NJSN	KA2INE	3735	1830	DY	31	42	173
CBTTN	KA2F	147.12	2000	DY	27	95	233
NJTTTN	WA2EPI	223.88	2100	DY	30	59	258
NJVN/E	WB2FTX	146.895	1930	DY/P	30	98	484
NJVN/L	N2FGC	146.49	2230	DY/P	30	31	482
NNJ/PL	W2QNL	145.01	24 hr	via WA2SNA-1			

Packet NTS activity for May, 1988: Total 106. WA2SNA-1 auto forward (43) plus liaison (63) by NZ2T (22), W2QNL (26), WB2FTX (9), KC2YG (2), N2HIF (2). SAR/PSHR: N2XJ 244/97, KA2F 130/106, N2DXP 151/63, WB2QMP 93/88, W2QNL 183/98, K2VX 78/82, W2RRX 70/81, WB2FTX 132/67, KB2CYC 5/45, N2BNW 31/54, KA2INE 68/82, WA2EPI 96/91, ND2K 8/29, W2XD 17/, NR2O 46/, NR2N 12/, W2CC 17/.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM: WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. PIO: WEØM. The Midwest ARRL Convention in South Sioux City, Nebraska was a big success with roughly 700 attending. Your Section Manager was kept busy chairing a Section Forum and making two other technical presentations, but still found time to spend some money in the flea market and admire the new IC-781 on display. Many thanks and congratulations to the 3900 Club and the Sooland Amateur Radio Association for a successful convention. The annual Iowa 75 Meter Net Picnic will be held at the Iowa City city park on August 21 at noon. WAØNDD and KØSVZ are co-winners of the Davenport Radio Amateur Club's Willis Otto Award. Congratulations! The Davenport group also provided communications assistance for the Cerebral Palsy Walk-a-thon. Regretfully, WAØGBD has become a Silent Key. The Cedar Valley Amateur Radio Club spring Novice class produced twelve new Novices, four of which are age 16 and under. In addition, the CVARC spring examinations produced 2 Novices, 9 Technicians, 4 Generals, and 1 Advanced. ZIP Code routing of NTS traffic on the state packet PBBS network is being implemented successfully. Hope everyone had a successful Field Day! Traffic: WØSS 227, KAØADF 90, WØYLS 86, KØPT 80, WBØMCX 70, KCØXL 39, KØGP 33, WBØAVW 30, KØBRE 22, WØOMV 22, W4JL 19, KAØVBA 9, WBØOKA 6.

KANSAS: SM, Robert M Summers, KØBXF-SEC: NØBLD. STM: WØOYH. Net Manager KØBN/KPN, WØFRC. Net Mgr QKS, WBØZYN. Ks RTTY Mgr, open. District Emergency Co-Ordinators are WØORG, WBØYJT, WØEB, WØFRC, NKØV, WAØCVR, WBØMDF. State Govt. Liaision: NØBLD. Tech Co-Ord. open. Bulletin Mgr: KØJDD. ACC: KØBXF. PIO: WBØWSG. Manager of QKS-SS is WØMYM. WX Net Manager, WBØYWZ. It looks like the long awaited KANSAS NEWS-LETTER is about to be borne. KØNL and WØOYH and myself are all but in agreement. Final decisions are in the making and hopefully will be ironed out soon after the hamfest at Salina. Net results for the month of April: KSBN QNI 1573 QTC 125. KPN 440/40. KMWN 706/562. KWN 943.628. CSTN 2038.48. QKS 247/77. QKS-SS 28/10. Still looking for a volunteer to rekindle the RTTY net! We also could use some more stations to represent KS on the dTEN net. If interested contact WØOYH. Congr. to NØJDW, ex KAØZSQ who is still continuing a FB Job as NCS for the QKS-SS net. Many TNX to KØEVM, KAØBSP, KØEW and WØEUY for picking up and Providing the communication efforts for the "RUN TO DAYLIGHT", special event, May 16-17 as the run proceeded thru Leavenworth, Wyandotte Cos in KS and Jackson Co., MO. KC 220 Users' net, KC area-224.54 (KRØ/E/R, use it! Traffic: WØFIR 244, WØFRC 207, WBØZNY 117, KSØU 111, WØFDJ 78, NBØZ 75, WØOYH 74, KØBXF 65, WØQMT 64, NZØM 45, KØKU 35, WØMYM 35, WØYXK 12, WØRBO 8, WØCHJ 6, NØDJT 3.

MISSOURI: SM, Ben Smith, KØPCK. Elected as officers of 1988 for the Lake Ozark ARC are; Pres. NØGYE, VP NØINI, and Sec.- Tres. NØHIZ. The Rolla Amateur Radio Society assisted with their local March of Dimes Walk-A-Thon. Members helping were: KAØWPH, WØRLQ and KAØLLN. Amateurs from the Central Missouri Radio Association and Mid MO ARC provided communications for the Ozark 100 Triathlon. Those assisting were: NØLV, NØIWF, NØSS, WBØTEG, NDØN, KAØIBS and KØPCK. After taking a lightning strike several months ago that greatly reduced the coverage of the 146.79 repeater at Rolla, the RRARS now has a new Hamtronics Model REP-100 operating from its old location and is providing communications for a big part of central Missouri again.

Net	Ses	QNI	QTC	Day	Time(PM)	Freq	Mgr
MOSSB	31	567	93	D	6:00	3.983	KØORB
MON	62	277	133	D	7/9:45	3.585	AIØO
MEOW	---	---	31	D	5:30	3.963	WDØELL
RRABN	29	425	7	D	8:00	146.79	KBØANP
RRABN	30	393	5				
LOZBC	26	403	0	M-SA	6AM	146.73	NØHVO
HBN	22	353	21	M-FR	12:05	3 880	KØDSQ
SLAN	5	298	3	M	8:00	146.91	KØWEX
CMEN	5	196	0	W	9:00	146.76	KØPCK
PHD	5	141	9	M	9:00	143.43	WAØKUH
HARC	5	108	11	---	---	---	KAØSXY
HARC	4	75	11	---	---	---	KAØSXY
LOZFM	4	99	0	F	9:00	146.73	NØHVO
SWMSW	4	86	1	---	---	---	KØKXC
KCARES	4	69	0	---	---	---	KØUAA
KCARES	5	73	0	---	---	---	KØUAA
ZAEN	5	55	1	T	8	147.24	NOØE
JCCCN	4	34	0	W	8	147.00	WBØDZX
MXARES	4	24	2	TH	9	147.255	KAØTGL
CARL	3	19	0	W	6:30	146.46	WBØWLU
MM1OM	4	18	0	SU	---	28.325	NSØB
CMOZYL	4	18	0	MO	8	147.285	NØHVO

Traffic: AIØO 174, WBØMA 152, KØORB 114, WAØHTN 113, NDØN 80, WAØYJX 63, WBØCJB 55, KØPCK 43, K9OCU 40, WØOUD 40, WCØAAG 34, WØRL 22, KDØAJ 15, WAØKUH14.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. SEC: Michael Ruhrdanz, NØFER. Several clubs and ARES organizations have been expressing concern about liability when conducting or participating in club activities and disaster drills. Some groups have obtained insurance but have had to raise dues in order to pay the required premium. On the other hand, some of the smaller groups have found liability insurance just too expensive, and as a consequence have not been able to even participate in local civil defense training drills. If your club or organization has come up with ideas that helped solve a problem with the liability issue, please share them with others. Your Section Manager would like to hear from anyone on this matter. At least three nets are operating in the Novice portion of the ten meter band in the Nebraska section. All checkins are always welcome to these nets: Thursdays 8 PM CDT 28.125 MHz CW, Thursdays 9 PM CDT 28.325 MHz SSB and the Freemont Pioneer Amateur Radio Club has a Sunday night net at 7:45 PM CDT on 28.360 MHz SSB. The Lincoln 10-10 Net meets Thursdays 8 PM CDT on 28.650 MHz SSB. The Lincoln Amatuer Radio Club picnic is set for August 7 at the home of NØFER, starting at 4 PM CDT. The joint club picnic for the Blue Valley Club and the Buzzard's Roost Club is scheduled for August 14 at Genoa, Nebraska. The AK-SAR-BEN Radio Club has scheduled their annual Missouri River Boat Cruise for August 14, 5 PM to 8 PM CDT . . . information and tickets can be obtained from WCØR of Papillion.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Dick Pechie, KB1H—STM: K1EIC. SEC: N1DCS. OOC: NA1I. ACC: NK1J. PIO: WA1CMF. TC: W1HAD. SGL: K1AH.

Net	NM	Time	Freq.(MHz)	Sess	QNI	QTC
CN	WB1GXZ	7 & 10 PM Dly	3.640	62	393	211
CPN	NK1J	6 PM M-SAT 10:00 AM Su	3.965	31	337	145
NVTN	NM1K	9:30 PM Dly	146.880	31	542	140
Westcon	N1EDD	8:30 PM Dly	147.180	31	508	168
RASON	KY1F	9:00 PM Dly	146.730	31	225	74
CSTN	K1CE	24 Hour BBS	145.010			
CSN	WB1GXZ	7:30 PM M-F	3.720	22	111	41
TMRCN	NM1K			10	130	10

With the vacation season in full swing, recognize those strange calls on your local CT repeater when heard. Congratulations to W1EQ on 50 years as ARRL member. Ct. Traffic handlers again achieved 100% representation to 1RN/2 for May. Southington ARA recent program was a film on the MIT Media Lab. VERY high tech stuff! VEOSEC has been named by the ARRL VEC as a participating VE team in the new field exam inventory program. This means a member of the team will have exams on hand at all times. Good job by the participating clubs and members of SE CT. Operation Technical Support, a Tri-City ARC project headed by W1RPQ and WA1WYN, is an effort to centrally collect manuals and old tubes. Recent elections at SARC have N1CWD as President for another year. SARC/ZYGO ARC have spaced reserved at the Durham Fair for a ham radio exhibit. KA1RDX and W1TKG are coordinating this multi-mode effort. Having played radio for 50 years, K1KKG finally got his DXCC award. Waterbury ARC one of many area clubs donating funds for the ARRL renovation project. ECARA NET/ROM node K1MUJ-1 now permanently a 220 digipeater. This change joins efforts of ICRC, K1IKE, W1OPS, and others to develop a 220 linking of packet within CT. Most 220 digipeaters are dual-ported to a 144 MHz frequency. If your club news is not making the Section News, is your newsletter editor sending a copy to the SM? Traffic: WB1GXZ 328, N1DMV 292, NM1K 289, N1FJW 209, W1EFW 153, KA1GWE 148, NQ1P 131, KA1FVY 108, KA1JAN 96, KB1ZC 59, KA1KP 58, KY1F 51, W1WP 43, W1YOL 39, N1BOW 29, K1AQE 28, KA1RVI 26, WA1NLD 23, WB1ESJ 15, W1CUH 9, W1QV 8, N1API 8, WB2SGI 7, KA1REQ 6.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA—STM: KW1U. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU, ACC: Open EMass Hotline: 437-0111 Westlink: 449-2226

Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY	53	159	166
EMRIPN	WA1FCD	3880	1730	DY			
EM2MN	KA1MDM	63/23	2000	DY	31	136	341
NEEPN	K1BZD	3945	0830	SUN	5	4	39
HHTN	NG1A	04/64	2230	DY	31	157	420
EMRISS	N1CVE	3715	1600/2030	DY	36	14	48
CITN	KB1AF	745/045	1930	DY	31	63	267

I hope everyone has a good time during the Field Day weekend, and that all your efforts get good publicity in your local communities. Field Day is a great opportunity to show off our hobby to our neighbors and friends, as well as have some fun. It is important to show off our capabilities to the local authorities so they can see exactly what we can provide for them during a large scale communications emergency, especially one where the telephones would be out. Bob Salow, WA1IDA, has been appointed DEC for Red Cross Operations. If anyone has any questions about Red Cross ham operations, ask Bob. I am sure nothing but good things will result from this appointment. The New England Spectrum Management Council recently elected temporary officers until their annual October meeting. They are as follows: Bruce Alexander, KA1IG, President; Bob Skinner, WA1YEG, Vice President; Dick Wall, K1ZZJ, Sect; George Foote, N1AG, Tres; Sergio Marino, KG1C, EMass Director; Andy Morrison, N1BHI, EMass Vice Director. NESMC coordinates 91 2 meter frequency pairs and 76 220 MHz frequency pairs, and they report that 440 MHz is not full yet. They also report plenty of 6 meter frequencies available. The Wellesly club is planning to return to the USS Constitution for July 4th and operate a ham station and a message booth. Most other clubs are getting ready for the summer quiet period. If your club is looking for a project,

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Works absolutely great! . . . (Bob N1EKP)

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A fine antenna! . . . (Joe KA3MMJ)

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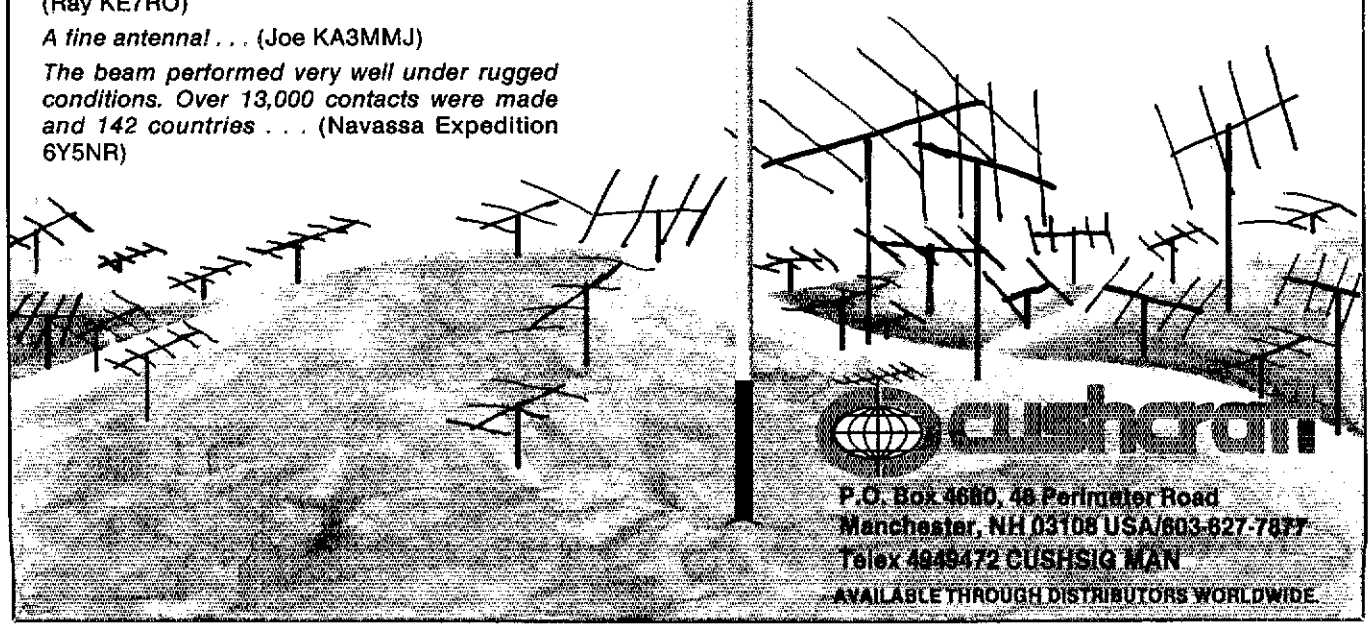

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why not adopt a local school? Now would be the time to do this, so any programs can be put in place for September. This will help ensure the future of our hobby. There are now more opportunities than ever to become a ham, but the number of people doing so has not been large enough to keep the wolves from our frequencies for long. If anyone has any ideas, please let me know. The Affiliated Club Coordinator job is open if anyone is interested. Also, AG1F and K1HLZ continue to look for assistants to help in their important roles. KW1U and all the traffic handlers continue to do an amazing job on a daily basis. Thank you to all who give of their time so our hobby can thrive, and increase public awareness. Have you expressed your opinion on Amateur Radio issues to your section or division staff lately?? Please do! Traffic: KW1U 542, KN1K 406, WA1TBY 205, KB1AF 187, NG1A 105, N1AJJ 103, KA1MDM 91, K1ABO 85, K1GQS 66, WA1FNM 64, KA1LIH 36, W1CE 30, KA1NOI 30, NK1O 25, N1EGN 21, K1SEC 18, K1LCQ 16.

MAINE: SM, Cliff Laverty, W1RWG. ASM: Bill Mann, W1KX. SEC: KA8UVQ. STM: WA2ERT. BS: W1JTH. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: KQ1L. ASM/Packet: N1AHH. OOC: W1RWG. As you read this activity report, Bill Mann, W1KX, is now the Section Manager of the Maine Section. After four terms (eight years), I decided not to run again and make room for new and fresh ideas. I have enjoyed working with the hams in Maine as their Section Manager. Most of the hams in the heading have served in their present capacity since the start of the reorganized field service, and they have served well. Phil Young, W1JTH, Bulletin Manager, reports 102 transmissions by 7 bulletin stations, comprising 9 ARRL, 2 Maine, 0 propagation, and 1 packet bulletin on Hancock ARES CMEN SGN MPSN RACES AEN MENET (packet). As follows:

OBS	bulletins	transmissions			
W1KX	15	41	SSB	3,940	RCS/MPS
N1EUK	3	5	FM	10/76	ARES-CMEN
N1BCF	11	21	FM	31/91	Hancock ARES
WA1YNZ	4	6	FM	13/73	AEN
WA2ERT	3	3	FM	31/91	Hancock ARES
KA1DAX	10	26	SSB	3940	Sea Gull Net

The Sandy River ARC participated in the annual Sandy River Rehabilitation Center Bike Hike on June 5. The following members participated: KI1B KA1JGF KA1CNG WB1GBC N1EZR W1HTG KA1JOJ with their time and expertise. Traffic: KA1JOJ 126, ND1A 66, WA2ERT 52, W1RWG 46, W1BMX 34, W1VEH 22, W1JTH 21, N1BJW 20, AK1W 19, KA1ODT 15, WA1YNZ 15, W1KX 13, W1OTQ 10, N1BCF 9, NI1Y 9, KA1DAX 8, N1EZR. PSHR: WA2ERT W1RWG.

Net	Sess	Checkins	Traffic	Mgr
Sea Gull	26	777	97	K1GUP
Pine Tree	31	285	62	ND1A
Aroostook Emerg	5	83	2	WA1YNZ
MePubSvc	No Report			KA8UVQ
CenMeEmergency	9	152	6	N1EUK
Races Oxfor Cty	5	59	33	W1RWG
RACES Hancock Cty	5	60	5	WA2ERT
RACES Kennebec Cty	5	67	---	KA1LPW
ARES Cumberland	5	73	---	KA1ODT

Please keep in mind the hamfests at St. Albans on August 13 and at Windsor on September 10. Keep your contacts clean! 73, Cliff.

NEW HAMPSHIRE: SM,Bill Burden, WB1BRE. STM:W1TN. TC:W1JY. We start off this month's report with a rocket launch!! Butch WB1GXM, teaches fifth grade in Lempster and his science class recently launched their own-made rockets. There were 2 tracking stations with W1GUA and KB4NSA providing comm via the Sullivan Cty ARES frequency to Butch to launch control. They reported rocket height with one rocket reaching 1200 ft! OK AMSAT, now about the Phase 4 launch. . .! And in the Keene Sentinel, Dawn Cummings K1TQY, NM, was featured in an article with pix promoting Ham radio and the Cheshire Cty ARES group activities. Tnx to Alan W1FYR for the input. This was Kingston fleamarket month and the new site on the fairgrounds was packed according to all reports. Proceeds after expenses go to the Boston Shriners Burn Center hospital-another example of community support by Amateur Radio. Each year, the Lung Association sponsors a 3 day bike tour as a fund raiser. This year it was held on the coast and Fred K1ACL, reports that the GBRA and Port City ARC combined forces to provide communications and safety support for this event. Meanwhile, the March of Dimes Walkathon in Exeter was supported by Dick W4PAS and a team of operators recruited on very short notice. A special thanks to these clubs and individuals who are giving their time to do these important public service activities for their communities. Dot and I visited the Lakes Region Repeater Association in Laconia for a pleasant dinner and visit. I spoke to the group briefly about current Section activities and FCC actions affecting the hobby. We also attended an NHARA board meeting in Derry on invitation from pres WB1HBB. This involved discussions of immediate projects and plans for the remainder of 1988. The May VE test given by GBRA had 15 candidates with 9 people upgrading. In addition, three people started with no license-one made his Novice ticket, one reached Tech and one went all the way to Advanced class! From the Twin State RC-Novice class exams are scheduled for June according to Bill N1EMF. We have more new appointments to the Field Organization this month-Rich KB4N is now a member of the Amateur Auxiliary, and Bob W1HJT, and Larry W1GTA have been appointed Asst Technical Coordinators for NH. Congrats to all! With the greatly improved band conditions on 10, 12, and 15m, many new hams will have their first exposure to massive doses of DX. It's important to keep in mind our role as US "ambassadors" to the international Amateur community. Many pleasant and exciting QSO's are in store for the operator who practices courtesy and good operating practices. If the sunspot cycle improves as currently predicted, we should see opportunities for many of the coveted DX awards. Finally, WA2SPL, NM, 1RN/3 reports that we had 90% representation on 1RN/3 this month.

Net	Time	Freq	Mgr
GSPN	6 PM	3942	WA1YZN
NHN	7PM	3547	KB4N
NHNTN	7 PM M-F	28330	KA1OU
GSFMS	8:30 PM	146.94	N1ALM
GSFMN	8:30PM	146.475	N1ALM

Traffic: GSFM 134, GSPN 116, NHN 77. NHNTN 40, W1PEX 1706, BPL, WA1FHB 428, N1CPX 377, K1TQY 293, KB4N 261, W1FYR 244, KA1GOZ 117, KK1E 53, N1ALM 50, W1ALE 48, WB1HBB 42, KA1OU 34, W1TN 31, KA1HPO 11, KA1LMR

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See you at the **1988 ARRL National Convention in Portland Oregon Sept. 9-11**

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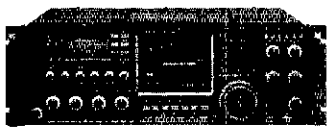
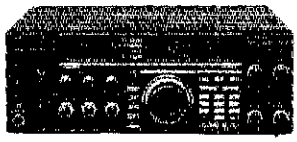
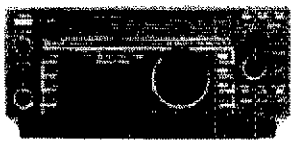


ICOM IC-781
Top of the Line



ICOM IC-761
Deluxe Transceiver



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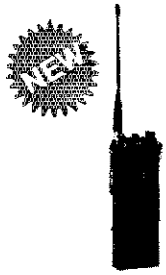

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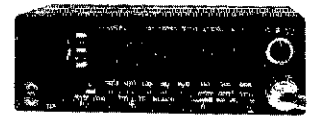

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220 MHz

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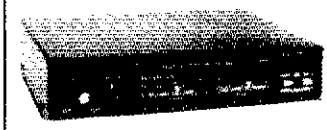

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10, KA1KFX 7, KA1JOU 7, N1DQA 6, KA1PFS 4, N8HTJ 3.

RHODE ISLAND: SM, William M. Foss, KA1JXH—RI staff appointees: STM: KA1KML. SEC: KB1G. TC: N1BAQ. ATC: W1CKH, KA1EGY, WB1FDY. KA1PBQ's Ocean State Young Amateur Net meets each Thursday at 8 PM on 146.70. Everyone is welcome to check in. KA1JNP & KA1NXS got their 224.56 rptr up & going. Results of the 200 special event stations. W200AQ 2893, NN200E 2771, W200SYE 630, W200DDD 500. ARASNE will have exams Aug 28. Novice-Extra. Contact WA2KFE or NO1U ex: KA1MO by July 7. If anyone is short one VE for their next exam, just let me know. I am looking for ATC & OO from each club. I would like to wish everyone a nice and safe 4th of July. Traffic: W1EOF 231, KA1JXH 182, PSHR 85, KA1KML 150, PSHR 64, WA1CRY 30.

VERMONT: SM, Peter G. Drexel, AE1T—STM: KT1Q. SEC: W1KRV. PIO: WA1YOY. As I write this, groups across the state are preparing for their field day endeavors. Here's hoping that you all had fun and accomplished your goals. Let's hear about your club's operation. Green Mountain Wireless Society has a new slate of officers. Congratulations to: Jozef WB2MIC (President), Russell N1FHY (VP), Eric KA1NZA (Treasurer), Pete KC1OO (Secretary). There's been lots of public service communications this spring. The Diabetes Bike-A-Thon was supported by W1EXZ and WB2JSJ as net controls in Burlington. WA2MAP, KA1JUI and WB1HHG provided coverage in Rutland. The March of Dimes Walkathon effort was organized by WB1AJG. N1ERI walked the entire route (whew), ND1I, KA1OIO and KA1NWB supported the Pittsford 10k race. W1KRV reports that a Weather Spotter class was held in St. J. WA1JVV, NJ1Z, NK1A and N1ANX are new spotters. Listen to your weather radio, contact NB1A, W1KRV for details of the next scheduled classes. Joe highlighted the significant progress that has been made in networking with the Red Cross and National Weather Service: a tribute to our ARES leadership. The Vermont Packet Radio Organization (VPRO) was formed at a meeting held at the QTH of KA1NZA, VPRO will study and coordinate the implementation of wide area and local area networks in the state. Attendees were WB1AJG, K1HKI, K1AUE, WA1OZE, W1LJA, WB1HHG, WB2MIC and N1CQE if you would like more information. The NTSVT packet node is now WA2SPL. The KD1R-1 Xerox 820 has been replaced with a PC with a bit more disk space. Thanks Ralph for helping to get all this started. It is with regret that I report that Francis W1ENC, and Jack N1CPO are silent keys. You are missed - 73... On a lighter note, congratulations to WA1ONT on the arrival of a new harmonic, Sara Marie. Recent upgrades: N1FHI/Advanced, KC1GR/Extra, KL7JJN/General, KA1KJE/Tech, KA1OIQ/General, KA1PUJ/Advanced, KA1RMN/General, KA1SAE/Tech. New Novice: KA1SAC. Great work folks! I'd like to take this opportunity to thank outgoing SM Frank, W1CTM, for his superb leadership over the past two years. It has been a pleasure working with him. Frank has accepted as ASM post and will act as the focal point for all RFI issues. I look forward to serving you folks and helping us be more effective communicators. Murphy had W1KRV and KT1Q in the hospital, on the same night, this past month. Fortunately, both are in fine fettle again. You guys arrange this as a preparedness drill for the rest of us? Vermont had 74% participation on 1RN/2 and 87% on 1RN/3. Six stations attained PSHR. KT1Q achieved BPL, NTS node; 3844 messages. May traffic: KT1Q 527, WA2SPL 478, N1DHT 102, WA1JVV 75, WB2MIC 64, W1KRV 62, NB1A 46, AE1T 36, WA1VXW 30. Net Reports: VTN 31/150/125. TSFMN 5/61/2, TSEN 4/55/3, VPN 5/90/10, GMN 26/406/33, CAR 26/501/45, CVFMN 5/101/5.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. I want to thank the HCARA for inviting me to their annual banquet. The food was delicious and I had the opportunity to meet the members of the club. W1KK gave me the grand tour of their contest setup. Very, very impressive. No wonder they are always found in the top ten percent of the contest entries. Congratulations to the members. Received an activity report from KZ1X, ATC, and he said that no one has asked for his technical expertise. There should be any number of new, or not so new, hams in the section that are having one or more technical problems. Steve would like to help in solving your problems. MARA reports that they are having a difficult time with their technical troubles. They are going to a dual antenna system with bandpass filters in hopes that it will cure the RF saturation at their repeater site. John, N1BHL, reports that the MARC is planning to take, or at least try to take, first place in one category during the Field Day test. Plans have been underway for the past four months. Fred, WA1IQR, had the able help of N1EKE, KA1RKJ, KA1RIT, KA1RKK, and NA1P erecting and tuning a long wire. That kind of help makes a big job very small. Roger, NE1C, of CMARA reports that 25 members participated in the Boston Marathon. W1JLA reports that CMARA has a staff chosen for Field Day. This is another club that is very serious about taking first place in the section. MTARA will be holding their field day at N1BDH's QTH in Hamden, Mass. They plan to participate in the VHF contest from Soapstone Mt. in Somers, CT. All the clubs in W. Mass. are very active. Join a club. Your help is needed. Traffic: KA1IFC 686, KA1EXJ 77, WB1HIH 56, WA1YYK 84, K1JHC 26, W1SJV 29, KA1EKQ 21, KA1QFV 34, NI1V 11, W1ZPB 2, W1KK 78, W1UD 201, KC1DI 23, KA1OFC 11, N3FSM 9.

NORTHWESTERN DIVISION

ALASKA: SM, Dianne Marshall, AL7FG—SEC: KL7AF. DEC Interior: NL7HI. STM: KL7VY. DEC Kodiak: KL7JBV. Mark Prez, NL7IY, was appointed OBS Kodiak Island. Congratulations, Mark. Election results for the Anchorage ARC; Harvey Rookus, NL7DK, prez, Lil Marvin, NL7DL, vice, Dan Robinson AL7GN sec, Fred Wagner, KL7HFM tres. Coming up: The Arctic Amateur Radio Club will have their Hamfest on August 27 at the Tanana Valley Fairgrounds in Fairbanks. EMERGENCY FREQUENCIES (kHz): State of Alaska 4460/5167.5; Troopers 5195/7486; Hams Statewide 3920/3933; US Coast Guard 5692/6518.8/12342/13113; US Air Force 5611.5/5631/13200.9. ARES/RACES Nets: Anchorage 147.90/30 0500Z Thurs; Mat-Su 146.25/85 0600Z Sun; Juneau 147.90/30 1800Z. Sat; Fairbanks 28.400 8 PM local Sunday.

IDAHO: SM, Don Clower, KA7T. SEC: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WG7E. The Eagle Rock ARC provided communications for the Loyalty Day Parade in Idaho Falls last month. Local hams provided communications for the Meridian Dairy Days Parade in Meridian and did a fine job plus had a lot of fun. We are going to be at the Mack's Inn RV Park, space 12, the whole week of Aug. 9-13th for WIMU. Stop by and chat with us about any concerns you have about Ham Radio or ARRL matters. I will have pictures and the Proclamation signed by Gov. Andrus at the WIMU ARRL booth. CUL & 73, Don. Traffic: W7GHT 158.

MONTANA: SM, Ken Kopp, KØPP—NW Div Dir W7RM has app't WA7DEO, W7GVT, WB7ODN as Ass't Dir's. They join WA7PZO, WB7TNH, KØPP in representing Rush in the section. Gov. Schwinden proclaimed Amateur Radio week in Montana ending with Field Day. LYARS (Glendive) celebrated 10th anniversary in May. GFAARC (Great Falls) hosted SM KØPP at June meeting. KE7X had top QRP (5 W) SSB score in SS with 808 QSOs. GHRC (Bozeman) has new emergency trailer. Hamfest reminders: CCARC (Helena)/BARC (Butte) picnic Jul 30/31, W7OTJ's ranch picnic Jul 31, WIMU Aug 12/13/14, Big Arm picnic Aug 14. Want to help with section service activities? At writing time (June 7) the Bulletin Mgr position is vacant. Contact KØPP for info. Swap your club's newsletter with other clubs—a way to share your activities and gain club recognition. Traffic: WB7WVD 30 (PSHR/68)

Net	Sess	QNI	QTC	Mgr
IMN	31	256	90	KA7EEE
MSN	5	95	0	KØPP
MTN	31	1491	120	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. RFI: AK7T. OO: WN7W. STC: N7ENI. The 1988 ARRL National Convention is coming along very well. All Commercial Exhibitor booths are filled and there is a waiting list for any cancellations. We have a great variety of seminars. There are just gobs of Flea Market Tables that have signed up. Be sure to circle September 10-11-12 on your calender because you don't want to miss this convention. We have three new Emergency Coordinators in the State. They are Darrell Nave, N6DXX, Washington County, Ray Neves, WA6ZEL, Douglas County and Craig Terry, K7JUV, Hood River County. We have established a new organization for the purpose of linking two-meter repeaters in the State of Oregon. It will be done with a 450-MHz backbone. The idea is to be able to connect to the backbone with tones from your tone pad and when the QSO is done you can disconnect from the backbone and have your normal repeater again. If you are interested in joining the group or help with sights, repeaters or technical support please contact "Oregon Repeater Inter-tie System" (ORIS) PO Box 13192, Salem, Or 97301. Traffic (P) = Packet W7VSE 431, N7BGW 228, N7ELF 139, KA7EEE 119, K7IFG 113P, WB7VSN 104, WB7EMO 87, N7CPA 76P, KZ7T 63P, W7LNE 61, W7LRB 60,W7ODG 58, WB7SZM 48P, N7APC 25, KA7AID 18, KD7YZ 12P, KA7UZ 11P. Late April: WJ7E 50.

WASHINGTON SM, Brad Wells, KR7L-STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM KA7CSP. ASM W7UOF. ASM: K7CLL. The Central Washington Hamfair at Yakima was the best ever this year. An idea, mentioned last month, concerning a common PL on repeaters for use during ARES activities surfaced at the EC meeting in Yakima. The consensus is that it is unnecessary, since people normally stay off a repeater during emergencies and the cost of installing tone encoders on personal 2 Meter gear could average about $100 per person. This month the Radio Club of Tacoma presents its 1988 Hamfair at Pacific Lutheran University on August 13-14. Features include seminars and forums, 10,000 square feet of flea market space, VE testing, Saturday night banquet, the Logger's Breakfast Sunday morning, ARRL forum, EC meeting, and many commercial exhibits. Dormitory rooms are available for a nominal fee and RV parking is available. Contact Bill Morgan, W7GPR, (206-531-3821) for more information. The Pacific Division of MARC (Mobile Amateur Radio Awards Club) will hold their annual get-together in Jennings Park on August 5-6. All are invited to attend. The camping is free and there will be a pot-luck dinner Saturday night . Contact Bob Klepper, W7IEU, (206-659-3005) for further information. WA7PIN and KD7QI, operating at the RCT Club Station, received 202 Mother's Day messages from Alaska via 20-meter SSB. These messages were than pumped into the NTS by the same operators. It was a good test of the club station's capabilities to handle H & W traffic in an emergency. Why not involve your club station in a similar project? Net Manager, N6EQZ, reports much activity on the Traffic Handler's Net which meets each night at 2220 PDT on 3995 kHz. It is an NTS wide-area net designed to move traffic from the night-time system into the daytime system. They average some 200 pieces of traffic each month. This net will provide you with an excellent opportunity to handle traffic. For operators interested in international message traffic, the Australia-to-North America Traffic Net meets daily at 0730Z on 7228 kHz and is managed by Sam, VK2BVS. The Clallam County ARC provided communications for the Sequim Irrigation Festival parade on May 18. Congratulations to N7KGS on becoming the EC for Kittitas County. Kitsap and Mason ARES responded to a real communications emergency when a backhoe accidently severed a 600-pair telephone trunk line. All telephone systems in the south half of Kitsap county and parts of Mason county were out of service. Within one-half hour of the incident, N7DXS, W7IVW, and KN7D had 35 operators dispatched throughout the affected areas of both counties. A job well-done which impressed county officials. PUBLIC SERVICE HOURS: Asotin 3, Benton 25, Cowlitz 25, Franklin 25, Garfield 41, King 510, Kitsap 125, Pierce 58, Thurston 115, Wahkiakum 25, Walla Walla 104, Traffic: N6EQZ 381, K7GXZ 267, WB7WOW 204, WA7CBN 189, W7IGC 188, N7GGJ 162, KR7F 128, W7GB 92, K7SUX 86, W7LG 69, WA7YEN 60, W7LBK 50, KA7PMD 32 K7UQH 28, KE7EO 26, K7AJT 16, N7DIP 15, W7APS 4, K7CLL 4, KD7G, KD7ME.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG. ASM: W6ZF. WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. Welcome to the newly League-affiliated Contra Costa Communications Club, Inc. Their service area is listed as the North San Francisco Bay Area, and they meet 2nd Sundays for breakfast at 0800 and business at 0900, at the Hickory House Restaurant, San Pablo Avenue, in San Pablo. The Benicia Amateur Radio Club is gearing up for FD, with a family dinner planned for Saturday night. The East Bay Amateur Radio Club mourns the loss of Mike Young, K6MBV. FD won't be the same without him there. The Hayward Radio Club graduated six new Novices for their latest class and are planning to set up their own VEC program. The Livermore Amateur Radio Club had a TWEAK-IN for member's hand held, mobile and base HF, VHF and UHF radios at their last meeting. The Mount Diablo Amateur Radio Club's "The Carrier" features articles transmitted to the editor via packet radio. Their newest members are KA6OFQ, N6RKA, KB6VKY, KB6WLD, N6QGN, Chris Goodnough and Brian Walker. May traffic: WB6DOB 250, W6VOM 128, and WB6UZX 26.

NEVADA: SM, Joe Lambert, W8IXD--ASM: K7HRW. The big news this month is the Nevada Hamfest in Reno. this will be held August 20 at Idlewild Park, just west of downtown Reno. Look for the California Building. Admission is $3.00 which includes one drink and one chance at the door prize. The Hamfest will feature VEC exams, a Flea Market and a talk and question and answer period by Pacific Division Director Rod Stafford. The VEC exams will start at 8:15 AM and last until about noon. Contact K7HRW for exam info. There will be food and drinks available and a good time will be had by all. All hams and their friends are definitely welcome. TARA reports that its new officers are WA6EWV, Pres.; W7KJU, VP; N6ELV, Secty, and WA6SIM, Treas. Directors are: NX6X, W6CSP, NR7A, WA6ASI and AH2A. SNARS has its new hilltop building in place and in operation. Picnic sponsored by LVRAC was held May 14. All hams in the So. Nev. area were invited.

PACIFIC: SM, Jonathan Starr, AH6GJ— Congratulations to WH2AEN on being named civilian of the Year on Guam! Comm. for JAL marathon on Guam included AH2S AH2AE AH2BT AH2BY KH2E KH2CC KH2CS KH2CU KH2CY KH2CG WH2ACQ WH2AEN W1YBM. Also communications for the American Red Cross "cocos challenge" swim race will be provided by KH2E KH2CS KH2CY WH2AEN and W1YRM. Increase of two in ARES membership on Kauai. Kauai's first foxhunt resulted in great fun and served as a valuable learning experience. Walk America on the Big Island had NH6ES KH9AB AH6GO AH6GD KH6FKG NH6FN WH6BWJ KA2IXG NH6OV NH6NY KH6LE AH6GN NH6ER NH6OJ and AH6GG. EARC provided support to the Western States Shriners convention parade, including NH6GJ KL7IVQ WH6BUL KH6HJA NH6IT NH6MH NH6OR KH6CIZ N4ESX NH6EV AB6BJ NH6LH WX4J KH6BIO. Thanks to all who participated in the statewide emergency drill on May 11. Aloha Jon AH6GJ. Traffic KH6S 46, KH6GMP 26, KH6H 49.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—NEED YOUR HELP! HAVE YOU read something similar to the following, which has appeared in this column many times?—"Don't forget the Section Net the first Sunday of the month at 8:00 PM on 146.085, input up .600 MHz." "When I was running for SM one of the things often mentioned as wanted was a Section Net to keep people informed and to provide a path back to ARRL officials for questions, gripes, etc. Recent nets have had very meager check-ins and in the latest, the only Section officials other than myself and Jettie, W6RFF (the alternate as Net Control) were Art KA6HVY, Plumas County EC and Ken, WO6H, Nevada County EC. Is trying to compete with "Murder She Wrote" a losing battle? Do we need some way to jog people's memories to get on? Is the Net no longer wanted? Is it at the wrong time? Wrong frequency? I am asking some of the Section Staff to try to find out: Jettie, W6RFF, the Affiliated Club Coordinator to get opinions from the clubs; Deane, NR6A, the Section Emergency Coordinator to check with his Emergency Staff; and Al, WA6WJZ, the Section Traffic Manager to poll the traffic people. If you have some input give it to one of them or direct to me. My phone number and address is on page 8 of every QST. I can often be contacted on 146.835 (- .6), or send a packet message to me, W6IEW @ WA6NWE-1. TNX es 73. Traffic: WA6WJZ 220, WA6ZUD 162, N6LUY 157, K6SRF 111, WD6BZQ 42, N6CVF 30, W6RFF 29, WB6SRQ 6.

SAN FRANCISCO: SM, Bob Smith, NA6T— SCRA has 7 public service events this summer, want to help? Contact N6KLU or N1AL via .13-73 for info. SCRA has a landline BBS for ham info, interested? Try 707-527-7734 (300-1200-2400 b 8-N-1.) VOMARC is very active in RACES within City of Sonoma, the van is working out. Want To Help? contact Kermit, W6JFN for information. REDXA is looking to expand the WG6H-1 dx digi network via 220 MHz. Any one interested contact WG6H or WW6D in Santa Rosa. GSLPRC (SF telephone pioneers RC) has been active with the Van this month, and was responsible for a lifesaving effort at one of the events with amateur radio and first aid. Be sure to check your VIP response kits, the fire season in Northern California has been called "VERY BAD" so far, and looks like the VIP Programs in the section will be active again. Don't forget the Southern Humboldt ARC get-together at Benbow Lake Aug. Tfc: N6FWG/T 35.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. Emergency Coordinators are needed in Calaveras, Madera, Mariposa, and Mono Counties. If you are interested in Emergency Communications and can fill one of these positions, please contact W6DPD or WC6U for an application. WD6CUG is a SILENT KEY. The Calaveras ARS operated special event station WA6YGA at the Jumping Frog Jubilee. They made 538 contacts. WA6CY1, WQ8H, N6NML, and WJ6O were the operators. N6NML is a General. KB4HTF is AA6ID. KJ6CC is Extra. KB6WBQ and KB6WZD are Techs. The Tulare County ARC will operate WA200BAI during California's week with the special bicentennial prefix for the Constitution bicentennial celebration. There is a packet net in Indian Wells Valley at 0300Z on Sunday evenings on 145.050. Mailboxes are available for traffic and will be delivered. Use WA0RTO-1 or KI6LO-1. Traffic: WA6YAB 14, W6DPD 9, N6MXG 4.

ROANOKE DIVISION

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—The 1988 Roanoke Division League Planning Meeting was held May 14 and 15 at the Registry Hotel in Charlotte and was hosted by the Mecklenburg ARS. In attendance were the four Sections Managers, appointees, assistant directors, club representatives, a member of ARRL HQ staff, division and vice director and interested amateurs. Each Section Manager and their appointees gave presentations on activities within their section. Items such as emergency preparedness, traffic, public information on Amateur Radio, affiliated clubs, packet radio, NTS and ARES/RACES were presented and discussed. Rosalie White, WA1STO, gave a talk covering the many activities and actions which take place at ARRL HQ. An open Q&A followed her formal remarks and many subjects were dis-

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D-52	10/15/20/40/80	2	105'	69.95
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D-68	10/15/20/40/80/160	8	146'	149.95

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VS-41	10/15/20/40	1	28'	49.95
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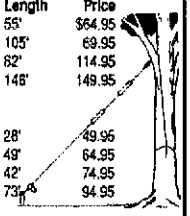
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95



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ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld ant. wire and End Insulators. Automatic Band Switching - Tuner usually never required - For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

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D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End Insulators.

●Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add $8.00 to antenna price.

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Type	Length	With antenna purchase	Separately
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RG-58	90'	12.00	16.95
RG-8	50'	20.00	25.95
RG-8	100'	33.00	39.95

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- Feedline can be shortened
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- Works ALL Bands 160 thru 10 Meters
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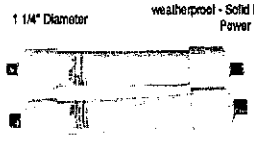

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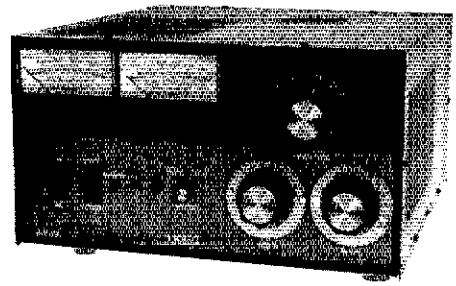

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cussed in detail. The final activity for Saturday was a barbecue cookout around the hotel pool and patio. The food was plentiful, weather good and was an excellent social event. The meeting continued Sunday with a review of the activities of the five ARRL Advisory Committees. Concluding the Sunday meeting was the open forum and resolutions. Sixteen resolutions were presented, discussed and approved. Some will become motions at the July ARRL Board meeting while others will become action items for the ARRL HQ staff. Traffic: K4ZN 259, W4ANK 193, KB4BZA 107, KA4LRM 80, N4MEJ 59, WD4PKZ 30, W4DRF 28.

VIRGINIA: SM,Mark Witt, NN4I. ACC:NT4S. OOC:W4HU. BM:AB4U. SGL:W4UMC. PIO:AA4VP. TC:WX4C. STM:KB4WT. SEC:N4EXQ.

VTN	1 PM	3907	KB4NGO
VSBN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN(EARLY)	7 PM	3680	N4GHI
VN(LATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	W4JLS
SVEN	7:15 PM	146.82	NT4S
STARES	9 PM	146.97	KJ4VT
DEC/EC	9:45 PM(3RD Wed)	3910	KA4NWK

This was a busy month with the LPM and two hamfests. Both the Roanoke and Manassas hamfests were well attended. The LPM was an outstanding affair with good interaction and positive direction for the Director. State Government Liaison Frank Brooks, W4UMC; Dave Norden, AA4VP-Public Information Officer; Rob Kinsley, NT4s, Affiliated Club Coordinator, and I attended with plenty of interaction with our sister sections in the Division. It is hoped that the LPM will be in Virginia in 1989. The largest group to date showed for the ARRL Section meeting at Roanoke with Section Leaders WX4C, Don Landes-Technical Coordinator; NT4S, Ron Kinsley-Affiliated Club Coordinator;and AB4U, Rick Cook, Bulletin Manager all there to brief the 30 attendees on the Volunteer Resources Program. Vice-Director John Kanode briefed the group on the LPM results. Due to illness, Aubrey Parson, KA4TWI, has been replaced by Wright Bell, W4JLS, as Net Manager for the VLN. We wish Aubrey speedy recovery and thank Wright for accepting the appointment. Berryville Hamfest August 7 followed by the Division Hamfest at Virginia Beach September 17-18. Virginia Beach will be a big one with all Section Managers promising to attend as well as Virginia's Section Leaders. Some Affiliated Clubs have still not made their annual reports-please check your club. It is requested that clubs use their box address if they have one. That way we can continue contact more easily. Official Observer Coordinator John Swafford, W4HU, reports eight observers reporting a total of 21 discrepancies noted on the air in May. The OO program is designed to help those who are willing to accept some help with operating practice. Section Emergency Coordinator Earl Bishop, N4EXQ, reported an increase in ARES participation bringing the ARES membership to over 1100. An increase in drills gave May a total of 179. Don Landes, WX4C, Technical Coordinator, should have his wide-area repeater up and in operation in the Shenandoah Valley by the time this is published. Traffic: K4DOR 536, N4GHI 514, N4EXQ 286, WB4PNY 231, KB4WT 226, W4JLS 175, W3ATQ 116, KB4NGO 112, WB4ZNB 97, KK4FV 74, KØJH 66, KI4BR 60, K4BGZ 60, WB4KSG 59, W4TZC 56, N6ANQ 45, N4SMB 43, N4KSO 42, NN4I 36, WB4ZTR 35, KJ4VT 30, K4JM 28, WA4LTO 16, K4GR 16, W4HDW 13, WB4KIT 11, K4MLC 9, KK8L 9, KI4W 6, N4FNT 6, WA4TVS 5, KA8TNF 4, NW4O 1.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT. SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. ACC: WA8CTO. REPEATER COORDINATOR: WD8OZT. KE8OK is now WG8D, nice going Joe. Congrats. to Gerry, WD8SEN and Jim, WA8CGM for excellent TV presentation in connection with "Operation Skywarn". Regret to report that Tom, K8BUX has become a silent key.

Net	Freq	Time	QNI	QTC	Sess	NM
WVFN	3865	6:00	917	120	31	W8YP
WVMD	7235	11:45	788	51	31	W8FZP
WVN	3567	7:00	225	88	31	KZ8Q
WVRN	3640	6:30	192	18	31	K8LG
WVNN	3730	5:15	91	36	25	WD8V
HILLYBILLY	14290	Noon Su	156	12	5	W8YP

Traffic: KA8WNO 226, WD8V 217, W8YP 159, K8TPF 159, W8FZP 150, K8UQY 118, WD8DHC 74, K8QEW 73, KA8ZXP 67, KE8FI 63, KD8WX 51, K8KT 33, N8FXH 25, W8JWX 12, NC8G 10, KB8AOB 10, KA8OGF 8.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQØJ. ASM:KAØMQA. SEC:WBØTUB. STM:KBØZ. ACC:WBØDUV. PIO: NØDZA SGL:WBØFQB. TC:WØLJF. OOC:KAØCDN/WØIJR. Numerous storms this summer have the SWN in full force up and down the front range. Thanks to all for your participation on a job well done. This month has been active for all clubs getting set up for the VHF QSO Party and Field Day. I hope you picked up one of the grid squares given out by many of our mountaintop groups. Field Day is being planned by virtually all clubs and several individual groups. The bands are in good shape on HF and UHF/VHF, so look for some high scoring for these events from Colorado. Sorry to report that WAØREX became a silent key, he was the EC for Clear Creek County, participated in the CWXN and SWN. He was the oldest EC in terms of years of service in the section, and he will be greatly missed. WIMU 88, Macks Inn, IDAHO August 12-14 will be the Rocky Mountain Division Section Manager meeting hosted by Utah ARC. Contact them at 801-583-3002, for further info. NETS: COL; QNI 1006, QTC 34-95, QNF 868, SESS 30. CWN: QNI 61, QTC 29, QNF 277, SESS 27, HNN: QNI 1915, QTC 150-785, QNF 1307, SESS 31, NCTN: QNI 181, QTC 74, QNF 279, SESS 30, SCTN: QNI 228, QTC 34-95, QNF 868, SESS 30. Traffic: NØHFZ 422, KØHOA 126, KAØWIE 123, WBØFFV 78, KBØZ 76, KØINI 31, KEØBI 15, WØNFW 6.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 at 0230 UTC, handled 96 msgs with 188 checkins. NM Roadrunner Net meets daily, 3939 at 0100 UTC, handled 81 msgs with 1320 checkins. NM Breakfast Club meets daily, 3939 at 6:30 AM, handled 160 msgs with 995 checkins. Yucca 2-mtr Net, 78/18, handled 9 msgs with 366 checkins. Caravan Club 2-mtr Net, 66/06 with 151 checkins. SCAT Net, 66/06 handled 5 msgs with 509 checkins. Info Net 12/72, with 85 checkins. WIMU @ MAC'S INN, Idaho, Aug

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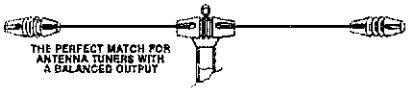

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SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
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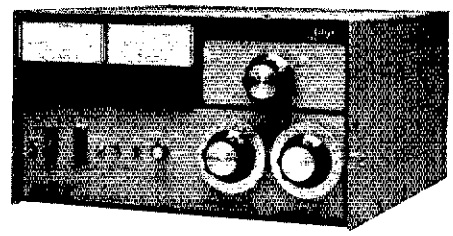

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13-15, 1988. Annual ALAMOGORDO HAMFEST, Sept 3 & 4, 1988 and the Annual NORTHERN NEW MEXICO HAMFEST, Sept. 24, 1988. Hope to see many of you at these hamfests. Vy sorry to report the passing of W5PQJ and W5FQX. They will certainly be missed. Sunday Noon Packet Net on the ZIA LINK with 78 checkins. Traffic: W5DAD 104.

UTAH: SM, Jim Brown, NA7G. SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. Congratulations to Roy, KB7AGY as the only submitted score from Utah for the Novice Roundup. He is son of NS7Y. Scott, WA7VYJ is moving to Logan. Glad you will be able to stay in UT, Scott. The VHF Society swap meet was held in Bountiful recently—turnout was pretty good. Hope everyone enjoyed Field Day! 73 de NA7G. Traffic: WA7KHE 82, WA7MEL 67, N7JLC 66, N7IUN 36, NS7K 23, NA7G 17, W7OCX 6, N7BQE 5.

WYOMING: SM, Jim Raisler, N7GVV-ASM; Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. NM: Dick Murdock, KC7AR. Morres Morgensen, W7MZW, Mac McDonald, WB7K. KB7AWM, Steve, recently piled up 37,888 points in the Novice Roundup which doubles previous scores from WY. Nice work Steve with that Hamfest prize transceiver. Dale, WC7S, reports the WX net which operates at 6:30 AM local had 268 QNI and 148 QTC. Cowboy net held 22 sessions/667/QNI/6QTC. Pony Express held 5 sessions/227/2. Albany Races held 4 sessions/31. Traffic: W7TZK 268, K7MM 14, WC7S 113. The Buffalo repeater 147.15 is now on the air with extended coverage - give it a try. 73 till next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. ACC: AA4BL. PIO: KB4KCH. SGL: N4FRQ. OOC: KF4VS. TC: N4QII. BM: KA4ZXL. Good news for Alabama amateurs served by GTE—they have ruled that amateurs should be charged residential rates for lines going to repeater sites. However, South Central Bell has refused to lower their rates and a hearing will be held before the Alabama PSC to determine the outcome. The Alabama Repeater Council and your section ARRL staff will be in Montgomery fighting this one out. New Birmingham ARC president is AA4LI. Congrats to Ellis and all the new BARC officers, as well as the hamfest committee which put on a great show this year. I hope to see many of you at the Huntsville hamfest this month. Does your county have an EC? Many do not—contact Boyd, KB4GDN, for information on being an EC volunteer. Our new emergency plan is coming along nicely—all of the DECs are assigned for the nine districts. Thanks to the East Alabama ARC for inviting me over in May—the EAARC is a very active club headed by Bob, KA4PKB. Our TC and SEC are putting together a plan to link section FM repeaters for public service purposes on 220 and 440 MHz. More details soon.

Net	Freq	Ses	QNI	QTC	Mgr
AENB	3575	62	337	93	W4QAT
ATNM	3965	36	3178	84	WO4E

PSHR: WA4JDH, W4PIM, N4RT, W4CKS. BPL: WA4JDH. Traffic: WA4JDH 755, W4PIM 190, W4CKS 76, N4RT 39, W4DGH 10, WO4W 8, WB4TVY 4.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & ACC: WA4ABY, SEC: NC4E. STM: WB4WQL. Asst STM (Packet): W4QO. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Here it is August & times for all gud GEORGIA RADIO AMATEURS to help with the TAG issue. I'm sure that all of you want to continue to display your call on that old bus like I do. WB4UVW, our vy capable SGL, has been in this fight with the State Legislature before but he needs all the help he can get. Our elected officials need to be more indoctrinated as to what our hobby really is and what it does in time of emergency. By the way this is election year, so you got your chance. We have almost 8500 hams in the section, so it can make an impact. If some of the hams u know that are not ARRL members & don't read my column need to find out about this important issue. PLEASE GET TO THEM VIA THE REPEATER OR PERSONAL CONTACT. We need them. As you all know, we are a self-policing organization. The FCC for many years has known that we take care of our own as the saying goes. Our vy capable OOC, W4TG, informs me that he still needs more qualified OO's for the AMATEUR AUXILIARY. There is a great influx of new hams on the air & from my observations a lot of them cud stand some help. Most will take constructive criticism because maybe they didn't know this or that. Remember the day when u needed some help? If some new ham comes to u for some help with a problem, please help or find somebody who can. We have many qualified ASSISTANT TECHNICAL COORDINATORS in the section who are willing to help or contact Morris, WD4PAH, our TC in Newnan. PSHR nominees for May are: WB4DVZ, W4RWB, WB4WQL, KA4HHE, KF4FG, W4HON & KB4JPN. ARRL members can qualify for many League appointments. If ur interested, please contact me & I will send you an application or see me at a Hamfest. 73 & God bless. Traffic: WB4DVZ 201, WB4WQL 95, KA4HHE 76, W4RWB 42, KF4FG 33, N4MWR 23, KJ4NK 17, KA8AI 13, W4HON 12.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—PIO: Petey, WA4PUO. SEC: Rudy, WA4PUP. SGL: John, KC4N. BM: Dave, N4GMU. STM: Rip, AA4HT. TC: Ed, WØRAO. OOC: John, AB6I. ASM: Bill, KB4LB. ACC: Giff, WD4RIQ. Many thanks to ARRL HQ for the new COMMUNICATIONS MANUAL and the CONVENTION and HAMFEST PLANNER. These books will be a great help to everyone who has wondered about these events. I urge you to get your copies. Two of our SSCs have been recognized for their work over the past year and have had their SCC status renewed for another year, NOFARS in Jacksonville and SSRC in Ocala. We also have two new AFFILIATED CLUBS to congratulate, i.e. WCARC in Chipley and SCARS in Ocala. We welcome then to our ARRL family. If you would like to have your club join more than 1600 others, get in touch with WD4RIQ, Giff in Ocala and he will see that the forms are sent. My mailbox this month has been very full with club newsletters. Thanks to all the editors and those who help put them together. I recall the following: ORACLE from SSRC; BLURB from HCARA; GROUNDWAVE of DBARA; WESTSIDE STORY of WESTVARS; SHARC NET of Spring Hill ARC; HAMM/RAMM NEWS of HAMM/RAMM ARC; RANDOM WIRE from BARS; BALANCED MODULATOR from NOFARS; SQUELCH TALE of RANGE: LISTENING POST of OARC; and KEYED UP from LMARS. If you don't show N4ADI on your M/L it would be appreciated if you would include him on the list. The address is on page 8 of recent QSTs. Thanks to all who do keep the SM advised of their work. Traffic: WX4H 536, WA4QXT 518, K4CY 466, WD4IIO 351, N4PL 344, N4SS 299, AA4HT 267, KB4LB 252, N4JAQ 168, AA4QC 127, N4GMU 123, WC4D 113, KB9LT 110, WA4EYU 95, KC4FL 74, WB4TZR 73, AA4FG 66, W4KIX 66, W7YWF 64, N4JHI 59, W4UEA 59, KB4FIY 50, NF4O 48, N4QYS 48, KA4KAH 42, N4DTV 38, KI4NN 37, WB4FJY 24, KI4CQ 23, WA4SXW 23, N4DY 21, KJ4HS 17, WB4GHU 16, KB4KFH 16, K1ADU 14, N4ADI 13, WB4JJH 12, W4AT 10, KB4JNC 10, WA4PUP 10, KF4TM 6, N4OZD 5, W8IM 2. (Apr.) NF4O 88, N4ADI 77, KA4KAH 56, N4COB 20, KJ4HS 9, N4OZD 9.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 73 bulletins received and 177 sent by AA4BN 22, W4DL 51, WA4EIC 105, WT4F 30, K4EIK 18, and WD4KBW 24. W4TAH has been working very hard developing a memorandum of understanding with the FCC for Southern Florida—hopefully it will become a reality soon. Both WA4MEJ and WG4R have been notified that they have passed their Amateur Auxiliary exam—many thanks for your support of the Amateur Auxiliary! The Manatee Repeater Assoc. bulletin states that they and the Manatee ARC are co-sponsoring Field Day this year. The South Florida FM Assoc. bulletin reported that W4SQG rescued the ham radio exhibit at the Dade County Youth Fair. Because of his efforts, the exhibit was manned throughout the event. The Sarasota ARA Amplifier said that KJ3T still had eighteen students in her Novice class and plans to finish up in May. KA4FZI sent word that she has had over sixty students express interest in a reading class that she will be teaching this next school year. The class will feature Novice class instruction, technical reading and communication skills. The Gator Chapter of the QCWA reported that the May issue was the last newsletter until October. Congrats to W9OQN the new president of the Martin County ARA. The Sarasota Hamfest, Inc. reports that though it is just a couple of months after the hamfest, they are already busy planning the next one. Their emphasis on this one, planned for February 18, 19, 1989, will be on increasing attendance. The Brandon ARS Slant Bars says that the annual BARS picnic will be held in conjunction with the Special Olympics Triathlon games during May at Medard Park. It sounds like a blast! It seems that the "SS Why Are My Shoes Filling with Water" will be offering cruises. The Broward ARC announces winners for their home-brew contest: K4COH, WA4YLH, W4NFJ and N4BFU—congrats fellows. Had a landline from DL1NN who was visiting in Broward County. W4NFK sent a message which noted on the two prior sessions of QFN the QNI of WV5Z, WA4LGT, KA4NXF, NK8O KA4SIH, WA9VND, W3TLV, AB4BC, WA4PFK, and W4NFK—all in Broward County. Additionally, N4SDS of Broward County can be found on QFNS. In Carl's words, "seems CW is not dead after all—." I never believed it was anyway, Carl!! I am sorry to report that WA4RLV has had to give up his NTS schedules due to health problems—he will be back on a more limited basis in a couple of months as he continues to improve. WT4F activated the Polk County SKYWARN two-meter net with thirteen participants on May 24 during a storm. WB5KDD reports DRN5 and CAND are in good shape with Florida reps K4CY, K4AJV, KB4MON and NQ5W. W4JM reports his antenna rotor quit so will need to fix that before fall—he also is staying busy as secretary of the Central Florida Chapter QCWA 107. The ARRL Information Net is well attended and is providing excellent service to Florida amateurs—please join us on 3940 kHz every Saturday at eight AM. Traffic: W3CUL 2907, W3VR 849, WA9VND 511, WA4PFK 344, W4NFK 255, WA4EIC 245, K4ZK 244, KK4WR 211, KA4FZI 184, WB4WYG 170, K4SCL 169, KB4KXV 168, AA4BN 145, WA4RUE 144, K4IA 138, W4DL 130, WD4KBW 121, N4ET 115, N4MML 108, K4EUK 106, W3TLV 100, KD4GR 94, KA4YHS 81, KB4MON 72, KY4U 68, N4HAP 60, N4ORZ 58, KA4NXF 57, WB4AID 56, KB4LPL 47, KA4SIH 46, K4FQU 42, KF4RL 42, N4HAS 34, WV5Z 33, K4JI 28, WB4CGK 28, WA4LGT 28, N4QER 26, N4SDS 25, MK8O 25, WD4NXK 23, KI4ZW 23, KB4UIA 22, WT4F 17, N2COI 15, KA9AKY 13, KJ4WJ 13, W3IJR 12, KA8RUL 11, KA8GYF 11, WA4VWJ 10, KB4UHC 10, KY8Y 10, AA4WJ 9, NY5Q 8, W4MPV 8, N4FLG 8, K9EHP 7, K4GVI 6, KB4TIU 5, WA4PIL 5, N4NZI 4, KA4GDU 4, W4DWN 4, AA4CH 3, AB4BC 3, AA4IF 1, N4PSV 1. (Apr.) N4HAS 1.

WEST INDIES: SM, Jose A. Purcell, KP4IG—STM: WP4FMH. PIO: NP4XM. TC: KP4ARY. BM: KP4EW. NM-WINC: KP4LP. NM-WINS: KP4DJ. NM-WINE: VP2VI. WINC Net changed to 147.210 MHz until La Santa Rpt is back. Congrats to NP4A and WP4FMH who participated in the WPX CW contest in November with high scores. KP4FFW and KP4BOL started radio classes in Utuado with 25 students. The PR CW Novice class net is now on 7125 kHz every Sunday at 1430 UTC. Please join us. WINS: Sessions 31, QND 175, QTC 5, QNI 128. WINC: 147.210 MHz daily 2230 UTC WINS: 3710 kHz daily 2300 UTC in CW. Join the ARRL! Need your support.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K6LL, WB7CAG. Section Leaders are: ASM: K7QMR. SEC: KX7P. TC: K7KI. OOC: NJ7E. ACC: N7ECE. BM: W1FJI. SGL: KE7WD. Section Nets with NTS liaison are:

Net	Freq	Time	MST	QNI	Traffic	Ses
SWN	3583 kHz	1830	MST Dly	188	98	31
Arizona Cactus Net (HF)	3715			1800	858	355
Arizona Cactus Net	145.37		MST Dly	1800		
ATEN	3922	1930	999	138	31	

Hearty congratulations are in order for the West Valley ARC Sun City which qualified for and has been officially designated a Special Service Club. This makes them one of the three exclusive designated clubs in the section. The other two are: Coconino ARC, Flagstaff and Green Valley ARC. Good work KE7DH, NW7R and others in the club on this accomplishment. John, KQ7T, sent in FB report from Verde Valley ARA detailing their recent efforts in promoting emergency communications by ARES personnel in Yavapai Co. Recent meeting in Prescott Valley between ARES members from both Prescott and Prescott Valley and town officials including Am. Red Cross representative was a big success. Also, members of VVARA are working with students at Camp Verde H.S. setting up training classes and making invitations to join ARRL and ARES. So far, twenty new Novices have been licensed with more to come. Cal, WI6S plans to teach technician and general classes to the H.S club this fall. FB! GVRC has suspended their regular month meetings for the summer. Next meeting will be Oct. 5. Cactus Keys held their May meeting in Tucson with a pot-lock at the home of Karen, WA8NNC. They are looking for a new name for their monthly newsletter. Contact is Billie, KA7ENL. Brian, AI7Z, reports new No. Az. Repeater Assn repeater should be on the air during June.

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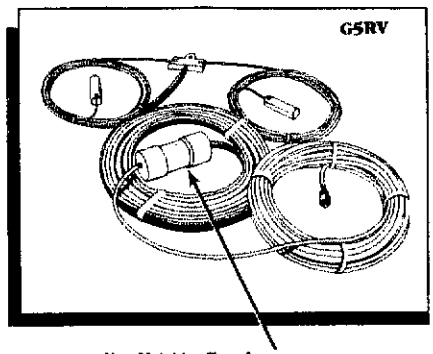

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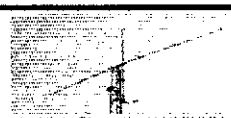

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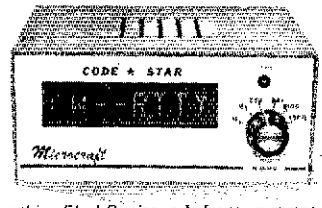

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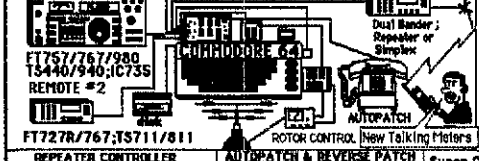

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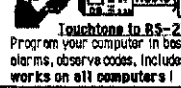

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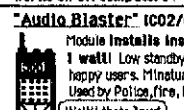

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It will be on 146.30/.90 MHz. Hope everyone has a good summer, but keep those activity reports coming in. 73, Jim. Traffic: W7AMM 254, W7EP 161, W7KCM 71, WE7G 58, K6LL 56, W1IBT 54, K7POF 22, N7ETP 30, W7KXE 16, KD7SK 12, W7GAQ 11, K7JKM 4. (Apr.) W7GAQ 30.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—The SAN FERNANDO VALLEY AMATEUR RADIO CLUB has moved to the Air National Guard building 5 for their meetings which are held the third Friday of each month at 7:30 PM. According to Archie Willis, W6LPJ, the Guard building is located in Van Nuys, south of Victory between the 405 Freeway and Woodley. More details on Examinations and directions are available from Mike Stuber, N6LGO, (818) 988 7165. Archie, W6LPJ, also reports that VU2BEJ, Deryck wrote a thank you note saying that the gift of Call Books, magazines and handbooks were received in Bombay, thanks to the San Fernando Valley ARC. All Los Angeles Clubs are invited to participate in HAMCON 89 yes HAMCON 89—please call Joe Cira, KB6AXK, (818) 858 584 9071. This SW Division Convention HAMCON 89 is sponsored by the Los Angeles Council of Amateur Radio Clubs. Your club can take an active part if you call Joe, KB6AXK, now or plan to attend the next LA Council of AR Club meeting. This will be a Los Angeles Convention scheduled to be held in the summer of 1989 at one of the larger hotels. In the meantime, don't forget HAMCON 88 Sept. 2-4 at the Disneyland Hotel.—The new FCC Proposed Rules are out. Officially known as PR Docket No. 88-139—In the matter of Reorganization and Deregulation of Part 97 of the Rules Governing the Amateur Radio Services. This is a 37 page document that is must reading for all Amateurs. This notice of proposed rule making was released by the Commission April 13, 1988, and they need your help. The last attempt was aborted some years ago. Readers with legal or parlegal backgrounds or anyone who can write please send your comments to the FCC as soon as possible.—The latest official ARRL Club listings for the Los Angeles County Area arrived this week, and it shows that we have 37 local clubs. About 25 of these clubs belong to the LA AREA COUNCIL of ARCs. The number to call if your club would like to join the LA AREA COUNCIL OF ARCs is (213) 615 8631 or 378 2489—Alan, WB8QPO. The LA AREA COUNCIL OF ARCs is the sponsor of the LA Convention HAMCON 89—Call Alan or attend the next meeting at the downtown American Red Cross Building and get your club more involved with helping our mutual cause. (1st Tues of odd-numbered months)—The LA COUNCIL OF ARCs is again sponsoring a ham booth and special events station at the LA County Fair Sept. 15 thru Oct. 2, 1988. Fair tickets and parking will be free to volunteers. Pat McNulty, N6GXZ (714) 622 8315 is Chairperson with Chuck Lobb, KN6H (213) 325 3184 in charge of handling Club signups.—MIDDLE MANAGEMENT is the level where you still hear the rumors, but you're not high enough to know if they are true. This came courtesy of the Hughes ARC bulletin so it may only apply at Hughes. STM News: The traffic is slowing down now as most of our regulars are taking vacations and not generating much traffic so far. WB6VPY is back from the hospital and doing fine, planning a trip to Alaska for two weeks. K6UYK back east vacationing. Len, N6LHE, planning on a long vacation so we will need a station for SCN/2/VHF. We are in need of replacement until December. Traffic: N6LHE 470, K6UYK 324, W6INH 198, W6TH 151, K6YBV 20, KI6A 51, K6CL 18, W6NKE 16.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv. Co. W6LKN, Bob (714 686-3823) ASM: Org. Co. Ralph WB6JBI (714 776 9272) ASM: San Ber. Co. Tony, WB6QHB (714 981-1836). Public Service. It is with sorrow that I announce the passing of John, WA6QMW. He became a Silent Key May 20th. John was past president RCARA and REAC of Riv. Co. He was instrumental in reactivating the Riv City Hosp support. Spent many hours in support of RMRU and was EC for the CDF VIP Program. He will be missed by public service officials and the Amateur Radio community. SEC: Ken, WA6ZEF, reports the planning for a southern Calif. emergency response institute for 1989 is in the works. The fire season is here. Are you prepared to respond? Are you and your equip. self sufficient for 72 hours? OOC/LIC, Nick, KA6GVY. Normal turkey hunting in progress. Sitting on mikes, handhelds and hung-up digipeaters seem to be in style. We wonder, should time outs be required on digis as are required on repeaters? KF6ZH, Steve; WB6QHB, Tony, with big assist from Bill, N6ITO, found one that tied up a county digi system for hours. CLUB NEWS: ACC Sandy, WA6WZN. There will be a booth (Amateur Radio) at the Orange County Fair. CQ CQ CQ de South High ARC. A group of highly motivated students are attending Amateur Radio classes and have already passed two new Novices! These old/new hams would like to establish a school station so as to acquaint their fellow students with the fascinating world of Amateur Radio. Your donations of equip and literature can help make this ham station a reality. For info, call Beth, N6PMN, 4636 Highgrove Ave. Torrance, CA 90505. (213 375-5342. Congratulations to CLARA. Now has joined the group. An ARRL AFFILIATED CLUB and a member of the ARRL Field Organization. SOARA Officers, Pres. Joel, WS6S. VP Lois, WD6CEO. Sec Dave, KB6CQK. Treas Jim, N6DLE. C bar C Pres Dan N6NJS sez. If it were not for Novice Enhancement, there would still be a lot of Novices that would remain inactive on the bands mainly because of Morse Code. There have been many new hams that have upgraded already to General or higher, but would have never gotten on the air because of Morse Code. Let's face it, the code is a barrier to the new hams and always has been. Except for those that work hard enough to master it. Novice Enhancement has brought down a few barriers of the past, and this can only lead to an enrichment of the hobby. Amateur Radio clubs have gained a big benifit from Novice enhancement. That's my opinion! What's yours? Happy Birthday BPARC. June is the occasion for celebration of the BPARC's fifth anniversary. The club held its first meeting on June 7, 1983 in response to the threat of restrictive antenna ordinance. The club met its first objective by obtaining a reasonable height limit. The club is still going strong with a very active membership. CVARC, Pres. Dave, WW6W; VP Mike, KI6CS, SECR Jean, KB6VRU; Tre Robin, N6OZY. Lee Deforest RC: The weekly workshop has been successful. Run by Beryl, NS6T, if you have questions present them at the workshop and get 100 experts. From Antennae to Zeners. STM: Dan, WF6O. NTS Report. Station traffic points, PSHR and BPL. WF6O 576, BPL, PSHR. AD6A 135, WB6QCA 89, PSHR. WB6QBZ 102, PSHR. KA6HJK 66, PSHR. K6DD 65. N6GOT 32. KA6TND 32. PSHR. N6QXR 19, KB6VPI 18.

PSHR. W6CPB 17. KA6GND 13. W6SX 11. W6NTN 10. N6NTN 10. N6ADV 8. KI6X 2. Good show.

Net	Frq	Time	Ses	QNI	QTC	NM
SCN/1	3598	1830	31	302	285	AD0A
SCN/2	3598	2015	27	170	27	AD0A
SCN/V	146.845	2100	31	327	31	WA6QCA

NTS needs liaison stations between SCN/CW Nets and the VHF Section Net. Try it, you might like it. For info, contact Jerry, AD0A, (714 351- 8824.) Don't forget to put your club ARRL ID Number on your ARRL renewal form.

SAN DIEGO: SM, Arthur R. Smith, W6INI. TC: N6JZE. STM: N6GW. SEC: W6INI. The Southwestern Div Conv. is Sep 2-4, 1988 at Disneyland Hotel, Anaheim. Adv. registration to Aug 15. A Public Service meeting is planned for Fri eve, Sep 2, with KY1T, Dep Mgr, ARRL Field Services Dept. N4KRA has left for Pittsburgh leaves the No County Tfc Net in the hands of KB6PCF and KI6ZM. The Sunday (0830) 13/73 ARES net needs additional net controls. Contact W9FQN, Present NCSs are W9FQN, W6HCD, W6JSP, N6MMP, KB6NMK, N6NZX, KB6NZA. WA6BCC did an outstanding job organizing oprs for the Greater San Diego Special Olympics on Jun 4 & 5—his 13th year with this event. Oprs participating were (Sat) NV6A, WA6BCC, W6BFQ, WB6DQR, N6ELF, N6ETA, N6JZE, KR6K, KB6KBI, KF6KE, N6LKL, W6MFT, K6QJP, N6QLJ, WA6QQQ, KB6SCU, W6TZV, KB6VOF; (Sun) WA6BCC, WD6GEB, N6GRB, N6IAQ, N6JOJ, N6OFO, WB6ORX, N6PPW, KA6QYE, KA6RLX, KA7WFU, KF6XY. Attn Field Day participants: msg to SM/SEC must be in standard ARRL form. Follow par 8A(3) of FD rules precisely. N6GW or KB6PCF will be on NCTN (13/73) at 2000 to tke msg. NCTN 30 sessions, 445 ck-ins, 82 msgs. Traffic: KI6ZM 96, N6GW 57, KI6ZH 33, N6RVO 10.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—ASM/Ventura: N6MA. ASM/Sbar: WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DEC/Ventura: WB6RVA. DEC: Sbar: N6AJA. DEC/SLO: WB6IIY. Two ham band incursion problems were resolved in April and May. In the first case the local cable TV company started running programming on CATV channel 18, which causes interference on 145.25 MHz. W6FLL alerted us immediately, and a call to COMCAST Cable was all it took to solve the problem in Santa Maria. Our sincere thanks to COMCAST General Manager Joan Wright for her friendly cooperation. The second problem involved what was thought to be pirate operation on two meters. Our alert OO in Lompoc, Mack Stephenson, W6WRA, tracked this down to third harmonic radiation from a number of Union Oil Company mobile and base radios. Mack approached Union Oil officials and has gotten first-rate cooperation from them. This problem has been under investigation for nearly a year and Mack did a super job in resolving it. Our thanks to Mack and to Union Oil. That is another example of the ARRL Field Organization working for you, and brings us to the conclusion of the ARRL re-org story: Headquarters staff was reorganized along lines which more closely serve the needs of the members "in the field," now being centered around functional areas that we can identify with (i.e. Clubs and Training, Publications, Membership Services, etc.) The Field Organization also re-organized, and now reports to the Field Services Manager. While under the old structure, the Field Organization was strictly concerned with communications, the current arrangement is much more broadly based, encompassing almost all of the League volunteer services (a few still report to the Division Director, or to ARRL HQ directly). The all volunteer Field Organization provides service to members and non-members, to hams and non-hams, and even to governments. In fact, anyone who can benefit from Amateur Radio is served in some way by the ARRL Field Organization. (Remember that ARES is a vital part of this structure.) At the top of this column you will find the call signs of the Field Organization leadership in SBAR Section. Two Assistant Section Managers (ASMs) help me to know what's happening in the southern parts of Santa Barbara Co. and in Ventura Co. (I'm close enough to San Luis Obispo Co. to keep in touch. The Affiliated Club Coordinator (ACC) maintains contact with the various clubs and is responsible for helping all clubs in the Section, regardless. (Incidentally, the ACC doesn't try to "coordinate" your club but is there to help coordinate BETWEEN clubs and to help club activities succeed. Call on him for assistance at any time.) The Bulletin Manager (BM), Section Traffic Manager (STM), Official Observer Coordinator (OOC), Public Information Officer (PIO) and Technical Coordinator each head a staff of volunteer specialists who help ham radio by their organized and coordinated efforts. (There are always openings for additional help, if you are interested in any of these areas, contact me or the appropriate department manager. If you have no experience, but would like to help, we will be happy to provide the guidance you need.) Finally, the Section Emergency Coordinator (SEC) heads the ARES organization for the entire tri-county area. He has appointed District Emergency Coordinators in each county, who in turn rely on the leadership of local Emergency Coordinators. This ARES pyramid structure ensures that there is a single point of contact in each county or district for state and/or county government officials to deal with. At the same time, local operations are conducted by the local hams who know their own areas better than any outsider. That this system works well is best demonstrated by the praise that ARES has received for the Los Politas and Wheeler fires in 1986, and by the many commendations that the counties and cities have bestowed on Amateur Radio. That brings me to the final note for this month: the Ventura County Boards of Supervisors has presented Ventura County RACES with a commendation for their very fine service and high-level of dedication. Ventura RACES and ARES are very nearly 100% overlapped, so the commendation is for ARES as well. CONGRATS to Ventura! George Hobbs, Mayor of Santa Maria, has also presented a commendation to Santa Maria ARES, the Satellite Amateur Radio Club and Amateur Radio operators for their community service. In doing so, he declared the week beginning with the Santa Maria Radio SWAPFEST, and ending with ARRL Field Day, as AMATEUR RADIO WEEK in the City of Santa Maria. 73 for now. Traffic: W6NOR 119, N6NLW 95, KB6IEC 32, KB6HGB 30.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC-ASST. SM:K5MXQ. SEC: W5GPO. STM: W5VMP. PIO: K5HGL. OOC: WB5JBP. SGL: N1CWP. BM: W5QXK. TC: W5LNL ACC: W5URI. Ham-Com '88 was a great meeting! So nice to renew the old friendships, and meet the faces that go with those call signs! I wish to thank our Executive V.P. of the League, Mr. Dave Sumner, K1ZZ, for taking the time to be our special guest this year. This was Dave's third trip to Texas in 10 months! It's nice to hear all the news straight from the horse's mouth. Please make sure to be in Arlington the first week-end in June of 1989, as this will be the ARRL National, West Gulf Division, Diamond Anniversary of the ARRL, and Ham-Com, all rolled into one; truly one of the greatest events in the history of our Section. The Ham-Com Director, John Fleet, has already revealed some of the plans for next year, and it will be an exciting event. Hats off to all the committees and volunteers who made Ham-Com '88 a huge success. The executive board will take action soon to add Baylor and Wilbarger counties to North Texas in exchange for Callahan and Shackelford counties to West Texas to coincide with League activities and ARES logistics. The ARRL members in these counties will be polled to make sure of this change. Hurricane season is here, already some activity in the Gulf has occurred. Now that Field Day is over, and all that emergency equipment is fine-tuned and ready to go, let's be on the alert when storm projections indicate a possible land-fall in the Texas coast. As we have learned in the past, a storm entering the state below Corpus Christi can track north, delivering severe flooding and high winds as far north as the Red River. Remember Albany, Graham, Eastland and the D/FW areas from past years? Let's be ready for quick response to any communications emergency. Our Section emergency frequencies are: 7290 kHz (day) 3873 kHz (night) and 3697 kHz (CW). All fixed stations should monitor these frequencies for possible calls from mobile stations needing assistance. OO reports this month from WA5YKO, NA5U, and K5VRJ. PSHR for May: KF5BL, WZ5N, K5UPN, and K5MXQ. Traffic: W5TNT 377, W5YQZ 332, K5UPN 326, KD5RC 262, KF5BL 153, W5VMP 145, KA5AZK 130, WZ5N 127, K5MXQ 115, AJ5K 108, KC5NG 54, KD0AV 38, N5KCL 32, KA5ZWY 19.

OKLAHOMA: SM, Bill Goswick, K5WG—ACC: WB5CDW. BM: W5AS. OOC: K5WG. SEC: W5ZTN. SGL: W5NZS. STM: KV5X. TC: W5QMJ. Ham Holiday '88 is here! This year's event will be held at the Lincoln Plaza Hotel and Convention Center, 4445 Lincoln Blvd., Oklahoma City on 5-7 August. Many interesting seminars and demonstrations are planned including technical programs featuring scientists/hams from the National Severe Storms Laboratory. Amateur license examinations will be conducted throughout the day on Saturday. Meetings are scheduled by Packet Radio, MARS, Repeater Society and other organizations. The flea market has been moved back upstairs and should be bigger and better than ever. Programs begin on Friday 5 August and continue through Sunday morning. Don't miss this outstanding event. The Sooner Traffic Net (now meeting on 3845 kHz) reported 26 sessions with 383 check-ins and 81 pieces of traffic in May. Tnx, Steve Ray, N5FEM, NM. Congrats to new appointee Jerry Wetmore, KD5IS, who has joined the ranks of Official Bulletin Stations. The efforts of all field appointees are sincerely appreciated. Traffic: WB5OHK 170, KF5RD 126, WA5OUV 85, N5IKN 84, KV5X 52, K5CXP 48, W5FIB 44, K5GBN 44, WA5ZOO 39, W5VLW 30, W5VOR 23, W5JJ 1. Public Service Honor Roll: K5CXP, KF5RD.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR. ASM: N5TC. SEC: K5DG. ACC: WB5YDD. TC: NZ5U. OOC: WA2VJL. PIO: WA5UZB. BM: K5CVD. STM: WR5O. SGL: K5KJN. Each member of the STX Section Leadership Team listed above is an appointed ASM; they are all working for the good of Amateur Radio and ARRL. Brazos Valley ARC, Ft. Bend and Harris Counties, rprts Pres KA5UXP upgraded to Extra; WJ5B and N5LXE passed all traffic from Mothers' Day event, other upgrades: KB5ESL, KB5EZQ, KB5GDO to Technician: N5LDS, KA3PNJ to Advanced; KB5FPO to General. CAND ANM WB5YDD rprts 624 msgs in 31 May sessions; DRN5 represented 100% STX stns helping were KE5ZV, KD5KQ, W5KLV, WB5EPA, WB5FQU, NX5V, WB5YDD. Clear Lake ARC rprts upgrades WD5EEU, WD5EEV, KB5AWM to Advanced; 21 ops helped in March of Dimes Walkathon: KA5GLX, KB5AQV, KB5AWM, N5JVV, KH6FHS, KA5UKV, KA5KTH, KA5HFH, KC5X, W5QPT, WA5SFY, G3MZK, KC5WW, KG5DW, NY5H, KG5HQ, WA5LOO, WD8KUJ, WD5EEV, N5GIG, WA4KEJ. 7290 Tfc Net Secy KB5DVF rprts 480 msgs in 48 May sessions 3118 QNI; 2 NTS liaisons per session; NM KA5AZK. San Benito ARC rprts Novcie class over, brags about 5 new ops; Mayor declared Amateur Radio Week June 1-10; KA5UVY elected to "Who's Who in High School Students"; rcvd award for highest computer math grade; Club has begun its annual 'traveling Amateur Radio exhibit.' Austin ARC had a good SKYWARN class. PIA NZ5J, Seguin, rprts KB5FUH upgraded to Technician; 146.70/.10 machine, San Antonio, sends code practice 7:30pm daily. DRN5 NM WB5YDD rprts 612 msgs in 62 May sessions; STX represented 100% by KD5KQ, W5YQZ, W5KLV, WV5X, W5CTZ, KB5CB, WB5HZQ, KE5ZV, WB5EPA, WB5FQU, WR5O, WB5YDD. PIA N5FIX, NW ARES, Houston, rprts special emergency drill with Northwest Memorial Hospital 6 area volunteer FDs, local EMS group and Houston FD; N5KEU, KE5IC, N5FIX, W5BKK, KA5QAP, KB5AEL, KF5ZL helped make it a success. NTS Tex Tfc Net (TTN) will have its annual picnic 17 Sept. in Tyler State Park; contact K5UPN or QNI TTN 3873 kHz 6:30-7:30pm for details. OBS W5KLV rprts 7 bulletins, 4 propagation fcsts broadcast on 6 nets. ECHO Society PIA KG5HQ rprts upgrades KA5ZZS, KA5EIK, KF5WS, to Extra; N5ERQ, KB5DDM, KA5QNC, WB5VNE to Advanced. KB5FZM, KA5BBD, one unlicensed to Technician; San Jacinto Lund Association 150-mile bike ride had help from KB5AEJ, KD5AS, KB5EEK, NV5B, N5LDS, WD5JLT, KA5BBD, KF5NU, VE3JST; Heart and Sole Fun Run in April had 29 ops assisting; WA5GZX suggests a standard VHF-FM power connector, especially for emergencies and other public service activity. PIO/ASM WA5UZB spoke before Clear Lake ARC, Katy ARC; SSC forms sent to Brazosport ARC, Houston Echo Society; South Texas Leadership PBBS in commission for (1) access to STX officials, (2) path for information from STX officials, (3) dedicated PBBS for ARRL, STX bulletins, (4) a PBBS dedicated in times of disaster or emergency for use by officials in ARES, RACES or STX Section. Traffic: WB5J 331, WB5YDD 303, WR5O 183, WD5GKH 169, NV5L 101, WB5FQU 94, WB5EPA 89, AC5Z 86, W5CTZ 76, W5BGE 26, NZ5J 16.

WEST TEXAS: SM, A. Milly Wise, W5OVH, ASM: KA5PTG, ASM: WD5EFJ, ASM: WF5E, ASM: N5DO, SEC: W5MVJ, PIO: KE5ZW. ACC: K5IS. OOC: K5KNC. BM: K5VRF. TC: K5CU. STM: AE5I. Now that one year has passed since I became your Section Manager, I wish to thank all the hams and friends who have assisted in making my job a little easier. Congrats to Lana KB5DHE of Booker and Elaine KB5FAM of Perryton for upgrading to Tech. KB5FJH Al, went from Novice to Extra at the VE exams in Midland—22 people attended spotter training in Stamford—W5ES/EPARC started new Novice class May 14th, with KB5QV and K5CU as instructors and various members of club assisting—the W5ES station has been upgraded, a new Yaesu FT 736R and a new 440 antenna donated by a member—Sweetwater repeater is on 147.12 and is linked to the West Texas connection—PIO Paul KE5ZW is asking each club to send their newsletters to him-San Angelo ARC now has as Emerg. Comm. Van and under construction is a trailer on which will be mounted a 6 KVA Generator—West Texas has over 280 ARES members as of May 20—over a dozen hams attended the SKYWARN training course presented for the ARES/RACES members by the National Weather Service in El Paso—Texas Traffic Net picnic will be held Sept. 17 at Tyler State Park—enjoyed the Abilene, Midland, and Ham-Com Hamfests where I met old friends and hopefully made new ones. 73 Milly W5OVH Traffic: (Apr.) AE5I 112, N5KUC 16.(May) AE5I 146, N5KUC 13.

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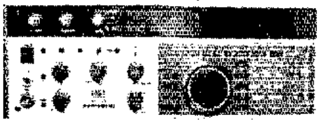

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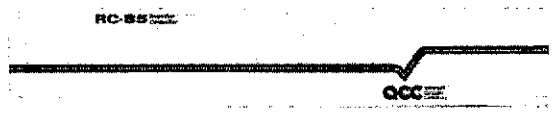

The RC-85 controller offers the high tech basics of repeater control, plus! Of course, much of what we consider to be the "basics" aren't found *anywhere else, at any price.*

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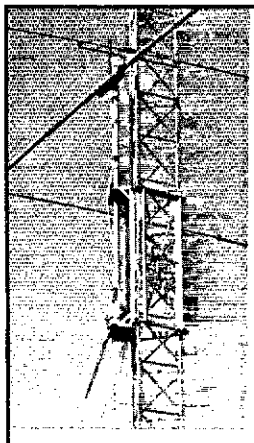

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MODEL	BANDS	LENGTH
GD-6:	80-40-20-17-12-10M	137'
GD-8:	80-40-30-20-17-15-12-10M	137'
GD-7:	160-80-40-20-17-12-10M	255'
GD-9:	160-80-40-30-20-17-15-12-10M	255'

Choose between 500W PEP or 2KW versions. Install as a horizontal dipole or an inverted-V. SWR usually better than 1.5:1. No tuner needed if properly installed. See letters of our ham customers in our data report. The GD-windom dipoles are no dummy load antennas. Our special GD-balun (500W or 2KW) matches the low impedance (50Ω) coax feedline to the high impedance windom-type antenna. All GARANT GD-windom dipoles come with a 3-year limited warranty and a 10-day money-back guarantee. Who else has that much confidence in his products?

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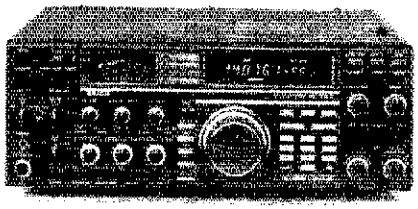

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HM-36 Scanning hand microphone 47.00
SP-20 Ext. speaker w/audio filter .. 149.00 139.95
FL-101 250 Hz 1st IF CW filter 73.50
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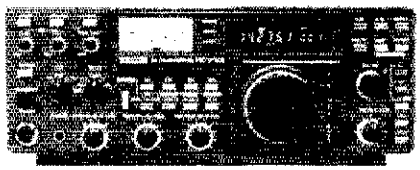
EX-310 Voice synthesizer..... 59.00



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FL-32A 500 Hz CW filter (1st IF).... 69.00
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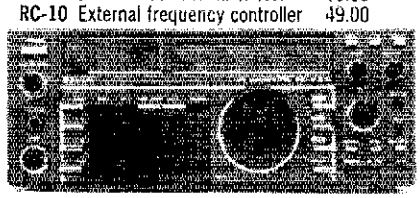

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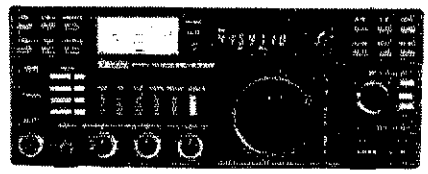

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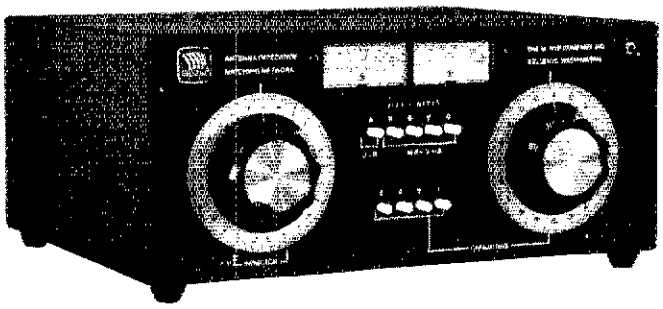

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Views On Selecting A VHF Transceiver

The classic saying of change being the only defineable constant in today's world is especially true in the area of amateur radio. Only a few years ago, for example, VHF band communications were relatively basic in nature and secondary in pursuit. Today, those same upper frequency ranges are amateur radio's hottest frontiers of interest and multi-mode action.

Popular FM and repeater activities have been joined by Packet messaging, SSB tropo DX'ing, globe-spanning OSCAR satellite operations, and much more. It is a modern amateur's dream come true, and setting up your own equipment to operate these bands is obviously a clever investment in long-term enjoyment. When selecting a 2-meter, 220MHz or 70cm transceiver, consider present interests and anticipate your future expansions. Let's divide that selection into FM-only and multi-mode categories, then take a closer look at each one for easy discussion.

Due to their compact size, FM-only transceivers are usually chosen for mobile operations. When investigating these units, look for modern-style features and memory flexibility to assure your full enjoyment of today's numerous odd split and subaudible tone-accessed repeaters. Extended 2-meter frequency coverage for receiving NOAA weather broadcasts in the 162 to 163MHz range is especially attractive for full mobiling enjoyment. Indeed, a 2-meter transceiver without weather coverage can only be compared to a seagoing schooner without sails.

Noteworthy considerations in multi-mode transceivers include high sensitivity with low noise receiver designs for weak signal DX'ing. Passband Tuning and good Noise Blanking are also extremely desirable for working the main OSCAR bands of 2-meters and 70cm. Since dual transceivers are used in a full duplex manner for satellite communications, a single knob/tracking adapter adds a perfect finishing touch to those set-ups.

Additional considerations in both FM-only and multi-mode transceiver selections include proven operating reliability and full customer support. **Any unit, regardless of its front panel glamour or operating frills, is no better than its warranty program.** A defunct unit makes you unhappy and it is negative advertising for its manufacturer. That's why Icom has one of the best warranty/service programs in the industry.

The previous information was written to assist today's amateurs in VHF equipment selection rather than promoting a particular manufacturer or unit. Inclusion of all the outlined features and operating assets in Icom equipment, however, is undeniable. That fact simply reflects **Icom's dedication to excellence in bringing you top-line equipment of innovative design.**

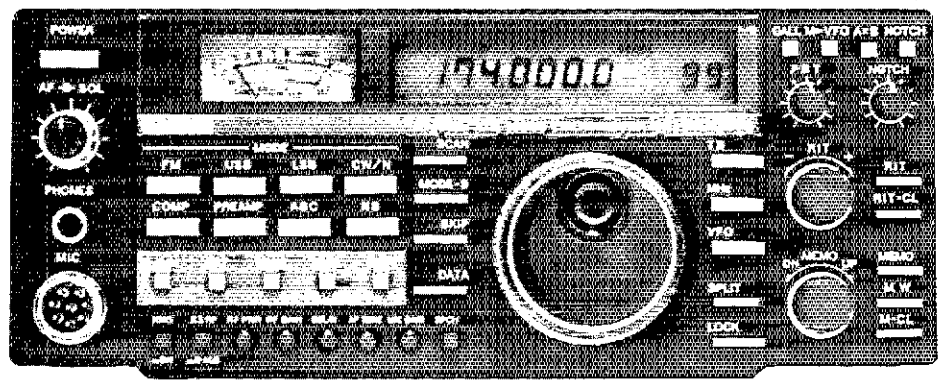
Icom's 2-meter IC-228A/H FM transceiver, for example, stores up to 20 different standard/odd repeater splits and subaudible tones into **any** of its 20 memories for total mobiling flexibility anywhere in the country. Both programmable band and memory scanning with single button lockout and recall of any memory are included in this easy-to-operate unit. You can disable local repeater channels while traveling or visiting other areas, then restore normal operations in a few seconds after returning home. Simple, effective, and the unit expands right along with your future interests! Both 25-watt "A" versions and 45-watt "H" versions of this ultra-compact FM transceiver easily fit into most auto's restricted space. Two-meter coverage in all Icom transceivers also extends continuously to 170MHz for reception (and memory storage) of all NOAA weather channels: an absolute blessing for happy motoring.

Icom's 2-meter IC-275A/H, 220MHz IC-375 and 70cm IC-475A/H multi-mode transceivers are true pacesetters in performance and reliability. Features like **true passband tuning, a superb noise blanker, if level notch filter and exceptionally clean RF output** continue making these units all-time favorites among VHF DX'ers and OSCAR satellite operators worldwide. High power "H" versions also eliminate needs for an external amplifier. A unique CT-16 satellite interfacing unit "slaves" the IC-275A/H and IC-475A/H for single knob/transceiver operation.

A shining example of dependable operation and customer support is continuously reflected in Icom equipment's field-proven track record familiar to thousands of amateurs around the world. As related in various Tech Talks and real-life testimonials, Icom transceivers are literally self-protecting diehards. In fact, many reports of flawless operation under the most adverse circumstances are genuine candidates for Ripley's "Believe It or Not" files! If, and when, problems do arise, however, four factory-owned and highly competent service centers located throughout North America stand ready to assist you. Icom strives for a three to five day turnaround time. **Assured rig enjoyment of this caliber is truly priceless!**

Whether your VHF interests are FM, mobiling, Packeting, OSCAR satellites, or a special combination of modes, the facts stand clear and most readable. Using top-line equipment always returns the greatest enjoyment. Don't settle for less. Icom. . . continuously bringing you today's best and most advanced equipment in an unparalleled manner!

IC-275



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ICOM

Dual Band Mobile & Handheld

DOUBLE YOUR PLEASURE
DOUBLE YOUR BANDS

Dual Band Radios from ICOM!
Double your operating pleasure with Icom's new dual band IC-3210 mobile and IC-32AT handheld FM transceivers. Each unit incorporates a wealth of special features and options designed to move you into the forefront of today's expanded 2-meter and 440MHz activity. Icom dual banders: the FM enthusiasts dream rigs!

Wideband Coverage. Both the IC-3210 and IC-32AT receive 138 to 174MHz including all NOAA weather channels, transmit 140 to 150MHz including MARS/CAP, and operate 440 to 450MHz. Total coverage of today's hottest FM action!

Full Duplex Operation. Simultaneously transmit on one band while receiving on the other for incomparable dual band autopatching!

20 Memories. Store any combination of standard or odd repeater offsets and subaudible tones.

Powerful! The IC-3210 delivers 25 watts output on both bands. The IC-32AT is five watts output on both bands. Selectable low power for local use on both units.

Programmable Band and Memory Scanning. Includes easy lockout and recall of various memories. Exceptional flexibility!

Repeater Input Monitor Button. Opens the squelch and checks Tx offset simultaneously.

Priority Watch. Monitor any channel for calls while continuing operation on another frequency.

Optional Beeper. Monitors for calls with your subaudible tone, then gives alerting beeps.

Double Your Bands with Icom's dual band IC-32AT handheld and IC-3210 mobile, and double your operating pleasure on 2-meters and 440MHz.

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First in Communications

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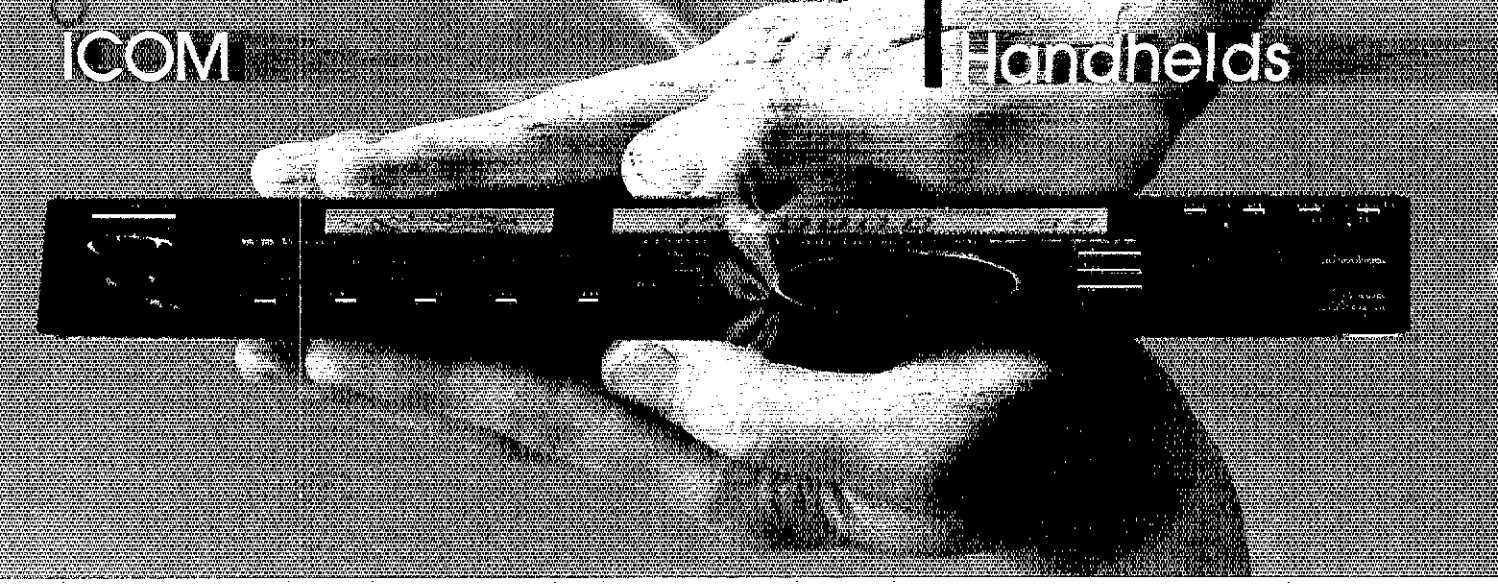


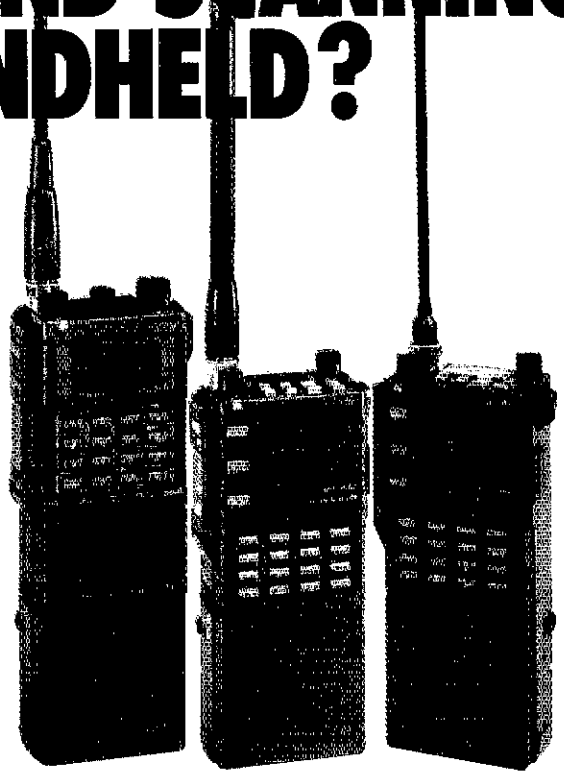
HOW DO YOU PACK 7 WATTS, 20 MEMORIES AND SCANNING INTO A HANDHELD?

IC-2GAT: 7 Watts Rx 138-174MHz; Tx 140-150MHz
IC-4GAT: 6 Watts 440-450MHz
IC-32AT: 5 Watts Rx 138-174MHz/440-450MHz; Tx 140-150MHz/440-450MHz

A New Generation of Powerful, Versatile Handhelds.

Select a new "G Series" or dual band ICOM transceiver and enjoy full base station luxury in a portable unit designed especially for you!

- **Maximum Frequency Coverage.** The IC-2GAT receives 138-174MHz, including NOAA, and transmits 140-150MHz to include CAP and MARS frequencies. The IC-4GAT operates 440-450MHz, and the IC-32AT receives 138-174MHz and operates 140-150MHz/ 440-450MHz.
- **Most Powerful Handheld!** The IC-2GAT delivers seven watts! The IC-4GAT is six watts and the IC-32AT is five watts! One watt level selectable for local QSO's.
- **20 Memories.** Store any frequency, Tx offset and subaudible tone in any memory. Total flexibility!
- **Programmable Scanning** of band and memories plus easy lockout and instant memory recall.
- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
- **Compatible Accessories.** All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable.
- **Optional UT-40 Beeper** silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.



IC-32AT 2 Meters and 440MHz
IC-2GAT 2 Meters
IC-4GAT 440MHz

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AMERITRON

SYMBOL OF ENGINEERING INTEGRITY. . .QUALITY WORKMANSHIP. . .RELIABLE LONG-LIFE PERFORMANCE

AL-80A LINEAR AMPLIFIER

The AL-80A will provide a signal output that is within 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost.

The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

Size: 15½"D. x 14"W. x 8"H. Wgt. 52 lbs.

AL-1200 LINEAR AMPLIFIER

WITH EIMAC 3CX1200 TUBE

Full legal output with 100 watts drive.

AL-1500 LINEAR AMPLIFIER

WITH EIMAC 8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

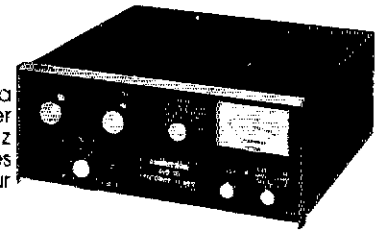
Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs.

AL-84 LINEAR AMPLIFIER

The **Ameritron AL-84** is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

Size: 11½"W. x 6"H. x 12½"D. Wgt. 24 lbs.

ATR-15 TUNER



The **Ameritron ATR-15** is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

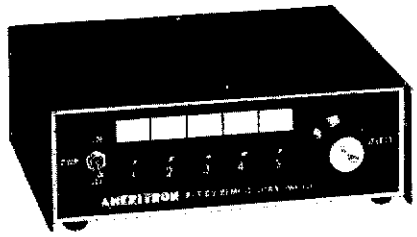
A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

Size: 6"H. x 13¼"W. x 16"D. Wgt. 14 lbs.

RCS-4 FOR CONVENIENT INSTALLATION

No control cable required.
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum.

Remote COAX Switches

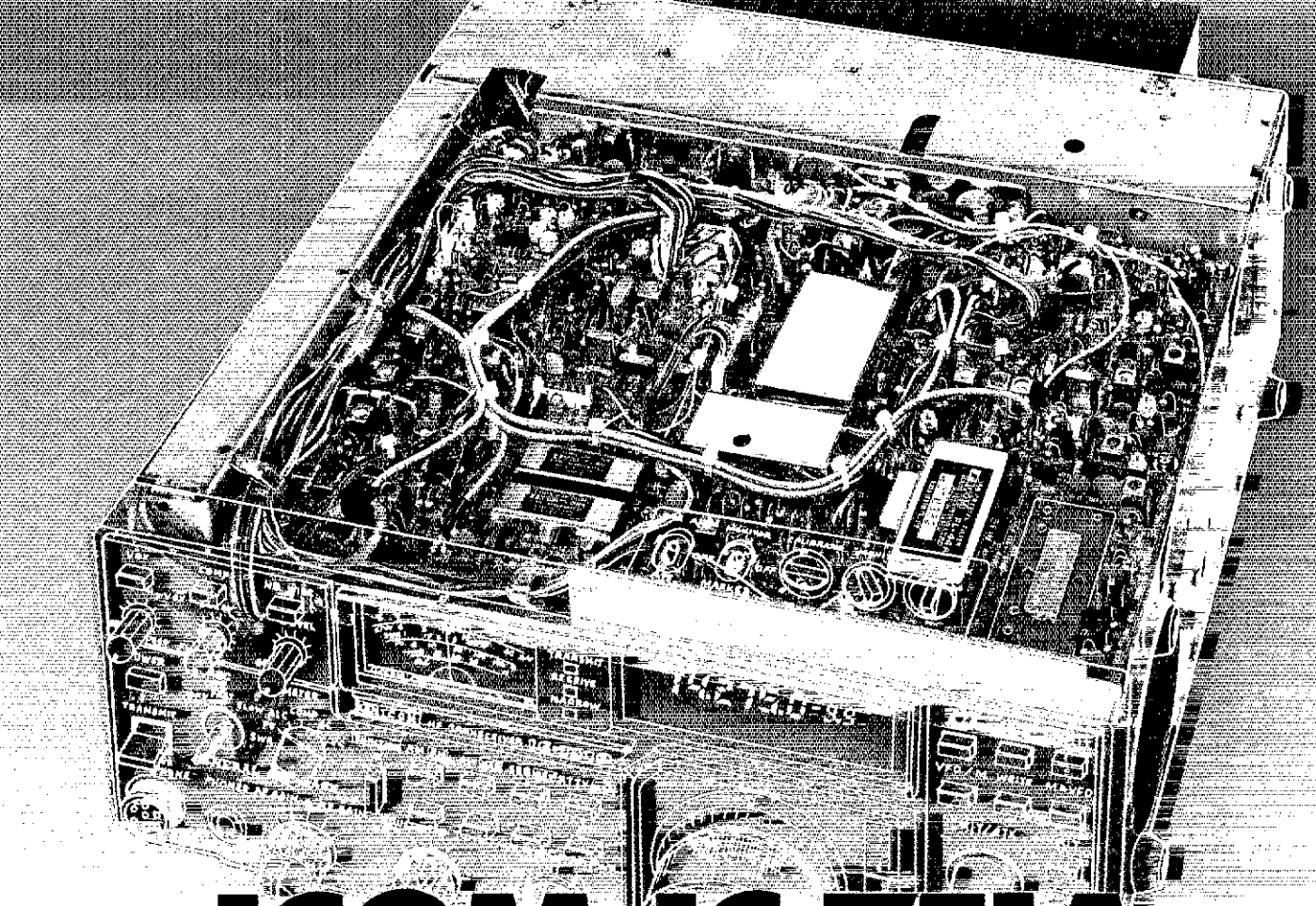


RCS-8V FOR SPECIAL APPLICATIONS

Selects up to five antennas.
Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

Available at your dealer. Send for a catalog of the complete AMERITRON line.

AMERITRON, Division of Prime Instruments, Inc.
9805 Watford Avenue • Cleveland, Ohio 44102 • (216) 651-1740



ICOM IC-751A

"IT'S WHAT'S INSIDE THAT COUNTS!"

- **All HF Band Transceiver / General Coverage Receiver**
- **Advanced Circuit Designs**
- **All Modes Built-in USB, LSB, FM, AM, CW, RTTY**
- **Superb Frequency Stability**
- **Continuous Duty Operation**
- **Crystal Clear Signal Quality**

Midsize Masterpiece! The deluxe IC-751A includes more high performance features and professional circuitry per cubic inch than any other HF transceiver. Its smooth-as-silk operation and long-term reliability produce the ideal contesting, DX'ing, mobiling and portable rig. Owning an IC-751A truly means "Going First Class!"

Unsurpassed Quality and Reliability. Quality and Reliability is important to you and it's important to ICOM. ICOM now covers you and your investment with its exclusive

one year warranty. There's more! The IC-751A's receiver boasts 105dB dynamic range for superb listening. The 100% duty cycle transmitter defies abuse and delivers 100 watts of exceptionally stable and clean RF output. Reliability. Quality. One year warranty. That's ICOM.

All Bands, All Modes Included. Operates 160 through 10 meters, it's easily modified for MARS operation, plus it includes general coverage reception from 100kHz to 30MHz. No compromise, no comparison!

32 Tunable Memories. Store both frequency and mode information. Use them to quick-access your favorite spots or as 32 preferred frequency-remembering VFOs.

A Modern Amateur's Delight! Special attractions include an electronic keyer, semi or full break-in rated to 40 WPM, panel selectable 500Hz/FL-32A CW filter, and volume control-tracking sidetone. SSB transmissions are enhanced with an RF speech processor and tone control to produce sparkling clear audio. PLUS there's a new rubberized tuning knob for velvet-smooth tuning and a full line of accessories and filters.

RF Power Control. Varies output independent of mic gain, ALC and speech processor action. Enjoy maximum "talk power" at any drive level!

To see the IC-751A, contact your local ICOM dealer.

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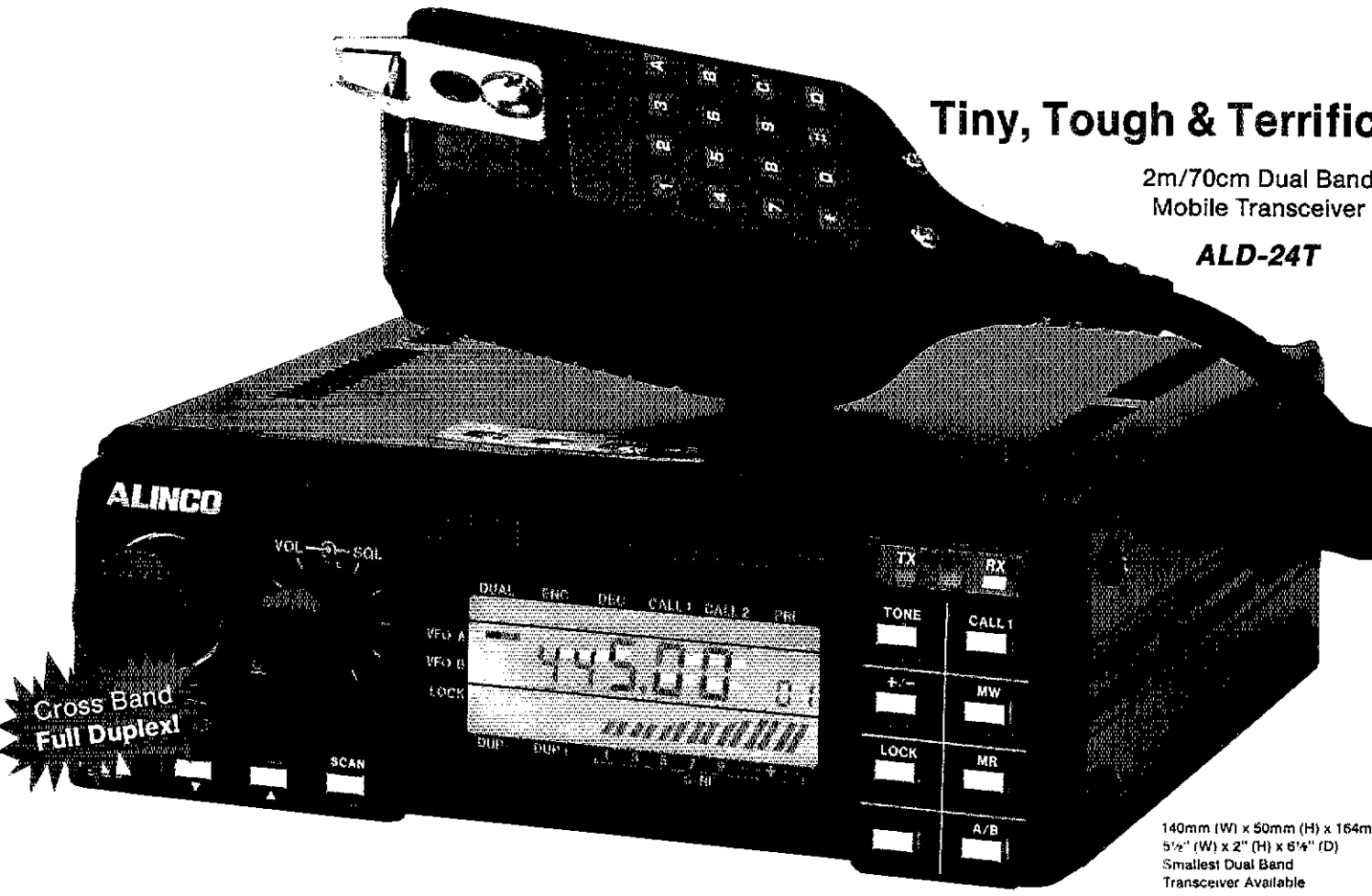
ALINCO ELECTRONICS INC.
20705 South Western Ave., Suite 104 Torrance, CA 90501 • (213)618-8616

Dual Bander

Tiny, Tough & Terrific

2m/70cm Dual Band
Mobile Transceiver

ALD-24T



140mm (W) x 50mm (H) x 164m
5½" (W) x 2" (H) x 6¼" (D)
Smallest Dual Band
Transceiver Available

With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

- 140-149.995 Mhz/440-450 Mhz
- CAP and MARS compatible
- 25 Watt High – 5 Watt Low Power both bands
- 21 Memory Channels
- Dual VFOs
- Large LCD
- **CTCSS Encoder/Decoder: Standard**
- 16-Key Autopatch Microphone with Up/Down Buttons
- Programmable Band Scan
- Memory Scan and Memory Lockout
- Ultra Compact & Light Weight
- Simple to Operate
- Programmable Standard and Non-Standard Repeater Offset

* Many more features, see your Dealer!
Also available:
25WATT 2m, 45 WATT 2m
and 25 WATT 450 MHZ.

*ALL ALINCO Products carry a 2-year Factory Warranty.
See your favorite dealer, listed below, for full details.*

Alinco's products are carried by these fine dealers

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Satellite City, Minneapolis, MN
Sound North Electronics - International Falls, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
Williams Radio Sales, Colfax, NC

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ALINCO ELECTRONICS

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Tiny, Tough & Terrific

COMING SOON

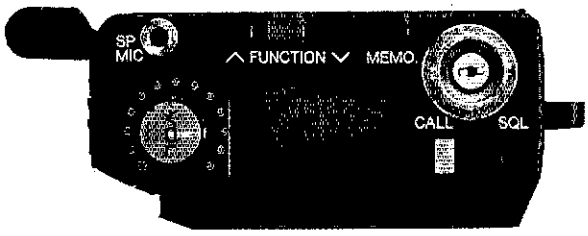
The *NEW* Generation of T.T.& T. Hand Held Transceivers From Alinco Are Just Around the Corner!

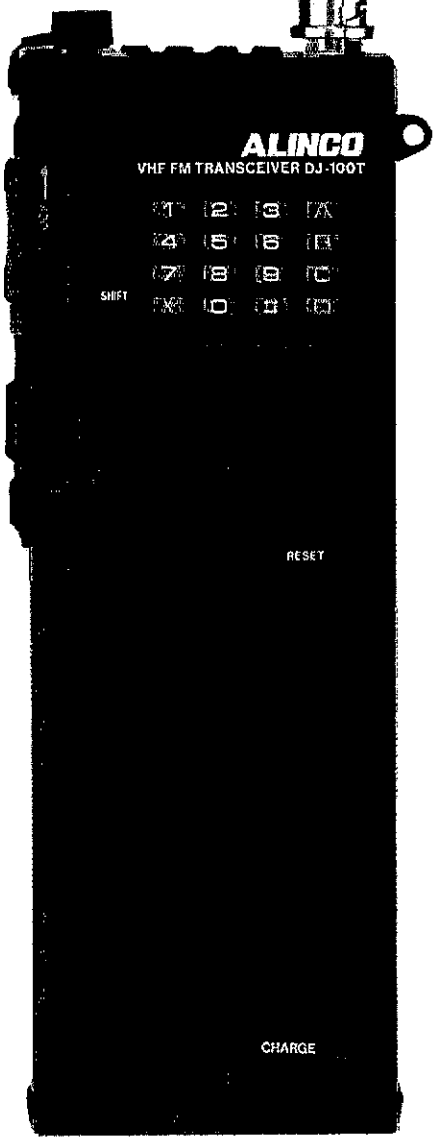
Introducing The DJ-100T 2 Meter Hand Held Transceiver

- **Tiny** = 1-3/16" D x 2-3/8" W x 6-5/8" H
- **Tough** = 6.5 Watts (With Optional EBP-8NAZ Nicd Battery Pack)
- **Terrific** = Features and Benefits

Suggested List Price $299.00

- LCD with Switchable Backlighting
- 10 Memories
- BNC Antenna Connection
- 16 Button DTMF Pad
- Easily Accessible Dip Switches For Encoding Sub Audible Tones
- Battery Save Draws 15mA For Extended Battery Life
- .20uV Sensitivity
- 144.00 MHz to 147.995 MHz
- CAP and MARS Modifiable – Simplex only
- Standard Battery, EBP-9NAZ Has DC/DC Converter Built In
- Stores Standard Repeater Offsets In Memory
- Full Range of Accessories
- 220 MHz and 440 MHz To Follow Shortly





Optional EBP-2NAZ Ni-Cd battery)

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The Ham Hut - Amarillo, TX
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Jun's Electronics - Culver City, CA
Kennedy Associates - San Antonio, TX
KJI Electronics - Houston, TX
Madison Electronics - Houston, TX
Maryland Radio Center - Laurel, MD
Memphis Amateur Electronics - Memphis, TN
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Reno Radio, Reno, NV
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Rogus Electronics - Southington, CT
Rosen's Electronics - Williamson, WV
Ross Distributing Co. - Preston, ID
Satellite City - Minneapolis, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
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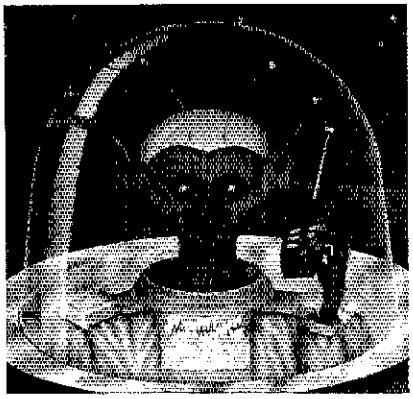
Yaesu's FT-736R. Because you never know who's listening.



The sky's no longer the limit.
With Yaesu's new FT-736R VHF/UHF base station, you'll experience some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

Join thousands of VHF/UHF pioneers already scanning the cosmos with their FT-736Rs. The most complete, feature-packed rigs ever designed for the serious operator.

Versatile frequency coverage. The FT-736R comes factory equipped for 2 meters and 70 cm (430-450 MHz), with two additional slots for optional 50 MHz, 220 MHz, or 1.2 GHz modules.

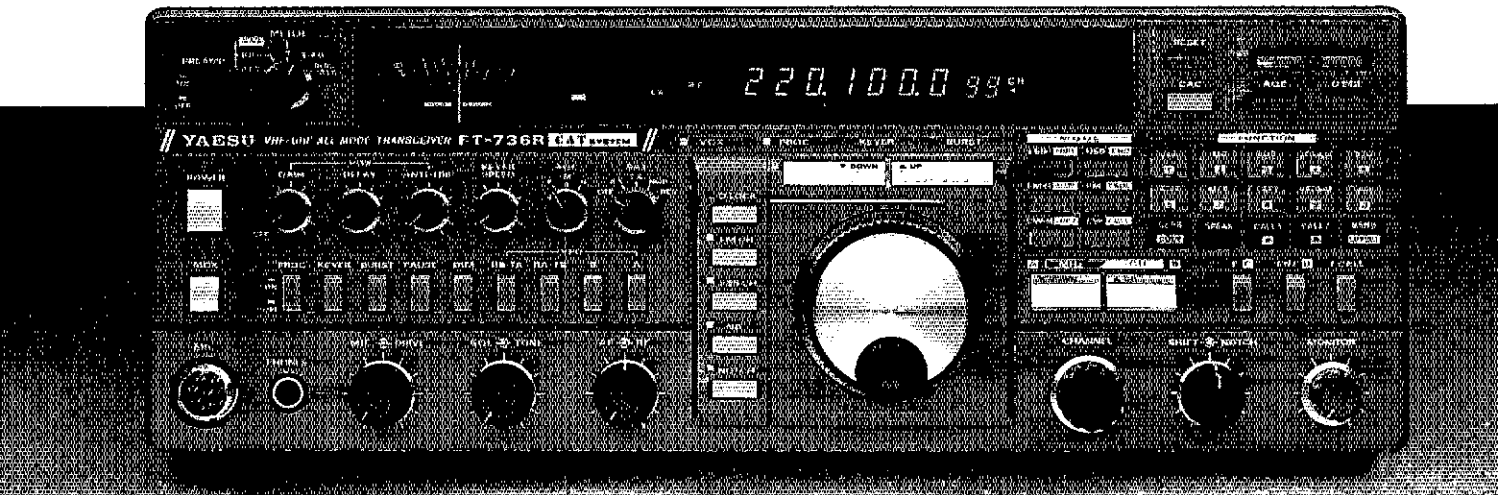
Multimode facilities. Every FT-736R is equipped for LSB, USB, CW, and FM operation. Wide/narrow filters for both FM and CW are factory installed—not expensive options. There's even all-mode squelch, too!

Satellite ready. A truly turn-key satellite rig, the FT-736R includes crossband full duplex capability. Plus VFO tracking for one knob tuning on both normal and inverted transponders. And with the optional 1.2 GHz module installed, you're QRV on Modes B, J, L, and JL. *With one box.*

Exceptional receiver design. The FT-736R was designed with low noise figure and careful gain distribution, for industry-leading sensitivity for weak signal work. And in addition to the wide/narrow CW and FM filter selection, you get IF shift. An IF notch filter. Noise blanker. Audio tone shaping control. Three-position AGC selector. And a preamp switch for activating your tower-mount RX preamplifier.

Operate Fast-Scan TV! Install the optional TV-736 and 1.2 GHz modules, and you're ready to operate fast-scan double-sideband TV with FM audio subcarrier. Black-and-white or color!

Contester's dream! Versatility is a must in VHF contests, as openings are brief. For quick activity checks, use the separate "channel" selector for a speedy trip up the band in selectable steps (SSB *or* FM!). Use the two



Video camera and monitor not available from Yaesu and not supplied with TV-736.

Prices and specifications subject to change without notice. FT-736R shown with 220 MHz option installed.

Seriously.

Write for your free extraterrestrial QSL card at our address below.

VFOs per band to watch different areas of the band. Keep your sked frequencies stored in any of the 100 memories, which retain frequency *and* mode. And let the RF speech processor get you through tough pile ups.

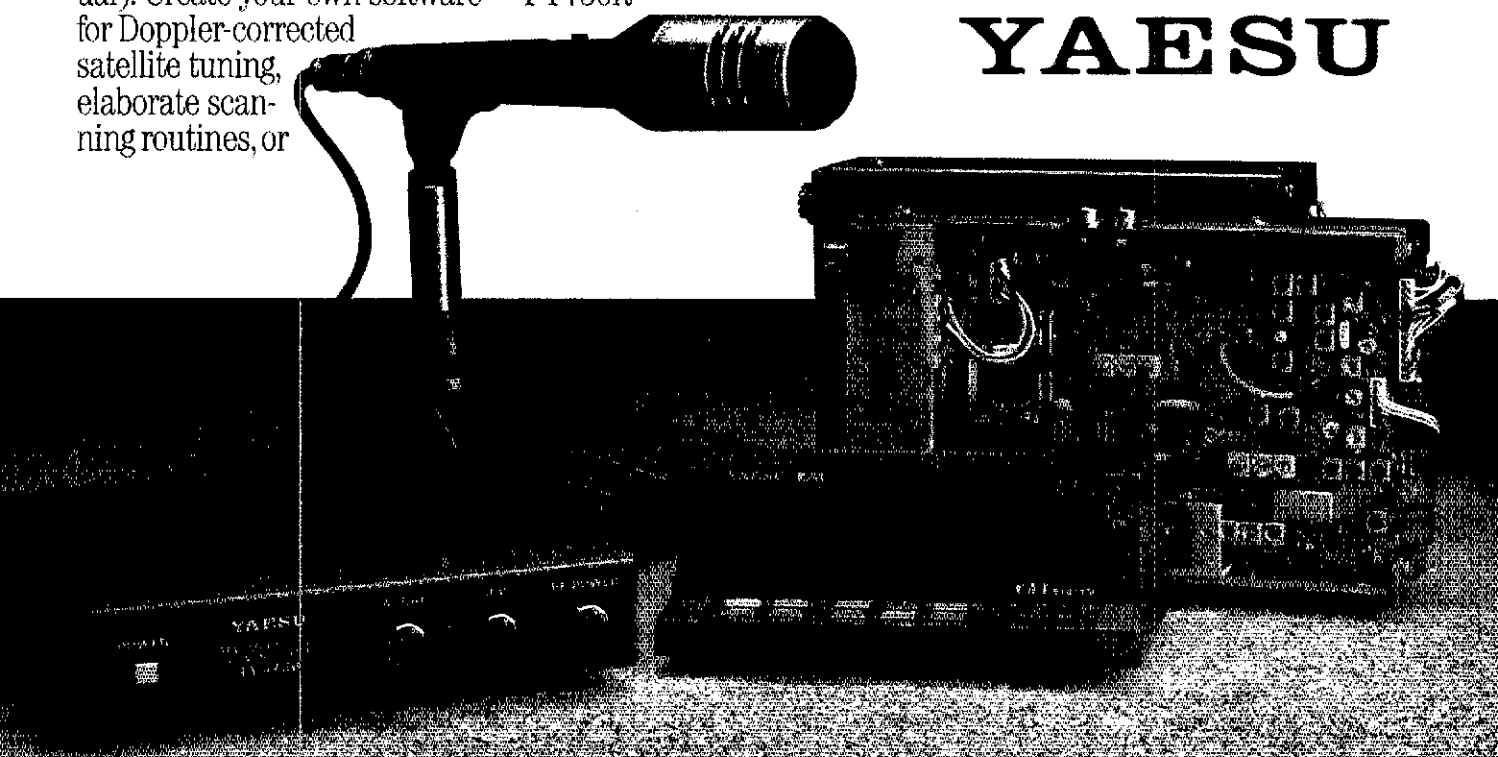
Ready for computer control. The FT-736R is equipped for CAT (Computer Aided Tuning) control via the rear panel 4800 baud serial data port (our command set is included in your owner's manual). Create your own software for Doppler-corrected satellite tuning, elaborate scanning routines, or complete frequency control *and* satellite/EME antenna tracking using our new G-5400B or G-5600B AZ-EL rotators.

Your total communications package. The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz and 70 cm. And 10 watts on 6 meters and 1.2 GHz. With separate linear amplifier relay control lines for each band.

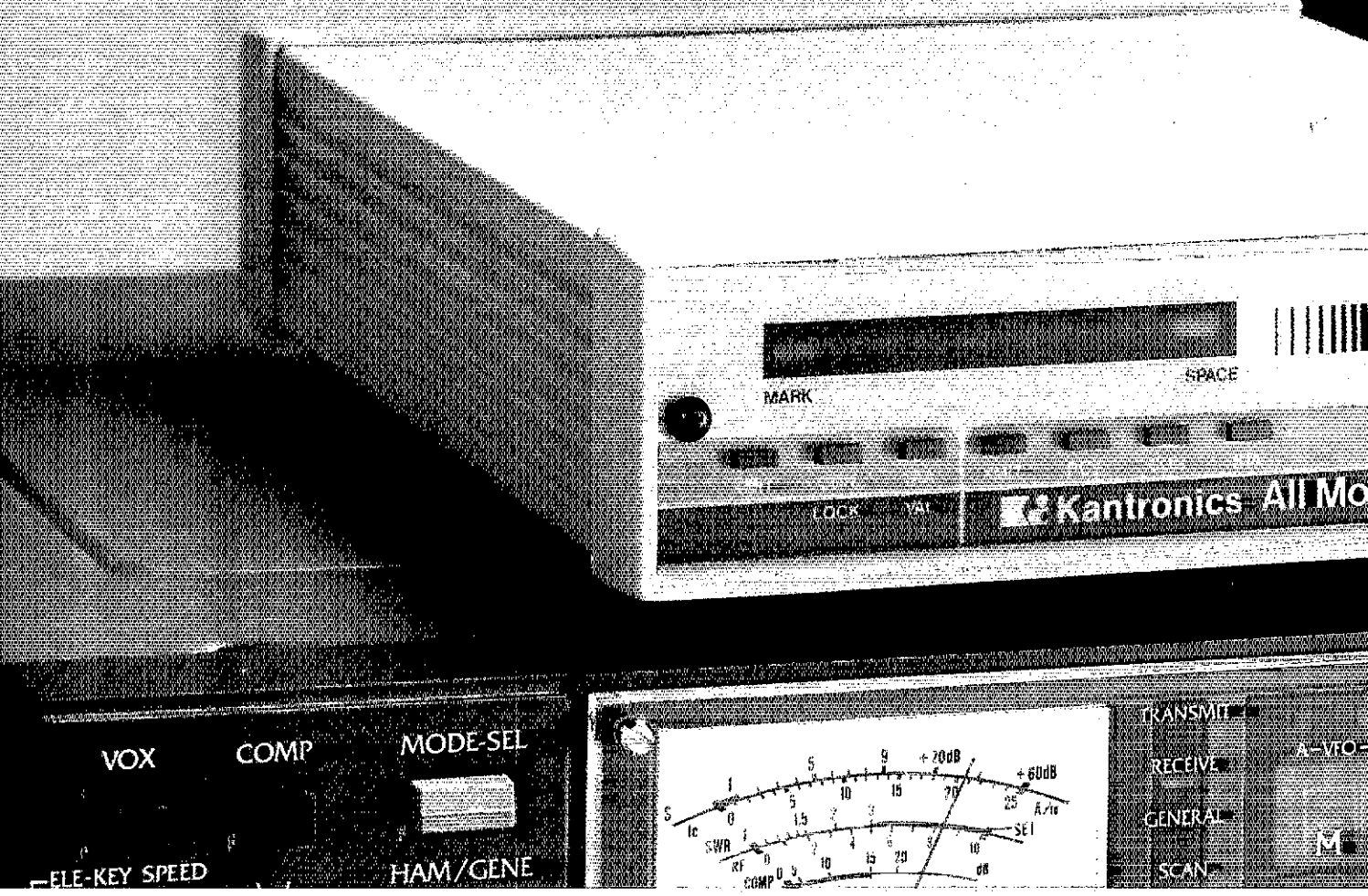
And to round out your FT-736R station, choose from these popular accessories: Iambic keyer module. FTS-8 CTCSS unit. FVS-1 voice synthesizer. FMP-1 AQS message display. E-736 DC cable. MD-1B8 desk microphone. And our super YH-55 headphones.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because the ultimate DX is out there. And you *never* know who's listening.

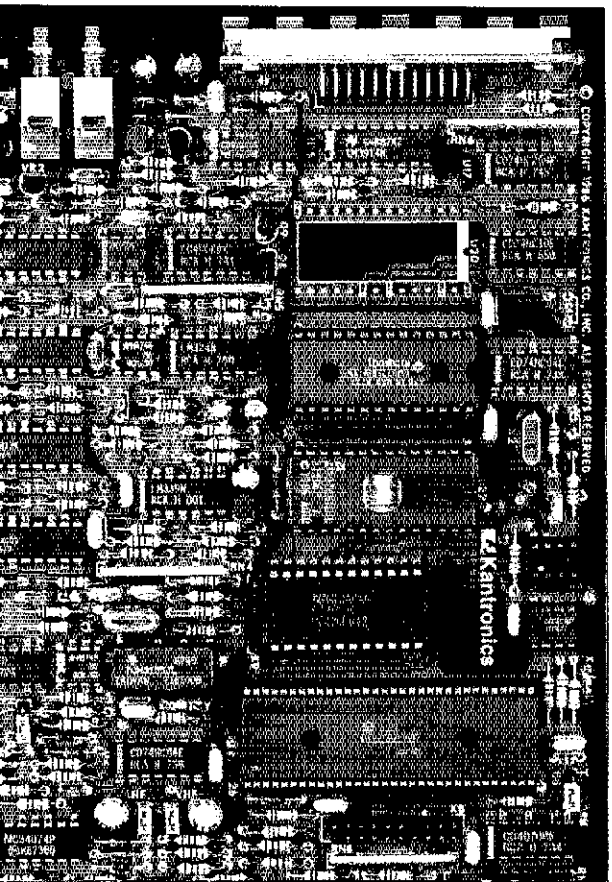
YAESU



Yaesu USA 17210 Edwards Road, Cerritos, CA 90701. (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.



Join the fun at th



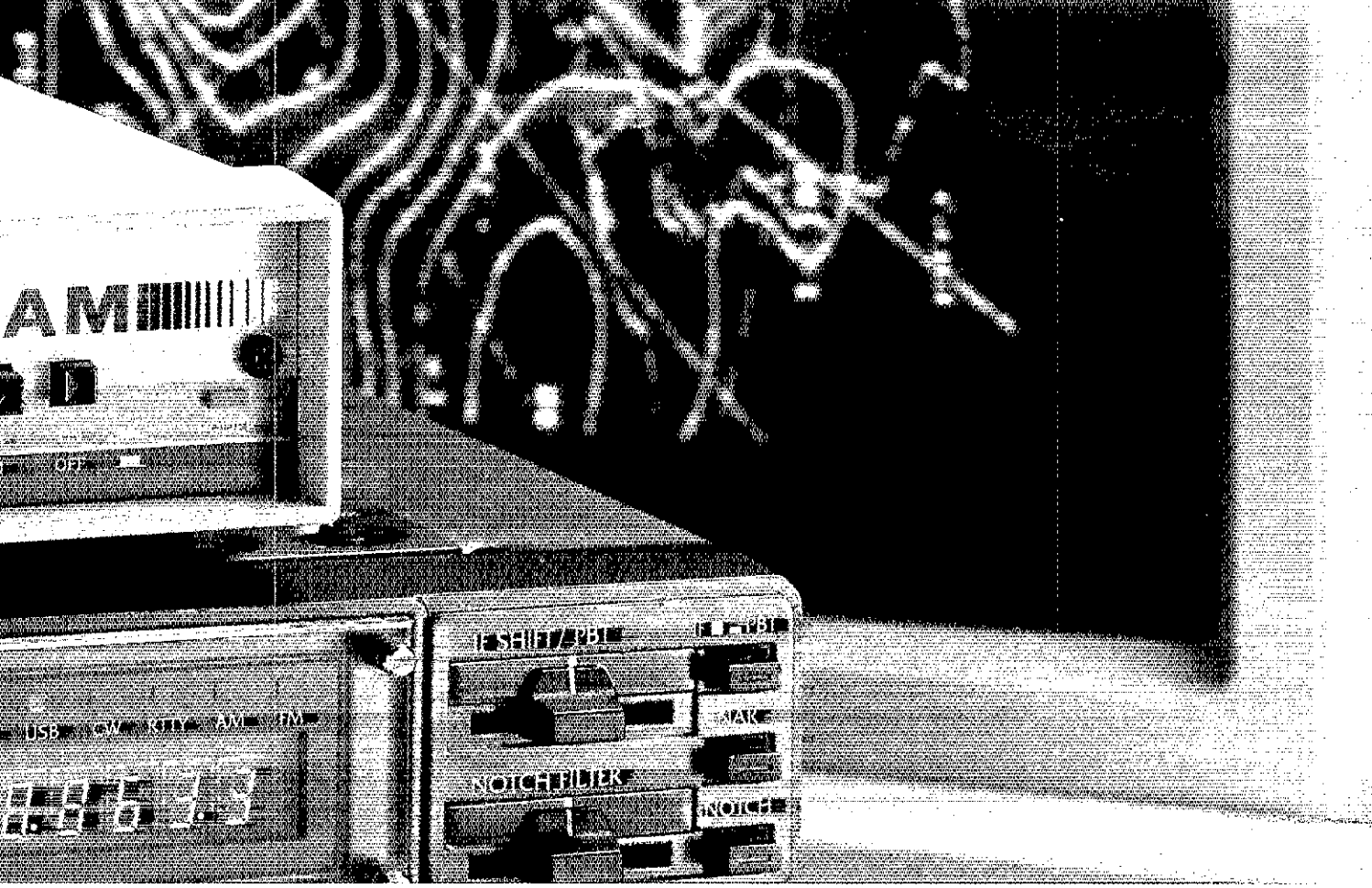
Whatever your interest, you'll find the Kantronics All Mode™ at the top of the pack. CW, Radio-teletype, AMTOR, ASCII, WEFAX and Packet, "KAM handles them all." HF and VHF simultaneous operation? You bet! The KAM can operate RTTY or AMTOR on HF while communicating Packet on VHF. Believe it. It's the only true dual-port on the market.

World-Class

Swedish and German hams have noticed KAM's engineering and are some of our biggest fans. The Japanese scrutinized our features and gave us ideas for extras like a subject field for the Personal Packet Mailbox™, listings of digipeater paths and more CW characters and functions. We are shipping KAM around the world.

Fun for Everyone

You'll be the envy of the airwaves with all the modes and features KAM brings to your fingertips. In addition to Packet, ASCII, AMTOR,



e top of the pack!

WEFAX, CW and Radioteletype, you'll have Dual-Port Operation (the only TNC offering this feature), Personal Packet Mailbox™, KA-NODE™, gateway, and digipeater operation.

You can operate non-packet modes on HF while maintaining a packet station at the same time on VHF. Or run an HF/VHF accessible personal mailbox or pc-based BBS totally dedicated to packet. Configure your KAM as an HF to VHF digipeater (gateway) or KA-NODE. Or open your LAN to the world. All these modes and more features are waiting to be discovered. Increase your station abilities to the most advanced available.

Today and Tomorrow

KAM is packed with all the latest features of today with Kantronics-written firmware. And since we write and copyright our own firmware, we're in a position to lead you into the exciting modes of tomorrow first. We have a history of keeping our customers current. Proof is in our firmware updates (2.7 in 1987 and 2.83 in 1988) offered at a fraction of the cost of a new purchase.

So join the fun, join the Top of the Pack.

Kantronics
RF Data Communications Specialists
1202 E. 23 St Lawrence, Kansas 66046 (913) 842-7745

Depend on Paragon Performance!

Transmitter audio quality that is a pleasure to hear and a receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz with two tuning rates. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five i-f filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters. All are push button selectable in any mode. Passband tuning, notch filtering, audio bandpass filtering, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). The scanning routine is easily controlled with both individual and global lock-out and reset functions. Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement when optional synthesized voice board is installed.

Rear panel controls adjust the VOX, CW monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and high speed switching for QSK linears, such as the Titan. Other rear panel connections are included for a transverter, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc and provision for the optional RS-232 control interface.

An absolute delight for the all mode operator.

The construction of the Paragon is impressive too. All of the circuit boards are G-10 glass epoxy and can be removed easily. All aluminum construction and the use of an external power supply, keeps the weight of the Paragon at a svelte 16 lbs.

The Paragon is the result of a three year computer aided (CADEC 4) engineering effort. Much of that effort was invested in improving receiver performance. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.

Write for our new full-line catalog.

The Term of Warranty Is One Year, As Always

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ATTENTION RF ENGINEERS
Tired of traffic jams and high taxes? If you have an EE degree and at least two years of RF design experience, preferably VHF, I would like to talk to you. Ten-Tec is a fun place to work and we are situated in the beautiful Smoky Mountains of East Tennessee. The best climate in the U.S. with four season splendor. Call or write: Lee Jones, Vice President, Engineering.

TEN-TEC

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Sevierville, Tennessee 37862
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Harness the Titan Power!

The TITAN has it all! Maximum legal power with ease, all bands 160 through 15 meters (through 10 meters after authorized modification), lightning fast QSK for full break-in CW and the digital modes, plus a two speed blower for quiet operation on phone. This awesome performance from a desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an absolute "horse" of a power supply.

The heart of the power supply is our own tape wound, four core, Hypersil® transformer which weighs in at an impressive 41 pounds. This transformer is conservatively rated at 2.5KVA CCS (continuous commercial service) or 9KVA IVS (intermittent voice service). The power supply is housed in a separate utility enclosure for remote operation and is nearly noiseless even at full power.

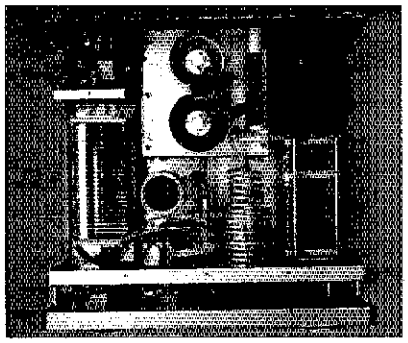
Front panel features include an instantaneous 10 element LED peak output power indicator, a dedicated plate current meter, a multi-meter to read grid current, forward power, reflected power or plate voltage, HI/LO plate voltage select, STBY/OPR switch and power ON/OFF switch. A red LED warns you if grid current becomes excessive and three other LEDs indicate status: WAIT, STBY and OPERATE. Vernier TUNE and LOAD controls, in combination with an outstanding RF deck design, make the Titan a real "pussy cat" to load and operate.

The low drive requirement of the Titan (65 watts in for 1500 watts output typical) makes life much nicer for your exciter too. Operating temperatures are significantly lower and component life extended accordingly. This is especially comforting using "keydown" modes such as RTTY. Adjustable ALC is provided for controlling exciter RF output levels.

The Titan has been the subject of two "product review" magazine articles. See QST, April 1986; CQ February 1986.

The Titan is designed to match our 100 watt exciters but it pairs up nicely, no matter what exciter you operate. If you are ready to choose your dream amplifier the Titan has everything but the highest price. Check it out!

Write for our new full-line catalog.



MADE IN USA

The Titan Is Backed With A Three Year Limited Warranty

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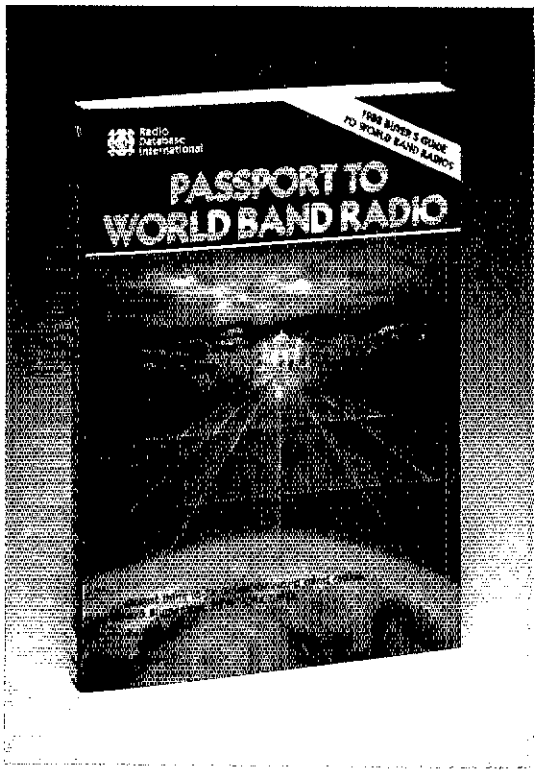

DISCOVER!

Here's your chance to discover (or rediscover) what is going on between our ham bands in the way of international broadcasting. Many modern Amateur Radio transceivers can receive these frequencies. Now it is easier than ever to hear world events as they happen — *providing* you know where and when to look for a particular station. **Passport to Worldband Radio** lists shortwave broadcast stations by country and frequency. It also gives the language, power and antenna directivity at specific times. For example, when might you expect to hear an English language broadcast from Malta? The country listing shows such a transmission on 9515 kHz. For more detail you turn to the frequency listings and see that the broadcast takes place at 2030z with a power of 250 kW beaming Europe. The frequency listing makes identifying particular stations a snap! International radio is a great way of increasing your knowledge of the world. Something is happening *right now!* You can be a part of it by listening in on the medium and shortwave broadcast bands. 352 pages. 1988 edition $15.00 plus $2.50 ($3.50 UPS) for postage and handling.

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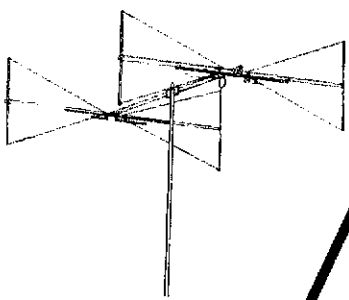
The HF5B "Butterfly"™
A Compact Two Element Beam for 20-15-12-10 Meters. Operates as a Dipole on 17 Meters.



- Unique design reduces size but not performance.
- No lossy traps; full element radiates on all bands.
- Turns with TV rotor
- Only 19 lbs.

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Butternut Verticals

Butternut's HF verticals use highest-Q tuning circuits (not lossy traps!) to outperform all multiband designs of comparable size!

Model HF6V

- 80, 40, 30, 20 15 and 10 meters automatic bandswitching.
- Add-on kit for 17 and 12 meters available now
- 26 ft. tall

Model HF2V

- Designed for the low-band DXer
- Automatic bandswitching on 80 and 40 meters
- Add-on units for 160 and 30 or 20 meters
- 32 feet tall - may be top loaded for additional bandwidth.

For more information see your dealer or write for a free brochure

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405 East Market Lockhart, Texas 78644

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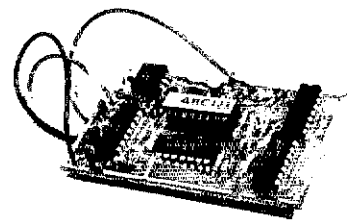
BUILDING A REPEATER?
Identify your FM transceiver with automatic code on each transmission.



SMALL: 1 3/4" X 2 1/4" X 5/16".
Perfect means of RTTY code ID

PRICE **$49.95** Ppd.
+$3.00 for Calif. address.

Full feature repeater IDer with timer **$79.50** Ppd. +$4.77 for Calif. address.

WARRANTY
Returnable for full refund within ten day trial period. One year for repair or replacement.

Your call sign programmed at factory, please be sure to state call sign when ordering.

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NEW!

Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.

- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

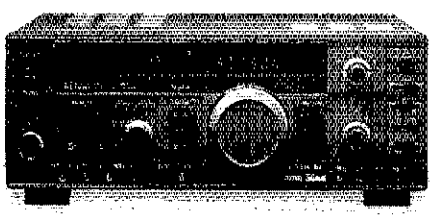
Optional Accessories:

• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter

TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.



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

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Good for Satellite Digital QSOs

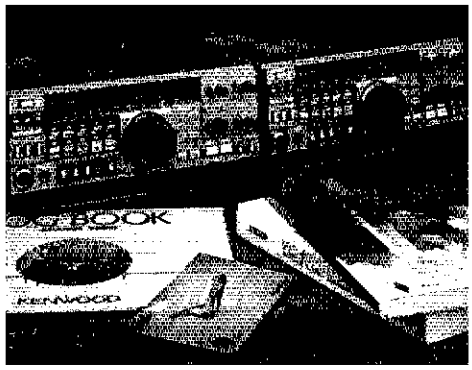
Matching Pair

Look for FUJI and PHASE III-C

TS-711A/811A VHF/UHF all-mode base stations

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.** Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out), "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.** For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.** Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
- **Semi break-in CW, with side tone.**
- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.

Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

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DIPMETER

1.5 To 250 MHz
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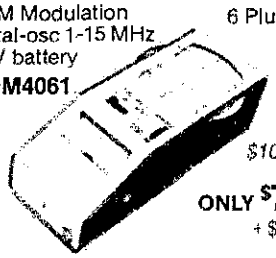


$109.95 Value

ONLY $79.95 + $4 UPS

- Measure resonance of antennas and tank circuits.
- Check for Harmonic radiation.
- Use as OSC for Rec. alignment.
- More uses detailed in the RSGB Handbook, pages 18.15 to 18.21.

RF SIGNAL GENERATOR

SG4160

- 100 KHz - 150 MHz to 450 MHz on harmonics.
- RF Output 100 mVs.
- Modulation: Int. - 1 KHz Ext. - 50 Hz to 20 KHz.
- Crystal OSC 1 - 15 MHz.

$219.95 Value **ONLY $149.95** + $4 UPS

RF POWER METER/LOAD

PM330

- 1.8 to 500 MHz.
- 50 OHM - N-J Connector.
- 5W, 20W, 120 Watts.
- Accurate to +/- 10%.

$109.95 Value **ONLY $79.95** + $4 UPS

FREQUENCY COUNTER

FC5250

- 10 Hz to 150 MHz.
- 7 Digit readout.
- Gate 1s & 6 sec.
- Accurate to +/- 1 count.

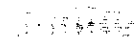
SENSITIVITY: 25 - 100 mV to 30 MHz; 100 - 300 mV to 150 MHz

$169.95 Value **ONLY $129.95** + $4 UPS

AC Adapter is included with unit.

RF ATTENUATOR DC—500 MHz

RFA8000



- 0 - 81 dB in 1 dB steps.
- Accurate to +/- .3 dB
- Steps 1, 2, 3, 5, 10 and 20 dB
- 50 OHm - ½ Watt Insertion Loss .5 dB.

$299.00 Value **ONLY $149.95** + $4 UPS

SWR/RF ANTENNA METER

SWR3P

- Read SWR, RF power and field strength.
- 1.7 to 150 MHz.
- 10 or 100 watt range.
- SWR +/- 5%; POWER +/- 10% accuracy.

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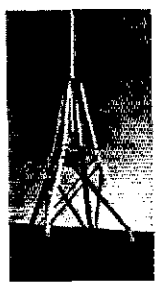
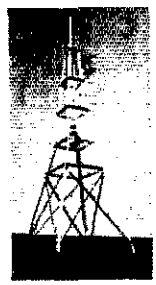
ROOF TOWERS



CR-18



CR-30

CR-45

CREATE ROOF TOWERS CONSTRUCTED OF HIGH GRADE ALUMINUM WITH GALVANIZED STEEL BRACING FOR ADDED STABILITY AND STRENGTH WILL EASILY ACCOMMODATE YOUR ANTENNA REQUIREMENTS. THREE SIZES OF ROOF TOWERS WILL SUPPORT VHF ANTENNAS, HF TRI-BANDERS, AND OSCAR SYSTEMS. ROTATORS EASILY MOUNT INSIDE THE TOWER. AN OPTIONAL THRUST BEARING (#303) IS RECOMMENDED. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-1/3"	440	28	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	681	55	328.00
#303TB	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					39.00

*GUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE

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20G	10' sect	45.95
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SB25G	short base	26.95
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	AND MORE!	

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6BTV	6 band trap vert	147.95
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RM40/RM40S	std. and super	18.95/26.95
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SSM-2	stainless ball mt	18.95
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	AND MORE!	

VAN GORDEN

PD8010	80-10 dipole kit	35.95
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PD4010	40-10 dipole kit	31.95
SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
ALL BANDER	160-10mt.	28.95
GR5V		49.95
	AND MORE!	

KLM

KT34A	triband 4 el.	C	P
KT34XA	triband 5 el.	A	R
2M-14C	2mt. satellite	L	I
2M-22C	2mt. satellite	L	C
435-18C	70cm satellite		C
435-40CX	70cm satellite	F	E
432-30LBX	70cm satellite	O	S
2M-13LBA	2 meter	R	
2M-16LBX	2 meter		

CABLE & CONNECTORS — per/ft.

Belden 9913	Low Loss	.54
Columbia RG213	50 Ω (OHM)	.35cts
RG8/U	Foam	.30cts
RG 8X	Mini	.22 cts
RG59/U	72 OHM	.14 cts
PL259/Silver		.99/1.39
N-Male for 8/U		4.00
BNC(M)-UHF(F)		4.90
Columbia Low Loss		.39cts

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A4	4 el triband	353.95
A3	3 el triband	259.95
AV5	5 band trap vert.	117.95
32-19	19 el 2mt boomer	107.95
215WB	15 el wide band 2 mt.	85.95
424B	24 el 70cm boomer	85.95
416TB	16 el OSCAR 435 MHz	67.95
A144-10T	10 el OSCAR 145.9 MHZ	57.95
AOP-1	OSCAR pack 2mt. & 70cm	167.95
AR-2	2mt. vert. ringo	27.95
ARX-2	2mt. vert. ringo ranger	34.95
ARX-2B	2mt. vert. ringo ranger II	41.95
	AND MORE!	
R4	4 band vert	214.95
	AND MORE!	

BUTTERNUT

HF6V	80-10 vertical 127.00
HF2V	80-40 vertical 119.00
2MCV5	2MT vertical 54.00
RMKII	roof mtg. kit 45.00
TBR160S	160m add on 47.00
MPS	mtg. post sleeve 6.00
HF5B	HF mini beam 199.95

HY-GAIN

TH7DXS	7 el. triband		
TH5MK2S	5 el. triband	C	
EX-14	4 el triband	A	P
TH3JRS	3 el. 750W pep	t.	R
18AVTS	5 band trap vert	L	I
14AVQS	4 band trap vert.		C
V2S	2mt. omni-direct	F	E
V4	70cm omni-direct	O	S
HB144MAG	2mt. mag. mt.	R	
	AND MORE!		

HY-GAIN ROTORS

T2X	20 sq. ft.	359.95
HAM IV	15 sq. ft.	299.95
CD45II	8.5 sq. ft.	213.95

DAIWA ROTORS

MR750E	16 sq. ft.	319.95
MR750PE	w/preset	419.95
MR750U	motor	99.95

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2 Meter	44.95
220 MHz	44.95
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LMMM	mag. mt	15.95
LM150	2m coil & whip	25.95
NMOMM	mag. mt.	17.95
NMO150	2m coil & whip	27.95
NMO270	coil & whip	38.50
KD4270	dual band duck	26.95
LM220	220 coil & whip	25.95
	AND MORE!	

Electrical and Mechanical Specifications

Shipping weight:	12 lbs./5.4 kg.
Height:	25 ft./7.6 m.
Feedpoint impedance:	nominal 50 ohms through included matching line (includes RF connectors for direct connection to any length of 50-ohm cable terminated in PL-259)
VSWR at resonance:	1.5:1 or less on all bands in typical ground level or above ground installations
Bandwidth for VSWR of 2:1 or less:	10 meters - 1500 kHz 15 meters - entire band 20 meters - entire band 30 meters - entire band 40 meters - 250 kHz 80/75 m. - 40 to 100 kHz
Power Rating	Legal limit SSB and CW all bands
Wind loading:	1.6 sq. ft./.49 sq. meters
Ungoyed wind survival rating:	80 m.p.h./129 k.p.h. assuming no icing and precipitation

Installation

Towers complete with 2 ft./79 cm. tubular mounting post (1-1/8 in. O.D.) for direct placement in earth or into standard steel TV mast (1 1/4 in. O.D. with .058 in. wall) or Butternut Mounting Post Sleeve (Model MPS). Eye level adjustment of 40, 60 and 30 meter resonator coils length adjustment on 15 and 10 meters. 20 meter adjustment is a function of 40 and 30 metar tuning. Coils for 80/75, 40 and 30 meters are 5/16-in. diameter aluminum wire, air wound and self supporting, typical spacing between adjacent turns is 1/2 in. or greater.

Model HF6V-X, an expert/DXpedition version suitable for surface placed post segment to most countries is available. Electrically identical to the standard model. Shipping weight: 12 lbs./5.4 kg.

MODEL HF6V

Compare Active Element Lengths

Band	HF6V	Typical multiband trap vertical
10/12M	25 ft. (7.6 m.)	24 ft. (7.3 m.)
15M	12 ft. (3.6 m.)	12 ft. (3.7 m.)
20M	26 ft. (7.9 m.)	12 ft. (3.7 m.)
30M	26 ft. (7.9 m.)	
40M	26 ft. (7.9 m.)	20 ft. (6.1 m.)
80M	26 ft. (7.9 m.)	26 ft. (7.9 m.)

HF6V 127.00

MISC ITEMS

DXA	160, 80, 40 dipole	49.95
AP151-3G	2m on glass	36.95
GGM	1/4 λ mag.	21.95
HB144BN	2m duck	16.95
MONR51	scanner mag.	39.95
BL1500	9:1 balun	46.95
Coaxseal		2.95
GR6	6' gnd rod	6.00
SRG58N	5' jumper	4.99
M5	5' mast	5.95
CS3G	3-way switch	33.95
LAC2	Blitz Bug	8.95
4UU	4' jumper	8.95
TRT60	5' tripod	19.95
AR300XL	TV rotor	59.95
258XUU	25' cable	9.95
508XUU	50' cable	15.95
758XUU	75' cable	20.95
1008XUU	100' cable	25.95
CS201	coax switch	25.75
CS401	coax switch	109.95
	AND MORE!	

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2½"

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CR4A	140MHz Mag MT	34.00
CR2RD	Radome Cover — CALL —	12.00

CABLE IS NOT INCLUDED

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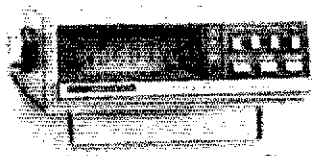
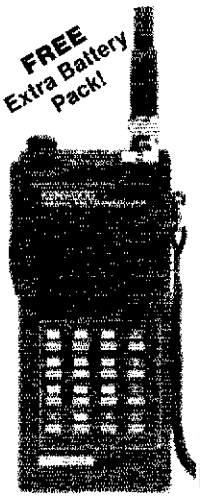
AX-2 Shoulder Strap with Ground Plane Antenna Base* for TR-2400/2500/2600 3500/3600 handhelds . . . **$9.95**
*antenna not included

TM-401B 25W compact 440MHZ FM transceiver w/ext. spkr and TTP mic . . . **Closeout $299.95**



CD-10 Call Sign Display **Closeout $49.95**
For DCL/DCS series tranceivers. Stores call sign of calling station in memory and displays it on LCD display.



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TH-21A 2m..... **$169.95**
TH-41A 440MHz.... **169.95**
TH-41AT 440/TTP... **189.95**
TU-6 Encoder purchased with TH-41AT.... *Only* **$4.95**
TH-21BT* 2m/TTP **$199.95**
TH-41BT* 440/TTP **199.95**
*Note: BT is latest model with built-in CTCSS encoder.
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★ **FREE Battery!** Extra PB-21 battery included with each of the above HTs.

TR-3600A 440MHz FM Handheld
Closeout - $249.95
Limited Quantity - Hurry!

Due to changing prices and limited quantities, all listings on this page are subject to change without notice. Please check with salesperson when ordering.

In Stock!
TS-140S 160-10M Tranceiver with 150kHz to 30MHz general coverage reciever... **CALL FOR PRICE**

Miscellaneous Closeouts

TR-9500 10W 430-440 SSB/CW/FM xcvr . . . **$399.95**
KPS-7A 6A power supply..... **49.95**
PS-20 4.5A power supply **39.95**
FC-10 Freq. controller for TM-201B/401B..... **29.95**
LH-1 Leather case for TR-2400 ..... **29.95**
LH-2 Leather case for TR-2500/3500 ..... **29.95**
DF-180 Digital freq control for TS-180S..... **49.95**
MB-1A Mobile mount for TR-2200 ..... **2.95**
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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

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(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

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The League reserves the right to decline or discontinue advertising for any reason.

CLUBS/HAMFESTS/NETS

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

LITTLE Big Horn Net Sundays: 14.067 MHz, 2200 UTC, 21.176 MHz 2230 UTC. Historians and Native Americans welcome. SASE WA2DAC.

THANK You for attending Warren Ohio Hamfest. See you August 21, 1988.

1988 "BLOSSOMLAND Blast" Sunday, October 2, 1988. Write "Blast", P.O. Box 175, St. Joseph, MI 49085.

HAMFEST Sunday September 18, 1988. LIMARC ARRL Long Island Hamfair at the New York Institute of Technology, Route 25A-Northern Blvd., Old Westbury, NY. Outdoor tailgating, no reservations needed, sellers car space $5, general admission $3. Non-Ham women & children free. Exit 39 North on Route 495, go North on Glen Cove Road 2 miles to 25A, turn right 1 mile to site. Talkin 146.25/85. Food, refreshments available with many awards to attendees. Open 7:30 AM for sellers, 9:00 AM for buyers. For further info call Mark Nadel, NK2T, 516-796-2366. Next fest Feb. 19.

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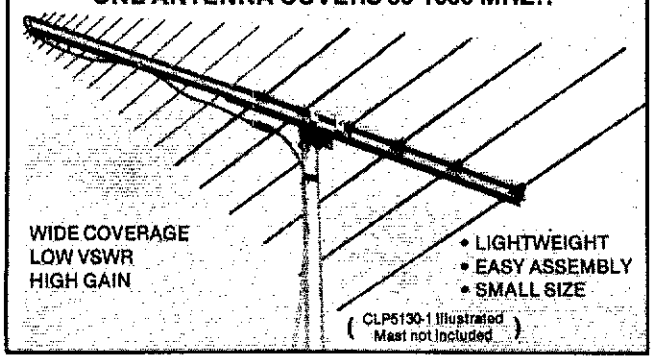
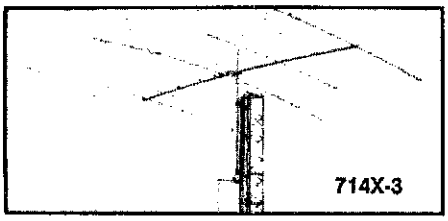


CLP5130-1 50-1300 MHz 25 el. 500W 6 ' Boom $239 + shipping
CLP5130-2 105-1300 MHz 20 el. 500W 4 '6" Boom $139 + shipping

Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

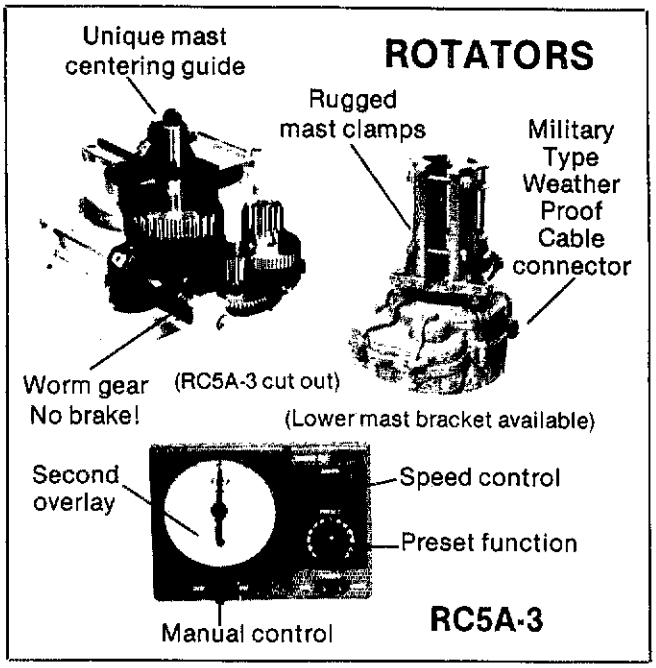


714 Series Tribanders
15-20-40 Meters
On One Boom!

Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28'6"	43'	25'3"	71	2 kw	$574.
714X	3/4/4	32'5"	44'	26'2"	75	2 kw	$762.
714T-3	2/4/4	28'6"	43'	25'3"	75	3 kw	$707.
714X-3	3/4/4	32'5"	44'	26'2"	80	3 kw	$928.

(Prices include balun)

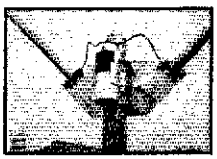
ROTATORS

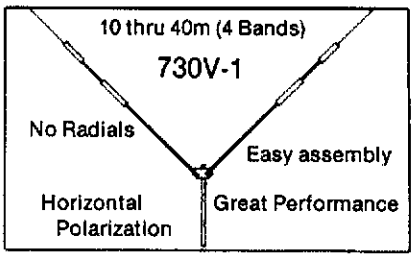


RC5-1	10 sq. ft.	$251
RC5-3	10 sq. ft. preset	$328
RC5A-2	25 sq. ft.	$399
RC5A-3	25 sq. ft. preset	$459
RC5B-3	35 sq. ft. preset	$736

All rotators will fit most towers. Please call for additional information.

730V-1 DIPOLE!





Find out why more and more people are replacing their lossy verticals and moving up to the super performing 730V-1 dipole. The 730V-1 consists of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary! The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. $159 + shipping.

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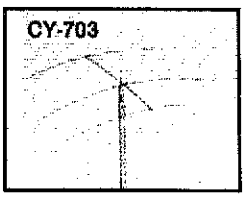
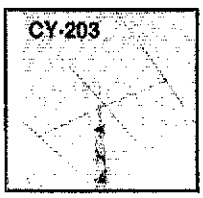
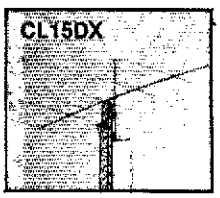
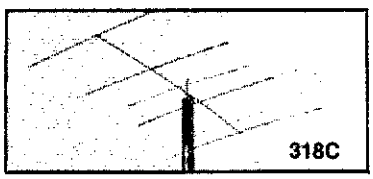






Mono Bander Data

Model	Freq MHz	El.	Boom Length	Longest El.	Turning Radius	Wgt. Lbs.	Power	Price
CY104	28.0	4	18'8"	18'4"	12'11"	19	2 kw	$185.
CL10DX	28.00	6	30'6"	18'½"	16'1"	33	2 kw	$310.
CY154	21.00	4	40'8"	24'3"	24'3"	58	3 kw	$205.
CL15DX	21.00	6	18'8"	24'5"	15'5"	21	2 kw	$559.
CL20	14.00	4	30'9"	36'8"	36'8"	58	3 kw	$495.



318 Series Tribanders
10-15-20 Meters

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
318JR	3/3/3	13'1"	31'1"	15'9"	28	1.2 kw	$289.
318	3/3/3	16'4"	31'1"	17'4"	40	2 kw	$345.
318B	3/4/4	20'11"	31'1"	18'4"	49	2 kw	$434.
318C	5/5/5	29'10"	31'1"	21'	58	2 kw	$643.
318B+7	1/3/4/4	20'11"	37'7"	19'11"	52	1 kw	$606
			(Prices include balun)			2 kw	

Price does not include shipping.

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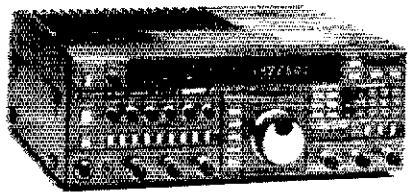
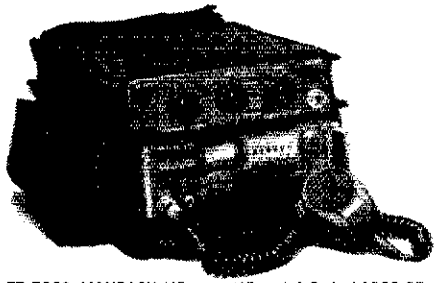
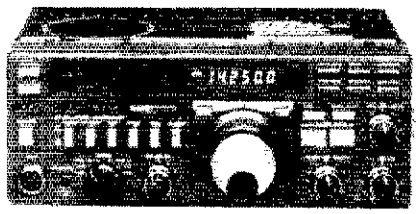


HF Equipment	LIST
FT-767GX 160-10m xcvr/.1-29.99 MHz Rcvr	$1929.95
SP-767 Speaker w/audio filters	79.95
2M/767 2m module	199.95
6M/767 6m module	199.95
430/767 430-440 module	249.95
440/767 440-450 module	249.95
FT-ONE Xcvr/Rcvr/4 filters/RAM/FM	2859.00



FT-70G* MANPACK HF xcvr (*Special Order)	1069.95
FNB-70* Extra 12V, 4 amp-hour nicad	299.95
NC-70* Nicad battery charger/base supply	259.95
CSC-70* Canvas carrying case	89.95
FC-70M* Manual antenna tuner	199.95
FC-70P* Preset antenna tuner	199.95
RSL-70* Whip antenna for FC-70P	27.95
MH-17* Speaker/microphone	31.95
YA-70* Tripod antenna	269.95
YH-70* Telephone-type handset	59.95



FT-757GX MkII 9-band Xcvr/SW Rcvr/mic	$1129.95
FP-757HD Heavy duty supply with fan	299.95
FP-757GX Compact power supply	239.95
FP-700 Power supply	239.95
FRB-757 External relay box	12.95
FC-757AT Automatic ant. tuner w/memory	399.95
FAS-1-4R Remote antenna selector	99.95
MMB-20 Mobile mount	25.95
FIF-65A Interface; Apple IIe	59.95
FIF-232C for VIC-20/TI/most RS-232	79.95
GX Turbo/F01 Software; Apple II	59.95
GX Turbo/C01 Software; C64/128	89.95
GX Turbo/V01 Software; VIC-20	89.95
FTV-700 Transverter w/no module	175.00
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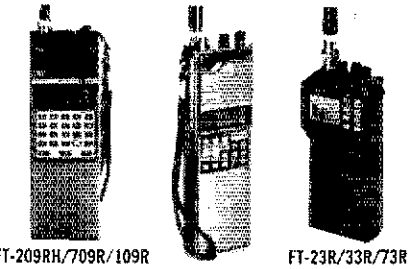

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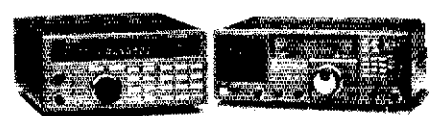

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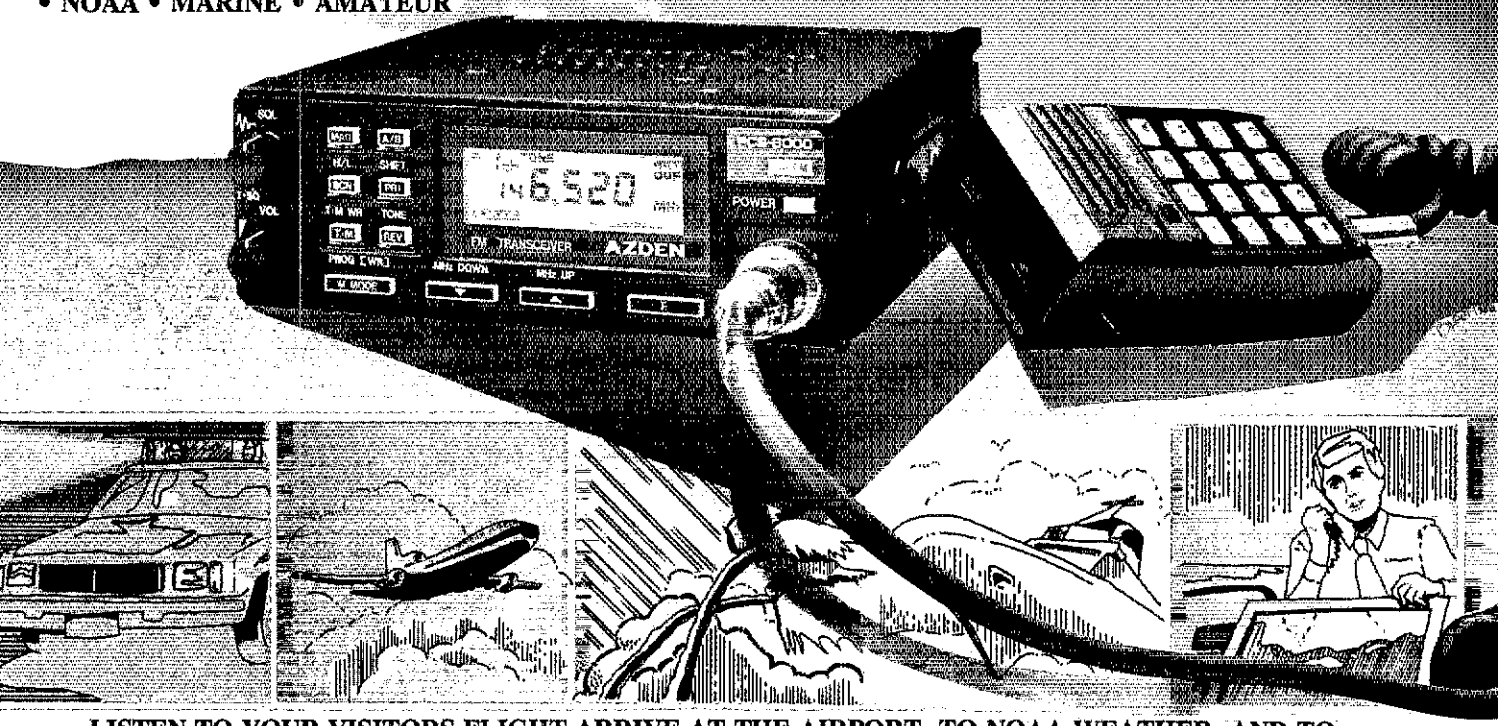

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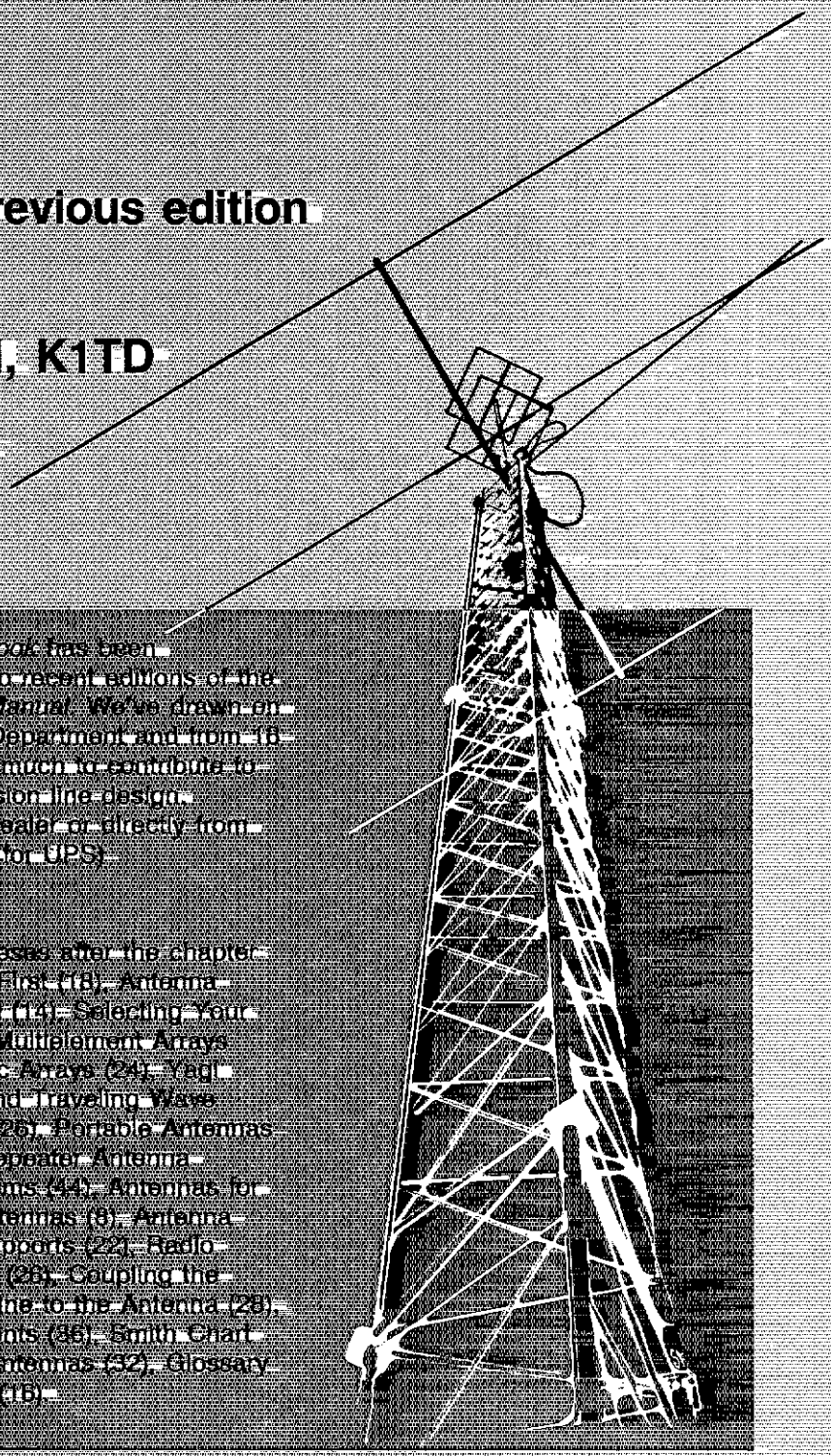

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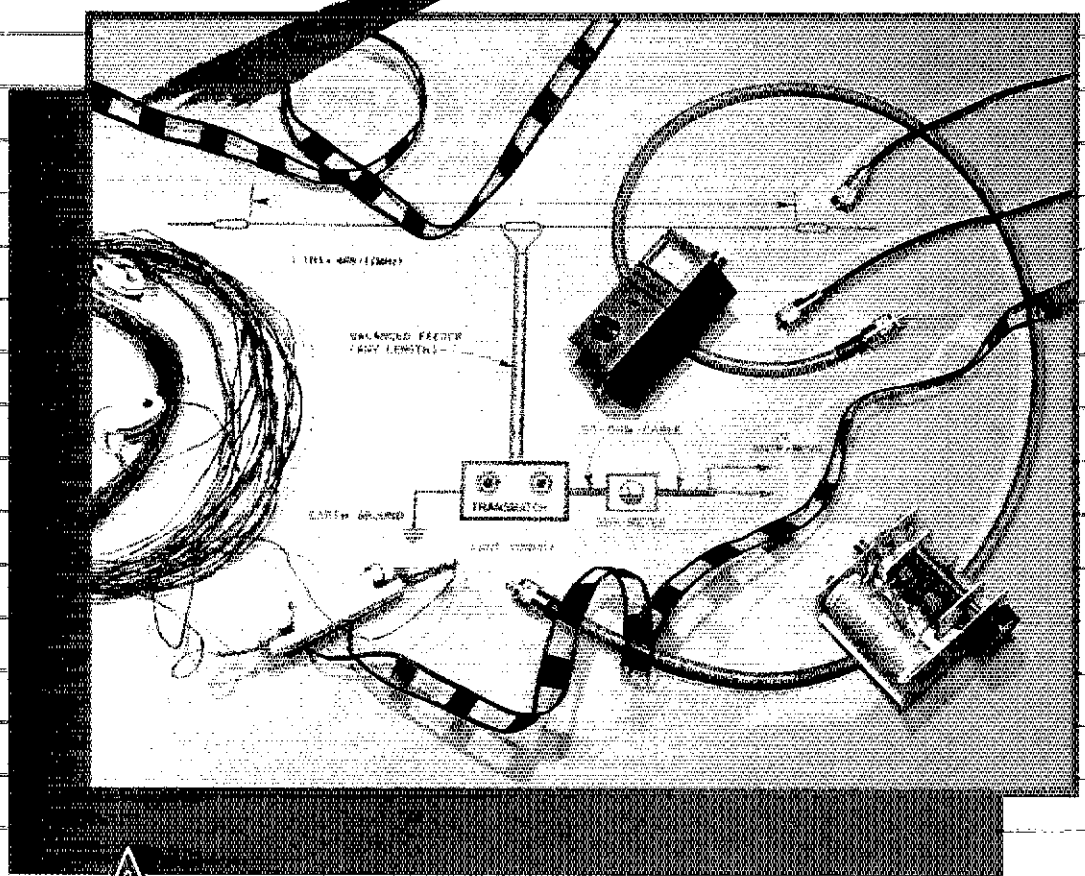

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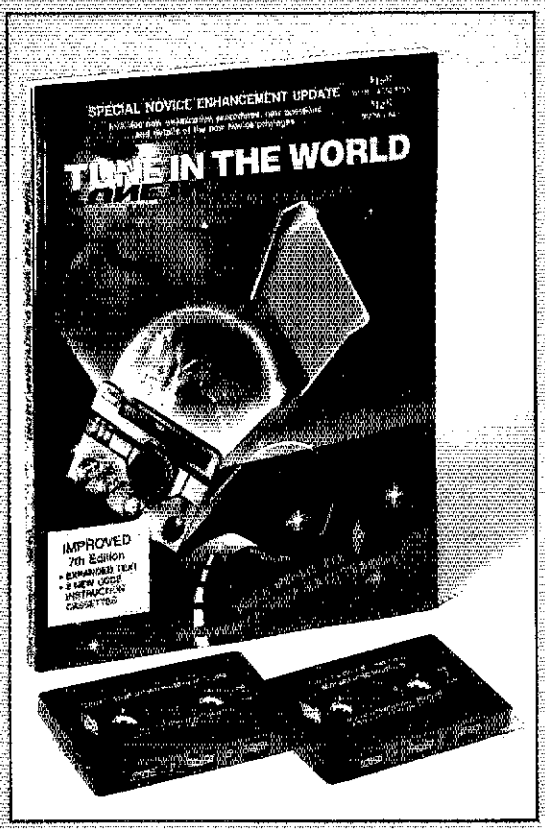

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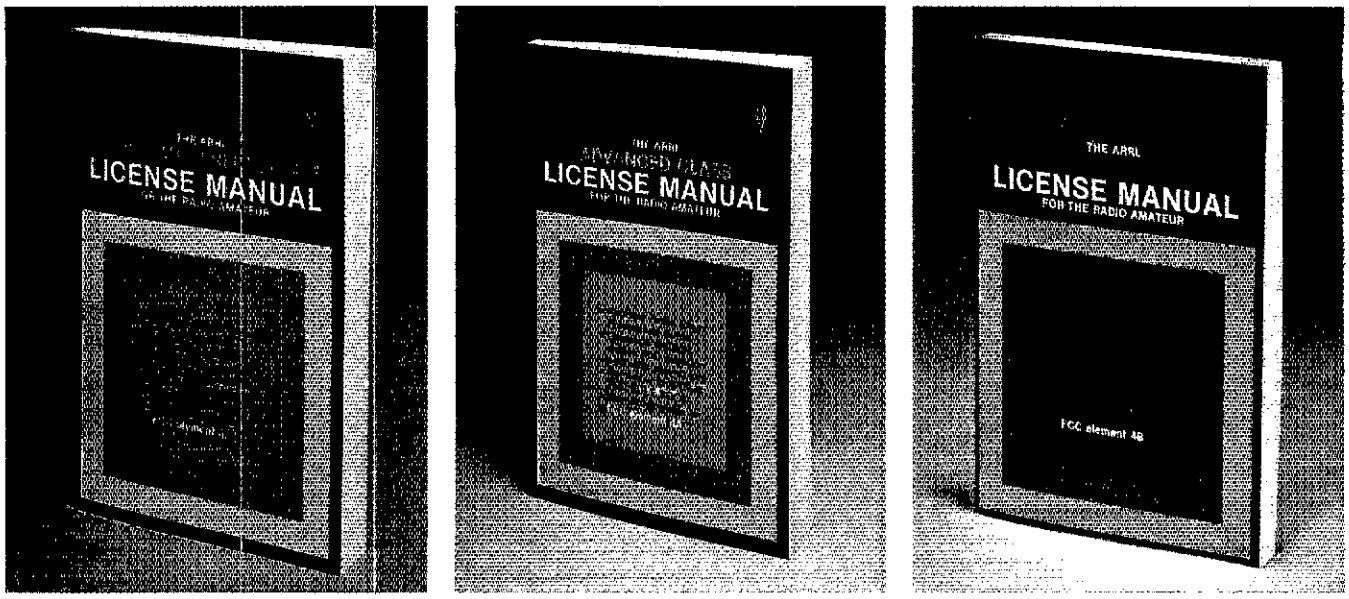

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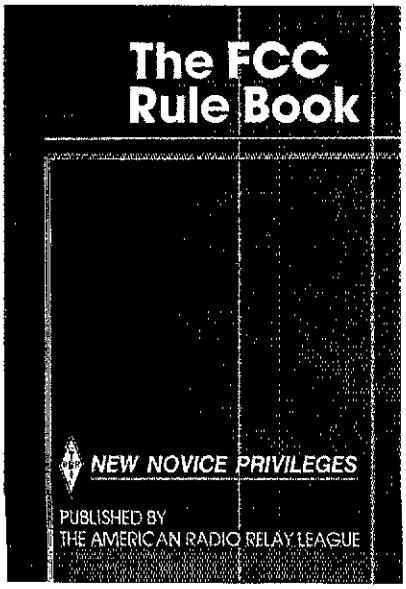

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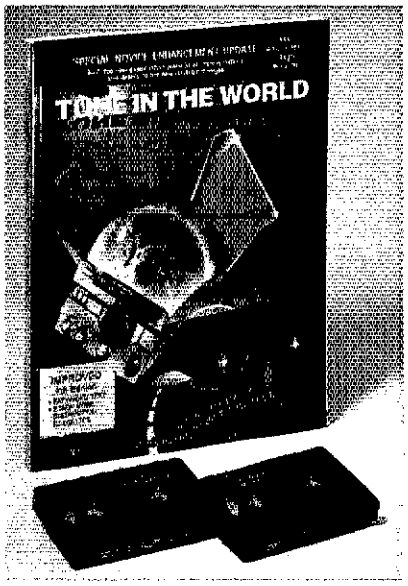

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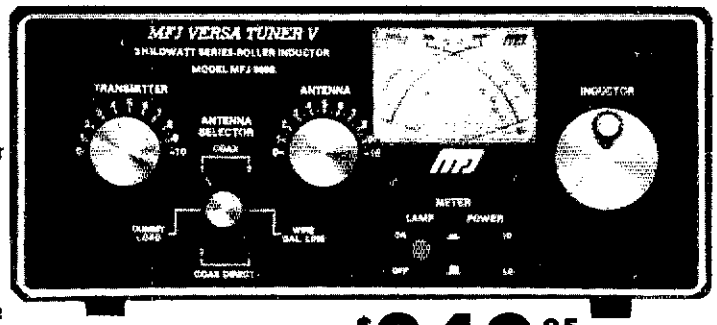

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You can tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A lighted Cross-Needle meter gives you SWR, forward and reflected power -- all at a glance. A 6-position antenna switch lets you select 2 coax lines, direct or through tuner, random wire/balanced line and dummy load. 1000 volt capacitors, efficient airwound inductor, heavy duty switches.

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MFJ-945C $79.95

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You can **operate anywhere in a band and get low SWR.** You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8x2x6 inches uses little room. **SWR/Wattmeter and convenient placement of controls make tuning fast and easy while in motion.** 300 watts PEP output, efficient airwound inductor, 1000 volt capacitors. Mobile mount, MFJ-20, $3.00.

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A lighted Cross-Needle SWR/Wattmeter makes tuning a snap and gives you SWR, forward and reflected power -- all at a glance.

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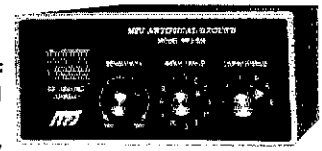

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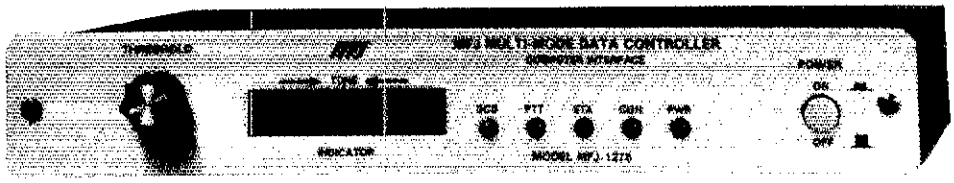

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You'll find it *the most user friendly of all multi-modes.* It's menu driven for ease of use *and* command driven for speed.

A high resolution 20 LED tuning indicator lets you *tune in signals **fast** in any mode.* All you have to do is to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

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Good news for SYSOPs! New software lets the MFJ-1278 perform flawlessly as a WORLI/WA7MBL bulletin board TNC.

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You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can *copy not only amateur RTTY but also press, weather and other exciting traffic.*

A high performance modem lets you copy both mark and space for greatly improved copy under adverse conditions. It even tracks slightly drifting signals.

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of 2125/2975 Hz. *This lets you operate MARS and standard VHF FM RTTY.*

You get both the American Western Union and the international CCITT character sets, Autostart for unattended reception and selectable "Diddle".

A receive Normal/Reverse software switch eliminates retuning and Unshift-On-Space reduces errors under poor receiving conditions.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

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You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

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You can store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

The CW receive mode lets you copy from 1 to 99 WPM. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

***You'll** be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your printer.* Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be *printed to screen in real time or from disk* on IBM and compatibles with the MFJ-1284 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only enjoy receiving pictures from thousands of SSTVers all-over-the-world but you can send your own pictures to them, too.

You can print slow scan TV pictures on any Epson graphics compatible printer. If you have an IBM PC or compatible you can print to screen in near real time or from disk with the MFJ-1284 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

***Nothing** beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

You get iambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

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A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

***Plus** . . .* printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack for both radio ports, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1½x9½ inches. 12 VDC or 110 VAC.

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SEND SASE for samples. Conner, 522 Notre Dame Avenue, Chattanooga, TN 37412.

FREE, 100 QSLs with first order. Samples cost 3 stamps. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

REAR WINDOW Callsign . . . 2 inches x 8 inches . . . Adheres to glass! Instant transfer car to car! Your call or repeater frequency in white lettering. Background is black, blue or red. Also available as a Magnetic Sign with lettering black, blue or red. Background in white! Only $8.50 each sign ppd. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

QSLs Samples $1 (refundable) (stamps okay). M. Dakin, Winzj Press, P.O. Box 265, Revere, MA 02151.

QSLs & RUBBER Stamps. Top quality QSL samples and stamp information $1 (refundable with order). Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

QSLs, QSLs, Rusprint QSLs quantities of 100, 200, 300 or more. Full color of Old Glory and cartoons. Also parchment, golden eagle and others. SASE appreciated. Rusprint, Rt. 1, Box 363 *QST*, Spring Hill, KS 66083.

CALL SIGN Belt Buckles, solid American brass, $11.99. H. Hornsby, Route 1, Box 211, Lake Isabella, CA 93240.

CREATE-A-QSL Kit! QSL samples: $1. Antique press pix, $2. Also, (new . . . photo decals, 25/$1.50 ppd.). Sam's Print/Wheels, P.O. Box 55, Petersburg, NY 12138.

QUALITY QSL Cards and Rubber Stamps. Send 25 cents postage or SASE for samples. Large selection at attractive prices. Sandollar Press, P.O. Box 30726, Santa Barbara, CA 93130.

QSL's by Northwest Imagery. Quality designs, affordable prices. SASE for samples—N7HJM, 11969 Tioga Street, Boise, ID 83709.

QUALITY QSLs. Samples $.50. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

LOW Cost QSL's Samples SASE. Koepke, 6 Katherine Road, Albany, NY 12205.

EZN-The "Original" QSL Holder is again available in limited quantities. 6 holders (displays 120 QSLs) for $10 postpaid, QSLs by W4MPY, 705 Audubon Circle, Belvedere, SC 29841.

GAIL'S QSL's, $6 first 100, $4 thereafter, stamp for samples. KAØYZT, 1150 Muenz, Wright City, MO 63390.

COLORFUL QSLs by WA7LNW - High quality craftsmanship using unique printing process that combines brilliant rainbow colors and sparkling metallic inks. Samples $1 (refundable). Colorful QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

THE 230 LINEAR AMPLIFIER—AWESOME!

No room for a legal limit amplifier at your operating position? Want real band-commanding power? Into contesting? DX'ing? Consider the 230 series linear amplifiers. The 230's RF and power supply deck may be placed up to 250 feet from a small microcontroller containing all metering and controls. Operation is FULLY automatic under microprocessor control.

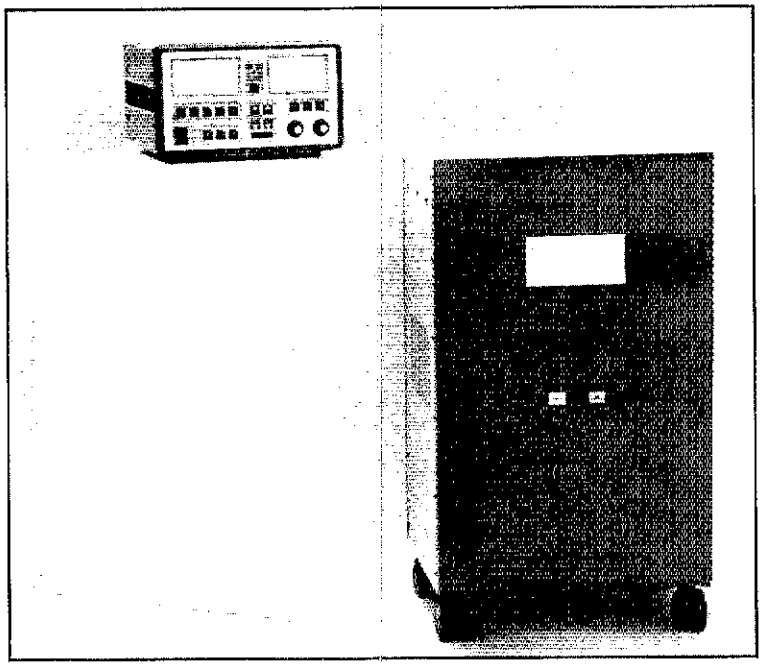
Those who saw our amplifier at Dayton or Visalia were able to see first hand the unique features and quality construction. You might be interested in the testimonial letter reproduced to the right from ICOM, a well-known name in amateur and commercial communications equipment.

The 230 provides hands-free operation. Drive frequency is constantly "read" by the amplifier and adjustments made by its microprocessor to ensure maximum output at all times. The processor changes bands when necessary and provides for full protection of the final tubes. You never touch a control!

The 230 is available as the 230A, amateur bands only; 230AX, export version; and 230C, commercial 3-tube version with continuous frequency coverage 2-30 Mhz.

FEATURES INCLUDE:

- Full remote control and automatic operation
- 1500 watts, continuous duty, all modes and full QSK
- Operates 160 thru 15 meter (less 30) bands
- RS-232 interface
- 3CX800A7's for low distortion operation
- Antenna switching
- Full protection for the final tubes
- SWR computer
- Easy modification to 12 and 10 meters



ICOM

Icom America, Inc.

June 6, 1988

Bob Sullivan
Advanced Radio Devices
103 Carpenter Drive
Sterling, Virginia 22170

Dear Bob:

Our extensive in-house use and testing has shown the 230 Amplifier more than lives up to its specifications and unique features. It is easy to operate and very effective in contest situations as evidenced by its use in the recent CQ-M contest. The auto-tune feature is amazing...band hopping is very fast!

We are also impressed with the high quality of construction and obvious attention to detail.

The 230 linear Amplifier is a quality product, worthy of ICOM's endorsement. It will prove to be a "winner".

Sincerely,

Evelyn Garrison KA7LPK
National Marketing Manager
Amateur Division

Bill Everett K7RIE
Engineering Support Manager

WBE:pk

SPECIFICATIONS:

Frequency: All amateur bands 1.8 to 21 Mhz (to 30 Mhz for export)
Drive: 50-80 watts
Input VSWR: 1.5:1 or less on all amateur bands
Harmonic Suppression: −45 dB
Intermod Products: −35 dB down
Duty: Continuous on ALL modes
Input power: 230 VAC/60Hz/20amps for the 230A. AX and C models may utilize 200/220/230 VAC 50 or 60 Hz.
Dimensions: Microcontroller 10 x 6 x 9 inches deep
RF/power supply deck: 14 x 22 x 13 inches deep.
All interconnecting cables are furnished.

The 230 is sold through better dealers everywhere. Call for the dealer nearest you or contact

In the U.S.: EEB, Vienna, Virginia 800 368 3279 (In VA. 703 938 3350)
Honolulu Electronics, Honolulu, Hawaii 808 949 5564
In Canada: Atlantic Ham Radio, Downsview, Ontario 416 636 3636
Com-West Radio Systems, Ltd., Vancouver, B.C. 604 321 1833

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HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WANTED: *QST* VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI, 02895-0001.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

BUY, Sell, Collect and Restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only $10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

CODE/CIPHER MACHINES Wanted! Historian buys code/cipher devices, manuals, books, etc! All periods! Melton, Box 5755, Bossier City, LA 71171, 318-798-7319.

WANTED: Hallicrafter silver panel Skynders and other very old or unusual Hallicrafter equipment, parts, etc. Chuck Dachis, "The Hallicrafter Collector", 4500 Russell Drive, Austin, TX 78745.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

I PAY CASH for new and used vacuum tubes, especially vintage and transmitting types. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

MANUALS For most hamgear made 1935-1970, plus Kenwood. No quotes. Our current catalog "H" at $1 required to order. Over 2,000 models. Hi-Manuals, P.O. Box H-802, Council Bluffs, IA 51502.

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SELL *QST* Oldest 1931. Some CQ, 73, HR, and Computer Mags. $1 each. Plus shipping, LSASE for list. Robert Willsey, W5VRA, Box 10, Martha, OK 73556.

WANTED Books: Pre-1900 Electricity and Telegraphy, Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton Street, Elma, NY 14059, 716-681-3186.

TELEGRAPH Bugs, old keys, keyer paddles sought for private collection. Old Vibroplexes needed. Donations of parts, inoperable items or memorabilia appreciated. Write: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WANTED: Pre-WW2 Pan American Airways aircraft transmitters/receivers and schematics/manuals for same; Pre-WW2 Speed-X bugs. Conly, 819 Henrietta Avenue, Sunnyvale, CA 94086.

WANTED: Old Hi-Fi Gear, Manuals, Literature, Etc. For my collection. Life ARRL Member. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53220-0803, 414-545-5237.

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E.F. JOHNSON Transmitters, Literature, and Accessories wanted for my station. Will pickup. Len Crispino, Box 702, Hudson Falls, NY 12839, 518-638-8199.

TELEGRAPH Items Bought By Collector: old or unusual keys, bugs, sounders, meters, pre-1920 books, franks, etc. Larry Nutting, WD6DTC, 4025 Slate Court, Santa Rosa, CA 95405, 707-539-1883.

BUY/SELL Pre-1930 *QST*. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

COMPLETE restoration of all tube ham receivers, including full alignment. All work 100% guaranteed, FCC licensed. Contact Healy, Classic Radio Service, Box 764, Woodacre, CA 94973, 415-488-4596.

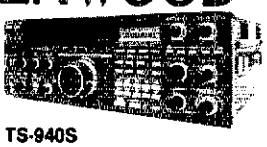
OVER 100 years ago solar telegraph made history. Read "Great Days Of The Heliograph" by W9CNY, 70 p., 8-1/2 × 11, illus., $5.95 ppd. Lewis Coe, 115 E 113th Avenue, Crown Point, IN 46307.

WANTED: WD-11, 199 and 201A tubes. Radios using these tubes. Very old parts. National SW-3 coils. N4DFX, Box 446, Drayton, SC 29333, 803-583-3081.

GENERAL Radio "Twin T Impedance Measuring Circuit" type 812A. Excellent condition, $80. C. Fortier, 62 Richlin Cr., Ottawa, Ont., CANADA K2B 8K4.

WANTED: Heliograph Signal Corp. device for sending code by sun mirrors and shutters. Dick Geise, WA8CAX, Conrad, IA 50621.

KENWOOD



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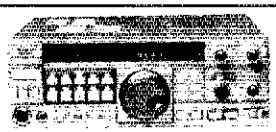

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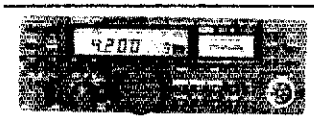

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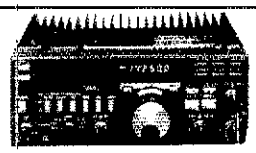

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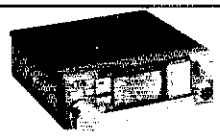

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RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

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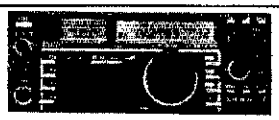

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B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$259
B3016	2M	Yes	30W	160W	$229
D1010N	440	No	10W	100W	$319

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2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
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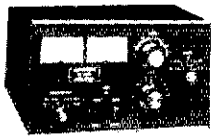
AL80A



AL80A	$985.00	ATR10	$325.00
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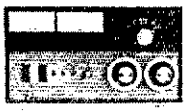

Model	List	Model	List
LK450	$899	LK450NT	$1199
LK500ZC	$1395	LK500NT	$1595
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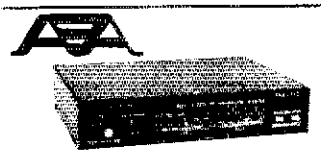

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QSTs 1970-79; stored flat, excellent condition, $70 + shipping. Ned, W1RAN, 203-447-1255 after 5 PM.

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WANTED: Any WW2 German, Japanese, Italian military radio equipment or related items. Any publication with info on same, including TM-E, TB-SIG-E. Some US military mobile and air types pre-1947, examples ARR-16, ARQ-1, BC-224A-C, BE-1136, BC-1209, MBM, PRC-5, RAX, TBY, TCH/18M. Military publications, directories, SIG-5, 1940-46 radio mags, pre-1946 aviation—mags, comm. equip. manuals, catalogs, and manufacturers' literature. Any of: "Bendix Radio Engineer", ROU "Radio Officer News", US Navy "Electron". Old airplane and forest service shortwave equipment. Dispose: 1960 Gonset G-76 Xcvr., Knight Spacespanner, Heath Mohican GC-1A Rec. Thank you. Hugh Miller, KA7LXY, 6400 Maltby, Woodinville, WA 98072-8375.

NATIONAL HFS Receiver, mint with matching National 5886 Power Supply, AM, CW, FM, all coils. AM Transmitters and Receivers Parts, Tubes. Send SASE for list. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

WANTED: Hallicrafters Receivers S76U and SX62. Healy, Box 764, Woodacre, CA 94973, 415-488-4596.

FOR SALE—Riders manuals. Volumes 1 to 13 (Volumes 1 to 5 abridged), hardly used, been in storage since 1946. W1HLT, 207-338-4214.

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RTTY JOURNAL, published 10 times per year for those interested in digital communications. Read about RTTY, AMTOR, MSO, Packet Radio, RTTY DX and Contests, and Technical Articles concerning the digital modes. $10 per year (foreign higher). RTTY Journal, 9085 La Casita Avenue, Fountain Valley, CA 92708.

RADIO SHACK Color Computers: Hardware and Software for ham use. Dynamic Electronics, Box 896, Hartselle, AL 35640, 205-773-2758.

SPY RADIOS WANTED! Buying all types of espionage radios and code machines! Especially wanted are military-type radios in civilian suitcases! Museum, Box 8146, Bossier City, LA 71113, 318-798-7319.

CX7 REPAIRS. Mandelkern, 505-526-0917.

WANTED: LAFAYETTE PrivaCom 3C, 525, 625, or GE5813B. Radio, 2053 Mohave Drive, Dayton, OH 45431, K9SQG.

HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco, CA 94128, 408-729-8200.

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SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrak compatibility, extensive instructions, and strong user support. Send SASE for details. SUPER VR85: $35 ppd (Calif. residents add 6% sales tax) RLD Research, McCloud, CA 96057, W6AMW owner.

SPECTRUM Communications SCR1000 2M Repeater, Wacom Duplexer WP-639, $1650. Milton Onaga, KH6US, P.O. Box 6122, Kahului, HI 96732-8922.

BEAM Headings your QTH, $6. W8JBU, 253 River Road, Hinckley, OH 44233.

ALUMA Towers. Crank-up with hinged base, house bracket, mast. Mobile van, rooftop, trailer towers. Stack sections. Will take amateur gear or computers on trade. McClaran Sales, P.O. Box 2513, Vero Beach, FL 32961, 305-567-8224.

TOWER Climbing Safety Belts, Gorilla Hooks and Accessories. Free specs. W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217-3618.

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AZDEN Service by former factory technician. Fast turnaround. PCS-300 NiCads $34.95. Southern Technologies Amateur Radio Inc., 10715 SW 190 Street #9, Miami, FL 33157, 305-238-3327.

'N-TENNA Quad Kits, $64.50. Box 5332, Hickory, NC 28603.

FREE "Magnolia Blossom" QSL, send SASE. K4NBN, "No Bad News".

TEFLON, SASE. W9TFY, Alpha, IL 61413.

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QRP CW Transmitter Kits. SASE brings descriptions. W1FB, Box 250, Luther, MI 49656.

HAM Programs for Commodore, IBM-PC, Apple, TI99/4a. Send legal size SASE: EPO Software, 7805 NE 147th Avenue, Vancouver, WA 98682.

LINEMANS Belts $35. Extra safety straps $12. Climber straps. (209' × 1' × 3/16') $5/pair. $3 postage each item. John Orr, N2RU, 715 River Road, Fair Haven, NJ 07704, 201-747-7334.

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HPG-382A, Wanted, Variable Attenuator. Ham lab project. Need several pieces. Will consider any condition. K6GOX, P.O. Box 10, O'Neals, CA 93645, 209-868-3548 collect.

AIR-1/VIC-20 with AMTOR—formerly manufactured by Microlog—special closeout price. Was $279, now $125. MD res. add 5%. Shipping $5 in US ($10 outside US). G and G Electonics, 8524 Dakota Drive, Gaithersburg, MD 20877, 301-258-7373.

LEARN CODE on your IBM-PC (or compatible), or Commodore C64/128. Code-Pro takes you from no knowledge to proficient copy. $10 plus $2 S&H. Specify computer and IBM disk size. Trio Technology, Dept. 862, P.O. Box 402, Palm Bay, FL 32906.

PRC-77. Near mint, recently aligned $425. SASE for list other surplus. Want OSC, keyer boards for RF-716 xmtr. Gary Cain, 1775 Grand #302, St. Paul, MN 55105.

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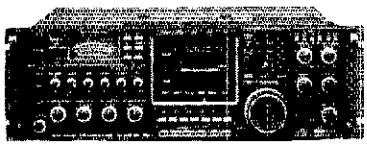

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HF Equipment	List	Juns
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IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-728A New 25W Mobile	509.00	Call $
IC-228H New 45W Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
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IC-02AT FM HT, HP	409.00	Call $
IC-μ2AT Micro HT	329.00	Call $
IC-900 Six Band Mobile	639.00	Call $
IC-2GAT	449.95	Call $
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IC-475A All Mode 25w	1399.00	Call $
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IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	369.00	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
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IC-32AT Dual Band Handheld	TBA	Call $
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IC-375A All-Mode, 25w, Base Sta	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1269.00	Call $
IC-1200 FM, 10w Mobile	699.00	Call $
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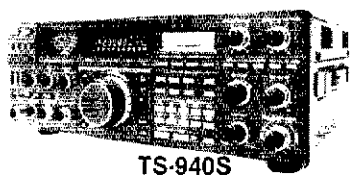

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TS-680S HF Plus 6m Xcvr	1099.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
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R-2000 150 kHz-30 MHz	749.95	Call $
VHF		
TS-711A All Mode Base 25w	1029.95	Call $
TR-751A All Mode Mobile 25w	649.95	Call $
TM-221A Compact FM 45w	439.95	Call $
TM-2530A FM Mobile 25w	479.95	Call $
TM-2550A FM Mobile 45w	499.95	Call $
TM-2570A FM Mobile 70w	599.95	Call $
TH-215A 2m HT Has It All	379.95	Call $
TH-25AT 5w Pocket HT NEW	349.95	Call $
TM-721A 2m/70cm, FM, mobile	649.95	Call $
UHF		
TS-811A All Mode Base 25w	1 229.95	Call $
TR-851A 25w SSB/FM	749.95	Call $
TM-421A Compact FM 35w	449.95	Call $
TH-415A 2.5w 440 HT	399.95	Call $
TH-45AT 5w Pocket HT NEW	369.95	Call $
TW-4100A, 2m/70cm FM	599.95	Call $
TH-55 AT 1.2 GHz HT	TBA	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
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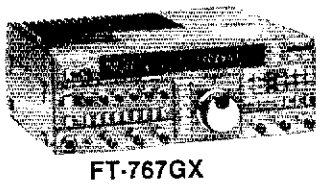
TM-3530A FM 220 MHz 25w	499.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	449.95	Call $
TH-315A Full Featured 2.5w HT	399.95	Call $



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FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-212RH NEW 2m, 45w mobile	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
FT-209RH FM Handheld 5w	389.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
VHF/UHF Full Duplex		
FT-736R, New All Mode, 2m/70cm	1749.95	Call $
FEX-736-50 6m, 10w Module	259.95	Call $
FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
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FT-109 RH New HT	399.95	Call $
FT-311 RM Mobile	499.95	Call $
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FTR-2410 2m Repeaters	1269.95	Call $
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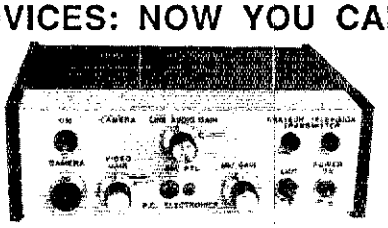

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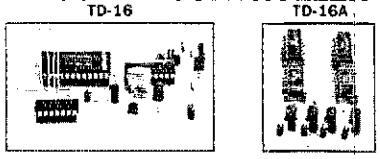

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5BDQS	trap doublet 10 thru 80 meters	
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25BS	2 meter 5 element beam	
28BS	2 meter 8 element beam	
214BS	2 meter 14 element beam	
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V-4S	colinear gain vertical 430-470 MHz	
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A3	3 element triband beam	$246.00
A743	7 & 10 MHz add on kit for A3	$81.00
A744	7 & 10 MHz add on kit for A4	$81.00
4218XL	18 element 2 mtr, 28.8' boomer	$125.00
R4	10,12,15,20 meter vertical	$204.50
A4S	4 element triband beam	$344.00
AV4	40-10 mtr. vertical	$94.50
AV5	80-10 mtr. vertical	$111.00
ARX2B	2 mtr. 'Ringo Ranger'	$39.25
ARX450B	450 MHz. 'Ringo Ranger'	$39.25
A144-11	144 MHz. 11 ele. VHF	$50.50
A147-11	11 element 146-148 MHz. beam	$50.50
A147-22	22 element 'Power Packer'	$141.75
A144-10T	10 element 2 mtr. 'Oscar'	$54.00
A144-20T	20 element 2 mtr. 'Oscar'	$77.50
215WB	15 element 2 mtr 'Boomer'	$81.00
220B	17 element FM 'Boomer'	$101.25
230WB	144-148MHz, 30 element	$216.00
32-19	19 element 2 mtr. 'Boomer'	$101.25
424B	24 element 'Boomer'	$81.00
10-4CD	4 element 10 mtr. 'Skywalker'	$124.75
15-4CD	4 element 15 mtr. 'Skywalker'	$145.00
20-4CD	4 element 14 MHz 'Skywalker'	$310.50

HUSTLER ANTENNAS

4BTV	40-10 mtr. vertical	$79.00
5BTV	80-10 mtr. vertical	$105.00
6BTV	6 band trap vertical	$124.00

ROTORS

Alliance	HD73 (10.7 sq.ft.)	$104.00
Alliance	U110	$47.00
TELEX	AR40 TV, 3 sq ft.	CALL
TELEX	CD45-II (8.5 sq.ft.)	CALL
TELEX	HAM IV (15 sq. ft.)	CALL
TELEX	T2X (20 sq. ft.)	CALL

CABLE

[2-18 & 6-22]	4080 - per foot	$0.18
[2-16 & 6-20]	4090 - per foot	$0.35
1108	RG8U Mini 8 low loss foam per foot	$0.17
1198	RG8U Columbia superflex 100'	$31.00
1180	RG8U Low loss 100% bonded foil shield 88% tin copper braided sheild -per foot	$0.35

★ CALL FOR PRICES ★

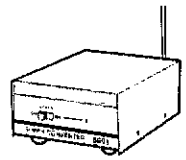
uniden

BC50XL
$119.90
WITH FREE Battery Pack Charger. 10 Ch 10 band, keyboard lock, 2 digit LC display, channel lockout, battery low indicator, memory backup, built-in delay, direct channel access, track tuning.

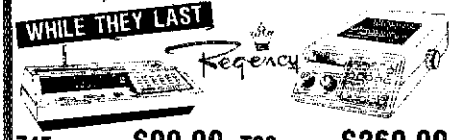
BC70XLT **$159.90**
10 Channel 10 band hand held.
BC100XLT **$199.90**
100 Ch 11 band aircraft H/H
BC200XLT **$299.90**
200 Ch 12 band 800MHz H/H.
BC145XL **$92.90**
16 Ch 10 band programmable.
BC175XL **$159.90**
16 Ch 11 band aircraft prog.
BC210XLT **$179.90**
40 Ch 11 band air & weather.
BC800XLT **$249.90**
40 Ch 12 band 800MHz AC/DC.
BC560XLT **$99.90**
16 Ch 10 band mobile w/bracket.
BC580XLT ..... **$$219.90**
100 Ch 11 band mobile, weather.
BC760XLT **$279.90**
10 Ch 12 band mobile, 800MHz.

SUPER CONVERTER

8001 ..... $69.90
SUPER CONVERTER, designed to receive frequencies between 810MHz & 912MHz and convert them down to 410MHz thru 512MHz. Easy to install.



WHILE THEY LAST



Z45 ..... $99.90
45 Channel 7 band, w/aircraft, programmable, 45 pre-programmed Channels, search or scan, alarm clock, priority, permanent backup, ch lockout, scan delay, AC/Dc with both cords.

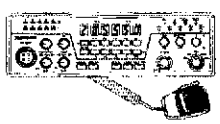
TS2 ..... $269.90
75 Channel 12 band 800 MHz, aircraft & weather, Turbo Scan*, bank scanning, instant weather, programmable, accuseek permanent backup, direct access, with AC adapter, DC cord & mobile Mt bracket.

HX1500 ..... **$179.90**
Hand held, 55 Ch 11 band, aircraft, Ch lockout, scan delay, w/ AC adapter/charger battery pack & carry case.

TS1 ..... **$199.90**
35Ch 11 band weather & aircraft. AC/DC.

RANGER

10 meter transceiver, 25 watt, can be programmed to split transceive, SSB, CW, AM, FM, programamble scanning, fully automatic noise blanker, 2½H, 7¾W, 11D.



AR3500....$334.90

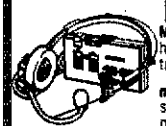
REGENCY LAND MOBILE

Utili-Com, 1 watt/2 Ch 2-way, lightweight, battery operated portable, w/flexible antenna, plastic case & battery charger. Supplied with itinerary frequency 151.625.

UC102 ..... **$139.90**

MAXON....$26.95

Model 49SA - 49 MHz, FM 2-WAY RADIO hands free operation, voice activated transmit up to ½ mile. Batteries optional



model 49B **$34.95**
same features as 49SA except uses "AA" nicad batteries and comes with battery charger

TENNA PHASE III POWER SUPPLIES

PS3 ..... **$15.90**
Output:13.8V DC - 3 amp constant 5 amp surge, electronic overload protection w/instant auto reset, fuse protected.

PS4 ..... **$19.90**
Fully regulated, 13.8 VDC - 4 amps constant with surge protection, overload protection w/instant auto reset.

PS7 ..... **$24.90**
Fully regulated, 7 amp constant,10 amp surge capacity.

PS12 ..... **$34.90**
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset.

PS20 ..... **$64.90**
Fully regulated, 25 amp surge capacity, 13.8 VDC, 20 amp constant, with meter.

PS25 ..... **$79.90**
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto reset, dual meter for current & voltage.

PS35 ..... **$99.90**
Same as above except, 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts.

WD4BUM MOBILE Antennas. 5/8 wave magnet mount, 2 meter or 220; $22.50. Quarter wave magnet mount; $12. Ham sticks for HF mobile; $15. Add $3 per order for shipping. Many other bargains. Send for catalog. Dealer inquiries welcome. Lakeview Company, P.O. Box 5706, Anderson, SC 29623, 803-226-6990.

GULF COAST QTH, 1/2 acre of antenna room. No deed restrictions. 3 br, brick split-plan, sprinkler, fireplace, utility room and cathedral ceiling. Stone covered workbench already in shack. Upper 50's, Pensacola, Florida, WD8OSU, 813-351-6078.

FOR SALE: Henry 2KD-Classic, 32S-1 (new), Antenna Tuners, Dummy Loads, Groth Turn Counters, Yaesu Model YR-901 CW/RTTY Reader (new), Swan 350 Transceiver (matching P/S), Swan 500-CX Transceiver (matching P/S), Collins KWM-2A (P/S), 75A-1, 32V1, Kenwood 21AT (many extras), Heathkit SB-104A, SB-634A, SB-614, SB-604, and HP-1144A (all new), many others. SASE for list. Bill, KA7VJO, P.O. Box 2030, Upland, CA 91785, 714-986-3515.

HAM HOLIDAY in VP5. Join cycle 22 fun from rare DX QTH Turks & Caicos islands. We supply transceiver, antenna, process license and offer accomodations as low as 7 nights $390 each double occupancy in private bungalow. Direct Pan Am service, 80 minutes Miami. Details VP5D, P.O. Box 100858, Ft. Lauderdale, FL 33310.

WANTED: Kansas City Keyer (KC-1). NL7DU, 907-452-1208.

THE QUAD CLIP-TM Beat the broken quad antenna wire syndrome. For information send a 25 cent stamp to Ampruss Co., KH6CTQ, P.O. Box 551, Aiea, HI 96701-0551.

"Q" PRODUCTS: 8877 QRO VHF amplifiers. HV power supplies, coaxial power relays, amplifier and power supply parts. SASE for catalog. "Q" Products, Larry Price, N7BNJ, 10412 36th Street E, Puyallup, WA 98372, 206-841-7465 evenings.

INTERNATIONAL Radio Inc. ICOM, Kenwood, & Yaesu Newsletters Available. Send SASE ($.45) for details. International Radio Inc., 751 S. Macedo Blvd., Port St. Lucie, FL 34983, 407-879-6868.

ATLAS RADIO-Swan Repair Service: Factory trained technicians, fast service and reasonably priced. RF Parts Co., 1320 Grand, San Marcos, CA 92069, 619-744-0720, 800-854-1927.

FOR SALE: DX QTH in Boynton Beach, Florida. Deluxe condominium 2br/2ba in attractive secure development includes roof-top antenna farm: five dipoles 10-80 and two 2-meter yagis. Private E-W exposure on canal. View alligators, sea turtles, exotic birds from your window, catch 18" bass from your backyard! Unfurnished at $115,000 or decorator-furnished with SSB and 2-meter rigs. W1KTH, 203-443-5990 collect.

MOONBOUNCE—New two meter EME array from M2 Enterprises. 8 14.5 dB yagis (33' boom), stacking frame, phasing harnesses, power divider, elevation rotor. Fully assembled but never installed. $1900 (orig. cost $2925). Cushcraft 230WB stacked 15el 2M boomers. $180 (list $320). Will not ship. Pick up only. Michael, WA2RAT, 3 Kaywood Court, Bayport, NY 11705, 516-472-0226.

DX QSLs. The "Go List". We make getting the QSL cards as much fun as the QSO itself. Over 5000 QSL managers. Updated and published monthly. The W6GO/K6HHD QSL Manager List, POB 700A, Rio Linda, CA 95673. $20/yr/USA.

WANTED: Heath MT-1, MB-1, PS. Nostalgia. K7LQI, 700 N 117th, Seattle, WA 98133.

U.S. HDX-572MD motorized tower and Telrex 20M646 beam again available. Previous purchaser reneged. Tower includes base, service platform, remote control and Telrex antenna mast. All excellent condition. Tower $3495 FOB Bend, OR. Antenna $465 FOB Portland, OR. W7RA, 503-274-1583.

BANK CONTROLLER I for TS-940. Allows memory bank switching from voice button. Price: $24.95 plus $5 shipping North America. Elsewhere $13. International Radio Inc., 751 S. Macedo Blvd., Port St. Lucie, FL 34983, 407-879-6868.

SIGNAL Generator, HP-608D, 10-420 MHz, calibrated output level. Fully operational, good buy $125. Cohoes, New York, Jim Meaker, 518-235-2892.

DXCC plus 829 other International Certificates from 99 countries listed in K1BV's comprehensive directory, $14.80. Ted Melinosky, 525 Foster Street, South Windsor, CT 06074-2936.

ATLAS RADIOS Wanted—working or not. RF Parts Co., 619-744-0720, 800-854-1927.

DRAKE TR7, Power Supply, Fan, WARC Bands, 500-250 CW Filters. Immaculate condx. Al, KV3I, 207 Patterson Avenue, Butler, PA 16001, 412-283-0665.

ATTENTION! Trade your old wristwatches (Rolex, Hamilton, Patek, Chronograph, etc.) for my classic ham gear or $. Eskenazi, 619 Broadway East, Seattle, WA 98102, 206-328-2847.

WANTED: 2 element quad, 10-15-20 meters. Vern, KE8JZ, 9720 Madison Street NE, Blaine, MN 55434, 612-784-6894.

FOR SALE: Collins—75S-3B/32S1/312B5/516F2 pwr. supply $550, 75S-3B receiver $200, KWM-2 with power supply $450, 30L1 amplifier $425. All winged emblem. Collins 75A4 receiver and AM xmtr., make offer. Swan WM-3000 peak meter $50. Pick up only. Call Mrs. Hines, W1ULF, evenings 203-272-8747.

HEATH SB220 Amplifier, almost new. Finals, standby switch installed, $485. Excellent condition. Prefer local pick up or U ship. KD8HW, 304-727-3066.

WANTED: Teletype Model 28KSR or 28RO. Working or non-working condition. Henry Eck, N3AX, 13600 Deerwater Drive, Germantown, MD 20874, 301-972-1202.

WANTED: Yaesu Receiver, FR-101 Digital, Matching Speaker—any options, YP-150 Dummy Load/Watt Meter. Mint condition only need reply. Joe Locastro, WB2NGX, 183-1/2 Lake Avenue, Auburn, NY 13021, 315-252-6107.

DRAKE Equipment For Sale: TR-7 w/fan & filters; PS-7 w/fan; MN-277; RV-7; SP-75; P-75; MS-7. All equipment is in perfect operating condition and like new in appearance. No modifications except the MN-2700 has been modified to accept only coax antennas. Firm price $1100 for all. Mike Bowen, W4CYJ, 912-685-6707. Leave message on answering machine. Will return call in two hours or less.

WANTED: Buy Heathkit Transmitter DX40. Working or not. Details to WD6BAL, 714-494-2158.

DRAKE Tono 9000E Terminal—CW, Baudot (RTTY) and ASCII (RTTY and KCS). Word processor built in. Battery back up memory. RS232, Drake high resolution monitor 80 column. K7IRO, 206-378-4481.

WANTED: Sony "Earth-Orbiter" or similar older transistor multi-band portable general coverage receiver. Wade, 657 14th Avenue, Prospect Park, PA 19076.

YAESU FT-227R Memorizer, 2 Meter FM Xcvr, mint cond, $150. Byron Welsh, 2712 Carrelton Drive, Champaign, IL 61821, 217-359-7361.

WANTED: LF/VLF RBA-7 equipment: CFT-4615B receiver, CBOG-21030-D rectifier/power unit. Compl. w/manuals, ready to operate. L. Lawrence, Ecola, 1394 N "E" Street, San Bernardino, CA 92405.

HEATH HR1680 SSB/CW Receiver with companion speaker 1661, manual, wired. Like new, $75. Also Jones HF Power and VSWR 263-263-3, manual $25. Hecht, 596 Halyard Lane, Longboat Key, FL 34228, 813-383-7918.

WANTED: Keyer, AEA-CK1 in excellent condition. Kevin Mandaville, KG5KI, 3600 Greystone #830, Austin, TX 78731, 512-345-6322.

YAESU FT-560, (500 watts CW, 560 watts PEP). Not working, suspect solid state VFO. Spare tubes, manual, $135. K3LQQ, 813-973-1238.

KW AMPLIFIER, mint cond, Amp Supply Co. LA-1000, $325. Trap vert. Hustler 4BTV, $50. Will ship. Herb, WB4PHI, Clearwater, FL, 813-581-7378.

WANTED: Yaesu FTV-107R VHF/UHF Transverter with no modules. Prefer new or very clean; will pay fair price for condition. Rus Healy, NJ2L, c/o ARRL, 225 Main Street, Newington, CT 06111, tel. 203-666-1541 weekdays, 8 to 4 EST.

KENWOOD TS-120S with 500 Hz CW Filter, MC-35S Mike, Manual, Astron RS-20A Power Supply. Good condition, $375. KE7KN, 602-298-4820.

6 METER Gear Wanted, SSB-Tube-Solid State. K2LGO, Box 158, Riverhead, NY 11901.

WANTED: Yaesu FV-101B VFO, SP-101PB Speaker, Swan 14-C DC Converter, VX-2 VOX, or 210 VFO. State price and condition. Jeff, WA6BIL, 14518 Daphne Avenue, Gardena, CA 90249.

SELL: ART-13 Transmitter. Army 1-177B Tube Checker. BC-221 Signal Generator. New in unopened box BC-458 Command Transmitter. New Transformer 3600 Volts—475 MA. Hallicratter S-38 Receiver. 10 Amp Variac *QST* Homebrew 400 Watts Transmatch. $150 takes all. Pickup only. Stan, W8QKU, 2748 Meade, Detroit, MI 48212.

CUSTOM McMurdo Silver Masterpiece V Receiver. All tubes with Power Supply. To be picked up. W8RRR, 313-798-3645.

FOR SALE: ICOM IC-745 HF Transceiver w/FM, FT, SSB Filter, Service Manual. Excellent condition, $650. ARRL Microcontroller and Rotator Interface (July & Sept., '88 *QST*), fully operational A&A boards, $125. Two Narda 40 dB VHF Directional Couplers, LC Connectors, $50 pair. Mike Owen, W9IP, 315-379-9669 before 9 PM Eastern.

SELL: WE Stock 1.2 GHz and 900 MHz Bricks, Pre-Amps and 900 MHz Linear Power Amps and FM Transmitters. Pauldon, 210 Utica Street, Tonawanda, NY 14150, 716-692-5451.

6-METER Big Gun: Link commercial unit. Three sections: Amp (800 watts FM), Receiver, and FM Exciter (80 watts). Housed in original locking cabinet, 24 × 18 × 78, 350 pounds, with original manual, clean, new final amp tube, $250 firm. Pick-up only. K7DJV, 801-224-6877 (eves).

FOR SALE: Heath dipmeter $60. MFJ preamp 1040B $80. Big dummy load $20. Hi-Mound iambic paddle $40. G5RV dipole $25. Write N7HID, 4842 N. Glen Canyon Road, GVSR, Kingman, AZ 86401.

TOWER 45' Aluminum Crank Up, Hy-Gain TH3-MK3 3 Element Tribander Antenna, CDE Ham II Rotor/Control, excellent condition, $600 takes all. WB2TTA, 2391 Kayron Lane, N. Bellmore, NY 11710, 561- 221-9531.

WANTED: Ten-Tec 276 Calibrater, 670 Keyer or similar Single-Paddle Keyer. For Sale or Trade, Ten-Tec 645 Automatic Keyer, $35. K4JCX, 121 Maple Lane, Oak Ridge, TN 37830, 615-483-1427.

HALLICRAFTERS SX-101A, SX-133, S-40A, S-58 (FM). Best offer(s). KA2SCV, 914-337-7727.

R-390A RECEIVER Parts: Info SASE. CPRC-26 military manpack radio, 6 meter FM, with antenna, crystal, handset: $22.50, $42.50/pair. Military-spec TS-352 voltohm/multimeter, leads, manual: $12.50. $4.50/piece shipping, $9 maximum. Baytronics, P.O. Box 591, Sandusky, OH 44870.

WANTED: Function switch from Hammarlund HX-50 Transmitter or junk HX-50 for parts. Will pick up in New England. Barry Fox, W1HFN, CBA or call from 8:00-5:00, 617-256-4511.

4-1000 PULLOUTS Guaranteed; $50, 833A with new socket and plate caps; $25, E.V. 664 broadcast mike, antique R.R.C. 7A mike, Western Electric 212E transmitting tube (1937); make offer. W5BWA, 318-448-3197.

FOR SALE: Slinky Dipole, never used, $50. HW8, working, $100. Cushcraft multiband with rotor, 6 months old, $400. Model RBL-3 Navy Receiver, dated 1943, best offer. KA2NWP, tel. 607-547-9252.

QTH—SUNBELT 3 band DXCC, 55 foot Rohn tower up with 3 full size 3 element beams for 20, 15, 10 stacked, also operating satellite TV dish, on 2 lots with chainlink fences, brick house, 3 bedrooms, 2 baths. Near Central State University, mid-hi, and grade schools. SASE for photos. W5ERY, P.O. Box 927, Edmond, OK 73083-0927.

WANTED: Collins 75A4, KWS-1. Bruce, 415-439-7909.

DRAKE TR-6, six-meter transceiver, good condition, SSB and CW, with mike and spkr, $250, or trade for Kenwood or Yaesu General Coverage Receiver. WB8P, 419-726-2467.

FOR SALE: Kenwood TS-820S with MC-50 mike. Mint! $500. Jeff, 516- 584-7975.

WANTED: Ten-Tec Power Mite. Argonaut. Grebe Receiver CR18 or earlier. General Electric A32 Receiver. Johnson Courier working or not. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615- 893-5344.

FOR SALE: Dentron MT3000A Antenna Tuner, mint condition, $200. Autek QF-1A Audio Filter, $40. B&W-425 Lowpass Filter, $25. Seiko World Timer wrist watch, all time zones and UTC, $30. Jerry, N7BSX, P.O. Box 580, Oak Harbor, WA 98277, 206-675-9250.

WANTED: Command Radio with Power Supply. William Gilbert, 33 Main, West Sayville, NY 11796.

FOR SALE: SB-221 w/10 meters, spare 3-500Z, exc. cond.-$655. Ten-Tec #546 OMNI-D w/filters, #243 remote VFO, #645 Keyer, #250 MO PS, exc. cond.-$695. FT-620B-$200. Other misc. including VHF, UHF equip., antennas, etc. #10 SASE for list. Lad, W1CRL CBA, 201-327-2706.

YAESU FT-1, Lot 10, all acc. $1175. TR-7, PS-7, RV-75, filters and blanker, WARC bands $975. MLA-2500B low hours all mint. K8CV, 313-549-1846.

MACKET: MacIntosh Packet Program, $39.95. Now supports RTTY and PK-232 HOST MODE. Contact WD8PUH, S. Fine Software, P.O.B. 6037, State College, PA 16801.

WANTED: Ham Equipment and Other Property. The Radio Club Of Junior High School 22 NYC, Inc. is a nonprofit organization, granted 501(c)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. We sponsor the classroom net on 7.238 at 1100 UTC daily and operate on 21.395 after the net. Please contact WB2JKJ using the callbook or telephone 516-674-4072, 24 hours, seven days a week. Thank you!

MILITARY H.F. Packset—Collins AN/PRC-47, fully synthesized, 2- 12 MHz, USB/CW, 100W, solid state except final/drivers. Includes handset, antenna, battery box, schematics—$325. WBØQNA, 314- 894-1822.

IC-2KL Linear Amplifier, 1-1/2 yrs. old, like new, $1050. NØFRT, 303-686-5965.

DEAD BATTERY??? Nicds/Packs/Inserts/Rebuilding. Batteries & Heat Shrink all sizes. Exact Replacement Packs: Yaesu FNB2 / Wilson BP4 / Maxon CP0500 $23.95. Santec 142/144 $21.95, Motorola Rap/Chg: HT220-Slim/225 $29.95, HT220-Omni/450 $34.95, GE/RCA/Johnson—Write. Inserts Only: ICOM BP2 $17.95, BP3 $16.95, BP5 $23.95, BP7/BP8 $29.95, Kenwood PB24 $19.95, PB25/25H/26 $24.95, Azden 300 $19.95, Tempo S1/270 $21.95, S1, 2, 4, 5, 15/450 $22.95, Standard C118 / Pace MXBT2 $24.95, Ten-Tec 2991 $24.95. Installation: (ICOM/Ken) add $4, send pack. Rebuilding: Yaesu FNB3 $34.95, FNB4 $37.95, Standard BP11 $27, others available. SASE/catalog. In PA add 6%. Add $3 shipping/order. Cunard Associates, Dept. H, RD 6, Box 104, Bedford, PA 15522.

CUSTOM Built Six Meter Linear 10 Watts in 300 out $450. Want Drake RV-6 and CW Filter TR-6. Commodore C-64 with Zenith Data Systems Monitor, owners and programmer guides $150. 1525 Printer $75. 1541 Disc Drive $100. K6KUQ, 209-564-3960.

2-MOTOROLA 20W UHF Duplex Mobile Transmitter-Receivers w/Duplexers, Accessories, Manual $250 each or $450 for both. W9PX, 1109 Avenue B, Rock Falls, IL 61071, 815-625-1672.

SUPERSCAF: All they claim, new, $119. R3 no-radial 20/15/10M vertical, complete, $135. Ned, W1RAN, 203-447-1255, after 5 PM.

FT-221 all mode 2 mtr., desk mike, pre-amp, $200. FT-301D transceiver, 100 watts, desk mike, $200. FP-301D power supply, $65. FC-301D antenna tuner, $65. FT-290R 2 mtr., all mode, portable, w/case, $150. FT-780R 430 MHz, all mode, mobile, 10 watts, $200. Manuals, u-ship, firm. WA1VCU, 1-508-349-3201.

COLLINS F-455J-60 Filter Wanted. State price. Bob Mattson, KC2LK, 10 Janewood, Highland, NY 12528.

DRAKE T4X Xmtr. Make offer. W6WI, 707-996-8373.

CLASSIC Heath AM-SSB-CW Rig: Apache, Mohawk, SB-10, $300. Thurtell, 382 N. Harvey Street, Plymouth, MI 48170, 313-453-8303.

WANTED—Heathkit SB-620 Scanalyzer. KB5YA, 1509 Conder, Killeen, TX 76541.

RTTY: Crown ROM-116, $100. Flesher TU-170A Terminal Unit, $75. Jerry, N7BSX, P.O. Box 580, Oak Harbor, WA 98277, 206-675-9250.

GROUND RADIAL WIRE For Verticals or Slopers: Improves performance, new #16 bare solid copper, 1000 feet convenient spools, $33 includes shipping to 48 states. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 617-369-1738.

FT. LAUDERDALE, Prime Location. Radio ready—40' EZ Way crank down tilt over galvanized tower with Ham 3 rotator and Tri-Band beam. 3 bedrooms, 2 baths, central air & heat, many extras. Contact Pat Norton, Assoc., 305-491-5831, Gordon Latz and Assoc., Inc. Realtor.

RF POWER TRANSISTORS

We stock a full line of Motorola & Toshiba parts for amateur, marine, and business radio servicing

Partial Listing of Popular Transistors

2-30 MHz 12V, (28V)*

P N		Rating	Net Ea.	Match Pr.
MRF421	Q	100W	$24.00	$53.00
MRF422*		150W	36.00	78.00
MRF454, A	Q	80W	14.50	32.00
MRF455, A	Q	60W	11.75	26.50
MRF492	Q	90W	16.00	35.00
SRF2072	Q	65W	12.75	28.50
SRF3662	Q	110W	24.00	53.00
SRF3775	Q	75W	13.00	29.00
SRF3795	Q	90W	15.50	34.00
SRF3800	Q	100W	17.50	38.00
2SC2290	Q	80W	16.75	39.50
2SC2879	Q	100W	22.00	48.00

Q Selected High Gain Matched Quads Available

PARTIAL LISTING OF MISC. TRANSISTORS

BFR96	$2.75	MRF966	2.75
CD2545	16.00	MGF1402	3.75
MRF134	16.00	NE41137	2.50
MRF136	21.00	PT9847	21.00
MRF137	24.00	SD1278-1	17.75
MRF138	35.00	2N1522	11.95
MRF150	87.50	2N3553	2.25
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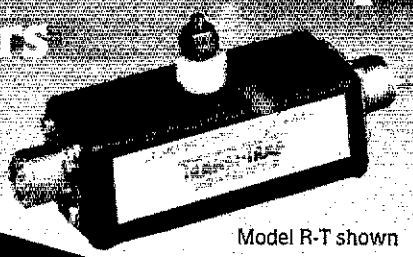
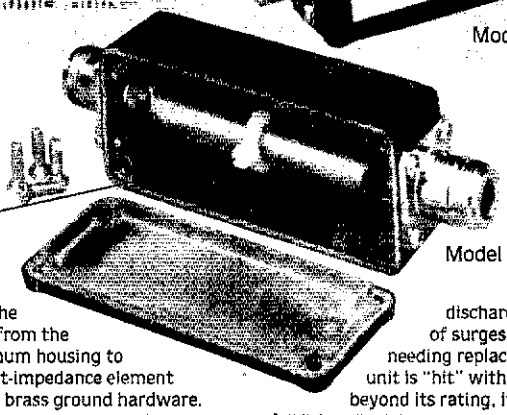


Model R-T shown



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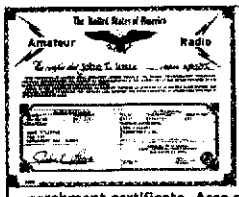

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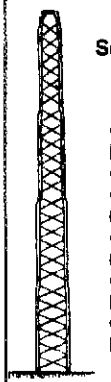

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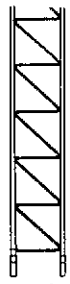

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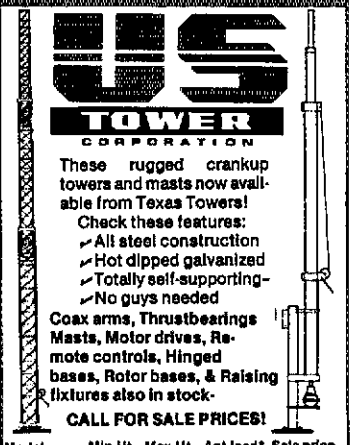

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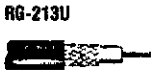
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1389
TX472	23'	72'	18 sq ft	2279
HDX556	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From Visalia, CA Factory

**Note-towers rated at 50 mph to EIA specifications*

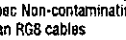
RG-213U



$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X



$.19/ft $179/1000 ft

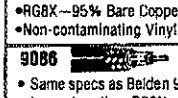
- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®



Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket.....$.79/ft.
⅞" LDF4-50 Andrew Heliax®.....$1.79/ft
1¼" LDF5-50 Andrew Heliax®.....$3.99/ft
select connectors below.
Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.54	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$25	$25	$33	$33
⅞" Heliax®	$29	$29	$29	$29
1¼" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259.....$1.25
UG21B N Male.....$2.95
9086/9913 N Male Connector.....$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.....$.10/ft.
¼ mile 18ga copper-clad steel wire.....$30
Dog bone end insulator.....$.79 ea.

Van Gorden

1:1 Balun.....$15 Center Insulator.....$8
Dipole Kits.....D80 $31.95/D40 $28.95
Short Dipole Kits.....SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line.....$29.95
G5RV all band antenna.....$49.95

ALPHA DELTA

DX-A 160-80-40 Sloper.....$49

CUSHCRAFT

A3 3-el Tribander.....$259
A4S 4-el Tribander Beam w/S S. Hdwre.....$349
A743 & A744, 30/40 mtr KIT for the A3 & A4 $ 89
AP8 80-10 mtr Vertical.....$139
AV5 80-10mtr Vertical.....$119
D40 40mtr Dipole.....$159
40-2CD 2-el 40 mtr Beam.....$339
A50-5 5-el 6 mtr Beam.....$ 98
215 WB NEW 15-el 2 mtr Beam.....$ 89
230 WB NEW 30-el 2 mtr Beam.....$229
4218 XL 18-el 2 mtr Beam.....$129
3219 19-el 2 mtr Beam.....$109
220B 17-el 220MHz Beam.....$109
424B 24-el 432MHz Beam.....$ 89
ARX2B 2 mtr Vertical.....$ 45

hy-gain

CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam.....
Discoverer 3-el Conversion Kit.....
EXPLORER-14 SUPER-SPECIAL.....
QK710 30/40 mtr. Add-On-Kit.....
V2S 2-mtr Base Vertical.....
V4S 440MHz Base Vertical.....
TH5MK2S Broad Band 5-el Triband Beam.....
TH7DXS 7-el Triband Beam.....
TH3JRS 3-el Triband Beam.....
205BAS 5-el 20-mtr Beam.....
155BAS 5-el 15-mtr Beam.....
105BAS 5-el 10-mtr Beam.....
204BAS 4-el 20-mtr Beam.....
64BS 4-el 6-mtr Beam.....
12 AVQ 20-10 mtr vertical.....
14 AVQ 40-10 mtr vertical.....
18 AVT/WB 80-10mtr Vertical.....
18HTS 80-10 mtr Hy-Tower Vertical.....
23BS 3-el 2 mtr Beam.....
25BS 5-el 2 mtr Beam.....
28BS 8-el 2 mtr Beam.....
214BS 14-el 2-mtr Beam.....
2BDQ 80/40 mtr Trap Dipole.....
5BDQ 80-10 mtr Trap Dipole.....
BN86 80-10 mtr KW Balun W/Coax Seal.....

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

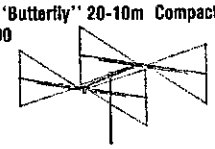
HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:

RMK II Roof Mtg. Kit.....$49
STR II Stub-Tuned Radials.....$29
TBR160 160m Coil Kit.....$49
30m Add-on Kit.....$29
20m Add-on Kit.....$39
17/12m Add-on Kit.....$27

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- Turns w/TV Rotor
- Boom Length 6 Feet
- No Lossy Traps
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam.....$399.95
KT34XA 6-el Broad Band Triband Beam.....$589.95

ROTORS

Alliance HD73 (10.7 sq ft rating).....$119.95
Alliance U110 (3 sq ft rating).....$49
Telex CD 45II (8.5 sq ft rating).....$Call
Telex HAM 4 (15 sq ft rating).....$Call
Telex Tailtwister (20 sq ft rating).....$Call
Telex HDR300 Heavy Duty (25 sq ft rating).....$Call

ROTOR CABLE

Standard 8 cond cables $.19/ft
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft
(vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$48.00 45G.....$133.00
25G.....$56.00 55G.....$165.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1049.
FK2558	58 ft.	13.3 sq. ft.	1099.
FK2568	68 ft.	11.7 sq. ft.	1149.
FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
FK4564	64 ft.	28.4 sq. ft.	1579.

25G Double Guy Kit.....$279.
45G Double Guy Kit.....$299.

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating).....$.15/ft
1/4 EHS Guywire (6650 lb rating).....$.18/ft
5/16 EHS Guywire (11,200 lb rating).....$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating).....$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32".....$.45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle).....$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle).....$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle).....$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle).....$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
8" Diam - 4 ft Long Earth Screw Anchor.....$14.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.69
502 Guy Insulator (1/4" Cable).....$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG6700 Guy Cable (6700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
Socketfast Potting Compound (does 6-8 ends).....$16.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$69	$89
18 in Wall	$49	$89	$129	$149
25 in Wall	$69	$129	$189	$249

ORDER TOLL FREE 1-800-272-3467

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Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074

(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection. Automatic step-change according to mode. IF notch filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra charge.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 meters, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

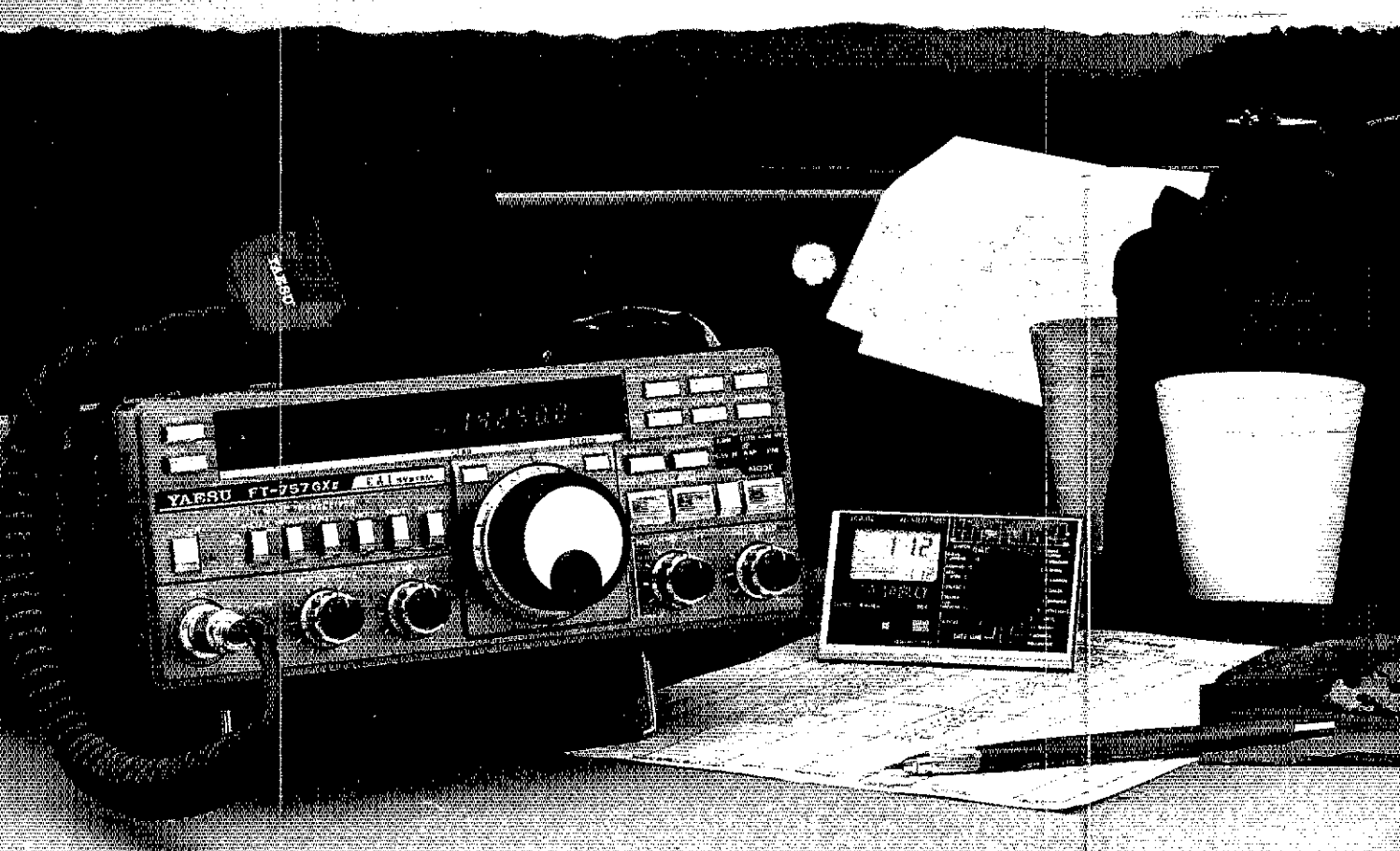
QSK operation. Massive heatsink and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface (software is available from your Yaesu dealer).

Of course, the FT-757GX/II offers the kinds of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, and more.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

YAESU



Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.

Prices and specifications subject to change without notice.

KENWOOD

...pacesetter in Amateur Radio

NOW Four to choose!

Four to Go!

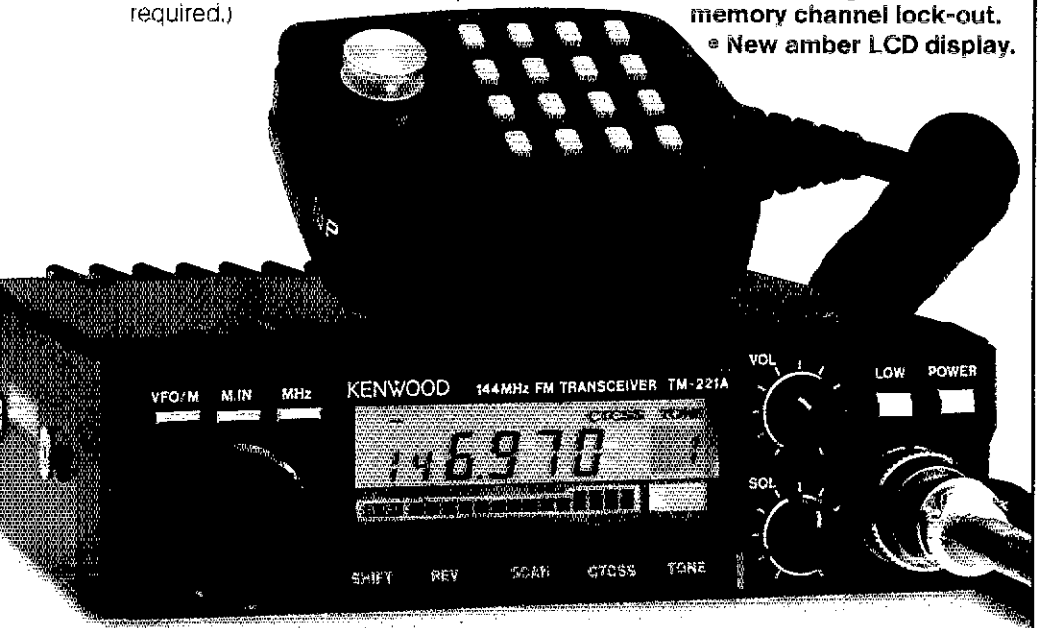
TM-221A/321A/421A/521A

144/220/450/1300 MHz

The Hottest Selling Compact FM Mobile Transceivers

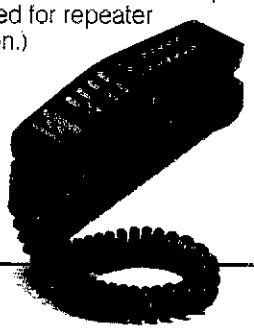
The all-new TM-221A, TM-321A, TM-421A and TM-521A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A receives from 138-173.995 MHz.** ***This includes the weather channels!*** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)
- **TM-321A covers 220-224.995 MHz, TM-421A covers 438-449.995 MHz, and the TM-521A covers 1240-1300 MHz.** (Specifications guaranteed for Amateur band use only.)
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls**—makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A provides 45 W. TM-321A 25 W. TM-421A 35 W. and TM-521A 10 W.** All models have adjustable low power.
- **Packet radio compatible!**
- **Programmable band scanning with memory scanning and memory channel lock-out.**
- **New amber LCD display.**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up, est. life 5 yrs.)
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A/521A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **a combination of two transceivers** with the optional PG-4G cable. When two transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable for second transceiver
- **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SWC-4** 1200 MHz Directional coupler. • **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker • **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** 2 m/70 cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

KENWOOD

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