January 1983 $2.50

QST

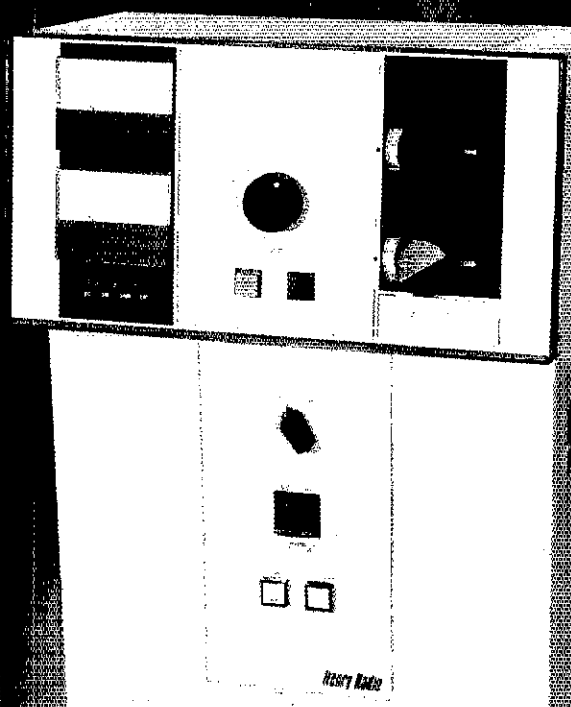
devoted entirely to Amateur Radio

ANNEE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

VHF QSO Party Results

Page 82

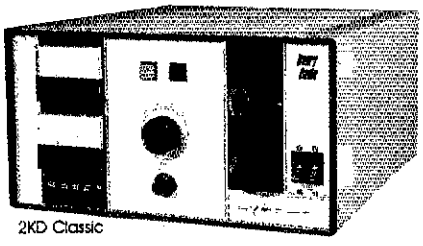
The world's broadest line of linears now boasts... four new amplifiers



2K Classic, 2K Classic "X" and 3K Classic similar in appearance

Now you have a choice of ten superb amplifiers spanning the spectrum from 3.5 MHz to 450 MHz. The most dazzling display of value and performance the amateur world has ever known.

Here they are! Treat yourself to the kind of amplifier you have always dreamed of owning.



2KD Classic

HF amplifiers..80 through 15 meters (10 meters included on export models)

The 1KD-5...1200 watt desk model $695

New!

The 2KD CLASSIC..2000 watt desk model. We challenge you to find a better desk model for even a thousand dollars more. $980

The 2K CLASSIC The latest and best version of the console that made the name "2-K" famous around the world. $1295

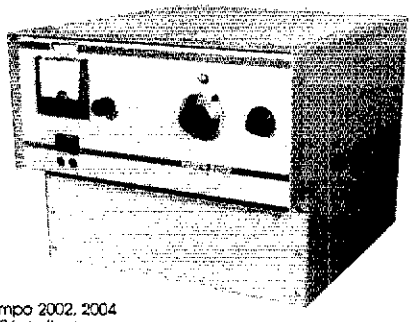
New!

The 2K CLASSIC "X" We can't think of any way to make this magnificent 2000 watt amplifier better. Rugged...durable...the last amplifier you may ever need to buy. $1790

The 3K CLASSIC uses the superb Eimac 8877 tube. More than 13 db gain. We believe the 3K to be the finest amateur linear available anywhere. $2695

The 3K CLASSIC "X" version available for export and military customers only. $2895

The 4K ULTRA A general coverage, general purpose amplifier for commercial, military, scientific and export customers. Not for sale to amateurs in the U.S.A. $4500



Tempo 2002, 2004
2006 similar in appearance

For VHF and UHF:

The TEMPO 2002 for 144-148 mHz. The 2000 watt workhorse of the 2 meter band. $1095

New!

The new TEMPO 2004 offers 2000 watts input at 440 mHz. Few amateurs have ever seen an amplifier capable of full powered UHF. $1295

New!

The TEMPO 2006. The same reliable design for 50-54 mHz. (For export only) $1095

All three models: 2002, 2004 and 2006 are also available on frequencies outside the amateur bands and are part of a unique line of high power commercial, industrial and scientific amplifiers and transmitters for communications, plasma-generation, nuclear magnetic resonance, heating and other special applications. Let us know what your requirements are. We're here to help both in the U.S.A. and throughout the world.

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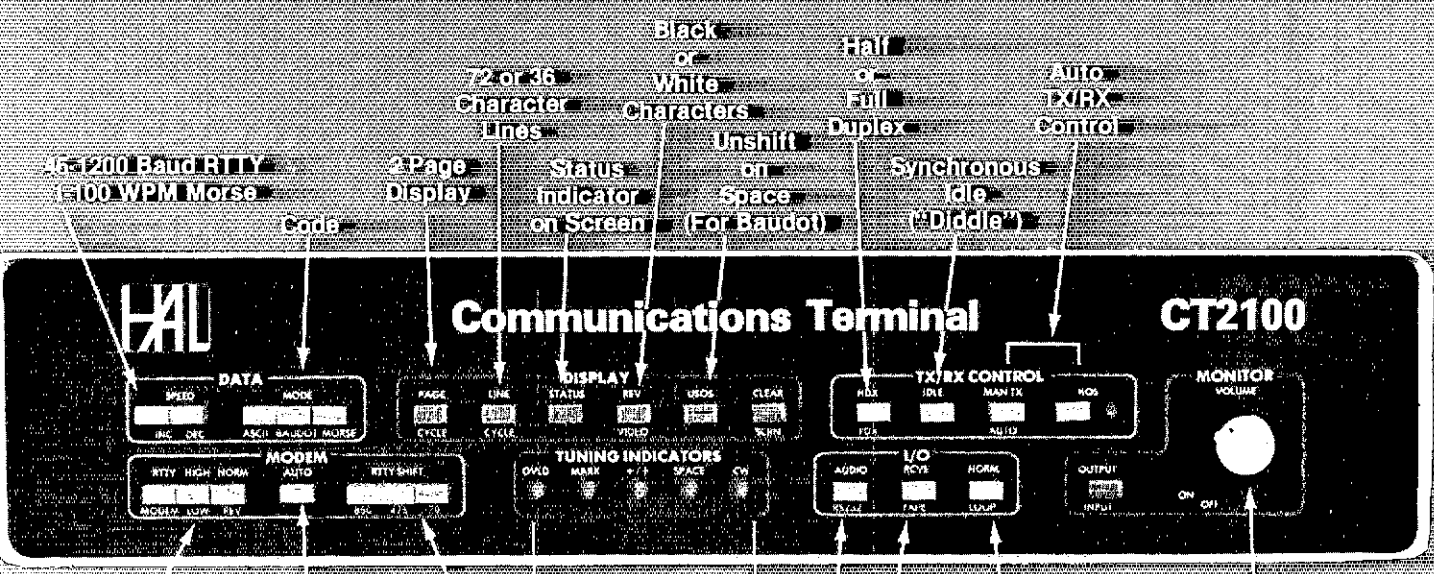
CT2100

HAL Puts MORE Behind The Buttons



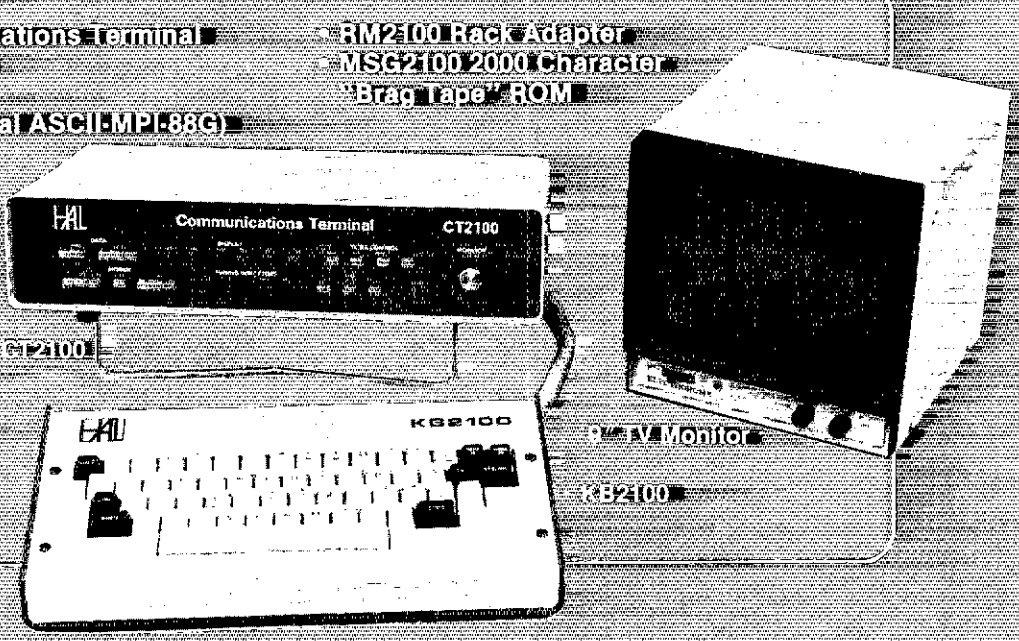
- 45-200 Baud RTTY
- 100 WPM Morse
- Code
- 2 Page Display
- 72 or 36 Character Lines
- Status Indicator on Screen
- Black or White Characters
- Unshift on Space (For Baudot)
- Half or Full Duplex
- Synchronous Idle "Diddle"
- Auto TX/RX Control

- Four Internal RTTY Demodulators
- High Tones (U.S. Standard)
- Low Tones (IARU Standard)
- 103 Modem (1070/1270 Hz)
- 202 Modem (1200/2200 Hz)
- Auto Mark Hold
- All 3 RTTY Shifts (High or Low Tones)
- LED Tuning Indicators Plus On-Screen Tuning Bar Plus Ext. Scope Connections
- Audio or RS232 Data
- Input Audio From Receiver or Tape
- Transmit and Receive With RTTY Loop Devices
- Audio Monitor For Either Input or Output Signals Internal Speaker Plus External Output

CT2100 System

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

- 2 Line Display
- 2 Pages of 72 Character Lines
- or
- 2 Pages of 36 Character Lines
- Split Screen (with KB2100)



- TV Monitor
- KB2100

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

IC-720A + IC-R70

The "plus" is the New IC-7072 Transceiver Unit

Now you can add ICOM's most versatile HF general coverage receiver to your IC-720(A). Combine the portability and operating convenience of the IC-720(A), with its long list of standard features...and the IC-R70, ICOM's latest general coverage receiver, into one transceiver by using the new IC-7072 transceiver unit.

Check ths list of features that will be added to your IC-720(A) receiving system:

Audio Monitor. Monitor your own transmitted audio and check SSB audio quality/CW keying characteristics.

Selectable AGC With Off Position. Perfect for use with transverters.

2 Position Noise Blanker. Very effective, virtually eliminates impulse noise.

500Hz CW Filter Standard. 250Hz (FL63) optional 8-pole filter.

3 Stage Preamp/Off (Direct)/Attenuator Control. Controls input to ICOM's Direct Feed Mixer receiving system.

Squelch Control. Effective in all modes allowing only signals above a certain strength to be heard.

Audio Tone Control. For easier listening/less fatigue.

Record Jack. Allows connection of a tape recorder to record both sides of a QSO. Unaffected by the volume or monitor control. Also may be used to drive an RTTY decoder.

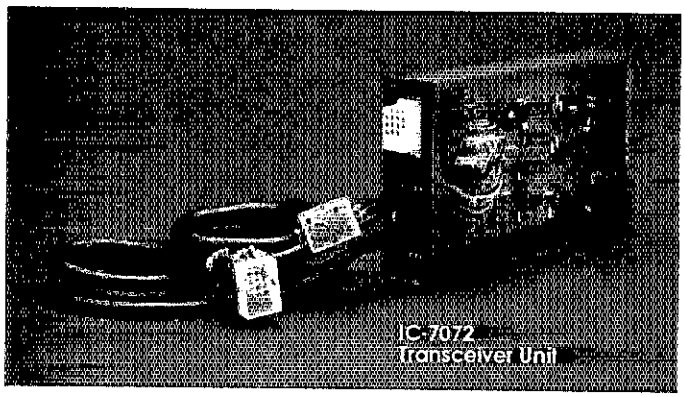
Notch Filter. Deep IF notch eliminates annoying heterodynes from interfering adjacent signals.

Large Front Mount Speaker. Full 3 watts of audio.

Expanded Range Pass Band Tuning. For greater adjacent signal rejection in the AM mode.

Option for FM Reception. Useful for 10 meter FM.

Excellent, Clear Reception. With the R70's advance receiving system with the first IF at 70MHz, and with the lowest synthesizer noise level available — better than receivers costing much more.



Bring all of these advanced features to your IC-720(A) shack with the R70 and the IC-7072 transceiver unit. The plug-in IC-7072 transceiver unit slaves the CPU of the IC-720(A) to the IC-R70 microprocessor. This allows the tuning knob and selector buttons of the IC-R70 to control the IC-720(A).

Included with the IC-7072 are cables for the mute line control on the IC-R70 and a coax line to patch the IC-720(A) antenna into the IC-R70. An accessory connector on the IC-7072 is provided for attachment of "ICOM System" accessories such as the IC-2KL linear amplifier or IC-AT500 automatic antenna tuner or both.

Now your base station can have the most advanced ham/general coverage receiver available and the crisp transmitted audio of the IC-720(A) with RF speech processor. And yet, the 12 volt operated IC-720(A) may be taken mobile or portable for the ultimate in a ham band transceiver ...and you still have general coverage reception...at both places!

ICOM
The World System

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

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

January 1983 *Volume LXVII Number 1*

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CONTENTS

OUR COVER

A group of vhf'ers gathers annually at W2SZ/1 atop Mt. Greylock in Western Massachusetts for the ARRL VHF contest (see p. 82). WA2AAU makes the final adjustments to equipment on the 1296/2304-MHz dish. *(June 1981 photo)*

TECHNICAL

BEGINNER'S BENCH

NEWS AND FEATURES

OPERATING

DEPARTMENTS

You've got to get a Santec to get it right!

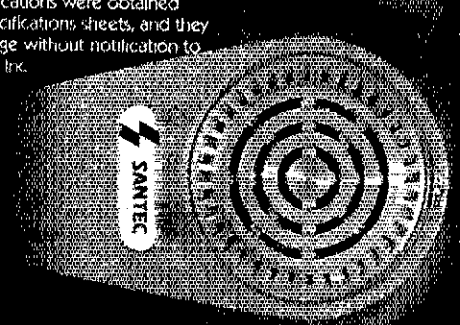
Compare Santec to anything you like, and you'll see — you've got to get a Santec to get: ■ memory channels which store standard repeater offsets for instant recall ■ less than 10 ma drain in receive to conserve power while you're monitoring ■ extremely wide power options of 0.1 W, 1.0 W or even 3.5 W for varying conditions ■ an accurate 24 hour clock for instant reference ■ and a full two year extended service plan which no one else will match.

When you get a Santec, you also get: ■ the widest frequency range of any handheld ■ odd offsets other than +600 kHz ■ variable step sizes in bandscan ■ a 500 ma battery with charger ■ a full six digit back-lighted LCD display for full frequency readout plus the memory channel number ■ the easiest keyboard entry of any handheld ■ eight modes of scan, search, manual control and open scan ■ the ability to change batteries without losing memory data ■ easily programmable bandscan ■ a frequency lock switch on the keyboard ■ an automatic low battery indicator ■ and much more.

FEATURE	SANTEC ST-144	YAESU FT-208	KENWOOD TR-2500
Size (mm)	68 x 170 x 47	61 x 168 x 49	66 x 168 x 40
Weight with Batt	600 gm	720 gm	540 gm
Readout	LCD (full 6 digits)	LCD (4 digits)	LCD (4 digits)
Memory Channels	10	10	10
Memory of Offsets	YES	NO	NO
Memory Backup	YES, Capacitance	Yes, Lithium Batt.	Yes, Lithium Batt
Scan (mem. & band)	YES	Yes	Yes
Search Mode	YES	NO	NO
Step Size	5-100 kHz	5 or 10 kHz only	Any 5kHz multiple
Battery	Quick Change Pack 500 ma-hr, 9.6 V	Quick Change Pack 450 ma-hr, 10.8 V	Slide-on Pack 400 ma-hr, 8.4 V
Frequency Coverage	142-148.995 Tx (149.995 optional) 142-149.995 Rx	143.5-148.495 Tx Rx	143.9-148.995 Tx Rx
Power (max)	3.5 W High 1.0 W Med 0.1 W Low	2.5 W High 0.2 W Low	2.5 W High .3 W Low (approx.)
Priority	YES (in Mem Scan)	Yes (Priority Ch.)	NO
Clock	YES	NO	NO
Computer Current Saver	YES (10 ma)	NO (20 ma)	NO (27 ma)
Display	6 Digits + Mem. #	4 Digits + Mem. #	4 Digits + Mem. #

New! Affordable Price! See your Authorized Santec Dealer for details.

Competitors' specifications were obtained from published specifications sheets, and they are subject to change without notification to Santec or Encomm, Inc.



Shown with optional SM-3 speaker microphone

Accessories for SANTEC Handheld Radios

clockwise from upper left
- Leather Case (ST LC)
- Base Charger & Power Supply (ST 5BC)
- Remote Speaker (MS-50S)
- Mobile Charger (ST MC)
- Speaker Microphone (SM-3)

The ST-144 μP is approved under FCC Part 15

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Ringo Ranger II

Simply the best

The best combination of gain, bandwidth and low angle radiation for simplex or repeater operation.

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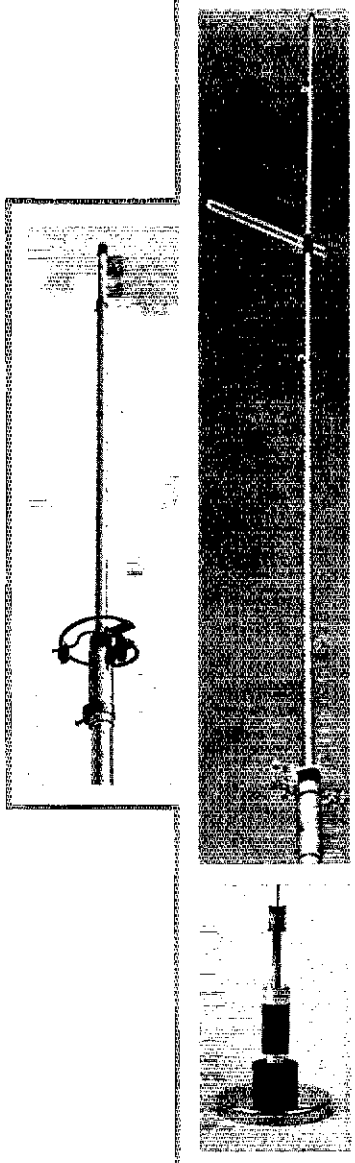
Mount anywhere with compact dimensions and neat appearance

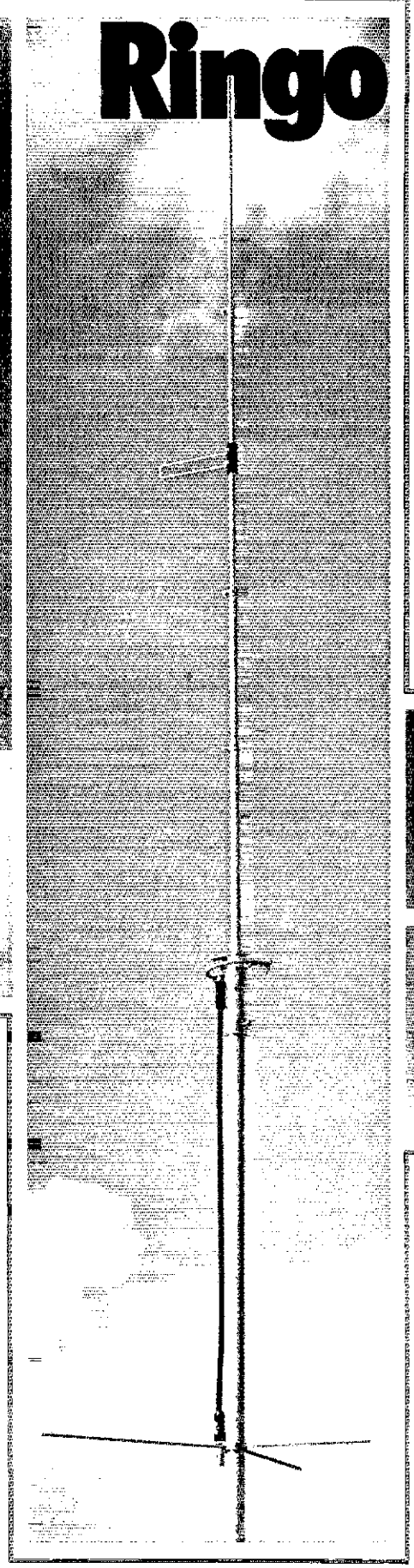
Proven performance and durability in all environments

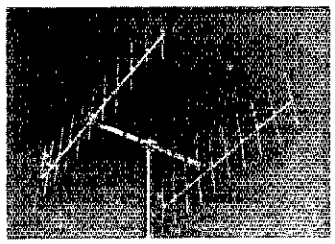
Complete FM band coverage

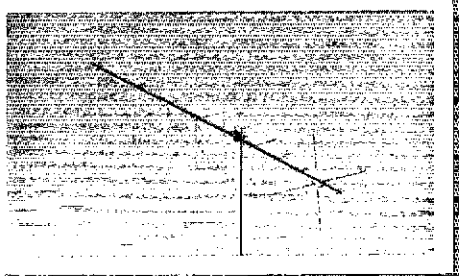
One year warranty

Cushcraft antennas created the FM antenna revolution by making the best performance and value available to every ham. We continue to set the pace with a broad line of antennas for every FM application. Tune across the band and you will find the overwhelming majority of hams using one, two, or more Cushcraft antennas. The reason is very simply that they are the best. Now is the time for you to enjoy the value of a Cushcraft antenna. See your nearby dealer today.









RINGO RANGER II

ARX-2B	134-164 MHz
ARX-220B	220-225 MHz
ARX-450B	435-450 MHz

RINGO RANGER

ARX-2	134-164 MHz

RINGO

AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

MOBILE ANTENNAS

AMS-147	144-148 MHz	Magnetic Mount
ATS-147	144-148 MHz	Trunk Lip Mount
AMS-220	220-225 MHz	Magnetic Mount
ATS-220	220-225 MHz	Trunk Lip Mount

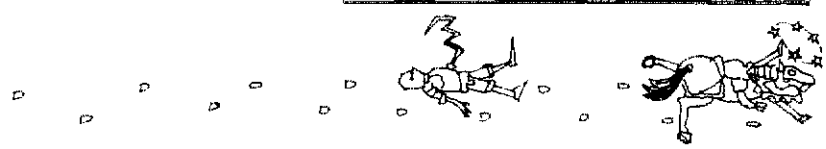
YAGIS

A147-4	145.5-148 MHz	4 Element
A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
A449-6	440-450 MHz	6 Element
A449-11	440-450 MHz	11 Element

CROSS YAGI

FOR CW/SSB and FM

A147-20T 144-146 MHz Horizontal
145.5-148 MHz Vertical



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CORPORATION

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

Scan the World.

NEW

SSB, CW, AM, FM, digital VFO's, 10 memories, memory and band scan, dual 24-hour clocks...

R-2000

The R-2000 is an all mode SSB, CW, AM, FM receiver that covers 150 kHz–30 MHz in 30 bands. New microprocessor controlled operating features and an UP conversion PLL circuit provide maximum flexibility and ease of operation to enhance the excitement of listening to stations around the world. Key features include digital VFO's, ten memories that store frequency, band, and mode information, memory scan, programmable band scan, fluorescent tube digital display, and dual 24-hour clock with timer.

R-2000 FEATURES:

- **Covers 150 kHz–30 MHz in 30 bands.** Uses innovative UP-conversion digitally controlled PLL circuit. UP/DOWN band switches (1-MHz step). VFO's continuously tuneable across 150 kHz–30 MHz.
- **All mode: USB, LSB, CW, AM, FM.** Provides expanded flexibility in receiving various signal types. Front panel mode selector keys, with LED indicators.
- **Digital VFO's for best stability.** 50-Hz step, switchable to 500-Hz or 5-kHz, using front panel pushbutton switches. F. LOCK switch provided.
- **Ten memories store frequency, band, and mode data.** Complete information on frequency, band, and mode is stored in memory, assuring maximum ease of operation. Each memory may be tuned as a VFO. Original memory frequency may be recalled. AUTO. M switch for automatic storage of current operating data, or, when off, selective storage of data using M. IN switch.
- **Lithium battery memory back-up. (Est. 5 yr. life.)**
- **Memory scan.** Scans all memories, or may be programmed to scan specific memories. HOLD switch interrupts scanning. Frequency, band, and mode are automatically selected in accordance with the memory channel being scanned. The scanning time is approximately 2 seconds per channel.
- **Programmable band scan.** Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish upper and lower scan limits. HOLD switch interrupts scanning. Frequency may be adjusted, using the tuning control, during scan HOLD.
- **Fluorescent tube digital display (100-Hz resolution).** Built-in 7 digit fluorescent tube digital display indicates frequency or time, plus memory channel number. DIM switch provided. The display may be switched to indicate CLOCK-2, FREQUENCY, CLOCK-1, and timer ON or OFF by the front panel FUNCTION switch.
- **Dual 24-hour quartz clocks, with timer.** Permits programming two different time zones. Timer for ON and OFF programming. Timer REMOTE output on rear panel (not for AC power).
- **Three built-in IF filters with NARROW/WIDE selector switch. (CW filter optional.)** 6 kHz wide or 2.7 kHz narrow on AM. 2.7 kHz automatic on SSB. 2.7 kHz wide on CW, or, with optional YG-455C filter installed, 500 Hz narrow. 15 kHz automatic on FM.
- **Squelch circuit, all mode, built-in, with BUSY indicator.**
- **Noise blanker built-in.** Eliminates pulse-type noise on SSB, CW, and AM.
- **Large front mounted speaker.**
- **Tone control.**
- **RF step attenuator. (0-10-20-30 dB.)** Four step attenuator, plus antenna fuse.
- **AGC switch. (Slow-Fast.)**
- **"S" meter, with SINPO "S" scale.**
- **High and low impedance antenna terminals.** A high impedance (500 ohm) terminal, and a low impedance (50 ohm) co-axial connector are provided.
- **100/120/220/240 VAC, or 13.8 VDC operation.** (Optional DCK-1 cable kit required for 13.8 VDC.)

Other features.
- RECORD output jack.
- Audible "beeper" (through speaker).
- Carrying handle.
- Headphone jack.
- External speaker jack.

Optional accessories:
- HS-4, HS-5, HS-6 headphones.
- DCK-1 DC cable kit.
- YG-455C 500-Hz CW filter.
- HC-10 World digital quartz clock.

More information on the R-2000 is available from all authorized dealers of Trio-Kenwood Communications
1111 West Walnut Street
Compton, California 90220.

KENWOOD

...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.

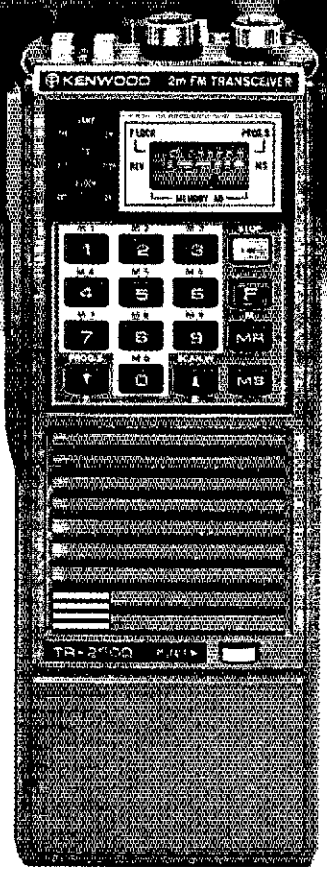
TR-2500

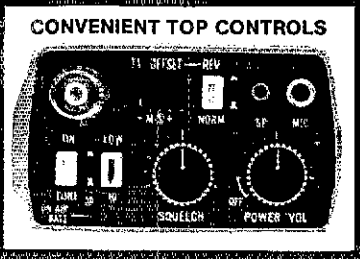
Size, Smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs). 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output. (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.

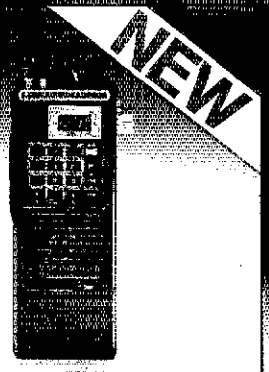




- Optional PB-25L Flexible 6 V 1.2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack.
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.



TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW.
- TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- RA-3 2 m 3/8 λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7950/7930

Big LCD, Big 45 W, Big 21 memories, Compact.

Outstanding features providing maximum ease of operation include a large, easy-to-read LCD display, 21 multi-function memories, a choice of 45 watts (TR-7950) or 25 watts (TR-7930), and the use of microprocessor technology throughout.

TR-7950/TR-7930 FEATURES:

- New, large, easy-to-read LCD digital display. Easy to read in direct sunlight or dark (back-lighted). Displays TX/RX frequencies, memory channel, repeater offset, sub-tone number, scan, and memory scan lock-out.
- 21 new multi-function memory channels. Stores frequency, repeater offset, and optional sub-tone channels. Memory pairs for non-standard splits. "A" and "B" set band scan limits. Lighted memory selector knob. Audible "beep" indicates channel 1 position.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- 45 watts or 25 watts output. HI/LOW power switch for reduction to 5 watts.
- Automatic offset. Pre-programmed for simplex or ±600 kHz offset, in accordance with the 2 meter band plan. "OS" key for manual change in offset.
- Programmable priority alert. May be programmed in any memory.
- Programmable memory scan lock-out. Skips selected memory channels during scan.
- Programmable band scan width.
- Center stop circuit for band scan, with indicator.
- Scan resume selectable. Selectable automatic time resume-scan, or carrier operated resume-scan.
- Scan start/stop from up/down microphone.
- Programmable three sub-tone channels with optional TU-79 unit (encoder).
- Built-in 16-key autopatch encoder, with monitor (Audible tones).
- Front panel keyboard control.
- Covers 142.000-148.995 MHz in 5-kHz steps.
- Repeater reverse switch. (Locking)
- "Beeper" amplified through speaker.
- Compact lightweight design.

Optional accessories:

- TU-79 three frequency tone unit.
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

NEW

Directors

Canada

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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager or Section Manager. Your SCM/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 SCM/SM has an appointment available. Check with your SCM/SM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Membership

The year just ended was a year of great progress for Amateur Radio. As radio amateurs and League members we enjoyed the first fruits of our years of WARC-79 labors, with the opening of the 10-MHz band to amateur occupancy. We got a bill through Congress, and signed into law by the President, with several provisions of great importance for the future. In response to this new law we planned for the introduction, later this year, of volunteers into the functions of monitoring the bands and preparing and administering amateur exams; this will allow Amateur Radio to move forward without being unduly hampered by FCC budget cuts.

We began to win the CATVI battle, through increased awareness of the problem by the CATV industry and with a number of cable systems forced to abandon channel E and many more forced to pay closer attention to their leaky distribution lines. We continued our support for a rational approach to possible biological hazards from rf energy, and fought to stem the tide of unrealistic regulations at the local and state level. In communities throughout the country, we helped protect the right of radio amateurs to operate without unreasonable restrictions on their antenna installations and without local regulation of rf interference.

The amateur community gained expanded privileges for slow-scan television, facsimile, digital communications and beacons, thanks in large part to a spirit of mutual cooperation with an FCC staff which, though strapped for funds, was sensitive and responsive to our needs. We beat back an industry attempt to use the 160-meter band for cordless telephones. We moved a step closer to expanded U.S. phone subbands, and laid the regulatory groundwork for AMTOR, an exciting new mode of radioteleprinter communication.

Within our national organization, League members extended a welcome to their new President and new General Manager, which gave Vic Clark and me a tremendous boost as we shouldered our new responsibilities; our thanks go to each of you for your encouragement and support. Final plans were made for the January 1, 1983, introduction of a new section-level ARRL volunteer structure, and the March 1 debut of an enhanced relationship between the League and its affiliated clubs. Further efforts were made to strengthen the League organization in Canada. An important step toward an improved International Amateur Radio Union was taken with the creation of a worldwide Administrative Council, to provide better representation and communication within our worldwide federation.

Amateur Radio accomplished a great deal in 1982, and you, the ARRL member, are responsible for the success we all have enjoyed. Take a bow! As a League supporter, you've earned it. Without you, 1982 would have been a chronicle of frustration and disappointment for radio amateurs — if there *were* any radio amateurs — because there would have been no cohesive, effective national organization to fight for our interests.

As a League member, you've earned something else: You've earned the right to ask your non-member friends to help you support Amateur Radio's only strong, national voice. The $25 annual dues rate adopted in 1981 ($20 for those 65 and over, or 17 and under) has resulted in greater dues income, but the burden is being carried by fewer members. There is no further increase planned for 1983, as there was none in 1982; let's use the opportunity to bring our ham friends and neighbors into the League. When questioned as to why they haven't joined, some non-members say, "Because I haven't been asked." Let's make 1983 the year they're asked! Some say *QST* isn't worth the money to them; let's show them the League is a lot more than a magazine subscription! Others will cite some disagreement with an ARRL policy or program, perhaps in the distant past; let's convince them that we have a new, fresh, responsive organization! None of us will find ourselves in agreement with "the League" 100% of the time, but the good which comes from having an effective national organization will make most dissatifications seem minor by comparison if we keep our perspective.

Let's each set a personal goal for bringing new members into the League, or former members back into the fold, in the New Year. If you need some application blanks, just let us know; we'll be glad to supply them! — *David Sumner, K1ZZ*

HONOR AMONG THIEVES?

Law-abiding amateurs deplore the antics of the few misfits among us who engage in jamming activities and commit other infractions on the air. Yet there has surfaced a contrary reluctance on the part of some to report to authorities the suspected identities of such wrongdoers.

The other day, for example, someone mentioned that persons responsible for staging a recent DXpedition hoax were known to them, but said they "would rather not identify the parties."

Who, in such a situation, is the more culpable?

Anyone . . . *anyone* who deliberately misuses the amateur bands is playing fast and loose with the future of our great avocation. If Amateur Radio is to survive and prosper, it requires us to be prompt and resolute in reporting the rascals for merited disciplinary treatment.

The trend toward government deregulation requires that amateurs be increasingly alert and responsive to matters of misbehavior on the amateur bands. "The price of freedom is eternal vigilance"; for amateurs, it is the *freedom to operate* that is at stake, and we must take the necessary steps to preserve our hard-won reputation as respectors of the law. — *Vic Clark, W4KFC*

League Lines...

Happy New Year! If you would like to know what's in store for 1983, turn to the Operating Events and Conventions Listing on page 54. Page 53 has the latest license renewal information, along with U.S. frequency and mode allocations, which include the new 10-MHz amateur band. Cut out the page on the dashed line, or make a photocopy, to keep it handy throughout the year.

The Mt. Diablo Amateur Radio Club, with assistance from ARRL Hq., is attempting to get officials of Contra Costa County, California, to take a more moderate approach in its plans to regulate Amateur antennas. Neighbors of Morey Young, KN6M, are pressuring the County Supervisors for an antenna ordinance, claiming that Morey's two 98-foot towers and two 75-foot towers in his back yard cause RFI. The FCC has given Morey's station a clean bill of health. KN6M is operated principally as a multi-operator multi-transmitter contest station.

The Massachusetts Department of Public Health is pressing ahead on its proposal to regulate human exposure to radio frequency energy. Under the latest proposal, Amateur Radio operators in that state will not have to register their stations or get prior approval from the Department of Public Health. However, amateurs will still have to observe an exposure standard for the public that is five times as strict as the latest American National Standards Institute's C95.1-1982 Standard. ARRL Hq. staff and the League's Committee on the Biological Effects of RF Energy are participating in the formal rulemaking process through both written filings and attendance at a public hearing in Boston. Those wishing to receive a copy of the Department's latest proposal should write to The Department of Public Health, 600 Washington St., Boston, MA 02111.

The ARRL has filed a petition for rulemaking requesting the FCC to exercise its new authority to issue 10-year Amateur licenses under Public Law 97-259. The League also asked that the period of grace for keeping one's station call sign, in the event one fails to renew during the license term, be extended from one year to two. At presstime no RM number had been assigned to the request.

"We respectfully request that any action which might lead to a class of amateur license not requiring a test in the international Morse code be deferred by the Commission for at least 18 months." This is the message contained in a letter from ARRL President Vic Clark, W4KFC, to FCC Chairman Mark Fowler. According to President Clark, the amateur community needs time to absorb its new responsibilities under the volunteer licensing program before considering the additional workload that might be brought on by a new codeless license. There has been talk at the FCC that a codeless license proposal may be unveiled before the end of 1982. See "It Seems to Us" in November 1982 QST, page 9, for more details.

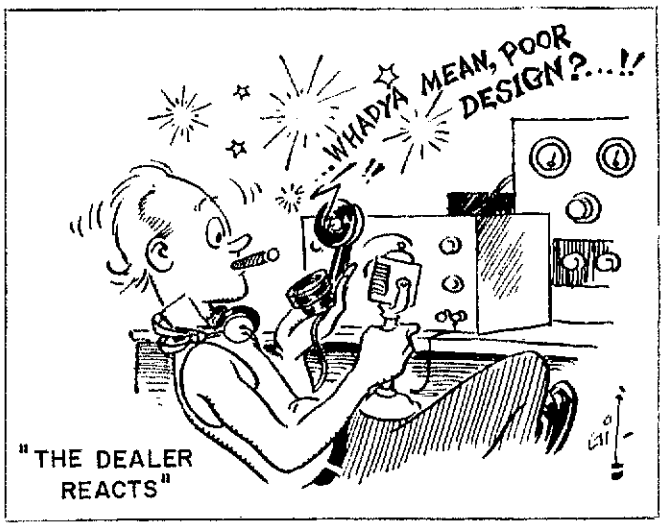
Amateur Radio will be represented at a White House ceremony and formal reception at the State Department recognizing World Communications Year 83. ARRL President Clark will be attending on behalf of all radio amateurs. The United Nations and the International Telecommunication Union have jointly declared 1983 to be World Communications Year 83 (WCY).

The FCC has adopted a Notice of Proposed Rulemaking that, if adopted, would enable the Commission to stop issuing individual licenses in the Citizens Band Radio Service. Instead, citizens band will be handled under a "blanket authorization," saving the FCC an estimated $360,000 per year. Public Law 97-259 gives the FCC the authority to do this only for the Citizens Band Radio Service. At presstime no docket number had been assigned to the proposal.

Two immediate job openings are available at Hq. for developing new recruitment and examining programs. If you're an experienced ham with excellent writing skills or an Extra Class licensee with business management experience, send a resume and writing samples to Dept. 9V-9R, ARRL Hq.

Amateur Radio will play a role in a program for middle-management government officials, engineers and senior technicians from Third World countries. The U.S. Telecommunications Training Institute (USTTI), a program backed by private communications companies, will begin offering seminars to inform tomorrow's Third World leaders about advanced telecommunications techniques. ARRL has offered to locate Amateur Radio volunteers in communities where instruction will take place, to be after-hours hosts for hospitality and, possibly, to teach Amateur Radio courses.

Modern Receivers and Transceivers: What Ails Them?



As the technology advances, some performance characteristics improve, while others worsen. Assorted ailments result from poor design and fundamental limitations; others are products of economic measures and modern technology.

By Doug DeMaw,* W1FB and Wes Hayward,** W7ZOI

How does your new super hf transceiver stack up against previous equipment you've owned? Chances are you're proud of that physically small, sophisticated and often costly transceiver that serves as the center piece of your operating desk. But, what is there about it that doesn't compare with some of the ham gear you bought or built earlier? Most users could prepare a list of faults on a moment's notice.

This paper will examine some of the common performance shortfalls that are peculiar to much of today's amateur equipment. Our main emphasis will be on receivers and the receiver portions of hf transceivers. Some comments will also be made regarding transmitter performance.

The Good Features

Manufacturers of amateur equipment have made noteworthy advances in circuit design and operating features in the past decade. Transmitter spectral purity (except for noise) has improved generally with each new model released. Harmonics and other coherent spurious emissions are typically very low with virtually all models of current equipment.

Receiver performance is similarly improved. Two-tone dynamic range has increased gradually, and for most equipment it is adequate for amateur needs.[1,2,3] Values in excess of 90 dB are common for both cw and ssb bandwidths. Oscillator stability and frequency-readout resolution have taken ham gear out of the Model A car class. This refinement appears not only in traditional designs with mechanically tuned oscillators and dial mechanisms, but in the later designs based upon digital technology. The latter include equipment with built-in counters and frequency synthesizers. Filter technology has advanced, offering significantly improved receiver selectivity. Modern designs provide more than adequate sensitivity while not severely compromising other performance factors. Image rejection and i-f rejection are also quite good, especially in those designs using a first i-f at vhf.

These fundamental improvements have been accompanied by operator-convenience features. Many of these are quite worthwhile. They include receiver incremental tuning — RIT (in transceivers), frequency memories, the ability for computer interface, various types of bandpass tuning and continuously variable bandwidth schemes, plus self-contained, tunable peak or notch filters. But, what have we traded off to obtain all of these marvelous improvements?

Some Not-So-Good Trends

Some lost performance may be attributed to economic considerations. Other losses result from fundamental limitations; the demands placed on equipment in today's crowded bands are severe. Another reason for degraded performance can be traced to design engineers unfamiliar with the requirements of amateur operators: Some designers aren't active amateurs and are not familiar with operating reality. One U.S. manufacturer of "ham" equipment refused for many years to include RIT in its transceivers. The rationale was that "RIT is used only by those manufacturers who produced rigs with unstable local oscillators"!

In the following paragraphs, we outline some of the problems we have observed. We will attempt to differentiate between fundamental items and those that result from economic considerations. Both reasons may apply.

Receiver Audio Quality

The receivers of the vacuum-tube era were typified by an abundance of available audio output. Things have changed, but not for the better. Many present receivers lack sufficient audio output power .This is most evident during mobile operation (owing to high ambient noise levels) — a paradox, for the state of the high-fidelity audio art permits undistorted audio output at levels up to 100 W (Fig. 1)! The problems are easily solved during design. Manufacturers could improve overall performance through the use of more efficient

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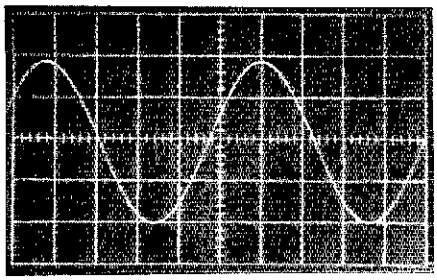
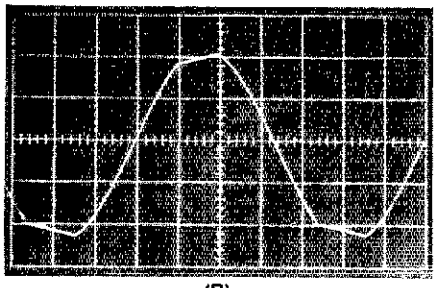
[1]Notes appear on page 16.



(A)



(B)

Fig. 1 — Oscillographs of (A) an undistorted sine wave at the output of a receiver audio system and (B) a distorted waveform resulting from inadequate audio-output power to overcome the ambient noise during mobile operation. Distorted audio is difficult to read, especially when automobile and wind noises are present.

speakers. Higher supply voltages, beyond the usual 12-V systems, would allow greater undistorted output power. Finally, the usual amplifiers, with one end of the speaker grounded, could be replaced with a pair of amplifiers (a "stereo" IC) that drives the speaker differentially, affording a 6-dB improvement in output power.

Attention needs to be paid to the frequency response of receiver audio systems. A number of receivers (new and old) have more or less flat responses out to 10 kHz. Communications information rarely contains components beyond 3 kHz. Receiver audio amplifiers should be shaped accordingly. The shaping should be changed as the i-f bandwidth is altered (switching from ssb to cw).

Agc Systems

A deficiency in many receivers is poor agc. There was a time in Amateur Radio when agc was used only during a-m phone operation. The agc was defeated for cw and, later, for ssb reception. Present operating practices are different: Most of us use agc during the reception of any mode. The agc system should be suitable for any condition that might be encountered.

The greatest agc failing is the attack characteristic. A loud signal, perhaps a cw station located within the first skip zone for a given band, appears within the i-f passband. An agc voltage is detected and *starts* to reduce the receiver gain. However, unless the bandwidth of the detection system is large with respect to that of the i-f, and detection occurs quickly, there will be a loud thump or pop. This is an annoyance to the operator, and it is fatiguing.

Designing a suitable agc response is not a simple matter of adjusting some R-C time constants. Rather, it is a system design problem, a detail that must be accounted for during the overall receiver design. A fast-attack agc is realized only if elements in the system that introduce a time delay are eliminated between the point where agc is applied (usually the i-f amplifiers) and the point of detection. The most common delay element encountered is a crystal or mechanical filter. Another potential delay element is the audio-amplifier chain. This precludes the use of audio-derived agc in a receiver for other than casual applications.

In spite of the difficulties, it is possible to design a suitable agc system. Such a system, when observed with an oscilloscope or with a critical "calibrated" ear, shows that the initial leading edge of a recovered audio signal has the same amplitude as that found with a steady tone. Some present equipment exhibits good agc performance. There are alarming exceptions, though! There are at least two agc-deficient commercial transceivers that DeMaw has tested. Both employ audio-derived agc (design rationale unknown) for which the attack times are faulty. Although the extremely loud pop in the receiver audio is barely tolerable when using a speaker, it is unbearable when using headphones during cw reception. Owing to a fairly short decay time, the agc can take hold many times during a single transmission by the station being worked, and the slower the cw is being sent the more times the pop will be heard in the phones.

Recovery time is the other critical parameter of an agc system. This is easily controlled by a suitable R-C time constant. The system should, however, be one that allows for operator control over the recovery time (fast or slow) and one that has a recovery time that is substantially independent of the strength of the incoming signal.[4]

Agc is an important part of present-day receiver technology, and is a preferred feature among most operators. The dynamic characteristics are important. There is no reason why the agc should not function smoothly and without popping, clicking or pumping.

A related deficiency in many receivers is the calibration of the S meter. It is not uncommon to find high-priced transceivers that show a difference between a displayed S1 and S9 signal of only 10 dB. The meter readings then take on greater meaning for stronger signals, although the calibration is rarely accurate. This deficiency could be eliminated through more careful design of the gain-controlled stages.[5] It may not be important for the manufacturers to develop a communications receiver that is suitable for making signal measurements. On the other hand, we suspect that a manufacturer who markets equipment with a calibrated S meter might be able to enhance sales with this feature.

I-F Filtering

An unfortunate fact is that some commercial receivers and transceivers contain essentially good cw and ssb filters, but leakage around the filters prevents them from providing the narrow response for which they were designed. There are other cases in which the filters themselves are deficient. While they may have excellent shape factors when the 6- and 60-dB down points are examined, the filters cease to provide much filtering action at the 80- or 100-dB points or more. Considering the state of front-end design, where it is possible to aim for essentially spurious-free responses over a 100-dB dynamic range or greater, it makes little sense to degrade the overall receiver response with poorly designed i-f systems. Some filter responses are shown in Fig. 2.

Poor stopband attenuation is observed readily in many receivers. The desired response is a dominant audio output of the proper pitch when a strong signal is encountered, with a total absence of signal-related output when the receiver is tuned away from the signal. It is common to hear a strong response for 10 kHz on either side of the signal frequency. A gradual decrease in strength as one tunes into the skirts of the filter is, of course, acceptable. The presence of a response completely outside the filter passband response is not!

A good ssb filter, alone and not in an i-f system, can have a stopband attenuation

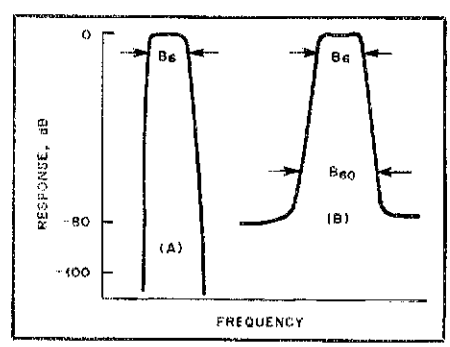


Fig. 2 — Passband responses for two crystal filters. That at A is a more-or-less ideal response. The skirts are very steep, and the filtering action continues for attenuations in excess of 100 dB. The filter at B is more typical of the performance found in a receiver i-f amplifier. While the skirt response is suitable with a good 6- to 60-dB shape factor, the stopband attenuation is limited to about 80 dB.

of 100 dB or greater. This is possible with relatively simple 8-pole designs. Even a 5-crystal cw filter with a bandwidth of 300 to 500 Hz is capable of more than 100 dB of stopband attenuation if the filter is built with care. These figures are probably acceptable if actually achieved in a receiver. This does not always occur. Actual filter characteristics are compromised through poor shielding of the i-f system and ground loops, and by inferior filter-switching circuits.

One solution is to use a multiplicity of crystal filters. This is more common in commercial equipment, although the intent of such a design usually has been for other reasons, the most common being a passband-tuning feature. A cw receiver we built has a 9-MHz i-f system using multiple crystal filters, each with a cw bandwidth.[6] This system exhibits a stopband attenuation in excess 130 dB. Listening to such a receiver can be a unique experience.

There are many virtues to designs that contain cascaded filters. It is easy to achieve 120 dB of stopband attenuation with two isolated filters, even if the individual filter characteristics are less than ideal. Moreover, the use of extra filters in an i-f amplifier will ensure that minimal i-f generated noise reaches the detector. Care must be exercised in such a design, for it can complicate the agc system by introducing the time delays described earlier.

Another problem with some receivers, related to the i-f filters, is the time-domain response. The ideal filter shape for communications is usually thought to be one with a flat top, with perhaps a slight ripple, and extremely steep skirt response, much like that shown in Fig. 2A. A practical approximation to this shape is a Chebyshev filter response.[7]

While the frequency response of a Chebyshev filter is close to ideal, there is a major drawback with such a design. This is in the time-domain response. Such a filter will show severe ringing. An impulse, either from a keyed signal or from a noise pulse, will cause an output that lasts much longer than the original excitation. Other filter types provide much better impulse characteristics. Examples are the Gaussian, the Maximally Flat Delay and the Linear Phase with Equiripple Error responses.[8] The compromise is in the frequency responses of these filters — the skirts are not as steep as those of a Chebyshev.

These fundamental problems are most evident with narrow cw filters. Chebyshev filters are usually acceptable for ssb applications. The best cw filters will have a peak response that is rounded rather than flat at the top.

Gain Flatness

There is barely adequate overall gain in some receivers. This leads to a receiver that sounds "quiet." In the absence of a signal, there is little noise output. Such a receiver is pleasing to use under normal operating conditions, but it is not adequate in other situations.

It is common with some receivers to find that the overall gain is lower on the higher bands. This is observed by replacing the antenna with a 50-ohm resistor and advancing the gain controls so the receiver noise is heard easily. Then, the band switch is changed. More often than not, the noise at 80 and 160 meters is significantly higher than it is in the 10-meter band. This is just opposite the gain distribution desired. Antenna noise is almost always the lowest at 10 meters. The problem is one of gain rather than noise figure, for even on 10 meters it is still common to hear an increase in receiver noise when an antenna is connected in place of a 50-ohm resistor. Receivers should have sufficient i-f gain to provide receiver noise that can be heard easily on any of the related bands.

Noise Blankers

Virtually all modern transceivers havew noise blankers. The performance can be spectacular for high amplitude noise pulses of short duration (automotive ignition noise). Unfortunately, the blankers are less than effective for other forms of noise. The most dramatic example is the over-the-horizon radar, or "woodpecker." Some builders have constructed special blankers that virtually eliminate interference from such additional sources.[9,10]

As we look to the future, we can expect that noise blankers will become much more sophisticated. Specifically, the blankers will be integrated with adaptive detection circuitry that will allow them to accommodate a much wider range of impulse widths and amplitudes. The key to such designs will be in implementing the blanking function without compromising the receiver close-in two-tone dynamic range.

Front-End Dynamic Range

Advances have been made recently in the design of receiver front-end sections. Ten years ago, many solid-state receivers were severely lacking in dynamic range (the ability to hear very weak signals in the presence of many strong ones). Today, many if not most receivers have two-tone dynamic range values of at least 90 dB.[11] Some equipment pushes the 100-dB figure, even in a ssb bandwidth.

It is interesting to examine the technology that is used to achieve the present-day designs. Surprisingly, most of the methods are *not* new. Diode-ring mixers have been available for over a decade. Power bipolar transistors suitable for strong rf and i-f amplifiers have been around for similar periods. The advances have been in the form of system analysis and specification, and in the realization that better performance is really needed.

This is not to say that device technology has not had an impact on front-end performance. Notable recent devices of interest are the VMOS FET mixers and monolithic integrated-circuit mixers for receiver front ends.[12]

In spite of the advances, commercial equipment with poor front-end design is being introduced. There is no excuse today for a receiver having less than an 80-dB two-tone dynamic range. Such performance is achieved easily, even with inexpensive components.

Noise in Local Oscillators and Synthesizers

Frequency synthesis has brought us a marvelous improvement in frequency stability — long overdue. Ironically, this has brought with it problems we do not need — notably, synthesizer noise and spurious responses. This is a recognized fundamental compromise.[13] The problems, while worse in synthesized equipment, are present in some equipment not using synthesis. Moreover, the noise problems are also evident in transmitted signals for which a synthesizer or noisy local oscillator is used for frequency control.

The basic nature of noise in an oscillator has been reported in the literature.[14] The problem is not generally appreciated by the amateur community. The reader is urged to review the literature to gain an understanding of this phenomenon.

The casual assumption is that the signal from an oscillator is "clean." After all, when observed with an oscilloscope, it appears as a sine wave. Usually, when observed with a spectrum analyzer, it looks like a rather pure tone, producing a trace resembling that of the filters in the analyzer. However, neither is a complete or accurate representation. Just because an oscillator has achieved limited level, this does not mean that the noise has vanished; the noise is still present. A representation of the output spectrum of an oscillator is shown in Fig. 3. The noise appears as a pair of sidebands, with modulation on the desired carrier. A broadband noise floor is also shown. The carrier-to-noise ratio is the vital parameter. The broadband ratio of the noise floor to carrier power is related directly to the transistor (or whatever) characteristics and to the power stored in the resonator during oscillation. The best (quietest) oscillators will be those with the maximum operating power level. The width of the noise pedestal is directly related to the *loaded* resonator Q of the operating oscillator. A well-designed oscillator will often have a loaded Q of about half of that of the Q_μ (unloaded Q) value of the resonator. All of the parameters may be controlled by proper design.

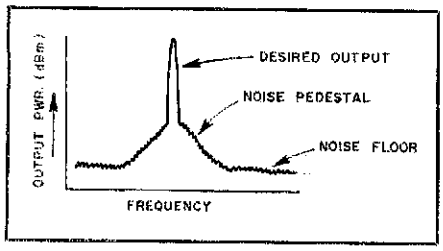


Fig. 3 — Nature of the output spectrum of a real oscillator. Desired output is actually the shape of the filter in the analyzer used for measurement. The noise floor is broadband in nature and is related to the operating power of the circuit. Noise-pedestal width is dictated by the loaded Q of the oscillator resonator.

How does this affect the performance of a receiver? The dominant phenomenon is termed "reciprocal mixing." Example: Assume that your neighbor has a very clean transmitter operating in one of the cw bands. You tune your receiver to his or her signal and note that the S meter needle is against the pin. As you tune away from the keyed cw signal, it would, ideally, disappear. You would then be able to copy the weak DX station that was only a kilohertz or two away. In reality, if your receiver local oscillator has excessive noise sidebands, you will hear a keyed hiss or noise as your neighbor keys the transmitter. Similar "splatter" occurs with ssb.

What if your receiver has a very clean LO system? Will the problems go away? They may or may not. The problems will cease if your neighbor's transmitter is really clean. If the rig is one with a similarly noisy local oscillator, however, the noise sidebands will be transmitted and you will hear them, even if you have cleaned up your own LO system.

How clean is clean enough? Consider that you wish to copy signals that are 100 dB below that of your neighbor, and that you are willing to tune at least 10 kHz away from him. Your receiver bandwidth is 1 kHz. Assume also that the front end is free of IMD and gain compression (blocking) for signals 100 dB more than the minimum detectable signal (MDS).

Recall that the problem is *noise*. Unlike a simple signal, the noise power will grow as you increase the bandwidth used to observe that noise. Hence, the noise sidebands must be 100 dB lower in your 1-kHz bandwidth, or 130 dB lower per hertz of bandwidth. Otherwise, your receiver LO will cause you to hear your neighbor instead of the desired weaker DX station. The situation becomes worse as you tune closer to your neighbor's signal.

The example has dealt with a simple L-C oscillator. The phase-noise value used in the example, −130 dBc/Hz (decibels with respect to carrier in a 1-Hz bandwidth) for the noise-sideband characteristic at a 10-kHz spacing, represents many rigs using L-C oscillators. Most are better, while a few are much worse! What happens when the local oscillator is replaced with a frequency synthesizer?

The largest problem related to synthesizer design, at least for hf applications, is that the oscillator must be voltage controlled. This is usually done with a Varactor® diode replacing the traditional mechanical variable capacitor. This imposes limitations. First, the diode must be operated in such a way that it *never* becomes forward biased by the rf signal in the oscillator. Should this occur, the tank Q will be degraded severely. This widens the oscillator noise pedestal. Also, this limits the amount of energy that may be stored in the resonator, thus degrading the broadband noise floor. For example, a receiver oscillator built by one of the writers had a voltage across the resonator of over 50, peak-to-peak. The measured noise was −154 dBc/Hz at a 10-kHz spacing. However, the high voltage required to achieve that noise performance would complicate tuning that circuit with a Varactor® diode. A Varactor could have been used to tune a very small range by using padder capacitors, keeping the rf voltage across the diode to a small value. However, the frequency range would have been too restricted.

The nature of the synthesis process will also lead to other potential spurious outputs. The typical synthesizer divides a sample of the voltage-controlled oscillator (VCO) down to a low frequency, usually in a programmable divider. The result, often at 1 kHz or 10 kHz, is then applied to a phase detector. A reference at the same frequency is also applied to the phase detector. The output is a chain of pulses that must be filtered. The dc component of that pulse chain forms the voltage that controls the VCO. The pulse nature of the detector output is removed with an active filter, the so-called "loop filter."

However, the filter can only be reasonably exotic. This is *not* merely a practical consideration. Excessive filtering can cause stability problems with the resulting phase-locked loop formed by the system. Hence, there will generally be a small amount of the reference frequency present at the output of the loop filter. This is applied directly to the VCO. This component leads to frequency modulation of the VCO at the reference frequency. The result is reference sidebands — signals on either side of the carrier displaced by the reference frequency. Careful system design will keep these sidebands low in amplitude with respect to the carrier. The sidebands may occur at many frequencies corresponding to harmonics of the reference frequency. This is the nature of fm. These sidebands can lead to reciprocal mixing, just as does the noise from a VCO.

Reciprocal mixing was measured on a popular synthesized transceiver. The performance was reasonable; it is one of the better amateur transceivers reviewed to date. The VCO phase noise at ± 10 kHz was − 142 dBc/Hz — rather good performance. This was degraded 8 to 10 dB by the presence of numerous reference sidebands. The performance was adequate, but not quite state of the art. This was a ham-band-only design.

The synthesis problems are complicated further in a general-coverage receiver. Performance is compromised by the wide tuning range required of the VCO — in excess of 30 MHz. The VCO is even more sensitive to extraneous voltages on the control line, including op-amp noise, power-supply noise and hum, and reference frequencies. One recent offering in the general-coverage arena sidesteps the problem partially by using not one, but six VCOs to cover the 30-MHz span. The even-more-restricted designs, where the VCO must only tune over a 500-kHz range, are better suited to the severe requirements of amateur communications. More sophisticated methods may be used to build extremely clean synthesizers. However, they often use a large number of phase-locked loops and become quite expensive.

The best performance the writers have obtained to date in a simple synthesizer is phase noise measured at − 145 dBc/Hz. That synthesizer was restricted to just over 100 kHz of tuning range. We feel that phase-noise performance of LO systems is the most significant fundamental limitation on the advancement of receiver performance.

ARRL laboratory tests for receiver dynamic range have been complicated by the appearance of synthesized equipment. Often, the phase noise is so severe that blocking from gain compression can't even be measured. To this extent, phase noise may lead to what might be termed "early blocking," the condition where the increase in receiver noise output from reciprocal mixing dominates the response. The noise and spurious responses from synthesizers are sometimes so bad that it is difficult or impossible to identify front-end IMD products for two-tone dynamic-range measurements. This negates design efforts toward an improved front-end!

Other Problems

We have covered some of the major deficiences in modern equipment. There are other problems, as well as additional features that might be included in an "ideal" transceiver or receiver. Some of these are subjective and represent personal preferences. They do not reflect fundamental deficiencies. Others are more general and important.

One of the greatest problems relates to the complexity of much of the modern equipment. As features are added and

fundamental performance is extended, the parts count increases and reliability suffers.

Reliability improves with enhanced quality. We are seeing new pieces of amateur gear that are inoperative or intermittent when it is first removed from the shipping cartons. This "infant mortality" has been traced to unsoldered joints, loose components and even wiring errors.

Another measure that can improve long-term reliability significantly, especially infant-mortality problems, is a burn-in. That is, once the equipment is completed and calibrated by the manufacturer, it is run for an extended period. It is then rechecked and calibrated prior to shipment. At least one manufacturer has instituted such a program with all of its equipment.

Many of the service manuals for existing equipment are poor. Moreover, some of the equipment is so sophisticated that it can't be serviced with the equipment found in a *well equipped* amateur shop. Few of us have spectrum analyzers or high-quality, wide-range signal generators. It would be helpful if service procedures were written that would allow for most of the routine maintenance with simpler equipment.

Shielding is poor in some equipment. It is, however, improving — partially because of the extensive amount of digital circuitry contained in the equipment. Not only should the signal coming from the antenna terminal be clean and free of spurious products, but the power lines, key and microphone lines, and whatever other interface cables might be used, should all be protected against outgoing and incoming radiation.

The Ideal Rig

As the cost of amateur equipment continues to rise, we should be able to expect advances in the design and performance of the units we buy. Price and quality do not always create a satisfactory blend today. That is, some rigs of modest cost seem to equal the top-of-the-line equipment in some performance areas. An understanding of the amateur's needs in equipment performance and features should be a fundamental rule among design engineers. The designer should assume that the product will be used in areas of dense amateur activity. This requires attention to receiver dynamic range, LO noise, transmitted noise, reduced spurious emissions, low IMD in transmitted ssb, and clickless cw waveforms (Fig. 4). Shielding and filtering should be adequate.

On the other hand, what is ideal for one amateur may be totally inadequate for another. That is, the devoted contest enthusiast needs more performance than the amateur who only wants to have something on hand for an occasional QSO. Don't go for more performance than you really need. Be aware that some features that may seem appealing are accompanied by potential performance compromises, or much higher cost and decreased reliability, or both. An example is the phase-noise compromise related to a general-coverage, synthesized transceiver.

It is difficult to generalize about where minimum performance specifications should be set. As mentioned above, it will depend upon the intended application. Still, realizing the subjectiveness, we would suggest the following:

Necessary Characteristics

1) Noise figure: 10 to 12 dB maximum (MDS may be calculated on the basis of the receiver bandwidth).

2) Blocking from gain compression: 110 dB above the MDS in a cw bandwidth for casual applications, 125 dB for contesting and DXing.

3) Two-tone dynamic range: 80 dB in a cw bandwidth for casual applications; 95 dB or more for competitive contesting and DXing.

4) All transmitter spurious responses down by 60 dB or more from the cw output.

5) Transmitter IMD on ssb greater than 30 dB below each tone of the two-tone test signal for casual applications; 35 dB or more for competitive use.

6) LO noise: Carrier-to-noise ratio in excess of 125 dBc/Hz at 10 kHz separation for casual applications; 140 dBc/Hz for competitive application.

7) Cw waveforms: 5 ms rise and fall times with a dot length equal to that injected at the key jack.

8) Agc: Attack characteristics such that the overshoot of the audio output from keying a carrier into the antenna jack, 60 dB over the MDS, does not exceed the steady-state value by more than 3 dB. Decay characteristics: 100 ms or less for "fast" recovery; 0.5 second or more for "slow" recovery; no more than a 100% difference for signals of various amplitudes. Agc threshold: – 100 dBm or less, but at least 20 dB over the MDS.

9) Receiver audio output: At least 1 W of output into the design load, with less than 10% total harmonic distortion (THD).

10) Frequency drift: 300 Hz or less warm-up drift in the first 30 minutes of operation in a "room-temperature-stable" environment; 100 Hz per half hour or less thereafter (should be much better in a synthesized system).

11) Frequency resolution: 100 Hz in a counted system; 1 kHz in an analog system.

12) Frequency accuracy: Within twice the resolution quoted above.

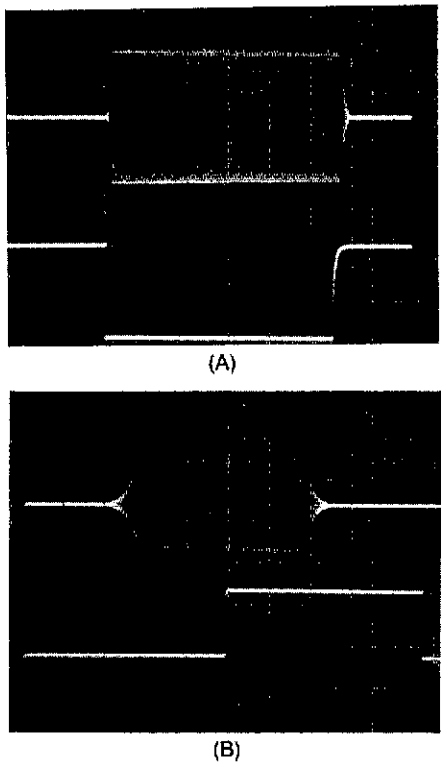
13) Coherent receiver spurious responses: None to exceed the MDS by more than 10 dB.

14) Reliability: Mean time before failure (MTBF) of three years, assuming four hours of use per day.

15) Receiver i-f stopband attenuation: Greater than 100 dB.

16) Image and i-f rejection: Equal to the two-tone dynamic range in a ssb bandwidth, or better.

17) Power supply: The 50/60-Hz, 117- or 234-V ac power supply should be capable of operating within its ratings without overheating and failure. Some accessory power supplies cannot be operated safely at 50 Hz, especially in tropical regions, with the cabinet cover in place. Most units have inadequate louver area for the high temperatures of the transformer core under such conditions. Adequate venting and an accessory cooling fan should be available to the purchaser.



(A)

(B)

Fig. 4 — Oscillographs of (A) an improperly shaped cw waveform and (B) a waveform that closely approaches the desired 5-ms rise and fall times. The waveform at A causes severe key clicks and is common to a number of commercial and homemade transmitters today. The example at B should provide clickless keying without being too "soft."

How to Buy a Rig

Now that the "ideal" rig has been specified, we come to making a suitable purchase. There are a variety of requirements, depending on the application. First, study the specifications in advertisements; these rarely tell the whole story. Most manufacturers specify a piece of equipment so that virtually any model making it through the manufacturing process will meet those specifications. Hence, they are rarely meaningful. *Reviews in QST* and other amateur literature are often more informative. But, they suffer from being the result of investigating only

one or two samples of the unit in question. Also, owing to the high rate of introduction of new equipment, the prospective buyer may not want to wait until a review is published.

The best test is to *use* the rig. A possible way to do this would be to operate the transceiver, ideally in conditions under which the rig will be used. If possible, ask the dealer if you can try the receiver or transceiver for a day or two before a purchase. The answer will most likely be "No," but it's worth a try. Otherwise, look for a friend who owns the type of rig you're interested in. Ask for his or her opinion or, better still, ask if you can operate the rig.

There is another alternative that could be productive for the aggressive dealer — that of equipment rental. A dealer could allow a rig to be rented for a short period at a reasonable fee, later applicable against a purchase.

If your ideal rig cannot be found, you can build your own! You should end up with the specifications that you really need.

Conclusions

The manufacturer that can provide the features listed earlier *(Necessary Characteristics)* at a fair price is sure to obtain a significant segment of the amateur market. These are reasonable goals for the homemade-gear devotee as well.

Although we have taken some well-meant "pot-shots" at the manufacturers, we have tried to base our judgments on realistic observations. We can conclude that there are many areas of deficiency. On the other hand, we cannot help but be impressed with the high performance usually being offered at a reasonable price by most manufacturers. Ultimately, the equipment will be what the market demands.

Notes

[1]W. Hayward, "Receiver Dynamic Range," *QST*, July 1975. Also see Technical Correspondence, Nov. 1979 *QST*.

[2]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977), Chapter 6.

[3]*The Radio Amateur's Handbook*, any recent edition.

[4]W. Hayward, "A Competition-Grade CW Receiver," *QST*, March and April 1974.

[5]W. Hayward, *Introduction to Radio Frequency Design* (Englewood Cliffs, NJ: Prentice-Hall, 1982), Ch. 6. There has long been an informal "standard" that S9 is equivalent to a signal level of 50 μV, with each S unit below that level 6 dB weaker. In 1978, the IARU Region 1 Division adopted this standard for hf receivers, with 5 μV equivalent to S9 in vhf/uhf receivers. See J. Lindholm, *QST*, March 1982, p. 83, for the other specifications of the Region 1 standard.

[6]See note 4.

[7]H. Blinchikoff and A. Zverev, *Filtering in the Time and Frequency Domains* (New York: Wiley, 1976).

[8]A. Zverev, *Handbook of Filter Synthesis* (New York: Wiley, 1967).

[9]Nicholls, "Blanking the Woodpecker," *Ham Radio*, Jan. and Feb. 1982.

[10]U. Rohde, "Increasing Receiver Dynamic Range," *QST*, May 1980.

[11]See note 5 for details on the measurement of MDS, noise figure, two-tone dynamic range, input intercept, gain compression and LO noise (Chapter 8).

[12]D. DeMaw, and G. Collins, *QST*, Jan. 1981.

[13]W. Sabin, "Use of Mixers in HF Up-Conversion Receivers/Exciters," *IEEE WESCON Conference*, San Francisco, 1982.

[14]Oscillator noise is covered in more detail in Chapter 7 of note 5.

New Books

☐ *Computers and the Radio Amateur*, by Phil Anderson, WØXI. Published by Prentice-Hall, Inc., Englewood Cliffs, NJ 07632. Hardcover, 7-1/4 × 9-1/2 inches, 208 pp., $18.95.

This slim volume is an innovation. Being the first to market a new device, a new product, or, in this case a new book, has advantages and disadvantages. An obvious plus is the opportunity to start fresh with a clean sheet of paper in the typewriter or on the drawing board and, not to be taken lightly, the possibility of profiting from being first out of the starting blocks. On the other hand, a product brought too quickly to market may well suffer from a number of "birth pains." That seems to be the case with *Computers and the Radio Amateur*. The *concept* of the book is an excellent one: a book (as the preface puts it): "for radio amateurs who have had little or no exposure to computers — how they function and how one programs them and attaches them to other equipment."

But, there seems to have been a number of complications, some serious, that developed between setting down the concept of the book and turning that concept into a workable manuscript.

For example, on page 3 there is a subsection headed "RTTY or ASCII terminal" yet the all-too-brief material under that section deals with Baudot code Teletypewriter signals and there is no mention, at that point in the text, of ASCII at all! (By the way, as far as I know, "Teletype" remains a registered trademark of the Teletype Corporation although it is not so identified in the book.)

Chapter 2, which is a brief history of computers, is *so* brief (less than one page takes us from 1890 to post World War II!) that it might as well have been omitted.

Chapter 4 satisfactorily explains the essential elements of BASIC programming. The author is liberal with the use of REM statements, which is a good programming style, especially during the debugging phase of writing programs. If the reader should wish to actually use the sample programs, he or she will likely wish to delete the REMs, especially those that, unaccountably, give the "example number" from the text.

Chapter 5 is devoted to assembly language programming. In the earlier chapter on BASIC, the particular dialect often used is from the TRS-80® Radio Shack level II language utilized by the Tandy Corporation. In Chapter 5, however, the examples are drawn from the 6502 microprocessor, which is used in a number of personal computers including the Atari but *not* in the Radio Shack machine. While Chapter 5 is interesting it will hardly make one an assembly programmer. (Actually, I wish I knew what *would*!)

The remaining seven chapters are devoted to interfacing the computer to amateur equipment and to some examples of computer programs you can use in your own shack. Many of the suggested programs are excellent examples of the ways the computer can be useful in Amateur Radio applications. Included are examples of contest log programs, code-reading programs and the like. As programming skills are sharpened, however, the reader might wish to try rewriting the program on page 182 to try to calculate the length of a dipole in fewer than 19 program lines. (Hint: There is only one really operative line — line 100, L = 234/F.)

If you have no knowledge of computers or how they might be useful in Amateur Radio, this book may be a good addition to your radio shack bookshelf. It is a relatively thin book that won't give you all the answers, but perhaps it will help you recognize what questions you need answered. — *Larry Price, W4RA*

Next Month in QST

- With action heating up on 10 MHz, you'll want to join in as quickly as possible. If you have a TS-820 or '820S, help is on the way. An article in February *QST* will show you how to add any or all of the WARC bands.
- Thinking about getting on line? The February On Line column will solve the mystery of how one type of BASIC is translated to another.
- 1982 was a terrific year for Amateur Radio! If you don't believe it, read all about it in the "year in review" article.

Automatic Control for the Alliance HD-73 Heavy-Duty Rotator

Tired of your manual rotator control? Try these modifications and enjoy "hands-free" operation!

By Joe Mehaffey,* K4IHP

For rotating large antennas, the Alliance HD-73 is vastly superior to the standard "TV" rotator motor used in the Alliance C-225 system. However, the manufacturers provide only a manual (push-to-turn) control box with the HD-73 system. After having enjoyed the fully automatic positioning feature of the C-225 control unit, I was very disappointed to have to hold my hand on a control lever while watching a meter slowly move to the correct position. With my C-225 unit, I simply rotated the control knob to the desired position, and the control box automatically shut off at the proper position. After using the HD-73 system for a few years, I set out to investigate what it would take to mate the C-225 control box with the HD-73 motor unit.

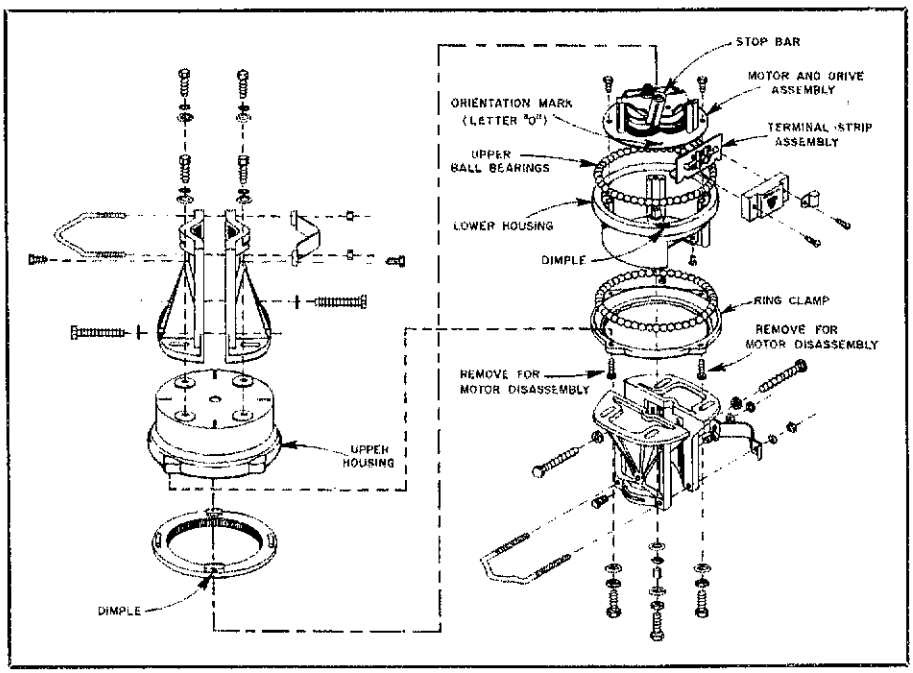


Fig. 1 — Exploded view of the HD-73 motor unit (diagram courtesy of the Alliance Manufacturing Company).

System Differences

Basically, the HD-73 and C-225 rotator systems vary in the design of the direction-sensing and display circuitry. However, in both cases a potentiometer is used in the motor housing to reference the antenna position back to the control box. In the HD-73, a 75-ohm potentiometer is used as the feedback device, and in the C-225 a slide-wire potentiometer of approximately 520 ohms is used. Additionally, the C-225 motor has the capability of rotating in excess of 360°, whereas the HD-73 motor stops prevent rotation beyond 360°.

To make the HD-73 motor operate with the C-225 control box, it is necessary to only make small modifications to both the rotator and control unit. The basic procedures are outlined here:

Rotation Angle: The HD-73 motor assembly must be modified to give it a small amount of overtravel at both the clockwise and counterclockwise directions of rotation. This is accomplished easily by physically modifying the limit stop lever within the HD-73 motor drive unit.

Potentiometer: A precision servo potentiometer must be substituted for the inexpensive wire-wound unit presently used in the HD-73. It is necessary to replace this unit for two reasons. The first is that standard potentiometers (such as the original) have proved to be so noisy and low in resolution that they cannot serve adequately in servo-positioning applications. The second reason is that the

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C-225 control-unit bridge is designed for a potentiometer in the 500-ohm range.

Bridge Balance Resistor: The third modification required is in the C-225 control unit, and involves changing the 511-ohm bridge resistor to a 464-ohm, 1% resistor. This change is necessary because the 360° rotation angle of the HD-73 motor results in a total resistance change of only about 430 ohms, as opposed to the total 500-ohm range of the servo potentiometer.

Rotation Range Adjustment: The last change required to complete the conversion is the selection of a rotation-range resistor, to be added in parallel with the 520-ohm, wire-wound strip resistor within the C-225 control unit.

The previously listed mechanical and electrical modifications cost about $20. Most of the work is involved with calibration and adjustment of the motor control unit. Much of my time in the original conversion was spent figuring out how to adjust the potentiometer in the HD-73 motor unit without spilling the ball bearings over the floor! Once this procedure was perfected, the calibration went very quickly.

Motor Disassembly

This procedure involves the disassembly of the HD-73 motor unit, and modification of the mechanical stop lever to permit the HD-73 rotator approximately 5° of overtravel in both directions. This is necessary to compensate for electrical tolerances that could direct the rotator to travel either in excess of slightly less than the desired 360° range.

To begin disassembly, please refer to the exploded view in Fig. 1. Invert the motor unit and clamp it in a vise with the screw heads facing upward. (This entire procedure should be performed in a clean area and executed very carefully, because of the likelihood that the ball bearings will become dislodged and fall out of the rotator motor assembly.) Remove the four screws from the bearing ring-clamp assembly. Lift the bearing-clamp assembly straight up off the motor unit. Remove all of the ball bearings from the upper bearing race. Carefully lift the upper housing assembly away from the lower one. No force should be required, but it may be necessary to wiggle the lower housing assembly as it is pulled away so that the bearings are released and remain in the upper housing race. The motor and drive assembly are installed inside the lower housing. This is where the first two modifications must be made.

Remove the stop bar from the mounting shaft and grind both sides as shown in Fig. 2. Smooth and reinstall the stop bar. In my case, it was necessary to destroy the lock washer (a type of speed nut) in order to remove the stop bar. I found an exact replacement at my local hardware store. If one cannot be found, a press-on axle nut for a toy tricycle should make an adequate substitute, and is available at most large hardware stores. Do not use excess force when installing the washer, or the casting may be damaged. The modified stop bar should have additional travel against the upper-housing stop tang. Don't forget to apply a small amount of bearing lubricant to the stop bar prior to installation.

Potentiometer Replacement

A Spectrol model 132-0-0-501 potentiometer was purchased to replace the original. This 500-ohm, wire-wound device is a precision semi-sealed unit with high resolution and long life expectancy in this type of service. This unit does not have stops at either end of its travel. A potentiometer with internal stops can be used. However, one runs the risk of damaging the stops if the potentiometer was initially adjusted incorrectly. To install the potentiometer, remove the motor and drive assembly from the lower housing by removing the four no. 10-24 hex-head screws holding the drive assembly to the lower housing assembly. The mounting plate will now swing freely on the connecting wires to the potentiometer and motor. Care should be used to bend the delicate connecting wires a minimum amount to prevent breakage.

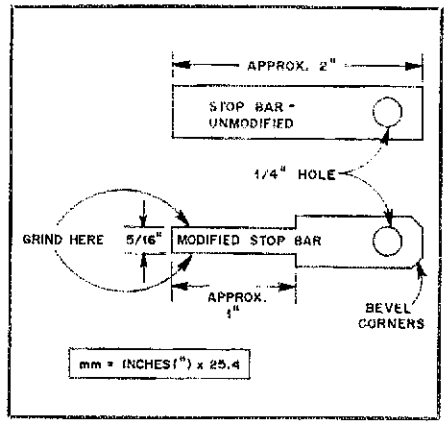

Fig. 2 — Illustration of stop bar prior to and after modification.

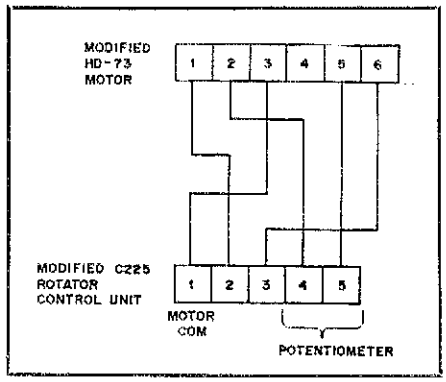

Fig. 3 — Interconnections for the modified rotator system.

Using an Allen wrench, loosen the gear at the top of the potentiometer shaft, and then loosen the mounting nut — freeing the potentiometer from the motor and drive assembly. Install the new potentiometer in its place. At this point, orientation of the potentiometer shaft relative to the body is not important, but use care that the keying peg goes into the keying hole in the motor drive unit. It may be necessary to enlarge the keying hole in the motor and drive assembly base slightly to accommodate the peg on the potentiometer. Be sure that no drilling debris remains within the motor assembly. After securely mounting the potentiometer and the associated drive gear, move the three wires from the old potentiometer one at a time to the Spectrol unit. Carefully observe which wire goes to which terminal, and put the wires on the new potentiometer exactly as they were on the old.

Refit the motor and drive assembly into the lower housing, and replace the hex-head screws. Use care not to pinch any wires as the drive assembly is reinstalled. As a preliminary setup, place an ohmmeter between pins 2 and 5 on the terminal strip of the motor unit. Rotate the potentiometer until the resistance is approximately 35 ohms. On the outside casing of the lower housing, mark the position of the potentiometer gear for future calibration reference. While viewing the motor and drive assembly as oriented in Fig. 1, move the stop bar all the way clockwise against the stop tang of the motor and drive assembly. Install the bearings in the race of the upper housing assembly. Invert the lower housing unit and mate it to the upper housing unit with the stop bar positioned just to the left of the stop tang. (The stop tang protrudes from the interior of the upper housing.) At this point, reinstall the bearings in the bottom of the lower housing race, and fasten the ring clamp using only two of the hex-head screws. These screws should not be tightened securely as they will have to be removed several times during adjustment.

Some experimentation is necessary to ensure that the HD-73 motor operates normally and that the newly installed potentiometer changes resistance as the motor rotates. To perform this test, connect the HD-73 to the C-225 control unit as shown in Fig. 3. Plug in the C-225 and move the control knob to the middle of its operating range. The motor should turn to approximately mid-position and automatically stop, which then turns off the red indicator light in the C-225 control unit.

Assuming the motor turns, rotate the control knob fully clockwise and counterclockwise, and note that the motor

runs into the mechanical stops but does not turn off the control unit at both rotational extremes. Unplug the control unit as soon as the motor drives into the stop. Carefully mark both extremes of motor travel by making scratches on the motor housing. These will be used for reference during the final adjustments.

If the preliminary tests were successful, proceed to modify the control box as described below. Failure at this point might be traced to either reversed potentiometer wiring or reversed motor wiring. Be sure that when the HD-73 is upright, a clockwise rotation of the control knob causes a clockwise rotation of the motor as viewed from above.

Control Unit Modifications

Change the 511-ohm, 1% resistor (item 101-3 in the C-225A control unit, or item 101-11 in the C-225 control unit) to a 464-ohm, 1% half-watt unit. You should have no trouble locating this resistor, for it is the only precision resistor in the control unit. Now locate the two ends of the 520-ohm strip resistor that is a part of the control-knob assembly. This strip resistor has a slide wiper that moves around the spiral — first to one end, then to the other as the control knob is rotated. Carefully solder two flexible wires approximately 1 foot long to each end of the slide-wire unit.[1] Do *not* overheat the rivets or they may become loose, and intermittent operation of the slide-wire potentiometer may result. As part of the calibration process, several resistors may have to be connected across these newly installed wires.

Counterclockwise Stop Calibration — Motor Unit

Rotate the control knob fully counterclockwise until the rotator motor stops with the control light still illuminated. Quickly unplug the control box to prevent burnout. Remove the wire from screw terminal no. 2 of the motor unit and connect an ohmmeter between this terminal and no. 5. Remove the two screws from the ring clamp assembly and carefully rock the lower housing away from the upper housing. This maneuver should be executed similar to the opening of a clam shell — so that a crack just wide enough to insert a small screwdriver appears directly in front of the previously marked potentiometer-gear location. Using a small screwdriver, move the potentiometer gear until the ohmmeter reads approximately 450 ohms. Gently reclose the motor housing and reinstall the two locking screws into the ring clamp assembly. Next, replace the wire on terminal no. 2, and note whether or not the motor moves against the counterclockwise stop. The objective is for the motor to stop in a position approximately 3/8 to 1/2 inch away from the mechanical stop.

[1]m = ft × 0.3048, mm = in. × 25.4.

If the motor continues to run into the mechanical stop, the assembly must be reopened and the potentiometer setting increased by approximately 5 ohms. If the motor stops with a gap appreciably greater than 1/2 inch, the potentiometer should be lowered in resistance by approximately 5 ohms and retested. This procedure should be repeated until the counterclockwise stop is properly adjusted. When this adjustment is completed, work on the motor assembly is now finished and all four ring-clamp mounting screws may be secured.

Clockwise Stop Calibration — Control Unit

To begin, connect a 3.3-kΩ, 1/2-W, 5% resistor to the ends of the two wires previously soldered in the C-225 control unit. Rotate the direction control fully clockwise and wait for the motor to reach the end of its rotation. If it rotated less than 360°, slightly increase the value of the 3.3-kΩ resistor. If it rotated more than than 360°, decrease the value of the resistor. The proper value for this resistor should be between 2.5 and 5.0 kΩ. When this adjustment is completed, place the resistor safely within the control unit so it cannot short to the chassis or other internal parts. Make sure the wires are dressed properly and do not interfere with the operation of the slide-wire assembly.

A purist may wish to remove the wires and solder in the resistor. If this is done, much care is required to avoid damage to the slide-wire assembly. Be sure to unplug the control box when making any changes, to avoid electrical shock.

Operation

The modified Alliance HD-73 motor and C-225 control unit combination have been in use for several months at my location. No problems have been experienced. Some may observe that the padding method used on the control-box potentiometer will cause a slight nonlinearity between the actual motor position versus control-box indication. This error will be maximum at the middle of the rotation range. The error is only a few degrees, however, and while measurable on the bench it is not perceivable to the eye. The angular error is very small compared to the beamwidth of most rotatable antennas, so there is nothing to worry about.

Acknowledgments

I would like to thank the Alliance Manufacturing Company for their assistance with this project. Their donation of service manuals and cooperation is greatly appreciated.

References

Alliance Tenna-Rotor Service Manual. Alliance Manufacturing Co., Alliance, Ohio.

HD-73 Heavy-Duty Rotator Owner's Manual. Alliance Manufacturing Co., Alliance, Ohio.

Strays

TALLYHO THE FOXHUNT

☐ Sure, I know what a foxhunt is. That is, I thought I did until I got involved in Amateur Radio and happened to tune across the 40- and 15-meter bands one weekend in September and heard "CQ Foxhunt, this is WB1EMT," followed by a pileup. No, they weren't looking for that elusive furry red animal, and no direction-finding equipment was involved. The word "foxhunt" comes from its sponsor, the Foxboro Company (Massachusetts) Amateur Radio Club.

The idea was conceived two years ago as an activity to get as many club members as possible active on the hf bands. During the first year's contest, WB1EMT was a portable operation, as part of an emergency communications demonstration at the Bellingham Fair. Besides being a "second Field Day" for the club, it got some spectators interested enough to join our Novice class.

The object of the contest is to first work club station WB1EMT, which operates on 40 and 15 meters and issues a log number with an "F" prefix. Now the hunt begins, for you must then look for other club stations operating on the band using their own call who will, in turn, issue an "O" log number, and then an "X," when they are found and worked. When you have caught the F-O-X, you qualify for a certificate, providing your log numbers check out. Sound too easy? Although frequencies are coordinated among club members by way of the club repeater, K1HF/R 147.975/375, the operating frequencies are not made known to the participants. Trying to find another "CQ Foxhunt" indeed becomes a search. For variation, this year we also had a cw station available to hunt, and we did have stations trying to earn our award on both bands. — *Frank S. Jasinski, W1XA, Bellingham, Massachusetts*

Foxboro Company ARC member WA1UMA operates from the club van during the annual Foxhunt Contest on 40 and 15 meters.

The Inverted L Revisited

City dwellers, don't despair. Here is a *good* 160-meter antenna that should fit on your lot!

By John F. Lindholm,* W1XX

I'll never know what inspired me to make a few contacts in the ARRL 160-Meter Contest. My antenna was made by tying together the open-wire feeders of my 80-meter dipole. The performance was not fantastic, but it was the first step in getting me "hooked" on the "gentlemen's band." Working three dozen European stations from a friend's house got my interest up. My friend has a good 160-meter antenna system — and *lots* of property to fit it on!

Returning to my 60- × 150-foot lot made me feel depressed.[1] I suffered all winter while listening to the others working VKs, ZLs and even JAs at daybreak. What could I do to improve *my* signal?

Many hours the following summer were spent trying to figure out how to cram a 160-meter antenna within the confines of my small lot. Space restrictions dictated that my wire be no longer than a standard 80-meter dipole. I began to consider alternative antennas.

Shunt feeding my 50-foot tower was investigated but dismissed for various reasons. This arrangement would require disconnecting the shunt feed when cranking down the tower, and all guy wires would have to be broken up into nonresonant lengths with insulators. Additionally, my cables would have to be rerouted to ground level. I then considered a full-length dipole originating in a neighbor's yard three houses to the east, crossing my property and finally terminating in the yard two houses to the west! This idea was rejected. The legal negotiation fees would have run in six figures! After much head scratching, I settled on the inverted L, an antenna made popular by the grand master of 160-meters, Stew Perry, W1BB. I credit Stew for coming to my rescue!

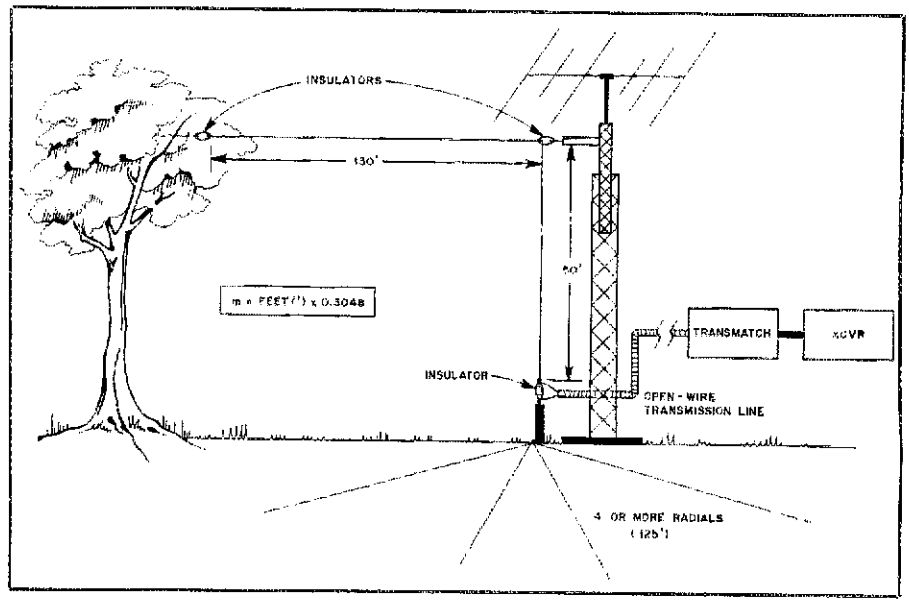

Fig. 1 — The W1XX inverted L is arranged in this manner.

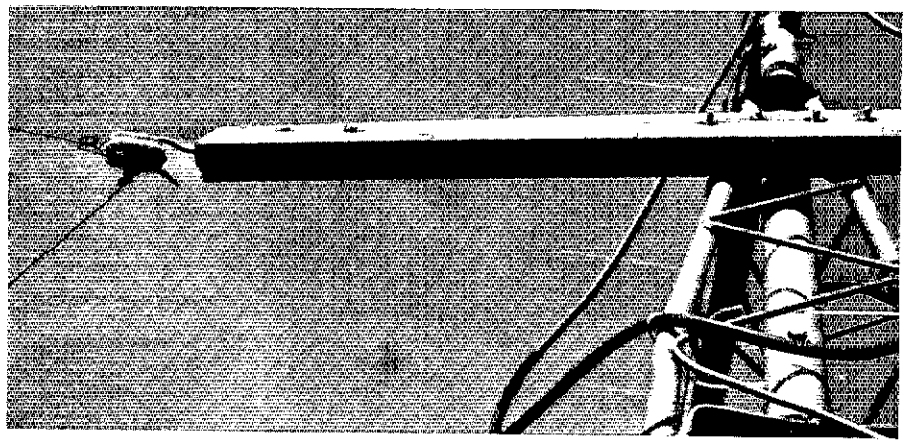

Fig. 2 — Detail of how the antenna is mounted to the top of the tower. TV-mast clamps are used to secure the wooden insulator.

The Inverted L

The inverted L was selected because it requires no more space than an 80-meter dipole and I could utilize my 50-foot crank-up tower for attachment. The vertical part is 50 feet long, and the horizontal part measures 130 feet, for an overall length of 180 feet (Fig. 1). This makes the antenna approximately 3/8 λ, with the horizontal part providing top-loading. W1BB advises making the vertical section as long as possible (depending on tower height), and that an overall length of 160 to 180 feet works well.

Construction

With a bow and arrow, I successfully attached the far horizontal end of the antenna to the top of a 60-foot fir tree. From there, I ran the wire back to the top of the tower, where I bracketed a 30-inch-long two-by-four with an insulator screwed in the end (Fig. 2). No. 14 Copperweld® wire is used for the horizontal section, and no. 10 copper wire is used for the vertical section, which is spaced about 2

[1]Notes appear on page 21.

*Communications Manager, ARRL

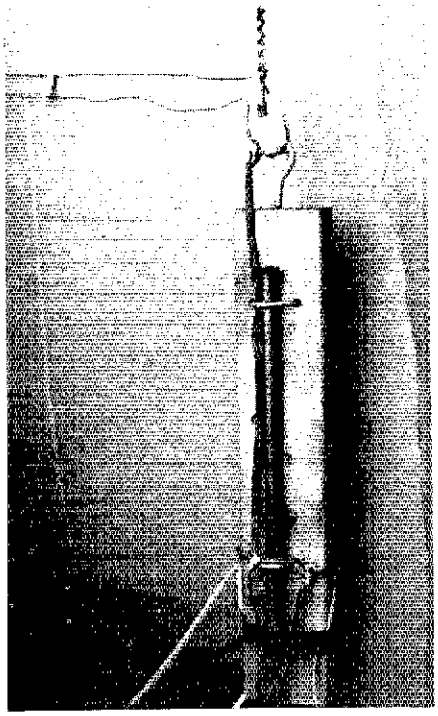

Fig. 3 — A ground rod at the tower base serves as a physical support for the insulator, and as an rf ground. Radial wires are connected to the rod by means of a ground bus, as described in the text.

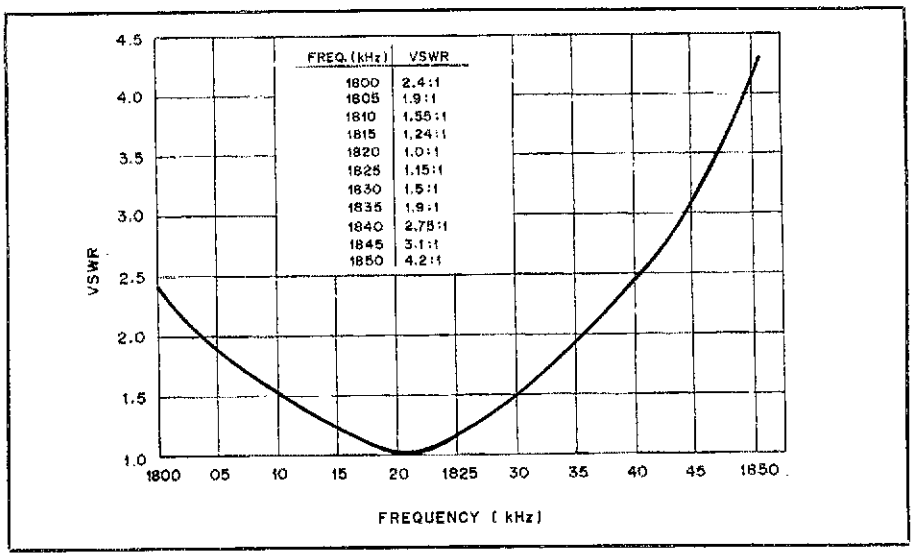

Fig. 4 — SWR curve for the inverted L, with the Transmatch adjusted for an SWR of 1 at 1820 kHz.

feet from the tower. These two wires are soldered together at the insulator.

A plumb line was used to locate a point on the ground directly below the 90° bend in the "L." At this point, a 10-foot copper-clad ground rod was pounded into the earth, leaving 18 inches sticking out. A two-by-four is clamped to the ground rod by means of TV-mast U bolts. The lower end of the vertical wire is attached to an insulator that is screwed into the top of the wooden block (Fig. 3). Next, I stripped some coaxial cable (RG-8/U) of its outer braid and used this to make a ground bus around the antenna base. One side of the open-wire transmission line is soldered to the base of the vertical antenna element, and the other side to the bus, which is attached to the ground rod with a clamp. This bus also serves as a connection point for the radials. So far, less than an afternoon of work had been invested.

Radials — the More the Better

The next day, my objective was to install radial wires, which are necessary because the inverted L is essentially a top-loaded vertical radiator. Previous meditation convinced me that several radials would fit on my lot. I'd *make* them fit! All radials were cut to 1/4 λ (125 feet), using scrap wire. About 300 feet of surplus telephone ground wire provided a good start. Stripping some old coaxial cable with a single-edged razor blade produced two radials from one length of wire (outer and center conductors). My technique for radial installation consisted of creasing the earth with a spade and shoving the wire in; afterwards the turf was pressed back into place with my heel.

With space a problem, it may be impossible to place all your radials in a straight line; don't worry, because it is not necessary. My installation followed a zig-zag path to avoid fixtures like the house and driveway. W1BB advises putting some radials under the horizontal part of the antenna. Unfortunately, the location of my garage prevented this. Initially, only four radials were planted, but more were added later. As with all vertical antennas, the more radials you can put in the ground, the better the performance!

Matching System

Voltage-fed antennas approximately 1/2-λ long, such as the inverted L, will have a fairly high feed-point impedance. They will also exhibit inductive or capacitive reactance, depending on whether the antenna is slightly longer or shorter than 1/2 λ. Since the inverted L does not have a 50-ohm impedance, a matching system is needed. To make tuning adjustments easier, I opted for locating the Transmatch *in* the shack, using open-wire line to the antenna. Being able to adjust the antenna match conveniently is recommended, since the SWR climbs rapidly as you shift frequency. For example, adjusting the Transmatch for a 1:1 SWR at 1820 kHz produces an SWR of 2.4:1 at 1800 kHz (see Fig. 4). With the Transmatch located in the shack, you can easily adjust for a 1:1 SWR no matter where you operate in the band. My Transmatch consists of a plug-in, link-coupled coil and variable capacitors — all scrounged at flea markets. Any of the configurations found in the *ARRL Antenna Book*[2] should work well.

Performance

Does the antenna work? Having no comparison antenna, my conclusions are subjective. But I've been on the air enough to know when, as they say, "it plays." With only four radials in place, my first night of operation yielded plenty of U.S. contacts, plus a Caribbean DX-pedition on the first call. Subsequently, many European stations have been worked from my northeast location with good signal reports. Contest activity has yielded some respectable scores, including many QSOs with the Caribbean, and South and Central America — even Antarctica!

By adjusting my Transmatch, I made limited tests with the L on 75-meter ssb. Comparisons were made to a 75-meter dipole at 50 feet. For signals close in, the L was down by some 3 to 5 dB, but equal or superior to the dipole for signals from eastern Europe. Apparently, the 160-meter inverted L also provides a low angle of radiation on this band too. On bands higher than 75 meters, the radiation angle will be tilted *upwards*, rendering the antenna inefficient for DX work. This phenomenon is explained in the *ARRL Antenna Book*.[3]

Giving up the 160-meter band for lack of sufficient real estate is unwarranted. With the inverted L, you can work Top Band from your urban lot. Installation is a breeze, and the performance is admirable. *Now* what's your excuse for missing out on the excitement of 160 meters?

Notes

[1] m = ft × 0.3048.
[2] *The ARRL Antenna Book*, 14th ed. (Newington: ARRL, Inc., 1982), pp. 4-1 through 4-8.
[3] *Ibid.*, pp. 2-23 through 2-24.

Beverage Antennas for Amateur Communications

Contrary to popular belief, the Beverage antenna can be used as an effective receiving *and* transmitting antenna for frequencies up to 30 MHz.

By John S. Belrose,* VE2CV, John Litva,*, G. E. Moss* and E. E. Stevens,** VE3CYO

A Beverage antenna is a broad-band aperiodic antenna that can be used over a frequency range of 2 to 30 MHz. It consists of a long wire stretched horizontally over the ground. In essence, it is a lossy transmission line with the ground acting as an imperfect conductor (Fig. 1). The antenna is terminated in the characteristic impedance of 400 to 600 ohms through a ground screen, with the received signal taken from the other end through a matching transformer that has one side connected to ground. This transformer is used to match the feed impedance of the antenna to 50-ohm coaxial cable. Dimensions of a typical Beverage antenna would be about 360 feet long and 6 feet above the ground.[1]

Beverage antennas can be used for receiving (single element) or transmitting (multiple-element array) applications. While no detailed study has been made on the optimum size of ground screens, the hf Beverage antennas we built employed radial ground screens comprised of 16 radials, 50 feet long, staked at the ends by 2-foot-long rods. Multielement arrays employ smaller ground systems — in our case, six radials, each 20 feet long. The connections to the ground side of the matching transformer and the terminating resistors were made with three, 3/4-inch-wide copper mesh ground straps.

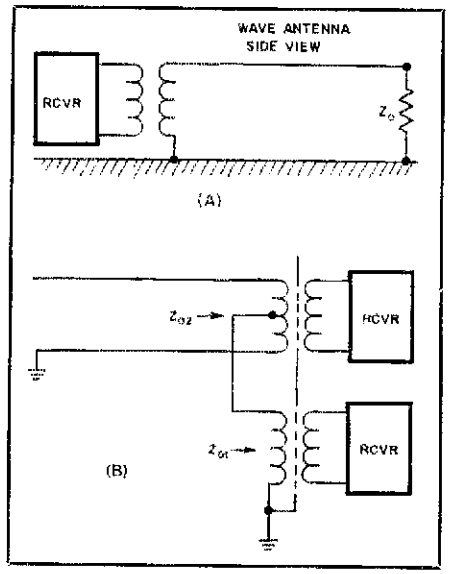

Fig. 1 — Alternative forms of wave antennas: (A) simplest form for unidirectional reception; (B) two-wire wave antenna for separate reception from reciprocal directions.

Previous Work

The initial Beverage antenna work was carried out by H. H. Beverage and associates, who tested the antennas on a transoceanic circuit using very long waves of 12 to 42 kHz, and at medium frequencies of 250 to 1500 kHz.[2,3,4] They found antenna lengths of approximately 1 wavelength were effective in reducing interference and static because of the directive nature of the antenna and its low response to radio noise. Wait and Mousseau calculated vertical-plane field patterns for horizontal traveling-wave antennas.[5] Travers and associates did extensive theoretical and experimental research with hf Beverage antennas from 1961 to 1967.[6] Their work is documented in a series of reports that have had limited distribution. A brief account of their work appears in a paper by Martin.[7] More recently, Litva and Rook gave a detailed description of experimental and theoretical results obtained from an extensive study of hf Beverage antennas.[8] Their theoretical work, supported by extensive experimental measurements, provides comprehensive Beverage antenna engineering data in a readily accessible format for the communications engineer.

Beverage antennas are shown to be effective as "building blocks" for large hf arrays: When multiple Beverage elements are employed, the antenna system has sufficient gain at hf to be efficient in both receiving and transmitting. Of course, the directivity and size of such an array would dictate bidirectional point-to-point operation.

Two-wire wave antennas for reception in reciprocal directions have been described by Laport and Misek (Fig. 1B).[9,10] This bidirectional wave antenna is unusual in that it simultaneously possesses two directivity patterns. The wave field impinges simultaneously upon the two wires, and equal currents flow in both wires in the direction of wave travel. These currents continue to flow until they reach the far end of the antenna, where reflection occurs by grounding one wire and leaving the other open-circuited. This balances the current received from the right, but has no effect on the unbalanced current received from the left. To obtain sufficient balances in the transformers, an electrostatic shield is required. The two receivers for simultaneous reception in the two reciprocal directions are matched to Z_{01} and Z_{02}. Z_{01} designates the characteristic impedance of two wires unbalanced to ground, and Z_{02} is the balanced characteristic impedance between the wires. Basically, the bidirectional wave antenna is an aperiodic antenna whose terminations have been transposed to the receiving end. This provides greater flexibility in controlling the antenna with simple switching and phasing circuits.

Comparison Between Theory and Experiment

Detailed measurements were made for Beverage antennas of various lengths and heights, with a typical length of 360 feet. Also, various grounds were tested. The received signal strengths were measured at

[1]Notes appear on page 27.

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**513-1485 Baseline Rd., Ottawa, ON

several frequencies, and airborne transmitters were used for signal generation. An aircraft towed a vertically polarized transmitting dipole, called XELEDOP (Transmitting Elementary Dipole of arbitrary Polarization).[11]

To develop azimuthal patterns with XELEDOP, the antenna must be towed concentrically around the antenna under test (AUT) at various heights and distances. A cut of the vertical pattern can be obtained by flying across the AUT at a given height (1.9 miles, typically) along the boresite, correcting the results for spatial attenuation, and for the changing angle between the XELEDOP dipole and the AUT ray direction.

Several antenna pattern measurements were made using a dipole suspended from a balloon. These measurements were made on a radius of about 1600 feet from the AUT, with the dipole coming within a quarter wavelength of the ground. Some examples of the various results using both balloon and XELEDOP techniques are shown in Figs. 2, 3 and 4.

In Fig. 2, a comparison is drawn between theoretical and experimental azimuthal patterns measured by the XELEDOP technique at 18 MHz. The vertical pattern (corresponding to the azimuthal pattern in Fig. 2C) is shown in Fig. 3. Measurements were also done using a 1/4-wave ground-plane antenna as a reference to measure the gain of the Beverage ground wave.

The results of detailed measurements of the vertical pattern at the azimuth of maximum gain are illustrated in Fig. 4. These results deserve some discussion. In this test, the AUT was a Beverage pair (two elements of a rosette array); therefore, the theoretical gain should increase 3 dB over a single Beverage element. The balloon measurements for low elevation angles ($\psi<3°$)clearly illustrate the response of the antenna to ground waves. The skywave lobe was a maximum at $\psi_N \sim 16°$.

Clearly, there is a consistent agreement between theory and experiment in the main lobe, but a fairly large discrepancy in the side- and back-lobe levels. Typically, the side lobes of theoretical patterns are 25 dB lower than the main beam, whereas measured values are normally only about 15 dB below the level of the main beam.

Theoretically Derived Parameters for Beverage Antennas

Since the agreement between experiment and theory was, except in some instances, reasonably good, it follows that theoretically derived parameters can be used with confidence in Beverage antenna design. Since theory reveals design trends better than experimentation, we shall consider the effects of length, height, frequency and ground conductivity on the Beverage antenna.

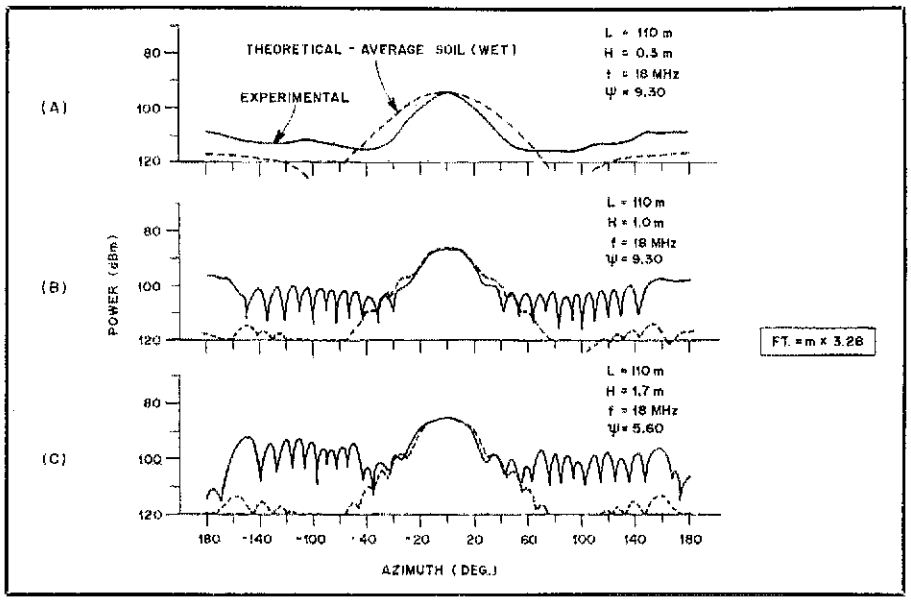


Fig. 2 — Comparison of theoretical and experimental azimuthal patterns for a Beverage antenna at 18 MHz.

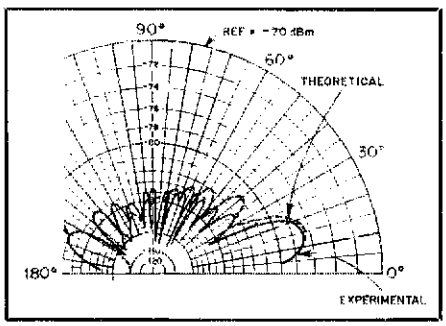


Fig. 3 — Comparison of theoretical and experimental vertical pattern in the bore-site direction (at 18 MHz) for an antenna length of 360 feet and a height of 4 feet (azimuthal pattern is shown in Fig. 2C).

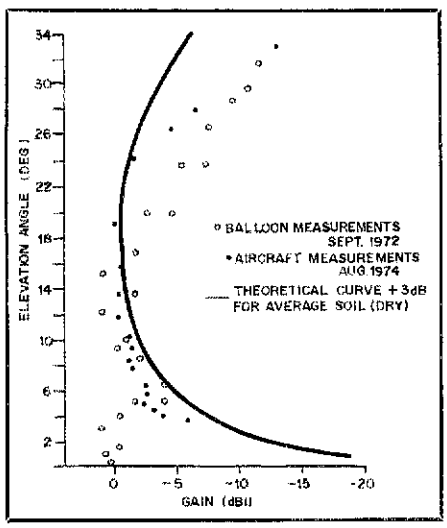


Fig. 4 — Vertical radiation pattern for a Beverage-pair antenna in azimuth of the main lobe at 9.5 MHz.

The length of a Beverage antenna should be greater than 1 wavelength, and since we are concerned with frequencies of 1.8 to 30 MHz, an antenna 656 feet long should give satisfactory performance at 1.8 MHz. Figs. 5, 6 and 7 are examples of design parameters — calculated values of gain in the main lobe (G_N), azimuthal beamwidth (BW_A), launch angle (ψ_N) and vertical beamwidth ($BW\psi$) for Beverage antennas 328, 656 and 984 feet long, all 6.5 feet high over average dry soil.

Figs. 8, 9 and 10 illustrate how the gain (G_N) varies with antenna length, antenna height and soil conductivity. Fig. 8 illustrates that the optimum length for a Beverage antenna mounted 6.5 feet above average dry soil is about 4 λ. In Fig. 9, it is shown that the gain increases at all frequencies as the height increases from 12 inches to 10 feet. The change is especially marked at the higher frequencies. The curves in Fig. 10 show the dependence of gain on earth conductivity. At 2 MHz, the gain decreases as earth conductivity increases, whereas at higher frequencies this variation has the opposite trend: Gain increases as conductivity increases.

Beverage Antenna Arrays for Transmitting Applications

While Beverage antennas are good for receiving because of their directivity and low noise, their efficiency is rather low. Compare, for example, the gain figures for the Beverage antennas discussed above with that of a quarter-wave antenna over a perfectly conducting earth, which is 5.16 dBi. For hf-receive applications, discrimination or directivity gain is the important factor, as the system signal-to-noise ratio is determined by ambient radio

noise, not the internal-equipment noise as at vhf. Thus, a directive receiving antenna can be many decibels below isotropic reference and still be useful. Consequently, the lack of efficiency in the Beverage antenna is of no importance for receiving. During transmission, however, poor efficiency represents power wasted, since radiation efficiency is a measure of the power radiated divided by the power of the transmitter.

Beverage antennas can be operated as linear phased arrays, employing several closely spaced Beverage-antenna elements fed in phase. The power gain of such an array increases by about 3 dB each time the number of elements is doubled, provided the elements are independent. The effect of interaction among elements, which limits the efficiency achievable by such arrays, has been determined. For element heights on the order of 6.5 feet, the interelement spacing can be as small as 20 feet. If there is sufficient land to mount a Beverage antenna in its length, only a modest increase in complexity could provide a power-gain increase of 3 or 6 dB by employing 2 or 4 elements in a linear phased array.

An example of a Beverage array is shown in Fig. 11. It consisted of eight 500-foot elements mounted 6 feet above

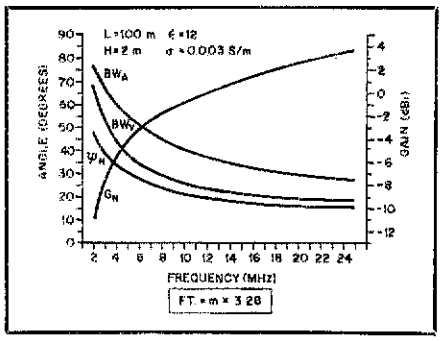


Fig. 5 — Design parameters for average dry soil: H = 6.5 ft; L = 328 ft.

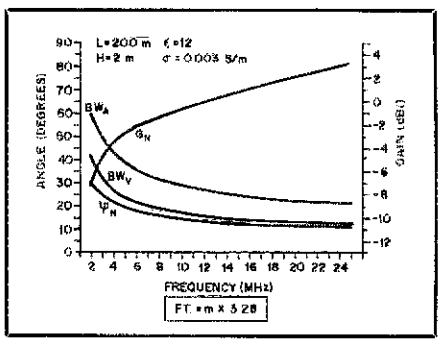


Fig. 6 — Design parameters for average dry soil: H = 6.5 ft; L = 656 ft.

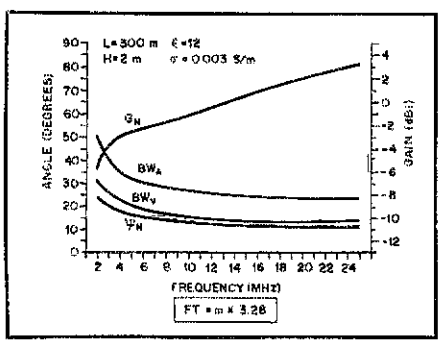


Fig. 7 — Design parameters for average dry soil: H = 6.5 ft; L = 984 ft.

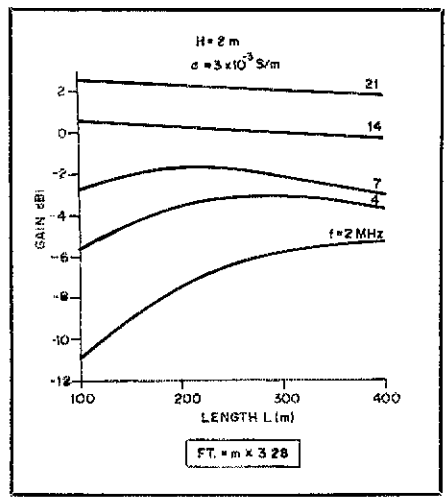


Fig. 8 — Gain of a Beverage antenna element as a function of frequency and length (H = 6.5 ft, average dry soil).

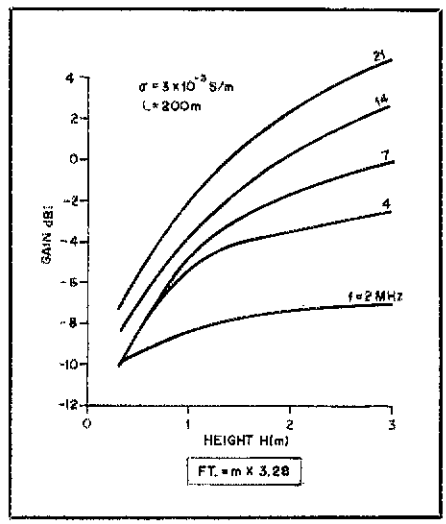


Fig. 9 — Gain of a Beverage antenna element as a function of frequency and height (L = 656 ft, average dry soil).

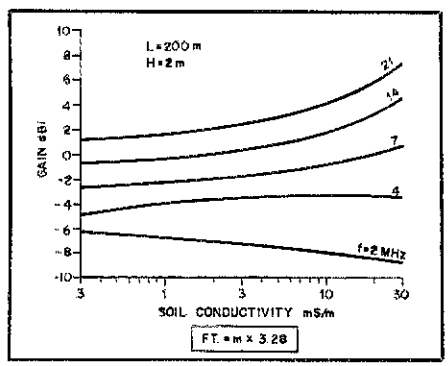


Fig. 10 — Gain of a Beverage antenna element as a function of frequency and conductivity (L = 656 ft; H = 6.5 ft).

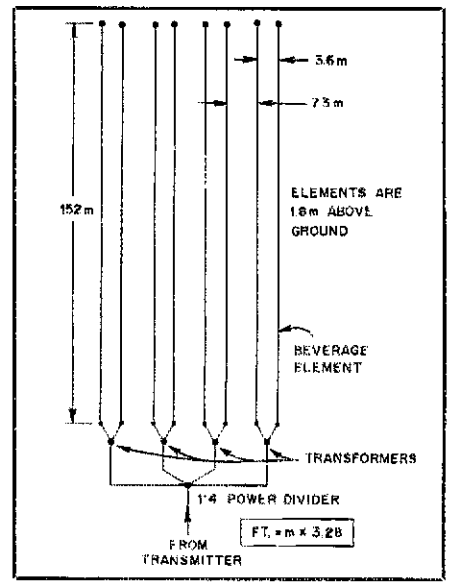


Fig. 11 — Plane view of an experimental Beverage array. See text for details.

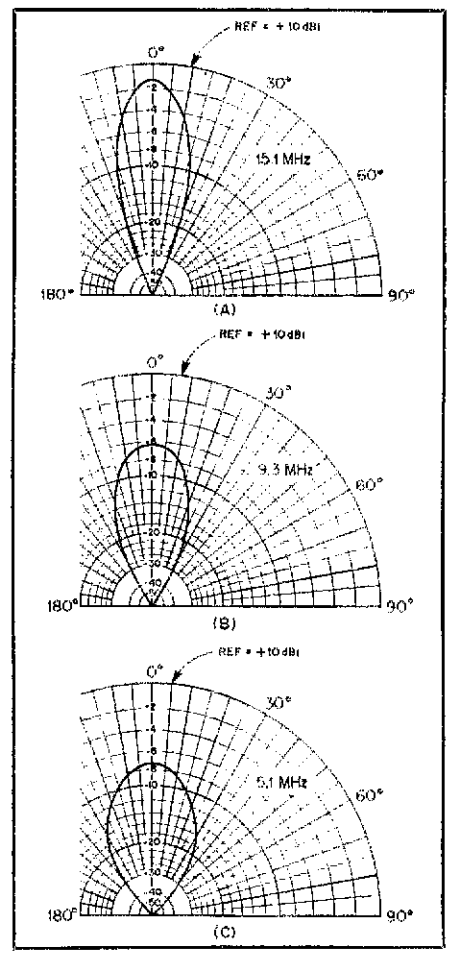


Fig. 12 — Measured azimuthal patterns for the experimental Beverage array shown in Fig. 11. Note that the 0 dB reference corresponds to +10 dBi.

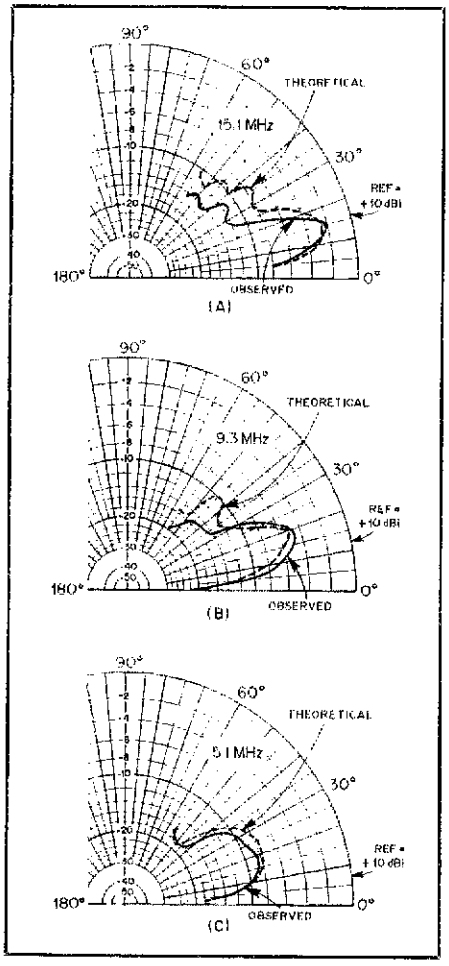


Fig. 13 — Measured and theoretical elevation patterns for the experimental Beverage array shown in Fig. 11. Note that the 0 dB reference corresponds to + 10 dBi.

the ground, with the elements arranged in pairs. Each pair was coupled directly to a matching transformer, which was connected through a length of coaxial cable to a 1:4 power divider. The measured azimuthal and elevation patterns, expressed in dBi, are shown in Figs. 12 and 13, with those for 5.1, 9.3 and 15.1 MHz shown in A, B and C. The theoretical plot in Fig. 13 demonstrates the close agreement between practical results and theoretical calculations of the main lobe. The pattern results were repeated for summer (3-foot-high grass, damp ground) and winter (6-inch dense snow cover, partially frozen ground) with no change in the results.

Conclusions

The Beverage antenna and arrays of Beverage elements present an inexpensive alternative for transmitting and receiving on long-range, point-to-point communications circuits. The disadvantage, from a radio amateur's viewpoint, is that gain is realized in only one or two reciprocal directions and a large amount of real estate is required for a Beverage array on the lower hf bands.

Appendix

The Beverage antenna is analyzed as a transmission line in which current has been induced by the impinging electromagnetic field parallel to the Beverage wire. The characteristic impedance and propagation parameters derived (or measured) from transmission-line theory are therefore important elements in analyzing the performance of the antenna. The simplest formula for the characteristic impedance of a single wire over a ground is

$$Z_o = 60\, ln \frac{2h}{a} \qquad \text{(Eq. 1)}$$

where

h = height of the Beverage wire above ground

a = radius of wire

n = antenna current-wave propagation factor

Although a more complicated analysis of the impedance of a wire over lossy ground is discussed by Litva and Rook, the detailed analysis does not improve the agreement with the experimental data. The impedance and propagation characteristics of the transmission line can be determined experimentally by measuring the input impedance of the line with the far end open and short circuited; or, by measuring the current on the antenna by means of a small probe that is excited by an rf generator. The characteristic impedance is calculated from the open and closed circuit impedance measurement:

$$Z_o = \sqrt{Z_{oc} \times Z_{sc}} \qquad \text{(Eq. 2)}$$

where Z_{oc} = open-circuit line impedance at a given frequency (F_G)

Z_{sc} = short-circuit line impedance at F_G.

The input impedance is generally complex. The propagation constant $\gamma = \alpha + j\beta$ is another important parameter:

$$\gamma = \frac{1}{l} \tanh^{-1} \sqrt{\frac{Z_{sc}}{Z_{oc}}} \qquad \text{(Eq. 3)}$$

The real and imaginary parts of this parameter are the attenuation (α in nepers/meter) and the phase constant (β in radians/meter), which are needed to calculate the current wave that traverses the wire.

The velocity of propagation can be obtained from the current measurements, or from the open (or short) circuit impedance measurements, since the input is high (or low) when the electrical length of the line is an integral multiple of a half (or quarter) wavelength.

In Fig. 14, the average characteristic impedances of a 360-foot antenna about 4 feet (mean height) over average wet soil (for soil conductivities and types see Table 1) is shown

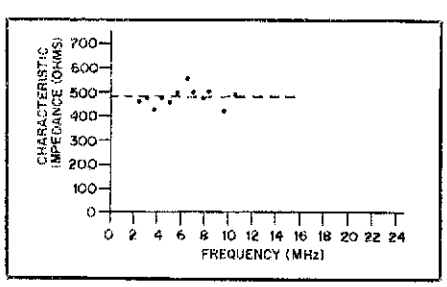


Fig. 14 — Characteristic impedance of a Beverage antenna 360 feet long and 3.7 feet high situated over average wet soil.

Table 1

Soil Conductivities and Types	Conductivity S/m	Dielectric Constant
Sea Water	5	81
Average soil (wet)	10×10^{-3}	10-25
Average soil (dry)	3×10^{-3}	10-15
Poor soil	1×10^{-3}	10
Poor soil (dry)	3×10^{-4}	8
Dry sand	1×10^{-4}	5

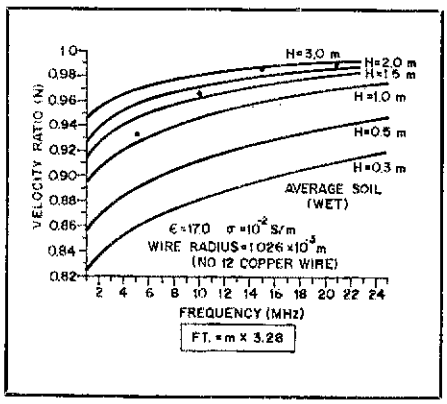


Fig. 15 — Theoretical and experimental values of current-wave velocity factor as a function of frequency for average wet soil (the experimental values were for an antenna height of 3.7 feet).

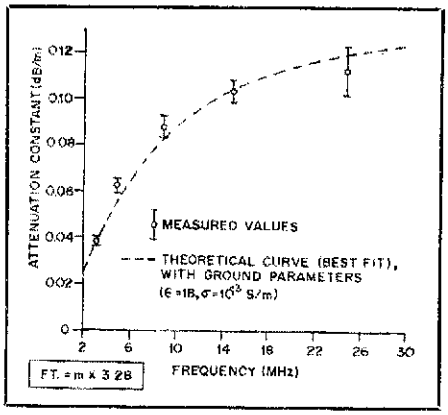


Fig. 16 — Attenuation as a function of frequency for a 6-foot-high Beverage antenna over poor soil.

for the range of 2 to 24 MHz. The mean value is 480 ohms, but clearly a single value for a terminating resistor will not result in absence of reflection from the end of the antenna. It should be noted that Z_o (calculated) equals 462 ohms. The Beverage wire was no. 12 copper-clad steel, for which a = 0.0043 in. Using Eq. 1:

$$Z_o = 60 ln \frac{2\,(4.13)\,(100)}{0.0043} = 462 \text{ ohms}$$

(Eq. 4)

In Fig. 15, we compare measured and calculated values for the current-wave velocity factor. The theoretical values have been calculated for various heights above average wet ground. The measured values were determined from current measurements. In Fig. 16, we show a comparison between theoretical and measured current-wave attenuation

(decibels/meter) of another Beverage antenna, which appears to have a poor soil ground.

Theory of Operation

A Beverage antenna responds to vertically polarized waves in that it responds to the horizontal component of the vertically polarized ground wave, owing to the tilt of the wavefront, and to the sky wave, because of the tilt of the downcoming wave front. A vertically polarized ground wave at the surface of the earth will have a forward tilt, the magnitude of which depends on the conductivity and permitivity of the earth. This slight tilt forward, in the direction of propagation, is responsible for a small vertical downward component, sufficient to furnish the power dissipated in the earth over which the wave is passing, and it is the horizontal component parallel to the Beverage wire antenna that induces a current on it (Fig. 17A). This current flows in the direction of the wave travel, which is toward the receiver. All portions of the antenna collect energy from the impinging wave field in space, so long as the phase of the wave in the antenna does not differ greatly from the exciting field. The gain of a Beverage antenna, relative to an isotropic radiator, for surface or ground waves has been derived by Litva and Rook:

$$G = \frac{377\pi \sin^2 \delta}{Z_o \lambda^2} \left| \frac{1 - \varepsilon^{-\ell\Gamma}}{\Gamma} \right|^2 \qquad \text{(Eq. 5)}$$

δ = tilt angle of surface wave

$$\delta = \tan^{-1} \left\{ \frac{(\varepsilon_g - 1)^2 + \left(\frac{\delta_g}{\varepsilon_o \omega}\right)^2}{\left[\varepsilon_g^2 + \left(\frac{\delta_g}{\varepsilon_o \omega}\right)^2\right]^2} \right\}^{1/4} \qquad \text{(Eq. 6)}$$

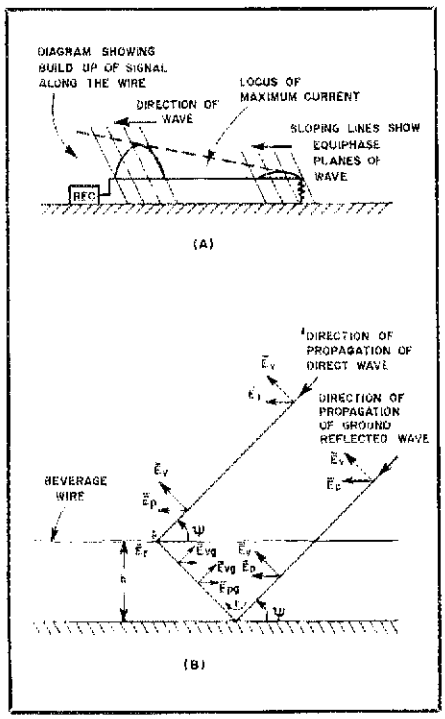


Fig. 17 — The wave or Beverage antenna illustrating: (A) current buildup along the wire for reception of ground wave; and (B) parallel voltage element induced in Beverage wire because of a vertically polarized downcoming skywave.

where

$\omega = 2\pi f$

ε_o = permittivity of free space

ε_g = relative dielectric constant of the earth

δ_g = conductivity of the earth

$\Gamma = \gamma - j\beta_o \cos \delta$

$\gamma = \alpha + j\beta$

$\beta_o = 2\pi/\lambda$

λ = free space wavelength

ℓ = length of antenna

α = current-wave attenuation on antenna (nepers/meter)

$\beta = \beta_o/n$

For skywaves, wave tilt is provided by the arrival angle of the downcoming plane wave (see Fig. 17B), and the magnitude of the induced voltage will depend on the parallel component of the vertically polarized electric field. Again, this induced voltage will cause a current wave to traverse the wire, in the direction of propagation, toward the receiver. The report by Litva and Rook derives expressions for the skywave gain of the Beverage antenna and a computer listing program to calculate the necessary design parameters. Here, we consider the analysis in outline only. The magnitude of the induced voltage on the wire is calculated from the resultant field parallel to the Beverage wire $\bar{E}_r$, where

$$\bar{E}_r = \bar{E}_v \sin \psi \left(1 - \rho_v e^{-j\frac{2\pi}{\lambda} 2h \sin \psi}\right) \qquad \text{(Eq. 7)}$$

where ρ_V is the reflection coefficient for vertically polarized ground waves:

$$\rho_v = \rho e^{j\phi} = \frac{\sqrt{\varepsilon_c} \sin \psi - \sqrt{\varepsilon_c^2 - \cos^2 \psi}}{\sqrt{\varepsilon_c} \sin \psi + \sqrt{\varepsilon_c^2 - \cos^2 \psi}} \qquad \text{(Eq. 8)}$$

where ε_c is complex and is given by:

$$\varepsilon_c = \varepsilon_r - j\frac{\delta_g}{\omega \varepsilon_o} \qquad \text{(Eq. 9)}$$

where

ε_r is the ratio of the dielectric constant of the ground to that of free space

δ_g is the ground conductivity in mho/meter

ε_o is the permittivity of free space (8.85 × 10^{-12} farads/meter)

The negative sign in the equation for $\bar{E}_r$ indicates that the horizontal components of the direct and ground-reflected wave are oppositely directed in space.

Since $\bar{E}_r$ is parallel to the Beverage wire, a potential gradient results, and the voltage induced in the line can be calculated. This elemental voltage gives rise to an elemental current, and the total current, as a function of the elevation angle ψ and azimuth angle θ, is obtained by integrating over the length of the line. The resulting expression is a complicated function dependent on the transmission-line characteristics, the properties of the ground, the height of the antenna above the ground, and the length of the Beverage wire.

The derived expressions follow. The power gain of a Beverage antenna referred to that of an isotropic radiator is

$$P_G = \frac{4\pi\mu_o c \mid I_T(\psi,\Theta) \mid^2 \mathrm{Re}(Z_o)}{\lambda^2} \qquad \text{(Eq. 10)}$$

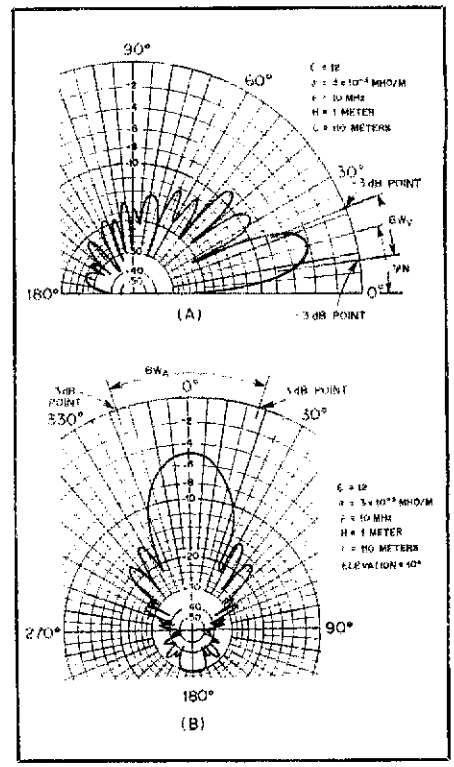


Fig. 18 — Theoretical elevation and azimuthal patterns for a Beverage-antenna element situated over average dry soil. The length is 360 feet and height is 3 feet.

(assuming E_v = unity)

where

μ_o = permeability of free space (4×10^{-7})

c = velocity of light

Re (Z_o) = real part of complex characteristic impedance of Beverage wire

$I_T(\psi, \Theta)$ = resultant current at receiving end of antenna, which is

$$I_{T(\psi,\Theta)} = \frac{E_r}{2Z_o} e^{-\frac{\gamma\ell}{2}\ell \cos\Theta} \times \left[\frac{\sinh\left[\frac{\gamma_1 \ell}{2}\right]}{\frac{\gamma_1 \ell}{2}} + P_L e^{-\gamma\ell} \frac{\sinh\left[\frac{\gamma_2 \ell}{2}\right]}{\frac{\gamma_2 \ell}{2}} \right] \qquad \text{(Eq. 11)}$$

where PL is the reflection coefficient, since in general Z_L will not equal Z_o at all frequencies:

$$PL = \frac{Z_L - Z_o}{Z_L + Z_o} \qquad \text{(Eq. 12)}$$

Z_L = terminating resistance

$\gamma_1 = \alpha + j\beta(1 - N \cos\psi \cos\Theta)$

$\gamma_2 = \alpha + j\beta(1 + N \cos\psi \cos\Theta)$

$$N = \frac{\mu}{c}$$

where

μ = velocity of propagation of current on the wire

c = velocity of light

A typical theoretical elevation and azimuthal pattern for a Beverage antenna over average dry soil is shown in Fig. 18.

Notes

[1]m = ft × 0.3048; mi = km × 1.6
[2]H. H. Beverage, C. W. Rice and E. W. Kellogg, "The Wave Antenna, a New Type of Highly Directive Array," *Trans. A.I.E.E.*, vol. 42, Feb. 1923.
[3]I. Herlitz, "Analysis of Action of Wave Antennas," *Trans. A.I.E.E.*, 1923, vol. 42, pp. 260-266.
[4]H. H. Beverage, "A Wave Antenna for 200 Meter Reception," *QST*, Nov. 1922, p. 7 (see update of 1922 article in *QST*, Jan. 1982, p. 11).
[5]J. R. Wait, and J. E. T. Mousseau, "Calculated Field Patterns for Horizontal Travelling Wave Antennas," Radio Physics Laboratory, Project Report No. 19-0-2, Jan. 15, 1953.
[6]D. N. Travers, P. E. Martin and W. W. Sherrill, "Use of Beverage Antenna in Wide Aperture High Frequency Direction Finding (Pt. IV Theory)," Interim Report for Contract NObsr-89345, Southwest Research Institute, March 23, 1964.
[7]P. E. Martin, D. N. Travers and R. Lorenz, "Circular Arrays of Beverage Antennas for High Frequency Direction Finding," paper submitted for technical program, Southwestern IEEE, April 1965.
[8]J. Litva and B. J. Rook, "Beverage Antennas for HF Communications, Direction Finding and Over-the-Horizon Radars," Communications Research Centre Report No. 1282, Ottawa, Aug. 1976.
[9]E. A. Laport, *Radio Antenna Engineering* (New York: McGraw Hill Book Co., Inc., 1952), pp. 55-60.
[10]V. A. Misek, *The Beverage Antenna Book* (Hudson, NH: V. A. Misek, 1977).
[11]C. Barnes, "XELEDOP Antenna Pattern Measuring Equipment, 2 to 50 MHz," Stanford Research Institute, Menlo Park, CA, July 1965.
[12]G. E. Moss, N. Muirhead and R. W. Jenkins, "The Use of Multiple-Element Beverage Antenna Arrays for HF Transmission," Communications Research Centre Report No. 1318, July 1978.

New Products

MOTOROLA BIPOLAR PROM

Motorola has introduced a 16-K Schottky TTL PROM, the MCM76161, with a 70 ns (maximum) address-access time. This fully decoded, high-speed, field-programmable ROM is organized as 2K, 8-bit words and is pin compatible with standard PROMs and ROMs. Three-state outputs and chip-enable inputs allow expansion to larger arrays.

The PROM is manufactured with a logical 1 (output high) at each location, and can be programmed selectively for logical 0 (output low) by raising the 5-V supply to 12-V with a rise time greater than 1 μs. The programming delay is typically 100 μs.

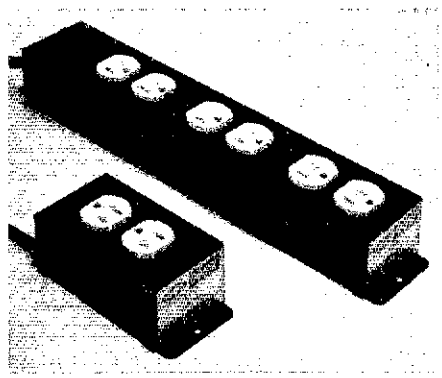
In a family of PROMs ranging in density from 2K to 16K, the MCM76161 is the highest-complexity product. Typical access times are 45 ns and 30 ns for address and chip-enable. The TTL-compatible outputs can sink 16 mA and source 2 mA. Supply current is typically 130 mA. In quantities of 100 to 999, the price is $18.85 each. For further information contact Jim Miele at Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB*

R. L. DRAKE MODEL LF2 AND LF6 LINE FILTERS

☐ These MOV-protected low-pass ac line filters may be of interest to both Amateur Radio operators and computerists. They are designed to restrict rf signals from traveling through the ac power line to and from equipment used.

The LF2 contains one grounded duplex outlet, while the LF6 has three duplex outlets. Each duplex outlet has its own hash filter and transient suppressor. The components comprising these filters are mounted on glass-epoxy pc board material and are attached securely to the outlet.

Transient protection is afforded by means of an MOV (metal oxide varistor) connected across the duplex outlet terminals. The General Electric V22OMA4B



MOV used is rated to handle voltage spikes having an 8 μs rise time and duration of 20 μs with a maximum spike current of 100 A. The rf line filters consist of ferrite-core inductors and disc-ceramic capacitors arranged in a T configuration on each side of the ac line.

Black-anodized aluminum enclosures are used for the filter assemblies. A no. 10 bolt is affixed to one end of the case. This grounding stud should be connected to a nearby station ground point. It is internally connected to the case, the duplex outlet ground and the ground wire of the ac line cord.

A lighted ON/OFF rocker switch on the LF6 indicates when power is supplied to the outlets. This filter is also supplied with a 15-A line fuse; the LF2 is unfused. A three-conductor ac line cord attaches each filter assembly to the ac source.

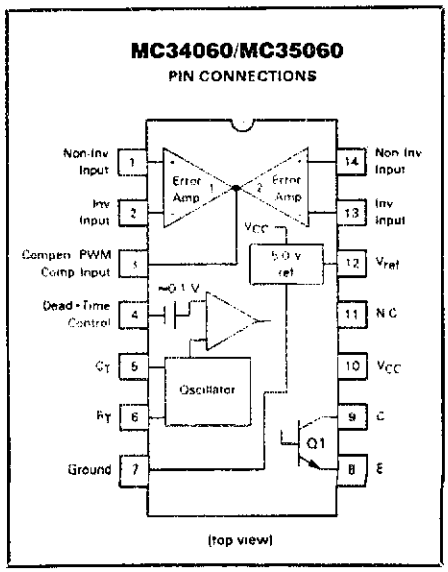
The LF2 measures 5.4 × 2.4 × 1.7 inches (LWD) and the LF6 is 16.2 × 2.4 × 1.7 inches (LWD) in size.[1] Price class of the LF2 is $40 and $70 for the LF6. They are available from the R. L. Drake Company, 540 Richard St., Miamisburg, OH 45342. — *Paul K. Pagel, N1FB*

[1]mm = inches × 25.4

MOTOROLA SINGLE-ENDED SWITCHMODE® CONTROL CIRCUITS

☐ A series of single-ended Switchmode® pulse-width modulation control circuits, MC34060/MC35060, has been introduced by Motorola. Designed specifically for Switchmode® power supply control, the MC34060/MC35060 is a low-cost, single-ended version of the Texas Instruments TL494 push-pull control circuit. Its electrical specifications are identical to the TL494 for all common characteristics.

These devices feature complete pulse width modulation control circuitry, adjustable dead-time control, and an uncommitted output transistor which can source or sink 200 mA. The MC34060/35060 has on-chip error amplifiers, a 5-V reference and an oscillator with master or slave operation. They're available in 14-pin plastic and ceramic packages with an operating temperature range of 0 to +70° C. The plastic MC34060 and ceramic MC34060 are $1.85 and $2.15 each, respectively, in quantities of 100 to 999. A full-temperature-range (−55 to +125° C) version is available in the ceramic package only (MC34060L) at $7.85 each in 100 to 999 quantities. For further information, contact Bob Benzer at Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB*



CATV Leakage: A Two-Way Street for Interference and Cooperation

Does it seem like you'll never win? Just when you thought you had the TVI situation in hand, the roles are reversed — ITV! Now you're the victim!

By Peter S. Carr,* WB3BQO

Interference has been a problem for radio amateurs since the early days. From the time of spark transmission to color television, amateurs often found themselves cast in the role of villain. Two recent developments have brought about a change in the amateur's role in interference cases.

The first development was the rapid growth of cable television (CATV). From a humble beginning in 1948, the CATV industry developed rather slowly until about 1972. At that time, changes in FCC rules, coupled with improved coaxial cables and CATV amplifiers, led the way not only to an increase in the number of CATV systems, but also in the number of channels used in the systems. Cable operators were originating programs locally and "importing" distant stations on microwave links. The mid-1970s ushered in the age of satellite communications for CATV operators. The rules and technology made more channels available, and the satellites delivered the programs to fill them. Today, the RCA SATCOM 1 satellite carries 24 channels of programming designed specifically for cable TV systems. The subscribers love it! Little wonder then that the number of CATV systems with over 29 channels more than doubled during 1980.

Coaxial cable shielding and the stronger signal voltage delivered to the TV antenna terminals by the CATV systems proved to be an advantage to the Amateur Radio community. Properly installed and maintained, cable systems meant a lot less TVI resulting from amateur hf operation. No one lamented the passing of corroded TV antennas and easily overloaded preamplifiers! So everything was looking better — right? Well, not quite.

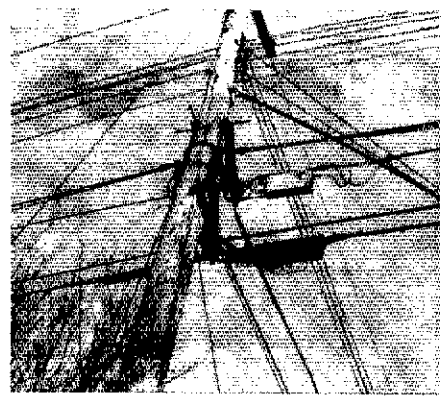


Fig. 1 — A typical utility pole with a CATV amplifier station mounted on a 1/4-inch steel support wire. Most CATV lines are mounted above the highest telephone cable and below the secondary electric wires.

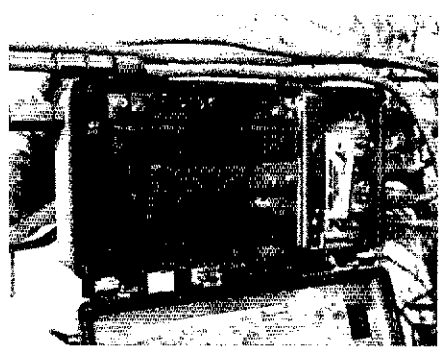


Fig. 2 — Interior of a CATV amplifier. Incoming trunk signals enter the housing at the upper left and exit at the top right of the housing. The vertical module is a high-level distribution amplifier that feeds four smaller cables going to houses in the immediate area. Both amplifiers are powered by 17-V dc, which is derived from an ac voltage that is fed down the coaxial cable.

Another development has occurred in the last decade: the explosive growth of amateur vhf-fm repeaters. Most parts of the country are served by at least one repeater, and a variety of choices is frequently the rule. A network of fixed, mobile and hand-held radios operating through a repeater has become the standard communication system for local emergency communications. The channelized operation of vhf fm, combined with telephone interconnection, has helped make this mode a favorite for portable and mobile operation. Today, the 2-meter fm transceiver, in its many forms, is the most commonly found piece of Amateur Radio communication equipment.

How has all this changed the amateur's role in interference? To provide all those extra channels, CATV systems legally use the full range of frequencies from 54 to 456 MHz — this includes amateur frequencies. Only a fraction of a microwatt is delivered to the subscriber TV antenna terminals. In the bigger, better shielded cable, power levels may approach 1 W. Even if a video carrier falls in the 2-meter band (145.25 MHz typically for cable channel "E") there should be no problem, at least theoretically.[1]

Leaks and Leakage

A corroded connection, a physical

[1]Many new, larger systems use the HRC (harmonically related carriers) system. In that scheme, the channel E visual carrier is at 144.0 MHz. For a variety of reasons, carriers are sometimes slightly offset from nominal frequency. For a listing of CATV channels, see February 1982 *QST*, p. 14.

*329 Little Ave., Ridgway, PA 15853

break or other damage to the system line or connectors, as well as poor quality components, can cause a signal leak. Where leaks exist, signals inside the cable escape and are radiated. (The lower the frequency, the more noticeable the radiation from the leak.) If the cable system uses channel E, there will be a 145.25-MHz visual carrier and sidebands being radiated in the vicinity of a leak. Roles are reversed as the radio amateur's reception is interfered with.

The role reversal is not complete, however. The leak that lets signals out of the cable also lets signals from outside enter into the cable; you might say it is a two-way street. The amateur hears interference in his receiver; when he transmits, it enters the cable and disrupts channel E reception. The neighbors complain! Will the cable company repair the leak?

Legal and economic reasons compel responsible CATV operators to repair leaks in their systems. Part 76 of the FCC rules requires CATV operators to check their systems for leaks at least once per calendar year. They are required to keep a log of leakage problems, causes and remedial measures taken. The rules (§76.610) limit allowable leakage in the 54- to 216-MHz range to 20 μV per meter at a distance of 3 meters (10 feet). In addition, harmful interference to other services is not permitted (§76.613).

For obvious economic reasons, the CATV operator wants to deliver high-quality signals to his subscribers. Leaks mean signal loss, and that means poor reception. Subscribers are not willing to pay for poor reception. That is especially true when the interference is to a premium program service. Channel E and the other mid-band channels in the 108- to 174-MHz range typically carry the movies and entertainment specials that provide added income to the cable company. Subscriber complaints are usually the first indication of a cable leak.

Not all cable systems use amateur frequencies inside the cable. If the system in your area does, and if you experience leakage problems, then you may want to know how to locate leaks on your own.

Begin by enlisting the aid of a couple of ham friends with rotatable antennas. Use the method of triangulation to narrow down the leakage location to a few square blocks. Place a battery-operated TV set in a vehicle and a pair of "rabbit ears" on top. Select a channel that is used in the cable but is not used for broadcasting in your area. With one person to drive and another to watch the TV screen, take a trip through the suspect area.

As you begin to approach a fault location, the first indication will be faint sync lines running either vertically or horizontally across the screen. As signal strength increases, faint images will appear, then fade, roll and return; this is caused by multipath signals reaching the antenna. When the picture stabilizes and becomes snow free, it indicates that the leak is very close. A return to snowy pictures indicates that the leak has been passed.

For ease of maintenance, most all cable equipment is mounted on the steel support wire close to a utility pole. The large majority of leaks that occur in the aluminum cable system center near these devices. For that reason, you should locate the pole nearest the spot where snow-free pictures were received. You can inspect the area from the ground, if you wish. For safety and liability reasons, make no attempt to climb the pole for a closer look. Copy the identification number on the pole and report your findings to the cable company.

A hand-held transceiver can be used to trace high-level interference to 2-meter communications. Remove the antenna and tune to a frequency around 147 MHz. You should be able to pick up sync and video sidebands when you are near a leak. With the antenna connected, the transceiver becomes a very sensitive leak detector. The sound carrier is 4.5 MHz above the video carrier. Less ambiguity will result from tuning to the sound signal, when possible.

Fig. 3 — Signal-level meter used to adjust amplifier levels. Continuously tunable from 54 to 300 MHz, the meter can be used for testing mid-band and super-band channels. It is battery powered and can be used with a small antenna to isolate cable leaks. Sensitivity is not great because the meter has broadband response.

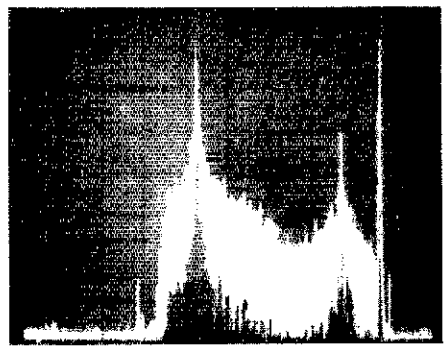


Fig. 4 — Spectral display of a channel E television signal. Horizontal divisions are 1 MHz; vertical divisions are 10 dB. At 145.25 MHz, the visual carrier (on the left) is the highest energy-level component of the composite TV signal. Notice that the chroma subcarrier and the aural carrier (on the right) are both outside the 2-meter band.

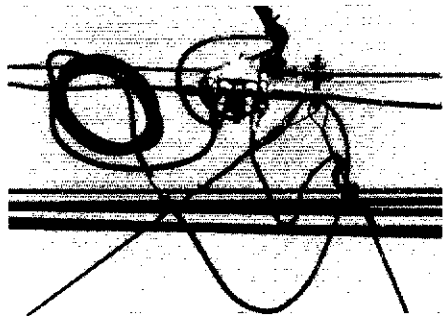


Fig. 5 — Directional tap unit installed in the aluminum distribution cable. Smaller drop lines are connected to the tap; the one at the left has a pay TV trap installed in series. Each connector may allow water to enter the cable, corroding the shield and causing radiation leakage.

Other Observations

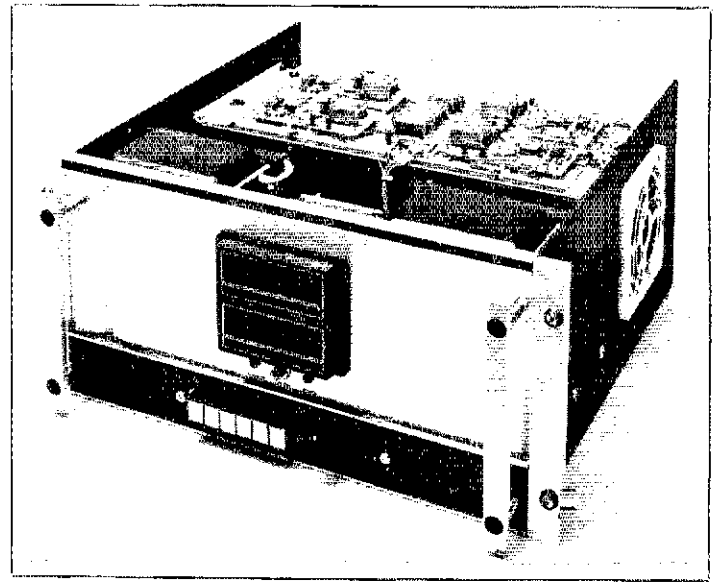
Not all leaks are located along the main cable. Cuts, breaks and corrosion on the subscriber drop cable are other sources of leakage. The good news is that the intensity will be less because signal levels are lower there. The bad news is that it can be hard to locate the source when several drop lines leave the cable from a single point.

Faults that are not located along the main cable near the poles are found mostly inside the subscriber homes. Lengths of twin-lead used to connect other TV sets or fm stereo receivers to the system are common offenders. Improper connection of video games and video cassette recorders will frequently cause leaks and will usually result in poor reception as well. I even heard of a fellow who connected his outside antenna in parallel with the cable at the TV set antenna terminals. Now that was a leak!

In the past, the amateur has looked upon CATV as a friend that offered a measure of protection against RFI to consumer electronic devices at no cost to the amateur. Today, it is time for hams to work actively with cable system technicians, a large number of whom are also hams, to control the CATV leakage problem. Each Amateur Radio operator is responsible for the proper operation of his station — emitting clean signals, reducing harmonics, using only enough power to communicate effectively and comply with the other FCC rules. CATV systems must also live up to the intent, not just the letter, of the FCC rules. Cooperation among all concerned will bring about the greatest benefit to all.

Peter S. Carr has been a licensed radio amateur since 1974, upgrading to Advanced class in 1978. His electronics background includes radar, telephone and cable-television systems operation and maintenance. Since 1972, he has been employed as chief technician and manager of Tele-Media, Inc., of Ridgway, Pennsylvania — a 3400-customer cable TV system. Pete also maintains the W3IE 2-meter repeater (the antenna is halfway up the 500-ft CATV tower). He has written a number of articles for Amateur Radio and R/C modeling magazines.

MOSFET RF Power — An Update



Part 2: The general application information provided in this series offers hard proof that power FETs have graduated beyond infancy. This concluding installment describes filtering methods and other modern amplifier concepts.

By Helge Granberg,* K7ES/OH2ZE

In Part 1 of this article (December 1982 *QST*), the author described a number of design and performance features for his 2-30 MHz, broadband MOSFET linear amplifier. Part 2 provides a wrap-up and offers a variety of design principles that can be applied to other solid-state power amplifiers.

Output Low-Pass Filters

Chebyshev five-pole, constant-k low-pass filters are used in the amplifier output (Fig. 5). Shunt elements have been added to provide an elliptic function. These elements usually are designed to resonate with the filter inductances at the harmonic or other undesired frequencies. This provides notches that give much higher close-band attenuation than can be obtained from a simple five-pole filter. The filter skirt is also much steeper, but at the cost of degraded far-band attenuation. However, in an application such as this in which the filters are used at a multiplicity of frequencies, they can't be optimized in this respect. The worst case (−35 dB) for the third harmonic (which is of the most concern) is with the low-frequency filters. This probably is caused by the low Q of the inductors.

The total harmonic attenuation at 7 MHz and below is approximately 50 dB or better, which meets the FCC requirement of 50 mW maximum for spurious emissions. The 1.8 to 30 MHz range can't be covered by the six filters without resultant gaps; a minimum of eight filters with sharper cutoff characteristics would be required for continuous coverage.

Filter Construction

Each filter is assembled on a separate pc board of similar layout. Only the component values are different. The most critical parts are the capacitors — often a stumbling block for practical high-power filter design. At these power levels, they must withstand peak rf voltages up to 800 (even higher in the event of a mismatch). The rf-voltage rating of ceramic capacitors is only some 30% of the nominal dc value. Hence, capacitors with ratings of 2000 to 3000 V are required. Also, they must be able to handle rf currents up to several amperes. These filters contain several inexpensive disc-ceramic capacitors in parallel. This provides current capacity and permits capacitor combinations that yield nonstandard values, as needed.

The distance from each filter input or output terminal is 2-1/2 inches to the corresponding terminals of the adjacent filter. This amounts to a distance of 12-1/2 inches from the first to the last filter.[5] Sections of 50-ohm strip line (Z1, Z2) are used to connect the T-R switch and the power amplifier to the filters. These are made of copper-clad pc-board material that is attached to the chassis below the filter boards. The lowest-frequency filter is located nearest to the input and output ends of the line, while the highest-frequency filter is at the far end. Thus, when the filters are switched, the remaining piece of unterminated line causes minimum VSWR in each case. Although the filters were tested individually with the amplifier, L1, L4, L7 and L10 had to be added to restore the filter characteristics in the composite circuit. This was necessary because the mechanical arrangement and the added capacitance from attaching the relay contacts to the 50-ohm lines affected the filters.

Filter-Relay Driver

Each relay field coil is driven by the circuit of Fig. 7. It is basically a programmable BCD-to-decimal decoder. The gates were added to accommodate the manual-switching feature. When the BCD input plug is disconnected, the manual switch is activated automatically. MMH0026 MOS clock drivers (U10-U12)

*Motorola Semiconductor Products, Inc., Phoenix, AZ 85062

[5]Notes appear on page 33.

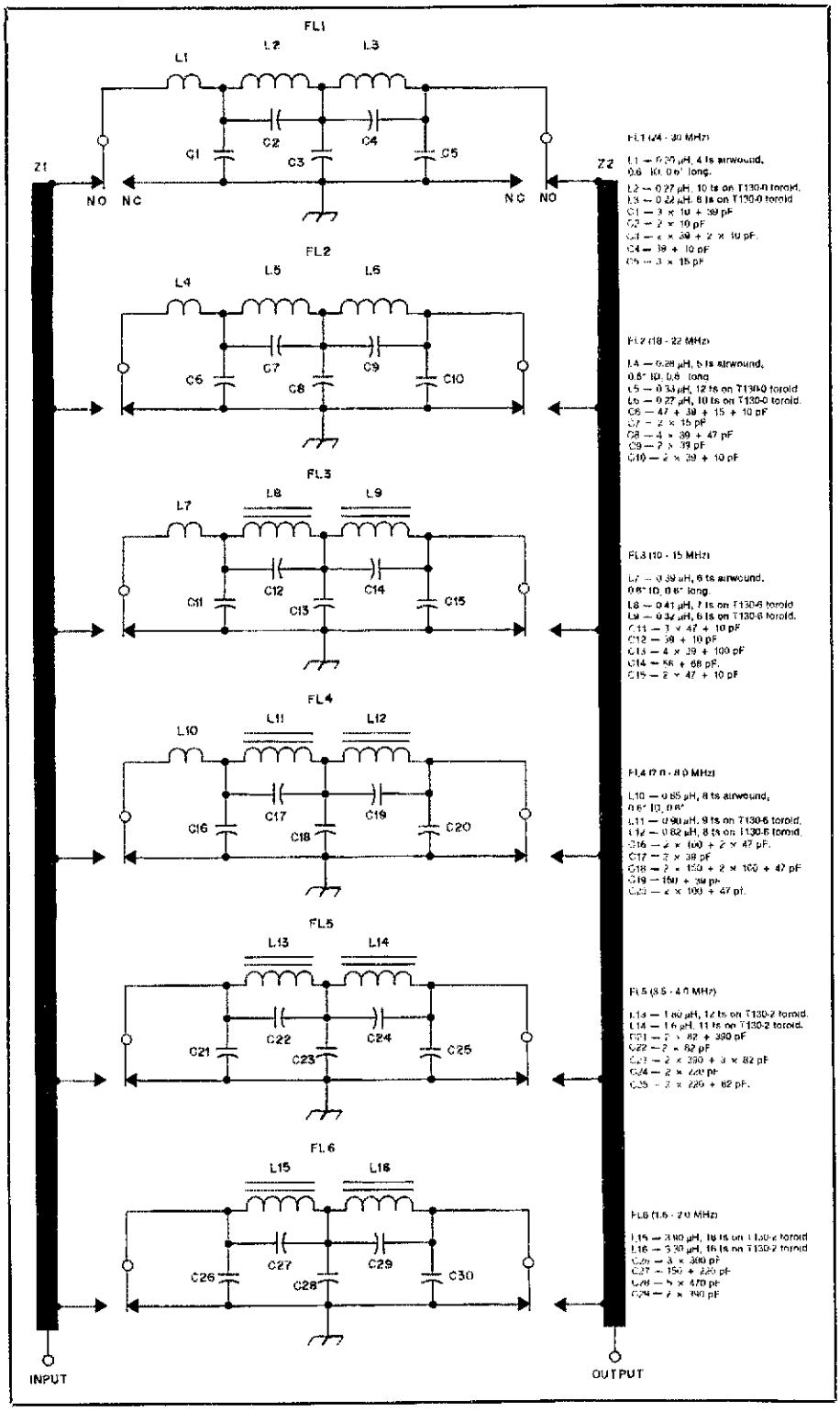


Fig. 5 — Low-pass filter circuit and component values for 1.6-30 MHz operation. Standard capacitor values have been placed in parallel to obtain nonstandard values. Toroid cores are Amidon, Palomar or Micrometals Corp. powdered-iron units. The designator "×" means "times," E.g., 2 × 47 + 10 pF means two 47- and two 10-pF capacitors, all in parallel to provide 114 pF. Wire type for all inductors is no. 14 enameled. Capacitors are RMC 3-kV disc ceramic, except those units that are 390 pF and higher, which are RMC 2-kV units. Relays are Deltrol 20693-83/405 with 12-V coils.

are used because they can be operated directly from a + 12-V supply. Also, they have internal clamping diodes for suppressing inductive spikes.

T-R Relay and Timing Circuit

Fig. 8 shows the T-R relay driver and timing circuit. The input-output timing of the T-R relays must be precise. If the output relay is switched with full rf power, the relay lifetime will be very limited. Thus, the output relay must be switched on before the input relay is. Similarly, the output relay has to be switched off after

Fig. 6 — Typical response curve of an elliptic function low-pass filter with two resonant shunt elements.

the input one is deactivated. Simple R-C and diode networks are used to generate the delays.

A CMOS hex inverter performs the amplifier pulse-shaping functions. The upper channel, which controls the input relay, delays the leading edge of the keying pluse and shortens it by a few milliseconds. The lower channel controls the output relay, and delays the trailing edge of the keying pulse, which is lengthened from the original as shown in the timing diagram. Both delays are adjustable from 2 to 12 ms by means of R2 and R4.

Other Circuitry

The circuit in Fig. 9 performs the following functions:

1) Output VSWR detection.
2) Linear alc control.
3) Alc shut down.
4) Bias switching between standby and operate.
5) Bias temperature tracking.

The VSWR reflectometer senses the reflected power caused by load changes (50 ohms nominal).[6,7] Capacitor C is approximately 1 pF in value and must be capable of handling high rf voltages. It can be made from a piece of coaxial cable, such as RG-58/U, with the braid stripped to a length of 0.4 inch. The section of center conductor can be used as the primary of T1 and for connections to the amplifier output and relay terminal.

The rf meter (normally seen in place of D4) is replaced with a diode for rectifying the rf energy. The resultant voltage is filtered by means of C6 and R31. The level of 0.2-0.3 V for a 50-ohm load. It increases to about 1.5 V for 3:1 VSWR. This voltage is used for the linear alc function and is fed to the alc amplifier, an LM307. Controls R26 and R30 can be set, for example, so that an output VSWR of 2 will have no effect, but a 3:1 condition will reduce the power output by 3 dB or more. The alc shutdown operates also from the dc developed in the VSWR bridge. During a complete mismatch, such as an open load, the instantaneous voltage is greater than 10, thereby saturating the

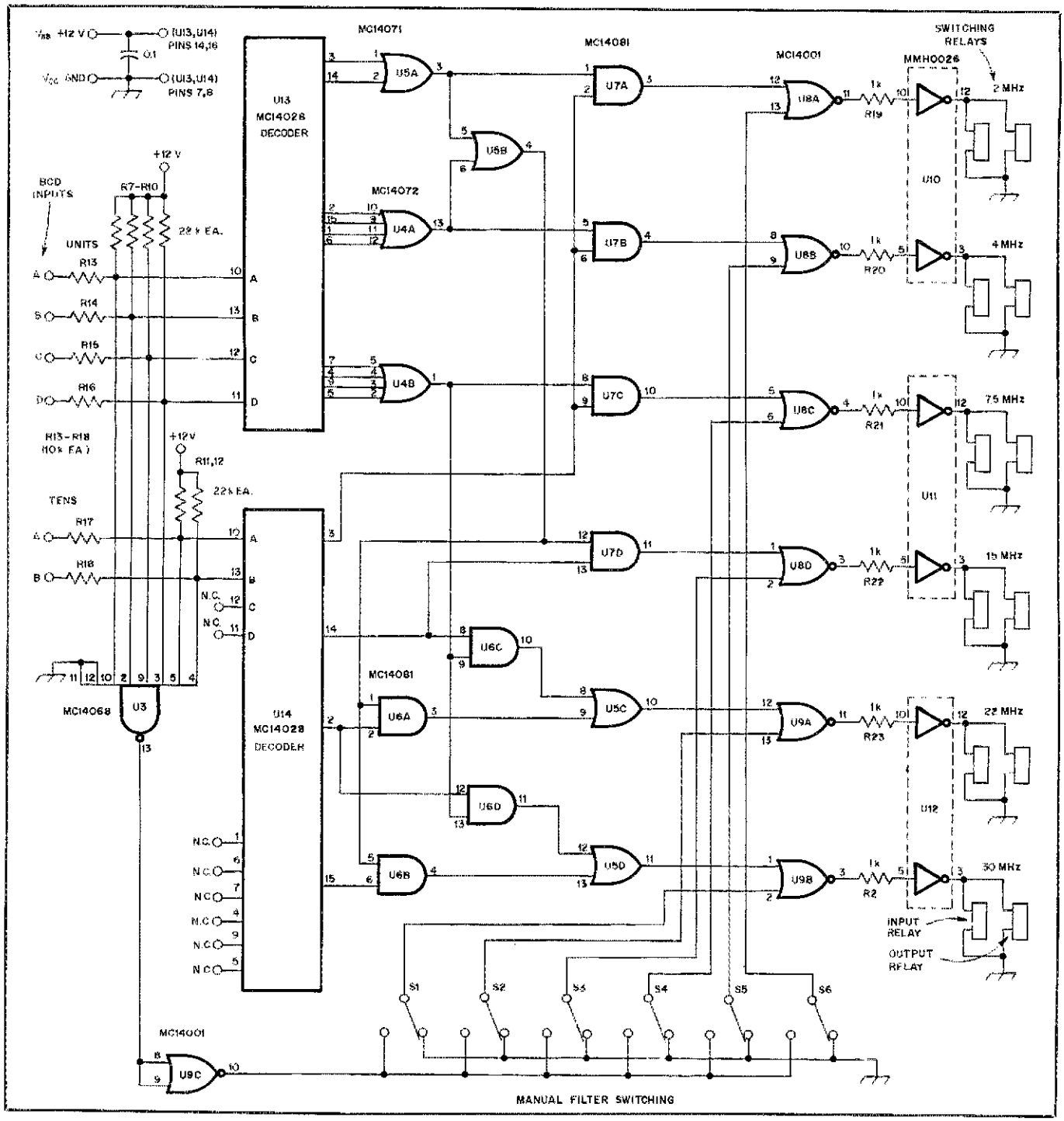


Fig. 7 — Output filter select and drive circuit indicator lights are connected in parallel with the relay coils, which are at the far right of the diagram.

LM307. After the alc loop has reacted and the power output has been reduced by a factor of 10, the voltage settles to 5 or 6 and the alc amplifier remains saturated. This holds the output power at the reduced level.

Automatic bias switching is initiated when a ground to +12-V signal is brought from the T-R relay driver to the same (−) input of the LM307. This overrides the control signal coming from the VSWR sensor and, when positive, turns the bias completely off. D5 makes this independent of the alc function.

Each of the rf amplifiers (Fig. 4, Part 1) and their associated circuits draw approximately 15 mA of bias current. The combined current is 120 mA, which is too much for the alc amplifier to handle. Therefore, a TIP31 has been added for use as a buffer/driver. Its input voltage is also controlled by a thermistor (R34), which is connected thermally to one of the main heat sinks. R34 controls the idling current of the power FETs by lowering the bias voltage during periods of elevated temperature, and vice versa. With bipolar transistors, this is normally done with forward-biased diodes, in which the diode voltage drop versus temperature closely follows that of the base-emitter junction. Both types of transistors have a positive temperature coefficient (for a constant bias current or voltxge, the idling current increases with temperature). Although the g_m (transconductance) of a MOSFET

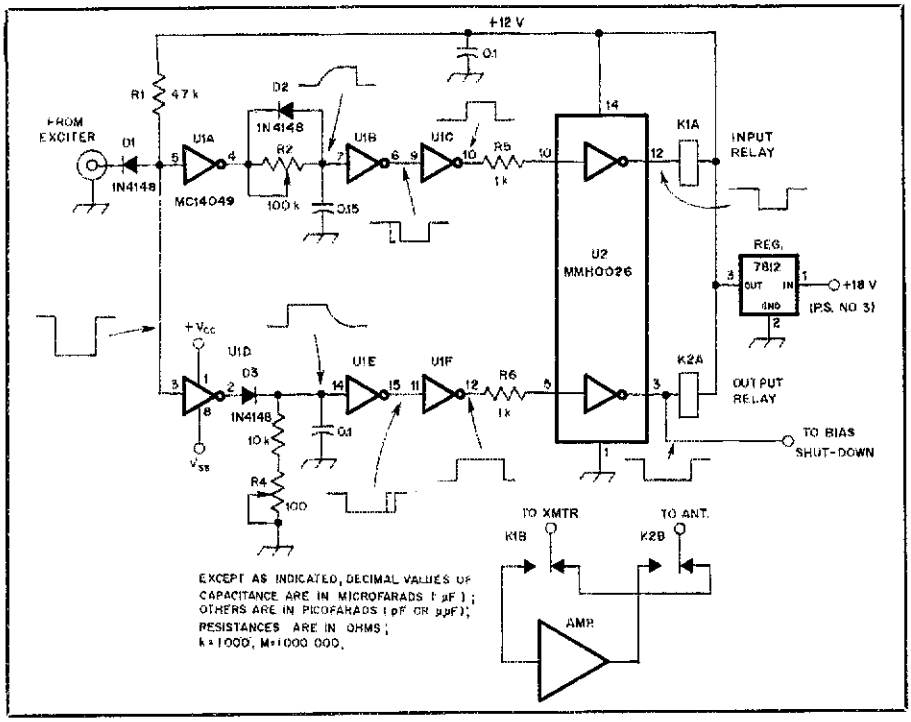


Fig. 8 — T-R switch drive and timing circuit. The approximate wave forms for the input and output functions are shown near the related ICs. Fig. 9 provides details of the relay connections.

decreases under these conditions the gate threshold voltage goes down, and usually has a dominant effect. There is a reversing point at higher drain currents. For the MRF150, this is around 5 A. The exact value depends on the g_m and the initial temperature. This is why power MOSFETs do not go into thermal runaway, provided the dissipation ratings are not exceeded.[8]

Conclusion

Although solid-state, high-power rf amplifiers are not in competition with vacuum-tube units, an increasing number of them appear on the commercial market regularly. Their feasibility versus output power is a question to be answered, at least until high-voltage rf transistors are available.

Power FETs are high-voltage, low-current devices, and some switching transistors for use up to several hundred volts are now on the market. In rf applications, however, several problems exist. Because of the internal structure of a transistor, rf arcing occurs (internally) easier at high voltages because the impedance levels are high. Transistor packaging techniques must be improved for this reason, and also for thermal considerations. The vertical-channel power FET (VFET) technology is fairly new and will certainly undergo many advances in the years to come.

This amplifier has been field-tested since late 1981, at the author's home. Switching from band to band is an absolute delight. Since no tuning is required, it should be a contest-operator's dream! Thus far, the only failures have been a jammed thermal switch that operates the fans, plus a burned low-pass filter board, caused by a loose piece of solder.

If you haven't worked with power FETs thus far, perhaps it's time you became involved, but maybe on not so grand a scale as is represented by this paper. Certainly, there are many advantages in the use of power FETs over bipolar transistors.

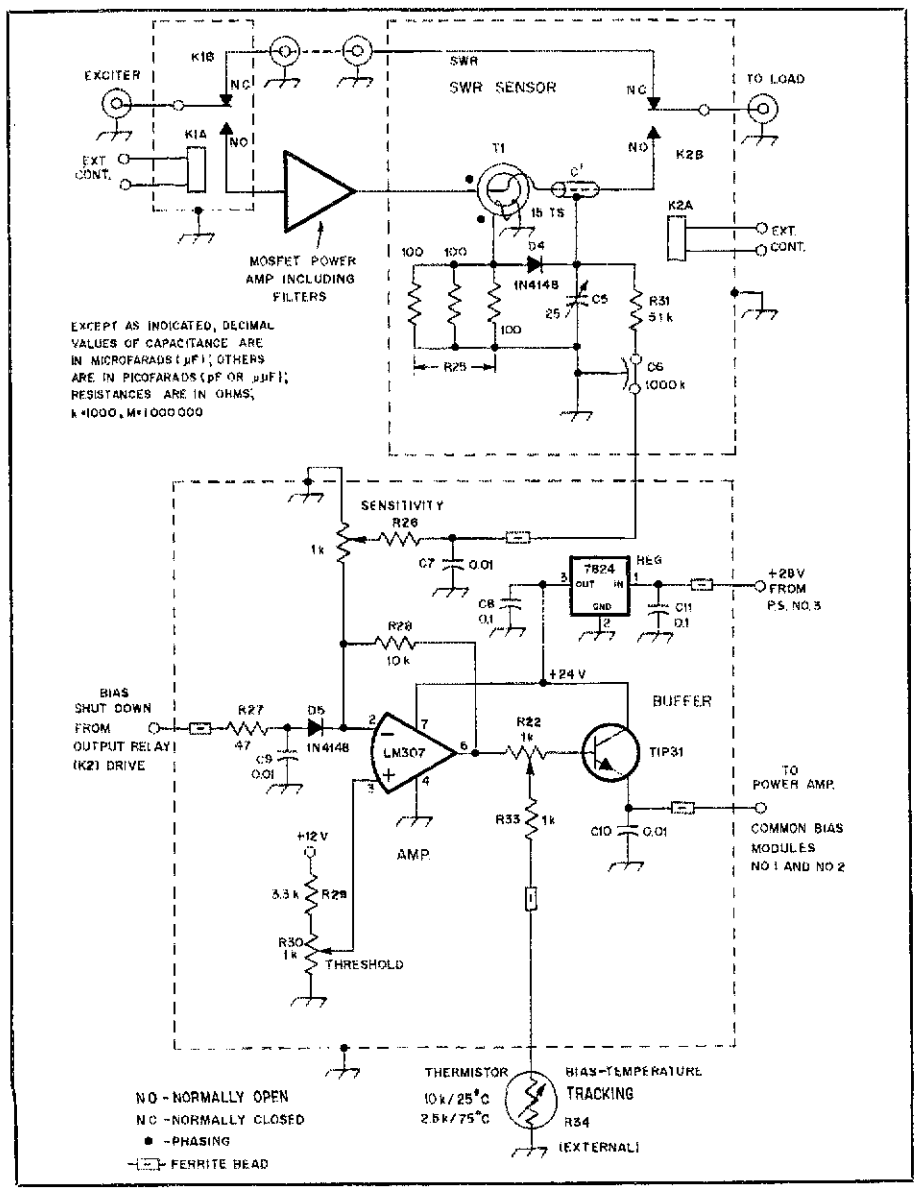


Fig. 9 — VSWR sensor, alc and bias circuits. Note ferrite-bead chokes in all alc input and output lines. They help prevent rf energy from getting into the alc amplifier.

Notes

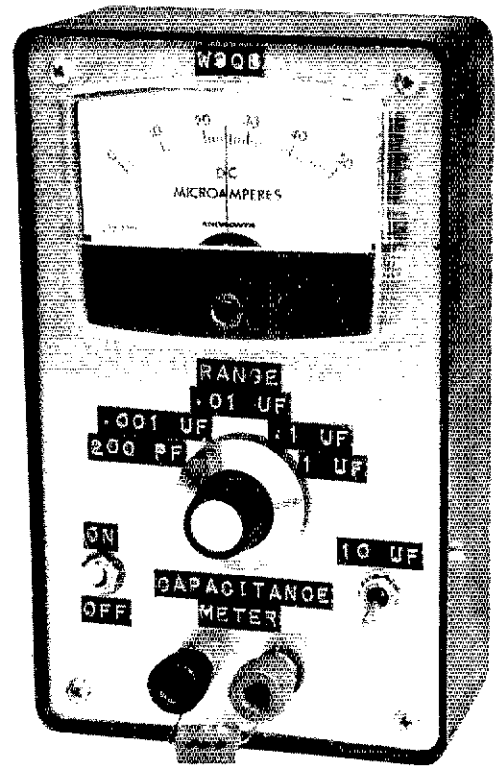
[1]mm = in. × 25.4

[6]*The Radio Amateur's Handbook*, 59th edition (Newington: ARRL, 1982).

[7]W. Orr, *Radio Handbook*, 18th edition (Indianapolis: Howard W. Sams & Co.).

[8]MRF150 data sheet, plus appropriate linear IC and CMOS data sheets.

A Simple Capacitance Meter You Can Build



This weekend project can save you time and money!

By Harry M. Neben,* W9QB

How many capacitors do you have that seem useless because they are marked in some strange hieroglyphics? If you're like most experimenters, you probably have a sizeable collection of such unknown capacitors. Here is a simple-to-build meter that you can use to decipher those strange markings and quickly find the right capacitor for the job at hand.

This meter has a reasonably linear scale and has sufficient accuracy to satisfy the needs of most experimenters. The scale linearity is approximately ±5%, and the accuracy is about the same. So the purists can stop reading now! If you are looking for a "ball park" capacitance value, however, this inexpensive meter will do the job.

The Circuit

The capacitance-meter circuit (Fig. 1) is similar to one described in *Test Equipment for the Radio Amateur.*[1] Modifications were made to improve the calibration and the scale linearity, however.

Six capacitance ranges, from 200 pF to 10 μF full-scale, are provided on the meter. While experimenting, I found that the characteristics of the 555 IC used in this circuit varied with temperature and from one IC to another. This resulted in problems when using a 100-pF, full-scale range. As a compromise, I selected 200 pF full-scale as the lowest range. The other ranges are in decimal relationship to one another.

To improve the meter accuracy, range adjustment trimmer resistors were included on the 200-pF and the 0.001-μF ranges. Fixed-value resistors may be substituted for these trimmers if you can tolerate the decreased accuracy.

In this circuit, the 555 is used in the monostable mode. One side of the unknown capacitor is switched between the positive and negative supply terminals by the 555 at a rate determined by R_A, R_B and C1. When connected to the negative terminal, the capacitor charges to a value near the supply voltage. When switched to the positive terminal, the capacitor discharges. M1 indicates the average discharge current value. It can be shown that

$$I_{ave} = \frac{V \times C_X}{(R_A + 2R_B)\,C1} \times K \qquad \text{(Eq. 1)}$$

where

V = voltage to which C_X is charged

K = a constant, depending upon the IC characteristics and the charge and the discharge time of the 555 circuit.

In this formula the internal resistances of the 555 IC are included in R_A and R_B. Therefore, I found it advisable to use trimmer potentiometers for meter calibration on the two lowest ranges.

Because the calibration is voltage-sensitive, a 6.2-V Zener diode is used to provide a constant voltage to the measuring circuit. While this places an additional current drain on the battery, the total current required is less than 10 mA, so the battery has a fairly long life.

Construction

All the components for this meter were purchased as stock items from a local parts store. [A complete parts kit is available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002. — Ed.] There are no specialty components to frustrate the builder. The meter is a 50-μA unit. All fixed-value resistors are 1/4-W, 5% carbon types. As the value of C1 determines the range and the accuracy of the meter, this capacitor should be as stable as possible and, therefore, of the highest available quality.

Front-panel layout is conventional, with the meter, the range-selector switch and the measuring terminals in line from the top to the bottom of the panel. The OFF/ON switch is mounted to the left of the range-selector switch and the 10-μF range switch is mounted to the right. The IC and most of the other components are mounted on a small piece of perf board or on the range switch.

Before completing the meter wiring, it is well to determine the resistance

[1]H. L. Gibson, *Test Equipment for the Radio Amateur*, 2nd. ed. (London: The Radio Society of Great Britain, 1978), pp. 7.5-7.7.

*151 Fairway Dr., Dunedin, FL 33528

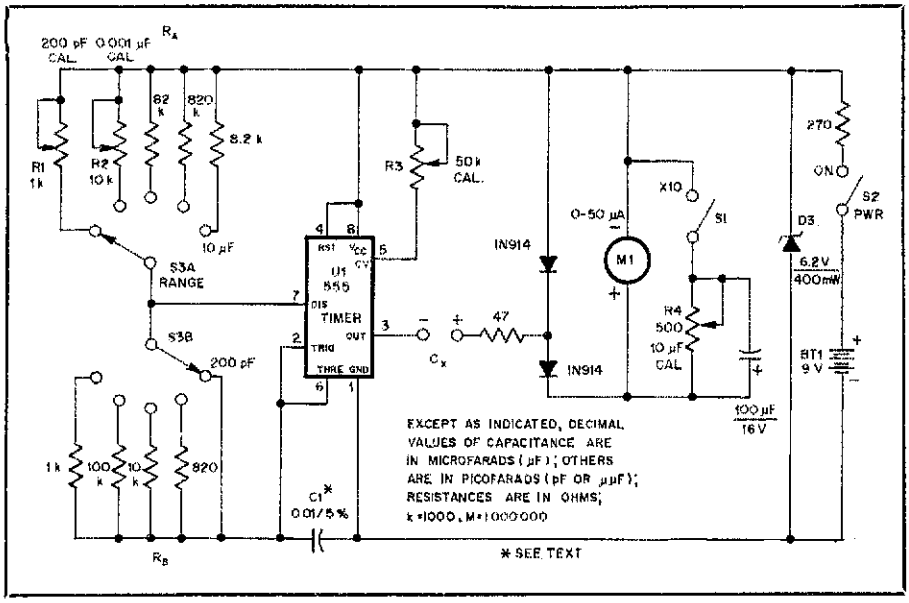


Fig. 1 — Direct-reading capacitance-meter schematic diagram. Resistances R_A and R_B discussed in the text correspond to the resistors selected by the range switch (S3). S3A selects the value of R_A, while R_B is selected by S3B. All fixed resistors are 5%, 1/4-W carbon types. Polarized capacitors are electrolytic. Numbered components not listed below are for text reference only.

BT1 — 9-V transistor-radio battery.
R1 — 1-kΩ pc-mount trimmer.
R2 — 10-kΩ pc-mount trimmer.
R3 — 50-kΩ pc-mount trimmer.
S1, S2 — Spst toggle switch.
S3 — 2-pole, 5-position rotary switch.
U1 — 555 timer IC.

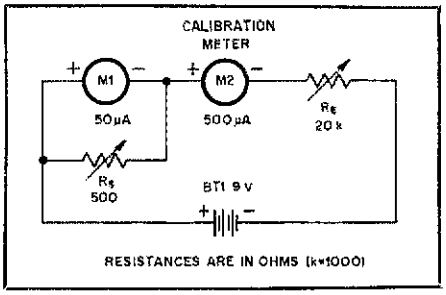
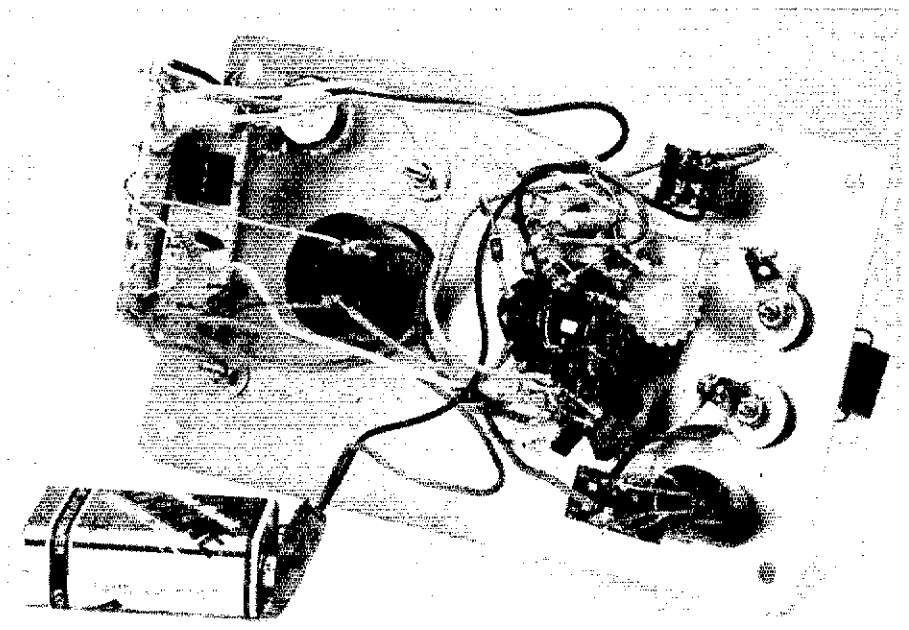


Fig. 2 — Suggested circuit for determining the value of the 10-µF range shunt resistor. After R_S is set to the correct value, it is used as R4 in the capacitance-meter circuit. The procedure for setting R_S is discussed in the text.



This interior view of the capacitance meter shows the parts placement used by the author.

necessary to produce a 10-µF range. This resistance (R4) shunts the 50-µA meter, increasing the full-scale reading to 500 µA.

To establish this resistance, another meter, such as a VOM (volt-ohm-milliammeter), must be used. Use the suggested circuit (Fig. 2) to determine this resistance. Set R_S to the lowest possible resistance before you start this procedure, to avoid damaging M1. Connect R_S across the terminals of M1. Connect this combination in series with the calibrating meter, R_E and the battery. Adjust R_E until the calibrating meter reads 500 µA. Adjust R_S until M1 indicates 50 µA. Readjust R_E until the calibrating meter again reads 500 µA, and adjust R_S so that M1 reads full scale. You may have to repeat this procedure several times to obtain a full-scale M1 reading when the calibration meter reads 500 µA. Once R_S is set to the correct value, it can be used as R4 in the capacitance-meter circuit (Fig. 1). Now the wiring of the capacitance meter may be completed.

Calibration

You can calibrate the meter using capacitors you have on hand. The more known-value standard capacitors you have, the easier the job is to do. Yet, you can calibrate this meter with only a 0.01-µF capacitor. Well, almost!

Begin calibration by placing the range switch in the 0.01-µF position. Attach your most accurate 0.01-µF capacitor to the C_X terminals. Turn on the meter and adjust R3 so that M1 reads full scale. This adjustment calibrates the 0.01 µF, the 0.1 µF, the 1.0 µF and the 10-µF ranges.

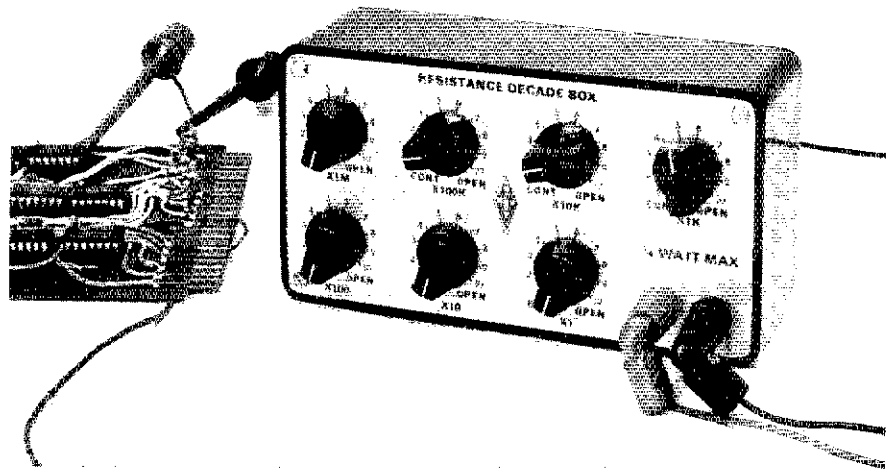
To calibrate the 0.001-µF range, leave the 0.01-µF calibrating capacitor connected to the C_X terminals. Place the range switch in the 0.001-µF position and place the 10-µF range toggle switch in the 10-µF position. Adjust R2 until M1 reads full scale. When the 10-µF range switch is returned to the OFF position, the meter will read 0.001 µF full scale.

The 200-pF range is calibrated by first selecting a 200-pF or less (preferably 200-pF) capacitor. Measure this capacitor using the 0.001-µF range. Place the range switch in the 200-pF position and adjust R1 so that the meter reads the value you found while using the 0.001-µF range. This completes the calibration.

Remember, the meter scale reads 0 to 50. So, unless you redraw the scale, you must use a scale factor on each range. This should not be a problem for most experimenters. I think you'll find that using this meter will make your next search through that sea of unmarked and unknown capacitors *much* less frustrating.

BEGINNER'S BENCH

Down Through the Decades



This is one project we think you'll find hard to resist!

By Bob Shriner,* WAØUZO and Paul K. Pagel,** N1FB

How much would 11,111,110 1-ohm, 1/4-W resistors weigh? Think you could pick up the pile? Sure you can! Fact is, you can (in effect) do it with one hand — if you've built the unit we're about to describe.

A Black Box

Experimenters and troubleshooters often need to substitute resistor values in a particular circuit during the course of bench work. While you could continuously insert and remove single resistors in the process of searching for the correct value, it would be tiresome and time consuming to do so. A much better approach is to use a resistance decade (substitution box). With this "black box," you can select a vast number of resistance values by simply rotating one or more switches. A pair of clip leads connected between the box and the circuit at hand makes resistance substitution an easy matter. Such a unit is shown in the accompanying photographs. The circuit appears in Fig. 1.

Circuit Description

A set of 12-position rotary switches is used to progressively select one or more of a number of fixed-value, 1/4-W resistors from each of seven decades. The CONT position of each switch provides a means of bypassing all of the resistors in that particular decade. Note that each unused decade must have its related switch set to CONT to provide continuity between the binding posts and the selected resistor(s). If any one of the switches is placed in the OPEN position, the resistance is effectively disconnected from the binding posts.

As the resistors are selected, they are placed in series with one another and across the binding posts (J1, J2). Clip leads, or a pair of leads equipped with banana plugs at one end and alligator clips at the other, connect the chosen resistance value to the circuit. Simple, isn't it?

Assembly

Gather the required parts first.[1] You must ensure that the enclosure you intend to use has enough height to accept the full length of the switches behind the panel without crushing the resistors attached to the switch lugs. The box we used measures 2-1/4 × 3-1/8 × 5-7/8 inches (HWD).[2] Sufficient panel and box space are available without component crowding.

The aluminum panel supplied with the box has been relegated to the "junkbox." A piece of 1/16-inch-thick pc board is used instead. (Although the pc board we used has copper on both sides, this is not a requisite. We used what we had on hand.) This material afforded greater structural strength than the flimsy piece of aluminum, and permitted us to etch the control markings indelibly on the top surface (front panel) of the unit. Of course, rub-on lettering or even tape labels could be used, but the aesthetics of the panel shown proved more appealing. Once the panel has been drilled and labeled, a coat or two of clear acrylic or polyurethane spray may be applied to add to the durability.

When the front panel is finished, mount the switches and binding posts. Make sure

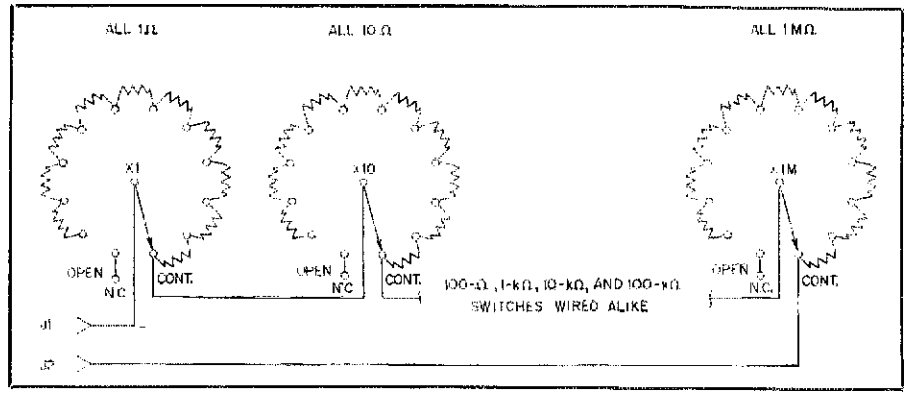


Fig. 1 — Circuit diagram of the resistance decade box. All switches are similarly wired. Ten resistors of equal value are soldered to the lugs of their respective switches.

R1-R70, incl. — 10 each of the following values resistors: 1 Ω, 10 Ω, 100Ω, 1 kΩ, 10 kΩ, 100 kΩ and 1 M Ω.
of 1/4-W, 5%-carbon composition or film

[1]Notes appear on page 37.

*P.O. Box 969, Pueblo, CO 81002
**Assistant Technical Editor, QST

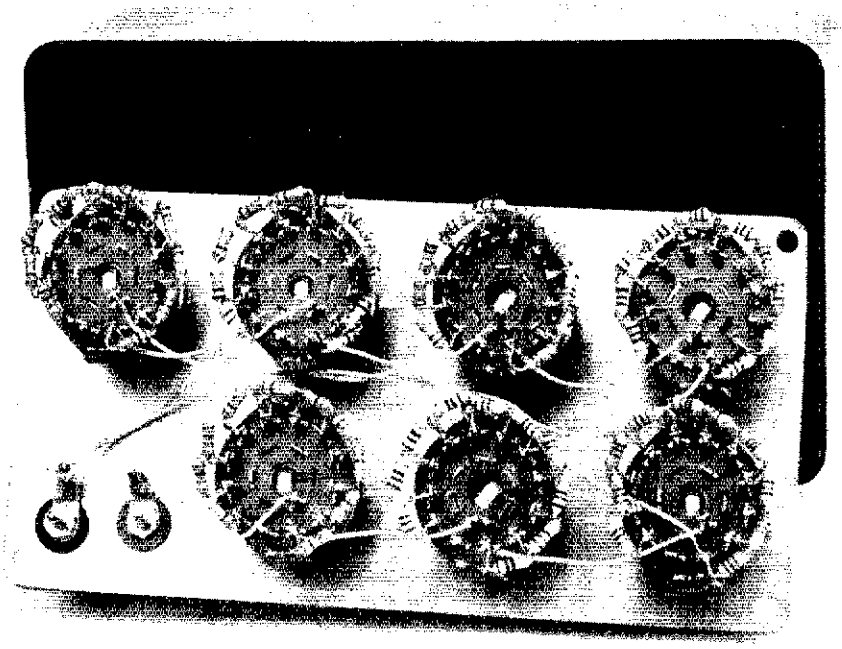


Fig. 2 — This inside view of the decade box shows the resistors surrounding each switch like ants playing "follow the leader."

the binding posts are insulated from the copper foil. Check the switch orientation and identify the first lug of each switch.

It's a good idea to check each resistor value with an ohmmeter prior to soldering it in place. It'll keep you from having to mess things up later, should there be a "baddie" in the bunch.

Then begin soldering the resistors to the switch lugs, forming a ring around the periphery of each switch. If you progress from left to right, bottom then top, it should be easy to keep track of the switch interconnections. When soldering, use a low-wattage (25 W or so) iron. Use of small-diameter (0.032-inch) solder helps things move along swiftly and smoothly.

After the resistors are in place, connect an ohmmeter to the binding posts and check each decade for proper operation. Once that's confirmed, you can plop the top panel assembly onto the bottom cabinet shell and secure it with a machine screw at each corner.

Summary

Remember that the power rating of the resistors used is only 1/4 W. Don't try to use the box as a dummy load for the transmitter or as a bleeder resistor for a kilowatt power supply! We hope you've enjoyed this "simple but engaging" project. It should make a welcome addition to your work bench.

Notes

[1]A complete kit of parts is obtainable from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

[2]mm = in. × 25.4.

Strays

QEX: THE EXPERIMENTERS' EXCHANGE

Wonder what you've been missing by not subscribing to *QEX*, the ARRL newsletter for experimenters? Among the features in the December issue were:

- "RTTY Send Program & Interface for the Sinclair/Timex ZX81, " by Brian Davis, W9HLQ
- A new, bimonthly "VHF + Technology" column by Geoff Krauss, WA2GFP
- "Nicads for the Azden PCS-2000," by Joe Pettengill, N2BC
- The popular "Components" column by Mark Forbes, KC9C.

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

HAMS ATTEND NATO CONFERENCE IN PARIS

☐ Recently, members of the Electromagnetic Wave Propagation Panel of the NATO Advisory Group on Aerospace Research and Development met in Paris. Hams who participated are Jack Belrose, VE2CV, as chairman; Dave Davidson, W1GKM, who gave a paper on earth-space propagation at 19 and 29 GHz; and Dick Grantham, VE1AI, who gave a paper on over-the-horizon salt-water path. VE2CV and W1GKM are ARRL technical advisors.

SOLID-STATE 6146s?

☐ There was a time when some hams joked about having a miniature, solid-state equivalent to the 807 or 6146 vacuum tube. That once-jestful concept is now a reality, for Siliconix has been at work developing a device that almost fits the description. The DV1260T MOS power FET measures approximately 1 × 7/8 × 3/16 inch. The operating voltage is 12.5 (V_{DS} maximum = 45) and the power output is 60 W up to 175 MHz. The device dissipation (maximum) is specified as 240 W. Maximum drain current is 12 A.

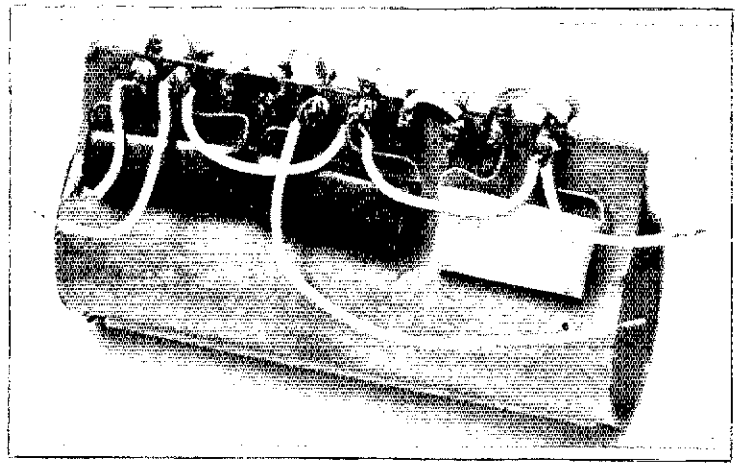
For those who aren't familiar with power FETs, they are triode devices that have input impedances similar to vacuum tubes (1 megohm or greater). The typical drain impedance is low, on a par with that of power bipolar transistors. Furthermore, the IMD characteristics are much better than one can obtain with bipolar devices. In fact, the IMD products are as low in level as those from vacuum-tube amplifiers.

Siliconix and Motorola are both making significant advances in the power-FET technology. The writer, while recently working with a pair of Motorola MRF 138 power FETs, obtained 60 W of rf output at 30 MHz with only 288 mW of driving power. Sound like a tube? Yes, indeed! — *Doug DeMaw, W1FB*

Washington Governor John Spellman (seated) signs a proclamation designating September 13-19, 1982 as Amateur Radio Week. Looking on (l-r) are WA7RWK, K7RS, W7WLX, K7LAY and W7CKZ.

88-mH Inductors — A Trap!

Was the inductance of your modified 88-mH inductor correct? No? Here's the reason why, and some other useful filter information as well.



By Harold T. Mitchell,* NØARQ

Ed Wetherhold has designed a number of excellent audio-frequency band-pass filters that use surplus 88-mH toroidal inductors.[1,2] One of his latest designs is a simplified version of the Crud-O-Ject (COJ) cw filter.[3] It achieves greatly improved skirt selectivity using five resonators (tuned to 592 Hz), instead of three as in the COJ.

Fig. 1 depicts the simplicity of this single-stack filter that employs five standard-value capacitors wired to the existing solder terminals of the toroid stack. An end inductor is removed from the stack, modified to a value of 36.4 mH, then reinstalled in the COJ. Schematic and wiring diagrams and termination information are also given in Fig. 1.

The improved attenuation and skirt selectivity of the filter as compared with that of the original COJ is shown in Fig. 2. An excellent shape factor of 3.7:1 is indicated.[4] A 6/60-dB shape factor could not be calculated for the original COJ because it is so broad, relatively, that 60-dB attenuation data points do not appear on the plot.

Toroids Under Scrutiny

From 1968, when Wetherhold published his information on inductance and Q of surplus inductors for the amateur community,[5] tables of inductance versus turns removed have been used, which require interpolation for obtaining intermediate inductance values. Then, only one core permeability had been recognized.

While modifying a number of 88-mH toroidal inductors for use in a different filter, I realized I had obtained different values of inductance using the toroids on hand, although the same number of turns had been removed from each toroid. One toroid had an inductance that was 18.3% lower than the required and expected value of 43.2 mH. This difference was traced to the fact that the toroid cores are made from two types of magnetic material having significantly different magnetic permeabilities.

Proper modification of the inductors can avoid large errors by taking into consideration the core type. The doubly wound (two-separate windings) toroid most commonly found is wound with green magnet wire on a light-blue (some might call it blue-green) core, and each winding start has a light-yellow tubing over the wire ends. Another type of two-separate-winding toroid is wound with green wire on a white core of higher permeability. Black sleeving is found on the ends of each start wire of that toroid type.

Bifilar-wound toroids are also available. These have red and green wires wound on a smaller core that is either brown or white in color. Tests of both bifilar-wound toroid types indicate that the cores have the same magnetic permeability. Perhaps the core colors are used to differentiate between manufacturers or core finishes.[6,7]

The Trap!

These audio-frequency toroids are beautifully analytic. It is possible to model these inductors precisely with equations that will give the number of turns to remove to obtain any desired inductance value. Since these modified 88-mH toroids have two equal windings connected in series aiding, I have written the equations in terms of the number of turns to remove per winding (turn pairs for bifilar-wound cores) and series-aiding inductance. These formulas are given in Table 1.

In addition to the gross error encountered as a result of the use of different core materials, there is a lot-to-lot magnetic permeability variation that is estimated to be ±8%. This variation is normally compensated for by adding or subtracting turns during the manufacturing process to obtain an estimated inductance value of 88 mH ±2%. An error analysis yielded a maximum error of ±6.7% at 43 mH for a modified toroid. Less error than this would almost always exist. In my estimation, an error within ±5% can be expected. The equations given in Table 1 are accurate for inductance values of 8 to 88 mH.

How many turns should be removed to obtain an inductance value of 36.4 mH for the improved COJ filter? From the equations: 132 turns per winding (264 total) for the blue core, 107 turns per winding (214 total) for the white core, or 133 turn-pairs (266 total) for the bifilar-wound toroid. If 132 turns were to be erroneously removed from the white-core toroid, the inductance value would end up being 27.7 mH, 23.9% low. This is the trap that exists. To avoid the trap, just identify the wire and core color and use the correct equation!

Summary

An s.a.s.e. (two stamps on a 4-1/2 × 9-inch envelope) sent to Ed Wetherhold[8] will bring a wealth of information on con-

*3M Electronic Products Division, 3M Center 207-1W, St. Paul, MN 55144

[Notes appear on page 39.]

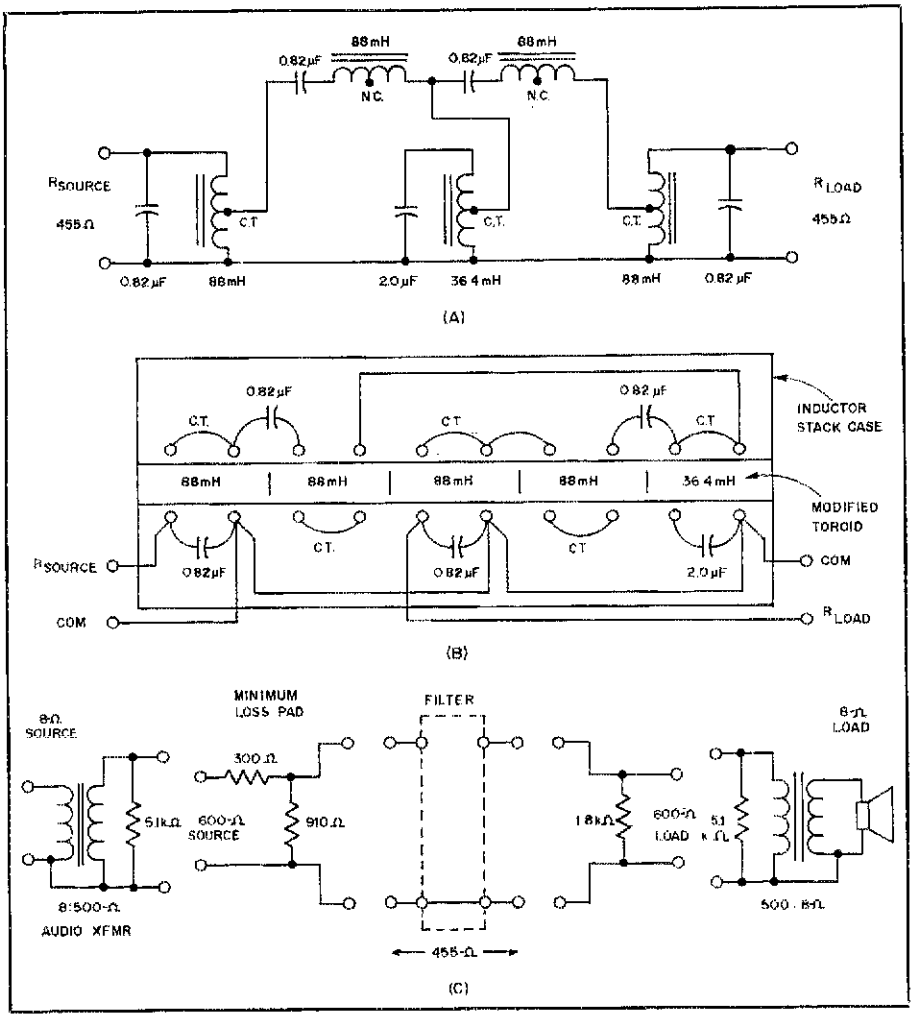


Fig. 1 — At A, the schematic diagram of the improved Crud-O-Ject cw filter. A pictorial wiring diagram is shown at B. One end toroid of the five-inductor stack is modified as discussed in the text. The impedance-matching methods shown at C should be employed to ensure that the filter is operating with the proper load impedances. Metallized Mylar capacitors with 100-V ratings may be used. Resistors are 1/2-watt, 10% units.

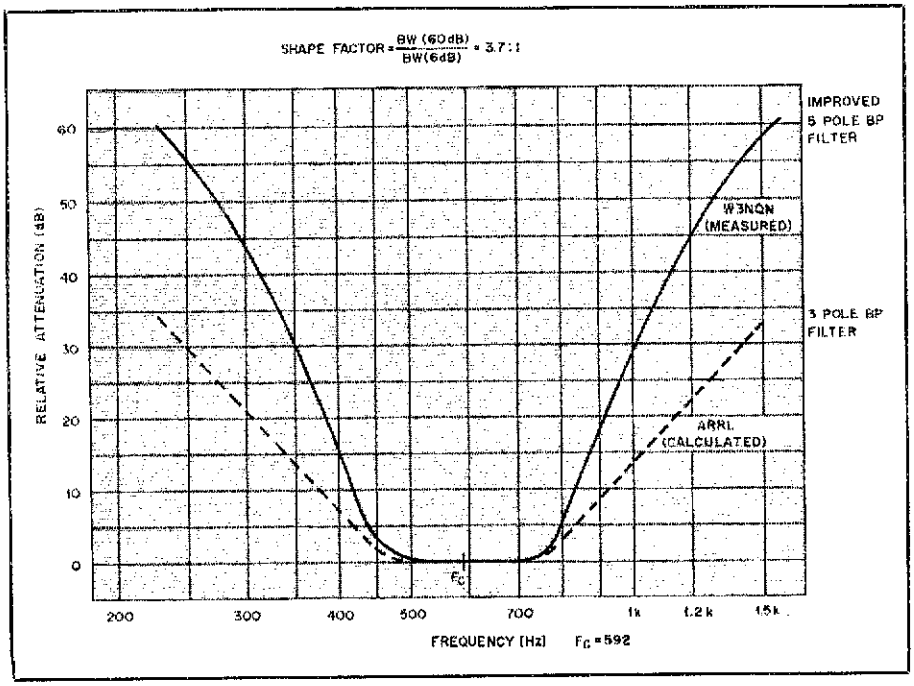


Fig. 2 — Comparisons of the attenuation characteristics of the original Crud-O-Ject filter and the improved Wetherhold version.

Table 1
88-mH Toroid Modification Equations

Two-separate-winding, blue-core, green-wire, yellow-sleeve toroid, 87.4 mH typical inductance:

$$T_{wr} = 373 - \sqrt{1592 \times L_{sa}}$$

$$L_{sa} = \frac{(373 - T_{wr})^2}{1592} \qquad \text{(Eq. 1)}$$

Two separate winding, white-core, green-wire black sleeve toroid, 87.3 mH typical inductance:

$$T_{wr} = 302 - \sqrt{1045 \times L_{sa}}$$

$$L_{sa} = \frac{(302 - T_{wr})^2}{1045} \qquad \text{(Eq. 2)}$$

Bifilar-wound toroid, 88.1 mH typical inductance:

$$T_{pr} = 372 - \sqrt{1571 \times L_{sa}}$$

$$L_{sa} = \frac{(372 - T_{pr})^2}{1571} \qquad \text{(Eq. 3)}$$

where
T_{wr} = turns removed from each winding.
T_{pr} = turn pairs removed.
L_{sa} = series-aiding inductance in mH. and 373, 302 and 372 are the number of original turns on the inductor (T_o).

struction and termination of a number of advanced cw, speech and RTTY filters, along with details of his offer to ship free surplus inductors to radio amateurs. These inductors are made available through the courtesy of the Chesapeake and Potomac Telephone Company of Maryland, and delivery is contingent on availability. For a nominal fee, Ed will not only ship inductor stacks to filter builders, but also will supply matched capacitor sets and impedance-matching audio transformers. These filters like to "see" and work into resistively terminated sources and loads of the proper value. A 10 to 20% impedance mismatch can be tolerated, however, depending on the reflection coefficient of the filter.

I gratefully acknowledge the assistance of Ed Wetherhold. The stimulation of his designs have led me to this interesting work. In addition to Ed's review of this article, I am indebted to Joseph A. Gutowski of EWC, Inc., for his assistance.

Notes

[1]E. Wetherhold, "Modern Design of a CW Filter Using 88- and 44-mH Surplus Inductors," *QST*, Dec. 1980, and Feedback, *QST*, Jan. 1981, p. 43.
[2]E. Wetherhold, "High Performance CW Filter," *Ham Radio*, April 1981.
[3]J. Hall and R. Myers, "The CRUD-O-Ject," *Weekend Projects For the Radio Amateur*, Volume I (Newington, ARRL, Inc., 1979) and *QST*, Feb, 1972.
[4]D. DeMaw, "Beating Rotten QRM — CW Filtering for the Beginner," *QST*, Oct. 1981 and Feedback, *QST*, Dec. 1981, p. 55.
[5]E. Wetherhold, "Inductance and Q of Modified Toroidal Inductors," *QST*, Sept. 1968.
[6]"Molybdenum Permalloy Powder Cores," Catalog PC-104H, Arnold Engineering, Marengo, IL 60152.
[7]"Molypermalloy Powder Cores," Catalog MPP-303T, Magnetics Inc., Butler, PA 16001.
[8]E. Wetherhold, W3NQN, 102 Archwood Ave., Annapolis, MD 21401.

APPENDIX

Since this article was written, a fourth type of 88-mH toroid has been found. Using inductance data obtained from the toroid by means of a precision RLC impedance bridge, equations were developed. The equation development method and the equations will be given here. A simple inductance-measuring technique will also be described.

Using the initial inductance value and any other inductance value measured after removing at least 20% of the toroid turns, the T_w^2/L_{sa} quantity (turns of wire per series-aiding inductance in mH) can be accurately calculated for various assumed values of T_o (number of original turns of wire). If the assumed value of T_o is less than actual, T_w^2/L_{sa} will decrease when turns are removed. If the assumed value of T_o is too large, the term will increase. For some T_o values, the calculated quantity will remain essentially constant, and the two then can be used to form the desired equations.

As shown in Table 2, four data points were obtained for the purposes of illustration, although two would have been sufficient in practice. When all turns were removed, 359 were counted for each winding, which agreed exactly with the assumed value of T_o.

Table 2

Data For the Two-Separate-Winding, White-Core, Red-Wire, Yellow-Sleeve Toroid

Measured Data		*Calculated Data* $T_w^2/L_{sa} = (T_o - T_{wr})^2/L_{sa}$		
		T_o =	T_o =	T_o =
T_{wr}	L_{sa}	*358*	*359*	*360*
0	88.0	1456	1465	1473
50	65.1	1457	1467	1476
100	45.8	1453	1465	1476
200	17.25	1447	1466	1484
		(Decreasing)	(Constant)	(Increasing)

Therefore

$$T_{wr} = T_o - \sqrt{\frac{T_w^2}{L_{sa}} \times L_{sa}}$$

$$= 359 - \sqrt{1466 \times L_{sa}} \qquad \text{(Eq. 7)}$$

and

$$L_{sa} = \frac{(T_o - T_{wr})^2}{\frac{T_w^2}{L_{sa}}} = \frac{(359 - T_{wr})^2}{1466} \qquad \text{(Eq. 8)}$$

An Inductance Measuring Method

For purposes of equation development or resonating an L-C circuit at a frequency of interest, the simple circuit shown in Fig. 3 may be used. If a close-tolerance capacitor (or one measured with a precision capacitance meter) is used, the corresponding inductance at resonance can be calculated from the equation

$$F_r = \frac{1}{2\pi\sqrt{LC}} \qquad \text{(Eq. 4)}$$

where

F_r = resonant frequency in hertz
L = inductance in henrys
C = capacitance in farads

For example, if C = 0.512 μF, and F_r is 750 Hz

$$L = \frac{1}{C(2\pi F_r)^2} = \frac{10^6}{(0.512)(2\pi \times 750)^2} \qquad \text{(Eq. 5)}$$

After inductor turns have been removed and counted, if resonance at 738 Hz is established with a 1 μF capacitor, then the second inductance value is calculated:

$$L = \frac{10^6}{(1)(2\pi \times 738)^2} = 46.5 \text{ mH} \qquad \text{(Eq. 6)}$$

In the preceding example, about 27% of the turns were removed ($\sqrt{46.5/88} = 0.727$), thus assuring accuracy when writing the other equations.

When using the test setup shown in Fig.3, vary the generator frequency to obtain a maximum voltage indication on the VTVM, and record the resonant frequency. Calculate the inductance using Eq. 5. If the counter is accurate to ±1 Hz and the capacitor has a tolerance of ±0.5%, the calculated inductance should be accurate to within ±1%. For best accuracy, the resonating capacitance should be more than one thousand times the isolation capacitance. If the resonating capacitance is too low, the isolation capacitance will be significant enough to effect the accuracy of the calculations.

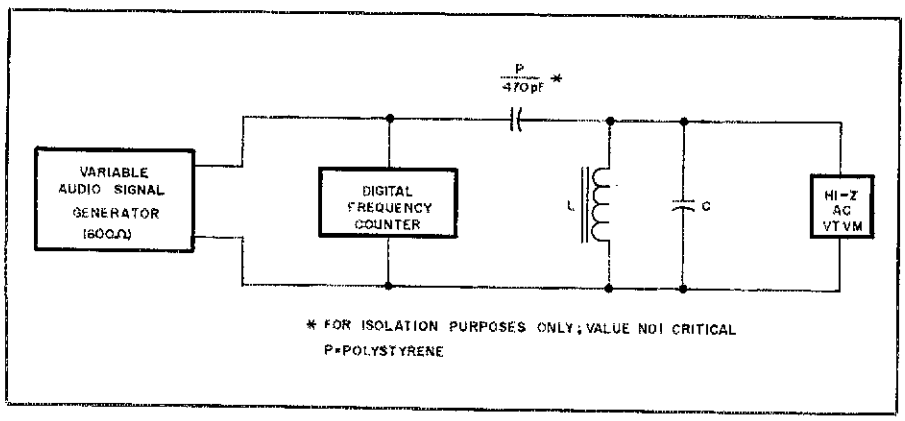


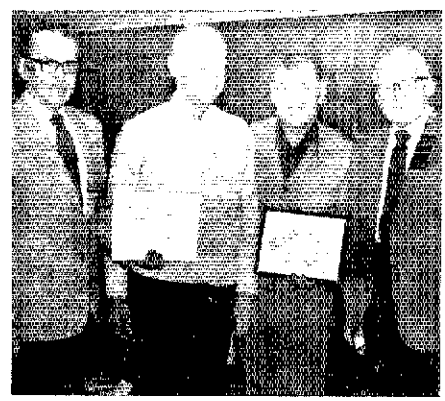
Fig. 3 — Test circuit used when evaluating toroid inductance (see appendix).

Strays

ARRL President W4KFC (center) poses with 50-year members Vice President KØGA (left) and K6EA, of Bemidji, Minnesota, at the Moorhead, Minnesota, convention in September.

TECHNICAL PUBLICATION FOR THE BLIND

☐ Blind and visually impaired amateurs who are interested in current technology can subscribe to the *Smith-Kettlewell Technical File*, a low-cost publication tailored to their needs. Produced by the Rehabilitation Engineering Center of the Smith-Kettlewell Institute of Visual Sciences, the *Technical File* is published quarterly in Braille, large print or talking book form, and provides independent access by the visually handicapped to state-of-the-art devices, circuits and adaptive techniques. For more information and a free first issue, write to or call William A. Gerrey, Editor, Smith-Kettlewell Institute of Visual Sciences, 2232 Webster St., San Francisco, CA 94115, tel. 415-561-1619.



You're never too old to become an amateur. Ed Rheault, a white-caner from Kenora, Ontario, is 72 and now on the air. From left to right: Bill Lowe, VE3MOS; Ed, VE3MOX; Ed's sponsor, Phil Mosher, VE3JJF; and Milt Sizer, VE3JJO, of Lake-of-the-Woods ARC. *(Kenora Miner and News photo)*

Product Review

Conducted By Paul K. Pagel,* N1FB

Cushcraft Corporation A4 Triband Yagi

☐ I have neither the desire nor the tower capability to place aloft one of those huge, super-dandy, drooping-monster hf-band Yagis at my QTH. My modest 50-foot, unguyed spire (Rohn 25G) will accommodate any reasonable size beam antenna,[1] but there are weight and wind-loading limits that must always be considered. Therefore, I have worked with a succession of 3-element triband Yagis for operation on 20, 15 and 10 meters, and the results have been entirely satisfactory for my DX appetite (modest).

There must be an acknowledged trade-off between size and efficiency when using a trap type of antenna, for there are always some losses in the system. But, the difference between a full-size 3-element Yagi and a shorter one with traps would yield a performance difference that would be difficult to measure. Practically, a well designed triband trap Yagi will provide good performance for all-around hf communications.

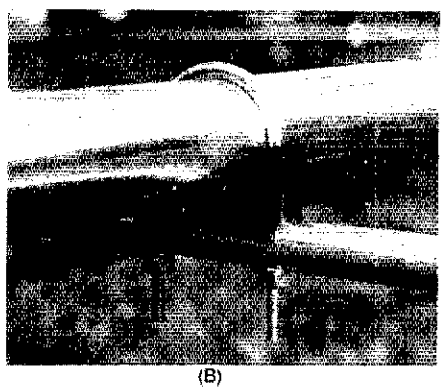
A major consideration, once you've chosen to erect a tribander, is the physical makeup of the antenna. That is, it needs to be rugged enough to withstand wind and ice loading (and vibration) without generating a shower of metal parts on your house or lawn. (I had that unwanted experience with one brand of beam antenna some years ago, owing to poorly designed element clamps.)

Based on comments by Paul Pagel, N1FB, I'd concluded that the Cushcraft A4 Yagi should be as rugged as his A3 version, so it was selected for use at W1FB. He was correct, for the system is nicely designed in terms of physical structure. Fig. 1A shows how the element sections are held together by means of steel compression clamps. Fig. 1B illustrates the Cushcraft method of joining the elements to the boom in a plastic cradle through which a U bolt is inserted. The boom-to-mast plate and U bolts are shown in Fig. 1C. This hardware is situated just behind the driven element feed point. A Bencher balun is shown in photograph C. It was tried experimentally and replaced later by the specified eight-turn decoupling choke made from RG-8/U cable.[2]

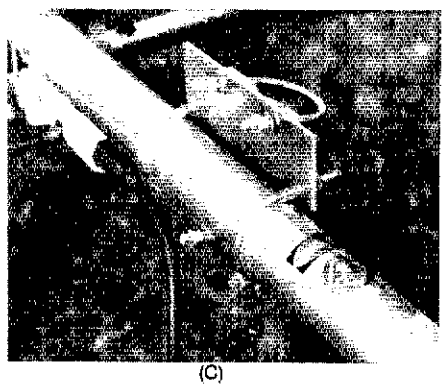
All of the aluminum stock for the A4 is polished and of high quality. No defects caused by the extrusion process were noted (always check for cracks or thin areas before assembling an antenna).

The A4 is rated at 2000-W PEP and has a balanced feed-point impedance of 50 ohms.

(A)



(B)



(C)

Fig. 1 — View of the steel hose clamp that joins the element sections (A). The boom-to-element mounting hardware is shown at B. Illustration C shows the boom-to-mast mounting method.

The longest element dimension is 32 feet. An 18-foot boom is used. Boom diameter (OD) is 2 inches. A turning radius of 18 feet is required for the A4. The theoretical gain for a 3-element Yagi of this spacing is approximately 8 dB, with an average front-to-back ratio of approximately 25 dB being typical.

Although the assembled antenna appears to be a 4-element type, it is not — at least with regard to electrical traits. There are four *physical* elements, but in operation on a given band there are but three elements. The fourth element is a reflector for 10 meters. The larger reflector behind the 10-meter one is used during 15- and 20-meter operation. This eliminates the need for an extra set of traps in the main reflector element.

Construction

Owing to an inherent lack of mechanical dexterity, it probably took me longer than most amateurs to assemble the A4. I devoted about four hours to the task. Another hour was spent getting the antenna mounted on the tower (courtesy of KC1V and AK4L). The only glitch in the process occurred during erection (at dusk): The Yagi was attached to the mast "upside down," and nobody noticed it. The undesired effect was readily apparent two days later when the SWR skyrocketed following a rain storm! The trap drain holes were of course pointing upward, and each trap had become a small reservoir! A 180-degree flip-flop followed, and once the traps dried out I was back in business. This illustrates clearly the need to make certain the trap holes are pointing downward after assembly, as indicated in the instructions.

As a preventive measure after assembly, I placed a generous blob of noncorrosive RTV sealant over each bolt head and nut. Cushcraft supplies zinc-plated steel hardware, which should last a long time. But, an added measure of protection will help prevent oxidation and aid one's peace of mind when contemplating antenna longevity.

The ends of the elements and boom are fitted with plastic caps to prevent accumulations of moisture. This also lessens vibration from the wind and prevents the elements from "singing."

Performance

My A4 is fed with 50-ohm, aluminum-

[1]meters = ft × 0.3048, mm = in. × 25.4.

[2]The Bencher balun was tested in the interest of compactness and physical convenience. However, the VSWR readings of Fig. 2 were obtained while using the 8-turn, 6-inch diameter coil of RG-8/U cable specified by Cushcraft. It is likely that the coaxial-cable decoupling choke is somewhat less lossy than the trifilar coil balun. The balun shifted the antenna resonance somewhat lower which would have required readjustment of the element lengths.

*Assistant Technical Editor

Cushcraft Corporation A4 Triband Yagi

Manufacturer's Claimed Specifications	*ARRL Evaluation*
VSWR: 1.2:1 typical (resonance).	Confirmed (see Fig. 2).
Power rating: 2000 W PEP.	Confirmed.
Feed impedance: 50 ohms.	Confirmed.
Material: 6063-T832 seamless tubing.	Confirmed.
Weight: 37 pounds (16.8 kg).	As stated.
Wind surface area: 5.5 sq. ft (0.51 sq. m).	—
Longest element: 32 feet.	As stated.
Boom length: 18 feet.	As stated

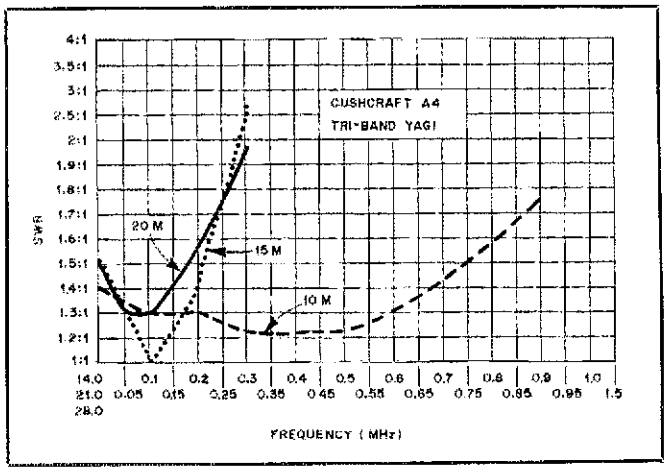
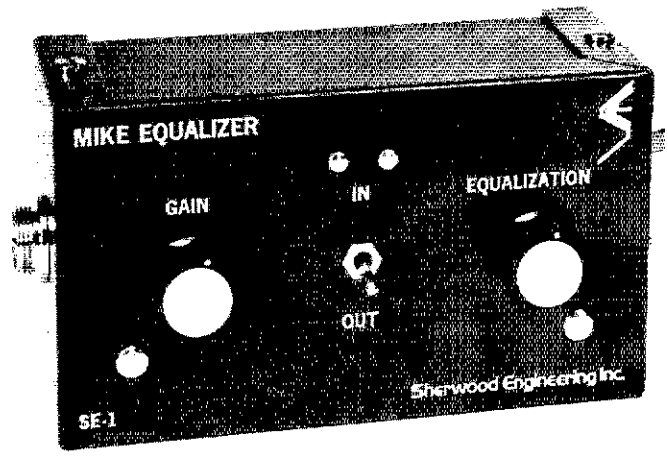


Fig. 2 — SWR curve of the Cushcraft A4 tribander.



jacketed Hardline. Overall transmission-line length is 60 feet. A Bird Thruline wattmeter was connected between the lower end of the feed line and an FT-101ZD signal source. The A4 was adjusted for optimum operation in the cw portions of the three bands, in accordance with the dimensions given in the instruction sheet. The resultant SWR curves are shown in Fig. 2.

$$VSWR = \frac{1 + \sqrt{\frac{P2}{P1}}}{1 - \sqrt{\frac{P2}{P1}}} \qquad \text{(Eq. 1)}$$

where P1 is the forward power in watts and P2 is the reflected power in watts.

I find it necessary to use a Transmatch to disguise the SWR when operating in the phone bands (which I seldom do). Operation by that means is satisfactory. Those wishing to strike a compromise between phone and cw operation may wish to adjust the antenna for midband resonance. A chart is given in the instruction sheets to provide dimensions for three segments of each band — phone, center and cw.

On-the-air performance has been excellent, with suitable front-to-back and front-to-side ratios evident. I have had no difficulty working DX worldwide, using 100 W and 1000 W of dc input power to the transmitter PA. My batting average for breaking pileups on cw has also been satisfactory.

The A4 has endured several severe wind storms (up to 70 mph) and one ice storm without mishap. Based on my experiences with the antenna during the past year, I would give it a top rating for a small, moderately priced beam antenna. Those wanting four-band operation with the A3 and A4 Cushcraft antennas may purchase the 40-meter conversion kit and install it in the driven element. The A4 price class is $330; A744 (7- or 10-MHz) adapter kit, $90; A4SK stainless-steel hardware kit, $55. Manufacturer: Cushcraft Corporation, P.O. Box 4680, Manchester, NH 03108. — *Doug DeMaw, W1FB*

SHERWOOD ENGINEERING SE-1 MICROPHONE EQUALIZER/ PREPROCESSOR

☐ Recently, amateurs have begun to take greater notice of their ssb signal fidelity. Traditionally, a "speech processor" has been a device that alters the signal peak-to-average amplitude ratio. Such systems invariably alter or degrade the audio characteristics of the voice — usually causing it to sound "bassy" and "rough."

Theoretically, the audio response of a microphone amplifier circuit in a communications phone transmitter should be flat across the voice band (300 to 3000 Hz). Often, this is not the case. The microphone response should be flat across this band, also. Again, frequently this is not the case. As a result, we have come to expect ssb signals to sound "Donald Duck-y."

Recording studios use equalizers to correct for distortion introduced by electrical and acoustical factors. An equalizer has controls that permit the operator to adjust the phase and level of several segments of the audio spectrum. The Sherwood SE-1 represents one attempt to introduce this kind of processing into Amateur Radio transmitters. It won't increase the average power level of your signal, but it may make it easier for operators on the receiving end to understand what you are saying.

The SE-1 is housed in a heavy, steel black box, measuring 3 × 5-1/4 × 2 inches (HWD).[3] Internally, the device is a "black box" also. A single transistor, one IC, a toroid and a few other components are mounted on a glass-epoxy pc board. All markings have been removed from the active devices. Sherwood does not supply a diagram of the circuit, but does provide minimal circuit description. In fact, the only paperwork supplied with the SE-1 are installation and operating instructions on two sides of one sheet of paper. The installation instructions are complete and should be adequate for anyone who is moderately comfortable when using a soldering iron and pliers.

A toggle switch places the circuit in line and applies power (9-V transistor-radio battery). Two controls, GAIN and EQUALIZATION, can be adjusted from the front panel. Adjusting GAIN simply changes the output signal level while changing the EQUALIZATION setting alters the tonal components of the signal. Advancing the control clockwise *appears* to enhance the higher-frequency components. Unfortunately, the exact functioning of the control is not specified in the literature.

I called Bob Sherwood and asked him about the EQUALIZATION control. Bob told me it controls the "tilt" of a processing stage. He went on to tell me what he meant by "tilt." With the control fully counterclockwise, a 2800-Hz tone through the device will have a 2-dB advantage over a 300-Hz tone. As the control is rotated to the fully clockwise position, the advantage increases from 2 to 20 dB. This description matches the subjective appraisal I received from operators on the air.

Bob stated that the microphone preamplifier stage consists of a single FET and a gain control. The high impedance of the FET permits the circuit to be used with any microphone, without danger of the circuit loading the microphone. Beyond that, Bob was reluctant to discuss the circuit.

On-the-air reports indicated that the SE-1, *properly adjusted,* made my ssb signal sound more natural — more like the audio extracted from an fm circuit. I believe it made it easier for other operators to understand what I was saying. If you are concerned about the quality of your signal and if you want to be understood as well as be heard, then you should give the SE-1 serious consideration. The SE-1 is available from Sherwood Engineering Inc., 1268 South Ogden St., Denver, CO 80210. Price class: $100. — *Peter O'Dell, KB1N*

DAIWA AF-606K ACTIVE AUDIO FILTER

☐ Audio filters are in abundant supply these days. They come in many sizes, shapes and price classes, but the Daiwa unit has a distinctive look — akin to that which characterized post WWII military gear. I was impressed with the clean, snappy appearance of the filter when I extracted it from the box. The panel appears to be black anodized aluminum, and the lettering at each control is off-white. A dark gray case provides a two-tone contrast.

But, appearance is not the primary consideration when buying a new piece of equipment for the shack. How does it "play"? That's the question asked by a smart buyer, and rightly so! Bells and whistles (if I may use the vernacular) seem to have a biasing effect on today's purchaser of new apparatus. But some of the fancy gee-gaws being offered could just as easily be omitted in the interest of keeping the unit cost within the reach of the common man or woman. The AF-606K has one feature that might be classed as a frill (more on that later), but it otherwise is a pretty basic audio

[3]mm = in. × 25.4

filter with variable bandwidth and a notch function.

The Daiwa unit does not have a built-in power supply. A low-current, 12-V external power supply is required for operation. *Beware!* The outer ring of the 12-V jack is the positive one. The center pin is for the negative or ground lead of the supply. This is not the U.S. convention, so don't let habit get you in trouble when you hook up your unit.

Installation requires a patch cord from the phone jack of your receiver or transceiver to the input phono connector on the rear of the AF-606K. A built-in speaker permits monitoring the filter output. Alternatively, the operator can attach an external speaker, or may elect to connect headphones by means of a front-panel jack. I found it best to use phones, since the speaker function did not produce room-volume audio at a level that was comfortable during weak-signal reception. Attempts to increase the output level by turning up the receiver audio gain resulted in distortion from overdriving the audio filter (a normal experience with outboard audio filters when the maximum tolerable excitation limit is reached).

Five controls are located on the front panel of the unit. Left to right are NOTCH, PLL, BAND PASS, MODE and POWER. The NOTCH control is variable from approximately 500 to 2500 Hz, with some overrun at each end of the control. I measured the notch depth (at 700 Hz) as 33 dB. I'll discuss the PLL control later on.

The BAND-PASS control is used to peak the audio-filter response for the cw pitch the operator prefers (500 to 700 Hz in my case). A band-pass response is provided in this unit, which yields audio roll-off above and below the desired frequency. The pass band is variable from approximately 400 to 1200 Hz, with some extra range at each end of the control.

MODE selection is accommodated by the near-right control. It enables the user to choose a notch condition, three ssb bandwidths (1.5, 2.0 and 2.5 kHz), three cw widths (80, 110 and 140 Hz) and PLL. The POWER ON-OFF switch is at the far right on the panel. Directly below it is the PHONE jack.

Now comes the "hell" or "whistle," whichever word you may prefer. The PLL function enables the operator to tune in a cw signal and listen to it via a keyed tone that is generated within the AF-606K. In effect, the cw signal from the receiver is detected, then routed to a control circuit, which actuates a tone generator. An LED on the front panel of the audio filter illuminates when the PLL frequency control is set to the pitch of the cw signal, as heard when the filter is turned off. Under this condition the PLL is considered in the "lock" mode. The purpose of the PLL function is to eliminate QRM and band noise. Effectively, all you will hear is a single cw note coming from the audio filter.

Various schemes of this type have been contrived and tested for a number of years. None of them proved to be spectacular. The major limitations are that very weak signals do not trigger the tone oscillator in a reliable manner, which leaves gaps in the cw message. Also, noise pulses will key the tone generator, causing false blips, "stuttering" and incoherence. These problems were noted while testing the Daiwa filter. When a strong cw signal was used to lock the PLL, I noticed the effect of excessive "weighting" on the cw characters. There was also a clicky characteristic to the tone-generated cw note. For the most part, coherence was far superior without the PLL function in use. If the buyer does not wish to have the PLL feature, he or she can purchase the model AF-406K, which is minus the tone decoder.

Filter performance is otherwise excellent. I found no evidence of ringing, and audio output from the AF-606K was very clean within the normal listening range while using headphones. Certainly, the filter did a fine job of "laundering" the receiver output with respect to reducing QRM, annoying heterodynes and receiver wide-band noise. Weak signals were "lifted" nicely out of the noise, providing Q5 copy when copy was not possible without the filter in the line.

This filter and others with similar performance characteristics can spell the difference between success and failure when copying weak cw signals, such as one encounters on 160, 80 and 2 meters, where noise is a universal foe. Sideband operators will find that a good audio filter will reduce adjacent-frequency splatter and rumble. In many instances, the audio filter will give the same effect as a speech processor when it is actuated by the person you are listening to.

Dimensions are 6 × 6 × 2-1/2 inches.[4] Price class is $121. Distributed by MCM Communications, 858 E. Congress Park Dr., Centerville, OH 45459, tel. 513-434-0031. — *Doug DeMaw, W1FB*

[4]mm = in. × 25.4

HAMLOG/APPLECODER

☐ I have some good news, some bad news and some more good news. The good news is that HAMLOG, a log keeping and maintenance program for the Apple II® computer, does everything it says it will do. The bad news is that there is so much that it will not do, frustratingly so, at times. The other good news is that those of you who feel compelled to use a $47 program and $2000 worth of computer equipment to do what a pen and a box of 5 × 7 index cards can do nearly as well won't be disappointed.[5]

HAMLOG fails to take sufficient advantage of the Apple II system power. Users are constantly restricted by the program limitations. That is, they must adapt to the program needs, rather than the other way around. Those who have seen a demonstration of or used such programs as Visicalc or Visidex know how "user friendly" a program can be. HAMLOG is a casual acquaintance at best, and a relatively expensive one at that.

Using HAMLOG

Initialization. When first using HAMLOG, you must initialize the system with your call sign, various modes that you expect to use, and your station-setup data. The latter demonstrates the limitations of HAMLOG rather quickly. Station-setup data is limited to seven characters. For example, the author suggests that a station consisting of a "standard" transceiver, wire antenna and linear amplifier be designated QRO-W-L. You can have several such station setups, so your log can show which particular configuration you were using when you worked a particular station. The brevity of a seven-character designation does have its advantages when it comes to displaying or printing out log data (this brings up another defiency of HAMLOG, which will be discussed later). Nevertheless, the restriction is too severe. Users, after all, can always choose brevity; it need not be forced upon them.

Log Entry: After initializing the program, you can run it. The program is menu-driven. One item on the main menu is "log entry," which is pretty straightforward, although it is definitely geared toward casual operating and not contesting. You enter one log entry item at a time: call, name, band, etc. However, as you enter the items, the previously entered items "scroll up" and quickly disappear from the screen. By the time you've entered the other station's signal report, the call and name have disappeared, and you cannot see them until you finish entering the entire log entry and select the "display log entry" item from the main menu. This is a major inconvenience. As it takes some time to step through the log entry menu, I found myself frequently writing down the other station's call, name, etc., so I wouldn't forget them in case he turned the QSO back to me before the log entry was completed (initial exchanges can be rather quick). This pretty much defeats the purpose of using a computer.

[5]H. Smith, "A Speedy QSO File," *CQ*, June 1962, p. 62.

Change Log Entry. Another item on the main menu is "change log entry." Unfortunately, when you use this item the old log entry does not appear on the screen; unless you have printed out or written down the log entry so you can look at it to know what you're changing, your memory is put to the test. It is a virtual necessity for the old log entry to be displayed while you are changing it. The fact that HAMLOG doesn't allow this is sheer shortsightedness.

Why would you want to change a log entry, anyway? Well, there are lots of reasons, but one very good reason would be to add some comments. You guessed it: According to the HAMLOG User's Manual, "you cannot add text that wasn't there, and you may not increase the number of text lines in the entry you are altering."

Search Log. A useful feature is the "search log" mode, which allows you to enter a call sign, a QTH, a date or a combination thereof, and causes the computer to display or print all log entries with the appropriate parameters. It takes about 3-1/2 minutes to search approximately 500 records, but fortunately you can set "core pointers" to optimize the search routine, and a search by call sign through the same 500 or so records is reduced to 15 seconds. Not bad! (Of course, with my file of 5 × 7 index cards I can perform the same feat in less than 5 seconds.) The core pointers have to be set each time you use the program, though. You can set pointers for call sign, QTH or date, but you can only have a single set of pointers at one time.

The search routines are limited, too, by the maximum number of log entries permitted on a log diskette. Typically, a single diskette can store data for 2000 contacts, *if* you do not append comments to the log entries. With comments, the maximum number of contacts on a diskette is reduced accordingly. For very practical reasons, you can only search *one* log diskette at a time, which seriously inhibits the utility of the search routines after you've been on the air for a while and have filled several log diskettes.

Output Format. HAMLOG formatting to the screen or printer is rather ho-hum. Log entries are printed out line by line, and the items within the log entries are separated by spaces. There is no serious attempt to format the screen or page, which would be easy to do, wouldn't slow down the program noticeably, and would make the entries so much easier to read. In fact, HAMLOG would be a whole lot better if entries were displayed on the screen while you are entering or changing them, with a "bouncing cursor" controlled by appropriate keys. This would allow you to move from item to item, make the necessary entries or changes, and show you exactly what you have entered as you enter it (and after you enter it) without its being blanked from the screen. The technology that permits this exists, but HAMLOG doesn't use it. Perhaps the second version of HAMLOG will. I suggest that you wait for it.

Applecoder

Applecoder is a Morse code teaching program for self-teaching or for the classroom. It, too, is menu driven. The author states that it needs no significant written instruction, and he's right. It is a cinch to use.

Applecoder sends random word groups utilizing the Apple II speaker. You select a "seed" number, which determines the random word groups and allows you to regenerate the same sequence at will. If you have a printer, you can generate "hard copy," which is useful for checking results for yourself or for a class full of students. The word groups are displayed on the screen, but you can always turn the screen off if you are tempted to peek.

Applecoder permits you to change the code tone (200-2000 Hz), speed (5-40 wpm) and character group length (1-9), and will also allow you to exclude certain characters (punctuation marks, numerals, etc.) at your discretion. By varying the random number seed, you never run out of "fresh copy."

Code-speed adjustments may need some fine tuning. The 5-wpm setting was accurate enough, but the 20-wpm setting was, by my calculation, closer to 25 wpm. Sound from the Apple II speaker tends to be muffled and tinny, but removing the top of the computer enclosure improves things considerably. Still, a large group might have difficulty, unless an outboard speaker were installed.

Applecoder uses the ARRL-accepted procedure for teaching and learning the code. At the slower speeds, the characters are sent fast, with additional space between words. This prevents the student from counting individual dots and dashes. All in all, Applecoder is a useful product. — *Hal Steinman, K1FHN*

HAMLOG

Requires 48K + DOS 3.3
Author: Dr. Keith W. Reiss, CECO, Inc.
Price: $47 (disk + manual)

Applecoder

Requires 16K + DOS 3.3
Author: Dr. Keith W. Reiss, CECO, Inc.
Price: $19.95 (disk + instructions)

Both: $58

THE FIST FIGHTER

To a cw operator's ears, there's nothing sweeter than the sound of a smooth fist batting out Morse code. The art of sending good cw has come a long way since the invention of the straight key. Electronic keyers of many different types are prevalent, and with computers and dedicated terminals becoming so much a part of the ham shack, it seems there's not much left that is done away from a keyboard and video monitor. However, there are those among us who still like the feel of the ol' straight key between their fingers.

Description

The Fist Fighter was designed by the Blacksburg Group to help straight-key advocates send perfectly timed Morse code. There are nine CMOS ICs and four transistors (and associated components) contained within the package to do just that. The front-panel mounted VOLUME/ON/OFF control functions as a sidetone level adjustment and power switch. Sending speed is varied by the adjacent SPEED potentiometer that provides a range of adjustment from about 3 to 30 wpm. There's an auto tune-up feature that is jumper-selectable. This provides a constant key-down condition during transmitter tune-up.

The rear panel supports the KEY jack, GRID (−300 V) and DIRECT (+300 V) key line outputs, and a 1/8-inch jack for connection of an external power source. A lantern battery or ac-operated supply delivering 5- to 15-V dc is required to power the unit. A built-in speaker is mounted on the inside of the top cover.

How Does It Work?

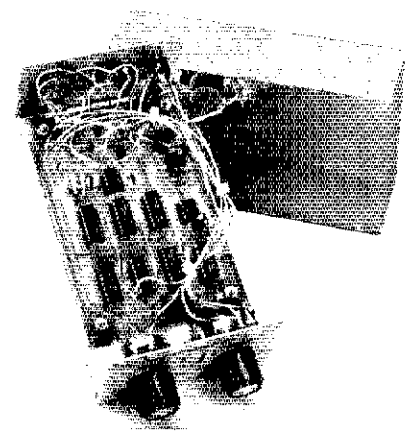
The space/dot/dash ratio has been designed for a 1:1:3 relationship. When you close the key contacts, the Fist Fighter begins sending a dot at the speed you've selected. If you release the key before the end of the dot, the element is completed automatically. If you keep the key closed for a period longer than the dot time, the unit "recognizes" this as an attempt to send a dash and lengthens the element. After each element a minimum off period (equal to a dot length) is enforced by the Fist Fighter. This prevents the dots and dashes from being sent too close together. A key closure during this period will be "remembered" and keying will start immediately after the forced space.

If the auto tune-up feature is wired on the board, a prolonged key closure will result in the sending of one code element followed by a constant key closure. This might lead initially to some confusion when you first try to use the keyer. You might try using it in both configurations to determine which is best for you.

Argument Pro and Con

The Fist Fighter does exactly what the manufacturer says it will do. It will make you send perfectly timed Morse code when using a straight key. However, this does not mean that it will teach you how to send good code with a hand key without the assistance of the Fist Fighter. In use, you must yield on a code element sooner than you would otherwise. This means the actual key closure will be less than it should be if you were sending Morse with only the hand key in the line. But . . . one may argue that such is the case *with all* types of electronic keying devices. For instance, if you've developed some of the characteristic sending habits of those who use iambic keying methods, would you be able to put down the squeeze key and keyer and send code as well with the old bug that's been relegated to the operating desk drawer? Probably not. The upshot of all this is that once you've learned to use the Fist Fighter effectively, the chances are that you will have to stay with it as you would with any electronic keying device. (The Wouff Hong should dispel any thoughts of using this device on SKN!)

The Fist Fighter is available from The Blacksburg Group, Box 242, Suite 100, Blacksburg, VA 24060. Size: 2-1/8 × 3-1/2 × 7-1/2 inches (52 × 89 × 190 mm) (HWD). Price class: kit form, $60; wired and tested, $80. — *Paul K. Pagel, N1FB*



Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

75-W AMPLIFIER FOR 10-METER FM

☐ Converted CB rigs are popular for 10-meter fm operation.[1] When conditions were good, these rigs provided many contacts, but with declining sunspot activity the 5-W power limit may be too restrictive.

I modified an old, homemade cw rig to serve as a Class C amplifier. The original circuit came from the 1962 *Radio Amateur's Handbook*.[2] The amplifier works well with my converted Hy-Gain CB board, and has a power input of 60 to 75 W. A Class C amplifier is nonlinear and is not suitable for use with an a-m or ssb rig, because it will distort the signal. A power supply capable of providing 600-V dc under load for the 1625 amplifier tube and 12-V ac for the filament is required. The original project included a power supply, but the tube rectifiers could be replaced with solid-state units.

I removed the 6AG7 buffer/multiplier circuitry and added an impedance-matching network at the input of the 1625 tube. The schematic diagram of the amplifier is shown in Fig. 1. The variable capacitors were taken from old broadcast-band receivers. A neutralizing capacitor made from several turns of twisted wire is used. Be sure to use wire with good high-voltage insulation. You will have to experiment with the number of turns in order to stabilize the amplifier.

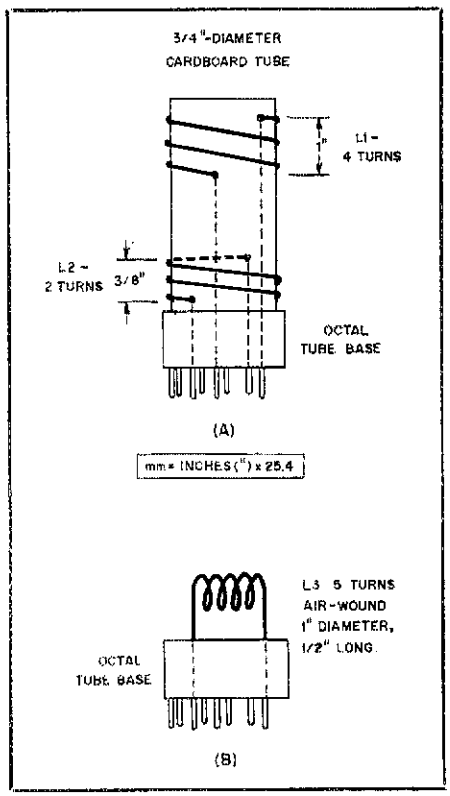


Fig. 2 — Coil-winding information for L1 and L2 is given at A, and for L3 at B. Octal tube sockets and bases were used in the original circuit to simplify band changes. This will not be necessary if you are building the amplifier instead of modifying an old transmitter.

Coil-winding information is given in Fig. 2. Use no. 14 wire for L1, L2 and L3. L3 should be air wound.

To use the amplifier, tune C1 and C2 for a transceiver output equivalent to that obtained when using a 50-ohm dummy load. Next, tune C3 and C4 to obtain the maximum output from the amplifier with a plate current of about 100 mA. This should result in 60 W or more of dc input power. One source of 1625 tubes is Fair Radio Sales, P.O. Box 1105, 1016 E. Eureka St., Lima, OH 45802. The cost should be but a few dollars each. — *Dick Gulatsi, AC3D, Devon, Pennsylvania*

INEXPENSIVE CTCSS TONE GENERATOR

☐ A common frequency for continuous tone-coded squelch systems (CTCSS) in many parts of the country is 100 Hz. I have a Sears Model 3880 2-meter rig, and was faced with the prospect of spending $20 or more for a commercial tone generator. In an effort to save that money, I built the circuit shown in Fig. 3. The circuit divides the 10-kHz synthesizer reference signal down to 100 Hz in a pair of 4018 CMOS divider chips.

The first stage can be any CMOS divide-by-10 chip, but the second stage must be a 4018 IC connected as a "walking ring" or Johnson counter. Four resistors form a digital-to-analog converter, which produces a fair approximation for a sine wave at 100 Hz. The 0.22-μF capacitor provides additional filtering. You should be able to use 39-kΩ and 22-kΩ resistors instead of the 1% values shown in the drawing. Just match them carefully with your ohmmeter.

Bob Heil, "Experience 10-Meter FM," *QST*, Aug. 1981, p. 22.
[2]"An Inexpensive 75-Watt Five-Band Transmitter," *The Radio Amateur's Handbook* (Newington: ARRL, 1962), pp. 174-177.

*Assistant Technical Editor

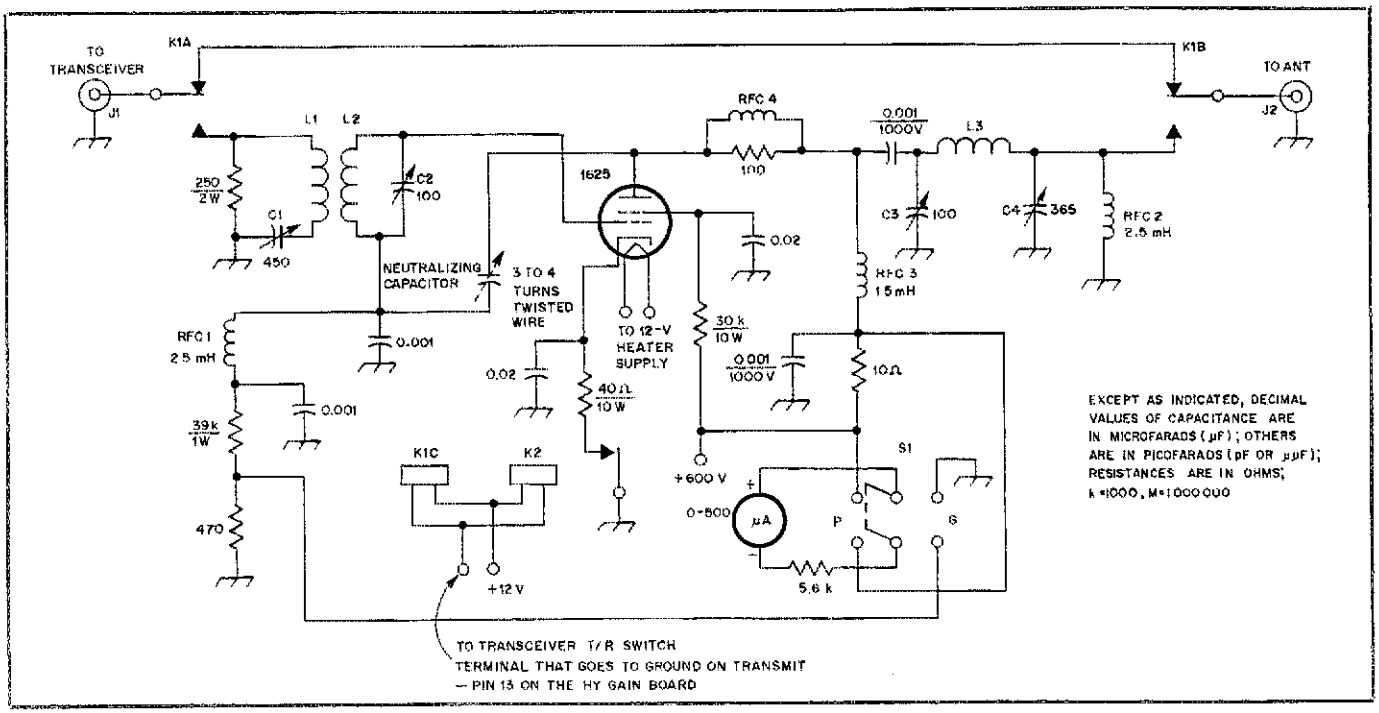


Fig. 1 — Schematic diagram of the revised cw transmitter used as a Class C amplifier for 10-meter fm operation. See the text for a description of how to build the "gimmick" type of capacitor used for neutralization.

K1 — Dpdt relay with 12-V, 160-ohm coil, such as Radio Shack 275-206.

K2 — Spst relay with 12-V, 1200-ohm coil, such as Radio Shack 275-003.

RFC4 — 8 turns of no. 18 enam., close wound on 100-Ω resistor.

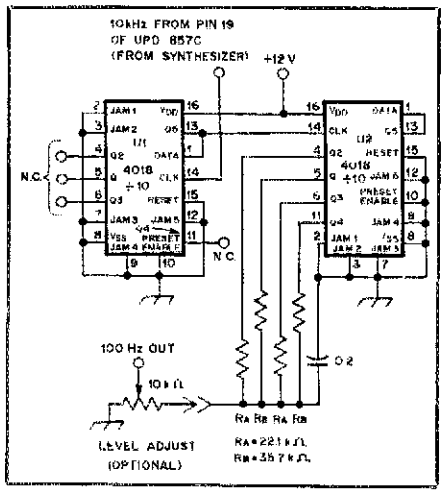


Fig. 3 — Schematic diagram of the 100-Hz tone generator built by WB8NBS. The level-adjust control need not be included if your rig has a built-in method of adjusting the tone level. Values of R_A and R_B are not critical, but R_B should be 1.62 times R_A for proper D/A conversion.

I glued the two ICs to the circuit board in my rig (upside down) and soldered the wiring directly to the pins. This construction may be ugly, but it is fast.

My rig was made by Yaseu and has the same basic synthesizer as the FT-227 "Memorizer." This circuit will work with that rig, and should also work with any radio that has a 10-kHz synthesizer reference signal available. Total parts cost for my unit was under $3. — *Jim Harvey, WB8NBS, Redford, Michigan*

REPEATER INTERFERENCE FROM HF OPERATION

☐ I was monitoring our club repeater when it suddenly came to life with what sounded like an ssb signal. I detected what I thought was an "N" prefix just before the interference stopped. A call to Albert Lankford, N4BIT, verified that he had been operating on 3965 kHz. Further tests revealed that his hf transmitter was keying his 2-meter rig. Albert uses a Touch Tone® mike with an auto-keying circuit for his 2-meter rig. He found that placing this mike on top of the radio instead of allowing it to dangle in front of his Transmatch cured the problem. — *Alton Erdman, W4CNQ, Montgomery, Alabama*

TS-830S 60-Hz HUM

☐ While having an ssb QSO with a friend, I learned that the signal from my TS-830S had a hum. It seemed to come and go in an unpredictable manner. I checked for loose connections or a broken ground wire, but everything appeared to be okay.

Finally I tried using the MONITOR function, with headphones. A few minutes of experimenting disclosed that the hum was coming from the magnetic field generated by the power transformer. My microphone is a low-impedance type, and when the mike was within 6 inches or so of the front panel the hum was present.' Moving it to about 1 foot from the transceiver was sufficient to reduce the hum to a negligible level. Perhaps others who have had this problem will find a similar solution. — *James Thurston, W4PPB, Clemson, South Carolina*

'mm = in. × 25.4; m = ft × 0.3048.

TRACKING CATV LEAKS

☐ When a CATV leak causes interference to your Amateur Radio reception you can use your portable or mobile equipment to locate the leak. But what do you do if the interference is only in the other direction and your transmissions disrupt TV reception? There may be a simple solution to this problem, too.

Many CATV systems also carry fm broadcast stations. If the cable system in your area does, and if one of those stations is beyond car-radio range, there is indeed a simple answer. Tune your fm car radio to a station that can be heard exclusively on the cable. (Some systems also carry a warbling tone or similar signal in the fm band specifically for this purpose.) Drive along the cable while listening to the radio. As you approach a leak, the signal level will increase considerably. When you locate a source of leakage, it should be reported to the CATV system operator. Give a street address or the number of the nearest utility pole. — *Robert V. C. Dickinson, W2CCE, Berkeley Heights, New Jersey*

TRACKING DOWN A LINE-NOISE PROBLEM

☐ The San Diego Gas and Electric Co. spent several days tracking a 3570-kHz signal that was being carried for miles on the power line. After localizing the area that the signal was originating from, they began to cut power to each house in order to pinpoint the source. Inspection of the offending house turned up a bell transformer with an arcing secondary. The coil winding was just right to make a spark-gap transmitter on 3570 kHz. The signal was being coupled back to the power line through the primary winding. This signal had been causing interference for several months before it was tracked down and eliminated. — *Ed Marriner, W6XM, La Jolla, California*

INCREASED CONTROL VOLTAGE FOR THE HEATH REMOTE ANTENNA SWITCH

☐ Most commercially available remote antenna switches (and antenna rotators) are designed to be used with 100 feet or less of control cable. Heavier conductors could be used for longer cable runs, but even that may be insufficient.

Recently, Craig Wheeler, KC9T, came to me with such a problem. His tower is located some 175 feet from the shack, and his Heath SA-1480 "Remote Coax Switch" would not work properly. The voltage drop in the control line was too great, even with larger conductors.

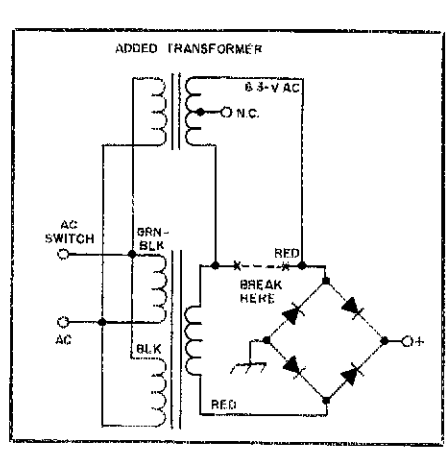


Fig. 4 — Wiring diagram for adding a transformer to increase the control voltage of a remote antenna switch to compensate for the voltage drop in a long run of control cable.

We decided to increase the power-supply voltage in the control box. We added a 6.3-V ac filament transformer in series with the original 25-V winding. Fig. 4 shows the transformer connections. Remember that the primary leads are wired in parallel and the secondary leads are wired in series. The phasing of the secondary windings is correct if the output from the bridge rectifier is about 42-V dc with no load. If the output is about 26-V dc, the phasing is reversed (wrong).

There was just enough room inside the control box to mount the additional transformer in Craig's unit. A 1- or 2-A rating on the new transformer should be sufficient. — *Lawrence Stark, K9ARZ, St. Charles, Illinois*

MICROPROCESSORS IN CARS, AND RFI

☐ I was procrastinating the job of installing an hf rig in my 1982 Buick Regal. The ritual of bonding all sections of the body and frame is one that few mobilers enjoy. In addition, the new cars with microprocessor controls could present some extra problems!

A new ICOM IC-730 provided the motivation to tackle the job. I was pleased to find that the car was clean. All of the usual shielding and bonding may not be necessary after all.

My car seemed to be developing an ignition problem, and it took a few trips to realize that the trouble occurred only when I was transmitting. The car engine would seem to miss on ssb voice peaks.

A trip to the Buick dealership led to a cure and an explanation of the problem. The service manager had seen the problem before, because he immediately pegged me as a "CBer with a kicker." I assured him that I was a licensed radio amateur and that my 100-W rig was perfectly legal.

The solution is to shield a four-wire cable that runs from the distributor to the microprocessor, grounding it at both ends. The processor in GM cars is located on the kick panel (fire wall) on the passenger side. The cable bundle leading from it contains many wires. Four of these go to the distributor, and control ignition, timing and advance. One or more of these lines was being affected adversely by the rf.

To shield these leads, I cut the four-prong connector off at the distributor and removed these wires from the larger bundle. I snaked them through a piece of braid from some old RG-11 cable and replaced the connectors. This solved my problem completely. — *David Aukamp, W4MJB, Dunedin, Florida*

STICKY VOX RELAY ON DRAKE T4X

☐ After many hours of operation, the VOX relay in my Drake T4X transmitter started to "hang up." I discovered that the armature of the relay had become magnetized. Using a tape-head demagnetizer, I slowly approached the armature with the demagnetizer turned on. I rotated the probe in a circular motion as close to the armature as possible for a few seconds. (Touching the armature will not harm anything.) Then I slowly backed the probe away, turning it off after it was clear of the transmitter. Of course, you should turn off the transmitter and unplug the power supply before performing this operation. — *John Chiuchiolo, W2LWB, Brooklyn, New York*

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

UHF TUBE OPERATING PARAMETERS

☐ Fred Merry's article, "Phase III With a Tetrode UHF Amplifier," (Aug. 1982 *QST*) is an excellent one, and the author is to be congratulated on the fine design of his amplifier. However, the operating conditions he proposes for the amplifier are ambiguous. A user of this device may be puzzled as to the correct operating parameters for the 4CX250B or 8930 tetrodes when used in grid-driven service. Tables 1, 2 and 3 contain suggested operating parameters.

Electron transit time in the vhf/uhf region causes back-heating of the cathode. Electrons leaving the cathode return and raise its surface temperature. To compensate for this, filament voltage should be dropped when the tube is used in continuous service (fm, RTTY, etc.) to reestablish the correct cathode temperature. Back-heating is less predominant during intermittent service (cw or ssb), so filament voltage may be maintained at the nominal rated value in this case. In either case, the rated heater voltage should be maintained during tune-up and standby periods.

The 4CX250B and 8930 tube types require a nominal heater voltage of 6.0, with a tolerance of ±0.3 V. It is recommended that an rms-responding (iron vane) meter be used for monitoring. For continuous service at 435 MHz, a recommended value of heater voltage that will compensate for back heating is 5.6 V. — *William I. Orr, W6SAI, Menlo Park, California*

*Assistant Technical Editor

Table 1

Operating Parameters for the 4CX250B in Class AB_1 (Ssb) Service at 435 MHz

Plate voltage	2000-V dc
Screen voltage	400-V dc
Grid voltage[1]	−85-V dc
Zero-signal plate current	70 mA
Single-tone plate current	250 mA
Single-tone screen current (max.)	30 mA
Power output[2]	250 W

[1]Adjust to specified zero-signal plate current.
[2]Approximate value

Table 2

Operating Parameters for the 4CX250B in Class C (Cw or Fm) Service at 435 MHz

Plate voltage	2000-V dc
Screen voltage	300-V dc
Grid voltage	−90-V dc
Plate current	250 mA
Screen current[1]	10 mA
Grid current[1]	10 mA
Heater voltage[2]	5.6 V
Power output[3]	290 W

[1]Approximate; varies with drive and loading.
[2]See application note.
[3]Approximate value.

Table 3

Operating Parameters for the 4CX250R or 8930 in Class AB_1 (Ssb) Service at 435 MHz

Plate voltage	2000-V dc
Screen voltage	400-V dc
Grid voltage[1]	−80-V dc
Zero-signal plate current	70 mA
Single-tone plate current[1]	380 mA
Single-tone screen current[2]	5 mA
Power output[4]	470 W

[1]Adjust to specified zero-signal plate current.
[2]For tune-up only; maximum continuous dc plate current is 250 mA.
[3]Varies with loading and drive conditions.
[4]Approximate value

Note: The 4CX250R and the 8930 have slightly larger cathode areas than the 4CX250B, which permits a higher value of peak plate current. In addition, the 8930 has a maximum plate dissipation of 350 W, as contrasted with the 250-W rating of the 4CX250B and the 4CX250R.

ENERGY STORAGE, BANDWIDTH, AND TANK CIRCUIT Q

☐ I have just read the article by O'Hara, "The Care and Feeding of Linear Amplifiers for ATV" (August 1982 *QST*), and found it very interesting. However, there are statements under the subtitle "50-Watt Triode Amplifier" that are correct only under special conditions. I am referring to the bandwidth of an amplifier utilizing 1/4-λ versus that of a 1/2-λ plate line. If a 1/4-λ coaxial or strip-line plate circuit is designed to *minimize* stored energy, the bandwidth will be *greater* than with a 1/2-λ line. This is the opposite of what O'Hara has stated.

To minimize the stored energy in a transmission-line resonator loaded with capacitance (e.g., the output capacitance of a 2C39), the Z_0 of the line should be made as high as possible. Thus, the line is made short, and there is little transmission-line capacitance to store additional energy. This principle applies to all coaxial lines, strip lines and parallel lines.

One might jump to the conclusion that in order to shorten the tuned line it could be loaded with capacitance. Unfortunately, there is no "free lunch." This technique *increases* the amount of stored energy!

For a number of reasons, the key to success in uhf output-network design is to minimize the loaded Q (Q_L) of the circuit. First, reducing the loaded Q improves the circuit efficiency.

$$\text{efficiency} = 1 - \frac{Q_L}{Q_O} \qquad \text{(Eq. 1)}$$

where
Q_L = loaded Q
Q_O = unloaded Q

Second, reducing Q_L makes circuit detuning effects caused by heat less noticeable. Improved circuit efficiency results in less circuit heating, thus causing less detuning. In addition, because of the wider bandwidth with lowered Q_L, the detuning on the resonance curve is less. The effect is somewhat of a square function.

To get wider amplifier bandwidth, you can minimize the Q_L by: (1) loading the output circuit heavily — run the tube at maximum rated plate current; (2) Not adding capacitance to the plate circuit — only the tube output C should be across the plate tuned circuit; (3) Using an L-C output matching circuit if possible — that is, an inductor that resonates with the tube output capacitance; (4) Using a 1/4-λ resonator if the L-C circuit is not feasible. Striplines with a Z_O up to 150 Ω are practical, as are coaxial circuits up to 120 Ω; and (5) Using a tuned coupling circuit (double-tuned circuit) to couple power out of the plate tuned circuit, just as O'Hara has done with his 2C39 amplifier.

As a practical example, the 2C39, with an output C of 2.01 pF, has an X_C of 183 Ω at 432 MHz. A 1/4-λ coaxial cavity can be built with a Z_O of 114 λ. This cavity could have an outer conductor ID of 5 in. and an inner conductor OD of 3/4 in.[1] It should be 58° long, which at 432 MHz is 4.40 in. The resulting amplifier bandwidth would be about 60% of that provided by an L-C circuit.

A 1/4-λ strip-line matching circuit would be very practical and could easily be made with a Z_O of 150 Ω. In this case, the line would be 50.66° long, which at 432 MHz is 3.84 in. The resulting bandwidth would be about 70% of that provided by an L-C circuit.

I have built a 432-MHz 2C39 amplifier using an L-C tank circuit. At 100-W input (3.2 W of drive), it gives an output of 60 W. This is Class C of course, not Class B (linear) service. I mention this to show that an L-C tank circuit *is* possible at 432 MHz (and would have the widest bandwidth of all).

I hope that the gist of my comments will be understood. It is evident that the concept of additional stored energy in resonant-line circuits is not well-known. — *Raymond F. Rinaudo, W6ZO, San Mateo, California*

SIMPLIFIED FORMULA

☐ The inductance formula appearing in all recent ARRL *Handbooks* appears to be taken from Terman's *Radio Engineer's Handbook* (McGraw-Hill). Although they may seem to be small points, two features of this formula disturb me: (1) the use of radius rather than the more convenient diameter, and (2) symbols that bear no evident relationship to the dimensions. The equation may be more simply expressed in this way:

$$L\ (\mu H) = \frac{d^2 n^2}{18d + 40\ell} \qquad \text{(Eq. 2)}$$

where
d = coil diameter (in.)
ℓ = coil length (in.)
n = number of turns

According to Terman, the accuracy is within 1% for coils longer than 40% of their diameter. — *Frank Noble, W3MT, Bethesda, Maryland*

IMPROVEMENTS FOR THE UPCONVERTING RECEIVER

☐ Helfrick's article, "A Modern Upconverting General-Coverage Receiver," (December 1981 *QST*), was of particular interest to me. I have long been interested in

[1]mm = in. × 25.4.

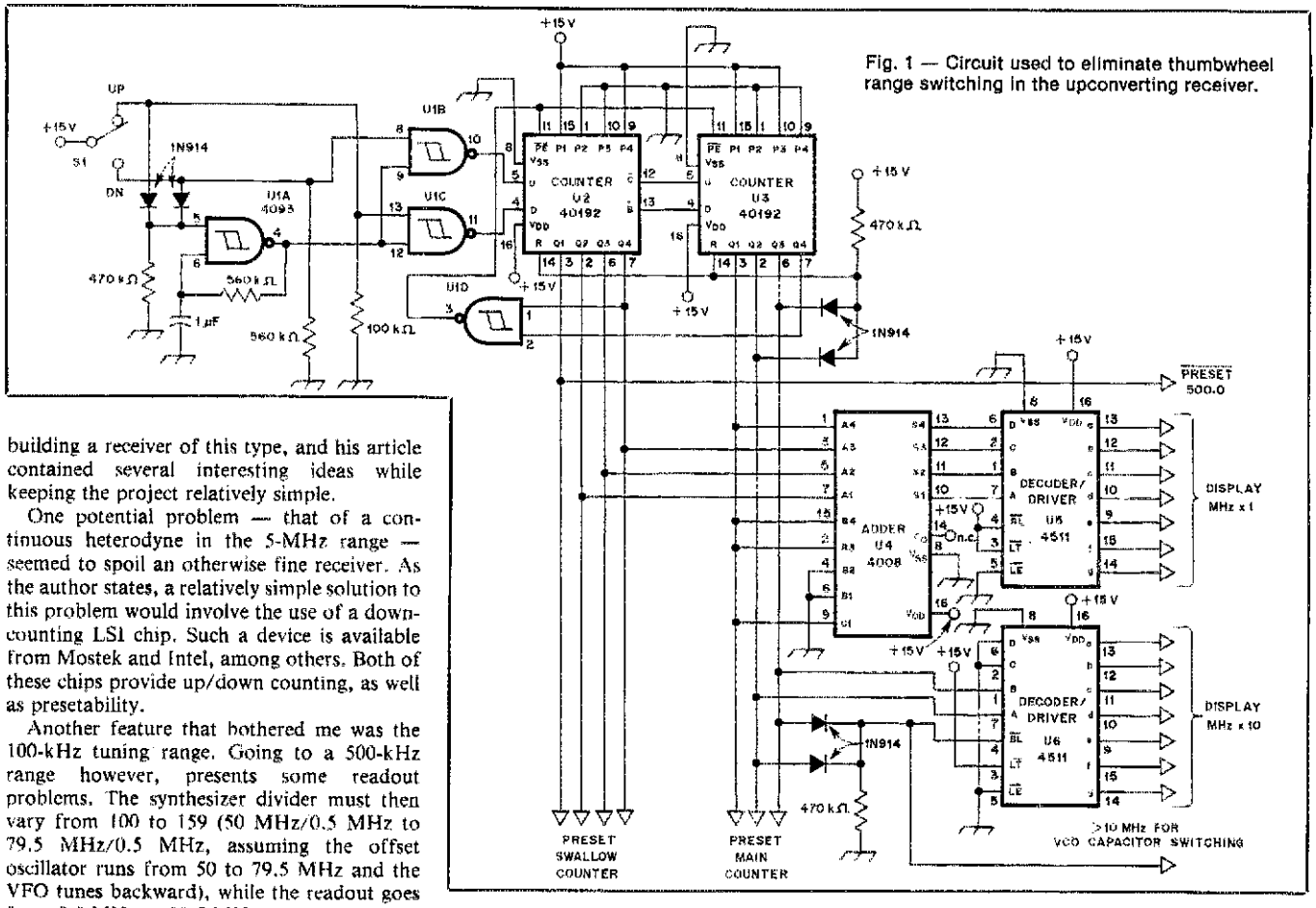


Fig. 1 — Circuit used to eliminate thumbwheel range switching in the upconverting receiver.

building a receiver of this type, and his article contained several interesting ideas while keeping the project relatively simple.

One potential problem — that of a continuous heterodyne in the 5-MHz range — seemed to spoil an otherwise fine receiver. As the author states, a relatively simple solution to this problem would involve the use of a down-counting LSI chip. Such a device is available from Mostek and Intel, among others. Both of these chips provide up/down counting, as well as presetability.

Another feature that bothered me was the 100-kHz tuning range. Going to a 500-kHz range however, presents some readout problems. The synthesizer divider must then vary from 100 to 159 (50 MHz/0.5 MHz to 79.5 MHz/0.5 MHz, assuming the offset oscillator runs from 50 to 79.5 MHz and the VFO tunes backward), while the readout goes from 0.0 MHz to 29.5 MHz.

To eliminate the thumbwheels for range-switching, it is relatively simple to provide an up/down counter from which the outputs preset the synthesizer counter. An examination of these outputs reveals a solution to the readout problem. It will be noted that only two decades are required; the hundreds divider may be hardwired to preset to one.

According to Table 4, we may take the least significant bit as the indicator to preset the LSI counter to 500.0 (remember the VFO is tuning backward, so this occurs for the even megahertz ranges). The next four bits (BCDA') will produce the unit megahertz if three is subtracted from the binary number whenever bit A' is one. Bits B'C' indicate the tens of megahertz. The circuit in Fig. 1 shows how this may be done.

Schmitt trigger U1A forms an astable multivibrator with a period of approximately 0.5 s. This time may be adjusted to suit individual preferences. Up/down counting is accomplished with S1, a momentary-contact spdt switch. The RESET and PRESET inputs of the two 40192 counters are used to limit the counting range from 00 to 59. The connections shown to the 4008 adder (U4) will subtract 3 each time bit A' is one. — *T. A. Bergstrom, W1IQW/DJØQT, Munich, Federal Republic of Germany*

Table 4

Up/Down Counter Sequence

Count	LSD	MSD	R/O	Count	LSD	MSD	R/O
	A B C D	A' B' C' D'			A B C D	A' B' C' D'	
00	0 0 0 0	0 0 0 0	00.0	.	. . . .	. . . .	.
01	1 0 0 0	0 0 0 0	00.5	.	. . . .	. . . .	.
02	0 1 0 0	0 0 0 0	01.0	43	1 1 0 0	0 0 1 0	21.5
03	1 1 0 0	0 0 0 0	01.5	44	0 0 1 0	0 0 1 0	22.0
04	0 0 1 0	0 0 0 0	02.0	45	1 0 1 0	0 0 1 0	22.5
05	1 0 1 0	0 0 0 0	02.5	46	0 1 1 0	0 0 1 0	23.0
06	0 1 1 0	0 0 0 0	03.0	47	1 1 1 0	0 0 1 0	23.5
07	1 1 1 0	0 0 0 0	03.5	48	0 0 0 1	0 0 1 0	24.0
08	0 0 0 1	0 0 0 0	04.0	49	1 0 0 1	0 0 1 0	24.5
09	1 0 0 1	0 0 0 0	04.5	50	0 0 0 0	1 0 1 0	25.0
10	0 0 0 0	1 0 0 0	05.0	51	1 0 0 0	1 0 1 0	25.5
11	1 0 0 0	1 0 0 0	05.5	52	0 1 0 0	1 0 1 0	26.0
12	0 1 0 0	1 0 0 0	06.0	53	1 1 0 0	1 0 1 0	26.5
13	1 1 0 0	1 0 0 0	06.5	54	0 0 1 0	1 0 1 0	27.0
14	0 0 1 0	1 0 0 0	07.0	55	1 0 1 0	1 0 1 0	27.5
15	1 0 1 0	1 0 0 0	07.5	56	0 1 1 0	1 0 1 0	28.0
.	. . . .	. . . .	.	57	1 1 1 0	1 0 1 0	28.5
.	. . . .	. . . .	.	58	0 0 0 1	1 0 1 0	29.0
.	. . . .	. . . .	.	59	1 0 0 1	1 0 1 0	29.5

Feedback

☐ Please make this correction to Fig. 6 of "Electrical Antenna Null Steering," October 1982 *QST*: The 343-pF capacitor should be labeled C3, and the 487-pF unit is C5. The series resonance of the L1/C2 combination is 1.025 MHz, and that of L2/C4 is 1.604 MHz. Author Webb also points out that L1 and L2 consist of 24 and 25 turns, respectively, of no. 26 wire on Micrometals T37-2 or T50-6 cores. In Fig. 5, no. 32 wire may be used for T1. C1 through C4, inclusive, should be increased in value to at least 1000 pF for 3.5-4 MHz operation, and to 2000 pF for 1.8-2 MHz operation. The four capacitors should be of equal nominal value.

☐ Dick Schellenbach, W1JF, has informed us of an error in Fig. 3 of November 1982 Technical Correspondence. Pin 4 of the NE570 a/c chip should be grounded, rather than not connected (as shown).

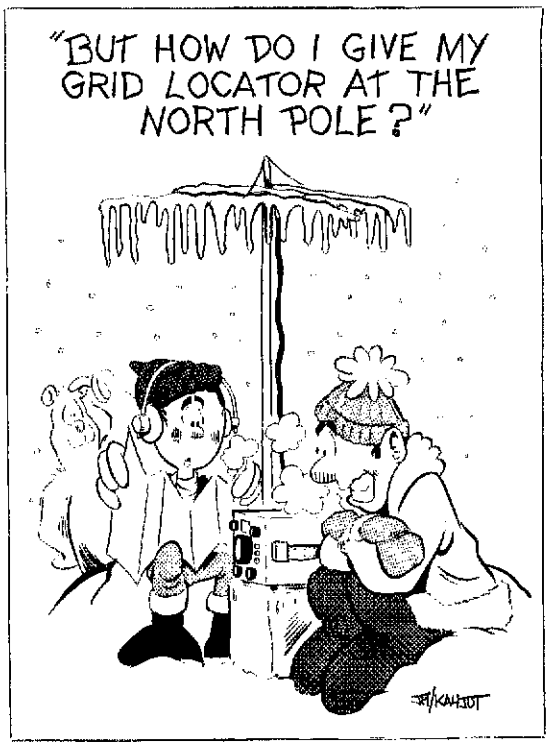
☐ The March 1982 installment of Technical Correspondence indicates that copies of government regulations on phone-line interfacing are available from FCC. Dick Richardson, N8CDH, has indicated that these regulations are now out of print, and are available only at your library.

☐ Fig. 2 of the H. Granberg power FET article, Part 1, for Dec. 1982 *QST*, contains an error. The submitted drawings had decimal points rather than commas in the filter-capacitor designations for power supply no. 2. The correct value is 13,500 µF, rather than the 13.5-µF value indicated.

VHF/UHF Century Club Awards

It's all about collecting grid squares, the new VHF cousin of DXCC. And determining your locator is a piece of cake!

By John F. Lindholm,* W1XX



thanks to OH5YW and *Radioamatoori*

If you live in Virginia Beach, Virginia, you are on exclusive FM26 real estate; the rest lies under the Atlantic Ocean. If you live in the farthest northwest reaches of Washington state, your CN78 designator will make you very popular on the vhf bands. Should you be vacationing next summer at the Cape Cod National Seashore, don't plan on relaxing at Nauset Beach: 'You'll be pestered constantly on 50 MHz for your rare FN51 exchange. And those of you who live in southern California and have always dreamed of going on a DXpedition, turn your gaze on San Clemente Island. The southern half of this tiny land mass in the Santa Barbara Channel is the sole foothold in DMØ2. A new series of prefixes? Nope. FM26, CN78, FN51 and DMØ2 are grid squares!

That's right. All those funny designators are grid-square locators. Though they may sound funny now, they may not be all that strange after you start hearing them used as standard QSO exchanges above 50 MHz. So, if you thought the 20-meter DX pileups on FB8WG, Spratley, or 1AØKM were bad, you ain't heard nothing yet. Wait till there is a 6-meter E-skip operation from Burrwood, Louisiana (EL58), at the *extreme* southernmost point of the Mississippi River delta. The bands will go crazy!

Why all the excitement? Because confirming contact with 100 2° × 1° grid squares above 50 MHz will earn you membership in the exclusive *Century Club* — not the popular DX Century Club, but its new vhf counterpart, the VHF/UHF Century Club, or VUCC. It's here: The brand-new ARRL-sponsored achievement award for working grid squares measuring 2° longitude by 1° latitude on frequencies above 50 MHz begins January 1, 1983. The ARRL Ad Hoc Committee, which has been studying ways of promoting vhf/uhf activities, has enthusiastically recommended this program to further boost activity on the higher frequencies.

Individual awards will be issued *per band,* with initial qualifying levels as follows: 50 MHz — 100; 144 MHz — 100; 220 MHz — 50; 432 MHz — 50; 902 MHz (when available) — 25; 1296 MHz — 25. Each award will be endorsable in increments of 25 for 50 and 144 MHz, 10 for 220 and 432 MHz, and 5 for 902 and 1296 MHz. Those certificates offered for 220 and 432 MHz will indicate membership in the *Half* Century Club. For higher frequencies, the *Quarter* Century Club will appropriate. But only those contacts made on January 1, 1983 and after will count for VUCC credit. Recognition for microwave activity above 1296 MHz is under active consideration, with qualifying levels to be instituted in the near future retroactive to the same starting date.

How to Determine Your Grid Square

To exchange grid-square information, you must first identify your own grid square. That is the easy part. Your 2° × 1° grid locator, measuring approximately 100 miles by 70 miles, is indicated by just two letters (the field) and two numbers (the square).[1] For most North Americans, the first two characters of your locator designation can be read directly from the map (see Table 1). For the third and fourth character numerals, simply convert your longitude and latitude (consult any road atlas or topographic map) as indicated in Table 1. This grid locator has worldwide application. It is the so-called "Maidenhead Locator System," named after the village outside London where the European vhf managers met in 1980 to endorse a replacement for the present European "QTH Locator." This system was introduced in West Germany some 30 years ago and spread like wildfire throughout Europe and North Africa. Originally conceived for European use, it has outgrown its geographical host and is unsuitable for worldwide application. Thus, the Maidenhead System, applicable throughout the globe and recently approved for use in the Far East at the Region 3 IARU conference held in Manila, appears at just the right time.

Collecting grid squares became quite popular throughout Europe, as impressive totals were amassed by vhf/uhf enthusiasts on the continent. Grid totals are published regularly within each country. "Gridpeditions" (if that term catches on, remember you saw it here first!) were made to put rare grid squares on the air, especially during contests. Why not partake of the fun and games in North America?

Thanks to Central States

Collecting grid squares is not actually a new concept to North America. The Central States VHF Society paved the way in

*Communications Manager, ARRL

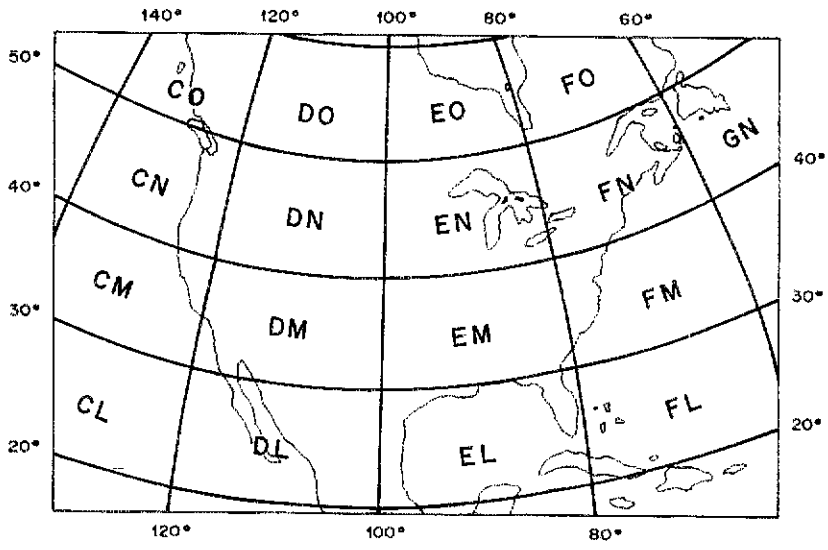
[1]Notes appear on page 51.

Table 1

How to Determine Your Grid Location†

†For those geographical areas not encompassed here, a complete explanation appears in the April 1982, issue of *The Lunar Letter*, entitled "Worldwide QTH Locator System Proposed by Region 1," by Lance Collister, WA1JXN.

1st and 2nd characters: Read directly from the map.



3rd character: Take the number of whole degrees west longitude, and consult the following chart.

Degrees West Longitude	*Third Character*	*Degrees West Longitude*	*Third Character*	*Degrees West Longitude*	*Third Character*
60-61	9	88- 89	5	114-115	2
62-63	8	90- 91	4	116-117	1
64-65	7	92- 93	3	118-119	0
66-67	6	94- 95	2	120-121	9
68-69	5	96- 97	1	122-123	8
70-71	4	98- 99	0	124-125	7
72-73	3	100-101	9	126-127	6
74-75	2	102-103	8	128-129	5
76-77	1	104-105	7	130-131	4
78-79	0	106-107	6	132-133	3
80-81	9	108-109	5	134-135	2
82-83	8	110-111	4	136-137	1
84-85	7	112-113	3	138-139	0
86-87	6				

4th character: This number is the same as the *2nd single digit* of your latitude. For example, if your latitude is 41° N, the 4th character is 1; for 29° N, it's 9, etc.

This four-character (2-letter, 2-number) designator indicates your 2° × 1° square for VUCC award purposes.

Table 2

More Precise Locator

To indicate location more precisely, the addition of 5th and 6th characters will define the *subsquare*, measuring about 4 × 3 miles. Longitude-latitude coordinates on maps, such as U.S. Department of the Interior Surveys, can be extrapolated to the nearest tenth of a minute, necessary for this level of locator precision. *This is not necessary in the VUCC awards program.*

5th character: If your number of degrees longitude is an *odd* number, see Fig. A. If your number of degrees longitude is an *even* number, see Fig. B.

Odd Longitude (Fig. A)*

Minutes W. Longitude	*5th Character*
0- 5	L
5-10	K
10-15	J
15-20	I
20-25	H
25-30	G
30-35	F
35-40	E
40-45	D
45-50	C
50-55	B
55-60	A

Even Longitude (Fig. B)*

Minutes W. Longitude	*5th Character*
0- 5	X
5-10	W
10-15	V
15-20	U
20-25	T
25-30	S
30-35	R
35-40	Q
40-45	P
45-50	O
50-55	N
55-60	M

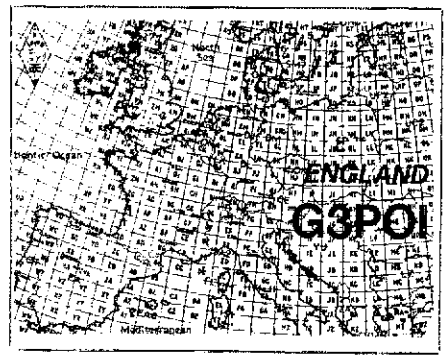
6th character: Take the number of *minutes of latitude* (following the number of degrees) and consult the following chart.

Minutes N. Latitude	*6th Character*
0- 2.5	A
2.5- 5.0	B
5.0- 7.5	C
7.5-10.0	D
10.0-12.5	E
12.5-15.0	F
15.0-17.5	G
17.5-20.0	H
20.0-22.5	I
22.5-25.0	J
25.0-27.5	K
27.5-30.0	L
30.0-32.5	M
32.5-35.0	N
35.0-37.5	O
37.5-40.0	P
40.0-42.5	Q
42.5-45.0	R
45.0-47.5	S
47.5-50.0	T
50.0-52.5	U
52.5-55.0	V
55.0-57.5	W
57.5-60.0	X

1981, when it announced a similar awards program. The intent was for ARRL to adopt the program eventually. This announcement is made with the full approval of the CSVHFS Board of Directors. Our thanks to Central States for providing valuable leadership.

Award Mechanics

Although the minute details for the award have not as yet been ironed out, this should not preclude anyone from starting on day 1. QSLs will be required, but verification will be conducted at the local level. ARRL-affiliated clubs that meet the requirements of the new Special Services Club program will be eligible to appoint a VHF Awards Manager, who



G3POI has collected 382 European QTH locator squares on 144 MHz. Clive has indicated his locator on the back of his grid-square QSL card. It is recommended that QSL cards indicate grid locators, just as they do states and counties.

Helpful operating hint: So that W1AW is always prepared to give out the correct grid locator during vhf QSOs, operator WA1POI has stenciled a sign at the operating position for quick reference. Good idea, Bruce!

will be duly certified to verify QSLs and applications for Hq. issuance of awards. Thus, it is expected that many certification points will be established throughout the U.S. and Canada. Overseas amateurs will be equally eligible for VUCC membership, with cards checked by those traditional awards managers who wish to assist. Detailed instructions will be provided to all involved in the verification procedure to insure uniformity of inspection.

No contacts are permitted for award purposes through repeater or active satellite devices. The first step in applying for the initial award is to request an application from ARRL. Included will be information as to the nearest verification point for sending QSLs. The VUCC certificate, endorsement stickers and grid maps of the U.S. will be available soon.

The VHF/UHF Ad Hoc Committee, which orchestrated this beehive of activity, has one more trick up its sleeve. I can't reveal all of its magic at this time, but I suggest you get your vhf running shoes ready and keep a keen eye in the coming months on the Contest Corral section of *QST*. You may have the opportunity to exchange grid squares on an organized basis sooner than you think!

For those of you who want to turn your computers loose on doing your grid-locator problems, you don't have to wait. WA5IED and SM5AGM have developed BASIC programs that should work well on most home computers.[2]

Good Luck

With this launching of the grid squares awards program, we wish you all luck. And we'll look forward to somebody operating from EL79, Apalachicola, Florida, a grid square that is 99% occupied by the Gulf of Mexico.

Notes

[1]km = mi × 1.6.
[2]*The Lunar Letter*, "Maidenhead Conversion Computer Programs," Oct. 1982, p. 24.

Strays

SANTA'S HELPER WAS A HAM

Few things are more satisfying to me than being able to give my husband *the* perfect Christmas gift . . . I mean, exactly what he wants, rather than a substitute for which I will be politely thanked while he tries to hide his disappointment. This year, I suffered no nagging doubts or indecision. Donald had done everything short of hiring a skywriter to let me know that he wanted a desk mike and a speaker to match his transceiver. He had purchased the rig, antenna tuner, and frequency counter from a close friend who, like most hams, took immaculate care of his ham gear. The addition of the microphone and speaker would make Don's station complete and attractive. It didn't seem much to ask. How little did I know!

Now that I knew what WA4RWD wanted for Christmas, my immediate problem was obtaining the money for the purchase. I had estimated the cost for both items to be about $80, which I didn't have, being unemployed. I could hardly ask Don for the money with which to buy his own gift. As I lay awake one night, chasing the problem in my thoughts, I decided to enlist the aid of a friend who has a lot of clout when it comes to solving problems. "Lord," I prayed silently, "I hope it isn't a sin to pray for money, but I need to earn $80 before Christmas so I can make my husband happy. Next morning, as I listened to the local radio station, I suddenly realized that my name was being broadcast. The disc jockey announced that I had won $100! Out of thousands of postcards entered in a contest, mine had been drawn. Feeling elated, I looked up and said, "Thank you, Lord."

As soon as the check arrived, I ordered the microphone. Now for the speaker. I got out my *QST* and phoned every dealer who had an advertisement. No one had the speaker. To my surprise, I was told that the company no longer manufactures that particular line of equipment. One dealer, after hearing my request, gave a wry little laugh and said, "Lady, you and 500 others are looking for that speaker." Another dealer didn't have the speaker, but he talked to me for 20 minutes anyway, because he was greatly amused by my Kentucky accent.

This was going to be tougher than I thought. I got my *QST* again and scanned every Ham Ad. Jackpot! A man in Alabama had the speaker for only $20. I phoned, only to be told that it had sold quickly. Okay; back to the ads. W1NW/8 in Ohio offered the speaker in a set with a receiver. Could I persuade him to sell the speaker separately? I phoned him, and a polite young man answered, informing me that Mr. Emely was not at home, but he would pass on the message. What if he returned my call and Don answered the phone? The surprise would be ruined. I was jolted from my worry by the ring of the phone. Mr. Emely was sorry, but his speaker was sold. He spoke kindly, offering helpful suggestions. As our conversation ended, he promised to try to help me locate another speaker. I hung up the phone, thinking that he was an exceptionally nice person, but not really believing that I would hear from him again.

Two days had passed when I received another call. I recognized the voice of W1NW/8. He had the speaker I wanted, and would be happy to ship it to me. I couldn't believe it! He had gone to the trouble of searching through the trade sheets, making inquiries, and checking with dealers until finally, he had found a dealer who had what I wanted. It was hard to believe that this man, to whom I was a total stranger, had put forth that much effort on my behalf, with nothing to gain for himself except my gratitude.

I could relax now, knowing that when Christmas morning came, my husband would turn to me with a smile and say, "See, hon, it's no trouble at all to buy a gift for me." Then I can laugh, and tell him everything. Until Christmas morning, I'll just smile mysteriously when I pass a box hidden under the bed. — *Shirley Harlow, N4FGD, Versailles, Kentucky*

I would like to get in touch with . . .

☐ anyone having or knowing the whereabouts of an HW-18 marine two-way radio or the amateur-band version, 160-meter, crystal-controlled receiver. Jack Ratzlaff, VE7DDS/VE5, 86 Culliton Crescent, Regina, SK S4S 4J6, Canada.

Arnold Littman, WA3BOH, mans the Amateur Radio station he designed and set up at the West Penn Hospital in Pittsburgh, Pennsylvania, the only hospital in the area with complete emergency communications capability.

Portable QRP: Some Unscientific Lessons Learned

By Wayne G. Sayles,* N9AKM

As my bag passed through airport security, the attendant asked a simple, but logical, question: "What is it?"

"Well," I said with a satisfying feeling of technical superiority, "it's an hf cw/ssb transceiver with regulated power supply, Transmatch, recorder, quarter-wave center-loaded variable-polarity monopole, transmission line and accessories."

"Oh," she said. "Is that like a CB?"

As with many people today, my job involves extensive travel. Since our teenaged son is also a ham, it was only natural to try to develop a system to keep in touch with the family and enjoy the other benefits of Amateur Radio on the road.

It didn't take long to realize that my first design problem was weight. In the beginning, I carried everything in a beefed-up "weekender" type of suitcase. It weighed 48 pounds, but looked sharp! On the first trip I left half my clothes, including my raincoat, at home because of a 66-pound weight limit on checked baggage. It rained every day, my rig got scratched up and I never did make contact with my son. Now, I hand-carry the rig, and the "weekender" is still sitting in the back of the closet. Lesson no. 1: Take what you need, and need what you take.

Back at home, some experimenting led me to an antenna that promised to be a cure-all for the motel-room blues. It was made of two telescoping aluminum tubular base sections. On the end of each was fastened a resonator section from a mobile antenna. A piece of wooden dowel was used as an insulator, and the aluminum sections were placed end to end — an instant, collapsible, indoor, multiband, shortened dipole!

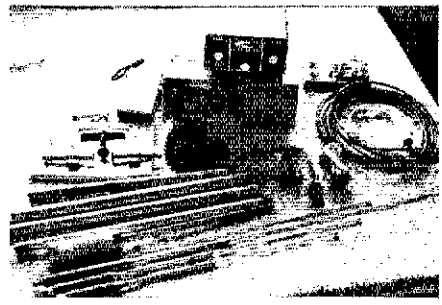
The test phase was encouraging; the antenna was directive, easily tuned and an effective radiator. Next trip out, I stayed at a motel with steel-reinforced walls — negative contact.

At home again, I tried using half of the infamous "instant dipole" as a quarter-wave vertical antenna. Bolting the wooden dowel insulator to a C clamp made installation easy, and it didn't work too badly. One day, I decided to hang it out of the bedroom window while testing the rig. There wasn't any way to clamp the quarter-wave section vertically, so I just clamped it horizontally to the window frame, running the coax center conductor to the quarter-wave element and the shield to the C clamp. What a bonanza! I was working stations all over the country on 20 meters with 10 W of output and a quarter-wave monopole. Lesson no. 2: Never underestimate the power of QRP.

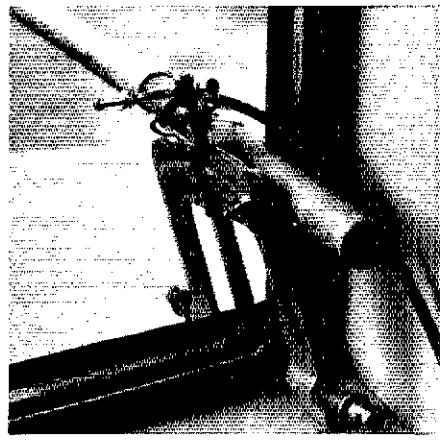
The real advantage of the quarter-wave monopole was that it could be mounted in so many different positions. It has been used effectively in the horizontal, vertical and 45-degree positions, and has been clamped to window sills, air conditioners, automobiles and furniture. Tuning of the resonator tip has always resulted in acceptable SWR, and the antenna tuner is used only to ensure maximum transfer of power from the solid-state rig.

Meanwhile, the fight against the weight problem continued. Rather than try to find a case to carry all the gear, I approached the problem by finding a case of acceptable size and then working to fit everything essential into it. I was able to eliminate foam packing and the balun. Judicious use of the space brought the package down to 23 pounds.

Does it really work? Well, it's not like the parting of the seas when I get on, but some common-sense operating practices have resulted in solid 30- to 60-minute QSOs on schedule to the home QTH from New York, Arizona, North Dakota and Maine on 10 through 40 meters. One late-winter day, I jumped into the frenzied ARRL SSB International DX Contest from home. With the antenna pointing north, I worked a J8, a GW, an I6 and a TG. Lesson no. 3: Success comes to those who persevere.



The complete portable QRP station — 23 pounds and found four bands of fun — is a proven companion for the traveling ham.



An inexpensive and simple C clamp gives a world of versatility in mounting the quarter-wave monopole antenna. A clamp made for beach umbrellas works with equal success in the most difficult of situations.

QRP Operating Tips

- Identify yourself as a QRP station; you'll be surprised at how many stations will help.
- Learn to tail-end without interfering. There is almost an imperceptible pause between one station signing and the next one picking it up.
- In a pileup, listen carefully after the DX station says "QRZ." Somewhere between the initial blast and the second round of callers you'll find another dead spot. Time your call to hit the right on the money and use standard phonetics.
- If the station is working call districts, call during your turn and be ready after the "Ø" calls; many stations will pick up mobiles and QRPers then.
- If you have a low-pitched voice, try tuning very slightly off frequency so the pitch rises, the better to penetrate pileups with.
- To get in at the first CQ, listen for the sound of a DX station tuning, the tell-tale "aah . . . lah" of a modulation check. Believe it or not, the sound is different on a multihop path.
- A few don'ts: Don't call over someone else's exchange, don't try to break a station working districts and don't be afraid to keep trying.

*Rte. 2, Box 32AA, Clear Lake, WI 54005

Wayne G. Sayles, N9AKM, is an Advanced class licensee and a retired U.S. Air Force Captain. Serving as a communications maintenance officer with the Air Force Communications Command, he has been involved directly in various aspects of radio communications over the past 20 years.

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL Hq.; s.a.s.e. please).

2) Mail to FCC, Gettysburg, PA 17325.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a one-year grace period under which you may still renew and keep your call sign without retesting, but you must wait until the new license arrives to operate. There is also a five-year grace period under which you may still renew; however, after the initial one-year period, you will be issued a new license with a new call sign. After this five-year grace period expires, you must be reexamined for a new license. Normally, application should be made approximately 90 days before expiration; however, renewal can be applied for at any time during the term of the license.

4) If you are simply modifying your license (change of address, for example), you must fill out the Form 610; a letter is no longer sufficient. Incidentally, your license will also be automatically renewed at this time.

5) If you have any questions or problems, drop a note to the Membership Services Department, ARRL.

The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities:

1800-1825 kHz	cw only	14.08-14.10 MHz	RTTY
1825-1830 kHz	"DX window" (no W/VEs)	14.23 MHz	SSTV
1850-1855 kHz	"DX window" (no W/VEs)	21.09-21.10 MHz	RTTY
3590 kHz	RTTY DX	21.34 MHz	SSTV
3610-3630 kHz	RTTY	28.09-28.10 MHz	RTTY
3845 kHz	SSTV	28.68 MHz	SSTV
7040 kHz	RTTY DX	29.30-29.50 MHz	Satellite downlinks
7090-7100 kHz	RTTY	29.52-29.58 MHz	Repeater inputs
7171 kHz	SSTV	29.60 MHz	FM simplex
		29.62-29.68 MHz	Repeater outputs

(In addition, on 20 meters in particular, the low end of the U.S. phone segment is reserved for DX, the high end for traffic, and ragchewing in between. The dividing lines are not definite, however.) Radio Control R/C Channels: 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7 and 53.8 MHz. See also May 1982 *QST*, p. 49, Minute 82 (tentative plan).

U.S. Amateur Frequency and Mode Allocations

Power Limits: All U.S. amateurs are limited to 250-watts dc input in the Novice segments. On all other segments, with certain exceptions in the 160-meter and 420-MHz bands, 1-kilowatt dc input is permitted. Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. (Revised as of December 1982)

Bandwidth Limitations

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION and FACSIMILE: On frequencies below 50 MHz, the bandwidth of A4, A5, F4 and F5 emissions shall not exceed that of an A3 single sideband emission.

On frequencies between 50 MHz and 225 MHz:

(1) The bandwidth of A4 and A5 single sideband emission shall not exceed the bandwidth of an A3 single sideband emission.

(2) The bandwidth of A4 and A5 double sideband emissions shall not exceed the bandwidth of an A3 double sideband emission.

(3) F4 and F5 emissions shall utilize a peak carrier deviation no greater than 5 kHz and a maximum modulating frequency no greater than 3 kHz or, alternatively, shall occupy a bandwidth no greater than 20 kHz. (For this purpose the bandwidth is defined as the width of the frequency band, outside of which the mean power of any emission is attenuated by at least 26 decibels below the mean power level of the total emission. A 3 kHz sampling bandwidth is used by the FCC in making this determination.)

Below 225 MHz, an A3 emission may be used simultaneously with an A4 and A5 emission on the same carrier frequency, provided that the total bandwidth does not exceed that of an A3 double sideband emission.

DIGITAL TRANSMISSION:

(a) *International Telegraphic Alphabet No. 2 (Baudot code).* When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

(b) *American Standard Code for Information Interchange (ASCII).* F1 emission shall be utilized on those frequencies between 3.5 and 28 MHz where its use is permissible, and the sending speed shall not exceed 300 baud. F1, F2 and A2 emissions may be used on those frequencies above 28 MHz on which their use is permitted, and sending speeds shall not exceed the following: 1200 baud between 28 and 50 MHz; 19.6 kilobaud on frequencies between 50 and 220 MHz; and 56 kilobaud on frequencies above 220 MHz.

The code must conform to the American Standard Code for Information Interchange (ASCII) as defined in American National Standards Institute (ANSI) standard X3.4-1968. See §97.69 of the Amateur Rules.

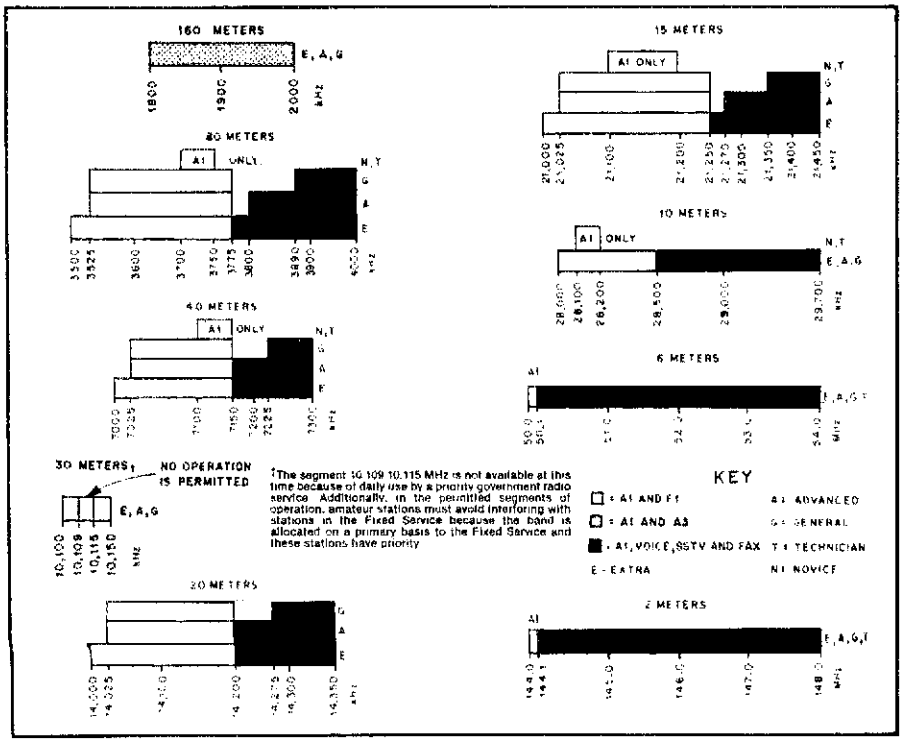
Additional codes are permitted above 50 MHz, with the following bandwidth limitations: 20 kHz on frequencies between 50 and 220 MHz; 100 kHz on frequencies between 220 and 1215 MHz; and on frequencies above 1215 MHz, any bandwidth may be used, provided the sidebands are confined within the authorized amateur band and all spurious emissions are reduced or eliminated in accordance with good engineering practice. See Sec. 97.69 for additional information and rules.

ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate subbands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 420-MHz band. For details, and for information on specialized modes, see *ARRL License Manual*. For information on repeaters, see the *License Manual* and *Repeater Directory*.

160 METERS: Extra, Advanced and General may use some segments at 1.9-2.0 MHz. Limitations are on a geographical basis; see *License Manual* or *FCC Rule Book* for limitations on this segment. There are *no* geographical limitations on the 1.8-1.9 MHz segment. (Note: A1 and A3 only are permitted on the 160-meter band.)

Other — All modes, except as noted.



Extra, Advanced, General, Technician

MHz	*GHz***
220-225*	10.0-10.5*
420-450*	24.0-24.25
1215-1300*	48.0-50.0
2300-2450	71.0-76.0
3300-3500	165.0-170.0
5650-5925	240.0-250.0
	All above 300

*Pulse not permitted.
**1 GHz = 1000 MHz.

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1983*

(Check *QST* monthly for updates)

JANUARY

1	Straight Key Night
6	West Coast Qualifying Run
8-9	ARRL QSO Party, cw
9	*ARRL Hamfest (Oak Park, MI)*
11	W1AW Qualifying Run
13-16	SAROC (Las Vegas, NV)†
15-16	VHF Sweepstakes
15-16	*ARRL Hamfest (Sarasota, FL)*
22-23	ARRL QSO Party, phone
25	W1AW Qualifying Run
29-Feb. 6	Novice Roundup

FEBRUARY

2	West Coast Qualifying Run
3-5	*ARRL Hamfest (Brownwood, TX)*
5-6	*Southeastern Division Convention (Miami, FL)*
6	*ARRL Hamfest (Arlington Heights, IL)*
9	W1AW Qualifying Run
19-20	International DX Contest, cw
20	*ARRL Hamfest (Melville, NY)*
20	*ARRL Hamfest (Elkin, NC)*
23	W1AW Qualifying Run
26-27	*Ohio State Convention (Cincinnati)*
27	*ARRL Hamfest (Vienna, VA)*

MARCH

3	West Coast Qualifying Run
5-6	International DX Contest, phone
10	W1AW Qualifying Run
12-13	*ARRL Hamfest (Fort Walton Beach, FL)*
18-20	*ARRL Hamfest (Orlando, FL)*
19-20	*Roanoke Division Convention (Charlotte, NC)*
24	W1AW Qualifying Run
26	*ARRL Hamfest (Elizabethtown, KY)*
26-27	*Arkansas State Convention (North Little Rock)*
26-27	*Georgia State Convention (Columbus)*
27	*ARRL Hamfest (Timonium, MD)*

APRIL

6	West Coast Qualifying Run
8	W1AW Qualifying Run
9-10	*Missouri State Convention (Kansas City)*
16-17	*Midwest Division Convention (So. Sioux City, NE)*
24	W1AW Qualifying Run
23-24	*Mississippi State Convention (Jackson)*
29-May 1	Dayton Hamvention (Dayton, OH)†

MAY

1	*ARRL Hamfest (Centralia, IL)*
5	West Coast Qualifying Run
7	*ARRL Hamfest (Albany, GA)*
10	W1AW Qualifying Run
15	*ARRL Hamfest (Marshall, MO)*
15	*ARRL Hamfest (Knoxville, IL)*
20-21	*Atlantic Division/New York State Convention (Rochester, NY)*
21	*ARRL Hamfest (Columbia, MO)*
26	W1AW Qualifying Run

JUNE

1	West Coast Qualifying Run
4-5	*Kansas State Convention (Salina)*
4-5	*Texas State Convention (Dallas)*
5	*ARRL Hamfest (Chelsea, MI)*
5	*Illinois State Convention (Princeton)*
8	W1AW Qualifying Run
11-12	VHF QSO Party
18-19	*ARRL Hamfest (Atlanta, GA)*
21	W1AW Qualifying Run
25-26	Field Day

JULY

7	West Coast Qualifying Run
8-10	*Northwestern Division Convention (Spokane, WA)*
9-10	IARU Radiosport Championship
14	W1AW Qualifying Run
17	*ARRL Hamfest (Washington, MO)*
20	W1AW Qualifying Run
31	*ARRL Hamfest (Belvidere, IL)*

AUGUST

3	West Coast Qualifying Run
6-7	UHF Contest
7	*ARRL Hamfest (Berryville, VA)*
7	*ARRL Hamfest (Moberly, MO)*
12	W1AW Qualifying Run
13-14	*Delta Division Convention (Shreveport, LA)*
14	*ARRL Hamfest (Willow Springs, IL*
19-21	*Pacific Division Convention (Reno, NV)*
20-21	*Alabama State Convention (Huntsville, AL)*
21	W1AW Qualifying Run

SEPTEMBER

1	West Coast Qualifying Run
2-4	*Southwestern Division Convention (Anaheim, CA)*
10-11	VHF QSO Party
10-11	*ARRL Hamfest (Windsor, ME)*
13	W1AW Qualifying Run
24	W1AW Qualifying Run

OCTOBER

5	West Coast Qualifying Run
7-9	*ARRL National Convention (Houston, TX)*
8-9	ARRL QSO Party, cw
9-10	ARRL QSO Party, phone
12	W1AW Qualifying Run
15-16	Simulated Emergency Test
30	W1AW Qualifying Run

NOVEMBER

3	West Coast Qualifying Run
5-6	Sweepstakes, cw
10	W1AW Qualifying Run
19	W1AW Qualifying Run
19-20	Sweepstakes, phone

DECEMBER

3-4	160-Meter Contest
7	West Coast Qualifying Run
9	W1AW Qualifying Run
10-11	10-Meter Contest
27	W1AW Qualifying Run
31	*Straight Key Night*

*Hamfests/Conventions of record as of November 1, 1982

†Not an ARRL event

Happenings

Conducted By Carol L. Smith,* AJ2I

- **ARRL Elections — Results Are In**
- **Volunteer Exam Proposal — In the Works**
- **Beacons — Automatic Control Given Go-Ahead**
- **RF Biological Effects — Still Pending**

ARRL Election Results

Counting of votes for ARRL Division Directors and Vice Directors took place at Headquarters on November 20, 1982. The process went smoothly, though a few of the races were extremely close. These newly elected representatives and those who were unopposed will take office on January 1, 1983, and will serve a two-year term.

You, the League member, have a chance to vote for your representatives on the Board of Directors every two years. Each issue of *QST* contains, on page 8, a list of all directors and vice directors (who would succeed the director should he or she be unable to serve). Later this year, nominations will be open for the Canadian, Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions.

The American Radio Relay League is a nonprofit membership organization incorporated under the laws of the State of Connecticut. ARRL members who want more details about our organization are invited to request a copy of the ARRL Articles of Association and By-Laws. Please send a business-size, self-addressed, stamped envelope to AA&BL, ARRL Special Requests, 225 Main St., Newington, CT 06111.

Here are your just-elected representatives:

Central Division

For Director: Edmond A. Metzger, W9PRN — 2668; Don C. Miller, W9NTP — 2398.

Director Metzger has been reelected to the Central Division post. A former assistant director and vice director, Ed lives in Springfield, Illinois, and is active in the Sangamon Valley Radio Club. He is an Advanced class operator and, in 1976, won a special award from the Starved Rock Radio Club for his numerous public services. Ed served as general chairman of the Central Division ARRL Conventions in 1961 and 1968, and holds the following positions and awards: OBS, ARES and A1 Operator certificates. He is a life member of the QCWA and a charter life member of the ARRL. Ed has been licensed since 1941 and is employed as a comptroller.

For Vice Director: Howard S. Huntington, K9KM — 2920; Kenneth A. Ebneter, K9EN — 2090.

Howard Huntington, K9KM, has been continuously licensed since 1959. He lives in Lake Zurich, Illinois, and is an engineering section manager at Motorola. Howard holds a BSEE from Purdue University and an MSEE from the Illinois Institute of Technology.

Currently serving as chairman of the ARRL Contest Advisory Committee, K9KM is also president of the Northern Illinois DX Association, a member of the board of directors of the ILL-WIND Contesters and a member of the LAMARS Amateur Radio Club. He holds various contest and operating awards, including DXCC. Howard is active as an Amateur Radio speaker for numerous clubs and civic organizations.

Hudson Division

For Director: George A. Diehl, W2IHA — 1616; Linda S. Ferdinand, N2YL — 1395; John J. D'Luhy, K2EXI — 526.

George Diehl, W2IHA, holds an Advanced class license. He was vice director from 1972 to 1980, and assistant director from 1962 to 1972 and 1981 to 1982. He is a member and past president of the Tri-County Radio Association, a director past president and honorary vice president of the Hudson Amateur Radio Council and chairman of the 1984 ARRL National Convention. He served as Board Liaison for the ARRL VHF Repeater Advisory Committee, and was a member of the ARRL committees on interference problems and the development of the ARRL Training Program.

W2IHA resides in Chatham, New Jersey, and has been active in many civic organizations, especially those involving school boards. A life member of ARRL and QCWA, George has been licensed since 1935, and spent his professional working years in power engineering and military electronics.

For Vice Director: Stephen A. Mendelsohn, WA2DHF — 1194; Dennis B. McAlpine, K2SX — 706; Paul Lindgren, AH2M — 636; Phillip H. Bradway, KB2HQ — 537; Alex M. Pontus, W2FCR — 458.

Steve Mendelsohn, WA2DHF, resides in Little Ferry, New Jersey, and has been licensed since 1959. A life member of the League, he holds an Advanced class license. He is a member of the A1 Operator Club and the ARRL Public Relations Advisory Committee, and is Hudson Division Public Information Officer. Steve has been involved with communications for the 1980 Olympic Torch Run and the New York City Marathon. He is active in many area radio clubs, including LIMARC.

New England Division

For Director: John Sullivan, W1HHR (unopposed).

A resident of Columbia, Connecticut, John is a design engineer with Emhart Industries. He holds an Extra Class license and is a life member of ARRL. A former vice director and assistant director, W1HHR served on the ARRL Management and Finance Committee and the ARRL Membership Affairs Committee. He was a past section emergency coordinator, and is active in several radio clubs.

For Vice Director: Richard P. Beebe, K1PAD — 2223; Clevis O. Laverty, W1RWG — 1415.

Rick, who has been reelected as vice director, lives in Billerica, Massachusetts, and was first licensed in 1960. Holding BS and MS degrees in electrical engineering, K1PAD is presently employed at Hewlett Packard. He is the Section Communications Manager for Eastern Massachusetts, and is involved with a popular monthly publication, the *Crossbander*. His Amateur Radio activities include DX, traffic handling, contesting, slow-scan TV, OSCAR and local club work.

Northwestern Division

For Director: Mary E. Lewis, W7QGP — 1917; Joseph N. Winter, WA7RWK — 1909.

Director Lewis, reelected, is a resident of Seattle, Washington. Mary holds an Advanced class license, and is an electronics instructor and freelance technician. She serves on the Board's Membership Affairs Committee and was Washington Section Communications Manager from 1973 to 1977, a past president, secretary and trustee of the North Seattle ARC, and an officer in several other Amateur Radio organizations. W7QGP holds two ARRL Public Service awards and is a QCWA life member. Her activities in Amateur Radio include phone, Baudot and ASCII RTTY, computer and cw operations.

For Vice Director: Mel C. Ellis, K7AOZ (unopposed).

Mel, reelected, is a member of QCWA, the Western Washington DX Club and many other radio clubs. K7AOZ is an active DXer and is Spokane County EC. Mel is also a speaker and emcee at radio functions throughout the division.

Roanoke Division

For Director: Gay E. Milius, W4UG (unopposed).

Gay returns as Roanoke Division Director and is an Extra Class licensee. He is a retired lawyer and a retired commander in the U.S. Navy Reserve. Gay served as vice director of the Hudson Division in 1950-51 and vice director of the Roanoke Division in 1977-80. Licensed since 1940, W4UG is a life member of ARRL. He has held positions of responsibility in many Amateur Radio clubs and organizations, such as the Washington (DC) Mobile

*Membership Services Assistant, ARRL

Radio Club, the Virginia Beach ARC and the Virginia Century Club. He was also co-organizer of the Maritime Mobile Service Net. Among his many awards are DXCC Honor Roll (mixed and phone), 5-band DXCC, DXCC (cw), WAC, WAS, Bicentennial WAS, WAC, WPX Honor Roll, A1 Operator Club and a National Certificate of Merit.

For Vice Director: John Kanode, N4MM (unopposed).

Returning as vice director, John lives in Boyce, Virginia, and does electronic circuit research and development for IBM. An Extra Class licensee, he became an assistant director in 1975 and is a former ARRL QSL Bureau manager for W4, K4 and N4 calls. He has served on the ARRL DX Advisory Committee and the CQ Contest Committee. N4MM holds DXCC Honor Roll, DXCC (phone), DXCC (cw), 5-band WAS, 5-band DXCC, 5-band WAC, 6-meter 600 Club, WAZ and WPX awards. John has been licensed since 1952 and is a member of AMSAT, QCWA and IARC.

Rocky Mountain Division

For Director: Lys Carey, KØPGM (unopposed).

Lys returns as Division Director. Residing in Lakewood, Colorado, KØPGM is a machine shop foreman and holds an Advanced class license. He was a vice director from 1979 to 1980, and assistant director from 1974 to 1978. Lys has been the editor of *The Roundtable* and has been active in ARRL conventions. He holds WAS, WAZ and WAC, and is a life member of the League.

For Vice Director: Marshall Quiat, AGØX — 943; Robert W. Scupp, WB5YYX — 597.

Marshall, reelected, is an attorney dealing with the general practice of law, with emphasis on trial law. He is a past president of the Denver Radio Club, a board member and an editor of *The Roundtable*, and legal and regulatory committee chairman of the Colorado Council of Amateur Radio Clubs. A life member of ARRL, AGØX was also the legal committee chairman of the 1976 ARRL National Convention.

Southwestern Division

For Director: Jay A. Holladay, W6EJJ (unopposed).

Jay returns as Director, having served in that post since 1978. He was a vice director from 1975 to 1978, and has been on the Executive Committee, the Plans and Programs Committee, the Long-Range Planning Committee, VHF/UHF Advisory Committee and the Amateur Satellite Service Council. Jay has been the director and trustee for the Jet Propulsion ARC and is active in the Southern California DX Club. Licensed since 1950, W6EJJ is a life member of ARRL, AMSAT and QCWA. He is a member of the technical staff at the Jet Propulsion Laboratory and holds these awards: DXCC Honor Roll, 5-band DXCC, 5-band WAS and WAS via OSCAR. Jay is active on 80 meters through 220 MHz.

For Vice Director: Fried Heyn, WA6WZO — 1790; Joseph Merdler, N6AHU — 1451; Peter F. Matthews, WB6UIA — 1012.

Fried Heyn is an ARRL life member and is involved with AMRAD, AMSAT, HandiHams, MARS and Side-Winders on Two (SWOT). He is also a member of the Southern California DX Club, Tucson Packet Radio and the Los Angeles Area Council ARC, and has been active in resolving RFI, antenna-restriction and malicious-interference problems.

Twice a section communications manager, Fried has also been an assistant director. WA6WZO holds DXCC, 5-band WAS, BPL and Public Service Honor Roll awards, among others. He has an Extra Class license, and is active in contests and DX and net activities.

West Gulf Division

For Director: Raymond B. Wangler, W5EDZ (unopposed).

Ray, of San Antonio, Texas, continues in office as Director. Having previously served as a vice director, he is an Advanced class amateur and a life member of ARRL. He serves as chairman of the Board's Management and Finance Committee and as chairman of the Special Committee on the Bioeffects of RF Energy. An amateur since 1952, Ray operates from 80 meters to 70 cm. He is a member of AMSAT, SWOT, SMIRK, 10-10 International, QCWA, the Central States VHF Association, the Texas VHF Society, Alamo DX Amigos, the San Antonio Radio Club and TTN. Ray is a senior member of the IEEE and holds a BS in chemistry and a BA in physics.

For Vice Director: Thomas W. Comstock, N5TC (unopposed).

N5TC, of College Station, Texas, is a life member of the League. Tom teaches at Texas A&M University, and is very active in Amateur Radio public service, having been a member of the Transcontinental Corps, a liaison for NTS region-to-area net, a liaison for section-to-region net, and an NCS for the region and section phone and cw nets. Tom holds the BPL, A1 Operator Club, Public Service Honor Roll, DXCC (mixed) and DXCC (cw) awards. He is active on most Amateur Radio bands.

THE ARRL VOLUNTEER EXAM PROPOSAL

The League has petitioned in RM-4229 that volunteers be allowed to prepare and administer Amateur Radio exams. The recently passed law, P.L. 97-259, among other things allows the FCC to accept and use these "voluntary and uncompensated services."

The ARRL stressed that its plan would improve the efficiency and availability of services to Commission licensees while greatly decreasing the cost of those services to the Commission. In support of its plan, ARRL contended that:

• *exam opportunities will be increased.* More people at more places will be able to take exams more frequently.

• *exams won't be compromised.* Currently, disclosure of test questions and answers, and FCC's lack of facilities to revise existing exams, have eroded test credibility. Under the League proposal, the Commission will approve a large bank of questions, which will then be in the public domain.

• *budget problems probably won't get better in the near future.* It is unlikely that the Commission will be able to afford the personnel required to create and administer exams. The ARRL and numerous amateur groups and individuals are prepared to relieve the Commission of this burden.

Specifically, the ARRL proposal would allow the following for Extra, Advanced, General or Technician exams:

• *times and locations of all examinations to be made public by FCC or by accredited volunteer examiners.*

• *a volunteer examiner to be General class or higher and be at least 18 years old.* Volunteer examiners may not be related to the applicants.

• *three accredited volunteer examiners must be present, and all three must sign the applicant's 610 Form.* At least one of the signers will be an Amateur Extra Class licensee, and the other two will hold a higher class of license than the class for which the exam is being conducted. In tests for Advanced and Extra Class licenses, all three signers will hold Extra Class licenses.

• *74% is the minimum passing grade for written exams.* For the purpose of grading, each element required in qualifying for a particular license will be considered as a separate examination. All written exams will be graded by the Commission personnel or the volunteer examiners who administered the test. Grading will be done on the spot, and results will be made known immediately.

• *persons who own a significant interest in or are employees of any organization involved in the manufacture or distribution of Amateur Radio equipment or the preparation or distribution of publications that may be used as study aids for amateur license exams are disqualified from being accredited volunteer examiners.* This provision is required by Public Law 97-259.

The League further proposed that

the Commission may designate nonprofit educational organizations to accredit volunteer examiners to provide exam opportunities throughout the country. Such an organization may be entrusted with screening an applicant's 610 form to validate volunteer examiners' signatures and to certify to the Commission that the applicant has successfully passed an examination. To designate organizations to accredit and coordinate the efforts of volunteer examiners, the Commission will, in a Request for Proposals, call for applications that must document in detail an organization's procedures and ability to:

• *establish a network of volunteers who can schedule examinations regularly and at the convenience of the amateur community in every section of the country.*

• *coordinate and monitor the activities of volunteer examiners, including producing and distributing the examinations themselves, both code and written, and screening and validating the applicant's 610 form.*

• *demonstrate a long-term commitment to coordinating a volunteer examiner program.* To this end, the Commission will require each candidate/organization to demonstrate in detail the personnel and monetary resources available to the program.

The Commission will use these criteria to designate organizations to accredit volunteer examiners, certify successful applicants' 610 forms and forward them to the Commission for the issuance of an Amateur Radio operator license.

To amass a pool of questions large enough to ensure the integrity of the amateur examinations, the Commission may accept the voluntary services of individuals and Amateur Radio organizations in preparing amateur examinations. The Commission may solicit a large bank of questions for each license class based on the Commission's Study Guide for that class of license. The Commission will approve these banks of questions, which will become public domain. Individual examinations will be made up of subsets of these questions, each examination to cover a proportionate sampling of each major Study Guide area, and will constitute the written element for an amateur examination. The Commission may also accept the voluntary services of individuals and organizations in the preparation of code exams for an amateur operator license.

The ARRL Novice Proposal

The League's proposal for the Novice examination would allow

• *the test to be conducted and supervised by a volunteer examiner selected by the applicant, unless otherwise prescribed by the Commis-*

sion. The volunteer examiner shall be at least 18 years of age, unrelated to the applicant, and the holder of an amateur Extra, Advanced or General class license.

• *the volunteer examiner to administer the telegraphy exam, Element 1(A), in accordance with Section 97.28(c).* The written portion of the examination, Element 2, will be prepared by the volunteer examiner from the pool of questions for Element 2, which the Commission has made public. The examination will be made up of 20 questions from the pool, chosen in prescribed proportions from the topics in the Commission's Study Guide for Element 2.

• *both code and written portions of the exam to be graded by the volunteer examiner.* Fifteen answers correct out of 20 is the minimum passing grade for the written exam. The volunteer examiner will be responsible for the proper conduct and necessary supervision of the exam.

• *the volunteer examiner to sign a statement on the successful applicant's 610 form attesting that the applicant has passed both the code and written portions of the examination.* The application can then be forwarded to the Commission by the coordinating organization for issuance of the license.

• *the Commission to accept the voluntary services of individuals and Amateur Radio organizations for amassing a pool of questions for Element 2 examinations.* The Commission will approve the pool of questions, which will become public domain.

FCC PROPOSES CHANGES IN NOVICE EXAM PROCEDURE

One day before the League's filing, the Commission adopted an NPRM in Docket 82-727 that would cut delays and costs in the Novice exam procedure in a slightly different fashion from that suggested by the League. The FCC proposal would eliminate the mail-back procedure, substantially cutting the cost of administering the Novice license program. The Commission said that "the existing procedure is unnecessary and burdensome, and its costs far exceed its benefits."

Under the proposed rule change:

• *the licensee giving the test would prepare a written exam based on the syllabus for Element 2 in the FCC Study Guide, administer the exam, and grade it (74% and higher is passing).*

• *if the applicant passed, the licensee would certify that both examinations were completed successfully, and the application would be processed by FCC, as it is now.*

• *the examiner must be a General class licensee or above.*

• *the examiner must be at least 18 years old.*

• *the examiner must not be related to the applicant.*

• *the examiner must keep a copy of each written exam paper for one year.*

The Commission requested comments on whether requiring the volunteer examiner to keep a copy of each written exam for one year would produce any enforcement benefits. It also invited comments on alternative methods of assuring that the written exams are administered in good faith. Comment deadline is February 15, 1983; Reply comment deadline is March 15, 1983.

The FCC said it "is confident that eligible licensees would fairly test Novice candidates. The Study Guide syllabus is carefully prepared by the FCC staff and revised regularly, with extensive input from the amateur community." It expressed confidence "in the competence of licensees and their commitment to the goals of the Amateur Radio Service."

BEACONS — AUTOMATIC CONTROL APPROVED

In Docket 81-823, the Commission amended its rules to authorize automatic control for Amateur Radio stations transmitting one-way "beacon transmissions to detect unusual propagation conditions and to check out and adjust radio equipment." Previously, beacon operations required manual control with the operator present at all times, though the Commission did routinely grant STAs to circumvent this requirement. That experience, in fact, helped convince the FCC that automatic control was adequate for complying with all the other rules.

Comments received on the proposal were generally supportive, though there was unanimous disagreement with the Commission's choice of frequencies to authorize beacon operation in the 10-meter band. The ARRL was concerned that provisions restricting *manually* controlled beacon operation to specific beacon subbands not be included because that would restrict experimentation.

The Commission cautioned that, while it was not placing frequency restrictions on manually controlled beacon operations, it "would not stand for illegally caused interference." Therefore, included in the rules is a provision for ordering the cessation of beacon operation when a station is operating improperly or causing undue interference.

Effective January 3, 1983, these new rules apply:

• *FCC-approved frequencies for automatically controlled beacon operation are*

28.20-28.30 MHz
50.06-50.08 MHz
144.05-144.06 MHz
220.05-220.06 MHz
222.05-222.06 MHz
432.07-432.08 MHz
All amateur bands above 450 MHz

• *manually controlled beacon operations are not frequency restricted.*

• *A0, A1, F0, F1 or A2J emissions are authorized for beacon use.* When F1 or A2J are used, the radio or audio shift must be less than 900 Hz.

• *maximum power is 100-W input.*

• *beacons must identify once each minute with the station call sign followed by the slant bar and the letters* BCN *or* B *(while using cw), or "beacon" (while using phone).* This station identification shall be made at intervals not to exceed one minute during any period of operation.

• *no beacon can operate on more than one frequency in the same band from the same location.*

• *automatic beacons operating in the National Radio Quiet Zone must follow special rules* (see June 1981 *QST*, page 54).

• *automatically controlled beacons must have devices installed and procedures implemented to ensure compliance with the rules when the duty control operator is not present at a control point of the station.*

• *beacon operation shall cease upon notification by any engineer-in-charge of a Commission field facility that the station is operating improperly or causing undue interference.* Beacon operation shall not resume without prior approval of the engineer-in-charge.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Alberta, Nevada, Rhode Island, Northern New Jersey, San Joaquin Valley, Utah, Maryland-DC, New Hampshire and Eastern Massachusetts sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. In accordance with the restructuring of the ARRL Field Organization, the position of Section Manager will supersede the position of Section Communications Manager in each section. Incumbent SCMs 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.* No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters, but are not required. The following form is suggested:

(Place and date)

General Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Manager for this Section for the next two-year term of office.

(Signature . . . Call . . . City . . . ZIP . . .)

An SM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 4, 1983.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, 1983. Returns will be counted May 24, 1983. SMs elected as a result of the above procedure will take office July 1, 1983.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1983.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by appointment by the General Manager.

You are urged to take the initiative and file a nominating petition immediately.

David Sumner, K1ZZ
General Manager

CODE CREDIT FOR COMMERCIAL RADIOTELEGRAPH OPS

The Commission, citing "redundant testing," has amended Section 97.25(c) of the Rules to give Amateur Radio code credit to commercial radiotelegraph operators. "Both amateur and commercial radiotelegraph operators are tested for various degrees of expertise in Morse code," the FCC said. "The commercial radiotelegraph examination requirements ex-

ceed even the most rigorous telegraphy examination requirements of the Amateur Radio Service. It is our view that constraints we place on present or former commercial radiotelegraph operators to get Morse code credit for telegraphy element 1(c) are unnecessary and inappropriate."

Effective immediately, commercial radiotelegraphy operators *will receive credit for any amateur telegraphy element if the applicant holds a commercial radiotelegraph operator license or permit or has held one within five years of receipt of that person's application for an Amateur Radio license.*

REMOTE-CONTROL AND SECURITY-ALARM MANUFACTURERS ENCOURAGED TO AVOID OUR FREQUENCIES

FCC has partially granted a League request seeking a "rethink" of its October 1981 decision giving flexibility in the operation of nonlicensed, low-power transmitters for radio-control and wireless security systems. ARRL had visions of potential disasters if manufacturers of these devices chose to use Amateur Radio frequencies for their garage-door openers, electronic burglar alarms, etc.

The League contended that "because amateur stations operate at high-power levels in residential areas close to homes having burglar alarms and other security systems, there is a high potential for amateur stations to jam these systems or to trigger a false alarm. Moreover, radio control and security devices could interfere with amateur stations." The ARRL asked that "144-148, 220-225 and 420-450 MHz frequencies allocated to the Amateur Radio Service be excluded from use by radio-control and security-alarm devices."

The FCC agreed, in part. It didn't ban manufacturers of the specified devices from using amateur frequencies, but it *strongly suggested that they be aware of the potential problems when designing their devices.* "Because of possible susceptibility and interference problems that might occur between security alarm systems and/or high-power radio operations," the Commission noted, "it would expand Part 15 (of the Rules) to alert manufacturers to consider, in designing equipment, susceptibility to Amateur Radio and other high-powered operations and to avoid operation on frequencies used by high-powered stations."

BIOLOGICAL EFFECTS OF RF ENERGY — STILL A QUESTION

Action surrounding the matter of biological effects of rf radiation continues on several fronts. On one side, state and local governments throughout the country are attempting to legislate radiation standards, widely varying in limits and proposed exemptions. For example, Multnomah County, Oregon, and the entire state of Massachusetts are proposing to enforce standards stricter than the new American National Standards Institute (ANSI) recommendations. On another side, affected organizations, including ARRL, and their members are worried that these restrictions will greatly hinder their communications.

The FCC, several years ago, issued Docket 79-144, which was meant to be a fact-finding inquiry of the biological effects of rf radiation. Earlier this year, the Commission proposed to require its licensees to file environmental impact statements if their operations would exceed federal rf standards. The League requested exemptions for amateurs and expressed concern about widely varying state and local government restrictions.

Table 1

ANSI Safety Levels of Human Exposure to RF

Frequency Range (MHz)	*Power Density (mW/cm^2)*
0.3-3	100
3-30	$900/f^2$
30-300	1.0
300-1500	f/300
1500-100,000	5.0

In its recent Reply Comments to Docket 79-144, the ARRL reiterated its position that "unless the Commission adopts preemptive rf exposure standards specifically exempting Amateur Radio, state and local government regulation will likely seriously affect the ability of radio amateurs to carry out the basis and purpose of the Amateur Radio Service." It also urged the FCC to

- *express its authority and intention to preempt local and state government rf energy exposure standards related to FCC-licensed facilities.*
- *recognize and adopt the latest ANSI standards (see accompanying table) for both the workplace and the public, and exempt Amateur Radio and other appropriate services.*

REPEATED VIOLATIONS, EVASIVENESS COST AMATEUR HIS LICENSE

Rogers, ex-WD5FPO

The FCC has reestablished the correctness of a legal principle that *rules violations committed in one radio service, such as the Citizens Band Radio Service, can form the basis for revocation and suspension of a station and operator license in another radio service, such as the Amateur Radio Service.* This ruling came as part of an FCC Memorandum Opinion and Order revoking the station license, WD5FPO, and suspending the Technician class operator license of William M. Rogers of Oklahoma City, Oklahoma. The Order also affirmed FCC's denial of Rogers's application for an amateur General class license.

On April 24, 1978, the FCC sent Rogers alternative Notices of Violations in the CB and Amateur Radio Services because "it did not know whether CB or Amateur Radio equipment was used." The Commission had caught Rogers transmitting voice communications on frequencies assigned to the Federal Aviation Administration (FAA), using a call sign designation of "103" instead of a properly assigned call.

The controversy over the legal principles involved came about when the administrative law judge hearing Rogers's case found that his violation of CB Rules in 1975 and 1978 "affected his qualification to remain a licensee." The administrative law judge thereupon revoked Rogers's amateur licenses and denied his application for a General class operator license. Rogers appealed the decision to the FCC Review Board, raising the issue of the Commission's authority to find a person unqualified to hold a license in one radio service because of violations that occurred in another service. Rogers also raised the issue of whether the Commission could really consider his rules violations as serious, in light of the fact that the Commission had renewed Rogers's license for WD5FPO after it began its revocation proceeding. Lack of coordination between the FCC license processing and enforcement personnel had resulted in its renewing WD5FPO on May 30, 1978. The Review Board reversed the administrative law judge's decision, and the FCC Private Radio Bureau appealed to the Commissioners.

The Commission Memorandum Opinion and Order specifically overruled the Review Board on two important issues. First, the Commission held that Section 303(m) of the Communications Act "means what it says — that the Commission can suspend the license of any operator upon proof sufficient to satisfy it that the holder of that license had violated any provision of the Communications Act or any regulation made pursuant to the Act." Second, the Commission held that "the grant of a license renewal does not preclude a later revocation proceeding based upon rules violations that occurred, and were known to the Commission investigators prior to license renewal." The FCC thus "disagreed with the Review Board that Rogers's amateur station license cannot be revoked because staff investigators knew of his violations at the time another Commission office renewed his license." According to the Commission, "Section 312(a)(4) of the Act plainly states that the Commission may revoke any station license for willful or repeated violations of the Act or our rules." — *W. Dale Clift, WA3NLO*

FCC Miami Field Office Relocates

The Federal Communications Commission's Miami Field Office has relocated to Kroger Building, Suite 203, 8675 NW 53rd St., Miami, FL 33101. The Office's telephone numbers remain the same: 305-350-5542; 305-350-5541 (recorded information).

ADDITIONAL SPECTRUM FOR R/C DEVICES

Radio-controlled model aircraft, boats, cars and other similar devices now have additional frequencies. Because of severe interference from the Citizens Band Radio Service, previously designated frequencies for these devices had become virtually useless. The Commission feels that R/C devices will have no impact on other licensed users of the frequencies, which are 72-76 MHz (80 channels), available on a secondary basis.

The FCC Docket Number is 82-181, and the effective date is December 20, 1982.

STAFF NOTES

The ARRL Hq. welcomes Wayne T. Yoshida, KA6KGU, to the position of Assistant Public Information Officer. A UCLA graduate, Wayne hails from Los Angeles. His duties will include the writing and editing of the League's Washington newsletter, *Amateuradio*, and the new *ARRL LETTER*. Wayne is a past president of the UCLA ARC, W6YRA, and remains active on the low bands. His other interests include backpacking, photography, motorcycles and, especially, the UCLA Bruins athletic teams. As an experienced mountaineer, Wayne should have no difficulty scaling the mountains (of paperwork) at League Hq. Happy trails, Wayne! — *Rick Palm, K1CE*

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Looking Ahead

Happy New Year! Back in July, the ARRL Board created the Committee for the Strengthening of CRRL. The task of the committee is ". . . . to study possibilities for strengthening the Canadian Radio Relay League, and to make recommendations as to such rearrangement of resource allocation and responsibility sharing between ARRL and CRRL as would result in optimum benefit to each corporation and its respective members."

So what's it all about? Back in 1979, the Canadian Division of ARRL incorporated as CRRL. Since then, there's been unprecedented change in the League in Canada: a five- (now seven-) member board, a CRRL headquarters operation, a CRRL news service, training materials for Canadian amateurs — the list goes on and on. All these changes were initiated and carried out by Canadian League members. In addition, CRRL continued the work of the "old" Canadian Division: representation of Canadian amateurs to DOC and the IARU, the International Amateur Radio Union.

Now, CRRL reps and workers, and the new committee, are wondering if it's time to go farther. During the past three years, CRRL has relied on ARRL to keep its membership lists. It has relied on ARRL to do its accounting (but not to set its internal budgets, or to decide how Canadian members' money should be spent). It has relied on ARRL for other services: *QST* journal, the benefits of the ARRL Technical Department, many of the materials distributed through the CRRL headquarters operation, and more. It has continued to share in ARRL's North American field organization, in ARES and in NTS.

The question before CRRL reps and workers, and the new committee, is how far to go. Obviously, no CRRL member wants to give up *QST*. Most members involved in NTS see little merit in establishing a CRRL traffic system. Too much traffic flows north and south. In ARES, there is a change. Some ARES members are asking CRRL to coordinate their efforts, to create a setup that would be useful in a *Canadian* national emergency. Finally, many CRRL members say that, eventually, they would like CRRL to handle its own membership lists and all its members' money, paying ARRL for *QST* and other benefits of continued membership in ARRL.

That seems to be a key point. CRRL members say they want to remain part of ARRL. When they take part in Field Day, they want to think of it as "our" Field Day, not "their" Field Day. They want to think of *QST* as "our" journal. They say if it weren't for ARRL, there would be no Amateur Radio today, and of course they're right. They say there's over 60 years of League tradition in Canada, and they don't want to turn their backs on it. Despite the occasional disagreement with the larger organization, they're proud of ARRL, and want to remain members.

These are the messages we keep hearing. We hope we're listening to the right people. How do you feel? Why not take a sheet of paper or a card, and let us know? There are going to be more changes in CRRL, that's for sure. But CRRL is the *League*. That means amateurs bonded together for their *common* interest. CRRL will never become an individual's or even a group's pet project. It will become exactly what you, the CRRL member, want it to become.

So tell us what you think. Tell that new committee! Please.

INTERIM MINUTES OF CRRL BOARD MEETING No. 5, 1982 OCTOBER 02

The Board of Directors of the Canadian Radio Relay League, Inc. met at 0920 EDT at the Waterloo Motor Inn, Waterloo, Ontario. Present were new ARRL Canadian Director Tom Atkins, VE3CDM, in the chair; new ARRL Canadian Vice Director and CRRL Secretary Harry MacLean, VE3GRO; and Directors Ray Perrin, VE3FN, and George Spencer, VE6AW. Also present were Honorary Vice President Noel Eaton, VE3CJ, and Counsel Robert Benson, Q.C., VE2VW.

1. By simple vote, the Board waived notice of meeting.

2. Moved by Mr. Spencer, seconded by Mr. Perrin, VOTED to correct Item 9(d) in the Interim Minutes of CRRL Board Meeting No. 4 to read as follows: "counsel action with respect to the trademark dispute with CARF. CARF has attempted to register the trademark CARL which stands for Canadian Amateur Radio League. The Board continued to feel that CARF was acting in bad faith, and that in any event, the trademark was too close to CRRL, and would become a source of unnecessary confusion to Canadian amateurs." Moved by Mr. Spencer, seconded by Mr. Perrin, the Board then VOTED to adopt the minutes as corrected.

3. Moved by Mr. MacLean, seconded by Mr. Perrin, the Board VOTED unanimously that Tom Atkins, VE3CDM, become new CRRL President.

4. Among other items, the Board discussed (a) the CRRL headquarters operation in London, Ontario; this would continue as before, (b) CRRL budgets for 1982; no problems were anticipated in meeting all expenses, (c) CRRL participation in World Communications Year, (d) the relationship of the new Section Managers to the CRRL Board; this would be worked out cooperatively with the Section Managers, (e) the CRRL General meeting, which would be held later in the day; as a result of this meeting, there would be significant changes in the CRRL Constitution, as recommended by the Board at CRRL Board Meeting No. 4.

5. The Board also wished to record a vote of thanks to outgoing CRRL President and ARRL Canadian Director Mitch Powell, VE3OT, for his three years of outstanding leadership and service.

6. There being no further business, the Board adjourned at 1200 EDT. Total time as a board: 2 hours, 40 minutes.

Respectfully submitted,
Harry MacLean, VE3GRO
Secretary

CRRL NEWS

Changes in the CRRL Constitution, approved by those who attended the CRRL General Meeting in Waterloo, Ontario on October 2, were approved by the Minister of Consumer and Corporate Affairs on October 13. The CRRL President and ARRL Canadian Director now become one and the same. The CRRL Vice President and ARRL Canadian Vice Director become one and the same. These will be elected every two years. Next election will be in October of this year. The CRRL Board now has five regional directors: one from British Columbia, one from the midwest, one from Ontario, one from Quebec and one from the Atlantic Region. These will also be elected every two years, but not on the years when the CRRL President and Vice President are elected. The next election will be in October of next year.

Interim directors have been appointed for British Columbia and the Atlantic Region. They are William Kremer, VE7CSD, and G. Andrew McLellan, VE1ASJ. Both are knowledgeable, active amateurs. Bill has represented CRRL at many hamfests on the West Coast. He operates VE7QST, transmitting CRRL bulletins across Canada each Sunday on RTTY. Andy is manager of the CRRL Central QSL Bureau. He holds many records in contest operating and vhf work.

Bill Loucks, VE3AR of CRRL, and Barc Dowdon, VE3TT of CARF, represented amateurs at the meeting of the Electromagnetic Interference Committee of CRTPB, the Canadian Radio Technical Planning Board, held in Ottawa on November 8. For RFI generated by computers, the committee recommended that DOC adopt the same standards adopted by FCC in the U.S. This would prevent "dumping" of substandard computer equipment into Canada. DOC reported that Amateur Radio created few cases of RFI. The committee recommended that DOC seek enabling legislation similar to the "Goldwater Bill" in the U.S., so DOC could set minimum rf susceptibility standards for home-entertainment and other electronic-electrical equipment. Amateur representatives urged DOC to adopt the Level 3 standards set out in DOC's Electromagnetic Compatibility Advisory Bulletin Issue 3. These standards would eliminate many of the problems associated with CATV systems. All recommendations now go to the full CRTPB, which will meet early this year.

Recently, an amateur in British Columbia attempted to import a linear amplifier, and was told by customs officials that amateur equipment had to be DOC type-approved before entering Canada. This was not correct. Amateurs who experience similar problems should refer customs officials to Revenue Canada Customs and Excise Memorandum D19-4-2, dated 1982 July 01. Section 8 of this memorandum states: "Amateur radio equipment does not require type-approval from DOC to be operated in Canada . . . " CRRL sent a letter to the customs officials in British Columbia, referring them to the memorandum, and a letter to customs officials in Ottawa, asking for their assistance so the problem will not occur again.

DOC NEWS

☐ DOC has informed CRRL of a new reciprocal operating agreement with Papau New Guinea.

☐ DOC will hold Amateur Radio examinations on February 9, April 20, June 15 and October 19. Closing dates for applying to DOC will be January 12, March 23, May 18 and September 21.

☐ DOC has announced the availability of a new poster that shows rf spectrum allocation in Canada, based on the results of WARC '79. The poster is available from bookstores that stock Government of Canada publications. Cost: $2.50.

☐ Some Canadian amateurs have expanded their hobby to include receiving satellite television. Back in October, Communications Minister Francis Fox announced a crackdown on owners of so-called earth stations who use signals they receive for commercial gain. Owners of purely private stations would not be affected. Adapting a statement made by another Canadian politician, Fox quipped that ". . . the DOC has no business in the backyards of the nation."

ARRL HAM INSURANCE

Many Canadian amateurs have expressed concern about ARRL low-cost insurance on Amateur Radio equipment. According to a report in the October *TCA*, the insurance was invalid — and illegal to offer in Canada. There *was* a small problem concerning the legality of the League's insurance company doing business in Canada, but this has been corrected. The League's insurance company has made arrangements with a Canadian insurance company. Appropriate government departments have been notified. They have approved the arrangements. The ARRL insurance is valid — and legal to offer in Canada.

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

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
NO. 403
NOVEMBER 20, 1982

Agenda

1. Approval of minutes of previous meeting
2. Recognition of new Life Members
3. Affiliation of clubs
4. Approval of conventions
5. Report on local antenna/rfi legal matters
6. Report on FCC matters
7. Report on progress toward reciprocal operating agreement betwcen U.S. and Japan
8. Review of actions taken by General Manager in response to previous Board Meeting actions
9. Report on Regional Emergency Coordinator concept
10. Final report on Wallace Nolen suit
11. Report on results of mail ballot concerning the venue of the 1983 Second Meeting of the Board
12. Request for transfer of $10,000 from National Traffic System appropriation to SCM Expense appropriation for 1982
13. Report on Space Shuttle project
14. Consideraton of film proposal by Roy Neal, K6DUE
15. Other reports

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 8:50 A.M., EST, Saturday, November 20, 1982, at the Headquarters offices of the League in Newington, Connecticut. Present were President Victor C. Clark, W4KFC, in the Chair; Directors Paul Grauer, W0FIR, Jay A. Holladay, W6EJJ, and William J. Stevens, W6ZM; and General Manager David Sumner, K1ZZ. Also present as observers were Director Edmond A. Metzger, W9PRN, and Counsel Christopher D. Imlay, N3AKD; Director John C. Sullivan, W1HHR, and Washington Area Coordinator Perry F. Williams, W1UED, also were present for part of the meeting.

1) On motion of Mr. Holladay, the Minutes of the previous meeting were accepted in the form in which they were distributed.

2) On motion of Mr. Stevens, the Committee recognized the names of 118 newly elected Life Members, and directed the General Manager to list their names in *QST*.

3) On motion of Mr. Stevens, the affiliation of the following clubs was approved (Category I unless otherwise indicated). Alamo Repeater Assn., Inc., San Antonio, TX; Contest Association of South Texas, Weslaco, TX; Delaware Amateur Radio Assn., Inc., Delaware, OH; Dixie DX'ers, Peachtree City, GA; Hart House ARC of the Univ. of Toronto, Toronto, ON, Canada (Category III); Lake of the Ozarks ARS, Sunrise Beach, MO; McMinnville ARC, McMinnville, OR; Monmouth County Repeater Assn., Inc., Monmouth Beach, NJ; Mountain Empire ARC, Wise, VA; North Idaho Amateur Repeater Assn., Coeur D'Alene, ID; Perkin-Elmer Amateur Radio Service, Danbury, CT; St. Mark School ARC, Stratford, CT (Category III); Southwestern Virginia Wireless Assn., Inc., Roanoke, VA; Turner Middle School ARC, Lithia Springs, GA (Category III); Western Pennsylvania DX Assn., Latrobe, PA; Woodford Amateur Radio Society, Versailles, KY.

With this action the League now has the following number of active affiliated clubs: Category I, 1593; Category II, 10; Category III, 176.

4) On motion of Mr. Grauer, approval was granted for the holding of the following ARRL conventions: Arkansas State, March 26-27, 1983, North Little Rock, AR; Mississippi State, April 23-24, 1983, Jackson, MS; Illinois State, June 5, 1983, Princeton, IL; Texas State, June 3-5, 1983, Dallas, TX; Alabama State, August 20-21, 1983, Huntsville, AL; Dakota Division, Sept. 23-25, 1983, Sioux Falls, SD; Southeastern Division, August 18-19, 1984, Huntsville, AL; Pacific Division, Sept. 1-3, 1984, Santa Clara, CA; New England Division, Sept. 29-30, 1984, Boxboro, MA.

5) Mr. Imlay reviewed the status of local litigation and regulation concerning Amateur Radio as follows:

5.1) Bynum, WB2SZK, case. The Supreme Court of New Jersey has taken no action since the previous meeting. The enactment of Public Law 97-259 should assist the amateur position in this and similar cases, in that Federal pre-emption in the field of rfi regulation has been re-emphasized and clarified.

5.2) Burbank, Illinois, anti-amateur ordinance. In response to the class-action complaint filed in Federal court on behalf of Burbank's amateurs, the city filed a "motion to dismiss" that was late and had other technical errors. Attorney O'Connell, W9WU, reports that an oppositon to the city's motion will be filed.

5.3) Dr. Harvey S. Ellis, WD8BCM, seeks appeal of a denial of a building permit for a modest tower at his home in Farmington Hills, Michigan. On motion of Mr. Stevens, it was voted that Counsel Imlay is authorized to prepare an Amicus Curiae brief explaining amateur radio as a normal and incidental use of residential property and is in the public interest.

5.4) Guschke, N5SW, case. At its July 20 meeting, the Committee had offered support in the form of out-of-pocket expenses for the appearance at trial of an expert witness on behalf of N5SW. The attorney handling the case, N5MS, has chosen not to utilize this testimony, but has requested other participation by Counsel Imlay on behalf of the League. On motion of Mr. Stevens, it was voted that Counsel is authorized to prepare a further Amicus Curiae brief for submission in this case.

5.5) Cerritos, California. After a period of relative quiet, problems are brewing once again for amateurs in Cerritos. Director Holladay is monitoring this situation closely.

6) Mr. Imlay reviewed FCC rulemaking matters, as follows:

6.1) November 29 is the deadline for comments on the League's petition, RM-4229, concerning the volunteer examination program. Brief comments are being prepared to clarify certain aspects of the petition.

6.2) January 14, 1983, is the deadline for comments on the FCC proposal in Docket 82-726 to virtually eliminate logging requirements for amateur stations. On motion of Mr. Stevens, it was voted that Counsel shall work with the staff in developing draft comments for review by the Executive Committee prior to the filing deadline. The draft comments will support the elimination of most logging requirements, particularly to relieve repeater licensees of the burden of logging third-party traffic; however, they will suggest that records of international third-party traffic continue to be required.

6.3) February 1, 1983, is the deadline for comments on the FCC proposal in Docket 82-624 to change the method of determining transmitter power in the Amateur Service. On motion of Mr. Grauer, it was voted that Counsel shall work with the staff in developing draft comments for review by the Board prior to the filing deadline. The draft comments will be in accordance with the policy established at Minute 60 of the 1982 Second Meeting of the Board.

6.4) A draft petition to FCC was reviewed seeking a ten-year license term for station and operator licenses in the Amateur Service, as authorized by Public Law 97-259, and further requesting that the present one-year grace period for the renewal of expired station licenses (and retention of callsigns) be extended to two years. On motion of Mr. Stevens, it was voted that Counsel proceed to file the petition as drafted.

6.5) The status of the League's efforts to resolve the cable television interference (CATVI) problem was reviewed briefly. An FCC official has been quoted as telling an audience of CATV engineers that the industry is close to losing access to Channels E and K if it does not do a better job of resolving interference problems with amateurs. It is hoped that this comment reflects the prevailing FCC attitude toward the ARRL petition, RM-4040.

6.6) Mr. Williams reviewed the developing situation with respect to a no-code amateur license. On motion of Mr. Holladay, it was voted that, in light of the impending transfer of amateur license examination responsibilities to the amateur community and its attendant workload, the possibility of deferring for at least 18 months the issuance by FCC of a Notice of Proposed Rulemaking seeking to establish a new codeless license class be explored with the Commission.

6.7) The FCC proposal in Docket 82-727 to change the Novice Class license examination system was discussed without formal action. It was noted that the League's petition RM-4229, also addresses this subject. Deadline for comments on this proposal is February 15, 1983.

7) Mr. Williams reported on meetings held November 18 between League representatives and FCC and State Department staff to explore ways of overcoming obstacles to a reciprocal operating agreement between the U.S. and Japan. The outlook is very encouraging for a satisfactory resolution.

8) Mr. Sumner reported on actions taken by the General Manger in response to Board directives. The only matter requiring Executive Committee action was the establishing of a formula for determining budgets for the 73 ARRL sections for 1983, as directed at Minute 21 of the 1982 Second Meeting of the Board. On motion of Mr. Stevens, the following formula as recommended by the General Manager was approved: $.75 per member in the section, with sections having fewer than 1,000 members to be allocated $750.

9) A report from Communications Manager Lindholm on the desirability of reactivating the Regional Emergency Coordinator appointment in the state of California, was presented, as requested by the Committee at its September 11 meeting. Mr. Lindholm recommended that the new section-level organization, and in particular the position of State Government Liaison, be given every chance to succeed before consideration is given to reactivating the Regional Emergency Coordinator appointment. The report was accepted without formal action by the Committee.

10) Mr. Sumner reported that the suit against the League filed by Wallace S. Nolen, WA2BLM, has been dismissed by the Court, and Mr. Nolen ordered to pay the League's court costs.

11) For the record, Mr. Sumner reported the results of the mail vote of the Board, as ordered at Minute 12 of the September 11 Meeting of the Committee. Nine Directors voted in favor of Houston, October 5-6, 1983; seven voted in favor of meeting as previously scheduled, in Hartford on October 20-21, 1983. Those voting in favor of Houston were Messrs. Atkins, Butler, Carey, Holladay, Mrs. Lewis, Messrs. Olson, Turnbull, Wangler, and Zak; those voting in favor of Hartford were Messrs. Grauer, Hurlbert, Metzger, Milius, Nathanson, Stevens, and Sullivan.

The Committee was in recess from 12:06 to 1:40 P.M.

12) Mr. Sumner reported that the 1982 SCM Expense appropriation of $38,000 had been nearly exhausted. On motion of Mr. Stevens, it was voted to transfer $10,000 from the National Traffic System appropriation to the SCM expense appropriation for the balance of 1982.

13) Mr. Clark reported that a joint proposal by the ARRL and AMSAT has been filed with NASA which offers the assistance of the two organizations in placing an amateur transceiver aboard Space Shuttle Flight STS-9 next October.

14) Roy Neal, K6DUE, Producer-Correspondent for the NBC Television Network, has offered to undertake the production of a film keyed to the Space Shuttle flight. Estimated costs are in the vicinity of $50,000. After discussion, on motion of Mr. Holladay, it was voted that the General Manager is instructed to prepare for the Board a plan, along the lines suggested by Roy Neal, for the preparation of a new Amateur Radio film dedicated to the premise that young people will enjoy the way in which Amateur Radio brings together space age communication and computer technology. The plan is to include possibilities for funding of the project.

15) Additional reports were rendered as follows:

15.1) A preliminary report on the 1983 ARRL National Convention from the convention chairman, Tom Taormina, K5RC, was received and reviewed.

15.2) Mr. Clark reported on a meeting with the President, Stuart Meyer, W2GHK, of the Quarter Century Wireless Association, to discuss QCWA participation in the volunteer examination program.

15.3) Mr. Clark also reported on progress being made by the ARRL Committee on Amateur Radio Digital Communication under the chairmanship of Paul Rinaldo, W4RI.

15.4) Mr. Holladay reported on steps being taken in the Southwestern Division to organize volunteer support for the FCC in accordance with Public Law 97-259.

The next meeting of the Executive Committee is scheduled for February 12, 1983, in the San Francisco area.

There being no further business, the Committee adjourned at 3:14 P.M.

Respectfully submitted,

David Sumner, K1ZZ
Secretary

Victor C. Clark, W4KFC
President

LIFE MEMBER APPLICANTS
NOVEMBER 20, 1982

List No. 1: Stephen Breden, W5HK; Nelson Kent Brooks, WB4LTS; Donald K. Burrows, KO2J; Garry F. Cobb, WA4QHN; Robert E. Davis, KBØDC; James J. Fitzgibbons, KAØJPA; Sandra M. Hamilton, NØCLQ; Richard D. Harris, WB5DGR; Vincent E. Henley, KB6GV; Stephen E. Hutchison, K8SUS; Harry W. Jackson, WD4PPF; Gary E. Jones, W5VSZ; David A. Johnson, KA5HSA; Fred Kahn, KK2T; Linda P. Keeney, KA6IBR; Kenneth E. Kinyon, W7TS; Richard E. Lambert, W5ZHI; Milo G. Larson, W5QDN; Phillip L. Leach, KC5XM; Richard S. Leary, W7LKG; Janet R. Levy, KA1JDH; Charles A. Lofgren, W6JJZ; Andrew C. Mac Allister, WA5ZIB; Douglas M. Macheel, K6HLE; Fredric S. Mendes, WB6FEF; Dennis R. Motschenbacher, KZ5M; Harry James Nelson, III, N6ASY; Max E. Norman, W2IQE; Presley Northcutt, KA9DZD; Allen F. Packer, WA7BKD; Stanley Painter, KA1BLL; Jimmy F. Pyeatt, W5JDV; Carl P. Rabalais, WB5YIF; Gerald R. Ransom, W7BYN; John P. Reed, Sr., WDØCCW; Leland E. Riggs, WB6ROJ; Donna S. Roesch, NØCAK; Mark A. Rosenthal, N6BVP; Gregory T. Schuh, WB6GJA; George Scott, WE4H; Joseph A. Silvasi, Jr., KC2J; Robert Lee Spindle, WA4QYP; Roger C. Stimson, WA8SQL; James A. Storm, WB6LWS; Carl E. N. Takle, WB5VGI; Norman A. Tramba, WAØHWH; Thomas E. Van Buskirk, WB2TGU; Samuel G. Van Zile, WB6CLD; David T. Vasicek, KS8U; Robert G. Vezeau, WB1GLN; Linwood E. Watrous, WB1EEX; Edward E. Watson, N6EIG; Peter D. Wechter, KI1F; Eunice D. Wilson, WD6AUT; Randolph Young, NH6B;

List No. 2: Leslie T. Anderson, KB5HP; Ted M. Bak, WB8ZME; David J. Belway, VE7DYT; William P. Bryan, KA4CIZ; Samuel E. Carroll, AI8X; Michael A. Corder, WDØFWK; Jerry L. Culver, W5UKS; Guy David Cusumano, KO2U; Lloyd J. Ellsworth, WA8ZCO; George D. Essig, WA7KSW; Gary R. Fuchikami, WH6C; George E. Gary, WD9JIC; James S. Glen, WB7NUA; Joseph A. Gutowski; Edmund P. Henke, Jr., WD9DXV; Robert Lee Hicks, III, KC8CR; Jerome M. Jarze, N8ATV; John Kosboth, KA2FQY; Dennis L. Liphardt, N8AJF; Syuji Minami, JH3UBF; Jay S. Oka, JA1TRC; William D. Paperman, WB5INB; Stanley Phillips, WB5WSX; Thomas C. Rac; John J. Roesch, NØBWE; Steve Roley, AD7G; Gayle Roseman, KAØMUW; Richard A. Sandell, WD6EXJ; Gary S. Schmid, KA1GDN; James P. Shores, W1ICT; Richard E. Smith, WD6GFF; David G. Spears, WBØZAH; Robert D. Tridle, WDØDJT; Dennis Trimble, W6LVY; Richard Valentine, N8BKN; Louis E. Voerman, KB2XN; John D. Vugteveen, W7KNT; Marvin R. Weatherly, KL7NU; Steven L. Weinstein, N2CHD; Jerry A. Young, K9JHE; John H. Antes; Thomas James Arey, WB2GHA; Stanley K. Arnett, II, AC8W; John B. Black, WD4CVR; Bruce P. Bogert, AI2X; Daryl L. Borgman, WB1DXN; Dennison L. Bradford, WB9LFD; Peter Byfield, K9VAL; Peter R. Harker, WD4PRT; Paul C. Quintin, KA1FRS.

List No. 3: W. David Bemmels, WØKL; Helen M. Broulette, WB9RAY; C. Allen Clark, WA2JDS; Earl E. Edwards, WD4HBP; Donald D. Hester, II, N6BQR; Paul Lecheler, N8BQI; Robert Pickett, N6EYV; Richard W. Randall, K6ARE; Richard A. Rhodes, II, KB8BGQ; Paul F. Supan, WB4JCY; Peter Turbide, K1VGR; Michael J. Wendland, KK9Q; Erold D. Williams, WB8BVF.

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

†**Florida:** The 4th Annual Sarasota Hamfest will be held at the Exhibition Hall, 801 North Tamiami Trail, Sarasota, Jan. 15-16. Doors open both days at 8:30 A.M. Sponsored by the Sarasota Amateur Radio Assn., Inc. Donation covering two days, $3 advance, $4 at door. Swap tables, advance reservation requested, two days, $12 donation includes door donation. No one-day tables. Commercial booth donation $60 for two days, no one-day booths. Fly-in: Sarasota-Bradenton Airport. QCWA luncheon, Saturday, Jan. 15, advance reservations mandatory. Information/reservations for QCWA luncheon, contact Frank Lehnert, W4AE, 4820 Calumet Ave., Sarasota, FL 33580 or tel. 813-355-4149. For advance hamfest tickets, booth reservations or information, contact Flo, WB4YUV, tel. 813-953-4515, or write Sarasota Hamfest, P.O. Box 3182, Sarasota, FL 33578. Advance reservations strongly recommended. Please enclose s.a.s.e. Talk-in on 13/73, 146.46 and 146.52 simplex.

†**Illinois:** Wheaton Community Radio Amateurs Hamfest will be held Feb. 6 at Arlington Park Race Track EXPO Center, Arlington Heights. Free flea market tables; plenty of space. Large commercial area including computer section. For general info call W9JTO at 312-231-9524. Clear, paved parking. Awards. Tickets $3 at entrance, $2.50 in advance. Send s.a.s.e. to WCRA, P.O. Box QSL, Wheaton, IL 60187. Doors open 8 A.M. Talk-in on 01/61 and 146.94.

Louisiana: Southeastern LA University ARC (SLUARC) is sponsoring a hamfest Saturday, Jan. 15, on the SLU campus in the Twelve Oaks Cafeteria (Eastside Cafeteria), from 9 A.M. to 3 P.M. Free admission; free swap tables.

Michigan: The Southfield High School ARC is sponsoring their 18th annual Swap & Shop, Jan. 30, at Southfield High School, 24675 Lahser, Southfield. Doors open at 6 A.M. for exhibitors. Open to the public at 8 A.M. to 3 P.M. Admission is $2.50. Reserved tables are $18 for two 8-ft tables (paid in advance). Additional reserved tables $9 each. Tables also available at the door. Parking, food, prizes. All profits go toward electronic scholarships and support of club activities. For information and/or reservations, write to Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034, tel. 313-354-7372 between 8 and 10:30 A.M., or 313-354-8210 between 10:30 A.M. and 3 P.M., Monday through Friday.

Nevada: Southern Nevada ARC of Boulder City has SAROC's 20th convention for Radio Amateurs scheduled at the Aladdin Hotel, Las Vegas, Jan. 13-16. Technical sessions and exhibits Friday and Saturday. First-time swapmeet inside near exhibit area. Advance registration $17 per person if postmarked before Jan. 1; afterwards $19. Coupon book and badge holder may be picked up at SAROC registration desk. Send check or money order (U.S. funds) to SAROC, P.O. Box 945, Boulder City, NV 89005-0945. Refunds after SAROC is over to those requesting same in writing and postmarked before Jan. 13. Special SAROC Aladdin Hotel room rate is $37 plus room tax, per night, single or double occupancy. Call 1-800-634-3424 for Aladdin Hotel reservations. Do not send accommodations money to SAROC.

†**Texas:** The Texas VHF/FM Society Winter Convention sponsored by the Brownwood ARC and Texas VHF/FM Society will be held at the Riverside Motel, Brownwood, Feb. 5-6 (Saturday from 8-6, Sunday from 8-1). Advance registration is $6, at the door $7. Swapfest, dealers' displays, guest speakers throughout the day Saturday. Motel, RV reservations. Talk-in on 34/94 and 52. For info and reservations write to Brownwood ARC, P.O. Box 3080, Brownwood, TX 76801, tel. 915-646-1079, Wes Roan, WB5FRE.

Wisconsin: New larger facility and special awards are features of the 11th Annual Midwinter Swapfest sponsored by the West Allis Radio Amateur Club. The event will be held Saturday, Jan. 8, at the Waukesha Co. Expo Center. Tickets are $2 in advance, $3 at the door. Tables are $2 in advance, $3 at the door. Write, including s.a.s.e., to W.A.R.A.C., P.O. Box 1072, Milwaukee, WI 53201.

Coming Conventions

February 5-6
Southeastern Division, Miami, Florida

February 26-27
Ohio State, Sharonville (Cincinnati)

March 19-20
Roanoke Division, Charlotte, NC

March 26-27
Arkansas State, North Little Rock

March 26-27
Georgia State, Columbus

ARRL NATIONAL CONVENTIONS

October 7-9, 1983
Houston, Texas

July 20-22, 1984
New York, New York

September 27-29, 1985
Louisville, Kentucky

SOUTHEASTERN DIVISION CONVENTION/TROPICAL HAMBOREE
February 5-6, 1983, Miami, Florida

The 1983 ARRL convention year opens in sunny Miami with this world-renowned international meeting of Amateur Radio enthusiasts. The rare DX station and the ham next door will be at the Southeastern Division Convention/23rd Annual Tropical Hamboree to greet you. During your free time you can visit the many places of interest in the Miami and Miami Beach area (map available from Committee), drive the famous Overseas Highway to historic Key West, arrange a one-day "SeaEscape" to the Bahamas or plan a complete post-convention cruise to several ports of call on the Tropical Islands in the Caribbean.

A full program of convention activities has been planned covering all facets of Amateur Radio, including an exciting presentation on the challenges facing us in the immediate future with speakers from FCC and ARRL. South Florida DX Assn. will host a DX Booth, Forum and Dinner. S.E. Chapter QCWA will have a Hospitality Corner at convention site for QCWA-SOWP-OOTC. So. Fla. Section will hold a Traffic Handlers Breakfast. All major manufacturers plan exhibits of the latest equipment, 400 swap tables will be filled with bargains and the Hamboree awards list will include computers, transceivers, hand-helds, mobile rigs, antennas and a lady's diamond ring. *FCC examinations for Extra, Advanced, General and Technician class licenses will be held Saturday. Send completed 610 Form with notation under your signature "For Miami Hamboree" to FCC, Suite 203-Koger Bldg., 8675 N.W. 53 St., Miami, FL 33166. Forms must be in by January 21.*

Site of all these events is fabulous Flagler Dog Track. There is ample free parking, including free overnight parking for self-contained RV units; reservations suggested. Special hotel rates at Airport Ramada Inn are $45 single, $48 double; $51 triple; reservation cards available from Committee. Convention registration is $3 through February 1, $4 after the first. Make check payable to Dade Radio Club, P.O. Box 350045-Riverside Station, Miami, FL 33135. DX Dinner Tickets are $15.75 each. Make checks payable to South Florida DX Assn., and send to P.O. Box 4541, Margate, FL 33063. For guaranteed seating, get dinner tickets by February 1.

†ARRL Hamfest
*Convention/Travel Coordinator, ARRL

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

The Simpatch

Phonepatch and autopatch operations uniquely enhance the amateur's emergency communications capability, thus contributing to the public interest. In fact, this is a reason the FCC has not moved to prohibit such operation, although on several occasions the Commission has cautioned against using autopatch facilities for business communications.

Traditional phone interconnect systems include the use of the phonepatch ("patch" refers to the interconnection) — a device that, for example, allows amateurs to "patch" sailors at sea into the phone system to talk to their spouses and families back home. Another device is the autopatch, so named for its use on repeaters where a mobile amateur operator may access Ma Bell automatically to report a "fender bender" on Interstate 495. The purpose of these patching privileges is public service. This intent is especially important when one considers that such operation usually involves amateur/nonamateur communication.

In recent times, we've witnessed the emergence of a new phone interconnect system called the *simplex autopatch or simpatch.* The device is a spin-off from the conventional repeater autopatch with the intermediary repeater eliminated. Normally, the simpatch is installed at the ham's home station for his or her private, exclusive use. It allows the mobile amateur to access the public phone system through his or her home station. The link is usually situated on a lesser-used vhf or uhf frequency.

There is a problem, however: Abuse. In the field, the simpatch is popularly employed to provide the mobile operator with the types of communications facilities normally provided by a radio telephone or by a cordless telephone. For many, a simplex autopatch system means a convenient, private and toll-free phone booth offering facilities for business communications. These are communications beyond the rule boundaries of the Amateur Service.

This is not to say that the simpatch has no place in Amateur Radio; the device offers another public service tool to amateurs in emergency preparedness. But misuse does occur, and it should be of concern in that all interconnection may be prohibited if abuse grows to significant proportions. It's important that phonepatch and autopatch be employed for the public benefit — not for business.

With this discussion in mind, we now turn to the specific rules concerning simpatch devices.

Q. The big question: Is the simplex autopatch legal? If so, how can I operate my device legally?

A. It is possible to use a simplex autopatch device in a limited manner that complies with the Amateur Rules, even though its use is not specifically provided for in the Rules.

Most importantly, a control operator must be present at *both* stations' control points (97.79[b]). The operation involves third-party traffic in that a third party is "participating" in amateur radiocommunication. This "participation" is permitted as long as the control operator is present and monitors and supervises the radiocommunication continuously to insure compliance with the Rules (97.79[d]).

This provision limits the mobile station operator to placing calls; incoming calls from third parties must be answered and screened off the air by the other station control operator, before being placed on the air.

Q. Is it legal to operate the home simplex autopatch transmitter by remote control from my mobile rig?

A. Remote-control operation is permitted within specific constraints. In this case, the mobile station in contact with the fixed home station is actually controlling the simpatch. This means that the mobile station, when it is used to turn the fixed station on and off and transmit other control function signals, is in *auxiliary operation* ("Radiocommunication for remotely controlling other amateur radio stations . . ." 97.3[1]). Accordingly, the mobile station in auxiliary operation must confine the control link frequency to 220.5 MHz and above (except 431-433 and 435-438 MHz) where auxiliary operation is permitted. Thus, when the home fixed simplex autopatch transmitter is being remotely controlled by the mobile auxiliary station, 2-meter operation is precluded.

Amateurs should have a good working knowledge of auxiliary operation, remote control and control-operator requirements before attempting to employ a remotely controlled station with simplex-autopatch capability.

Q. What about the legality of the so-called reverse autopatch?

A. Section 97.79 of the Rules concerning control-operator requirements makes it clear that *no* unlicensed person may initiate an amateur transmission. Incoming calls, as previously mentioned, must be answered and screened off the air by the control operator to ensure rules compliance. Reverse autopatch is permitted only under these strict conditions.

Q. Are simplex autopatches appropriate in the Amateur Service?

A. The Commission is aware that simplex-autopatch devices can be used easily in a way that violates the Rules. But even when the device is operated within the Rules, the appropriateness of the operation is an open question. The Commission has not received any requests asking that simplex autopatch devices be either prohibited or expanded. The Commission is, however, interested in learning how the amateur community feels about the appropriateness of these devices in the Amateur Radio Service. See the sidebar story for information on how you can help.

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

Simplex Autopatch — Your Concerns

Consider the following questions and let your conductor, K1CE, know how you feel about simplex-autopatch devices in the Amateur Service. Is the simpatch autopatch a wolf in sheep's clothing?

1) Are you concerned about fellow amateurs monopolizing a frequency with a simplex patch?

2) Do these devices meet the Basis and Purpose criteria of section 97.1?

3) Should the rules be made clearer regarding control-operator responsibility and the use of autopatch facilities?

4) Should simplex autopatch be banned from the Amateur Radio Service, or should the rules regarding the control operator be relaxed to further facilitate simplex patch use?

Traditional repeater autopatch systems are sometimes found in high places, such as this pristine site on the old Observatory building at the summit of Mount Washington in New Hampshire. The autopatch at K1OIQ/R is often used for public service in the White Mountain region.

*Assistant Manager, Membership Services, ARRL

Correspondence

Conducted By Peter R. O'Dell,* KB1N

THE JOY OF *QST*

☐ Encouraged by *QST*, I am now catching up on solid-state: Your emphasis on technical upgrading is absolutely right as well as very helpful. I can testify that the 6L6 job still works, but I'll now get a power FET on the air for the good of my soul.

I very much appreciate the time you people at ARRL devote to answering letters — I know how busy you are. It's of a piece with the extreme courtesy I get on the air, which Advanced and Extra Class operators extend to lids like myself. Apart from design and construction, I think this is one of the most rewarding things I've encountered as a Novice, and somebody should acknowledge it. There aren't too many considerate people around today. — *Alex Comfort, M.D., KA6UXR, Santa Barbara, California*

☐ Put me down in the "support your ARRL" column. I read with disgust the cynical, critical and ill-conceived letters written by hams complaining about too much advertising, too few technical articles, too expensive homebrew gear, etc. I totally disagree with them. I have found that, over time, there have been many, many articles of interest to me. This to the point that I have found it necessary to devise a cataloguing system for easy reference. Now, my only interest is hf cw so, judging by the size of my catalogue file, I would say you are doing a super job. I wish the critical hams would offer solutions when they submit their complaints. The ones that don't, I ignore. — *George Anthony, KEØV, St. Joseph Missouri*

☐ Re: "Bloody Bore" (November "Correspondence"): How true! How true! — *Harry Adelman, K6IB, Chatsworth, California*

GREAT ANTENNA FOR THE NEWCOMER

☐ I would like to comment on the *New Ham News* September article, "Simple Novice Antenna" by Carol L. Smith, AJ2I. [*New Ham News* is a newsletter designed for the newly licensed ham; four issues are sent to all new licensees.—Ed.] This is the best and most easy to follow and understand article that I've read — and believe me, I've read and read on this subject. Even in my Novice class, it was not as clear and understandable. Thank you. — *Robert E. Durham, Phoenix, Arizona*

SEX BIAS AND THE HAMFEST

☐ I have just seen yet another example of the typical discrimination against women that is so prevalent throughout hamdom. A recent catalog describes an upcoming hamfest as having a lot of "YL" activities. Why is this? Why are these activities directed only to women? Why can the activities not be listed as "alternative activities," or some other such non-maligning name? In recent years the number of female hams has increased dramatically, and as dramatic is the increase in the number of female hams who go to hamfests and other ham related activities for "ham" reasons — not to learn how to can sauerkraut.

It is for this reason that I am doing my small part in "retaliation" for this attitude. I will not attend a 'fest which has on its bill the fact that there will be "women's activities" as opposed to "Ham's (men's) activities." I realize that this will not affect anyone other than myself, since I do enjoy a good hamfest. I simply felt it time to make my feelings understood in hopes that other hams might do the same. — *John Stover, N9AMC, South Bend, Indiana*

[Editor's Note: ARRL encourages all groups submitting material for "Coming Conventions" and "Hamfest Calendar" to use nongender-related terminology in describing their programs.]

SOME CABLE OPERATORS ARE OKAY

☐ I represent the Chehalem Valley Amateur Radio Club in Newberg, Oregon and am an active member of that club. When Liberty Cable Television began to install cable television in the Newberg area, I was concerned that interference, which has occurred in other communities, would occur here. I wrote a letter to the Chief of Police, who shared the same concern, since their communications occur in the 150-MHz range.

A letter was written to Liberty Cable regarding my concern, and we received a prompt reply from Rick Schall who listed the steps they had already taken to eliminate any problem before it started. Since numerous installations have already been made, another amateur and I have attempted to find any leakage and have found none, even right next to the cable connections. Liberty also brought to our club meeting some of the latest radiation leakage equipment that is used to insure there is no leakage.

Liberty has demonstrated their facilities to us and done everything possible to insure that the installation is truly state-of-the-art and that no interference will occur. They have also indicated that in the event any problem occurs we can contact them at any time, and they will fix it immediately if possible. It is understood that during wind or ice storms or with expansion and contraction of connections, that some interference on a short-term basis may occur when a connection opens up. But they are as interested in fixing the problem as we are, and that is all we can ask. — *Colin Lamb, K7FM, Portland, Oregon*

SOME CABLE OPERATORS ARE NOT

☐ Having been involved in a CATVI situation for over one year, it would be refreshing to have Messrs. Raimondi and Wanderer (Technical Correspondence, September) brought back to the real world.

While their calculations make very interesting reading, in reality, our CATV operator has not been able to bring the system into compliance with Section 76.605, 20 μV/m at 10 feet, in over a year of effort. The CATV operator has not even acknowledged the existence of Section 76.613 concerning noninterference with duly licensed services. Of all the radio services, only Amateur Radio does not have specific channel or frequency assignments. Therefore, why should off-set even be a discussion item? In Kansas City, all repeater pairs have been used, and we are now working on the 15-kHz splits.

Any signal, regardless of level, which violates the amateur spectrum must be regarded as interference. Bad or missed terminations, broken connections, rodent damage, etc. render all calculations meaningless. A perfect new system can only deteriorate and cause problems. Also, the slightest error during installation or routine maintenance can cause problems covering a wide area.

Our system is small compared to many. It is 140 miles of trunkline without counting the thousands of subscriber drops. Our problems have ranged from repeater/hf ingress into trunks at several thousand feet to CATV egress covering entire areas measured by the square mile. Add to that microprocessor controlled converters, which "forget" in strong rf fields. Help get CATV off our bands. — *John F. Fuhrman, KØLFA, Olathe, Kansas*

HOW TO GIVE THE TEST?

☐ I read with interest the letter from the potential Amateur Radio candidate indicating he was unable to find a willing "Elmer" (Correspondence, October). His letter indicates that three attempts to find a Novice volunteer examiner ended up in disinterest or no assistance at all by the amateur community.

The problem is that most amateur operators simply don't know how the volunteer Novice program is administered. It's not that they are uninterested in giving the exam — they simply don't know what the procedure is! Consequently, they shy away or make themselves unavailable to the applicant for the Novice test. How about an article detailing how to give a Novice test? — *Gordon West, WB6NOA, Costa Mesa, California*

LIKES HIS PHONETICS

☐ A 2 × 1 or 1 × 2 call is not a prerequisite in order to operate in the Extra portions of the bands. As an Extra class license holder, I have elected to keep my old call, KA6 *N*umber *O*ne *R*adio, rather than upgrade, because I like it. Yet it is a "beginners" call. I've been asked lately, especially since dropping "interim LB," if I belong in the Extra portions of the band.

Don't get me wrong; I invite friendly inquiries. But what irks me is the "Don't you belong somewhere else?" type of challenge to my use of the Extra frequency. I too want to keep Amateur Radio as professional as it is and welcome policing, but let's do this in a nice sort of way. — *Kenneth R. Caplin, KA6NOR, Orange, California*

SUCCINCT

☐ I hate speech processors. — *Glen Danner, W9MQW, Madison, Indiana*

*Public Information Officer, ARRL

IARU News

Conducted By Richard L. Baldwin,* W1RU

Administrative Council Concept Approved

By the end of November, more than the required two-thirds of the membership of the International Amateur Radio Union had approved the adoption of a change to its constitution that would provide for the formation of an Administrative Council, the body which will henceforth establish the policies of the Union.

The members of the Administrative Council will consist of two representatives from each region, plus the Headquarters officers. Their first task, to be commenced at a meeting in the spring of 1983, will be to completely overhaul and modernize the constitution of the IARU, in order to recognize the growth of the Union, the many changes that have occurred since its last revision some 10 years ago and the interaction of the Administrative Council with the other bodies of the Union. When the Administrative Council has completed its draft of the proposed new constitution, that draft will be submitted to the membership of the Union for approval, thus ensuring that it is a completely democratic process.

The work of revising the constitution thus far has also been a democratic process. Studies to restructure IARU were commenced during the course of WARC-79 in Geneva, under the leadership of Noel B. Eaton, VE3CJ, then president of IARU. The Executive Committees and the directors of the three IARU regions exchanged voluminous suggestions and comments on the changes that they as individuals saw necessary, and there was extensive discussion at each of the three triennial meetings of the regional organizations. Those discussions resulted in the putting forth to the membership of the concept of the Administrative Council, with the understanding that the Administrative Council would then be tasked with the completion of the constitutional revision process.

Those who have been participating in the pending its approval, and who are expected to attend the first meeting next spring, include Eric Godsmark, G5CO; Louis v.d. Nadort, PAØLOU; Alberto Shaio, HK3DEU; Pedro Seidemann, YV5BPG; Masayoshi Fujioka, JM1UXU; David Rankin, 9V1RH; David Sumner, K1ZZ; Richard L. Baldwin, W1RU; and Carl L. Smith, WØBWJ. Serving as alternates to the Administrative Council members are Walcott Benjamin, EL2BA; Wojciech Nietyksza, SP5FM; and Gustavo Reusens, OA4AV.

With the adoption of the Administrative Council, the work of the Restructuring Committee has come to an end. However, it is important to point out that we could not have progressed this far without the many hours of thought and effort that went into the work of the Restructuring Committee. In a future column we shall pay tribute to all its members.

*President, IARU

Strays

There's no doubt that Richard Simpson, W6JTH, of Palo Alto, California, is high on Amateur Radio as he operates atop 14,018-foot Mt. Tyndall in his home state. Mt. Whitney, the highest point in the continental U.S., peaks only 476 feet higher in the background.

ATTENTION RADIO TELEGRAPH LICENSEES

☐ The Veteran Wireless Operators Association will grant a certificate of recognition to the oldest living person who holds a valid First or Second Grade radio telegraph license. Suitable recognition will also be given to all who enter this event.

To apply, send (1) your address, (2) the name of the last vessel or shore station you served with and the last year of that service, and (3) a statement of your age and that you presently hold a valid First or Second Grade radio telegraph license to Harvey R. Butt, Sr., Secy., VWOA, 118 River Dr., Annapolis, MD 21403. Applications must be received no later than January 31, 1983.

HAM RADIO ON THE HIGH SEAS

☐ How do more than 650 homesick, lovesick and seasick maritime cadets cope with their first 2-month training cruise? The answer is NTS — the National Traffic System. Each year, members of the Massachusetts Maritime Academy are introduced to the rigors of life on the high seas with a maiden voyage — and Amateur Radio is there to help them get through it.

Operating N1BBT/MM, an amateur onboard the *U.S.T.S. State of Maine* maintains daily skeds with liaison stations on land, who forward the sailors' messages to friends and family through NTS for the duration. This year's cruise is from January 10 to about March 10, 1983. In that time, N1BBT/MM hopes to originate and receive more than 3000 messages on behalf of the novice sailors. — *Brian C. Churchill, N1BBT, Wareham, Massachusetts*

Bill Sutter, WA2BTG (left), of Fair Haven, New York, finally had an eyeball QSO with ARRL Atlantic Division Director Hugh Turnbull, W3ABC, at the Syracuse (New York) Hamfest last October 2, but it wasn't to talk about League policies. Hugh was Bill's first on-the-air contact as a Novice. *(WB2FAW photo)*

Conducted By Stan Horzepa,* WA1LOU

Repeaters — An Eavesdropper's Paradise

At a backyard ham picnic, a man reminded me that we had met before. "You gave the talk at the Dallas Amateur Radio Club a couple of years ago about security. . . about not talking so much on the repeaters concerning our personal lives. I still remember the things you said." Goodness. The talk was two years ago, and this fellow remembered what I said. That's better than a lot of preachers, whose sermons may not linger past the final hymn. "Maybe you ought to write an article for *QST*," he continued. Not a bad idea.

I have spent a major portion of my adult life as a U.S. Treasury agent, a CIA agent, and a writer and lecturer to citizen and police groups on the subject of security. I am more sensitive than most about locking my car and my house, and watching what I say concerning my personal comings and goings. While you may never share my total outlook, some of my observations should cause you to stop and think about some of the things you say on your local repeater.

Because repeater activity is usually confined to talking to the same friends — to the point that we recognize each other's voices — we tend to forget how many eavesdroppers there are. With all the scanners, portable radios that tune the vhf bands, ham rigs sold at flea markets, etc., there is a vast audience out there for your casual remarks. Couple that with the fact that you are listed in the *Callbook*, and possibly in a local ham directory, and you are inviting problems if you talk indiscriminately.

I let my ham license expire while I was in the CIA. Getting on the air and talking about my work was not part of their master plan for me. When I returned to civilian life in Dallas, I started studying for my ticket, and bought a 2-meter rig. This was my first exposure to modern ham repeaters. I couldn't believe what I heard.

I made some profiles of people and families I heard on the repeaters and phone patches. I learned the names and addresses and phone numbers of the husbands' and wives' employers, their home addresses and phone numbers, the names and ages and the schools attended by their children. Also divulged were long lists of personal possessions, their vacation plans (with dates and places), the nights they would be out for dinner or a show, and even when they would return home. Some folks told who was left at home (elderly parent, child, babysitter), and where they left the spare key to the house. On and on it went.

I also heard discussions of what kind of medications people were taking, the kind of booze they drank and the general status of marriages. "Love you a bunch," or the irate XYL who answered the phone patch call with "You've been talking to Mary Jane!"

"How'd you know?"

"Never mind how I know."

"Can't we talk about this later?"

Is any of this the business of a stranger? Would you go on the local a-m radio station and talk about these personal matters? It's little wonder that you hear so many hams remark, "Well, I don't talk on the repeater much, but I *listen* a lot." I should think so. It's incredible what you hear.

You may be placing your security, or your family's security, in jeopardy by talking indiscriminately on a local repeater.

"Well, I'm just about to get on the plane. See you all in a week. KH6IO clear." Each time I hear something like that coming into a repeater from the airport, I cringe. Anyone listening now knows that you have gone on a trip and won't be back for a week. I don't have to draw a picture for you to understand the implications of the wrong person having that information. I make it a practice never to talk about a trip as I leave town. Anyone who really needs to know that you are leaving already knows. Don't tell the whole world. Wait until you've returned, and then get on the air to announce your triumphant return. Never mind that the first response may be, "Oh. You been out of town?" Your dog probably missed you.

Then, there's the phone patch. Wonderful gadget. Lots of fun. But don't turn it into a daytime soap opera with revelations of your personal life.

Every city seems to have a bachelor who asks directions over the phone patch for every new YL he is dating. "It's apartment 212, upstairs on the right. My blue 280Z is parked just under my bedroom window." Most likely, W5LOVER is trying to impress everyone on the repeater that he has a new girlfriend (any girlfriend!). I'm sure she would be upset if she realized he had just broadcast her location to all those listening. And now that Touch Tone decoders are common, it's easy to get the phone number, too. Bad news.

Some things overheard recently on a local phone patch were: "If I go out before you get here, I'll leave the house open." And a guy talking on the patch to his YL around midnight, both agreeing that she will spend the night alone at her place. The next day the same guy was talking with her again on the patch, arranging for her to spend the night at his place. Wouldn't she be surprised to come home the next morning and find her apartment ransacked. I wouldn't.

Many times we use a repeater when direct communications would do the job. I make it a practice to use a portable transceiver on low-power simplex whenever I am giving final directions to my place. If you must talk about your personal life, at least limit the audience as much as you can. And don't do your fellow hams a disservice by talking to third parties about your friends' plans for evening outings or vacations.

Earlier, I mentioned *Callbook* listings and local ham directories. Think about listing a "mailing address" with the *Callbook* and the FCC that is different from your home address. It's not easy for some to do this, but it seems worthwhile.

You may think I'm being unrealistic and there is little left for you to talk about. Not really. Simply use common sense. Ask yourself, "Is this something I want a complete stranger to hear?"

The concept of security is harder to sell than a 75-meter rhombic to an aeronautical mobile operator. A majority of customers for security products has already been victimized. Don't assume that *it* always happens to other people, or wait until something happens to you before you become conscious of your own security. Remember: Our broadcasts don't have commercials. You'd be surprised what a crowd that can draw. Think before you punch that mike button. Someone may just be waiting for you to supply that last piece of the puzzle. — *Richard C. Rhodes, KH6IO, Dallas, Texas*

*72 Stiles St., Waterbury, CT 06706

REPEATER LOG

According to reports received between October 21 and November 21, repeaters were involved in the following public service events: 6 weather emergencies, 8 crimes, 6 medical emergencies, 100 vehicular emergencies, 7 fires, 3 search and rescues, 47 public safety events, 53 drills/alerts and 6 power failures.

The following repeaters were involved (followed by the number of events): K1FFK 2, K2BR 1, KC2CY 8, N2MD 3, WA2PAV 9, K2QIJ 8, W2VL 17, WB2ZII 8, WA2ZWP 1, W3ACH 2, N3AIA 3, N3BFL 7, K3MJW 14, VE3TTT 2, W3UER 7, W3VRZ 2, KA4BQH 1, WB4LET 10, NN4N 2, WB4QES 14, WA4SWF 2, W5GIX 11, WB5SCY 1, W6ASH 17, WD6AWP 12, WB6CAN 4, WD6FGX 7, KH6H 1, KH6HHG 2, WB6HUK 2, KH6S 2, K7CC 4, WR8AMD 3, K8DDG 13, WD8IEL 2, WA8ULB 2, WB9DGO 2, W9FO 1, W9KXQ 2, W9VCF 1, WRØACD 1, WRØAEV 2, WDØBQM 2, WBØCMC 7, WBØHAC 4, WBØUZM 4, WØVQR 1.

YL News and Views

Conducted By Jean Peacor,* K1IJV

When DX Stations Talk, Real DXers Listen

Once in a while a CQ DX will result in snagging a rare DX contact, if you're lucky. This seldom happens, however. Usually what you have to do is listen — and listen — and then listen some more . . . [Through listening, you] can find out where he is listening . . . bide your time, and wait for your chance. (1982 Radio Amateur's Handbook)

Most radio amateurs get bitten by the DX bug at some point in their radio career. The excuse, "I'd rather contact people I'll have a chance to meet," is no longer valid. Today's world finds radio amateurs visiting among countries more often and in less time than ever before. If you happen to contact a DX station and aren't excited about the QSL card at the moment, exchange cards anyway. A QSL card is the ultimate courtesy of friendship and an interesting QSO. Plus, you never know when thoughts of DXCC might loom on the horizon. This advice stems from the experience of Marte Wessell, KØEPE.

Marte Wessell, KØEPE *(W1YL/4 photos)*

Martha King, WD4NKP

Currently, 318 countries are included in the DXCC list. The DXCC Honor Roll is comprised of those call signs that have been credited with at least 309 of these countries. Marte Wessell made the latest DXCC Honor Roll (Oct. 1982 *QST*) with 309 confirmed on phone. Marte holds DXCC no. 2018 dated March 6, 1960, and her confirmed total to date is 328 (19 of those have since been deleted).

Marte's OM, WØCM, is at the top of the all-phone list with 318. She worked many of the stations Pete worked, but had never sent for QSLs. The time came when she wished she had. Trying to track down how to get QSLs for QSOs of years back was not any easy task. Learn from her experience.

Marte spends much time listening and waiting for DXpeditions. You'll find her on the Tangle Net exchanging DX information with many YLs with similar interests.

Martha King, WD4NKP, lives in Ladson, South Carolina, and is edging toward the DXCC Honor Roll with 282 countries confirmed (mixed), and with four more cards ready to send in. She worked her 300th country in August 1982. She also has 227 countries confirmed, all phone.

All of this has occurred since getting her Novice license in February 1977. She got a Technician license the following year, General in February 1979, and Advanced in July of the same year. In her first year of being licensed, Martha worked all states. Her first DX contact on 15 meters was with F6EQV in January 1978. By July 1978, her DX interest had really grown, and her log book began to look like the DX *Callbook*. She attained DXCC in September 1979.

Again, the advice is "listen." Martha believes you can learn more from listening on 20 meters between 14.205 and 14.240 MHz. If something new is on, you'll hear it there, or hear about it. She finds the DX nets on 10, 15 and 20 meters all helpful. She enjoys operating on 10 meters during the winter and on 20 in the summer, both ssb and cw.

The funniest thing that ever happened to her in this chase for DX exemplifies that true-blue ham spirit. She lived in Wilmington, South Carolina, at the time, and a neighbor two houses away (K4UWH) was an avid DXer, too. A transformer at the end of her driveway gave them both problems from time to time. One night, a DX station they both needed was on. It was pouring rain, and the transformer was doing its thing. They had learned that by pulling on one of the guy wires on the pole the interference would stop. In frustration and desperation, Martha braved the elements, pulled on the guy wire and Charlie worked the DX. Then Charlie obliged while she took her turn. That's real teamwork in DXing.

Lois Gutshall, WB3EFQ, of Altoona, Pennsylvania, is well on her way to the DXCC Honor Roll with 200 countries confirmed (mixed), mostly phone on 10 and 20 meters. She has contacted most of these in the past three years. Her interest stems from hearing her OM, W3BZN (288), and his brother, W3BTX (310), converse about their "new ones." Since becoming interested, Lois has been playing catch-up. She finds contacting a DX station and really ragchewing most exciting.

Lois Gutshall, WB3EFQ

The YLRL convention in June 1982 gave Marte, Martha and Lois the opportunity to get together and compare notes. Lois also had the good fortune to meet her YLRL DX adoptee, Sheila Gabriel, G3HCQ. She now knows that you do get to meet people contacted on the DX bands. She went home intent on working more DX. Marte, Martha and Lois are but three YLs who are listening when DX stations talk.

CERTIFICATE OF COMMENDATION AND APPRECIATION TO: GERTRUDE (GERT) POND, W7KOY

On July 27, 1982, Ed Gordon, WB7OKK, and his family, of Phoenix, Arizona, returned to their home and found their front door kicked in. They had been burglarized, losing appliances, jewelry, stereo equipment and an Amateur Radio hand-held transceiver. Ed announced the description and serial numbers of the stolen radio equipment at 1730 hours over Phoenix Amateur Radio repeaters, telling valley hams to be on the lookout for his transceiver.

Gert Pond, W7KOY, heard the announcement concerning the stolen radio and later commented on the air that anyone listening to or having knowledge of it would be better off trying to return it to the owner, rather than hold onto stolen property. Moments later, a voice called Gert on the air and announced that he had just purchased, a few hours before, what he was told was a CB radio for $20. It turned out to be the transceiver stolen only hours earlier. Gert deftly conversed for half an hour, keeping the man talking. During that time, she convinced him to return the radio to Ed Gordon. The Phoenix Police Department was notified and accompanied Ed to the individual's home. Further questioning resulted in the recovery of all the stolen property, and the individual and his boss are cooperating in locating the actual burglars.

Because of quick and effective action on Gert Pond's part, plus her vocally convincing abilities, close to $2000 of the $2500 value of items stolen only hours before was returned to Mr. Gordon. Gert has been recognized for her public service activities many times before, but never has she, nor probably any other Amateur Radio operator in the nation, ever actually led to possession of "hot" or stolen equipment and the recovery of the missing items within hours of the actual break-in. For these actions, we commend her. *(Adapted from the Phoenix Police Department Commendation)*

*Country Club Dr., Monson, MA 01057

How's DX?

Conducted By Ellen White,* W1YL/4

The Quality of Rareness

In recent months at both the popular annual W9DXCC shindig (Chicago, in September), and that excellent biennial DX event in the DC area (DXPO, Gaithersburg, Maryland, September), the usual question of "rareness" came up for discussion. The perennials surfaced: "How do guys ever get to the top of the Honor Roll? How can I ever hope to make the top ten? Why is Burma rare? — When was the last expedition to San Felix"? — *ad infinitum.*

Obviously, certain countries are rare because of infrequent operation. The "why" they're rare generally falls within the two categories of difficulty of access or political considerations within the country. Countries just developing generally have more to worry about with feeding and housing a burgeoning population than affording their populace the relative luxury of Amateur Radio!

The "want list" of countries still to work by many hasn't changed too drastically within recent years. In fact, the ARRL *Operating Manual* agrees quite well with K1TN's recent *DX Bulletin* survey results on the 10 countries needed by the "mostest": China, Heard Island, The Laccadives, Albania, Cambodia, Burma, Yemen, Bouvet, The Andamans and San Felix. Let's take a brief look at each of these DXCC listings.

Among our rare contenders are several zero-population entities — "countries" by definition of our DXCC Award criteria. Candidates for sure-to-be-popular DXpeditions certainly would include *Heard Island (VKØ).* Heard is in the South Indian Ocean, about 310 miles southeast of Kerguelen, with a high point about 6000 feet above sea level. The island, interestingly enough, was discovered by an American navigator in 1853, and claimed by Australia in 1947. Together with the McDonald Islands, Heard constitutes the Australian External Territory. Heard represents a hostile environment, severely testing both men and machinery. A bit over 10 years ago, the island saw operation by VKØHM. At the time of preparation of this material for *QST,* plans were underway by two different groups who were racing to put Heard back on the Amateur Radio map. Should either or both operations come to fruition, the pileups are likely to be ether-shattering. Continentally, Heard counts for Africa, has a land area of about 140 square miles and is in Zone 39.

Another of our no-resident-population listings (and small wonder!) is *Bouvet (3Y),* a Norwegian island in the South Atlantic, about 1600 miles south-southwest of South Africa's Cape of Good Hope. Bouvet reaches close to the chill of the Antarctic and has a forbidding climate. The island is about 20 square miles, counts for Africa, and is in Zone 38. The last Bouvet operation was about seven years ago, by the phone/cw team of 3Y1VQ and 3Y1VC.

The last of our zero-amateur-population countries is the Chilean island of *San Felix (CEØX).* In the Pacific, about 600 miles off the west central coast of Chile (South America, Zone 12), tiny San Felix is all of about 3 square miles of land. The last operation there was by W9IGW in the early '70s.

Low-resident-population entities still needed by the faithful include the *The Laccadives (VU7),* a group of about 20 islands and coral reefs in the Arabian Sea, off the southwest coast of India. The Laccadives have a population of about 32,000 on a land area of about 11 square miles, counting for Asia in Zone 22. The last Laccadive operation, in 1971, was by VU5KV.

Another moderately populated and needed "exotic" is the *Andaman and Nicobar Islands* grouping. The Andamans are located in the east part of the Bay of Bengal, about 400 miles directly west of the coast of lower Burma. The Andamans themselves form the north group of islands, with about 3200 square miles and a resident population of over 110,000. This Asian entity, in Zone 26, saw operation by VU9KV in 1971. An operation by VU7AN in 1981 still hasn't cleared the DXCC desk.

Our high-density rare ones are generally that way by reason of being "private" or what might be called "closed countries," with permission to operate being most unlikely. We'll start off with *Albania (ZA),* a country located between Yugoslavia and Greece, on the east coast of the Adriatic. As with many of the politically conscious countries, it has not seen any degree of activity since WWII. Albania is in Europe, Zone 15. The last valid operation took place around 1970, by ZA2RPS (People's Republic of Shqiperi). There probably have been more "phony" ZA operations over the years than from any other DXCC listing!

Kampuchea (Cambodia) *(XU)* is in Southeast Asia, bounded on the north by Thailand and Laos, on the east and southeast by Vietnam, on the southwest by the Gulf of Siam, and on the west and northwest by Thailand. Kampuchea houses close to 7,000,000 inhabitants on about 70,000 square miles, and is considered Zone 26. The last credited operation took place in the mid-'70s by the unique Don Riebhoff at XU1DX.

Yemen Democratic Republic *(7O),* formerly known as Southern Yemen, is on the South Arabian Peninsula in Southwest Asia. It is bounded on the north by the Yemen Arab Republic, on the east by Oman and on the south by the Indian Ocean and the Gulf of Aden. Yemen occupies about 128,000 square miles, and has nearly 2 million inhabitants. Asia, Zone 21. Includes the islands of Perim, Socitra and Kamaran.

Another of our Asian "toughies" is *Burma (XZ),* bounded on the north by India and China, on the east by China, Laos and Thailand, on the south by Thailand and the Andaman Sea, and on the west by the Bay of Bengal. Burma encompasses an area of over a quarter of a million square miles with about 28,000,000 occupants; counting for Zone 26. In the mid-'60s, the XZ2TZ operation took place, under somewhat differing DXCC rules (that is, there was no requirement to furnish proofs). The unauthorized operation within the past year from the Kawthoolie Province was not creditable. Geographically, Burma constitutes the northwest section of the Indochina Peninsula. It gained its independence from Great Britain in 1948.

China (BY), the most populated country in the world, a country whose width, length, diversity of climate and terrain staggers the mind, holds over a billion people in over 2-1/2 million square miles. China sprawls from Asia to Oceania, in Zones 23 and 24. For decades China has undergone considerable domestic upheaval, and remained very much, of a "closed" society. However, this past year we've seen the first tentative signs of emerging Amateur Radio, with most welcome rf being generated by BY1PK. There is a long road ahead before large numbers of BY calls are heard. All of us should remember the positive aspects of polite, well-conducted contacts — not only to keep BY1PK operating, but to encourage ever-increasing numbers of BYs to enter our Amateur Radio world.

Since its inception, the ARRL DX Century Club has been the focus for worldwide DX endeavors. It is an ongoing race with the carrot (of course) being able to achieve ranking on the DXCC Honor Roll (the top-ten deleted numbers overall). Some feel that achieving such a ranking is "too hard," and that the wait is "too long." They feel the achievement should be "easier" to attain. But, the size of the Honor Roll listing in *QST* is indicative of the fact that many hams throughout the world have managed, by diligence and skill, to acquire the appropriate credits. In past years the achievement has been made by some in as few as seven years. The fact that it may take longer is a result of the various interlocking factors of sunspot cycle, lack of expeditions, and world political activity.

But, back to one of those basic questions: "How can I ever hope to get on the Honor Roll if there hasn't been activity in the needed countries for about 10 years?" Well, I'd have to say the answer to that might well be that it wouldn't be much of an honor to be on this illustrious roll if the challenge itself was met too easily.

*19620 SW 234 St., Homestead, FL 33031

THE CIRCUIT

☐ W3CRA: Several issues ago we explored the inception of DXCC and the vital role Frank Lucas, W8CRA (pre-war)/W3CRA, played. Thus, it is with particularly heavy heart that we received W6YO's report on Frank's passing, on October 24. Fifty years ago he worked the world on 20 meters and consistently radiated superior signals from his Canonsburg, Pennsylvania, hilltop. His big signal and his DXploits prompted Eimac to use pictures of his station in one of their first Ham Station *QST* ads. W3CRA was a DXer's DXer and his passing leaves a formidable void in our ranks.

☐ The Dixie DXers has been formed — it is a club devoted to DXing and contest operation in the Middle Georgia area. Meetings are the first Thursday of each month at 1930 local time, at the Farmer's and Merchant's Bank on North Highway 85, in Fayetteville. President is NQ4I, Rick Dougherty, 104 Bowfin Bay, Peachtree City, GA 30269.

☐ *QRZ DX*, a weekly newsletter, features a "new look" and timely information for the DX-afflicted. Sample copies via K5FUV, 1310 Paris, Garland, TX 75040.

☐ FO8 stations turned out in force last July for the Special Tiurai Net, making in excess of 5000 two-ways.

☐ The Royal Omani Amateur Radio Society Award is currently available to claimants who have worked eight stations with the A4X prefix on ssb or five on cw (the award will display the appropriate endorsement). Claims must be accompanied by a log extract certified and countersigned by an official of an affiliated radio club. Five IRCs (or equivalent) should accompany the claim, addressed to The Awards Manager, ROARS, Box 981, Muscat, The Sultanate of Oman.

☐ VERON, the Dutch Society, announces the availability of the English translation of their Dutch Award and Certificate Guide, $4 U.S. (for outside of Europe orderers). Write VERON Amsterdam, Box 9, 1000 AA Amsterdam, The Netherlands.

☐ China: W8JJO spent a year at the Xian Foreign Language Institute with his wife, teaching English. Brad notes that of about 1000 students at the Institute, 700 specialize in English (many specialize in Japanese, and the rest in German and English). Brad first learned about BY1PK's operation from the peripatetic W6AQ!

☐ Syria: Amateur Radio activity in Syria began in 1947, through the efforts of YK1AA. And now, in celebration of 35 years of Amateur Radio in Syria, the Technical Institute of Radio in late December had planned activating 6C35 A, M, N and O. If you've been lucky enough to make it, QSL with an addressed envelope and 3 IRCs or equivalent, to Box 35, Damascus, Syria.

☐ International DX Convention: The first word is out on the 1983 event, again to be held in Visalia, California, April 22-24. This year's DXtravaganza will be hosted by the Northern California DX Club. Clubs furnishing two sets of club-member mailing labels will receive automatic mailings of pertinent information (the list will not be used for any other purpose). Information via NCDXC, Box 608, Menlo Park, CA 94025.

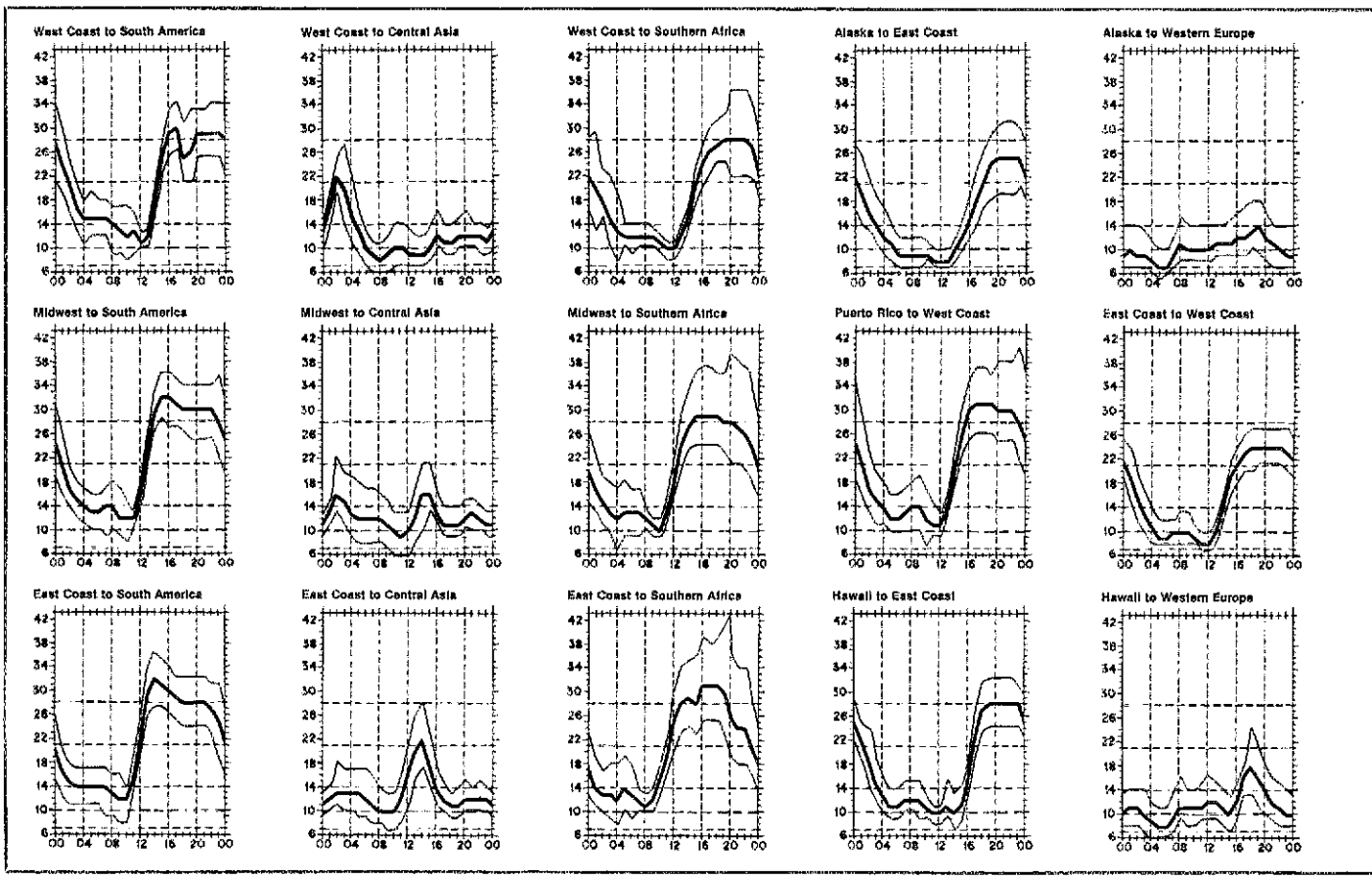
☐ St. Peter and St. Paul Rocks: Although the DX-pedition was an overall success with about 15,000 two-ways, the operation generated numerous complaints regarding the undue spread on 20 ssb. Although there were extenuating circumstances, IDXF feels there can be no excuse for denying the band to others for many hours on two days. Accordingly, IDXF has taken a positive stand and changed the wording of their operating guidelines, etc., to ensure no repeat performance.

☐ Nepal: At year-end, Rana WB4NFO, was scheduled to lead an operating DXpedition to Nepal to celebrate the King's 38th birthday. At least six operators and four stations were scheduled to man 9N38; it was scheduled to be QRV Dec. 28, 29, 30. Cards for this IDXF-equipment-furnished event go via W1GAY.

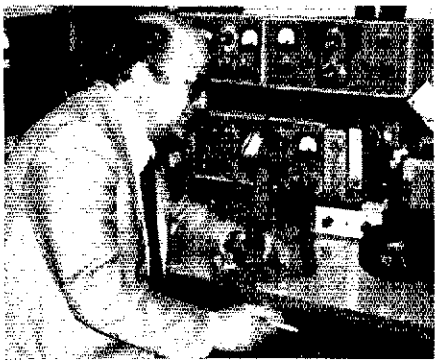
☐ ZK1AA: Via N4TL and ZK1CG, we learn that ZK1AA sends cards very slowly. ZK1CG's Manihiki attempt gave him something of *cachet* on the island

W8JJO (right) stopped at the JARL Special Events station in JA4RL in Matuse, enroute home from China. The staton had been set up for a Kunibiki (a Children's Exposition) this past summer. On the left foreground is Atsumi, JA4CX, and in the center foreground is Kumiko, JH4MVN.

Alex, VP2MM, cards via AB1U.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the



Pino, IØDUD, operating HV3SJ. *(KB9CY photo)*

after his landing attempt dropped his $1500 rig in the drink, followed by Victor himself. Locals would greet him somewhat differently — instead of hello or good morning, Victor would receive a greeting of "aren't you the guy that fell off the boat the other day!"

Honor Roll DXer K6WR visited Japan recently and noted that there was evidently great advertising for our part of the hobby what with "DX" and "Super DX" on many cars — at least until it was pointed out that was an abbreviation for Deluxe and Super Deluxe! Brad noted a veritable barrage of beams and OSCAR layouts.

QSL Corner

Administered by Joan Becker, KA1IFO

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

A22EL (OE2DYL)
CR9T (WA4IKZ)
FMØGA (N6ZV)
FOØJO (W6GO)
FOØOJ (K6HHD)
HR8AL (WA4VDE)
PY1ZEL (John M. Pate, Caixa Postal 2038, 2000 Rio De Janeiro, R.J. Brazil)
PY2ZFO (W7AMM)
P47N (W5AT)
TI2WX (K4WVX)
VP2ER (KC5EA)
VP5JEX (W4DR)
VP9BO (N1AFC)
VQ9TO (KC4OK)
VS6IC (W2PD)
V3CQ (N6ADI)
XP1AB (WA2TTI)
ZD9BV (W4FRU)
ZL4OY/A (VK3DWJ)
ZP5XDW (N4DW)
3D2XN (DK7XN)
5B4LY (P.O.B. 375, Larnaca, Cyprus)
5T5TO (F6BUM)
6W8IK (W2PD)
8P6JG (WA8IMO)

QSL Manager Volunteers

K9NN	KA6BIM
K5FO	KC4UB
K1NCD	NI6G
	WB5LWP

DX Tips

When sending cards to a QSL Manager, put the QSO date/time on the "outside" envelope, preferably in the lower-left corner; include the call sign. Not having the information "up front" sure slows it down for managers of contesters who may work 2500 two-ways on a weekend! — *W5AT*

Help!

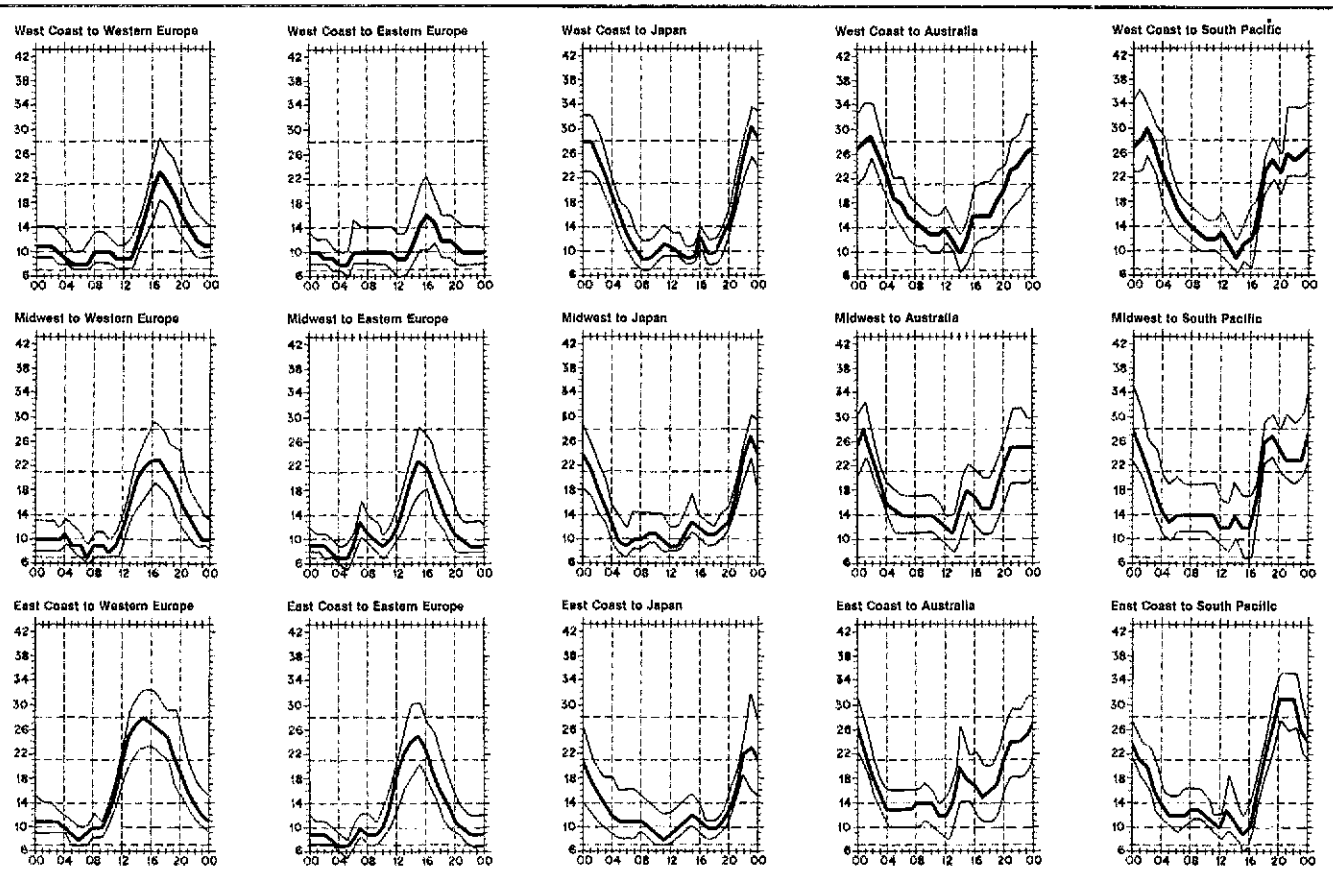
W1NH is looking for pasteboards from VP8KF and FR7ZL, 1973; WA6EGL/VQ9 (Chagos), 1976; and P29KK, 1979. (Bob also reports a few 80-meter "new" ones for him in N.H. as FO8DF, T31AE and SMØAGD/KH1.)

Special Notes

W3BL is not manager for any station.
KB7SB is not the manager for T30AE.
WA8AEE is not the manager for TF3YH.

December 1982 QSL Corner contains information and addresses for the Incoming bureaus. September 1982, QSL Corner, page 65, contains information on the ARRL Outgoing Overseas QSL Service. For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

These are the happy, smiling faces of the WØ QSL bureau volunteers, who know that you have your 5 × 7-in. s.a.s.e. on file with the bureau. Many thanks to all the WØ QSL bureau for their time and effort.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11 for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for January 15 to February 15, 1983, assume a sunspot number of 79, which corresponds to a 2800-MHz solar flux of 129.

DX Century Club Awards

Administered by Don Search, W3AZD

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. There are now 318 countries on the list, and the DXCC Honor Roll (published in the March and September issues) highlights those ops who are within 10 countries of that figure. Each DXCC certificate may be endorsed for additional countries over 100 — in increments of 25 up through 250, increments of 10 through 300 and increments of 5 over 300. This listing contains the call signs and exact country-totals of amateurs who've joined the DXCC or increased their country-totals during the period from October 1, 1980, through September 30, 1982, as well as current members of the DXCC Honor Roll. Think you may be ready for DXCC? Write Headquarters for details.

Mixed

367 W1GKK

366 DK4AM

365 F6CJD I1BDJX W2AGW W2BXA W4LX W7MB W8UIN

364 PZ2CK W1BIH W4ALT W5KC W6GT N8CZ W9ZM W0ILA SL1RY

363 OK1FR VE2GL W3KT W3MP W4BQY W7KH W9DU

362 DL7AA VK4QM W2JVU W4AAV W4UM W8DMD W9BW W0MLY

361 DL1KB F6CU OH2NB ON4NC W1HX W2RQ W2QRH W4TM W5MK W6EE W8AA

360 GW3AHN KH6CD W3FVW W6GD W6BZE W6TZD W7ER W8IKB

359 G3AAE G4CP I4AMU K4FQ K3UC OK1FF W1IK W1FZ W1HZ W2LV W2OKM W4SJ W5IO W5PQA W6KA W6CHV W6HX W6RDT W6NAW W8PWS W8JBI W8MPW W8RL W9IIV 4Z4DK

358 G2BW OL7RK G3FXB HB9MQ K2BZT K4PDV W2AO W3AYJ W7FF W2LPF W3NKM W4PL W6RT W7DC W7OF W7PHO W9PKG W9GTL W9SYK

357 G3FKM G3VT K2FL K3GL K4SM K4YR SM5BKZ VE2NV W1JR W2BOK W2CR W2SSC W4CWG W6DR W5MMB W6ID W7ADS W7CN W8AH W8PGL W0QGL

356 DL1BO DL6EN DL7EN G2BVN K4CB K6DC ON4DM W2HTI W2NUT W2UM W2UE W6ML W6BS W6CAL W6KZL W6YK W6ZJ W8PHZ W9RKP W9SFR W9ATH 4X4JU

355 HB9TL I5VZG K2BK K7TWR K4LNM K5DX I4DMG OH5U OZ5Y PA0FX W1AKA W1NU W2AX W3GH W4ELE W6BSY W6RKP W7CG W6KPL

354 DL7AP K3MD K4BU K9AB LU5AO PY1HQ W1AA W1JNV W2BHM W2FZY W2JDC W3AFM W3BAA W4KO W4CXB W4VPD W5AL W5NW W6CPB W6SQF W8ZQD W9DWQ W9HB

353 JA1DM S3LL K6KLL PA0LOU PY1HX SM0AJU VE5RU W2PXA W7OP W3CGS W5FFW W5KGX W5NUT W5UN W5GO W6RVM W6FL W7AO W9UY W9RCJ YS1O ZL3US ZS6LW

352 DL1LW DL3BK DL9UH GI3IVJ I8KDB K5FJ K6LQF K9DR KA1QY KH6IJ W1HH W1PM W2BMK W2GLF W2SAW W3CRS W4WV W5ZQ W6FF W7AQB W7QK W8OK W8QY W9TKV

351 AI4K F5AL G2BSP G3BOZ HB9KB I1ZL I1YIA OH2QQ OK3MM W1CKA W2TBV W2XN W4BYH W4LF W5QK W6HYG W6RG W6KH W6MUR W6AW W8LJ W6ZM W0LMG ZS6RM

350 DL1HH DL7HU G3HCT HB9PL JA2JW K9UIE U85WE VE3AAZ VE3BWY W1WY W4IR W5NCO WA2DIG W4GRL

349 K9RM F5UA G2SHZ K6RQ K6UNV K6PARE PY7YS SM7ANB W2TP W2YY W4AVY W4OO W4ZD W5TCT W6QNM W6UQQ W9RM W9GU W9TKD W0BTD W0OEJ

348 DL1DC G2FYT HB9MX JA1BK K2TOC K4RPK K6RF K6RN LA5HE N6FX ON4PA VE3HD W4AKR W4BFR W4QM W5ET W5HDS W5KJA W5OB W6ISQ W7CMD W7DX W7JYZ W9JIU W9CH 3E1AE

347 GM3IUN JA3DY K2VR K4AIM K4FZ K6GA OE1FF OZ4SS SM7QY UR2AR VE7WA JY3YL W1AFF W1MTT W3DUZ W4MCN W4NMH W5SH W6RGH W6SN YV5ALP YV5GYO

346 DL7HZ HB9DX K4IL K6EV K6WR K6ZM K9CD N6FA OE1FT OH2QV OK1ADM W1RTQ W1SD W2CP W5QBZ W8DA W6EL W6ONA W7LTE W9ZTD W0BK YV5BX ZL4BO

345 DL8CM G3IOR JA1BN SM0KV W1IAS W4KFC W5CO W5ND W8DA W9EP W9HJ W9YSR YA2V YV5ANF YV5BZ

344 JA1AIN JA1AG K2PXX K8OKG OK4IZ VE6LU W1DGT W1UU W1BBP W4VQ W6FW W6GMF W6DEL W8SA W7BCH W9NA W0NVZ ZS6IW

343 DJ2AA DL1CF DL7BK JA7AD K2UVU K4MQG K8FF N4XU N6AR OH2BH OK1MP ON4UJ PY1OH W4OG W5UR W6KTE W6RJ W7CSW W8ARH W9BW W9KNI W9FT W9PN ZL1AJU

342 F9GL I5ARS JA1BKK JA4ZA K2BS K4JO KS7F N6AV N6GM N9ZN W1SP W2QDS W2GK W2CKZ W2MJ W2PV W4FX W4ZR W5EIT W6LWZ W8PR W8YGR W8ZD W9ABA W9GRF W9HZ W0BN 5X4FO

341 DJ7XG I2KMG I7ZPR K4YTG K5AAD K6MA K6PU K6YRA K8DYZ K8PL PY2PA PY2PB SM5AQM OA9VB W1FTX W1OJR W2PN W3KA W4DRK W4KN W1OQN W5HF W6RGG W9EB W9GB W9HK W9HLY W9QLD

340 DL7FT K2YLN K6LU K7BR LA5LF N6DX OH4NS PZ2BRO N1DO N2AZX W2FNB W2NC W3PN W4DHZ W4EBU W5QC W5KEL W6EHF W6YB W6YMV W8BKP W0MW YU1BCD

339 DJ5DA DJ0KO DL1OJ F2JMY K2EL K3AV K4EJ K4EKK K6IU K6QH K8FJ LA1K LA1KL OA1CR W1AB W1ECR W1GMS W3EYF W6EZS W7JYX W7KR W8RSW W9AZP W9DI W9KNB W9AUB WA6GEN

338 DJ7CX JA4BJO JA8AIX K1YZW K4BVQ K4LTA K4KG K6DT K9BCM N4IO OH2BC OZ3PO PT2CQ PY2NO SM1CXE VE3MJ VE4WI W1EJ W1LPF W4EEO W6CF W8JQ ZL1AV 2S4MG

337 DL6MK G2SM JA1BWA JA1TBX JA1MIN K5DJ K6MPF K5TY K6AO K6SW K7ABV K9SM K5AP SM5AZU SM5BPW SM6AEK W2MZV W2VIN W3SO W5JC W7DY W9KRU W0OA WA6DET ZL1AH ZL1ARY

336 AI9J DJ5IA DL8NU EA1BC I6BG JA1MOJ K1DRN K5RL K9RJ N1XX N4FA N5CM VE3WW VE4OX VE7SV W7OK WA4JVU W5IO WA6FET W6IG K9DX WA4WIP WB2HBD WB7ABK

335 G3RP HB9IK I2IAJ K3KP K6DY K6MZH K5OOF K5LLL K6EXO K9OHB OZ1LO PY1APS PY3CB SM3CXS SM6CKS SP7HT W2NE W1WDD W2HZ W2EL W4NL W4YN W5CKT W5LZZ W6ARA W6KNH W6MI W9QL W7CB W8DCH W6ZCK W9ROD

334 AA6MM DJ1XP G3IRC JA8JL JA8ZO K1NA K2AQZ K7CL K4XL K6KA K9AWK LA9CE N4WW N5DK N7NC ON4UN SM5APL SM6CWK SM6DHU VE3BX W1GX W2FF W4BKE W6BTH W6SI W7RV W8HN YV5AHR YV5BBD

333 DL3OH F2BS F8RU F9IK G3IAG HB9AHA I0RBI I0JX IA1MJ JA1ZX K1DFC K1RM K2UR K4GEB K4HJF K4KO K8VUK K9MM K0BCR OE1HZ OE7FGI OH3SR OZ6MT PA0TAU SM6AFH VE7IG W1YRC W2PPG W4DEL W5TR W5SJ W6EKS W6KZJ W6XL W0PAH W6PT WA9NUQ YU2DX Z24JS

332 DJ6RX I2JPRK JA2AAQ JA3BG K8TFP F8IP K9KA K5MFZ K4MM N4ZC N9AF OK1MG OZ5DX VE3EMJ W3PVZ W3XM W4CTS W6EJJ W6GXM W8TTL W8KR W9DH W0RL W0SD WA4HDP WA5DDK WA0CAH

331 DJ5WQ F2TL JA1DPD JA1FBK JA1HQP K2CM K4AIL K4BBF K5UR K7KG K8MFO K8CJF N4JF N4WF N5RB N6UC N8DX OH2VB ON8RA PY2OFR PP5KG SM5CAK W1OBA W1GT W2ZZ W4AUH W4QRT W4OMJ W4WU W5EDX W5QOU W6MIM W6PN W7JFO W7LEA W7GM W8CNL W8RCM W9ZRY W0UD WA2CBB WA3ATP WA4IKK WA5IEV WB4OSS YU4HA

330 DJ4PT DL6KC G3GIQ I2DEZ G3EVS JA1ERR JA1JRK JA1OCA JA7AN JA2HNP JA7MA K2BT K2KER K4NMG K4XC K5JW K6LAE K6XP K9PPY K9RA N4IF N5NW N6KT OE8RT OH7BR SM5AQB SM5FG SM6CVX SM7ASN VE1KG VE3C1X VE3IZQ W1CC W1JZ W7KP W2MUM W2SUA W2VUF W3KV W4NO W5JW W5MQ W6PLR W6TPJ W9RF W4TKR W9YR YO3KY ZL1AMO

329 AB4D AJ0X DJ4TZ DK3PO G3RIA JA1AAT I7LAG I7WL JA1EOD JA4KI K2UBQ K3RS K5DS K6OZL K9CM K9AJ K4UH N8AA N9AR OE7UDH OK7RZ SM5BBC VE3GCO W1RCH W3GG W4FFW W4AR W5MUG W5TTX W6TA W8YA W9CD W0HZ W0NYN WB7FPG YO3JU YV5AL

328 DJ5JH DL1PM I1XK JA1IFP JA7AOH K2KCB K7ZP K3HRG K3NL K3SOE K5AQ K5GG K8CH K8KS N4KG N7RO OH2BAD ON5KL SM6EOC W2HJ W3CV W5RL W6YHG W7NCO W9PKR K9KB WA4FFW WB7YQH WB9EON

327 AA4S CT2AK G3LQP JA1JAN JA2JRV JA3AAW JA4AU JA4APT JA0S7 K1NDE K2SB K3ZR K3EEK K4RA K9JF K9CVB K9PLZ N4XX N9OA PY2LIV VE5HD W1NG W3LPL W4ID W4WG W4GFG W5IAO W9VNE WA4KDI WB2NYK XE1KS

326 DJ1CG I7HH JA2AH JA3APL JA7GHU K1BV K1BW K4OLA K5JR K6UJO K8PYO G3SS G4NO N6AN N6AW ON5KD OZ8BZ PY5ATL SM3RL SM5DOC SM7CXE SP3OOI W1CR W1HGA W3AP W3LB W5ZWA W6AN W6GC W7CTZ W7OBH W8AU W8DK W9GAL

325 AB4H DJ8QR DL1LD DL7GS JH1CJQ JH1EIG JA8KB JA8MS K3ERN K5EDA K7HN K8RWL K4IDE K9RF K9AB N4SA OH2BCV W1EW W1IQQ W2CNQ W3KFQ W3ZN W4SJ W4YA W6YV W5MJQ K6CYR W6KPC W7KSG W7LZF WA4URU WA5REU YU1AG 4X4NJ

324 DL8FL I1APQ JA1GTF JA6BSM K1IO K2SW K4IO K5LM K8CW K0IFL N3KD N4CC N5EA N7TT OH5SR OZ7JZ OZ2BW HB5WE VE4SK W2SY W4CPZ W4FTA W5RO W6IZQ W6UY W6ZYG W9GJ W9GW

323 JH1RFF K1LWI K4LSP K5GMX K7AA N6RJ N6GR VE7BD W1AM W1OA W1NHJ W2AWK W2YD W4OEX W4PZV W5SP W5UP W9XJ W7EKM W7MT W7TE W8SE W8KCI W9GE W9BN WA9WLB WB6APX

322 DJ4AA G3KDB I7ZZZ I79ADA JA6BHA F5OA KB1JG K8RA K8ST K0LEA N7LM K4RA K5AU N4RR ON5NO SM4DHF SM4EAC VE7HP W2JB W6NTH W6TC W5QWI YU1NYP YV5DEL

321 AE4A AE3T DJ0MH DK5PR DK9FB JA1ELY JA2ACC JA3BQS K4IR K4LTA K4ZYU K5GH K5RJ K6AQV K6IR K6PZ K6UPT K6WC K9FN N1GL N6MU W1KFA W1GDQ W1GL W1KG W1DN W2REH W4BTX W4FDA W4RJC W6BFW W6DN W7CNL W9SS W0SMV WA3HPF

320 AA2CI DL3ZA F2YF HB9AQM HB9RX JH1IES JA3EMU JA3GM K1KT SL2SL K4ML K4XH K5XT K5KX K6KT K6KE N6HR OK3EA PY7ZZ SP5BD SP6RT W1EUW W2BAT W2RS W7IL W4GYP W5MFO W6GMR W8US W8KA W8IZ W9HBU YV5CMO

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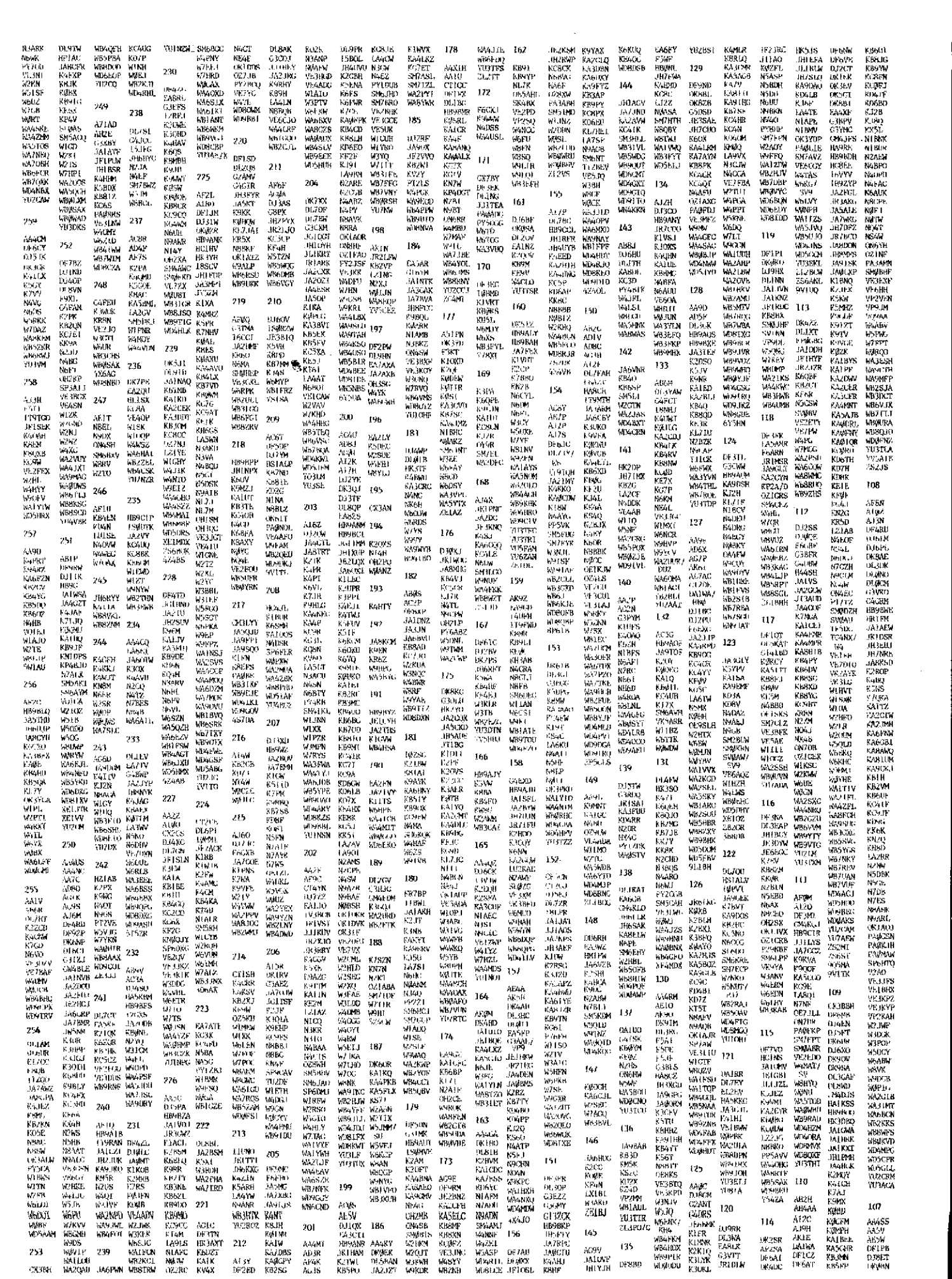

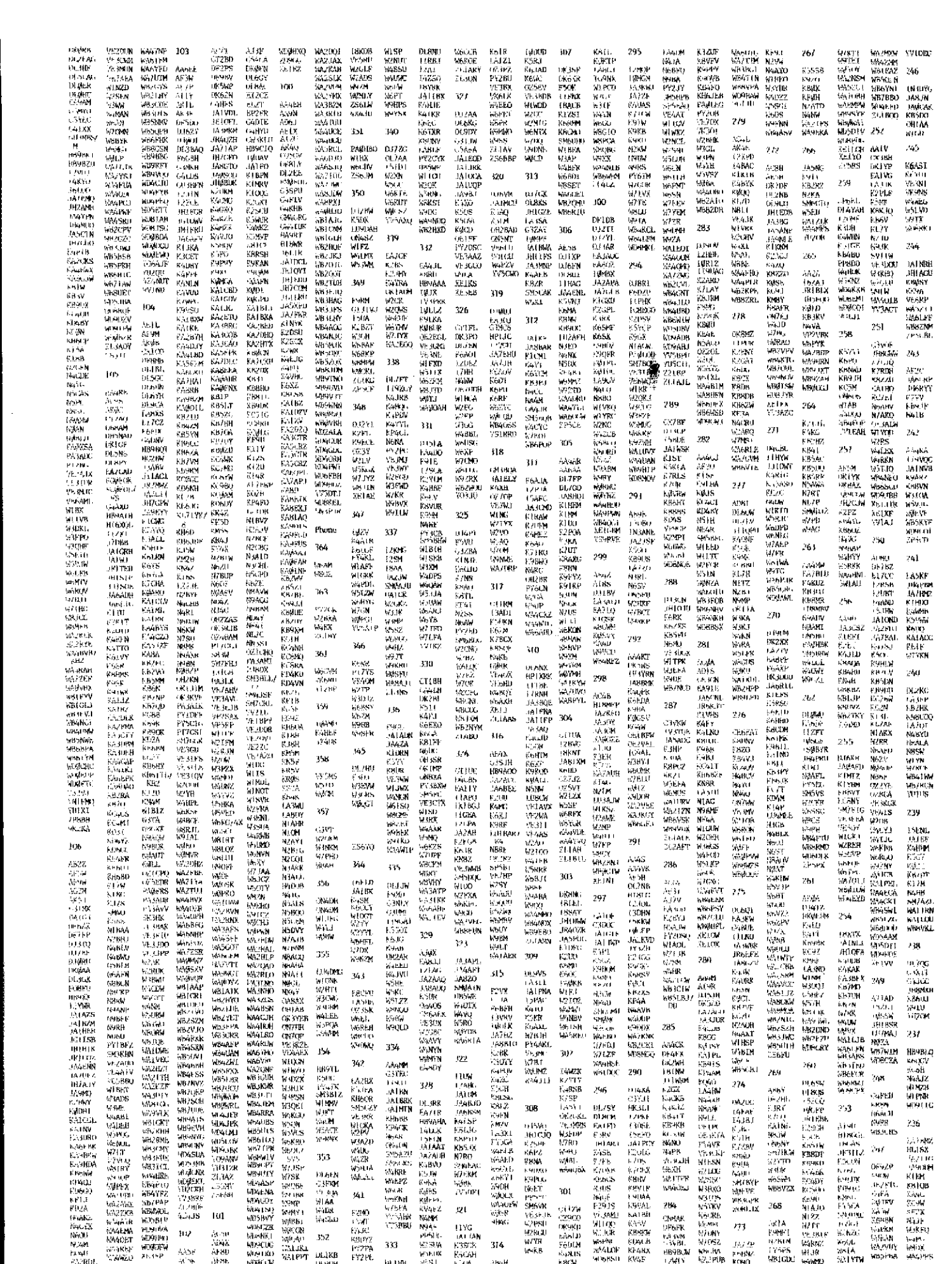

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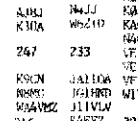


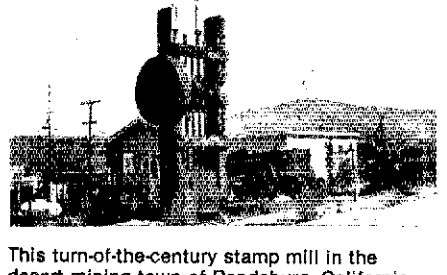
I would like to get in touch with . . .

☐ any amateurs with information on Sinclair ZX81/Timex 1000 computer applications, especially interfacing the old Model 15 Teletype. Tom Hagerman, NØDST, 1812 Neihardt, Branson, MO 65616.

☐ any motorcycling radio amateurs who are interested in joining a net on 3967 kHz at 0300Z Thursday evenings. S.a.s.e. to Gary McDuffie, AGØN, Rte. 1, Box 90-A, Bayard, NE 69334.

☐ amateurs interested in joining an hf facsimile net. Warren Ziegler, Jr., K1IE, 215 Bedford Ave., Staten Island, NY 10306, tel. 212-987-6856.

☐ other amateurs who are also Rotary members. Dave Harris, A22BX, Private Bag 0060, Gaborone, Botswana.



This turn-of-the-century stamp mill in the desert mining town of Randsburg, California, played an important part in a modern-day Amateur Radio communications event. Members of the Los Angeles Air Force MARS Base Support Team used the inactive ore crusher to mount one of two beam antennas used in contacts with amateurs in Randsburg, South Africa, last October.

Mark Schultz, KE9C (right), of Watertown, Wisconsin, was this year's successful bidder for the good luck trophy — a bottle of ale inside a Honduran mahogany case — at the 1982 Groundhog Party in Watertown. Looking on is auctioneer Lowell "Bud" Koeppel, W9HIF, of Milwaukee. *(K9ZZ photo)*

New Books

☐ *Packet Radio,* by Robert Rouleau, VE2PY and Ian Hodgson, VE2BEN. Published by Tab Books, Inc., Blue Ridge Summit, PA 17214. First edition, June 1981. Soft-bound, 8 × 5 inches, 304 pp., $11.95.

The transmission of digital information by radio, or packet radio, is of growing interest to radio amateurs, particularly those who also have an interest in small computers. This book is meant to be an introduction for hams who would like to know more about this interesting information-transfer technique, and who might like to try something different. While the major emphasis is on the use of uhf and vhf "links" for the information, there are several groups in the U.S. working on hf links, too.

The first chapter is a mish-mash of technical information that should have been edited and distributed as appropriate throughout the book. Unfortunately, the authors chose to introduce binary and hex arithmetic, digital logic, ASCII, serial transmission, error checking, and so on, without really telling you what packet radio is all about, why you might be interested, how it works, who is involved in it, and other information to whet your appetite for more details later in the book. If you feel a bit lost in this chapter, I suggest that you skim the information and go on to Chapter 2, which is the real start of the packet radio information.

The next four chapters provide quite a bit of useful information about packet radio and some of the things that must be considered in a system. The authors have assumed that more than two stations will be involved in a packet-radio net, so the explanation describes the pros and cons for several schemes, or protocols, that can be used. It may have been better to start by describing a simple, two-station packet radio net, just to get readers pointed in the right direction. Some readers may be uninterested in the chapter covering *throughput* and *delay,* important considerations in multistation and repeater-based systems, but the information is presented in readable form, and it's there if you need it.

A specific packet network, the ALOHA net, is described in detail so you can see how a real system was developed and how it works. The authors use the Hawaiian name *menehune,* (imp) to describe the control station. This is an unnecessary distraction; "control station" would have been a better choice. The Montreal Packet Net (MP-Net) is described in its own chapter, but it seems out of place, between a chapter about microcomputers and one covering hardware and software. An assembly-language program for a Z-80-based repeater controller is provided, but the documentation is a bit sketchy and no circuit or interfacing details are provided.

The software and hardware chapter provides some general flow charts that the authors think will help you develop your own microcomputer control programs. Before you go too far, you'll want to photocopy these charts and tape them on a large sheet of paper for reference. Schematic diagrams for serial I/O ports and modems are provided with enough information to get you going. However, this information isn't for beginners, so good assembly-language programming and interfacing skills are a must at this point. The techniques described use the asynchronous mode of operation, but several other communication protocols are in use or development. These are not described in this book.

The authors discuss receiver sensitivity specifications, but fail to specify one particular model, ". . . which shall go unnamed . . .," that has a poor rating for use in a packet system. Part of the rationale for writing a book is to share experiences, both good and bad, with readers. Now, readers will wonder if they're buying the right rig.

Overall, the book is interesting, but short on the specific information needed to get a packet station or a packet repeater off the ground. It suffers from disorganization, and some poorly done graphics. The strongest parts are those that deal with the general considerations for packet communications and protocols. — *Jon Titus, KA4QVK*

☐ *Disassembled Handbook for TRS-80,* Vol. 5, by Robert M. Richardson, W4UCH. Published by Richcraft Engineering Ltd., Drawer 1065, Chautauqua, NY 14722. Spiral-bound softcover, 8-1/2 × 11 in., 205 pp., $20. (Vol. 5 programs for TRS-80 Models I and III are available on diskette, $35 each.)

Computers are proliferating on all of the amateur bands. How would you like to join the fun and harness your TRS-80® microcomputer for RTTY operation? Here is a book that shows you how to do it.

Basically, "Disassembled Handbook for TRS-80, Vol. 5" presents a program for tranceiving Baudot radioteletype at 60, 66, 75 and 100 wpm using a Radio Shack TRS-80 Model I or Model III computer and peripheral hardware. The book includes program listing and program documentation (instructions for using the program).

As the author suggests, the book "is really two books inside one cover." The "first book," Chapters One through Five, is for the radio amateur who wishes to use his TRS-80 for operating Baudot RTTY, not for programming Baudot RTTY. The "second book," Chapter Six through Ten, is for the programmer who "wants to understand and analyze every facet" of programming the TRS-80 for Baudot RTTY.

In Chapter One, the author presents a general introduction to Baudot RTTY concepts and delineates a number of ways of diminishing that old bugaboo of TRS-80 ham radio operating: computer RFI. Chapter Two reveals that the program uses the TRS-80 port zero, and thus requires two pieces of peripheral equipment: a port zero decoder/encoder and an RTTY terminal unit (TU). The author lists the equipment requirements and options; he recommends the Telesis VAR/80 port zero encoder/decoder and the Flesher TU-170 TU.

Interconnecting the peripherals with the TRS-80 and the ham radio gear is explained in Chapter Three. This is followed by documentation for a BASIC program that is used with the main program (written in machine language) to "personalize" nine of its 26 preprogrammed messages. (Without this BASIC program, "personalization" would require use of an editor/assembler program.) The chapter ends with the listing of this BASIC program.

Chapters Four and Five detail the operation of the program. The program requires a TRS-80 Model I or III with 48K of RAM and at least one disk drive. The program may be dumped to cassette tape for use with a TRS-80 without disk capability, as explained later in this review.

This program has a lot of features only found in some of the more expensive TTY programs. A 1K buffer permits the user to type ahead of the text being transmitted or received. There is a menu of 26 canned messages that may be "personalized" and used at any time on the air. In addition, the user may compose and store messages in memory for later use (these user-composed messages are not saved by the program, and thus are lost when the computer is turned off).

Another feature is Morse code identification (as required by the FCC). Mark and space tones may be reversed. Received text is stored automatically in high memory and is sent automatically to a line printer. Editing received text, as well as editing text in the type-ahead buffer, is permitted.

The program object code is listed in Chapter Six, while an annotated source code is listed in Chapter Seven. The source code is entered into the computer without comments using an editor/assembler for program input and assembly; the program will not fit in the available 48K RAM if the comments are entered along with the source code. (The object code is the result of assembling the source code.)

Chapter Eight is a commentary on the inner workings of the program; it takes up where the source code comments leave off. This chapter is intended for the programmer who wants to understand how the program works and is a stepping-off point for modifying the program.

Two additional programs are listed in Chapter Nine. The first consists of a source/object code listing that provides instructions for editing text in conjunction with the main Baudot TTY program. The second program also consists of a source/object code listing; it provides Morse identification for the main program.

Chapter Ten explains the procedure of combining, "concatenating," the edit mode instructions, Morse identification and Baudot TTY programs using the DUMP command included in the TRSDOS and NEWDOS-80 disk operating systems. Also included is a program listing (source/object code) that allows the user to dump the Baudot TTY program on cassette tape for use with a TRS-80 without disk drive capability.

Keying all of the given programs into your TRS-80 can be tedious and time-consuming. To save you from this experience, the programs are available separately on diskette for the TRS-80 Model I and III.

The book presents the reader with a hands-on introduction to ham radio operating *a la* computer with enough information to allow the reader to take off on his own and fully explore other computer operating techniques using W4UCH's groundwork.

Overall, the author is to be commended for this excellent product. — *Stan Horzepa, WA1LOU*

In Training

Conducted By Steve Pink,* KF1Y

THE LAST STEP: ADVANCED TO EXTRA

Many Amateur Radio operators are content to stick with their Advanced license. After all, an Advanced class ham has all but 45 kHz of high-frequency phone privileges and 25 kHz of cw privileges on four hf bands. And those funny two-by-one call signs: Can they really be enough to get you to take yet another code and written exam? The Amateur Extra Class license represents the highest achievement the Federal Communications Commission bestows on a licensee in the Amateur Radio Service. As Sir Edmund Hillary (G3???) remarked in response to being asked why he climbed Mt. Everest, the Extra Class ham can answer: "Because it's there!"

Overcoming the Code Hurdle

The 20-wpm code exam is the first obstacle in the last upgrading step. By the time most amateurs think about taking their Extra Class exam, they will have spent some time on the cw subbands in traffic handling or just pleasant conversation. Most ragchewing and traffic handling go along somewhere between 18 and 25 wpm, so you may be surprised to find out that you are already very close if not already at the 20-wpm required level. Since the 20-wpm FCC code exam follows the same QSO-style format as the 13-wpm test, you will be both familiar and practiced for the Commission's examination.

Perhaps the most-frequent lament heard at the Training Desk about the Extra Class code test is that one can copy 35-wpm QSOs perfectly in one's head, but writing down five minutes of text and answering seven out of ten fill-in-the-blank questions correctly call upon completely different skills. If we are primarily cw ragchewers, we aren't used to copying our QSOs out on paper. Since memorizing the high points of a five-minute contact, including RST and calls, is not everybody's strength, we should acquire the skill of making hard copy before taking that long early-morning drive to the FCC district office. Use code practice tapes, W1AW code-practice sessions and on-the-air QSOs to learn how to write and abbreviate quickly. Devising your own shorthand abbreviations for small connecting words and prepositions will allow you to correctly copy the major words that you must know in full for the fill-in-the-blank questions. One more hint: As in the 13-wpm test, fill in the exact


The United States of America
FEDERAL COMMUNICATIONS COMMISSION
AMATEUR EXTRA CLASS
RADIO OPERATOR LICENSE

words (letters, punctuation, numerals) as sent, with no abbreviations or lengthenings. The FCC is trying to approximate a perfect copy-type exam, and you are required to fill in exactly what they send to you. Don't try to improve on what you hear!

Studying for the Written Test

The written portion of the Extra Class examination is Element 4B, and the syllabus for this exam contains items that reflect the state-of-the-art in Amateur Radio theory and practice. Let's review a few of the main theoretical topics with an eye to studying for the exam.

In the section of the FCC Study Guide syllabus (reprinted in the ARRL *Radio Amateur's License Manual* and March 1980 *QST*) entitled "Mathematical relationships; calculations," the item that will strike the Advanced class ham as unfamiliar is "Algebraic operations using complex numbers; real, imaginary, magnitude, angle." As far back as the Novice exam, we have been asked to understand and manipulate simple algebraic expressions. Ohm's Law, the formulas for series and parallel resistance, capacitance and inductance, and resonance equations are all formulas of *real* algebra. *Imaginary* algebra uses the imaginary operator "j," which represents $\sqrt{-1}$, a term that is meaningless in the real number system. For amateur purposes, imaginary numbers represent the reactive part of an impedance and so are necessary for understanding what is happening in most ac circuits. This point is brought up here because, unfortunately, imaginary and complex numbers were left out of the present ARRL *License Manual*, and you can certainly expect questions covering imaginary numbers on the exam. To prepare yourself adequately, bone up with a mathematics textbook, one preferably written for a course in applied or technical algebra; your local library can help. Of the many good textbooks available, the Training Branch recommends *Mathematics for Electronics* by Donald P. Leach (Reston, VA: Reston Publishing Company, Inc., 1979). This book will not only tutor you in imaginary algebra, but will also help you with other types of calculations needed for this section of the Extra Class syllabus.

Some newer active devices and the circuits that contain them are introduced at the Extra Class level: MOSFETs, integrated operational amplifiers, phase-locked-loop integrated circuits and two common series of digital integrated circuits. Although you don't need to be a circuit design engineer to pass the test, you do need to know the schematic symbols, if any, for these devices and be certain of their important operating parameters. For the phase-locked loop, you need to be able to describe how the circuit works. For the op-amps, you should be able to calculate the gain of a circuit and explain what the circuit is primarily intended to do. Brush up on your Boolean algebra besides learning the advantages and disadvantages of CMOS versus TTL digital integrated circuits. FET amplifiers are designed a lot like tube amplifiers, so you can apply your knowledge of tube biasing to this topic.

Space doesn't permit a broader look at the new topics in the FCC Study Guide. You will find that in ARRL's *License Manual* and *Handbook*. Remember that you must supplement the Extra Class chapter in the *License Manual* with material from other ARRL publications. Check off each topic on the syllabus after you have covered it thoroughly to make sure you will not be surprised by an unfamiliar subject on the exam. The Extra Class chapter is not intended to stand alone as a complete test guide. As an applicant for the highest class of Amateur Radio license, you can do some research of your own into the frontiers of your hobby.

Attaining the highest class of Amateur Radio license deserves some recognition, and the FCC has something for you. When you have passed your Extra Class exam and received your new license, write to the engineer-in-charge of the district office that gave you your exam and ask for the special Amateur Extra Class Operator License, suitable for framing. Please include a photocopy of your new license. Congratulations!

*Training Program Manager, ARRL

50 Years Ago

January 1933

☐ Amateur operator licensees now number 30,000 — about double the total when we entered 1929 with doomsayers predicting the end of ham radio under the greatly reduced bandwidths from the Washington international conference.

☐ W1DF uses the new 58-57-56 series of tubes in an "autodyne" receiver circuit, a stable oscillating detector and an r.f. amplifier with gain control to prevent detector blocking and to increase effective selectivity.

☐ By 1933 standards, "portable" still means several hundred pounds of rig, receiver, wavemeter, batteries and dynamotor, but W6CUG has put them all in a compact assembly for extensive travel. The unit is also used for the home station driving an amplifier.

☐ When the *President Pierce* docked in Yokohama, radio op W. S. Upson (ex-W6IP) looked up some old DX contacts and was treated to a full round of hospitality, Japanese and ham style combined.

☐ With crowded bands and extensive government (as well as League OO) monitoring, we no longer can be careless about off-frequency operation. Hq. TIS specialist Clyde Houldson helps the situation with a combination frequency-meter/monitor using a 24-A oscillator and 56 detector, of course well shielded.

☐ W1EAO analyzes amateur observations of signal strengths during the August total eclipse of the sun. The pattern somewhat followed day/night propagation characteristics, supporting the optical (ultraviolet) theory of ionization rather than the "corpuscular" approach.

☐ W1MK again transmitted results after polls closed last November national election day, and many reports say the amateur data was an hour or more ahead of the wire services.

25 Years Ago

January 1958

☐ W3BWK found he could "bend" a crystal-controlled oscillator as much as 110 kc. at 20 Mc. So, by beating its output against any one of five fixed xtal signals 100 kc. apart in the 16-Mc. range, he achieves truly variable crystal control over the entire 80-meter band.

☐ Crystals are still cheap in the surplus market, and W2IHW outlines a safe method of etching to move the frequency to a desired spot. He finds it easier than using grinding compounds, and can obtain 100-kc. moves in 10 hours.

☐ W4GF uses a smidgeon of rectified r.f. from McCoy's "Monimatch" to power his "Matchtone," an audio keying monitor.

☐ A kilowatt in a mobile? W6EI has built a transformer that will handle the alternator's 3-phase output, producing 2500 v.d.c. and reasonable regulation despite variations in motor speed.

☐ When aging dropped the battery voltage in W1CUT's transistorized b.f.o. (for c.w. work in an all-wave receiver), the unit stopped oscillating. But the remaining regenerative effect, surprisingly, produced a sharp and tunable notch in the receiver passband. Laird capitalized on this effect by construction of a unit with variable regeneration, providing a choice of notching or Q-multiplier-style peaking.

☐ The International Geophysical Year is in full swing, and Naval Research Lab personnel outline ways in which amateurs can contribute by monitoring satellite signals, with emphasis on telemetering analysis.

☐ Ted Henry fulfilled his DXpedition urge by taking W6UOU to Samoa and operating VR2BC on sideband and c.w.

☐ Clipping speech peaks is highly desirable for effective voice communication; the disadvantage is distortion, especially in the lower audio range. Rather than expensive new transformers, W9AEI suggests using negative feedback to maintain the waveform. — *W1RW*

Silent Keys

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

K1ANG, Hayward H. Tatum, Newington, CT
KA1AVT, George "Smitty" Smith, Hadley, MA
KA1AYH, Joseph M. Durgin, Union, ME
W1BCJ, Robert R. Watts, Stoneham, MA
W1CMF, Walter S. Keith, Sr., Vernon, CT
W1CZM, Richard D. Swift, Stockton Springs, ME
K1EON, Claude E. Nichols, Nashua, NH
W1ITZ, Robert M. Foley, Quaker Hill, CT
W1JZV, Frank R. Britner, Middleton, MA
W1KXP, Roger S. Hotaling, Concord, MA
WA1LFP, George C. Upton, Stamford, CT
WA1VYC, Murray L. Baron, Fairfield, CT

K2AI, George W. Leck, Princeton Junction, NJ
WA2DHZ, John L. Wilcox, Sr., Horseheads, NY
KA2EFK, William T. Nixon, Henrietta, NY
KA2EYI, Peter J. Savasta, III, Hudson Falls, NY
WB2GEA, Donald E. Joslin, New Providence, NJ
W2GOP, Robert P. Flathman, Shoreham, NY
W2KY, Charles L. Reynolds, Binghamton, NY
W2LK, Clarence E. Dengler, Rochester, NY
KB2NK, Thomas R. Riggs, Edison, NJ
**K2OVN, John S. Brandau, Brooklyn, NY
K2ZTL, Malcolm A. Fulton, North Syracuse, NY

W3ACA, Wallace H. Grotefend, Glenshaw, PA
W3CRA, Frank Lucas, Canonsburg, PA
W3ETB, Robert B. Little, Strafford, PA
W3FUN, Ellsworth S. Stackhouse, Bethlehem, PA
WA3FYP, Robert J. Moyer, Reading, PA
W3HAX, Edgar O. Miller, Reading, PA
*W3ID, Frank C. Baxter, Sr., Hatboro, PA
KA3IFW, August A. Augustine, Natrona Heights, PA

W4BG, George K. Ashenden, Alexandria, VA
W4CDK, James N. Glass, Eddyville, KY
K4CFX, Howard F. Ficquette, Winter Garden, FL
KD4EH, Edward C. Asay, Sarasota, FL
K4ERZ, Dr. William H. Chapman, Charlottesville, VA
K4FZU, Robert Fried, Delray Beach, FL
K4GTN, Jacob H. Garwes, Savannah, GA
K4HCI, Lucius G. Hobbs, Naranja, FL
W4IX, Forrest B. Duncan, Satellite Beach, FL
W4LFE, Nathan F. Coffey, Lake Wales, FL
W4OAT, Ronald F. Ring, Albany, GA
KC4RU, Lawrence W. Richards, Fort Lauderdale, FL
W4SIZ, Dwight W "Charlie" Schaffer, Lake Panasoffkee, FL

WA4SUD, John Sasse, Zellwood, FL
WA4UTI, Ronald Rosen, Ft. Lauderdale, FL

KA5AHP, Harvey B. Richards, New Braunfels, TX
WA5DTP, Lloyd N. McConnell, Fayetteville, AR
W5EFD, Elyot R. Scott, Cleveland, TX
W5MCL, Roland F. Crane, Fort Sumner, NM
W5PQA, Dr. Howard W. Merideth, Albuquerque, NM
W5REP, Eugene E. Mullen, Sr., North Little Rock, AR

W6CIF, Frank W. Webster, Long Beach, CA
W6CLB, Albert E. Lower, Sacramento, CA
W6DCE, Henry W. Rodie, Reedley, CA
K6GNF, Beverly D. Zirkle, San Francisco, CA
W6HVY, Thomas O. Tindall, Los Angeles, CA
WA6IHN, Fred W. Hintz, Bakersfield, CA
WA6IKY, Robert M. Robinson, Rosamond, CA
W6MYP, James W. Robertson, Stockton, CA
W6MYZ, Earl G. Banks, Pacifica, CA
W6RF, W. Rad Coover, Sacramento, CA
WA6SFZ, Ralph F. MacCaughtry, Brownsville, CA
*K6TXR, William J. Vette, San Jose, CA
W6TZ, Harlan R. Fullerton, Pasadena, CA
W6WLU, Harold C. Kapp, Palm Desert, CA
WB6WVE, Ezra Suderman, Shafter, CA
W6ZLV, Eddie A. Kramer, Fallbrook, CA

W7BZT, Robert C. Baker, Weiser, ID
K7CIP, Arthur M. Young, Gleneden Beach, OR
KA7IIX, Jerry C. Worthen, Bothell, WA
W7KRU, R. Gene Krulish, Phoenix, AZ
W7QL, Eugene Mathews, Carson City, NV
W7RBU, Coy J. DeLapp, Salem, OR

W8DGN, Harrell V. Noble, Xenia, OH
WA8IJW, Dorothy E. Baumgardner, Fairview Park, OH
K8LIQ, Robert G. Hale, Kingsford, MI
W8RQL, Jack C. Hilton, Sanibel Island, FL
WB8UYZ, Robert M. Dodsworth, Columbus, OH
K8WRR, Dale F. Baker, Columbus, OH
KD8Z, David B. Hartman, Brunswick, OH

W9AEX, Francis W. Wentura, Payson, IL
N9AWB, William F. Harney, Hammond, IN
KA9DKV, Arthur P. Castoldi, Herrin, IL
W9GJA, Miroslav Sekera, Westchester, IL
W9HA, Gordon W. Heffernan, Manitowoc, WI
W9RVM, Ralph N. Roales, Vincennes, IN
W9UAJ, Walter D. Kryze, Rogers, AR

KØBWH, George P. Bonham, Aurora, CO
WDØDDM, Frank B. Rabb, Omaha, NE
WØDNX, John Earl Endacott, Lawrence, KS
*WØEF, Spero J. Spiro, Edina, MN
WØGFN, Ira B. Haskett, Parsons, KS
WØLXA, Leonard L. Lamer, Salina, KS
WAØZBT, George M. Read, Cameron, MO
WØZGX, Elmer A. Allan, Craig, MO

VO1FL, Donald B. F. Oppelt, Conception Bay, NF
VE1JT, Rev. Joseph A. Secord, Upham, NB
VE1NG, Capt. Joseph L. Romain, Meteghan, NS
VE2KC, Paul Dubuc, Outremont, PQ
VE3BOV, Vernon L. Dykeman, Kitchener, ON
VE3EJK, Russell Parkinson, Hamilton, ON
VE3GH, Gerry Halliday, Powassan, ON
VE3VN, Jack M. Emerson, London, ON
VE6EH, H. L. Johnson, Calgary, AB
VE7APM, Pollitt M. Gordon, Hot Springs, BC
VE7DDO, Joseph R. Nickerson, Sooke, BC

EA4CR, Santos Yébenes Mũnoz, Madrid, Spain
HH2JC, Jean Claude Carrie, Port au Prince, Haiti
OE1FF, Frank Friedl, Vienna, Austria
V2AB, James A. N. Brown, St. John's, Antigua, WI
ZL1DB, F. R. Dugmore, Tauranga, New Zealand

Feedback

Harold Sharpe, VE3CLH, who was listed in the Silent Keys column of the December issue, is not a Silent Key.

*Life Member
**Charter Life Member

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

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

Strays

CFO — THOSE CW FOLKS

☐ Hamming without cw is only half the fun, but by hamming without QRQ cw, especially as a Chicken Fat Operator (CFO), you miss a challenging *and* fun mode of communicating. CFO folks usually can be found "clucking" QRQ cw at the lower end of 40 and 20 meters (near 7.030 and 14.030). It probably sounds like RTTY or "digitronics," but it's just plain old cw at breathtaking speeds of 45 to 100+ wpm.

Although the super speed gives challenge and excitement, communicating in a helpful and courteous manner is usually a CFO trait. Most of the 700 or so "members" worldwide love conversational cw. I have yet to hear a QSO like TU CALL UR RST 579 QTH PODUNK NAME BILL 73 GL CUL DE W/KXXXX. More often, I'll hear real-conscientious QSOs from CFO folks getting to know each other and endlessly solving rig and antenna problems.

CFO began about three years ago when Jim Ricks, W9TO, began the "disorganization of competent cw operators who enjoy the social aspects of ham radio." Many top operators belong to CFO, ARRL President W4KFC included. "Membership" is by nomination of a CFO station and is based on cw proficiency, usually in the 45-wpm range.

Next time you hear us, plug in that earplug and listen over and over. Soon, you'll discover QRQ cw and CFO, "a high-speed cw group which preserves Morse code as a foundation of communication and Amateur Radio, honoring it through proficiency in use." — *Barry G. Yoder, W8SJO, Bradenton, Florida.*

I would like to get in touch with . . .

☐ anyone who has a manual or any other information on the CRV-46148-C Radio Receiver, serial no. 31, a unit of model RBC-3. John Szkudlarek, KA8FGE, Pres., Sinclair College ARC, 4299 Drowfield, Dayton, OH 45426, tel. 513-837-6522.

☐ any Swan equipment owners who would like to start a net on 40 or 20 meters. Richard Swanson, KAØGUJ, Box 349, Wellman, IA 52356.

☐ former members of Det. 7, 313th Signal Co., who were stationed at Fontenet Suh-Post, France, in 1960-62. Edward O. Page, WA2GDE, 4 Scott Carpenter Rd., Oxford, NY 13830.

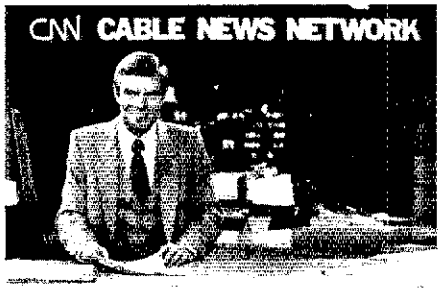
QST congratulates . . .

☐ James M. Talens, N3JT, on being named Chief, Domestic Services Branch, Common Carrier Bureau, FCC.

☐ Cornelius J. Steketee, WA8NHM, of Holland, Michigan, on being named a Paul Harris Fellow, Rotary's highest honor.

☐ Kurt Schmeisser, W8LZV, of Detroit, Michigan, on being the first U.S. operator to receive the German DLD-800 award.

☐ Kenneth D. Hopper, K2VAM, of Holmdel, New Jersey, on receiving the Bell Laboratories Distinguished Technical Staff Award.



When not working 20-meter cw and ssb, Rick Hull, K5WSE, works as an anchorman for Cable News Network, Atlanta, Georgia. An Extra Class licensee, Rick is an active DXer and contester.

While traveling through northcentral Wisconsin this past summer, John Gowron, VE4ADS, of Winnipeg, Manitoba, discovered what could be the ultimate vacation spot for amateurs.

Club Corner

Conducted By Sally O'Dell,* KB1O

Club ACCtion!

What is an ACC? A new kind of soap or a breed of dog? Neither! The ACC (or Affiliated Club Coordinator) is a new section-level appointment in the restructured ARRL field organization.

Who is our ACC? How do we contact our ACC? When does the position take effect? Why does the position exist? What do I say to my ACC? All of these questions and more are coming in from affiliated clubs around the country. They are anxiously looking for affiliated-club information or waiting to become Special Service Clubs. These clubs need to use the services of their ACC fully, but they don't know it yet.

The ACC is responsible for liaison between the affiliated clubs in the section and the rest of the ARRL organization. This person assists affiliated clubs in meeting the League's objectives at the local level, including the training of new amateurs and the sponsoring of hamfests. He or she is the person your club contacts when it decides to check on the club status with the ARRL, become an affiliated club or become a Special Service Club. (See December *QST* for information on the Special Service Club program.)

Your ACC also is the person to contact for general ARRL club information. Some active and thriving clubs in the field are in the ARRL *inactive* files. The reason is we have not received a club annual report form for over two years. If the secretary moves or if a P.O. Box is closed, another club could be lost on the club records. ARRL files include those clubs that have been in touch with the Club and Training Department within the last year. The ACC will be the link between Hq. and the clubs. He or she will be able to follow through to help resolve problems.

How can you use the services of a person when you don't know who that person is? Simple! Contact your Section Manager for the name of the newly appointed ACC in your section. (Each ACC is appointed by a Section Manager.) What is that? You say your section has a Section Communications Manager, not a Section Manager? Then contact your SCM. (See page 8 of *QST* for the name of your SM/SCM.) The new field structure (conversion of SM to SCM and other changes) begins on January 1, 1983 and will be phased in over a two-year period, so there may not be an ACC in your section, yet. If there isn't, contact your SM/SCM and volunteer your services for this position. The job is open to qualified people who want to work with clubs at the local level.

The ACC in your section is someone who is interested in Amateur Radio and your local club. This person is anxious to help your affiliated club. He/she will supply interested clubs with application forms, help affiliated clubs establish workable programs to use in the new SSC program, and work with other appointed section leadership officials to ensure that clubs are involved in the mainstream of ARRL Field Organization activities. The ACC will also assist any club interested in ARRL affiliation that does not want or is not yet qualified to be an SSC.

Suppose your club is ready to become an SSC. First, find the name of your ACC (or volunteer). The ACC will be able to tell you the current status of your club and provide other information. Then, you need to read the introductory information. Decide whether or not to continue. Are you ready? The next step is to make sure your group is interested. Are they? The ACC is the person who approves all SSCs, determines that they meet the qualifications of the program and knows that the club is anxious to continue.

The ACC position exists to *help* your club become more effective as an Amateur Radio club. The first thing you say to your ACC is, "Hi! I'm a member of a club (or affiliated club) and we want to (become an affiliated club) or get started on the SSC program. Can you help us?"

What is an ACC? An ACC is your contact with the new SSC program. Support your ACC and, in turn, support your club.

*Club Program Manager, ARRL

SERVICE BEYOND SUBSCRIPTION

"Service Beyond Subscription" is here and taking up space on the Hq. library shelves when it should be in *your* slide projector at your next club meeting. This slide/audio tape production will give your members an in-depth view of the ARRL. There is no fee. You pay only return postage. For order information, contact Karl Townsend, ARRL Club and Training Department, 225 Main St., Newington, CT 06111.

FIFTY YEARS OF SERVICE

The Hamfesters Radio Club, celebrating 50 years of service to Chicago-area hams, will be sending a special QSL anniversary card to all contacts in 1983. Send QSL to Hamfesters Radio Club, P.O. Box 42792, Evergreen Park, IL 60642.

Central Division Vice Director Ken Ebneter, K9EN (left), presents an ARRL Certificate of Affiliation to Green Fox ARC (Wisconsin) members Bob Roddy, N9BMI (center), and Jack Bremer, KB9WC. *(photo by Jim Romelfanger, K9ZZ)*

Special Events

Conducted By Mark J. Wilson,* AA2Z

Covington, Indiana: Wabash and Erie Canal ARC members will operate from 1500-2300Z *Jan. 8* to celebrate the club's second anniversary. Frequencies: phone — 7.260 21.400. Certificate for working two member stations available for large s.a.s.e. to K9FAR, 1313 7th St., Covington, IN 47932.

Manchester, Connecticut: Manchester RC will operate W1KKS from 1500Z *Jan. 8* until 2000Z *Jan. 9* to commemorate the achievements of John Reinartz, K6BJ, one of the club's charter members and a radio pioneer. Also, it's the club's 70th anniversary. Frequencies: phone — 20 kHz up from General-band edges; cw — 20 kHz up from General-band edges, 0200-1000Z. Certificate for large s.a.s.e. to P.O. Box 1114, Manchester, CT 06040.

Issaquah, Washington: Issaquah ARC will sponsor "Rat's Nest and Crooked Stick III" from 2100-2400Z *Jan. 9*. IARC members will be using homebrew wire antennas and barefoot rigs to contact as many stations as possible. Frequencies: phone — 21.350-21.450; cw — 21.100-21.200. "Rat Catcher Award" for QSOs with three or more IARC members. Certificate for list of IARC members contacted and large s.a.s.e. to: WB7DHC, 675 S.W. Ellerwood St., Issaquah, WA 98027.

Frankfort Center, New York: WD2ALL will operate during the Camp Ballou Scout Freezeout from 1400-1700, 1800-2200 and 2300-0100Z *Jan. 15*. Frequencies: phone — 10 kHz from lower General 40, 20 and 15-meter band edges; cw — 25 kHz inside Novice bands. QSL with s.a.s.e. via *Callbook* address.

Sterling Heights, Michigan: Ford Tin Lizzy ARC will operate AD8R/8 from 1700Z *Jan. 29* until 1700Z *Jan. 30*, during their fifth annual "Freeze Your Arctic Off" event. Frequencies: 7.275 21.380 146.58. Certificate for QSL to Box 545, Sterling Heights, MI 48077.

Eau Claire, Wisconsin: Eau Claire ARC will operate K9EC/9 during the National 70 Meter Ski Jumping and Nordic Combined Championship, from 1400-2300Z *Jan. 29-30*. Frequencies: phone — 3.980 7.277 14.282 21.382 28.620; cw — 52 kHz up from lower band edge. Certificate for large s.a.s.e. to N9A1X, P.O. Box 201, Altoona, WI 54720.

Buffalo, New York: Buffalo Area DX Club will operate WB2YQH from 1800Z *Jan. 29* until 2200Z *Jan. 30* to commemorate the 6th anniversary of Western New York's great blizzard of 1977. Frequencies: 7.245 14.290 21.360. Certificate available from BADXC, 55 Randy Way, Buffalo, NY 14227.

Punxsutawney, Pennsylvania: Punxsutawney ARC will operate Groundhog Day from Gobbler's Knob, home of *the* Groundhog, from 1400-2200Z *Jan. 30* and *Feb. 2*. Frequencies: 7.230 14.290 on Jan. 30, and 7.230 on Feb. 2. Certificate for QSL and large s.a.s.e. to A. Sweeney, K3HWJ, RD 1, Box 371, Punxsutawney, PA 15767.

*Assistant Communications Manager, ARRL

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. For example, your information would have to reach Hq. by Feb. 15 to make the April issue.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Parabolic Dish Feeds

A parabolic dish is a very useful antenna at microwave frequencies for a number of reasons. One is the fact that once an accurately profiled dish has been constructed it can be used at any frequency simply by using the appropriate feed. (By accurately profiled I mean the dish surface does not deviate from a true parabolic shape by more than about 1/10 of the wavelength at which it is being used.)

A characteristic parameter of any dish is its f/D ratio (see Fig. 1). This determines the angle that the dish will subtend to the feed. The importance of this should be evident on an examination of the geometry of Fig. 1. The radiation from the feed is directed toward the dish. If the feed has a very high gain, and consequently a very narrow beamwidth, then most of the radiation from the feed will strike the center of the dish and leave the outer rim of the dish underilluminated.

This leads to a loss of efficiency, because the outer rim of the dish is not being effectively used. On the other hand, if a low-gain feed with a very wide beamwidth is used, then much of the radiation from the feed will "spill over" the edge of the dish and, thus, will not be reflected in the desired direction of forward gain of the dish antenna system. It is evident, therefore, that somewhere between these two extremes lies an optimum feed system that will maximize the dish efficiency (and hence the dish gain).

Ideally, we would like to illuminate the dish surface evenly, but in practice with real feeds this is impossible. It turns out that with most feeds the maximum aperture efficiency occurs when the illumination of the edge of the dish is 10 dB down on that at the center. Note that this will maximize forward gain, but will probably not be the illumination that gives minimum sidelobes or maximum front-to-back ratio. For example, to increase front-to-back ratio, spillover must be decreased by designing a feed to, let's say, give an edge illumination 20 dB down on the center. But doing this underilluminates the dish edge, and so its forward gain will decrease.

A circular parabolic dish is a symmetrical object, as seen by the feed. That is to say, looking at the dish from the position of the feed, the dish is as wide as it is high. Therefore, the feed should have a symmetrical pattern in the vertical and horizontal planes. Constructing such a feed is not as easy as it may at first sound. A very simple common feed is a dipole-reflector combination. This consists of a dipole mounted about 1/4 wavelength above a circular reflecting sheet of about 2 wavelengths in diameter.

Unfortunately, such a feed does not have a very symmetrical pattern. Its E plane −10 dB beamwidth is approximately 104°, and its H plane −10 dB beamwidth is around 166°. It is obviously impossible to illuminate a circular parabolic dish optimally with such a feed. In a recent paper (see references), a technique has been described for equalizing the E and H plane beam patterns from such an antenna. The technique involves the placing of a "beam forming" ring above the dipole (on insulating supports), as shown in Fig. 2. The dimensions shown were found to be optimum for a beam-forming ring made of 0.035-λ-diameter wire. With the beam-forming ring in place, the E and H plane −10 dB beamwidths of the feed shown in Fig. 2 are approximately equal at around 114°. The H plane pattern has been compressed, leaving the E plane pattern substantially unaffected. Since the ring is circularly symmetrical, the orientation of the dipole is obviously unimportant. Similarly, the use of a beam-forming ring with crossed dipoles fed with the correct phase to produce circular polarization should be just as effective in producing a feed with a symmetrical pattern.

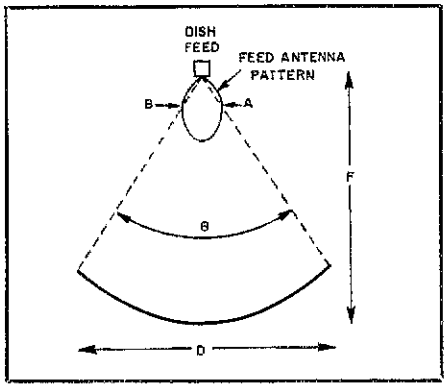


Fig. 1 — Parabolic dish and feed (see text).

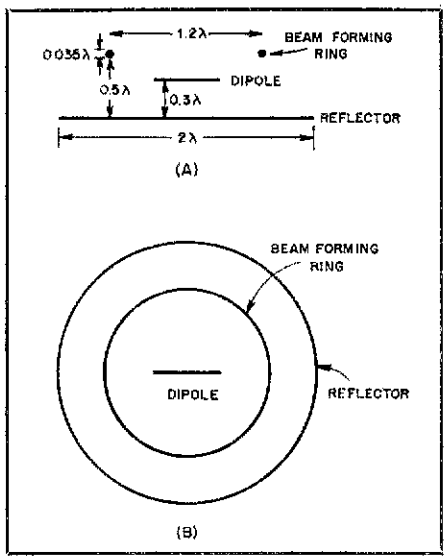


Fig. 2 — Parabolic dish feed with beam-forming ring. A is a side view; B is a top view.

The observation that for maximum forward gain the edge illumination of the dish should be about 10 dB down on that at the center was mentioned earlier. However, that does not mean that the angle subtended by the dish at the feed should be the same as the −10 dB beamwidth of the feed, as might at first be thought. This is because the edge of the dish is farther away from the feed than is the center of the dish (the dish is parabolic, not spherical). This gives rise to a phenomenon known as space loss, where radiation from an isotropic (equal in all directions) source placed at the focus would produce a lower illumination at the edge of a dish than at its center. For a focal plane (f/d = 0.25) dish, the edge illumination would be 6 dB down on the center because the radiation has twice as far to travel to get to the edge. For a 0.5-f/D dish, the space loss is about 2 dB.

The relationship between the f/D ratio of a dish and the angle θ (as defined in Fig. 1) is

$$f/D = 1/[4 \tan (\theta/4)] \quad \text{(Eq. 1)}$$

The feed will optimally illuminate the dish for maximum gain when the following holds true:

space loss + power at θ degree bandwidth = −10 dB (Eq. 2)

Relating these equations to the disk-dipole feed with a beam-forming ring, we find that it is best suited for a 0.5-f/D dish. Referring to Fig. 1, this means that the points on the feed pattern marked A and B are the −8 dB points. Together with the space loss of 2 dB, this gives a −10 dB edge illumination. The phase center (the point from which the feed seems to radiate) should be placed at the dish focus. In this feed, the phase center is directly below the feed point of the dipole, almost on the reflector surface. If the diameter of the reflector is reduced, then the phase center will move forward toward the dipole.

For dishes of other f/D ratios, other feeds may give better results. Dual mode and corrugated feed horns can provide better dish illumination at the expense of more complicated construction. A number of alternative dish feeds are described in the references below.

*103 Division Ave., Millington, NJ 07946

References

The Crawford Hill VHF Club, Technical reports No. 5 and No. 9. Linear and circular polarized dual-mode feeds for 1296 MHz are suitable for a 0.6-f/D dish.

Evans, D. S. and G. R. Jessop, ed. *VHF-UHF Manual*, RSGB, pp. 8.65-8.68. Feeds for 1296 MHz to 10 GHz are described for dishes of f/D 0.6 to 0.25. Included are dual mode, disk-dipole and waveguide feeds.

Kildal, P. and S. Skyttemyr, "Dipole-Disc Antenna with Beam-Forming Ring." *IEEE Transactions on Antennas and Propagation*, Vol. AP-30, No. 4, July 1982, p. 529.

Knadle Jr., R. T. "A Twelve-Foot Stressed Parabolic Dish", *QST*, Aug. 1972, p. 16. This article includes construction information on dual-mode feed horns for 1296 and 2304 MHz.

Turrin, R. H. "Dual-Mode Small Aperture Antennas," *IEEE Transactions on Antennas and Propagation*, Vol. AP-15, March 1967, p. 307.

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A New Era

The value of beacons for marking the occurrence of extended propagation and for serving as a means of checking equipment has long been known to many. Those active on 6 meters have certainly become familiar with a number of beacons operating in other countries as heralds of sometimes spectacular DX conditions.

Unfortunately, FCC rules, having required the presence of an operator on duty at a control point, have prevented U.S. amateurs from taking full advantage of the benefits beacons can provide. Most hams cannot, or will not, listen to a signal drone on 24 hours per day, so beacons in this country have been few and far between. Some have put up part-time beacons, which are on when the owners are present to monitor their operation. As laudable as these efforts may be, they have not fully served the primary beacon function — providing consistent, reliable, ever-present signal sources.

Now, however, this situation is about to change. On November 2, 1982 the FCC released a Report and Order establishing a new class of operation in the Amateur Service called "beacon operation." Under this type of operation, a beacon may be operated under "automatic control" without an operator on duty at a control point. In other words, when in beacon operation, the station may be unattended. The Report and Order followed a Notice of Proposed Rulemaking released in November 1981. This was in response to a petition filed in 1979 by the Johns Hopkins Applied Physics Laboratory Amateur Radio Club. For about six months prior to filing the petition, this group had operated a 2-meter beacon at the Laboratory, located between Baltimore and Washington, under a Special Temporary Authority (STA). The purpose was to evaluate the benefits and any possible negative impacts that beacons might have on other amateur activities. The filing was accompanied by a report on the results of operation under the STA.

Under the Commission's new rules, which go into effect January 3, 1983, stations engaging in beacon operation under automatic control may use a power input of no more than 100 watts and must be within the following frequency bands: 28.2 to 28.3 MHz, 50.06 to 50.08 MHz, 144.05 to 144.06 MHz, 220.05 to 220.06 MHz, 222.05 to 222.06 MHz, 432.07 to 432.08, and all amateur frequencies above 450 MHz. Emissions below 450 MHz are limited to A$\emptyset$, A1, F$\emptyset$, F1 or A2J — in other words, cw or fsk. If fsk is used, frequency shift must be kept to 900 Hz or less. Above 450 MHz, any authorized emission is permitted. Beacons must suspend operation if notified by the FCC Engineer in Charge of the local field office that the station is "operating improperly or causing undue interference to other operations." In addition, there are some specific provisions applicable to beacon operation in the National Radio Quiet Zone (NRQZ). For additional details see page 57.

So much for the legal ramifications. How can we best take advantage of the new rules, for which many have fought for years, to secure the greatest benefit? Notice that, except for the 28-MHz band and above 450 MHz, the frequency bands on which unattended beacons may operate are extremely limited. Obviously, FCC is trying to prevent beacons from becoming a nuisance to other amateur operations. I'm sure we all share that objective.

Because of the limited amount of frequency space authorized, the number of beacons in a particular area must be kept low if anyone is to have a chance to hear those coming in from other areas, when conditions are right. There is certainly no need for everyone to rush out immediately and set up beacons. Some kind of coordination as to frequencies and locations is certainly indicated. This can be modeled after methods used by the area frequency coordinators that serve fm repeaters, but on a wider, perhaps continental, scale. Just how and by whom this should be done is an open question at the moment. Your suggestions are welcome as always.

As to location, it would appear that beacons should not be located at the QTH of someone active on the band, or bands, in question. If they are located there, those people will surely turn the beacons off — when they are operating or merely checking the band for DX. Thus, the beacon may not be there when others are looking for it. It would also be well if beacons are not placed near large population centers where their signals will be strong over an area inhabited by a substantial number of people interested in the particular band. A site about 25 to 50 miles out of town, perhaps on a cooperative farmer's silo or windmill tower, would appear to be about right. The signal should be strong enough to be useful in checking out receivers and antennas, but not overwhelming. By the same token, except possibly under unusual circumstances, the beacon antenna need not be particularly high. About 30 to 100 feet above ground for average locations should serve the purpose very well. The W3VD 2-meter beacon operated by the JHU/APL Radio Club used about 25 watts to a halo 30 feet above ground and was consistently copiable by stations out to 75 to 100 miles. Under unusual conditions, reports came from as far away as Quebec and New Brunswick.

Because the bands allowed for beacon operation are so narrow, it is very likely that some kind of time-sharing may be necessary if we are to be able to hear weak DX beacons on the same frequency as the local ones. This will require accurate clocks, which should not be a significant problem these days. The assignment of time slots to beacons on the same frequency would be part of the coordinating activity suggested earlier.

In addition to signing the prescribed identification, it would appear appropriate for beacons to indicate their locations. A standard means of doing this might be for them to send their grid square. (See the article by W1XX beginning on page 49.)

How we build and operate our beacon systems will have a lot to do with whether they become a blessing or a curse. Your suggestions are most welcome. Once I have them, I will publish a synopsis, along with specific recommendations. In the meantime, it would probably be well for public-spirited individuals and groups to take advantage of the new rules by putting on interim beacons with the understanding that possibly not all of them need remain on, or that they may be asked to QSY slightly or modify their operation once a coordinated plan is worked out. It might also be a good idea for those wishing to operate attended beacons not to use the frequency bands made available to beacons under automatic control. This will help make room for more 24-hour-per-day beacons.

A new era has begun. Let's see to it that it pays big dividends in terms of additional extended-range QSOs and better understanding of the propagation characteristics of our bands.

A NEW GAME ON THE BANDS

The "A New Era" title could just as easily apply to this paragraph as to this column's lead material. An article on page 49 by W1XX announces a new and exciting ARRL awards program applicable to all of the bands above 50 MHz. If the experience of vhfers in Europe, where collecting grid squares sometimes reaches fever pitch, is any indication, this new program should result in greatly increased activity on all of our bands — and not just during contests, either.

As this is a goal for which we have all been striving for a long time, every active vhfer should get behind the new VUCC Award by using grid designators during routine contacts. Also, become familiar enough with the grid system to be prepared to help others determine their designators and be able to explain the awards program to them.

This column will assist by noting the grid of stations mentioned in the text, when that information is made available. Eventually, the standings boxes will be redesigned to include the grid designator for each listed station, as well as the number of grids each claims.

It should be fun and should breathe new life into the bands. W3XO (FM19) will certainly be in there exchanging grids with as many as possible.

ON THE BANDS

6 Meters — To the surprise of not too many, the 1982 fall F2 season has been far below that of the past few years. After all, we are now three years beyond the officially proclaimed December 1979 sunspot maximum of 164.5. Nevertheless, a number of pretty good contacts have been made — although a lot more vigilance has been required to catch them this year. The same will probably be true until E_s returns in April or May. In other words, the middle and western parts of the country are likely to experience additional DX to the Pacific, but it won't be as prevalent as last year. However, we easterners, who do not usually share in much of the spring-season goodies, anyway, are probably out of luck as far as much more F2 is concerned.

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late breaking information.

23-cm Standings

Figures are states, U.S. call areas (plus VE and XE call areas, plus other DXCC countries not located within the borders of the above) and best DX in statute miles for farthest terrestrial contact. *Indicates that some contacts were made via EME. – Indicates information not supplied.

K1PXE	13	5	448
K1FO	11	4	405
W1JR	10	4	475
W1XP	7	5	300
KA1GT	7	4	360
W1QXX	6	3	260
K2UYH	20	9	770
WA2LTM*	17	6	770
W2VC	15	5	537
W2DWJ	12	4	200
K2YCO	11	8	570
K2EVJ	10	6	426
K2JNG	10	4	305
WA2VTR	6	4	320
W2PGC	5	5	473
WA2FUZ	5	3	125
WA2EUS	4	5	320
K2OVS	3	2	135
W3HMU	11	5	300
K3IUV	9	4	290
WA3JUF	7	4	300
K4QIF	15	6	790
W3IY/4	7	5	274
K4KJP	4	2	670
K4NTD	3	2	847
W4VHH	2	1	350
WB5LUA*	12	15	839
W5HN	6	2	625
K5MWH	4	2	280
KR5F	3	2	750
W5UWB	3	2	720
N4JS/5	3	2	467
K5LLL	2	2	847
W5LDV	2	2	847
WB5TCO	2	2	218
W5UKQ	2	1	365
W5HPT	1	1	571
WA5TBE	1	1	372
W5GVE	1	1	366
K5PUF	1	1	290
WA5HNK	1	1	250
K6ZMW	4	3	402
N6CA	3	2	338
W6XJ	2	3	250
W6OQQ	2	2	200
N6NB/6	1	2	360
WB6NMT	1	1	296
KC6A/6	1	1	295
N6TX	1	1	112
N6VII/6	1	1	94
K7GNV/7	5	3	402
N6NB/7	4	2	295
KB2M/7	4	2	295
N6CA/7	3	2	345
WA7JUO	2	1	—
N6CA/7	1	1	215
W7LUX	1	1	130
K8WW	10	7	448
WA8TXT	10	7	—
W8YIO	9	7	551
WB8BKC	6	3	500
WB8PAT	3	3	405
W9ZIH	10	5	790
WB9SNR	8	5	760
W9UD	5	4	760
W9JIY	5	3	300
W9WCD	3	3	770
W9AAG	2	2	350
WØPW	3	2	97
WØZJY	3	1	170
WØMDL	2	2	340
WØVB	2	2	290
XE2BC	1	1	370

The best period between mid-October and mid-November was around the changeover of the months. The 10.7-cm solar flux peaked at 202 on October 25, and the geomagnetic A Index reached 30 on the 31st. On the 26th, K1EM and W1AIM report contacting LU8YYO and LU1YBV, and K8EFS hooked both of them plus OA8V. W5DZF/4 worked some 5s on backscatter and several West Coast stations via direct F2 the same day, and VE1YX completed what was surely an F2 direct contact with W5FF New Mexico. What may have been the first direct transcontinental F2 of the season was worked a few days earlier by W4CKD Virginia at 1704Z on the 20th, when Bob completed a QSO with Southern California station KA6FTB. Sunday morning, the 31st, saw the band alive with signals from the south. The FY7THF beacon was received on the East Coast with good strength, and the HC1JX beacon was heard as well. DL3ZM/YV5 was worked by a number of East Coasters, and many U.S. stations were heard and worked via backscatter. PJ9EE reports contacting about 30 U.S. stations that day, with one of them, W5HUQ/4, showing a distinct backscatter characteristic. Beam headings for both stations were very much off the direct path.

Later in the day, from about 2255 to 2315Z, the West Coast experienced an opening to Japan, also with decided backscatter, or bent path, conditions in evidence. W6OAL notes that the JAs peaked with his beam at 240°, while JA1VOK, one of those contacted, reported his best direction as 90°. An aurora was noted on the East Coast on both 6 and 2 meters during the evening local time, while more southerly stations, like W5UWB, were busy working LUs via TE, as they have been doing quite regularly in the early evening hours. The following morning, F2 backscatter signals were especially strong along the Atlantic Coast. The repeaters in Colombia were very loud as well. The one on 50.075 was picking up and repeating U.S. ssb stations around 50.125, causing quite a ruckus indeed! In the afternoon, KH6IAA worked as far east as K8MMM. The following day, a number of East Coast stations made the grade with OA8V. The farthest north known to have been in on this was W2CAP/1 on Cape Cod. VE1YX was active at the time but could not hear OA8V. The band was really hot to the south the morning of the 3rd, with the FY7THF beacon in well before 1300Z and 9Y5OLL as well as K6KLY/8P6 working a string of stations, including this conductor. OA8CW was in also swapping reports with several 4s and a few 8s but, unfortunately for many of us who still need him, no one in the mid-Atlantic states that day.

Paul, OA8V and son Curtis, OA8CW, whose QTH is a missionary camp in the heart of the Peruvian jungle, are very popular on the band these days. Many report working one or both for a new country. One of the more interesting of these accounts comes from KØSFH whose 3 watts was sufficient to give OA8V his first WØ on October 21. On Friday, November 5, VE1YX struck it lucky, completing a contact with ZS6LN and managing crossbands with G4BPY and G4GLT, thought to be the first North America-to-UK 10/6 meter QSOs of the season. That day, the 10.7-cm solar flux was at its low for the month, only 139. Despite a slight rise in that index, 6-meter DX conditions appeared to decline in the days that followed. However, by Saturday the 13th things seemed to be on the mend with WB1FUB making it crossband with G5KW, albeit via a bent backscatter path, and K1JRW heard the ZD7BW beacon about 1300Z. CT2EE and XYL CT2YJ did well, working PJ9EE, 9Y5ØLL, WD4IYS and WD4NMV via the 10 to 6 route. KA1PE and VE1YX heard OA8CW but, unfortunately, neither was able to make the grade. Earlier in the day, at around 1000Z, ZS6LN had reported a good opening to southern Europe with the 5B4CY Cyprus beacon well over S-9. Out in the Pacific, ZL2KT heard the KH6EQJ beacon and worked KH6JJI via a bent path toward the U.S. mainland. Later, the ZLs were treated to a strong JA opening. Though most of us thought that Sunday the 14th would be even better, it proved to be a bust with little DX present, one of the few breaks being T32AB reported into the West Coast about 2000Z. The only F_2DX that has come to my attention for Monday the 15th is an apparently isolated opening between W5UWB in south Texas and ZL2KT. This path was open on and off from about 2130 until 2300Z. The two were able to work on both 51 and 52 MHz, but ZL2KT heard no other U.S. stations during the period.

2 Meters — Depressed over wintertime conditions and want a lift? The piece by W3EP appearing in the November/December *SWOT Newsletter* should raise your spirits, or at least your expectations. Emil provides a rundown of various terrestrial propagation conditions that may, and often do, occur during the cold months to provide 2-meter DX. He also provides some hints on how to determine when they may be present. One of the lessons we all should learn is if you don't think you are going to work something, you probably won't get on the air, and therefore you won't work anything! A corollary to this also applies sometimes. Maybe reading W3EP's short article will dispel some of the negative thinking and put more DX in our lives.

That TE reported last month continued through October. JA1VOK reports working AX4IR (special call for VK4IR) with 5 × 5 signals at 1040Z on the 13th, and VK4ZSH/VK8 with 4 × 1 signals at 1132 on the 22nd. On the 25th, at 1145Z, Hatsuo contacted VK4ZSH again, this time /VK4. The paths involved are about 3000 miles.

Tales of single-Yagi EME QSOs come in from time to time. Most speak of a contact with K1WHS. Dave's array of 24 Junior Boomers has demonstrated on numerous occasions that it can make up the difference in the lack of sufficient moonbounce gain on the other end. But now W5UWB reports two EME contacts, one with WA1JXN/7 for state number 33, and the other with SM7BAE. John uses a Tempo 2002 to a single 14-element Junior Boomer at 55 feet and a mast-mounted MGF-1400 preamp.

This hardly seems like the time of year to talk about 2-meter ssb mobile operation. On the other hand, most cars have heaters, so why not? Besides, it's something else to do while waiting for the winter DX that W3EP writes about, to put in an appearance. It's also a good time to get your installation in top-notch shape for summertime driving. What follows are a few of the 2-meter ssb mobile reports turned in over the past year. Perhaps they will serve to inspire more such activity in 1983.

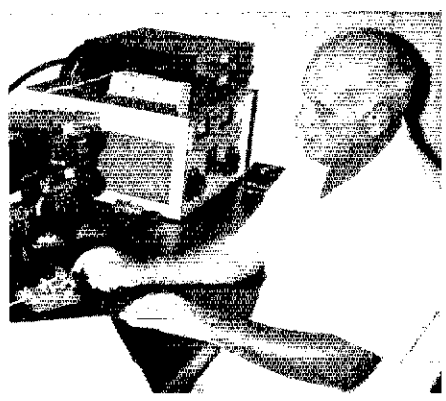
One was the case of W3UN. For a trip to the Eastern Shore of Chesapeake Bay late last spring, Ed installed his TR-9000 and KLM-140 amplifier in his car and mounted a JWL Electronics 2 Meter Square about 8 feet above the road on a mast attached to the rear bumper. Results were very gratifying, indeed. From Onancock, Virginia, he was able to consistently hold ssb QSOs with K4BRK Winchester, Virginia, almost 200 miles distant. He also had a number of contacts with stations in central Pennsylvania, New Jersey and even Connecticut. Ed was particularly pleased with the performance of the 2 Meter Square and is certain that the use of horizontal antenna for ssb work paid real dividends.

Another interesting mobile story comes from WA6BJH/4 Chapel Hill, North Carolina. Kerry was naturally quite excited over a contact he made back in July while driving to work through nearby Durham. Running just 10 watts to a vertical whip, he hooked up with W1VD Burlington, Connecticut on 144.2 ssb, apparently via tropo. He notes that 2-meter mobile can be a lot of fun and urges those with multi-mode rigs in their cars to switch from that other mode to ssb more often. There's no telling what you might work. This conductor certainly echoes that sentiment.

The Higher Bands — From the October/November issue of *432 News* put out by WØOHU, comes word that K6MYC has been experimenting with a 24-foot dish on terrestrial paths. Mike finds it to be 6 dB better than his array of four KLM long-boom Yagis. The same issue notes that W4GJO's success in working out to 300 to 500 miles continued well into October. Grid comments that he has 23 states on 70 cm, all via terrestrial modes.

WB5LUA reports on a 23-cm DXpedition he took to Arkansas and Missouri to provide the two states to K5MWH. Al's mobile rig consisted of an IC-245 and a homebrew transverter putting out plus 8 dBm, or a little less than 0.01 W. The car-mounted antenna was merely a dipole. Having provided K5MWH his own state of Arkansas, Al moved on to Missouri. This time, the dipole didn't make it, so out came the portable 45-element loop Yagi. This did the trick, bringing K5MWH's state total to four. K5MWH runs 100 watts using 2C39As in UPX-4 cavities. Incidentally, he and Al noted that the ceramic version of the 2C39A works better than the glass version or the 7289. In other 23-cm news, W2DWJ writes that he is on regularly each evening at 2200 and 2300 local time. He says most stations in his area now use 1296.100 for the Calling Frequency.

WA5VJB is all ready to take advantage of the new rules allowing unattended beacon operation. Kent is putting the final touches on a GaAs FET dielectric oscillator that puts out about 10 mW at 10,250 MHz. Coupling this to a 10-dB-gain omnidirectional antenna rounds out the equipment he plans to put on as a beacon as soon as the new rules go into effect.



Popular 6 meter catch, PJ9EE. Chet has provided the Netherlands Antilles to scores of 50- MHz DX chasers. *(W1BIH photo)*

Results, 1982 ARRL September VHF QSO Party

By Bill Jennings,* K1WJ and Mark Wilson,** AA2Z

It appears that all of those tired excuses — bad/no/poor propagation, bad/no/poor participation, etc., aside, the September VHF QSO Party is making a comeback as a major event on the vhf operator's schedule. Note that the 442 entries received for the September 11-12 edition of the contest is the greatest number of entries for this event in 19 years — just short of the 1963 total of 461 logs. Recent rules and administrative changes on ARRL's part, coupled with an ever-increasing number of commercially available vhf rigs, appear to have helped toward this end.

The rule changes include the 146.52 prohibition and single-band entry classes. Gone are the days when the contest was decided by which station in the section could dominate the national 2-meter fm calling frequency for the "best" four hours, thereby holding rockbound noncontesters captive and antagonizing other vhf contesters who were not lucky enough to be able to mountaintop on the choicest location in three states. Also gone are the days when it was necessary to donate beaucoup time and bucks to build a killer station on five bands to compete for contest awards. Single-band awards are now available and within the reach of more modest stations.

Who brought you these changes? *You*, the active vhf/uhf contester did! By letting the ARRL Ad Hoc Committee for VHF/UHF Contesting, the ARRL Contest Advisory Committee and the ARRL Headquarters contest branch know what you wanted, you've made the changes and pumped new life into the VHF QSO Parties! That's the way it should be; after all, "It's those who play that have the say." Well done!

In addition, more commercial vhf/uhf rigs are available to the general amateur population than ever before. Many hams are discovering that their 2-meter rigs have mode switches, and that it's possible to work stations hundreds of miles away on cw or ssb with 10 W. Vhf "DXing" is one of *the* things to do these days. And, as many would-be vhfers are discovering, it's no longer necessary to roll your own to get quality equipment for the vhf/uhf bands. There are even good transverters, amps and antennas available for 1296!

Of course, even with the number of contest participants on the rise, the other half of the formula for a successful contest is good conditions. This September was a little better than most. Operators on the East Coast were treated to a mild aurora on Sunday evening, as well as some enhanced coastal tropo. Six-meter scatter operators found good morning conditions, as witnessed by the slightly higher-than-normal section totals for that band. And the stations equipped for EME — K1FO, K9HMB and AAØL, among others — found things as good as they could possibly be. For an idea of what EME can mean, take a look at K9HMB's 2-meter section total. Although conditions were average for September, that is to say mediocre, there were a few bright spots.

Those 10 stations setting new Division records (see the tables) did so more through operator skill and advanced technology than because of any significant band openings. Leading the multioperator pack with a new overall contest record, as well as a new Division record, was the crew from W2SZ/1. Their score of 250k-plus seems more at home in a June contest. Super effort, guys. Other top scores read like a *Who's Who* from the 1981 September contest, with old hands WA2SNA, K1TR, W8VP, W9IP K9HMB, K3YTL and K3MTK. Welcome to newcomers VE3ONT and W1VD.

Among the single ops, WA2DPU took the top spot again this year, while fellow Pack Rat WB3CDE made second. Other single ops from last year are K1PXE and WB1CJT, while W1JR, W2CNS, W9OEH, WA2TEO, W2EIF and K1EM are all familiar calls.

The operators at VE3ONT epitomize the work and dedication that goes into a record-breaking multiop effort. For the second vhf contest in a row (see the results of the 1982 June contest in September 1982 *QST*), they broke into the Top Ten listing for multiops. They also broke their eight-year-old Division record, this time by a margin of about two to one. VE3DSS commented, "We talked about regrouping for the vhf contests for about five years, and we finally got it all together." That they did. The VE3ONT equipment list needed to set the record included: 50 MHz — IC-551D, 8877 amp and 11 elements at 90 feet; 144 MHz — ssb/cw, IC-551D and transverter, 8877 amp and two 14-element Yagis at 80 feet and fm, 140 W to two 11-element Yagis at 80 feet; 220 MHz — hf rig with MMC 220/28 transverter, 8877 amp and 15 elements; 432 MHz — IC-430, 8938 amp and four RIW Yagis at 60 feet; 1296 MHz — transverter, 2C39 amp and a 42-element loop Yagi at 60 feet; 10 GHz — Gunnplexer. Quite an impressive lineup, eh? By all accounts, it worked.

Another surprise from Canada was the appearance of VE1UT on 220 MHz. Bernie worked 14 stations on that band, giving many their first contest 220-MHz QSO with Nova Scotia. Several stations were lucky/skillful enough to work him on 144 and 432 MHz as well, taking VE1 off the "extremely rare" list in the Northeast U.S.

On the whole, the September bash was an enjoyable outing, and now we're looking forward to the January VHF Sweepstakes, to be held later this month. Complete rules appear in December 1982 *QST*. As usual, September certificates will be in the mail around January 15.

Division Leaders

Single Operator	*Division*	*Multioperator*
WA2DPU*	Atlantic	K3MTK*
W9OEH	Central	K9HMB*
WØXG*	Dakota	KCØP
W2GU	Delta	W4BFB
WD8ISK	Great Lakes	W8VP
WA2TEO	Hudson	WA2SNA
NØIS	Midwest	WDØBQM
K1PXE	New England	W2SZ/1*
W7TYR	Northwestern	—
WA6HCI	Pacific	WA6OSX
W3IY/4	Roanoke	K3LNZ/8
W5FF*	Rocky Mountain	AAØL*
WA4CQG	Southeastern	WD4IIS*
K6PVS	Southwestern	WA6OYS
WA5VJB*	West Gulf	K5LZO
VE1UT	Canadian	VE3ONT*
JA2DDN	DX	—

*Indicates new Division record

Top Ten

Single Operator		*Multioperator*	
WA2DPU	65,593	W2SZ/1	251,700
WB3CDE	53,853	W1VD	142,796
K1PXE	47,902	K3MTK	130,188
W1JR	34,207	K9HMB	113,452
WB1CJT	33,150	K1TR/1	101,568
W2CNS	28,490	K3YTL	99,632
W9OEH	26,280	WA2SNA	97,440
WA2TEO	25,730	VE3ONT	86,700
W2EIF	25,392	W9IP	80,066
K1EM	24,900	W8VP	75,504

Left to right are VE3s CRU, AIA, CVX, FIB, DSS and KZ of VE3ONT multiop fame.

SOAPBOX

Really gave rotator a workout by shifting between aurora and good tropo to the southeast. Hearing more stations on 220 MHz each contest (K9MRI). Only had 15 W to high-loss coax and a vertical antenna. Just too bad that we had the aurora on the week *before* the contest (VE2ADE). This contest was an exceptional September contest. Our location on Mt. Pinos was

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

All-Time Division Records

		Single Operator			Multioperator		
		Call	Score	Year	Call	Score	Year
Atlantic	Jan.	WA3AXV	80,770	81	W3KKN	52,272	81
	June	K3SXA	45,144	81	W3CCX	276,675	82
	Sept.	WA2DPU	65,593	82	K3MTK	130,188	82
Central	Jan.	K9RO	30,080	80	K9HMB	72,424	81
	June	W9IP	90,797	81	K9HMB	136,656	81
	Sept.	GW3NJY/W9	35,310	79	K9HMB	113,452	82
Dakota	Jan.	WØRGU	16,000	81	KØVXM	7830	79
	June	KØVXM	29,127	80	W9UD/Ø	115,072	82
	Sept.	WØXG	5889	82	KØSE	10,492	79
Delta	Jan.	WB4JGG	16,884	80	WB4HEL/4	8880	73
	June	WB4JGG	36,936	80	W4BFB/4	74,404	78
	Sept.	WB4JGG	28,424	79	W4BFB	86,880	81
Great Lakes	Jan.	K8LEE	41,080	76	K8III	80,984	79
	June	WB8IGY	57,138	82	W8VP	139,356	82
	Sept.	W8DJY	38,226	81	WA8ONQ	77,952	81
Hudson	Jan.	WB2WIK	63,070	80	K2XR	76,000	81
	June	K2CBA	62,316	82	K2XR	203,218	81
	Sept.	WB2WIK	54,202	79	K2XR	142,006	80
Midwest	Jan.	WBØZKG	16,776	81	KØVUY	14,196	76
	June	WØRT	30,562	82	WØOHU	68,796	79
	Sept.	NØIS	24,119	79	KØTLM	7470	79
New England	Jan.	WA1MAO	55,130	81	WA1RWU	90,902	82
	June	K1FO	109,855	82	W2SZ/1	342,855	82
	Sept.	N6NB/1	102,795	79	W2SZ/1	251,700	82
Northwestern	Jan.	WA7KYZ	10,296	79	WB7DTI	10,008	81
	June	KB7WW	26,649	81	N7DB	42,210	81
	Sept.	WA6JUD/7	4056	76	WA7NAN	8759	75
Pacific	Jan.	WA6JUD/6	23,868	76	WA6BMV	24,814	77
	June	N6NB	69,184	77	WA6JUD/6	81,213	76
	Sept.	WA6JUD/6	24,640	77	WB6KBZ/6	31,995	78
Roanoke	Jan.	K3ICH/4	23,744	80	W4BFB/4	27,392	80
	June	N6NB/8	84,780	81	W2CNS/8	214,472	82
	Sept.	WA2FGK/8	50,298	81	W4BFB	190,210	79
Rocky Mountain	Jan.	N6NB/7	6120	80	WAØPHZ/Ø	8062	68
	June	WAØTVZ	22,395	77	AAØL	41,448	82
	Sept.	W5FF	1102	82	AAØL	5580	82
Southeastern	Jan.	W4GDS	26,400	73	W4VO	18,966	78
	June	WB4OSN	55,380	80	WA4OYH	85,500	80
	Sept.	WA4NJP	13,939	81	WD4IIS	33,726	82
Southwestern	Jan.	N6NB	25,880	79	N6NB	46,750	81
	June	K6YNB	60,342	76	W6AMT	105,080	76
	Sept.	K6YNB/6	34,013	76	N6MI	22,848	81
West Gulf	Jan.	K5CM	14,100	78	N5KW	16,644	82
	June	WA5HNK	34,151	77	K5CM	110,001	82
	Sept.	WA5VJB	7521	82	K5CM	18,630	78
Canadian	Jan.	VE1ASJ	21,156	79	VE1DXA	13,266	79
	June	VE3ASO	49,495	82	VE3ONT	182,592	82
	Sept.	VE3ASO	18,816	73	VE3ONT	86,700	82
DX	Jan.	C6ADV	320	82	—	—	—
	June	W2BN/C6A	18,700	77	VP5AA	29,526	80
	Sept.	JA1RJU	8	79	XE2XW	114	81

Call-Area Score Leaders — QSOs/Multipliers per Band

Call	50 MHz	144 MHz	220 MHz	432 MHz	1296 MHz	2304 + MHz
K1PXE	45/13	150/22	43/19	93/22	30/10	—
W2SZ/1*	396/35	567/27	93/24	158/24	44/16	27/24
WA2DPU	140/23	266/23	35/14	106/23	15/6	—
WA2SNAQ*	232/25	380/25	66/17	104/21	21/8	—
WB3CDE	122/27	235/22	59/18	72/20	—	—
K3MTK*	239/31	378/27	90/22	132/24	27/10	—
KC4EG	30/9	99/15	12/8	26/10	—	—
W4BFB*	177/31	471/21	33/13	35/14	2/1	—
WA5VJB	52/9	135/6	35/3	29/3	3/1	1/1
N5DL*	37/12	113/13	10/6	20/8	—	—
WA6HCI	62/10	142/9	42/7	39/6	3/2	—
WA6OYS*	54/9	94/10	25/6	30/8	9/4	6/4
W7TYR	27/2	48/3	17/2	17/2	3/1	6/5
WB7EUS/7*	(no breakdown provided)					
WD8ISK	110/24	115/15	19/8	34/8	—	—
W8VP*	190/29	282/28	63/22	55/20	6/5	—
W9OEH	199/36	177/15	—	31/9	—	—
K9HMB*	217/37	469/37	70/18	80/17	6/4	—
WØXG	70/25	81/14	—	—	—	—
AAØL*	53/25	55/17	—	8/3	—	—
VE1UT	—	127/17	14/5	24/8	—	—
VE3ONT*	224/37	386/27	38/15	61/18	7/4	7/1

*Multioperator stations

great, except when we were above the inversion or tropo and couldn't even work into Arizona. I actually saw a condor this time. The weather was excellent all weekend and provided the atmosphere for an exceptional effort. Other than a little difficulty in getting up the mountain, the contest operation went off without a hitch . . . a new first (WA6OYS). Six meters tried very hard on Sunday for about five hours but never really did open up. Since I use transverters for each band, I guess that I was on 2 meters or 1296 when 6 meters did its thing. Salvaged seven more sections on 6-meter aurora Sunday night to up my section multiplier (VE3BFM). Conditions for this contest weren't particularly hot. Activity on 2 meters seemed to be very good here in the midwest, but a number of "rare" states were not on (ex: KS, OK, MO). The aurora added more excitement to our operation than it added multipliers to our score. Thus, our score represents a lot of plain old hard work. This will probably be the last W9IP operation from the fire tower (see photos in *QST*s). When we arrived to set up for the contest, the ARMY Corps of Engineers was there setting up a major experiment. We just barely got to operate for the contest weekend (W9IP). Heard South Dakota on scatter, but could not get both ends acknowledged at the same time. Had partial contacts over a three-hour period on Sunday morning with WØPUF in South Dakota (K1VOW). Had a good time setting up and tearing down antennas in rain and wind on 7400-foot Mingus Mountain (K2DNR/7). Saturday was a rainy, slow, dull day. Sunday was sunny and great for the microwave QSOs. The 24-GHz contact worked extremely well once we both understood the antenna pattern. Signals were excellent over the path (W7TYR). September and January are bad times of the year for vhf contests. There seems to be little activity and propagation at these times. I would like to see the dates changed to sometime in November and maybe in March (KO7G).

FEEDBACK

Please refer to page 87 of January 1982 *QST* for the following corrections to the results of the 1981 Sept. VHF QSO Party. In the Utah section, N7BHC should have been listed as the top single-operator entry, while WA7ADK (+ WB7QVZ) should have been listed as the top multiop entry. In the Call Area Score Leaders box, the Tenth call area multioperator station should have been listed as WBØZKG, with the following breakdown (QSOs/multipliers): 50 MHz — 36/10; 144 MHz — 82/11; 220 MHz — 12/5; 432 MHz — 24/5. In the results of the June 1981 VHF QSO Party, reported on page 77 of September 1982 *QST*, WB5DSH/Ø (+ N5DDB) should have been listed as the second-highest Colorado multiop with the following line score: 20,160-334-60-ABD. Finally, in the results of the June 1981 VHF QSO Party, starting on page 82 of September 1981 *QST*, the call of the number two Virginia single op is K4LH*B*, not K4LH*D*.

SCORES

Scores are listed by ARRL section. Within each section, single-operator, multiband scores are listed first, then single-operator, single-band scores starting with the lowest frequency, and then multioperator scores. From left to right, each line score lists: call, score, QSOs, multipliers, bands operated (A — 50 MHz; B — 144 MHz; C — 220 MHz; D — 432 MHz; E — 1296 MHz; F — 2.3 GHz; G — 3.4 GHz; H — 5.7 GHz; I — 10 GHz; J — 24 GHz; K — 48 GHz; L — light). Among the single-operator stations, the overall section winners and single-band winners are indicated by bold-face type for the call sign of the section winner and for the letter(s) denoting the bands won. For example, in Connecticut, K1PXE is the overall section winner as well as the single-band leader on 220, 432, and 1296 and above. K1EM is the 50-MHz leader, while K1FO is the 144-MHz leader. W1VD is the highest-scoring Connecticut multiop.

W/Ve

I

Connecticut

K1PXE 47,502= 361= 50= ABCDE
K1EM 24,900= 361= 60= ABCD
W1FAA 5346= 162= 43= ABCD
KA1BXB 1710= 194= 45= ABCDE
WA1ZNI 3050= 150= 22= AB
WA1GLP 5270= 131= 25= AB
W1AW (WB1HKN, op(s))
2286= 108= 18= BD
W1HDQ 1463= ... 19= AB
KA1GAT 1155= 77= 15= A
K1FO 49,80= 140= 26= B
K1VVO 1504= 94= 16= B
KA1EJR 1435= 69= 15= B
K1EMS 1017= 79= 13= B
N1BCA 945= 63= 15= B
K1SA 15= 3= 1= B
W1VD (+K1s JA,??,WA1STO,AA2Z)
14,??0=1021=116= ABCDEI
W1QK (+KA1AQL,KC2OF WA1WXV,
WB1S CVK,EA)
55,440= 609= 72= ABCD
K1MUJ (K1GX,K9KD,WA1s BZB,
BYN, op(s))
25,650= 550= 57= ABCD
WA1IVD (+KA1YE,WA1IWX)
2776= 206= 36= ABC

Eastern Massachusetts

W1JR 34,20?= 282= 74= ABCDEF
N1AIS 9306= 201= 33= BD
KA1OHO 8536= 187= 47= ABCD
WB1EKA 8729= 184= 43= ABCDE
K1SE 7654= 144= 45= ABCD
W1QAI 3472= 131= 36= BCDE
WA1TOB 6560= 172= 52= BD
N1BC 3444= 85= 17= BD
W1JOU 1071= 76= 17= BCD
KA1CKE 756= 48= 12= ABC
KA1AMB 210= 52= 8= AB
WB1EPB 2845= 115= 22= A
K1DAT 2589= 131= 19= A
W0RLI 4800= 200= 23= B
W1QXX 3610= 190= 19= B
WA1YKN 2125= 125= 17= B

K1AM 1815= 141= 15= B
KA1EVG 1255= 117= 13= B
KA1QAR 957= 87= 11= B
W1IOL 510= 45= 10= B
W1EM 360= 30= 12= B
KA1GHR 252= 28= 9= B
WA1P 48= 6= 8= D
N1RC 12= 2= 6= B
W1XM (W1XG,K2ME,WA4TTG, op(s))
34,432= 518= 81= ABCDE
N1BLI (+N1s BCC,BYS)
13,630= 258= 47= ABD

Maine

KA1NKC 126= 21= 6= A

W1PLX 1077= 83= 19= B
E1BZ 412= 59= 8= B

New Hampshire

WB1CIT 31,150= 387= 65= ABCDE
AE1T 20,536= 256= 66= ABCDLI
W1EJ 19,251= 279= 53= ABCDE
AC1T 6468= 117= 26= ABD
WA1GDR 1004= 59= 17= AB
KA1FIG 660= 42= 15= ABC
K1RA 510= 34= 15= AB
W1PZ 1065= 71= 15= A
WE1SM 1700= 100= 17= B
WB1N2 1282= 90= 14= B
KA1QF 4= 2= 2= B

Rhode Island

```
WIAJR      2240=  280=  80= ABD
K1DS       3400=  884=  72= ABD
KA8QZ/1    31749= 1464= 211= B
5x1E (+K1JQ,WA1AYS,WB4RVA)
           1,978= 2084= 52= ABCD
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Vermont

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WI1X/1     2365=  136=  17= BC
WA1JRK     2030=  532=  11= B
WITRZ (+K1GCF,1R,UR,N2AWE,
 9Y5 WC1,QRP,WA1PMF PQF,110 WB1S
 BQM,EDF, opers.)
           3,184/ 259= 57= ABCDEF
WIAIM (+K1IQE)
           2,192= 310= 22= ABCD
AB1GQR (+N1QG)
           1,044= 225= 44= ABCD
K1IK (+KA2S RAO,1PO,KC1F,
WA1PCD,WB1S IDA,1SW)
           782= 225= 34= ABC
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Western Massachusetts

```
KA1APE 18,250= 280= 65= ABCDE
WA1PLS 11,540= 280= 55= ABC
W1WLS      2200= 312= 22= AB
W1CM       1176=  96=  14= B
WA1BOL     402=   47=  11= B
W1JP       168=   31=  8= B
AC1G       140=   17=  10= B
W1WZZ (+K1IM,K1DR,WA1HCE,WB1S
 CBH,HIH,AZZX,KZA TR,UF,WR,
 WAKD,WA2S ASD,GHP,SPI,WB2R
 IUR,PKO,KA3WIX,N8AHM,WA8USA,
 VE7JI, opers.)
           2,200= 1285= 150= ABCDE
                            FGIJ
K1OKZ (+K1LS KA1A,K3WM,N1BEM,
WA1S ON8 PKO,OWF,UEI)
           101,968= 926= 92= ABCDE
KA1V (+N1KPH,WB1EHD)
           3864= 111= 28= ABD
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2

Eastern New York

```
WA2TEO 23,250= 354= 62= ABCDEF
K2YAA  24,852= 213= 61= ABCDE
W2CRS  23,166= 243= 66= BCDLU
WA2ITF 12828= 2048= 26= B
W2RT       6102= 171= 12= A
W2LP       855=  35=  14= B
WA2IHV     900=  60=  10= B
W2ONE (K2MMB,KA2CIM N2S BI,DL,
 DLL,WH2S KSP,TDF,UME, opers.)
           31,968= 512= 53= ABD
K2INA (KA2S N1Q,N0E,N2BLB,
WA2BSP,WB2S CCB,FBB, opers.)
           13,984= 442= 47= 5B
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New York City-L.I.

```
N2BFJ  18,876= 401= 62= ABD
K2LD       3588= 300= 26= ABCDE
WA2AUW     2.0=  .7=  11= ABCD
WB2PRO     3570= 192= 32= BC
WA2RUS     3042=  91=  12= BD
K2QVS      6660= 163= 33= ABD
WA2SLY     8105= 365= 37= AB
WA2PEI     3648=  55=  18= B
K2BIW      6800= 132= 30= D
WA2PMW     918=   21=  9= D
WB2PWK (+WA2VWP)
           34,014= 250= 54= ABCD
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Northern New Jersey

```
WB2WIB 22,902= 417= 54= ABCD
WN2QBD 22,245= 209= 54= ABCDE
WA2CWA 20,832= 624= 38= AB
W2VU       2226=  102=  14= DE
WB2ONA     7668= 167= 36= BCE
K2UBF      4674=  116=  41= ABCD
WA2WDT     2080=  80=  26= AB
KF2RC      1848=  66=  22= AB
WB2TMD     1632=  96=  17= B
WB2CDT     3038= 279= 22= B
WB2AIM     1632=  108=  16= B
K2QM       1134=  22=  9= B
WA2SNA (K2BJG,KA2S BTD,NDZ,
 OVK,N2S AA2,RMM,[,IIR,WB2S,
 WA2S ISW EPA,WB2REB, opers.)
           91,140= 805= 96= ABCDE
K2RF (+AA2U,K2S BIA,QEI,KU2C,
PT2B,WB2WWC,WA2S BBW,BLC,DEM,
WAH,WB2S RHO,KAIH,NY2S PSO,NYK)
           41,985= 545= 85= ABCD
N2BOW (+KA2S WBD,PBU,N2S BMF,
CXI,WB2WIM)
           25,883= 328= 57= ABCDEI
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Southern New Jersey

```
WA2DPU 63,993= 562= 92= ABCDE
W2RIB  37,392= 224= 84= ABCDE
K2AT   35,211= 232= 84= ABD
W2HBM  31,332= 222= 84= ABD
WA2KUU2 8266=  81=  39= BCDE
K2GES      4248=  149=  28= BD
N2BVB      2337=  123=  19= BC
WB2SPU     110=   11=  10= A
FC2mb      1080=  104=  20= B
K8ZUW      552=   32=  14= B
WB/RVV (+KA2NVF)
           24,112= 374= 66= ABCDE
K2BWR (+K2ZRI)
           2,218= 121= 32= ABCDE
K2NE (+N1BMH,KH6UP)
           20,200= 403= 80= ABD
```

Western New York

```
W2CNS  28,640= 413= 71= ABCD
N2MK       5544=  102=  22= AB
N2SBD      1742=  93=  26= AB
WB2ZYA     1623=  74=  25= BD
K2MHG      1200=  80=  20= AB
K2CSY      552=   28=  14= A
WB2NFB     525=   36=  12= B
WB2PEF     2205=  105=  21= B
K2UR       1800=  90=  20= B
W2WGF      1000=  56=  20= B
WB2QGJ     542=   19=  14= C
K2IRV (+WB2IMC)
           15,120= 241= 56= ABCDE
WB2QOH (+WA2PXH)
           1008=  34=  12= B
```

3

Delaware

```
AC3T (+K3WJV,KA3B,N3S AJ,
BHS,CUX)
           41,775= 341= 62= ABCD
K3QBD (K3SB DNO,YW,KA3ND,
WB3KKK,WA3S HDS,WCE,WHG, opers.)
           7044= 141=  47= B
```

Eastern Pennsylvania

```
WB3GDE 33,854= 448= 87= ABCD
K3BP       25,206= 534= 86= ABD
WB3IYQ 23,220= 381= 98= ABD
3P90       16,926= 534= 66= ABD
K3WK       9,207= 198= 43= ABD
K3CL       6600=  183=  47= ABD
AE3T       3076=  141=  36= AB
WA3HDP     3055=  91=  31= CDE
K3KPD      3648=  130=  48= ABD
WA8BCI     3420=  107=  28= ABD
K3AIL      2448=  102=  24= AB
K3YTO      2340=  117=  24= ABD
WA3EVD     1300=  65=  20= AB
WA3AWA (WA3KEL, opr )
           420=   32=  10= AB
K3LYB      780=   60=  13= A
K3MMW      855=   11=  7= B
W3GIC      4320=  65=  20= B
K3PI       2400=  140=  21= B
W3CTD      2184=  104=  21= B
WA3BJP     1665=  111=  15= B
K3KEY      1640=  82=  16= B
K3AYY      2001=  77=  15= B
KA3DAT     435=   41=  15= B
WA3BKU     1326=  77=  11= B
K3MTK (WB2YLH, WC0PV, WA3a
 KPP, [3I, 2QU, K3SBSS, opers.)
           130,188= 866= 114= ABCDE
K3CJD, (K3a EDU,MRZ,KA3S CWR,
 EPD, N3AVZ, W3UR, WA3S WPZ, SWY
 XUN, WB3S CAI,CCC,EAR,ESO,FYT,
 IPC, opers.)
           24,642= 280= 106= ABCDE
N3AD (K3SZY, N3BNA, W3IPX, WA3S
 HMK,IQU,PHL, WB3ANB, opers.)
           27,944= 432= 59= ABD
WB3LNZ (+K3ssa HE,IB,ZS, N3ADC,
WA3NWI)
           21,551= 332= 64= ABCD
W3LP (W3a GEZ,IMZ,WA3CUQ, opers)
           11,270= 226= 65= 3B
```

Maryland - D.C.

```
W3IP       19,065= 189= 65= ABCDE
K3WEM      12,330= 189= 60= ABDE
N3ZO       9,900=  243=  55= ABD
K3AKR      7,400=  128=  50= ABCD
N3AVT      5886=  111=  36= AB
K3XU       2484=  92=  27= AB
K3AJ       1500=  50=  21= A
K3UQD/3    5490=  218=  45= B
W3OTC      792=   44=  18= B
WB3ELA     1802=  6=  12= D
```

Western Pennsylvania

```
K3MD       5577=  129=  34= ABD
WA3DOH     5,874= 152=  38= ABD
W3IE (WB3BGU,opr)
           258=   7=  6= B
K3WA/K3 (+K3EI, K3IS AMT,DJO,
OWR, WA3S BDX,FEL,IRV, WB3KRX)
           35,330= 326= 90= ABCDE
K3HAK (K3VXU, KA3B DRI,HNS,FML,
K3CSL, RL3C, WB3AEI, opers.)
           2,156= 138= 17= ABD
```

4

Alabama

```
WA4COG     5638=  111=  43= ABCD
K4AF       2455=  115=  36= ABCD
WA4EWA     3570=  104=  30= AB
WA4LIT     1440=  57=  25= BD
W4HIL      252=   24=  10= B
```

Georgia

```
WA4TCS (+AA4QA, K1AR1, WB4s
 AA5,NMA, W4as DUV,WA5I
           15,776= 333= 72= ABCDE
```

Kentucky

```
KC4EC      8610=  167=  42= ABCD
WB4KIT/4
           5600=  175=  40= ABCD
W4EED      7=     1=    6= A
AD4RPL     600=   25=  12= B
5A4DKH     330=   31=  10= B
WD4EKA (+K4IEH, KM4X, KA4a
 CAA,KM6,KY2, WD4OSM)
           27,930= 279= 54= ABCD
```

North Carolina

```
WD4GQU     2688=  101=  28= AB
K4CUP/4    1161=  81=  23= ABD
WD4ODS     2100=  66=  20= AB
K4FAW      1444=  62=  19= D
N4TN (+WA4KIM, WC4a)
           6426= 178= 36= ABC
```

Northern Florida

```
W4ODW      2815=  134=  33= ABCDE
Wa7SB (N4a OPM,DXS, opers.)
           335=   37=  9= AB
```

South Carolina

```
WA4LDU     700=   30=  10= AND
NR4A       852=   51=  12= B
W4VRV      400=   40=  10= B
```

Southern Florida

```
K1EJM/4    324=   51=  14= ABD
W32R/4     147=   21=  7= A
WD4HAL     1=     1=   1= B
```

Tennessee

```
W2CU       1440=  154=  35= ABD
WR4LBD     1530=  96=  20= ABD
WA4QIK     1034=  82=  22= ABCDE
N4BDR      504=   45=  16= B
K4WDRS     567=   41=  18= B
K4NW       360=   36=  10= B
WA8EB (AK4E,AA4W,K1CZ,AB4C,
K4a CEB,LVV,MQG,FF,KA4a RNC,
WTT,KD4IL,KB0V,N4BIR,WA4KKL,
WA4a QIO,VCC,WB4ILX,WD4a ABZ,
JWD, opers.)
           43,200= 218= 80= ABCDE
```

Virginia

```
W3IY/4     7566=  92=  38= CDE
K4EIO      2211=  98=  28= AB
WB4HIG     4786=  91=  34= BD
KC4TW      1200=  30=  8= AB
K1CE/4     966=   42=  15= B
K7RE/4     2401=  79=  10= A
WA4MS      1320=  55=  4= A
N4EDU      2414=  72=  17= D
WA1Y (K4HWG,KA4CKI,WB4RDV,
WJ4RI,N4KV, opers.)
           31,614= 366= 77= ABCD
W4DU (+AA4O,KA4IXS,K4SKI)
           20669= 219= 54= ABD
K4NFR (+K4GMR5,N4GKH,N7AN)
           2068=  128=  31= B
```

5

Arkansas

```
WD5AGO     360=   69=  9= B
K5UL (K5IU,KA7OP,WD5S CJA,
CAF)       8190=  180=  54= ABCD
K5GO (+AN5XR,K8CC)
           4200=  151=  40= ABD
```

Louisiana

```
WB5LBT     2226=  .1=  29= ABCDE
N5JM       41=    .=   3= A
W5OKQ      288=   .=   7= D
```

Mississippi

```
W5RCI      2418=  93=  26= BCD
K5DEY      4420=  86=  10= BD
```

New Mexico

```
W5FF       1100=  55=  14= ABD
K5MAT      2142=  38=  9= ABC
W5RKS      410=   24=  7= ABD
WA5CHZ/5 (+WB9S (eR,ERI
           84=    21=  11= AB
```

Northern Texas

```
WA5VJB     .1=    .1=  .1= ABCDEI
```

Oklahoma

```
K5WE       1358=  111=  27= ABD
W5RZS      1194=  86=  16= ABD
K5SW       507=   25=  11= BC
```

Southern Texas

```
K5BZU      56=    26=  6= B
K5JZO (+WB5RUS,WB5KSY)
           2820=  120=  30= ABD
W5HKR (+WA5IBE)
           1129=  130=  21= ABDL
```

6

East Bay

```
WD6CHL     9014=  216=  23= ABCDE
N6AMG      3640=  101=  28= ABCDE
K6JAT      666=   40=  14= ABD
WB6MAC/6   12=    4=   3= B
WB7ABP/6 (+NN6N)
           114=   8=   6= DEI
```

Los Angeles

```
N6DBA      1504=  142=  .=  BC
N5RGZ      1040=  64=  11= ABD
WB6PIB/6   104=   13=  .=  AB
N6PRK      .0=    .=   .=  B
KA6BAM     210=   30=  7= B
```

Orange

```
K6PVS      5327=  140=  21= ABDE
(K6PN (+K6KIS,K6ns JUI,OXY,
K6ola,K6LAF,WA6PMX)
           2147= 140= 13= ABD
```

Sacramento Valley

```
N6GJZ      88=    .=   .=  B
WA6EIK (+N6EEK,N6WNA,WB6SRM)
           6,432= 194= .=  ABCD
WA6KOD (+W6SFH)
           976=   46=  16= 80EI
```

San Francisco

```
WA6LLY     1431=  .1=  14= AB
N1bb       520=   .=   10= AB
WA6KKB/6   168=   12=  4= B
W6DHK (+N1BF,WB6IBU)
           1130=  69=  17= ABCD
```

San Joaquin Valley

```
WA7KBM     6024=  106=  .=  ABCD
KE6KO      2475=  .5=   15= ABCDE
WA6OSS (+WA6IQU)
           2240=  116=  30= ABCD
WB6DIA/6 (+K6LMN)
           4,524= 169=  .=  ABCDE
EA6NS (+NN6YW)
           1,578= 142=  .=  B
```

Santa Barbara

```
K6ELQ      2142=  40=  21= ABD
WA6DIS (+W6DAA,WB6YIN)
           1,442= 118=  .=  ABCDE
                            FGIL
```

Santa Clara Valley

```
WA6HCT 12,260= 283=  34= ABCDE
WB2SZK     1042=  52=  .=  ABCD
K6CAP      900=   100=  .=  B
WB6VYX     720=   90=   6=  B
WB9AIZ/6   522=   .=    .=  B
KA6DJX     90=    15=   .=  D
```

Sonoma

```
KA1BO (+K1RZ)
           2436=  220=  36= ABD
```

7

Alaska

```
KL7WE      72=    16=  .=  ABD
KL7DX      12=    3=   3= ABD
```

Arizona

```
K7VOW      260=   34=  14= ABDI
7JONR/7    171=   51=  7= ABD
WA7BRA     24=    15=  7= BD
```

Idaho

```
N7KIJ      190=   .=   10= AB
```

Nevada

```
K3ZAP/7    130=   42=  7= ABCD
WA7KSA/7 (+WA7IBD)
           450=   51=  6= BCD
```

Oregon

```
W7TYR      2550=  118=  15= CBLDE
                            FGHIJ
W7UOM      2086=  107=  14= ABCDE
                            FGHI
K7BSJ      1854=  130=  11= ABCDE
WA7AVI     .0=    .=    .= B
```

Utah

```
N7BRC      12=    .=   3= ABD
WA7ABK     .0=    .=   .= B
```

Washington

```
W7YOZ      2514=  190=  11= ABCDEI
K7MD       1590=  91=  13= ABCD
W7RT       1053=  86=  12= AB
W7ERH      180=   42=  .=  BC
WB7QET     384=   38=  6=  A
K7UQ       1085=  .=   .=  A
K7HKB/7    660=   120=  .=  B
K7IEJ      324=   108=  .=  B
AB7G       111=   .=   .=  B
```

8

Michigan

```
WB8RAT     2004=  143=  48= ABD
N8BHV      1440=  .=   .=  ABD
WA8ZCO     .16=   11=  9= CDE
WA8KEA     1254=  144=  21= B
WB8AP      1170=  .=   15= B
K8NTE      1134=  81=  14= B
WB8AAX     1088=  147=  17= B
W8VPH      732=   81=  12= B
KA8DDQ     .0=    .=   .= B
K8MR       .84=   .=   .= B
```

Ohio

```
WD8ISK 18,216= 278=  52= ABCD
K8DTD      4104=  152=  45= BD
WD8OVH     4572=  108=  28= ABC
K8DW       3600=  .=   28= BCDE
WD8OAB     6.4=   .=   .=  AB
N8KPR      .45=   .7=  .=  A
K8III      8400=  280=  40= B
WD8RIU     7014=  144=  14= B
N8CUS      1991=  181=  14= B
K8DGY      1035=  64=  15= B
K8AIA      6.2=   .=   12= B
N8KJN      5000=  .=   10= B
WD8KRP     1764=  .=   .=  B
K8WP       1008=  .=   12= B
K8VP (K8a AL,KNL,KA8BUZ,
N8COX,WD0A,WA8HBE,W8as ESR,
IS[,WB8YGZ, opers.)
           .,.48= 1086= 104= ABCDE
K8DIY (+KA8ZZD WB8ULE,WB8NFI)
           21,240= 430= 82= ABCDE
WD8RSA (+KA8s DII,OHS,KR8O,
W8AHKR,WD8ORI)
           646=   .6=  14= B
```

West Virginia

```
N4VL/8     .78=   .7=  .4= AB
WB2BIN/8 2776=  .0=  .7=  BD
K1BA       2038=  .6=  .1=  BD
WB8OBR     2.0=   .15=  .0=  B
K3NZ/5 (W4PSJ,WA3S EDQ,N2I,
OYW, opers.)
           .6,.2=  .20=  .6=  ABD
K8OC (+KA8MR,KD8G,NB8GV,
W8s IN,VE,WA8LLM)
           .8[.5=  .16=  .1=  ABD
K8SA (+KB8MZ,KA8s PYZ,PZS,
W8CY,KC8FI,WA8CIF,WD8S MCR,
OPB)       5,.2=   .7=   .8=  B
```

9

Illinois

```
AE9M       5040=  124=  .=  AD
W9MNSV     3024=  144=  21=  B
WD9RSA     1812=  .=   .=  B
N9USA      .96=   .7=   .=  B
9+HNB (+K9s GL,NO,PW,RS,VY,
K9QW,WA2C ID,WA9EYJ,WB9S CAS,
IIY) (11,.42= .40= 11= ABCDE
W9IP (+W3EP K9ARS,W9UU,WA9YLK)
           80,068= 210= 98= ABCDE
[A40 (+KA9LKT,K9VS OBB,OBS,
WB9VDV)
           13,.62= 243=  .=  ABCD
K9VBV (+K9AVS OBL,IZQ,N9KSR,
WA9RSD,WD9COL)
           .875= 111=  .=  ABD
```

Indiana

```
WH0KIF     .6,220= 402=  .=  ABD
W9YNIL     5,.80= 140=  .=  ABCD
W9AZC      2,11=  .=    .=  ABC
WD9FMR     1,5..=  .=   .=  ABCD
WB9UTA     605=   .=   11=  BD
K9TIC      .=     .=   .=  A
K9MAH      .980=  .4=   .=  B
K9KES      .42=   .5=   .=  B
K9AEP      .41=   .=    .=  B
W9NSK      .12=   .=    .=  C
K9MRI (K9IUV2,KB9QL,WB9CNS, opers.)
           .1,.48= .41=  .=  ABCD
```

Wisconsin

```
WA9RGO     .056=  .42=  .=  ABCD
WA9CUH     2.46=  .01=  .=  ABCD
K9WWM      .402=  .5=   .=  BCD
WA1TKD     1.28=  .08=  .=  BC
N9CIO      .65=   .1=   .=  AB
WA9LZM     .1=    .=    .=  AB
N9IIO      .7=    .=    .=  B
WB9SBD     .88=   .=    .=  B
K9WRR      .14=   .=    .=  B
K9ODF      .=     .=    .=  B
N9DLO      .=     .=    .=  B
EA8CRD/9 (+EC8MP)
           .=     .=    .=  B
```

Ø

Colorado

```
AØAT       .1=    .1=   .=  ABC
WØMU/Ø     .02=   .3=   .=  A
WØGFA      .=     .=    .=  B
5A0L (+AD0U,KAØRUZ,NØUY,
WA7VMS,WAØISH)
           .58=   .16=  .=  ABD
AAØP (+KNØTY,WDØHHD)
           .78=   .6=   .=  ABD
```

Iowa

```
KØDAS      .14=   .06=  .=  BCD
WBØZKG     .104=  .40=  .=  ABD
NYØD       .64=   .=    .=  AB
ØØRAP      .088=  .=    .=  AB
WAØEKS     .80=   .=    .=  AB
WØSX       .064=  .=    .=  A
WØCIH      .012=  .11=  .=  B
NØØUS      .03=   .3=   .=  B
KØØV       .10=   .=    .=  A
AEØM       .=     .=    .=  B
```

Kansas

```
WBØISW     .28=   .24=  .=  ABCD
WØILL      .428=  .65=  .=  AB
KØKT       .84=   .=    .=  ABCD
KØUBT      .60=   .=    .=  AB
KØØW       .34=   .=    .=  AB
AEØC       .6=    .=    .=  B
WAØVIH     .20=   .=    .=  B
KØVUA      .=     .1=   .=  B
```

Minnesota

```
WØXC       .84=   .1=   .=  AB
WØVB       .=     .2=   .=  ABCD
KAØCOG     .24=   .20=  .=  ABD
WØRLM      .20=   .7=   .=  AB
EC8E (+KAØCRO)
           .=     .=    .=  ABCD
```

Missouri

```
NØIS       .=     .4=   .=  BD
KAØNOK     .52=   .2=   .=  ABCD
WØKY       .48D=  .=    .=  ABD
WØJKP      .06=   .=    .=  AB
KAØCOG     .48=   .2=   .=  B
KAØPOM     .6=    .4=   .=  B
```

Nebraska

```
KØOS       .04=   .42=  .=  AB
KØAY       .40=   .4=   .=  AB
NØAJU      .70=   .5=   .=  B
WDØBOM (+KAØCRI,WØKAP)
           .10=   .=    .=  ABD
```

South Dakota

```
KØUDZ      .48=   .=    .=  ABD
```

VE

Maritimes-Newfoundland

```
VE1UT      .090=  .65=  .=  BCD
VE1AHM     .6=    .4=   .=  B
VE1YX (+VE1NX)
           .60=   .5=   .=  AB
```

Quebec

```
VE2SH      .4.4   .00=  .=  ABDE
VE2KW      .=     .=    .=  AB
VE2CUA (VE2a AEQ,BAR,OUR,CUC,
opers.)
           .=     .8=   .=  AB
VE2EUF (+VE2EMK)
           .=     .=    .=  AB
VE2CVV/2 (VE2s DOJ,eLM,opers.)
           .=     .=    .=  B
VE2JDE (+VE2LHN)
           .12=   .5=   .=  B
```

Ontario

```
VE3BBM     .885=  .=    .=  ABE
VE3EFN     .518=  .74=  .=  BD
VE3EYB     .422=  .14=  .=  AB
VE3EGH     .=     .=    .=  A
VE3ONI (VE3s eIA,CRU,CVX,DSS,
EIK,KZ,MEI, opers.)
           86,700= 7..=(0/= ABCDEI
VE3LNX (+VE3s AD),CRK,NSD)
           25,512= .11=  .=  AeCDEF
```

Saskatchewan

```
VE5JQ      .6=    .=    .=  AB
```

British Columbia

```
VK7NOR (VK/BEK,opr,)
           .=     .=    .=  AB
VE7CSI     .=     .6=   .=  ABCD
```

DX

Japan

```
JA2DDN     .=     .=    .=  A
```

Checklogs

```
K1TO,WZ7O,AK(N,WA1AA),
K4KDT,WB4EPG,WD6BAM,WA5LKE,
K5AING,KA7LNP,K5UR/7,N4BHD,
W8HBG
```

Club Competition Rules and Contest Disqualification Criteria

The 1983 contest season is upon us. Three of the ARRL-sponsored contests during 1983 include an ARRL-affiliated club competition — January VHF Sweepstakes, February/March International DX Contest and November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. The use of standard ARRL contest forms will help to ensure that your score is figured properly and speed up the publication of contest results in *QST*.

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings to be counted for a club.

For a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet, *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* is in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX Contest.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be an ARRL-affiliated club.

2) *Medium.* Any club submitting fewer than 50 entries falls in this class, except as noted in local club criteria, below. The same mileage and attendance requirements apply as the unlimited class club. The club must be an ARRL-affiliated club.

3) *Local.* Any club submitting 10 entries or less is in this classification. All members must reside within 20 miles of the club's center. There is not attendance requirement. Again, the club must be an ARRL affiliate.

Single and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (i.e., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete.)

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later so that the 50-percent attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator cw score and the highest single-operator phone score in any club entry will be awarded with a club certificate when at least three single-operator cw and/or three single-operated phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by two percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1982 phone SS prohibits submission of an entry for the 1983 phone SS, but 1983 cw SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by Hq., three additional contacts will be deleted as a penalty. The penalty will not be considered part of the two-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final.

Strays

I would like to get in touch with . . .

☐ anyone with practical suggestions and applications for the use of Amateur Radio aboard sailing vessels. James W. Petersen, WB9ZKI, 1820 Elmwood Dr., Highland Park, IL 60035.

☐ any brass pounders who are still active in railroad telegraphy. Don Hallenbeck, Pittsfield Historical Society, 18 Westbranch Terr., Pittsfield, ME 04967.

Bill Kremer, VE7CSD, of Burnaby, British Columbia. Bill is Canada's answer to W1AW — on RTTY at least. Using the call VE7QST, Bill transmits the CRRL bulletins every Sunday on 14.075 MHz at 2200 UTC. *(VE3GRO photo)*

***QST* congratulates . . .**

☐ Dr. Allen F. Mattis, N5AFV, of Tulsa, Oklahoma, on being elected a Fellow of the Geological Society of America.

☐ Dr. Paul F. Hultquist, KCØSX, of Lakewood, Colorado, on being elected Chairman of the Management Committee of the Division for Parish Services of the Lutheran Church in America for 1982-84.

ARRL QSO Party Rules

With the ARRL Field Organization expanding into areas beyond communications matters, the time has come to modify the traditional CD Party structure. It is no longer apropos to continue to call the QSO parties for *all* League volunteers "CD Parties." To reflect the assimilation of the Field Organization into the mainstream of League membership, the "CD Party" has become the "ARRL QSO Party." ARRL QSO Parties are open to *all* ARRL members to promote interaction between appointees and the general membership.

The ARRL QSO Party is similar to the annual Open CD Party, formerly held in April. Entry forms are available from ARRL Hq. for an s.a.s.e. Everyone sending in a log will receive a copy of the results. Please note that the deadline for *receipt* of logs at Hq. is February 7, so mail early.

If you're interested in getting involved in the ARRL Field Organization in one of the many areas served by volunteers, contact your Section Manager or Section Communications Manager (listed on page 8 of *QST*), or write to Hq. for more information. We would love to have you take a more active role in Amateur Radio and the ARRL Field Organization.

ARRL QSO Party Facts and Figures

Phone	*Cw*
Starts: 1800Z Jan. 22	Starts: 1800Z Jan. 8
Ends: 0600Z Jan. 23	Ends: 0600Z Jan. 9

Eligibles: Member, Life Member, Charter Life Member, President, Vice President, Past President, Past Vice President, Honorary Vice President, Director, Past Director, Director Emeritus, Vice Director, Assistant Director, Counsel, Canadian Counsel, Treasurer, Secretary, Advisory Committees, Technical Advisor, Intruder Watch, QSL Manager, NTS Official, Section Manager, Section Communications Manager, Asst. SCM, SEC, STM, ACC, BM, OO/RFI Coordinator, PIO, SGL, PGL, TC, DEC, EC, NM, OBS, OES, OO, ORS, PIA, Hq. Staff.

Rules: Exchange "status" (MBR, ORS, SM, etc.) and ARRL section. You may work stations once per band. Operate a maximum of 10 hours; off-times must be at least 30 minutes each and must be marked clearly in the log. Log times must be in UTC, not local time. Number new sections as worked. Phone and cw contests are separate. Include dupe sheets with entries of 200 QSOs or more total. Entries must be mailed in time to reach ARRL Hq. by February 7, 1983.

Scoring: Final score equals number of QSOs times number of different ARRL sections plus VE8/VY1 worked (max. 74).

Suggested Frequencies: Phone — 1.865 3.870-3.910 7.200-7.245 14.265-14.295 21.340-21.360 28.600-28.630; cw — up from 1.835 3.535 3.715 7.035 7.115 14.035 21.035 21.115 28.035 28.115. Try 10 on the hour from 1800-2100 UTC and 160 at 0430 and 0530 UTC. Check the Novice bands frequently. Don't forget 6 and 2 meters.

1983 Novice Roundup Announcement

Attention, Novices and Technicians! It's time to get ready to enter *your* contest, the Novice Roundup. There's no other contest like it. Only Novices and Technicians are eligible to compete for awards. A handsome achievement certificate is awarded to every Novice or Technician (single-operator station) who submits a valid entry of 200 or more QSOs in the 1983 Novice Roundup.

An important part of playing the contest game is complying with the rules and doing the associated paperwork. The Novice Roundup is a very good place to start and learn the fundamentals of contesting. Many top contesters have gotten their start in the Novice Roundup.

To ensure your success in the NR, you should: (1) Read and understand the rules for the contest. If any part of the rules is unclear, by all means contact us here at ARRL Hq. for a clarification. (2) Follow the rules to the letter during the contest. Be sure to copy all the contest QSO exchange information for every QSO. (3) Very carefully check your contest entry before sending it in. Make sure that all the pertinent information is included in your contest entry. (4) Last but not least, be sure to mail your entry by the deadline set forth in the rules (March 8, 1983, in this case). All your contest efforts will have been for naught if the logs do not arrive in time to make the listings.

How to Participate

The 1983 Novice Roundup starts at 0001 UTC on January 29 and ends at 2359 UTC on February 6. That means the NR starts on Friday evening, January 28, local time. You may operate 30 hours out of the nine days. Rule 2 further details the timekeeping. Entry forms are available from ARRL Headquarters: log sheets, summary sheets (one needed) and CD-77 forms ("dupe sheets" — one needed) to keep track of whom you have worked in matrix form. The log sheets have room for 100 contacts each. Send your self-addressed, stamped envelope to Headquarters now, and you'll have your forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

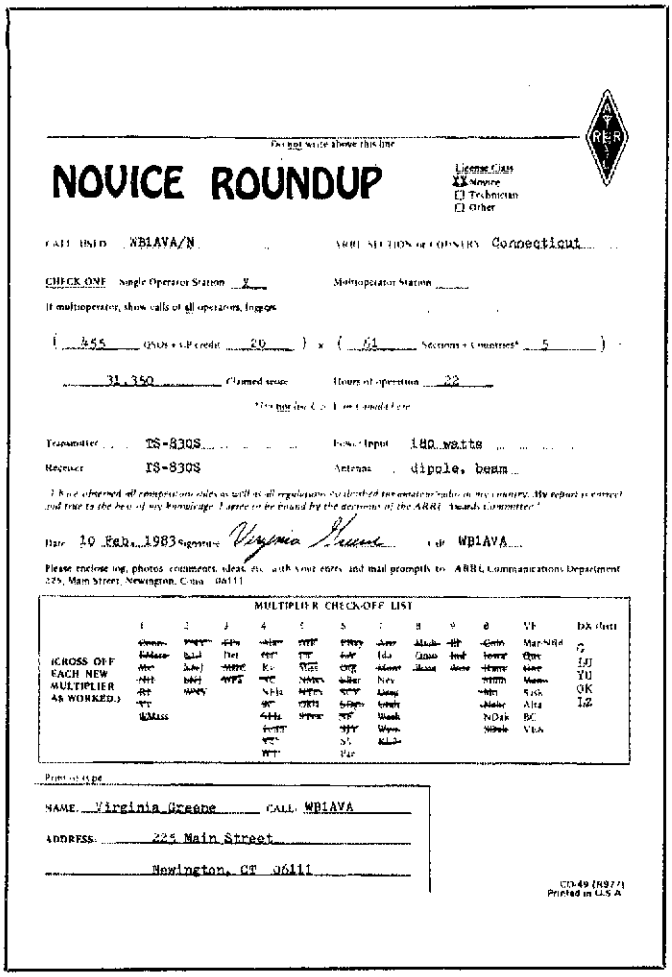
The idea in the contest is to work as many stations as possible, in as many different ARRL sections and foreign countries as possible. ARRL sections are listed on page 8 of every *QST*. If you are in one of the few states with more than one ARRL section and do not know which station you are in, write and ask for a free copy of *Operating an Amateur Radio Station*. You may work each station *only once*. Keep your contacts as short as possible; send your exchange (RST report and ARRL section) only once, and repeat it only if requested. Keep your CQs short, too! Here's a sample:

CQ NR CQ NR DE KA2YYY/N KA2YYY/N K
KA2YYY/N DE WA1XXX/T AR
WA1XXX/T DE KA2YYY/N 579 ENY K
KA2YYY DE WA1XXX R 569 NH K
WA1XXX R 73 DE KA2YYY/N K

Note that once you have established each other's license class you can drop the /N and /T for the duration of the QSO; brevity is the name of the game!

Scoring and Rules

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers



Do not write above this line

NOVICE ROUNDUP

License Class
☒ Novice
☐ Technician
☐ Other

CALL USED: WB1AVA/N ARRL SECTION or COUNTRY: Connecticut

CHECK ONE: Single Operator Station X Multioperator Station

If multioperator, show calls of all operators, logger

(455 QSOs × CP credit 20) × (61 Sections + Countries* 5)

31,350 Claimed score Hours of operation 22

*Do not include U.S. or Canada here

Transmitter: TS-830S Power input: 140 watts

Receiver: TS-830S Antenna: dipole, beam

I have observed all competition rules as well as all regulations governing amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee.

Date: 10 Feb., 1983 Signature: Virginia Greene Call: WB1AVA

Please enclose log, photos, comments, ideas, etc., with your score, and mail promptly to: ARRL Communications Department, 225 Main Street, Newington, Conn. 06111

MULTIPLIER CHECK-OFF LIST

	1	2	3	4	5	6	7	8	9	0	VE	DX (list)
(CROSS OFF EACH NEW MULTIPLIER AS WORKED.)											Man/Sbld	G
												UJ
												YU
												OK
												IZ
											NDak	BC
											Nfnld	VE8

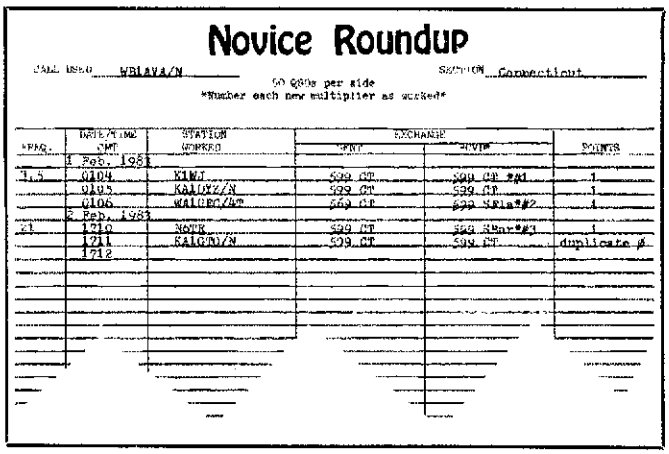
Print or type

NAME: Virginia Greene CALL: WB1AVA

ADDRESS: 225 Main Street

Newington, CT 06111

CD-49 (R97) Printed in U.S.A.



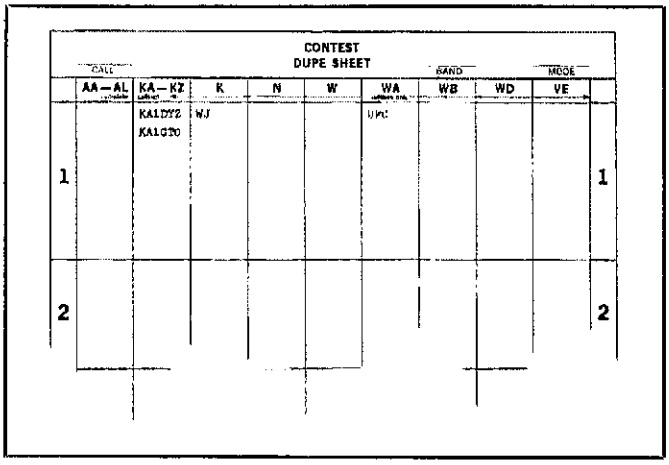
Novice Roundup

CALL USED: WB1AVA/N SECTION: Connecticut

50 QSOs per side

Number each new multiplier as worked

PERIOD	DATE/TIME GMT	STATION WORKED	EXCHANGE SENT	EXCHANGE RCVD	POINTS
	1 Feb, 1983				
1.5	0104	K1WJ	599 CT	599 CT #W1	1
	0105	KA1DYZ/N	599 CT	599 CT	1
	0106	WA1QBC/WP	599 CT	599 SRIa*#2	1
	2 Feb, 1983				
21	1710	NO7K	599 CT	599 SNev*#3	1
	1711	KA1GTO/N	599 CT	599 CT	duplicate Ø
	1712				



CONTEST DUPE SHEET

CALL: BAND: MODE:

	AA—AL	KA—KZ	K	N	W	WA	WB	WD	VE	
		KA1DYZ	WJ			UPC				
		KA1GTO								
1										1
2										2

(sections + countries) worked. And remember: KH6, KL7, KP4/KV4 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31 + 3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see "Contest Corral" on page 92 of this issue. You may work DX stations for contest credit; a multiplier of one is earned for each different foreign country worked.

Read the rules carefully. Keep a check sheet (also called "dupe sheet" or form CD-77) of stations worked so that you won't have duplicate QSOs. Log sheets, CD-77 and a summary sheet are available now from your ARRL Headquarters. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed, stamped envelope containing your full name, call and mailing address complete with ZIP code.

BCNU in the NR!

Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to exchange QSO information with as many stations as possible on the 3.5-, 7-, 21- and 28-MHz Novice/Tech bands. Others work Novices and Technicians only.

2) **Contest Period:** First week of February, including both weekends. Begins 0000 UTC Saturday, January 29, 1983, and ends 2359 UTC Sunday, February 6, 1983. Operate no more than 30 hours. Off periods must be at least 15 minutes long; listening time counts as operating time. Times on and off must be indicated in your log.

3) **Categories:**

(A) Single Operator: one person performs all transmitting, receiving and logging functions.

(B) Multioperator: Single transmitters only. Those obtaining any form of assistance such as relief operators or logging.

4) **Exchange:** Signal report and ARRL section or country for DX stations. Novices should send /N and Technicians /T after their call sign so others will know their license class.

5) **Scoring:**

(A) QSO points: Count one point for each complete two-way QSO. Work each station once, regardless of the frequency band.

(B) Multiplier: Each ARRL section (listed on page 8), plus VE8/VY1, plus each foreign country.

(C) Code proficiency: Additional points can be earned if you have qualified for an ARRL Code Proficiency certificate. FCC code credit *cannot* be used in lieu of the above. If an entrant does not already have an ARRL CP Award, apply for credit by attaching a copy of the qualifying run from W1AW or W6OWP for February to your Novice Roundup entry. CP credit equals the wpm speed indicated on the latest certificate or sticker held by the entrant.

(D) Final score: Add your Code Proficiency credit to your total number of QSO points. Multiply that by your ARRL section/country total for your final score.

6) **Miscellaneous:** Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL Hq., for an s.a.s.e. Official forms are recommended. Any entrant making more than 200 QSOs must submit duplicate checking sheets (alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs. Logs should include dates, QSO times, on and off times, complete exchange sent and received, and band. Postmark your entry within 30 days after the contest (March 8, 1983).

8) **Awards:** Certificates to the top Novice and Technician in each ARRL section and each single-operator Novice or Technician who submits a valid entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards.

9) **Conditions of entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See this issue, page 85.

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,*
W9KDR

ESA SAYS APRIL

The European Space Agency (ESA) has announced that AMSAT Phase IIIB will fly on the Ariane L6 mission rather than the previously planned L7: L6 will lift off late in April. *Amateur Satellite Report (ASR)* had speculated in its #43/44 edition that such a swap was likely. The extra delay was a surprise to many, however, as flight L6 was due for launch late in November. Though the L5 failure on September 10 suggested a launch delay of only two months, ESA decided to be cautious and allowed additional time for inspecting the L6 turbopumps. The extra inspections will cost another launch interval and push L6 to April.

The Board of Inquiry looking into the loss of L5 concluded in its report that the cause of the failure was most likely "damage to the turbopump gearing due to a combination of the following factors: Insufficient lubrication. . . during ground tests [and] an unduly narrow operating safety margin for the gearing due to an unfavorable combination of . . . tolerances." AMSAT was aware as early as September 11 that the L5 loss was likely caused by the turbopump and learned shortly thereafter of the possibility that ground tests performed prior to integration of the L5 launcher may have damaged the pump gears. The so-called "tolerance build-up" is not an uncommon problem: If all components are at the limits of their tolerances, the end item will malfunction even though a different combination of the same components with slightly different measurements would function perfectly. Both citations of the Board of Inquiry point to system deficiencies. The pump appears to have been damaged in testing; inadequate specification is the culprit for the tolerance build-up situation (from *ASR* 45/46, Nov. 8, 1982).

Phase IIIB Mode B Specs

The major Mode B performance values were released recently at the AMSAT Phase III seminar held at the Applied Physics Laboratory of Johns Hopkins University in Maryland. According to Engineering Vice President Jan King, W3GEY, the following values were obtained during tests in Marburg and Munich, West Germany.

Parameter	*Value at 0° C*	*Value at 35° C*
Xmtr power output	51 PEP, 14.3 avg.	45 PEP, 12.8 avg.
Translation freq. in output for 435.100 MHz in	145.906 MHz	145.900 MHz
Engineering beacon	145.988 MHz	145.986 MHz
General beacon	145.8105 MHz	145.8091 MHz
Rec. noise figure	3.0 dB	3.0 dB
AGC cut-on at rcvr terminal, less ant. gain	– 108 dBm	– 101 dBm

Beacon output power at 25° C

Engineering	3 W, 1.5 if transponder on.
General	1.8 W

Bandwidth of transponder

– 1 dB	150 kHz
– 3 dB	152 kHz
– 30 dB	154 kHz
Filter shape factor	1.16

(from *ASR* 45/46, Nov. 8, 1982)

Cousins Across the Water

Recently, we received a letter sent to the RSGB from a British satellite enthusiast. His comments dealt with the misuse of amateur satellite frequencies.

Dear Sirs:

I note with interest your remarks in the current issue of *Radio Communication* (#10) about satellite frequencies and the use of 145.800-146.000 MHz.

As a satellite enthusiast I welcome your remarks. May I bring to your attention the other problem that exists, the downlink frequencies 29.300-29.500 MHz? The offending stations are mainly American [terrestrial] stations who are totally unaware of the problems they are causing. There are, however, a few English stations as well.

Would it be possible for the RSGB to mention a few timely words to the ARRL who might be able to educate our cousins across the water?

Yours a Frustrated Satellite Enthusiast,
Norman Dilley

Self-policing the Amateur Radio bands has been and will always be a necessary education of proper operation. Most amateurs unfamiliar with satellite communication are not aware of the problems they cause by operating on the frequencies assigned for satellite use. The 10-meter downlink frequencies assigned to the Amateur Satellite Service are 29.300-29.500 MHz. This is a "gentlemen's agreement" and can only be policed in a polite manner. Most offenders are simply not aware that they are interfering with operators who cannot move beyond the limits of the satellite passbands. All that is usually necessary is a friendly explanation. When you hear nonsatellite signals on the downlink, contact the station and in a courteous manner explain the satellite frequencies.

Propagation on the 10-meter band can extend satellite signals and direct signals all the way around the globe. Some offenders do not understand that direct transmissions can cause interference to satellite users operating in another part of the world. Since all satellite signals are weak, it is extremely difficult to compete with strong direct transmissions. It is the satellite user's responsibility to safeguard the satellite downlink frequencies and educate those who do not know. This will result in better satellite operation and could interest other amateurs to listen between 29.300 and 29.500 MHz. After all, that's how we got started as satellite operators . . . by listening.

QST Satellite Bibliography Available

We have just updated the *QST Bibliography of Amateur Satellite Articles*. This current 20-page bibliography lists the year, month, title, author, page number and number of pages of each *QST* satellite article published since 1961. In addition to the articles, we have complete a similar list of satellite Strays that have appeared in *QST* since 1978. To receive both lists, send a self-addressed, business-size envelope with three units of postage to ARRL Hq., *QST* Satellite Bibliography. Mark your return envelope with your address.

FCC Waives Retransmission Rules For Shuttle

On November 9, the FCC granted a request from the JPL Amateur Radio Club for a 90-day temporary waiver of Section 97.113 to permit club stations W6VIO and W5RRR to manually retransmit on Amateur Radio frequencies the voice communication from the space shuttle *Columbia*. Other amateurs may retransmit the information from W6VIO and W5RRR, but they may not directly pick up *Columbia* communications and retransmit them.

The retransmitted communication shall be for the sole benefit of licensed Amateur Radio operators. Retransmitted communication must comply with section 97.91, which states that one-way transmissions must consist "solely of subject matter having direct interest to the Amateur Radio Service as such."

ARRL urges the Amateur community not to encourage nonamateurs to listen in. The value of any favorable press attention is more than offset by the possibility of jeopardizing further waivers of this nature. In short, FCC will take a dim view of any amateur's broadcasting to the public. JPLARC announced before the launch its intention to retransmit only on its club repeater W6VIO/R (224.04 MHz). Stations beyond the coverage of this repeater should check the Special Events section of *QST* for future flights of the shuttle. (from *The ARRL Letter*, 2, Nov. 11, 1982)

Nineteenth Amateur Radio Satellite Launched

The launch of ISKRA 3 by Cosmonauts Berezovoy and Lebedev from the SALYUT 7 space station on November 18, 1982, brings the number of Amateur Radio satellites to 19! Not all, of course, remain in service, but this is a remarkable record for amateurs over the 25-year history of man-made satellites.

ISKRA 3 was heard in Newington at the ARRL Hq. operators' club station, W1INF, a few hours after launch, sending telemetry on 29.584 MHz. The telemetry pattern is similar to ISKRA 2. *ASR* 34, May 31, 1982, outlined the telemetry parameters of the ISKRA 2 and may indicate whether a transponder is operating. The R-channel reading could indicate transponder activity. The ISKRA 3 transponder has an uplink of 21.230 to 21.270 MHz and a downlink of 29.580 to 29.620 MHz. Listening near the beacon frequency (up 60 kHz), you may hear amateur signals being relayed from another band.

Orbital parameters for ISKRA 3 were released by the Soviet TASS news agency just a few hours after launch. Rich Zwirko, K1HTV/3, AMSAT Vice President of Operations, phoned the news to ARRL Hq. after receiving the TASS release from NASA. Rich said the orbital period was 91.5 minutes, longitude increment 23°, altitude 350 km and inclination 51.6°. The TASS release said ISKRA 3 was built by students at the Moscow Aviation Institute and was to be used for experiments as well as Amateur Radio communication.

Monitor W1AW bulletins and AMSAT nets for further information. ISKRA 3 will likely be operational for only a short time before re-entry. Reports of telemetry and QSOs may be sent to P.O. Box 88, Moscow, Reference orbit for 8 Dec. '82: 0009 UTC at 50° W. long.

Satellite Listening Post

The times and dates (Central North American Time Zone, not UTC) shown below are approximate. During these weekend periods, you can listen to amateur communication on the 10-meter downlinks between 29.300 and 29.500 MHz.

Jan. 1 - 2 — 10:10-11:30 P.M. and 8:30-10:05 A.M.
Jan. 8 - 9 — 9:50-11:10 P.M. and 7:30- 9:05 A.M.
Jan. 15-16 — 9:30-10:50 P.M. and 6:30- 8:05 A.M.
Jan. 22-23 — 9:10-10:30 P.M. and 5:50- 7:05 A.M.
Jan. 29-30 — 8:50-10:10 P.M. and 4:30- 6:05 A.M.

Listen roughly 2 hours before the times listed for an East Coast overhead pass and 2 hours later for a West Coast overhead pass.

Monthly Listings

☐ ASR is available for $18 ($25 overseas) for 26 issues (1 year) from Amateur Satellite Report, 221 Long Swamp Rd., Wolcott, CT 06716.

☐ Project OSCAR 1983 Annual Orbital Predictions for every orbit of AMSAT-OSCAR 8 and RADIOs 5, 6, 7 and 8 are available for $10 postpaid in Canada, Mexico and the U.S.; $12 elsewhere. Send to Project OSCAR, Inc., P.O. Box 1136, Los Altos, CA 94022.

☐ ARRL members only: Send an s.a.s.e. with your call sign to ARRL Hq. Club and Training Department for a complete, monthly orbit schedule for all operating amateur satellites.

☐ Further information on the Amateur Radio Satellite Program can be obtained free of charge from ARRL Hq. The OSCARlocator package (satellite plotters and details) is now available for $7 U.S., $8 elsewhere.

*OSCAR Program Manager, ARRL

Strays

I would like to get in touch with . . .

☐ any amateurs who would be willing to describe their successful 20- and 40-meter mobile setup for me. Lloyd Kerr, KCØYN, 2245 W. Columbia, Davenport, IA 52804.

☐ any hams born in 1918 who are interested in joining a net on 15 meters. Tony Coppola, WA8FTW, 21831 Mastick Rd., Fairview Park, OH 44126.

☐ any hams who served in the Allied armed forces in Yugoslavia during WW II. William O. Sturmey, WB6BPA, 624 Hemlock Ave., Millbrae, CA 94030.

☐ any Collins owners with pre-380 series gear. Bob Ralph, G4KSG, 4 Leam Crescent, Solihull, West Midlands B92 8PD, Great Britain.

☐ any Extra Class couples I haven't heard from before. Betty Baldo, KB6P, 3 Eton Ct., Berkeley, CA 94705.

QST congratulates . . .

☐ Arthur Westneat, W1AM, of Newmarket, New Hampshire, on receiving the IEEE Distinguished Service Award for his work on electronic underwater systems.

Public Service

Conducted By Robert J. Halprin,* K1XA

Trilogy

FORT WAYNE FLOODS: AMATEURS AID VICTIMS

What ended as a $51-million disaster in Fort Wayne, Indiana, last March started innocently enough one Friday in January. It snowed that day and the next. It snowed every weekend in January. During February, it snowed almost daily. When the snow season ended, Fort Wayne had been set up by Mother Nature with a record 81 inches of snow.

When the thaw came in March, it came quickly. By Friday, March 12, the probability of a major flood was 50-50, depending on whether it rained.

Well, it rained! On the 13th, the Allen County Sheriff activated the emergency operations center (EOC), a communications center normally manned by amateurs during emergencies. Its purpose is to supplement official communications channels.

The life-threatening emergency began when one of the city dikes broke and flood waters inundated homes and businesses. As shelters were being set up for evacuees, requests for communications support began pouring in from the local Red Cross, the Salvation Army, and several local churches, all of which were helping shelter the 9000 people who were evacuated from the flooded areas.

Local amateurs provided equipment and operators for all of these groups. The Red Cross tried at first to rely on its public-service-band radios or skilled operators. Hams were asked to serve, and the discipline imposed by amateurs turned a deteriorating system into a smoothly run network.

Not all of the hams who helped were "old-timers." KA9FFZ received her Technician license only two weeks before the flood. Yet after a short briefing by Red Cross personnel, she and KA9GWE spent roughly 80 hours each at the Red Cross radio along with many other volunteer radio amateurs. She commented that it was a good on-the-job-training and a great way to get over mike fright!

Overall, amateurs supported the local Red Cross chapter with 24-hour operation in the chapter house, various shelters, in mobiles and at a local seminary, where food was being prepared for the evacuees and volunteers.

Communications support was also provided to the Salvation Army (which was distributing food and clothing to victims) and to several churches that were providing shelter. The Southern Baptist Convention sent to Fort Wayne a food truck that could feed 3000 people; since the truck did not have local Red Cross frequencies in its radio, amateurs provided coordination between Red Cross and the truck.

All of these groups found that the normal modes of communication (mainly telephone) did not provide the versatility needed to keep a coordinated relief effort flowing smoothly. Versatility is exactly what the hams in Fort Wayne offered and provided. They took their handhelds and stations where needed and followed key people at all times to ensure instant communications access.

Hams were not put to use walking dikes to any great extent; city communications were not disrupted by the waters, and local officials used their own channels for that work. One dike incident, however, did involve a couple of amateurs. Around 11 P.M. on Wednesday (the 17th), word was spreading that a major dike had been breached by the water. The water level at that point was 10 feet above the houses around the dike. If the dike broke, the flooded area would almost double.

K9JDF was one of the first on the scene with radio gear. He was able to relay the first accurate word to the Allen County civil defense director that the dike had not broken. It was leaking and in dire need of support, but was holding. K9JDF and N9BUK walked the dike until help arrived.

Response was immediate. The Army Corps of Engineers had come to Fort Wayne with empty sandbags, and volunteers had been filling them or storing them at the Memorial Coliseum staging area for several days. When word about the dike reached the Coliseum, thousands of volunteers (mostly young people) were trucked to the dike with sandbags. They used 300,000 to reinforce the dike. It held, and what could have been a disastrous escalation of the problem was contained.

The waters subsided after cresting 11 feet above flood level. By Saturday, March 20, the EOC was officially deactivated. The need for amateur support did not end, however, until each flooded home was inspected and utilities were restored. Red Cross closed its shelters and relieved the amateurs on Friday, April 2.

Eighty-five amateurs took part in the communications effort; several out-of-town amateurs assisted. For example, KA5CFN and KA5CFO, from Arlington, Texas, helped fill sandbags and provide communications at one of the sheriff's staging areas. W8TDK used his mobile home generator for lights at another site. N9BHM, KA9BZL and WA9AQQ came from Muncie, Indiana, and the Indianapolis Red Cross Radio Club offered the use of their communications van.

The majority of local amateurs who took part were members of the Fort Wayne Radio Club and the Allen County Amateur Radio Technical Society. Although hf communication was available through various club members, very little hf traffic was handled, since telephone lines into the city were not disrupted. At times, four local repeaters and simplex frequencies were in simultaneous use, while other amateurs were assisting on the Red Cross radios.

When it was all over, 3000 homes were flooded and 9000 people had been evacuated; 32,000 tons of sand and dirt had been used to fill 1,300,000 sandbags! Fort Wayne's amateurs helped minimize the damage and personal distress in this crisis by contributing their skills, discipline and efficiency as communicators. As one relief official put it, "I guess you showed that there is more to communicating than knowing where the mike button is!" Amateurs again justified the privileges they are allowed and proved their value to yet another community. — *Ron Koczor, K9TUS and Bernie Holm, K9JDF*

SILVERADO FIRE, NAPA COUNTY, CALIFORNIA

High, gusty winds coupled with rapidly falling humidity set the stage for a potentially disastrous wildland fire in northern Napa County. California Department of Forestry personnel had been anticipating such conditions for more than a month. Long-range weather forecasts had predicted low fire danger throughout much of the summer, but warned of rising hazards toward August.

Saturday, September 11, 4:41 A.M. Winds gusting to 60 mph on the south slopes of Mount St. Helena at the northern end of the Napa Valley topple a tree through power lines feeding a secluded summer home. Since the home is unoccupied, the resultant fire goes unreported for precious minutes. By the time it is discovered, the fire totally destroys the home and races south down the mountain toward the town of Calistoga.

7:10 A.M. The telephone rings in the shack of N6XN, ARES Emergency Coordinator for Napa County. The Forestry emergency communications chief (ECC) is calling to activate the Volunteers in Prevention (VIP). The VIPs are asked to report to the Command Center in St. Helena by 1 P.M. The time until then is used by Forestry personnel to make plans, install equipment in the Center, and set up the fire camp. Amateurs notify back-up stations, check equipment and gas up vehicles.

12:40 P.M. W6SJA and KA6DFP report to the Command Center and set up portable antenna and 2-meter radio equipment.

12:45 P.M. W6TIG and WB6PMS arrive at the fire camp being set up in a state park campground south of Calistoga. They deploy portable equipment and establish the first link to Headquarters in St. Helena.

1:15 P.M. W6SJA activates the emergency net on WA6ZQH repeater (147.78/18), which, ironically, is located on top of the burning mountain. There is little danger to the repeater, however, since it is carefully kept clear of grass and brush. It is also equipped with standby generator power.

1:25 P.M. WB6VGC, KA6GUR and her OM, WA6TTP, arrive at the Napa Chapter House and put the Red Cross amateur station on the air. Simultaneously, N6GLL and WB6SQY activate the St. Helena Chapter using portable equipment. WA6AVD reports to the relocation center in Calistoga with his mobile equipment. All stations are logged in by Net Central Station W6SJA at the Communications center.

2:02 P.M. The American Red Cross, Napa Chapter, calls Napa Co. Emergency Coordinator N6XN. They plan to activate a reloca-

*Deputy Communications Manager, ARRL

tion center in Calistoga should an evacuation of homes in the path of the fire become necessary. They also wish to activate the St. Helena Chapter House in case their support is needed.

2:10 P.M. Fire Information Officers (FIO) request two operators to accompany them to the fire area for reconnaissance. KA6DFP and WB6PMS are assigned. As they are about to depart, a second major fire is reported in the rugged hills west of Lake Berryessa, some 25 miles to the east. WB6PMS and one FIO leave for that area. Many requests for information are arriving at CDF Headquarters from newspapers and television news reporters. The amateurs riding with the FIOs prove invaluable in providing the information required by the news media. Without Amateur Radio, passing this traffic would use valuable tactical air time.

At Headquarters, many offers to help are pouring in on the emergency net. This presents a dilemma to the net control operator. While the offers from other amateurs are greatly appreciated, they tie up the repeater frequency. During an operation of this sort, frequency control is essential. When traffic from or to the fire area is ready, it must be transmitted immediately.

A short disgression: Non-hams don't understand the "simplex" nature of radio and grow impatient if they must wait until someone else finishes a transmission. This is all the more difficult if the transmission is not related to the emergency. The solution to this problem is rather simple: If you have not been asked by the NCS to transmit, don't. The NCS or the EC may not know you, but they certainly do (or should) know the ARES or RACES group that represents you. If help is required, *you* will be contacted on *your* frequency by the EC or his representative, and an official request for assistance will be made at that time. It sounds unfriendly, but it is very necessary. You have only to work one fire or other emergency to know the reality of this.

2:25 P.M. W6SJA notices that the Red Cross station in Napa is drifting off frequency. Murphy's law seems to be at work. Throughout the year, regular tests disclose no problem with the equipment, but now it needs attention. WA6ZPL, owner and technician of the Mount St. Helena repeater, offers to respond to Red Cross to make adjustments. When done, he proceeds to St. Helena to relieve W6SJA as NCS.

Sunday, September 12. The fire is less than 30-percent contained. The winds are still gusting dangerously, and the humidity is low. Contra Costa County ARES/RACES (West County), headed by N6DRT, is asked to stand by for relief duty. Sonoma County RACES is also alerted. Both organizations are veterans of wildland fires.

10:28 A.M. Emergency traffic has slowed, and the NCS elects to open the repeater frequency to handle health and welfare traffic from the fire camp. Normally, the primary frequency is not used for this purpose, but the fire camp is shielded by hills in three directions and simplex is not practical. The alternative, an hf station, is not used. Efficient use of repeater time by stations receiving traffic is accomplisehd by the use of tape recorders. The traffic is taped and transcribed immediately after clearing frequency. The fire-camp team makes up a temporary banner advising off-duty fire fighters of the traffic service. KA6DFP, N6GLL and KA6NEJ begin accepting traffic for transmission. Receiving teams, organized by NI6A, STM East Bay Section, are on the frequency and ready to receive traffic for relay to the National Traffic system (NTS). The main traffic outlets are provided by the Northern California Net on 3630 kHz, NCN VHF on the 144.81/145.41 repeater, owned by WA6EUZ, and the Sixth Region Net on 40 meters. Traffic destinations range from as close as Napa, 18 miles to the south, to cities on the East Coast. One message, to a fire fighter's family in New Jersey, is delivered in less than three hours from transmission. Many veteran fire fighters have worked in several states and have come to rely on Amateur Radio to keep their families informed of their welfare.

7:57 P.M. The Sonoma County ARES/RACES team arrives at CDF Headquarters for relief duty. N6BLN, SEC San Francisco section, assumes Net Control, assisted by KD6GC. K6QXB and WB6PMN report to fire camp to relieve the traffic team. The fire is still only 40% contained, and weather forecasts are not favorable.

Monday, September 13, 8:41 A.M. W6SJA returns to CDF Headquarters and is briefed by N6BLN on the night's activities. He relieves the Sonoma County group and resumes Net Control. NTS personnel check in to receive backlog traffic from the fire camp. KA6DFP is atop the mountain with an FIO, providing information to a television news team. Some of his transmissions are difficult to copy because of the noise of aerial tankers flying overhead in preparation of dropping fire retardant chemicals. From his vantage point, KA6DFP can see forestry aircraft below him. The fire is reported to be 70-percent contained.

5:30 P.M. NCS is advised by the ECC that containment is favorable. A change in the weather has caused the winds to slack and humidity to rise. ARES is notified to secure at 7 P.M. After the emergency net is secured, the traffic teams remain on frequency to continue passing health and welfare traffic from the fire camp. Even though activities are winding down on the fire lines, the fire camp is still crowded.

A review of the operation logs reveals that ARES operators spent a total of 370-1/2 hours. NTS operators handled nearly 50 formal messages and more than 300 "informals." During a span of 60 hours, 4000 acres of timber and brush was burned and two structures were destroyed. No serious injuries were reported, although several firefighters were stung severely by swarms of "yellow-jacket" hornets disturbed by the fire. Among the victims was KA6DFP, who was stung many times but remained on the fire scene for more than 54 hours. — *John Wehren, EC Napa County*

NEW YORK CITY MARATHON

The world's largest non-emergency communications network was activated on October 24, 1982, to help the New York City Road Runners Club stage the largest marathon in the world. A total of 178 Amateur Radio operators under the Tri-State Amateur Repeater Council banner turned out to help.

Beginning at 3:30 A.M. on race day and continuing until the last runner crossed the finish line at 7 P.M., the amateurs provided runner safety and logistics communications for senior race officials. In addition, 20 amateurs formed a net at the starting line to help register the 16,005 runners (who were transported to the starting area in 175 buses). Other hams provided medical and runner safety communications and helped worried families find runners who had dropped out or had been taken to hospitals.

At various times during the day, at least four of the 10 networks used would be on the air simultaneously. Hams were stationed at the mile points to help the mile or aid-station captains set up and prepare to give on-course times and logistics aid. As runners passed each mile point, the hams at that mile point would take the numbers of the first 10 men and women and pass the numbers along to officials at the finish line. (This prevented anyone from jumping in and finishing without actually running the entire race.) The amateurs then patrolled the mile that they were assigned to, and if they spotted a fallen runner, they would call his/her number into the medical network. Doctors stationed at medical aid stations then would bicycle to the fallen runner and provide aid. Two hams were posted at every mile and at 10 additional aid stations on the course. Hams were also posted at each half mile after the 16-mile point and at each of the five bridges that the race crosses.

As runners reached the finish line, they were spotted by a four-man network that allowed the finish line "chute" captain to keep things flowing past the runner checkout tables. Here the runners were logged out to finish the race. This was also where the 20-person medical simplex network took over. Amateurs were stationed at the chutes, at the three emergency medical tents and on patrol to catch the over 150 runners who collapsed from exhaustion at the finish line. Before the day was out, over 300 medical emergencies had been called in from the course, resulting in 75 ambulance dispatches.

Many of the 16,000 runners' families waited at the finish-line, family-reunion area for their runners to cross the finish line. When a runner didn't show, the family would go to a trouble desk and ask a race marshal. The marshal had a list of fallen runners that had been sent via 2 meters. If the runner did not show up on the fallen list, the marshal would put out the word via the logistics network. The hams on the course, along with the Road Runner Club volunteers, would try to spot the lost runner. Locating runners in this way performed another direct service to the public.

What makes this race different from other marathons is its enormity. The City of New York is shut down in many areas. New York City Road Runners Club President Fred Lebow may have summed it up best when he said, "The ham radio volunteers do not get the publicity they deserve, but without them there would be no NYC Marathon." However, during ABC Television coverage of the marathon, anchorman Jim McKay publicly recognized the efforts of the radio amateurs by commenting, "They are the central nervous system of the marathon, the hidden heroes of the race." — *Steve Mendelsohn, WA2DHF, President, Tri-State Amateur Repeater Council*

NATIONAL TRAFFIC SYSTEM

October Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	35	1258	35.9	.812	85.2	
CAN	33	1047	31.7	.663	100.0	
PAN*	61	1059	17.4	.547	98.4	
Region Nets						
1RN	63	532	8.4	.332	87.9	97.1
2RN	66	376	5.7	.312	97.3	100.0
3RN	37	247	6.7	.392	96.6	97.1

4RN	56	710	12.7	.375	73.7	97.1
RN5						100.0
RN6	64	645	10.1	.303	95.3	98.4
RN7	95	786	8.3	.525	84.6	98.4
8RN	62	489	7.9	.446	87.1	100.0
9RN						100.0
TEN	36	737	20.5	.546	87.3	100.0
ECN						20.0
TWN	62	362	5.8	.339	71.6	98.4
TCC						
TCC Eastern	101[1]	664				
TCC Central	84[1]	517				
TCC Pacific	117[1]	675				
Cycle Four						
Area Nets						
EAN	33	2122	64.3	1.584	93.9	
CAN	33	1382	41.9	1.131	98.5	
PAN	33	1362	41.2	1.210	99.5	
Region Nets						
1RN						84.8
2RN	94	578	6.1	.441	97.2	93.9
3RN	64	414	6.5	.419	97.9	97.0
4RN						100.0
RN5	65	1091	16.8	.771		100.0
RN6	66	858	13.0	.546	100.0	100.0
RN7	64	730	11.4	.881	96.6	100.0
8RN	56	454	8.1	.435	84.4	90.9
9RN	62	722	11.6	.496	96.0	95.4
TEN	66	451	6.8	.380	76.3	100.0
ECN	68	300	4.4	.364	80.4	97.0
TWN	66	528	8.0	.403	94.7	98.5
TCC						
TCC Eastern	143[1]	880				
TCC Central	61[1]	676				
TCC Pacific	133[1]	1007				
Sections[2]	7599	36,959	4.9			
Summary	9039	60,618	6.7			
Record	8258	59,630	16.4			

*PAN operated both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (252): ABN ASN MG SSN (AK), AENB AEND AENH AENI AENJ AENX AENY AENZ ATNM (AL), APSN ATN (AB), ACN ATEN HARC (AZ), BCEN (BC), NCN NCTN (CA), CN CPN NVTN RTN WCN (CT), DEPN DTN NCC2MN SEN (DE), AIN DEN FAST FMSN FMTN FPON FPTN GN LCEN MCEN NFPN PBTN PEN PRVAN QFN QFNS SBEN SEFTN SERA SPARC SVTN SWFTN TPTN (FL), I75MN I75NN ICN ITEN TLCN (IA), ILN ITN (IL), ICN IPN ITN QIN (IN), CSTN KPN KSBN KWN QKS QKS-SS (KS), 5ARES 11ARES BARES CARN CCEN KEN KNTN KRN KSN KTN KYN KYPON LCARES MKPN PAEWTN PAWN SEKEN TSTMN WTEN (KY), LAN (LA), CI2MN EMRI EMRIPN EMRISS EM2MN HHTN NEEPN (MA/RI), MEPN MMN MTN WRIN (MB), MDD (MD/DC), AEN CMEN MPSN OCRACES PTN SGN SPSN (ME), MAC6 MITN MNN QMN UPN (MI), MNWX MSN MSPN MSSN (MN), MTN (MS), APN (MR/NF), CFARS CNCTN JFKN M2MEN PCTN RARS THEN (NC), CMN CN CSN (NC/SC), MNARES NCHN NFN NSN PARC2MN PVTN WNN SBARES (NE), GSFM GSPN MCEN NHN (NH), JSARS MCN/SJVN NJN NJPN NJSN NJVN OBTTN SOCTN TCETN (NJ), NSN (NV), CDN CNYTN EPN HVN NLI NLIPN NLS NYPON NYS NYS/M OCTEN SCVHFTN SDN STAR WDN (NY), ALERT BN HCARES LCNWOARES MCTN NCTW NEON O8MN OSSBN OSSN TATN (OH), OFON OLZ STN (OK), KTN LN OLN OPN OSN OSND OSN2 (ON), BSN JARES ORARES OSN OSND OSN2 (ON) BSN JARES ORARES OSN PTTN WCN (OR), D3ARES D5ESN D6ARES EPA EPAEPTN LCARES PTN PTTN PWARES WARCVTN (PA), WQVUARES (PQ), BR2MN GPD2MN LC2MN SCNTN YC2MN (SC), SDEMGN SDEPN SDMN SDN (SD), TNCW TNPN TNVN TSRN (TN), TEX TSN TTN (TX), BUN DCEN UCN (UT), STARES SVEN VEN VLN VN VNTN VSBN VSN (VA), VTN (VT), EWTN NTN NWSSBN PSTS SCARES WARTS WSN (WA), WVARES WVFN WVMDN WVNN (WV), BEN BWN NWTN WCNTN WTN WNN WSBN WSSN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	131	77.1	1301	664
TCC Central	93	90.3	1034	517
TCC Pacific	124	94.4	1349	674
Summary	348	87.3	3684	1855
Cycle Four				
TCC Eastern	160	89.3	1701	880
TCC Central	70	87.1	1314	676
TCC Pacific	139	95.7	2022	1007
Summary	369	90.7	5037	2563

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (October) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, WB1HIH, AH2M, K2KIR, KB2HM, KF2T, KO2H, N2s CER YL, W2s CS XD ZOJ, WB2s IQJ MCO, K3JSZ, WB3GZU, WA4s CCK LJI, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE1WF, VE3s GOL HTL. Central Area (W9JUJ, Director) — KA4s MZY SAA, WF4X, W5s CTZ KLV, N5s AMK BT CRU DFO, WB5YDD, K5s BNH KJN, KB5TC, KD5KQ, W9s JUJ NXG, WB9WGD, WØFRC. Pacific Area (WØHXB, Director) — KV5U, W5JOV, K6s HAP OWA UYK, KM6I, KU6D, N6s AED GIW, NI6A, K7OVK, KA7FKT, KF7R, KM7Z, N7CSP, W7s DZX GHT VSE, WA7s GYQ KHE WQE, WB7s NHK TQF WOW, W9OBV, KØDJ, KBØMB, KCØD, NØs ACW CXI, WØs EJD GMO HXB UA, WAØOYI, WBØOYI, WBØNHA. *Cycle Four* — Eastern Area (W2CS, Director) — W1s EFW ISO QYY TM, WA1TBY, N1NH, WB1CPF, W2s CS FR GKZ SX, WA2SPL, N2YL, AH2M, KF2T, W3s BBN FAF PQ, WB3GZU, W4UQ, K4ZN, N4KB, WA4CCK, WB4s PNY UHC, AB4V, W8PMJ, K8JQ, WB8MTD, AF8V, N8XX, WB9IHH, VE1WF, VE3GOL. Central Area (W5GHP, Director) — W4s WXH ZJY, K5s GM TL, N5TC, W5s LQ RB TFB, KB5W, W9CXY, WB9UYU, KØEZ, WØs AM HI. Pacific Area (KØDJ, Director) — W6s EOT VZT, KT6A, K7s HLR KSA, KN7B, W7s AK DZX EP GHT LCF LYA VSE, WA7GYQ, WB7NHR, KØs BN DJ, KCØD, WØs HXB OGH, WDØAIT, VE7ZK.

Independent Nets (October 1982)

1	2	3	4
Amateur Radio Telegraph Society	31	1453	344
Central Gulf Coast Hurricane	31	229	2419
Clearing House	31	105	351
Early Bird		828	395
Empire Slow Speed	32	55	385
Golden Bear	31	124	1641
IMRA	26	674	1246
Mission Trail	31	153	1334
North American SSB Traffic	26	76	233
Southwest Traffic	31	103	1350
West Coast Slow Speed	31	127	432
20-Meter ISSB	26	780	524
75-Meter ISSB	31	412	1092
7290 Traffic	50	616	3493

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll October 1982

1461
N4EDQ
398
KCØOO
222
K7VW
202
WØOYH
190
W4GPL
186
K5CXP
178
KA3CDQ
173
WD4COL
171
K2ZM
159
KA1GBS
149
W2AHV
141
W2MTA
138
NG4J
137
WB3GZU
133
K4SCL
131
KB3XO
WB2MCO
130
AF8V
VE3GOL
129
N8DTZ
128
KB4OZ
126
WA4QXT
WD8LRT
125
WF4X
124
WB9IHH
KT6D
123
WA1TBY
WA4EIC
122
WB2EAG
121
WD4ALY
KS7I
120
WB1GXZ
WA4JDH
119
WB4WYG
WA4PFK
KA1T
117
KM9B
WB7TQF
116
KC9CJ
114
K4ZK
113
KB5W
W9YCV
VE3WM
112
N1NH
K1JHC
WB8MTD
AK1W
W6VOM
112
WA3EHD
111
W5DTR
W9JUJ
WB6QBZ
110
KB2HM
N7DNG
KAØJQG
109
AG2R
N8DSW
KC3DW
108
WD4CNQ
KT7X
KA7ELI
K4JST
KUØG
WB8WKQ
107
W1IDK
KAØCUF
WB1HIH
106
WB2ZCM
W9DM
K8KQJ
K7GXZ
105
KA5CXW
WB7WOW
VE3HGJ
104
W2XD
KBØMB
KT6A
103
N3CKQ
KV5X
K4KDJ
KA8GHF
KA4SAA
NI6A
W3NTN
VE3GT
102
KA1ON
KB5UL
KA5KRI
WA3WIY
WB8SYA
W2AET
101
WA7LGN
W4CKS
W1EOF
KC5NN
KI1M
KA4GFU
WD9ESZ
100
K3ZJJ
N2XJ
KA5LLT
W2YJR
99
WD8MIO
WAØTFC
WØLAE
WØKJZ
KA3GJT
98
K2VX
WØHXB
NØBDG
WA4CCK
WB5YDD
W5CTZ
K1OSM
KA8CPS
W2ZOJ
97
WD4AWN
KB5EK
W7LNE
N5AMK
W1TN
N9DIH
KA1AVU
96
KA2KVZ
K3CR
KE4DA
N8AUH
N8EES
KE1U
KB4WT
WB5CIC
N5TC
KA5HDT
WA5FJJ
96
AG9G
K6YD
95
W5JOV
KA9IKR
94
K2ZVI
93
WB4AID
N6AWH
W7VSE
WB4WII
KA9HPQ
KB3LF
92
WA8HGH
N1ARI
NT4U
W4ANK
WB3KUZ
W2BIW
91
K3JL
W7EP
KA4MTX
WA4YPQ
90
WA4CXP
WD8RHU
W6CPB
VE3DPO
89
KA4ASZ
N8BQK
VE3FGU
88
KA1EHR
KD5P
N8GIW
87
K2GCE
K9MX
WA5RVT
N1BJW
86
WA7MEL
AA4AT
N5BT
N9BYK
WD9FRI
85
KAØARP
KA3EJG
KE1L
W3VA
84
W5WZ
W9NXG
WD5GKH
WB3FKP
83
N2BOP
WDØAIT
WB4TZR
KA6BNW
82
WA2ARC
KA1BBU
K5OAF
N5FDL
W1KK
WB5LBR
81
WD8KBW
KA4AUR
WB8YDZ
W1RWG
VE3BDM
VE3HTL
80
AC3N
KY4U
K6UYK
WA4EYU
W2GJ
79
KA8GJV
WA7GQO
WB2IDS
78
K4VWK
KF4HA
KA2BHR
77
KX2L
N2AKZ
W3DKX
76
WB7OEX
WB1ABQ
WA6OCM
75
WØOGH
KTØU
NW4O
WA5QFD
WB7WVD
N4PL
N2BLX
74
K3RZR
WB4FDT
WA8DHB
W8VPW
WB2OWO
W6RNL
73
KC1G
WB2TWQ
72
KA4GUS
N1BIR
W2TZO
KY4K
KSØI
W5KLV
K7NTG
N9ATP
AC5R
KJ3E
KD4PJ
71
N7BGW
KØJCF
70
KA2GSX
WD4HBP
KA8NCR
KC5SF
KQØI
69
WB5MMI
KC2SW
N6NR
WA1YNZ
W3DP
WA3WQP
68
KK9N
WB2QMP
N4HIR
NT4S
KA5AZK
KA4BCM
KD4TY
KE8X
WA2KOJ
KC2QQ
67
N3ADU
KB3DT
NN4I
KD5FR
KB4LB
KB3UD
66
VE2EDO
W4HON
NP4D
KA4IUM
WB4GHU
N3BFL
65
N1AJJ
WØOUD
WD4BSC
VE7BNI
64
WB4NTW
KØDJ
W9FRC
K4ZN
WB8VAZ
WA4JTE
63
W8GGX
NØACW
AE1T
WA4SWF
WA2FSR
62
KA4BBA
KE6ZA
KV8Q
W8KKK
KA2NMA
WB2TQC
WBØHOX
N4UF
NN4D
KP4DJ
WA1VRL
KA3DTE
WA4LJT
61
KS2G
WD4CNG
WA6QCA
N2BDW
60
WA6YAB
WB2OUR
W9TLU
W7LBK
N2AKD
53
N5EZM/T
52
KA8GGZ/T
49
N2DPV/T
47
K1LCQ/T
46
N5FCZ/T
45
N6EPG/T
43
N2CPX/T
42
KA9GBG/N
41
KAØNLI/N

Brass Pounders League October 1982

1	2	3	4	5	6
N4EDQ	412	1973	594	1379	4538
W3CUL	779	903	1314	73	3069
NØBQP	34	1131	236	590	2018
KA9CPA	21	885	125	660	1691
WAØHJZ	27	749	92	500	1368
WØACD	0	781	10	483	1274
W4ZJY	395	126	691	4	1216
W9JUJ	8	537	552	10	1107
WA4JDH	8	476	449	14	947
NG4J	321	101	402	20	844
WØACH	31	377	408	0	816
KCØAS	9	542	192	7	750
AF8V	10	359	340	29	738
W5SHN	6	319	351	8	684
NI6A	80	273	310	14	677
W3VR	287	101	273	11	672
W7DZX	11	334	309	3	657
K8NCV	27	300	324	3	654
K8OZ	3	327	314	4	648
WB3GZU	27	303	274	36	640
W7VSE	1	298	319	4	622
W1EOF	0	224	389	5	618
KA1GBS	5	281	269	63	618
WB2EAG	4	272	281	21	578
WD4COL	51	237	217	72	577
WF4X	11	263	271	29	574
KS7I	47	239	260	26	572
KT6A	7	340	199	15	561
WA2SPL	1	286	228	45	560
W5CTZ	5	255	273	9	542
WB5YDD	3	266	227	39	535
WD9ESZ	0	165	368	0	533
W3ATQ	0	262	266	3	531
KBØMB	10	219	284	15	528
WØFRC	72	189	261	5	527
WD8MIO	40	241	203	35	519
KS6T	19	255	226	10	510
WA4CCK	1	230	270	2	503

BPL for 100 or more originations plus deliveries:

W4GPL	174
VE3HGJ	123
WA4STO	123
K2ZM	120
N1BBT	115
WØOYH	114
N5FDL	109
KA5CXW	104
KA7ELI	104
K5CXP	102

Multioperator station:

K4KDJ	107

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

JANUARY

Dec. 31 — Jan. 1

ARRL Straight Key Night, Dec. *QST,* page 96.

5

West Coast Qualifying Run, 10-35 wpm at 0500Z Jan. 6 (9 P.M. PST Jan. 5). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

8-9

ARRL QSO Party, cw, this issue, page 86.

World 40-Meter and 80-Meter SSB Championships, Dec. *QST,* page 96.

Zero District QSO Party, Dec. *QST,* page 96.

14-MHz SSB Contest, Dec. *QST,* page 96.

10

W1AW Qualifying Run, 35-10 wpm at 0300Z Jan. 11 (10 P.M. EST Jan. 10). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Jan. 5 listing for more details.

15-16

ARRL VHF Sweepstakes, Dec. *QST,* page 87.

World Communications Year Contest, Nov. *QST,* page 100.

HA DX Contest, Dec. *QST,* page 96.

Hunting Lions in the Air Contest, Dec. *QST,* page 96.

QRP CW Contest, Dec. *QST,* page 96.

World 160-Meter SSB Championship, Dec. *QST,* page 96.

A5 Magazine WAS SSTV Contest, contact *A5 Magazine,* Mike Stone, WBØQCD, P.O. Box H, Lowden, IA 52255-0408 for details.

22-23

ARRL QSO Party, phone, this issue, page 86.

North Dakota QSO Party, sponsored by the Red River RA, from 0000-0800 and 1600-2400Z Jan. 22 and 0800-1600Z Jan. 23. Work stations once per band and mode. Exchange signal report and QTH (County for ND stations; state, province or country for others). Suggested frequencies: phone — 3.905 7.280 14.280 21.380 28.580; cw — 1.810 3.540 7.035 14.035 21.035 28.035; Novice — 25 kHz from lower band edge. Count 10 points per phone QSO, 20 points per cw QSO and 50 points per RTTY QSO. ND stations add 100 points for working 5 Novices. ND stations multiply by total states/provinces/countries worked; others multiply by total ND counties worked (max. 53). Mail logs by Feb. 28 (include large s.a.s.e. for results) to Bill Snyder, WØLHS, P.O. Box 2784, Fargo, ND 58108-2784.

Texas QSO Party, sponsored by the West Texas ARC, from 0000Z Jan. 27 until 1800Z Jan. 23. All bands and modes. Single operator only. Work stations again as they change county. Cw QSOs in the cw sub-bands only. Exchange serial number starting with 001 and QTH (county for TX stations; state, province or country for others). Suggested frequencies: phone — 3.940 7.260 14.280 21.370 28.600; cw — 65 kHz from lower band edge. Novice — 10 kHz from lower band edge. TX stations count 1 point per phone QSO and 2 points per cw QSO; multiply by total states, provinces and countries worked. Others count 1 point per phone QSO, 2 points per cw QSO with fixed TX stations; count 5 points per phone QSO, 7 points per cw QSO with mobile TX stations. Multiply by total TX counties worked (max. 254). Mail logs in time to be received by March 15 to WTARC, P.O. Box 9944, Odessa, TX 79762-0041.

West Virginia QSO Party, sponsored by the West Virginia State AR Council, from 1700Z Jan. 22 until 1700Z Jan. 23. Single operator only. Exchange signal report, serial number and QTH (county for WV stations; state or country for others). Suggested frequencies: phone — 10 kHz up from lower General band edges; cw — 35 kHz up from low end; Novice — 35 kHz from lower band edge. Count 1 point per QSO. WV stations multiply by total WV counties, states and countries worked; others multiply by total WV counties worked. Multiply score by 1.5 if running 200 W or less. Mail logs by Feb. 11 (include large s.a.s.e. for results) to K8BS, 950 Gordon Rd., Charlestown, WV 25303.

25

W1AW Qualifying Run, 10-35 wpm at 2400Z (7 P.M. EST) Jan. 25. See Jan. 10 listing for more details.

29-Feb. 6

ARRL Novice Roundup, this issue, page 86.

29-30

ARRL Midnight Special, from 0400-0600Z Jan. 30 (11 P.M. EST Jan. 29 until 1 A.M. EST Jan. 30). First hour, 40 cw; second hour, 80 cw. Suggested frequencies 7.040-7.075 and 3.540-3.575. Work stations once per band. Use exciters only — no external amplifiers! Exchange honest signal reports and a three-letter abbreviation for the name of your county. Score equals number of QSOs; no multiplier. Mail entries by Feb. 7 to ARRL Hq. Include s.a.s.e. for results; top scorers will be listed in *QST.* (Note date change from December Contest Corral listing.)

Classic Radio Exchange, from 2100Z Jan. 30 until 0400Z Jan. 31. Object is to restore, operate and enjoy older equipment built since 1945 but at least 10 years old. Exchange name, signal report, state/province/country, receiver and transmitter type (if homebrew, send PA type — eg. "6146") and other interesting conversation. The same station may be reworked with different equipment combinations and on each band and mode. Suggested frequencies: phone — 3.990 7.290 14.290 21.390 29.050; cw — 60 kHz from low end; Novice/Tech — 3.720 7.120 28.120. Multiply total QSOs by number of different receivers, transmitters, states, provinces and countries worked per band and mode. Multiply that total by classic multiplier: total years old of all receivers and transmitters used (3 QSOs minimum per unit). Transceivers count double. Mail logs (include s.a.s.e. for results) to: Stu Stephens, K8SJ, 1407 Hollyrood Rd., Sandusky, OH 44870.

CQ WW 160-Meter Contest, cw, sponsored by *CQ Magazine,* from 2200Z Jan. 28 until 1600Z Jan. 30. Cw only (Phone from 2200Z Feb. 25 until 1600Z Feb. 27. Exchange signal report and QTH (state/province for W/VE stations; country name for others). All stations are urged to observe the 1825-1830 kHz cw DX window. Count 2 points per QSO with your own country; 5 points per QSO with stations in different countries but on your continent; and 10 points per QSO with stations on other continents. Multiply by total states, VE provinces and DX countries worked (KH6 and KL7 count as DX; there are three VE1 provinces — NB, NS and PEI). Mail entry by Feb. 28 (March 31 for phone) to Don McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32901.

French Contest, cw, sponsored by Reseau Des Emetteurs Francais, from 0600Z Jan. 29 until 1800Z Jan. 30 (phone 0600Z Feb. 26 until 1800Z Feb. 27). No rules received for this year's contest, but here are the rules for last year. Single and multioperator classes. Single ops operate a maximum of 26 hours with three off-times max. Work French stations, including overseas territories and DA1/2 French military stations. Exchange signal report and serial number. French stations also send their Department (county) number (two digits), and Belgian stations send their Province number. Count 1 point per QSO and multiply by total French departments (eg. F6GGG/76 is in dept. 76 — max. 96), French overseas countries (max. 29), Belgium provinces (max. 9), DA1/2, DUF countries (max. 25) and DNF countries (max. 14) worked. Mail entry to REF French Contest, Square Trudaine 2, 75009 Paris, France.

FEBRUARY

1

West Coast Qualifying Run, 10-35 wpm at 0500Z Feb. 2 (9 P.M. PST Feb. 1). See Jan. 5 listing for more details.

5-6

Arizona QSO Party, sponsored by the Southern Arizona DX Assn., from 1800Z Feb. 5 until 0600Z Feb. 6. Single operator and club aggregate entries only. Work stations once per band. No repeater QSOs. Exchange signal report and QTH (county for AZ stations; state, province or country for others). Suggested frequencies: phone — 3.895 7.230 14.280 21.365 28.560; cw — 60 kHz up from lower band edges; Novice — 25 kHz up from lower band edges. Count 1 point per phone QSO, 2 points per cw QSO and 4 points per Novice/Tech QSO in Novice bands. AZ stations multiply by total states/provinces/DXCC countries worked; others multiply by total AZ counties worked (max. 13). Also, non-AZ stations can count club station W7NQ as a multiplier and can double the multiplier if all counties and W7NQ are worked. Awards. Mail entry to be received by March 5 (include large s.a.s.e. for results) to: SADXA, Philip Stickney, N7BUP, 1890 West Paseo Cuenca, Tucson, AZ 85704.

QRP SSB Contest, sponsored by QRP Club ARI, from 1500Z Feb. 5 until 1500Z Feb. 6. Single op, single or multiband only. 80-10 meters. Use max. 10W PEP output. Exchange signal report. Count 1 point for QSOs with stations in your country, 2 points on same continent and 5 points for other continents. QSOs made with non-directive antennas count double points (e.g., with vertical or dipole). Multiply by total DXCC countries worked. Multiply that total by the following power bonus for final score: 0-.9 W, ×3; 1-3.9 W, ×2; 4-10 W, ×1. Mail logs within 30 days to: Massimo Capozza, IØOAY, Via Sierra Nevada, 99, 00144 Rome, Italy.

New Hampshire QSO Party, sponsored by the Concord Brasspounders, from 1900Z Feb. 5 until 0700Z Feb. 6 and 1400Z Feb. 6 until 0700Z Feb. 7. Work stations once per band and mode. NH-to-NH QSOs allowed. Exchange signal report and QTH (county for NH stations; ARRL section or country for others). Suggested frequencies: phone — 3.935 3.975 7.235 14.280 21.380 28.575 50.115 145.015; cw — 1.810 and 55 kHz up from lower band edge; Novice — 30 kHz up from lower band edge. NH stations count 1 point per QSO and multiply by total ARRL sections/NH counties/countries worked. Others count 5 points per NH QSO and multiply by total NH counties worked. Mail logs by March 12 (include large s.a.s.e. for results) to: Norman Littlefield, W1VBX, RFD 1-Buck St., Box 323, Suncook, NH 03275.

South Carolina QSO Party, sponsored by Colleton Co. Contestors, from 1800Z Feb. 5 until 2359Z Feb. 6. Work stations once per band and mode. No repeater QSOs. SC mobiles may be reworked as they change county. Exchange signal report and QTH (county for SC stations; state province or country for others). Suggested frequencies: phone — 3.895 7.230 14.280 21.365 28.560; cw — 60 kHz up from lower band edges; Novice — 25 kHz from lower band edges. Count 2 points per phone QSO and 3 points per cw QSO. SC stations multiply by total states/provinces/countries worked; others multiply by total SC counties worked (max. 46). Awards. Mail logs by March 5 (include large s.a.s.e. for results) to: Elliott Farrell, Jr., KE4VP, Rt. 3 Box 658, Walterboro, SC 29488.

RSGB 7 MHz Contest, phone

North American Sprint, cw

8

W1AW Qualifying Run, 10-40 wpm, at 0300Z Feb. 9 (10 P.M. EST Feb. 8). See Jan. 10 listing for more details.

12-13

North American Sprint, phone

PACC Contest

YU WW DX Contest

QCWA QSO Party, cw

19-20

ARRL International DX Contest, cw, Dec. *QST,* page 88.

YL ISSB QSO Party, phone

23

W1AW Qualifying Run

26-27

CQ WW 160-Meter Contest, phone

French Contest, phone

World RTTY Championship

RSGB 7 MHz Contest, cw

*Assistant Communications Manager, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SCM/SEC: VE6XC. ASCM: VE6AMM. STM/NM ATN & APSN: VE6AGH VE6AVV VE6AMM VE6AHC VE6FV VE6ABC VE6ASL VE6AFO. VE6AVZ did some PR work for ARES awhile back. SET was high lite for ARES, but unfortunately few areas participated in the provincial scheme. No news of local SET activities. Gov't officials impressed with volume of tfc but disappointed in the coverage. Next year our SET will be more centered on getting links to important gov't points. Trying to get tfc across Canada within the hours set out for SET and the keeping of regular net times is a waste of time. It has never worked with much success. Traffic: VE6CHK 262, VE6ABC 57, VE6XC 56, VE6AMM 13, VE6SA 5, VE6VS 5, VE6YW 4.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Travelers VE7ASL off to China and VE7AP to KH6-land. The snow birds are flying off south, VE7LL and VE7CB and others. VE7ZR is in hospital. VE7BLQ out of hospital and recuperating from heart attack. Vancouver ARC officers: VE7BQS, pres.; VE7FHO, secy. Burnaby ARC officers: VE7AVU, pres.; Ms. Margret Kremer, secy. VE7EXD is back from Europe where he worked in a pulp mill. Traffic: VE7ZK 122, VE7BNI 63, VE7FB 34, VE7CDF 6, VE7DFY 5.

MANITOBA: SCM, Peter Guenther, VE4PG — SEC: HK. STM: RO. NMs: TE NM VJ ACX HW. SET proved to be a useful event again this year. Thanks go to a multitude of stations including Saskatchewan and Ontario. This was the first time an attempt was made to hookup with as many province as possible. Conditions on 40 meters limited us to mostly MB, SK and ON. The swap and shop net is back on again, usual place, same time every Sunday after their evening phone net. CTN QNI 144, QTC 25, sess. 28. MTN QNI 183, QTC 47, sess. 31. WRIN QNI 321. QTC nil, sess. 9. MEPN QNI 1089, QTC 27, sess. 31. MMN QNI 392, QTC 31, sess. 31. Traffic: VE4PG 78, VE4AJE 62, VE4JA 51, VE4ACX 46, VE4TE 32, VE4SSS 31, VE4RO 26, VE4QI 18, VE4AAD 14, VE4FK 10, VE4ID 10, VE4JK 8, VE4LB 6, VE4ADS 4, VE4AFO 4, VE4TL 4, VE4AP 3, VE4HK 3, VE4XN 3, VE4CR 2.

MARITIME/NEWFOUNDLAND: SCM, D. R. Welling, VE1WF — ASCM: VO1FG. NMs: VO1JN VE1WF. SEC: VE1EI. STM: Open. Hospital: VO1KH in Toronto. Silent Keys: VE1AQW VE1BQ. Nfld Phone Net is back on full schedule. SONRA holding election of officers in November. Congrats to all who passed their exams during October. MAARC hosting Flea Market during Nov.; hope it is successful. Clubs were active in providing communications for various sporting events. Next March HARC will be celebrating their 50th anniversary. APN: sess. 35, QNI 198, QTC 69, QTR 414. Traffic: VE1WF 337, VE1BXA 74, VO1AW 14, VE1BKM 9, VE1BPM 3. (Sept.) VE1BKM 12.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. STM: VE3GFN. VE3CP has informed me that the Ontario Phone Net is 35 years old as of November 1. Present NM is VE3GNW. Niagara Peninsula ARC operated a 40-meter ssb station at the Salvation Army hall for the Boy Scout JOTA with 25 scouts participating. In addition VE3s BSA WT DVI held open house for local scouts. I enjoyed meeting members of the Ottawa Valley MRC while presenting a talk on the NTS as well as meeting members of the Ottawa ARC while attending a League booth with VE3FN and VE3DZH at that club's annual auction. Regretfully I report that VE3BKW and VE3BOV have become Silent Keys. As the OVS appointment no longer exists, I'd like to thank VE3DSS and VE3EMS for their excellent monthly reports. VE3AJN enjoying her monthly stints on the IATN. Congrats to VE3JUZ on becoming a League LM. VE3HGJ found time from his editorial duties to earn his 4th BPL. Mark May 15 for SORT's 2nd annual flea market in London. VE3NV celebrated his 60th year with the same call sign. He still has his first "ticket," certifying his proficiency in sending and receiving cw at 5 wpm. Windsor ARC's past president's banquet had a good turn out. VE3LXE and VE3NN have been experimenting with a new antenna called a Swiss quad for 2 meters with good results. KWARC, along with REACT, provided communications for the OKTOBERFEST Parade with VE3s GYC AMZ BLJ CHQ CHM IXC KVQ AVY HVO and DOS participating. VE3NY and VE3UG are new members of CARTG. The *"Oakville Do"* has been revived. Vhfers from the 50s and 60s as well as a good collection of newer Vhfers got together in Toronto. Among those present were VE3s DIR DSE BQN (organizer), CRU FIB CVX MR DSS AIA AIB ABG LNX BFM and many more. May 1983 be your best year. Traffic: VE3HGJ 397, VE3GOL 337, VE3GT 211, VE3HTL 150, VE3WM 145, VE3GFN 134, VE3AJN 98, VE3FGU 98, VE3GNW 87, VE3KXB 87, VE3DPO 84, VE3KCZ 79, VE3BVG 71, VE3BZB 56, VE3BDM 53, VE3LNN 43, VE3WG 36, VE3AYZ 25, VE3EFX 23, VE3JSM 20, VE3DZH 18, VE3KLX 15, VE3DUK 14, VE3EWD 8. (Sept.) VE3FGU 49, VE3AWE 25, VE3JSM 13, VE3LNN 8.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2EDO VE2FSA. New appts: VE2EDO, NM for QSN; VE2ALE as OBS. At Verdun, members of VE2CRV, operated VE2JAM, at the 25th Jamboree on the air and the 75th anniversary of scouting. A good time was had by both boy scouts and amateurs. The public was invited. Operators: VE2s EVW GTD GMD BP. Gelicitations au club Sorel-Tracy, VE2CBS, pour leur classement au Field Day. Le president du club VE2CAM, (St-Hyacinthe) est VE2FEB. Traffic: VE2EDO 84, VE2BP 40, VE2EKC 39, VE2EC 27, VE2GAG 26, VE2FSA 20.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3WIY K3JL W3DKX. Traffic nets: DTN M-F 3.905 6:30 P.M. DEPN Sat. 3.905 P.M. Del. Rptr Net 146.73 Tues. 7:30. Over the Hill Net 224.96 223.96 443.05 Mon. 7:30 Aware Net 146.955 Sat. 8:30. SEN 147.075 Tues. 7 P.M. PLEASE support your club by attending meetings. DARC drawing for Icom 2A in June, but to win you must attend meetings. SARA members furnished communications for a CROP WALK sponsored by local churches. They were, W3WD W3FEG K3JL WA3RTX WA3ZBI N3DCK WA3YTB WA3PWT W3PVO KA3CDF. DTN: QNI 315, QTC 43, sess. 23. DEPN: QNI 60, QTC 22, sess. 6. SEN QNI 36, QTC 5, sess. 4. Traffic: W3PQ 125, WA3WIY 79, W3DKX 75, W3QQ 69, WB3DUG 56, K3JL 32, W3WD 16, WA3DUM 15, WA3PWT 12, KA5DIJ 8, W3FEG 5, N3SJ 4, K3ZXP 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: KB3LF. DEC: AA3C K3QXC KB3QW KB3UD N3BFL N3CJP W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.	Mgr.
EPAEPTN	3917	6 P.M. Dy	576	325	39	WA3EHD
EPA	3610	7/10 P.M. Dy	558	243	61	AA3B
PFN	3958	5 P.M. Dy	285	253	31	WA3WQP
PTTN	3610	6:30 P.M. Dy	240	48	30	WB3EPU

Local and Vhf nets reports (QNI/QTC/Sess.): D3ARES 212/31/5. D5ESN 108/57/6. D6ARES 28/1/1. LCARES 18/3/3. PWARES 15/19/1. WAECVTN 54/100/10. OO reports: KB3XO W3FAF W3GTN W3KEK. OBS: K3EBZ KB3VV W3AVJ W3CL W3VA WA3ENE. PSHR: KA3DLY KA3EJG KA3GJT KB3LF KB3UD KB3XO KE1L/3 N3BFL W3DP W3VA WA3EHD WA3WQP WB3FKP WB3KUZ. New appts: WB3EPU, NM; KB3TS, EC Monroe Co.; KC3AK W3AQN W3PTM K3BWE, OES. Effective Nov. 1, WB3EPU is new NM for PTTN. Please give her your full cooperation. Many thanks to WA3OFD for FB job as PTTN NM. He had to resign owing to work skeds. New calls: KK3M/KA3IGF, N3CDG/KA3JSU, N3DGR/KA3HJZ. KA3KAE new 11-yr-old YL in Lebanon. Upgrades: Extra-KB3YY N3AIU; Adv-K3QJT WA3ZCJ; Tech-N3DGR. EPAEPTN welcomes KA3EDX. PTTN welcomes N3AIW. PFN welcomes KA3BQS KA3DLY KA2FFC WA3VAW WB8MZZ. New gear: WB3KUZ trap dipole; WB3FKP 3-el yagi; KA3EJG 2M isopole; KB3UA FT102. Congrats to PWA first place in 7A Field Day Stations sending SET messages to this office: AK3O K3ARR K3KT K3WKK KA3EAQ KA3FBP KA3GJT KA3HJZ KB3LF KB3QW KB3XO N3BAY N3CMC W3EEK W3PTM W3PVO WB3EPU WB3LUJ on emergency power and K3QXC KA3CHB KA3EJG KB3NV KE1L N3AIW N3AOG N3CWD W3PWS W3YZW WA3CIG WB3EFI WB3JYY WB3YTI on conventional power. K3UKW reports 36 members of Holmsburg ARC, with support from UPARC and Philmont ARC, manned Special Events Station W3WP for 300th Birthday of William Penn, founder of the city of Phila. Over 1235 contacts were made. As a result of excellent news media coverage, the Mayor proclaimed Amateur Radio Week Oct. 24-30. New officers Delaware-Lehigh ARC: WB3HBR, pres.; N3BHF, v.p.; K3NWM, secy.; KB3RI, treas. Penn Wireless ARC: AG3R, pres.; KB3NE, v.p.; KB3NG, cor. secy., N3CIZ, rec. secy.; W3FAF, treas. York ARC: W3EDO, pres.; W3BUI, v.p.; WB3LJS, secy.; WA3SRE, treas.; K3BWB, trustee. This club now celebrating its 50th anniversary. W3EEK reports new 10 MHz band just great. It is with deep regret we note the passing of W3ID. He was very active in the Section, holding several appointments. Our thanks to the various nets and members of EPA for the fine job done in the '82 SET. Traffic: KB3LF 250, WA3WQP 217, W3PIX 180, WA3EHD 155, W3VA 154, KE1L/3 143, KA3DLY 138, WB3KUZ 134, WA3DFU 132, KB3XO 130, AA3B 110, KB3UD 100, W3DP 98, N3BFL 76, KA3GJT 68, WB3FKP 56, N3CD 38, KE3U 27, KA3EJG 26, N3COY 24, W3ADE 21, W3AQN 21, W3CL 16, W3EEK 10, W3TWV 10, W3PTM 9, K3QXC 9, AF3Z 9, W3FAF 7, N3BHF 6, WA3CKA 5, K3EBZ 5, W3AVJ 2, W3HK 1, KB3VV 1.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — STM: WB3GZU. SEC: WA3TAI. SET reports show much activity. Congrats to all who participated. W3UT says the batteries last much longer with transistors than with vacuum tubes. W3OYY is looking to net improvements. W3MSN has an antenna for every band thru 450 MHz. KC3D has an RF noise bridge and is bringing all his antennas up to peak. W3CDQ has started her new season with a bang. KB3WL is up in the mountains. W3ZNW has joined a midwest RTTY net. KA3R says OO business slow this month. KJ3E has the new flat top at 40 feet and 200 feet of ladder line feed. WB3KJT tried out the new rig on the MEPN, and everything has fallen into place. N3QA is reliable! KC3DW is really going to town on the traffic nets. WB3BFK sometimes operates from the comfort of his living room. W3LDD's only comment is "Big Deal." WA3VPL reports the Queen Anne ARC going great and the Severn School's club did very well in the FD. W3FZV had a nice trip to the Orient and visited JARL. N4DR's dreams have come true with 10 MHz open. KB3DE became a grandpa on his anniversary. WB3GZU's busy season is underway. KB3NL keeps Carroll Co. on the map. K3LFD in Easton is heard from. KA3CDQ is taking on a second job. Net/manager meets sess. traffic/QNI avg. MDC PON/W3CYY 1700 local Thurs. 3905 4/6/19. WC 2-Mtr/KC3DW 1900 Tues. 09/69 4/0/16. WR PON/WB3BFK 1700 MFS 3905 22/36/16. MDD/W3PQ 1900/2200 3643 64/271/8.2. Brass: W3FA W3UT W3QQ. Meets daily. MTN/KA3CDQ 1930 M-F 3737 21/24/5. MEPN/WB3GZU 1800 Dy 3920 30/142/29. 100%: KA3ARH WB3BFK KA3CDQ W3FA W3LDD. All times local and frequencies in kHz except 2 mtrs. Traffic: WB3GZU 640, KA3CDQ 359, KC3DW 243, W3FA 197, KJ3E 159, W3UT 152, N3QA 58, WB3KJT 40, KB3WL 33, WA3VPL 19, WB3BFK 18, W3ZNW 18, N4DR 14, KC3D 8, W3LDD 6, W3FZV 2.

WESTERN NEW YORK: William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ASCM: W2GLH. DECs: WA2AIV KA2BHR WB3CUF WB2NAO W2GJ (acting). Silent Keys: Horseheads DEC KW2S/WA2DHZ and Rochester radio pioneer, Clarence "Duck" Dengler, W2LK.

Net	Freq.	Time/Day	Mgr.	QNI	QSP	QND
NARAN	75/15	0930/Sn	WA2JPM	96	1	5
NYS/1*	7077	1000/M-S	WB2EAG	192	99	25
NYSCN	3677	1000/Sn	W2MTA	47	29	5
M Farad	3925	1300/M-S	VE2FMQ/2	276	60	26
THIN	3913	1600/Sn	WA2KOJ	63	—	5
NYPON*	3903	1700/Dy	K2KQC	779	257	31
NYSPTEN	3925	1800/Dy	KA2Q	764	75	31
ESS	3590	1800/Dy	W2WSS	385	55	32
OCTEN*	34/94	1830/Dy	WB2HLY	765	159	39
Q Net	31/91	1830/Dy	KA2CMQ	436	11	31
STAR/E*	99/39	1830/Dy	N2BLX	58	9	27
WDN/E*	04/64	1830/Dy	KC2QQ	768	128	43
NYS/4*	3677	1900/Dy	N2APB	477	208	35
JCARCN	10/70	2000/Dy	WA2WAX	508	15	30
OARCN	25/85	2000/W	K2VTT	85	0	4
VHF THIN	04/64	2000/Sn	KC2QQ	56	—	4
WNYECN	3955	2000/3 Sn	W2BCH	(ARES)		
BRVRAN	055/655	2100/Dy	WB2OFU	287	10	31
CNYTN*	90/30	2115/Dy	WA2PUU	366	33	31
STAR/L*	325/925	2130/Dy	N2BLX	104	65	25
WDN/L*	04/64	2130/Dy	KC2QQ	859	141	35
NYS/5*	3677	2200/Dy	N2AFB	361	335	31

*NTS net. ARES nets: Central 1930 3rd Sun. 40/00, Chemung 2100 Sun 10/70, Lewis 1815 Sun 43/03, Oneida 1930 Tues 34/94, Oswego 1900 Sun 75/15, SLVARES 1930 Sun 31/91. PSHR: W2AET N2ARD KA2BHR N2BLX WA2FJJ W2GJ WB2IDS WA2KOJ W2MTA WB2OWO KC2QQ KC2SW W2ZOJ. Appts: N2APB NM-NYS; (ORS) K2IUT KC2SJ. Novice classes: Waterville-KA2LHO W2EVE; Owego-K2QR WA2SZY. Club officers: ARATS-WB2WUB KA2CJS K2LRL; LARA-WB2BGA N2BIC K2JYV KA2MXX. Reports (OES): W2AET WA2HSB WA2KOJ WA2KOJ KA2LHO WB2NAO K2OC W2ZOJ. Comms: Boonville ARC Elks C.P. Walkathon-WA2OEP; RARA American Diabetes Bikeathon; National JCAA Cross Country Run-KK2B WA2LEZ; BARA Lions Run for Sight-WA2SGS. K2QR EME contest OSOs included DJ-DK-F-OH-JA-OZ-SM-UA-VE-YU-YV! He also worked W2CNS! Anyone else in WNY doing moonbounce? CONGRATS to Saint Lawrence Co. ARES for timely response to Simulated Emergency Test requests for aid from Brockville, ON. Traffic: W2MTA 375, KO2H 282, W2AET 259, WB2IDS 193, WA2HSB 184, W2ZOJ 176, WB2OWO 160, WA2FJJ 148, WB2QIX 120, VE2FMQ/W2 115, W2FR 100, KG2D 91, KC2SJ 70, N2BLX 62, KC2QQ 54, KC2SW 52, KA2BHR 51, W2GJ 46, WB2RBA 45, N2ABA 40, WA2RXO 38, WA2AIV 33, AF2K 32, WA2KOJ 30, W2HYM 24, KA2DBD 22, N2ARD 21, WB2NAO 21, WB2PID 21, WA2OEP 20, K2RN 18, KC2SD 11, WA2SMZ 11, K2IUT 8, KA2OQZ 8, KA2QCQ 3, K2VR 3, KA2LHO 2, N2CBX 1.

WESTERN PENNSYLVANIA: SCM: Otto L. Schuler, K3SMB — STM ASCM: N3EE. NMs: AC3N N3ADU W3MML W3NEM. SEC: AB3Q. DECs: WB3JDI KB3OO KN3ZAN WB3EFQ WB3KJH WA3ZNP N3ADU.

Net	QNI	QTC	Sess.	kHz	T/D
WPACW	395	266	35	3585	7:00 P/D
WPAPTN	760	320	35	3983	6:15 P/D
WPA2MTN	568	174	33	146.28/88	8:00 P/D
NWPA2MTN	—	—	—	146.04/64	9:00 P/D
PFN	285	253	31	3958	5:00 P/D

We wish to extend our condolences to the families of W3ACA W3CRA KA3IFW & W3RNO now Silent Keys. As of November 1, we will have a change in STMs. N3EE will not be STM. I want to thank him for a job well done and will call on him in the future for help. AC3N will be the new STM, and WA3UNX will be net manager for the WPA CW Net. These changes are to give more operators in sight into the section activities. KA3CEO is the chairperson for the 3rd District YLRL. Congrats. New Novice KA3JXA. Upgrades: Tech-KA3JGN KA3GBT KA3GXF KA3JGU; General-KA3EXO KA3JKO N3CVP (ex-KA3AFW), KA3BNI KA3ITM; Advanced: KA3IRT KA3GLD (?), WA3EKH; Extra-WA3WNU WB3GPR. New calls: KJ3O/ WB3GXG; KB1DM/WA3IGF; KC3EB/N3CVS. New officers, Skyview ARS: W3GVI pres.; KC3BB, v.p.; K3VRV treas.; KA3HBB, secy. WB3FYP KJ3Q WA3YNX KK3I WB3HFP KB2YP, trustees. Thanks to all who participated in the SET. It was a great success, and we hope to have more next month. Traffic: N3ADU 478, N3CKQ 326, AC3N 269, K3CR 236, W3OKN 204, K3NPX 189, K3SMB 107, W3PFD 102, W3SMV 95, W3MML 87, W3EGK 82, N3FM 74, KB3YC 73, KB3DT 66, WA3QNT 65, W3RUL 59, KA3CNP 48, WA3DJE 45, W3IQD 44, WN3VAW 40, K3NPW 39, K3VOV 35, WB3HVY 34, K3TUA 33, KB3VB 30, WA3UNX 29, W3KMZ 25, KB3UO 24, KA3COX 22, W3KYN 22, N3BKU 21, K3HCT 21, WB3GUK 18, W3NGO 17, N3BKV 13, K3KUN 13, KB3NV 13, K3LTV 11, W3SN 11, KI3C 10, KA3ETC 8, W3TTN 6, W3LOD 5. (Sept.) N3WS 34, W3RUL 13.

CENTRAL DIVISION

ILLINOIS: SCM, David E. Lattan, WD9EBQ — ASCM: K9ORP. SEC: W9QBH. STM: WB9JSR.

Net	Freq.	Times/Day	QNI	QTC	Sess.
ILN	3690	2330/0330 Dy (Z)	482	356	63
IPN	3915	2130 Dy	—	—	—
NCPN	3915	0700 Dy	374	72	26
NCPN	7270	1215 Dy	164	167	26
IEN	3940	1400 Sn (Z)	139	3	5
ITN	3705	1900 Dy	176	65	27

D9RN 100%: W9HOT W9NXG WB9ODN WB9WGD WD9EJP. CAND 100%: WB9WGD W9NXG W9HOT WB9QIH. K9AXS reports the W9VEY memorial net had 63 QNI and 9 QTC. DON'T FORGET PSHR!! Appointees are reminded to take credit for their activities by filling out the PSHR report on the back of the monthly CD-210, or by including the info in your radiogram report. Quick checking indicates many stations are not taking the credit due them in this area. Along these same lines, letters published in *QCD* favoring elimination of the 5 point limit on public service events have received favorable response, and that action will be considered by Hq. When that goes through a lot of folks putting in many hours in weather watches, ESDA drills, thons and other local events will receive the credit that is due. WD9EED reports that Piatt Co. ARES assisted by hams from DeWitt Co. handled communications for the freedom marathon held in Allerton Park. Twenty seven hams

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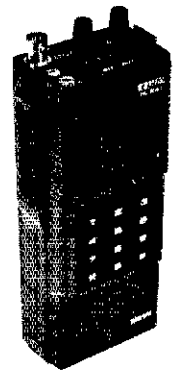

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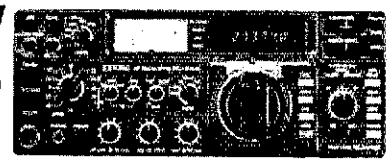

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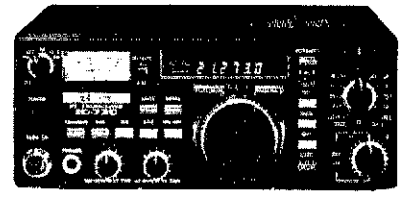

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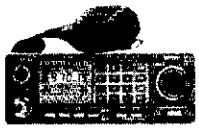

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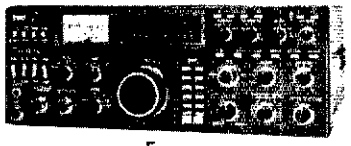

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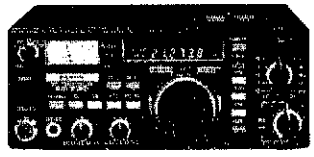

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R-4C Ham Rcvr 299 mfv
MS-4 Speaker 19 mwfv
FL-500 Filter 35 w
SC-2 2m rcv conv 69 m
SC-6 6m rcv conv 69 m
CPS-1 Conv ps 19 m
CC-1 Conv console 39 m
R-7/4 filters SW Rcvr 115 f
R-7A SW receiver 1169 m
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T-4XB Transmitter 249 mf
T-4XC Transmitter 299 mwfv
TR-3 Xcvr 199 m
TR-4 Xcvr 269 mfve
TR-4C Xcvr 349 mwfe
TR-4CW Xcvr 399 mve
TR-4CW/RIT Xcvr 469 f
RV-4C Remote VFO 89 w
TR-6/NB 6m Xcvr 369 m
TR-6/NB/AM filter 399 m
AC-3 AC supply 59 me
AC-4 AC supply 89 all
DC-3 DC supply 39 wf
DC-4 DC supply 69 fe
TR-7 Xcvr 895 mwf
TR-7/NB Xcvr 949 m
TR-7/NB/fan Xcvr 969 m
TR-7/500 Hz filter 929 c
TR-7/2 CW filters 949 m
TR-7/fan/3 filts/AUX-7 995 m
PS-7 Power supply 199 mfc
PS 75 Power supply 119 m
RV-7 Remote VFO 129 mf
SP-75 Speech processor 89 m
MN-4 200w tuner 69 m
MN-7 Tuner 119 mv
MN-75 Tuner 149 f
AC-10 AC supply 19 f
Theta 7000E Terminal 499 m
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RVD-1002 Video conv $199 m
RVD-1005 Video conv 229 m
ST-6 Demod/AK-1/425Hz 189 m
ST-5000 Demod/keyer 169 m
ST-6000 Demod/keyer 489 m
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IC-551D 80w 6m Xcvr 469 m
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TS-520/CW filter 479 m
TS-520SE Xcvr 449 f
TS-520SE/CW filter 479 m
TS-530S Xcvr 529 v
TS-820/DG-1 Dig Xcvr 569 m
TS-820S Xcvr 589 m
TS-820S/CW filter 619 m
TS-830S Xcvr 699 w
BS-8 Panadaptor kit 49 w
TS-930S Xcvr (like new) 1189 m
R-820 Ham receiver 689 v
TS-700S 2m Xcvr 399 wf
TR-2200A 2m FM port 99 mf
TR-2200G 2m FM port 89 w
TR-7200A 2m FM Xcvr 89 mf
TR-7400A 2m FM Xcvr 189 cv
TR-7600 2m FM Xcvr 159 m
TR-7625 2m FM Xcvr 199 wf
TR-7625/ITP mic 229 c
RM-76 Microprocessor 59 m
TR-7800 2m FM Xcvr 229 mf
TR-7850 2m FM Xcvr 269 m
PS-5 AC supply/clock 39 f
KPS-7 7A power supply 59 f
TR-2500 2m FM HT 229 m
MFJ
481 Memory keyer $ 59 m
408 Keyer 49 f
8043 Keyer 39 m
MACROTRONICS
IA-650 Interface/Apple $269 m
MICROLOG
AKB-1 Keyboard $169 mfe
AKB-1/CW only 149 f
AVR-2 Demodulator 269 mve
MIDLAND
13-510 2m FM Xcvr $169 e
PANASONIC
TR-930 9" B & W monitor $109 m
RF-3100 SW receiver 189 m
ROBOT
70A Monitor $169 m
80 Camera 129 w
400 Scan converter 329 m
800 Terminal 369 m
SONY
ICF-2001 SW Rcvr $199 mwf
SPECTRONICS
DD-1T Tempo dig display $ 69 w
STANDARD
C-7800 440 FM Xcvr $249 m
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117C AC supply $ 59 v
P-1215 AC supply 19 m
100MX Xcvr 349 m
Astro 150 Xcvr 489 f
PSU-5 AC supply 89 m
Astro 102BX Xcvr 599 m
Astro 103 Xcvr 799 m
PSU-6 AC supply 129 mf
PSU-6A AC supply 129 m
260 Cygnet Xcvr 199 m
270 Cygnet Xcvr 229 wf
350 Xcvr 169 mf
350C Xcvr 269 f
500 Xcvr 229 mf
500C/SS-16 filter 269 m
500CX Xcvr 269 w
HF-700S Xcvr 269 mfc
750CW/SS-16 Xcvr 369 m
250 6m Xcvr 149 f
250C 6m Xcvr 199 mv
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515 Argonaut Xcvr 299 m
206A Calibrator 19 m
208A Ext CW filter 19 m
210 AC supply 19 f
540 Xcvr 299 f
244 Dig display 89 w
580 Delta Xcvr 569 m
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262M AC ps/VOX/meter 89 c
280 Power supply 99 m
670 Keyer 19 m
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FV-301 Remote VFO 89 m
YO-301 Monitor scope 169 f
FT-901DM Xcvr 659 mfcv
SP-901P Spkr/patch 55 v
YO-901P Scope/patr 359 v
YR-901 Reader 369 w
FC-902 250w tuner 139 e
FT-107M Xcvr 569 m
FP-107 Internal ps 99 m
FP-107E External ps 99 m
FC-707 Ant tuner 89 m
FT-102 Xcvr (like new) 829 e
FRG-7 SW receiver 189 we
FRG-7700 SW Rcvr 329 w
FRT-7700 Rcv ant tuner 39 w
FRV-7700A VHF rcv conv 99 mw
FTV-650 6m Xvtr 139 m
FTV-250 2m Xvtr 149 m
FT-221R 2m Xcvr 369 m
FT-680R 6m Xcvr 359 v
CPU-2500RK 2m FM/TTP 229 f
FP-80 4 5A ps 69 v
YC-500S Counter 119 w

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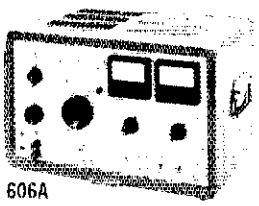
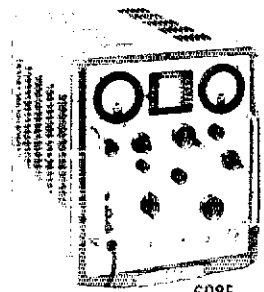


606A



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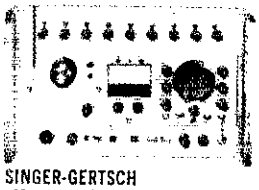

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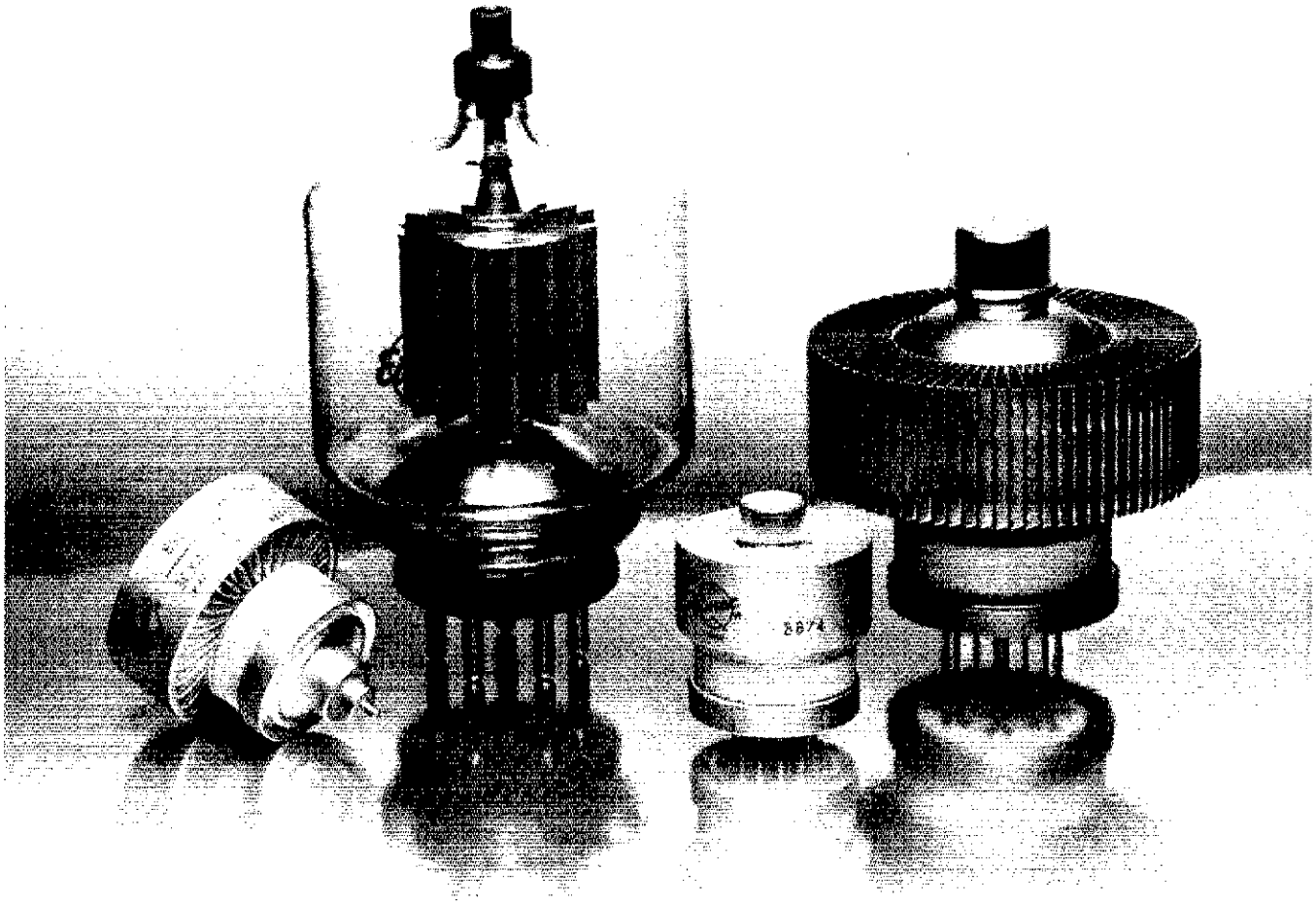

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assisted park officials and county deputies at the event. As usual, K9DRP and the McLean Co. ARES were shining brightly in this year's SET. The drill was made known to 38 agencies and 129 hams in the area. A computer was used to send cw H + W messages to a message center set up in a local shopping mall to gain some community contact. WD9EED also reports that when the Central IL ARC was formed 52 years ago there were only 7 hams in Bloomington. ITN NM KB9X sends word that W9KGT KA9NWO K9AZS W9HBI WB9WGD and N9EM have received ITN certificates for their consistent activity in the last three-month period. KB9X is *looking for* a replacement as NM for ITN. Anyone interested? The Moultrie Amateur Radio Klub in Mattoon is alive and well, holding meetings at their club house in Bruce, IL, on the 3rd Monday of each month at 7:30 P.M. If you're interested in MARK, contact W9LYN for info. Bond Co. EC WB9YVE and his gang provided communications and traffic control for the Greenville HS homecoming parade. Dekalb Co. ARES has installed 2M rigs in all three county hospitals to provide backup comms to existing radio at county ESDA office. Nice pix of EC WB9NPC in the *DeKalb Chronicle*! Logan Co. EC WB9CWE says that the 2M net there has been reactivated. It meets on the 147.945 rptr at 2100 lcl on Thurs. Williamson Co. ARES under EC K9UXK helped police and ESDA in a four-day S + R mission when two hunters failed to return from a scouting trip. Hams were assigned to each search team to provide comm back to the mobile EOC. The 1st Annual IL ARES Seminary was a great success. Congrats to SEC W9QBH for putting together a fine program, and TNX to WA9YXZ (Champaign Co. ESDA Coord) for hosting. Traffic: W9NXG 310, W9JIJ 214, W9HOT 208, KB9X 168, K9MX 156, KD9K 93, W9OK 72, W9TLU 62, N9DR 54, KN9BAM 39, AA9D 36, K9ORP 35, K9GXU 30, W9HLX 29, K9SW 27, WØRJW 26, WA9SHE 24, K9EHP 21, W9LNQ 21, W9KSU 11, WD9CJB 9, WA9RUM 6, KA9NBH 5, W9KR 4, W9HBI 2.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUJ. SOOC: KJ9G. SGLC: WA9BVS. SRC: N9WB. SACC: K9TUS. SCC: W9OBF. STC: WD9ADB. SPRC: K9DIY. NMs: ITN-W9QYY; QIN-KJ9J; ICN-W9JUJ; VHF-W9PMT; IWN-N9BHT; IPN-KO9F; I6SSB-WD9HQJ.

Net	Freq.	Time UTC Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2300	2479	1407	2900	62
QIN	3656	1430/0100/0400	790	436	2340	96
ICN	3708	0015	100	57	662	30
IPN	3910	2130	1165	216	1061	31
IWN	3910	1310	4370	—	531	31
6SSB	50150	0100	422	9	2441	31

Hoosier vhf nets QNI 5791, QTC 282, QTR 6690, bulletins 57 for 25 nets. D9RN 100% 420 messages in 1405 min. for 64 sess. IN stns W9URQ W9JUJ K9CGS KJ9J WB9MIK KB9NR. CAND 1047 messages in 33 sess. D9RN 100%. IN stns W9JUJ W9URQ K9CGS. Silent Key W9HVM. Appts: Section Public Relations Coordinator-K9DIY; Section Technical Coordinator-WD9ADB; Emergency Coordinator-Crawford Co. N9AZC, Hancock Co. K9BRF, Harrison Co. WD9CTB, Hendricks Co. W9TIZ, Jasper Co. N9BLK, Ohio Co. WB9JKU, Stark Co. K9VCM, Jay Co. WB9TYJ, Brown Co. N9CCL, Elkhart Co. AE9U; ORS-N9PS W8LKU KG9K W9CM WD9BHU; OBS-K9TKE KB9NR W9QYY; OO-KA9IRS WD9IZA KC9ED WA9OQT KA9LNW KB9DE. W9JUJ WB9ZQE and I enjoyed the Hoosier Hills Hamfest. I want to thank K9BGF for the fish and KC9ED for the hospitality. WB9ZQE and I talked to the Madison Co. ARC. The new Special Service Club program sounds exciting. Statistically this was our best SET ever. WB9ZQE wishes to thank all who participated. He says it was enlightening and enjoyable. A special thanks to N9AHP for hundreds of messages. All ECs please don't forget your annual reports. The Bloomington ATV rptr is on 439.25, in 425.25 out. They have added an amplifier. DEC K9KTH reports a new EC Net on 78/18 the first Monday of each month at 2330Z. WD9CIV is the new manager of the 3910 Flower Fund. A special thanks to WA9OHX who had been the manager for many years. Congrats to WA9AWG K9BRF and N9CQD for upgrading. The Kokomo DXpedition to Siberia, IN was a great success, thanks to KJ9G N9BLN KA9LNW WA9NWW WD9FZF K9CWG KA9CWB WD9ADB KC9TA W9AIM and W9CNE. I thought W9ZGC's drawing for *Marc Sparks* was very clever. Traffic: W9JUJ 1107, WB9ZQE 393, KJ9J 371, W9URQ 233, WB9UYU 209, W9QLW 180, W9UMH 153, KM9B 119, KA9DHL 95, W9QYY 92, W9EI 91, WB9MIK 79, KK9N 74, W9RTH 57, W9PMT 56, KB9HH 55, KA9FFO 51, KB9NR 49, KB9DE 41, N9AST 37, W9UEM 36, WB9OZZ 28, WD9DWD 26, KA9EIC 26, KK9D 25, N9CQS 25, K9OUP 24, K9FZX 23, K9WWJ 22, K9DIY 19, W9JZV 17, W9DKP 16, K9FVN 15, K9CGS 15, KA9LAU 14, WA9OKK 14, WD9CIV 13, W9UPI 13, KI9R 12, W9XD 12, W9ZGC 12, W9CM 10, K9TKE 10, K9FHQ 8, WA9JNC 8, KJ9G 7, WB9AJY 6, N9DHX 6, W9BDP 5, KA9ENN 5, W9WEI 5, W9KMY 4, W8LKU 2, W9YEW 2 (Sept.) W9WKM 59, W9JZV 29, WD9DWD 28, W9ZGC 8, WD9BDZ 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1115Z QNI 1122, QTC 1269 WB9YPY. BEN 3985 1700Z QNI 567, QTC 193 WB9ESM. WSBN 3985 2200Z QNI 1018, QTC 349 WD9ESZ. WNN 3723 2300Z QNI 195, QTC 34 KA9HPQ. WSSN 3645 2330Z QNI 166, QTC 60 N9BYK. WIN-E 3662 0000Z QNI 372, QTC 174 W9YCV. WIN-L 3662 0300Z QNI 329, QTC 127 K9LGU. XPO 3925 1731Z QNI 250, QTC 9 WA9YVC. NWTN .34/.94 2330Z QNI 514, QTC 47 WB9YPY. Gr. Bay .72/.12 0145Z Wed. QNI 8, QTC 0 WB9NRK. WCWTN .31/.91 2330Z QNI 397, QTC 31 N9AUG. WSBN certificates to N9DIH N9AZI N9BYK KN9P and WB8RGE. New Novices Watertown area KA9OIF KA9OIC KA9OJA and KA9OJE. First snowfall in the state at Morse. KB9CV reported 9 inches October 20 at 6 A.M. Guess that means winter is here. Are you ready for it? I'm not. 1982 SET was a success, thanks go all who participated. The Greater Milwaukee DX Assn's new officers are as follows: K9CJK, pres.; N9AU, v.p.; N9AW, secy./treas. BPL to KA9CPA & WD9NOV has received 73 magazine's "Worked the World" Award. KD9E won first place as single operator of the San Diego Division in the 1982 ARRL DX Contest. K9KVA won first place as single operator for FLARC in the 1982 ARRL DX Contest. N9CKW is now KQ9J. WA9TGL has Extra. Waukesha Swaptest Saturday January 8. Sorry to report W9HA is a Silent Key. In September issue of *QST*, W9VFO was reported to have upgraded. It should have been W9VFD. Traffic: KA9CPA 1691, WD9ESZ 533, W9CXY 370, WB9YPY 243, W9YCV 239, W9IEM 208, W9DND 185, K9FHI 156, K9GDF 147, N9DIH 137, KC9CJ 124, N9BYK 122, W9UCL 111, WA9WYS 93, WD9FRI 90, K9AKG 80, KA9HPQ 78, W9OT 70, KA9IKR 67, WB9NRK 61, KA9BHL 60, AG9G 60, W9CBE 59, N9ATP 48.

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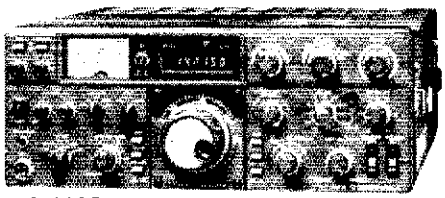
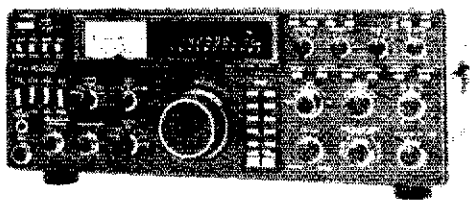


TS-830S



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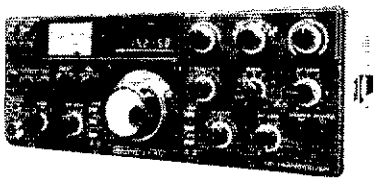

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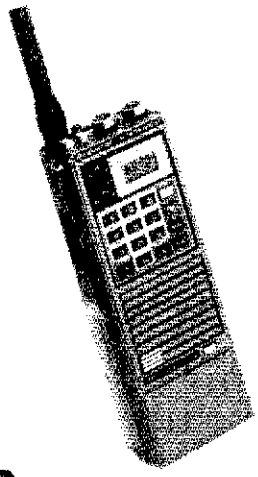

TR-2500/3500
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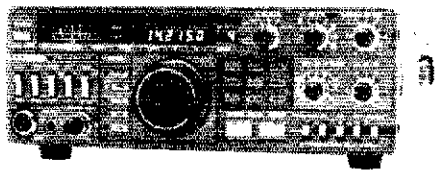
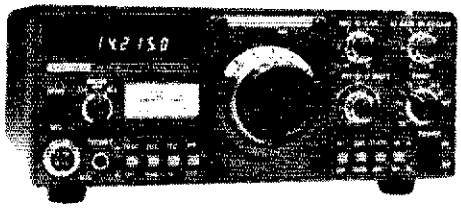
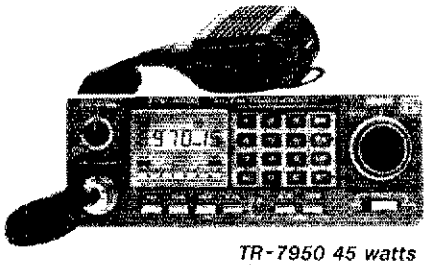


TS-430S

TS-130SE





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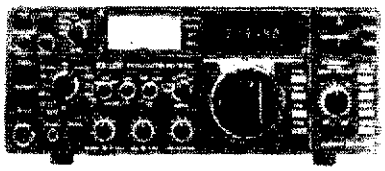

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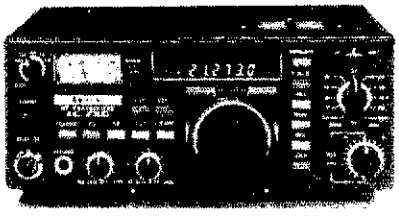

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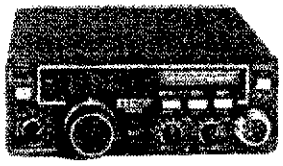

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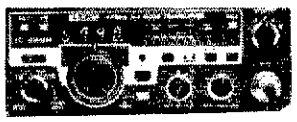

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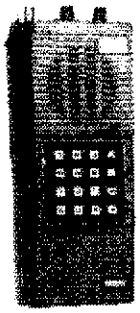

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WB9ICH 46, WB9PKL 46, W9SO 45, W9LDO 44, W9IHW 43, WA9ZTY 41, WB9JSW 36, K9JPS 35, KB9NG 35, WB9JGA 33, N9BCX 30, WB9WNA 29, WA9YVC 28, N9AUG 26, K9HDF 26, WD9BKT 24, N9DCF 24, KB9GO 24, KA9IKR 24, K9UTQ 24, KA9OBP 22, WA9DXW 21, W9FDY 21, KC9GW 20, KA9GYD 20, KG9B 17, WD9IMZ 15, WA9GYF 12, KA9MFV 11, N9BDL 10, KA9BHK 10, WB9TOC 9, W9UW 8, KB9FM 4. (Sept.) W9CXY 273, KA9MFV 6, WA9BZW 2. (Aug.) WA9AJW 9.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — STM: ADØS. SEC: KNØJ. MSSN has a new time. It's now 6 P.M. 3710. Please checkin as often as you can. It's easy and the perfect net to get your feet wet. The St. Paul RC is now sponsoring a Worked All Minn. Award. Please contact P.O. Box 30313, St. Paul, 55175 for details. Congrats to: Novices-KAØPBY KAØPAN; Techs-KAØGMN KAØHGA KAØAXA KAØMPM; Generals-KAØNUG NØCID NØEBT; Advanced-KCØYG. Scotch Hams had a FB Banquet Nov. 12, and have the best newsletter I've seen. The Willmar club also had a full house at their banquet Oct. 13. Thanks for a super evening. I had the pleasure to meet the Moose Lake ARC, a super group and growing. Ask your senator & rep to give support for the HAM PLATES BILL for RVs & trucks. The SET was a fine success tnx to KNØJ & all ECs. New Ulm has a club. Contact NØBMA for info. Where is your SAR? If you handle any traffic, PLEASE send me (ADØS) a Sect Act report by the 5th.

Net	Mgr.	Freq.	Time	QNI	QTC
PICO	WØHZU	3925	8:00 A.M.	5811	1510
MNWX	WAØØNE	3929	6:15 P.M.	565	402
MSPN/E	KCØT	3929	5:30 P.M.	1224	332
MSPN/N	KAØJUX	3945	12:10 P.M.	703	231
MSN/1	W9DM	3685	7:00 P.M.	365	186
MSN/2	KØJCF	3685	10:00 P.M.	224	87
MSSN	WBØWXU	3710	6:00 P.M.	95	17

Traffic: KBØMB 528, WAØTFC 389, WBØHOX 299, KTØU 245, KAØARP 243, KNØJ 232, KAØJUX 225, WØHZU 213, W9DM 204, KAØEPY 182, KAØIAQ 122, NØCLS 119, KØJCF 117, KCØT 92, WØDFX 91, ADØS 80, WØMFW 69, WAØONE 67, KTØR 54, KAØMZJ 40, KCØYG 29, WDØBGS 25, KØCSE 25, KØJP 24, WØGRW 20, NØDUQ 19, KAØJQO 17, NØDFR 13, KØPIZ 9.

NORTH DAKOTA: SCM, Dean R. Summers, KQØC — Minot (MARA) meets 1st Mon. of month in C.D. Room, Ward Co. Court House. Novice classes began Oct. 21 at RRHS Voc. Centre, E. Grand Forks, also in Bismarck Jan. 6 at Ø130Z at State Radio, Fraine Barracks. Moves: KA6JWI KC4VY to MAFB, KAØKOD to Mpls, KØRDF to KC, MO. Upgrades: Extra-KVØC KVØF; Novice-KAØOYP. Harmonics: WAØHHI KBØGX. TRARC & BARK had displays in Nov. Hope everyone had nice holidays, Best Wishes to all for good '83.

Data	3.9965	2330Z Dy
Goose River	1.990	1400Z Sn
NDYL Wx	3.9965	1330Z Dy
ND Slow Net	7.145	2300Z S

Check into a cw net this winter!!!

SOUTH DAKOTA: SCM, Fredric Stephan, KCØOO — WØKJZ appointed ASCM. As always, she will do FB job. Use your radio privilege for volunteer service in a leadership appt. Mobridge Area ARC and Signal Hills ARC both conducting radio classes for license upgrading. SD Emg. net needs your help with emergency planning and practice. Check in also to SD Mng CW Net for cw and traffic training sessions. This is new and needs your support. Medicine Butte ARC had farewell party for W7JER who went to Africa. KØFRE WØKJZ WØHOJ WAØAOY WBØKWX KCØOO and WDØBMS were NTS liaison. They are appreciated. Join them on TEN or DTEN. SD Emg Net 234 QTC, 189 QNI. SD Mng Net 135 QTC, 961 QNI. SD Eve CW Net 61 QTC, 104 QNI. SD Eve Phone Net 31 QTC, 1183 QNI. SD NJO Net 21 QTC, 805 QNI. PSHR: KCØOO WØKJZ. Traffic: KCØOO 187, WØKJZ 133, WØHOJ 124, KØAIE 109, KØFRE 72, WAØVRE 71, WØMZI 54, WAØUEN 53, WØDVB 51, WBØOMF 28, NØCDX 25, KØZBJ 23, WBØRXF 16, WBØLTV 14.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC: WB5IGF, announces the starting of the Arkansas EC Net on Sundays, 5:30 local, on 3995. All ECs and hams interested in emergency communications welcome. Arkansas DX Assn (ADXA) held annual banquet Dec. 4 at Ramada Inn, Ft. Smith. K5YY and W5JM were guest speakers. NWAARC held annual banquet Nov. 13 at Holiday Inn in Bentonville. MARC awards Banquet held Flaming Arrow, LR on Dec. 17. Ark. represented 97% DRN5 by W4AZJ W5TUM AE5L WB5GQH W9YCE W5CYN K5VR8 N5AZH. Razorback Net 861 checkins, 49 traffic. Mockingbird Net 610 checkins 12 traffic. Ark. Phone Net 395 checkins, 43 traffic. OZK Net 107 checkins 24 traffic. Marc Net 21 checkins, traffic. Traffic: AE5L 173, W5QFU 48, W5TUM 39, W5KL 14, W5UAU 11, W5ASD 6.

LOUISIANA: SCM: John Meyer, N5JM — ASCM: KC5SF. STM: W5GHP. SEC: AC5R. Warm up the New Year with old friends at the Hammond hamfest Jan. 15th; fun and talk-in provided by SELARC. KC5JM's noble effort as hamfest chairperson netted her the same job for '83 plus the Prexy position at SARA. Fellow officers are: KD5QS, v.p.; W5LMS, secy.; N5ATK, treas. The Crescent City Traffic Net debuts on .01/.61 courtesy of GNOARC for liaison with lower band nets for worldwide tfc. The Livingston train disaster brought more than 50 LARC and BRARC folks to the rescue with more than two weeks of comms, sheparded over by N5ADF, B.R. EC. Confucius say: "DDXA is gung-ho club with several prized China QSLs in hand BY-golly, plus six Honor Roll members with 306 countries cfmed." Make a resolution that '83 will be your best year as a ham by joining in more activities and public services.

Net	Freq.	Time	Mgr.
LAN	3610	7 & 10 P.M. Dy	KC5SF
LTN	3910	6:30 P.M. Dy	N5ANH
LSN	3703	7:30 P.M. M-F	WD5CWK
LRN	3587.5	6:30 P.M. Sn (RTTY)	W5GHP
CCTN	.01/.61 (vhf)	6:45 P.M. M-F	GNOARC

Traffic: W5LQ 320, K5TL 282, W5GHP 202, KA5HDT 191, KC5SF 144, WD5JFY 80, AC5R 75, WB5LBR 68, WA5TQA 43, N5ANH 36, K5WOD 29, WD5CWK 18, KD5MA 15, WA4MUW 10, KA5NYT 10. (Sept.) WD5JFY 43.

MISSISSIPPI: SCM, Paul Kemp, KW5T — STM: KB5W. SEC: N5DDV. Freq. Coord. KB9TN. The Jackson ARC plans a Novice class in mid-January. Apptd KB9TN as frequency coordinator. Keep him informed on all vhf activities and rptr coordination. N5ATF & KA5NQX heard as regulators on DRN5. N5AMK getting more activity on late MTN. All nets picking up as winter gets us back indoors. CAND (W5KLV) sess. 33, QTC 1047. DRN5

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Your training is built around the latest model of the world's most popular computer. It's the amazing TRS-80™ Model III, with capabilities and features to perform a host of personal and business functions. No other small computer has so much software available for it, no other is used and relied on by so many people. And it's yours to keep for personal or business use.

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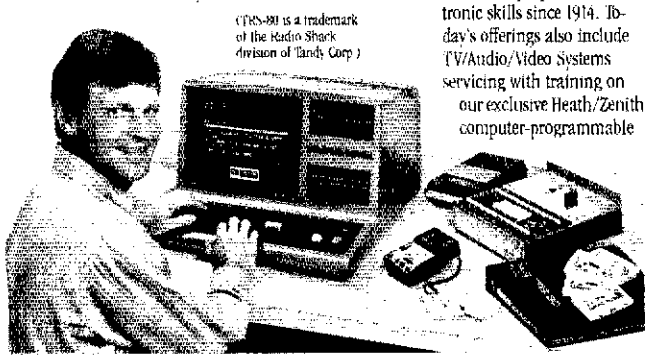

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A4

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For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

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

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

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- Automatic protection circuit for finals under high SWR conditions
- Digital readout • Receives WWV • Selectable AGC
- Up/down tuning from optional microphone
- Handheld microphone standard (no extra cost)
- Optional mobile mount available

ICOM

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

IC-740

Internally Mounted Options

Internal options are provided for the IC-740 to increase its flexibility.

The internal power supply, the EX238, gives the IC-740 portability and also makes a clean looking shack.

With an installation time of under 30 minutes and clear instructions, the IC-EX238 can be installed easily. The EX238 works from either 110 or 220 VAC 50/60 Hz.

The EX242 FM unit allows transmission and reception of FM signals on 10 meters.

A marker unit, EX241, gives clear frequency marking signals at 25 or 100 KHz, selectable by top panel switches.

With the installation of the **EX243 electronic keyer and optional filters,** the IC-740 becomes a compact, complete CW station.

Filtering
Control in Center Position

	Modes Of Use	6dB Bandwidth	60dB Bandwidth
Standard Filtering IF Shift Mode	CW/RTTY/SSB	2.4	4.5
Standard Filtering PBT Mode	CW/RTTY/SSB	2.2	3.6
Optional FL44 with Standard PBT Filter	CW/RTTY/SSB	2.2	3.0

Optional Filters

	Use	Center Frequency	6dB Bandwidth	60dB Bandwidth
FL44	SSB/CW/RTTY	455.0KHz	2.4KHz	4.2KHz
FL45	CW/RTTY	9.0115MHz	500Hz	1.6KHz
FL54	CW/RTTY	9.0115MHz	270Hz	1.1KHz
FL52	CW/RTTY	455.0KHz	500Hz	820Hz
FL53	CW/RTTY	455.0KHz	250Hz	480Hz

ICOM
The World System

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IC-740

Extensive Versatility for the Serious Operator

The IC-740 from ICOM contains all of the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator.

Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

Features of the IC-740 receiver include variable width and continuously adjustable noise blanker, continuous, adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two built-in VFOs for the serious DX'er.

The IC-740 allows maximum transmit flexiblility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

See and operate the versatile and full featured IC-740 at your authorized ICOM dealer.

Options include:

- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9MHz IF Filters for CW
- 3 - 455 kHz Filters for CW
- Internal AC Power Supply

Accessories.

- SM5 Desk Microphone
- UP/DWN Microphone
- Linear Amplifier
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner

ICOM

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Multimode Mobile Magic

IC-290H & IC-490A

ICOM's latest state of the art 2 meter and 440MHz multimode transceivers.

IC-290H

25 Watts of Power. A full 25 watts in all modes gives extra communication range in the IC-290H.

Green LED Readout. For improved readability in bright sunlight.

Dual VFO's. Provide ease in marking frequencies. Tuning rates are 5KHz in FM, 100Hz in CW and SSB, and 1KHz with the tuning speed button pushed.

Priority Channel. Any memory channel can be monitored for activity on a sample basis, every 5 seconds, without disruption of a QSO conducted on a VFO frequency.

Adjustable Power Levels. Both the hi and lo power levels are independently adjustable for meeting simplex or amplifier input requirements.

Squelch in All Modes. Standard noise squelch in FM and AGC derived squelch for CW and SSB reduce fatigue factors and allow scanning silently while looking for band openings or satellite signals.

Multimode Capability. FM, SSB, and CW modes provide solid communication modes for repeater, simplex, satellite or the CW enthusiast. Sidetone is provided on CW.

Adjustable Duplex Splits. Offset may be changed from its initial value by pressing the priority button while in VFO mode, then rotating the main tuning knob. The offset is displayed on the frequency readout.

Scanning (S/S). Memory scanning and full or programmable band scan are standard features. Internal switches select busy/empty modes, adjustable delay or carrier operated resume, and full or program band scan.

Memory Backup. The optional, heatsink mounted, BU1 memory backup battery option provides retention of memory when moving the transceiver from one power source to another.

Touchtone™ Microphone Supplied. Each unit comes with a touchtone® microphone as the standard unit microphone.

IC-490A

The operational characteristics of the IC-490A are the same as the IC-290H except for the features outlined in the following chart.

		IC-290H	IC-490A
Freq. Range (MHz)		143.8-148.199	430.0-439.999
Power	Hi	25	10
	Lo	1	1
Memories		5	4
Initial Offset		600KHz	5MHz
1MHz Up Button		Not Req'd	Yes
Normal Tuning Rates (KHz)	FM1	5	5
	FM2	Not used	25
	SSB	0.1	0.1
	CW	0.1	0.1

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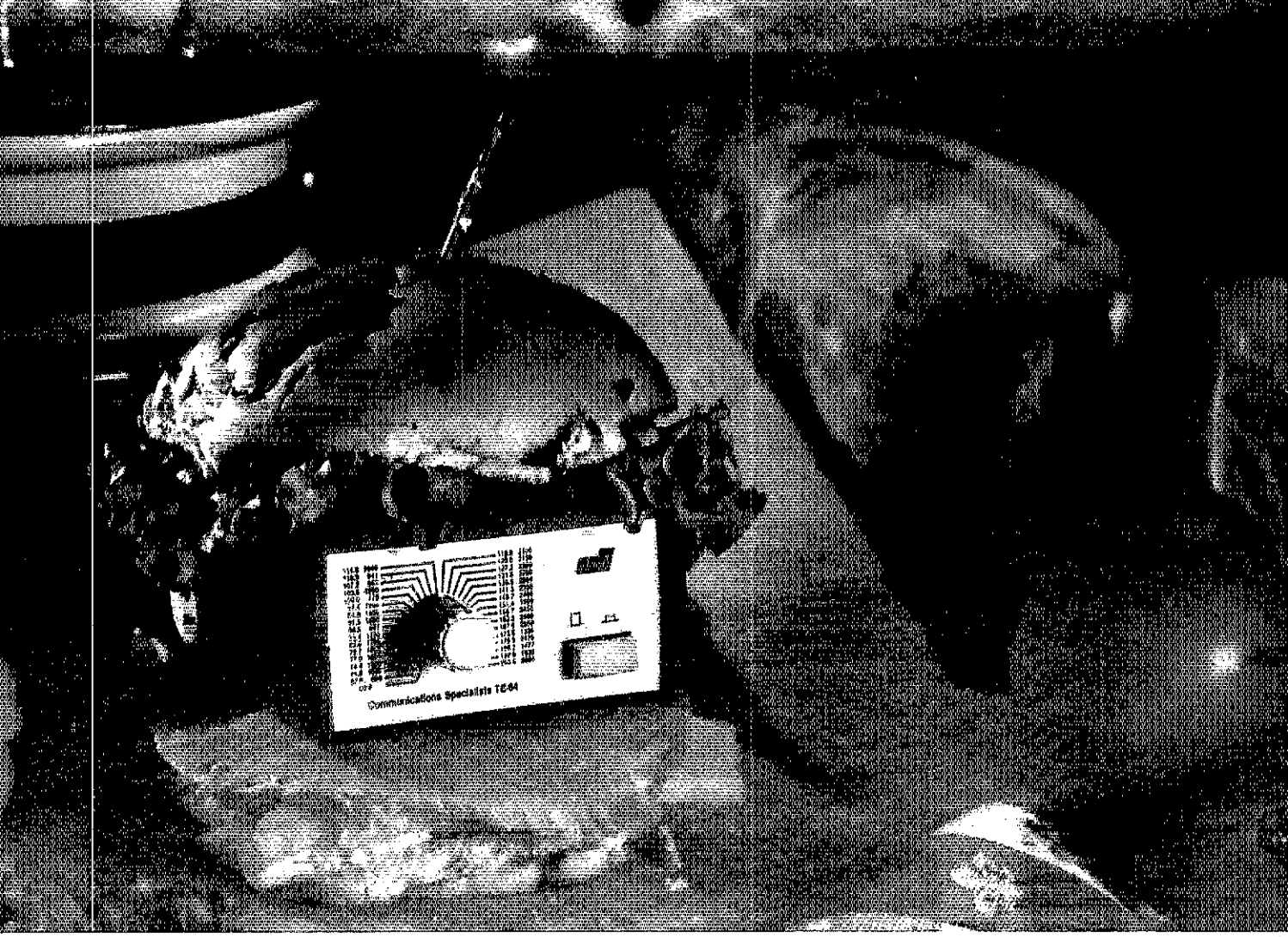

Food for thought.

Our new Universal Tone Encoder lends its versatility to all tastes. The menu includes all CTCSS, as well as Burst Tones, Touch Tones, and Test Tones. No counter or test equipment required to set frequency-just dial it in. While traveling, use it on your Amateur transceiver to access tone operated systems, or in your service van to check out your customers' repeaters; also, as a piece of test equipment to modulate your Service Monitor or signal generator. It can even operate off an internal nine volt battery, and is available for one day delivery, backed by our one year warranty.

- All tones in Group A and Group B are included.
- Output level flat to within 1.5db over entire range selected.
- Separate level adjust pots and output connections for each tone Group.
- Immune to RF
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak
- Instant start-up.
- Off position for no tone output.
- Reverse polarity protection built-in.

Group A

67.0 XZ	91.5 ZZ	118.8 2B	156.7 5A
71.9 XA	94.8 ZA	123.0 3Z	162.2 5B
74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 1Z	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
85.4 YA	110.9 2Z	146.2 4B	192.8 7A
88.5 YB	114.8 2A	151.4 5Z	203.5 M1

- Frequency accuracy, ± .1 Hz maximum - 40°C to + 85°C
- Frequencies to 250 Hz available on special order
- Continuous tone

Group B

TEST-TONES:	TOUCH-TONES:	BURST TONES:			
600	697 1209	1600	1850	2150	2400
1000	770 1336	1650	1900	2200	2450
1500	852 1477	1700	1950	2250	2500
2175	941 1633	1750	2000	2300	2550
2805		1800	2100	2350	

- Frequency accuracy, ± 1 Hz maximum - 40°C to + 85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

Model TE-64 **$79.95**

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(WB5YDD) sess. 33, QTC 457. MTN (K5OAF) sess. 31, QNI 207, QTC 87. MTN/Late sess. 31, QNI 62, QTC 24. MSBN (N5DSK) sess. 30, QNI 2473, QTC 67. MN/RACES (WB5RMW) sess. 30, QNI 499, QTC 10. MSN (N5ERX) sess. 19, QNI 110, QTC 22. RACES/ARES (WB5RMW) sess. 5, QNI 74, QTC 1. GSEN (KB5W) sess. 22, QNI 511, QTC 58. CAEN (KA5AGD) sess. 5, QNI 140, QTC 5. Traffic: KB5W 472, N5AMK 389, K5OAF 173, N5RN 164, KD5P 69, W5WZ 41, N5EZQ 38, KT5Z 19, W5LSG 18.

TENNESSEE: SM, John C. Brown, NO4Q — STM: K4YOL. SEC: K4TKQ. SGL: W4WHN. ACC: WA4GLS. The other slots in the new organization are not yet filled. Hope to have them filled soon. W4VQE is the temporary net manager for the RTTY net. Look for the net to change to 0130 UTC. This will not have any of the nets competing with each other. Hope you RTTY operators will take time and participate in this mode of net operations. Have been listening on the new 10 MHz band. I am sorry to say that many of the operators are NOT staying out of the zone 10.109 thru 10.115. That is asking for trouble and the FCC has so indicated. Enjoy it, but do not abuse it. That goes for all frequencies. NG4J and W4ZJY are the BPL winners this period. That is a lot of traffic: The CW net honor roll has been missing for the past three months, but is as follows-W4WXH (3), W4DDK (2), W4ZJY (2), NS4X and K4WOP one each. Net managers for five (5) nets did not get their reports in this time. When reports are not given to the STM, you are not getting credit for the fine work your people are doing, so how about sending one in. Traffic for this period is LF-sess. 69, QNI 3704, QTC 188; VHF-sess. 88, QNI 2260, QTC 643; CW-sess. 74, QNI 367, QTC 228; RTTY-sess. 27, QNI 53, QTC 4. It should be noted that only 28 station activity reports were received. I know that there are many that don't think their activity counts. It takes the effort of many to make up the section's activity, so how about sending in your activity. Would like to include it in this section. Remember the Section Communications Manager is now the SECTION MANAGER. All other titles are the same. Traffic: W4ZJY 1216, NG4J 844, W4DDK 198, K4WWQ 147, KA4BSG 117, K4WOP 107, N4MRD 96, N4EAM 91, K4YOL 75, K4VM 69, NN4D 53, KE4OL 46, NM4W 42, K4AMC 33, NN4S 25, W4PFP 22, WA4UCE 17, WD4GYT 17, W4TYV 15, KE4LS 12, W4PSN 10, W4EWR 9, NQ4Y 6, KE4EO 5, KA4USF 3, K4VMW 2, NG4X 1. (Sept.) K4AMC 28.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: KA4MIC.

Net	Freq.	Time/Day	QNI	Tfc.	Sess.	Mgr.
KRN	3960	0830 M-F	528	32	21	WA4IUW
MKPN	3950	0830 Dy	1197	145	31	KA4SAA
KTN	3960	1900 Dy	1218	159	31	WD4BSC
KNTN	3727	1900 Dy	434	128	41	KB4OZ
KYN	3600	2000 Dy	201	135	32	WD4IYI
KSN	3600	Dy	208	120	33	KC4WN

19 public service nets reported QNI of 5494 QTC 1155. D9RN 100% PSHR: KB4OZ KA4SAA KA4GFU WA4YPQ KA4MTX KA4BCM KD4TY WD4BSC WA4JTE WA4SWF. New appt! SEC is KA4MIC in Williamsburg. Support him and check into the KEN each Wed. following the KTN. SET big success even if it did take four hours for N4COT to find our lost balloonist. Traffic reports starting now will all go to KA4GFU/STM. Traffic: WA4JTE 277, KA4SAA 242, KA4GFU 223, WA4SWF 206, KB4OZ 138, NW4P 131, KC4WN 117, WD4IYI 106, WD4BSC 71, K4AXE 69, W4WQV 67, KA4MZY 54, KD4SN 51, K4MHL 43, KA4BCM 41, WA4EBN 40, WA4YPQ 39, WA4AGH 35, WD4IYH 33, NZ4L 33, K4HOE 32, KA4SKV 31, KA4MTX 27, WA4JAV 26, KA4MBF 25, WD4CJQ 24, KZ4G 24, KD4TY 24, WA4AVV 17, W4OYI 16, KA4GBZ 15, WB4AUN 12, N4GD 12, NN4H 10, WD4CQF 8, WA4JDJ 6, KA4ADF 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: WD8RHU. DECs: K8BTH N8CUH WD8IXZ WD8MBB W8VWY. NMs: WA8DHB N8DSW K8LNE K8KMQ K8KQJ W8QHB W8SCW KV8U W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc.	Sess.	Mgr.
MITN*	3953	1900 Dy	718	391	31	K8KQJ
OMN*	3663	1800 Dy**	1239	334	98	KV8U
MACS*	3953	1100 Dy**	575	274	31	K8LNE
UPN*	3922	1700 Dy	656	203	41	WA8DHB
MNN*	3722	1730 Dy**	404	162	64	N8DSW
GLETN	3932	2100 Dy	1087	136	31	WD8IBY
WSSBN	3935	1900 Dy	504	43	31	WB8SUR
TASYL	3922	1900 M	16	4	3	KM8E
BR	3930	1730 M/S	—	—	—	WB8ZGP
MEN	3930	0900 Sn	—	—	—	WB8ZGP

*NTS nets. Times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. Vhf nets 6 rpts, QNI 326, tfc 132, sess. 30, WD8RHU mgr. 3932 is MI emer. freq. ARES net Sn, 3932, 1730. Traffic Workshop Sn, 3953, 1600. Silent Key, with deep regret: K8LIQ. MI's longest-in-service EC, WA8AXF, retired after 18 years of excellent work for Emmett and Charlevoix Counties. His place is being taken by WD8MJB. WB8VWK is new EC for Montcalm Co. WD8NKT, former Vhf activities manager, has moved to TX. New ORS: WB8WKQ. L'Anse Creuse ARC claims members in five foreign countries. Can any club top this? LCARC also wins the MCRC's Ivory Olinghouse Field Day Award for the second straight year. The U.P. Hamfest will DEFINITELY be held in Marquette. The host club, Hiawatha ARC, will be celebrating their 50th year, and the originally announced Copper Country club graciously withdrew their bid for 1983. Should be a good one. Preliminary figures indicate excellent activity in 1982 SET. Except for the expected traffic overflow on Sunday, we held the line on making it a one-day affair, with many expressing appreciation for this. Whether any records were established is unimportant. The overall quality of the local exercises was what impressed me. Involvement of served agencies was stressed, as was public information. And there were many new callsigns heard on the hf traffic nets. All the hard work and good advance planning by our SEC and STM paid off handsomely. Good show! BPL for AF8V. Traffic: AF8V 738, KA8CPS 423, WB8WKQ 422, WB8MTD 347, WB8YDZ 266, WD8RHU 264, WA8EFK 248, N8DSW 217, K8KQJ 199, WA8DHB 183, N8DTZ 179, WD8LRT 169, N8BNC 161, WD8IXZ 150, K8GXV 106, W8DT 98, W8QHB 88, KB8GT 87, K8UPE 86, WD8MJB 85, W8RNQ 78, K8KMQ 72, W8YIQ 72, KA8NCR 70, KF8M 65, N8DNC 61, WB8SYA 55, WD8EIB 54, W8IHX 52, W8VIZ 48, KU8H 46, KV8U 46, WB8SIW 43, W8YY 42, KE8X 41, K8OCP 40, KA9JFM 36, WD8OUQ 36, W8SCW 33, K8LNE 32, WD8ILV 30, KT8G 28, N8EGK 18, WB8POL 18, WBJXJ 16, N8BBY 14, WB8YRY 13, KI8Q 12, KN8I 11, WB8ITT 11, WD8ROK 11, W8HIN 10, W8LDS 10, WB8TTA 10, W8VPW 10, KS8P 9, N8CQA 7, W8URM 6, K8DD 4, KR8L 4,

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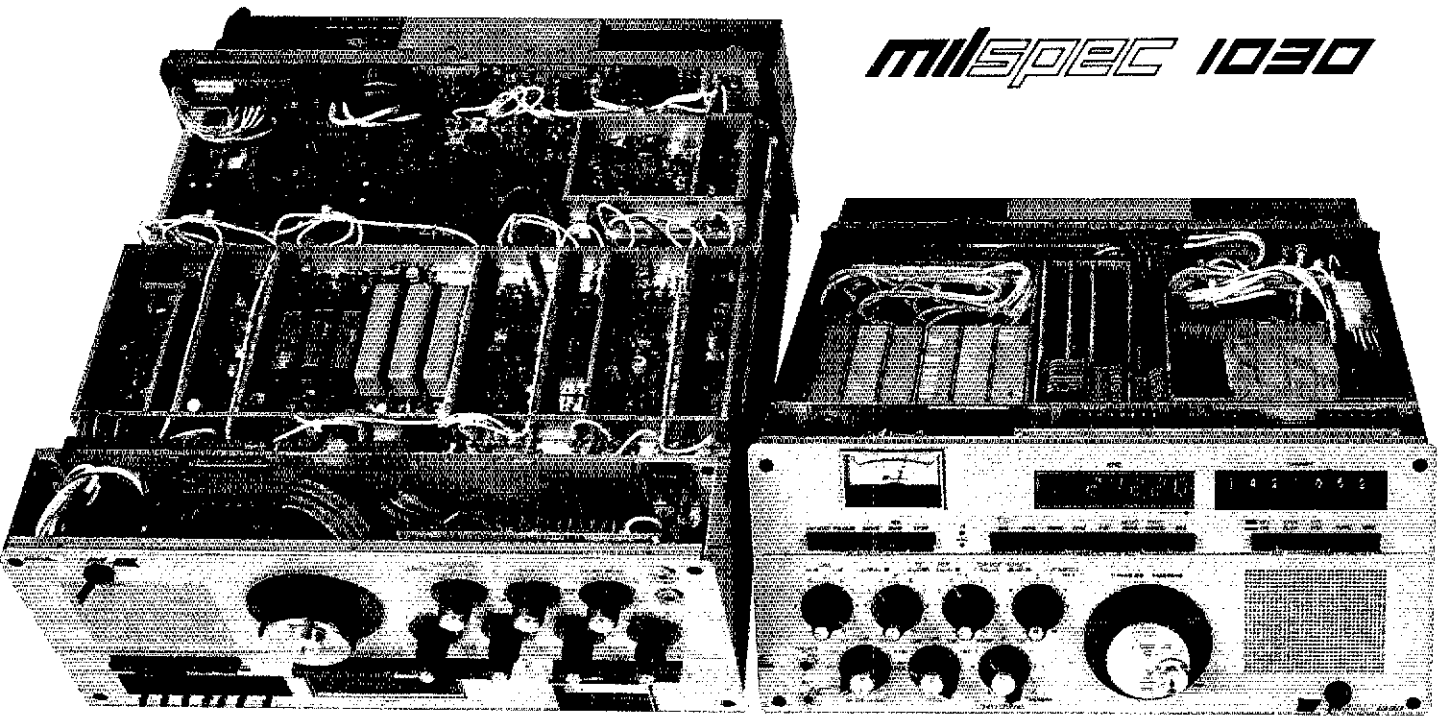

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●**Fully Synthesized General Frequency Coverage:** 10 kHz — 30 MHz in 1kHz,100 Hz or 10 Hz steps; tunable with encoder or thumbwheel preset, stability of 1 Hz/C°.

●**Lever Switch Frequency Pre-Set:** Provides instantaneous band change;sets to within 10 Hz;automatically returns to Tuning A/B. The fastest and most convenient method of frequency entry and recall with additional digital display and memory, **TUNING C**, make this superior to keyboard systems.

●**New Synthesizer Technique:** 120 dB/Hz phase noise close to carrier; extensive CMOS circuitry used for improved spectral purity and great reduction of digital noise—a problem that plagues other HF transceivers causing unwanted mixing products—that insures weak signals will not be covered by internally generated noise due to adjacent strong signals.

●**Real Time Frequency Acquisition:** Not multiplexed, unique synthesizer design allows frequency jumps of 30 MHz in 10 milliseconds, useful in military surveillance applications that demand ultrafast synthesizer switching.

●**Remote Control and Programability:** Permits transceiver use in computer based communication systems. (Optional interface req.)

●**Unequaled Receiver Dynamic Range and Front End Selectivity:** + 20 dBm, 3rd, order intercept point and .25 uV sensitivity offer the best immunity to strong signal overload currently available to the commercial and amateur market. Specially developed high level monolithic, double quad balanced mixers combined with low synthesizer phase noise and up-conversion to 40.455 MHz 1st. I-F thru 8 pole Crystal Cross Mod. Filter with a ± 4 kHz bandwidth, designed for low intermodulation distortion products, makes this performance possible.

●**Synthesized Passband Tuning:** 1st. and 2nd. I-F tune in 10 Hz steps over ± 5 kHz range with respect to 1st. and 2nd I-F filter passbands, a unique dual passband feature for maximum interference rejection. Controlled by tuning A/B.

●**Collins/Rockwell® Mechanical Filters:** For maximum selectivity and ultimate rejection performance. Demanded in most military/commercial applications. 2.1 kHz (USB/LSB), each selected for optimum performance on SSB, cascaded with front end VHF 8 pole crystal filter, active I.F. notch filter, passband tuning and noise blanker deliver 16 pole, 1.4:1 performance (6/60 dB) and add up to the most powerful anti-ORM system available.

●**Noise Blanker:** Pre I-F blanker with adjustable threshold and 80 dB dynamic range; gating effectively placed in receiver RF path and triggered by pulsed noise such as over-the-horizon radar.

●**I-F Notch Filter:** Active 300 Hz notch in 2nd. I-F. Adjustable ± 1.5 kHz with 40 db rejection. Receiver AGC not affected by notched-signal.

●**High Power Transmit System:** Motorola® high power final amplifiers with 150 watt CW/SSB output or 200 watt option.

●**RF Speech Processing:** Clipped transmit RF signal is passed through mechanical and crystal filters for unequaled SSB talk power and elimination of unwanted intermodulation distortion products. This is a preferred process and considered superior to audio type processors.

●**QSK CW Full Break-In:** Vacuum relays and 200 Hz filter offer a superb full break in CW System

●**Construction:** All circuit boards, including synthesizer modules, plug-in; ribbon cable interconnection and Minisert® sockets for transistor and IC replacement insure ease in self servicing; military and computer grade components used exclusively.

RECEIVER PERFORMANCE

Sensitivity: .25 uV (—118 dBm or better) for 10 dB S/N ratio at antenna input 1.6-30 MHz (2.1 kHz width in SSB).

Selectivity: 1st. I-F: 40.455 MHz ± 4kHz @ -6 dB, 1 dB ripple, 8 pole crystal filter.
2nd. I-F: 455 kHz mechanical filters, @ 3 dB.

Standard:	Optional:	
USB 2.1 kHz	CW2 .375 Hz	AM 5.8 kHz
LSB 2.1 kHz	CW2 .200 Hz	AFSK/LSB 300 Hz
CW1 1.9 kHz	(extra steep skirts) (CF high tone pair)	

Mixers: Specially developed, high-level, monolithic double balanced mixers with hot carrier diodes used in first and second mixer stages.

Intermodulation Distortion: (typical) 3rd. order input intercept point + 20 dBm for separated signals of 20 kHz;
2nd. order IMD is —80 dB.

Cross Modulation: Unmodulated wanted signal of 100 uV together with a modulated (30% at 1 kHz) unwanted signal of 100 mV spaced 30 kHz apart produces 10% Cross Mod

Blocking: Attenuation of a wanted AF signal of 50 uV and caused by an unmodulated unwanted signal of 1V spaced 30 kHz apart then produces 3 dB blocking.

IF and Rejection: 80 dB

Synthesizer Phase Noise: Mean S/N ratio of 1st. L.O. (typical, reference to 1 Hz bandwidth); 90 dB measurement 1 kHz from carrier; 135 dB measurement 20 kHz from carrier.

TRANSMIT PERFORMANCE

Power Amplifier: Solid state, broadband 1.6 — 30 MHz 150 W or 200 W (high power option) CW/PEP output keydown all bands and modes. Automatic power cutback under excessive VSWR conditions. Heavy duty Hypersil® transformer for exceptional regulation and power. For continuous full power "key down" operation, blower option required

Third Order Intermodulation Distortion: 25 dB below each of two tones at full PEP output.

Unwanted Signal Suppression: Carrier: —50 dB min; undesired sidebands, 1 kHz —55 dB min; harmonic (all: —40 dB 10 log of mean power output; mixer products: —50 min.

GENERAL

Frequency Coverage: 10 kHz to 29.9999 MHz receive; 10 kHz to 1.6 MHz at reduced sensitivity, 1.6 to 29.9999 MHz transmit.

Frequency Control: Memory provides **split tuning A/B** — using opto-electrical shaft encoder tuning in increments of 1 kHz 100 Hz and 10 Hz (180 kHz, 18 kHz, and 1800 Hz/360° respectively), selectable with front panel push buttons. **Tuning C** — preset frequency settable to 10 Hz with front panel lever switch, frequency entered by set button,display and BCD registers updated

Memory:— frequencies stored in any of 9 memories, recalled for Tuning A/B frequencies with read push buttons; frequencies from Tuning A/B or C entered into memories with Auto Write or Write push button

Stability: 1 ppm/month, 1 Hz/C°; 1 ppm after 15 min. warm-up at 25°C typical. For more demanding requirements, high stability reference oscillator option available — will meet military and commercial standards for specialized data transmissions.

Modes: USB, LSB, CW, AFSK, AM — receive. USB, LSB, CW AFSK/LSB — transmit.

Remote Computer Control: via rear panel 60 pin connector
1. BCD (1-2-4-8) 12 V CMOS parallel command for:
A. Frequency / handshake 2. Pulse input to drive shaft
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C. Bandpass tuning 3. AGC output
D. BFO tuning 4. Receiver mute command

Power Supply: Built-in heavy duty AC/DC supply. 115/230V ± 5%, 50 to 400 Hz, 12 to 15 VDC at 40 AMPS max., negative ground. 120 W max. in receive, 600W peak at full transmit input. Thermal and current overload protection.

Size: 16.2" wide, 7.8" high; 17.8" deep. **Weight:** 50 lbs.

Specifications are subject to change without notice or obligation.
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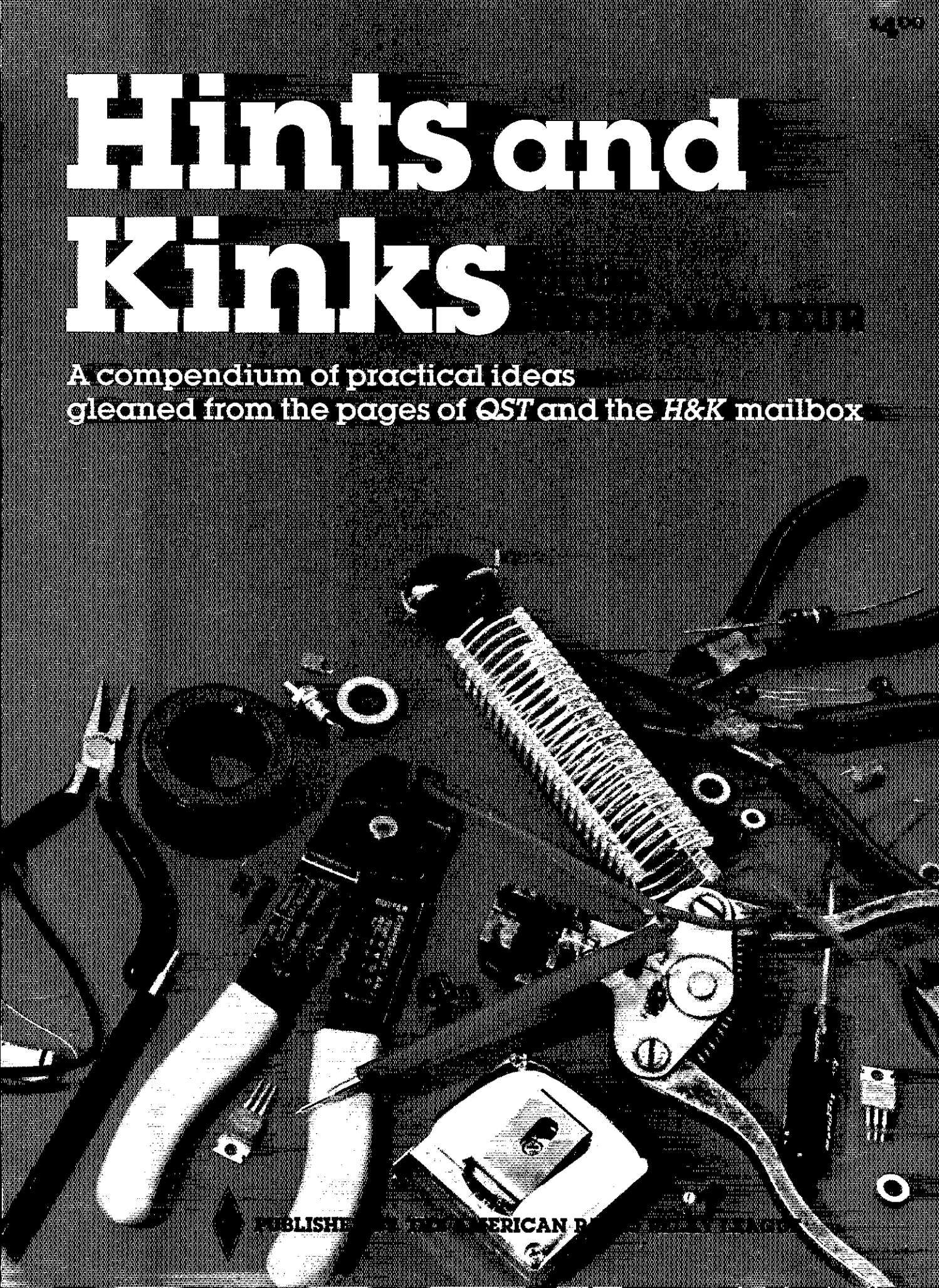
Hints and Kinks

A compendium of practical ideas
gleaned from the pages of *QST* and the *H&K* mailbox



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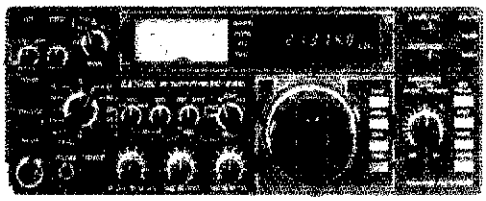
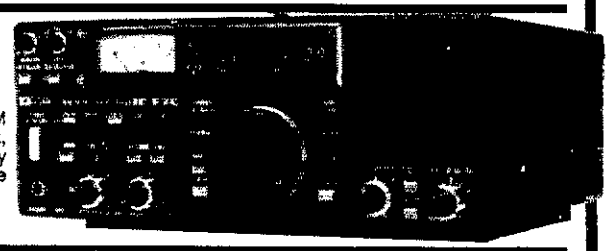


NEW IC-740

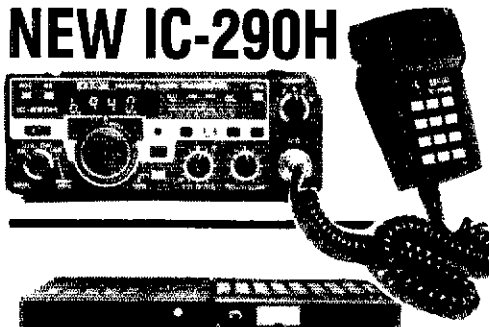
contains all of the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator. Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

NEW IC-R70

Features: squelch on sideband, adjustable width noise blanker, adjustable speed AGC, passband tuning as standard, and adjustable notch filter as standard. Other features are high stability, synthesized tuning and 3 tuning speeds, optional AM/FM mode, variable CW filter widths, dial lock, two VFO's with data transfer, plus many others. Also, the IC-R70 will operate transceive with the IC-720A.



NEW IC-290H



The IC-290H features a powerful 25 watt output and a highly sunlight readable green readout, in the same compact package as the IC-290A. Other features and styling of the IC-290H are the same as the previous model - the IC-290A.

FEATURES

- 5 memories - store your most worked frequencies.
- Call channel - your favorite frequency instantly available.
- 5/KHz FM tuning or 1KHz/100Hz tuning on SSB.
- FM/USB/LSB/CW modes.
- Programmable offsets.
- Priority channel - monitors 2 frequencies.
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IC-2KL 160 - 15 meter solid state linear amplifier. For use with the IC-701, IC-720A, or IC-730, 500 watt CW out. Includes matching power supply.

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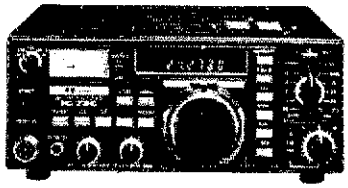

The **IC-730** is truly a superior grade transceiver at an affordable price.

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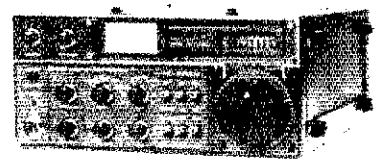
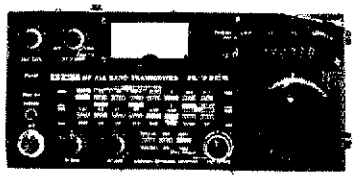
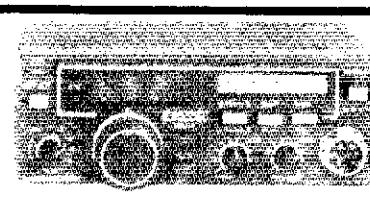


The **IC-251A** has excellent sensitivity and crystal filters having an exceptional shape factor giving good selectivity. Includes AC Power Supply.



ICOM's **IC-720A** is a superior quality HF transceiver. Whether you are a radio amateur, a shortwave listener, or a mariner, you will find the **IC-720A** has features that no other transceiver offers in such a small compact size.



The **IC-25A** is truly a step forward in 2-meter transceivers and its compact size and affordable price makes it the best buy in 2-meter HF mobile.

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At Ameritron we build reliability into all our products. The SPR-8 Studio Processor gives you studio quality sound in a natural way. The RCS-8 Remote Coax Switch allows you to *instantly* switch up to 5 different antennas, using a single coax without leaving the comfort of your shack.

Shouldn't your equipment give you performance and economy? Shouldn't it be built by Ameritron?

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There is no other 1200 watt linear on the market today selling for $699.50 to offer full break-in and all WARC bands and a one (1) year limited warranty.

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- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.
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- **FULL 16-KEY TOUCHTONE® PAD:** Keyboard functions as autopatch when transmitting.
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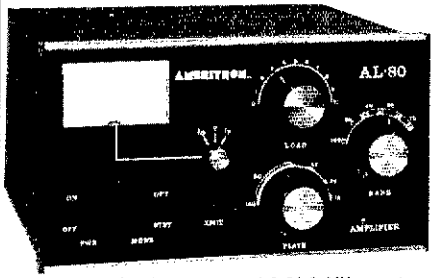
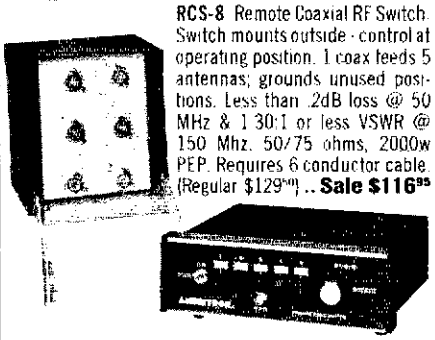
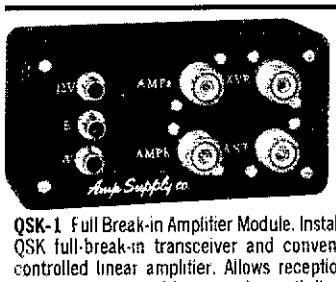


AL-80 Linear Amplifier. Covers 1.8-21.5 MHz amateur bands with wide coverage for MARS, etc. 1200+w PEP SSB, 1000w CW/RTTY/SSTV; QSK full break-in. (1) 3-500Z (included). 50 ohm tuned input, minimum 65w drive. 120vac @ 20A/240vac @ 10A. 12"w × 6½"h × 11¾"d, 43 lbs. (Regular $649.50) ..... **Sale $584.95**

SPR-8/MC-8 Speech Processor with Microphone. Boosts average SSB output power and readability without increasing distortion or causing splatter. Connects to mic. input; no modifications. In/out switch & level control. 9-15vdc, w/9v batt. 4"w × 2¾"h × 4½"d. (Regular $119.50) ..... **Sale $108.95**

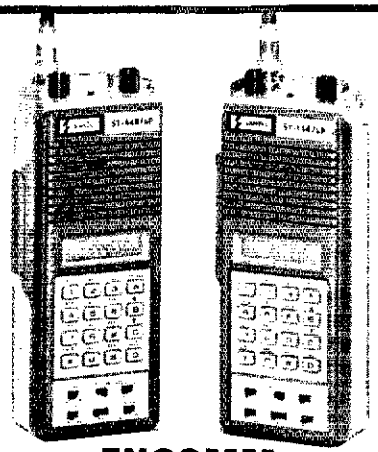


RCS-8 Remote Coaxial RF Switch. Switch mounts outside - control at operating position. 1 coax feeds 5 antennas; grounds unused positions. Less than .2dB loss @ 50 MHz & 1.30:1 or less VSWR @ 150 Mhz. 50/75 ohms, 2000w PEP. Requires 6 conductor cable. (Regular $129.95) .. **Sale $116.95**



Amp Supply Co.

QSK-1 Full Break-in Amplifier Module. Installs between a QSK full-break-in transceiver and conventional, relay controlled linear amplifier. Allows reception of signals between transmitted keying pulses with linear in operation. Conversation-like CW QSO's at a full KW; no modifications to transceiver or linear..... **$59.50**



ENCOMM

SANTEC ST-144uP & ST-440uP

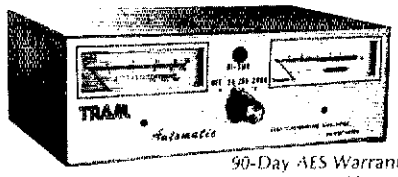
Features: Wideband - (2m) 142-149.995; (UHF) 440-449.975 MHz.; Output: 3w, 1w or 100mW; 500 mA/Hr Nicd pack, 8-AA; C-MOS Computer & LCD; 10 memory channels (9 with offset memory, 1 simplex programmable offset & scan limit); Priority Memory Scan, Programmed Band scan; Lock switch; 16 key Touchtone™ pad; 600 kHz offsets (5 MHz UHF); 24-hr clock; 3"w × 6¼"h × 1¼"d, 1.4 lbs. With NiCd battery pack, flexible antenna & 16-hr wall charger.

ST-144uP 2m HT (Reg. $359) ..... **Sale $289.95**
ST-440uP 440 HT (Reg. $399)..... **Sale 299.95**

Accessories:

ST-LC Leather case	$29.95
ST-500B3 Extra battery pack	24.95
ST-MC Mobile charger/power cord	9.95
ST-6BC base charger	29.95
ST-EMC External microphone connector	6.95
SS-32 32 tone CTCSS encoder	29.95
SM-3 Speaker/microphone	34.95
MC-50S Remote speaker w/2.5mm plug	14.95
ST-EC External charge adaptor	4.95
ST-SS Shoulder strap	5.00
ST-WC Extra wall charger	9.95

ST-7/T 2.5 watt 440 HT with battery pack, charger, TTP & flexible antenna (Reg. $349.95)..... **Sale $249.95**

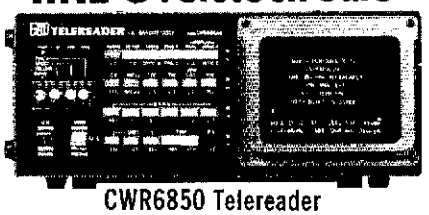


90-Day AES Warranty

TRAM SWR/Wattmeter Fully automatic, self-calibrating - no adjustments to make. Dual illuminated meters show both watts out and actual VSWR -simultaneously! 1.8-30 Mhz; 0-20, 0-200 & 0-2000w ranges; 5% accuracy; only 10% of full scale power required for VSWR; 3:1 warning light, remote RF sensor w/50" cable. AC adaptor supplied, or use 6 "C" cells. 7¼"w × 2¾"h × 5½"d. Original AES price - $119.95. **SAVE $50.....Closeout $69.95**

VISA MasterCard

HAL Overstock Sale

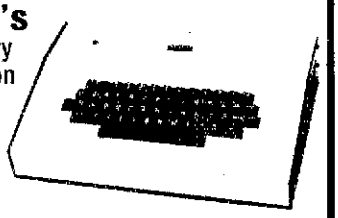


CWR6850 Telereader
Portable Terminal w/5" CRT & Keyboard
Reg. $995 - **Special Sale $849.95**

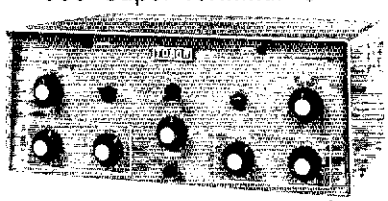
CT2100 Communications Receive Terminal
Reg. $845 - **Special Sale $689.95**

ROBOT's Inventory Reduction Sale

New **Lower** Prices!



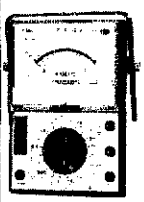
800 Super Terminal - **$447.50**



400 SSTV Scan Converter - **$397.50**

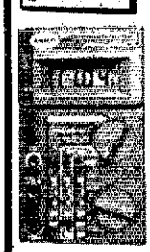
YAESU FT-208R 2-meter Hand-Held Transceiver
New Low Price **$269.95**

MICROLOG AVR-2 CW/RTTY/ASCII Demodulator
Closeout Price **$399.95**



AMECO Multimeters

M-300 Large (3¼"w × 2½"h) meter with easy to read scales and parallax mirror. 20K ohms/V DC & 10K ohms/V AC. **DC-volts:** 0-0.25, 1, 2.5, 10, 25, 100, 250, 1000. **AC-volts:** 0-10, 25, 100, 25 & 1000. **DC-current:** 0-50, 500uA, 5mA, 50mA, 500mA. **Ohms:** 0-6K, 60K, 600K, 6M. 5½"h × 4¼"w × 1½"d, 9.2 oz. With test leads and battery..... **$28.95**



D-200C LCD Digital type with 3/8"high, 3½ digit display. 10 meg. input-Z. Automatic polarity & zero, Over-range & low-battery indication; Overload protection. **DC-volts:** 0-200mV, 2, 20, 200 & 1000. **AC-volts:** 0-200, 750. **DC-current:** 0-200uA, 2mA, 20mA, 200mA, 10A. **Ohms:** 0-200, 2K, 20K, 200K, 2000K, 20M. 6½"h × 3½"w × 1¾"d, 18 oz. Test leads, batt. & case (Reg. $73.95).. **Sale $64.95**

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W8LOU 4, WD8OEP 4, KA8KCJ 3, KB8TD 3, N8EBM 2, WD8OUM 2. (Sept.) W8ECK 24, WD8OEP 24.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MQK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW WA8DYX W8EK WA8GMT KF8J WD8KFN WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	490	338	61	6:45/10 P.M.	3.577
BNR	318	167	38	6:00 P.M.	3.605
ONN	173	41	27	6:30 P.M.	3.708
OSN				6:10 P.M.	3.577
OSSBN	2,300	1,129	108	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
OSSN	189	89	31	6:45 A.M.	3.577
O6MN	592	20	31	9:00 P.M.	50.160

Hope all of you enjoyed watching the SET exercise unfold as much as I did. Thanks to the STM, SEC, NMs, ECs and especially the newer members of various nets and organizations. By the end of SET weekend you couldn't tell the tyros from the vets, and that's what it's all about. Just learned (thru receipt of the Buckeye Belles' Newsletter — thanks) that WD8IKC is 8th District chmn of YLRL, and two of our Section traffic handlers are officers of the Belles — WD8MIO, secy. and N8AJU, treas. Double congrats to WD8MIO, new manager of 8RN (cycle two). Hope you're making plans for the third annual Ohio State Convention, Feb. 26 & 27 in Cincinnati again. Super forums, women's activities, banquet, prizes, etc. See you there! Club elections: Canton ARC: WD8IPE, pres.; KA8MWZ, v.p.; W8FEC, secy./treas. Greater Cincy ARS: WA8SSI, pres.; K8WWA WD8JGB, v.p.; W8GS, r. secy.; K8CKI, c. secy.; WA8STX, treas. LEARA: AB8P, pres.; W8AZO W8MW, v.p.; WA8MAA, secy.; W8GRG, treas. Upgrades: to Extra-N8BHL N8CHH N8DHO. Appts: EC-KA8OFE, Williams Co.; K8LMN, Auglaize Co.; KT8I, Lawrence Co.

Local Nets	QNI	QTC	Sess.
ALERT	62	20	4
BARF	152	51	23
BRTN	359	237	36
LCNWOARES	467	131	51
MASER	110	7	4
Medina Co.	248	49	31
NCTW	42	53	16
NEON	172	50	31
RARA	67	—	4
TATN	416	89	31
TSRAC	1046	99	41
VWCEN	50	3	4

Traffic: KA8MEB 30, KA8KGO 29, WD8RGS 28, WA8BUW 27, W8QEM 27, WD8RZG 27, KA8HUZ 25, W8TP 25, WA8DYX 24, WB8YUS 23, W8ZPF 23, W8CXM 21, K8JE 21, WB2LZN 21, KB8VE 21, WD8DOS 20, K8CKY 19, N8CW 19, WD8IQJ 19, WA8QYJ 19, WB8KQJ 18, WD8JAJ 17, K8VOY 17, KA8KFW 15, WB8SIQ 15, N8CJM 14, WB8HHZ 14, KA8GMF 13, KA8NXV 13, WA8HED 12, WD8NED 12, W8LZE 11, WB8VOA 11, WD9HDZ 10, W8RG 8, N8AEH 7, N8AJU 6, W8FUP 6, KC8JI 6, KA8LNA 6, WB8MRL 6, WB8KKI 5, N8CJS 4, WD8EKI 4, WB8AWM 3, WB8KWD 3, WB8NHV 3, AF8O 3, K8CMR 2, W8OOL 2, KA8PHB 1. (Apr.) WB8QYT 43, WB8YYS 24, W8CXM 14, WB8NTR 10, N2NS 4.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. NM: (CW): W2WSS N2AFP WB2EAG. NM: (HF phone): WB2MCO KA2G. NM (RTTY): W2ODC. NM (VHF): WB2ZCM N2BDW K2ZVI KV2U. CLUB NEWS: Albany ARA's K2HUG and W2OOJ assisted with info on Amateur Radio on WMHT-FM's Radio Information Service for the print-handicapped call-in program. AARA welcomes new members KA2OYE WA2MRL & WA2DRI. Rip Van Winkle ARS welcomes new members W3HHN & KA2PZZ. Also had an excellent Christmas dinner and party. Orange Co. ARC has new newsletter editor, WA3RPC. Ulster Co. RACES and Overlook Mt. ARC's KA2GHR and WA2BZT provided communications for Halloween Patrol. Westchester Emergency Communications Assn. had excellent holiday dinner. WB2HQK reported that his XYL had the magician make his ham station disappear, but only temporarily! As we institute the SM plan, I ask everyone to assist by giving us input. What changes do you want to see. Thanks to all those who helped during the last year. The best of the holiday season to all! ESS and NYS/M both report increased attendance. Let's all support our nets! Cw traffic handling is really not that difficult! See you all in the new year. BPL: WB2EAG WA2SPL K2ZM. PSHR: K2ZM WB2MCO WB2EAG WB2ZCM W2YJR KA2KVZ K2ZVI W2BIW WB2TWQ WA2FSR N2BDW N2CPX. Traffic: WB2EAG 578, WA2SPL 560, K2ZM 320, WB2MCO 261, KA2KVZ 199, WA2JBO 162, W2BIW 111, WA2JOI, 108, W2YJR 99, K2ZVI 96, WB2ZCM 81, N2BDW 57, WB2TWQ 51, K2MI 35, N2CPX 31, WB2OHR 28, WA2CJY 25, WA2FSR 24, WB2SON 22, WA2YBM 22, K2HNW 14, AA2Y 14, N2CSX 11, W2SWA 10.

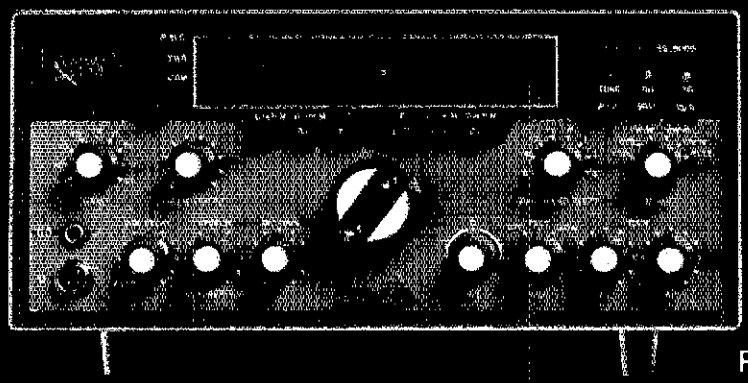
NEW YORK CITY-LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: WA2KKJ. STM: K2GCE.

NLI CW*	3630	1900/2200	W2LWB
NLIPN*	3928	1815	KS2G
NLS*	3720	1930	WB2EUF
NCVHF	6.04/64	2100 M, W, Th	N2BZL
SCVHF	4.77/5.37	2030 M-F	WA2ARC
BAVHF	7.915/315	2030 M	N2BQD
LIMARC	6.25/85	2100 F	N2BZL
ESS	3590	1800	W2WSS
NYS	3677	1900/2200	N2APB
NYS	7077	100 M-S	WB2EAG

*Denotes section net, all times are local, please try and help out by checking in whenever you can. Thanks to whoever the kind person was that drew my ticket out in the door prize drawings at the HARC convention, I now have a nice new Cushcraft A3 tribander to replace my TA-33 Jr. Who says there ain't no Santa Claus? NLIPN welcomes back KA2GFU. Also, NLIPN had a score of 92 for the SET. K2BSJ was in Staten Island Hosp. for an operation. Start making plans now for the 1984 National Convention July 20-22, 1984, tentatively set for the New York Statler. The Babylon ARES is sponsoring a First Aid course starting Jan. 7, 1930 to 2300. This is a 10-week course that will include First Aid, Personal Safety and C.P.R., the fee will be $5. WA2HLO and WA2IFU have moved to Fla. as of Oct. 1. New QTH is Maitland, about 5 Miles north of Orlando. Merroplex has some new ID tapes, made by Oscar the Grouch, and a few other "stars". WB2HTW reports that 9 stations participated in the SET in the town of Smithtown with 20 messages being handled. Grumman ARC toured ARRL Hq. Sept. 30. N2CRV reports there is a users net for hams using Timex/Sinclair equipment on 146.67, Monday at 2030 local with W2EWE as NCS. Other nets are

More Transceiver

Contest or rare DX – the world is waiting to hear from a new breed of HF operators who'll have the power of a microcomputer at their instant command. The Heath SS-9000 signals a new era in Amateur Radio, full of exciting promise. Challenge. And opportunity...



MORE WORLD HORIZONS

In the SS-9000, we met a major design goal: *provide the highest-tech, most versatile transceiver possible.* Our objective? Nothing less than setting the pace for transceiver performance in the next decade. And transforming the state-of-the-art in amateur telecommunications potential.

As a microprocessor-based, fully-synthesized nine band Transceiver, your SS-9000 leads the new revolution in computer-enhanced hamshacks – with an array of applications yet to be discovered. At your command under direct or RS-232 control, it could break all known records for station performance.

MORE MICRO CONTROL

Harness the SS-9000 to a video terminal, ASCII teletype or home computer. Commands are available to select, display and change all 27 operating and memory frequencies, assign and toggle T/R/Tr status on the dual readout, and freely manipulate the three stored frequencies on each band, with full diagnostic error-prompting.

Keyboard command also allows you to set and switch the band, mode, passband shift, baud and scan rates, plus switch to one of five antennas *automatically.*

MORE POWER AS A PAIR

The PS-9000 AC Power Supply has an in-cabinet speaker and two digital 12 or 24-hour clocks. Both units benefit from thermal and over-current protection with high VSWR cutback. Test-prove the assembled System 9000. Get a hands-on tryout at your nearby Heathkit Electronic Center.*

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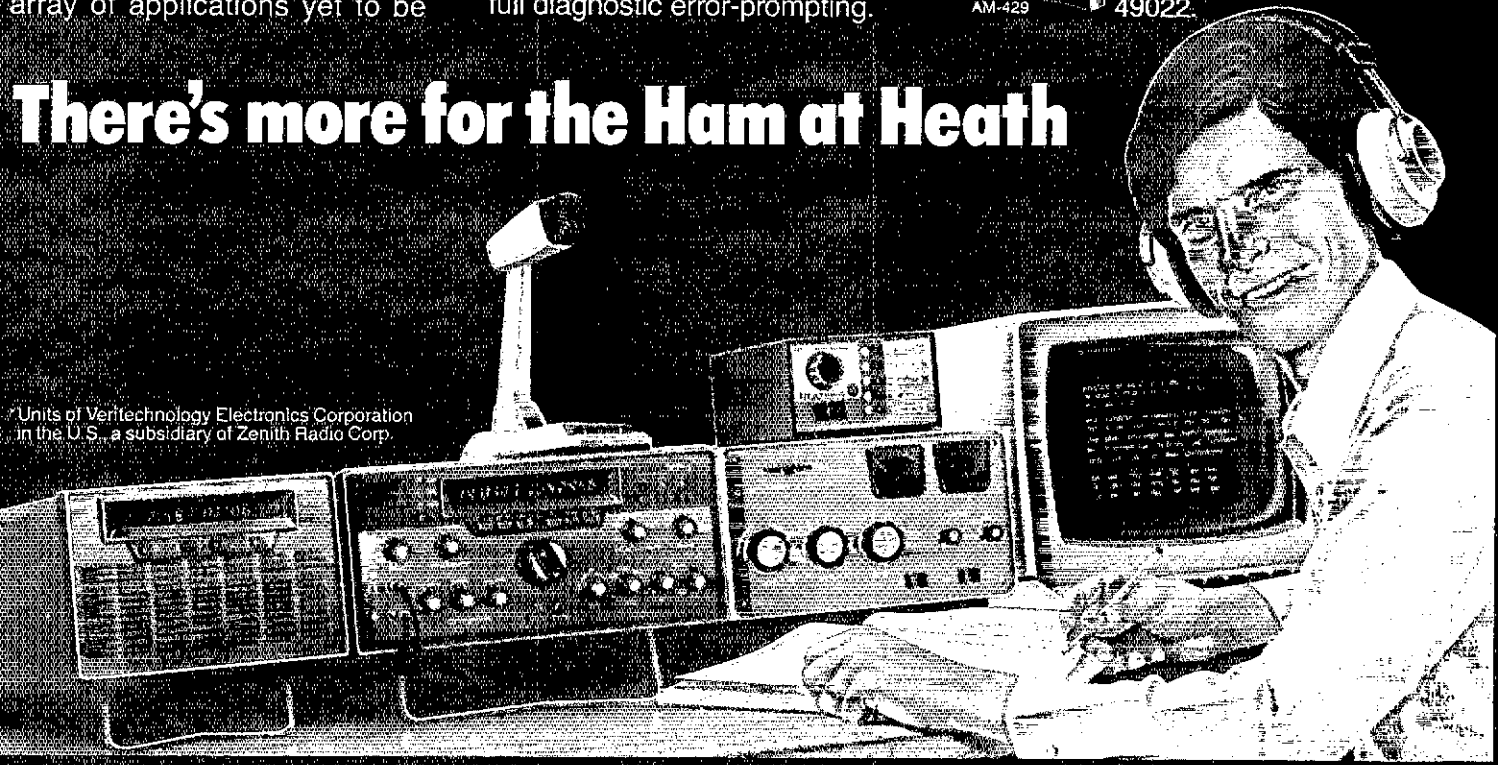
FREE! For complete details and specs, get a copy of the latest Heathkit catalog. **Write:** Heath Company, Dept. 009-974, Benton Harbor, MI 49022.

There's more for the Ham at Heath



*Units of Veritechnology Electronics Corporation in the U.S., a subsidiary of Zenith Radio Corp.

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The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

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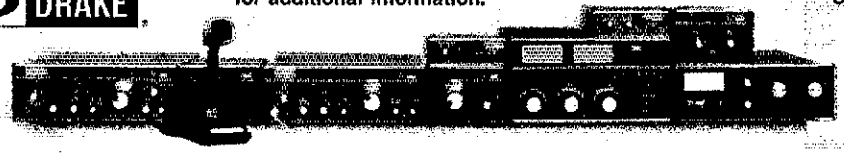
See your Drake dealer or write for additional information.



COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO or RV75

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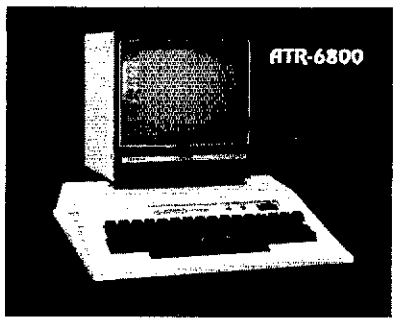
* Patent pending



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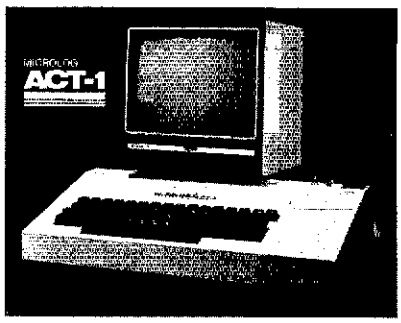

Both Systems Provide

• SIMPLE DIRECT CONNECTION to your Transceiver. • COMPLETE SYSTEM, built-in Demodulator & AFSK Modulator with keyboard programmable tone pairs. • SPLIT-SCREEN operation with keyboard selectable line location. • LARGE, TYPE AHEAD text buffer. • TEN, programmable message memories, plus ID's WRU & SELCALs. • RANDOM CODE generator & hand key input for practice. • Baudot 60 to 132 WPM. • ASCII 110 & 300 baud. • SYNC-LOCK MODE for improved ASCII operation. • RECORDER INTERFACE FOR "BRAG-TAPE" or recording off-the-air. • CODE CONVERTED Printer output in Baudot or ASCII. • SSTV/GRAPHICS transmit. • FULL 63 KEY Computer grade keyboard.

You won't find as much well thought out programming, circuitry, and features anywhere, at any price! The ATR-6800 combines the best of both worlds, an easy to use video system for CW/RTTY/SSTV with automatic station control and a stand-alone computer with expandable memory & full instruction set in Motorola assembly language. Add the BASIC language option package and you'll have the unique combination of an RFI proof computer and ultimate RTTY/CW HAM station. And don't forget "easy to use." All of us at Microlog are RADIO ACTIVE on RTTY, so there's a lot of personal attention to detail and ease of operation. "Stick-on" command listing and video status display will get you on the air quick and sounding like a pro.

There's a certain thrill to using efficient, reliable digital communications equipment on the air. That's the fun of RTTY. Spice up your Amateur Radio operation with the silent video system that does it all, the Microlog ACT-1. Even if you own a home computer and are considering an outboard interface/program, remember, we've put it all in one RFI tight enclosure that's ready to go as soon as you power up. And, with the "Battery-backed" memory option, you won't even lose your pre-programmed messages if there's a "blink" in the A.C. The ACT-1 has features that the competition doesn't even have on the drawing board! Check for yourself, you could spend a lot more and still come up short.

ATR-6800 vs ACT-1

The most often asked question we hear is "What's the difference between the ATR & the ACT-1?" The ACT-1 is a dedicated system for RTTY/CW/SSTV. It provides all the functions and features you need for a multi-mode station. Along with this superior "ON-the-AIR" performance, the ATR-6800 extends your operation into the realm of automatic station control and computer programming. Plug-in applications modules expand the ATR's memory to add new HAM oriented programs which are enabled by simple keyboard commands. By adding the BASIC option package, you'll have pre-programmed full community mailbox, contest dupe sheet, personal station log, message editor, BASIC computer language and 16k of battery-backed (non-volatile) memory. We also provide a subroutine list so that you can write programs to directly control the ATR-6800 in easy to use BASIC language. The ATR-6800 then is the expandable, "do everything" system where your imagination is the only limit! The ACT-1 is designed for the HAM who needs the essentials of a complete video system for digital communications.

TECHNICAL SPECIFICATIONS ATR-6800 & ACT-1

INPUTS

Speaker Audio	100mv min.
Digital	TTL, Keyer, Hand Key
**RS232	± 12V, 330 Ohm Source

OUTPUT TO TRANSMITTER FOR CW/RTTY/SSTV

+ Voltage Keying	+ 40VDC @ 300ma Max.
– Voltage Keying	-150VDC @ 50ma Max.
**Mercury Relay	200VDC or 2 amp (20VA Max.) N.O. & N.C.
T/R Change Over	ATR — Relay ± 30V @ 2 amp N.O. & N.C. ACT-1 — Transistor + 12VDC @ 300 ma. GND on XMT
AFSK Tones, Range	Keyboard Programmable 500 Hz to 3000 Hz
AFSK Tones, Level	Mic Compatible 30-60mv Audio
Slow Scan	Mic Compatible Audio. Sync 1200 Hz, Black-1500 Hz, White-2300 Hz

MISCELLANEOUS CONNECTIONS

RS 232	± 12VDC, 330 Ohm Source Impedance, Negative Mark
Printer Driver	ATR — • Hi-speed RS-232 upto 2400 Baud • Slo-speed Baudot & ASCII Floating Relay for Current Loop Switching ACT-1 — • Slo-speed Baudot & ASCII Transistor Switch + 40VDC @ 100 ma. • Optional Hi-speed ASCII RS232 @ 2400 Baud.
Tape Recorder	Mike ≈ 100 mv Audio
"Brag Tape"	Speaker ≈ 200 mv Audio
Scope	Horizontal and Vertical Outputs to Scope for RTTY Tuning Aid
Morse Speed Tracking	Automatic or Speed Lock

VIDEO OUTPUT

1 Volt Peak to Peak, Negative Sync Composite Video (American Standard) European standard available upon request.

VIDEO FORMAT

Normal	24 lines, 40 characters per line
Zoom	12 lines, 20 characters per line
Black on White or White on Black	Keyboard selectable
Display Split Screen	Any location Line 0 (Off) to Line 20, Keyboard selectable
SSTV	3 lines, 8 characters per line + graphics

TEST MESSAGES: Quick Brown Fox and RYRY's in Baudot, U*U* in ASCII, VVV in Morse.

SYNC: Transmits "Blank-Fill" in RTTY and 67 in Morse when Text Buffer is empty and unit is in transmit. Keyboard command on/off.

UN-SHIFT on Space: Automatically shifts back to "LETTERS" upon receipt or transmission of space. Keyboard command on/off.

REAL-TIME CLOCK: Keyboard set, always on screen display, hours, minutes, seconds. Can also be inserted in transmit text buffer by keyboard command.

WORD WRAP AROUND: Prevents splitting words at the end of a line. Works in receive as well as transmit.

CODE PRACTICE: Random 5 char generator sends at any speed you set via the keyboard. Hand-Key input allows use in code practice oscillator that will also read your sending!

STATUS DISPLAY can be called up to show the condition and control commands for 20 programmable parameters, such as AFSK tone freqs, UNOS, printer, etc. Useful as a "HELP" command in case you misplace the manual. There's also a constant "TOP-LINE" display of Time, Mode, Speed, & Code in use.

DETECTION MODES

Direct	Phase correlation detector with AGC controlled bandpass filter (100 Hz nominal width — 800 Hz center frequency)
Demodulator	Computer program enhanced dual tone demod. Primary tones fixed @ 2125/2295 Hz, Secondary tones variable @ 500 — 3000 Hz.
**Terminal	RS232 compatible half duplex or full duplex up to 9600 Baud

DATA RATES

Morse	5-199 WPM Keyboard selectable in 1 WPM steps. Auto speed tracking or speed on receive
Baudot	All standard 45, 50, 57. 74, 100 Baud (60, 66, 75, 100 and 132 WPM)
ASCII	110 & 300 Baud normal & synclock using internal Modem. ATR adds speeds up to 9600 Baud.
Slow Scan	8 seconds per frame

OUTPUT OPERATING MODES

Symbol	Character ouputs when typed
Word	Words sent after "Space Bar"
Line	Line sent after "Return"
Buffer	Send entire contents of text buffer

TUNING INDICATORS

Audio Ref. Tone	800 Hz Keyed Regenerated
Visual	LED on Mark (Keydown)
Scope	Tuning ellipse for RTTY

PROGRAMMABLE MEMORIES

Here is*	10-40 character messages (400 total) or *10-80 character messages (800 total) battery backed
ID*	15 characters maximum in standard ID and 17 in RTTY ID
WRU:	Up to 15 characters
Selective Call:	ATR — 4 memories, up to 15 characters each. ACT-1 — 2 memories for printer on and printer off

COMPUTER CAPABILITY

Memory	Standard unit has 4000 bytes of RAM for user program. Basic package adds 16K.
Language	Basic or Motorola M6800
Commands	Input; Output; Load, Go with Break Point; or Normal Basic
Tape Interface	Store Programs on Audio Cassette

POWER

115 VAC, 60 Hz 60 VA Max, Act-1, 30 VA Max (230 VAC, 50 Hz optional) 12 volt version available
External input for charging expanded battery backed memory. 6-15VDC @ 10 ma. max.

MECHANICAL

ATR-6800:	
Size	14¾"W x 12¼"D x 4"H
Weight	15 lb.
ACT-1:	
Size	17.8 W x 3H x 9.5D
Weight	7 lb.
ATR-6800 & ACT-1:	
Color	Beige Top, Black Base
Material	ALS052 Aluminum Alloy

*Standard on ATR, Optional on ACT-1
**Standard on ATR, Not available on ACT-1

MICROLOG CORPORATION —18713 Mooney Drive—Gaithersburg, MD 20879 (301)258-8400

Introducing Corsair

A New No-Compromise HF Transceiver

The CORSAIR is an extraordinary new HF transceiver. Every function operates without compromise. New unique features make it a delight to operate.

A new front end provides extreme sensitivity, low internal noise and high dynamic range to bring weak signals to life. For even greater overload prevention, the integral rf preamplifier can be switched out. More effective than the usual rf attenuator.

The filtering system, a TEN-TEC exclusive, virtually switches to privacy. It starts with a superb 2.4 kHz 12-pole ladder sideband filter system, standard. It provides variable bandwidth for ssb, great for today's crowded phone bands. A novel pass band tuning circuit allows a received signal to be moved within the pass band to its optimum position with respect to QRM. Optional narrow band filters are available for ssb, cw and RTTY, all switched from the front panel. The ultimate in QRM reduction.

Full cw break-in opens a window on the band while transmitting, turning monologues into conversation. Or, if conditions dictate, just switch to semi-break-in. And no VOX adjustment when changing modes.

A versatile offset tuning system allows the receiver and transmitter to be tuned separately with a ± 1 kHz range for fine tuning or ± 4 kHz for working off frequency. For net operation, both can be moved simultaneously.

Reliability is designed in. The CORSAIR system is so rugged it will operate into infinite SWR. And we guarantee it unconditionally (except for lightning) for one year. The CORSAIR is designed for 100% duty cycle, ideal for RTTY, SSTV and of course, contests.

Beauty is more than skin deep. The contemporary styling with the blackout LED frequency display (last digit in green), the baked-on textured bronze/black finish with aluminum trim will retain its handsome appearance permanently. Beneath its sleek exterior is a carefully crafted chassis packed with performance.

There are many other features, each with superb performance. An effective speech processor, notch filter, adjustable noise blanker, signal spotter, three position AGC, threshold ALC, simplified VOX, all controlled from the front panel. In addition, the CORSAIR has a compression loaded speaker, less than 2% audio distortion, and full accessory connections including remote bandswitch output. It even has a volume equalizing headphone output.

The CORSAIR is a total system of pure operating pleasure—it really must be put through its paces to be fully appreciated. Its smooth controls, comfortable and logically spaced, give it the feel of a superlative transceiver. One that will be a faithful companion for the years ahead.

All TEN-TEC products are completely manufactured in the U.S.A., in the foothills of the Great Smoky Mountains.

Model 560, CORSAIR transceiver . . . . . $1169.
See your TEN-TEC dealer or write for full information.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

also on 7240, Sunday at 1100 local, KQ2F NCS and 14.345, Wed. 2100 local with W9CQD NCS. Gt. South Bay ARC turned in a FB performance in Field Day, coming in 71st place out of over 300 entrants in 3A class. Staten Island ARA has some members using 146.565 simplex as a ragchew freq. If you want to join in they meet 1100 to 1130 local daily. Traffic: W2AHV 212, N2AKZ 127, WA2ARC 98, K2GCE 78, KA2NMA 54, W2ITZO 54, WB2TQC 26, K2IZ 24, KA2ETG 22, KS2G 19, WB2BNA 5.

NORTHERN NEW JERSEY: SM, Curtis R. Williams, W5DTR. SEC: WB2VUF. STM: W2XD. NMs: W2CC AG2R N2BNB N2BOP KA2GSX KA2HNQ WB2IQJ W2PSU.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJPN	W2CC	3950	6 P.M. Dy 9 A.M. Sn	39	468	175
NJN/E	AG2R	3695	7 P.M. Dy	32	469	174
NJN/L	AG2R	3695	10 P.M. Dy	31	300	110
NJSN	WB2IQJ	3735	6:30 P.M. Dy	34	280	133
OBTTN	N2BOP	72/12	8 P.M. Dy	37	709	176
TCETN	KA2GSX	855/255	7:30 P.M. Dy	37	211	60
NJVN	KA2HNQ	49/49	10:30 P.M. Dy	31	311	79

NJRTTY W2PSU 147.51 Autostart

The NNJ Chapter of the QCWA has announced the Elmer of the Year Award goes to W2NTP. Congrats to W2NTP, who has helped many NNJers get their license and get on the air. Congrats to KA2JMH, now KX2L, W2OTD and KB2UC on upgrading to Extra, and to KA2NQJ on upgrading to Advanced. Your local and state nets need your support. Can you spare a few minutes to be NCS or a liaison once a week? NJN welcomes back AF2L. Congrats to N2CHE, who is now KX2D. KJ2O in Newark has been appointed Official Observer. W2UH's EC appointment has been endorced for another two years. Please let W5DTR know if your appointment needs endorsement. The Cherryville RA provided support for the Flemington Walk-a-Thon. Many groups took part in the Simulated Emergency Test during Oct. AG2R is issuing Section Net certificates to active members of NJN. PSHR: W5DTR KB2HM AG2R W2XD N2XJ K2VX N2BOP KX2L KA2GSX WB2QMP N2DPV. Traffic: KB2HM 251, W2RQ 176, N2XJ 175, AG2R 172, K2VX 142, N2BOP 108, W2XD 100, KX2L 81, W5DTR 64, KA2GSX 54, N2BNB 51, N2DPV 43, WB2QMP 39, WB2KLF 37, AF2L 24, KA5DLV 22, WA2NPP 22, KC2MM 21, W2CC 18, W2ZEP 10.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — ASCM: WØRPK. SEC: WA4VWV. STM: KØGP. NMs: WAØAUX KQØI WØYLS WBØAVW. Now accepting nominations for the "Iowa ARRL Amateur of the Year Award" for outstanding service. Past recipients were KØGP and WAØAUX. Certificate of Appreciation to WDØHND, who has resigned the NM post of ICN. KQØI has been chosen to replace him. Emmet Co. has new RTTY rptr, WØMDM/R. Remember the Dvnprt Hamfest Feb. 27 and the Midwest Convention in Soo Cy April 15-17. Many new upgrades: Tech-KAØMHJ KAØZW KAØOXQ; Gen-NØEAE KAØNNQ KAØDDT; Adv-KAØHYC NØDYN KAØGVB KAØLSE. Congrats to all. KMØQ has new commercial ticket. WDØDWK and KBØZG now Vic20 RTTY. CVARC helped with Diabetes Bikathon and have new agreement with Red Cross. New rptr is planned for Clinton and Prescott. Creston rptr back operating on new pair.

Net	Freq.	UTC	Day	QNI	QTC	Sess.
TLCN	3560	0030-0400	Dy	365	240	62
ITEN	3970	2230	Sn	52	29	4
75M Phone	3970	1830-2330	M-S	2099	167	52
PM Net	3975	2130	MWF	109	1	12

Traffic: WØSS 325, WAØAUX 250, KØGP 208, WØYLS 140, KAØLUZ 139, KAØJQG 88, W4JL 61, KAØADF 57, WDØFWB 56, KQØI 50, KØCY 47, WDØHND 39, NØCWO 36, WBØCPR 36, WBØAVW 35, WBØJFF 32, WØBW 21, KA9GBG 21, KBØOZ 18, KØZQ 17, KØEVC 13, NØEAE 12, WØFQ 12, KAØNNQ 10, WBØQAM 7, KCØSC 4.

KANSAS: SCM, Robert M. Summers, KØBXF — Two more of our ranks have joined the Silent Key list, WØMCH and WØLXA. To their families, our deepest sympathy. WØLXA will long be remembered for his efforts put forth in the Kansas Post Office Net. Net reports: KSBN QNI 1680, QTC 642; KPN QNI 500 QTC, 265; KWN QNI 859, QTC 521; CSTN QNI 1707, QTC 144; QKS QNI 307, QTC 103; QKS-SS QNI 40, QTC 17. WAØLBB has been asked by the Kansas Wx Bureau to help them to compile additional info, weather data, to aid the public. Keep tuned to 3920 kHz for more on this subject. OO KØFPC has noticed an out-of-band operation by quite a few, who have not yet learned the correct freq. allotted us in the 10 MHz band. Please check before operating. Let us not lose by misuse. Hiawatha ARC active again in Halloween Parade and local Chamber of Commerce 6-mile run. The BEARS/Ø Bulletin *HAM & EGGSTRAS* is a fine publication. If your club is not on their exchange list, I am sure a note to N7PM at Wichita will get you there. Jamboree '82, (Girl Scout) was a success and so was the operation by the Salina ARC and KBØEY KØFPC KBØBH KBØEC and KØWA. A good SET effort. Traffic: WØFRC 527, WØOYH 258, KAØCUF 247, WBØZEN 238, WØHI 150, KØBXF 117, WØQMT 94, WØFIR 85, WØAM 73, WAØLBB 85, NØBDG 72, WØCHJ 45, WØFDJ 37, KØFPC 36, WØRBO 35, WØPB 26, KØGSC 14, WØRT 8, KAØE 7, WAØOWH 1. (Sept.) WBØYCP 17, WØRT 7, WAØOWH 3.

MISSOURI: SCM, L. G. Wilson, KØRWL — ASCM: WØOTF. SEC: NØAJI. STM: KMØL. The Ozark ARS and the Eastern Ozark ARC are currently conducting Novice classes. New officers for the Callaway ARL for 1983 are: WDØCGZ, pres.; WØNUB, v.p.; KSØM, secy./treas. The Kansas City DX Club recently held a swapfest in the parking lot at Missouri Radio Center. Despite weather and other goings-on that day, the club was able to make a profit.

Net	QNI	QTC	Net	QNI	QTC
HBN	390	14	CMEN	94	4
MON	171	105	MOSSB	791	105
MON2	96	43			

Congrats to KA6CSJ/Ø on his imaginative idea of a correctional institution being struck by a tornado in the recent SET. The exercise was a success again this year. Congrats to the following upgrades: Tech-KAØLUD KAØOSJ KAØOWV KA9NVR; General-WDØCDD WDØGFZ KAØGXC KAØNGU; Advanced-NØBPA; Extra-KAØNSM. Traffic: KCØAS 750, KIØK 176, KØSI 155, KØPCK 130, WØBMA 116, WØNUB 116, KUØG 90, WBØSSB 63, KT5Y 47, KØRWL 10.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: NØAIH. STM: WDØBQG. We are sorry to hear that WØAP has moved to Boise, ID. A Certificate of Merit was issued to WBØGOB for his handling of 359 QTC in 17 months. New officers for Pioneer ARC (Fremont) are:

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V Series Antennas

More ERP* for your Repeater

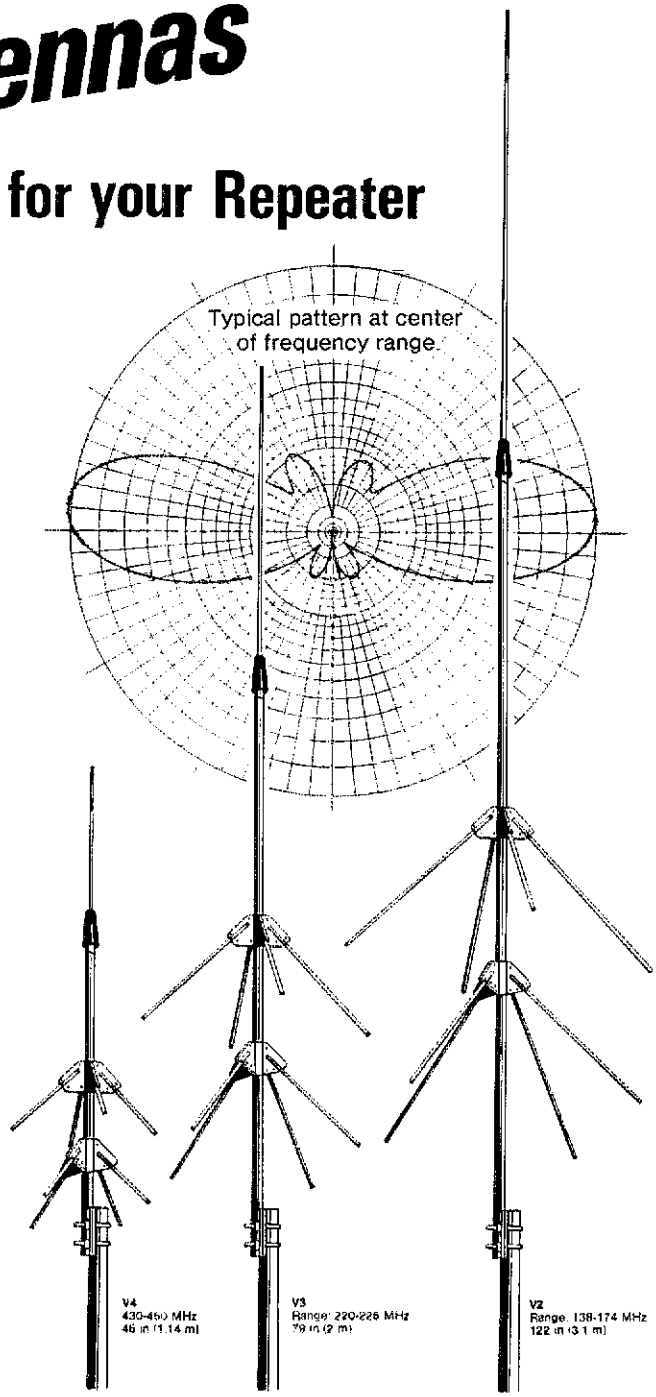
Hy-Gain V Series antennas focus the omnidirectional pattern evenly at the horizon, without high angle lobes or horizontally polarized content. By concentrating the power at the horizon you get cleaner transmissions over longer distances, improved communications in valleys and reduced picket fencing of the signal between tall structures. A Hy-Gain V antenna is like adding an amplifier and receiver pre amp. And, because antennas which "talk" louder, also "hear" better, a V Series antenna is also ideal for your home QTH.

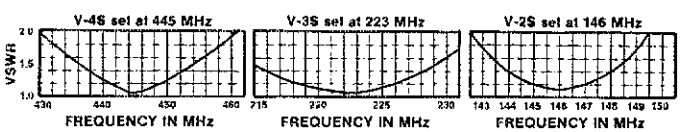
Extended double zepp V Series antennas consist of two stacked .64 wave vertical sections in phase. Two sets of 1/4 wave radials decouple the antenna from the mast and feed line so all RF goes into the antenna and is not radiated by the coax. The feed line connects through the lower section to the center matching coil. This not only provides weather protection for the connector (SO-239 connectors for V2, V3. Type N connector for V4) but also places the entire antenna at dc ground to reduce lightning hazard and QRN.

V Series antennas are easily assembled in one hour or less. Rugged and maintenance free, they're made of seamless, corrosion resistant 6063-T832 aluminum and all critical hardware is of passivated stainless steel. They'll withstand winds of 100 mph (160 km/h). V models accept mast diameters up to 2" (50 mm) so you can readily mount a V above your HF antenna.

Since a Hy-Gain V Series antenna costs only a fraction of a re-tuned landmobile antenna, you can now realize the *full* potential of your communications with the repeater or your home station, economically.

For unbiased information ask any of several thousand V2 users or read the product review in QST May '82 or Amateur Radio Profiles Vol. 2, No. 3.





V Series antennas cover the entire band with VSWR below 1.5:1. Broadband characteristics insure optimum repeater performance on both input and output frequencies.

*Effective Radiated Power (ERP) equals the gain of the antenna times the power to the antenna.

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C106 10W in=60W out $199.95
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C1012 10W in=120W out $289.95
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RC-1 AMPLIFIER REMOTE CONTROL $24.95
Duplicates all switches, 18' cable

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- direct SWR reading

MP-1 (HF) 1.8-30 MHz
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$119.95

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D24 2W in=40W out $199.95
(1W=25W)

D1010 10W in=100W out
(½W=24W, 1W=70W) $319.95

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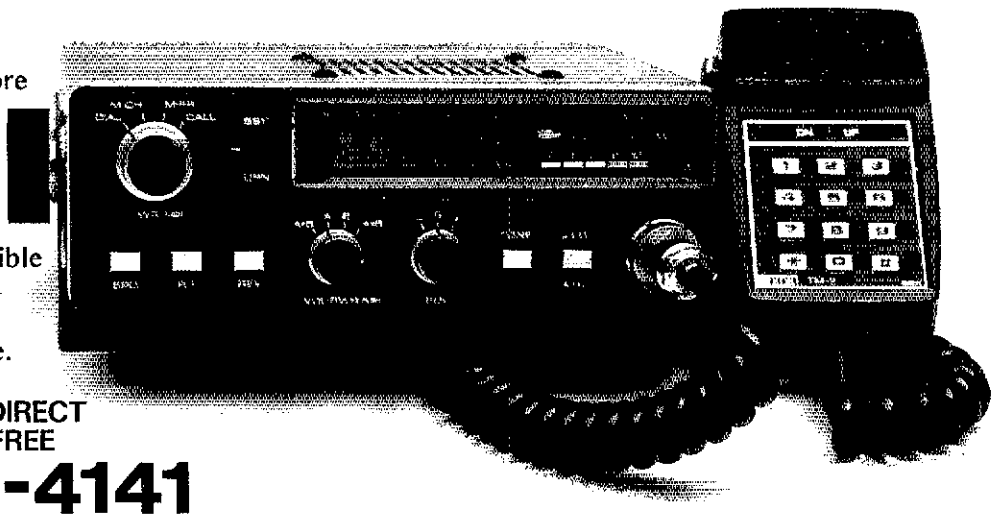

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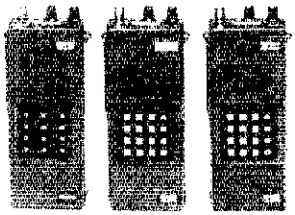

IC-2AT IC-3AT IC-4AT

- ★ **Special in-store and wats line pricing.**
- ★ **ICOM Personnel to demonstrate new equipment.**
- ★ **Refreshments will be served.**

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KAØAEW, pres.; KAØLCY, v.p.; KAØAEN, s/t Congrats to WDØBQN who upgraded to EXTRA, WDØBPC to Adv, KAØLUG to Gen, and KAØOYO, new Novice! Love & friendship filled the air Oct 15, in Harrison (highest town in state) when 8 hams from 3 states surprised WAØIJY by delivering to him a complete high powered 2-meter station from his family, community friends & fellow hams from VT, SD, WY & NE. NEEDED CW operators for TEN Net 3679 at 0145 & 0330 UTC. Listen and hop right in there and try it!! Tnx. Traffic: KØDKM 145, KAØBCB 27, WØHOP 27, WAØOQX 27, WØZNI 20, WBØGOB 12, WBØGWR 11, WØNIK 10, WØHTA 7, KAØIOM 6, WBØGMQ 4, KØUDW 4, WAØPCC 3, WBØSGB 2, WØJUJ 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, KA1KD — STM: K1EIC. SEC: K1WGO. OO/RFI: KA1ML. Clubs: K1UQE. SGL: K1AH. PIO: WB1AIU. Tech: W1HAD. OBS: WA1DWE.

Net	Freq.	Local Time	QTC	QNI	NM
CN	3640	1900/2200	304	382	K1EIC
CPN	3965	1800/1000 Sn	151	251	W1OD
NVTN	28/88	2130	82	243	WA1ELA
WCN	78/18	2030	75	400	W1DPR
RTN	13/73	2100	82	303	WB1ESJ

Upgrades: Extra-WB1HHW; Adv-N1CKC N1BOW; Gen-N1CIT KA1CWP KA1IWH KA1HYB; Novice-KA1JKC KA1JKD. The BIG SWITCH is on. Don't forget that our section has been reorganized. As of 1 January all letters, monthly reports should be directed toward the individuals listed above. All information for this column and correspondence concerning the administration of our section should continue to be sent to the SM. Call changes-KA1HZT/N1CKD; KA1GRL/N1CKC; KA1BIJ/N1CJB. KF1J now has his DXCC. HAPPY NEW YEAR. KA1GRD/N1BDY operated during the Boy Scout Jamboree on the Air from Putnam Park. FARA provided communications for the annual Thanksgiving Pequot Road Race. Thirty new Novices c/o the Bethel Middle School ARC. W1KVM has just received his 5-Band WAS. Welcome to 10 MHz; more to follow. ECARA placed first in category 5A in New England. K1XA/6Y5 for CQWW CW. K3ZJJ operated with the Medical Net for the NY Marathon. NARL, using the facilities of W1AW/R, assisted the Newington PD with Halloween Goblin Patrol. The new officers of CARA: W1PV, pres.; KA1F JR, v.p.; KA1ECL, secy.; WB1HHW, treas. With the winter upon us, we should all assess our cold weather emergency preparedness, both our stations and vehicles. If your club publishes a newsletter, please remember to send copies to the SM, PIO and Club Coordinator. In this way your club's deeds and ideas may be shared with other clubs and members within our section. Does your club have an active Education Committee? Need help setting up radio classes? Contact C&T at Hq. Traffic: WB1GXZ 409, W1EFW 311, WB9IHH 234, WB2PJU 167, KA1BHT 114, K3ZJJ 98, KA1EGE 85, K1AQE 78, W1XX 78, WB1ESJ 38, K1EUW 23, KA1KD 15, W1QV 8, W1VS 8, W1CUH 3, N2BQA 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	611	458
EMRIPN	KA1ON	3.949	1730/Dy	360	287
EM2MN	N1BNI	23/63	2000/Dy	443	149
NEEPN	K1BZD	3.945	0830/Sn	95	25
HHTN	K1BSO	04/64	2230/Dy	554	207
EMRISS	N1BHH	3.715	2030/Dy	170	77
CI2MN	N1BYS	045/645	1930/Dy	74	65

Congrats Eastern Mass. hams. We are now authorized to operate on 10 MHz, and you played a part in how we're allowed to operate there. What I'm talking about is the cw only/250-watt limit which seems to be working quite well. Three hundred of us in Eastern Mass. contributed in a major way to the League's proposal through a questionaire in the *Crossbander* and now the FCC has implemented this proposal. Who says your opinion doesn't make a difference! Part of the Goldwater Bill, which is now Public Law 97-259, will see almost immediate action by the FCC. The part I'm referring to is the volunteer examiner option that the FCC now has. The FCC seems to think that amateurs are honest enough so that a volunteer examiner can make up his own questions based on a syllabus that the FCC puts out. I would like to think so too but I'm not willing to risk diluting our ranks because of a few bad examiners. Remember we're talking about all license classes now, not just the Novice class. Also, who would guarantee the uniformity of difficulty from one examiner to another. You could be sure people would find out who gave the easiest exam in your area. So I am in full support of the League's proposal which would have at least three examiners present at the licensing session, have a qualification requirement for being an examiner, and have the exam be made up of questions extracted from a very large list (perhaps 500) of questions which have been approved by the FCC. This would reduce the risk of cheating, make the examiner's job a little easier, and assure some uniformity in difficulty across the country. The *Crossbander* has changed its name to *New England Report*, which more accurately describes its contents. News items from other New England sections have been included for some time so the change is a good one. Sorry that room doesn't permit local club news this month but so much is happening on a larger scale that I decided to change it for this month only. Traffic: KA1GBS 618, WA4STO 393, WA1TBY 363, N1BBT 334, N1BHH 290, KA1ON 181, N1AJJ 159, W1IDK 132, K1GN 119, KA1DB 111, KA1BBU 106, KA1AE 101, N1BYS 91, KE1U 89, WA1LPM 84, KA1MIJ 73, N1CDI 56, N1CKM 40, WA1FNM 28, K1BZD 27, WA1DXT 24, KA1DWX 23, KA1KF 18, W1DMH 16, W1ATX 15, K1LCQ 7.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. New officers for the Augusta Emergency ARU: K1WWT, pres.; KA1DXL, v.p.; N1CIQ, secy.; W1WCI, program; N1AZH, hamfest. PSHR: AK1W W1RWG N1BJW KA1AVU WA1YNZ.

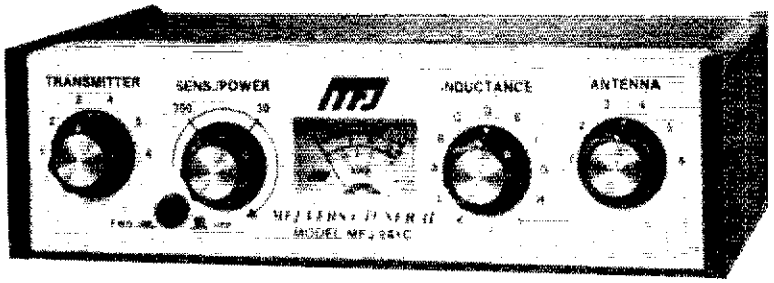
Net	Sess.	Checkins	Tfc.	Mgr.
SGN	32	989	305	K1GUP
PTN	54	442	291	W1HDC/N1BJW
AEN	7	107	59	WA1YNZ
CMEN	9	151	19	W1WCI
MPSN	5	64	19	N1BCE
SPSN	14	80	15	N1BCE
RACES	4	40	12	W1RWG

Traffic: AK1W 392, KL7IJG 145, N1BJW 141, W1RWG 125, WB1BYR 116, KA1TJ 115, W1YA 99, KA1AVU 81, W1HDC 80, W1JTH 75, N1BLZ 71, W1BMX 51, W1KX 40, N1BCE 35, KA1HJO 32, KA1EIW 22, W1WCI 22, WB1EIL 18, K1PV 14, KA1GCW 12, KA1ENL 11, KA1AFV 8, K1BUC 8, KK1A 6, KA1FTL 5, N1BME 4, W1TDK 1. (Sept.) WB1BYR 103.

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95 (+ $4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

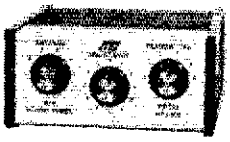
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+ $4), like 941C less balun. **MFJ-945, $79.95** (+ $4), like 941C less antenna switch. **MFJ-944, $79.95** (+ $4), like 945, less SWR/Wattmeter. **MFJ-943, $69.95** (+ $4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

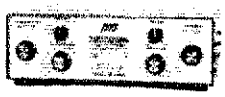
Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II



MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50 ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

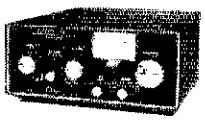
18 position dual inductor, ceramic switch.

7 pos. ant. switch, 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf 6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM W1VTP. Feb. 5th & 6th, New Hampshire QSO Party. Plan ahead. N1NH's daughter Jennifer now KA1JMG. Ninth grader KA2KHT now General. W1BY's back in Florida. Welcome back to traffic work WA1MXT. Nashua club won Field Day Class 5A. KI1M has new VIC-20 computer. W1FYR, EC Cheshire, reports 40 active hams and 21 are ARES members. WA1UNN & WA1YZN are AECs. W1TN now OO. W1AM list of NH Honor Roll DXCC hams: Mixed W1FZ 318/359, W1AM 311/323, W1KGH 309/329; Phone W1FZ 316/350, W1ICH 315/332. W1QYY & ZA1GA attended GSPN dinner. Thanks to all for excellent SET. Happy New Year. Traffic: W1QYY 371, N1NH 272, W1TN 247, K1YMH 132, KI1M 124, K1OSM 115, AK1E 94, W1VTP 89, KI1R 84, KA1BJ 82, WB1CFP 72, W1CUE 57, WA1YZN 55, N1ALM 49, KA1CJI 47, K1ACL 47, KB1A 43, W1ALE 42, KA1FKM 28, WA3BZM 28, W1FYR 25, WA1PEL 18, K6UXD 14, KK1E 13, N1AKS 10, KA1HUW 8, W1NH 7. (Sept.) W1FYR 40, KA1ISL 17, WA1PEL 15, W1BYS 3.

RHODE ISLAND: SCM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: KC1G. WA1OSL, NM RIEM2MTN, reports 21 sess., 155 QNI, 23 QTC. NM RITN KB1G NM RITN, reports 8 sess. & 13 QTC. KA1DRI and N1BXS have upgraded to Advanced class. Sub Sig group erected their new tower and had it pulled down by an errant garden tractor. Secret agents indicate that it is back in service. OSARG held quarterly meeting at New England Wireless Museum. Received very little news this month. This column will only reflect what is received. So if it is only a couple of lines, then so be it. Traffic: W1EOF 818, KC1G 196, KB1G 103, KA1EHR 73, N1RI 56, KA1FPP 38, K1AOS 27, AE1S 10, KA1DRI 4.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Altho it is jumping the month of reporting, the Green Mt. Net had the pleasure of having W1AW check in, during the first part of Nov. 'Twas such a rarity some wondered who was in trouble!!! Hope the next visit is not so far down the log. VSB 31/490/129; VTN 29/8194; VFM 31/331/74; GMN 26/417/40; Carrier 26/559/29; RFD 5/94/26; VPN 5/89/6. The Central Vt. ARC has a 2M rptr located in Graniteville, operating 146.025/625, under the call of W1BD. Congrats to CVARC. KA1GID had to resign as NM of VSB owing to work. Thanks for your cooperation and job well done. Traffic: K1BQB 193, N1ARI 138, AE1T 115, KA1GID 91, WB1ABQ 79, W1KRV 37, W1KJG 27.

WESTERN MASSACHUSETTS: SCM, William J. Hall, W1JP — STM: W1UD. SEC: WB1HIH. ACC: W1YI. It is with deep regret that I must report that WA1GLG and KA1AVT have become Silent Keys. On a happier note, KA1CDC upgraded to Extra and KA1DIP to Tech. WA1FOD reports the U. Mass ARC active in the Sept. VHF QSO Party, with 228 QSOs in 34 sections. KR4N is instructing a Novice class at U. Mass. Two members have passed code test. Classes also being conducted by HCRA and Provin Mt. clubs. The Mt. Tom ARA, HCRA and Provin clubs have organized a Christmas party on 10 December, featuring the WB1EMN band. ACC W1YI is getting somewhat desperate in his attempts to glean information from Worcester Co. clubs for the "Activities" column. W1YI, who used to be a silent movie organist, will soon do Charlie Chaplin's "The Gold Rush" at Amherst College. A lot of public service activity in section lately. Reports received from W1YBT (parade), W1HER (race), WB1EDA (horse trials), and K1JHC. Late flash! W1KK has come forward to become Hampden Co. EC. To all of you, Season's Greetings from Heather and me. PSHR: KA1T WB1HIH K1JHC W1KK. Traffic: KA1T 459, WB1HIH 235, W1UD 133, KA1CDC 128, W1KK 68, KB1W 68, K1JHC 51, WB1HKN 32, WA1OPN 20, W1ZPB 18, W1JP 10.

NORTHWESTERN DIVISION

ALASKA: SCM, Richard Henry, AL7O — ASCM: AL7AC. SEC: KL7LO. STM: WL7H. KL7LO is the new Section Emergency Coordinator, replacing AL7AC who has accepted the position of ASCM. Arctic ARC elected new officers: KL7IRT, pres.; WL7AKS, v.p.; KL7JLF, secy.; KL7AZJ, treas. The Alaskan DX Assn. is still growing. Anyone interested in contesting or DX should contact NL7G for membership details. Monthly reporting is required by all station appointees. Ensure your report card is mailed to me by the first of each month. Traffic: KL7LO 27.

IDAHO: SCM, Dennis Hall, KK7X — Special thank you's to those who participated in the 1982 SET. Still need to hear from those stations interested in an official appointment. With winter coming, so come the increased chances of communication problems here in the state. Welcome to a new club in North Idaho, the "North Idaho ARA." Congrats to WA7HPB, new president of the Kootenai ARS, and their new board of directors. Information is needed from the other clubs in Idaho regarding their events. I will be making a trip through the state in Spring, and hope to be meeting more of the amateurs in Idaho. 73. Traffic: W7GHT 226.

MONTANA: SCM, Les Belyea, N7AIK — It is with great interest each month that I look forward to receiving and reading various club newsletters from around the state. I believe I get most; if there are any others out there, I would appreciate a copy. There's a lot of activity out there and this is a great way of passing along information to all. The Red Lodge rptr has a new freq. of 146.10/70 (RTTY and voice). Billings is on 147.74/14. Libby is back on 146.31/91. Want to really plan ahead? The 1983 ARRL NW Division Convention will be July 8-10 in Spokane. W7LBK of Laurel reports updating his station with a new TS830S, TRS-80 Model 3 and all the goodies. He goes on to say he spends most of his time in the shack and it keeps him out of his XYL's hair. W7TGU has a county total of 2485 and is looking for more.

Net	Sess.	QNI	QTC	Mgr.
MTN	23	800	90	K7TQM
IMN	31	254	139	K7JV
BSN	12	219	18	WB7UTJ
MSN	6	77	6	KB7SE

PSHR: WA7GQO W7LBK WB7WVD. Traffic: KF7R 188, W7LBK 70, N7AIK 50, WB7WVD 50, WA7GQO 29, W7TGU 10, KA7LRD 6.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: N7CPA.

Net	Time/Day	Freq.	QNI	QTC
OSN	0230/0600Z Dy	3587	657	621
BSN	0145Z Dy	3908	949	34
WCN	0300Z Dy	3702	432	127
OARES	0115Z Dy	3993.5	577	78
PTTN	0300Z Dy	146.76	267	40
LBLARES (Sept.)	0330Z Dy	146.79	1006	23

N7CPA is new SEC for Oregon. KV7F DEC for Portland area. KC7YN will be Public Information Officer for Oregon, and KA7KSK will be State Govt. Liaison beginning 1 Jan. Upgrades: Novice-KA7OJV KA7OVF; Adv.-KA7MOF. KF7Z no. 1 in NW Div. for ARRL Int. DX Contest. Hoodview ARC's "Super Saturday" Open House at Hood C.C. was a big success. KA7OJV is new Novice op at 9 years old. A real big CONGRATS to all the above. McMinnville ARC made fine showing in FD results, mid 5-A class. N7BTK in EA6-land may be on air soon. Grants Pass ARES members participated in county-wide simulated disaster exercise. WCN net new director WB7WOW. WCN has regular check-ins from BC, WA, OR, UT, MT, and CA. AL7W QRV on six meters. Lookout DX! K. Falls, K-BAR-A, officers: KU7K, pres.; N7BSS, v. pres.; KA7BGQ, treas.; K7TDX, sec. Traffic: W7VSE 622, KT7X 387, WA7LGN 337, KA7ELI 266, K7NTS 174, WB7OEX 107, W7ZB 84, KI7Y 74, W7LNE 73, N7BGW 42, KA7AID 36, AL7W 13, W7LT 8.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Freq.	Time (Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0145/0445	833	272	62	W7GB
WARTS	3970	0100	2877	279	31	W7SFT
NTN	3970	1830	875	72	31	W7VL
NWSSB	3945	0130	651	47	31	W7JGM
EWTN	146.64	0030/0430	88	60	42	WA7CBN
PSTS	145.33	0030/0530	152	91	62	W7IEU
SCARES	147.18	0230 W	18	5	4	KA7AML

Clark Co. ARA will send Christmas messages for veterans from the Vancouver Veterans Hosp. W7SB is in charge. Yakima ARC rptr is moving to new site, hopefully to be operating before the ice forms. K7VAS is coord'g the Oak Creek hunting camp again this year on 147.90/.30. Yakima Hamfest is planned for May 14-15. Rebel's hold Annual Potluck at Thrift Comm Hall on 11-20-82. Mike & Key ARC held successful Auction on 10-30-82. If you were not there, you missed some good deals. N. Seattle ARC heard talk by W7GVF Deputy Chief Seattle FD on comms and other subjects in the Seattle F.D. The "Challenge Cup" for bunny hunting between Mt. Baker ARC & RASC was won this yr. by MBARC. Look out next year, MBARC. KA7LOY gave an interesting talk on the Voice of America. STM W7GB rpts N7CSP will be new mgr. of WSN as of 12-1-82. N7DNG has been checking into WSN and enjoying the net. W7GIP resigned as NCS on Mon. RN7. W7GB & W7GHT will fill in for awhile. SEC K7SH and I visited the Chehalis Valley ARS meeting at their new quarters and talked about ARES and asked for recommendations to fill an EC vacancy in Lewis Co. Interested parties contact K7SH. Also, K7SH is looking for someone to fill the EC vacancy in Spokane Co. left by resigned KM7U. Our many thanks to KM7U for his many years of service as EC, DEC and ASEC. Numerous clubs are calling for nominations for 1983 officers. Many will volunteer their services for these important jobs. Let us all help the newly elected by volunteering for the many committee positions. I invite you to accept an ARRL appt. such as Official Relay Stn (ORS), Official Observer (OO), Official Bulletin Stn. (OBS), Emerg. Coord. (EC), Dist. EC (DEC), etc. Please write me for an application and join the fun. BEARS and the RCT are battling it out in SS for the 2nd year of 5-yr. challenge. Who will win this yr? Stay tuned. WB7FHC taught computer classes with monetary proceeds going to the club 220 rptr fund. Very successful activity. Congrats. Traffic: W7DZX 657, KS7I 572, WB7TOF 338, WB7WOW 271, N7C6P 244, K7GXZ 218, N7DNG 213, W7HNA 182, K7CTP 119, W7GB 101, N7AFZ 77, WA7BDD 76, N7AFZ 74, W7IEU 64, W7GIP 57, KD7G 55, W7BUN 54, KR7F 43, K7VW 42, W7LG 24, K7BFL 18, WA7OJI 11, K7OXL 11, W7APS 7, W7CKZ 4, W7AIB 3.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — ASCMs: W6ZF N6OHN VE2AQV/W6. SEC: W6LKE. STM NI6A made BPL again! The NCCC-sponsored Calif. QSO Party was a great success, judging by the participation level and the number of logs received by NCCC president W6SZN. Alameda Co. RACES participated in a Halloween drill coordinated by K6JNW. N6BPL is one of many who have tried the new 30-meter band and liked it. MDARC mourns the loss of K6DEJ. N6RO made a presentation on the CAL QSO Party at their last meeting, complete with slides of previous operations. An article on cw & phone nets by NI6A appeared in their excellent monthly, *"The Carrier."* LARK's latest "Klutz of the Month" award went to KE6BS for wondering why no one on 2 meters was responding to his calls made on the wrong microphone! The Pacific Division Convention in Santa Clara was handled marvelously by SCARC. W4KFC K1ZZ & N3AKD represented Hq in an outstanding manner. Traffic: NI6A 677, W6VOM 162, K6APW 139, K6AGD 23. (Sept.) K6AGD 58.

NEVADA: SCM, WJD Marshall-Gratrix, KA7Q — STM: W7BS. At the Nevada ARA meeting held on Wednesday, Nov. 17th, the following officers were elected: W7SRN, pres.; W7CX, v.p.; W7UIZ, secy./treas. Nov. 22 marks the fifth anniversary for the Wide Area Data Group, something of a monument for its hard working driving force N7RH. In the transition, some reports are being lost. Please make sure they reach KA7Q. Nevada Sagebrush Net weeknights at 1900 PST on 3906 KHz.

PACIFIC: SCM: Army Curtis, AH6P — STM: KH6HIJ. SEC: KH6B. ECs: Hawaii-AH6K; Kauai-KH6S; Maui-KH6H; Oahu-KH6NP; Guam-KG6JKV. Aloha and hafa adai to all of the Pacific. We have a new EC for Guam, thanks to KG6JKV, and a new asst. EC on Oahu, thanks to KH6LO. Pacific Traffic Net now meeting at 6 P.M. local time, MWF. KH6HIJ planning a new section-level traffic net at 7 P.M. and a Novice training net at 8 P.M. Call KH6HIJ or me for more details. AH6B is now on Guam and working lots of DX. KH6DQ reports handling almost 20,000 QSLs in the first 5 months of 1982. Do you have an envelope on file? Traffic: KH6B 147, KH6HIJ 66, KH6H 56, KH6S 51, KH6LO 28, AH6P 24, KC6JJ 7, W6ORS 1.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. The North Hills RC's annual Old Timers Night was again a big success. W6KME was the oldest ham there and YL KA6SMK at age 9 was the youngest. KME was only 71 years older. New officers for the River City Contesters are: N6GJC, pres.; KF6A, v.p.; WB6RDA, treas. Congrats to N6EPG on again making PSHR. KE6NO is now an Official Relay Station. I am sad to note that W6RF and WB6QZV are Silent Keys. The Shasta Cascade ARS provided communications for the Whiskeytown Relays. Congrats to NM6T on his new ticket and call. N6JV gave a presentation to the Yolo

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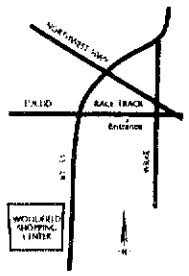

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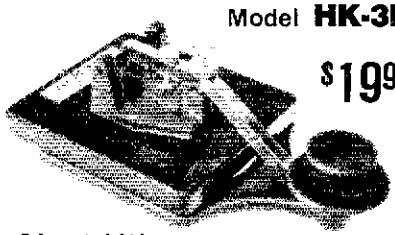


- Deluxe straight key
- Heavy base. No need to attach to desk
- Navy type knob

CC-3P shielded cable & plug for HK-3M **$1.50**

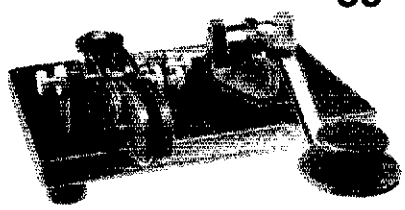
Model **HK-1** $24.95

- Dual lever squeeze paddle
- For use with all electronic keyers

Model HK-2 Same as above less base **$15.95**

CC-1P shielded cable & plug for HK-1 **$2.00**
Combo offer, HK-1/HK-5A & CC-1P **$69.95** Package

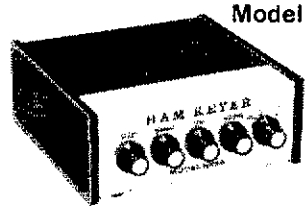
Model **HK-4** $39.95



- Combination HK-1 & HK-3 on same base

CC-1/3P shielded cable & plug for HK-4 **$3.50**

Model **HK-5A** Electronic Keyer $49.95



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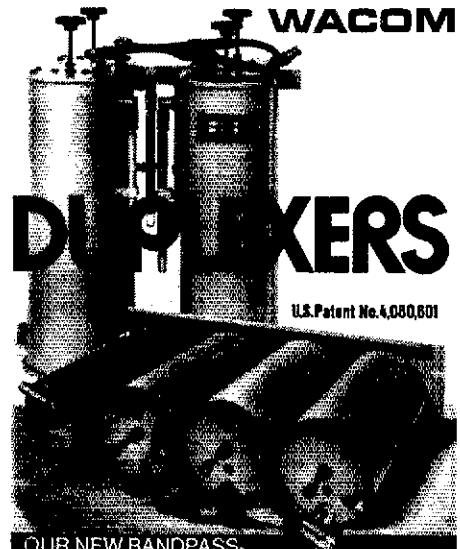

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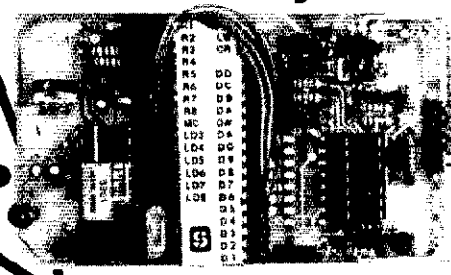

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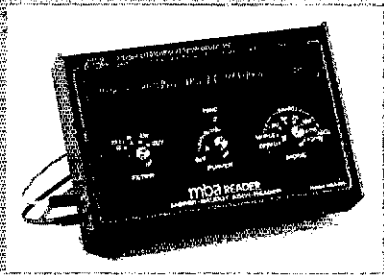

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ARS on early radio tubes. Traffic: KE6NO 32, N6EPG 10, K6MLW 4.

SAN FRANCISCO: SCM, Bob Smith, NA6T — SEC: N6BLN. STM: K6TP. The section survived COWW-A3. N6OJ's multi-single netted 1.1 mil. FB. SCRA Xmas Party is Dec. 12 at Windsor Country Club. MARC Xmas Party is Dec. 3 at HAFB clubhouse. SFRC Xmas Party is Dec. 11 at Castle Lanes. SCRA won Small Club Award at Pacific Div. Convention. We have a lot of GOOD small clubs, so let's get out and support all of them. FWRA-HARC participated in 3 public service events during October. Mendocino Co. has won 2/3 of the battle in CATVI; channel E will not be used in new cable installations in Mendocino Co. Tnx for the help in the CATVI battles, and for all your help in the SF section. Happy Holidays and best of DX to all. See you all next year. Traffic: K3TP 83, K6TWJ 73, W6RNL 47, NA6T 40, WB6RTE 9.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. ASCMs: W6TRP K6YK NF6K. With deep regret I must report the following SILENT KEYS: KA6GVR W6DCE WB6WVE WA6IHN. New officers of the Central RC are: WA6JFB, pres.; K6REZ, 1st v.p.; W6TRP, 2nd v.p.; N6HB, secy./treas.; W6UZ N6UR WB6VGZ, board. W6MRT has moved to Arizona. WA6OYF and KA6VUH tied the knot; congrats. KA6VUQ KA6BZQ and KA6VXB upgraded. KA6BWY is Tech. KA6SKD is General. KA6WBK is a new amateur. W6NTK has PCS 4000. W6XP chases DX on 80 meters. W7POR has TI computer. W6DPD has an Apple computer. W6JPU has TRS-80 color computer. A computer net meets Wed. at 9 P.M. local time on 147.33 linked to 145.21. The 1983 Pacific Division Convention is Aug. 19-21 in Reno. The 1983 Fresno Hamfest is May 20-22. Mark your calendar for these events. Traffic: N6AWH 200, WA6YAB 53, W6DPD 22, W6SX 10, WA6JDB 6.

SANTA CLARA VALLEY: SM, Ross Forbes, WB6GFJ — STM: W6ZRJ. SEC: KA6R. Happy 1983! Now that the new year has arrived, don't forget that the SCV is operating under the NEW SECTION STRUCTURE. There are many positions open for those interested in an appointment. Contact SM for details! W6ASH & WA6ROM spoke before the Mt. View Planning Commission, concerning a possible new antenna ordinance. They were successful helping Amateur Radio, and any changes will NOT affect us. Congrats for their fast action. Last month saw lots of Christmas parties by clubs in the section, and with the new year brings the change of command in many section clubs. Be sure to keep the SM informed of changes in YOUR club. N6ARP has been kept busy speaking to many clubs on the early days of radio. SCCARC now has a CW Flex Net at 8 P.M. (local) on 21.120 MHz. New editor of *The Footprint* is WB6YZI. FARS is holding their annual banquet this month. Clubs taking part in the local SS competition included FARS, SPARK, EMARC and PAARA. NPS ARC had an interesting program on remote bases. WD6EKR has been kept very busy with public service activities. K6SZ is a new member of the San Mateo RC. K6OYN is the new president of the Varian ARC. Since the 10 MHz band has been opened up, for cw and RTTY only, you can experience the thrill of learning new hf propagation. Jump in and have fun, but don't use more than 250 watts! Stations who spent time outside of our section included K6WR in JA, W6SZN in VP5, and N6BT in OA. N6NF and K6AYB have been active as OO, while N6FMF has been off fishing. Congrats to recent upgrades KA6OCG KA6UES and WA6WAT! Traffic: W6YBV 202, KE6ZA 68, W6KZJ 58, WD6EKR 50, WA6HAD 49, WB6GFJ 10, W6PHT 4, W6PIH 2.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR —

Net	Time	QNI	QTC	Sess.	Mgr.
CMN	1245Z	457	210	33	W4EAT
JFK	2330Z	1013	187	33	WB4WII
THEN	0030Z	1025	165	33	WA4OBR
CN	0000Z/ 0300Z	552	349	61	AB4S

This is for all you hf buffs who, like me, wondered about the amateurs who wander around hamfests with HTs clipped to their belts. Well, those things are not just for show. They are used, and the fellows don't just hang 'em on for the hamfests. They wear them at all times. AT ALL TIMES. At work, at play — clipped to their PJs at night and, yes, even when they go to the bathroom. We got proof positive earlier this month with word from down New Bern way. Seems as how WD4JRK found himself in extremes in the powder room the other day. Someone had not only removed all the toilet tissue but had also absconded with the Sears catalog. HT to the rescue. A quick call to the XYL downstairs solved the problem. However, it also alerted 279 other repeater users to the near catastrophe. Offers of help poured in, advice was freely given and the local RACES group was put on stand-by alert. WD4JRK admitted later he was just wiped out by all the activity. And no, I won't divulge my source. There have been unconfirmed reports in the past of a rig left on VOX inadvertantly during a honeymoon, but the above is fully documented and we think a classic. We had assumed that, as in the past, Thanksgiving traffic would be heavy and took steps in preparation of the load. So far, nothing. Many thanks to all of you who took liaison spots and adjusted your net activities to help. Maybe Xmas will give us a chance to see if our preparations were adequate. Traffic: WB4WII 324, WD4CNR 373, WD4CNO 305, WA4FKY 301, KD4PJ 211, AB4S 191, W4EAT 183, NJ4L 168, KU4W 156, KZ4A 97, NT4K 82, KA4KJI 74, N4CYG 69, WA4SRD 66, KA4DHP 62, WB4HRR 57, WB4N 56, WA4OBR 52, K4NLK 49, NE4J 48, WB4YZF 47, WD4LRG 45, W8JUP 32, WA4CUD 27, N4UE 27, WD4BCX 24, WD4CEB 24, N4EHM 22, WD4HTE 20, WB4CYN 16, WD4LOO 15, KA4LKF 13, WA4WFY 12, KA4AKK 10, W4WXZ 9, W4RVE 4.

SOUTH CAROLINA: SCM, Jimmy Walker, WD4HLZ — Rockingham, Cheraw, Dillon and Greater Pee Dee ARCs combined for the first annual PIG PICKING FEST. Fun and fellowship was had by all. If you missed the event, better make plans to attend next year. Received a letter from Bernie Palmer, MIC-Columbia WSFO, concerning the SET. He states, "I believe the drill was a success, and the NWS would like to thank all who participated in the event. Please express our appreciation to them." And I would like to thank all of you for your cooperation and help. Without your effort, activities such as this would be a failure. THANKS! SCSSB 1353/121, SCNT 312/83, Blue Ridge 1781/78, Greater Pee Dee 1038/115, Western Carolina 310/23, York 164/11, Lancaster 155/11, Carolina State Line 57/2, Newberry 42/4, Laurens 24/0. Traffic: K4ZN 215, W4NTO 114, W4ANK 93, KA4AUR 89, W4FMZ 88, WB4UDK 41, K4EAR 40, K4ZB 40, K4FRX 39.

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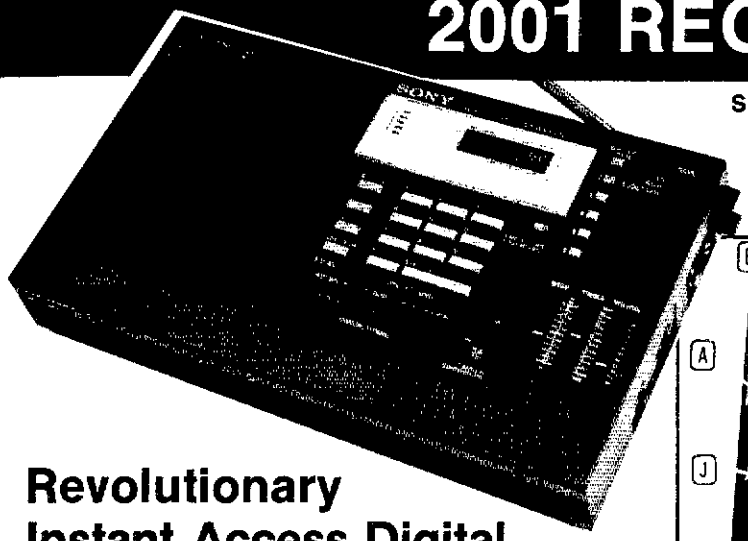

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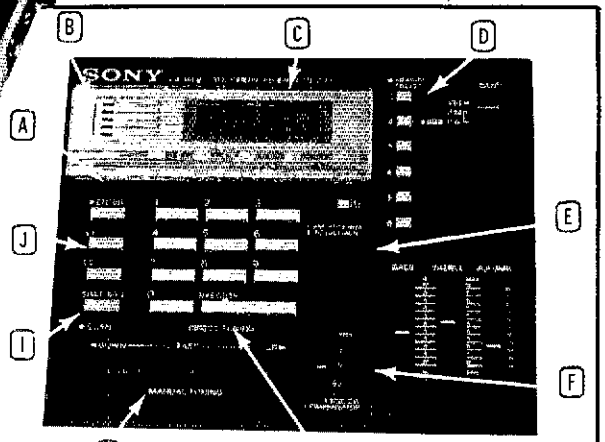

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DUAL PLL SYNTHESIZER CIRCUITRY covers entire 150 KHz to 29.999 MHz band. PLL_1 circuit has 100 KHz step while PLL_2 handles 1 KHz step, both of which are controlled by separate quartz crystal oscillators for precise, no-drift tuning. **DUAL CONVERSION SUPERHETERODYNE** circuitry assures superior AM reception and high image rejection characteristics. The 10.7 MHz IF of the FM band is utilized as the 2nd IF of the AM band. A new type of crystal filter made especially for this purpose realizes clearer reception than commonly used ceramic filters. **ALL FET FRONT END** for high sensitivity and interference rejection. Intermodulation, cross modulation, and spurious interference are effectively rejected. **FET RF AMP** contributes to superior image rejection, high sensitivity, and good signal to noise ratio. Both strong and weak stations are received with minimal distortion.

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SPECIFICATIONS

CIRCUIT SYSTEM: Fm Superheterodyne; AM Dual conversion superheterodyne. **SIGNAL CIRCUITRY:** 4 IC's, 11 FET's, 23 Transistors, 16 Diodes. **AUXILIARY CIRCUITRY:** 5 IC's, 1 LSI, 5 LED's, 25 Transistors, 9 Diodes. **FREQUENCY RANGE:** FM 76-108 MHz; AM 150-29,999 KHz. **INTERMEDIATE FREQUENCY:** FM 10.7 MHz.; AM 1st 66.35 MHz., 2nd 10.7 MHz. **ANTENNAS:** FM telescopic, ext. ant. terminal; AM telescopic, built-in ferrite bar, ext. ant. terminal. **POWER:** 4.5 VDC/120 VAC **DIMENSIONS:** 12¼ (W) X 2¼ (H) X 6¾ (D). **WEIGHT:** 3 lb. 15 oz. (1.8 kg)

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KE4WG 35, KE4QZ 22, KA4LRM 21, WD4FJP 20, W4PAB 20, WD4PLB 9.

VIRGINIA: SCM, Phil Sager, WB4FDT — ASCM: K3RZR. STM: KY4K. SEC: WB4UHC. Chief OO: W4HU. Chief OBS: K3RZR.

VNTN	Noon	7260	WD4FTK
VSBN	6:00 P.M.	3947	W4NWM
VSN	6:30 P.M.	3680	K4VWK
VN	7:00 P.M.	3680	K4JST/W3ATQ
VLN	10:15 P.M.	3947	WD4ALY
VN (late)	10:00 P.M.	3680	K4JST/W3ATQ
VRN (RTTY)	7:30 TTh	3625	KA4ERP

I regret that George Robinson, ex-W3FE, is now a Silent Key. He was first licensed in 1913 and was one of the first five licensed radio amateurs in Virginia according to the Callbook of that year. He helped found the Tri-Cities ARC in 1921, the predecessor of the Richmond ARC. He had not been licensed since the 1950s, but kept a receiver tuned to the amateur bands and was an occasional visitor to the Richmond club. Wow! *Three* BPLs this month. Congrats to W3ATQ WA4CCK and K4KDJ this month. Wow again! Nineteen Virginians made PSHR this month. Congrats to WD4ALY K4JST K4KDJ WA4CCK KB4WT NT4U AA4AT K4VWK NW4O K3RZR WB4FDT KY4K NT4S NN4I KA4IUM WA1VRL WA4LJI KA3DTE and WD4CNG. STARES reports 49 QTC and 809 QNI, while SVEN reports 41 QTC and 505 QNI. W2SYR (ex-WA4BOQ) passed Extra and is awaiting his new call. W4MYI new president of the Richmond ARC. The first hamfest of the year, the Richmond "Frostfest," will be January 16 at the State Fairgrounds in Richmond. Thanks to N4EPO for providing ARRL bulletins after some sessions of the VSBN/VLN. I understand that a number of Virginia amateurs have already worked WAS on the new 10 MHz band. W4THV organized communications for the Tobacco Festival Parade. Traffic: W3ATQ 531, WA4CCK 503, WB4PNY 466, WD4ALY 291, WD4FTK 283, K4KDJ 283, K4JST 249, WA4LTI 221, AA4AT 218, KA3DTE 186, NT4U 125, W3BBN 119, K3RZR 111, KB4PW 109, N4YQ 104, W4NWM 103, NN4I 98, KY4K 92, K4JM 84, K4DHB 78, NW4O 75, KA4IUM 74, W4UQ 74, W3BBQ 73, KB4WT 60, W4HIR 58, KR4V 57, NT4S 52, K4VWK 50, W4NFA 48, WB4UHC 44, W4PVA 43, WB4FDT 42, KA4JXZ 40, WD4CNG 32, N4FNT 32, K4MLC 31, WB4CVY 30, KB4QG 30, KC4HN 28, W4LXB 28, WB2DQZ 25, KM4X 24, WA1VRL 20, WA4TVS 18, W4CFV 16, KI4W 15, W4TZC 12, WB4KIT 11, WB2OMZ 11, WB4RWY 11, W4OKN 10, WB4ODZ 9, N4LE 5, N4RYO 5, N4BJX 3, W4KXE 3, WD4KQJ 2, W4DM 1, N4YE. (Sept.) WB2OMZ 14, WB4RWY 6, N4DW 1.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. Rptr. Coord.: WD4KHL. KA8GHF WB8VAZ and W8FG are new OBSs. WB8ZTV and W8PZT are new OOs. New hams include KA8QPK and KA8QGU; congrats. K8LG is new pres. of State Radio Council due to resignation of WA8GYU. WV QSO Party will be Jan. 22 & 23. Check "Contest Corral" or contact KB8ZM for details. Happy New Year to all and tnx for support during 1982.

Net	Freq.	Time	QNI	QTC	Sess.	NM
WVM	3567	7:00	98	24	28	W8LYV
WVFN	3990	6:00	593	161	31	N8AJC
WVMD	7235	Noon	409	39	29	W8FZP
WVNN	3730	6:15	48	6	16	WD8LDY
KFC 2M	87/47	8:30 M	59	0	3	WD4KHL

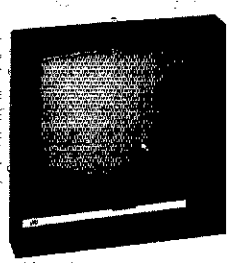
Traffic: KA8GHF 214, K8QEW 101, KD8G 87, K8BS 58, WB8WEZ 50, KA8HCT 47, K8KT 42, N8AJC 41, KC8CR 38, WB8ZMX 33, W8FZP 26, WA8KCJ 26, KV8T 26, WB8ZTV 21, W8CAL 13, K8JQ 12, WB8VAZ 6, WA8YLW 6.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, W0ACD — SEC: K3PUR. STM: WD0AIT. NMs: WD0AIT W0HXB W0LAE WA0RYL. From all reports it seems as though the section had a very good SET again this year. The NTS stations were more involved than in the past, as their traffic count went up considerably. It was good to learn that W0UA, a contester at heart, wound up as one of the NTS liaison stations during SET. Good work to all who participated. Thanks to WD0AIT the traffic count was increased a good bit. This year has been a very active one for the section, and I want to thank everyone for their part in making it so. I wish everyone the best for the holiday season and hope the New Year will be a good one for all. We will be implementing the new ARRL Field Organization system on 1 January. I am looking forward to it and ask your support as you have given in the past. Nets: Colombine. sess. 26, QNI 1082, QTC 68, inf. 271, QNF 1075. CWN sess. 37, QNI 272, QTC 302, QNF 1002. HNN sess. 31, QNI 1792, QTC 122, inf 303, QNF 1384. Traffic: N0BQP 2018, WA0HJZ 1368, W0ACD 1274, W0ACH 816, K0JAN 450, K0DJ 391, WD0AIT 375, W0HXB 335, W0EJD 283, KB0Z 264, N0ACW 192, WB0NHA 166, W0LAE 124, W0NFW 64, KA0NLI 53, K0TIV 53, W0UA 38, W0LQ 27, AD0J 26, K0CNV 7, W0GW 2. (Sept.) W0HXB 473, K0JAN 219, N0ACW 185. (Aug.) W0HXB 216. (July) W0HXB 248.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. STM: KV5U. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3583 at 1930 local and handled 260 msgs with 280 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 at 0100 UTC and handled 80 msgs with 1041 stations in. New Mexico Breakfast Club meets daily on 3939 at 0630 local and handled 83 msgs with 928 checkins. Yucca 2-Mtr. Net (7/18 & 9/33) handled 13 msgs with 687 checkins. Caravan Club 2-Mtr. Net (6/06) handled 15 msgs with 185 checkins. Vy sorry to report the passing of our old time friend and super DXer W5PQA. He will be deeply missed. Nice newsletter *"The Local Oscillator"* from Mesilla Valley RC. New 145.23 rptr near Sunspot. Traffic: KV5U 194, W5JOV 174, W9OBV 159, K5DUV 146, W5DAD 120, N5SJ 90, KB5LI 79.

UTAH: SCM, L. M. Norman, W7PBV — STM: W7OCX. SEC: WB7BZJ. WB5TJP/7 is public relations officer for AF MARS Region 5. WB7BZJ conducted SET on 40M. K7MD and WB7UML installed 2M antennas at McKay-Dee Hospital for emergencies. W7KVS out of hospital and doing OK. Cactus Net members N7CLG WA7GIE WA6ITE WB6LVZ and WB6QMS building a remote site on Blow Hard Mtn. UARC homebrew contest winners: W7JPC for linear amp; KM7A for HT case; KA7HIF for pictorial discription of a vertical ant; W7ETR for cw/RTTY keyer. KA7HYD home from a year's tour of hazardous construction duty in NV. N7BUO and WB7BZT on 160M. WA7MTF assisted a British team in trying to set a new world land speed record. N7DWB busy attending dental conventions. All radio amateurs urged to check into the Utah Weather Net on 2M. K7HLR thinks 30M band is great. Traffic: K7HLR 207, WA7KHE 141,



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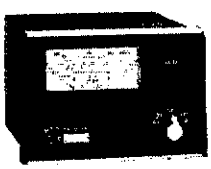

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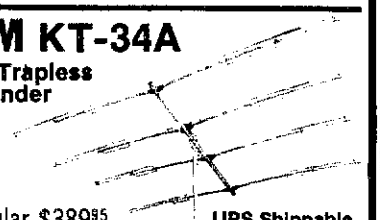

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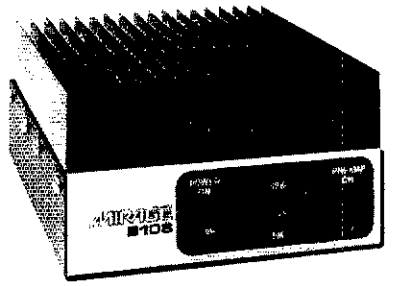

B-108 2m 80w amplifier with built-in 10db gain/2.5db NF Receive Preamp. All mode, 500mw-15w drive; 10w in/80w out. Int./ext. relay keying. 5¾"w×3"h×8"d, 3 lbs. 13.6vdc/12A. (Reg. $179.95)..... **Sale $159.95**

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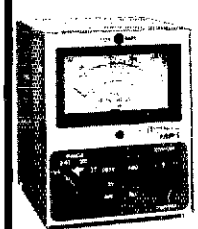

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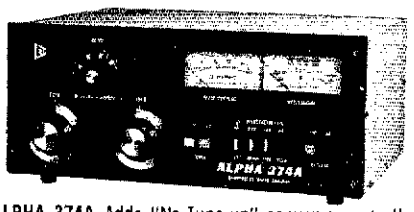

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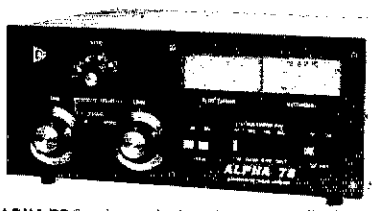

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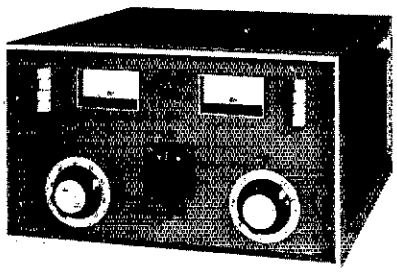

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WA7MEL 117, WA7JJL 78, WB7UJP 56, KN7U 51, K7CKF 24, W7RO 23, W7OCX 18, W7PBV 11.

WYOMING: SCM, Dick Wunder, WA7WFC — WB7RGN is new emergency coordinator for Goshen Co. N7ABC reports the Sweetwater ARC is conducting a ham license class for area law enforcement officers, which will provide more qualified operators for the county ARES/RACES station. New Novices include KA7OGQ KA7OGR KA7OMP (sons of WA7USI) & KA7OLJ. Recent upgrades include KA7JWY & N7EIP to General and KW7L to Extra. Congrats to all. WB7NHR reports the Wyo. Cowboy Net held 21 sess. with 612 QNI & 16 QTC. WAØPFJ reports the Wyo. Jackalope Net held 26 sess. with 597 QNI & no QTC. KA7FKT, nice to have you back in the traffic sessions. The best to all in the New Year. Traffic: WB7NHR 285, WØOGH 127, KA7FKT 114, W7SQT 34, K7SLM 29.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Hubert H. Wheeler, W4IBU — ASCMs: WA4RNP KA4WVU. SEC: N4DMA. STM: WA4PIZ. A tip of the hat to K4HJX for organizing the Tuskegee ARC. The following officers were elected: K4HJX, pres.; K4PXR, v.p.; KA4IOC, secy. Let us all know when you affiliate! Need info from net mgrs. to include your call in column. The SET was very successful though no unusual exercises were reported. A new high for traffic count may have been established. KA4IJT reported excellent participation on the ATNM. WA4LXP still looking for new blood on the AEND. Wonder what record WA4JDH has compiled being on the Public Service Honor Roll? The 30-meter band is now open for use (see ARRL bulletin #95) with the exception of the frequencies between 10.109 & 10.115 MHz. Don't jeopardize your license by using these frequencies. The results of the Field Day activities prove that Alabama can hold its own. As an affiliated club, you can earn money by letting your members re-enroll in ARRL through your club as well as enrolling new members at 2 bucks each! It is like found money. Alabama represented 100% on CAND by W4CKS. Alabama represented 100% on DRN5 by KC4GS WA4JDH W4WJF KD4KT W4IBU WB4IXA NW4X WA4HRV W4CKS W4ISS and W4YRO. Traffic: WA4JDH 947, W4CKS 206, WA4LXP 175, NW4X 142, WA4HRV 92, K4HJX 89, W4IBU 85, WB4IXA 63, N4HIR 46, KA4IJT 37, K4AOZ 16, KY4H 13, W4DGH 11, WD4DHI 10, WB4TVY 10, K4GXS 8.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: K4VHC. SEC: WB4HXE. ASEC: K4SWJ. STM: W4WXA. Red Cross Liaison: NC4E. Chief OBS: W4BIA. NWS: WA4PZD. The newly formed Metro Atlanta Ladies ARC invites YLs to join their organization. Sorry no OMs. MALARC elected: KE4AV, pres.; KB4XD, v.p.; KA4LPT, treas.; KA4WAK, secy.; WA4WKC, memb.; KA4GAC, historian; KE4UF, cert. Interested YLs write or call KA4LPT. K4UPP is recovering from heart surgery. Get well & take it easy. The Atlanta Hamfestival is moving to the Civic Center in '83. Coastal Area RS 1983 officers are: K4NLX, pres.; N4CTF, v.p.; WB4KOZ, secy.; WB4MBN, treas. Remember all who are planning hamfests this year, now is the time to get all the info into our S.E. Director, W4RH, & if you want an ARRL sanctioned one, ask for the necessary forms. Also W4RH can tell you if you have any competition on those days. I am writing this after returning from the Stone Mt. Famvention. For those of you who did not attend, the State Authority of Georgia did not allow tickets to be sold for prize drawings. If you are planning a hamfest on city, state or other government property, be sure to check to see if this is allowed. Governments are looking in all areas to increase their revenues, so check first. Otherwise it can be embarassing. Want to remind all that if you have ever been through the Royal Order of the Wouff Hong ceremony, it will be put on at the state convention in Columbus. I am hoping that real soon in 1983 we can start the ARRL information net so that all can be updated & informed on things that are happening. I would like your comments on this subject. We don't know what the rest of this winter will bring as far as wx is concerned, but please be ready if we need to furnish any communications for the citizens. HAPPY NEW YEAR! Traffic: W4PIM 174, WB4NTW 164, K4NM 56, KA4ATM 54, K4JNL 51, W4HON 48, W4FIZ 45, N4BIM 23, W4NKL 21, W4BIA 19, W4AAY 12, K4BAI 12, K4PIK 9, W4REI 8, AA4EI 2.

NORTHERN FLORIDA: SCM, Billy F. Williams, N4UF — STM: WF4X. SEC: W4UEA. Our STM has a new call. He is now WF4X, ex-WD4HIF, in addition to working as STM, he has been busy lately upgrading his computer system. Thanks to all who participated in the SET. W4UEA did a fine job of developing an emergency scenario of a terrorist raid on NFL water supplies. N4ADI is now ASCM for ARRL affiliated clubs for NFL. The *Orlando Sentinel* newspaper is sponsoring a bicycle race thru Orange, Seminole, Marion, Lake, Alachua, Gilchrist and Columbia Counties from April 4th thru 9th. Proceeds go to charity. NFL hams will provide communications for first aid and emergency assistance for the bicyclists. Anyone in those counties interested should contact N4ADI. The West Volusia ARS has a new ARES/RACES net on 147.31 MHz each Wed at 2345Z. The Halifax Chapter QCWA rcvd its banner from Hq for recruiting over 50 members. Congrats! The GCARC saw a RTTY demo and talk put on by NE4E WA4PHL KT4Q WB4PEI & WA4L. HCARA had program on antennas by K3AW. RTTY rptr being planned for Brooksville area and HCARA planning for FD '83 already underway with KB9LT as chmn. New EC for Beaches of Jax is WB4K. AECs are WA3UBA & WD4FHD. KB4CD planning operation from Guan. Bay in January. AB6I has nice article on TV basics in LMARS newsletter *Keyed Up*. FL state FD results show W4IZ (NOFARS) tops and LMARS 2nd. Other NFL groups in top 10 were CFDXA (6th), SSRC (7th), OARC (8th). EC N4ARJ and Clay Co. ARES have new weekly net on Sunday at 1930 local using 07/67 rptr. OPARC voted to purchase that machine as a club project. OPARC assisted with Annual Twilight Run. N4FMN is now KF4GU. Coronado Wireless Assn. is having a special operation from Christmas, FL again. New ANM for NFPN is WD4IUI. NFPN now meeting at 2330Z on 3950 kHz. NM is KF4GZ. Incidentally, his XYL Karm, KF4HA, is NM of TPTN. Traffic: N4EDQ 4,538, WF4X 574, N4PL 317, WA4QXT 289, KB4LB 252, WA4EYU 218, KF4HA 192, WD4HPB 171, W4UEA 155, W4MGO 149, WD4IIO 143, WB4ADL 122, WB4GHU 112, N4ADI 106, WD4RIQ 105, W4WGR 101, WB4TZR 96, KF4U 88, NS4C 76, NY4E 74, WB4DTS 58, KB4T 52, N4UF 50, KB9LT 45, NF4O 42, KA4VXT 41, W4DTV 37, W4GUJ 35, KD4QZ 34, NQ4P 33, W4KIX 31, WB4FJY 25, KA4RBY 24, WA4STZ 24, N3RBT 23, WD4ORO 16, W4LUW 15, KA4OFG 15, N4ESM 14, W3IDO 13, KA4RNG 12, WD4NVJ 10, NA4F 9, W4LUW 9, N4FMJ 8, WD4BII 7, N4CIJ 7, WD4GUZ 6, WB4HMT 6, WA4PUP 6, WB4YOP 3, K4DXN 1, WD4NKA 1, WB4OOS

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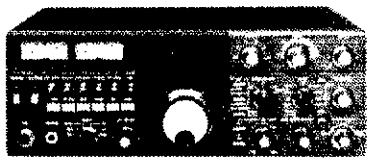

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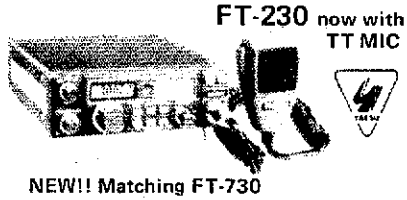

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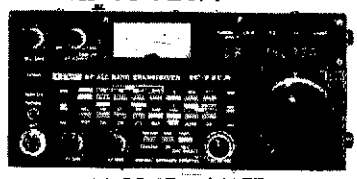

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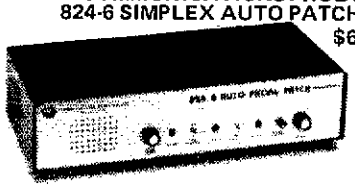

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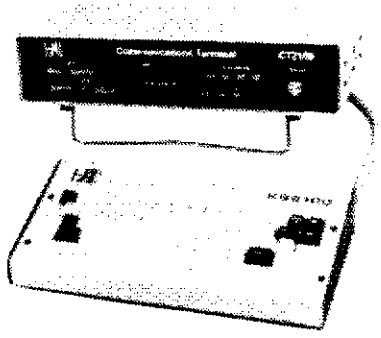

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1, KA4RVQ 1, W4WUU 1. (Sept.) WB4YQP 1. (Aug.) KA4RVQ 1.

SOUTHERN FLORIDA: SCM, Richard D. Hill, WA4PFK — SEC: KB4OW. STM: K4ZK. Congrats to KB4OW W4UEA and all of the nets, net members and managers for a very successful SET weekend held October 9 and 10 in Florida. K4ZK reported a 20% increase in traffic handled on the Martin Co. Emergency Net over last year, even though there were fewer participants. A second major event in October was the Suncoast Convention in Clearwater. There were many interesting meetings, including a Tropical Phone Traffic Net meeting at which AA4FG presided since manager KF4HA (ex-KA4MGR) could not attend. The Florida Midday Traffic Net met with WB4AID, who recently returned from a trip to Europe. The SCM/STM forum was also well attended. K4ZK handed out a list of Florida traffic handlers, giving their QTH and net affiliation. It was an extremely well done job and will certainly help in the routing of traffic. WA4PFK discussed the 1981 section standing in traffic handling and stressed the need for all stations to submit monthly SAR (station activity report). Lee Co. really responded to my request with over fifty hams reporting from that area. The Florida Combined Section Net agreement was discussed at length and it appears that it will likely be finalized at Miami. WF4X (ex-WD4HIF), STM of Northern Florida, did a great deal of work in developing this agreement. KB4OW held an ARES/SEC forum at which Florida's SET, held the previous weekend, was discussed. One point made was that perhaps in the future SET could be scheduled for a particular weekend in October as Field Day is in June. Hopefully, this would eliminate major conflicts as happened with this year's national SET and the Suncoast Convention. I believe there were eight hams from Hardee Co. at the SEC forum. Hardee Co. is also well represented on QFN with W4KLY and KE4DA. K4ZK hosted a traffic handlers breakfast Sunday morning. It was good to see K4SCL there. W4RH held an informative ARRL forum after the breakfast. A great convention; good to see so many of you there. KE4DA, a proud Elmer, reports that Hardee County's newest Novice, KB4CRR, had over 25 QSOs in one hour of his first two hours on the air. W4ROA said that he, N4FSN and WB2PMP were active in the 1982 Jamboree On The Air with Webelos Pack 406 in Sunrise. KI4T reported a communications center has been established at the National Hurricane Center in Dade Co. All essential equipment is stored there and is ready for instant use in case of an emergency. W4LIA reported 104 maritime mobile phone patches handled this month. KA4GUS said he is a blind operator and has handled over 650 formal messages so far this year. There are several very fine blind traffic handlers doing a FB job for the Florida traffic nets. WB4ITH reports he and several other operators supplied communication for two days for the Surf Sailing Regatta. NW4R reported that Polk Co. held their 1st annual "Picfest" with 150 attending. Traffic: W3CUL 3069, W3VR 672, WD4COL 577, WA4PFK 431, K4ZK 384, VE3BSY 387, W4GPL 364, WA4EIC 349, W4NFK 246, K4SCL 243, KE4DA 235, K4IA 217, WD4AWN 177, WB4AID 169, KB4OW 169, WB4WYG 161, KA4GUS 148, NW4R 145, KD4SF 135, K4EUK 129, WA4TWD 123, KE4O 119, WA9TOC 118, W4YCL 114, KC4FL 111, KA4ASZ 90, W4LLA 88, KA4AMC 83, W8BZY 81, W4ESH 78, W4DL 78, N4ET 75, WB2OUK 73, KY4U 69, W4DVO 68, WA4HXU 60, KC4OT 51, W3IJC 48, KA4FZI 47, W3TLV 42, WD4CHO 41, WB4MPJ 41, K5IHH 39, K4PQU 39, KM4Y 37, W1DLP 35, N1BIR 35, W4SME 35, W4LVA 35, KF4I 34, W4KLY 34, WB4GCK 33, W4ROA 30, KA4BBA 24, WA4C 24, KA4NXF 24, NJ4O 24, AA4BN 22, W4WYR 21, W4PKC 18, NU4X 17, KA4YHS 17, W4SMK 17, WB4HZK 16, KE4PQ 12, N4CMW 11, WB4LPX 11, W4DUG 11, K7LCA 10, WA4NBE 10, KA8CXQ 9, WB4HYB 9, K4KKP 9, WA4GIE 8, W3IJR 8, W4KEB 8, N4FNY 7, WA4GQY 7, WD9AEP 7, W4PJG 6, KA4VAW 6, KA4GDU 6, W4MPV 4, KA4LCR 4, KB4KB 4, K4JLL 3, NX4X 3, W9FPO 3, KA4VFU 3, WA4LKY 3, W4JM 2, KM4G 2, N4GQR 2, KA4UIO 2, KA4RWV 2, KA4HYE 1, WA4VOB 1.

WEST INDIES: SCM, Julio Negroni, KP4CV — NP2AP reports the VI VIA WIN QTC 10, QNI 33, WINE operated on 160 M. VP2VI reports WINE had 24 sess. during Sept. KP4DJ, the Section Iron Man, has continued with his incredible multiple operations, acting as relay for SCM on section information, OBS relaying bulletins daily on 2200Z on 3710 kHz and pushing 93 pieces of traffic for the month. KP4DJ, operating during SET Oct. 16/17 on battery power, transmitted 13 routines, 3 welfare, 2 priority for a total of 49, and checked in to WIN/E Oct. 16/17 10 times plus 2 times as NCS. Congrats. PSHR: NP4D KP4DJ. Traffic: WP4AOH 162, KP4DJ 93, NP4D 73, KP4ABK 43.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — October appears to have been a very active month. The Scottsdale ARC members participated in the World Scout Jamboree-On-The-Air. The Superstition ARC sponsors code practice on Wed. at 7:30 P.M. on the .72/.12 rptr. W7KAX reports the following participated in the Kingman Centennial Parade comm. exercise: W7KAX WB7BVV W7KSF KA7ESZ W7TAZ WB7RYQ WB7YYC N7BUC. 23 Gila Co. amateurs participated in the 6th Annual Copper Valley Marathon and 4th Annual 10,000M run as reported by KQ7Y. WA7NXL reports he has already worked 36 states on the new 30M band. Members of the Tucson IBM ARC provided comms for the SCCA sponsored sports car rally. The following aided in the search for an elderly gentleman who had wandered away fro his nursing home: K7GAT K7DNN K7ESA K7TJZ W7SXP KB7CH WB7OEC WB7CHQ. WA7CSN assisted in the search for a father who had been separated from his son in the Redington Pass area. New ECs: KA7AVO-Bullhead City; KA7BTC-Lake Havasu City. The following Silent Keys are reported: W7RQ KA7GMW. Members of the TRA and OPRC provided comms for the Tucson Crime Fair and the 2nd Annual Optimist Air Show. The following participated in one or both of these events: N7EOJ WB7OBF KA7IZC AF7M N7EKT WB7CGQ K7SEC W7UCX WB7VOM K7OMR WA7RKI KC7HU K7RIS K7KYW WB7TLR WA6NNC KA7DAC WB7TWM WB7ESQ WA7WKE AG7H N7CVG N7CLC KA7FTZ W6GXQ N7EH, ATEN: QNI 854, QTC 238. Tonto Emer Comm Net QNI 94, QTC 5. PSHR: K7NTG W7EP. Traffic: W7EP 254, W7LVB 142, K7NTG 121, K7UXB 91, W7AMM 64, K7NMQ 38, WA7KQE 29, N7CQY 28, WA7NXL 19, K6LL 15, N7EH 12, N7CVT 11, WA7YUL 10, K7GLA 3, W7DQS 1.

LOS ANGELES: SCM, Stan Broki, N2YQ — SEC: N6UK. STM: W6INH. I had my FT101E on the new 30-Meter band in 45 minutes. It takes only 3 jumpers on the S1 switch sections g, l, and m. Anyone needing the info please

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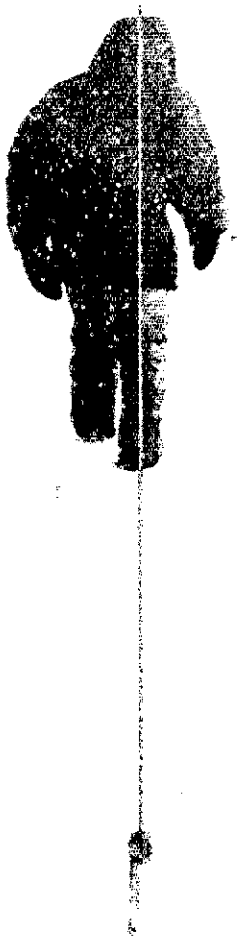

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write or call N2YQ. The JPL ARC W6VIO has received a TA for 90 days, suspending FCC rules so that the club may broadcast shuttle audio. This will be good news to those interested. Antenna height restrictions are again running rampant in the LA section. Cerritos city council reversed its previous stance and has now chosen not to allow antennas higher than 45 feet. N6VI has been appointed assistant director in charge of antenna restriction problems. Anyone having local problems should contact N6VI. Several clubs and ARES groups participated in the SET this year. Also several real disasters occurred. Amateur Radio is serving well in public service. Keep up the good works. OO reports: WB6YID 1; KD6NL 3; K6KA 60. Traffic: K6UYK 374, KT6D 149, W6INH 134, WA6OCM 118, AD6A 58, N6DZQ 32, W6NKE 14, K6CL 4.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ, DECs (by counties): K6GGS (San Bernardino), W6LKN (Riverside), WB6JBI (Orange), WB6YZY (Inyo). Congrats to WA6QCA (presently SCN/V NM) on becoming Section Traffic Manager (STM) after the resignation of KN6C. The Southern Calif Net (SCN) has a new Manager, K6XI, jointly appointed by the SCMs of the Santa Barbara, LA, San Diego and Orange sections. K6XI is also the new editor of the SCN newsletter *Zero Beat*. KD6HD and K6WS appointed ORS and W6DXL appointed OO. Victorville has declared an official Amateur Radio Week in order to recognize the community support of Victor Valley ARC beginning their 26th year. Congrats to W6BUK W6VH W6PHE and W6AGK for receiving 60-year award from QCWA, and W6AM and K6BV for 70 years. WB6ZJR, XYL of late Lee De Forest and founder of the Lee De Forest RC (of Hemet and San Jacinto), is now in the St. John of God's Convalescent Home in Los Angeles. So. Calif DX Club made charter members honorary life members. Tri-County ARA holds free Novice classes on Thurs by KA6PVL. Congrats to WB6RPH on election of Flotilla Commander, and to WB6ULU re-elected vice-commander of Coast Guard Auxiliary OC Fire Dept. Is training hams for program like the CDF VIP program thru OC RACES. Hams interested in chess by radio should contact SCM to share info. The following Morongo Basin ARC members provided communications for Stevens 50-Mile Walk: WD6FKD K4WRM N6DOU WA6MRA KS6T W6NMR WB6PAH W6BA KA6EMS W6SOA WD6FMP W6IF WA6OGK. AM is not dead; try Golden Poppies Net Mon-Fri 7:30 P.M. at 145.75 MHz or Calif Award Hunters Net Sundays 10 A.M. 50.4 MHz. Fullerton RC new officers are: W5AQ, pres.; W6ZKZ, v.p.; WA7AHY, secy.; KD6AX, treas. Members stay in touch on 147.495 (channel X). Congrats to Western ARA on winning OC FD plaque again; owing to N6ME's resignation, N6AWF is the new pres. The Inland Empire ARC RTTY rptr 145.12 (−.6) WB6ZIR/r schedule is 9 A.M. plus 1 P.M. weather report daily, 6 P.M. ARRL bulletins daily, ARES 8 P.M. Mondays, ASCII 8 P.M. Mondays, ASCII 8 P.M. Wednesdays and pictures Tues/Thurs evening. The following AARA members provided communications for the KFWB/CHOC 10K Run: WB6ARK WB6RQT W6RE KD6Z N6BNM KD6DA WB6OSM K6TWK WB6GCT N6TM WB6JBI WA6PPH. New swap net held Thurs 7 P.M. on 146.4/147.435 WA6KOS/R. New ATV net 8 P.M. Monday 434/1253 MHz WA6SVT/R. New RTTY rptr on 146.7/(−.6) in addition to W6IWO/R (SCATS) is N6GWD/R in Palm Springs. New Rio Hondo ARC net is on 28.775 MHz Wed 8:30 P.M. SB #7 EC WD6BNG and SB #6 EC K5EDS combined forces with Barstow Desert Rescue Squad in locating lost party in Death Valley with the help of WB6QFU K6SQJ WD6ADH N6EHI W6PMO and WB6SAK. Even though we had less participation in SET this year owing to actual emergencies, including the OC fires the week before, more traffic passed thru the use of "NTS liaisons." Traffic: KS6T 510, N6GIW 410, W6NTN 369, N6AED 298, WB6QBZ 193, AI6E 140, WA6QCA 108, KA6HJK 106, W6CPB 91, W6TKV 91, WA6WZO 69, KA6BNW 68, WA6WZN 54, AE6N 27, W6TKV 22, K6XI 19, K6CZE 14, WB6LGL 11, WB6FRB 4, WB6NSX 1. (Sept.) N6AED 39.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. ARES Public Service events for Oct. included assisting at Open House for Calif. Dept. of Forestry, three days of Red Flag Patrols, and fire camp-to-headquarters communications. The latter were provided by N6CQW WB6RHL WA6JCG and WB6RJB when landlines failed during major wildland fire. North County Tfc Net held 30 sess., handling 95 msgs. KT6A has achieved BPL 30 times since Dec 1976. His monthly record has been continuous since Oct 81. Imperial Co. amateurs assisted with the Muscular Dystrophy Telethon. Involved were: WA6AUP WB6AVI WD6GUL WA6KEW WB6LJH KA6LNG WA6MIW WB6PMF WA6PYD WB6RMG WB6YFA. Additionally available were: WB6AVG N6EFP W6JHG WA6LAW K6OCT WB6PUM KA6TCO. Thanks, gang! The SET for '82 consisted of participation in earthquake drill sponsored by the County of San Diego to exercise management levels and emergency operating centers. ARES members worked with City of San Diego and Red Cross. PSHR: KT6A N6NR. Traffic: KT6A 581, KM6I 345, K6HAP 190, W6HUJ 101, N6NR 70, KB6AI 66, N6AT 30, N6GW 4.

SANTA BARBARA: SCM, Robert N. Dryuff, W6POU — N6CPN devised, sold, voted via braille ballot. EC N6AJA formed ARES field unit to support local SAR team; W6RIC supplied printout of all Vent. Co. rptrs; W6POU added to State's Quake Task Force for A.R./ARRL on disaster comms & testified before joint legis. comm. State OES comm. chief W6AAH addressed ARRL convention as ARES/NTS leaders hold coord. meet. New ass't dir. AE6N for SW emerg. comms. KA6Q led largest sctn SET effort with 28 vhf/15 hf ops on 145.18 WB6RDV/R & 7235 nets. Sctn supported Australian SET. Fires around sctn saw 65 ops from Conejo, Simi, Ventura, Oxnard, Camarillo, SBar So. in support of Vent. Red Cross over 50 hrs on ICS, shelter, damage assessment, mutual aid for LA and K6IYK ops; SLO Co. CDF fire and Red Flag comms via N6BUY/WB6IIY. Diabetes Bike Run by Poinsettia ARC plus Scout Jamboree. Simi Settlers ops on March of Dimes Bike-a-thon. WD6DND freed passengers in fatal auto crash he reported. W6MSG/KA6Q operate BAJA 1000 mi race comms. One year's work plus mucho dinero by WB6GVO brought $6,000 fine against Sonic Cable for CATV!. Hams nationally owe WB6GVO many thanks! K6YD concludes over year as editor/treas. *ZERO BEAT*, SCN letter. K6XI new editor. Congrats to both! N6GZT reports CATV! problem in 1,000 Oaks. WB6RVA gave illustrated quake talk, & is now proud father! WA6ZQJ heads SBARC trng staff. Daughter Kirsten now KA6WCC, age 10! WB6TMF conducts Simi classes. SBar Boys Club opens K6TZ/6 club station construction

via K8QYL. "Ham of Year" award to WA6UEQ and "DXer of Year" to N6VR by Ventura Co. ARC. NF6F asks help from VU2-land where xcvrs carry 320% duty for natives. W6DMJ/CT1 back home with ON9AA. FØHCL calls. Record shows K6FI rare STA by FCC for ham opns during WWII tornado. WD6BNH back to SBARC recruiting after great year as EC. KA6UEW/WA6OHX supply quality graphics of sctn organization. Tnx also to KA6ENR for caligraphy many certificates. Traffic: K6YD 185.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — ASCM: WA5QFD. STM: W5VMP. SEC: W5GPO. W5VMP, our Section Traffic Mgr., has moved into the Metroplex. His new address is: Art Evans, W5VMP, 6404 N. Park Dr., Watauga, TX 76148, Tel. 817-656-3019. NMs please address all net reports to W5VMP. Also he handles the Official Bulletin and Official Relay Stn appointments in our section. K5SOR is the latest ORS appointee. Congrats! The new District Emerg. Coordinator for Dist. #1 (Panhandle) is W5MVJ. New EC for Potter and Randall Counties is WB5EUC. We have seen so many good things coming out of the Panhandle area in the way of emergency perparedness, and I know Sandy and John will continue in the fine tradition that we have all come to respect! Congrats to N5FDL for making Brass Pounders League this month; only the second BPL issued from here this year! SET was a complete success, with reports from all over the section of numerous drills and activities. 1982 has been a banner year for Amateur Radio, the ARRL, and the North Texas Section. I want to thank all of you for your dedication, service and participation. Keep those reports coming in; I need to hear of all your activities so that they may be shared via this column. PSHR: N5FDL KA5AZK WA5QFD N5BT KB5UL N5FCZ WB5CIC KC5NN K5EZM KD5FR KA5LLT. Traffic: N5BT 309, N5FDL 306, K5PC 274, KA5LLT 240, WB5CIC 186, KA5AZK 170, KB5UL 145, N5EZM 109, WA5QFD 101, N5FCZ 88, KC5NN 86, K5SOR 73, W9OYL 65, W5GPO 63, W5ERT 27, W5PBN 22, KD5FR 18, N5DKW 6, K5HGX 4.

OKLAHOMA: A/SCM, Raymond L. Miller, W5REC — With Leonard R. Hollar, WA5FSN becoming a Silent Key, it is time to reflect and be grateful in our friendship he said, "There is much to be done." With that in mind, the New Year is here and it is time to plan the new ARRL Field Organization of the section, to continue the close relations with the National Weather Service, to reassure our posture with the American Red Cross chapters, to supply communications for the many local events throughout the section, to continue in traffic handling, to promote the services of ARRL so that all will want to support it, to promote public relations by conducting ourselves and our station like ladies and gentlemen, and to pursue our individual facet of operation to give a sence of satisfaction. Thanks to the many who work in the middle of the night to enhance the repeater technology. Congrats to K5WG and KE5J for their being in the top ten of service to help amateurs across the nation. HAPPY NEW YEAR TO ALL!! Traffic: K5CXP 267, KV5X 241, W5REC 217, W5RB 211, KA5CXW 208, W5AS 202, KB5EK 122, W5VXU 88, WB5ELG 86, WA5OUV 61, WD5IFB 53, W5FW 44, WB5EAY 38, WB5TFX 38, KB5XI 37, WD5JCE 35, W5SUG 35, W5VLW 25, W5VOR 25, WA5ZOO 18, WA5OGC 16, K5CAY 9, KC5OU 8, NØIN 7, WB5LSW 1. (Sept.) NØIN 16.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — ASCM/TM: N5TC. SEC: WA5RVT. BPL: W5SHN W5CTZ WB5YDD. N5AF and W5PDE now on 432 MHz ssb/cw. CAND mgr W5KLV reports STX section of DRN5 represented on CAND 100% by N5AMH KD5KQ N5FN W5SHN WB5YDD W5KLV N5DFO N5CRU W5URN W5CTZ and WA5RVT. EC AB5X reports 10 stations took part in unscheduled emergency exercise held prior to SET; he has been elected Secretary of Houston Chapter, QCWA; has been enjoying send/receive RTTY. DRN5 mgr WB5YDD reports STX section represented 100% on DRN by K5SAC N5CRU W5KLV K5WOB K5DLX KC5XP W5CTZ W5RNV W5URN K5KJN N5DFO WB5SON N5AMH W5TUK. N5FN WA5RVT and WB5YDD. ORS N5CRU relayed 14 test Priority messages during SET. OBS W5KLV continues to set broadcast records with his Oct. 176 bulletin readings spread over ten nets. Williamson Co. ARC *VOICE* reports N5DYN is new General class licensee; also enjoying Temple ARC's new slow speed net for early Sunday risers at 7:30 A.M. on 3725 kHz. Amateur Radio busy during the Confederate Air Force AIRSHO 82 providing communication about the airport; crowds exceeded 10,000 on each of the 4 days of the show at Harlingen. Traffic: W5SHN 684, W5CTZ 542, WB5YDD 535, W5KLV 364, N5TC 174, N5CRU 69, AB5X 55, WA5RVT 52, WB5MMM 43, KA5KRI 42, W5KR 35, WD5GKH 26, K5RG 18, WØGUR 7. (Sept.) AB5X 20, K5RG 10.

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☐ License Plate $5.00

☐ Cloth Patch $5.00

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☐ 6½ x 9½ (US and Canada only) $6.00

☐ 8½ x 11 (US and Canada only) $7.00

☐ L/C/F CALCULATOR Slide-rule type for problems on inductance, capacitance and frequency $3.00

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☐ "Amateur Radio - A National Resource"

☐ "Amateur Radio - One World, One Language"

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☐ 30 minutes of 5 wpm and 30 minutes of 7.5 wpm on one standard cassette.*

☐ 30 minutes of 10 wpm and 30 minutes of 13 wpm on one standard cassette.*

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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. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*. If the 20th falls on a Sunday, the Ham-ad deadline is the previous Friday.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievements added upon request. SASE brings TAD data sheet. W6LS, 2814 Empire, Burbank, CA 91504.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

CINCINNATI ARRL '83 - Hamilton County ARPSC invites all hams to participate in the third annual Ohio State Convention. Two full days of amateur activities; forums, meetings, exhibits, Wouff Hong, flea market, and much more. This all-indoors activity will take place on Saturday & Sunday, February 26 & 27. For further information contact Cincinnati ARRL '83, Committee for Amateur Radio, P.O. Box 46311, Cincinnati, OH 45246. Dealer and exhibitor inquires invited. Registration $4, Flea Market $3.

JOIN the Old Timers Club, an International non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. Box AA, Mamaroneck, NY 10543 for details.

FOX-TANGO Club Newsletters for Yaesu Owners. Back issue (1980/1981) looseleaf sets $6 each, both for $10 while they last. Fox Tango Club, Box 15744, W. Palm Beach, FL 33416.

INDIANA: South Bend Swap & Shop, Jan. 2, at the Century Center downtown, on U.S. 33, Oneway north between St. Joseph Bank Building and river. Half acre on carpeted floor. Industrial history museum in same building. Four lane highways to door from all directions. Talk-in 52-52 & area repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1889 Riverside Dr., South Bend, IN 46616, telephone 219-233-5307.

YAESU Owners — Join your International Fox-Tango Club — now ending its eleventh year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out — get top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325 MHz), more. 1982 or 1983 sets $8 each; both $15. Send dues to FT Club, Box 15944, W. Palm Beach, FL 33416.

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■ **Built in 110 or 220** volt AC power supply.

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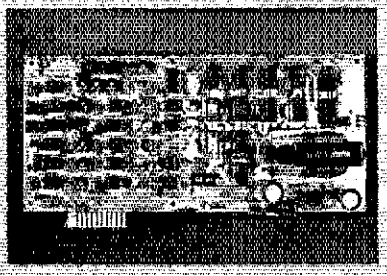

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THE Columbus Amateur Radio Club invites all hams to participate in the Georgia State Convention/Hamfest in Columbus, Georgia. Two full days of Amateur activities, forms, meeting, exhibits, flea market and much more. The event will take place on Saturday and Sunday March 26 & 27, 1983. For further information contact; CARC, W4CVY, P.O. Box 6336, Columbus ,GA 31906. Dealer and exhibitor inquiries invited.

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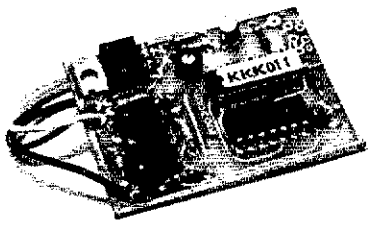

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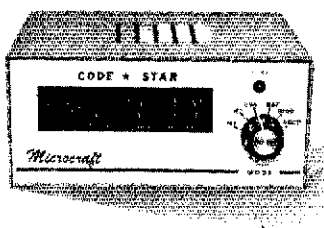

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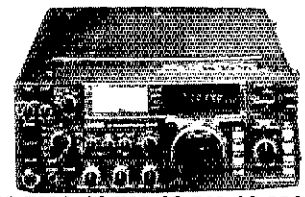

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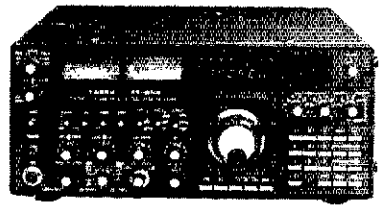

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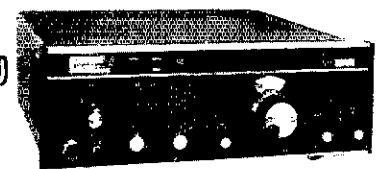

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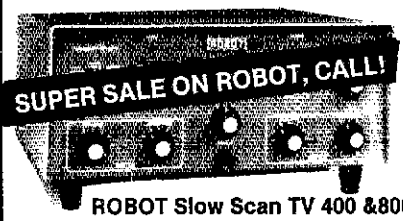

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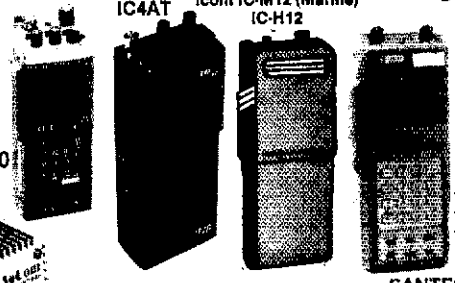

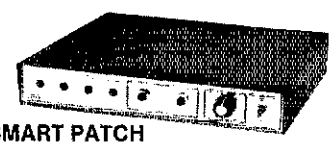

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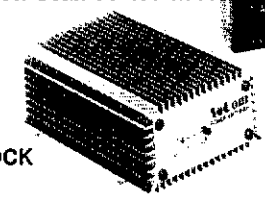
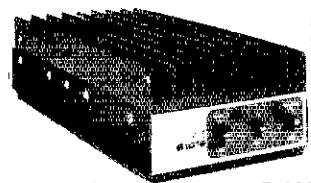


SANTEC
ST-144/UP
ST-440/UP



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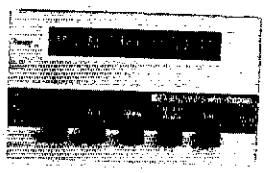

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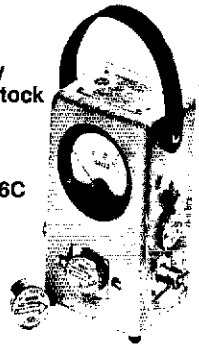

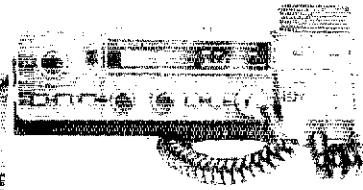

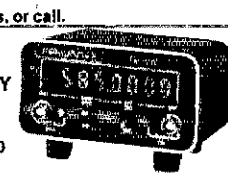

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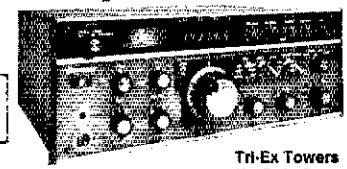

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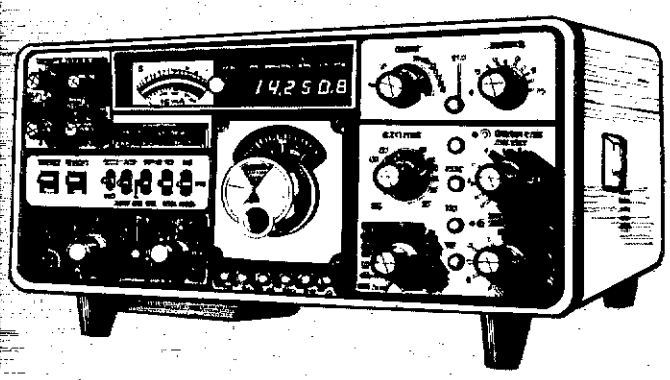

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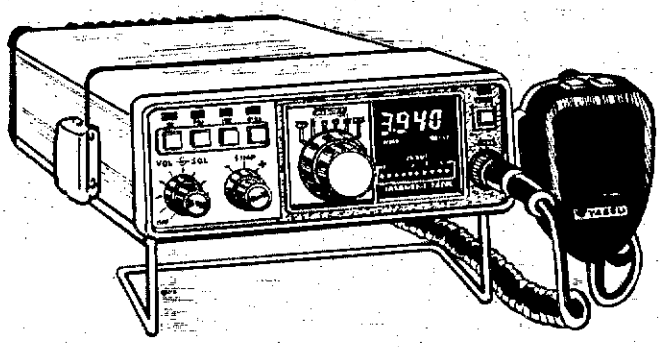

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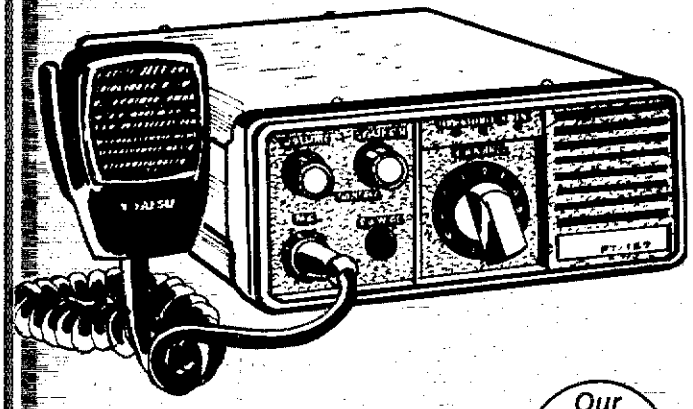

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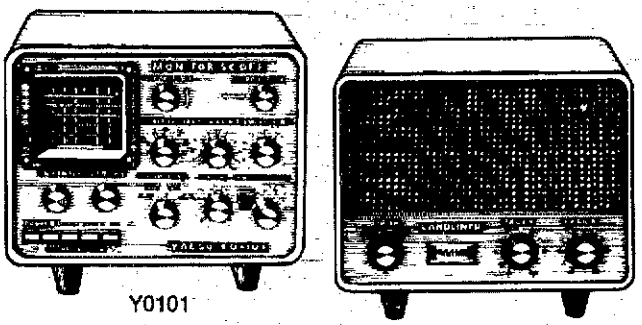

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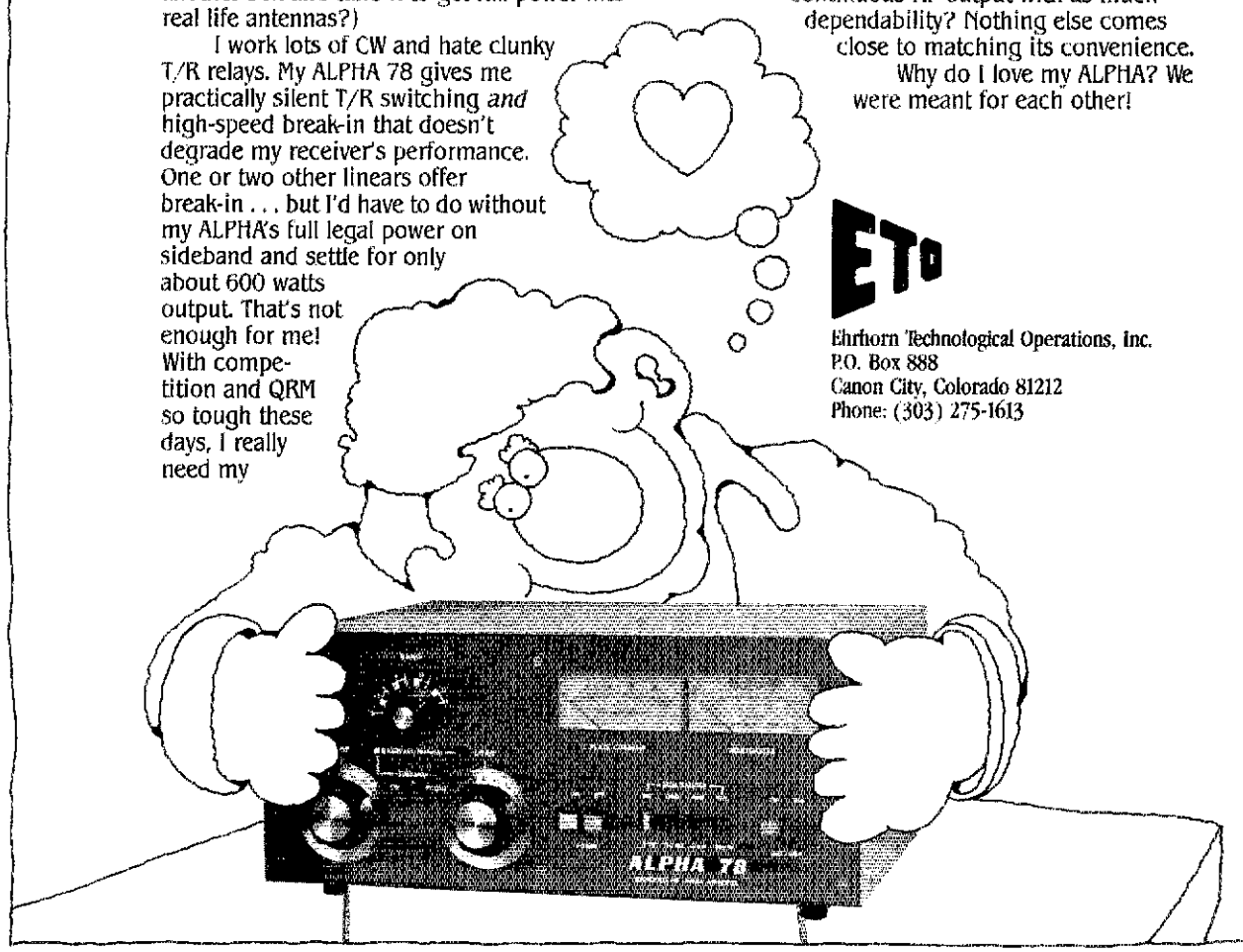

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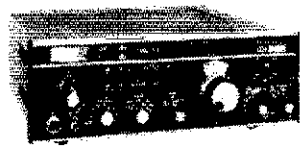

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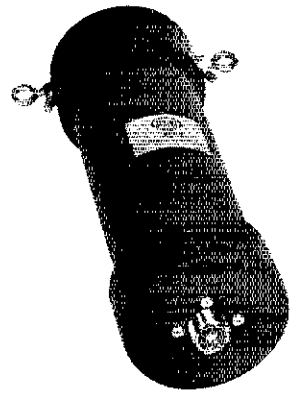

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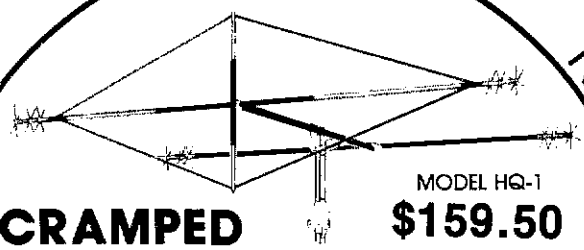

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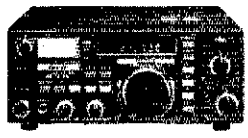

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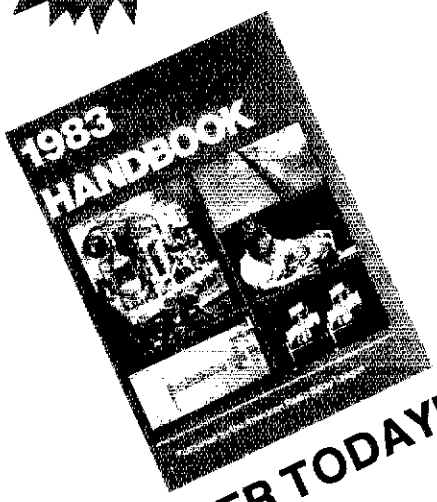

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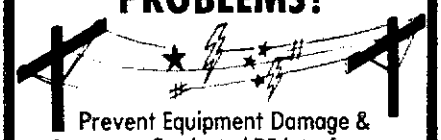

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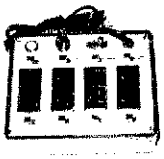

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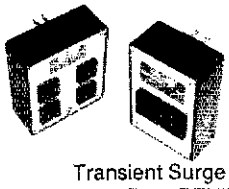

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P-5	C-5	5		
SP-58		5, 6		
P-68	C-68	6, 7, 8		
P-91	C-91	9-11		
P-10	C-10	10		
4P-12	4C-12	12-14		
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KENWOOD TR-7500 2 meter FM xcvr, $175. Heath HW-16 with HG-10 VFO, $135. K6VPN, 271 Madison Ave., San Bruno, CA 94066.

WANTED: Gonset GSB-101. W8CGG, P.O. Box 53, Doylestown, OH 44230.

DRAKE TR3, ACPS, VFO, mike, sparetbs, cristal $325. Best offer. Henry K2000 $450. Test instr, all mint. WB6EYA, 1608 Charles Rd., S. Leandro, CA 94577 Walter.

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HEATH., VF7401 2 meter, PTT, list $369 plus factory alignment sacrifice $225/BO, mint. Eagle Bx 1047, Framingham, MA 01701 Current model; Warrantee.

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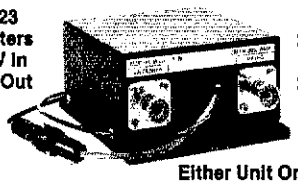

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RS35M	25	35	149
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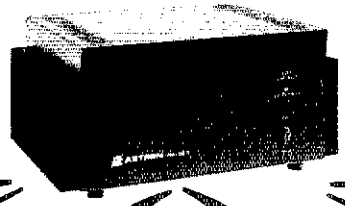
MODEL RS-50A



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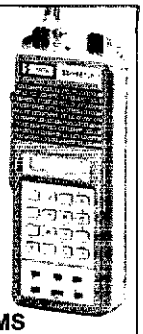

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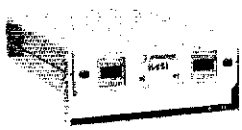

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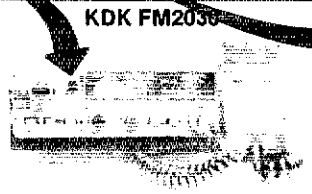

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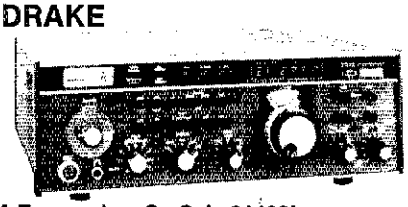

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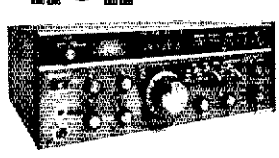

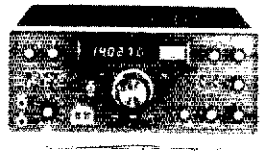

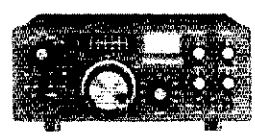

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941C Tuner w/Meter	79
949B Deluxe Tuner	129
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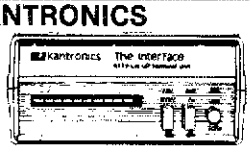
KANTRONICS



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SELL: D-104 microphone, grip-to-talk stand $35. HyGain phone patch $20. B&W 6-antenna grounding switch $20. Practice oscillator $20. Lowpass filter 1kW $20. Gloria McDaniel W9GHO, 6090 Fall Creek Road, Indianapolis, IN 46220 317-257-0362.

DRAKE R7A receiver in new condition for sale. Asking $1250. Bill WA2TDR 201-482-6629.

ICOM IC-701, power supply, microphone, RM-2 microprocessor controller, Autek QF-1A audio filter. $725 or B.O. N6UC, 714-544-5369.

NATIONAL NC-303 receiver: $200. UPS paid. WDØGNS 913-825-8841.

KENWOOD TS-120 $500, Heathkit HW-101 $325, together $725. Both in excellent condition. KAØDFW/5 918-747-2873.

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QUALITY stainless nuts, bolts, "U" bolts, screws, washers! New stainless HANDI-PACS for hobbiests, with assortments, or alike items. Lists 25¢, or SASE! Walt, W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

SELL: FT-101 with cables mike and manual. Asking $400. W2WLO 4421 Mohican Trail, Valrico, FL 33594. 813-689-3762.

CENTURY 21, excellent condition, $220. Will ship UPS, Lew Dexter KA6UHD, 546 Hastings, Cambria, CA 93428 213-927-3150.

NEW high speed and timely classifed ad publication. ($8 six months) $12 annually) Published three times monthly, the 1st, 10th and 20th, for the fast service needed in buying, selling or trading. Very reasonable ad rates! Reaches thousands of active hams! First Class Mail out only! Subscribe to "The Ham Boneyard" 364 Kilpatrick Ave., Port St. Lucie, FL 33452, 305-878-7296. Master/Visa card welcome.

KENWOOD Twins 599-D T+R match spkr. Excellent condx $460 firm. R. Peterson KA2HXV 1-212-356-2582.

FOR SALE: Surplus Transmitter only T47/ART-13 will swap with H.F. rig, etc., or best offer. DU1CPL P.O. Box 1019 MCC, Makati, MM Philippines.

HELP WANTED to locate: have PE-75 generator with old B&S Type "AA" engine with bad flywheel magnets. Need another magneto or whole engine. Leads appreciated. K4RN, Box 312, Versailles, KY 40383.

ALPHA Amplifiers, display demonstrators, unused, limited warranty three years: 76PA $1720, 76CA $1930, 374A $1870, 78 $2495, 77 DX $3870. Payne Radio, K4ID, 615-384-2224.

WANTED: 1982 foreign and domestic Callbooks. KT2D, Box 191, Oakland, NJ 07436.

MILITARY Communications Receivers: R-174/GRR-5, tunes 1.5-18 MHz, AM-CW-SSB, mint: $47.50; good: $27.50. ARC-27 Guard Receiver Subassembly, tunes 238-248 MHz AM, mint: $12.50. Technical data included. Add $6.50 shipping. Stephens, K8SJ, 1407 Hollyrood, Sandusky, OH 44870.

WANTED: Heathkit ET-3400 microprocessor trainer WA1OMW Box 375, Upton MA 01568.

MADISON '83 bargains: IC740 $969; FT102 $999; TS830S-call; TS930S-stock; IC730 $649; FT1 $2300; demo TS530S $600; IC2AT $239; ST144UP $289; FT208RA $289; FT708RA $259; TR2500/TR3500 - call; Microlog ACT1/Nicad (list $1125) $995; Triex W51 $799, FOB California; TR7A $1450; TR5 $699; all major accessories -stock; Belden 9258 RG8X 19¢/ft; Bird 4304 $325 - call; 43, slugs - stock; Kantronics Interface $169; Hamsoft -stock; TCG 2.5A/1000PIV epoxy diode 19¢ea; Amphenol silverplate PL259 $1 ea. Used guaranteed: RME4350 $150; 75S3B $600; CX11/filters $2500; FT902 $900; TR4C/AC $500; 75A4 $295; TR7/R7/PS7/Acc. $2300. All guaranteed, FOB Houston, Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268.

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SELL: Icom 3AT 220 MHz handheld for $185 new Regency K500 scanner (40 ch) for $175. Bearcat BC-100 (16 ch) scanner for $190. Robot 70 SSTV monitor for best offer. Icom IC-22A 22ch 2 meter mobile rig 20 channels with crystals Boston area $125. Stephen Powers, 41 Elsie Road, Brockton, MA 02402.

CLEGG FM-28 mint, $210. Icom IC-2AT, PL, base chrg, BP-2-3-4, DC-1, 10W amp, mag, 5 ducks, etc, mint, $360. 80-10 Ultimate Transmatch, $70. H. Goldman, WA2OVG, 212-796-8617 or 696-4000.

HEATHKIT HW-101, power supply, mike, filters, etc. $400. Call 212-776-7238. D. Rosenblitt.

Building An Amplifier?

Electrolytic Capacitor

EC-125	125uf 500 volt DC	$ 3.95

Diodes

D-3-A	High voltage supply diodes 1KV, 3A	$ 1.00
DZ-8.5-Z	Zener 8.2 volt 50 watt	$ 5.50

Switches

SB-6	6 position 4 section 2KW PEP ceramic switch with tuned input switching voltage use with 3-500, 4-400, 572B	$21.50
SB-5	5 position 1 section use with 811's or sweep tubes	$ 9.50
BD-6	Planetary Ball Drive for variable caps 6:1 ratio ¼ shaft	$ 4.25

Tuned Input

ATI-6	Complete PC board tuned input board with 6 toroidal coils, 12 trimmer capacitors 6-DPDT relays and coax, fully assembled tuneable 1.8 - 30 mhz matches any amplifier 6¼" x 3¾", 12 VDC	$79.50

Tubes

3-500Z EIMAC	$94.50
811A	$14.50
572B	$46.50
3-1000Z EIMAC	$360.00
8877 EIMAC	$455.00
813	$40.00

Coils

TIC-1	Toroidal tuned input coils specify frequency	$ 2.00
FTC-1	Final Tank Coil for 3-500's, 4-400's, 8877, 572B etc. 2KW 160-40 MTR	$16.50
FTC-2	Tank Coil - 20-10 MTR	$5.50

VARIABLE CAPACITORS

Plate

A-250-75	250pf 3.5 - KV	$21.50
A-225-120	225pf 4.5 - KV	$23.50
A-232-45	250pf 2.2 - KV	$19.25

Loading

A-1100-53	1100pf 3 section 1.2KW	$12.25
A-1000-32	1000pf 2.5KW	$35.50
A-800-32	800pf 2.5KW	$26.00

Plate Chokes

PC-811-1A	Use with 4x811A or Sweep tubes	$ 5.25
PC-500-2A	Use with 3-500, 4-400 etc.	$ 8.25
PC-1000-2A	Use with 3-1000, 4-1000, 8777 etc.	$10.00

Fillment Choke

FC-30-A	30 amp choke on Ferrite Core	$ 8.50

Plate Caps

PC-500-1	Aluminum Heat Sink use with 3-500 etc.	$ 5.50
PC-811-1	Use with 811A, 572B	$ 1.50
PC-8877-1	Aluminum Heat Sink For 8874, 8875, 8877	$7.50

Sockets

SC-500-1	Johnson 122-0275-001 use with 3-500, 4-400 etc.	$10.50
SC-811-1	Socket for 811A, 572B	$ 1.00
SC-1000-1	Socket 3-1000, 4-1000	$35.00

Antenna change over relay 2KW

RL-2P-1	2PDT 12VDC	$ 5.25
RL-3P-1	3PDT 12VDC	$ 7.50

Meters

M-1000-P	Dual scale 0-3000VDC, 0-1 amp w/shunt & voltage resistors	$17.95
M-2000-W	Dual scale wattmeter 0-200 watt 0-2000 watt	$19.95
M-5000-VDC	5000 VDC Meter	$19.95

Ceramic Loading & Coupling Capacitors

CC-1000	1000pf 5KV	$ 5.95
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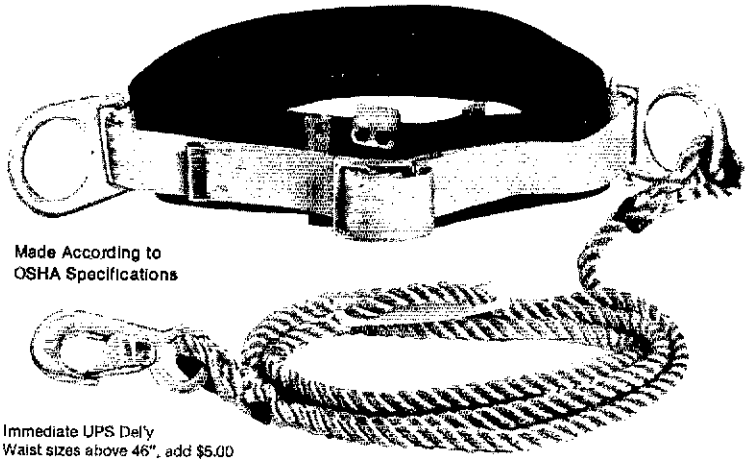

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ICOM IC-245 FM, CW, plus SSB. Have mobile bracket *and original shipping carton. $350 or trade*, plus cash, for Kenwood TR2500 or Yaesu FT208R. WA6SSG 525 Calaveras St., Lodi, CA 95240. 209-369-7256.

MINT MFJ-901 tuner $40 and MFJ-1045 Preselector $50. Nearly new Cushcraft ATV-5 vertical $65. Olsen, 24 Marydith Lane, Chico, CA 95926 916-343-3167.

WANTED: Drake C-line, mint cond. R-46, T-4XC, AC-4, etc. W3LAZ, 412-279-1973.

DRAKE TR7/DR7, PS7, MN7 Drake mike, service manual, AM filter, very little transmit time, good conidtion $1250 + shipping N8AWD/Ø 303-797-6622.

COLLINS 30S-1 amplifier, excellent, $1395. W9ZR, 1-414-434-2938.

SALE: MLA-2500B Dentron linear amp. Like new $500 KA6KSE, 321-0463 or 374-9420.

SELL - KWM-2, 516F2, 312B4, round emblem, perfect plus set tubes $875 R-1000 receiver. Like new $295 WA2YNS Joe Perry 1-315-724-5374.

SELL complete Drake station T4XC, AC4, MS4, R4C with filters, noise blanker-$600; W5MUG, 145 Pasa Robles, Jackson, MS 39206; 601-981-9885.

CRYSTALS: Build something! Good starter - QRP oscillator like "Cubic Incher" July QST. We'll supply the crystals and sockets. FT-243's General, Novice, any frequency. 01% 4001-8700 kilocycles $2, minimum five $1.75 each. New 30M 10100 - 10150 .01% $3.95, five $3.45. 3500 to 4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50¢. Postage - Airmail 25¢ per crystal. "Crystals Since 1933", WØLPS. Stamp for 1700 to 60000 kilocycles-listings-circuits. C-W Crystals, Marshfield, MO 65706.

KWM-2 516F2 in speaker cabinet D104 mike $425. Drake 2NT, Ten-Tec 200 $1252. Cannot ship KWM2. W2DED, 201-276-4388.

SANTEC HT-1200 handitalkie with leather case, $200. Call 415-228-3059 D. Rosenblitt.

WANTED Kenwood TS120S or similar inexpensive mobile rig, must be in good condition. N8AWD 303-797-6622.

COLLINS 32S3, 516F2, DX Engr processor $495. 75S3B, 500 Hz filter, $395.; 312B4 $165. UPS Brown ppd cont. USA W6HVN Box 833 Altaville, CA 95221.

HEATH: HW-101, HP-23C supply, CW filter, HS-1661 spkr. All excellent, $300. SB-221 new, never unpacked, 10 mtr kit incl, $495. MFJ-8043 keyer, $30. Hammerlund HQ-170A, $120 or trade for SX-100 or HQ-180. HQ-110, not working, $45. W7BER, Tempe, AZ 602-820-9111.

SWAN 700CX ps/sp VOX $295 Hallicrafter Sky Buddy, best reasonable offer. Palomar VLF converter $49. Earp W4LCY 8007 Dobbin, Richmond, VA 23229 803-288-1354.

NEW station closing. Sell Drake MN2700 - $225 Yaesu YS 2000 - $60 plus many other bargains, all like new. N6AUK 714-582-7659.

FOR SALE: Yaesu FT-207R H/T, $150. YM-24A speaker-mic $20. Mint condition. K9LWA Robert White, 2501 Birch Drive, Richmond, IN 47374 317-935-3966.

QST 1949 thru 1979 except May 1951, $5 per year or best offer. Instructograph 500 plus 10 tapes, $95. Radio Amateur's Handbooks, send SASE for list. Books for the electrician, journeyman or pro, send SASE for list. You pay shipping on the above items. W4PRJ 703-343-8710.

WANTED: Old bugs for my telegraph and radiotelegraph key collection. I am trying to find each make and model of bug manufactured before 1950. Vibroplex, Martin, McElroy, Bunnell, Mecograph, MacDonald, etc. Also looking for Spark keys, sideswipers, cooties and keys of historical significance. 73 de K5RW Neal McEwen 1128 Midway Richardson, TX 75081.

COLLINS 75A-4 receiver three filters excellent serial #5697 $375 W6WY 213-661-4189.

DRAKE TR-4, speaker, power supply, R-4, Heathkit amplifier, Autek memory keyer, Bencher paddlekey, Shure 444 mike; $800. plus shipping Blackburn, 215 Hoover Ave., Waukesha, WI 53186.

CONTACT W4BLX for info on dealers selling Sony '2001 for $150 or less.

WANTED: low pass TVI filter, 40 meters, coax, minimum 100 watt. Francis 15766 Millbrook Lane, Laurel, MD 20707.

KENWOOD TS180/DFC, SSB, CW, filters, SP180 speaker, MC-50 microphone, PS-30 power supply $675. Kenwood TR-7600 2m FM $195. Kenwood SM-220 scope $250. Robot 800 with Sanyo video monitor VM4209 $700. Drake MN2000 $160. Heathkit HD-15 phone patch $35. Heathkit SB220, pickup only, $550. TRS-80 Model I Level II, 16K, cassette, printer cable $575 K4CUU 205-766-4175.

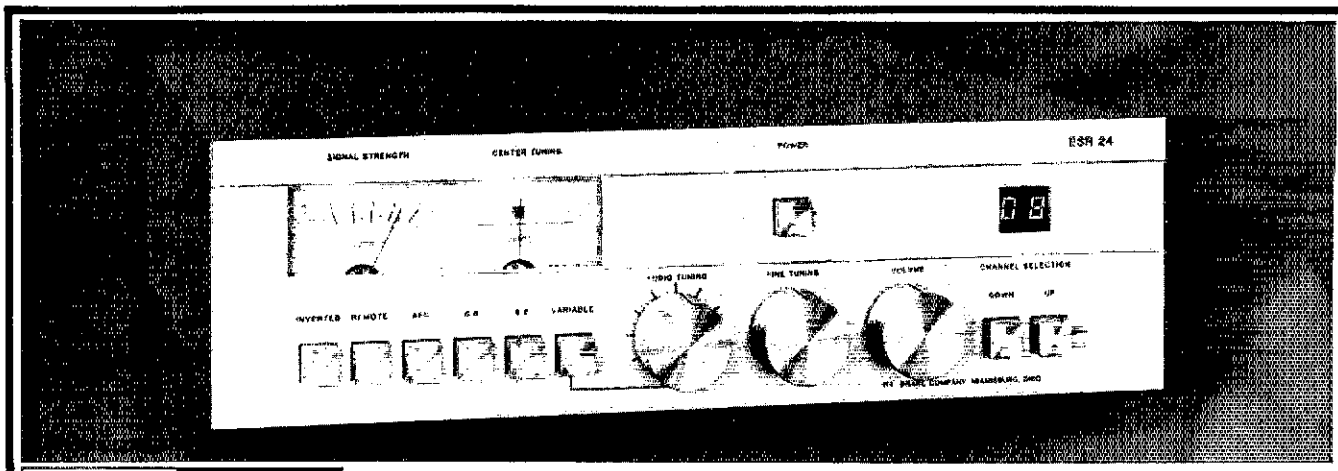
SELL: TenTec transceiver M-540 with power supply and microphone excellent condition $325. John Bittens, W8WTK, 6463 Buckingham Drive, Parma, OH 44129. Tel 216-884-1006.

FOR SALE: Ten-Tec 544, manuals, power supply, VOX and speaker, microphone. Excellent condition $500. W8DTP, 616-335-5757.

KENWOOD TS-520S with service manual, excellent $475. Jim Cannon, W4BMJ. 34 Barcelona Drive, Clifton Park, NY 12065 518-371-2119.

TS520, CW filter $425 offer W5MJQ 315 Camelia Laredo, TX 78041.

AMCOM S225 2mtr transceiver and 110 V supply $325 and $75. WA8ATB, 923 Jewell Rd, Milan, MI 48160.



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MD-11B Specifications:

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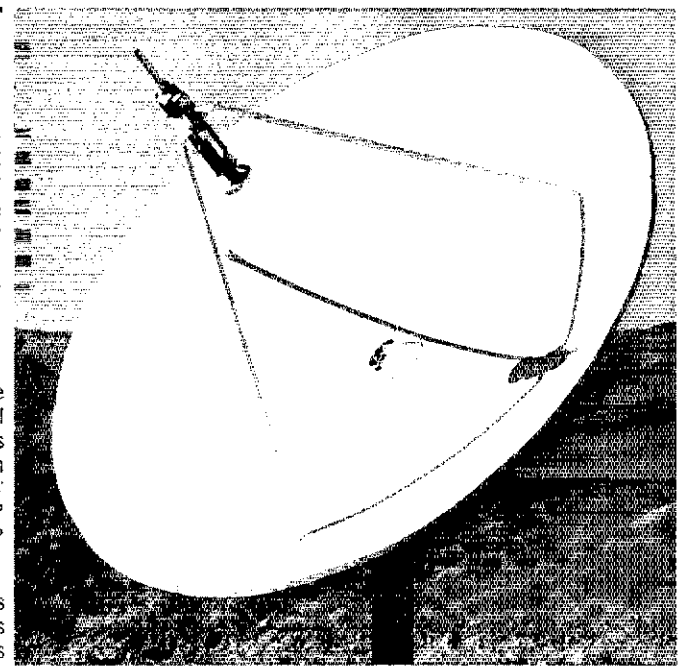
Diameter	11' or 3.35m
Construction	12 panels, 18 ga. steel
Finish	Tan, zinc primer
Weight	225 pounds
Wind-operational	50 mph steady load
Survival	100 mph steady load
Temperature range	-60 to +125°
Frequency	3.7 to 4.2 GHz
VSWR	1.25 or less
Gain	41 dB
F/D Ratio	.44
1/2 power beamwidth	1.5°

MOUNT

Type	True polar, rotatable base
Construction	1/4" - 3/8" steel
Weight	300 pounds
Finish	Brown
Foundation	4 holes 6" × 4'
Azimuth Sweep	91°
Elevation	66°

MISCELLANEOUS

Total shipping weight	660 pounds
Installation Time	2 men, 3 hours
Warranty	6 months



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TS520SE, CW filter, excellent, $420. N4LH, 502-425-0584, evenings.

ALPHA 76CA - $1375. SB200 - $300; TR-2400 $250. AA4T 813-725-1053.

HENRY 3 k-A linear amplifier, super mint condition, less than 30 hours use. $1395 firm. K6RMM, 805-927-4177.

FOR SALE: A.E.A. Morse, Baudot, ASCII MBA Reader model RO and sender CK2 with Bencher silverplated paddle key unused $200. Purchaser pays freight. WA1HMW, 57 Pinewood Road, Bolton, MA 01740.

COLLINS KWS-1 $475 pick up, SB-630 $95, Bird 4350 wattmeter $85, R-4C FL-500 filter $47, new 811A's $18. Rick, K5UR, 501-988-2527.

CLEANING House: SASE list including Drake T-4XB/4-4B/AC4, Heath Twoer/2meter, QST's from 1940, best Heath Hi-Fi with 3-speed turntable, other goodies, all manuals, cables. Cheap. Need: tubes UV-199/C299/WD12/C12, also SHORTWAVECRAFT magazines early 1930's. W2MQB, Box 223, Easthampton NY 11937.

COLLINS KWM-2 transceiver (WE), 516F-2 power supply, fair condx, $425. Looking for KWM-2A (RE), mint condx. KJ6N 24 Catalpa Drive, Alberta, CA 94025 415-328-2449.

FOR SALE: SWAN 500C, JT-30 Mic 117 X C spkr. power supply, VX-2 VOX Unit. All mint, orig. boxes $350; 1kW home brew linear 80-10 meters with power supply $250. You ship K1DIH Brian 95 Keeler, Norwalk, CT 06854, 203-853-3192 Nites.

COLLINS: KWM-380, factory updated Aug. $2000. Kenwood TS-530S, new $525 Pat Elliott 619-421-2418.

DRAKE TR3 transceiver and AC power supply. Very good condition, new finals. $285 KB2AS 315-451-6472 925 7th North St., Liverpool, NY 13088.

KENWOOD '820S $525, '7400A $225. Both in excellent condition. W8SGM, 1007 Trinity Ct., Midland, MI 48640. 517-631-4515.

IC-740, 500 Hz CW filter, IC-HM7 mic, SP-3 spkr, Astron 35 amp metered power supply. New condition. Not used after nine hours logged. $1100. N5XA.

HW-8, HWA-7, mint, $95, KI7A, 206-527-1883.

WANTED: Drake FS-4, Alpha, 312B-5, noise blanker for R-4C, Ham-M or similar. Rick Roderick,Box 1463, Little Rock,AR 72203, 501-988-2527.

DXERSI RX, R4C with Fox Tang 1st IF filter 8 kHz, IC product detector. NB plus 1.5 and .25 kHz filters. 15 extra xtals. T4XB with new finals. Both in very good condition with manuals. $625 for both WA4MIT Morris 205-339-9677.

NCG 15 SB 15 meter SSB, CW QRP transceiver KG9N 309-965-2819 $125.

FOR SALE: Kenwood TS-830S, VFO-240, SP-230, MC-50 $800, SM220 w/pan - $300 N2BJX 716-683-5703.

SSTV scan converter, $165; ATV transceiver, Bird slug 25D, $28; Microcraft RTTY Reader above $70; W2WHK, 210 Utica St., Tonawanda, NY 14150 716-692-5451.

WANTED: Vernier tuning knob for Collins 75A - series receiver. K2LQ, 62 Upper Prospect Rd., Atlantic Highlands, NJ 07716.

GE portables: 470 MHz. Two new PE units. Model PE65 RBWBNX. 2 frequencies. PL Both units $1000 WB2MSL 518-891-3324.

WANTED tunable reeiver above 30 MHz in good operating condition. Please give all frequencies in MHz, age, condition, make, price. KE4FO, 3331 Bankhead Avenue, Montgomery, AL 36106.

MICROWAVE-Modules: Call for our unbeatable price on: MMT144-28, MMT432/435-28s, MMT 1296-144. Lunar amplifiers with preamps - 50 MHz; 120 watt $238, 144 MHz; 40 watt HT $109, 100 watt $238, 150 watt $260, 200 watt $315, 220 MHz; 80 watt $186, vhf/uhf GaAsFET preamps by Lunar $112.45, mastmounted GaAsFets $249.95, other preamp models available call! Astron: VS35M $167.50 RS35M $148.50, RS35A $129, other models available from 7-50 amps. KLM 140-150 MHz verticals $25, Mirage D1010N 100 watt 430-450 MHz $280 VHF Shop Box 349 RD 4 Mountaintop, Pennsylvania 18707 info/orders M-F after 6:00 PM, weekends anytime! 717-868-6565 Two stamps for catalog.

VHF Shop - Dentron $pecials: Clipperton-L $679, Galion-II $989, MLA2500VHF $995, GLA2500VHF $529, Icom IC451 $759, IC251 $589 Call on VHF units: 1296 MHz transverters 1-3 watts, 28-144 MHz IF's, 1296 MHz MGF1402 GaAsFET preamps, 60/120 watt 1269-1296 linears. F9FT 1296 MHz Yagis $48.35. coming soon 1269 MHz upconverters! K3MKZ 717-868-6565 MC/VISA.

ICOM 720A with PS15 and CW filter, mint condition $1200 Dentron Super Tuner $100. Mike, N2OD 212-934-2253.

TELETYPE 43KSR must sacrifice. With built in 103 type data set and with variable interface (RS232) $550. WB2MSL 518-891-3324.

CMOS Super Keyer PC boards (QST, Oct. 1981). $16 ppd. KCØQ/NØII, 2519 Meadowbrook Dr., SE, Cedar Rapids, IA 52403.

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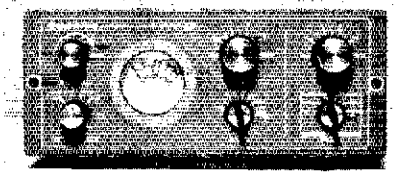

HC-200 ANTENNA COUPLER — This small sized, big quality antenna tuner can be used on rigs of up to 300W PEP input and with all of the new solid state type transceivers which like 50 ohm antennas best.

The HC-200 can replace the wattmeter/VSWR bridge and the coax switch (for up to three antennas) as well as smooth out the VSWR on the line. The HC-200 has a two range, switch selectable wattmeter for more accurate readings, plus a VSWR function for tune-up. Other quality features include ceramic coils and the ability to select direct hook-up bypass. Quite a bit of quality for just a few of your hard earned bucks. $99.95 Suggested Retail.

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For catalog, send QSL card to
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2000 Avenue G, Suite 800, Plano, Texas 75074

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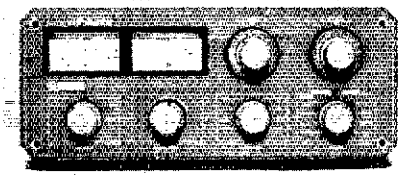

HC-2000 ANTENNA COUPLER — THL's top quality 2kW antenna coupler, which can take the legal max from your amplifier. This is the ultimate in quality transmatch design and construction for HF all band operation, WARC bands included.

For DX on the edges of the band, this is your kind of coupler. It can provide a matched antenna, while ready for both forward and reflected power at the same time on its accurate dual meter VSWR/wattmeter. The HC-2000 works 4 coaxial outputs (one for a dummy load), one single wire and one balanced wire antenna (Balun included), and it provides for direct bypass hook-up. All this, coupler, coax switch and wattmeter, for only $349.95 Suggested Retail.

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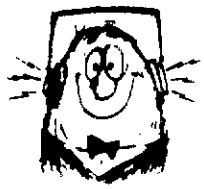

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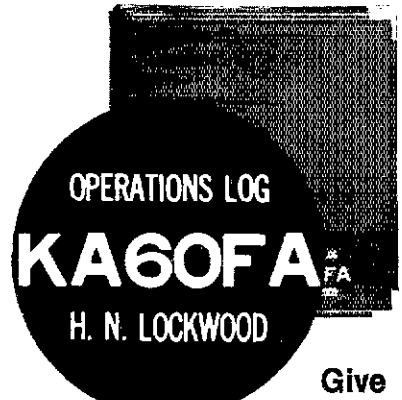

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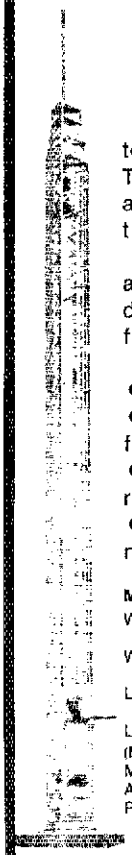
ANTENNA SYSTEMS/TOWER HARDWARE



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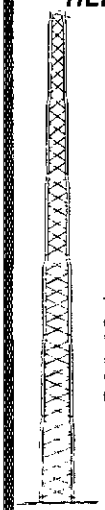

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And – Save even more – include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

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STR KIT	Stub Tuned Radial Kit	$ 20

CUSHCRAFT

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A3	3-El. Triband Beam	$179
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10-4CD	4-El. 10 mtr. Beam	$ 89
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ARX450B	450 Mhz "Ringo Ranger II"	$ 38
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A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 69
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KLM

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MOSLEY

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S-402	2-El. 40 mtr. Beam	$279

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HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
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3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$6.50
1/2 EE (1/2" Eye & Eye Turnbuckle)	$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)	$9.50
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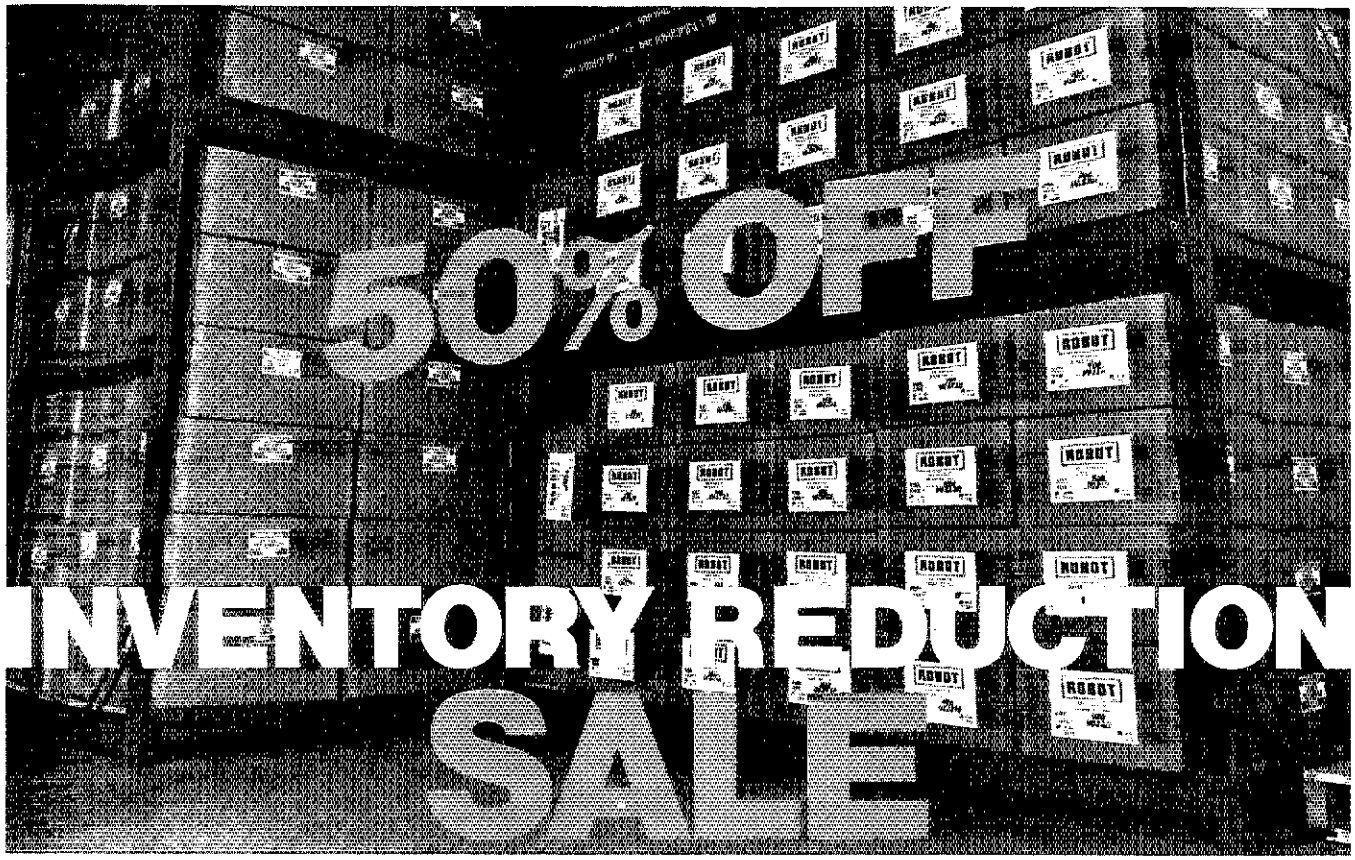

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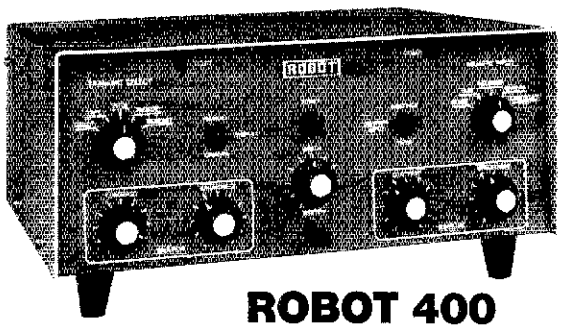
There has never been a better time to complete your station with SSTV, RTTY, and Machine Morse capabilities than right now. The recent FCC proposal opened up all amateur voice transmission frequencies for SSTV, more hams are operating specialty mode than ever before, and with this half-price sale you can complete your station at tremendous savings. But act now. See your participating dealer today. This half-price sale is limited to units in stock.



ROBOT 400 SSTV CONVERTER

Simple to operate, easy to add to your station. All connections to your transceiver are with ready made connecting cables. NO modifications required.

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ROBOT 800 SUPER TERMINAL

For Baudot/ASCII, Morse and SSTV graphics. The Robot 800's built-in demodulator equals or exceeds the performance of those found only in expensive stand-alone terminal units.

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The all-new receiver front end utilizes a low-distortion RF preamplifier that may be by-passed via a front panel switch when not needed. Maximum receiver performance is yours with this impressive lineup of standard features: IF Notch Filter, Audio Peak Filter, Variable IF Bandwidth Control, IF Shift, Variable Pulse Width Noise Blanker, independent SSB and CW Audio Channels with Optimized Audio Bandwidth, and Front Panel Audio Tone Control. Wide/Narrow filter selection is independent of the Mode switch.

The celebrated transmitter section is powered by three 6146B final tubes, for more consistent power output and very low distortion. An RF Speech Processor, Mic Amp Audio Tone Control, VOX, and an IF Monitor round out the transmitter lineup.

Futuristic panel design and careful human engineering are the hallmarks of the FT-102. Convenient pop-out controls below the meters may be retracted when not in use, thus avoiding inadvertant mistuning. Abundant relay contacts, rear panel phono jacks for PTT, microphone/patch input, and other essential interface connections make the FT-102 extremely simple to incorporate into your station.

SPECIFICATIONS

TRANSMITTER

Power Input: (1.8-25 MHz) (28-29.9 MHz)

SSB, CW	240W DC	160W DC
AM	80W DC	80W DC
FM		160W DC

RECEIVER

Image Rejection:
Better than 70dB from 1.8-21.5 MHz
Better than 50dB from 24.5-29.9 MHz

IF rejection:
Better than 70 dB

Selectivity (−6 dB/ −60 dB):
SSB, CW, AM; 2.7/4.8 kHz (with no optional filters)
Width adjusts continuously from 2.7 kHz to 500 Hz (−6 dB)

Spurious Radiation: Better than −40 dB

SP-102 FT-102 FV-102DM FC-102

SP-102

The SP-102 External Speaker/Audio Filter features a large, high-fidelity speaker with selectable low- and high-cut audio filters. The front panel A-B switch allows selection of two receiver inputs for maximum versatility. Also available is the SP-102P Speaker/Patch.

See your Authorized Yaesu Dealer today for a hands-on demonstration of the rig that everybody's talking about. It's the FT-102, The Transceiver of Champions!

FV-102DM

The FV-102DM Synthesized External VFO tunes in 10 Hz steps. Keyboard entry of frequencies, UP/DOWN scanning, and 12 memories make the FV-102DM a "must" for serious DX or contest work.

FC-102

The FC-102 Antenna Coupler is capable of handling 1.2KW of transmitter power, with an in-line wattmeter, separate SWR meter, and A-B input/output selection expanding your station's capability. The optional FAS-1-4R allows remote selection of up to four antennas via one coaxial cable connected to the FC-102.

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Digital DX-terity...

General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch...COMPACT!

TS-430S

The TS-430S combines the ultimate in compact styling with advanced circuit design and performance. An all solid-state SSB, CW, and AM transceiver, with FM optional, covering the 160-10 meter Amateur bands, it also incorporates a 150 kHz-30 MHz general coverage receiver having a superior dynamic range, dual digital VFO's, 8 memories, memory scan, programmable band scan, IF shift, notch filter, all-mode squelch, and built-in speech processor.

TS-430S FEATURES:

- **160-10 meter operation, with general coverage receiver**
  With 160-10 meter Amateur band coverage, including WARC 30, 17, and 12 meter bands, it also features a 150 kHz-30 MHz general coverage receiver. Innovative UP-conversion digital PLL circuit, for superior frequency stability and accuracy. UP/DOWN band switches for Amateur bands or 1-MHz steps across entire 150 kHz-30 MHz range. Two digital VFO's continuously tuneable from band to band. Band information output on rear panel.
- **USB, LSB, CW, AM, with optional FM**
  Operates on USB, LSB, CW, and AM, with optional FM, internally installed. AGC time constant automatically selected by mode.
- **Compact, lightweight design**
  Measures only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm), weighs only 14.3 lbs. (6.5 kg).
- **Superior receiver dynamic range**
  Use of 2SK125 junction-type FET's in the Dyna-Mix high sensitivity, balanced, direct mixer circuit provides superior dynamic range.
- **10-Hz step dual digital VFO's**
  10-Hz step dual digital VFO's operate independently, include band and mode information. Different band and mode cross-operation possible. Dial torque adjustable. STEP switch for tuning in 10-Hz or 100-Hz steps. A=B switch quickly shifts "B" VFO to the same frequency and mode as "A" VFO, or vice-versa. VFO LOCK switch provided. RIT control tunes VFO or memory. UP/DOWN manual scan possible using optional microphone.
- **Eight memories store frequency, mode, and band data**
  Memories store frequency, mode, and band data. Eighth memory stores receive and transmit frequencies independently. M.CH switch for operation of memory as independent VFO, or fixed frequency.
- **Lithium battery memory back-up**
  Estimated five-year life.
- **Memory scan**
  Scans memories in which data is stored.
- **Programmable automatic band scan**
  Scans programmed band width. Scan speed adjustable. HOLD switch interrupts band or memory scan.
- **IF shift circuit for minimum QRM.**
  IF passband may be moved to place interferring signals outside the passband, for best interference rejection.
- **Tuneable notch filter built-in**
  Deep, sharp, tuneable, audio notch filter.
- **Narrow-wide filter selection**
  NAR-WIDE switch for IF filter selection on SSB, CW, or AM, when optional filters are installed. (2.4 kHz IF filter built-in.)
- **Speech processor built-in**
  Improves intelligibility, increases average "talk-power."
- **Fluorescent tube digital display**
  Indicates frequency to 100 Hz (10 Hz modifiable).
- **All solid-state technology**
  Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Built-in cooling fan, multi-circuit final protection. Operates on 12 VDC, or 120 VAC, or 220/240 VAC with optional PS-430 AC power supply.
- **All-mode squelch circuit, built-in**
- **Noise blanker, built-in**
- **RF attenuator (20 dB)**
- **Vox circuit, plus semi break-in with side-tone**

Optional accessories:

- PS-430 compact AC power supply.
- PS-30 or KPS-21 AC power supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket.
- AT-130 compact antenna tuner, 80-10 m incl. WARC.
- AT-230 base antenna tuner, 160-10 m incl. WARC.
- FM-430 FM unit.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand microphone.
- MC-60A deluxe desk microphone, UP/DOWN switch.

More information on the TS-430S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220

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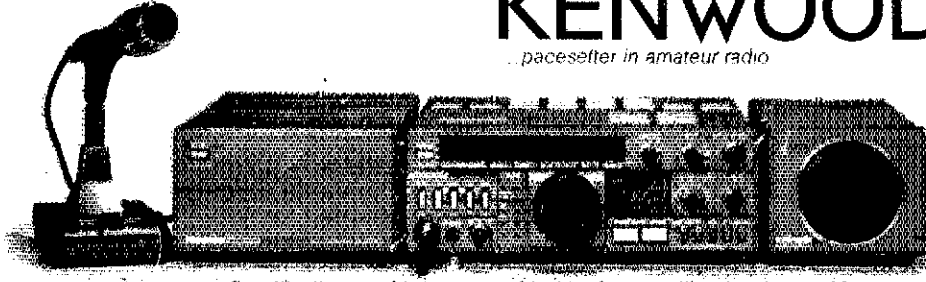

Specifications and prices are subject to change without notice or obligation