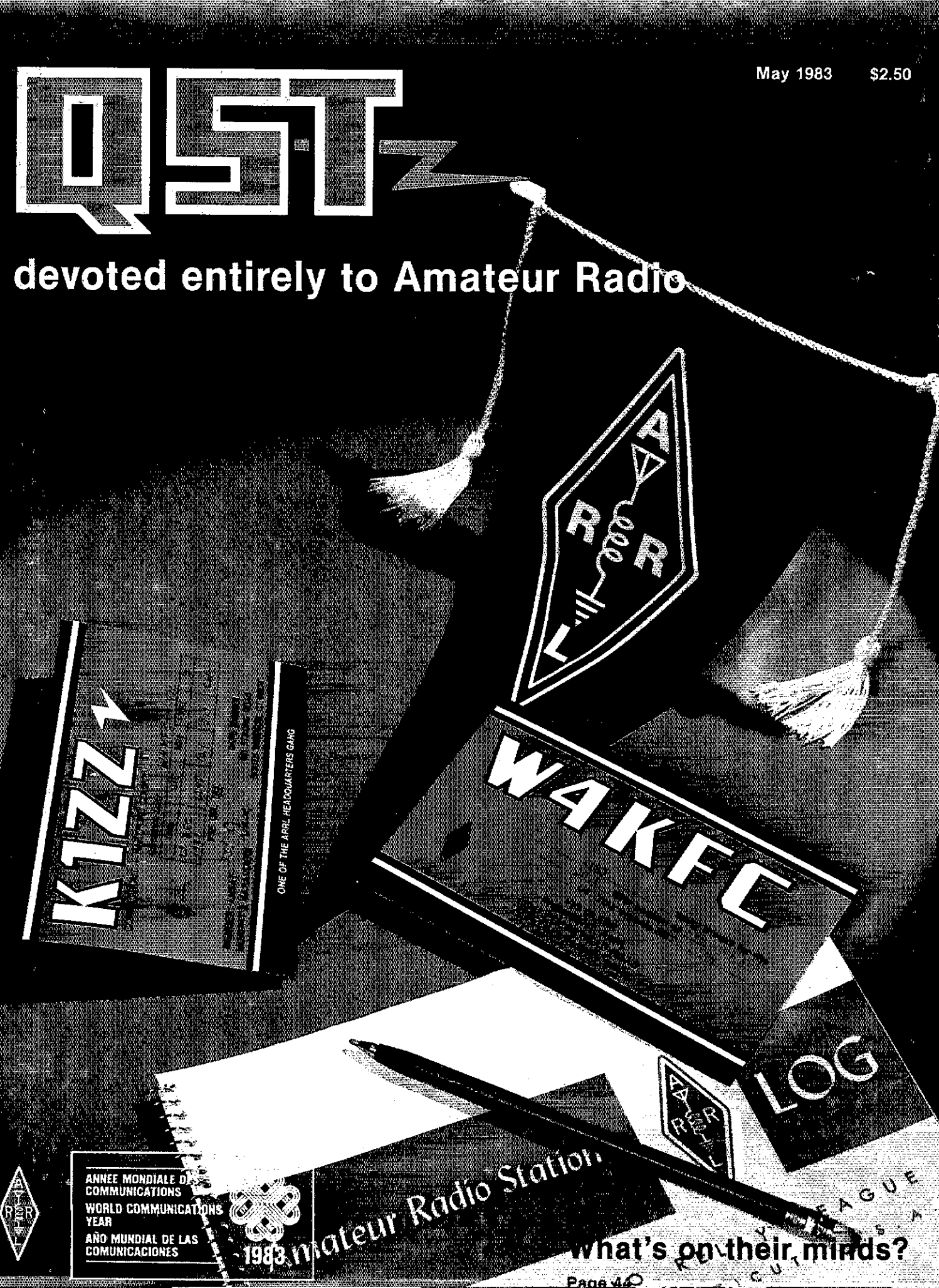
QST

May 1983 $2.50

devoted entirely to Amateur Radio



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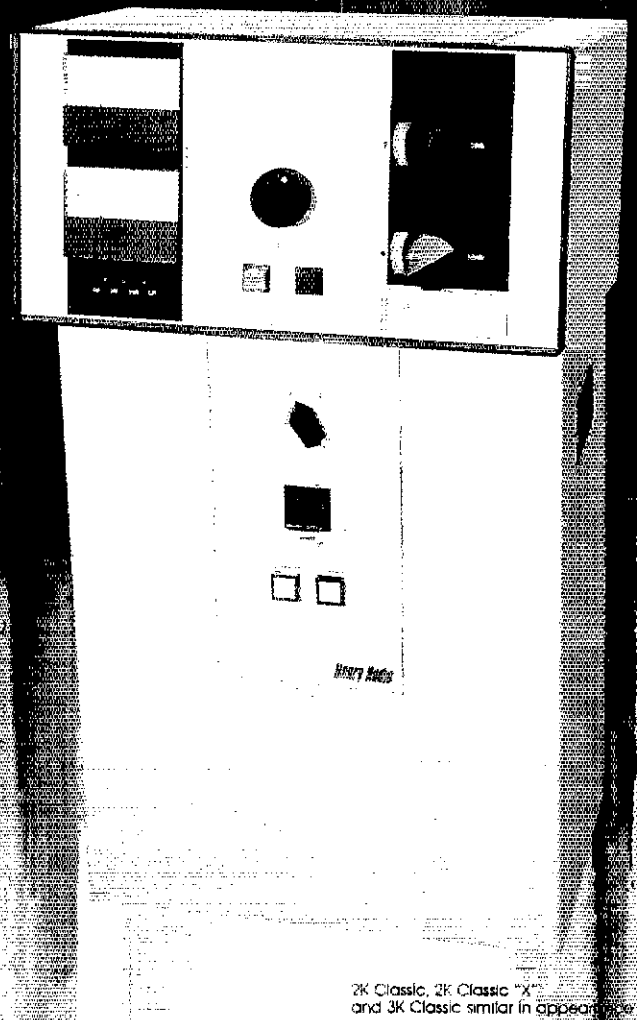
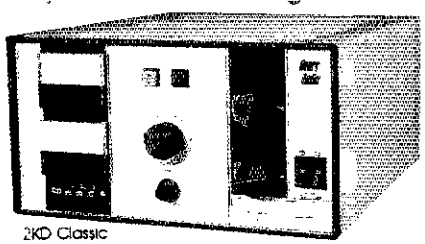
The world's broadest line of linears now boasts... four new amplifiers



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

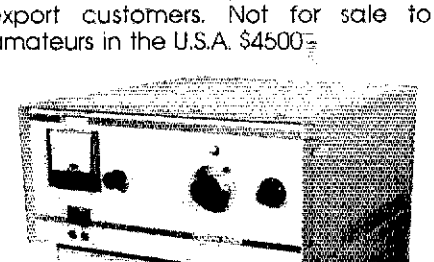
The 2K CLASSIC The latest and best version of the console that made the name "2-K" famous around the world. $1295

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 watt 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.

54 YEARS OF SERVICE

Henry Radio

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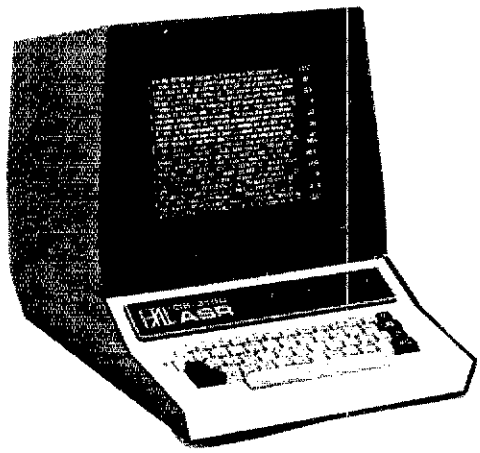
For all states except California.
Calif. residents please call collect on our regular numbers

MESSAGE PROCESSOR TERMINAL



MPT3100

Message processing is now available for radio communications systems. The MPT3100 is a complete up-date of the popular HAL DS3100 RTTY terminal, adding the ability to store RTTY messages, edit them, and retransmit them singly or in preset groups. ALL of the previous features of the DS3100 and MSO3100 are retained and new mailbox commands are included. The editor may be used with any file that is stored. The MPT3100 includes ASR (Auto Send-Receive), MSO (Message Storage Option - "mailbox"), and TRO (Traffic Relay Option) modes. The MPT3100 is a new software package that works in ANY DS3100 with MSO3100 circuit board. Some of the features of the MPT3100 are:

NEW FEATURES OF MPT3100:

- Automatic storage of all received text in files separated by the standard "NNNN" terminator (TRO-REC mode)
- Full editing capability of all files stored by mailbox (MSO) or by TRO storage
- Editor allows insertion or deletion of text in any part of a stored message - 15 keyboard edit commands
- Editor may be used even while receiving, transmitting, or storing messages - even when MSO mailbox is in use
- Files may be renamed, created in the editor, cut into smaller files, and deleted with keyboard commands
- Message files may be transmitted singly or in batches
- Transmitted messages may be serial-numbered automatically
- The full format requirements for NAV MAR COR MARS NTP-8(A) are supported
- New TRO commands include: RXON, RXOFF, DIR, SEND, STOP, RESUME, RESTART, EDIT, CUT, CREATE, QUIT, RENAME, DELETE
- On-screen status indicators show: TRO mode; bytes of memory remaining; file names being recorded, transmitted, and edited
- MSO mailbox .SDIR directory command revised to shorten time required for transmission
- New .DIR [filematch] and .SDIR [filematch] mailbox commands give listing of only file names that include [filematch]
- Programmable "header ID" for each mailbox transmission

MSO Mailbox Features:

- Programmable MSO call-up command
- Mailbox may be controlled by external station to store message files, read files, delete files, and list the file directory
- DS3100 operator may perform all MSO operations on the keyboard without transmitting
- Mailbox transmissions include user-prompting and automatic CW and RTTY indentification
- HELP messages are provided to assist the new user in operation of the mailbox
- All mailbox messages stored may also be edited, renamed, and transmitted using TRO commands
- MSO commands are: .DELETE, .DIR, .DIR [filematch], .ENDFILE, .FILEHELP, .HELP, .KY1ON/OFF, .KY2ON/OFF, .PRINTON/OFF, .QBF, .READ, .RYS, .SDIR, .SDIR [filematch], .WRITE

DS3100ASR Terminal Features:

- Send and receive ASCII, Baudot, Morse codes
- ASCII or Baudot at 45, 50, 57, 74, 100, 110, 134, 150, 300, 600, 1200, 2400, 4800, and 9600 baud; full or half duplex
- Morse code at 1 to 175 wpm
- Full length 72 character line / 24 line screen display.
- 50 line pre-type on-screen transmit buffer
- True "ASR" operation - pretype transmit text while receiving
- 150 line receive display buffer
- MSO 3100 adds 32K bytes of additional storage
- 12 inch, P31 green display built-in
- Control functions are clearly marked on keytop
- On-screen status indicators with real-time indication
- Upper-lower case ASCII with ALL control codes
- Current loop or RS232 RTTY input/output
- Positive and negative Morse key outputs
- ASCII printer output prints Baudot, Morse, or ASCII text
- Operates on 105-130 / 210-250 VAC 50-400 Hz power

WHEN OUR CUSTOMERS TALK, WE LISTEN—and we have been listening. Rather than making a proven product obsolete—a product that is well known and respected for its reliability and capabilities—HAL has completely rewritten the software of the DS3100 to offer the features that our communications customers have been asking for. A full year in the preparation, these are features that could only be designed by people who know and operate RTTY. Best of all, ANY DS3100 can be modified at the factory to include the MPT3100! In marked comparison to other radio equipment that is made obsolete by new models every 6 to 12 months, the DS3100 lives on—a full 4 years after its announcement.

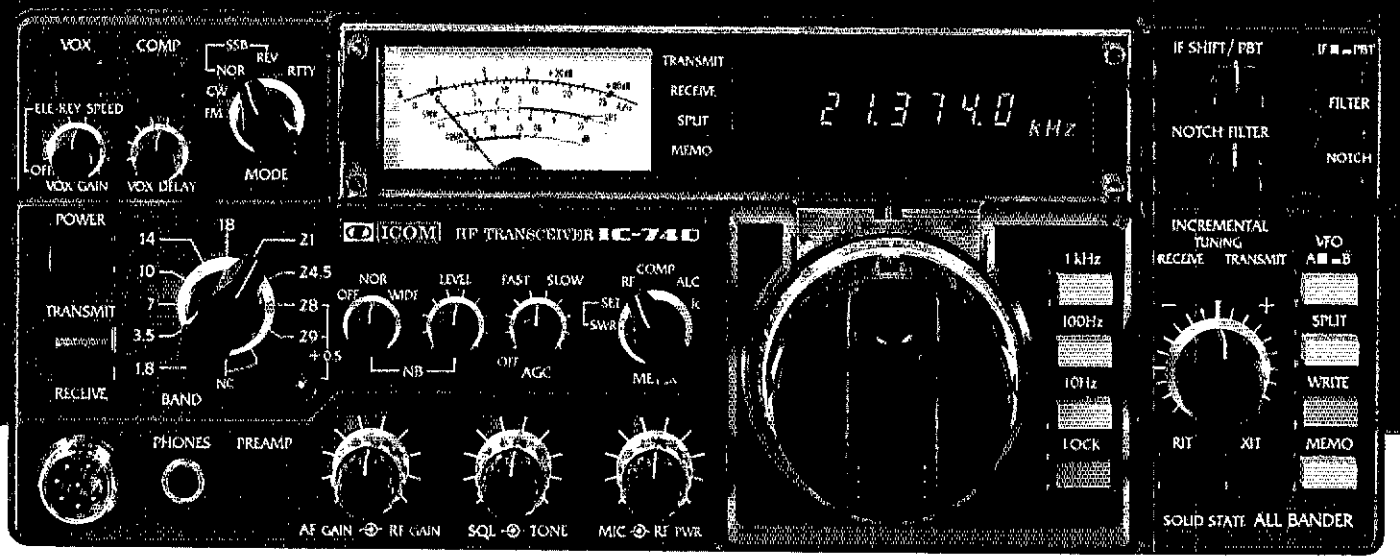
HAL COMMUNICATIONS CORP.
BOX 365
URBANA, ILLINOIS 61801

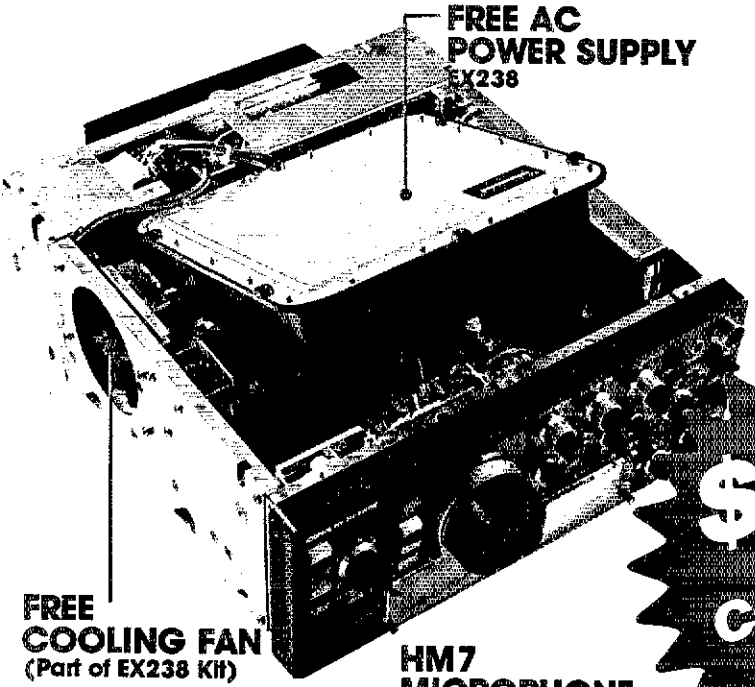
If you are really serious about your RTTY, look to HAL, your REAL RTTY company.

Please write for even more details about the MPT3100 Message Processor Terminal. Call your dealer or HAL for prices and how to get a new MPT3100 or to arrange for modification of your present DS3100.

ICOM IC-740+

IC-740 PS + Cooling Fan + Mic + Rebate = Your Best Buy!





FREE AC POWER SUPPLY
EX238

FREE COOLING FAN
(Part of EX238 Kit)

HM7 MICROPHONE
Included With IC-740

Now the world's only completely self contained solid state 200W PEP, 12VDC/117VAC 9 band HF ham transceiver with a **Competition Grade Receiver** can be yours . . . at a special price.

Until July 31, 1983, the IC-740 and the optional IC-740PS ($159 value) internally mounted power supply are available at your authorized ICOM dealer for the price of the IC-740 alone. PLUS you get a $50 cash rebate directly from ICOM.

$50 Cash Rebate
For the purchase of an IC-740.
Expires July 31, 1983

The ICOM 740 provides competition grade receiver performance with superb dynamic range in excess of **100dB** and a intercept point of **+18dBm** plus **pass band tuning, variable AGC**, and a **noise blanker** that works, all **standard.**

The IC-740PS AC power supply installs in under 30 minutes, making the IC-740 the ideal self contained rig for both summer vacation portable operation, as well as your main home rig . . . The benefits of 12 VDC and AC operation in one compact package.

For the ham who appreciates quality, get a competition grade receiver, rock solid solidstate transmitter, internal AC/DC power supply with cooling fan, and a microphone all for the price of the transceiver. Get extra savings while getting an ICOM IC-740 . . . simply the best ham transceiver in the world today . .

. . . Offer subject to equipment availability . . . at your authorized ICOM dealer . . .

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.

Power Supply / Rebate Combination Offer begins Mar. 21, 1983; ends July 31, 1983.

May 1983 *Volume LXVII Number 5*

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OUR COVER

Although they have distinct leadership roles, Vic Clark and Dave Sumner work very closely together to further the goals of the ARRL. Find out what's on their minds, in the article beginning on page 44.

TECHNICAL

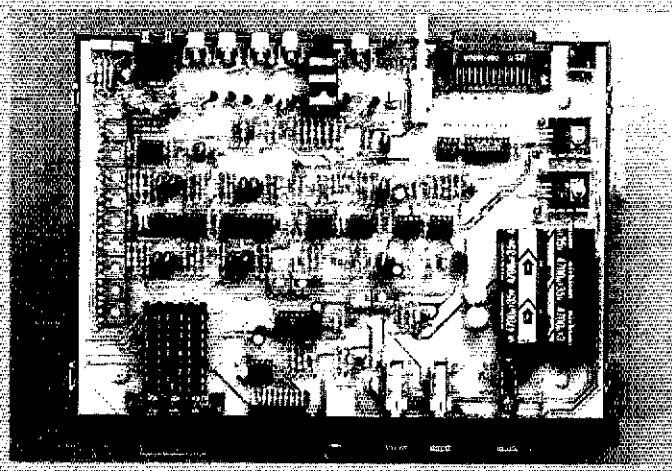
BEGINNER'S BENCH

NEWS AND FEATURES

OPERATING

DEPARTMENTS

CHAMPAGNE RTTY/CW on a Beer Budget



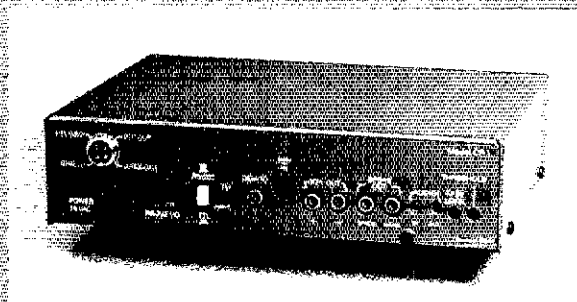
CP-1 Computer Patch™ Interface

The AEA Model CP-1 Computer Patch™ interface will let you discover the fastest growing segment of Amateur Radio: computerized RTTY and CW operation.

When used with the appropriate software package (see your dealer), the CP-1 will patch most of the popular personal computers to your transceiver for a complete full-feature RTTY/CW station. No computer programming skills are necessary. The CP-1 was designed with the RTTY neophyte in mind, but its sophisticated circuitry and features will appeal to the most experienced RTTY operator.

The CP-1 offers variable shift capability in addition to fixed 170 Hz dual channel filtering. Auto threshold plus pre and post limiter filters allow for good copy under fading and weak signal conditions.

Transmitter AFSK tones are generated by a clean, stable function generator. Plus (+) and minus (-) output jacks are also provided for CW keying of your transmitter. An optional low cost RS-232 port is also available. The CP-1 is powered with 16 VAC which is supplied by a 117 VAC wall adaptor included with the CP-1.



Please write AEA for more detailed information on the CP-1 or better yet, see your favorite dealer and compare.

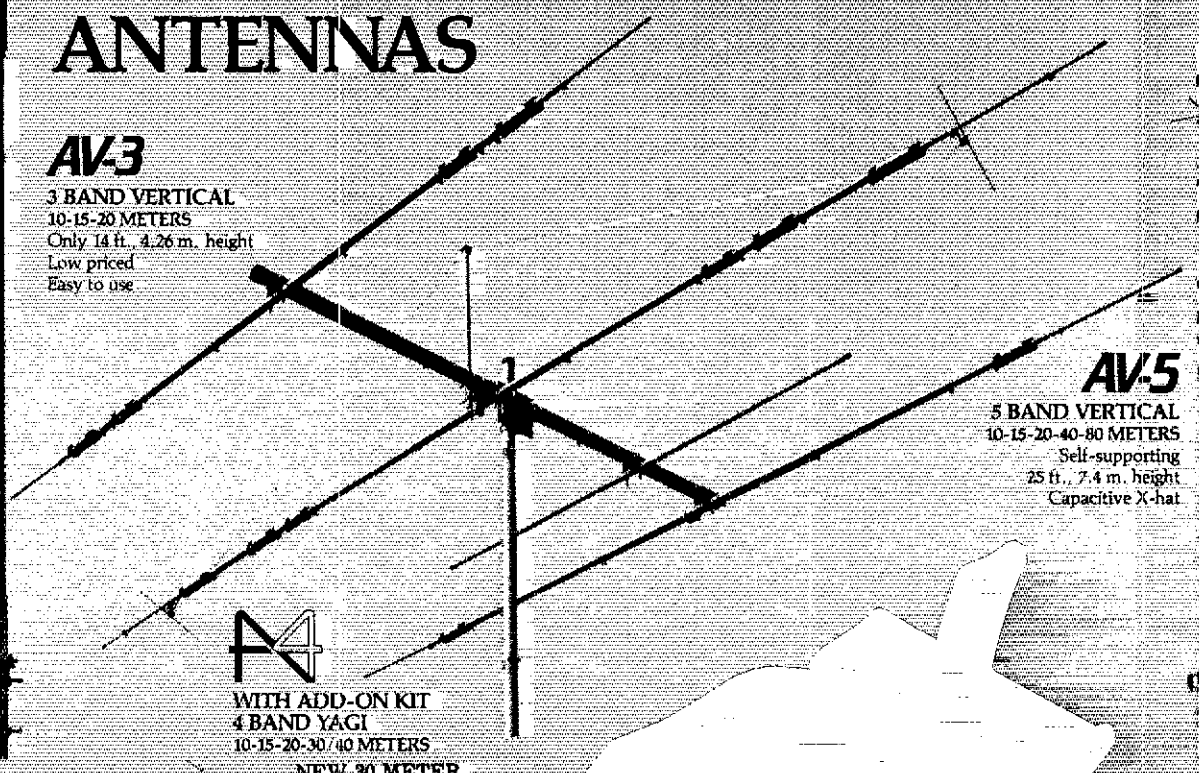
Prices and specifications subject to change without notice or obligation.

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C-2160, Lynnwood, Wa. 98036
206/775-7373 Telex: 152571 AEA INTL

AEA Brings you the Breakthrough!

CUSHCRAFT HF MULTIBAND

CONTEST WINNING ANTENNAS



AV-3

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

AV-5

5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
25 ft., 7.4 m. height
Capacitive X-hat

A4

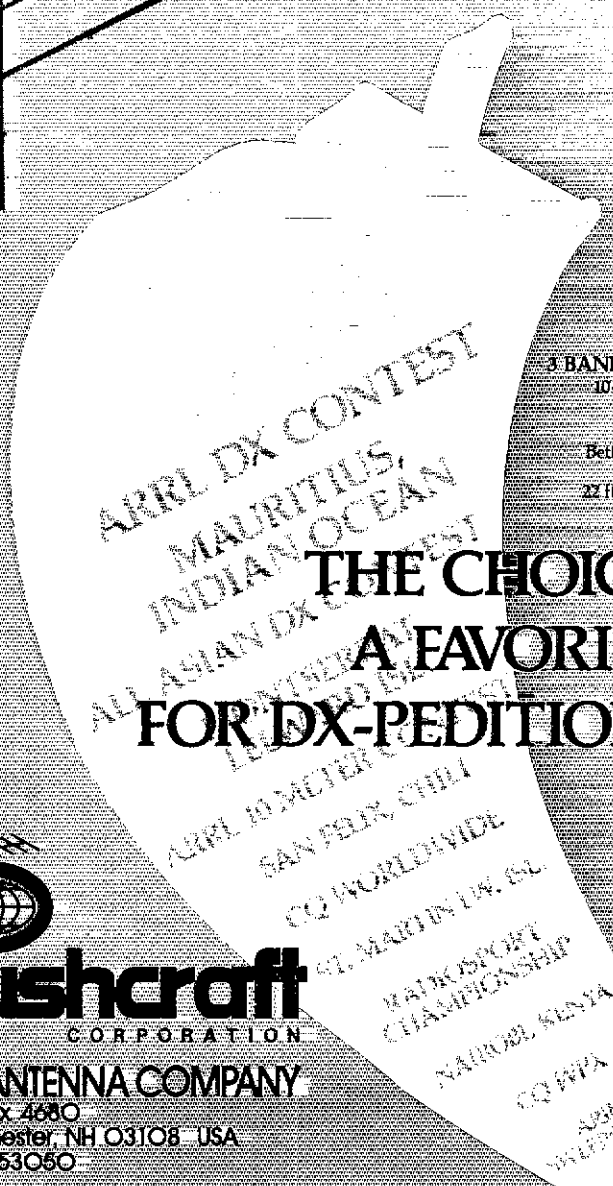
WITH ADD-ON KIT
4 BAND YAGI
10-15-20-30/40 METERS
NEW 30 METER WARC BAND WITH A3 OR A4

A3

3 BAND YAGI
10-15-20 METERS

R3

3 BAND VERTICAL
10-15-20 METERS
No radials
Remote tuning
Better than average performance
22 ft., 6.7 m. height



THE CHOICE, A FAVORITE FOR DX-PEDITIONS

The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.

For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3

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

A4

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

cushcraft CORPORATION

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

Scan the World.

NEW

SSB, CW, AM, FM, digital VFO's, 10 memories, band and memory scan, optional 118-174 MHz coverage...

R-2000

The R-2000 is an innovative all-mode SSB, CW, AM, FM receiver that covers 150 kHz–30 MHz, with an optional VC-10 VHF converter unit to provide coverage of the 118-174 MHz frequency range. New microprocessor controlled operating features and an "UP" conversion PLL circuit assure maximum flexibility and ease of operation to enhance the excitement of listening to stations around the world.

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 the band and from band to band.
- **Optional 118-174 MHz coverage.** Through use of innovative microprocessor technology, frequency, band, and mode data of stations in the 118-174 MHz range may be tuned, displayed (full frequency, ie., 146.000.0), stored in memory, recalled, and scanned, using the R-2000 front panel controls and frequency display, allowing maximum convenience and ease of operation.
  The optional VC-10 VHF converter unit may be easily installed on the rear panel of the R-2000.
- **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. 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.)**
- **Programmable 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.**
- **Three built-in IF filters with NARROW/WIDE selector switch. (CW filter opt.)** 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.**
- **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.**
- **100/120/220/240 VAC, or 13.8 VDC operation** (with opt. DCK-1 cable kit).

Other features.

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

Optional accessories:

- VC-10 118-174 MHz converter.
- HS-4, HS-5, HS-6, HS-7 headphones.
- DCK-1 DC cable kit.
- YG-455C 500-Hz CW filter.
- HC-10 World digital quartz clock.
- AL-2 Surge Shunt

VC-10 subject to FCC approval

More information on the R-2000 is available from all authorized dealers of Trio-Kenwood Communications
1111 West Walnut Street
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KENWOOD
...pacesetter in amateur radio

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

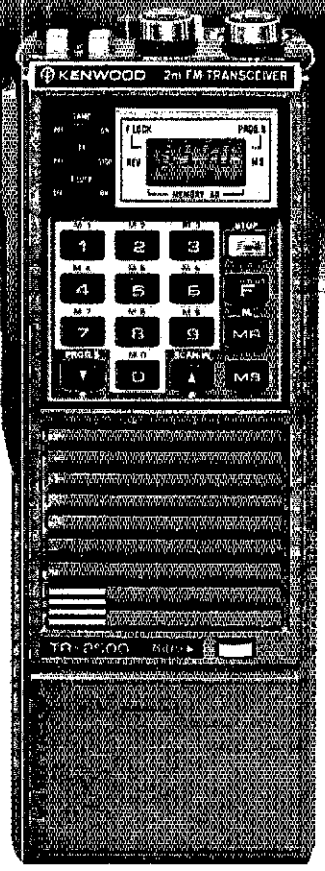
TR-2500

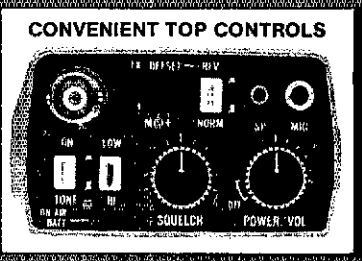
...size, smaller price!

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 MS-1 charger/stand for 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

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us . . ."

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

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

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

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111, USA. Telephone: 203-666-1541, Telex: 643958 AMRAD NEWI.

The "JA Phenomenon" Revisited

Back in November 1975, *QST* carried a seven-page article by Hal Offutt, K8HVT, then a resident of Japan, entitled "The Incredible JA (+ JH, JR, JE, JF, JG, JI) Phenomenon." This classic article contributed enormously to people's understanding of Amateur Radio in Japan, and is still "must" reading for anyone wanting to know how our avocation is practiced there.

In March, thanks to the scheduling of an IARU Administrative Council meeting in Tokyo, I had the opportunity to visit Japan for the first time and to evaluate and update Offutt's observations. The subject is especially timely, inasmuch as the FCC in its codeless license proposal has cited Japan as an example of a country with such a class of license. In fact, the Commission has said, ". . . we are unaware of any difficulty that has been experienced because of the creation of such license classes" — a comment which suggests that no one at FCC has ever read Offutt's descriptive analysis.

Hal described how amateur operator licenses in Japan grew from 70,000 in 1965 to 499,000 ten years later (the figure today is slightly more than *one million).* He told how station licenses — the number to use for comparison with U.S. figures, since the Japanese operator license is lifetime — went from 38,000 to 286,000 in the same period (the number today is 532,000). He attributed the growth to existence of a codeless Radiotelephone Class license carrying full frequency privileges (except on 14 MHz), but limited to phone and with a power output limit of 10 watts. He explained how the administration of Japan rationalized its issuing of a codeless license for high-frequency operation, irrespective of the international Radio Regulations. Finally, Offutt documented some of the problems that had resulted: serious overcrowding on some bands, widespread violations of the power limits, TVI/RFI, and a tendency for newcomers to lose interest after a year or so (a consequence of the ease with which they obtained the license in the first place). He also observed that there was little interest in upgrading to a higher license class among Japanese amateurs, 95% of whom apparently were content to hold what U.S. amateurs would regard as an entry-level license. He concluded with this:

> The hobby in Japan is first and foremost just that — a hobby, something that one does in one's spare time much as one might sail a boat or fly a model airplane . . . public service plays an almost insignificant role, . . . even in a country plagued with severe earthquakes and violent typhoons. While the first paragraph under the United States Amateur Regulations defines as a fundamental purpose of Amateur Radio: "Recognition and enhancement of the value of the amateur service to the public . . . particularly with respect to providing emergency communications," there is no comparable clause in the Japanese Regulations.

Based upon a week of admittedly superficial personal observations, Amateur Radio does not seem to have changed dramatically in the intervening eight years. The 10-watt license still accounts for 95% of Japan's amateurs. Additional mode privileges have been granted to the Radiotelephone Class, and repeaters are being authorized for the 430- and 1260-MHz bands (144 MHz is only 2 MHz wide and is much too crowded to accommodate repeaters, and there is no 220-MHz band in Japan), but these are matters of detail rather than concept. While there are far more amateurs in Japan than in the U.S., JARL membership is about the same as that of ARRL — which bears out Offutt's suggestion that the average Japanese amateur may be less committed to Amateur Radio than his American counterpart.

So much for the negative. On the positive side of the ledger, thanks to their numbers Japanese amateurs enjoy access to a much wider variety of inexpensive, sophisticated equipment than is exported to North America. JARL has learned how to capitalize on the size of the amateur population in its government relations, and has far more influence today than was evident at WARC-79, where Japan's level of support for Amateur Radio was somewhat disappointing. As reported in "Amateur Satellite Program News" this month, a Japanese amateur satellite is in the works for 1986 — surely a sign of government backing. Finally, while the percentage of amateurs holding "full privilege" 100-watt and 500-watt licenses is small, they still number in the tens of thousands, a figure comparable to the amateur population of any country other than the U.S. Amateur Radio in Japan certainly is different from what we know in North America, but "different" does not necessarily mean better or worse.

A development which may slow the growth of Amateur Radio in Japan is the creation of a new, high-quality Personal Radio Service. One common calling channel (for digital selective calling) and 79 simplex fm communications channels are available in the vicinity of 903 MHz; transmitter power is 5 watts. Japanese manufacturers estimate their domestic market for this equipment at 2 or 3 *billion* dollars over a 10-year period, and they're gearing up for it in earnest; it was interesting to see equipment already on sale less than four months after the government announcement of the new service. The same technology should be available for use in the new 902-928 MHz ham band here in ITU Region 2 (the Americas).

Finally, during our visit JARL provided some fascinating data on the age distribution of its members today as compared with earlier years. The charts show a very high dropout rate among young amateurs in Japan, and also show that new members increasingly are coming from the over-30 age group. The pattern is quite similar to what we are experiencing in the U.S. May we be so bold as to suggest that a codeless license is, perhaps, not a panacea for the problem of attracting and holding the interest of young people? — *David Sumner, K1ZZ*

League Lines...

We regret to report the death of past ARRL President Goodwin L. Dosland, WØTSN. "Dos" died on March 29 after a long illness. June QST will carry his obituary.

The FCC has granted ARRL's request for an extension of time for filing comments in the proposal for a new Amateur Radio License not requiring knowledge of Morse code, PR Docket No. 83-28. The new comment deadline is June 28, and replies to comments are due July 28. The text of the FCC's proposal can be found on pages 49-51 in March 1983 QST.

U.S. 20-meter phone band expanded! The FCC has adopted a plan to increase phone privileges on the 20-meter band as follows: General class and above: 14.225-14.350 MHz. Advanced and Amateur Extra class: 14.175-14.225 MHz. Amateur Extra: 14.150-14.175 MHz. This expansion will be effective May 22 at 0001 UTC. The Commission also adopted Notices of Proposed Rule-making exploring the expansion of other hf phone bands and 10-year terms for amateur licenses.

Do you design and build "homebrew" equipment and test gear for 420 MHz to 24 GHz and up? Do you know someone who does? If so, please contact Chuck Hutchinson, K8CH, at ARRL Hq. The League is looking to pay authors for unpublished, original projects suitable for use in a new ARRL book.

The newly formed Administrative Council of the International Amateur Radio Union held its first meeting in Tokyo March 28-April 1 with members from IARU Headquarters and all three IARU regional organizations in attendance: G5CO, HK3DEU, JM1UXU, K1ZZ, PAØLOU, W1RU, WØBWJ, YV5BPG and 9V1RH. Most of the week was spent arriving at agreement on the concepts for a new IARU Constitution, and developing a provisional draft. Plans call for the drafting work to be completed at a second meeting later in the year. See January QST, page 64, for more background on the IARU Administrative Council.

The U.S. Virgin Islands now has a new ARRL QSL Bureau -- the Virgin Islands Amateur Radio Club. Until the new Bureau has obtained a P.O. Box, cards destined for Virgin Islands amateurs should be sent to ARRL Hq.

If you are planning a DXpedition or vacation to a foreign country this summer, please send Hq. your request for information as early as possible. Normally, applications for reciprocal operating permits are made through the mails, and directly with the telecommunications authority in the host country. Processing times vary from two to six months! Mail your request for information and forms to the ARRL Membership Services Department, specifying the countries you will be visiting. Remember that Canada and the U.S. now hold an "open" agreement so that reciprocal operating privileges are automatic; no written permission is required (but keep your original license with you).

The National Radio Astronomy Observatory (Greenbank, West Virginia) 140-foot dish antenna will be used for the Jansky Commemorative operations two weekends in May, the 7-8 and the 14-15. The tremendous gain of this antenna will allow very modest 70-cm stations to work WV via EME. Details appear in "Amateur Satellite Program News" on page 78.

Congratulations go to William Lazzaro, N2CF, who has been hired as AMSAT's new General Manager.

A reminder about ARRL's ongoing Public Service Announcement program: We can supply radio and TV PSAs. If you can get air time, contact the League's Public Information Office at Headquarters.

June 1 is the deadline for registering your public service net for the 1983-1984 edition of the ARRL Net Directory. Registrations must be received at ARRL Headquarters on or before June 1. Necessary information includes net name, frequency (input and output if a repeater is used), meeting days and times, and the manager's call. A Net Directory registration form, CD-85, is available from Hq. for an s.a.s.e.

FCC licensing of individuals in the commercial services will soon be changed. The Commission intends to retain the present licensing requirements in the Aviation Radio, Maritime Radio and International Common Carrier Radio Services; however, licensing requirements in the other commercial services will be either eased or eliminated. The changes will appear in the Federal Register and will probably become effective 30 days thereafter.

The Weather that Brings Vhf DX

Weather changes can bring spectacular DX openings to the vhf bands. What causes this, and how can you tell when DX conditions are right?

By Emil Pocock,* W3EP

Radio amateurs have known for a long time that weather affects vhf propagation.[1] Under certain atmospheric conditions, contacts of more than 1400 miles over land and 2500 miles over water have been made on the 144, 220 and 432-MHz bands.[2,3] This type of vhf DX is called tropospheric enhancement, or simply "tropo," because it occurs in the weather-producing lower part of the atmosphere called the troposphere. Signals propagated by tropo can be quite strong, and it is not unusual to hear 10-W stations with small antennas making 1000-mile contacts under the right conditions.

Tropo is the most common form of propagation in the bands above 144 MHz, but many vhf amateurs use tropo without realizing its full potential. Although weather changes can dramatically affect propagation, only two weather systems cause most true DX openings: the sluggish high-pressure region that appears most frequently in late summer, and the springtime wave cyclone (see Table 1).[4] Other weather conditions can also improve vhf propagation and sometimes create brief DX openings. Warm fronts and cold fronts bring enhancement to local areas (restricted to a radius of a few hundred miles), but they rarely bring DX conditions. Several unusual types of winds also have DX-producing possibilities.

The Causes of Tropo DX

Tropo DX is quite different from the more familiar ionospheric skip. Ionospheric skip occurs when radio signals are reflected or refracted by a region of ionized air 50 to 250 miles high. In contrast, tropo DX is caused by a layer of warm and often very dry air, known as a *temperature inversion,* that is usually no more than 1 mile high. Normally, the temperature and moisture content of the lower atmosphere decrease with altitude. In an inversion, the temperature suddenly rises and moisture content often decreases dramatically. Inversions may begin right at ground level and rise for a few hundred feet. Most inversions that are useful for propagation, however, are found at altitudes of 1500 to 6000 feet. Fig. 1 shows the temperature and moisture profiles of a normal atmosphere and of two inversions.

Radio signals traveling through an inversion are bent or refracted toward earth. Some inversions do not refract vhf waves enough to bring them all the way back to the earth's surface. Consequently, only stations within the "normal" working range appear stronger. This is often referred to as *local enhancement* because DX contacts do not take place. Tropo DX occurs when an inversion is strong enough to refract vhf signals back to the earth's surface, and when it covers a wide geographical area. Both conditions must be met because tropo signals are not reflected in a single hop (or a series of long hops) at high altitude, as is true for ionospheric propagation. Rather, an inversion continuously refracts radio waves back toward the earth over paths that it covers completely.

The change in the index of refraction of the air within an inversion determines how much the inversion can refract radio waves. Although refractive index change measurements cannot be made by the average ham, they do provide a more precise way of describing inversion conditions. The calculation of the refractive index of air at radio frequencies, designated as N, involves only temperature, moisture and pressure.[5] Since atmospheric pressure always decreases with altitude, variations in temperature and moisture are the only factors that need be considered. Cool, moist air yields high values of N, and warm, dry air produces low values. Refraction is greatest when the index of refraction decreases sharply with altitude.

In a normal atmosphere, temperature and moisture both decrease steadily with altitude for several thousand feet. These changes cause the index of refraction to decrease only by about four N units per 100 meters as altitude increases. (The decrease in N units per 100 meters is noted as dN.) This small change in the index with altitude causes radio waves to be refracted slightly, but not enough to prevent them from going uselessly into space.

Vhf signals are refracted at greater angles as dN increases. When dN equals 16, radio waves are refracted enough to bring them back to the surface of the earth. This condition is known as *superrefraction,* and it occurs in especially strong inversions. Temperature rises and moisture content decreases rapidly in such inversions, causing the index of refraction to decrease sharply. When a superrefracting inversion covers a wide area, DX contacts may be possible.

Even though superrefraction conditions exist, all radio frequencies are not refracted to the same degree. The inversion depth (the vertical distance over which the temperature rises) determines the minimum frequency that is actually superrefracted.[6] Ultra-high frequencies are superrefracted with shallow inversions, but very-high frequencies require

[1]Notes appear on page 15.

*810 Henderson St., Bloomington, IN 47401

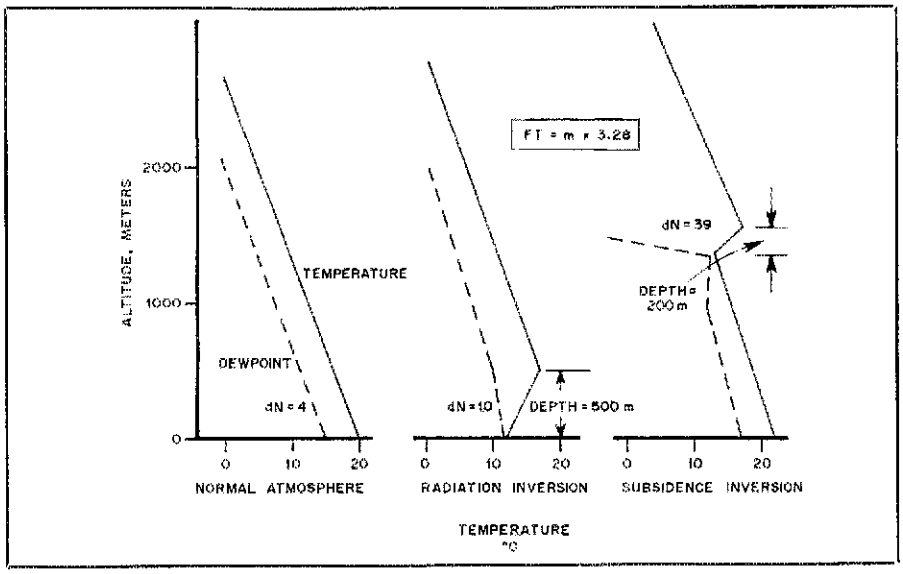

Fig. 1 — Upper atmosphere profiles of temperature and moisture content for normal conditions, a radiation inversion and a subsidence inversion. Moisture is measured by dew point. Note that only the subsidence inversion yields dN large enough for superrefraction. The minimum ducting frequency of this layer is about 100 MHz.

Table 1
Glossary of Terms

Dew point: The temperature to which a given sample of air must be cooled before water condenses; a measure of water vapor content.
DX: Distance over 500 miles.
Index of refraction of air (at radio frequencies): A measure of the potential of air, with given characteristics of temperature, moisture content and pressure, to refract radio waves.
Inversion depth: The vertical distance over which a temperature inversion exists.
Ionosphere: The atmosphere above 40 miles in altitude.
Jet stream: A narrow band of high-velocity winds that flow eastward between 30,000 and 50,000 feet (9000 to 15,000 meters) in altitude.
Local enhancement: An increase in strength of vhf signals within a 500-mile radius of the listener.
Polar front: The worldwide boundary between cold polar air and milder air of the temperate region.
Refraction (of radio waves): The slight change in direction of radio waves caused by their passage between contrasting media, such as layers of air with different temperatures and water content.
Subsidence: The sinking of air in the atmosphere.
Superrefraction (of radio waves): The bending of radio waves in the atmosphere at an angle great enough to bring them back to the surface of the earth.
Temperature inversion: An increase in air temperature with increasing altitude.
Troposphere: The atmosphere from ground level to about 33,000 feet (10,000 meters) in altitude.
Warm sector: The area to the south of the warm front in a wave cyclone.
Wave cyclone: A weather feature characterized by an area of counterclockwise winds that forms along a polar front.

minimum value of 16. When dN equals 16, an inversion 750 feet deep superrefracts 1296-MHz signals, but 144-MHz signals are not superrefracted. With the same inversion depth, 144-MHz signals are refracted back to earth only when dN is greater than 19. Since inversions grow in depth and strength, even over a period of a few hours, a tropo opening may be evident on 432 MHz or higher before it appears on 144 MHz. Monitoring uhf TV channels may provide a good early warning of the formation of inversion conditions on the vhf bands. Signals at 50 MHz are rarely affected by superrefraction because the required large value of dN and depth of inversion are rare.

A large superrefracting inversion is sometimes called a *duct* because it acts like a giant, natural waveguide. Only vhf signals above a certain frequency are trapped below the inversion layer, unable to escape into space because they are refracted back toward earth. Signals within the ducting area are sent long distances with little loss of strength. Unlike ionospheric skip, all stations within the ducting area normally hear each other.

Atmospheric Inversions

Three different weather processes create inversions over land. A *radiation inversion,* caused by the rapid cooling of the earth after sunset, is the most common type, but it is rarely useful for DX propagation. *Subsidence inversions,* which occur primarily in large high-pressure systems, provide strong and long-lasting DX openings. Inversions caused by the movement of air masses are created in a number of weather systems, including wave cyclones, warm fronts, cold fronts and certain wind systems. Wave cyclones often bring DX, but fronts generally do not produce true DX conditions.

Radiation Inversion

This is the most common type of temperature inversion. It often forms over dry land during clear, calm summer evenings and is the result of progressive nighttime cooling.[7] As the sun warms the ground after sunrise, the surface air is rewarmed from ground heating. The inversion is destroyed and any fog or dew present is evaporated.[8]

Radiation inversions occur during all seasons, but they are more common in summer. They are generally weak and rarely create widespread DX. This is because moisture content does not drop off fast enough to add much to the change in the refractive index, and the temperature rise by itself is rarely steep enough to cause a high dN. In addition, radiation inversions are usually not continuous over large areas. They are disrupted by local winds, large bodies of water, mountains and by other factors. Even though radiation rarely causes inversions strong enough for DX communications, it is a common cause of enhancement over paths less than 500 miles long during the evening and morning hours of clear, calm days.

High-Pressure Systems

Late summer and early fall high-pressure systems bring a majority of the strong, long-lasting vhf openings, although not all highs are accompanied by DX. An atmospheric high is a large mass of air whose pressure is relatively higher than the air around it. Steady, clockwise winds force air within the system downward and outward; skies are generally clear and winds are light under high-pressure conditions.

The air within a high is stable because it is sinking. This *subsidence* of air is a most important feature of a high because subsidence creates strong inversions.[9] Fig. 1 shows the temperature and moisture profile of a strong subsidence inversion with a base at 4400 feet.

Subsidence inversions become stronger, more stable and lower in the atmosphere at night. During sunlight hours, subsidence is countered by a strong rising of air caused by the heating of the earth's surface. Low, puffy cumulus clouds are often formed by the daytime rising air movement. As the sun goes down, the ground loses heat and the air stops rising. Subsidence takes over, strengthening the inversion and forcing it farther downward. The clouds are often quickly evaporated by the decending dry air in late afternoon. Since clear skies and calm air prevail after sunset under high-pressure conditions, radiation inversions often form. By morning, radiation and subsidence inversions may exist simultaneously.

A typical high-pressure opening occurred on the evening of September 9, 1979. Many vhf operators remember this as the third day of the spectacular four-day opening that coincided with the 1979 ARRL September VHF QSO Party.[10]

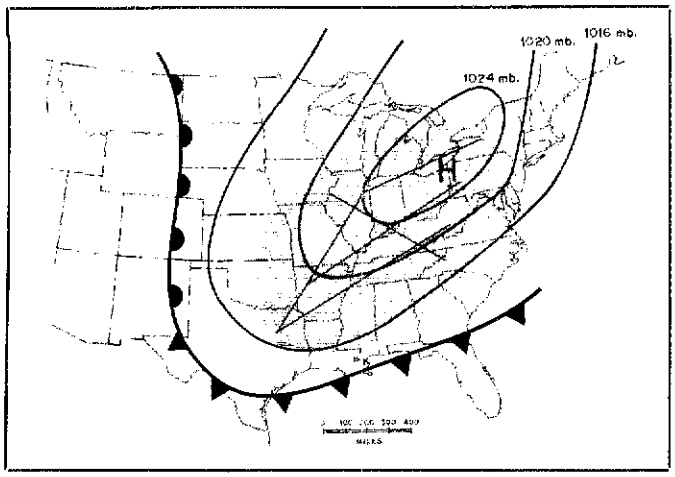

Fig. 2 — Surface map of a stagnating high-pressure system early on the evening of September 9, 1979. The center of the high is over Lake Erie. A few of the known 2-meter contacts are indicated by solid lines. The approximate limits of the area open to DX contacts is shaded. This area expanded to include southern New England by midnight.

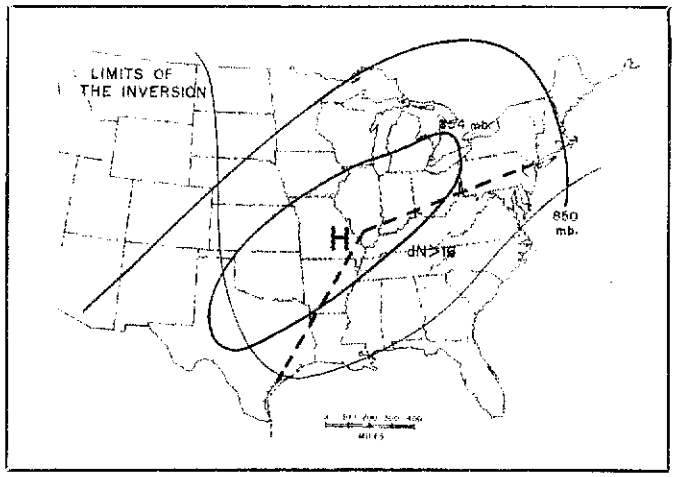

Fig. 3 — Map of the high-pressure system of September 9, 1979, at an altitude of about 4500 feet. The inversion boundary is indicated by a solid line. The useful area of the inversion (where dN is greater than 16) is shaded. Note that the center of the high at this altitude is located over Missouri. The broken line indicates the location of the cross section of upper-air profiles shown in Fig. 4.

Several features of this opening are not obvious from the surface weather map shown in Fig. 2. One might expect, for example, that the longest and strongest radio paths would lie directly across the center of the surface position of the high, where, presumably, subsidence and inversion formation were the greatest. This is almost never the case. The best paths appear consistently to the south or southwest of the center of this high and other highs. It is also unclear why the high has an elongated shape and what clues this might provide to help forecast propagation conditions.

Answers to these questions are found at about 4500 feet above sea level, where the most important inversion lies (see Fig. 3). The superrefracting part of the inversion (where dN is greater than 16) covers the area where 2-meter contacts were made. This area was southwest of the surface position of the high-pressure center. At 5000 feet, the center of the high lies near the midpoint of the inversion layer. The center shifts with altitude because the high leans to the southwest. This leaning is characteristic of "warm-core" high-pressure systems, in which the air is relatively warm. Warm-core highs rise to over 20,000 feet in altitude and lean toward the source of warmest air. Over the U.S., this generally means toward the southwest. The leaning makes the high look elongated on the surface map.

A more detailed analysis of the inversion further reveals that the inversion is bowl-shaped. The center is at about 3000 feet, while the extreme edges rise to nearly 6000 feet (see Fig. 4). The highest values of dN are found toward the center, while the lowest values are at the edges. The depth also decreases at the edges, further making the outer edges of the inversion useless for DX propagation.

Many high-pressure systems originate in the cold, dry air of northern Canada as *cold-core* highs, and slowly evolve into *warm-core* types.[11] Cold-core highs are less likely to bring enhanced propagation conditions.[12]

Winter highs that originate over the Gulf of Mexico and other warm regions sometimes bring very warm air into the Midwest and the East. These warm-air masses may create a strong inversion because cool air is held near the ground by the warm air aloft.[13]

Several high-pressure regions that exist more or less continuously over ocean areas adjacent to the continental U.S. create strong inversions over water. The Pacific high, which sprawls between Hawaii and the West Coast, frequently allows contacts over distances of 2500 miles between the islands and the California coast. The current 432-MHz terrestrial record was made by tropo over this path.[14]

The western side of the Bermuda high, which often lies south of Bermuda off the East Coast of the U.S., has the potential to support long-haul contacts over water as well. This was demonstrated in June 1981, when many Caribbean stations made contacts of up to 1800 miles into Florida and South Carolina.[15] The Caribbean, Bermuda and a large portion of the East Coast of the U.S. may be affected from time to time by a strong inversion associated with the Bermuda high.

Wave Cyclone

The wave cyclone is an entirely different weather system that occasionally brings springtime DX to the central part of the country. Wave cyclones, unlike stagnating warm-core highs, exist for only a few days from birth to collapse.[16] Fig. 5 shows a typical wave cyclone with a well-developed warm sector that covers the entire southeastern part of the country.

The local weather associated with wave cyclones is frequently violent. Severe thunderstorms along the cold front are often accompanied by high winds, hail and tornadoes. Low-level clouds and rain occur along the warm front and around the low. The warm sector often has scattered clouds and showers, especially close to both fronts. Wave cyclones are quite variable, however, and while the cold front almost always brings severe weather, the area within the warm section may remain calm and relatively dry.

On May 7, 1979, a typical springtime wave cyclone brought a strong opening from Iowa, Illinois and Indiana to Louisiana and Texas. Several 1000-mile contacts were made between the three Midwestern states and south Texas. The longest paths aligned generally north-south in the warm sector, but at some distance from the cold front. These are the most typical DX paths in such openings. In some wave cyclones, DX contacts occur along east-west paths in the southern part of the warm sector, such as between east Texas and Georgia. Typically, a wave cyclone is productive only for a single evening and the following morning.[17]

Wave cyclones appear in any season, but they are more common in springtime when the polar front moves northward. Wave cyclones that produce DX propagation appear as early as January along the Gulf Coast, but are most common farther north during May and June. The central part of the U.S., south of the Great Lakes and west of the Appalachians, is most often affected, although the East Coast may experience wave cyclone openings occasionally.[18]

Warm Fronts and Cold Fronts

Warm fronts and cold fronts are common weather features that create inversions. These inversions generally affect vhf propagation only for a short time in limited areas. Fronts rarely bring DX con-

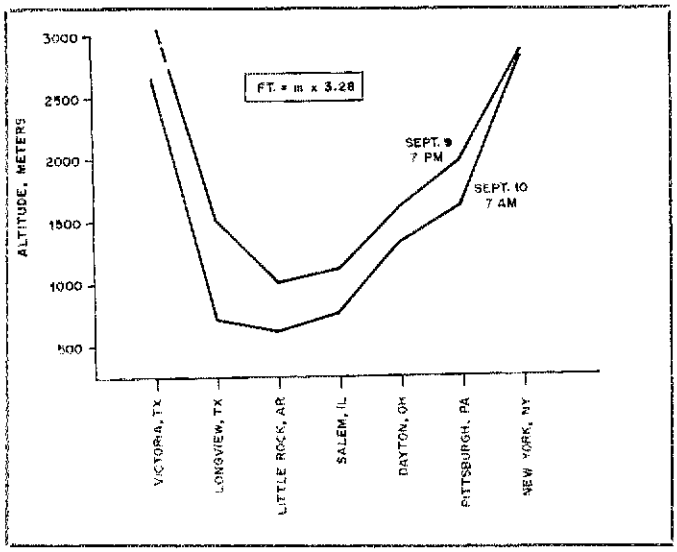

Fig. 4 — Height of the subsidence inversion base of September 9, 1979, at 7 P.M. EST, and at 7 A.M. the next morning. The bowl shape and the lowering of the inversion from early evening to morning are clearly evident.

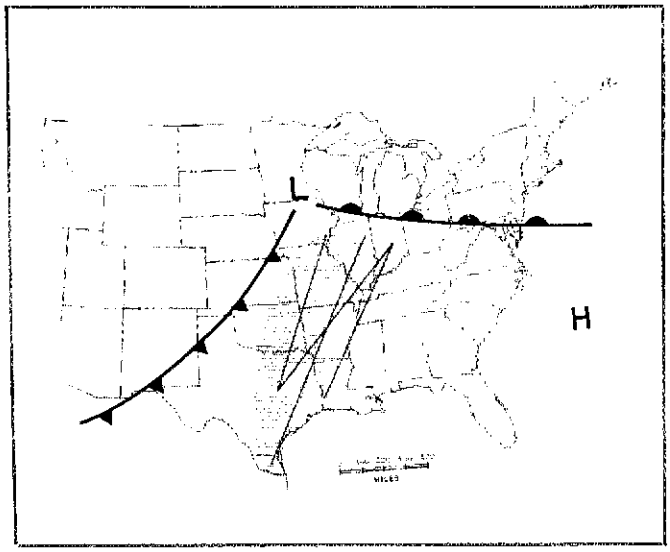

Fig. 5 — Surface map of a wave cyclone on the evening of May 7, 1979. The solid lines are a few known 2-meter paths, and the shaded area shows the limits of the area open to DX.

ditions.[19] Very long or slow-moving warm fronts may provide some exceptional DX conditions, but typically only enhanced local conditions exist for a few hours along and directly ahead of a warm front.

Cold fronts also improve local conditions for a short time, but they, too, rarely produce extended openings.[20] Any enhanced conditions take place immediately after the cold front passes and the atmosphere calms. The winds shift around to the northwest, temperature and humidity drop, and the skies clear. Vhf conditions behind the front may improve dramatically for a few hours. An unusual cold-front opening that produced a few hours of DX contacts between Oklahoma and western New York on the morning of June 29, 1980, is shown in Fig. 7.

Land Breeze

Good vhf conditions reported along the East Coast on clear summer evenings are often caused by land breezes, which develop after sunset. The land cools more quickly than the adjacent ocean. Air cooled over the land flows near the surface, toward the ocean, to replace the air rising over the warmer water. The warm ocean air, in turn, travels inland at altitudes of 600 to 1000 feet, to replace the cool air. The land-breeze circulation of cool air near the surface and warm air aloft may create a low-level inversion up to 50 miles inland and for hundreds of miles along the coast. Land-breeze inversions may last until morning, providing enhanced local conditions and, occasionally, some DX.

Other Weather Conditions

The weather systems described so far do not exhaust all the possibilities for producing useful inversions. Two interesting weather systems with inversion-producing winds have not been reported by vhf amateurs. They are the predictable Chinook winds of the Rocky Mountain foothills and the regular trade winds of the Atlantic Ocean.

Chinook winds occur in late winter and early spring along the eastern slopes of the Rocky Mountains and may produce strong inversions over the Great Plains. The wind originates when a large air mass is forced up the western side of the Rocky Mountains. It is cooled as it rises, and moisture condenses and falls out as rain. When the air mass reaches the crest of the range, it is cold and dry, but as it passes down the eastern slopes it is recompressed and warmed. The air that arrives on the plains below is warmer and drier than when it started. The wind temperature may be as high as 20° C with a relative humidity of less than 10%. This warm, dry Chinook wind overflows a plain that is often cold and still snow-covered, creating conditions ideal for inversion formation: warm, dry air overlaying cool moist air. Vhf contacts may be possible from the prairies of Saskatchewan to as far south as Oklahoma and perhaps east to the Missouri River.

Inversions are also associated with regions of trade winds in the Atlantic Ocean. These warm, dry winds create an inversion at 1500 to 6500 feet above sea level in two broad bands just north and just south of the equator between South America and West Africa. Contacts between Brazil and the coast of southwestern Africa, with Ascension Island at the center of the path, may be possible. In the northern trade-wind belt, useful inversions could potentially stretch from the Caribbean area to the coast of northern Africa. Although vhf activity is not high in these two areas, they may be reliable paths worth investigation.

Conclusion

The vast majority of tropo DX openings over the continental U.S. can be classified as either high-pressure or wave-

Table 2
Symbol Table

	Warm front
	Cold front
	Stationary front
mb.	Isobars (with atmospheric pressure measured in millibars)
H	Center of high pressure
L	Center of low pressure
	Two-meter radio path
	Limit of temperature inversion
dN>16	Temperature inversion where the change in the index of refraction exceeds 16 "N" units per 100 meters change in altitude (shaded portion)

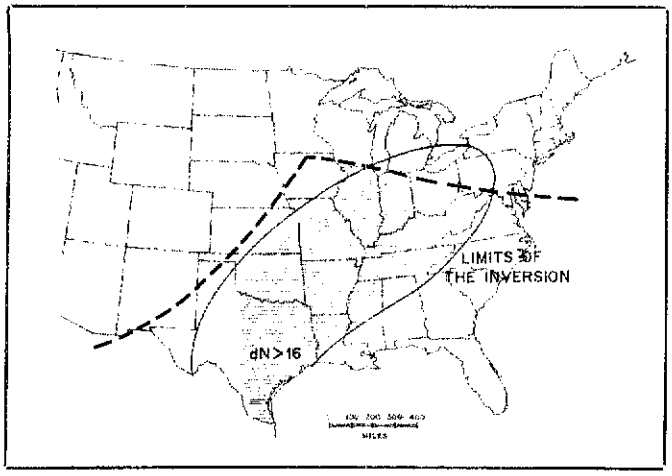

Fig. 6 — The wave cyclone of May 7, 1979, at an altitude of about 3000 feet. A broken line indicates the surface location of the fronts. Inversion limits are indicated by the solid line, and the area of the inversion where dN is greater than 16 is shaded.

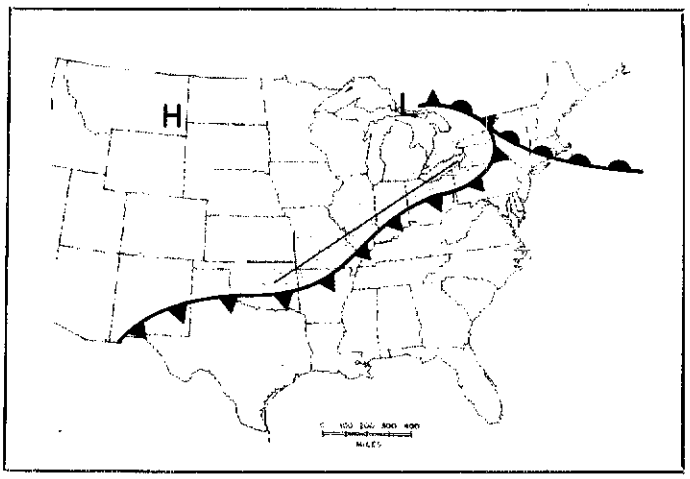

Fig. 7 — Surface map of a cold front of June 29, 1980, that brought a few hours of DX. Known 2-meter paths are indicated by the solid line. The shaded portion shows the presumed limits of DX propagation. Note that the cold front is part of a shallow wave cyclone.

cyclone types. The examples of these two types discussed here are among the best and clearest cases, but they are not unusual. The features of similar weather systems that bring DX openings may be distorted or partially formed. The physical principles are the same, however. Frontal regions and local winds can provide enhanced local conditions, but they are infrequent producers of DX propagation. No doubt there are still other weather configurations that may give rise to inversion formation.

The practical vhfer may wish to make personal forecasts of inversions using TV or newspaper weather maps. "A.M. Weather," which is on public television for 15 minutes each weekday morning, provides us with much useful information. Professional weather forecasts, such as those used by pilots, could be even more helpful, if they are available. Monitoring uhf TV channels is a good way to check on actual conditions. Still, there is nothing to replace getting on the air and making a few calls in likely directions. You never know who may be trying the same thing 500 or 1000 miles away.

Acknowledgments

I am grateful to everyone who provided copies of their logs and informal reports of band conditions over the past few years. These reports of actual radio conditions were an invaluable part of my propagation studies. Analysis of the high-pressure system was aided by an extensive description of the September 7-10, 1979 opening compiled by Curt Roseman, K9AKS, Michael Owen, W9IP and myself. I also appreciated the opportunity to present an early version of this material at the July 1981 meeting of the Central States VHF Society. Curt Roseman and Ann Higginbotham read rough drafts of this article, and their comments were most helpful. Special thanks to Curt Roseman for all his encouragement, and for his valuable comments and suggestions.

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Notes

[1] R. Hull, "Air-mass Conditions and the Bending of Ultra-High Frequency Waves," *QST*, June 1935, pp. 13-18; W. F. Hoisington, "Painless Prediction of Two-Meter Openings," *QST*, Oct. 1949, pp. 22-26; J. Collie, "Upper-Air Conditions for Two-Meter DX," *QST*, Sept. 1955, pp. 16-18. Also, see the *QST* column The World Above 50 MHz.

[2] The World Above 50 MHz, *QST*, July 1982, p. 68.

[3] km = statute mi × 1.609, nautical mi × 1.852; m = ft × 0.3048.

[4] Only paths longer than 500 miles are considered true DX here, since that is the farthest distance the best-equipped vhf stations can cover under ordinary circumstances.

[5] A detailed discussion of the radio refractive index may be found in D. Evans and G. Jessop, *VHF/UHF Manual* (London: Radio Society of Great Britain, 1980), pp. 2.2-2.8. More technical aspects are in B. Bean and E. Dutton, *Radio Meteorology* (New York: Dover, 1968).

[6] The role of inversion depth is presented in B. Bean and E. Dutton, *Radio Meteorology* (New York: Dover, 1968).

[7] As the sun goes down, the land cools by radiating heat. In turn, the air directly above the surface is cooled. Higher in the atmosphere, the air remains relatively warm, creating an inversion. The cooling process continues throughout the evening and predawn hours. As time passes, the inversion deepens, reaching heights of 500 meters in extreme cases. Sometimes the air will cool enough for fog or dew to form, especially in low-lying areas.

[8] Several conditions retard the information of radiation inversions. Wet ground does not radiate heat readily, and high humidity hinders radiation. Cloud cover also prevents heat from escaping, thus insulating the lower levels of the atmosphere and preventing inversion formation. Even under clear skies, wind destroys inversions by mixing the cool and warm layers of air.

[9] As the air is forced downward, it is compressed, heated and dried. The creation of layers of warm, dry air at various altitudes results in inversions. Three or more inversions may form within a well-developed high, but only the lowest inversion is important to vhf propagation. This inversion is most useful when it lies between 500 and 2000 meters because, at this altitude, its depth and dN are generally greatest.

[10] Contesters had made as many as 20 QSOs over 1000-mile paths on 144 MHz between north Texas, Oklahoma and Arkansas to New England and the mid-Atlantic states by the end of that evening. Contacts in the 500- to 1000-mile range were common; many were made by stations using only a few watts. WB4LHD/5 in northwestern Arkansas completed over half a dozen 1000-mile QSOs, the farthest being with N6NB/1 in Vermont — over 1200 miles. The most distant contact that evening was probably 1275 miles, made by WD5CRK in eastern Oklahoma and N6NB/1. Although contacts on 220 MHz and 432 MHz were less numerous, similar paths were covered on these frequencies.

[11] Canadian cold-core highs generally move southeastward, and are heated from below during the day as they travel over the warmer surface. They grow larger and more sluggish, and their speed of travel may decrease to less than 500 miles a day.

Other factors affect the progress of large highs. During the late summer and early fall, the high-altitude wind of the jet stream may not provide its usual strong eastward push because it loops to the north of the high. Then, the high-pressure system slows still further.

Late-summer and early-fall highs frequently bog down over the eastern U.S. because they are blocked by the even larger semipermanent Bermuda high that lies off the Atlantic coast during this season. They may remain nearly stationary for several days or more. The air-mass temperature rises when it stagnates, and subsidence strengthens, resulting in a very strong inversion. The strongest and most stable inversions are produced in these stagnating high-pressure systems. Spectacular DX conditions may last several consecutive evenings as a result.

Although the most productive stagnating warm-core highs occur in late summer, high-pressure systems occur during all seasons. Most of these do not create DX openings.

[12] Unlike warm-core highs, cold-core highs are shallow weather features that do not rise above 3000 meters into the atmosphere. Subsidence is not as pronounced in them, and inversions that do form are weak. Cold-core highs that move too quickly out of Canada are not transformed into large warm-core types. When the surface over which they are moving is cool, as in winter or spring, transformation is even more difficult. Even in summer, highs that move more than 300 or 400 miles a day do not reach DX-producing capabilities before they slide off the continent. In general, fast-moving highs, especially in the cool months, will not produce good DX openings.

[13] Subsidence is not the primary cause of such warm-air-mass inversions, but it helps stabilize the atmosphere. If the surface is snow-covered or wet from recent rains, the additional moisture adds to the change in the refractive index. A superrefracting inversion often results. Such conditions are usually accompanied by dense day-long fog and low clouds. Winter warm-air-mass openings may be quite strong in local areas, and last all day.

[14] The World Above 50 MHz, *QST*, Aug. 1981, p. 72.

[15] The World Above 50 MHz, *QST*, July 1982, p. 68.

[16] Wave cyclones appear along the global boundary between polar and temperate air regions called the *polar front*. This extremely long polar front is unstable, and "waves" appear as low-pressure centers where the jet stream crosses it from the

southwest. The counterclockwise winds created by the low pressure pull cool air around from the northwest, creating a cold front southwest of the low center. Breezes associated with a region of high pressure off to the southeast bring mild Gulf air northward, creating a warm front to the east of the low. The area south of the warm front is known as the warm sector.

As the wave cyclone develops, the cold front is pushed eastward and catches up to the slower moving warm front. In the last stage of the wave, the two fronts meet, the warm sector is closed off and the wave ceases to exist. While the wave cyclone is going through this cycle, it also moves northeasterly. A wave that begins in southern Colorado may collapse over New York state. The whole process takes about three days. Wave cyclones form "family groups," and one wave may form after another along the polar front. The polar front, with its family of wave cyclones, may stretch across North America, the Atlantic and Europe.

"In contast to the subsidence inversion of the high-pressure system, wave cyclone inversions are created primarily by strong winds. Mild, moist air flows steadily north near the surface within the warm sector. Above the surface flow, at 4500 feet and higher, very-fast-moving, warm, dry air associated with the jet stream crosses the warm sector from the southwest. The intersection of these two winds, mild and moist below, very warm and dry above, creates a strong and relatively flat inversion at altitudes of about 3000 feet (see Fig. 6). Conditions generally improve after sunset when ground heating and winds decrease. Weak subsidence may also be present if the warm sector stabilizes the inversion layer.

"Not all wave cyclones create inversions useful for vhf propagation. The reasons are not clear in every case, but several features seem to be important. Productive wave cyclones are usually well developed with large and distinct warm sectors. They appear to have fewer clouds and less rain in the warm sector, although clouds and even rain do not prevent good vhf conditions from existing. Midwestern stations in the northern part of the warm sector have worked Texas stations while it was raining and while thunderstorms were within a distance of 50 miles.

Wave cyclones must be carefully distinguished from other kinds of cyclonic weather. Wave cyclones form only along the very long polar front; the fronts associated with them are continental in scale, stretching 1000 miles or more. Other low-pressure regions may have fronts associated with them, but these fronts are invariably short. Since wave cyclones are a part of a global weather feature, they are sometimes difficult to recognize on a map as small as that of the U.S. alone. Even so, their formation and development can often be followed in daily weather reports.

"A warm front is the advancing edge of a warm-air mass that is moving toward more stationary cooler air. The less dense warm air overrides the cooler air and forms an inversion *ahead* of the surface boundary between the air masses. The long wedge of overriding warm air may extend for 250 miles ahead of the front.

Warm-front inversions are weak. The difference in temperature and moisture between the warm air aloft and the cool air below is usually not enough to create superrefracting conditions. Low-level clouds accompanying the front often produce rain that disrupts and obscures the inversion *boundary*. Warm fronts are also generally too short to create inversion conditions over long paths.

"A cold front is the advancing edge of a cold-air mass that is moving toward more stationary warmer air. Since the approaching cool air is denser than the warm air it confronts, it wedges under the warm air, forcing it aloft in a steep grade. An inversion may appear in a narrow band no more than 75 miles wide *behind* the front.

The sharp differences in temperature and moisture between the two air masses in a typical cold front suggest that the inversions might be strong, but usually this is not the case. The frontal boundary is quite unstable. Cold fronts give rise to towering thunderstorms and high winds. These small but violent storms mix the air along the front and destroy the stable conditions needed for an inversion. QST

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 April/May issue were:

- "Diode Voltmeters," by Albert E. Weller, Jr., WD8KBW
- "Right on Channel — A Frequency Standard for HF RTTY," by Paul Newland, AD7I
- "Novation D-CAT Modem for Amateur Radio," by Robert Gervenack, W7FEN and Russell Faudree, KA7HVA
- "VHF+ Technology," by Geoff Krauss, WA2GFP
- "Data Communications," by David Borden, K8MMO

Issue 15 of *QEX* is for both April and May. That is to allow the editor, Paul Rinaldo, W4RI, to move from McLean, Virginia to Newington, Connecticut, in early May to take up his new position as manager of the ARRL Hq. Technical Department. Beginning with the June issue, *QEX* will be prepared in Newington.

Please send all subscription requests, manuscripts and correspondence for *QEX* to ARRL Hq. The domestic subscription rate for ARRL members is $6 for 12 issues; $12 for nonmembers. There are additional postage charges for mailing outside the U.S.; write to Hq. for details.

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

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

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

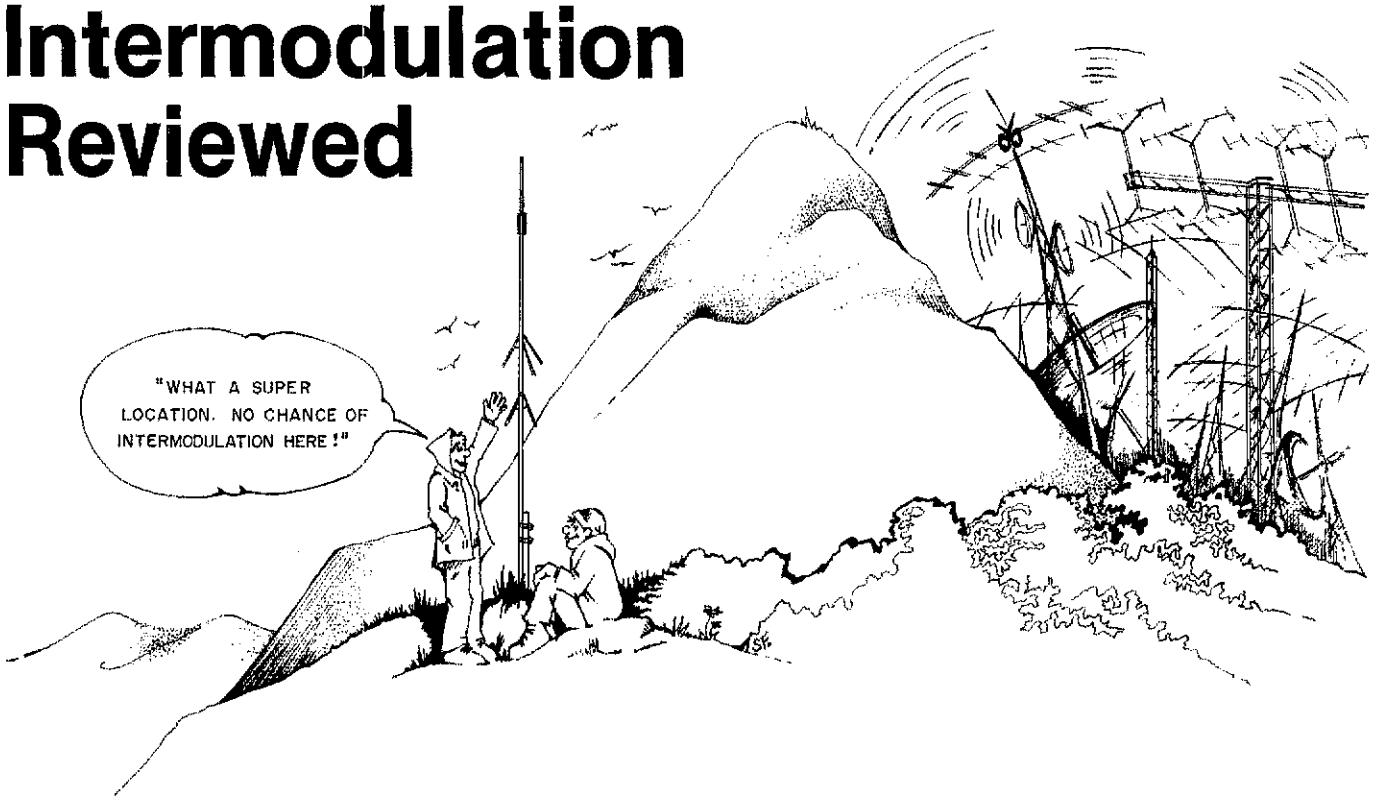
4) When writing, please come right to the point, and be sure to share with us whatever experience you have had with the problem in question. This will avoid our reply covering ground you've already been over.

5) Address all technical questions to Technical Information Service, American Radio Relay League, 225 Main St., Newington, CT 06111. — *Bob Schetgen, KU7G, Technical Information Specialist*

Next Month in QST

If you've ever thought about delving into slow-scan TV, you'll want to read an overview of the subject in June *QST*. Other features in that issue include a report on the April Board of Directors meeting, a discussion of how amateurs can get involved with SETI (the search for extraterrestrial intelligence), and the results of the 1982 Simulated Emergency Test. Whatever your interests, you have something to look forward to in June *QST*.

Intermodulation Reviewed



Hearing unwanted signals on your favorite repeater? Intermodulation may be the culprit!

By David W. Potter,* W2GZD

Intermodulation (IM) is defined as the undesired mixing of two or more frequencies in a nonlinear device, which produces additional sum-and-difference frequencies. Problems with IM seem prevalent in the vhf and uhf bands, because amateur repeaters tend to cluster around hills and mountain-tops — in close proximity to commercial and government vhf and uhf radio services. The intermodulation problem has been understood for years, but a review of the subject can be helpful.

Types of Intermodulation

The simplest kind of intermodulation is the mixing of two frequencies. The equation for *second-order* IM is

$$f_{IM} = f_1 \pm f_2 \qquad \text{(Eq. 1)}$$

where f_{IM} is the frequency of the IM product, and f_x are the mixing frequencies.

Intermodulation products are the sum and difference of the two mixing frequencies. These are similar to the familiar products deliberately generated by the mixing process used in superheterodyne receivers. Note that if f_1 and f_2 are frequencies within an amateur band f_{IM} must be an out-of-band signal.

Third-order IM products can produce both in-band and out-of-band signals when f_1, f_2 and f_3 are all in-band frequencies as given by the equation

$$f_{IM} = f_1 \pm f_2 \pm f_3 \qquad \text{(Eq. 2)}$$

In-band signals are generated by the sum of any two frequencies minus the frequency of the third signal. The out-of-band signal is the sum of all three frequencies. A special case of Eq. 2 is

$$f_{IM} = f_1 + f_1 - f_2 = 2f_1 - f_2 \qquad \text{(Eq. 2A)}$$

Here, the second harmonic of an in-band signal can beat with a fundamental frequency to produce another in-band signal.

Fifth-order IM products are given by

$$f_{IM} = f_1 \pm f_2 \pm f_3 \pm f_4 \pm f_5 \qquad \text{(Eq. 3)}$$

with special cases:

$$f_{IM} = 3f_1 \pm 2f_2 \qquad \text{(Eq. 3A)}$$
$$f_{IM} = 3f_1 \pm f_2 \pm f_3 \qquad \text{(Eq. 3B)}$$
$$f_{IM} = 2f_1 \pm f_2 \pm f_3 \pm f_4 \qquad \text{(Eq. 3C)}$$
$$f_{IM} = 2f_1 \pm 2f_2 \pm f_3 \qquad \text{(Eq. 3D)}$$

Some fifth-order products are in-band and others are out-of-band. Notice that second- and third-harmonic signals may be involved. Odd orders of in-band mixing frequencies produce some in-band products, but when out-of-band mixing frequencies are involved, even-order products may fall in band!

The above equations are valid for steady carriers, and it is easier to understand the concept of intermodulation by using them. Most of the signals we deal with are not steady carriers, however, but modulated ones.

The bandwidth of an IM product may be wider than the bandwidths of the individual signals. This is because the instantaneous frequency of the product is the algebraic sum of the instantaneous frequencies of the mixing signals. For fm, it would be equivalent to adding three voice signals together in a wide-band fm transmitter. Assume that the audio amplitude is limited on *each* signal to produce a deviation no greater than 5 kHz. When the three signals are added together, they could produce an IM product having much greater deviation than any of the individual signals.

Intermodulation may involve any number of frequencies, but let's concen-

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trate on the more common third-order types. I will show some examples to make these abstract concepts more meaningful.

Field Examples of Intermodulation

Consider two repeaters that are physically located close to each other. One repeater transmits on 146.70 MHz, with a 146.10-MHz input, and the second has a 145.31-MHz output and a 144.71-MHz input. Assume that the .31 repeater output causes the .70 repeater first receiver stage to be driven into nonlinear operation (overload). This means that mixing of all frequencies seen by the first stage will occur.

Case 1: The .70 repeater is off, but the .31 machine is operating and a local 145.50-MHz simplex signal is present. The .31 repeater input and output signals and the simplex signal mix to produce an IM product on 146.10 MHz: 145.31 − 144.71 + 145.50 = 146.10 MHz. This signal can key up the .70 machine, which will then repeat both the .31 machine *and* the simplex conversation. We will disregard the other IM products that are generated.

Case 2: The simplex station is off the air. The .31 machine is repeating, and the input to the .70 repeater drops, but the output is still up. An IM signal is produced: 146.70 − 145.31 + 144.71 = 146.10 MHz. The .70 machine will now repeat the signal from the .31 repeater until someone overrides the IM signal — provided that the .70 repeater doesn't time out beforehand. If the system gain is adequate, the repeater could feed back on itself with a resulting characteristic audio howl.

Case 3: The .31 repeater shuts down. The input to the .70 machine drops, but the output is up and *stays* up. You may hear another signal on the output, or the repeater may break into oscillation. Why? You find a strong signal at 147.30 MHz that is overloading the repeater receiver, causing it to be nonlinear. The strong signal mixes with the second harmonic of the repeater: 2(146.70) − 147.30 = 293.40 − 147.30 = 146.10 MHz. This signal falls on the .70 repeater input.

These cases use the popular 2-meter band for illustration. Keep in mind that intermodulation can occur on *any* band, and can entail an endless combination of frequencies.

Receiver as the Culprit

Usually, the first stage of a receiver is the one most likely to overload, causing susceptibility to intermodulation. In some cases, however, later stages may be at fault. Receiver front-end nonlinearity occurs at relatively low input voltage levels, so the signal power involved is small. Therefore, the IM products generated there are also low in amplitude. These signals are fed to the receiving antenna and are radiated. If you track down these weak IM signals, they will lead you back to the receiver site!

There is a big temptation to use a preamplifier to increase the sensitivity of a receiver or the range of a repeater. The use of these devices in repeater service is strongly discouraged. Preamplifiers may not have the dynamic range that early stages of communications receivers have, and they usually lack the front-end selectivity found on well-designed receivers. Therefore, they are red-hot candidates for intermodulation. Preamplifiers may generate signals on the input frequency of the repeater, and users have to override these signals in order to be heard. The use of a preamplifier can sometimes *degrade* system performance!

Reducing Receiver IM Susceptibility

It is important to realize that it takes only *one* signal, located anywhere in the spectrum, to drive a circuit into nonlinearity, which could produce IM products when one or more other signals are present. In order to minimize intermodulation, your receiver circuitry should provide great attenuation to all frequencies except the band of interest. The receiver dynamic range should also be as large as possible. For this idealized case, only a huge signal in the passband could possibly cause overload and nonlinear operation. Any resulting IM signals falling outside of the receiver passband would be severely attenuated.

Transmitter as the Culprit

Serious intermodulation problems can be generated by transmitters when other strong signals present on the antenna (and coupled to the final amplifier) mix with the fundamental and its harmonics. Here the voltage and power levels are much greater than those associated with receiver circuits, so relatively strong IM signals may be coupled to the transmitting antenna and be radiated. The transmitter final amplifier is essentially an rf switch, and unless it is operating Class A (which is uncommon) it will be a nonlinear stage. Class C operation is more likely to cause intermodulation than Class AB1 — because it is more nonlinear. Wide-band, solid-state amplifiers with low-Q circuits tend to be more susceptible to intermodulation than are narrow-band, high-Q configurations.

Reducing Transmitter IM Susceptibility

Fm transmitter final amplifiers are quite nonlinear, and intermodulation can occur if other signals mix in this stage. The Q of most final stages is not high, even for tuned final amplifiers, so the resulting bandwidth is wide. Increasing circuit Q helps the IM problem, but it may be undesirable for other reasons. Eliminating intermodulation in transmitters is, therefore, more difficult than in receivers. The use of a *circulator* is effective because it presents a very low impedance to signals going from the transmitter to the antenna, but high attenuation to signals going from the antenna to the transmitter. Since the circulator must carry full transmitter power, it is an expensive cure for intermodulation. When duplexers are used at repeater sites, a degree of attenuation is introduced for out-of-band signals, but this alone may not be sufficient if other transmitters are nearby.

Conclusions

In-band intermodulation products will degrade or destroy your station performance, in addition to interfering with other amateur communications. Out-of-band IM products may play havoc with non-Amateur Radio services. Furthermore, transmitting spurious signals, such as IM products, is illegal. Conscientious operators are knowledgeable about intermodulation and ensure that their stations are free from it. QST

David W. Potter, W2GZD, is a spokesman for the Long Island GAME Association (Group Against Malicious Emissions). If it sounds like a hunting club, you're right! The group is engaged in tracking down interference for local repeater clubs. David's inspiration to write this article came about as a result of his involvement with the group. Persons interested in working with the GAME Association are invited to contact him.

Strays

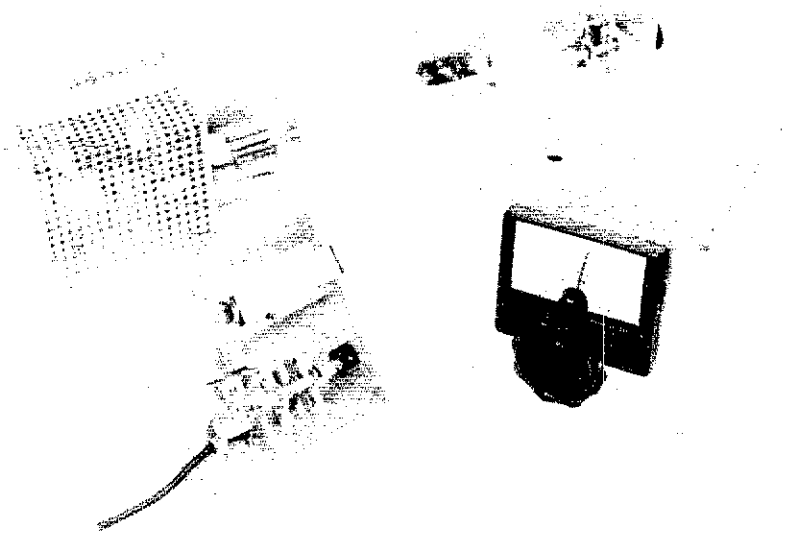
At the 1982 New England Division Convention, ARRL General Manager K1ZZ (left) had the pleasure of presenting awards to the top-scoring W/VE entrants on both modes in the 1982 ARRL DX Contest: K1ZM, operating W1ZM on phone, and K1GQ, operating his own station on cw. Both are members of the Yankee Clipper Contest Club. *(W1VRK photo)*

KERCHUNK!

☐ Advice from a New York photographer to ladies on how to compose their mouth to gain "some advantage to their appearance" when sitting for a picture: ". . . If she wishes to look mournful, she must say 'Kerchunk'. . ." — *Quincy* (Massachusetts) *Patriot*, Dec. 3, 1887 as reprinted in *The New Yorker; tnx W9IWI*

A Minimum 2-Meter Satellite Transmitter

Is OSCAR operation beyond the reach of the budget-minded amateur? Not necessarily! W6IOJ shows you how to do it with a "junkbox special" transmitter.



By John Reed,* W6IOJ

This article describes a simple transmitter for the 2-meter satellite band. It features variable-frequency crystal control (VXO) and up to 40 W of power output. Methods for measuring power, using simple homemade equipment, are also included. The circuit is relatively simple and can be easily duplicated. Components for the projects were chosen on the basis of their availability.

Circuit Details

VXO and Multiplier Chain

A VXO offers crystal stability, high output frequency and circuit simplicity — an ideal signal source for a vhf transmitter. The restricted frequency coverage is not a hindrance in this case, as the 2-meter satellite passband is only 150 kHz wide. My prototype circuit provides a tuning range of up to 300 kHz while retaining excellent stability. Four crystals were tested in the VXO circuit — three overtone units calibrated in the 48-MHz region and one fundamental-type 16-MHz crystal.[1] The internal capacitance of the overtone crystals is somewhat lower than that of the fundamental unit — a characteristic that could influence the tuning range. However, detailed comparative tests indicated no significant differences between the two types. One disadvantage of the overtone crystals is that with 25-pF loading the oscillator frequency will be lower than the marked frequency. The 16-MHz crystal did not exhibit this trait. Regardless of the crystal type, the VXO should operate near the center frequency of 16.230 MHz.

Several versions of the VXO tank circuit were tested to see which gave the maximum tuning range and the best stability. The values shown on the schematic diagram represent the best compromise. Long-term stability will be improved by using silver-mica capacitors rather than disc ceramics in the gate-source capacitive divider. However, Doppler shift during satellite operation far exceeds any instability condition exhibited by the oscillator.

The schematic diagram of the VXO/multiplier circuit is shown in Fig. 1. The VXO uses a 3N211 dual-gate MOSFET in a Colpitts circuit, with the drain tuned to the third harmonic of the crystal. A bipolar-transistor stage triples this 48.6-MHz signal and provides approximately 10 mW of 146-MHz energy to the driver stage. Components are mounted on a 5- × 6-inch double-sided pc board, with the component side unetched and used as a ground plane.[2] The FET drain circuit and the multiplier input circuit are mounted on the foil side of the board to provide maximum isolation.

The crystal frequency is "pulled" by the series circuit, consisting of L1 and C1, with an additional capacitor (C2) used to bring the tuning range into the satellite band. Under certain conditions the crystal would not oscillate at "power up." The combination of D2, D3 and C3 corrects this problem by shorting the reactance network to ground for a few milliseconds. This starts the oscillator as if it were a conventional Colpitts crystal type. Once the circuit is oscillating, the load capacitor charges and offers a high impedance to the reactance network. The completed VXO assembly is shown in Fig. 2.

Driver/Final Amplifier

The schematic diagram of the driver and final amplifier is shown in Fig. 3. The circuit mounts on a 4- × 4-1/2 inch, double-sided pc board, with the component side used as a ground plane. The collector circuit of the predriver stage is mounted on the foil side for isolation. VXO output is coupled directly to the base of the predriver through 20 feet of RG-58/U coaxial cable. A high-Q tuned circuit (which discriminates against spurious signals) follows the predriver stage.

A series-tuned circuit is used to couple

[1]Notes appear on page 22.

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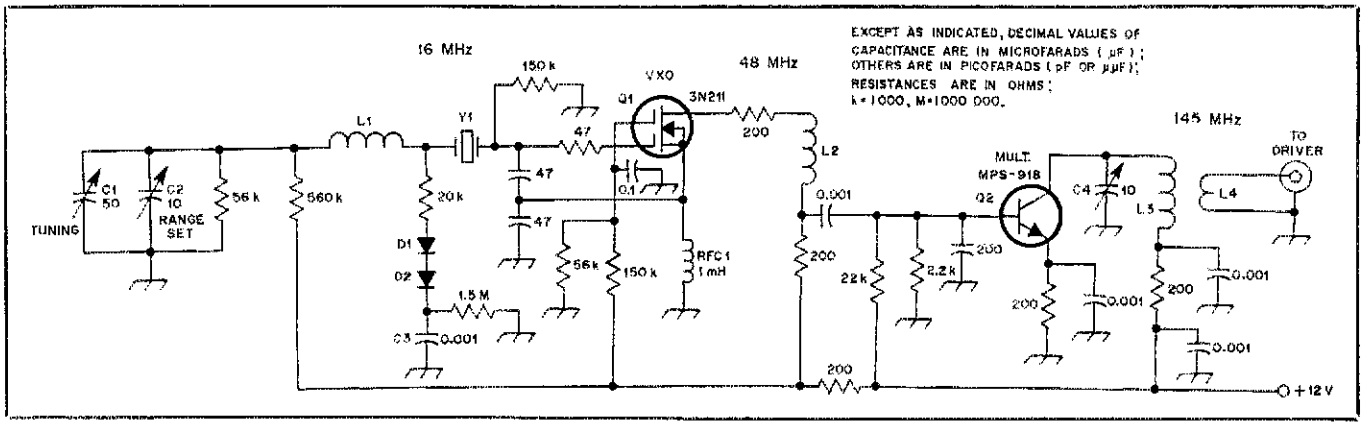

Fig. 1 — Schematic diagram of the VXO/multiplier circuit. Numbered components are identified below. Fixed-value resistors are carbon composition, 1/4 W unless otherwise specified. Capacitors are disc ceramic, except those with polarity marked, which are electrolytic. Part numbers in parentheses are from Radio Shack.

C1 — 7-50 pF variable, Hammarlund MC50-M or equiv.
C2, C4 — 1.5-10 pF piston trimmer.
D1, D2 — 1N914 silicon switching diode (276-1124).
L1 — 35 turns of no. 32 enameled wire on a 3/8-inch-dia. slug-tuned form.
L2 — 7 turns of no. 32 enameled wire on a 3/4-inch-dia. slug-tuned form.
L3 — 9 turns of no. 14 solid wire wound over a 1/4-inch-dia. rod.
L4 — 2 turns of no. 24 plastic-insulated wire wound over the end of L3.
Q1 — 3N211 dual-gate MOSFET (276-2045).
Q2 — MPS-918 silicon npn transistor (276-2011).
Y1 — 16.230-MHz quartz crystal. See note 1.

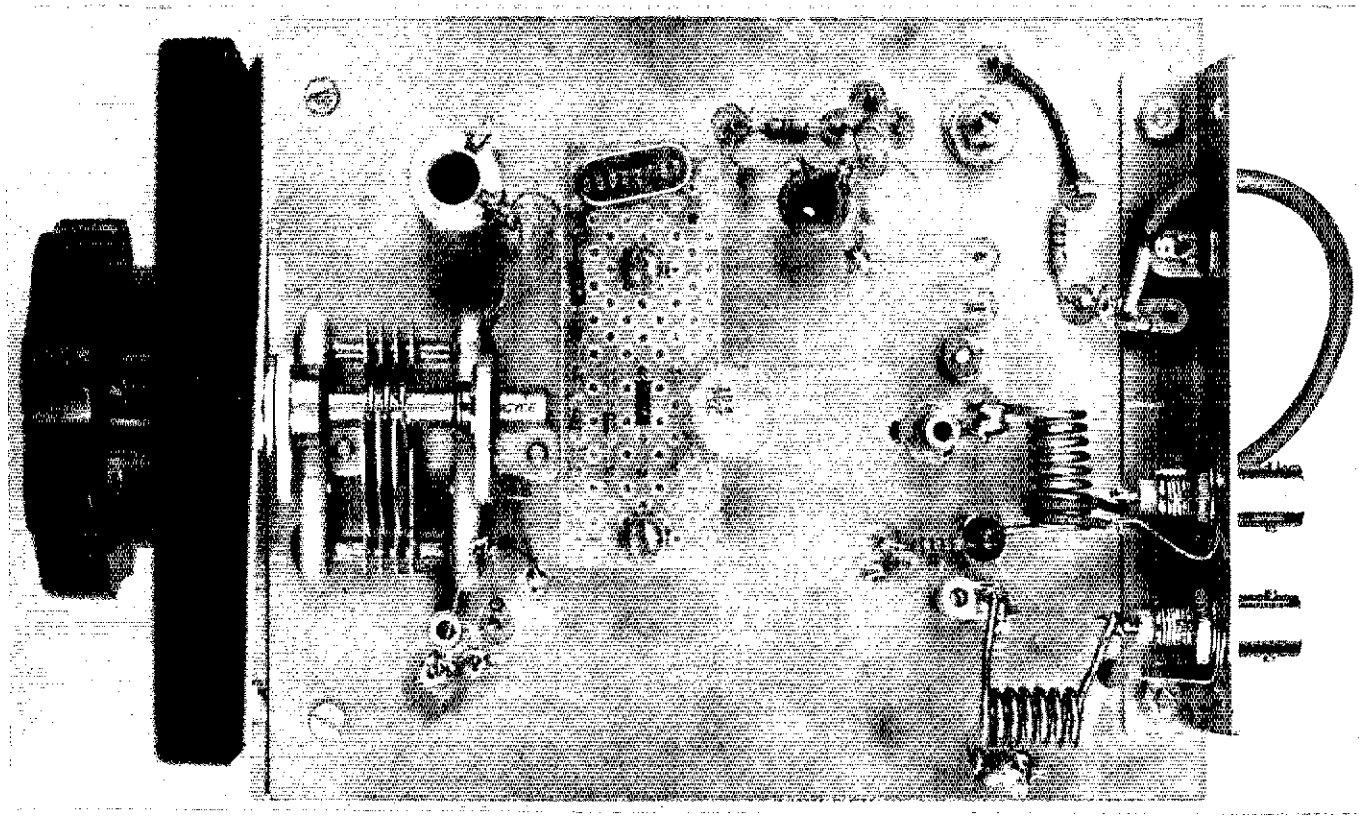

Fig. 2 — Interior view of the completed VXO assembly. Several of the components are mounted on the opposite side of the board.

energy from the driver stage to the 6146 final amplifier. This arrangement provides the best compromise between drive capability and stability. The driver transistor, Q4, must be properly heat-sinked, as it operates at 4-W input. In some of the Radio Shack 276-2038 devices, the case is tied to the collector. In later units, however, the case is insulated and can be clamped to the chassis. In the prototype transmitter, more than adequate heat transfer was achieved with a 1-1/2 × 1-1/2 × 1/16-inch aluminum plate fastened to the printed-circuit board.

Both the chassis and the shields are made of aluminum purchased from a hardware store. Perforated aluminum is used for the shields to permit air circulation around the 6146 envelope. The driver and final amplifier are mounted on a 20 × 5 × 1-3/4 inch "U" chassis. Support for the 6146 is provided by a vertical bracket mounted 5-1/4 inches from one end of the chassis. Next to the vertical bracket is a 4- × 3-1/2 inch cutout for mounting the driver circuit board. Two shields are used in the assembly: One houses the grid circuit/driver; the other covers the plate circuit. Fig. 4 shows the physical layout.

The 1/2-λ plate line is tuned by a 50-pF variable capacitor, which also serves as a mechanical support for one end of the line. Final-amplifier B+ is fed at the rf voltage null on the strip line, approximately 6-3/4 inches from the plate connection. Output power is link-coupled by means of a loop near the rf current node, with coupling varied by a mechanical ar-

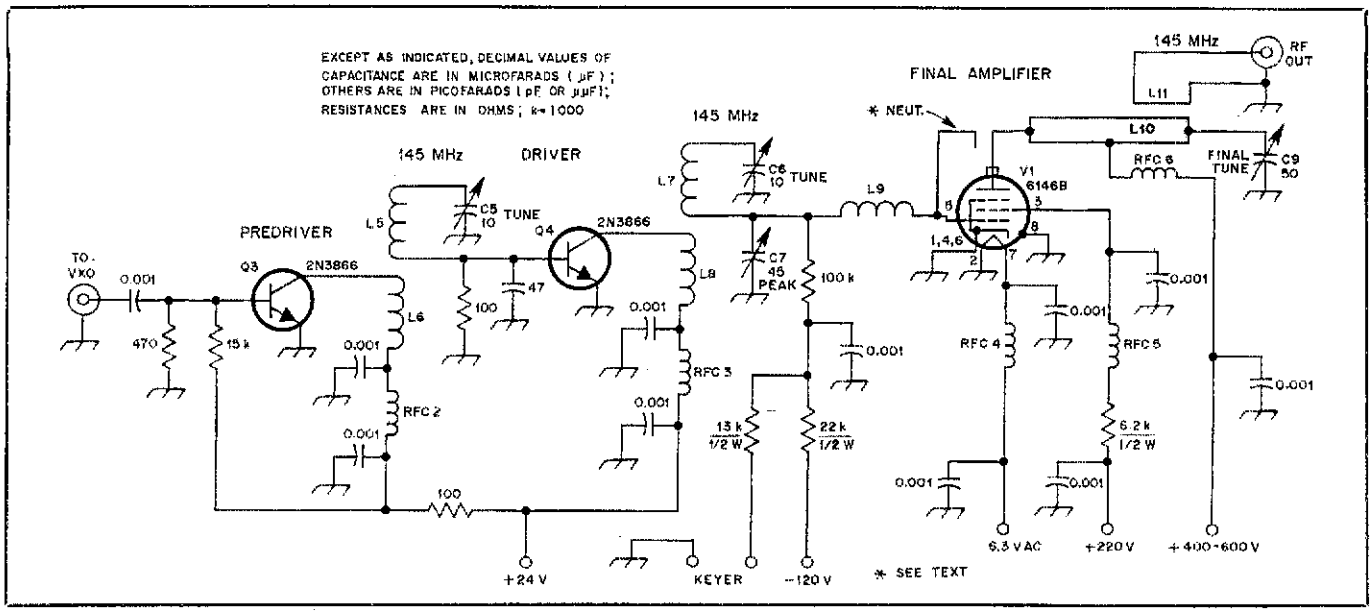

Fig. 3 — Schematic diagram of the driver and final amplifier. Numbered components are identified below. Fixed-value resistors are carbon composition, 1/4 W unless otherwise specified. Capacitors are disc ceramic unless otherwise specified. Part numbers in parentheses are from Radio Shack.

C5, 6 — 1-10 pF piston trimmer.
L5 — 9 turns of no. 14 solid wire wound on a 1/4-inch-dia. rod.
L6 — 2 turns of no. 24 plastic-insulated wire wound over L5.
L7 — 7 turns of no. 14 solid wire wound on a 1/4-inch-dia. rod.
L9 — 3 turns of no. 24 plastic-insulated wire wound over L8.
L10 — Double-sided printed-circuit board, 10 inches × 7/16 inch, spaced 3/4 inch above chassis.
L11 — 2-3/4 inch × 7/16-inch loop made of 5/16-inch copper strip. Mount 5 inches from plate connection on L10 (see Fig. 4).
Q3, 4 — 2N3866 silicon npn rf-power transistor (276-2038).
RFC 2, 3, 4, 5, 6 — 10 turns of no. 32 enamel-coated wire over a 47-kΩ, 1-W resistor.

rangement that permits rotation of the loop approximately 90°. The dimensions provide a 50-ohm output impedance with the loop near the strip-line axis.

One might ask, "Why use a long, 1/2-λ strip line, considering the loaded Q is probably not much greater than a conventional L-C circuit?" The strip-line method was chosen because of the simplicity and predictable performance. A 2-meter L-C tank, loaded by a 6146, turns out to be a hair pin — the parallel tuning and bypass capacitance values become critical. In a strip-line circuit, the tuning capacitor selection is less restrictive: There are no critical bypass capacitors, and there are fewer restrictions on the output coupling arrangement.

Although the 6146B is a rugged and forgiving device (particularly when compared to some solid-state amplifiers), lack of plate voltage will cause an abnormal increase in screen current — exceeding the rated screen dissipation. In this design, a dropping resistor provides screen voltage from the plate supply, which causes an opposite effect: Losing drive causes an abnormal increase in plate current.

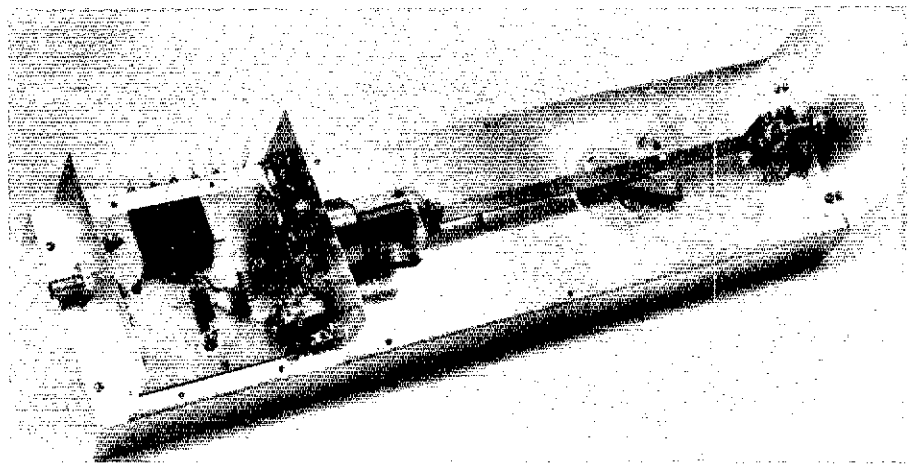

Fig. 4 — View of the driver and power amplifier stages of the transmitter. Power is fed to the unit through the 0.001-μF feedthrough capacitors, which can be seen in the upper left-hand corner of the picture.

Tune-up and Operation

VXO

After checking the circuit wiring, apply power to the VXO and short the junction of Y1 and L1 to ground. This allows the oscillator to be calibrated at the natural crystal frequency. Trim the drain circuit for proper operation at 48.690 MHz — the third harmonic of the crystal. With C1, C2 and L2 adjusted for their minimum respective capacitance and inductance, the VXO fundamental frequency should not change more than 2 kHz when the short is removed. If the frequency drops *lower* than 2 kHz, then L1 has too much inductance. C1 should have a tuning range of approximately 100 kHz (at 48 MHz) when the proper value for L1 is found. C2 can then be adjusted to center the tuning range in the satellite band. Use a receiver, frequency counter or other frequency-measuring device to confirm VXO output on 146-MHz. When the VXO is operating properly, connect it to the driver/final amplifier stage through a length of RG-58/U coaxial cable.

Driver/Final

In the present configuration this amplifier is stable, even without shields. However, a word of caution! Instability during the initial adjustments can destroy the driver transistor. It is recommended that initial adjustments be made with no more than 100/50 V on the 6146 plate and screen, respectively.

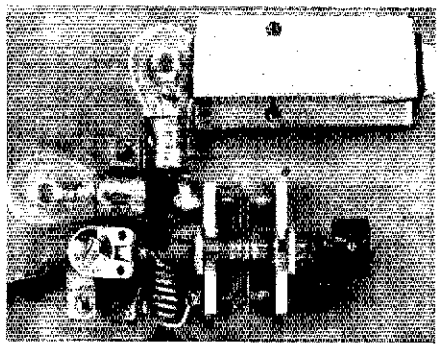

Fig. 5 — View of the homemade power meter. The small piece of "U" aluminum contains the photoresistive cell.

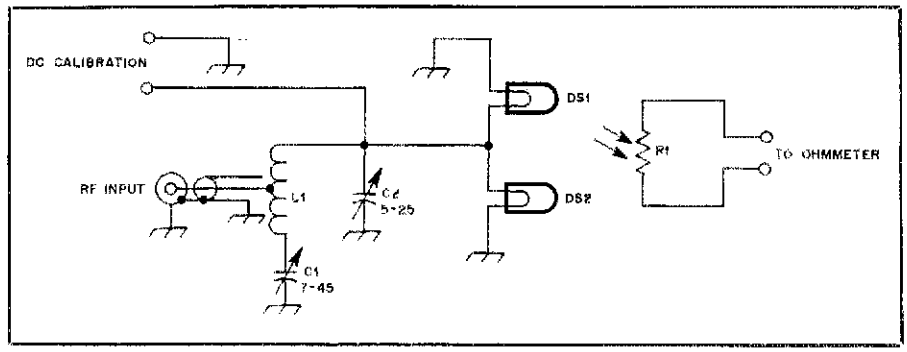

Fig. 6 — Schematic diagram of the "light" rf-power meter. See text for details on construction and operation. R1 is a Radio Shack 276-116 photoresistor, and DS1 and 2 are Sylvania no. 93 bulbs.

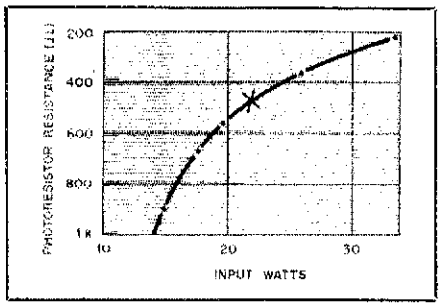

Fig. 7 — Calibration chart for the prototype lamp power meter.

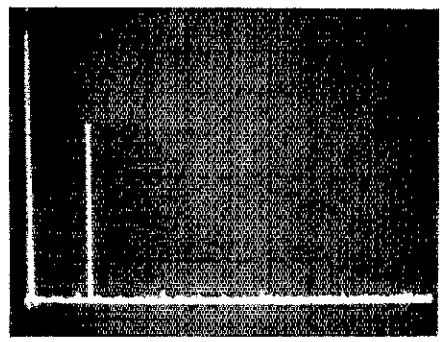

Fig. 9 — Spectral display of the W6IOJ transmitter after the addition of a strip-line output filter. Each horizontal division is 100 MHz, and each vertical division is 10 dB. All spurious and harmonic products are greater than 70 dB down. Several strip-fine filter designs are shown on page 15-8 of the 1983 edition of *The Radio Amateur's Handbook* published by ARRL.

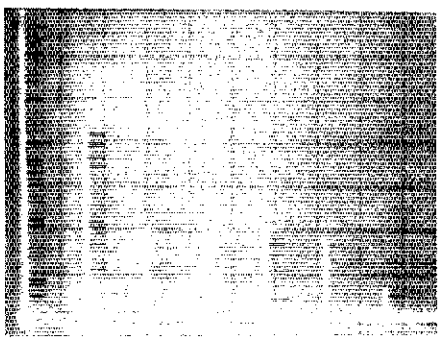

Fig. 8 — Spectral display of the W6IOJ satellite transmitter. Each horizontal division is 100 MHz. Each vertical division is 10 dB. The fundamental signal has been notched 28 dB to prevent analyzer overload. The transmitter does not comply with FCC spectral purity requirements.

Since there is high gain in the final amplifier, the 6146 must be neutralized. Neutralization requires a small capacitance between the grid and plate. This is accomplished with a number 14 wire connected to the grid. The wire is routed along side the tube envelope in close proximity to the plate. A copper strip, 3/8-inch wide, and the length of the tube, is soldered to the wire to increase the capacitance. During adjustments, this is bent in or away from the plate for optimum neutralization. Peak each stage of the driver and final amplifier before applying full plate voltage to the 6146. With 600 V on the plate, power output should be about 40 W.

Power Measurements

Two methods were used to measure the power output. One uses lamps to convert the rf energy to light, and the second employs power resistors for a thermal conversion. Both methods indicated an amplifier efficiency of approximately 55%. Although this is somewhat lower than expected, the measuring devices are inherently lossy and it is probable that several watts were lost in the energy conversions.

The most accurate method was with the lamp power meter (pictured in Fig. 5). Two 12-V high-intensity lamps wired in parallel allow power measurements up to 30 W. Although the dc resistance of each lamp is about 5 ohms, the impedance at 2 meters is high, requiring an impedance-matching network. A good match is obtained by tapping the inductor on a parallel-tuned circuit for the proper input impedance. C1 provides a method for optimizing the tap position, and provides dc isolation. "Eye-balling" the lamps for brilliance is a mistake — they appear very bright even at half the rated input. Guesswork can be avoided by using a cadmium-sulfide photocell for indicating lamp brightness. The schematic diagram of this simple circuit is shown in Fig. 6. The CdS cell resistance varies from approximately 100 Ω to 1 MΩ, depending on the light level. One problem with this method is that the CdS cell is far too sensitive for this application. The detector was modified by placing the cell in a box, with the box facing the lamp and the front blocked except for a 3/32-inch-diameter aperture. The cell is placed in the box in such a manner that it receives only scattered light, avoiding any possibility of hot-spot errors. Calibrate the meter by placing various dc levels on the lamps and recording the photocell resistance. Fig. 7 shows the calibration chart for the prototype meter. Match the unit to a 50-ohm input by inserting an additional 1/4-λ RG-58/U coaxial section in the input circuit and note the difference in loading. Then change the line length by 1/8 λ to maximize the loading difference. Adjust the two capacitors until the loading remains the same regardless of the line length. The line sections involved should use constant-impedance connectors (N, SMA, BNC, etc.).

Conclusions

If the builder uses reasonable care during the construction of this transmitter, he or she will be rewarded by premium performance from a low-cost investment. The transmitter has been in use at W6IOJ for many months, and has provided "solid" satellite contacts.

Notes

[1]Several of the crystals tested in the VXO circuit were purchased from International Crystal Mfg. Co., 10 North Lee, P.O. Box 26330, Oklahoma City, OK 76126. The overtone units are catalog number 031081, and the fundamental 16-MHz crystal is catalog number 031300. Be sure to specify the desired frequency when ordering.

[2]mm = in. × 25.4.

Designing Narrow Band-Pass Filters with a BASIC Program

Computer-aided design will help you add this important circuit to your "designer's toolbox."

William E. Sabin,* WØIYH

In radio-frequency circuit design, whether at 10 kHz or 10 GHz, a very useful circuit is the narrow band-pass L-C filter. This filter type can be designed by first designing a prototype low-pass filter and then converting the prototype into a band-pass filter. This article will discuss this procedure and a BASIC program that can be used to design these filters.[1] This program and an ac circuit analysis program used to analyze filter performance combine to bring this interesting circuit into the repertoire of the experimenter or designer. The analysis program is not presented here, but a suitable program can be found in the literature.[2]

A popular narrow band-pass filter is shown in Fig. 1. There are other ways to configure this filter, but this is the form considered here. The design relies on the idea that for a given center frequency (f_0) and passband width, the end loading and the coupling can be adjusted to obtain predictable passband and stopband responses (Fig. 2). These responses conform closely to those of filters found in catalogs of low-pass prototypes. This applies for passband widths of, say, 1-10% of f_0. At high attenuation values, some departures from the predicted responses do appear. In order to implement the filter design, a means of measuring L, C and Q is required. Some knowledge of coil design is also necessary. Coil measurements should be near f_0 to assure accurate filter designs.

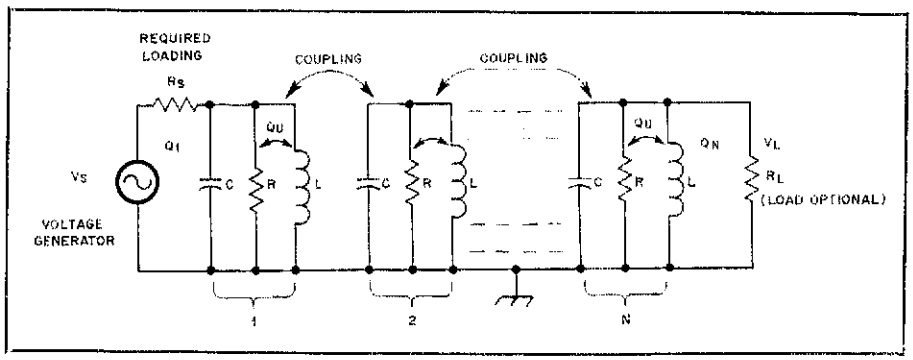

Fig. 1 — Basic narrow band-pass L-C filter shown in nodal form.

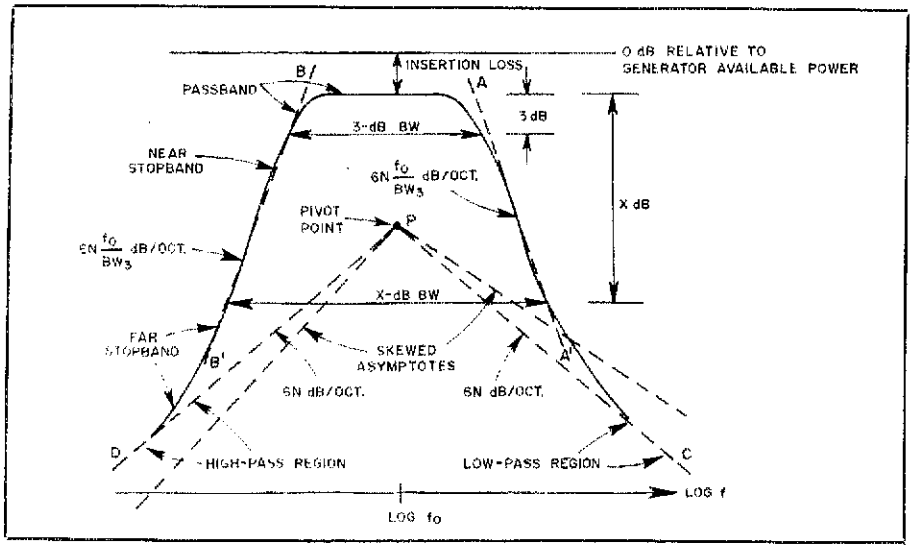

Fig. 2 — Frequency response of a narrow band-pass filter. The passband and *near* stopband responses have almost the same shape as a standard low-pass prototype filter. Lines AA' and BB' have slopes of $6Nf_0/BW_3$ in the near stopband region. In the *far* stopband, asymptotes PC and PD, with slopes of 6N, meet at pivot point P. These asymptotes can be skewed, as is shown, by the coupling networks (as in Fig. 13). In the far stopband, the filter reverts to high-pass or low-pass behavior. Point P may be 10 to 120 dB below the maximum response. This behavior is caused by the nonlinear mapping from low pass to band pass, which distorts the shape.

The Low-Pass Prototype

The circuits shown in Fig. 3 (A and B) have approximately the frequency response shown at C. The generator resistance, R_s, is a mandatory part of the filter. To the right of the generator, the first component is a shunt C (if N is odd) or a series L (if N is even). Both networks end with a shunt C. The output load resistance, R_L, is optional. If it is used, it has a definite value that will be determined. At $\omega_c = 1$ ($\omega = 2\pi f$), the response of these networks drops 3 dB. Each L and C has a loss resistance (R_1, R_2, etc.) associated with it, and each component has the same value of Q, called the prototype Q (q_0). Evaluated at $\omega_c = 1$, it is

$$q_0 = \omega_c R_1 C_1 = R_1 C_1 = \frac{\omega_c L_2}{R_2} = \frac{L_2}{R_2} = \cdots \quad \text{(Eq. 1)}$$

*Rockwell International, Collins Telecommunication Products Division, MS 137-138, Cedar Rapids, IA 52498

[1]Notes appear on page 29.

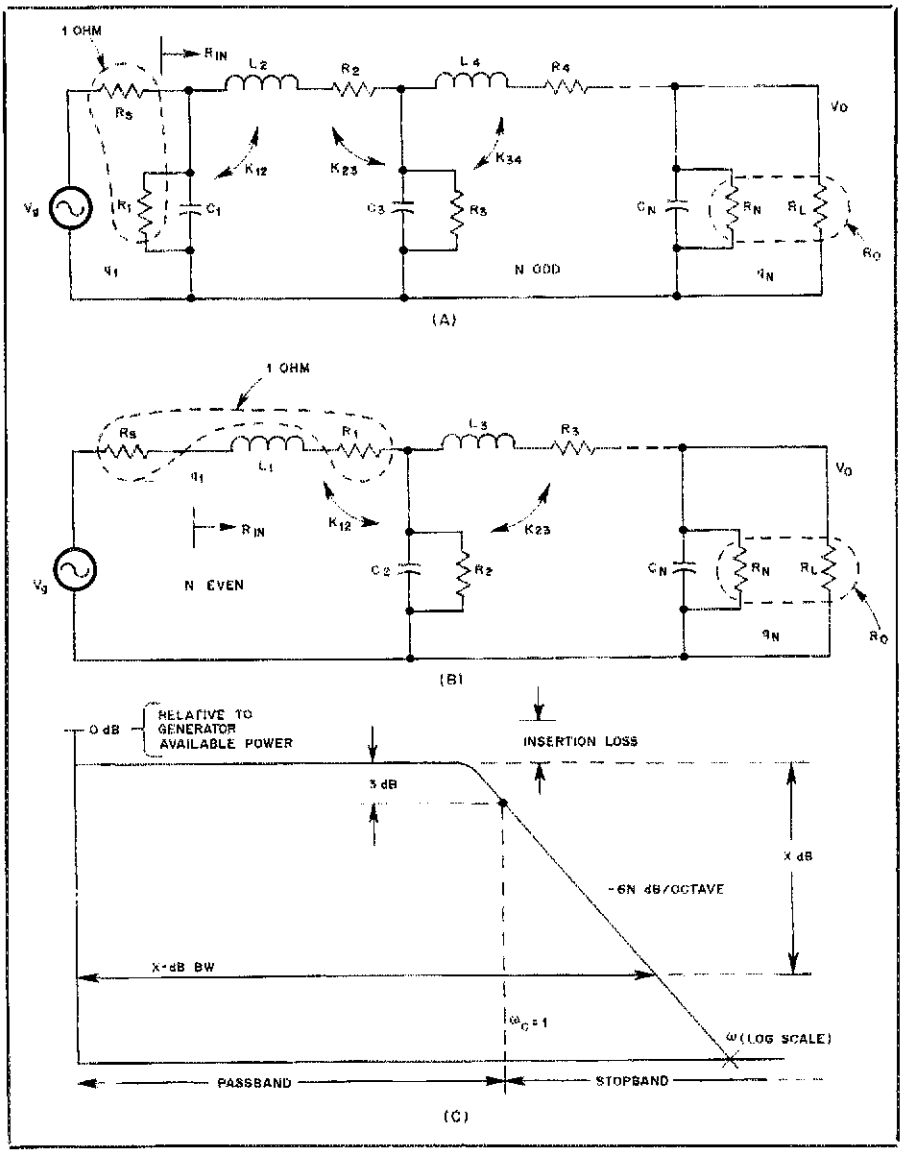

Fig. 3 — Schematic diagrams (A and B) and frequency response (C) of low-pass prototype filters.

Resistors R_S and R_1, in series (Fig. 3B) or in parallel (Fig. 3A), equal 1 ohm (an exception to this will be noted later). The required output loading, R_o, is equal to R_N and R_L in parallel:

$$R_o = \frac{R_N R_L}{R_N + R_L} \qquad \text{(Eq. 2)}$$

Because of loading by R_S and R_1, the first network component has a Q called q_1:

$$q_1 = \omega_c C_1 \frac{R_1 R_S}{R_1 + R_S} = C_1 \text{ (for N odd)} \qquad \text{(Eq. 3)}$$

$$q_1 = \frac{\omega_c L_1}{R_1 + R_2} = L_1 \text{ (for N even)}$$

Likewise, the last filter element (shunt C) has a q_N of

$$q_N = \omega_c C_N \frac{R_L R_N}{R_L + R_N} = C_N R_o$$

(for N odd or even) (Eq. 4)

Note that R_o is not necessarily 1 ohm. The remaining filter elements retain Q values equal to q_0 (from Eq. 1).

Filter elements C_1 and L_2 have a series resonant frequency, ω_{12}, and a "coefficient of coupling," k_{12}, is then defined as

$$k_{12} = \frac{\omega_{12}}{\omega_c} = \omega_{12} = \frac{1}{\sqrt{C_1 L_2}}$$

(for $\omega_c = 1$) (Eq. 5)

Other coefficients of coupling are defined in a similar manner:

$$k_{23} = \frac{1}{\sqrt{L_2 C_3}}; \; k_{34} = \frac{1}{\sqrt{C_3 L_4}}; \text{ etc.} \qquad \text{(Eq. 6)}$$

Tables of q and k values are commonly available and are used in this design procedure. The reason for using q and k values, rather than values of L and C, is explained later. Since these q and k values are determined at $\omega_c = 1$, they are the "3 dB down" values, and the tables are labeled in that manner.

In the low-pass prototype, the power available from the generator is

$$P_{GEN} = \frac{V_g^2}{4R_S} \qquad \text{(Eq. 7)}$$

While the power in the load is

$$P_{LOAD} = \frac{V_o^2}{R_L} \qquad \text{(Eq. 8)}$$

From this, an "insertion loss," IL, is defined as

$$IL = 10 \log \frac{P_{GEN}}{P_{LOAD}} \text{ (dB)} \qquad \text{(Eq. 9)}$$

This insertion loss has two parts: A mismatch loss occurs if the input resistance at $\omega = 0$ is not equal to R_S. If q_0 is very large, then $R_{IN} \approx R_L$ and the approximate mismatch loss is[3]

$$L_M \approx 10 \log \frac{(R_S + R_L)^2}{4R_S R_L} \text{ (dB)} \qquad \text{(Eq. 10)}$$

There is also a resistive loss, resulting from dissipation in the L and C elements. For realistic values of q_0, this loss is well approximated by

$$L_R \approx \frac{4.343}{q_0} (C_1 + L_2 + \ldots + C_N) \qquad \text{(Eq. 11)}$$

The insertion loss is, then, with good accuracy, the sum of L_M and L_R.[4] It should be noted that the resistive losses may modify the input resistance at $\omega = 0$ slightly. This results in the actual mismatch loss differing slightly from that given by Eq. 10.

The passband amplitude response of a filter with little or no insertion loss can be flat, rounded or rippled, as shown in Fig. 4. These response shapes correspond to the labels Butterworth, Gaussian (also Bessel or Fano) and Chebyshev. The ripples in the Chebyshev response allow us to define a "ripple bandwidth," as is shown in Fig. 4C. This bandwidth is less than the 3-dB bandwidth and is often specified in filter tables and design specifications. Fig. 5 is a graph that can be used for the conversion from ripple bandwidth (BW_R) to 3-dB bandwidth (BW_3). Fig. 5 will be referred to again.

Note in Fig. 4C that if N is even and q_0 is large the response is reduced at $\omega = 0$. This results from the introduction of a mismatch loss equal to the ripple value. Thus, the output load is not 1 ohm. At the response peaks, however, the transformer action within the filter removes this loss. In the odd-order filters, the mismatch loss occurs at frequencies other than zero and the load is, therefore, 1 ohm.

As the resistive loss increases (q_0

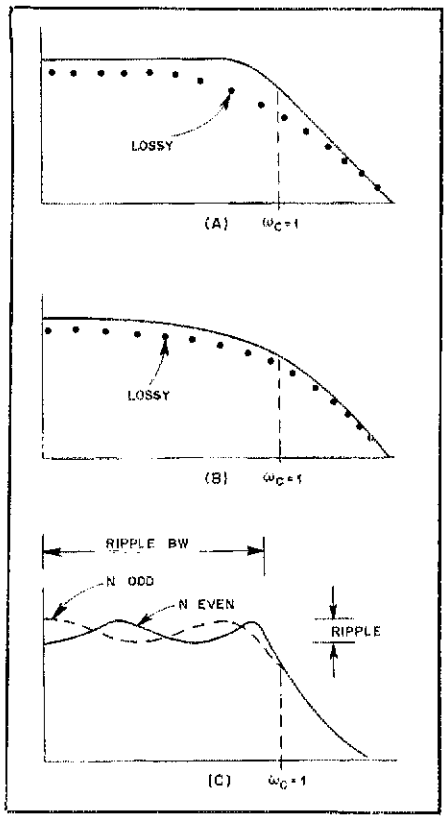

Fig. 4 — Three types of low-pass prototype filter response are possible: Flat (A), rounded (B) and rippled (C).

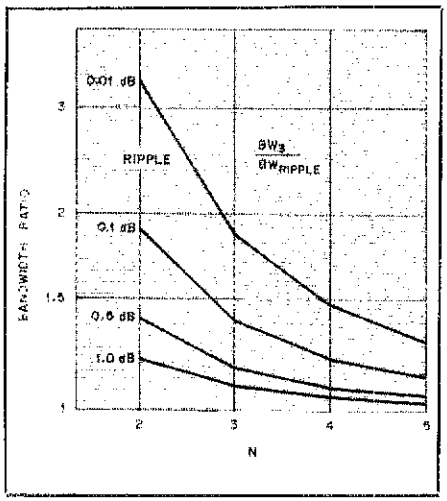

Fig. 5 — This graph can be used to convert from the 3-dB bandwidth to the ripple bandwidth of a Chebyshev filter.

decreases) the passband response changes, as is suggested by the dotted curves in Fig. 4A and B. In the case of the Chebyshev response, the ripples flatten out and the corner becomes rounded as the loss increases. The passband response, particularly the 3-dB bandwidth, also becomes less definite.

The important point is that there are two design approaches that can be used. One is to use the k and q values of the *lossless* prototype, and then to adjust the 3-dB bandwidth until the "lossy" final filter has an acceptable passband response. This is called the "pseudo-exact" approach. It frequently results in very adequate designs having low insertion loss near $\omega = 0$ (this is highly desirable in many applications). The problem is to know how much to change the bandwidth. Reference to lossy filter response curves and trial and error using the computer programs are the methods used in this article.

The second approach is to use a different set of k and q values, and to introduce mismatch loss so that the lossy L-C elements produce exactly the desired response. The additional loss introduced in this approach is often acceptable, especially in filter types other than the Chebyshev, when the exact response is really important. This approach is called the "predistorted" design, and tables of k and q values for various values of q_0 are available.

Now we will consider the stopband response using a geometrical approximation method. At frequencies far above $\omega_c = 1$, the circuits shown in Fig. 3 reduce very nearly to a cascade of voltage dividers, as is shown in Fig. 6. Note that R_1, R_2, R_3, etc. are missing. Using this method, the following "asymptote" formula applies:

$$V_o \approx \frac{1}{\omega^N C_1L_2C_3...C_N} \Big| \text{ N odd}$$

$$\approx \frac{1}{\omega^N L_1C_2L_3...C_N} \Big| \text{ N even} \qquad \text{(Eq. 12)}$$

If we let $\omega = 1$, the value of V_o is

$$V_o \Big| \omega = 1$$

$$= \frac{1}{C_1L_2C_3...C_N} \Big| \text{ N odd}$$

$$= \frac{1}{L_1C_2L_3...C_N} \Big| \text{ N even} \qquad \text{(Eq. 13)}$$

This response, compared to that of the lossless prototype (which also uses a 1-V generator), is shown in Fig. 7. We see that the asymptote at point A does not necessarily "join up" with the prototype response at point B. In the case of the Butterworth filter, they do come together, but for the other types, B is above or below A. For example, a Chebyshev response is shown in Fig. 8. It is apparent that the 20-dB bandwidth estimate is poor, as was the case in Fig. 7. The approximation becomes much better when we apply simple correction factors to the asymptote formulas. Resistive losses less than 2N dB do not invalidate this design procedure. Referring to Fig. 3, the value X is reduced by the value of the resistive loss. For example, if $L_R = 3$ dB, then the 30-dB bandwidth becomes the 27-dB bandwidth.

An interesting prototype filter is formed if we assign a certain uniform value to every L and C element (such as 1H and 1F). The result is an equal element or minimum loss (very nearly true) or Cohn filter. Band-pass versions of this filter are often used in receivers and transmitters. For a given stopband bandwidth, say at 40 dB, the insertion loss at f_0 (for a given q_0) is less than that of any other filter type. Note that for the doubly terminated filter, with a large value of q_0, we have

$$q_1 = q_N;\ k_{12} = k_{23} = ...$$

$$= \frac{1}{q_N} = \frac{1}{q_1} \qquad \text{(Eq. 14)}$$

The two-element pseudo-exact Butterworth is also a minimum-loss filter.

It was mentioned earlier that R_L (Fig. 3) can be an open circuit. The idea of mismatch loss then becomes meaningless, but resistive losses are still present, meaning that the power available from the filter is less than the power available from the generator. Any of the various responses can be achieved over a wide range of R_L values, and catalogs containing the required k and q values are available. The open-circuit case is especially useful when a low-noise common-source FET amplifier is used at frequencies for which the gate impedance is very high, because then no signal power is lost in a terminating resistor.

Frequently, the terminating resistance is the input impedance of a grounded-gate amplifier. In this case, the signal power is not lost, yet the filter is still doubly terminated. Doubly terminated filters are easier to adjust, and singly terminated filters tend to have high input SWRs.

Listed in Table I are a few k and q values for various kinds of prototype filters in which q_0 is assumed to be infinite. Values for the lossy, predistorted Butterworth case are also listed. Table I is meant only as an illustration and is not complete, but should prove useful.

For the minimum-loss filter, if $N \geq 3$ and $q_0 \geq 5$, an improvement in the shape factor (BW_{60}/BW_3) for a given resistive loss *may* be possible, compared to other types such as the 0.1-dB Chebyshev. For even-order filters, the minimum-loss type avoids the mismatch loss of the Chebyshev filter at $\omega = 0$. The minimum-loss filters are pseudo-exact in that we use the lossless values of k and q for resistive losses up to N dB or so. You should use a circuit analysis program to compare the various

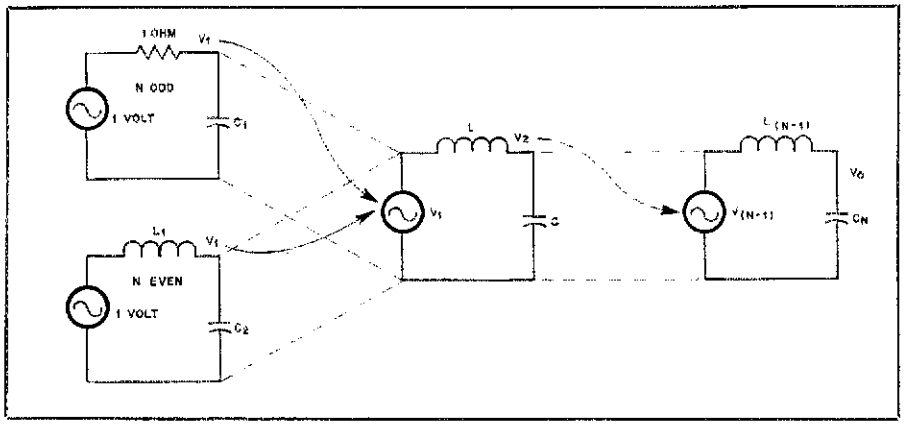

Fig. 6 — Circuit configuration used in calculating the approximate filter stopband response.

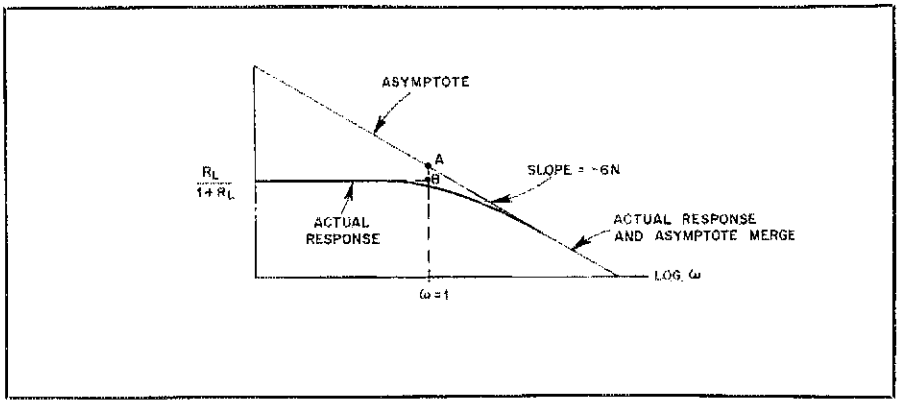

Fig. 7 — The relationship between actual filter response and the stopband asymptote.

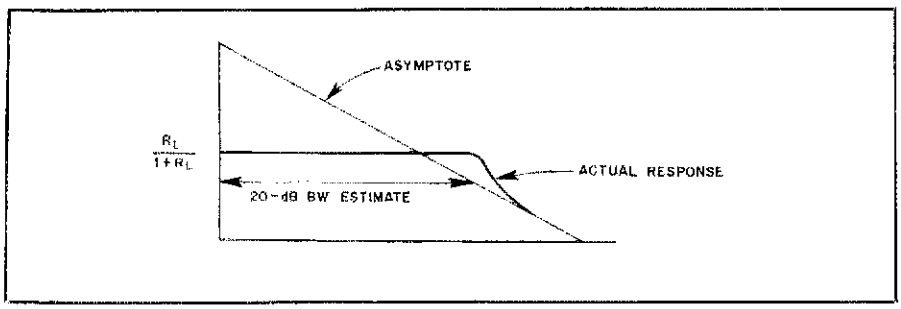

Fig. 8 — The relationship between the Chebyshev response and the stopband asymptote.

prototype filters before making your final selection.

Conversion from Prototype to Narrow Band-Pass Filter

The next step in our filter design is to convert the prototype low-pass circuit into the desired band-pass filter. Fundamental to this conversion is the idea that each prototype L or C element becomes a band-pass filter resonator (as in Fig. 1), with a resonant frequency of f_0.

The loaded Qs of the first and the last resonators are

$$Q_1 = q_1 \frac{f_0}{BW_3}, \quad Q_N = q_N \frac{f_0}{BW_3} \qquad \text{(Eq. 15)}$$

where BW_3 is the passband 3-dB bandwidth. These values result only from the resonator loss resistance and the adjacent external resistor. Loading caused by the other resonators is not included here. For the internal resonators, the "unloaded" Q_U is used for design purposes:

$$Q_U = q_0 \frac{f_0}{BW_3} \qquad \text{(Eq. 16)}$$

Note that these resonators are not really unloaded.

If q_0 is large and the BW_3 is small, a resonator of very high Q_U is required to satisfy the resistive loss, mismatch loss and the frequency response goals. The resistive loss and the mismatch loss are identical to those given by Eqs. 10 and 11 for the prototype.

Generally, Q_u (usually assumed to be the coil Q) is known. Thus, for a desired value of f_0/BW_3, q_0 and, therefore, the resistive loss are established. Consider resonator 1 in Fig. 1: We can freely choose the value of L, C or R_1 (R in parallel with R_S), and the remaining two factors are then defined (since f_0 and Q_U are known) by manipulating the following formulas

$$C = \frac{1}{\omega_o^2 L} = \frac{Q_1}{\omega_o R_1}; \quad \omega_o = 2\pi f_0 \qquad \text{(Eq. 17)}$$

Often, we choose an inductor that has a high Q at f_0, or a standard capacitance value. In this design procedure and for the program, we choose to make the values of L and C the same for every resonator, although this is not mandatory.

The coupling coefficient between resonators is

$$K_{12} = k_{12} \frac{BW_3}{f_0}, \text{ etc.} \qquad \text{(Eq. 18)}$$

We can now see why k and q values were used for the prototype design. They are related closely to the K and Q values of coupled, loaded resonators. It is apparent, for example, that two slightly "over coupled" resonators will have a Chebyshev response. "Critical coupling" yields a Butterworth response, while "under coupling" produces a Bessel (or Gaussian) response.

It is important to keep in mind that the low-pass bandwidth shown in Fig. 3 (from zero to ω_{LP}) is related to the bandwidth, BW_X, in Fig. 2 by

$$BW_X(BP) = BW_3(BP) \cdot \omega_{LP} \qquad \text{(Eq. 19)}$$

Table 1

k, q (3 dB down) Values for Low-pass Prototypes

Butterworth (doubly terminated)

N	q_0	q_1	q_N	k_{12}	k_{23}	k_{34}	k_{45}
2	any	1.4142	1.4142	0.7071			
3	inf	1.0	1.0	0.7071	0.7071		
3	10	0.8007	1.5359	0.7388	0.6716		
3	5	0.8226	1.7115	0.6567	0.7060		
4	inf	0.7654	0.7654	0.8409	0.5412	0.8409	
4	8.7	0.5407	1.8605	1.0411	0.5373	0.6992	
4	4.36	0.5819	2.2961	0.9051	0.4592	0.7706	
5	inf	0.618	0.618	1.0	0.5559	0.5559	1.00
5	8.1	0.610	0.8157	1.0075	0.4844	0.6887	0.6278

Chebyshev (0.1 dB) (doubly terminated)

2	any	1.6382	1.6382	0.7106			
3	inf	1.4328	1.4328	0.6618	0.6618		
4	inf	1.3451	1.3451	0.6850	0.5421	0.6850	
5	inf	1.3013	1.3013	0.7028	0.5355	0.5355	0.7028

Minimum Loss (doubly terminated)

2	inf	1.4142	1.4142	0.7071			
3	inf	1.5214	1.5214	0.6573	0.6573		
4	inf	1.6529	1.6529	0.6050	0.6050	0.6050	
5	inf	1.7458	1.7458	0.5728	0.5728	0.5728	0.5728

Butterworth (singly terminated)

2	inf	0.707	inf	1.00		
3	inf	0.500	inf	1.22	0.707	
4	inf	0.383	inf	1.56	0.765	0.644

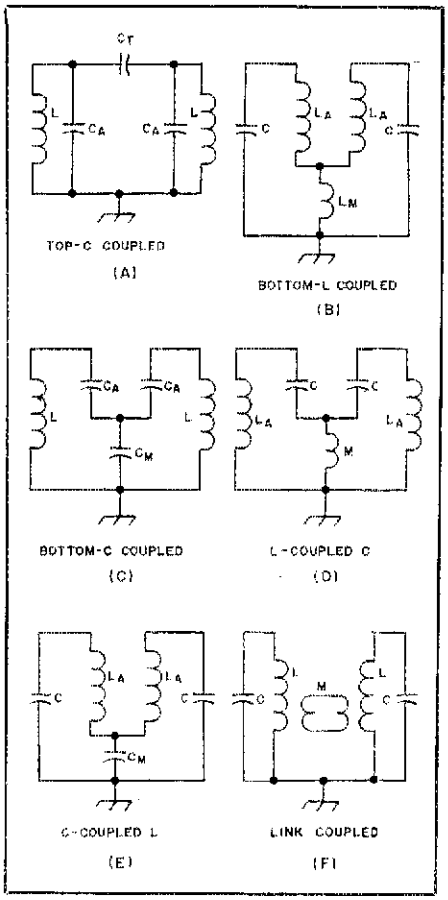

Fig. 9 — Various methods can be used to provide coupling between band-pass filter resonators. The methods shown here are discussed in the text.

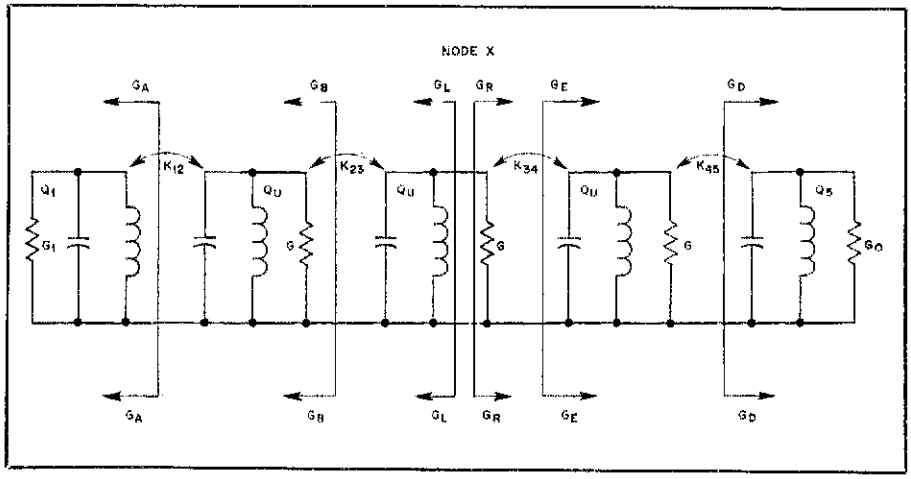

Fig. 10 — Circuit configuration used in calculating the resistance at node X.

The ratio of BW_X to BW_3 is the same in both the low-pass and the band-pass filters. This proportionality holds despite the nonlinear transformation described in Fig. 2. If, for the Chebyshev filter, we want to specify the ripple bandwidth rather than the 3-dB bandwidth (BW_3), it is necessary only to increase the value of BW_3 by the factor obtained from Fig. 5. As previously discussed, further adjustment of the lossy filter may be needed.

Designing the Band-Pass Filter

Shown in Fig. 9 are the various ways to obtain coupling between the band-pass filter resonators. The theory of this coupling can be based on the "J-inverter."[5] In the computer program, the values for coupling method A are computed first. The values for the other methods are then derived by modifications and transformations. Improved attenuation at frequencies far above f_0 is obtained by using the coupling methods shown at B, E and F. Methods A, C and D are better far below f_0. The value of C_T in Fig. 9 is simply

$$C_T = K_{12}C = K_{12}(C_A + C_T) \quad \text{(Eq. 20)}$$

where C is the value given by Eq. 17. In a gang-tuned filter, we would look for a coupling method that maintains the prototype response over, say, a 3 to 1 frequency range. The correct end loading must also be maintained. As f_0 is changed, the coupling and the end loading must change in such a way that the original prototype k and q values still describe the band-pass filter. This is less difficult to achieve if the ratio BW_3/f_0 remains constant (a constant percentage bandwidth is maintained).

We can now examine how to find the resistance, at f_0, at nodes within the filter. In the example shown in Fig. 10, node X is loaded from the right (G_R) and from the left (G_L). Thus, the node resistance is

$$R_X = \frac{1}{G_L + G_R} \quad \text{(Eq. 21)}$$

To find G_L, we start at G_I and calculate G_A, G_B and then G_L, looking only to the left:

$$G_A = G_I = \frac{1}{\omega_0 L Q_I} \quad \text{(Eq. 22)}$$

$$G_B = \frac{G_I^2}{G_A}(Q_I K_{12})^2 + G$$

$$G_L = \frac{G_I^2}{G_B}(Q_I K_{23})^2$$

Then, starting at G_o, we work to the left, looking only to the right:

$$G_D = G_o = \frac{1}{\omega_0 L Q_5} \quad \text{(Eq. 23)}$$

$$G_E = \frac{G_o^2}{G_D}(Q_5 K_{45})^2 + G$$

$$G_R = \frac{G_o^2}{G_E}(Q_5 K_{34})^2 + G$$

These formulas are theoretically exact, even in low-Q situations.

Of particular interest is the fact the resistance at node X can become very high, making the resonator tune very sharply. In a transmitter, the voltage at node X can become very large; that is, a degree of transformer action occurs in the band-pass filter that is not found in the low-pass prototype. A circuit analysis program can be used to determine these voltages.

When a singly loaded filter is connected to the gate of an FET amplifier, the output resistance looking into the filter is important in determining the amplifier noise figure. A capacitive divider can be used to transform this resistance down to a better value (Fig. 11F). This also helps prevent amplifier overdrive caused by excessive voltage step-up within the filter. More uniform impedance levels can be obtained by using a minimum-loss design. In the minimum-loss design, all the resonators are equally loaded, as verified by Table 1 and Eq. 22. Another technique that can be used is to modify the resonator L-C ratios. This procedure is not provided for in the computer program, but it is covered in the literature.

An "intrinsic" filter impedance is established by R_I, the parallel combination of R and R_S in Fig. 1 and Eq. 17. We must transform the actual source and load resistances to that value so that the filter is properly terminated at both ends. Proper termination is necessary if the desired filter performance is to be obtained. The transformation methods used in the program are shown in Fig. 11.

Often, approximate formulas are not adequate in low-Q cases. Further, if we want to analyze a design with a circuit analysis program, highly accurate component values are useful. Therefore, the program algorithms begin with approximate formulas and then the values are adjusted until the resonance and impedance requirements are satisfied to four significant figures.

In the case of link coupling, the coupling coefficient must exceed a certain value or the transformation cannot be achieved. Also, the link coil Q should be specified. It is also possible to use a tapped inductor method.[6]

There are also certain limitations when top C or top L coupling is used. These

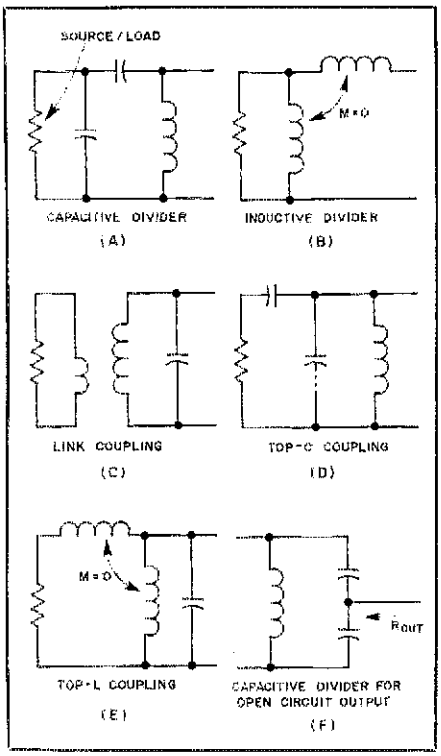

Fig. 11 — Each filter has an instrinsic resistance. Shown here are several methods that can be used to transform the source and load resistances to the intrinsic resistance of the filter.

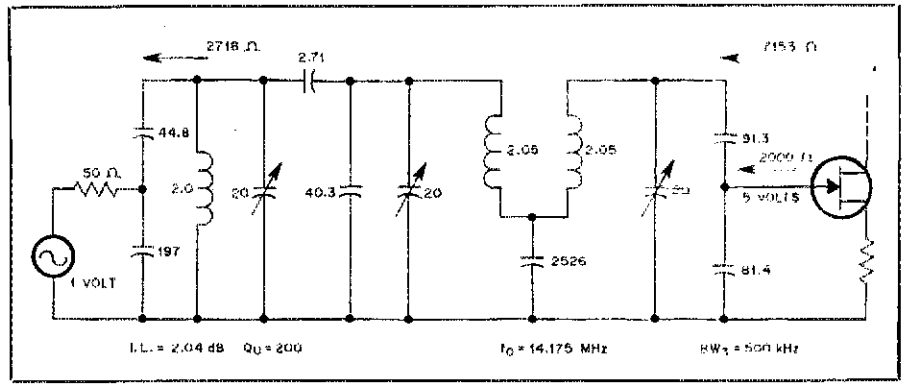

Fig. 12 — This example is a three-resonator, singly loaded Butterworth pseudo-exact design.

limitations are indicated by the computer program. Both of these coupling methods have a useful property: The impedance looking from the loading resistor into the filter becomes very high at frequencies outside the passband; that is, the load becomes "decoupled" from the filter.

The C and L dividers shown in Figs. 11A and B can be used to absorb certain amounts of load reactance. If the load is a complex combination of L, C and R, the situation becomes a problem in approximate matching over the passband.[7] Over a narrow passband, a constant load and source impedance can usually be safely assumed. Trouble can occur, however, at frequencies outside the passband (discussion of this complex subject is beyond the scope of this article).

In transmitter and certain other applications, the output and input SWR of the filter are of great interest. Slevin has found that filters using the pseudo-exact procedure for 0.01-dB Chebyshev responses have less than a 1.25 SWR over the ripple bandwidth, especially if the insertion loss is less than 2 dB.[8] Predistorted designs tend to have higher values of SWR. The Butterworth pseudo-exact is quite good in this respect over 60% of the 3-dB bandwidth if N is greater than 2. Minimum-loss designs have good SWR over 40% of the bandwidth.

From Figs. 9 and 11, it can be seen that certain combinations of coupling and termination circuits are somewhat awkward. For example, the coupling circuit of Fig. 9C or D would not combine well with the transformation circuits shown in Fig. 11A or F. The circuits shown in Fig. 11B, C or E would be better choices for use with these coupling circuits. Also, the matching transformers may not be able to accommodate certain values of load or source resistance. The program detects this condition and informs the user. Changing the filter impedance or transformer will solve this problem.

The use of link-coupling (mutual inductance) circuits requires that the coupling coefficient be known. This necessitates some supplemental measurements.[9,10] For pseudo-exact designs, the generator and load resistances of the low-pass prototype have the same values as those of the lossless filter. The program makes this adjustment and produces the correct mismatch and insertion-loss values.

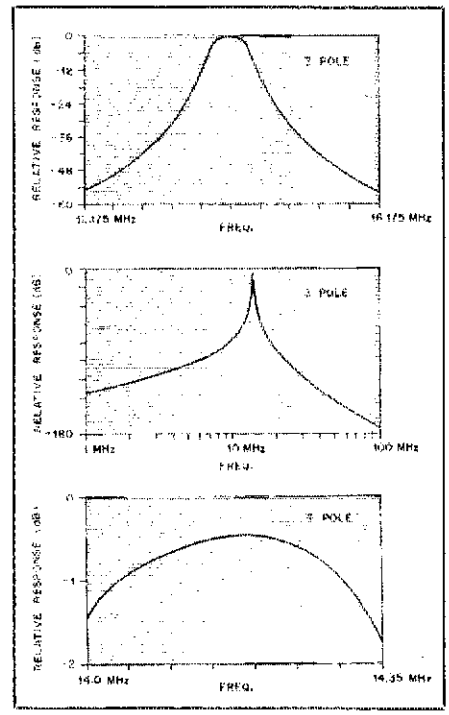

Fig. 13 — Amplitude versus frequency response of the design example discussed in the text and shown in Fig. 12.

The Program

The preceding discussion greatly reduces the need to talk about the computer program at great length. Table 2 is a printout of the design example shown in Figs. 12 and 13. The program requires 8.5K bytes of memory in an Apple II® computer. Another 2K of memory is required for the solution of a 10-resonator problem. Operation of the program is "menu" oriented and is highly interactive. Provisions have been made for the inclusion of a stray or trimmer capacitance value for each resonator in the circuit. The inductance values used are the "effective" values measured on a Q meter at f_0. That is, the inductance value measurement is affected by the coil self capacitance. If the self-resonant frequency of the coil is more than 2.5 times f_0, no significant errors result from this approximation in a narrow-band filter.

In a filter with an open-circuit output, the output resistance at f_0 is determined by the program and a capacitor divider is calculated that transforms the output resistance to the desired value. Also, the values of L, C and R for the low-pass prototype are provided, according to the diagram in Fig. 3. The values of the load resistance and the resistive loss and the mismatch loss (if it is defined) are also determined. The stopband width approximation algorithm has proven to be reasonably accurate in a large number of situations. A circuit-analysis program should be used to verify the filter performance before construction is begun.

Theory and Practice

It is apparent from the discussion that small changes in loading and in the coupling between resonators can make a big difference in the response, insertion loss, and so on. If slug-tuned coils and variable capacitors are used, an infinite and bewildering array of tuning possibilities exist. On the other hand, very accurate measuring equipment is needed to select components of exact values. The following compromise procedure is suggested for practical situations:

1) Use the computer program to design

Table 2
Design Example Printout

```
JRUN
DESIGN DISHAL NARROWBANDPASS FILTER.

2 TO 10 RESONATORS.

NUMBER OF RESONATORS=3
CENTER FREQUENCY=14.175E6
3 DB BANDWIDTH=5E5
ENTER 'INF' FOR INFINITE VALUE
UNLOADED COIL Q=200
NORMALIZED QP OF LOW PASS
 PROTOTYPE=7.05467372

BASED ON QP, DETERMINE THE LOWPASS
 PROTOTYPE 3 DB DOWN K,
  Q VALUES FROM SOME REFERENCE SOURCE

IS QP LARGE ENOUGH (Y/N)?
ENTER 'INF' FOR INFINITE Q
INPUT TERMINAL IS RESISTANCE LOADED
Q(1)=.5
Q(3)=?INF

K(1,2)=?1.22
K(2,3)=?.707

LOADED, DENORMALIZED Q:
Q(1)=14.175      Q(3)= INF

INPUT RESONATOR SPECIFICATION MENU:
SPECIFY 'L', 'C', 'R' :L
L=2E-6

L=2E-06
C=6.30324418E-11
R=2524.9687

ARE L,C,R SATISFACTORY (Y/N)?

ARE THE UNLOADED COIL Q AND THE 3 DB
 BANDWIDTH STILL SATISFACTORY (Y/N)?
COIL RESISTANCE=35625.6607

REQUIRED SOURCE RESISTANCE=2717.57697
REQUIRED LOAD RESISTANCE =INF

CT(1)=2.7125072E-12
C(1)=6.03199346E-11
CT(2)=1.37192015E-12
C(2)=5.87480144E-11
C(3)=6.14605217E-11

WIRING + AVERAGE TRIMMER C FOR EACH
 RESONATOR=20E-12
C(1)=4.03199346E-11
C(2)=3.87480144E-11
C(3)=4.14605216E-11

TYPE 'SPACE' TO GO ON

COUPLING MODIFICATIONS MENU

TYPE 1 FOR CAPACITOR PI TO TEE
TYPE 2 FOR L COUPLED C
TYPE 3 FOR INDUCTOR TEE
TYPE 4 FOR C COUPLED L
TYPE 5 FOR M COUPLING
TYPE 6 TO CONTINUE
?4

FIRST NODE=2
SECOND NODE=3
C(2)=4.03199346E-11
C(3)=4.30324418E-11
CM=2.52753851E-09
L(2)=2.04987654E-06
L(3)=2.04987654E-06

COUPLING MODIFICATIONS MENU

TYPE 1 FOR CAPACITOR PI TO TEE
TYPE 2 FOR L COUPLED C
TYPE 3 FOR INDUCTOR TEE
TYPE 4 FOR C COUPLED L
TYPE 5 FOR M COUPLING
TYPE 6 TO CONTINUE
?6

DESIGN I/O IMPEDANCE TRANSFORMERS

SELECT TYPE OF TRANSFORMER AT INPUT:
TYPE 1 FOR C DIVIDER
TYPE 2 FOR L DIVIDER
TYPE 3 FOR LINK COUPLING
TYPE 4 FOR TOP C
TYPE 5 FOR TOP L
TYPE 6 TO CONTINUE
?1

SOURCE RESISTANCE=50

C(1)=4.47660911E-11
BOTTOM CAP=1.97111192E-10

OUTPUT PORT IS OPEN CIRCUIT
TYPE 'SPACE' TO GO ON
FIND INSERTION LOSS
FOR PSEUDO-EXACT, INPUT '1'
FOR OTHERS, INPUT '0' 1
PROTOTYPE Q=7.05467372
PROTOTYPE RB=1
RESISTIVE LOSS (DB)=2.05160031
MISMATCH LOSS NOT DEFINED

LOWPASS PROTOTYPE VALUES
X(1)=.5          R(1)=14.1093474
X(2)=1.34372481  R(2)=.190472991
X(3)=1.48884963  R(3)=4.73833863

APPROXIMATE STOPBAND RESPONSE
ENTER 1 FOR CHEBY, MIN-LOSS,
 0 FOR OTHERS 0

17.9 DB BW=1077098 HZ
27.9 DB BW=1580956 HZ
37.9 DB BW=2320515 HZ
47.9 DB BW=3406034 HZ
57.9 DB BW=4999350 HZ

UNLOADED OUTPUT RESISTANCE AT F0=7153
DESIRED OUTPUT RESISTANCE=2000
C DIVIDER, C1 BOTTOM, C2 TOP
C1=8.13813902E-11
C2=9.13203642E-11

COMPLETE
```

the filter. A good estimate of the coil Q is very helpful.

2) Model the filter with a circuit analysis program, obtaining amplitude response versus frequency.

3) Pick two frequencies in the lower stopband, two in the upper stopband and three in the passband.

4) Build the filter using component values that are as close as possible to the calculated values.

5) Trim the L and C values until the response fits the data points chosen in (3). Use an oscillator, a frequency counter and a simple rf voltmeter or a receiver and attenuator to make the measurements.

6) The top coupling capacitors (C_T) are the most critical. Build a 4-MHz oscillator, and measure the frequency change when C_T is connected across the tank circuit. Use the formula:

$$\left|\Delta f\right| \approx \frac{f_0}{2_C} \cdot C_T \qquad \text{(Eq. 24)}$$

This simple procedure will greatly reduce the alignment effort.[11]

7) Confirm the SWR (if it is important) by using an analysis program or by measurement.[12]

The methods of adjusting narrow bandpass filters described by Dishal should be studied carefully.[13] An interesting, brief discussion has also been presented by Hayward.[14] The job of tuning a filter with several resonators can be quite a challenge, and the formal procedures suggested in these references can be helpful.

Acknowledgments

I wish to express my appreciation to R. C. Edwards and H. L. Landt, of Collins Telecommunications Products Division, for the helpful discussions that enabled me to better understand this subject. Dick Edwards has been especially generous with his involvement in this project.

Notes

[1]The author will place this program on a disk for the Apple II® or the IBM PC® upon receipt of a disk, return postage and an envelope. The program listing can be obtained for $1 from ARRL, Dept. TD-Sabin, 225 Main St., Newington, CT 06111.

[2]R. Steincross, "BASIC Program Performs Circuit Analysis," *EDN*, Sept. 1, 1982.

[3]H. Blinchikoff and A. Zverev, *Filtering in the Time and Frequency Domain* (New York: Wiley and Sons, 1976), Chapters 3, 4 and 6.

[4]S. Cohn, "Dissipation Loss in Multiple Coupled Resonators," *Proc. IRE*, Aug. 1959.

[5]A. Zverev, *Handbook of Filter Synthesis* (New York: Wiley and Sons, 1967, Chapters 3, 6 and 10.

[6]H. Krause, C. Bastaian and F. Raab, *Solid State Radio Engineering* (New York: Wiley and Sons, 1980), Chapter 3.

[7]F. Davis, "Matching Network Design With Computer Solutions," *Motorola RF Design Handbook*, 2nd ed. (Phoenix: Motorola, Inc., 1980), pp. 20-35 to 20-45.

[8]R. Slevin, "Pseudo-Exact Band-Pass Filters," *Microwaves*, Aug. 1968.

[9]*ITT Reference Data for Radio Engineers*, 6th ed. (Indianapolis: Howard Sams, 1975), Chapter 13.

[10]K. Henney, *Radio Engineering Handbook* (New York: McGraw-Hill, 1959).

[11]F. Noble, "The CMO — A Capacitance-Measuring Oscillator," *QST*, Aug. 1979, pp. 38-39.

[12]J. Priedigkeit, "A Reflection-Coefficient Bridge — Impedance Measurements the Easy Way," *QST*, Oct. 1981, pp. 18-20.

[13]M. Dishal, "Alignment and Adjustment of Synchronously Tuned Multiple-Resonator Filters, *Proc. IRE*, Nov. 1951.

[14]W. Hayward, *Introduction to Radio Frequency Design* (Englewood Cliffs, NJ: Prentice-Hall, 1982), Chapters 2 and 3.

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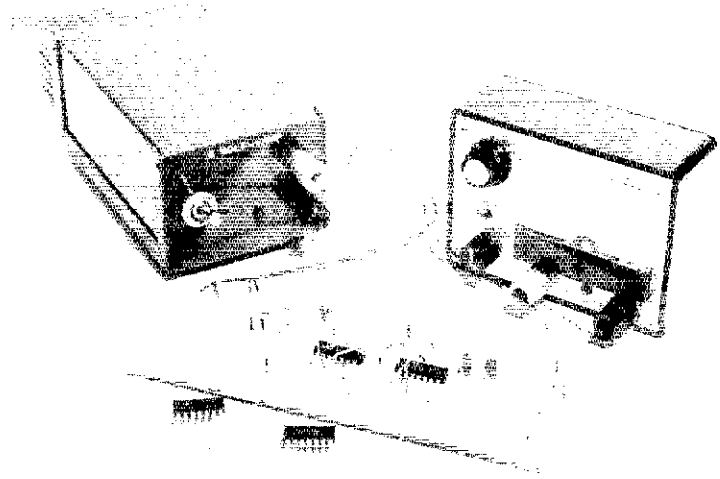
A Beginner's Look at Digital Electronics

BEGINNER'S BENCH

ANDs, NANDs and NORs have you mystified? This introduction to digital logic should help clear up the subject for you.



By George Collins,* KC1V

Have you looked at any new rigs lately? Many of them are loaded with digital logic circuits. Keyers, repeater controllers and modern RTTY (radioteletype) gear are all based on digital logic. A basic understanding of digital electronics has become essential to amateurs today. With microcomputers playing an increasing role in our amateur activities, digital techniques will become even more important to the amateur who wants to understand "how it works." Besides, experimenting with logic circuits can be very enjoyable. So let's get started on a beginner's look at logic.

Logic States

The logic devices we will be discussing have only two states, or conditions. They can be "on" or they can be "off," but intermediate conditions are not possible. A toggle switch is a good example of such a device; it can be open (off) or it can be closed (on), but it can't be in between. The on and off states can also refer to different voltage levels, current flows, frequencies, or other physical conditions.

Because we are dealing with only two possible states, the binary number system, which contains only the numerals 0 and 1, is ideal for representing logic-device states. We could, for example, assign the closed-switch position a value of 1, and the open position could be represented by 0. Another way of describing logic states is to define one state as the "true" condition and the other state as the "not true," or "false," condition. In the switch example, we might define the closed position as the true state. The open position would then be the false condition.

Basic Logic Operations

There are three basic logic operations we need to understand. They are AND, OR and NOT. An AND gate is a device that performs the AND operation. It has two or more inputs and a single output. The state of the output is determined by the logic states at the device inputs. If an AND gate has two inputs, A and B, both A *and* B must be true in order for the output to be true. If the AND gate has more than two inputs, *all* of them must be true before the output will be true. We can construct an AND gate by wiring two switches together as shown in Fig. 1A. The switch positions serve as the AND gate inputs, while the output state is displayed by the lamp. Only if both switches are closed will the lamp light (the true state).

Fig. 1B is the diagram of a toggle-switch OR gate. As the name implies, the output of this gate will be true if input A *or* input B is true. The output of an OR gate with more than two inputs will be true if *any* input is true.

The remaining basic logic operation, NOT, is also called the inverse or the complement operation. NOT gates are generally referred to as inverters. Unlike AND and OR gates, inverters have only one input. The output state of an inverter is always the opposite of the input state (Fig. 1C).

Truth Tables and a Few More Gates

By making a list of all possible combinations of input states and the resulting output states, we can describe the operation of any logic gate in an easy-to-understand manner. Such a list is called a truth table. Shown in Fig. 2 are truth tables for the AND, the OR and the NOT gates. In these tables I have chosen to use a 0 to represent the false condition and a 1 to indicate the true state. Next to each truth table is the standard logic symbol for the corresponding gate. These are the symbols we find in schematic diagrams of circuits containing integrated-circuit (IC) logic gates.

Also shown in Fig. 2 are the logic symbols and truth tables for three other gates. Two of these, the NAND and the NOR, are related to gates we've already looked at. The NAND gate is equivalent to an AND gate followed by an inverter. If we compare the truth tables for the NAND and the AND gates, we see that for any set of input conditions the output of the NAND gate is the inverse of the AND gate output. The symbol used for the NAND gate is the same as that used for the AND gate, except that a small circle has been added at the output. This circle indicates that the inversion operation has been applied to the output; thus, we have a NOT-AND gate. This type of relationship also applies to the NOR (NOT-OR) and OR gates. A NOR gate is the same as an OR gate with an inverter placed at the output.

*Assistant Technical Editor

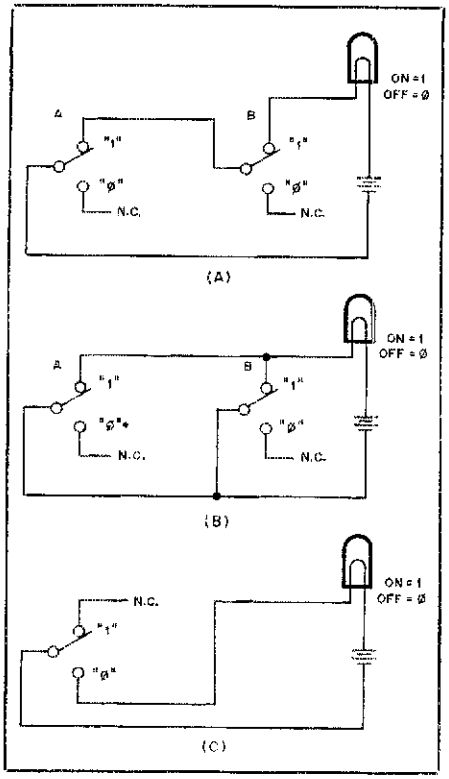


Fig. 1 — A lamp, a battery and toggle switches can be used to demonstrate simple logic operations. The circuit shown at A performs the AND operation, while the OR function is implemented at B. At C is the inverse, or NOT, operation.

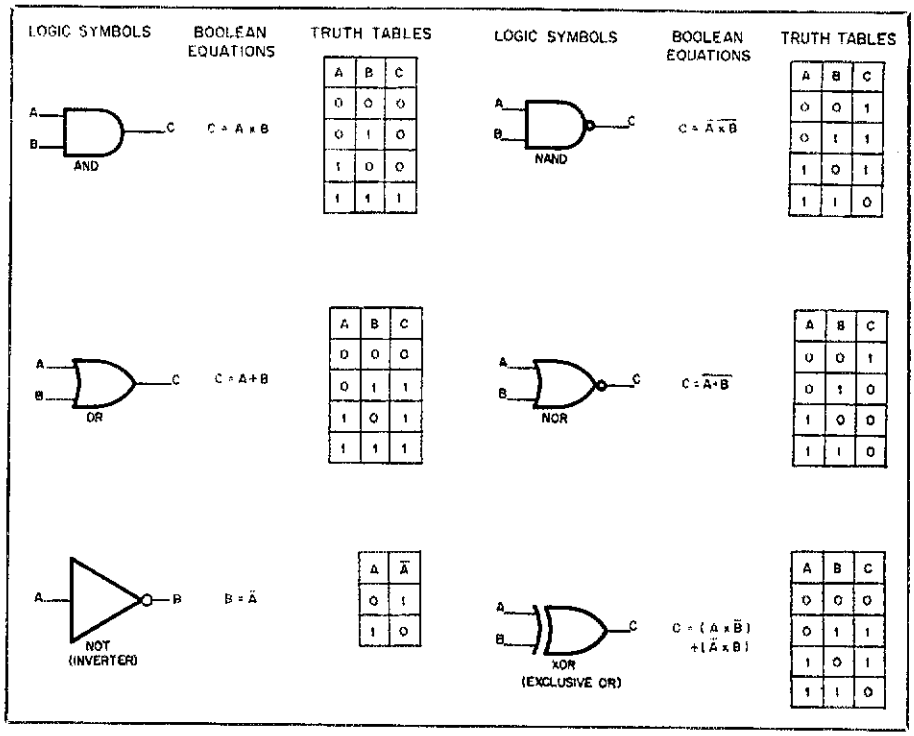


Fig. 2 — Standard logic symbols, Boolean equations and truth tables for the logic gates discussed in the text.

The last gate shown in Fig. 2 is similar to the OR gate, but with an important difference. The XOR, or "exclusive or," gate is like the OR in that the output will be true if input A or input B is true (that's the *or* part). If A and B are *both* true, the XOR output, unlike the OR output, will be false. One input or the other can be true, but not both (that's the *exclusive* part). By placing an inverter after the XOR gate we can form the XNOR function. It's analogous to the NAND and the NOR functions.

Another Way to Represent Logic Functions

As useful as truth tables are, they do have limitations. One problem is that they take too long to write out for complex circuits. We need a shorter way to represent logic circuits. This brings us to Boolean algebra. Don't worry, we won't be wading through any proofs or theorems. We're just going to "borrow" a few symbols and some basic principles to help us in our logic work.

In normal algebra, there is a symbol for each mathematical operation, such as addition (+), subtraction (−) and multiplication (×). There is also a Boolean algebra symbol for each of the logic operations. The OR operation symbol is "+." For example, we can write the logic expression for a two-input OR gate as A + B = C. The AND operation is represented by ×, and a bar over a variable indicates the NOT operation. If the bar is placed over an expression, such as $\overline{A + B} = C$, it means that you first find the value of the expression (A + B) and then take the inverse. If A + B = 0, then $\overline{A + B} = 1$. There is also a symbol for the XOR operation, it is ⊕. The Boolean equations for the various gates are given in Fig. 2.

Analyzing Logic Circuits

So far we have been doing "ground work" — learning the basics of logic. Now we can begin to use these basics to help us understand how logic circuits function.

There is usually more than one way to do something, and analyzing a logic circuit is no exception. The circuit shown in Fig. 3A, for example, can be analyzed in a number of ways. One method is to construct the truth table for the circuit. We begin by writing down all the possible input combinations. Since the circuit has two inputs, there are four possible combinations. These are listed in the left-hand columns of the truth table shown in Fig. 3B. To make it easier to keep track of the various logic states, four intermediate circuit points have been labeled ($\bar{A}$, $\bar{B}$, C, D). These points are included in the truth table. Circuit point E, the output, is the last column of the truth table. Now, all we have to do is fill in the table and we'll know the output state for any combination of input states!

It's really easier than it might sound. First, $\bar{A}$ and $\bar{B}$ are simply the inverses, or complements, of A and B. If A is a 0, then $\bar{A}$ is a 1. The next step is to determine the states of points C and D. Fig. 3 shows that the state at point C is the AND of $\bar{A}$ and B. Anytime $\bar{A}$ and B are *both* 1, C will be a 1. Using the $\bar{A}$ and the B table columns, we can fill in the C column. We can fill in the D column in exactly the same manner, except that A and $\bar{B}$ are the inputs. The last step is to form the OR of C and D to produce E, the circuit output. This completes the truth table and the analysis of the circuit. Easy, wasn't it?

In the "truth table approach," we start

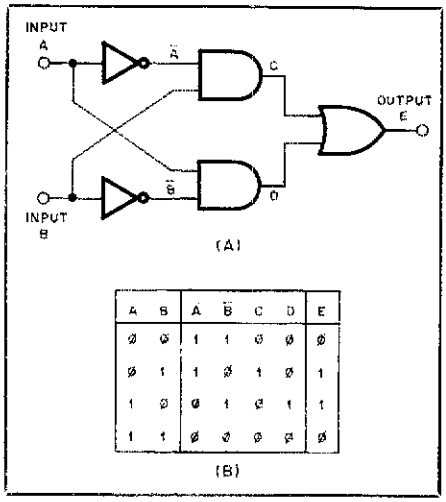


Fig. 3 — Analyzing logic circuits is simplified by using a systematic approach. Two methods of analyzing this circuit (A) are explained in the text. The truth table for the circuit is shown at B.

at the inputs and work toward the output. We could start at the output and, using the Boolean algebra expressions we talked about earlier, work toward the inputs.

To use this approach to analyze the Fig. 3 circuit, we begin by writing the Boolean expression for point E, the output:

$$E = C + D \qquad \text{(Eq. 1)}$$

Then we move a step closer to the inputs by writing the expressions for C and D:

$$C = \overline{A} \times B \qquad \text{(Eq. 2)}$$

$$D = A \times \overline{B} \qquad \text{(Eq. 3)}$$

By combining these expressions, we obtain the expression for the complete circuit:

$$E = (\overline{A} \times B) + (A \times \overline{B}) \qquad \text{(Eq. 4)}$$

Does this look familiar? It's the same as the expression for the XOR gate shown in Fig. 2. In fact, Fig. 3 is one way the XOR operation can be performed by a combination of AND, OR and NOT gates.

This brings up an important point: We can perform *any* logic operation by using a combination of OR gates and inverters or AND gates and inverters. As an illustration, let's form a NOR gate from an AND gate and some inverters.

Examining the truth tables in Fig. 2, we see that the NOR gate output is true when A *and* B are false. The "and" is the clue. If we invert both inputs and then AND them, the result is exactly the same as a NOR gate (Fig. 4). This result can also be written as a logic expression:

$$\overline{A} \times \overline{B} = \overline{A + B} \qquad \text{(Eq. 5)}$$

By the way, this is an application of what is known as DeMorgan's theorem. It is one of the important results of Boolean algebra. There are many other examples of this idea. For instance, how would you construct an OR gate using AND gates and inverters? The truth tables in Fig. 2 and 4 should give you a hint.

Some Real Logic Devices

So far, we've been discussing digital logic in general terms, but have not talked specifically about how the logic is implemented in practical circuits. The switch and lamp circuits of Fig. 1, while good illustrations, are not the kind of logic circuits in which amateurs are generally interested. So let's take a look at some IC logic devices — types that are frequently used in Amateur Radio work.

Transistor-Transistor Logic

TTL, short for transistor-transistor logic, is one of the two most popular types, or families, of IC logic devices. Of the various TTL devices, the 7400 series is perhaps the most common. The 7400 series ICs you are most likely to encounter are packaged in dual in-line packages, or DIPs. Shown in Fig. 5 are some 7400 series gates. Like many TTL ICs, these

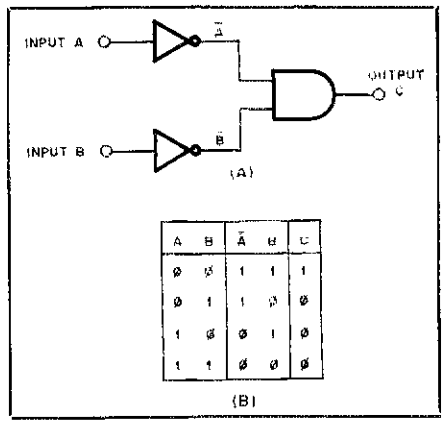


Fig. 4 — A particular logic function can be performed by a combination of other types of logic gates.

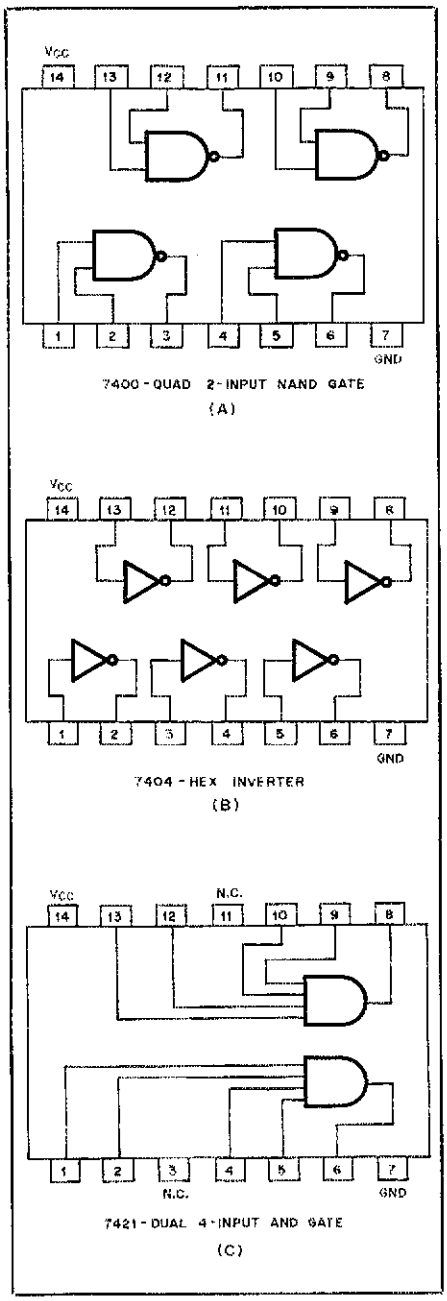


Fig. 5 — Package outlines and pinouts of some common 7400-series devices.

devices contain more than one gate. For example, the 7421 (Fig. 5C) contains two AND gates, each of which has four inputs. This device is referred to as a dual, 4-input AND gate. Because the gates in a single package may be used in *different* parts of a schematic diagram, the representations used in Fig. 5 aren't always convenient. Normally, the individual gates are drawn without the package outline. Pin numbers are then written near the appropriate input and output lines to identify the gates.

In addition to the simple logic gates, other functions are available in the 7400 series. These include flip-flops, counters, registers and many others (there are over 300 devices in the series!). We'll have to save those devices for another time when we discuss sequential logic.

Electrical Characteristics

Earlier, we related true and false logic states to some physical condition, like the position of a switch or whether or not a lamp is on. When dealing with logic ICs, the physical property most often used to represent logic states is voltage. If an input or output voltage is above a specific value, it represents one of the logic states and we refer to it simply as a HIGH level. Voltages below a specified limit are called LOW levels and represent the other logic state. As long as the voltages are above or below the limits, we don't care what the exact values are. Generally, the true state is assigned to the HIGH level and the LOW level is taken to be the false state. It is also common to assign the binary value 1 to the HIGH level and 0 to the LOW level.

Table 1 contains some of the general electrical specifications for three types of TTL ICs. Keep in mind that these are *general* specifications; specific devices may have slightly different specifications (you'll want to consult a manufacturer's data book when dealing with a critical parameter). First, let's see what Table 1 tells us about the voltage limits we spoke of earlier. Starting with the standard 7400-series input values, we see that the *minimum* HIGH input voltage is 2.0 V. This means that if the voltage at a gate input is 2.0 V or greater (but below a maximum of about 5.0 V), we can be certain that the gate will respond to the input as a HIGH level.

The *maximum* LOW input voltage is listed as 0.8 V, meaning that the input voltage must be at or below this level in order to guarantee a LOW input. Between 0.8 and 2.0 V is a sort of "no man's land." Voltages in this region are undefined and can result in improper circuit operation.

As you may have guessed, the output voltage levels produced by 7400-series devices are compatible with the input level requirements. This allows the output of one device to be directly connected to the input of another, simplifying our logic circuits. The HIGH level output voltage is

Table 1

Electrical Characteristics of Common Logic Families[4]

	Standard TTL (active pull-up) V_{CC} = +5.0 V	*Low-power TTL (74L)* V_{CC} = +5.0 V	*Schottky low-power TTL (74LS)* V_{CC} = +5.0 V	*CMOS (4000A)* V_{CC} +5.0 V	*CMOS (4000A)* V_{CC} +10.0 V	*CMOS (4000B)* V_{CC} +5.0 V	*CMOS (4000B)* V_{CC} +10.0 V	*CMOS (4000B)* V_{CC} +15.0 V	*CMOS (74C00)* V_{CC} +5.0 V	*CMOS (74C00)* V_{CC} +10.0 V	*CMOS (74C00)* V_{CC} +15.0 V
minimum HIGH input voltage	2.0 V	2.0 V	2.0 V	3.5 V	7.0 V	4.0 V	8.0 V	12.5 V	3.5 V	8.0 V	—
maximum HIGH input current	40 μA	20 μA	20 μA	—	—	—	—	1.0 μA	—	—	1.0 μA
maximum LOW input voltage	0.8 V	0.8 V	0.8 V	1.5 V	3.0 V	1.0 V	2.0 V	2.5 V	1.5 V	2.0 V	—
maximum LOW input current	1.6 mA	400 μA	400 μA	—	—	—	—	1.0 μA	—	—	1.0 μA
minimum HIGH output voltage	2.4 V	2.4 V	2.5 V	4.95 V	9.95 V	4.95 V	9.95 V	14.95 V	2.4 V	9.0 V	—
maximum HIGH output current	800 μA	400 μA	400 μA	(no load) 300 μA (2.5 V)	250 μA (9.5 V)	(no load) 510 μA (0.4 V)	1.3 mA (9.5 V)	3.4 mA (13.5 V)	(360 μA) 1.75 mA (0 V)	(10 μA) 8.0 mA (0 V)	—
maximum LOW output voltage	0.4 V	0.3 V	0.5 V	0.05 V	0.05 V	0.05 V	0.05 V	0.05 V	0.4 V	1.0 V	—
maximum LOW output current	16 mA	4.0 mA	8.0 mA	(no load) 300 μA (0.4 V)	600 μA (0.5 V)	(360 μA) 500 μA (0.4 V)	1.3 mA (0.5 V)	3.4 mA (1.5 V)	(360 μA) 1.75 mA (5 V)	(360 μA) 8.0 mA (10 V)	—

guaranteed to be 2.4 V or greater, and the maximum LOW output voltage is specified as 0.4 V. Both of these values are 0.4 V *inside* the respective input ranges. This "safety factor" is often called the *noise margin*. An output signal can have 0.4 V of unwanted variation, or "noise," superimposed on it and still be within the input limits.

The remaining 7400-series values in Table 1 are the input and output currents. In the LOW state, a 7400-series gate output can pass a maximum current of 16 mA while maintaining an output voltage of 0.4 V or less. An output may pass more than 16 mA, but the voltage could rise above the specified 0.4-V maximum. In the LOW state, current flows *into* the output pin. This is often termed current "sinking." Thus, we can say that the output can sink 16 mA in the LOW state (conventional current, not electron flow). When the output is HIGH, it can *source* (current flows out of the gate) only 800 μA (0.8 mA) of current.

Now turning to the gate input, we see in Table 1 that the maximum HIGH input current is 40 μA. This is the maximum current that can flow when the input voltage is in the HIGH region (2.0 to 5.0 V). This current flows into the gate, or in other words, the input sinks current in the HIGH state. If the input voltage is in the LOW region (0 to 0.8 V), the maximum current that can flow out of (the input sources current in the LOW state) the input is 1.6 mA.

What's the importance of the input and output current specifications? The answer to that question is *fanout*. In all but the simplest circuits, the output of a gate will be connected to several inputs. Fanout is the number of inputs that can be driven from a single output. Since each input can source 1.6 mA in the LOW state and an output can sink a maximum of 16 mA, the fanout is 16 ÷ 1.6, or 10, in the LOW state. Similarly, the HIGH state fanout is 800 μA per output ÷ 40 μA per input, or 20. Because the LOW state is the limiting condition, the gate fanout is said to be 10. Understanding these input and output specifications is also important when we connect logic ICs of one type to ICs of another type or to other kinds of circuits.

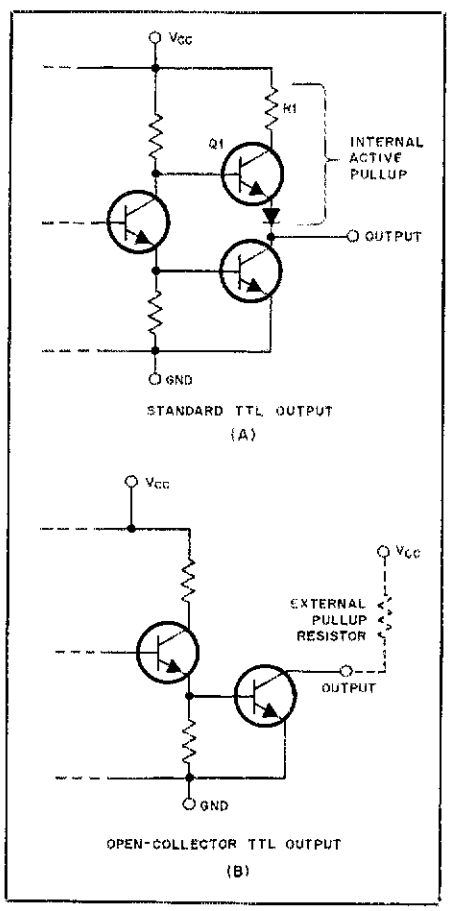


Fig. 6 — Shown at A is the output circuit of a standard 7400-series gate. Q1 and R1 form the internal active pull-up circuit that supplies current to the output pin. Open-collector gates (B) do not have an internal pull-up. In most circuits an external resistor is used to "pull up" the output to V_{CC} when it is in the HIGH state.

The standard 7400 series is not the only TTL family of devices in use. Other varieties, in which particular characteristics have been optimized, are also available. For example, there is a 74L00 series. The L stands for low power. These devices perform the same function as the 7400 counterparts, but they consume less power. The penalty you pay for this reduced power consumption is lower operational speed. There are several other 7400 variations, but the most popular is the 74LS00 series. These devices offer high-speed operation *and* lower power consumption. Many microcomputer devices are designed to be compatible with the 74LS00 series. The input and output specifications for this TTL family are shown in Table 1.

Open Collectors and Wired ORs

A special type of output circuit is used in certain TTL devices. It is called the "open-collector" output. A "normal" TTL output is shown in Fig. 6A: An internal active "pull-up" circuit, formed by a resistor and a transistor, is used to connect the output pin to the supply when the output is in the HIGH state. An open-collector output stage (B) has no internal pull-up; it is simply an npn transistor with the collector connected directly to the output pin and the emitter internally connected to ground. In the LOW state, the transistor is turned on, providing a low-resistance path from the output pin to ground. The transistor is turned off in the HIGH state. An external pull-up resistor connected between the output and the supply provides a high-voltage level in this state.

The value of an open-collector output lies in the fact that two or more of these outputs can be connected together — something you *cannot* do with other TTL outputs. This type of circuit, often called a "wired-OR," is shown in Fig. 7A. Two truth tables are shown for this circuit: At B, ones and zeros are used to represent

HIGH (1) and LOW (0) levels (in the same manner used in the earlier truth tables). We can see from this truth table that this circuit produces the AND logic function. Why then is this circuit called a wired-OR? To answer that question we must take an "upside-down" look at true and false logic states.

Negative and Active-Low Logic

So far we have assumed that the HIGH level (a high voltage) was the true state, and we have been using a binary one to represent that state. This seems reasonable, but remember that these assignments are arbitrary. We could just as well call the LOW level (0 V) true and the HIGH level (+5 V) false. This is just what is done in many logic circuits. In the second truth table (Fig. 7C), true and false logic states, rather than ones and zeros, are used. We've chosen to let the true state be a LOW level and the HIGH level be the false state. Using this convention, we see that the circuit *does* produce an OR logic function: Input A *or* B must be true to cause the output to be true.

Sometimes, this logic convention is called "negative" or active-low logic. Meaning simply that the low-voltage level is the state that causes something to happen. Fig. 8 is a practical example of a circuit in which active-low logic is used. In order for the relay to close, current must flow from the +5 V supply, through the coil and into the gate output to ground. This is what happens when the output is in the LOW state. If the output is HIGH (+5 V), no current flows through the relay coil (no potential difference across the coil). The truth table shows that inputs A and B must be LOW in order for the relay to be activated. They are active-low inputs. Because the output must be LOW before the relay will close, we call it active-low, also. To help make schematic diagrams more understandable, signal lines are often labeled ($\overline{\text{RELAY}}$ in our example). A bar placed over the label indicates that the signal is active-low. In addition to having many uses in conventional logic circuits, active-low signals are widely used in microcomputer memory and interface ICs.

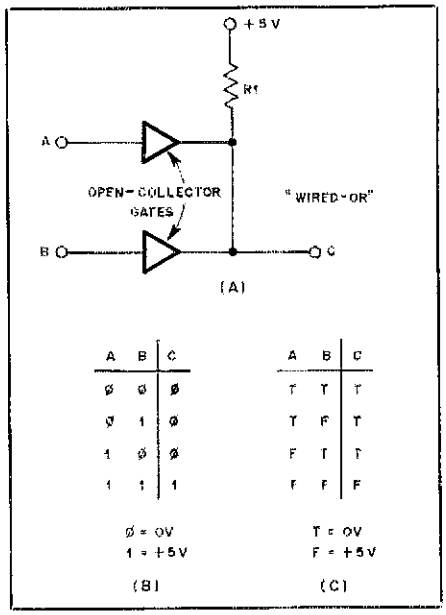


Fig. 7 — An example of a circuit using open-collector gates (A). The gates used here are buffers (the output state is the same as the input state). Other types of gates with open-collector outputs could be used in their place.

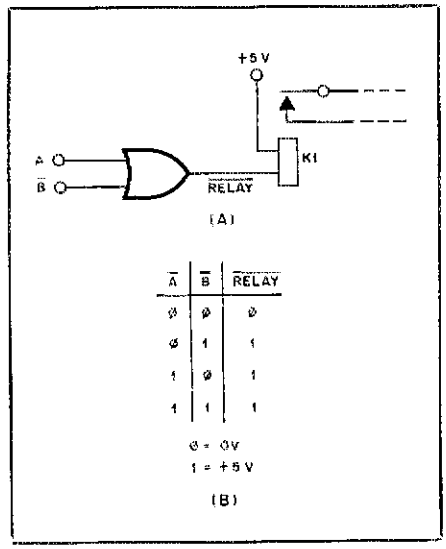


Fig. 8 — A practical circuit example using active-low signals.

CMOS

The various TTL families (standard, low-power, etc.) are basically similar, differing only in specific characteristics. The next type of digital IC we're going to examine, CMOS (complimentary-symmetry metal-oxide semiconductor), is much different. To begin with, CMOS devices are constructed from field-effect transistors (FETs) rather than the bipolar transistors used in TTL devices. The result is that CMOS ICs consume far less power than even the 74L00 series ICs. CMOS ICs are also much more tolerant of supply-voltage variations. TTL requires a fairly closely regulated 5-V supply, while CMOS will operate with supplies of about 3 to 18 V. This characteristic, coupled with the low-power requirement, makes CMOS ideal for battery-powered circuits.

As you might expect, CMOS ICs do have certain limitations. Compared to TTL, CMOS is slow. If a particular TTL device will operate at 15 MHz, a similar (in function) CMOS IC may operate to only, say, 4 MHz. In applications where high speed is not required, the advantages of CMOS make it more attractive than TTL.

While we're comparing CMOS and TTL, another characteristic should be mentioned — static sensitivity. TTL is relatively immune to static damage, but CMOS ICs can be damaged easily by static discharges. For this reason, CMOS devices are normally stored in conductive foam or other static preventive material. You should exercise some care when handling CMOS. Simply touching a grounded surface with the conductive foam and your hand before removing the IC from the foam is generally all that is necessary to prevent damage to the device.

There are two other precautions you should take when working with CMOS: Always disconnect the supply voltage before removing CMOS ICs from, or inserting them into, a circuit, and *never* make or break a connection to an IC with the power applied. If you follow these rules, you'll find CMOS to be easy to use.

There are three families of CMOS ICs commonly available. Two of these, the 4000A and the 4000B series, are basically the same, except that the B series has additional output buffer stages. The buffers allow the outputs to operate at higher current levels. There is also a 74C00 series of CMOS ICs. These devices are *functionally* similar to the equivalent TTL device. The 74C02 CMOS IC and the 7402 TTL IC, for example, are both quad two-input NOR gates. While both devices perform the same logic function and have the same pinout, they cannot be interchanged in most circuits.

CMOS Electrical Characteristics

Table 1 contains some of the electrical specifications for the three CMOS families we have mentioned. Because CMOS logic can be operated from a wide range of power-supply voltages, three sets of specifications are listed for each device type. Each set corresponds to a different power-supply voltage (V_{DD}). At a supply voltage of 15 V, the minimum HIGH input voltage (for the B series) is 12.5 V; when a 5-V supply is used, the HIGH input is 4 V. Most of the other specifications also change with supply voltage. In Amateur Radio applications, it is often convenient to power logic circuits from a 12-V supply. The specifications listed for V_{DD} = 10 V in Table 1 can be used for circuits operating at 12 V.

CMOS IC input and output currents are much smaller than those of TTL devices. The maximum input current is less than 1 μA, compared to 1.6 mA for standard TTL! If a 5-V supply is used, a B-series output can pass approximately 500 μA. In the HIGH state, more current can be drawn from the output, but the voltage will drop: At 1.6 mA, the output voltage falls to 2.5 V.

Looking at the input and output current specifications, you might conclude that the fanout of CMOS is very high. In most cases this is correct, but when you are working with circuits that operate at high speeds, another factor enters the picture. Each CMOS input has a capacitance of 7.5 pF. This load capacitance must be

charged by the output before the voltage can reach a HIGH level. The larger the load capacitance, the longer it takes to charge it (a series R-C circuit). If you connect 10 inputs to an output, the total load capacitance becomes 75 pF. This increases the length of time required for the output to change from one state of another and limits the operating speed of the circuit. This isn't a problem very often, so we needn't be overly concerned about CMOS fanout capabilities.

Experimenting with Logic ICs

We mentioned earlier that experimenting with logic circuits can be very enjoyable. That's true partly because it's so easy to do. Most of the time you don't even need to heat up a soldering iron! If you use solderless "breadboards," you can wire a circuit simply by plugging in the ICs and making interconnections with no. 26 solid insulated wire.

A typical logic circuit, wired on an AP Products Super-Strip, is shown in the title page photograph.[1] TTL ICs are used in this example, and a homemade 5-V supply powers the circuit. LEDs (light-emitting diodes) and a simple voltmeter serve as output state indicators. Low-cost logic probes, used to determine input and output logic levels, are also available. If you want to experiment with CMOS devices, the same 5-V supply used with TTL circuits can be used to power your CMOS circuitry. A 12-V supply or a 9-V transistor radio battery also make good power sources for CMOS projects.

Finding the necessary components is often difficult for the builder and experimenter, but it shouldn't be a problem when you're working with logic projects. Dozens of mail-order suppliers carry complete stocks of 7400 and 74LS00 series TTL and CMOS devices.[2] Radio Shack stores carry many popular logic ICs and most of the other components the experimenter will need.

Once you have begun experimenting, it's logical that you'll want to increase your knowledge of digital circuits. The *ARRL Handbook* contains an excellent section on digital logic that should help you to enjoy your experimenting even more![3]

Notes

[1] AP Products, Inc., Painesville, OH 44077. The Super-Strip (Model SS-2) is available from Priority-One Electronics (see note 2).

[2] The following suppliers sell a wide variety of electronic components by mail: Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002; Priority-One Electronics, 9161 Deering Ave., Chatsworth, CA 91311; Mouser Electronics, 11433 Woodside Ave., Santee, CA 92071.

[3] G. Woodward, ed., *The Radio Amateur's Handbook*, 60th ed. (Newington: ARRL, 1982), pp. 4-48 to 4-61.

[4] This data represents typical IC family characteristics compiled from various sources. Specific device characteristics may differ from those listed.

References

Motorola Semiconductor Data Library/CMOS, Vol. 5, Series B. Phoenix, Arizona: Motorola, Inc., 1976.

TTL Data Book. Mountain View, California: Fairchild Camera and Instrument Corp., 1978.

Strays

FLASH! SHUTTLE FLIGHT WITH HAND-HELD LOOKS PROMISING

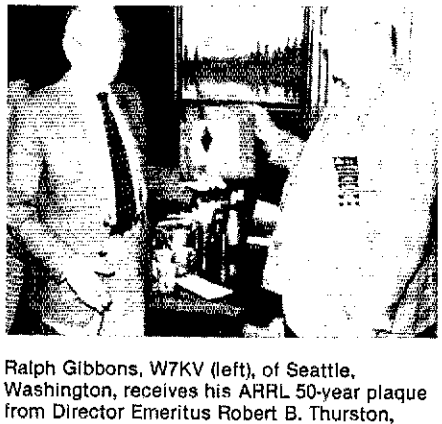
☐ As this issue was going to press, we received unofficial word that Astronaut Owen Garriott, W5LFL, will be authorized to carry a specially designed 2-meter hand-held transceiver aboard the STS-9 Space Shuttle flight, scheduled for September. Details will follow.

AFCEA LUNCHEON THIS MONTH

☐ The Washington Chapter of the Armed Forces Communications and Electronics Association (AFCEA) will hold its annual luncheon on May 13 at the Shoreham Hotel, Washington, DC. The guest speaker will be Dr. Robert S. Cooper, director of the Defense Advanced Research Projects Agency. For more information and reservations, call Diana Sibley at 202-457-3060.

MOVING? CHANGING CALL?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL Hq. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive *QST* without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each request.



Ralph Gibbons, W7KV (left), of Seattle, Washington, receives his ARRL 50-year plaque from Director Emeritus Robert B. Thurston, W7PGY. W7KV is a past director of the Northwestern Division, when Hiram Percy Maxim, W1AW, was ARRL President.

WANTED: INFO ON MODIFYING HF EQUIPMENT

☐ *QST* would welcome current information on modifying hf transmitting and receiving equipment for 30-meter operation. We would be most interested in successful modifications to the more popular transceivers. These need not be limited to full-length articles. If manufacturers, their distributors or individuals are offering modification kits or factory modifications, we would appreciate knowing about them. Please direct your related correspondence to the *QST* Senior Technical Editor, ARRL Hq.

When Karl Stephan, KD5DC, of Austin, Texas, checked out his homemade 432-MHz helical antenna last spring, he found an unexpected guest had set up housekeeping on the matching network. The guest has since left, so KD5DC can get ready for another "bird" — the AMSAT-Phase IIIB satellite.

Recognize this equipment? It's a World War II Canadian Army Model 19 set — and it still works! Dick Moores, VE3LRB, of London, Ontario, warms it up once each year, on Remembrance Day, November 11. *(VE3GRO photo)*

Product Review

Conducted By Paul K. Pagel,* N1FB

ICOM IC-290H All-Mode 2-Meter Transceiver

The first reaction to this radio has to be, "Boy, they're sure packing a mountain of features into a molehill of gear these days!" At first glance, the '290H, 25-W successor to the 10-W '290A, could be mistaken for an fm-only box; it's the same size and weight as 2-meter fm gear produced only a few years ago. A second glance at the knobs and buttons on the front panel makes it clear that you're looking at a state-of-the-art multimode transceiver.

Well designed for ease of operation and aesthetics, the front panel has no less than 16 knobs, switches and buttons (others are hidden under the top cover). Each control is marked clearly, making mobile operation, even at night, easy to master. The bright, frequency readout LEDs go to four decimal places (100s of hertz for ssb and cw). Other LEDs indicate that a signal is being received or sent, that a priority frequency (more on that later) is in use, and that the radio is in the DUPLEX mode. An S/RF indicator shows S-units and relative output power in decibels using a row of seven LEDs.

Features Galore

It's no longer necessary to ask if a radio like this is synthesized, whether it scans or has memory capability. The appropriate questions are: Is it easy to tune? How many scanning functions and memories does it have? Does it have two VFOs for added versatility? How about RIT? A noise blanker? Automatic gain control? Standard tone pad for repeater autopatch use?

The answers: for the most part, four and five, yes, yes, yes, yes, yes. In fact, you'd be hard-pressed to think of a feature it doesn't have, and to find a control that isn't convenient to find and operate. To provide an idea of what this radio is designed to do, let's take a look at the scanning capabilities.

Pressing the S/S (Scan/Stop) button initiates the SCAN mode, indicated by two flashing decimal points in the frequency display. After programming the five memory frequencies, you can scan them (plus the two VFO frequencies) by pressing the button labeled M-R. Or, if you're anxious to find a QSO, you can scan the entire frequency range — all 4.4 MHz of it. Or, you can select the range to cover, for example, only the ssb subband. Want to have the radio stop at any *empty* frequency? Flick the BUSY/EMPTY switch under the top cover.

One scanning feature in particular caught my eye. In my review of another manufacturer's fm-only transceiver a couple of years ago, I lamented the lack of a scanning delay; whenever a busy frequency was reached, the scanner would pause, but then travel on its merry way the instant the carrier dropped out. I found this annoying, and said so in the review. ICOM must have been listening, as the IC-290H not only has a scan/stop function, but pause time can be adjusted (by means of a control under the top cover) from 5 to 20 seconds. Problem solved! Scanning speed is also adjustable. A convenient 1 kHz button allows scanning (and tuning) in 1-kHz increments rather than the standard 5-kHz (fm) or 100-Hz (ssb/cw) steps.

The IC-290H sports several other features that set it apart from run-of-the-mill 2-meter transceivers. RIT (receiver incremental tuning) allows you to raise or lower the receive frequency by as much as 800 Hz. This is especially handy for satellite work and for keeping drifting stations within earshot. By pressing the AGC button, you can improve the reception of stations that tend to fade quickly. A noise-blanker (NB) switch activates a circuit that reduces pulse-type noise such as that generated by automobile ignitions. Have a favorite frequency? You can monitor it while enjoying a QSO by pushing the PRIORITY button, which sends the receive frequency to your chosen frequency for an instant every five seconds. The rear panel contains jacks for an external speaker and a key, as well as an accessory socket, power socket and antenna connector.

A second VFO was at one time a luxury reserved only for hf transceivers in the $1000-and-up price range. No longer. The two VFOs in the IC-290 make it simple to find a clear frequency. If you're in the midst of heavy

Table 1

ICOM IC-290H Multi-Mode 2-Meter Transceiver, Serial No. 02128

Manufacturer's Specifications	*Measured in ARRL Lab*
Frequency coverage: 143.8000 to 148.1999 MHz.	As specified.
Modes of operation: Fm, usb, lsb, cw.	As specified.
Transmitter power output (HI): 25	30
(LO): 1	2
Frequency readout: Digital, 5-digit green LED display, 100-Hz resolution.	As specified.
Frequency resolution: Ssb: 100-Hz steps; fm: 5-kHz steps (1 kHz selectable).	As specified.
kHz/turn of knob: 5 kHz (250 kHz in fm; 50 kHz selectable).	As specified.
RIT range: ±800 Hz.	As specified.
S-meter sensitivity: Not specified.	S1, 0.95 μV; S9, 3 μV; S9 + 20 dB, 6 μV.
Harmonic suppression: 60 dB below peak power output.	62 dB below peak power output.
Current drain at 13.8-V dc: Approx. 6.0 A (max.).	5 4 A (HI), 2.0 A (LO)
Receiver sensitivity: Fm — more than 30 dB S + N + D/N + D at 1 μV. Less than 0.6 μV for 20 dB noise quieting. Ssb, cw — less than 0.5 μV for 10 dB S + N/N.	Receiver dynamics: Noise floor (MDS): −138 dBm. IMD DR: 85.5 dB. Blocking: Noise limited. Third-order intercept: −9.75 dB. Receiver quieting: 0.26 μV/20 dB
Size (HWD): 2.5 × 6.7 × 8.6 in. (64 × 170 × 218 mm).	As specified.
Weight: 5.5 lb (2.5 kg).	As specified.

*Assistant Technical Editor

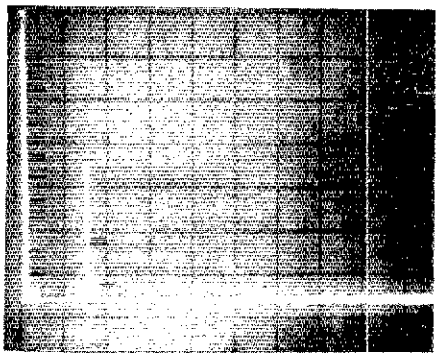


Fig. 1 — Spectral display of the IC-290H. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 30 watts at a frequency of 146.010 MHz. The fundamental has been reduced in amplitude approximately 34 dB by means of notch cavities; this prevents analyzer overload. All spurious emissions are at least 62 dB below peak fundamental output. The IC-290H complies with current FCC specifications for spectral purity.

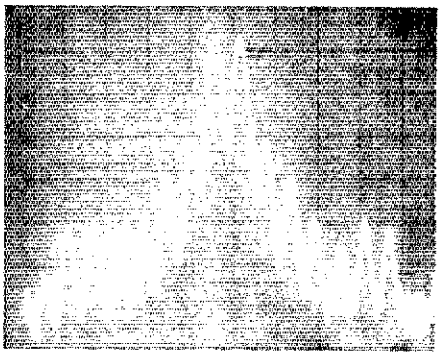


Fig. 2 — Spectral display of the IC-290H output during transmitter two-tone IMD test. Third-order products are 30 dB below PEP and fifth-order products are 40 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated input power on the 2-meter band.

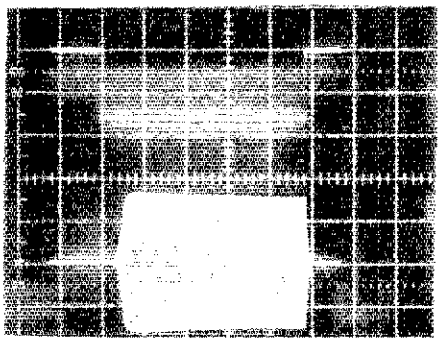


Fig. 3 — Cw keying waveform of the IC-290H. Upper trace is the actual key closure; lower trace is the rf envelope. Each horizontal division is 5 ms. This keyed wave has a rapid fall time.

QRM and want to find another frequency, just change VFOs, search for a clear frequency, and change back. The frequency you left on one VFO is memorized when the VFO is switched. A second VFO is also useful if you'd like to "keep an ear on" a particular frequency while working stations elsewhere on the band.

Another feature worth mentioning is the nonstandard offset selection. For "oddball" repeater splits, the offset can be changed from ±600 kHz quickly and easily.

Despite the initial challenge of learning the functions and operations of the various controls, the IC-290H is a breeze to use. Right after unpacking the box, I hooked it up to a power supply, plugged the supply into the wall socket, connected an antenna, set the MODE switch to USB, and proceeded to run a slew of nearby stations. I then realized that I had inadvertently chosen to break in the radio during the height of an ARRL VHF QSO Party!

It was a good omen. The ssb subband hasn't seen that level of activity since, but I've made my share of contacts through various conditions and have had no trouble getting into area repeaters. The receiver sensitivity seems excellent, as one would expect from the manufacturer of the IC-2A.

Technical Description

Frequency control is accomplished with a microprocessor-based, 100-Hz-step digital PLL synthesizer. The circuit serves as the local oscillator for both transmit and receive with output approximately 10.75 MHz below the receive frequency. The operating frequency is controlled by pulse signals generated by the rotary encoder at the tuning knob being added to or subtracted from the preset frequencies in the μP. The μP controls the PLL circuit, which in turn determines the output frequency of the VCO.

Incoming signals are mixed with the LO output from the PLL circuit. In the ssb and cw modes, the circuits function as a single-conversion type with a 10.75-MHz i-f; in fm, they function as a dual-conversion type with an additional 455-kHz i-f.

The transmitter carrier frequency is 10.7485 MHz for usb and 10.7510 MHz for lsb. Carrier and voice signals are sent to a balanced modulator, where the dsb suppressed-carrier signal is generated. The unwanted sideband is removed by a crystal filter, and an ssb signal of 10.75 MHz results.

In the cw mode, the usb carrier is shifted up about 800 Hz and is then fed to the transmit mixer. In the fm mode, it uses another crystal oscillator to produce the 10.75-MHz signals that are direct-frequency modulated. The ssb, cw or fm signal is mixed with the LO output from the PLL circuit, and is then amplified, filtered and sent to the antenna.

Manual

Covering 44 pages, the manual is clear, thorough and well-written. There are typographical errors, to be sure, but they are rare. Diagrams liberally sprinkled throughout show how to mount the '290H in a car, an exploded view of the mike plug, the operation of the various scanning functions, AMSAT-OSCAR 8 frequencies and basic operation, the location of key components under the top and bottom covers, and block diagrams of the rf, scan control, main and PLL circuits. In addition, there is a troubleshooting chart, individual descriptions of the various circuits, and photos and identifications of available options, such as ac power supply, scanning mike, mobile speaker and condenser mike.

Separate from the manual are a fold-up, two-color, board-layout diagram and a complete schematic, which should make it easy to identify errant components or to make modifications.

Criticisms

While it has many different features designed to make operating versatile and enjoyable, the IC-290H lacks a couple of circuits that would have made the radio complete. There's no quick and easy way, for example, to decide on the spur of the moment to head for a distant part of the band. If you're listening to a W1AW bulletin on 147.555, for example, and hear that the Perseids are due at any time, you'll want to try to work some meteor scatter at the low end. How do you get there in a hurry? If you haven't programmed an ssb frequency into a memory or a VFO, you can either hit the SCAN button and wait for the frequency to make its way down, or you can rotate the tuning knob about 13 times (in either direction, thanks to the continuous tune feature that prevents out-of-band operation). If you leave the MODE switch in the FM position, the frequency moves in 5-kHz increments (selectable to 1 kHz), so it doesn't take *too* long to find the ssb subband. However you decide to get to the low end of the band, it's a minor inconvenience. A MHz control switch would have been a nice touch. In addition, there is no provision for VOX, and there is no mike-gain control.

On the plus side, the '290H is better suited than its predecessor for working through the amateur satellites, as it tunes in either direction when in the transmit mode. (The '290A tuned only upward in frequency, making it nearly impossible to send a string of dots to tune in your signal through the satellite.)

Two other changes from the '290A are worth mentioning: Bright-green frequency-readout LEDs replace the red ones, making them easier to read in sunlight, and a yellow "caution" sheet warns of a potential readout problem. It explains that the program that initializes the operating condition of the transceiver may malfunction because of an intermittent connection of the power plug or the power switch being turned off and on too quickly. Although the sheet says it's "not an equipment malfunction," I'm not sure how else it can be described. The problem never arose in the review model, however, and it probably doesn't happen too often. In case it does, the sheet gives a procedure that should solve the problem.

The ICOM IC-290H is distributed in the U.S. by ICOM America, Inc., 2112 116 Ave., N.E., Bellevue, WA 98004. Price class: $550. — *Joel P. Kleinman, N1BKE*

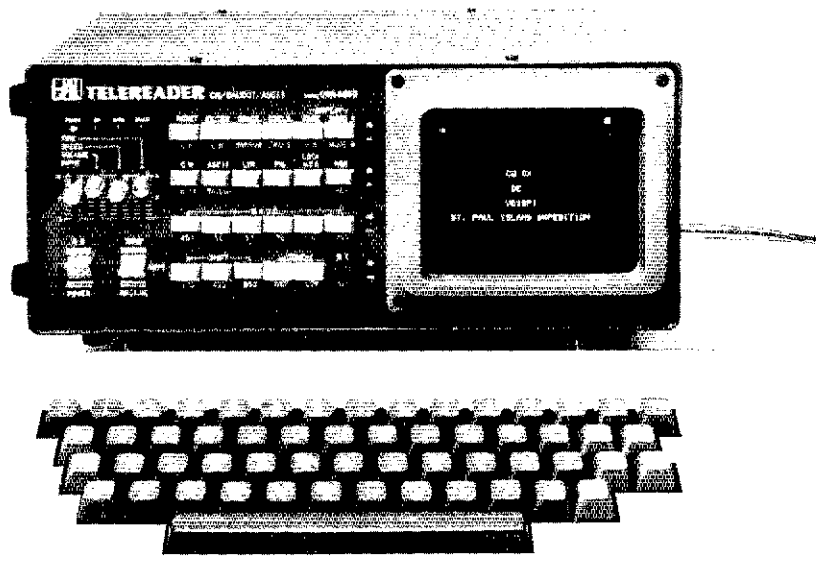
HAL COMMUNICATIONS CWR-6850 TELEREADER® RTTY/CW TERMINAL

☐ While searching for RTTY equipment to use on our St. Paul Island DXpedition,[1] I came across the advertisements for the HAL CWR-6850. It looked like it would fit our needs perfectly. We arranged to have one shipped to Hq. for Product Review and use during the DXpedition.

The '6850 Telereader is a portable RTTY/cw terminal that can send and receive the ASCII and Baudot teleprinter codes as well as international Morse code, at the speeds summarized in Table 2. In the unit are tone generators and demodulators for both the high and low afsk tones. Provision for fsk is also made. Receive

[1]"Canadian NewsFronts," *QST*, November 1982.

and transmit data are displayed on a green, 5-inch CRT. Interface circuitry for driving an external video monitor and a Centronics-compatible printer is included. The entire package weighs just 16.5 pounds,[1] and operates from a 13.8-V dc power source.



Features

It would take many pages to describe every feature of the Telereader. I will highlight the basic modes and features.

Display: In any of the three modes of operation, four "pages" of data can be displayed on the CRT. A page consists of character data in a 32-character-per-line, 20-line-per-page format. The pages are numbered Ø through 3. Page Ø displays the first 19 lines of the receive buffer (608 characters). Page 1 displays 15 lines of the receive buffer, the status line, tape-storage-buffer line and three lines of the transmit buffer. Page 2 is the reverse of page 1 — it displays the entire transmit buffer (480 characters), three lines of the receive buffer and the status/tape-storage-buffer lines. Page 3 displays the six HERE IS messages, three lines each of the transmit and receive buffers, and the status and tape-buffer lines. The status line indicates the page in use and whatever special functions are active. When using an external (optional) tape recorder to store or send messages, the tape-storage-buffer line displays the data going to (from) the tape. The page selected for viewing can be controlled from the front panel or the keyboard.

Keyboard: The keyboard is a stand-alone, ASCII-encoded unit that connects to the main "box" through a multiconductor cable. The keytops are gray plastic with white lettering, and the "feel" of the keys is quite light. Several useful functions can be activated from the keyboard by use of the CTRL key. A list of a few of these functions is shown in Table 3.

Front Panel: There are *30* front-panel controls on the '6850, four of which are slide potentiometers. The INPUT and VOLUME controls set the audio input level and internal-audio-oscillator level, respectively. Morse code speed is set by the SPEED control. The center frequency of the RTTY demodulators can be altered slightly by the FINE control. Two large lever switches control the main POWER and the transmit/receive condition (RECEIVE/TRANSMIT/AUTO). The remaining 24 switches select the display PAGE, the operating mode (MORSE/RTTY, ASCII/BAUDOT); the RTTY BAUD rate (45, 50, 57, 75, 110 or 300) and the RTTY TONE pairs (HIGH or LOW). Other function switches control the unshift-on-space (UOS) function, NORmal or REVerse RTTY receive sense, the cw receiving program (SPACE/NARROW) and the cw receive-FILTER mode.

Rear Panel: The rear panel is filled with jacks, mostly phono types which are used for input/ouput interfacing with a transceiver. Other types of connectors are used for the keyboard, printer, external video monitor, cw key (1/4-inch phone jack) and the dc power connector (polarized).

Firmware: Much of today's communications equipment uses microprocessors, and the CWR-6850 is no exception. The program controlling the '6850 operation is contained in several ROMs. It is quite versatile — for example, the section used to decode international Morse has a special mode which enables the unit to copy poor fists (QLF?). Another feature is the ability to copy any mode while sending ASCII data to the printer.

[1]kg = lb × 0.454

On-the-Air Operation

Initial checkout of the Telereader at my home station indicated no defects. The unit was then repacked in a watertight container for our trip to St. Paul Island.

Our DXpedition RTTY setup consisted of the CWR-6850, a Kenwood TS-520S hf transceiver and a Cushcraft A3 triband Yagi. After our first RTTY CQ, a large pileup ensued. If that wasn't a test for the RTTY filters, nothing was! The unit performed admirably. Although many stations were calling, I had no trouble in "printing" the caller's call signs on the screen. During our entire operation, we had no troubles with the unit. I was amazed of the ability of the '6850 to operate perfectly with widely varying supply voltages; several times the supply voltage dropped to 11 volts and the only ill effect was a slight shrinking of the CRT video.

Back Home

After the trip home, the Telereader was put through the paces at several Hq. employees' ham shacks. Almost all reports were positive. The RTTY filter/demodulator is not as good a performer when copying weak signals, as is true of some other systems. Also, many RTTY terminals provide a "diddle" function that sends the ASCII NUL code or Baudot LTRS code when no character data is present in the transmit buffer. (This function is useful because it keeps the receiving station printer in sync.) On other RTTY systems, the "diddle" function (when enabled) comes on as soon as the operator initiates transmission. The "diddle" then fills in gaps between groups of data. With the '6850 (operating in the CONTINUOUS or "letter" mode) the "diddle" must be turned on and off independently of the status of the transmit line, and it must be turned off before any character data can be sent! In the WORD mode (data transmission being enabled by the detection of a space followed a word) the diddle works as would be expected.

The 32-character-per-line format is somewhat small but necessary when using the built-in 5-inch display. When using an external video monitor, however, 40 or 64 characters is to be preferred.

Table 2

Speeds Available on Telereader Terminal

Code	*Speeds Available*
Morse	4-33 wpm transmit (can be modified); 1-100 wpm receive
Baudot	45.45, 50, 56.88, 74.2, 110 and 300-baud transmit; up to 110-baud receive.
ASCII	Same as Baudot.

Table 3

Keyboard Functions

CTRL:	*Function*
A	On-off control of automatic send-receive (KOS)
D	Extends cw transmit dash length by 25%, increasing the cw weighting.
E	On-off control of the echo from transmit to receive butters.
I	Changes transmit mode from RTTY to cw, and vice versa.
N	Turns the "diddle" on and off.
P	Turns the printer on and off.
Q	Sets the display page.
U	Slows the rate at which data comes out of the transmit buffer. The effective baud rate is 25 regardless of the speed selected.

Conclusions

What an amazing terminal! It is hard to imagine how they pack all those features into such a small package. The versatility of the Telereader makes it ideal for both portable and fixed-station use. It is unfortunate that a little more design effort was not placed in the display and software. Overall, I would rate the CWR-6850 as an excellent, well-built product worth the asking price. It is one of the first imported products offered by HAL. For more information, contact HAL Communications, Box 365, Urbana, IL 61801. Price class of the CWR-6850 Telereader is $1000. — *Gerald B. Hull, VE1CER/WI*

TOKYO HY-POWER LABS HC-200 TRANSMATCH

☐ If you operate with medium power, go out for portable operation or just need a Transmatch to use your 40-meter dipole on the 30-meter band, consider the HC-200. Size and weight make it a viable candidate for mobile operation as well.

Muted green lettering stands in pleasant

Table 4

Tokyo Hy-Power Labs HC-200 Transmatch, Serial no. 829113

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequencies: 80-10 m (8 bands)	
Power-handling capability: 200-W PEP (100-W cw) at 50 ohms	As specified.
Input impedance: 50 ohms (at matched condition)	As specified.
Output impedance: 10-250 ohms unbalanced	
Meter ranges: 20, 200 watts (forward) and SWR	As specified.
Connectors: Three SO-239 and one single-wire terminal	As specified.
Weight: approx. 4.84 lb†	
Size: 3.3 × 8.26 × 7.36 in. (HWD)	

†kg = lb × 0.454; mm = in. × 25.4

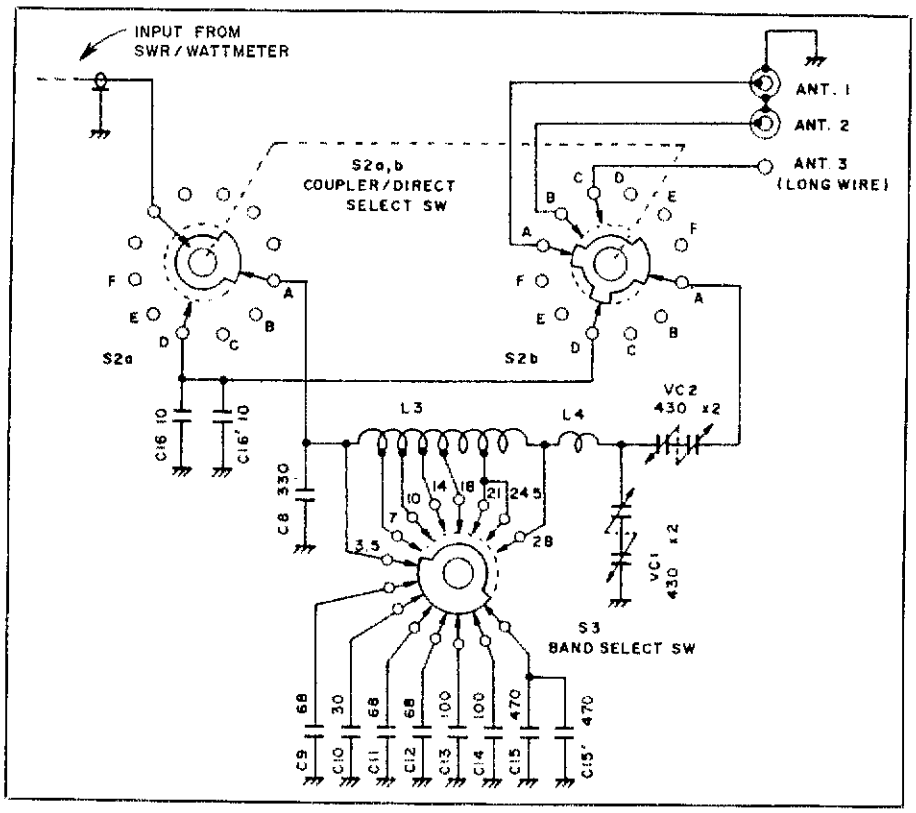
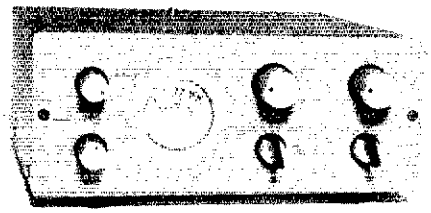


Fig. 5 — HC-200 matching-network schematic diagram copied from the operating manual. Metering section is not shown.

relief to the gray of the extra-thick front panel. Bright aluminum knobs, two with black plastic inserts, a round meter and a black cover combine to give the unit eye appeal.

All eight amateur bands from 3.5 to 30 MHz, including WARC bands, are covered by the '200. A power-handling capability of 200-W PEP (100-W cw) is well suited to most modern transceivers. I tried the '200 with a variety of loads on several different bands at home and in the ARRL lab. The results were satisfying — particularly when using my 40-meter dipole in the 30-meter band. During the DX contest, the '200 saved the day by allowing a solid-state transceiver to drive the untuned input of a kilowatt amplifier.

Perhaps the most striking visual feature of the '200 is the round meter. Control of metering functions is by means of METER SELECT and SWR CAL knobs. Those functions include SWR (FWD and REV), 200 W and 20 W (forward power). Separate SWR calibration scales for 200-W and 20-W power levels is an excellent feature. Diodes are notoriously nonlinear, particularly at lower power levels. I compared meter readings from the '200 with readings taken on a Bird model 43 wattmeter. The results are shown in Tables 5 and 6. The metering circuit may not qualify as a lab standard, but it is good enough for the average amateur.



Matching Network

The right-hand side of the front panel has four knobs that are used to control the matching network. The large TUNE and LOAD knobs look good and are easy to use. The two remaining control knobs, BAND and MODE have black plastic inserts that serve the dual function of making it easy to operate the associated switches and providing a positive indication of switch position.

Fig. 5 shows the schematic diagram of the matching circuit. You can see that it looks like a pi network with a series capacitor at the output. That series capacitor increases the matching range of the network.

Table 5

Comparison of HC-200 and Bird Model 43 SWR Readings (70 W)

	21 MHz			*7 MHz*	
R_{load}	SWR	'43	'200	'43	'200
112.5	2.25	2.2	2.4	2.2	2.1
25	2.0	2.1	1.4	1.9	1.6

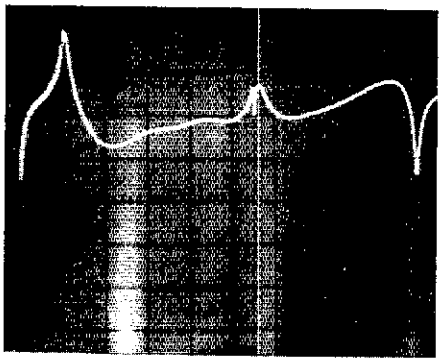


Fig. 6 — Network frequency-response curve. Horizontal divisions are 20 MHz; vertical divisions are 10 dB. The network is adjusted for 50 ohms input and output at 21.050 MHz.

Table 6

Comparison of HC-200 and Bird Model 43 Power Readings (21 MHz)

'43	*'200*
200-W range	
100	90
60	60
40	42
20	22
20-W range	
20	19
10	9
5	4

I was curious as to what the response of the circuit was. The spectrum analyzer and tracking generator in the ARRL lab revealed an interesting situation. The results can be seen in Fig. 6. The matching network exhibits a bandpass response; frequencies above and below the desired band are attenuated. I like that!

The '200 is designed for use with unbalanced loads. There are three antenna connections on the rear panel: two SO-239 coaxial connectors and a single wire terminal. The MODE switch allows any of these three antennas to be selected, routing it either through the matching network or bypassing the matching section altogether. The K8CH antennas are resonant at my favorite portion of each band. Full coverage of some bands does require the use of a Transmatch. This sometimes-yes/sometimes-no situation makes me appreciate the ability to easily switch the matching network out of the line!

The rear panel also contains an SO-239 connector for IN/TX and a bolt and wingnut combination for a GND connection. I found the '200 easy to operate and the documentation complete. There is even a table of typical settings for operation into 50 ohms on each of the bands.

The '200 is available from Encomm, Inc., 2000 Ave. 'G', Suite 800, Plano, TX 75074. Price class is $100. — *Chuck Hutchinson, K8CH*

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

"MULTIPEDANCE" BROADBAND AUTOTRANSFORMER

☐ After reading Doug DeMaw's article on a multipedance broadband transformer, I decided this was a piece of equipment I needed.[1] I had plenty of no. 24 wire to wind the transformer, and did not want to buy heavier gauge wire for the project. Some method of providing higher current-carrying capacity was needed, at least for the lower-impedance taps.

Fig. 1 shows my solution. I used six parallel strands of wire to start, then decreased the number of strands as the impedance ratio increased. First, I cut six pieces of no. 24 wire to different lengths, as shown in Fig. 1A. The shortest pieces were long enough to make five turns on the T225A-2 toroidal core, spaced to fill the entire periphery. The fifth-turn tap point was placed alongside the starting point, as shown in Fig. 1B. All six wires connect to the tap, and three of them continue to the next tap. I kept the wires in a flat bundle, with each succeeding five-turn winding adjacent to the last.

To insulate the tap points, I placed the tapped turn in a fold in a piece of 10-mil-thick fish paper (used to insulate transformer windings). Turns 25 through 90 have only one strand of wire, with taps placed every fifth turn. Fig. 2 shows my completed autotransformer. There was just enough room on the core for five turns of fiberglass string between the starting and ending turns of the entire winding.

To finish the project, I sewed the folded ends of fish paper together and coated the entire unit with casting resin, as suggested by DeMaw. You could also place a primary winding over this one and use it as a conventional broadband transformer. — *Frank Thompson, WØOD, Baudette, Minnesota*

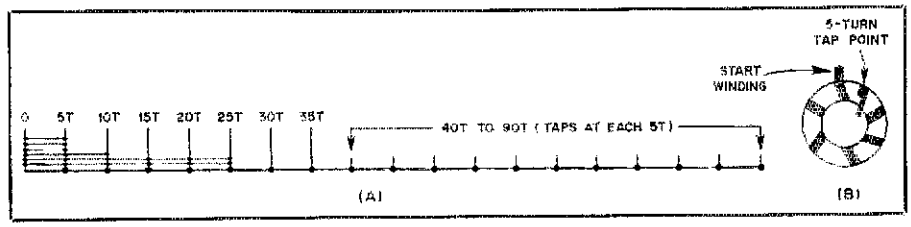


Fig. 1 — The wire layout used by WØOD for his multipedance autotransformer is shown at A. B shows how the first set of five turns was positioned on the core.

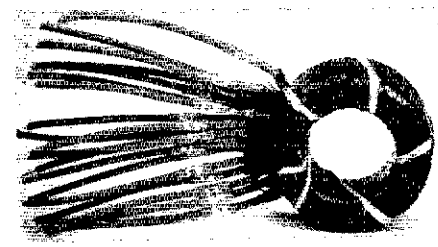


Fig. 2 — Photo of the completed transformer. Note the insulating paper between tap points.

AUXILIARY CRYSTAL SOCKET FOR THE DRAKE T-4X

☐ I recently purchased the crystals needed to operate my Drake T-4X and R-4A on 30 meters. Installing the new crystal in my receiver was simple because there are 10 auxiliary sockets, readily accessible from the rear of the chassis. The transmitter has only four auxiliary sockets, located so that the top cover must be removed each time a crystal is changed. I had already filled the four sockets with crystals covering the 160- and 10-meter bands. (Each crystal provides coverage of a 500-kHz segment.)

My solution to this problem was to install a socket on the right side of the T-4X chassis, so crystals can be changed without removing the cover. Installation of the new socket was facilitated by the fact that my rig had the required holes already drilled in the chassis. The older T-4 had a socket installed on the side, and apparently the same chassis was used for at least some of the T-4Xs. Later versions may not have the holes drilled, but it should not be too difficult to locate a suitable mounting position and drill the holes.

I moved the wire to the crystal-selector-switch from socket number four to the front-panel crystal switch. I soldered this wire to one terminal of the new socket and used a short piece of hookup wire to connect the other terminal to the common side of the original sockets. Now the crystal-selector switch selects the new socket when it is in position number four. Changing crystals is now an easy task.

The owner's manuals specify the crystal frequencies for a desired operating range. A 20.8-MHz crystal is required to transmit on the 30-meter band. It is necessary to add 9.7 MHz to the dial reading to determine your operating frequency. This poses no problem because the 21.1-MHz receive crystal provides direct dial readings from 10.0 to 10.5 MHz. I calibrate my receiver to WWV and spot the desired transmit frequency on my receiver. — *Donald Stickle, K2OX, Lake Hopatcong, New Jersey*

JOHNSON VIKING II ON 10 MHz

☐ When the FCC announced the opening of the 10-MHz band for amateur operations, I realized that my four-year-old Kenwood TS-520S would not operate in this new band. I began to think about the possibility of using my old Hammarlund HQ-140X receiver and Johnson Viking II transmitter. I had kept both in operating condition, and even used them for an occasional QSO.

The HQ-140X tunes continuously from 0.54 to 30 MHz, and has a bandspread tuning dial with scales calibrated for the 80, 40, 20, 15 and 10-meter bands. I prepared a frequency chart so that I would know the actual frequency for any given bandspread dial reading. With the main tuning dial set on 10.25 MHz, 10.10 to 10.15 MHz lies between the 7.00- and 7.10-MHz markings on the bandspread dial.

According to the Viking II instruction manual, 10-MHz output can be obtained by using a 5-MHz crystal and setting the band switch to 20 meters. The oscillator, buffer and final stages are all tuned to 10 MHz. Since I wanted to use the Model 122 VFO, I would have to modify it to provide a 5.05- to 5.075-MHz output. This VFO has three ranges: 1.75 to 2.00 MHz, 7.00 to 7.425 MHz and 6.7 to 6.85 MHz. I do not use the last range, so that is the one I modified. A study of the wiring diagram indicated that the only change required was to add some additional capacitance across C56. I found a couple of air-dielectric padder capacitors that would provide 135 pF when wired in parallel. These were installed, and I found the VFO to cover the range 5.05 to 5.075 MHz with dial readings from 7.00 to 7.13 MHz on the original scale.

To ensure good keying characteristics, the Viking and VFO should have the Johnson Time Sequence Keyer modification. Otherwise, you may have a signal with chirps and clicks. — *Walt Bollinger, AF3V, Pittsburgh, Pennsylvania*

DETUNING SLEEVE FOR THE RINGO RANGER

☐ One problem experienced by many users of the original Cushcraft Ringo Ranger 2-meter antenna is the lack of any method to decouple the antenna from the transmission line. This results in the flow of antenna currents on the outside of the coaxial-cable feed line. Owners of the Ringo Ranger II report greatly improved operation because of the decoupling system incorporated with that antenna. Not wanting to replace my antenna, I found a way to retrofit a decoupling system to it.

The operating principle of my system is found in *The ARRL Antenna Book*.[2] A 1/4-λ sleeve, open at the top and shorted to the coaxial-cable shield at the bottom, is placed over the feed line. The impedance at the top of the sleeve is high, and very little current can flow on the outside of the tubing. The detuning sleeve acts as an rf choke, isolating the antenna from the rest of the feed line.

Fig. 3 shows the construction details. A 1/4-λ section of 2-inch aluminum tubing serves as the detuning sleeve.[3] I fabricated a brass bushing for the base of the sleeve. This bushing is made to fit inside the aluminum tubing, and is machined to allow a long double-female coupling (the type with threads over the entire length) to thread through the center. The coaxial cable attaches to this coupling on each side of the bushing, feeding the signal through to the antenna. A Plexiglas® spacer in the top of the sleeve keeps the cable centered. Use a hacksaw to slit the bottom of the tubing, and secure it to the bushing with a hose clamp. — *Rudy Knauck, W7FGQ, Seattle, Washington*

[1] D. DeMaw, "A 'Multipedance' Broadband Transformer," *QST*, Aug. 1982, p. 39.

*Assistant Technical Editor

[2] *The ARRL Antenna Book* (Newington: American Radio Relay League, 1982), p. 5-8.

[3] mm = in. × 25.4.

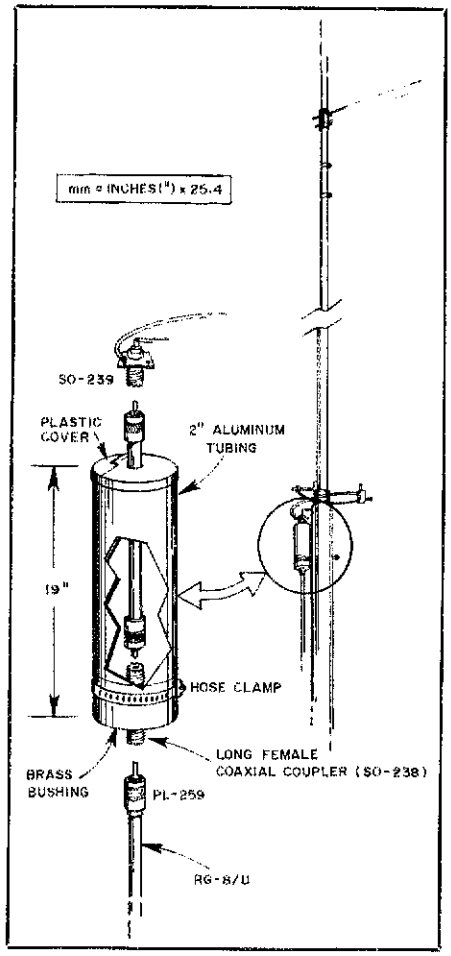


Fig. 3 — Construction details of a detuning sleeve designed by W7FGQ for the Ringo Ranger 2-meter antenna.

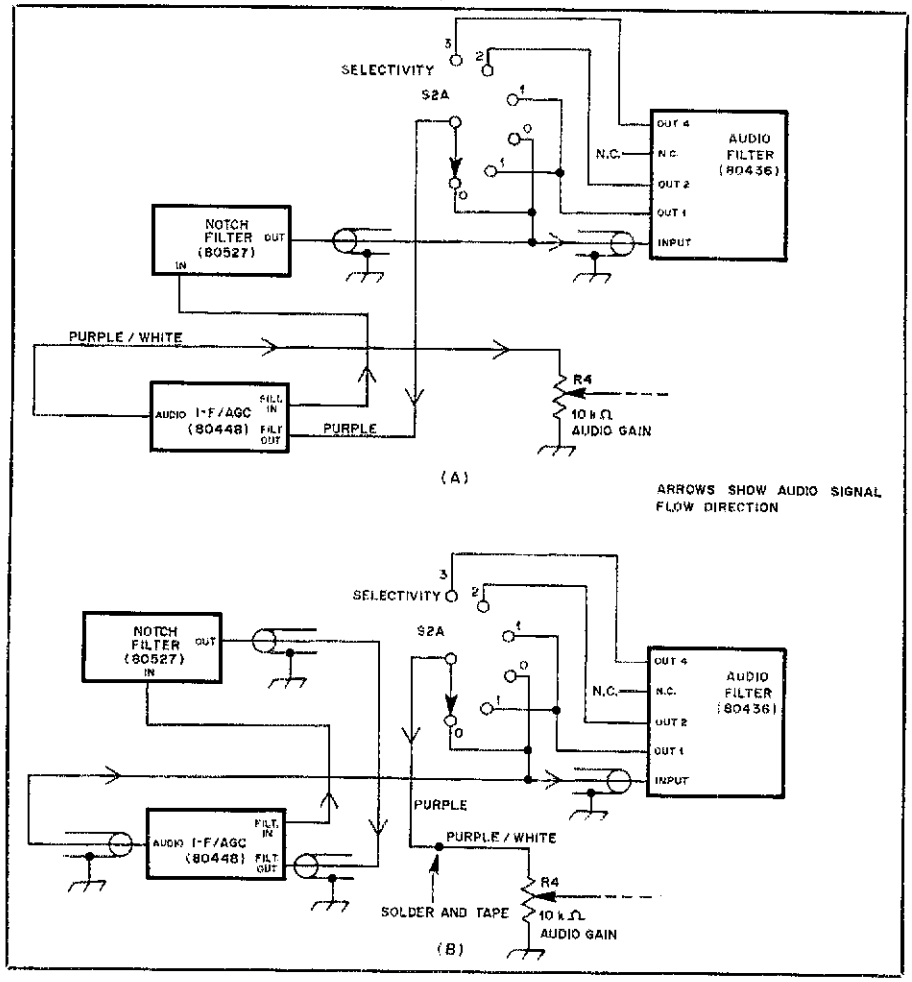


Fig. 4 — Audio- and notch-filter wiring in the Ten-Tec OMNI B before (A) and after (B) K1JD's modification to decrease the agc attack time constant.

REDUCING THE AGC ATTACK TIME IN THE TEN-TEC OMNI

☐ The audio notch and band-pass filters are inside the agc control loop in the Ten-Tec OMNI B transceiver. The advantage of this system is that the agc is not activated by strong signals outside the filter passband or within the notch. You can observe the operation of the filters and agc action by watching the S meter reading decrease as a signal is notched out. Unfortunately, when the audio filters are switched in, a time constant, proportional to the inverse bandwidth of the filter, is introduced into the agc loop. This increases the agc attack time and contributes to the characteristically loud "pop" when the agc responds to a strong cw signal.

After installing the 1.8-kHz and 0.5-kHz crystal i-f filters in my OMNI B, I conducted a short experiment. First, I tuned to a strong cw signal using the 1.8-kHz filter and no audio filtering (0 position). By switching to the 0.5-kHz filter and to audio-filter positions 2 or 3, I noticed an increase in the "pop" as the agc attack time increased. I used this as a measure of the improvement that could be realized by moving the audio filters outside of the agc control loop. With 16 poles of i-f selectivity, performance is not degraded seriously by shifting the additional audio selectivity outside the loop. If your OMNI does not have either a 0.5-kHz or 0.25-kHz i-f filter installed, then I would advise against making this modification.

The only additional material required for the change is a 6-inch piece of shielded wire. The actual circuit changes are shown in Fig. 4. After taking off the top cover, you will have to remove the notch-filter support bracket to gain access to the I-F/AGC board. Remove the I-F/AGC board by pulling gently on the connector pins with pliers. There is an insulating plastic sheet under the board that will also have to be removed. This will provide access to the two filter terminal strips. The board must squeeze past the S meter, but can be removed. Locate the purple wire from the audio filter output in the socket nearest the front and the purple/white audio-output wire from the socket nearest the back. Locate the shielded wire on the notch filter card. This wire is the notch output, even though my manual shows it as the notch input line.

Unsolder the purple/white wire at the I-F/AGC board and the shielded wire at the notch filter output. Connect the center conductor in the shielded wire at the point where you removed the purple/white wire. Solder the braid to the nearby ground lug. This shielded wire *will* reach; remove the audio filter board only if necessary to pull the wire over to the socket. Unsolder the purple wire at the I-F/AGC board and connect it to the loose end of the purple/white wire. Be sure to insulate the joint. Finally, solder the center conductor of one end of a 6-inch piece of shielded cable to the "Filter Out" socket terminal, and the other end to the notch filter output. Ground both ends of the shield at convenient locations. Reassemble the rig, remembering to put the insulating sheets back in place under the boards that you removed.

A check of receiver performance should indicate that the notch filter operates as before. Switching between audio-filter positions 2 and 3 with the 0.5-kHz filter in place will no longer affect the S meter reading. You should also find a noticeable decrease in the audio "pop." — *John DePrimo, K1JD, Honolulu, Hawaii*

COLLINS EQUIPMENT ON 30 METERS

☐ There is an easy way to put the Collins S-Line and KWM-2 on 30 meters. The process is as simple as changing a crystal. I removed the crystal from position 3C (for 14.8 MHz) and replaced it with a 0.001%-tolerance, 13.155-MHz crystal in an HC-6/U holder. This crystal is Collins part no. 290-9042-00. I bought mine from Jan Crystals.

The 14.8-MHz band-switch position now covers 10.0 to 10.2 MHz with the PRESELECTOR or EXCITER tuning control set between 2 and 3 on the logging scale. I did not find it necessary to retune or realign any internal controls after making this change. The 10.100- to 10.150-MHz range is between 100 and 150 on the main tuning dial. There is an added bonus — the unit now tunes WWV at 10 MHz instead of 15 MHz, a frequency that produces more consistent propagation in most of North America. — *Ray Soifer, W2RS, Glen Rock, New Jersey*

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

TRANSISTOR INPUT AND OUTPUT CAPACITANCES

☐ Some amateurs have indicated during correspondence with ARRL Hq. staff members that they are confused about the C_{in} (input capacitance) and C_{out} (output capacitance) of transistors. They do not understand what effect, if any, these values have on the design of input and output networks. Practically, the effects of C_{in} and C_{out} can be significant if a proper impedance transformation is to be obtained: Maximum power transfer will take place only when the driving source is matched to the input of the transistor amplifier. Likewise with the transistor output and load.

These capacitances need to be absorbed in the matching network when L-C components are used, such as in Fig. 1. When broadband transformers are used in place of L-C networks (Fig. 1B), it is important to consider the effects of the capacitances on the transformers. Knowledge of the C_{in} and C_{out} values is required in order to execute a good design. Unfortunately, not all manufacturers include this data in their specification sheets. Motorola Semiconductor Corp. provides capacitance-versus-frequency curves for most of its power transistors.[1]

We must be mindful, when working with rf bipolar devices, that the input and output capacitances change markedly with operating frequency. The curves in Fig. 2 illustrate this characteristic, which complicates the feedback-network design for wide-band linear power amplifiers. This was not a concern when we worked with vacuum tubes "way back when." The capacitances change significantly with the operating voltage. Each time the collector-supply voltage is doubled, the capacitance increases by an approximate factor of 3. This is true also of power FETs (drains). The capacitance is constantly changing as the sine-wave (signal voltage) goes through its excursion. The changing capacitance results in a varactor type of action, which in turn generates harmonic currents of high magnitude. It is for this reason that we need to use considerably more filtering with a solid-state power amplifier than would be needed in a vacuum-tube model. The usual envelope distortion associated with harmonic generation in vacuum tubes is prevalent also in solid-state amplifiers. It is not uncommon, therefore, to observe second- and third-harmonic levels (before filtering) that are only 10 to 15 dB below the peak output level of the fundamental frequency.

Power FETs have the advantage of being rather similar to vacuum tubes with respect to stable values of C_{in} and C_{out}. That is, the capacitances do not change significantly with changes in drive-power level or frequency. This makes them well suited to use in wide-band amplifiers that employ feedback.[2] Power-FET input capacitances are quite low compared to those found in bipolar transistors. They are on par with most sweep tubes. The output capacitance of big power FETs does, however, compare somewhat in magnitude to those encountered while working with power bipolars.

We should pay attention to the C_{in} and C_{out} characteristics of transistors we plan to substitute in amplifiers, lest the new devices upset the matching networks by virtue of markedly different amounts of capacitance. I was fortunate when replacing a pair of Toshiba S2535s with Motorola MRF421s after I blew out the original transistors in my FT-301D transceiver. Not only did the Motorola parts fit the pc board and match up with the mounting holes, the capacitances were close enough to those of the Toshiba devices to permit instant success upon firing up the repaired transmitter. This might not always be the case when making substitutions, so beware! I hope this discussion has helped to solve some problems you may have had when designing homemade solid-state power amplifiers. — *Doug DeMaw, W1FB, ARRL Senior Technical Editor*

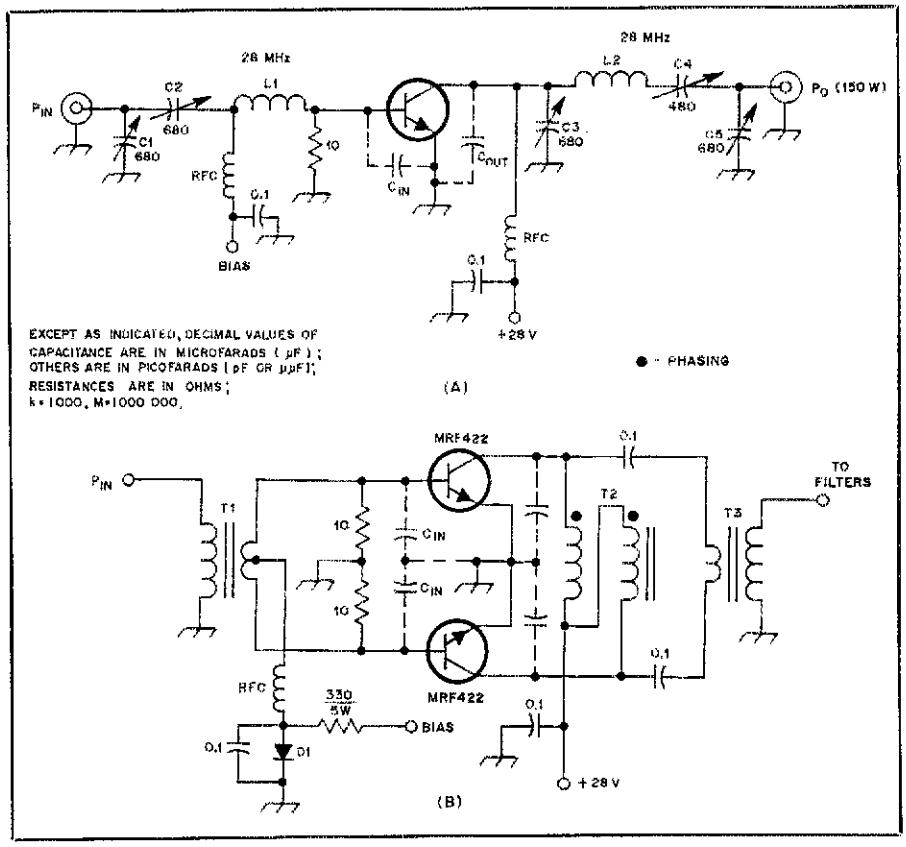


Fig. 1 — C_{in} and C_{out} at A can have a marked effect on the network design, and these values have to be absorbed into the networks. The capacitances need to be accounted for when designing for broadband amplifier service (T1, T2 and T3 of illustration B).

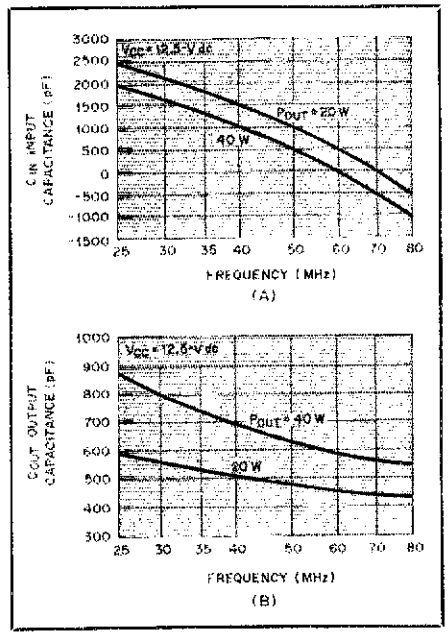


Fig. 2 — Transistor input capacitance versus operating frequency is shown by the curves at A. At B, a similar set of curves shows the change in output capacitance as the frequency is varied. These curves apply to the 2N5849. *(courtesy of Motorola Semiconductor Corp.)*

SOLAR FLUX/SUNSPOT NUMBER CONVERSION FOR MINIMUF

☐ Over the past couple of years, I have spent a fair portion of my hf operating time obtaining a working knowledge of propagation factors.

[1] *Motorola RF Data Manual*, 1978 edition, P.O. Box 20912, Phoenix, AZ 85036.
[2] H. Granberg, "MOSFET RF Power — An Update," Parts 1 and 2, Dec. 1982 and Jan. 1983 *QST*.

*Assistant Technical Editor

Rose's article, "MINIMUF: A Simplified MUF-Prediction Program for Microcomputers" (Dec. 1982 *QST*), offered me an additional means toward this end. Along with other students of the subject, my primary source of information regarding solar activity and propagation conditions is the hourly broadcast by WWV. Since they use the 10.7-cm solar flux as an indicator, the graph included in the article must be used to convert this figure to the sunspot number, which is utilized in the program.

This presents two problems. First, at the time I began using MINIMUF, solar flux values were well in excess of 250, which is the upper limit of the conversion graph. Second, while the computer would calculate and display the results of the complex algorithm quickly, the solution hinged upon my ability to find the graph among the clutter of my operating position. In order to at least resolve the second problem, I investigated the possibility of performing the solar-flux-to-sunspot-number conversion in the form of an equation, which could then be incorporated into the driver. I could not find any information at our public library dealing with propagation, so I (approximately) characterized the conversion curve with the quadratic equation:

$$SF = (0.0008)(SSN)^2 + (0.73)(SSN) + 65 \qquad \text{(Eq. 1)}$$

where

SF = 10.7-cm solar flux

SSN = sunspot number

Solving, then, for the sunspot number:

$$SSN = \frac{-0.73 + \sqrt{(0.73)^2 - 4(0.0008)(65 - SF)}}{2(0.0008)} \qquad \text{(Eq. 2)}$$

or, in a BASIC-compatible form:

$$S9 = 625 * (SQR((0.73)\,2 - 0.00032 * (65 - SF)) - 0.73) \qquad \text{(Eq. 3)}$$

These equations do not perfectly represent the conversion curve, but give integer values adequate for setting the S 9 sunspot parameter in the MINIMUF model. The greatest error appears at a solar flux value of 130, where the graph indicates a sunspot number of 83, versus a value of 82 derived from the above equations. — *Clay Bartholow, KAØLEN, Minneapolis, Minnesota*

MORE MINIMUF PROGRAM MODS

☐ I was delighted to find Rose's article on muf prediction in December 1982 *QST*. I promptly entered the program into my computer, and started running muf predictions.

Here are a couple of modifications to the program that some users might want to add. One addition is a conversion scheme for deriving the sunspot number from the solar-flux index. The second addition draws a graph of muf versus UTC and, like the original, is written for the Tektronix 4050 series computers. Once again, thanks for the excellent article. — *Denton Bramwell, K7OWJ, Minden, Nevada*

MINIMUF PROGRAM MODIFICATIONS:

```
102 DIM T0(24,2)
430 PRINT "SOLAR FLUX NUMBER =";
442 GOSUB 2000
640 FOR T5=0 TO 23
650 GOSUB 1000
660 PRINT USING 670:T5,J9
661 T0(T5+1,1)=T5
662 T0(T5+1,2)=J9
670 IMAGE 5X,2D,7X,2D.D
680 NEXT T5
690 PRINT
700 GOSUB 7000
710 END
720 REM *** LINE 700 "REM" RATHER THAN "GOSUB" IF NOT USING GRAPHICS
2000 REM CALCULATES SUNSPOT NUMBER FROM FLUX NUMBER
2010 B1=1*(S9<100)+2*(S9=>100)*(S9<170)+3*(S9=>170)*(S9<200)
2012 B1=B1+4*(S9=>200)
2020 ON B1 GOSUB 3000, 4000, 5000, 6000
2030 RETURN
3000 REM COMPUTES SUNSPOT FOR FLUX BELOW 100
3010 S9=(S9-64.8)/0.745
3020 RETURN
4000 REM COMPUTES SUNSPOT FOR FLUX BETWEEN 100 AND 170
4010 S9=(S9-58.5)/0.875
4020 RETURN
5000 REM COMPUTES SUNSPOT FOR FLUX BETWEEN 170 AND 200
5010 S9=(S9-45.3)/0.99
5020 RETURN
6000 REM COMPUTES SUNSPOT FOR FLUX OVER 200
6010 S9=(S9-41.3)/1.015
6020 RETURN
7000 REM *** DRAWS GRAPH OF DATA
7001 REM *** DELETE 7000 THRU 7200 IF NOT USING GRAPHICS
7010 WINDOW 0,23,0,40
7020 VIEWPORT 50,125,20,80
7030 AXIS 1,5,0,0
7040 FOR I=0 TO 9 STEP 2
7050 MOVE I,0
7060 PRINT "J";I
7070 NEXT I
7080 FOR I=10 TO 23 STEP 2
7090 MOVE I,0
7100 PRINT "HJ";I
7110 NEXT I
7120 FOR I=0 TO 40 STEP 5
7130 MOVE 0,I-0.5
7140 PRINT "HHH";I
7150 NEXT I
7160 MOVE T0(1,1), T0(1,2)
7170 FOR I=1 TO 24
7180 DRAW T0(I,1),T0(I,2)
7190 NEXT I
7200 RETURN
```

DX AND THE BREWSTER ANGLE

☐ The best DX antenna I ever had on 40 meters was a pair of phased 1/4-λ verticals. I used that array over 10 years ago in rural Michigan. Encouraged by the 40-meter performance, I tried an 80-meter vertical. Again I enjoyed excellent results for my efforts. Curiosity then prompted me to try a 1/4-λ vertical on 20 meters. This time I was disappointed.

According to the books, a vertical should have a radiation pattern lobe aimed at the horizon. By contrast, a horizontal antenna exhibits a null in this direction. Since a low vertical angle of radiation is desirable for working DX, why did a simple dipole outperform my 20-meter vertical? I worked Gus Browning, W4BPD, from his many exotic island locations on 20 meters, and all *he* used was a multiband vertical (Oops — guess that gave my age away!). Why did a vertical always work for Gus and not for me? It was not until several years later that I found out why.

Those beautiful radiation patterns in the books are accurate if you assume that the earth is a perfect conductor. It isn't. For horizontal antennas, this makes very little difference in the low-angle radiation. For verticals, however, the situation is altogether different. Toward the horizon there is an almost complete cancellation of energy because of ground reflection.

The reasons for this are based in optical theory. There is a 180° phase shift in the reflected ray on the horizon. This phase shift causes signal cancellation. At some angle, the phase shift is 90° and the reflected ray is neither a help nor a hindrance. Above this angle, the reflected ray tends to reinforce the direct ray. This angle is called the "Brewster" or "Pseudo-Brewster" angle.

In the RSGB publication *HF Antennas for All Locations* by L. A. Moxon, G6XN, Brewster angles are given for various situations. They are: dry ground, 28°; average ground, 17°; very moist ground, 10°; fresh water, 6° and sea water, 1°.

The final fact in solving the riddle that bothered me is that lower-frequency DX tends to use relatively high vertical angles of radiation. At last it became clear that my antennas mounted over "average ground" exhibited a Brewster angle that didn't affect me on 40 meters, but did on 20 meters. Gus had mounted his vertical right at the edge of the sea, which provided a superior environment — hence a very low Brewster angle.

The answer, you may say, is to lay down 120 radials, like the broadcast stations do, to help cut down ground-return losses in the antenna system. However, those radials will *not* significantly affect ground reflection losses at the lower angles. To lower the Brewster angle of average ground appreciably would require a ground screen that is many wavelengths in radius. Most of us can't afford that kind of installation.

Until I move to an ocean island, I will use horizontal polarization on the hf bands above 14 MHz. — *Chuck Hutchinson, K8CH, ARRL Assistant Technical Editor*

Feedback

☐ The Mirage C22 220-MHz amplifier reviewed in March *QST* and the B23 2-meter version reviewed in May 1981 have been updated since the units were submitted to ARRL for review. The new versions now have slide switches on the front panel (opposite the rf connectors) for ON/OFF and SSB/CW selection. Also, an intermittent voltage regulator problem was discovered in the automobile in which the C22 was mounted. Circumstantial evidence indicates that this contributed to the failure of the one C22 unit.

☐ March 1983 *QST* contains an article entitled "Go Class B or C with Power FETs" by W1FB. The transistors specified are Motorola MRF138s. We have learned since publication that some manufacturing problems have delayed the appearance of these devices on the market. They will be available later this year, according to a Motorola spokesman. Those interested in the amplifier may substitute the Siliconix DV2840S, which has nearly the same characteristics and is in the same package format. The notable difference is that the DV2840S can deliver 40 W of output rather than 30. At 1.5-W input, the power is 30 W at 175 MHz. Less than 1 W of drive should provide 30 W of output from 1.8 to 30 MHz. Further details are available from Ed Oxner, KB6QJ, our ARRL TA at Siliconix.

☐ Please note that the correct street address for Macrotronics, Inc., is 1125 N. Golden State Blvd. An incorrect address appears in the March 1983 Product Review column.

☐ The $2 copy fee quoted in footnote 7, p. 27, of April 1983 *QST*, for the BASIC computer listing for the ANTRXSWR/BAS program is in error. The correct fee for this program, used with Hall's article, "The Search for a Simple, Broadband 80-Meter Dipole," is $1. If you've already submitted $2, you'll receive a credit for the difference.

Inside ARRL: W4KFC and K1ZZ Speak Out

How do the League's President and General Manager view the state of amateur affairs, domestically and worldwide?

Licensed for 50 years, Vic Clark, W4KFC, is no stranger to the ebb and flow of events that have shaped the Amateur Radio Service over the years. When he was elected ARRL President in March 1982, it was the culmination of a natural progression through the League's volunteer structure.

At 33, Dave Sumner, K1ZZ, may lack some of the perspective of those with several decades of ham radio experience. But he makes up for it with the energy and enthusiasm that has been going full-bore since he "majored in Amateur Radio" at Michigan State. And it would be inappropriate to characterize the League's General Manager (and ARRL/IARU Secretary) as a neophyte, since he joined the Old Timer's Club last December.

Vic and Dave have worked closely together over the years, most notably on two highly successful projects — WARC-79 and the Long-Range Planning Committee. Since assuming their positions of leadership in the amateur community, they've been in almost daily contact, responding to events in Washington, and around the world, and carrying out the policies of the Board of Directors. Vic and Dave also have a heavy travel schedule, making it a point to meet ARRL members at hamfests, conventions and club gatherings.

The 14 months they've been at the helm have been exciting ones for ARRL. The League's volunteer field organization has been reorganized, Congress has passed a landmark law that benefits all U.S. amateurs, and the FCC has proposed a no-code license (and has in turn received an immediate and firm rebuff from the amateur community).

In the midst of their often-hectic schedules, President Clark and General Manager Sumner took some time to discuss the pressing issues facing the Amateur Radio Service and ARRL, and how they view their roles in the organization. *QST* Features Editor Andrew Tripp, KA1JGG, conducted the interviews.

President Victor C. Clark, W4KFC

Vic Clark joined ARRL soon after earning his first license, W6KFC, in 1933.

When not discussing League affairs with the Board of Directors or federal lawmakers and regulators, ARRL President Vic Clark, W4KFC, enjoys ragchewing with members on the air. Often heard on 2-meter fm while motoring in the capital area, Vic is also quite active in DX and traffic handling.

Since then, he's made a permanent mark on the League, having distinguished himself as a volunteer in several different positions in the League's Field Organization. As an SCM, Vic saw duty in Arizona in the late '30s and in Virginia in the early '50s. Before serving for seven years as Roanoke Division Director, Vic was Assistant Director for 14 years. In 1976, the Board of Directors elected him Vice President, a post he served in until he was elected President in March 1982, succeeding Harry Dannals, W2HD. As IARU Region 2 President, Vic was a key figure in the Amateur Radio success at WARC-79 in Geneva. He now keeps on top of international affairs as Region 2 Vice President. As Chairman of the ARRL Long-Range Planning Committee from 1979 to 1982, Vic helped lay the groundwork for programs that will carry the ARRL and the Amateur Radio Service well into the 21st century. Retired since 1973, Vic lives with his wife Hester, WA4PAE, in Clifton, Virginia.

QST: How do you see your role as ARRL President? How does it fit in with the role of other League volunteers?

Clark: I regard the ARRL President as a member of a very large team concerned with the well-being and future of the Amateur Radio Service. Duties prescribed for the President call for provision of personal leadership and direction to ARRL, consistent with the policies and directives of the League's Board of Directors. The President takes an active part with the other officers, the Directors and the General Manager in ARRL planning and decision-making activities. He is responsible for monitoring the execution of those plans and programs, and for reporting the progress and any special problems that arise in the process.

As President, I try to maintain close contact with the membership on the air, through correspondence and personal visits to clubs, hamfests and conventions. The President also is responsible for representing ARRL in its relationships with the public and various governmental agencies, and at IARU regional conferences.

In an earlier day it may have been more symbolic, but today the League's presidency has become a full-time working assignment. Two telephones rattle constantly; correspondence is in the thousands of letters per year. Contacts with other officers, directors, General Manager Sumner and other members of the Headquarters staff are on a daily basis.

QST: Before becoming ARRL President you were chairman of the ARRL Long-Range Planning Committee, which recommended restructuring the League's volunteer section-level field organization. What benefits do you see coming from these changes?

Clark: Restructuring of the ARRL field organization was one of several recommendations contained in the LRPC report. These were based on comments and suggestions from hundreds of amateurs and friends of Amateur Radio. The objective of the field organization changes, now being placed in effect, was to enable a greater number of serious amateurs to occupy meaningful volunteer roles in the organization, where they'll contribute to the League's decision-making activities. Until recently, the only organizational handholds in the ARRL field structure have been in the fields of traffic handling and emergency preparedness. Important though these are, they represent a declining fraction of

the specialized forms of amateur involvement. Under the new structure, amateurs with other specialties will have a greater opportunity to participate in League affairs. This step, together with the plan to encourage local radio clubs to take a stronger hand in League affairs, has been referred to as a "decentralization" process. Reorganization of the League's field structure is one important step toward unifying the nation's amateurs.

To many a member, Newington is "they," and ARRL membership is regarded as a subscription to *QST*. The daily activities and concerns of a remote leadership pass unnoticed. Membership thus becomes optional for many. Many amateurs simply don't see the need for organizational unity to assure our mutual security. To some, Amateur Radio is a God-given right. They may see ARRL as a self-serving enterprise created for the benefit of the Headquarters staff, or merely as a publishing house. The simple fact is that a strong and influential national organization is the key to the continued existence of a vigorous Amateur Radio Service. ARRL is active daily in a host of ways, working for the best interests of the Amateur Radio Service in the halls of government and through the IARU with our sister societies overseas, and providing many types of services not available elsewhere.

"Individual memberships are vital . . . But more than that, membership commitment is needed in the form of ideas, enthusiasm, cooperation and loyalty."

Individual memberships are vital to such a national organization. But more than that, membership *commitment* is needed in the form of ideas, enthusiasm, cooperation and loyalty. New ways must be found to convey to all amateurs the necessity of a teamwork approach, and to make this attractive and satisfying. ARRL must begin to be a cooperative enterprise at the local level; it is here that problems of zoning, radio-frequency interference, public relations, emergency planning and the recruitment and training of new amateurs can be addressed most effectively.

My own view is that the real strength of the League — and of Amateur Radio — lies not so much in its leadership as in its membership. Talent abounds within the amateur ranks; we need only to find better ways to focus our collective strengths to solve problems and meet the challenges that lie ahead.

For those looking for a better way to get results, I have a suggestion: Get yourself appointed to a Field Organization position, or sponsor a worthy candidate for elective office (or run yourself). Make your views known to your division Director, stir up your fellow club members and push for the reforms and changes you believe in. But in any case, *belong*.

QST: With the passage of the Goldwater-Wirth Amateur Radio bill, Public Law 97-259, our clout in Washington has been highlighted. Does ARRL plan to expand our influence in Washington?

Clark: There is general agreement that our representation in Washington has never been better than it is today. The development of the position of ARRL Washington Area Coordinator and Perry Williams's performance in the job has been widely acknowledged among those knowledgeable in Washington affairs as a quantum improvement over earlier arrangements. Through Perry's frequent personal contact and by employing assistance and advice from a group of concerned and strategically placed members in government, the League now keeps closely abreast of developments affecting Amateur Radio, and is able to take early and more effective action to influence the course of events.

Nevertheless, a special ad hoc committee has been created by the ARRL Board of Directors to explore possibilities for even further improvements. This committee, chaired by First Vice President Carl Smith, has been consulting with Washington-area amateurs and officials and will make its recommendations to the Board of Directors in April.

QST: Some type of no-code license seems inevitable. How can the League make the best of the situation by trying to attract those who don't have to pass a code test?

Clark: There is little question that the Commission's proposal to create a no-code amateur license is widely regarded as an attempt to establish a "leper colony" in our neighborhood. To comment on all of the aspects of this proposal would require more space than we have here. I feel that if it can't be dealt with in a more constructive way, we should outline the best possible specifications for such a new class of license and seek to make it work in the "public interest, convenience and necessity."

QST: What changes might this bring about to the Amateur Radio Service?

Clark: Any no-code license will result in the creation of a unique group of amateurs. If they are to experience all of the benefits of Amateur Radio and to contribute to its public service obligations, they must be welcomed into the amateur community and given support. Encouraging them to qualify for full participation in Amateur Radio affairs through development of technical and communications knowledge and skills will present a special challenge.

Amateur Radio has for years drawn its life's blood and many outstanding performers from the ranks of the Novices, and more recently from CBers. Although we can argue that there are better approaches, it is not beyond belief that a new category of codeless amateur, given the proper reception and assistance, could also become a source of worthy recruits for the amateur fraternity.

"FCC has shown cooperation and understanding in a number of recent rule-making actions . . . The folks at FCC are fine and dedicated people."

QST: How would you characterize the climate of ARRL-FCC relations following FCC action on the no-code license and the upcoming licensing deregulation? How do the League's goals differ from those of Jim McKinney and others at the FCC who are responsible for regulating the Amateur Radio Service?

Clark: The rule makings by FCC during the past few years have made many amateurs apprehensive and frustrated. The question is raised frequently, "What are they going to do next?" Probably, the call-sign changes have done the most to create unease, for this has been widely regarded as unnecessary and disturbing. On the other hand, FCC has shown cooperation and understanding in a number of recent rule-making actions. While we may at times question their wisdom, personally the folks at FCC are fine and dedicated people. Relationships with Jim McKinney and other FCC personnel are amicable, perhaps more so today than at any time in recent history.

QST: What do you think needs to be done about the problems of QRM on the band brought about by contests and DXpeditions, and the use by some of obscene and profane language?

Clark: The real problem with DXing or contesting — or for that matter with any other specialized facet of Amateur Radio, including casual ragchewing — seems to be that those who specialize tend to develop a bit of myopia and become unmindful of the needs of others. Amateur Radio is no longer a single hobby, but rather, as someone described it, "a highly diverse group of separate activities flying

in loose formation." This suggests three things: We all need to become a little more tolerant of the other fellow's interest and activity; we should make sure that, in our enthusiasm (or preoccupation) with what we are doing, we do not trample someone else's flowers; and almost every ham I know (including myself) could profit by moving around a bit and learning from experience what is going on in other areas of Amateur Radio.

The problem of improper language is a difficult one. There are 400,000 of us in Amateur Radio in the U.S., and the behavior we exhibit probably follows the classic bell-shaped curve. The vast majority of amateurs cherish and respect their privileges, and their use of the band reflects that attitude. Out on the fringes, a few will continue to use tantrum tactics to draw attention to themselves. Then, there are those who confuse free speech with irresponsible speech. I believe that the new monitoring and enforcement procedures possible under P.L. 97-259 will make it easier to respond to this problem.

QST: In 1937, you were awarded the Hiram Percy Maxim Award for making the greatest contribution to Amateur Radio during 1936. Wouldn't reinstating that award be one means of giving recognition to amateurs who volunteer their time year after year to help improve the Amateur Radio Service?

Clark: Yes, I share that view. The award meant a great deal to me. But beyond its effect on a single teenager, it provided another avenue for favorable Amateur Radio publicity and a nationwide focus on the opportunities offered in Amateur Radio for young people to participate on a par with adults. ARRL is now taking steps to reestablish the Hiram Percy Maxim Award for young amateurs; an announcement providing further details will appear in an early *QST*.

General Manager David Sumner, K1ZZ

By the end of his teens, it was clear to Dave Sumner that his love for Amateur Radio was no passing fancy. First licensed as KN1ZND at age 13, in 1962, Dave was a founding member of his junior high school radio club. Two years later, Dave had his Extra Class license. He was both president and vice president of his high school radio club, and also of the Michigan State University RC, where he spent many hours between classes operating W8SH. Active from the beginning as an ARRL volunteer, Dave worked his way through the ARRL Hq. ranks after arriving in Newington in 1968 as a part-time employee. He joined the full-time staff in 1972 as an assistant secretary in the Membership Services Department. Four years later, Dave was named Assistant General Manager. As AGM, he was deeply involved in preparations for WARC-79, traveling extensively in the process. He devoted full time to the WARC effort during the year preceding the conference, and, fittingly, was a member of the team that represented the IARU in Geneva during WARC-79. In 1982, Dave was selected by the Board of Directors to fill the vacancy created by the retirement of General Manager Richard L. Baldwin, W1RU. Dave has also served on the ARRL Long-Range Planning Committee, whose recommendations he is helping to implement. Dave lives with his wife Linda, KA1ZD, and their daughter Deryn in South Windsor, Connecticut.

Away from the office, ARRL General Manager Dave Sumner, K1ZZ, spends much of his spare time cultivating a "modest" antenna farm — an activity that continually pushes him to new heights! A well-known cw contest operator, Dave chases DX, and maintains an interest in vhf, both "weak signal" and fm mobile.

"Much of the League's work is done by volunteers; a large part of our work in Newington is to support those efforts."

QST: At age 32 at the time of your appointment, you are no doubt one of the youngest General Managers the League has ever had. After a year on the job, have you perceived any change in attitude among amateurs who have in the past criticized the League for being a bit on the stodgy side? If so, how has this change of attitude become apparent?

Sumner: The perception seems to lag the reality, unfortunately. On the other hand, I haven't been trying to rush the pace of change; its traditions are one of the League's great strengths. I suppose what we're trying to show is that one needn't be stodgy to see value in tradition, and that respect for tradition needn't blind us to change.

QST: What's your most pressing task for 1983 and beyond? Why is it so important?

Sumner: Rebuilding the membership base is the most important task at hand, not only for financial reasons but also because active members are the backbone of the organization. The League is first and foremost a group of volunteers — people who want Amateur Radio to survive and grow, and who recognize that they must join together to see that it does. Much of the League's work is done by volunteers; a large part of our work in Newington is to support those volunteer efforts. For the rest, the members must rely on a professional staff. Together, the volunteers and professionals make a good team, and we have a good record: defense of the 220-MHz band, new bands from the 1979 WARC in Geneva, defeat of the FCC "plain-language" rules proposals, passage of Public Law 97-259, and a number of other recent successes. We need the support of more radio amateurs so that record can continue.

QST: What is the League doing to reverse the recent drop in membership?

Sumner: A direct-mail membership campaign was launched in early March, one which we hope will bring several thousand new and lapsed members into the organization. Special dues rates for those 65 and over, and under 18, should help to retain the long-time members now on fixed incomes and to bring in the younger members we need so badly for our future vitality. In the months to come, affiliated clubs and individual members will be asked to help convince nonmembers to support the League. The present members are a powerful sales force.

QST: How do you respond to nonmembers who tell you, "Why should I join the League? I already subscribe to a good Amateur Radio magazine"

Sumner: Well, there are some good magazines published commercially, but none compares with the breadth of coverage or the timeliness of *QST*. We work hard to give members fast, accurate information, and there's no monthly commercial publication that can come close to our ability to carry late-breaking news. But that begs the real question; ARRL membership would be important to any active ham even if there were no *QST*. No commercial magazine publisher spent hundreds of thousands of dollars defending Amateur Radio at WARC-79, but ARRL did. From some commercial publishers all the amateur fraternity got was a lot of inaccurate, unproductive doom and gloom. Is that the kind of enterprise that deserves support? Most

hams don't seem to think so, judging from independent surveys and Postal Service circulation figures.

QST: How will the Hq. staff be able to cope with the added responsibilities brought about by the volunteer-examining program? What benefits will accrue to the Amateur Radio Service under the program?

Sumner: The real burden of the program will fall on the volunteers in the field, who will be doing the actual work of scheduling and administering the exams. If the League is selected as an exam coordinator, though, it will certainly have an impact on the staff. We have four new staff positions, additional data processing capability, and a lot of printing and postage expense built into a budget I'm confident is realistic. We expect it to cost a bit less than $200,000 per year to administer the program once it's in full swing.

The benefits to be gained from the program are substantial. Sure, we're removing a burden from FCC's shoulders; but in the process we can make exam opportunities much more convenient and frequent, and we can restore integrity to the exam process. That's not a bad trade-off.

"Amateur Radio is very healthy worldwide."

QST: As IARU Secretary, you play a significant role in international amateur affairs. How do you see the state of Amateur Radio worldwide? What issues on the international front currently need attention, and what issues should we be preparing for now?

Sumner: Amateur Radio is very healthy worldwide; the IARU member-societies report that the total number of amateur stations worldwide has now reached 1,380,000. There was a time when North American amateurs comprised the majority of the world's amateur population, but this is no longer true, and the IARU itself is being restructured to take this reality into account. Survival is the most important requirement, and to guarantee survival we must have the support of the majority of the world's nations when they gather for future World Administrative Radio Conferences affecting our interests. To earn that support we must show that Amateur Radio is relevant to the situation in developing countries. This, and not the desire to work a new country for DXCC, is the real significance of recent activities in China. The more examples we have that demonstrate Amateur Radio's effectiveness as a medium for technical self-training in developing countries, the brighter our future looks. This must be the overriding international priority.

QST: Business aside for a moment, how did you come to be involved in the first SSTV contact between the U.S. and Europe?

Sumner: The credit for that contact, some 15 years ago, really belongs to Ralph Taggart, WB8DQT. He and I were students at Michigan State University, and he needed some help with the high-frequency operation of his homebrew SSTV equipment. The experience was very valuable to me, because it made me sensitive to the desirability of encouraging and supporting the use of new modes by amateurs. When AMTOR came along, the League was quick to support it. The League also supported the deregulation of digital codes for operation above 30 MHz. These were important regulatory steps whose importance will be much better appreciated in coming years, and to some extent they stem from the lessons learned in the early days of SSTV.

QST: What's your personal favorite mode of Amateur Radio communication? Why?

Sumner: My own favorite on-the-air activity is the overcoming of natural obstacles to propagation. For example, 160-meter DX falls into this category, as do microwave work and moonbounce. Competing with the laws of physics is, I believe, the ultimate challenge in Amateur Radio. The fact that my wife Linda, KA1ZD, shares my enthusiasm for antennas makes this a bit easier! I also enjoy other competitive activities and saying hello to old and new friends, particularly on cw, and I check into traffic nets enough to keep my hand in. I built one of the first 220-MHz repeaters in the Hartford area, eight years ago, and I still try to gain personal experience in at least one new facet of Amateur Radio every year. From home, I'm on every band from 1.8 to 1296 MHz, though the antennas come and go as Linda and I decide to try something new. QST

Strays

TRN: A NET SUCCESS

☐ Using an experimental teleconferencing procedure, ARRL President Vic Clark, W4KFC, presented a discussion on "The Future of Amateur Radio" on March 3. Speaking from his home in Clifton, Virginia, Vic was patched into the Teleconference Radio Net, which covered 36 states, Washington, DC and Ontario (see Feb. 1982 *QST*, p. 17). A teleconference is a system that enables a multistation network to tie into a central control bridge by use of direct lines. Thus, amateurs throughout the country were able to communicate with Vic.

A total of 66 repeaters, some with multiple sub-links, were tied directly into the net. At least two hf locations were also reported to have carried the discussion, which reached an estimated 75,000 amateurs, possibly the largest audience to copy a single amateur transmission. The two-hour presentation was divided into three parts: (1) institutions of Amateur Radio, (2) regulations under which amateurs operate and (3) technology. After Vic addressed each topic, several minutes were allowed for hams to respond with questions or comments. A tape of Vic's talk is available on loan from Karl Townsend, Film Librarian, ARRL Hq.

Much of the credit for the success of TRN goes to National Net Manager Rick Whiting, WØTN, Control Bridge Operator Lou Apple, KØIUQ, and the members of the Honeywell ARCs in Minneapolis, Phoenix and Billerica, Massachusetts. The Honeywell group extended the idea of linking repeaters for educational purposes that was pioneered by Ed Piller, W2KPQ, of the IEEE/LIMARC Technical Network, which covered the NY-NJ-CT area. "We applied modern multipoint teleconferencing technology," Whiting explains, "and expanded the net to essentially North American participation." Through a letter-writing campaign over a period of many months, Whiting was able to build the Net to the nearly 70 repeater organizations that participated in the TRN.

Although there were no unforeseen technical difficulties, participating repeater groups will be asked in the future to improve their audio output to net control. As for listener input, Whiting says, "We're always looking for ideas on how to do it better. If amateurs have a specific topic or speaker they would like to hear, we invite them to contact us."

Ideas being discussed for future teleconferences include a panel discussion (two speakers) and the use of reference materials. The latter may involve having a schematic diagram, for instance, printed in a national amateur publication in advance of a talk, enabling listeners to refer to the drawing during the presentation. Scheduled teleconferences include a discussion on state-of-the-art antenna designs by Joe Reisert, W1JR, on June 2 and a talk by Barry Goldwater, K7UGA, on September 1.

For more information on TRN or how your repeater group can participate, write to Rick Whiting, WØTN, 4749 Diane Dr., Minnetonka, MN 55343. — *Ed Raso, WA2FTC*

Phase IIIB Special Service Channels: A Prime Opportunity

This plan recognizes the global needs of the Amateur Radio community and the service that its satellites could offer those interested in space communications technology.

By Richard Zwirko,* K1HTV and Bob Ruedisueli,** W4OWA

The Special Service Channel (SSC) concept was derived from meetings of AMSAT, ARRL and other interested users over the last four years. As a new communication "tool," the Phase III satellite offers almost unlimited possibilities. To ensure that this new service is used in the best interests of the Amateur Radio community, worldwide input from those interested in space communication was molded together and the SSC plan was born. Although some control over the use of the Special Service Channels will obviously be necessary, it is intended that as much flexibility as possible be built into users' access plans.

Who are the users? Anyone with information to relay to the worldwide Amateur Radio community. Frequent transmissions of bulletins, propagation information, solar events, announcements, and so on, will be originated by the bulletin stations of various national Amateur Radio organizations. Not all voice transmissions will be in English; amateurs around the world will be able to monitor bulletins and other information transmitted in their native tongues! In addition to information of interest to amateurs from various societies, AMSAT bulletin stations will transmit the latest data for the Phase IIIB, UoSAT, AMSAT-OSCAR 8 and Soviet RS satellites. Satellite users will know the very latest operational plans for these spacecraft without having to wait for published information. No longer will hf propagation anomalies and QRM cause users to miss information.

Educational bulletin stations will transmit material primarily intended for student audiences in school systems around the world — wherever such educational programs have been developed. The Phase IIIB satellite could even link classrooms thousands of miles apart through Amateur Radio, exposing our future scientists to hands-on satellite communications at an early age.

Special demonstrations for or by radio clubs could be scheduled. Individual users wishing to put on demonstrations for schools or other interested groups could also reserve time on the appropriate SSCs by contacting the appropriate coordinator.

AMICON, the AMSAT International Computer Network, will be another user of the Phase IIIB Special Service Channels. Some of the possibilities here include establishing two-way computer links, computer networks, packet radio gateways for long-haul traffic, and even digitized voice and video.

Individuals and groups of radio amateurs interested in serious scientific research could use Phase IIIB to perform meaningful experiments. These would first be cleared and coordinated by Scientific Program Managers in various countries around the world.

Certain regularly scheduled, long-haul, third-party traffic networks (cw and RTTY) could use Phase IIIB to provide a reliable channel for message handling, especially in emergencies. Individuals living in areas where natural disasters have disrupted normal communications could use the SSCs for relaying emergency messages in and out of the affected areas.

Other SSC users would include Net Control Stations and individuals participating in AMSAT nets, propagation nets, vhf/uhf experimentation nets and the like, where input from the amateur community is shared with others with common interests. A good example would be the reporting of major auroral, E skip, tropo, transequatorial or meteor scatter openings where real-time notification to those interested is necessary.

Should a specific listening or calling frequency be designated where everyone could monitor? In the Phase IIIA band plan AMSAT proposed a frequency called ANCF, the AMSAT Net and Calling Frequency. In addition to using this frequency for AMSAT international and regional nets, it was to have been used to exchange satellite information among AMSAT area coordinators, bulletin stations, command stations, net control stations and other AMSAT volunteers. AMSAT proposes that this frequency should also be included in the Phase IIIB band plan and that it be used as an Emergency Calling Frequency, as well, to be monitored by all.

Coordination of all this activity requires AMSAT to establish a worldwide SSC plan. Meanwhile, one thought remains clear: Disciplined use of the SSCs will be imperative; SSC use most be noncompetitive! Therefore, coordination and mutual cooperation is a prerequisite, and both planning and organization are essential.

Using the SSCs

Our present views are not final; flexibility remains uppermost in our minds. The SSCs must be arranged to allow maximum use of the available passband while providing as many options as possible. The SSCs will be located at each passband edge. Initially, only four channels are being considered: two at the high end and two at the low end.

The upper channels (H1 and H2) would be used for voice transmission, while the

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**AMSAT Hq., P.O. Box 27, Washington, DC 20044

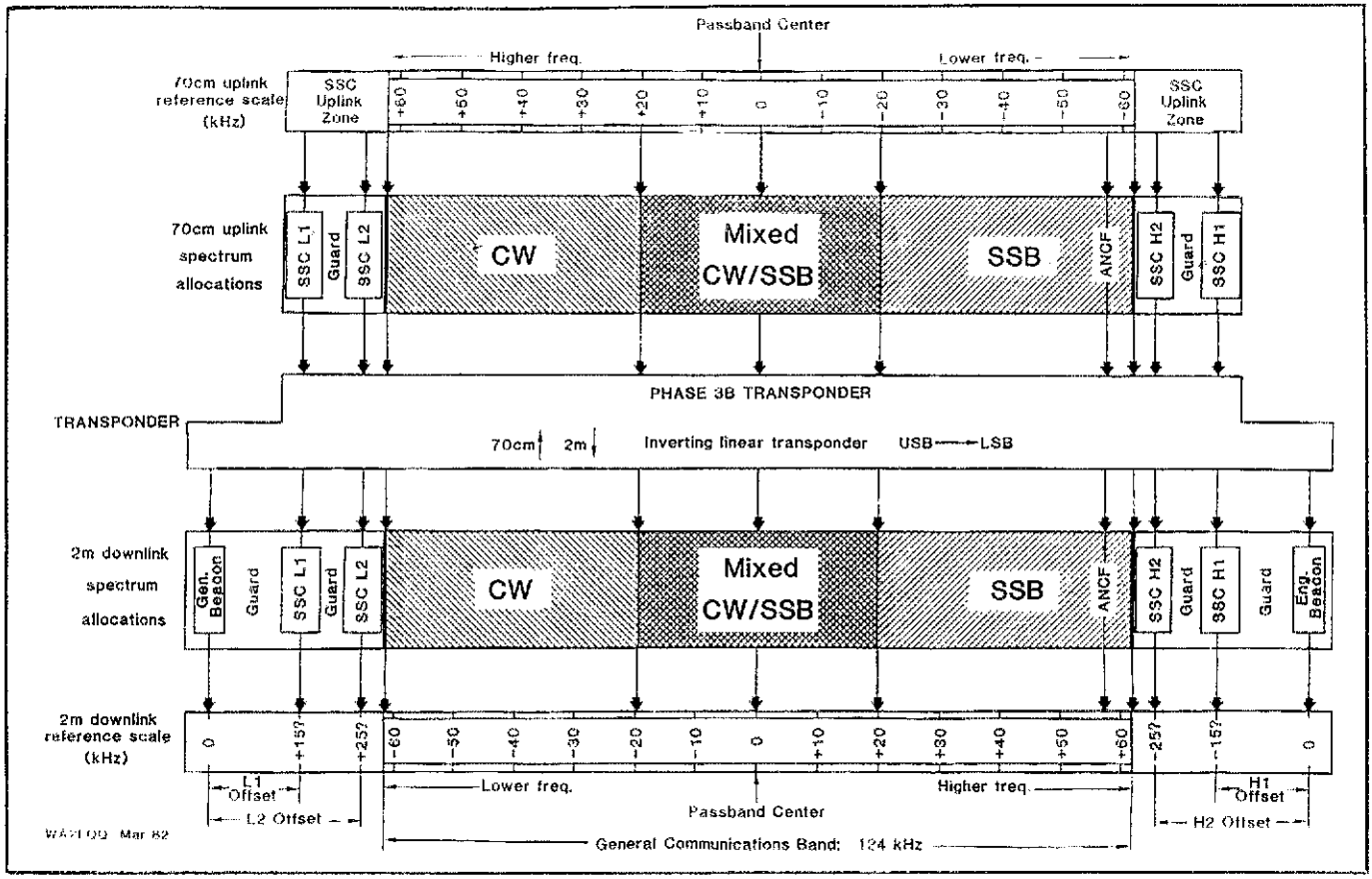


Fig. 1 — Phase III band plan. ANCF denotes the AMSAT Net and Calling Frequency. Beacons are placed tentatively at 145.812 MHz (General) and 145.990 MHz (Engineering). Passband centers (uplink and downlink) will be announced after systems calibration. Approximate values are 435.100-MHz uplink and 145.900-MHz downlink. All frequencies and allocations are subject to final approval. *(courtesy* ORBIT, *March/April 1982)*

lower channels (L1 and L2) would be strictly for cw and digital data. This is in keeping with the conventionally practiced band-pass plan that provides the lower third for cw, the upper third for ssb and the middle third for mixed cw/ssb. These relationships are shown in Fig. 1.

Voice SSCs

The upper two SSCs, H1 and H2, occupying the higher frequency, would be used primarily for one-way broadcast bulletins originated by any of the IARU Societies — ARRL or RSGB, for example. H1 would be used at times for certain educational and scientific programs. H2 would be used primarily in connection with scientific programs and, to a lesser extent, as backup for bulletins and educational programs. H2 would also be used for certain two-way network activity, such as coordinating or relaying information about propagation studies, solar events, moonbounce and meteor scatter transmissions, or in support of various worldwide AMSAT activities. The need for maximum flexibility, however, may necessitate using "Voice 1" for programs intended primarily for H2, and vice versa, as situations dictate.

Cw and/or Data SSCs

Consider the two lower SSCs, L1 and L2, as consisting of two 5-kHz-wide segments. The L1 frequency segment (the one closest to the lower edge of the passband), for instance, could be used for ASCII packet transmission, while the upper (L2) segment could be made available for cw or RTTY work.

Since each of these 5-kHz segments can accommodate several individual slow-speed channels, some thought must be given to how the segments could be compartmentalized. The L1 segment would be used primarily for experimental data services such as those being pursued by AMICON. Several AMICON groups — those in San Francisco, Washington, DC, New Jersey, Ottawa, Vancouver and Sweden, for instance — could be linked by a packet network that uses the L1 segment. L1 may also be used on occasion for science programs.

L2, the upper 5-kHz segment, would be used primarily for cw and RTTY bulletin transmissions and for scientific programs and experiments using cw or RTTY.

Mode L Use

Mode-L transponder use will grow quickly following a few months of tests and experimentation. Growth will be stimulated primarily by two factors: the introduction of new equipment and the possible crowding of the Mode B transponder. Mode L will then become a safety valve by absorbing more of the traffic. As a result, the proportion of time it's on will likely increase from the initially planned one day per week.

SSC Services Needed

AMSAT proposes a plan for SSC coordination and for suitable organizations to administer the plan. Once again, *disciplined use of the SSCs will be imperative; SSC use must, of necessity, be non-competitive!* Therefore, coordination and mutual cooperation are prerequisite. Both planning and organization are essential.

This proposed plan is intended to support six types of services for the SSCs: Transmission of General Bulletins, Presentation of Educational Programs, Implementation of Scientific Programs, Implementation of AMICON Programs, certain special Cw/RTTY Traffic and special Activity Networks.

In addition, this plan recognizes the need for three distinct efforts required to carry out each service: Program Planning, Coordination and Scheduling and Program Implementation. All three are required to guarantee equitable use of the SSCs.

Program Planning

Behind every program planned for the

SSCs there will be needs and ideas. These may originate anywhere within, and in some cases outside of, the radio amateur community. This plan would provide a means of assimilating these needs and ideas and converting them to worthwhile programs.

To accomplish this, individuals in each of the three IARU (International Amateur Radio Union) Regions will be appointed to manage the planning of SSC programs in each of the following areas: Education, Science and AMICON activities.

Additional individuals within the Regions will be appointed to manage the planning aspects associated with General Bulletins, Cw and RTTY Traffic (where permitted), Special Network Activities and Emergency Communications.

These Program Managers would be responsible for gathering ideas and responding to needs arising in their "jurisdictions." These needs and ideas would be gathered through appropriate input from the originators (see Fig. 2). This would be accomplished via personal contact, letters from individuals, clubs and organizations, contact during net sessions, and so on. The managers would then be responsible for planning one or more programs designed to satisfy specific needs utilizing the best of all available ideas.

Education

The Education Program Manager would tend to the needs of educators, students and anyone interested in learning about space communications. This manager would plan programs that use the capabilities of SSCs H1 and H2. The contents of transmissions made by those involved in the Education Program might cover topics such as orbital parameters and their meaning, how to improve uplink and downlink signals, and spin modulation. The SSC also could be used to link students in classrooms in different parts of the world, involving them directly with space communications.

Scientific

The Scientific Program Manager would proceed in a similar manner, planning programs using primarily the H1, H2 or the L2 SSC, depending on the content of the experiment. One experiment might have individuals track the low-orbiting UoSAT data, relaying telemetry in real-time via an SSC. Another experiment (already in the talking stage) is one that would relay data from a GAS (Get Away Special) aboard a future Space Shuttle mission through a Phase IIIB SSC.

Bulletins

Bulletins intended for transmission on the SSCs (ssb normally on H2, cw/RTTY on L2) would be routed directly to the various Phase IIIB bulletin stations by IARU Headquarters, IARU national societies, ARRL, AMSAT or any other Amateur Radio organizations. These bulletins, intended primarily for radio amateurs, would contain items of national or international interest. Topics covered might include hf propagation, reports of solar and geomagnetic activity, DX information, satellite operating status reports and orbital predictions.

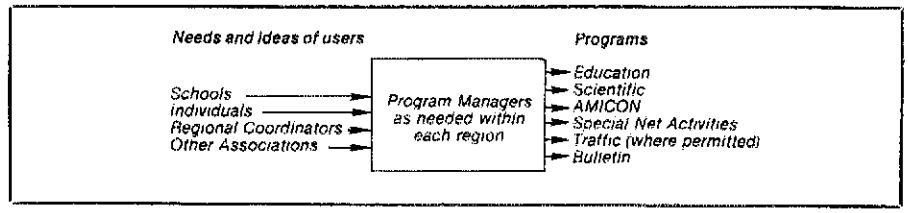


Fig. 2 — Needs generate programs. *(courtesy* ORBIT, *July/Aug. 1982)*

Traffic and Special Activities

Traffic Managers and *Special Activities Net Managers* would look to the requirements of various cw/RTTY long-haul traffic schedules (such as the Transcontinental Corps in the U.S.), and the ssb international AMSAT nets, which for many years have had to contend with the vagaries of hf propagation. (Note that although third-party traffic is allowed in the U.S., Canada and some other countries, this activity is strictly prohibited by most countries.) Phone-patch traffic, which seems to overrun the upper half of the 20-meter band, would be detrimental to the Phase IIIB passband if it were allowed to grow in a similar manner. AMSAT strongly recommends that, though they might be okay in a few countries, phone patches should *not* be conducted on the Phase IIIB satellite except in extraordinary situations, where no commercial telephone or radiotelephone circuits exist. A good example might be an Antarctic scientific research site or an Arctic expedition across the tundra or a polar ice flow.

The Emergency Communications capabilities of Phase IIIB will be extensive. Planning must be done in each region to prepare for the possible use of one or more SSCs during earthquakes, floods or other natural disasters when normal communications are unavailable.

AMICON

AMSAT International Computer Network activities on the Phase IIIB's L1 Special Service Channel will consist primarily of the exchange of digital packets. Since AMICON's users will be worldwide, standards and protocols must be developed. Other SSC programs will be developed by *regional* program managers, based on the needs of their particular region. AMICON program managers in each region, however, will direct AMICON activities in accordance with the recommendations of the AMICON Planning Committee. The Committee has made a number of recommendations concerning, for example, the required bandwidth of AMICON and certain stations acting as gateways, linking worldwide users of this digital communications system. More on the subject of AMICON standards and protocol will appear in a future issue of AMSAT's *ORBIT* magazine.

ANCF: Net and Calling Frequency

Although not proposed as an SSC, the *AMSAT Net and Calling Frequency, ANCF,* could become the primary *emergency listing channel* if amateurs monitor this one frequency when not making QSOs via Phase IIIB. This frequency could also be used by those who would want to share information on such vhf openings as E skip, aurora and transequatorial scatter. The present hf International AMSAT nets are expected to move, eventually, at least part of the net operations to the ANCF.

Coordination and Scheduling

In planning their programs and activities, managers within each IARU Region will acquire SSC "airtime." As conflicts will arise occasionally, overall coordination will be needed. This proposal requires the appointment of SSC coordinators for each IARU region. Initially, these coordinators will be the present AMSAT regional coordinators. It will be their responsibility to review all requests for SSC use in their regions and then make appropriate SSC schedule assignments. They will resolve any conflicts, establish schedules for SSC usage in their regions and finally pass this schedule information to the Program Managers in the respective regions (see Fig. 3). Any inter-regional conflicts that might develop would be settled at the regional coordinator level.

Program Implementation

Each Regional Coordinator will act as an interface among the program planners in his or her region. Program Managers will be responsible for developing programs to suit the needs of those in their own country or region. They also will be responsible for notifying participants of the SSC schedules established for their particular programs. SSC user stations will follow the schedules developed and

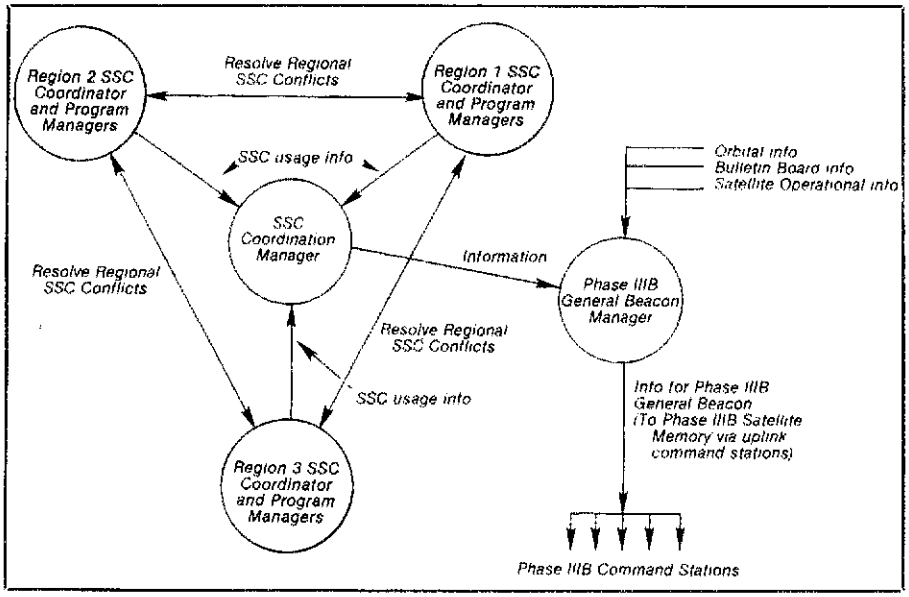


Fig. 3 — System coordination scheme *(courtesy* ORBIT, *July/Aug. 1982)*

coordinated by their Regional SSC Coordinator Manager.

Coordinating Plan Proposed "Who's Who"

AMSAT Vice President of Operations K1HTV has assumed responsibility for overseeing Phase IIIB Special Service Channel utilization. To assist with this task, it is proposed that an SSC Coordinator Manager and a General Beacon Coordinator Manager be designated to work with him. In addition, it is proposed that the current AMSAT Chief Regional Coordinators would support the Vice President of Operations by becoming the first SSC Regional Coordinators.

At this time, K1HTV will serve as SSC Coordinator, KO5I as General Beacon Coordinator, G3IOR as Region I (Europe) SSC Coordinator, LU4ENQ for Region 2 (South America), and, in Region 3, JA1ANG for Asia and WH6AMX for the Pacific. SSC Coordinators for Africa and North America are to be determined.[1]

Under this plan, the Regional Coordinators would establish schedules for SSC usage in their regions, resolving any conflicts that might result and, finally, would pass this schedule information to the Program Managers in their respective Regions. The following is a list of volunteer program managers for each region. The letters TBD (to be determined) indicate the need for a volunteer for that particular program in that region (see Table 1).

Finally, under this plan bulletin material originating with major Amateur Radio organizations would have various coordinators, as follows: *IARU* — G3AAJ in Region 1, W1AW in Region 2, TBD in Region 3; *RSGB* — G3AAJ; ARRL — W9KDR; and *AMSAT* — WA2LQQ. Coordinators for other organizations are to be determined.

Table 1
SSC Regional Coordinators

	Reg. 1	*Reg. 2*	*Reg. 3*
General Bulletin	G3AAJ	K1HTV	TBD
AMICON Programs	TBD	KA6M	TBD
Education Programs	TBD	TBD	ZL1MO
Scientific Programs	TBD	TBD	ZL1MO
Special Activities	TBD	W8GQW	TBD
Traffic Net	TBD	WB9IHH	TBD
Emergency Comm.	TBD	TBD	TBD

Since this is a plan subject to growth and adjustment, these assignments are still tentative. The task descriptions in this article are intentionally general and are intended to guide the future development of the various programs. AMSAT has tried to avoid overspecifying the tasks at this stage. Rather, we know the actual task description and responsibilities will evolve with time and with the decisions that you, as volunteers, will make in your respective roles. An optimum and equitable use of the Phase IIIB Special Service Channels poses a gigantic task, but one that can be managed if formulated carefully and thoughtfully. Worldwide coordination and mutual cooperation will go a long way to ensuring maximum benefits to all interested in space communications and experimentation.

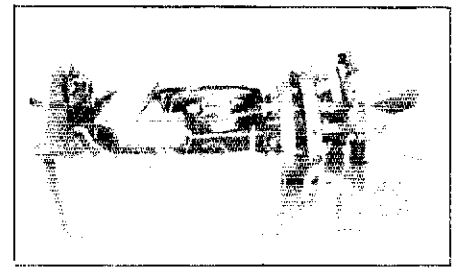
If you wish to help in any capacity, let us hear from you. Please address all comments to the authors at AMSAT, P.O. Box 27, Washington, DC 20044, USA. If you have an interest in developing a particular program within your country or region, please contact the AMSAT Regional Coordinator serving your area: Pat Gowan (G3IOR) in Region 1, Carl Huertas (LU4ENQ) in Region 2, Harry Yoneda (JA1ANG) or Rick Dittmer (WH6AMX) in Region 3. These gentlemen can be reached via the above address.

We will soon have in Phase IIIB one of the most significant communications tools ever made available to Amateur Radio. What good comes of the opportunity depends on what we, the user community, do with it. Let us plan well . . . and do well.

The authors would like to thank all those who contributed to this article, especially Pat Gowen, G3IOR; Harry Yoneda, JA1ANG; Andras Gschwindt, HA5WH; Dom Mallozzi, N1DM; Steve Place, WB1EYI; Vern Riportella, WA2LQQ; and Bernie Glassmeyer, W9KDR.

[1]Please note that for AMSAT planning purposes all Pacific islands will be considered to be in Region 3. Countries in the rest of the world will follow the IARU region plan.

Strays



Ced Tanner, VE3BBI, used a combination of past *QST* articles and some ham ingenuity to build this keyer. *(photo by VE2BBI)*

QST + INGENUITY = SUCCESS

☐ This keyer shows what can be done with a couple of "old" *QST* articles and a little ham ingenuity. The keyer circuit is that of "A Low-Cost Dot-Memory Keyer," which appeared in June 1978 *QST*, p. 22 (with further information in the Aug. 1978 issue, p. 45). I found it easy to build, following the instructions given.

The paddle is a modified version of "The Chip" by WA3VIL (Oct. 1982 *QST*, p. 33). Mine is made of bakelite rather than Plexiglas, and has some adjustments not in the original article. An ac power supply has been added as well.

The housing (not shown) is a Radio Shack metal cabinet (4 × 2-3/8 × 6 in.), catalog no. 270-252. To add weight, I glued a heavy, square metal washer (power-line type) to the bottom with Pliobond cement. The key feels like a Bencher, and keys any transmitter in fine style! — *Ced Tanner, VE3BBI, London, Ontario*

See You During Hurricane Season

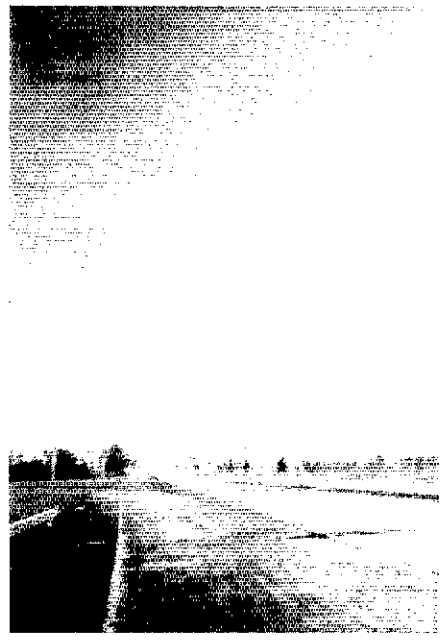
ARRL's participation in NVOAD helped the American Red Cross respond to an Illinois tornado — and helped bring about a new respect for hams as disaster volunteers.

By David E. Lattan,* WD9EBQ

Following the Marion, Illinois, tornado disaster on May 29, 1982, I found that I had been singled out by the press as their contact for information on radio amateurs' involvement in the tornado spotting and the relief effort. There were many times that the job at hand seemed more important than talking to a reporter, but I recalled past situations when it seemed that ham radio had gotten the short end of the publicity. This time, I was hoping not to lose the opportunity to bring this current effort into the public eye.

The same questions recurred. "At what point did the hams get involved?" always brought some disbelief when I answered that the hams had been involved since Friday evening (May 28). "But the tornado didn't occur until Saturday afternoon. How could you have been involved before it happened?" Many of the hams in the area are part of the National Weather Service SKYWARN program and have been trained as severe-storm spotters by the NWS. This is not uncommon, as many amateur groups around the country have been getting involved with NWS spotting operations.

The southern Illinois hams have taken this involvement a step further, patterning their system after the one created by Illinois Section Emergency Coordinator W9QBH in the Chicago area; that is, one of the amateur stations has access to the NOAA Illinois weather wire circuit and also an FAA circuit known as "service A." These are landline weather teleprinter circuits that operate at 75 and 100 wpm, respectively. The station with access to these circuits selects data that is applicable to the area from the vast amount of information that is on the wire, and then resends it on 2-meter afsk at 60 wpm, 170-Hz shift. Many of the trained spotters and net control stations have equipment to receive these transmissions, and are kept up to date on developing weather situations.



The deadly funnel cloud en route to Marion, Illinois. Quick work by SKYWARN-trained Amateur Radio operators permitted the NWS to issue an early warning for the entire county. Each amateur participating in this emergency received the Illinois SM's achievement award. (*Jean Price/Myra Walker photo*)

The Call-Up

In the case of the Marion tornado, we knew from weather reports on Friday afternoon that there would be a good chance for severe weather on Saturday. During Friday night and throughout Saturday we were keeping an eye on the weather to the west and south, and we were not surprised when the National Severe Storms Forecast Center issued a tornado watch for Saturday afternoon and evening. When the watch was issued, the Amateur Radio spotters were put on alert. When radar indicated the first potentially severe cell about a half hour away, the spotters went into the field. The storm was approaching from the northwest, instead of the southwest. The last time such a system had approached our area from the northwest, it had caused considerable damage.

We were lucky to have Jackson County Emergency Coordinator W9CJX spotting from Marion that afternoon. As the cell came toward Marion (amid associated unconfirmed reports of funnels), W9CJX kept a close eye on the approach. When he reported a wall cloud, his information was relayed to the NWS office in St. Louis. When he reported a funnel, St. Louis was again contacted and asked to stay on the line. When W9CJX confirmed that the funnel was indeed a tornado, the forecaster heard the report directly and issued a warning for the county. Fortunately, the tornado was spotted while it was still a good distance from Marion. The NWS warning was issued at 3:19 P.M., 11 minutes before AA9D reported the tornado at the west edge of Marion. From this point on, while the weather was still closely monitored, the amateur involvement switched from spotting to disaster-relief communications.

Red Cross Hookup

By 3:45 P.M., AA9D's concise damage reports had me convinced that the amount of damage was far greater than the local emergency agencies were going to be able to handle, in terms of caring for the homeless for the next several weeks. It was about this time that I remembered that ARRL is a member of the National Volunteer Organizations Active in Disaster (NVOAD). I knew from the ARRL/Red Cross Message Relay (Oct. 1981 *QST*, p. 54) that the Red Cross was also a member, and that the NVOAD directory would have the information I needed regarding contacting the Red Cross to initiate their response. I found

*SM Illinois, RR 1, Box 46E, Makanda, IL 62958

their national number in Washington, DC and gave them a call, identifying myself and the situation. I was told to expect a return call from the Bi-State Division in St. Louis. The return call informed me that Ward Johnson of the Red Cross Midwest Field Office would be arriving early Sunday morning and that the Bi-State office would be relying on amateurs to keep them in contact with Johnson until a local Red Cross headquarters could be established.

During this time, hams were providing much of the on-site tactical communications immediately following the tornado. Early Sunday morning, KA9EWN established contact with Johnson, and stayed with him throughout the day so he had a means of communicating while he assessed the situation and set up the local Red Cross headquarters. In addition to providing the Red Cross with tactical communications, the area hams went to work handling Welfare traffic that was coming through on MIDCARS (the Midwest Amateur Radio Service). Those messages that could be handled by phone from Carbondale were delivered the same day, and the ones that could not were held for personal contact, which was to begin the following day in conjunction with the Red Cross Disaster Welfare Inquiry (DWI) group.

On Sunday morning, we decided to try to handle as many of the inquiries as possible by telephone, as the phone system outside of the directly affected area was still operational. The problem was getting into the busy Marion exchange from the outside. The answer was to put a station at the Marion central switching office, where we could be sure to have access to Marion lines no matter how busy the exchange got. W9CJX, an employee of the phone company, secured permission to set up the station at the phone company office and manned the station throughout Monday, handling the Welfare messages that could be run down by phone. Another station was set up at the local Red Cross Hq. in Marion; this station forwarded Welfare inquiries to W9CJX and was also the clearinghouse for mobile units that were physically locating people who couldn't be contacted by telephone. K4VUD, in Carbondale, remained as net control to handle liaison to MIDCARS and also to coordinate additional units coming into the affected area.

As the weather continued to be threatening all Saturday evening and throughout Sunday, I didn't get out of the weather center and over to Marion until late Sunday night, when W9CJX and I went to the telephone office to install the 220-MHz link. The next day, after helping set up the Red Cross station, I asked Mr. Johnson how else we could assist them now that the DWIs were being handled and tactical communications needs were diminishing. Mr. Johnson sent me to the Red Cross Mass Care office, which was being set up in a local junior high school. Mass Care is just what the name implies; in this case, caring for the masses involved feeding over 45,000 meals during the two weeks they were in operation!

The hams involved set up and manned the Red Cross 47.42-MHz base station, which tied the Mass Care office to the meal delivery trucks and to the Red Cross officials who had portables on that frequency. In addition, hams were responsible for finding or providing all of Mass Care's refrigeration, telephone, dairy product, portable water and foodservice contact needs. For the duration of the job, "we need help" in the Mass Care office became synonymous with "call the hams."

Knowledge Gained

Another question put to me by the news media was, "What have you learned from this experience that will help you to respond to future disasters?" The answer is one that will be etched in the minds of the hams in the area for a long time to come. Fifteen minutes after a disaster strikes is *not* the time to go to local government officials and say, "We are ham radio operators and we can help." Local officials might see this offer of help as a liability, not a resource. Since they wouldn't know us and wouldn't understand what radio amateurs can do, they may choose not to deal with us at all.

Because of our proven ability to provide so many forms of needed communications in a disaster, local government officials whom we had tried unsuccessfully to make contact with are now seeking us out and asking that we become part of the standing disaster plan. The hams in Williamson County, who have always been more than willing to help when there was a need but didn't see the importance of organizing into a county Amateur Radio Emergency Service (ARES) group, now have formed such a group under the leadership of newly appointed EC K9UKX. Hams throughout the area are also taking a second look at SKYWARN training. The Red Cross has offered to teach classes in damage assessment to local ARES groups. Furthermore, the Red Cross has asked us to instruct their personnel on the use of communications systems so they can better understand and make use of both their own and Amateur Radio communications facilities.

During amateurs' participation in this event — from spotting the tornado to helping Red Cross with the ongoing Mass Care effort — many strong friendships developed. There grew from the experience a feeling of oneness of purpose. As the Mass Care effort was winding down and the staff and volunteers were preparing to go home and pick up their lives where they had left them three weeks before, one Red Cross staffer turned to me and said, "Well, see you during hurricane season."

For the disaster professionals of the Red Cross, this statement may be taken literally. The next time the call for help is sounded, I may not be there myself, but I'm confident that hams will play an important part of the disaster response team. QST

Strays

"HAMFEST CALENDAR" RULES AND REGS

☐ *QST* will list your hamfest in its monthly Hamfest Calendar free of charge. There are certain guidelines, however.

Hamfests will be listed only once. Sponsors may specify the issue in which the announcement should appear. Normally, if the event will occur before the 10th of the month, we recommend listing it in the previous month's issue. The deadline for *receipt* of hamfest information is the 15th of the second month preceding publication. In other words, if an event is August 5, the announcement should be in the July issue, and will need to arrive in Newington by the 15th of May at the very latest. For an August 19 event, the sponsor could choose either the July issue, with the May 15 deadline, or the August issue, with a June 15 deadline.

Postal regulations prohibit mentioning prizes or games of chance such as bingo in *QST*. We will acknowledge all information received at Hq. for Hamfest Calendar with a postcard stating the date of publication. If you do not receive an acknowledgment within two weeks, your letter may not have arrived at Hq., so please send us a duplicate copy.

Oh, yes, Hamfest Calendar is separate from the hamfest section of the Ham Ads. See the first page of the Ham Ads section in this issue for more information. — *Marge Tenney, WB1FSN*

I would like to get in touch with . . .

☐ other amateurs who believe in the true sonic superiority of vacuum-tube over solid-state high-fidelity equipment and wish to share ideas, circuits, etc. Dennis J. Lusis, W1LJ, 160 Curtiss St., Bristol, CT 06010.

☐ powdered-snow and advanced skiers worldwide who are interested in joining a net. David Arnold, KA1CPL, 309 Musterfield Rd., Concord, MA 01742.

☐ any amateurs who are blind or deaf and would like to establish a sked. David Kilgar, ZL2BHV, 12 Miriona Grove, Paekakariki, Wellington, New Zealand.

New Books

☐ *The BASIC Book,* by Harry Helms. Published by McGraw-Hill Book Company, New York. First edition, 1983. Soft-bound, 5-3/8 × 8 inches, 49 pages (including index), $6.95.

Once you've worked with a computer for a while, you become aware that you can't simply key in any BASIC program not specifically written for your computer and expect it to work without some changes. BASIC is not a "pure language" today — there are many dialects. It seems most personal computer manufacturers have included or excluded certain features that make their form of BASIC nearly unique. Advances in technology have had their effect in this area. So, you may find you have to do a bit of translating to get a desired program (meant to run on another brand of computer) to work with your favorite machine.

This small volume gives you a summary and cross reference of BASIC as implemented on the Apple II (Applesoft), Atari 400/800, Commodore PET, IBM, Radio Shack (level II and Extended Color), and Texas Instruments 99/4 computers. According to the author, these were chosen on the basis of how widely an implementation is currently used or its potential for wide use. No DOS commands are covered.

As Mr. Helms points out, you may discover that converting desired programs to your BASIC dialect is not as easy as it may at first seem. Machine language subroutines are one stumbling block. Knowlege of the particular computer memory maps and how to use them is required for your conversion process to be effective.

A 10-page key word ready reference table lists 223 BASIC key words, a page number where detailed information can be found pertaining to that particular word, and indicators showing which of the BASIC dialects use that particular word. (It's easy to see the IBM PC has the largest vocabulary of those computers listed.)

The two-page first chapter tells you concisely what to look for and how to go about converting from one BASIC dialect to another. Syntax and common programming practices are discussed briefly in Chapter 2, but only beginners will learn anything from that page and a half.

System commands, variables and arrays, arithmetic, relational and logical operators, control and transfer statements, I/O statements, a brief explanation of subroutines, string functions, numeric functions and statements, assembly language routines and statements, and graphic statements are covered in Chapters 3 through 12. A limited (25-word) glossary is also included. — *Paul K. Pagel, N1FB*

☐ *CQ Contest,* by Garry V. Hammond, VE3GCO, 5 McLaren Ave., Listowel, ON N4W 3K1, Canada. 8-1/2 × 11 inches, 132 pages, $8 (U.S.) postpaid.

Intended more as an operating aid than as a reference book, this photocopied publication comes prepunched and ready for installation in a buyer-supplied three-ring binder. According to the introduction, the purpose of *CQ Contest* is to help the radio amateur with the logistical and administrative aspects of contesting. The book provides rules, sample summary sheets, sample log sheets, dupe sheets and multiplier check sheets for most of the major contests scheduled throughout the year. Hammond provides the paperwork for events ranging from the ARRL- and CQ-sponsored DX contests to those contests sponsored by overseas societies, such as the JARL All Asian DX Contest and the DARC Worked All Europe DX Contest.

The book arranges the paperwork by the month in which the contest occurs. For example, the January section contains rules and forms for the ARRL January VHF Sweepstakes, the CQ Worldwide 160-Meter Contest and the REF French DX Contest, as well as rules for the Hungarian CW DX Contest and the *73 Magazine* 40- and 80-Meter contests.

Also included in the package are nice touches such as "universal" log, summary and multiplier check sheets that can be used for just about any contest. The use of organized summary sheets and log sheets is mandatory for any contest. With the right information, any contest sponsor will be able to put you in the entry class you want to be in. Without sufficient information you may end up in the wrong entry class or, worse yet, counted as a "checklog" ineligible for awards.

For the newcomer to contesting, Hammond includes several pages of hints for more efficient contest operation. While these "tips" aren't earthshaking news to experienced contesters, they are very useful to a neophyte contest op attempting to unravel some of the mysteries of the game.

Although *CQ Contest* is somewhat lacking because of the quality of the photocopied pages, it does allow the active ham to have ready access to a number of useful contest forms. And, as Hammond points out, the price of the book is certainly less than the postage to get forms from each individual contest sponsor. — *Mark J. Wilson, AA2Z*

☐ *Armchair BASIC,* by Annie and David Fox. Published by Osborne/McGraw-Hill, 630 Bancroft Way, Berkeley, CA 94710. First edition, 1983. Soft-bound, 7-3/8 × 9-3/16 inches, 264 pages, $11.95.

This book was written for the beginning computerist or someone who simply wants to learn a bit about the fascinating world of computers and one of its languages. In fact, you don't even need a computer at your fingertips to help you start learning the most widely used computer language — BASIC. As the title suggests, you can indeed get a grasp of the fundamentals of this language from the comfort of your favorite chair.

Some BASIC instruction books I've read border on the ridiculous in the presentation of the material. Exhaustive use of cartoons, "humorous" (not to me!) dialogue and sample programs that make me shudder because of their silly content are part and parcel of these volumes. *Armchair BASIC* isn't that bad, although I feel the prologue and chapters I and II fall into a similar category. With those eliminated, I am comfortable with the book.

The text is readily understandable and the format easy on the eyes. A light and humorous writing style is used, but it is not excessive. Chapters 3 through 10 are followed by brief multiple-choice quizzes. The correct answers are supplied at the back of the book. A number of the questions are giveaways, but sufficient testing exists to try the beginner's "memory banks."

Though you don't *need* a computer to use the book and benefit from its contents, chances are good that before long you'll probably want to try the stuff you've learned on the nearest available computer. The authors recommend it as do I. The feedback will reinforce the learning process.

You won't learn *everything* there is to know about BASIC from this book, but it will serve to get you started in the right direction. The glossary of terms supplied is comprehensive and should make you more conversant in "computerese." — *Paul K. Pagel, N1FB*

Harry's Hams

Hams in Seattle are doing something about the weather — providing weather reports for area travelers, and providing the Amateur Radio Service with solid public relations.

By Bob Hart,* WA7HRA

Every weekday morning at 6 and again at 4:45 in the afternoon, net control station Bob Hayden, K7ZBF, calls for reports from the Seattle Area Amateur Radio Weather Reporting Service (SAARWRS) — rhymes with Star Wars). Stations report in from the entire Puget Sound Basin — the primary market area for Seattle commercial broadcast station KIRO, which has a morning new-and-traffic information format for commuters.

Weather throughout the area can vary dramatically because of terrain, and the commuter may get all sorts of surprises on the way to work. The 6 A.M. report may tell him that even though clear and dry weather exists at home, he can expect fog or freezing rain on his way to the job. Newscasters report particularly hazardous conditions within minutes of the time hams make their observations. Although local information passes through a 2-meter repeater, a number of stations relay weather information from 75-meter weather nets that encompass the entire western U.S. The news staff reports the nonlocal weather for the benefit of travelers and to add interest to their broadcasts.

The afternoon report takes a somewhat different format. The information gathered at 4:45 P.M. goes directly to the station's weather-news director, Harry Waptler, who in turn reports the data from "Harry's Hams" on KIRO-TV at 5:25. As in the morning, the news is still "new."

How it Began

This outstanding bit of public service (and, by the way, excellent Amateur Radio public relations) didn't just materialize. It was, if you'll pardon the expression, "part of the fallout" from the eruption of Mount St. Helens in May of 1980. When the mountain blew its top, everyone wanted to know which way the wind was blowing and what the weather was over the entire area in the fallout pattern for the ash. Ash-fall could have gone as far as 500 miles in any direction the wind was blowing. The National Weather Service actually had few reporting stations and found it impossible to cope. Amateurs immediately gathered data, but found no organized method for passing it to those who needed the information. Since that time, a 75-meter weather net has been formed to report directly to the Weather Service and others organized to report to the media. Weather Service personnel recognize the media as their most important means of communicating with the public.

Members of the King County (Seattle) ARES group felt that something needed to be done to get the reporting organized. As with all nets, the daily activities are more or less for drill. We are all preparing ourselves for the big disaster we hope never happens. The organizers felt that a routine report to the media would provide the daily discipline required while actually allowing the members to hear their small and often remote towns mentioned on the broadcasts. Bob Brady, KB7HP, and K7ZBF developed a reporting format and began to promote interest. They asked Harry Waptler, KIRO's popular weather-news director, if he'd be willing to broadcast the collected data. He was. After the details were worked out, the program started in the fall of 1980. Check-ins were few and far between in the beginning, but within a few months 40 or more stations were checking in with 50 to 60 in-state data points and an additional 30 to 40 out-of-state points.

A Progress Report

After more than two years, Harry still thinks the program is great, and hopes to see it continued. He particularly enjoys the DX reports net members pick up from all over the world. A report of tropical weather in India followed by a report of Arctic cold from Siberia really spices up the local reports.

Items of special interest to Harry and his viewers include road conditions, temperature, measured rainfall and wind speed. The occurrence of localized storms and unusual conditions are also good news items. Current weather-related stories, such as power lines down or flood information, are of great interest.

What else would Harry like? He says he'd like to see a national amateur weather reporting service. That's a pretty big order.

As amateurs, we have accomplished three things with the program. We perform a public service that is appreciated and enjoyed by many. We've trained a contingent of hams to report conditions throughout the Puget Sound Basin in an accurate and timely manner. A third achievement, which wasn't even considered in the beginning, is the message we bring to hundreds of thousands of people five nights a week: Amateur Radio is on the job and ready to serve. QST

From Hilton to Harry

Before there was SAARWRS, there was CARWRS — the Connecticut Amateur Radio Weather Reporting Service (see October 1979 *QST*). Organized in 1979 as part of the ARRL Amateur Radio Emergency Service (ARES), CARWRS was fashioned after tornado-watch programs in the Midwest and Southwest. Trained radio amateurs, acting as observers, gathered timely weather information and passed it on to government agencies, the news media and the National Weather Service for the information and safety of the citizenry.

The impetus for CARWRS came from a popular local television weatherman, who contacted ARRL Hq. with the idea of establishing an Amateur Radio weather service, especially because amateurs can operate when commercial power sources are knocked out. Ultimately, "Hilton's Hams" — as the CARWRS group became known to television viewers statewide — was incorporated into the Connecticut Emergency Broadcasting System.

*1835 E. Main St., El Cajon, CA 92021

Until recently a resident of Washington state, Bob Hart has been actively involved in the SAARWRS program since its inception. Now, Bob spends the summer months in western Washington as a "roving reporter" for SAARWRS.

Happenings

Conducted By Carol L. Smith,* AJ2I

- *Hildebrand Ruling Reactions*
- *No-Code Comment Deadlines Extended*
- *League Financial Statements*

Hildebrand Ruling — ARRL, PRB Request Review

An FCC Review Board ruling effectively permitting indecent language on Amateur Radio frequencies (see Dec. 1982 *QST*, p. 69 and April 1983 *QST*, p. 56) has come under fire from the Amateur Radio community and the FCC. Amateurs are worried that our service could lose its respectability and become a sewer on the airwaves. The Private Radio Bureau, which feels just as strongly about this Review Board ruling, wonders if it wouldn't be powerless to prohibit indecency in the Amateur Radio Service. Both the PRB and the ARRL want to see the case reviewed by the full Commission.

The PRB took action first by filing an application for review. It feels that the Review Board misapplied the *Pacifica* decision, a case in which the Supreme Court held that the FCC could determine that transmission of certain obscene words violated the indecency provisions of U.S. law. [This is the first Amateur Radio case to be reviewed in light of *Pacifica*. Again, the amateur, David Hildebrand, N6BHU, admittedly transmitted foul language — language that violated almost anyone's standards. That fact is not at dispute.] The PRB asserted that the Review Board ruling *not* applying *Pacifica* standards to amateur transmissions was an "inappropriately narrow view." It argued that the *Pacifica* decision "was not limited to stations engaged in broadcasting and that all of the factors cited in *Pacifica* exist in the field of Amateur Radio as well as broadcasting."

The Bureau was also concerned that children could be subjected to this kind of language. Many Amateur Radio licensees *are* of young age, and many more licensees have children in their homes. The potential for youths hearing these kinds of indecent transmissions is great. Furthermore, adult amateurs and listeners who don't want to hear this "gutter parlance" often simply can't turn to another frequency because of skeds they must keep. The privacy of their homes is being invaded, and they are left with the "dilemma of having to either tolerate indecency or discontinue their hobby."

The PRB also asserted that Section 97.119 of the Rules (prohibiting obscene, indecent or profane words, language or meaning) exists independently of the *Pacifica* decision. The Review Board has, in effect, overturned Section 97.119 and, in doing so, has acted beyond its authority. "Worse," the PRB continued, "the Review Board has ended the Commission's enforcement program in the area of indecent communications."

"The Commission must review and overturn this decision." — Private Radio Bureau

"The entire ARS was stunned by this decision." — ARRL

Sixty-Day Extension for No-Code Granted

The ARRL asked the FCC for an extension for filing comments about the proposed no-code license to allow ample time for full discussion and debate of this vital issue within the Amateur Radio community. (See March 1983 *QST*, pp. 9 and 49, and April 1983 *QST*, p. 9.)

The Commission agreed that the no-code Amateur Radio license is a core issue for the amateur community. Saying that it wanted "input from Amateur Radio operators to reflect thorough and dispassionate consideration," the FCC granted the time extension.

• New deadlines for Docket 83-28 are June 28, 1983; reply comments — July 28, 1983.

The Bureau predicted a bleak future for the Amateur Radio Service if the Review Board's Hildebrand decision is allowed to stand. "It is but a short step from the mental images created by Hildebrand to the video images that are sure to be fostered by the effect of the Board's decision." Because of the significance of this case, the PRB requested that the Commission hear oral arguments.

In support of the interests of Amateur Radio, the ARRL filed a brief stating that this case directly affects the future of the entire Amateur Radio Service. The League emphasized the self-policing, disciplined nature of our hobby, which exists as a result of uniform "community standards" that have developed throughout the Amateur Radio community worldwide. "Foul language of the type admittedly uttered by Hildebrand," the League asserted, "is not under any circumstances whatever and never has been tolerated by the Amateur Radio community. The utterances of Hildebrand in this case were blatantly outrageous to the amateur community. For the Commission to sanction such language would undermine the integrity of the Amateur Radio Service in the United States more than any other single action the Commission could take."

Other ARRL arguments for a reversal of the Review Board decision somewhat parallel those of the Private Radio Bureau. The League emphasized that children and others should *not* be subjected to foul language on Amateur Radio frequencies and that the Review Board erred in refusing to apply the indecency standards of *Pacifica* to Amateur Radio transmissions. Indeed, the League pointed out that the *Pacifica* indecency standard is entirely appropriate for application in this case because the Amateur Radio Service is identical to broadcasting in many respects. Furthermore, the Administrative Law Judge in the original Hildebrand ruling did not *extend Pacifica*, but rather "did what the Supreme Court in *Pacifica* instructed the Commission to do — he analyzed the *context* of the transmissions in a specific factual setting and applied the *Pacifica* indecency standard to Amateur Radio, which happens to be perfectly analogous in this context to broadcasting."

The League worried that if the Review Board's "faulty" decision is allowed to stand, "outrageous language such as Hildebrand's will unquestionably proliferate, driving decent people away from this public-service avocation and causing the United States, the leader in Amateur Radio development, to lose esteem in the eyes of foreign administrations. . . . The Commission must," it concluded, "reverse the decision of the Review Board in this proceeding and affirm the initial decision of the Administrative Law Judge which found Hildebrand unqualified to remain a Commission licensee."

WARC COMMENTS — OKAY, BUT . . .

The League recently filed its comments in Docket 80-739, the implementation of the Final Acts of WARC-79 (see March 1983 *QST*, p. 56). Generally supportive of the FCC proposals, the ARRL nevertheless had certain

*Membership Services Assistant, ARRL

grave concerns about "those proposals that appear to be in conflict with the U.S. proposals to WARC-79, and which go beyond those proposals in restricting the Amateur Service."

At issue specifically are the 1900-2000 kHz and 220-225, 420-430 and 2310-2390 MHz bands.

• *1900-2000 kHz.* The FCC-proposed reduction of amateur status from primary to secondary at 1900-2000 kHz is not consistent with U.S. WARC proposals. Neither is the proposed introduction of radiolocation as a primary service on these frequencies, and the League adamantly opposes these provisions. The Amateur Service has historically been allocated 1900-2000 kHz on a primary basis from the earliest days of radio regulation, though amateurs were restricted from interfering with LORAN-A radiolocation stations. LORAN-A operations, however, have been terminated in the U.S. and will soon end in Canada, so the need for secondary status for Amateur Radio will soon no longer exist. Amateur understanding has always been that full use of the band would be restored as soon as LORAN-A was no longer required.

"Despite this decades-old understanding," the League says, "the Commission proposed to permit continued amateur operation at 1900-2000 kHz *only on a secondary basis.* This is entirely unacceptable to the ARRL and to the Amateur Radio community."

The League cited the increased amateur participation on 160 meters in recent years and stated that amateurs need the full 200-kHz segment (from 1800-2000) with *primary allocation.* 160 meters is, and should remain, one of the most important bands in the Amateur Radio Service.

• *220-225 MHz.* The ARRL wants the nongovernment fixed and mobile services allocations stricken from this band. The Commission stated that current and future spectrum requirements for 220 are "undefined at this time." The League took exception, noting that "the need for continued amateur access to the band has been clearly defined for some time and has become increasingly more important following adoption of an NPRM to create a codeless class of license."

This band is particularly desirable for amateur operations, and amateur occupancy of 220 has increased despite the decade-old threat of a nongovernment, nonamateur allocation at 220-225 MHz. The League and the amateur community would welcome a "clear statement from the Commission of its intention to retain the band for amateur use."

• *420-430 MHz.* The ARRL wants the process of issuing permits for U.S. amateur operation at 420-430 MHz along the Canadian border to be "streamlined as much as possible." Agreeing that Canadian fixed and mobile operations should be protected from harmful interference, the League nevertheless wants to ensure that U.S. amateurs are able to make the fullest possible use of this band without unnecessarily severe restrictions. The ARRL envisions that the process for applying for waivers to operate at 420-430 MHz be as simple and straightforward as possible. It also offered to cooperate with the Commission in developing and implementing an effective procedure for handling waiver requests.

• *2310-2390 MHz.* The FCC sees aeronautical flight test telemetry requirements as having top priority, and proposes to eliminate amateur use of this band. However, aeronautical telemetry requirements here are limited to well-defined, sparsely populated areas of the country. The ARRL therefore suggests that the FCC investigate the possibility of allowing amateur microwave operation in other areas.

In conclusion, the ARRL reiterated its support of all the other Commission proposals for the Amateur and Amateur Satellite Services. It also noted that while early access to the new allocation at 10.100-10.150 MHz has been given to amateurs, we are still eagerly waiting for access to the 18.068-18.168 and 24.890-24.990 MHz bands. (In any event, these will become available on an exclusive basis on or before July 1, 1989.) Based on the excellent opportunity for public participation in the entire WARC proceeding, the League ended its comments by praising the Commission for "the manner in which they have discharged their public trust."

At the recent dedication of the Cardinal Glennon College repeater station WBØQXW/R in Missouri are (l-r) NØDN, KAØIAR, Bishop Schlerhoff, KØYCV, KAØKQB and NØDWC. *(photo courtesy Saint Louis Review)*

PROPOSED RF RADIATION STANDARDS — ARRL COMMENTS

In its ongoing attempt to free Amateur Radio operators from unreasonably restrictive radio-frequency radiation standards, the League presented its position in comments to the Environmental Protection Agency (EPA). This group is currently considering the subject as noted in the Advance Notice of Proposed Recommendations in Docket A-81-43.

The ARRL wanted to be sure that the EPA knows of Amateur Radio operators' fundamental interest in this area. Hams are, after all, users and experimenters with rf energy. We have a vital concern in seeing that regulation of radio-frequency energy by government agencies is based on *full* knowledge of the issues.

The foundation of League comments to the EPA is built upon these issues:

• *Amateur Radio stations pose no hazard to the public, given the intermittent nature and relatively low powers used.*

• *the EPA should adopt the latest American National Standards Institute (ANSI) Radio Protection Guide (C95.1-1982) as the federal radiation protection guide for public exposure to rf radiation.*

• *the EPA should adopt a uniform, national, preemptive radiation standard to protect the public from overzealous state and local government regulation.*

"UMS" INTERFERES WITH AMATEURS

A Soviet station (or several different stations) reportedly belonging to the Russian Merchant Navy, has shown up regularly through the years on several frequencies allocated exclusively to the Amateur Radio Service. Called "UMS," it usually operates on cw and RTTY. Many amateurs have complained to the ARRL Intruder Watch about the harmful interference caused by "UMS."

On February 24, 1983, the FCC sent a telegram to the Soviet Union pointing out that "UMS" was causing harmful interference to amateur operations on 21.032 MHz and requesting that the Soviet Union abide by international regulations and cease operation on that frequency. This is not the first time that the FCC has contacted the Soviets about "UMS"; an earlier message, sent on August 9, 1982, dealt with the presence of "UMS" on 14.141 MHz. No replies have been received.

U.S. amateurs are not alone in being plagued by "UMS." Australian hams and others are waging a similar battle. We can't promise results about this situation, but we will keep you informed.

ANTENNA VICTORY IN MISSOURI

Some ground has been won in Missouri in the battle against restrictive antenna height limitations. The Circuit Court of Clay County found that John Spencer, ABØI, does not have to (1) obtain special use permits for his Amateur Radio towers or (2) lower his antennas. The Court ruled that the county regulating ordinances were unconstitutional because

• *they lack sufficient standards for granting or denying special use permits.*

• *they are vague, arbitrary and capricious.*

Most important, the Court agreed with Spencer's assertion that

• *the Federal Government has preempted Amateur Radio tower regulation under the Amendment to the Communications Act of 1934 (P.L. 97-259).*

Rod L. Richardson, WAØHHX, who has so far successfully argued Spencer's claims, feels that this case could continue through the system of appeals. At any rate, amateurs can take heart that a victory in the antenna height restriction arena has been wrested from the judicial system.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington 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 supersedes the position of Section Communications Manager in each section. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* 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 Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . .as candidate for Section Manager

for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .).

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, June 10, 1983.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, 1983. Returns will be counted August 23, 1983. SMs elected as a result of the above procedure will take office October 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 October 1, 1983.

If no petitions are received for a section by the specified closing date such section will be resolicited in October *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

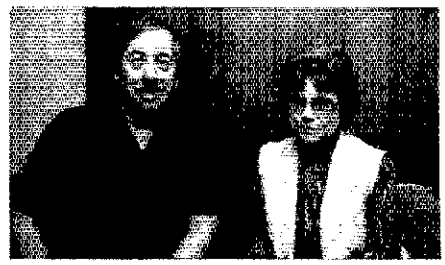
SECTION MANAGER ELECTION RESULTS

The following were elected for a two-year term of office beginning July 1, 1983:
Uncontested
Alberta, E. Roy Ellis, VE6XC; Eastern Massachusetts, Richard Beebe, K1PAD; Maryland-DC, Karl R. Medrow, W3FA; Nevada, Leonard M. Norman, W7PBV; New Hampshire, Robert C. Mitchell, W1NH; Northern New Jersey, Robert E. Neukomm, KB2WI; Rhode Island, Gordon F. Fox, W1YNE; San Joaquin Valley, Charles P. McConnell, W6DPD; Utah, Ronald C. Todd, K3FR.

THE DEMAWS RETIRE

After 18 years of dedicated service, Doug (W1FB) and Jean (W1CKK) DeMaw have retired from ARRL Hq. Doug became connected with the ARRL publishing effort as a freelance writer for the first edition of *The ARRL VHF Manual*. Impressed by his writing ability, ARRL Technical Director George Grammer, W1DF, persuaded Doug to join the League's technical staff. In March 1965, he came to ARRL Hq. as an assistant technical editor. In 1968, he became the editor of the *ARRL Handbook*. After being promoted to Technical Department Manager and Senior Technical Editor in 1970, he started a strong movement toward emphasizing solid-state circuit design in *QST* and the *Handbook*.

Doug has written more than 200 *QST* articles during his years on the ARRL staff, and has made many contributions to the League's technical books. He has also written three engineering-level books for Prentice-Hall, Inc., and Howard Sams & Co. His major technical interests and contributions have been in rf circuit design and antennas. His specialty has been high-performance receivers and transmitters for the medium and high frequencies.



First licensed in 1950 as W8HHS, Doug holds an Extra Class license. An active cw enthusiast, his primary Amateur Radio operating interests are QRP, 160-meter DXing and DXpeditions to the West Indies.

Doug holds a BSEE degree, and is a Life Member of the ARRL and a Senior Member of the IEEE. He has organized 17 professional technical sessions for the IEEE, and was founder and publisher of *VHFer Magazine*.

For the many faithful readers of W1FB's *QST* articles, we have a bit of good news. Doug will continue to edit, write and do *QST* column work for the ARRL for at least three more years. As he said, "I am retiring from the League, but I will continue to support and promote the ARRL wherever I travel."

Jean, who was first licensed in Michigan as WN8REI in 1953, started her Hq. career in the Circulation Dept. In 1975, she transferred to the Communications Dept., where she took over as manager of the Awards Branch, administering the many popular League-sponsored operating awards. The personal touch that she has brought to the awards program has tremendously enhanced the popularity of "awards chasing" over the course of the past eight years. Countless numbers of radio amateurs have received their treasured certificates as a direct result of Jean's good work.

Doug and Jean will be returning to their native Michigan to live on their 40-acre farm. Doug will be entering into private business as owner of Oak Hills Research & Publishing. His work will involve consulting, amateur booklet publication and some small-product manufacturing.

Doug and Jean regret leaving their son KA1BUQ and family in Connecticut, and also their many good friends and co-workers. The Technical Department staff in particular will miss Doug's guidance and encouragement. Jean's thoughtfulness and good cheer will be missed by everyone she has come in contact with. We hope they will now find time to do the many other things they enjoy, such as gourmet cooking, gardening, fishing, hunting, camping and coin locating with a metal detector. The best of luck to Doug and Jean on their new venture, from all the staff at Hq. — *Marian Anderson, WB1FSB*

POSSIBLE GOOD NEWS FOR PENNSYLVANIA AMATEURS

If you own an Amateur Radio antenna or tower in Pennsylvania, you could be among the most fortunate of the amateur ranks. Legislation prohibiting zoning ordinances that restrict the height or existence of Amateur Radio antennas or towers has been reintroduced in the Pennsylvania legislature. House Bill No. 49 says

> Section 603.1 — No zoning ordinance shall exclude or restrict the erection, location or height of an Amateur Radio antenna, or the tower supporting such antenna. An ordinance may regulate the construction or maintenance of an antenna tower, but only to the extent as is necessary to protect life or property.

It will probably be a rough road to the successful transformation of this bill into law. Pennsylvania amateurs are urged to contact their state representatives to press for its passage.

S.66 — "CABLE TELECOMMUNICATIONS ACT OF 1983"

One of Amateur Radio's staunchest friends, Senator Barry Goldwater, K7UGA, was the primary force behind the recent introduction of S.66 in the U.S. Senate. This bill would establish guidelines and a national policy for cable telecommunications regulations.

Currently being reviewed in the Committee on Commerce, Science and Transportation, S.66 caught the attention of the ARRL. (As amateurs know all too well, wherever cable television and ham radio coexist, problems often appear.) The League filed a statement to the Committee, pointing out the gargantuan CATVI problem and the only practical solution — getting cable television off Amateur Radio frequencies. The League urged that the Committee acknowledge this serious problem in its Report on this legislation so that the Amateur Radio Service might continue its public service activities unfettered, *and* so that cable TV customers might enjoy a good quality product.

Missionary, Also Ham, Canonized

Father Maximilian Kolbe, issued the call sign SP3RN in the 1930s, was canonized last October. Fr. Kolbe was born in Poland and was, for a while, a missionary in the Far East. He used Amateur Radio to communicate with other missionary stations around the world. Fr. Kolbe died while imprisoned during WW II when he sacrificed his life so that a fellow prisoner might be spared.

MEL C. ELLIS, K7AOZ

We are saddened to report the death of Northwestern Division Vice Director Mel C. Ellis, K7AOZ, of Spokane, Washington. Mel was an Advanced class amateur with an exceptional interest in and motivation for Amateur Radio. He was highly involved in many amateur activities, having served as Northwestern Division Vice Director since 1981. Associated with QCWA, Mel also had affiliations with the Western Washington DX Club, Spokane Dial Twisters, Inland Empire VHF Club, Tri-State ARC and the Northwestern Division Convention Committee. K7AOZ was Spokane County EC, an emcee at numerous banquets and an active DXer. Mel was retired from management and ownership in the heavy construction and highway construction fields. He will be sorely missed by the amateur community.

AUDITED ARRL FINANCIAL STATEMENTS RELEASED

The audited financial statements reprinted below set forth the League's financial condition as of December 31, 1982, as compared to a year earlier. The statements show an after-tax net gain of $390,832 on total revenues of $6,367,634 for the calendar year 1982.

The financial statements and supplementary financial information will appear in the 1982 *Annual Report*, which should be available in late spring. Affiliated clubs that returned the request form sent to them late last year will be receiving a copy of the *Annual Report* as soon as it is received from the printer; members may obtain a copy for a $1 postage and handling fee.

Price Waterhouse

ONE FINANCIAL PLAZA
HARTFORD, CT 06103
203 525-5671

February 28, 1983

To the Board of Directors of
The American Radio Relay League,
Incorporated

In our opinion, the accompanying balance sheet and the related statements of revenues and expenses and changes in general fund balance and of changes in financial position present fairly the financial position of The American Radio Relay League, Incorporated at December 31, 1982 and 1981, and the results of its operations and the changes in general fund balance and of changes in financial position for the years then ended, in conformity with generally accepted accounting principles consistently applied. Our examinations of these statements were made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Price Waterhouse

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

BALANCE SHEET

Assets	December 31, 1982	December 31, 1981
Current Assets:		
Cash (including time deposits of $1,086,834 in 1982 and $1,325,000 in 1981)	$ 1,253,986	$ 1,440,926
Accounts receivable (less allowance for doubtful accounts of $26,500 in 1982 and 1981)	408,940	444,105
Inventories	273,302	259,237
Prepaid expenses	22,207	11,787
Total Current Assets	1,958,435	2,156,055
Life Membership Proceeds:		
Due from current funds	51,878	127,380
Accrued interest receivable	70,851	10,283
Marketable securities, at cost	3,302,286	2,516,543
Life membership plaques	9,310	7,584
	3,434,325	2,661,790
Regular Portfolio:		
Marketable securities, at cost	585,157	762,764
Cash Surrender Value of Life Insurance	40,753	38,481
Fixed Assets:		
Land	1	1
Buildings	1,153,902	1,138,954
Furniture and equipment	829,058	730,461
	1,982,961	1,869,416
Accumulated depreciation	(713,775)	(601,516)
	1,269,186	1,267,900
Goodwill, Trademarks and Copyrights	1	1
	$ 7,287,857	$ 6,886,991

Liabilities and General Fund Balance	December 31, 1982	December 31, 1981
Current Liabilities:-		
Accounts payable:		
R.R. Donnelley & Sons Company	$ 310,063	$ 380,025
Other	128,697	112,129
	438,760	492,154
Due to life membership fund	51,878	127,380
Accrued liabilities	132,543	260,033
Deferred membership fees and subscriptions - current portion:		
Life members	291,782	235,668
Term members	1,222,622	1,194,145
Current portion of mortgage note payable	24,596	22,431
Income taxes payable	209,379	136,043
Total Current Liabilities	2,371,560	2,467,854
Deferred Membership Fees and Subscriptions:		
Life members	3,099,215	2,442,124
Term members	298,005	823,799
	3,397,220	3,265,923
Mortgage Note Payable	94,449	119,046
Loan Payable	36,500	36,500
Reserves:		
For promotion of amateur radio overseas	6,075	6,329
For Colorado Convention Fund	4,896	4,378
For Project Goodwill	21,426	21,978
For OSCAR Station Construction	1,127	1,211
For H.P. Maxim Award	1,000	-
	34,524	33,896
General Fund Balance	1,353,604	963,772
	$ 7,287,857	$ 6,886,991

See accompanying notes to financial statements.

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

STATEMENT OF REVENUES AND EXPENSES

AND CHANGES IN GENERAL FUND BALANCE

	Year ended December 31, 1982	1981
Revenues:-		
Publications:		
Advertising QST magazine	$ 2,039,133	$ 1,991,687
QST newsdealers sales	139,200	131,825
Standard handbook sales	473,494	472,204
Booklet sales	520,901	526,389
Booklet advertising sales	15,058	13,993
Tune in the World sales	128,520	121,953
Tune in the World advertising sales	-	13,560
QEX income	13,752	12,001
ARRL Letter	17,029	-
	3,347,087	3,283,612
Membership dues (including membership subscriptions to QST magazine)	2,593,180	2,488,463
Membership supplies sales	121,877	126,370
Interest, dividend and royalty income	231,485	234,081
Revenue from donated equipment, materials and supplies	3,228	13,238
Increase in cash surrender value of life insurance	2,272	2,310
Contributions	5,616	2,013
Awards income	375	135
Cash discounts taken	2,725	3,441
Overseas QSL service income	38,713	47,333
Gain (loss) on sale of investments	47,386	(25)
Amortization of bond discount	-	2,336
	6,393,944	6,203,307
Deductions from revenues:		
Discounts allowed	240	5,169
Exchange and collection charges	12,170	15,253
Sales returns and allowances	13,900	14,238
	26,310	34,660
Total Revenues	6,367,634	6,168,647
Expenses:		
Operating expenses	5,450,865	5,444,249
Administrative expenses - other expenses authorized by Board of Directors	317,018	327,566
Total Expenses	5,767,883	5,771,815
Excess of Revenues over Expenses before Income Taxes	599,751	396,832
Income tax on unrelated business income	(208,919)	(135,583)
Excess of Revenues over Expenses	390,832	261,249
General Fund Balance:		
Beginning of year	963,772	702,523
Reserve for H.P. Maxim Award	(1,000)	-
End of year	$ 1,353,604	$ 963,772

THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

STATEMENT OF CHANGES IN FINANCIAL POSITION

	Year ended December 31, 1982	1981
Financial resources were provided by:-		
Excess of revenues over expenses	$ 390,832	$ 261,249
Add (deduct) income charges (credits) not affecting working capital:		
Depreciation	167,082	140,913
Decrease in reserves	(372)	-
Working capital provided from operations	557,542	402,162
Decrease in marketable securities	177,607	-
(Increase) decrease in cash surrender value of life insurance	(2,272)	2,496
Borrowing against life insurance	-	36,500
Increase of deferred fees - term members - non-current portion	-	633,255
	732,877	1,074,413
Financial resources were used for:		
Additions to furniture and equipment, net	168,369	356,983
Mortgage payment	24,596	22,431
Net increase of life membership assets over life membership deferred fees	115,444	18,207
Increase in marketable securities	-	264,726
Decrease of deferred fees - term members - non-current portion	525,794	-
	834,203	662,347
(Increase) decrease in excess of current liabilities over current assets	$(101,326)	$ 412,066
Changes in components of working capital		
Increase (decrease) in current assets		
Cash	$(186,940)	$ 684,032
Accounts receivable	(67,846)	53,770
Inventories	14,065	48,237
Prepaid expenses	10,420	(616)
Accrued interest receivable	32,681	-
	(197,620)	785,423
(Increase) decrease in current liabilities		
Accounts payable	53,394	(275,033)
Accruals	127,490	(24,149)
Payable for life loan	75,502	(86,436)
Prepaid fees and subscriptions:		
Life members	(56,114)	(30,836)
Term members	(28,477)	(110,394)
Bank overdraft	-	155,715
Income taxes payable	(73,336)	(249)
Reduction in long-term mortgage	(2,165)	(1,975)
	96,294	(373,357)
	$(101,326)	$ 412,066

See accompanying notes to financial statements.

NOTE 1 — SIGNIFICANT ACCOUNTING POLICIES:

Business

The American Radio Relay League, Incorporated (the League) is a not for profit, tax-exempt organization formed to promote interest in amateur radio communication and experimentation. The League also publishes documents, books, magazines, newspapers and pamphlets necessary or incidental to its purpose.

Income Recognition

A portion of the revenue from membership fees and subscriptions applicable to acquisition costs is recognized at the time the memberships and subscriptions are received. The remaining portion is included in revenues on the straight-line basis ratably over the applicable membership or subscription period.

The League recognizes income on donated capital based on the fair market value of the item at the date of donation.

Deferred Life Membership Fees

By-laws of the League provide for a paid-up life membership in the League available to any licensed amateur radio operator upon payment of a fee of twenty-five times the annual dues rate. Life membership fees received are deferred and invested to produce income to defray the cost of servicing life members. Deferred life membership revenues are amortized to current revenues and funds are transferred to current operations based on a rate designed to offset the costs of servicing the life membership.

Income Taxes

The League is required to pay federal income taxes on unrelated business income, primarily net income received from advertising placed in its *QST* Magazine.

Investments

Marketable securities are carried at cost. Bond premium or discount is amortized to income over the life of the bond.

Inventories

Inventories are carried at the lower of cost (first-in, first-out) or market.

Fixed Assets

Fixed assets are recorded at cost. Depreciation is computed on the straight-line method for assets purchased prior to January 1, 1981. For assets purchased after that date, an accelerated depreciation method is used. Buildings are depreciated over a 40 year life. Furniture and equipment are depreciated over their useful lives ranging from 3 to 20 years.

NOTE 2 — INVENTORIES:

Inventories are comprised of the following:

	December 31,	
	1982	*1981*
Standard Handbooks	$ 58,374	$ 63,429
Booklets	129,897	80,227
Tune in the World Booklets	9,312	49,561
Membership Supplies	75,719	66,020
	$273,302	$259,237

NOTE 3 — INVESTMENTS:

	December 31,			
	1982		*1981*	
	Cost	*Market*	*Cost*	*Market*
Life membership proceeds	$3,302,286	$2,986,599	$2,516,543	$1,935,694
Regular portfolio	585,157	641,733	762,764	828,865
	$3,887,443	$3,628,332	$3,279,307	$2,764,559

Investments are comprised of the following:

	1982		*1981*	
	Cost	*Market*	*Cost*	*Market*
Certificate of deposit	$ 50,000	$ 50,000	$ 50,000	$ 50,000
Preferred stocks	207,347	136,045	231,293	137,045
Common stocks	309,170	335,569	519,907	599,653
Corporate bonds	1,141,713	909,732	1,215,730	810,790
Government agency and other issues	2,179,213	2,196,986	1,262,377	1,167,071
	$3,887,443	$3,628,332	$3,279,307	$2,764,559

The increase (decrease) in unrealized depreciation in the market value of investment securities for the years ended December 31, 1982 and 1981 was $(255,637) and $59,394, respectively.

NOTE 4 — LONG-TERM DEBT:

On March 1, 1977 the League signed a mortgage note in the amount of $225,000, the proceeds of which were used to finance a building addition. The interest rate on the mortgate note is 9 1/4% per annum. Monthly installments are $2,882 (including interest) through March 1, 1987. The note is secured by property, building and related equipment having a net book value of $1,269,186.

NOTE 5 — LIFE MEMBERSHIP FUNDS IN OPERATING ACCOUNT:

As of December 31, 1982 and 1981 the Life Membership fund had $51,878 and $127,380, respectively, in the League's operating cash account in order to receive the higher interest rates earned by the operating fund's "overnight" investment account.

NOTE 6 — RESERVES:

Reserves are established for purposes specified by donors or the League Board of Directors. Such reserves are administered by designated officials of the League in accordance with the directions of the donors or Board of Directors.

	For promotion of amateur radio overseas	*For Colorado Convention Fund*	*For Project Goodwill*	*For OSCAR Station Construction*	*For H.P. Maxim Award*
Balance, December 31, 1980 and 1981	$6,329	$4,378	$21,978	$1,211	
Contributions					$1,000
Income earned		518			
Expenditures	254		552	84	
Balance, December 31, 1982	$6,075	$4,896	$21,426	$1,127	$1,000

NOTE 7 — PENSION PLAN:

The League has a noncontributory group annuity retirement plan which covers full time employees. The League's policy is to fund pension cost accrued. The total pension expense for 1982 and 1981 was $160,292 and $149,615 respectively, which included amortization of past service cost over a 30-year period. A comparison of accumulated plan benefits and plan net assets as of the most recent actuarial valuation dates is presented below:

	June 3,	
	1982	*1981*
Actuarial present value of accumulated plan benefits		
Vested	$387,903	$577,417
Non Vested	58,797	80,272
	$446,700	$657,689
Net assets available for plan benefits (as reported by the insurer, including $140,500 in 1982 and $142,100 in 1981 payable to the insurer by the League)	$170,865	$250,438

The assumed rate of return used in determining the actuarial present value of accumulated plan benefits was changed to 7.5% at June 3, 1982, from 6% at June 3, 1981. The net effect of changes in certain actuarial assumptions used in computing pension costs (including the change in the interest rate assumption) resulted in a decrease in the actuarial present value of accumulated plan benefits of $109,908.

NOTE 8 — DEFERRED LIFE MEMBERSHIP FEES:

The following is a summary of deferred life membership fees and subscriptions activity:

		December 31,	
		1982	*1981*
Beginning balance		$2,677,792	$2,142,335
Additions:	Membership fees received	598,577	561,343
	Investment income	367,126	209,502
		965,703	770,845
Deductions:	Membership fee allocation	(106,609)	(88,909)
	Investment income	(367,126)	(209,502)
	Reserve maintenance	238,067	86,801
	Net transfer to operations	(235,668)	(211,610)
	Administrative Expenses	(16,830)	(23,778)
Ending balance		$3,390,997	$2,677,792

Moved and Seconded...

LIFE MEMBER APPLICANTS
FEBRUARY 12, 1983

List No. 1: Julian H. Allen, WD8PYR; James R. Aman, KB5TC; John D. Armstrong, KA3CYT; Patricia L. Arnett, KA8AMX; Horace C. Atkins, Jr., KA5FWZ; Charles E. Banks, W6HYY; Lawrence T. Bartlett, Jr., KA1DPD; Rodney Emerson Beam; Jay I. Berman, WB2FVT; Allen Bianco, KL7FKO; Bruce Bischof, W7ITT; R. H. Blessin, KC0QF; Richard E. Bokern, WB9PUJ; Anthony C. Bongiovi, Jr., KX2Z; William Brandt, WB2GTG; Jan Edward Bridge, KB2RV; David R. Bristol, II, N1BLL; Barry H. Burton, Sr., KC4ST; George L. Carlson, Jr., WB9RJD; Ann M. Carro, KA1DNB; Travis H. Case, N5DEZ; F. John Cianci, Jr., N1AMB; John P. Conshick, KA1EBZ; James S. Cook, WD4IYI, Robert W. Cook, KA8MDZ; William R. Cowan, Jr., N4DJY; Gordon M. Cox, WD2AHL; Matthew R. Craft, KA0HBU; Bruce D. Crawford, WA3WUL; John B. Creel, Jr., WB3GXW; Scott L. Curry, N8ADZ; Chalmers R. Custer; Jon A. Dainty, Sr., KB0UX; Raymond J. Dashnaw, KA0BBF; Michael A. Davidson, KC5CP; Robert A. Davis, N2CBW; William D. DeMar, KA6CCM; Donald R. Denmeade, N2DAI; James E. DuFour, KA0MCP; Theodore E. Durst, W6PFW; Erik Ekstrom, KE4XY; Roland L. Erikson, N1SE; Fred T. Erskine, III, W3IRK; Donald R. Etheredge, AL7Z; James S. Evans, W6EFB; Bob Evinger, WD9EKA; Paul W. Feddersen, KK0U; Robert P. Gagaich, KU2V; James H. Gardner, KG5T; Philip I. Goodman, K4FXB; Kris Gordon, KA2BBX; Michael Green, N5BAL; Frederick M. Haggett, WB1GYI; Robert J. Harker, KC9UU; James I. Harvey, K10X; Peter John Harvey, WA2TBP; Michael L. Hasenfratz, WA6FXT; John P. Heavey, WB2EMB; John T. Hellyer, KB7IN; Paul Herink, KA2FTC; Anne Holcomb, WA6NCP; William R. Holly, K1BH; Philip C. Hopson; Leon Hornstein, Jr., AE3S; John M. Houk, WB3ABH; James P. Hughes, K1EQX; Joseph J. Ireland, KB7UC; Robert L. Jackson, N8DBO; Gregory G. Johnson, N9AKP; Jeff H. Judy, WA4MPV; John M. Karian, KB3H; Harvey James Keating, K7LJQ; Joan Keller, KA4ADP; James N. Kile, WB2PID; David P. Koch, W8LNJ; Mark Kopitz, WB6ANU; James Korman, N5BHC; James R. Krymkowski, K9WYB; Martin W. Kulp, Sr., KA3CAM; Iani Kusmulyana, KO4J; Donald J. Lamont, WD5AAH; John Landrigan, KA4RXP; Joel E. Lepouce, WB9VDF; Mark Craig Lingard, WA6MMH; L. H. Litton, KC4NB; John Edward Maguire, WB6JBQ; Michael D. Mahoney, WA1KNO; David Marik, WD8KTM; Alan R. Marote, WA1LBG; Robert A. Martinson, N0AFY; Bryant D. Mauk, N5BRT; Charles O. Mays, WB4TNC; Lee S. McColloster, WA5DRK; William T. McMannis, WD8JCY; Robert W. Meyer, KA9KTF; Russell J. Mize, Jr., KA4AIY; Robert L. Montgomery, WB5RGL; Donald S. Morris, Jr., AB4J; Harold E. Mundy, KD2K; Bruce Muscolino, W6TOY; Roger A. Mussell, WA9NMW; William E. Nave, KA9JXQ; David L. Nystrom, WD0GTU; Walter E. Orzechowski, KG3K; Steven H. Overmyer, N8BCM; Joseph A. Palmer, KS8M; Wayne L. Pier, WA2ZTH; Nicholas Pino, N3ARK; Jack Pletcher, W6JIR; Frank Popovics, W4EZI; William R. Pulhamus, W2IYC; John S. Purtill, W1IDB; Charles A. Rees, WA1LEZ; Maurice F. Reiter, WD0DZE; Charlotte L. Richardson, KA1GHR; Julio Ripoll, WD4JNS; David Roberts, W0NT; Gary Bruce Rogers, WA4YMZ; Joseph L. Rossmiller, AG9Y; Harry M. Rubinson, K7GD; P. Ronald Sanders, WN9IJB; Charles M. Sandlin, WD4PAH; John M. Sawina, WA2PNF; Lewis W. Sayre, N7AVK; Maurice L. Schietecatte, N8CEO; Peter K. Schutte, WA0YRX; Mark J. Sebern, WA9JMS; Larry M. Simko, WA8EXE; Dwight Sipler, AI3E; Samuel Lloyd Sondley, Jr., K5VGC; William J. Soon, K6SVG; Martin Smaha, WB6WFY; Fredric C. Smith, WA6HQW; Gustaf T. Smith, II, WD2AGY; Rodney J. Stafford, KB6ZV; Charles R. Stanley, WB9BSE; Timothy W. Stein, WD9DVO; John Pfouts Stevens, III, WB3BHE; Virgil R. Stewart, KA3CSV; James D. Stone, WD0EJK; Claud J. Thomas, KA4RRO; Robert C. Thomas, KB4QR; Donald R. Thompson, II, KB6BL; Thomas W. Tippery, KA0ATU; Joseph Travis, KA8NMV; Samuel M. Trine, WA6QGH; David B. Tumser, WB2WVW; William Turco, WB2DOV; Charles V. Turner, N0BZE; Paul H. Valentino, K4FPF; Alexander Vrenios, KA9JFR; Edwin D. Walston, KA1WF; Paul K. C. Wang, KU6T; Paul Wasserstein, WA0UME; Robert A. Weinberger, AE3L; Timothy D. Wetzel, KA5FSJ; James B. Wiley, KL7CC; Richard T. Williams, KD6KF; W. J. Wischmann, KB2XZ; Lloyd D. Worley, NO4H; George B. Yantis, WA0GNQ; Francis Yaroszeufski, WB3IZE; Ernest J. Young, K3ZQI; Herbert Zander, DJ7LR; Donna Zug, KA0HNQ; Richard R. Zupp.

List No. 2: David Abrantes, WB1EDT; Edwin Adams, KB3DH; Allen W. Akerson, W7GYZ; Larry L. Alman, WA8QCW; Michael Kriss Anderson, WA7PHI; Stuart K. Arestad, W7OQQ; Leonard M. Armstrong; Marilyn R. Armstrong, N6CUH; Donald V. Atkinson, N0BIV; Robert J. Atwater, KA4KYM; Charles L. Azevedo, W4ERM; Brian F. Bailey, WB4MMP; Edward F. Baker, KA3FDM; John Q. Banbury, II, AG7N; Gregory V. Barber, KJ2U; Victor E. Barborini, LU4DIJ; John B. Barham, WB5GUV; David R. Beatty, VE3KNN; David K. Beaulieu, WA3KRL; Leonard T. Becker, WJ4B; William H. Becker, K1NE; Thomas L. Beeman, WB5ROI; Lloyd H. Bell, Jr., AL7CQ; James C. Berger, K3II; Keith A. Berglund, WB5ZDP; Norman P. Bermes, KA5AMF; Paul C. Bernhardt, WD4EBA; Louis C. Berry, WA6WHQ; Roy J. Bonvillian, Jr., WD5DBV; Steve Bowdle, KA5HNJ; Donald E. Bowen, K5LHO; William T. Bowen, N6FMK; Gerald R. Bowman, N5CCV; Jim Brassell, KU5I; Doyle W. Braun, KI8L; David L. Breeding, WB5LBN; Marvin Breitkreutz, WD0CDT; Patsy C. Breitkreutz, WD0CDS; Ralph H. Brenner, Sr., KA7ISB; Tenney Brown, N3ATV; Thomas R. Brown, W6JHQ; Texas D. Buckhaults, KA0ABO; David L. Burger, WB4MDY; Donald D. Button, Jr., AJ1T; William W. Cady, K8UHH; Patrick C. Cain, KN0D; Peter A. Cantara, K1IM; Jeffrey J. Capozzio, WB8WUY; John R. Carlson, WA1VRL; Charles W. Carpenter, KA2CC; Charles R. Carter, III, WD0GOQ; Paul W. Caruso, WD6EYX; John E. Cave, WD4HLI; Gary Kim Chan, WA6LZC; John M. Coldwell, W4VYP; Landy W. Compton, KB5IK; William G. Compton, WB6KER; Jeffrey J. Covelli, WA8SAJ; Brian J. Cox, WA8QAF; Edward W. Cox, W0RAO; Eldon E. Crawford, AG1O; Chris Davis, KA6AVR; Gary Dawson, KB7NP; Fred A. Dayton, WA7TTD; William DeChastain, N6AIX; James P. DeClercq, K8JUM; Patricia S. DeSain, KC5YM; Roger E. Delaney, WB2MUT; Al Deshotel, WB5VNX; Harold C. Diezel, W7KP; James L. Dionne, K1MEM; Richard C. Djubek, KA1ERH; Michael G. Dooley, KA2CTU; Edmond P. Doone, KA9AAA; Robert H. Dougherty, KA2HMM; James D. Douglass, AC0E; Rudy J. Duchan, WA5QNH; James T. Downey, W6TD; Thomas R. Ebeling, N8TE; Arthur B. Epstein, WB2WMJ; Melvin J. Erb, K6GWC; Ward A. Erickson, N0AJD; Ronald L. Ewing, KA7BRR; John W. Farber, KG6I; Leroy J. Fast, W6JXV; Robert Fasulkey, W3BBQ; William J. Feldkamp, K1AB; Gary B. Ferree, W7DEQ; Robert W. Flack, KT4M; Michael E. Flahaven, WA7OQS; Norman L. Fleck, Jr., N8AQW; Gerald D. Fox, WA2VKS; Leverett M. Francis, K4SRA; Richard P. Fray, N5EYT; Thomas W. Frenaye, K1KI; John D. Fulton, KB7MD; Joel S. Gambord, KT6J; Kenneth E. Garlock, K8CHO; Leo E. Garrett, KC5UM; Sherman Gary, KA3ALZ; Edward J. Gerber, WD5IQA; Roy S. Gertig, KA2ABR; William T. Gibbons, W9KBV; Larry D. Godek, W0OGH; Jim Goldsberry, KD4GR; Wilbur M. Goss, Jr., WD4RDT; Thomas J. Greco, N1AZF; Eugene Green, N8BYG; Louis Gregor, KC2OB; Stephen N. Gross, N2BNB; Robert L. Grubic, NC6Q; Edmund J. Gurney, Jr., K8PCZ; Richard E. Hagerman, WB5SRN; Kendall R. Haines, KC5XZ; LeRoy H. Hamilton, ND6C; Lawrence W. Hammel, NA5Q; Douglas Lee Hanna, KA4KXR; Lawrence W. Heether, N2CEN; Wayne Leslie Hester, KD4QP; H. T. Hodgson, W6TAI; Geoffrey Kendall Hoffman, VK6NM; Richard L. Hojaboom, WA6YCG; Mark Holland, W6JOB; Masahiro Hoshino, JA1RFF; Donald H. Howell, KL7IFK; Loren M. Howerton, AI0T; Thomas P. Hughes, KB7KR; Roland H. Hundley, N2BIJ; Harry James Hunt, KA0FNX; Robert E. Hylinski, KB3YP; Christopher D. Imlay, N3AKD; Lloyd G. Jeffries, Jr., WD5CXN; Dale G. Johnson, WD8KXL; Dorothy J. Johnson, WD5GPH; Glenn R. Johnson, WA0RUJ; James F. Johnson, KA0KUO; Theopolis W. Johnson, K6UJV; David Jones, WD4LVN; Ron Jones, KC4GR; William B. Jones, WB4PUD; David L. Justis, KN0S; Henry L. Koch, N0BHB; Robert E. Kotoski, WB0SPG; Toivo Kuokkanen, KK6P; Mason S. Landau, WB0RJQ; Kenneth P. Lang, KD6LN; Eric D. Lapham, KG8Z; James L. Laubach, KA3GFH; Robert Rex Le Galley, WB5WKU; George R. Learned, WD0FAI; Frank H. Letton, W6JTI; James E. Ling, K6EXI; Michael I. Linger, WA5MOE; Thomas W. Little, Jr., KA1ON; Thomas E. MacAdams, K3AIJ; Joseph L. Manson; Robert James Marsh, KA0EAA; John Martin, KB0EA; Stanley W. Mattson, WA8MIL; John T. McCombs, Jr.; Wilbur G. McFarland, Jr., K4PVZ; Gregory Dean McIntire, AA5C; Richard A. McMahon, Jr., WB9QMF; Joseph L. Medeiros, Jr., WA1VIA; Terry E. Miles, K4FEY; Bruce M. Miller, N6DEF; Steven J. Miskey, KE8J; Charles W. Moore, WA4RJG; Howard W. Moran, Jr., KA5DQP; Warren L. Munson, K7RBD; James D. Nixon, N4DVW; C. Dean Norris, K7NO; Royal F. Norton, WB6LLA; David P. Nulty, N4ATI; Larry J. Oliver, KK5H; John Victor Owen, KB7GL; Robert C. Ower, WA7YUL; Constantine T. Papas, WB6FZN; Stephen T. Payne, WD6ADZ; Susan A. Pegg, KA9NGM; Jack T. Phelps; James R. Plummer, KA7ESL; R. Polhamus, KA4TYF; Priscilla M. Pollman, KA7FVP; Eugene R. Poole, AJ6F; James J. Porter, KC5TF; Billy C. Primm, WK4R; Roger Purdy, WB2HUV; James K. Queen, KB3Y; Joseph Anthony Radcliff, WD8EOG; Kirk D. Ransom; Robert M. Resconsin, W3HVA; Eric Samuel Richardson, N8CTQ; Steven A. Richmond, W7XO; Richard Wolfe Ridenour, KB0ZL; Michael T. Ritz, WA6HKP; Glen T. Rowen, WB0PZJ; Stephen C. Ruten, WB5YTA; William K. Saint, KA9GPD; James E. Scarlett, KD7O; Robert L. Schafer, KA4PKB; John H. Schaffner, Jr., KB8LH; Eric R. Shahan, WA7LNH; C. Norman Smith, N1BEN; Paul Keith Smith, N4FFO; Jo-Anne Spence, KA5PXK; Russell G. Spence, Jr., WD4FYA; James N. Standley, KJ8T; Douglas P. Stevens, Jr., W14P; Roger Steyaert, K7RXV; Wayne Stilwell, KE6A; William J. Stroman, W5DHK; George W. Sturm, N5DFE; Ronald J. Svihel, KA0DPY; Henry P. Tardif, WA6NHN; Craig S. Taylor, K9CKA; Robert L. Tegel, KD6XO; John D. Van Blitter, K6NM; Mark W. Van Horn, WD8BHP; Kathryn F. Vaughan, WD0AQH; Scott Vogelsang, WA6YNE; Arthur R. Vogt, N9CPN; Roger H. Wayman, W9TYT; Doug Wendling, WD6EDY; Richard G. Whisler, WA6SLO; Richard A. White, Jr., KA3T; David R. Willemin, AI8M; Richard P. Williams, KA4RZE; Scott D. Wills, WA4YOF; Marquis G. Witt, NN4I; Ranzy H. Wood, Jr., WB2VCR; Mollie Allen, KA6WUI; Larry Crispell, KA6WUC; David M. DeLay, WA6DCP; Tommy S. Evans, NE4J; Laurence T. Holloway, VE7ADC; Jack A. Holzer; Joseph A. Marino, WB9VXM; Michael Meehan, AK6N; Bob J. Ravenstein, W1FDR; Rodger E. Runyan, WB0GOB; Jay Eugene Whitehurst, WA5GZX; Julius B. Wlaschin, WA0CIE.

List No. 3: Gerald G. Boyd, WB6NJY; George S. Brown, N1ATT; Harry E. Davidson, W6JTY; Raymond M. Holt, KL7IFN; Earl H. Hunter; Charles Roy Morris, Jr., W4WFB; Peter L. Norris, N1BCE; Robert A. Orr, WA4BPZ; Edward J. Swiatlowski, WA2URK; Robert E. Tucker, W0KYI; Steve Twiggs, KM7U; Bradford K. Zuehlke, WA9ZZV.

Strays

I would like to get in touch with . . .

☐ any hams using the IBM-PC or other computers who are interested in cw, RTTY and AMTOR software programming. Emile F. Alline, Jr., WA5WUJ, 773 Rosa Ave., Metairie, LA 70005.

☐ any hams who are using an 1802 ELF series microcomputer in any Amateur Radio related areas. Gary W. Sanders, N8EMR, 335 North Ogden Ave., Columbus, OH 43204.

QST congratulates . . .

☐ the Miami Valley FM Association, of Dayton, Ohio, on receiving two plaques in recognition of activities in support of the National Weather Service.

☐ Warren B. Bruene, W5OLY, of Dallas, Texas, on being named the Rockwell International Corporation Engineer of the Year, the company's highest honor for engineering achievement.

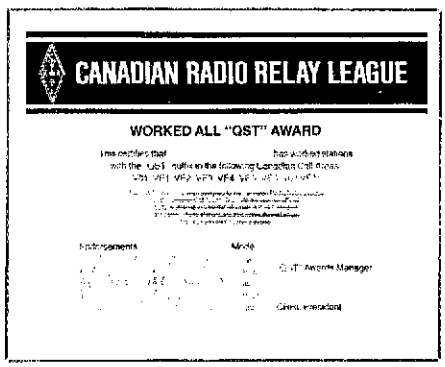
☐ Evelyn Fox, WB9QZA, of Merrimac, Wisconsin, who at the age of 86 has achieved her WAC and WAS awards.

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GPO

The Worked All "QST" Award

Most amateurs know that the "QST" suffx has been assigned to CRRL in all Canadian call areas. "QST" calls are used by Official Bulletin Stations (OBS) across the country, and are also activated during League contests and public service events. Now there is a CRRL *Worked All "QST" Award.* The award is available in five categories: cw, phone, RTTY, mixed and QRP. To qualify, work stations with the "QST" suffix in VO1 and VE1 to VE7. Endorsements are available for VEØ, VO2, VE8 and VY1. When you've worked the eight stations, send your "QST" QSL cards to CRRL, Box 7009, Station E, London, ON N5Y 4J9, or directly to John Gowron, VE4ADS, in Winnipeg. John is in charge of this award.



Here's some new wallpaper for your shack. Start looking for "QST" stations today!

The licensees who control the use of "QST" calls and maintain logbooks for QSL purposes are: William Kremer, VE7CSD (VE7QST); Bill Gillespie, VE6ABC (VE6QST); William Munday, VE5WM (VE5QST); Peter Guenther, VE4PG (VE4QST); Dick Reiber, VE3IBV (VE3QST); Harold Moreau, VE2BP (VE2QST); Don Welling, VE1WF (VE1QST); and Clarence Mitchell, VO1AW (VO1QST).

CORDLESS TELEPHONES

Saskatoon amateurs have contacted CRRL regarding an influx of cordless telephones in that city. The telephones operate simultaneously in a 49-MHz band and a 1.6-2.0 MHz band. Contrary to popular opinion, the telephones are not short-range devices. The amateurs are reporting signals on the 160-metre band 30 dB over S9 from telephones over 3 miles away. Advertisements for some telephones are claiming a range of 50 miles!

Of course, the telephones are unlicensed. Under the Radio Regulations, Part II, there is a blanket exemption from licensing for operation in the 49-MHz band. However, exemption from licensing in the 1.6-2.0 MHz band requires DOC approval. CRRL learned that no telephones presently sold in Canada have received this approval. All are operating outside the Radio Regulations.

DOC is preparing a new TRC-68 that will set standards for cordless telephones and limit their low-frequency operation to 1.6-1.8 MHz. However, CRRL believed there would still be interference. CRRL sent a letter to the Minister of Communications outlining details of the problem, asking that the new TRC-68 require cordless telephones to carry a notice that the telephones must not cause interference to licensed radio services (including the Amateur Service), and that users of the telephones must be prepared to accept interference from licensed radio services (again, including the Amateur Service). CRRL also asked the Minister to take steps to eliminate the present interference, and to place a ban on sales of cordless telephones not approved by DOC.

CRRL NEWS

☐ Congratulations to Larry Thivierge, VE3GT, who was re-elected Ontario Section Manager. Larry ran unopposed. His new term of office began on April 1.

☐ All former Section Communications Managers in Canada have endorsed the League's new Section Manager concept. When it's all in place, each Section Manager will have eight section-level assistants: a Section Emergency Co-ordinator, a Section Traffic Manager, a Bulletin Station Manager, an Official Observer-RFI Co-ordinator, a League-affiliated Club Co-ordinator, a Public Information Officer, a Provincial Government Liaison and a Technical Co-ordinator. How does CRRL fit into all this? All the materials and programs from ARRL are excellent, but many are not geared for Canadian needs. CRRL will be providing Canadian materials and many of the support programs for the Canadian section-level activities.

☐ Many amateurs contacted CRRL to express concern about certain questions that appeared on the October and February Amateur and Advanced Amateur exams. At press time, CRRL was studying the problem and preparing recommendations for DOC.

DOC NEWS

☐ How is DOC's new TRC-24 different from the old one? Basically, it's in the way the technical requirements are set out. Candidates for the Amateur certificate will be responsible for material on (1) theory of electricity, (2) vacuum tubes and semiconductors, (3) radio-wave propagation and basic antennas, (4) block diagrams for equipment for various modes of emission and (5) setting up an Amateur Radio station. Candidates for the Advanced Amateur certificate will be responsible for *detailed* material on (1) power supplies, (2) receivers for various modes of emission, (3) transmitters for various modes of emission, (4) antennas and transmission lines and (5) test equipment. The new TRC-24 is a considerable improvement over earlier documents. The scope of each topic is described in great detail; students will know exactly what to study. As announced earlier, the TRC-24 should be available now, but will not be used as the basis of DOC examinations until February 1984.

☐ DOC will conduct Amateur Radio examinations across Canada on June 15. If you plan to write, apply to DOC before May 18. Remaining date for DOC examinations this year is October 19.

Guelph ARC's Amateur Radio Fleamarket is widely recognized as the premier spring fleamarket in southwestern Ontario. VE3ZJ, VE3IBV and VE3OT man the CRRL booth at last year's big event. *(VE3HGZ photo)*

NEWS FROM ALL OVER

☐ Terry Thompson, VE3FTT, and Bob Howard, VE3GQW, of Ottawa, successfully completed a series of experiments using Telidon. Whole pages of information were translated into the NAPLPS code, transmitted, and reconstructed at the receiving end by a computer. This is a high-tech area in which Canada leads the world.

☐ When the Queen opened British Columbia Place in March, amateurs were tuned in. DOC gave a group of Vancouver amateurs permission to relay Her Majesty's speech via 2 metres to hf amateur stations that transmitted the speech on amateur bands from 80 to 10 metres. To commemorate Her Majesty's visit, British Columbia amateurs were also able to use the special prefix XO7 during March.

☐ Prefix hunters, take note. This summer, to commemorate 400 years of settlement, DOC will permit amateurs in Newfoundland and Labrador to use the special prefixes VX1 and VX2. A special events station, VO400, should also be active.

☐ Calgary amateurs are gearing up for the 15th Boy Scout World Jamboree, to be held in their city in July. The event will attract 20,000 scouts and leaders, mostly from outside of Canada, and several thousand visitors. Calgary Amateur Radio Association's extensive project called ELEKTRON will feature operating Amateur Radio stations, kit-building sessions, and tours related to the electronics and communications industries.

☐ Bill Bowman, VE4AFO, of Selkirk, Manitoba, operates a computer bulletin board of interest to amateurs. It offers CRRL news bulletins, operating information, DX forecasts and more. Format is 300-baud ASCII with 8-word bits, 1 stop bit and no parity. In its first month, the bulletin board attracted 23 users, who accessed it a total of 352 times. You can access this bulletin board by calling 204-785-8742 any time of day or night. If you've got a computer and a modem, give it a try!

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

IARU News

Conducted By Richard L. Baldwin,* W1RU

Promoting Amateur Radio Worldwide

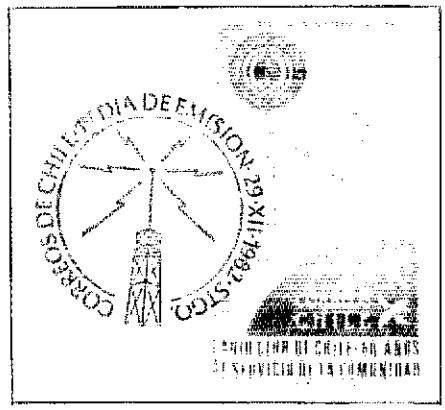
Amateur Radio needs to constantly reinforce its recognition by members of the general public. This is necessary so the public will become more aware of the advantages and benefits of the Amateur Radio Service, and also so the Amateur Radio Service will not be confused with any other service. The ultimate goal, of course, is to secure greater appreciation of and support for the Amateur Radio Service, particularly at international frequency-allocations conferences.

There are many, many ways in which recognition of the Amateur Radio Service can be enhanced, most of these falling under the heading of public relations. That is, the good deeds of radio amateurs need to be publicized. Some of the larger member-societies of IARU have clearly defined public relations programs, but it is the sort of task that all societies, regardless of size, can tackle to some extent. Such an effort is particularly appropriate during this World Communications Year.

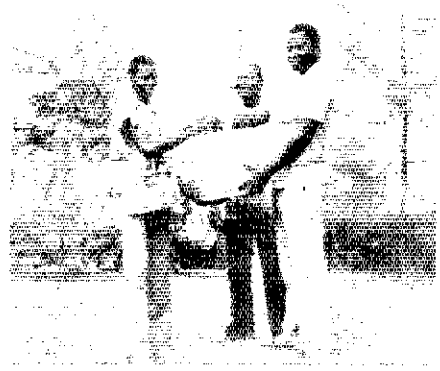
We are pleased to note that the Radio Club de Chile has been honored by the issuance of a postage stamp commemorating their 60th anniversary. An accompanying photograph shows the stamp on a first-day cover. Not only has the Radio Club de Chile been honored, but use of the postage stamp during the year will be a constant reminder to all who use the mails of the Amateur Radio Service.

The Nigerian Amateur Radio Society has been actively promoting Amateur Radio, particularly to encourage more Nigerians to become interested enough to be licensed. There have been Amateur Radio exhibits at trade fairs, and there have been special presentations of the so-called "goodwill kits" to appropriate individuals. The photographs tell the story.

We commend all those who continue to work so diligently in obtaining favorable recognition of the Amateur Radio Service.



First Day Cover of and the stamp honoring the 60th anniversary of the Radio Club de Chile.



Kunle B. Ajayi, 5NØOBA, secretary-general of the Nigerian Amateur Radio Society (right), presents a Project Goodwill kit to SWL A. Ogunlokun. Looking on in the center is NARS National Treasurer Prince Ekpe, 5NØPEE.

NARS set up an Amateur Radio exhibit stand at the Lagos Specialized International Trade Fair during November/December 1982. The call sign used was 5NØSIF.

The Golden Antenna Award

Here's another example of good publicity for Amateur Radio. Annually, the town of Bad Bentheim, Federal Republic of Germany, will award a Golden Antenna for an outstanding performance in the field of Amateur Telecommunications. The council of the town has announced that it will issue the award each year during the Deutsch-Niederlandische Amateurfunkertage, which takes place during the last weekend of August. The judges consist of representatives of the town of Bad Bentheim, the IARU, and the IARU societies in the Netherlands and the Federal Republic of Germany. If you wish to nominate someone who has made an outstanding humanitarian contribution in the field of Amateur Radio, send your nomination, with complete particulars, to Stadt Bad Bentheim, Schlossstrasse 2, D-4444 Bad Bentheim, Federal Republic of Germany, prior to May 31, 1983. The town will pay travel and accommodation expenses of the winner for attendance at the ceremony.

THIS AND THAT, FROM HERE AND THERE

The Soviet magazine *RADIO* has a circulation of 1 million . . . There are currently about 900,000 licensed amateurs in Japan, some 850,000 of whom have the codeless radiotelephone class license . . . Thanks to the help of JARL, overseas amateurs resident in Tokyo now have an "English repeater" on 430 MHz . . . During the month of June, French amateurs in the town of Annonay will use the special prefix HW83 to celebrate the bicentennial of the first hot-air balloon flight. Frequencies were not specified in the announcement, but there'll be five French amateurs active . . . The American Amateur Radio Club of Korea hopes to be able to install a 2-meter repeater, a first for the country. They have a limited budget and would like equipment contributions from U.S. (or other) amateurs. Contact the American Amateur Radio Club of Korea, c/o General Delivery Service, APO San Francisco, CA 96301 . . . There is always a considerable amount of interest in the various maritime nets around the world. Here's a current list from DK4BP, of Intermar:

Transatlantic Maritime Net	1300 UTC	21,400 kHz
Southeast Asia Net	1200	14,320
Maritime Mobile Net	1730	14,325
Canary Islands Net	1030	7080
Inter Island Net	1130	7230
Swedish Maritime Net	0600	14,303
UK Maritime Net	0800 1800	14,303

In addition, we have learned of the following from a publication of the United States Power Squadrons:

South Pacific Net	0530	14,313
South African Maritime Net	0630	14,320
International Maritime Net	0700	14,313
Bay Of Islands Net (So. Pac.)	0715	3820
Caribbean Weather Net	1030	3808
Barbados Cruising Net	1030	14,265
Caribbean M/M Net	1200	7115
Waterway Net (U.S. East)	1300	7268
South Pacific Net	1800	7197
Pacific Maritime Net	2300	21,404

*President, IARU

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Club Stations

A few years ago, the Commission decided that certain special station licenses were luxuries we could not afford. Provisions for issuance of *new* RACES, repeater, auxiliary, military-recreation, special event, secondary and club station tickets were felled under the FCC's deregulatory blade. These various types of special operation are still permitted, of course, but under the auspices of your primary license. This month we'll look at club stations, licensing and responsibilities. We'll also look at the mysterious Form 610-B, and how you can unravel its complexities.

Q. What is a club station?

A. A club station is a separate Amateur Radio station licensed to an Amateur Radio operator acting as a station trustee for a bona fide Amateur Radio organization or society (97.3[h]).

Q. What type of group qualifies as an "Amateur Radio organization or society"?

A. At least two persons (one of whom is a ham) belong to an Amateur Radio organization or society. The group must have a name, an instrument of organization (a constitution), management (a president, for example) and a primary purpose consistent with the bases and purposes of the Amateur Service (97.3[h]).

Q. The Commission no longer issues club station tickets. So, isn't the above meaningless?

A. It's true that FCC no longer issues club station licenses. But, they *do* continue to renew and modify thousands of club tickets already in existence. Renewals run concurrently with the station trustee's primary-station license term. Modifications include changes in trustee, address and location (97.37[b]).

Q. Our club holds a club station license. How do we go about changing our mailing address on record with the FCC?

A. Take your life into your hands and complete a *Form 610-B*. This form is entitled *Application For Amateur Club Or Military Recreation Station License*, and is one of three in the series of 610 forms. (The 610 is the familiar general-purpose form; the 610-A is for aliens applying for reciprocal-operating permits) (97.47[a]) (97.305 [a]).

To change your mailing address for the club or to make any other modification, the station trustee sends the completed Form 610-B to FCC, Gettysburg, PA 17325. FCC will, in turn, modify the license and send it back to the trustee in about a month. The modified club station ticket will bear the same expiration date as the trustee's primary station license. In all cases, the club call sign is retained.

Q. How do we go about renewing the club license?

A. Simply have the station trustee complete the form 610-B, and send it to Gettysburg along with his or her own Form 610 for renewal of the primary station license (remember, the two tickets run for the same duration) (97.47[a]).

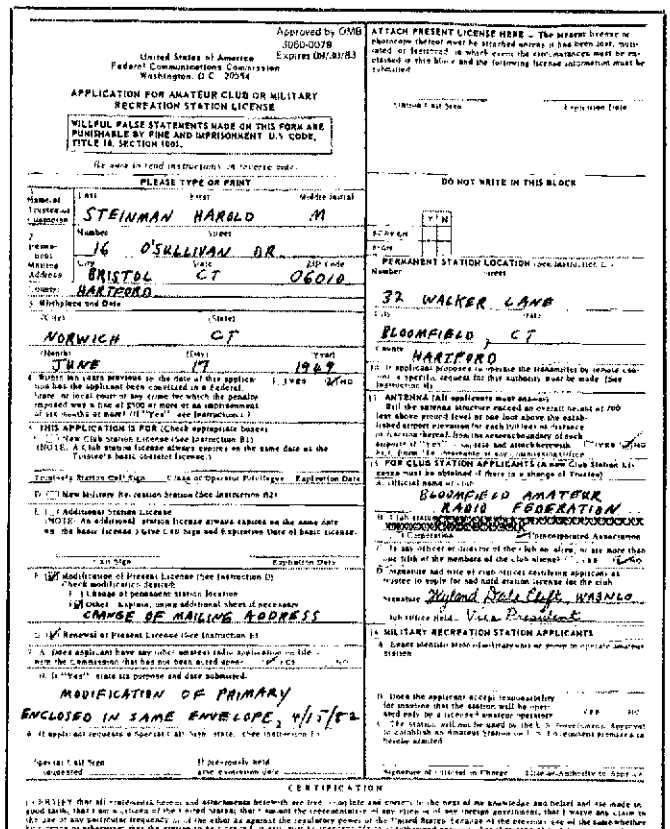
Q. Who is responsible for the proper operation of our club station?

A. The station trustee, together with the control operator, is responsible for the station's operation. The control operator may operate the station up to the privileges of his or her own operator license only. If the privileges in use exceed those of the station trustee's, however, then the station i-d must consist of the club station's call sign followed by the home station call of the control op: WA1JUY/WB1CWD, for example (97.79[b]) (97.84[b]).

Q. How come I got my renewed primary license back three weeks before the renewed club ticket?

A. The trustee will receive his or her renewed primary license two to three weeks before the renewed club ticket is returned because the FCC's primary licensing system is automated and therefore beats the time required for the manual club ticket processing.

*Assistant Manager, Membership Services, ARRL



Approved by OMB 3060-0078 Expires 04/30/83

United States of America
Federal Communications Commission
Washington, D.C. 20554

APPLICATION FOR AMATEUR CLUB OR MILITARY RECREATION STATION LICENSE

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND IMPRISONMENT. U.S. CODE, TITLE 18, SECTION 1001.

ATTACH PRESENT LICENSE HERE

PLEASE TYPE OR PRINT

DO NOT WRITE IN THIS BLOCK

Name of Trustee or Operator: Last STEINMAN First HAROLD Middle Initial M

Trustee Mailing Address: Number 16 Street O'SULLIVAN DR.
City BRISTOL State CT ZIP Code 06010
County HARTFORD

Birthplace and Date: City NORWICH State CT
Month JUNE Day 17 Year 1949

PERMANENT STATION LOCATION: Number 32 Street WALKER LANE
City BLOOMFIELD State CT
County HARTFORD

THIS APPLICATION IS FOR (Check appropriate boxes)

MODIFICATION OF PRIMARY
ENCLOSED IN SAME ENVELOPE, 4/15/82

Applicant's Signature: Harold M Steinman
Date Signed: 4/15/82

CERTIFICATION

FCC Form 610-B November 1981

Form 610-B application of the Bloomfield Amateur Radio Federation for renewal and modification (change of mailing address). Note that the trustee is filing for renewal and modification of his own primary license at the same time, and has enclosed his Form 610 in the same envelope (see 7A and B). Items 5C, D and E are irrelevant because new club and military recreation tickets are not issued. Item 8 can be ignored because no special call sign requests are processed by FCC. Item 10 is not applicable because prior notification of remote control operation is not required any more. In Item 13B, check the nature of your club, but disregard any instruction to attach a copy of the club constitution or bylaws — these are no longer required by FCC. Disregard Item 13C because FCC now allows licensing of aliens. Finally, don't forget to attach a copy of your license to both applications, and date and sign them at the bottom! Also, keep copies of your application in the event they get lost in the mail or undergo a similar disaster.

Q. Our new club, the Newington Amateur Radio and Vibraphone Society, wants to set up a station at our club headquarters. Since no club station licenses are being issued, what are we supposed to do for station authorization?

A. Designate a responsible member of your group as station caretaker. Since no club station license is involved, there is no need to inform FCC of your actions. The club station uses the caretaker's own primary station license for authorization and call sign for i-d purposes. The caretaker is operating his or her own station in portable operation (at a fixed location, the club hq., away from the station location shown on the caretaker's home ticket). As always, the station licensee (the caretaker) and the duty control operator are responsible for the proper operation of the station (97.3[1]) (97.79[a] and [b]) (97.84).

Correspondence

Conducted By Peter R. O'Dell,* KB1N

M*A*S*H MASHED QRM

☐ For many evenings during the past several months, I have been chasing BY8AA on 20 cw. Monday evening, February 28, was no exception. I started hunting about 0045 and noticed many signals across the lower 50 kHz. A few Russian signals were a good indicator that propagation might favor BY.

As time passed, a couple of the Russians had modest pileups going, and a PY3 stirred up the BY hunters with his chirpy signal. By 0127, BY8AA still had not appeared, so I headed upstairs to watch the finale of M*A*S*H with the rest of my family.

At the first commercial break, I returned to the shack to see if the BY had appeared. Except for the PY3 who was chirping out a CQ and the Russians who were working each other, the lower 50 kHz of 20 cw sounded like a major solar flare had wiped it out. By the third commercial break the PY3 was gone, as were the Russians. The bottom 50 kHz was now totally dead.

It appears that it had been M*A*S*H-ed! — *Art Pahr, K9XJ, Plymouth, Wisconsin*

BOOTLEGGERS ON 15?

☐ While operating on the 15-meter band, I happened to tune across a very strong station in QSO with another amateur using "CB" lingo. I broke to join the QSO and satisfy my curiosity about this station. A quick look in the latest *Callbook* showed no listing for the call used (a WA2). I asked this operator if he could switch to cw to "help me check a problem with my rig," and he said that would be illegal since we were in a voice portion of the band! Well, I knew then he was no amateur, so asked where his QTH was. He started getting upset and called me "rude" for having broken in the QSO. I then informed him he apparently had no amateur license. I then heard his reply of "Okay, okay, you caught me."

I don't mind doing the additional work to upgrade and then obtaining extra privileges. . . . I do not want to share them with bootleggers. I have noticed at least three other stations whose calls are not listed operating very near the bottom edge of the 15-meter band. It seems bootlegging may be an organized effort. I would ask other amateurs to take notice of stations who do not sound quite "legit." They may sound that way because they are not really amateurs! — *James B. Brenner, NT4B, Belleview, Florida*

GOBBLEDYGOOK?

☐ With respect to W4OH's comment in the March issue, I can't agree that the magazine is "full of goble de goop."

Webster states that *gobbledygook* is "inflated, involved and obscure verbiage characteristic of the pronouncements of officialdom." While *QST* does present involved articles and frequently offers official statements dealing with society issues, many members are interested in these matters. In this regard, *QST* is no different than the typical Sunday edition of a metropolitan newspaper. — *Leonard C. Silverin, K6RXU, Sedona, Arizona*

☐ I have read with some interest in recent issues of *QST* regarding several individuals who find the journal "dull, boring, stuffy, not viable, etc."

It seems that most magazines that are published have Letters to the Editors columns with several "contributors" complaining about the editorial policies of that publication.

What I can't seem to understand is those who have such feelings seldom have any constructive or specific ideas to improve the lot. They don't like this or that about the magazine. Well, come up with particular ideas and perhaps even voluntarily submit material for consideration that you would like to see published. Surely if you have a state of mind that can often mindlessly criticize, then you are in a position to make a contribution for the benefit and enhancement of Amateur Radio. — *Jim Monahan, K1BNQ, New Canaan, Connecticut*

NO SSTV?

☐ Your coverage of SSTV is very poor, to say the least. I hope you can start a monthly column covering SSTV. — *Joe Vianello, KA8IAB, N. Canton, Ohio*

CRUEL, CRUEL

☐ The picture on the front cover of the March 1983 *QST* constitutes cruel and inhuman treatment. There are many hams who cannot put up a beam antenna system because of financial or physical reasons or both. But when we see a picture of a beam antenna farm we can dream of what it would be like to have a really good antenna system. Keep the pictures coming so we can dream. — *Harold C. McGee, W9LZ, Indianapolis, Indiana*

SCREWY VERTICAL?

☐ From time to time, *QST* has printed articles extolling the virtues of old and time-honored forms of antennas, including variations of the Hertz, Zepp and antenna/counterpoise systems. It might be of interest to note the success attained with an antenna I used in the early 1930s, which I called a "vertical helix." I was operating from western Kansas on the 40- and 80-meter bands with a 50-foot vertical made from 2-inch water pipe set in concrete. A tornado struck the place — twisting the vertical into an almost perfect helix, which remained standing upright.

A C match was fashioned (similar to a T match) by bending a length of pipe to conform to the lower half-spiral of the helix, which was then fed with 600-ohm open-wire line. Results on both 40 and 80 meters were encouraging, and I estimated that my operating range had approximately doubled over that of the vertical.

Serious inquiries were received regarding this antenna, and commercial expansion of the project was under way when another tornado struck, screwing the helix into the ground with only an 8-inch stub protruding. This was used as a ground rod until I moved away in 1937. — *Mark F. Mitchell, W0APN, Cassville, Missouri*

MAY THE CODE BE WITH YOU

☐ By practicing Morse code from September 1982 through December 1982 for 20 minutes a day, I achieved the Novice proficiency of five words per minute. I made the time to master a vital skill. If people have time for watching television and sports, they could manage to find time for a mentally stimulating activity, i.e., learning the code. It seems to me that some people are mentally lazy. They don't want to use their "little gray cells." — *Karol A. Smith, KA5PXR, Alpine, Texas*

☐ If a 65-year-old man like myself can struggle through and learn the code then I say — so can anyone else. Besides, I am looking forward to break the 30-wpm barrier someday soon. Why? Because it is a challenge. It is the whole meaning of Amateur Radio to me. — *Vincent Portuese, KF6IA, Santa Monica, California*

☐ If what we recognize as traditional Amateur Radio does, in fact, have anything to offer, these new licensees will come to recognize it once they have joined us. If it does not, then perhaps it is time for significant change.

Personally, I feel that *true* Amateur Radio is cw Amateur Radio. I operate cw virtually exclusively when on the hf bands. I also believe that anyone with the proper motivation can learn the code. The question is how to generate that motivation. — *Darrell W. Ringer, K8WV, Morgantown, West Virginia*

☐ Classroom instruction produces results. For example, when I tried to learn how to type on my own, I gave up within two weeks because I could not discipline myself to practice. On the other hand, when I took typing at school, I could type over 30 words a minute within a few months. In addition, it took me over a year to learn code on my own because I lacked the discipline to motivate myself. If I had access to classroom instruction for code, I might have learned code much faster. — *Tom Badura, KA2OPK, Poughkeepsie, New York*

BLAME IT ON THE MOON

☐ I have a problem with the claim by K4NI ("First Call Sign on the Moon," Dec. 1982 *QST*, p. 89). At that time, I worked for Greenray Industries, Inc., which built crystal oscillators and frequency standards. We had a contract from Westinghouse, who built the TV camera used on that mission [first moon landing of July 1969]. The last thing before the box was sealed up was that Greenray President Ray Green, W3UDH, and I scratched our calls in the pc board. Hence we were there with K4NI. This little trick was also done on the Space Shuttle hardware that we supplied. — *Glenn R. Kurzenknabe, K3SWZ, New Cumberland, Pennsylvania*

*Public Information Officer, ARRL

How's DX?

Conducted By Ellen White,* W1YL/4

Getting the Cards

The ARRL Incoming QSL Bureau

Volunteer "bureaus" within the U.S. and Canada act as central clearing houses for cards arriving from foreign countries. The service is free for all, supported by the ARRL membership.

The ARRL Outgoing QSL Service

Each month ARRL members have access to the system at the modest cost of $1 per pound of presorted cards sent to Hq. (your *QST* mailing label validates your use of the system). Free brochures explain both systems.

Working DX can be an end in itself, or a means to an end — with an impressive award just waiting to decorate your shack wall. But from the time you actually work the station you "need" until you qualify for the award there are a number of steps you'll have to go through to get the coveted verification.

A recent issue of *The Totem Tabloid* (Western Washington DX Club, Inc.) carried an interesting resume by W7YF under the heading "How to QSL Without Going Broke." This editor concurs most heartedly with Jack's comments, which follow (with a bit of editorial license!)

1) Use the QSL Bureau for the majority of your cards. Most DX stations will do the same with their cards going to you. When the DX station says "QSL via the buro" he probably means it, and it also means you'll be saving on postage and IRCs.

2) Make a habit of QSLing 100% yourself. Don't sit back and wait for the DX station's card to arrive to send one out. Many DX stations want your card for their award purposes, and they'll want confirmations on different bands and modes, for 5-Band WAS, for example.

3) *Always* use UTC on your card. Make it easy for the DX station to locate you in his log by having the correct date and time on your card. Simplify the procedure by leaving the shack calendar and clock on UTC. Be cautious about your date notation. Many non-Ws switch day and month in the all-numerical system. To be safe, either spell out the month (15 May 1983, for example) or use Roman numerals to denote the month (15 V 83).

4) Use the ARRL Outgoing QSL Service. This has got to be the most economical way for an ARRL member to "bulk mail" cards to foreign countries. See April *QST*, page 65, or send for the ARRL reprint on how to use this system; include an s.a.s.e., please.

5) If you're not going via the bureau, you'll have several options. If the DX station's manager is within the United States, send your card to him, enclosing an addressed envelope with sufficient return postage. If the manager is outside the United States, send the card, an addressed envelope and the equivalent of return postage. You may choose International Reply Coupons (available from most post offices) or an actual postage stamp valid in the country the card will be mailed from (W2AZX runs a DX Stamp Service directly geared to this). In most cases, it is dangerous to send currency through the mail; it may not make it to the recipient, and it might well get the recipient in a great deal of political difficulty.

6) If you haven't picked up the address of the manager, consult one of the DX News Sheets or the impressive monthly listing put out by W6GO/K6HHD, Box 700, Rio Linda, CA 95673.

7) To receive your card back "via the bureau," you'll have to have envelopes on file at the bureau. (Check your own bureau's requirements for size, postage, etc.)

8) Be patient; the tradeoff for the economies of the bureau is time.

10 MHz

"Words of Wisdom" noted while enjoying the rebirth of that special feeling that comes with discovery of a new band (30 meters), were also in the above-quoted monthly, by K7WA. "One of the more aggravating things I've heard recently goes something like this: 'The 10 MHz band? Why bother, nothing you work there counts anyway.' Of course this refers to the decision by ARRL (and other worldwide organizations) to keep the newly opened band free from the more competitive aspects of amateur radio — contesting and awards chasing. I hope that the spirit of DXing is bigger than just the pursuit of DXCC 'counters'. . . what has happened to the thrill of communicating with another *person* across the miles, oceans, or continents? Can you remember the excitement of your first DX QSO? . . . If amateur radio is going to continue to make its unique contribution to international goodwill, it's going to take more than '5NN PSE QSL' contacts to do it. Work some QRP JAs, practice your Spanish with an LU, discuss gardening with a Y22 or a ZL. Try out our new 10 MHz band. Make some DX friends. That's what DXing is *really* all about."

During three days at the end of December 1982, the King of Nepal's 38th birthday was celebrated in royal fashion by a group of hams manning three stations in and around Katmandu. The group managed about 5000 two-ways, divided about equally between phone and cw, while signing 9N38. They are (l-r) 9N1VLV (JI1VLV), 9N1OAT (W6OAT), 9N1YOU (WA6YOU) and 9N1RFT (JM1RFT). At the right, a tired WB4NFO/9N1NFO, after clearing airport customs, has a tight grasp on an ICOM 740 and Hygain TH2MK! As Rana (WB4NFO) explained, the operation had an additional aim: to cultivate local interest in Amateur Radio and to demonstrate it to both military and civil authorities. A special showing of the ARRL film "The World of Amateur Radio," took place on January 3 at the American Cultural Center Auditorium. *(Special thanks to WB4NFO and W5AT for seeing that photos reached this editor!)*

*19620 SW 234 St., Homestead, FL 33031

The W6GO/K6HHD List perpetrators, Jan and Jay O'Brien, holidayed late fall on Bora Bora and Moorea in French Polynesia, somehow amassing close to 9000 contacts in 128 countries while living in wonderful style at Club Mediterranee resorts. Jan signed FOØOJ, while Jay used FOØJO. Almost half their contacts were made on 10 meters, and almost a fourth of *all* QSOs were with the savvy JA operators. (After both Heard Island Expeditions early this year, the term seems to take on a different meaning!)

The Brothers Drake (Al, W8MPW, and Ted, W8JBI) represent almost 100 years of ardent DX enthusiasm and active interest. Al lives in Coshocton, Ohio and Ted in Birmingham, Michigan. As teenagers they became interested in ham radio; both then went on to graduate from Ohio State University in 1939. They stand at the top of the Honor Roll, and can be found almost daily around 14,210 kHz (beginning at 1200Z, with an eye on the long path toward Asia and the Indian Ocean). At about 1400Z, they move to 28,655 for a bit of togetherness.

THE CIRCUIT

☐ Summer travel plans? The Radio Amateur Club of Pieksamaki invites you to the annual hamfest of the Finnish Amateur Radio League on July 21-24 in the beautiful town of Pieksamaki, located 200 miles northeast of Helsinki. Full attractive information from Axel Tigerstedt, the SRAL President, At Ox 306, SF-00101, Helsinki 10, Finland.

☐ Gama Island: The early March event by LU2DT/D took place from Gama Island, southeast of Buenos Aires Province. Cards via the Radio Club Mar Del Plata, Alte. brown 4255, 7600, Mar del Plata, Buenos Aires, Argentina.

☐ Arkansas: That flurry of Arkansas DX Association member activity results from the club contest ending April 14.

☐ French Oceania: The new address for the FO QSL Bureau is the Radio Club of French Polynesia, B.P. 5006, Pirae, Island of Tahiti, French Polynesia, South Pacific. This address should be used for all club correspondence, as well as for FO8 cards via the bureau. WB6GFJ cautions that unless an FOØ station instructs you to send cards via the bureau get an address (or QSL manager). 1983 club officers include President FO8IW, V.P. FO8EW, Treasurer FO8HI/HL, Secretary FO8IK and Technical Advisor FO8IQ. The club's "official" name is the Club Oceanien de Radio et d'Astronomie, and it is now up for membership in the International Amateur Radio Union.

☐ Special WCY (World Communications Year) prefixes by Canada include CI1, Newfoundland (VO1); CI2, Labrador (VO2); CK1, Yukon Territory (VY1); and CY1-8 for the other provinces, VE1-8.

☐ Iraq: K7ZZ reports that Saad, from YI1BGD, indicates that cards for YI1BGD require a self-addressed envelope and 3 IRCs. The IRCs must be stamped with postal authorization, and dates prior to June 1981 are invalid.

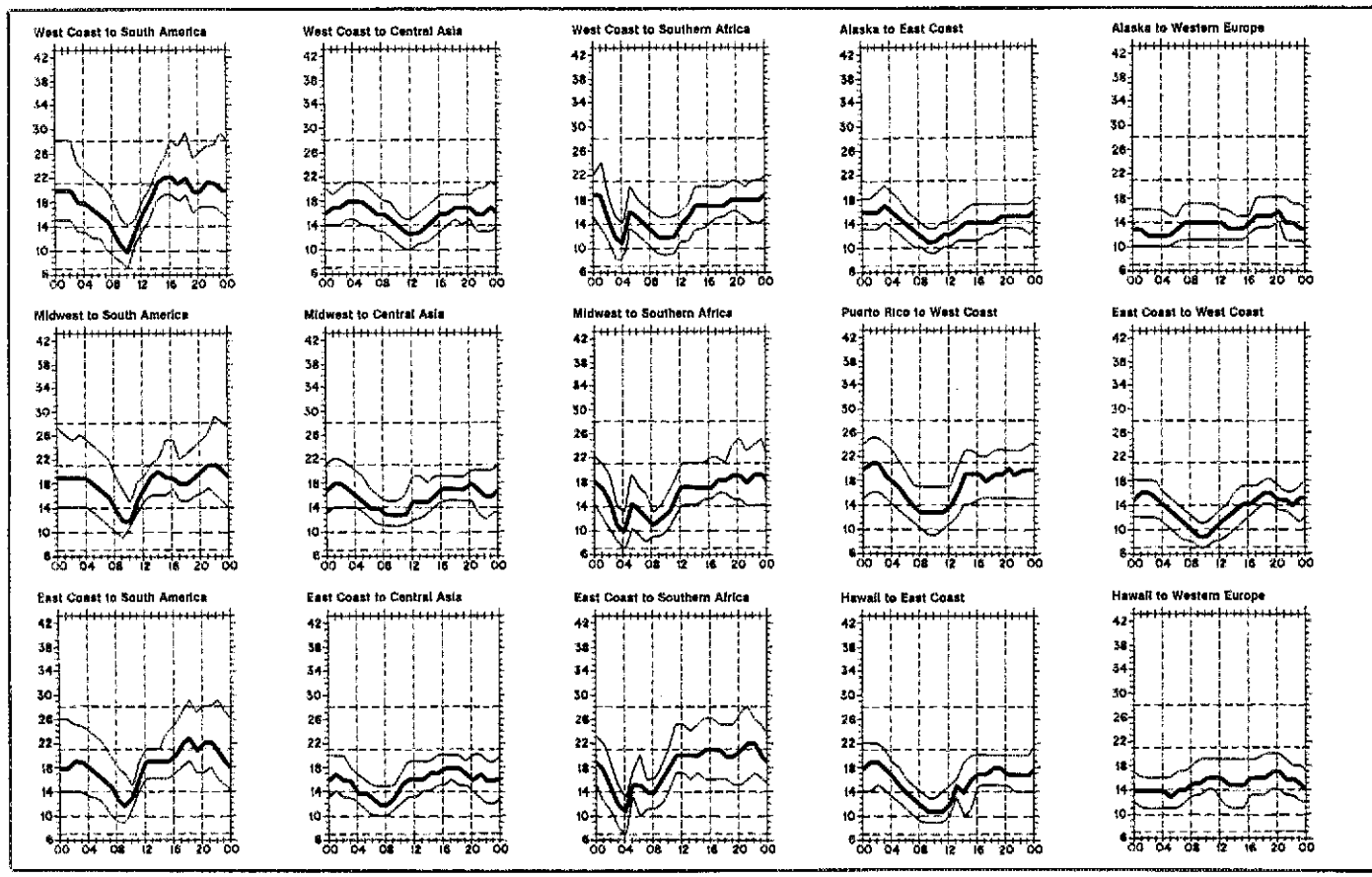
☐ Qatar: The Colvins operated W6KG/A7 ending February 5. Lloyd and Iris were on the air three weeks and made 8000 contacts in 135 countries — phone and cw, 10-40 meters. Their antennas were located on top of a 14-story hotel with a clear shot in all directions. They note that, generally speaking, hams are not encouraged to visit the Arabian countries. Cards, of course, via YASME, Box 2025, Castro Valley, CA 94546.

☐ Haiti: HH2CQ in the 1982 CQWW and the 1983 ARRL DX Contest go via W4MGX.

☐ Antarctica: The DARC has informed ARRL that the Federal German South Polar Station DP0LEX will have been replaced by DP0AA this past March.

☐ Field Day: Sierra Leone special stations 9L1FD, 9L2FD and 9L3FD operated April 9-10. Pasteboards via WAØCAE.

☐ Colombia: The Liga Colombiana de Radioaficionados, the LCRA, member-society in Colombia, is conducting a year-long 50th anniversary celebration. There are 10 special stations with the prefix of 5J or 5K and the suffix LR. Operating awards will be issued for working eight 5J or 8 5K stations (no fair totaling the two separate ones!). More information later.



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 lowest curve (optimum traffic frequency, or fot).

☐ BV2A: QSL Manager K2CM has a new address at the time you read this. Cards for BV2A now go via Rte. 1, Box 485, Millstone, WV 25261.

☐ XE1CHL: Cesar hasn't made the *Callbook* as yet, and is anxious for cards, via his dad, XE1ABV.

☐ San Marino: As of last month the hams of San Marino no longer sported the prefixes MI and 9A1: T77A to Z represent first-class licenses; T72A to Z second-class licenses (vhf and above); and T71A through Z represent "special" prefixes. If you worked T7ØZ on April 20, you're eligible for a special card with first-day stamp representing this World Communication Year (further details from ARRSM, Box 1, Rep. of San Marino 47031).

☐ Clipperton: The FOØX operation of last August appears to be yet another fabricated one.

☐ QSL via: EA4AXW, Region 2, via K5BDX. Everybody else via the EA bureau (unless you're frothing at the mouth, in which case s.a.e. to K5BDX). TG9ML, TG9XML via K5BDX (under no circumstances via the TG bureau). YN1ZBD, YN1JSM (1972), via EA4AXW, EA Bureau.

☐ Diploma Del Millenario, on the occasion of the Millenary of the foundation of the city of Udine, in collaboration with the ARI, is being offered to hams and SWLs who during calendar 1983 score at least 30 points as follows: IV3 prefixes count 1 point; member ARI stations in Udine count 3 points; stations in Udine, Buia, Fagagna, Brazzacco, S. Margherita del Gruagno count 6 points; the special station operating October 8-9 on the premises of the 6th EHS exhibition counts 10 points. The same station may not be worked more than once on the same band; contacts via repeaters and mixed mode are invalid. No charge for the award. Log copies to ARI Udine Diploma del Millenario, Box 23-33100 Udine, Italy (by Feb. 29, 1984).

☐ A6XJC: Confirmations have been acceptable for DXCC credit since February 1 (the necessary documentation has now been received and verified). Any U.A.E. station licensed after February 11, 1979 under the Federal Government and capable of producing an Amateur Radio license like that of A6XJC will be eligible for DXCC credit.

☐ Southern California visitors in mid-June will have the unique opportunity to visit the W6AM Rhombic Farm on Sunday, June 12, 1983, from 1 to 5 P.M. at 28503 Highridge Rd., Rancho Palos Verdes, CA 90274.

☐ Have you heard? From the Kansas City DX Club Newsletter this past February we got quite a chuckle from the following, titled Pileups Renamed: "In light of the recent interest in a certain TV miniseries, the huge pileups on 20 sideband for Heard Island have been appropriately renamed 'The War of Winds!' "

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.

CN8EU (KA4S)
EA6BG (W4JVU)
EA8ZI (SM5IWC)
FB8WI (F6GXB)
FPØJA (WB2MSH)
JX6RE (LA6RE)
J37XC (W2BJI)
J87BI (KA2GMT)
J88AB (W2MIG)
SV1NY P.O. Box 2597, Athens, Greece
TO6GYT (F6GYT)
TR8DR P. O. 2125, Libreville, Gabon
TR8JD (F6AJA)
TT8BC (K4PHE)
VP2ES (K8CV)
VP2MJI (W2BJI)
VP5BAX (N4BAA)
VP8AQ (KØJW)
VP8AOE (KØJW)
VP9KA (W1BPM)
V2AW (WB8SSR)
V3HE (DL1JW)
XL1ASJ (VE1ASJ)
ZF2GR (KH6HBZ)
ZS3GB (NØAW)
Z2IGN (KA4ROR)
ZD8DX (W4MJZ)
3B8FK P.O. Box 1080, Port Louis, Mauritius
9J2TY (JH3DPB)
9L1EX (LA2EX)
9L1JW (DJØGN)
9Q5DQ (K2IJL)

QSL Manager Volunteers

W2PCS
KR7L

Special Notes

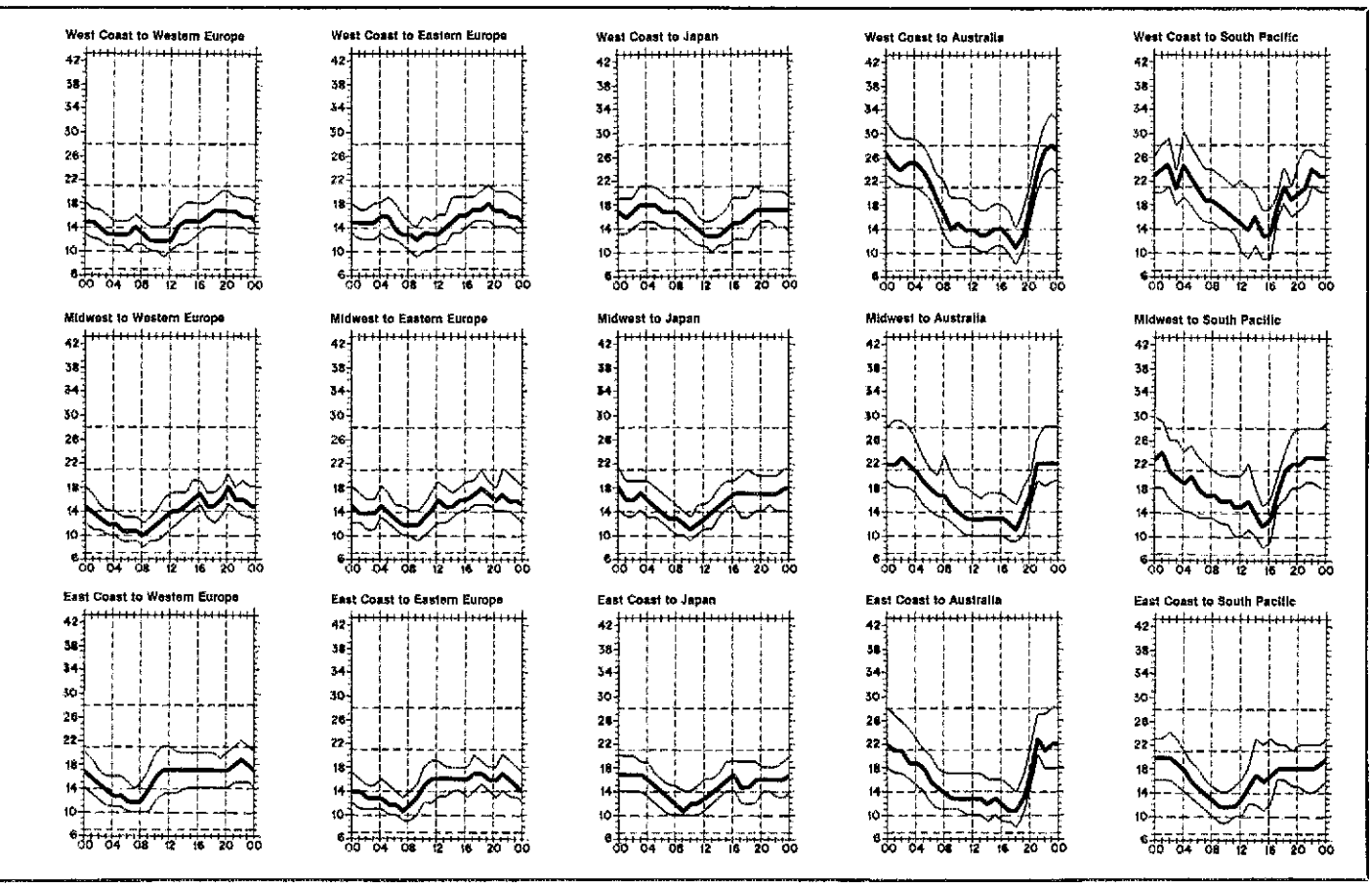
☐ New QTH for K2CM, manager for BV2A, is Rte. 1, Box 485, Millstone, WV 25261.

☐ Recently, many VP5 QSL cards have been arriving at the bureau in Jamaica. The bureau will accept only 6Y5 cards.

☐ WB2LCH is not manager for J6LT.

☐ KP2A is not manager for FPØJA.

☐ Dec. 1982 QSL Corner, page 77, contains information and addresses for the Incoming Bureaus. April 1983 QSL Corner, page 65, contains information on the operation of the ARRL-Membership 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.



See April 1983 *QST*, page 63, 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 megahertz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for May 15 to June 15, 1983, assume a sunspot number of 71, which corresponds to a 2800-MHz solar flux of 121.

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. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 27 through February 28, 1983. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DA2AO/110 F6GCZ/158 LA1HZ/100 SM6AHX/274 K1JYM/105 N2CQE/101 W4OYJ/120 WD5BUG/121 W7FGT/127
DF4YI/103 F6HKD/106 LA8AE/102 SM7KIL/100 K1PV/102 W2WW/104 WD4JEQ/151 AC6H/105 KA8FFW/100
DF6PK/109 G3FVL/101 LA9ML/104 TG8IA/200 KM1R/100 WA2MHZ/100 WD4KYO/100 AI6I/100 KK8E/142
DF7JH/153 G4KHG/105 LU4BR/107 VE3IMO/161 KN1L/111 WA2OAF/103 WI4K/106 KA6FFO/103 KX8V/104
DK1IO/116 GM4KHE/210 OE8PSK/102 VE3SV/104 W1RBL/106 WA2RRS/100 WK4O/107 N6BAD/100 KB9PB/120
DK1JX/103 I8AA/337 OH2BEN/210 VE4ADS/104 WB1CPJ/102 WA2UGT/118 KT5S/222 W6AMW/259 KG9W/101
DK9ZL/101 I8TSL/199 PY4DD/249 XE1MMD/116 KA2HMJ/151 WB2TBB/114 N5DO/110 KM7E/138 W9AMS/103
DL2HT/100 JH1FMW/127 PY4DM/229 YU1EA/274 KC2UF/111 KB3QU/159 W5YM/117 KQ7H/137 WA9TZR/129
DL5MBY/103 JH4AGO/109 PY4OP/234 YU7AJU/162 KE2C/289 WA3PGQ/100 WA5CLA/106 W7BMM/101 WD9GBH/107
DL7FAB/106 JAØBSL/102 SM4AS/128 4X6CA/104 KI2P/138 AB4U/106 WB5RYB/101 W7DG/110 KSØG/105
EA5AIO/104 JAØVHI/159 SM5FQQ/286 5Z4CM/136 N2CIC/114 K4QE/105

Radiotelephone

CT1BGR/114 G4HXB/108 KP4DSD/129 SM5FQQ/286 4X6CA/103 KB3QU/158 KT5S/211 K7INM/183 KK8E/138
CT2CQ/201 HB9BV/110 OH1DG/105 TG8IA/199 W1RBL/102 W3BH/100 WA5SOG/129 KB7TQ/173 W8ILH/260
DF4NR/119 I4USC/304 OH2BEN/162 VE5AEX/103 KA2HJS/109 K4CEF/306 WD5GJP/102 KM7E/138 WA8VDC/150
DF8HS/105 I7IEH/228 PA3AAJ/105 VS5MK/104 KC2FC/110 N4BSH/105 AC6H/100 KQ7H/135 WB8NQC/132
DJØZF/104 I8TSL/199 PA3AUA/106 XE1MMD/110 KC2UF/111 W4OYJ/120 KA6FFO/102 N7ATZ/100 AE9P/103
DL7FAB/102 JH1FMW/111 PY4LJ/217 XE1VIC/119 KO2Q/121 WA4SAC/100 KB6LT/109 N7CJO/124 W9ZR/326
EA5AYD/104 JH4AGO/109 PT7BZ/223 YB2BLI/133 N2CIC/114 WD4PQF/234 N6HK/107 N7CTY/109 KBØBH/110
F6BVY/205 JH5CKV/129 PT7VOB/175 ZP5JAL/107 WA2RRS/100 WI4K/105 W6GAH/101 W7PLK/113 KCØWG/103
G3XLB/122 LA9ML/103 PT7ZAD/109 ZP5MJY/107 WA2UGT/118 KA5HOI/102 K7DOR/170 K8NEU/106

CW

DF2NL/149 OA4JR/110 OK1DCU/105 SM4ASI/128 W1ENE/103 K4CEF/147 WB4MAI/125 K8PXG/160 KQ9W/108
DK6UR/110 OH2BEN/141 OK3DTO/106 VE6CNV/122 KO2Q/117 K4XI/163 W5HNS/101 KR8Y/102 KR9O/113
DL5KAT/103 OH2BVM/103 PA3ASC/101 KE1K/100 W2HAZ/260 N4FKZ/170 N7AWG/104 W8ZN/118 WØCHJ/100

RTTY

KA5BOZ

5BDXCC

YU3VM N6ND UT5AB SMØCCM JAØCWZ JA8MHG SV8JE JA7OEM WA4VDE
HK3YH JA1SVP AI3R DJ9RQ I1BSN OH2BGD W6BJH K9CJK YU1NR

Endorsements

Mixed

DF1FX/201 JA1AFF/157 VE2CU/199 KG2A/282 W3AIC/177 N4TJ/303 KC5CR/206 WA6JDB/231 WA8VDC/284
DF3FR/200 JH1FDP/249 VE3DMC/300 K5ZG/156 W3EEK/185 N4TL/228 KC5FQ/256 K7LJQ/262 WB8RNY/203
DJ1BV/313 JJ1IHS/234 VE3DUS/252 KU2X/200 W3LDD/250 N4XZ/287 KC5MO/173 K7RDG/303 WB8VKL/259
DJ7CY/339 JA2AH/327 VE3GFN/260 N2AIR/229 W3TEF/249 NT4W/250 N5CEM/145 KB7SF/150 WD8CZA/250
DJ9RQ/310 JA2KLT/324 VE6EO/234 N2AMS/225 W3YZI/310 NV4O/163 NA5C/248 KC7GI/251 K9AYK/200
DK1HO/201 JF2JRC/159 VE7DTS/251 N2AP/320 WB3KUH/211 NX4N/226 W5JK/261 KC7WZ/200 K9CJK/335
DK2XX/283 JA3KWJ/310 VE7DXN/250 N2ATD/293 AA4CM/281 W4BRE/336 WB5CRG/280 N7ADU/198 K9HIW/300
DK6UR/169 JA4GXS/284 YB2BLI/162 N2MF/304 AA4KA/298 W4DKL/233 WB5UIH/291 N7YL/152 KA9JKQ/265
DL1DC/351 JA7FS/316 YU1DZ/316 N2UN/280 AA4VK/300 W4KA/312 WD5GXI/270 W7EDA/313 KB9DE/252
DL1ES/305 JA7HZ/323 YU2RTW/312 W2AAN/225 K4BVQ/339 W4LSI/158 WD5JFM/225 W7FLD/221 KB9KI/126
DL1RB/305 JA9GEK/175 YU3VM/270 W2ARQ/294 K4CEF/324 W4ROA/152 AG6D/262 W7LYO/255 KB9MO/251
DL5BAN/261 OH2BGD/327 YU4EBL/320 W2AW/204 K4DSE/291 W4VN/289 K6FS/225 W7PK/316 KC9CO/262
DL7FAH/239 OH3TQ/249 YU7NW/226 W2HKE/260 K4FCT/312 W4VUL/251 K6SP/319 K8IAI/209 KR9S/127
DL7JY/277 OH6RA/325 4Z4AB/254 W2KI/259 K4FY/307 W4WFB/202 KA6MKY/151 K8MC/261 N9AGC/297
EA2CR/275 OK2BBJ/279 K1LEC/225 W2POZ/256 K4ICH/214 WA4LRO/125 KA6OPL/205 K8VFV/290 W9GMS/209
EA3JJ/231 ON4FQ/304 K1XA/250 W2RQH/241 K4KUZ/293 WB4MAI/267 KD6XY/279 KC8RH/126 W9NYW/252
F6DYG/281 OY7ML/310 KA1JC/152 WA2SEN/199 K4MG/322 WB4OSN/303 KT6T/234 KX8N/125 W9TWM/203
FR7BP/193 PY6ABZ/202 N1BIZ/152 W2SLF/200 K4MZU/336 WB4SXX/300 N6DCJ/128 KZ8K/182 W9WAQ/205
G3AAE/VP9/204 PT7WA/290 W1ENE/244 W2SR/273 K4SB/305 WD4FYB/128 N6HK/251 N8CPE/150 W9YB/155
G3XBY/279 SM5AJR/286 W1GME/341 WA2JBV/320 K4WSB/303 WD4HRO/200 N6HR/322 W8BKP/348 ACØA/291
GU3HFN/155 SM5DKJ/250 WA1LEZ/141 WA2LMW/268 KA4LXZ/191 WD4PQF/236 N6VI/285 W8ELE/320 KØAB/338
HA5NK/201 SM6CTQ/314 AA2F/227 WA2OVG/173 KC4MJ/128 AA5C/254 W6DU/310 W8KKF/299 KØDEQ/274
HB9ANZ/201 SM7BYP/303 K2EUH/152 WB2PMP/285 KC4OH/247 AG5Z/124 W6MUM/333 W8NJC/299 KCØDA/201
HB9BKT/135 SP2AJO/303 K2MFY/310 K3II/354 KE4AC/206 K5FUV/246 W6NNV/330 W8QBG/311 KSØZ/260
I1BWI/270 SP6BZ/300 KA2GMT/224 KA3DRO/150 KF4EJ/184 K5JUC/294 W6OAT/303 W8QID/174 WØJLC/251
I2AY/263 TG9NX/303 KB2RZ/280 KI3L/273 N4DVW/252 K5RSG/295 W6PN/333 WA8FEN/229 WØJSN/251
I8SCV/250 TJ1CK/167 KC2ML/151 W3AC/337 N4FKZ/266 KA5V/300 W6TXL/338 WA8SAE/282 WBØWAD/266
IT9JLA/301 VE1AI/302

Radiotelephone

CT1UA/307 HB9BKT/127 OZ3IQ/164 W1HFJ/159 W3NJL/154 N4TJ/267 W5JK/260 W7EDA/176 K9KA/331
DF2JE/176 I2ODZ/152 SM6AHS/272 W1JCI/163 W3YZI/303 N4TL/227 W5KC/337 W7JXP/128 KA9JKQ/255
DF3FR/186 I5ENL/266 SM6CTQ/285 WB1GOO/207 AA4KA/263 NT4W/250 W5LLU/249 W7KOI/261 KB9AW/201
DF7NM/270 I0CEP/305 SM7BYP/293 K2SHE/316 AA4VK/298 NV4O/145 WB5CRG/279 W7LDJ/208 KB9DE/251
DF9RB/204 I0OLK/317 TG9NX/302 KB2EF/228 K4BVQ/329 W4BRE/334 WB5UIH/285 K8VFV/290 KB9MO/250
DJ1BV/302 IT9YSW/199 VE3CKP/290 KB2OM/199 K4FY/287 W4KHL/149 WD5JFM/216 N8DFO/152 KC9OP/132
DJ2YL/310 JA1FO/125 VK2AOU/199 KB2RZ/280 K4GDE/163 W4LSI/138 KD6XY/269 W8KKF/299 KR9S/125
DJ9RQ/308 JJ1IHS/230 VY1CC/201 KC2KU/174 K4ICH/213 W4WFB/202 KT6T/233 W8NXF/329 N9AGC/296
DK2XX/280 JA2AH/325 Z21BP/294 K5ZG/155 K4KAK/275 WB4FQX/212 N6APW/225 W8PNC/296 W9KA/206
DK4AP/203 JA3KWJ/297 ZP5CBL/250 N2AIR/198 K4KUZ/276 AE5E/252 W6DU/228 W8QBG/306 W9OKL/260
DL2NAR/176 JA4GXS/255 ZP5CF/354 N2ATD/289 K4MG/318 K5RSG/284 W6PGK/267 WA8FEN/218 ACØA/291
DL5BAN/259 JA7HZ/323 ZP5MJO/177 N2BAT/200 K4SB/299 K5SIN/155 W6TXL/302 WB8RNY/203 KØDEQ/162
DL7FP/309 JH8MXH/252 4Z4AB/229 W2ARQ/292 KB4BC/152 KA5V/296 WD5GFF/178 WB8VKL/255 KBØSY/261
EA3BOX/180 JA9GEK/175 K1AS/266 W2POZ/225 KC4MJ/126 KC5CR/205 AD7S/205 WD8CZA/250 KQ0J/149
EA3OD/295 LA7ZO/303 KA1JC/152 W2RGU/317 KE4AC/193 KC5MO/173 K7LJQ/262 WD8EMI/284 NØACH/230
EI8AU/200 OE3KTA/289 KA1ND/280 WA2OVG/126 KF4LJ/252 N5AFV/131 KC7G/251 WD8SDL/153 NØBZA/157
G3AAE/VP9/200 OH2BGD/249 KB1I/280 WB2MZI/148 KQ4O/290 N5AJW/298 KC7WZ/192 AG9G/125 NØBZE/150
G3XBY/263 ON7DR/158 KE1K/225 N3JM/150 N4DIT/154 W5CRP/181 N7ABJ/265 K9HLW/265 WØJLC/130
GM4KHE/208 ON7FK/208 W1EQD/249 W3AC/332 N4FKZ/253

CW

DL1HH/284 SM5DQC/265 K1XA/204 N2UN/251 K4JYS/204 W4ZR/200 W5ORM/125 N6UH/202 KØDEQ/250
FR7BP/178 SM6CTQ/222 KA1Q/126 W2SR/250 K4KUZ/267 WB4OSN/261 WB5UIH/232 W6DU/232 KØJCF/251
JA1JQY/206 SM7BYP/251 W1ZW/157 K3EQ/229 K4SB/205 WB4ZBI/124 K6AC/274 K7RDG/230 KMØQ/123
JA2TK/260 TG9NX/280 WA1FCN/227 KI3L/227 KD4CA/149 AA5C/231 K6RK/218 W7EDA/253 NØRR/303
JA4GXS/209 VE2CU/199 KA2DIV/204 W3GOH/204 N4TJ/183 AG5C/200 K6ZUR/152 K8SW/203 WØJSN/201
JA5SIX/162 VE3II/250 KG2A/260 AA4KA/233 NN4B/150 K5TSQ/251 KA6IYF/149 N9KW/250 WØYBV/199
LA3XI/253 XE1XF/125 KU2X/149 KA4HWG/155 W4WG/185 W5KC/275 KD6DJ/125 W9RKP/178 WØJLC/232
LU3YL/W4/150 YU2RTW/284

DXCC NOTES

Honor Roll Corrections: Mixed, K3AV 309/341, K8ONV 315/349.

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Repeater Sites — Meeting the Rent

The variety of choice amateur repeater sites in use is a glowing testimonial to the imagination and salesmanship of the operators. There are few areas of the country remaining where access to a vhf repeater is not yet possible.

However, situations arise from time to time in which we find ourselves denied access to a desirable site, or threatened with the loss of such a site already in use. The reasons for this vary, but one important underlying factor often present is a failure on the part of those controlling the site to perceive the voluntary public service nature of the repeater system and its enormous potential for emergency communications use.

As this is written, New England amateurs are engaged in efforts to gain approval by the Massachusetts state legislature for a bill that would allow them continued use of the popular Mount Greylock repeater. The antenna tower has been pronounced "unsightly" by the state's Department of Environmental Management. Another valuable mountaintop repeater, serving the northern Shenandoah Valley of Virginia, has been hit by the National Forest Service management with an escalating "forest use fee."

Still other threats to prime amateur repeater locations have been experienced around the country. Some have been countered successfully, while a few have resulted in a forced move or discontinuance of the repeater.

The recent report of the ARRL Long-Range Planning Committee included the following recommendations:

> The vhf repeater has emerged as one of the most useful and effective local area emergency communications devices available to radio amateurs. A majority of all active licensed amateurs already are equipped to communicate through it, most of them with mains-independent equipment. At this point, however, only a relatively small number of repeaters have been formally aligned with local emergency preparedness programs. Significant mutual benefit can be realized from the development of local agreements which make the repeater facilities available to government and relief agencies for use in local area emergency situations. Well-planned demonstrations can quickly convince authorities of the emergency communications potential of the repeaters (and family of repeater users); conversely, *the support of these authorities can often prove beneficial in preserving the integrity of the repeater installation and its antenna location.* (emphasis added)

We amateurs characteristically proceed with an independent spirit in pursuit of our project goals, sometimes avoiding or overlooking external liaisons as an unnecessary encumbrance to experimental freedom. The requirements of our public service charter, however, and our dependence on others for cooperation in the hosting of many of our repeater installations, point up the need for deliberate and early action to make known the valuable communications potential of amateur repeaters. A track record of emergency-communications service can provide a trump card to employ against eviction threats. Further, the existence of formal alliances with local civil defense authorities, sheriff and police departments, the Red Cross and others, as well as affiliation with ARRL emergency-preparedness programs, could produce valuable sources of advocacy in assuring continued access to repeater sites. — *Vic Clark, W4KFC*

FREQUENCY COORDINATION INTERFERENCE

The following quote comes from Dave Toth, VE3GYQ: ". . . things are so tight for 2-meter repeater frequency pairs in the Toronto-Niagara-Buffalo area that we had to start a waiting list. None of the pairs are available except for 145.25 MHz, and that is troubled by significant CATV interference! I think it's wonderful how the people that share our band are helping us out."

GUNS AND BRUDDER

The following letter comes from a reader who wishes to remain anonymous (for good reason):

> I recently renewed my ARRL membership, and January *QST* was the first one I received. I always have enjoyed FM/RPT, and want to add my hearty "Amen" to the guest column by Richard Rhodes, KH6IO, about loose talk on repeaters.
>
> I have followed most of his recommendations in the four years I have been in this great hobby, and I thought you might be interested in some further comment along this line. I call it my "affirmative action" policy.
>
> As a life member of the National Rifle Association, I have a number of guns around my house. Most are intended for peaceful use, but I keep a 12 ga. riot gun, a Colt .45 automatic and a Smith & Wesson .38 Chief's loaded at all times and within easy reach. (By the way, there are no small children in the house, and when we expect little visitors the weapons are either locked up or unloaded.) I also have a sophisticated alarm system which will ring at a central monitoring station, as well as locally.
>
> I have made it a point to discuss the alarm system openly on the air, though not in intimate detail. I have also discussed the loaded guns, along with some of the prizes and medals I have won with them. I have made it plain that I would not hesitate to make full use of them as allowed by the state law to thwart a burglary or other attempted felony on my premises.
>
> The suggestion to not mention when you are going to be away is certainly valid, but there is one problem. Too often I have heard hams discussing the absence of one of our number from a certain repeater and ending with the observation that "he must have gone on vacation; I can't raise anyone on the landline." I have found my brother-in-law very useful in this regard. He is 35 years old, 6 foot 3 inches tall and a real mean son of a gun. He was a Green Beret in 'Nam, and still likes to pick fights in bars just to keep in shape. That's what goes out over the repeater; that he is house-sitting for us and it might be dangerous even to ring the front doorbell after dark. (In reality, he is pushing 50, 5 feet 7 inches tall, was an Air Force radioman and probably couldn't fight his way out of a hair-pulling match at the PTA.)
>
> It now occurs to me that I had better ask you not to use my name or call in the event that you decide to use any of this material, else my cover is totally blown! Anyway, I have enjoyed your column for several years and am looking forward to many more of the same.

PACKETING IN DETROIT AND ST. LOUIS

The St. Louis Area Packet Radio Club (SLAPR) has been active in the Gateway City for nearly a year. SLAPR is deeply involved in the TAPR beta tests. The group operates a digipeater (on 147.555 MHz) and publishes a very informative newsletter as well. For more information, send an s.a.s.e. to SLAPR, 1309 Gloucester Dr., Edwardsville, IL 62025.

Meanwhile, a group of Motor City radio amateurs has formed a test group for the TAPR beta boards. If you live in the greater Detroit area and want to get into packet radio, send an s.a.s.e. to Jay Nugent, WB8TKL, 307 Ross Dr., Monroe, MI 48151.

A FLORIDA WELCOME WITH REPEATERS

If you are traveling in the Sunshine State, be sure to stop at one of the Florida Welcome Centers. Besides a complimentary glass of fresh orange or grapefruit juice, you can pick up a copy of the Florida 2-meter repeater directory, which is provided as a public service by the Cloverleaf Farms Amateur Radio Club (WD4IIO) of Brooksville. — *Clyde C. Hackett, KA4WLN*

REPEATER LOG

According to reports received between January 20 and March 10, repeaters were involved in the following public service events: 45 weather emergencies, 8 crimes, 15 medical emergencies, 436 vehicular emergencies, 19 fires, 5 search and rescues, 27 public safety events, 71 drills/alerts and 24 power failures.

The following repeaters were involved (followed by the number of events): WA1KGQ 2, W1XJ 10, WB2NQV 15, W2ODV 7, WA2PAV 12, K2QIJ 6, W2VL 18, WB2ZII 10, WA2ZWP 1, N3AIA 1, N3BFL 25, W3CYO 2, W3GT 2, VE3TTT 1, W3UER 23, W3VRZ 3, WB4LET 7, NN4N 7, WB4QES 59, WA4SWF 5, W5GIX 19, W5RVT 1, *W6ASH 54*, WD6AWP 15, WD6FGX 21, KH6H 1, KH6HHG 3, W6JYY 19, K6TZ 10, K7CC 11, W7EX 233, W7HSG 5, K7OMR 4, WR8ARB 2, K8DDG 11, WD8IEL 8, WA8ULB 3, K9LSB 11, W9VCF 2, WØAFG 2, WDØBQM 2, WBØHAC 4.

*72 Stiles St., Waterbury, CT 06706

YL News and Views

Conducted By Jean Peacor,* K1IJV

It's Magical

The flip of a switch. The turn of a couple of knobs. The right antenna. Bingo — you're about to be on the air! You touch a key or depress a mike button, sign your call and, like magic, there is someone out there waiting to contact only you. You may have a great ragchew, provide a signal report for one who has spent the past many hours troubleshooting a rig, find a new country or be just the contact needed for someone to qualify for one of the many awards available.

Most certificates are works of art. To give but one example, the ALARA (Australian Ladies Amateur Radio Association) award, designed by Heather Mitchell, VK3AZU, combines dignity and delicacy with Old English lettering and beautiful wild flowers of each state forming the border — all hand painted by Heather.

YLRL (Young Ladies Radio League) sponsors many certificates: YLCC (Young Ladies Century Club), WAS-YL (Worked All States), WAC-YL (Worked All Continents), DX-YL and DX-YLCC. Rules for these have appeared in past issues, or can be obtained by writing this conductor or any YLRL member. Rules for some other certificates appear in the March 1983 column. This continues the list and adds to the many reasons for you to tune up your rig, get on the air and add to the magic of Amateur Radio.

Lads 'N' Lassies Certificate is sponsored by the Young Ladies' Radio Club of Los Angeles. Work 10 members of the YLRC LA since January 1, 1952. Send copy of log including name, call, date, time, band and type of emission to Irma Weber, K6KCI, 165 North Marcello Ave., Thousand Oaks, CA 91320.

Parka Lucky Seven Award is sponsored by the Polar Amateur Radio Klub of Alaska. Work seven paid-up members (Alaskan amateurs work 11) after February 1, 1955. Send confirmation (photocopies of QSL cards must show both sides of cards and be witnessed by 2 amateurs) with IRCs for return of cards plus $1 to PARKA, P.O. Box 1987, Anchorage, AK 99510.

ALARA (Australian Ladies' Amateur Radio Association) award. Work four members to include four Australian states (VK/ZL work 10 members and five states) after June 30, 1975, exclusive of 2-meter contacts. Applications should include your name, address, signature and call. Send complete extract of log entries, witnessed by two amateurs, and $3 Australian or 7 IRCs to Mavis Stafford, VK3KS, 16 Byron St., Box Hill South, Victoria, 3128, Australia. All contacts must be made from same area.

Trillium Award is sponsored by the Ontario Trilliums YL Amateur Radio Club. W/VE stations need 6 points, DX 3, and members 12. Each member station counts as 1 point; Club station VE3TOT, 2 points. Send list of calls, TOT #, full log data and $1 (or for DX, 10 IRCs) to Mrs. Marion Course, VE3CLP, Oxford Ranch, R.R. 1, Welland, ON L3B 5N4 Canada.

*Country Club Dr., Monson, MA 01057

Past secretary of the National Capitol DX Association Rosie Lamb, KA4S, continues to be a top DXer since moving to Summerville, South Carolina. She needs two countries to reach the Honor Roll total of 311. Rosie is a government secretary for the Navy, and enjoys big-game hunting, trailering and climbing when not chasing DX. *(photo by Lynn Lamb, W4NL)*

Misty Ayers, KA9JUP (left), received her Novice at age 11, and her sister Candy, KA9NRC, at age 10. W9ET is their proud father, WØFXY their grandfather.

French Award has three levels: (1) Work 10 YLs — five French and five from three different continents; (2) d'Honneur: Work 100 YLs — five French and the others from three different continents. (3) Trophy: Work 500 YLs — five French and others from six continents. Send return postage for your QSLs, (Parts 1 and 2, 25 FF or 10 IRCs; Part 3, 50 FF or 20 IRCs) to Mrs. Gilda LeGall, F6FMO, Ecole Publique, 56490 Guilliers, France.

BYLARA is sponsored by the British Young Ladies' Amateur Radio Association. British and European stations work 15 YL members, to include 10 British YLs (G, GM, GW, GI, GD, GU, GJ); DX stations work 10 members, to include six British YLs, after April 29, 1979. SWLs may apply on a "heard" basis. Send log data, signed by applicant, with fee of £1.50, 12 IRCs or $4 U.S. to Diana Hughes, G4EZI, 3 Primley Park Crescent, Leeds LS17 7HY, England.

JLRS (Japan Ladies Radio Society) sponsors three certificates:

All Cw Certificate

YL-CW-AJD Certificate — contact 10 YLs in each of 10 districts in Japan from 1 to 0.

YL-CW-WAJA — contact YLs in each of 43 prefectures (*ken* in Japanese), Tokyo-to, Osaka-fu, Kyoto-fu and Hokkaido.

YL-CW-JCA — contact YLs in 10 different cities *(shi)*. Endorsements available for each group of contacts with 10 additional different cities.

YL-CW-JDA — contact YLs in 10 different *guns* in Japan. Endorsements available for each group of 10 additional contacts.

YL-CW-10 — work 10 YLs anywhere in the world. Endorsements for each additional group of 10.

YL-CW-Alphabet Certificate — work 26 YL operators in the world. The last letters of the call signs of the contacts should contain all 26 letters of the alphabet.

Apply for these certificates in accordance with General Certificate Rules for each. Send 10 IRCs (from outside Japan) and information to Nobuko Nishigori, JA3UPR, 2-6-11 Hirosedai, Kaai-machi, Kitakatsuragigun, Nara-ken, 636, Japan.

JLRS YL-10 Certificate — work 10 licensed YLs, to include at least one Japanese YL, after January 1, 1953. Apply in accordance with GCR to Minako Abe, JE1IVM, 4-25-6 Oi, Shinagawa-ku, Tokyo 140, Japan. Send 10 IRCs from outside Japan.

JLRS YL-Alphabet Certificate — work 26 licensed YLs. The last letters of the call signs should contain all 26 alphabet letters. No time limitation. There are two classes: (1) contacts with JLRS members only, and (2) contacts with YLs anywhere in the world, to include five Japanese YLs for those outside Japan. Apply in accordance with GCR and 10 IRCs (if outside Japan) to Tsuneko Watanabe, JE1IWR, 5-15-2 Asahi-machi, Atsugi-shi, Kanagawa-ken 243, Japan.

DL-YL Certificate — work 10 YLs of German Federal Republic; European stations work 25. A QSL of a YL working at a club station (DFØ, DKØ, DLØ) counts extra if this QSL and the own QSL of the YL show different dates. Award also available to SWLs. Send QSLs or photocopies and list showing call, first name and date to Ursula Burger, DL3LS, 12 Furberger Str., 5630 Remscheid, West Germany, or, for W land, to Karla A. Holmes, WA1UVJ, 2 Belfast St., Nashua, NH 03063. Fee: $3 or equivalent, and postage for returning QSLs is requested.

WAYL (Worked all YL) Certificate is sponsored by YLs from South Africa. Work five YLs from the following areas: ZS, Z2, 9J2, 9Q5, D2/D3, C8A, 7Q7, 7P8, 3D6, A2 (three of these contacts must be within South Africa [ZS]), after July 1, 1952. Apply to Susan Smith, ZS1SM, 2 Bournemouth Road, Muizenberg 7945, South Africa. Fee: 3 IRCs.

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

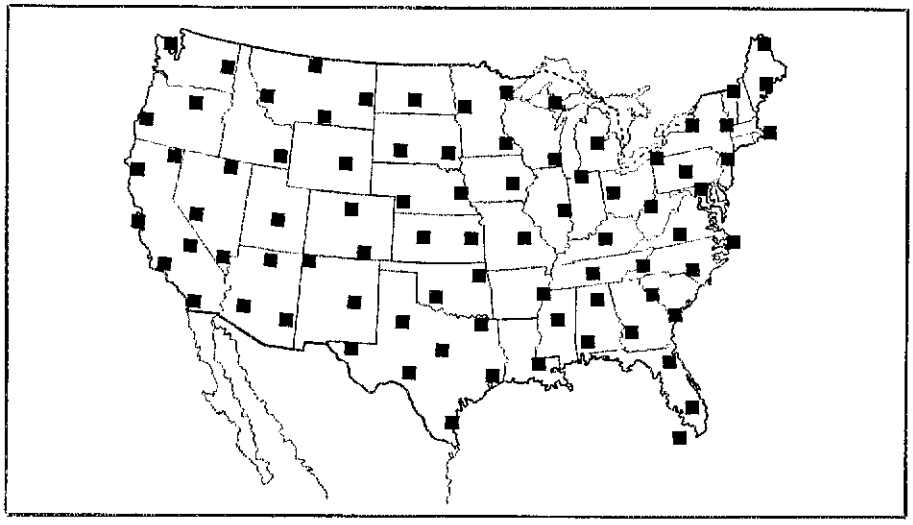
Implementing A National Beacon System

January *QST* announced recent changes to the Amateur Rules that permit automatic unattended beacon operation for the first time in the U.S. This column, in that issue, discussed a few thoughts regarding beacon power, location and a few other aspects that might permit us to derive the most benefit from the new rules. I won't repeat these thoughts now, but urge readers, especially prospective beacon builders, to review them, as the ideas presented here are based on them.

I hasten to add that, like most ideas, the ones presented here are not absolute, but may serve as reasonably good guidelines. No one person's ideas are ever perfect, nor universally applicable. Even if they were, implementing them depends on available resources and compatibility with existing local conditions. This is especially true when dealing with something involving voluntary contributions of time, money and effort, as is usually the case in implementing any amateur communications system.

With these considerations in mind, let's speculate a little on what a national beacon system might look like. I believe that the ideas expressed here are applicable to beacons from 50 to 450 MHz. Ten-meter beacons may involve a somewhat different approach. Since we have 100 kHz available on that band, we are less constrained as to frequency than on the vhf bands. On the other hand, propagation during high sunspot years is such as to provide strong signals from stations within the U.S., and we don't want so much QRM from our beacons that we can't hear those from other parts of the world. Recently, K1HTV provided me a list of 10-meter beacons he assembled through a year or more of careful listening. (A copy is available to anyone sending me an s.a.s.e.) This list was considered in selecting a frequency for the W3VD 10-meter beacon operated by the Johns Hopkins Applied Physics Laboratory Radio Club. The frequency chosen is 28.296, and the beacon has been on the air since late March. The 2-meter W3VD beacon has been operating on 144.052 with 25 W to a halo at 30 feet since mid-February; a 6-meter companion should be on 50.062 by the time this appears. All of these beacons are at a common site located between Baltimore and Washington at 39° 10' N. lat., 76° 54' W. long. in grid FM19. The only information I have received so far regarding other U.S. 10-meter beacons is from KA1YE Niantic, Connecticut, who has a 2-W beacon on 28.284 located at 41° 27' N. lat., 72° 12' W. long. in grid FN31.

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late breaking information.



Microwave beacons present an entirely different situation than do those for the lower-frequency bands. There is a great deal of space up there. Unlike the other bands, above 450 MHz, FCC rules do not restrict beacon operation to any particular segments within the amateur bands. Also, propagation is such that it is hard to imagine that we will ever have too many beacons in this part of the spectrum. The difficulty will be in getting enough people able and willing to construct and operate them. Therefore, the following discussion applies to beacons for the bands from 50 to 450 MHz. I believe that it applies reasonably uniformly to all of these bands, with the possible exception of 70 cm, where the very limited space authorized for beacon operation (10 kHz) and the difficulty of establishing and maintaining a specific frequency may dictate a somewhat different approach. I will discuss the special considerations that may be applicable to this band later.

One of the first questions that arises concerns the physical separation of beacons and what constitutes optimum locations. Remember that what is being addressed is one man's view (mine) of what constitutes an optimum world. What individuals and groups are able to implement will, most certainly, differ from this "ideal" situation. Many may have other ideas as to the "best" system of beacons. I believe that the beacons should be located no closer than about 125 miles apart, but that there should be one at least every 250 miles. It seems reasonable to expect their density to be greatest in the high activity areas of the East and the lower West Coast. It would also seem appropriate for beacons to be located along the coasts to provide the best indication of enhanced coastal propagation.

With these thoughts in mind, I have drawn up the accompanying map showing what seems to me to be good locations for beacons. This exercise also leads to an estimation for a total number of beacons in continental U.S. This comes out to be about 80.

Considering a single band, 2 meters seems appropriate since it will probably be the band to see the most beacon activity and the frequency assignment provided is only 10 kHz. There is 20 kHz available on 6 meters. Under "dead band" conditions, it might be conceivable to cram all of the beacons into such a narrow space. An allocation could be set up such that one could hear all or most of the neighboring beacons roughly 100 to 250 miles away. However, the chances of anyone being able to receive beacons perhaps 600 miles distant, under enhanced propagation conditions, would be slight indeed. The local beacons would present too much QRM.

For this reason, it seems imperative that beacons be time-shared. To accomplish this, each minute might be divided into four 15-second segments. In addition to selecting or being allocated a specific frequency, each beacon operator would choose or be given a segment. In this way, the number of beacon assignments is multiplied by four. Until enough beacons come on the air, however, there seems no immediate need to implement these time segments. Beacons should be able to operate continuously until potential conflicts develop.

In the case of 6 meters, I don't know whether it would be better to space beacons by twice as much in frequency and thus have the same number of frequency assignments as on the other bands, or to take advantage of the 20 kHz made available by the FCC to delay the day when time-sharing might become

necessary. However, my thinking tends toward providing twice as many frequency slots. After all, the frequency stability and tolerance situation on this band presents one-third the difficulty faced on 2 meters. As with all of these ideas, I welcome reader input.

For 70 cm, the frequency-tolerance problem probably dictates that only three frequency assignments be implemented, e.g., 432.073, 432.075 and 432.077. If some beacon operators should choose to employ super-stable frequency control sources, possibly tied to WWV or a similar standard, they may be able to use 432.071 and 432.079. Nevertheless, the number of slots available on this band by using frequency separation is quite limited. Thus, it would appear that more time segments will be needed to provide a sufficient number of unique assignments. Possibly by basing the epoch on a period longer than one minute, perhaps two or more minutes, we can provide the potential for hearing weak DX beacons on this band.

As always, your comments and suggestions are invited. It seems imperative that some kind of nationwide assignment system, similar to that done regionally by the repeater frequency coordinators, be implemented if we are to realize the full potential that beacons can provide. The ARRL seems to be an appropriate vehicle to accomplish this, and will provide the organizational structure. However, the actual coordinating job cannot be accomplished by Hq. personnel. They are overloaded now. Thus, volunteers are sought; one person or group to handle each band from 28 MHz up. Those willing to serve in this capacity are requested to address their offers to John Lindholm, W1XX, ARRL Hq.

NEW 1-1/4 METER TERRESTRIAL WORLD RECORD

After several months of trying, following a 2-meter to 1-1/4 meter crossband contact last November (see The World Above 50 MHz for February), KP4EOR and LU7DJZ were finally able to complete a two-way contact on 220 MHz at 0033Z March 9 to establish a new terrestrial world record for the band. Using atlas-listed coordinates for San Juan and Buenos Aires, the distance works out to be 3670 miles, or 5870 km, far exceeding the old published record of 2540 miles between W6NLZ and KH6UK established in June 1959. KP4EOR was running about 200-W output to a single 17-element Boomer, and was 559 on cw and 5 × 5 on ssb at LU7DJZ's QTH. On his end, LU7DJZ runs 70 W to two stacked 10-element Yagis. His signal was 539 at David's location. Following their success, the two are trying to see how often they can work on this band via the transequatorial propagation route, as well as, beginning next August, investigating the possibility of contacting on 70 cm.

Congratulations are in order to both KP4EOR and LU7DJZ for this record-breaking accomplishment. Their achievement surely marks another major event in the history of the world above 50 MHz.

NINTH ANNUAL EASTERN VHF/UHF CONFERENCE

This year's Eastern VHF/UHF Conference will be held May 13-15 at the Sheraton Tara, Nashua, New Hampshire, about a half-hour drive north of Boston. Festivities will get underway Friday evening with a hospitality room hosted by the Northeast VHF Association. Saturday will feature an array of speakers well versed in various facets of the world above 50 MHz, followed by an evening banquet. Sunday will be devoted to antenna gain and preamp/converter noise-figure measurement. The range will handle antennas for 432, 902, 1296 and 2304 MHz. Converter i-fs of up to 1500 MHz can be accommodated.

Registration is $13.50 through May 9, and $20 thereafter. Banquet reservations must be made by May 9, and are $14 per person. Contact Rick Commo, K1LOG, 3 Pryor Rd., Natick, MA 01760, to make conference reservations. Lodging arrangements at the Tara should be handled directly with the hotel (tel. 603-888-9970), mentioning the conference (ask about the "Weekender").

50-MHz STANDINGS: STAY TUNED!

Originally scheduled for this month's column, the 50-MHz standings will appear next month.

ON THE BANDS

6 Meters — This conductor's face is somewhat red, but I'm happy to admit it. No more than I had, in last month's column, all but dismissed the old band, except for summer E_s, than it reared back and provided some very interesting F_2 openings, indeed. One of the best days in the February/March period was March 6. Actually, quite a few days produced good openings to South America from the southern tier of states, but this day witnessed one of the better ones. Add to that the widespread E_s, which burst upon the scene, and you have the makings of a wild time for many. The E_s-to-F_2 linkup enabled numerous northern Midwest and Western stations to take part in the fun that normally is reserved, this time of year, for the more southerly located.

WA5IYX San Antonio, who is a long-time close observer of propagation phenomena, says that the March 6 E_s was one of the most intense he has ever observed this time of year. He notes that March is the poorest month for the Sporadic E mode. Pat had observed some E_s to Mexico on the lower TV channels and the fm broadcast band during the previous evening, but by 0800 local time on the 6th he was receiving a mixture of Cuban and Florida TV. By 1050 A.M., the muf climbed into the fm band, followed by a quick shift from North Carolina to the upper Midwest. Later, the propagation shifted farther west. The muf did not drop below the fm band until 1830 CST. An 8-1/2 hour opening! Is it any wonder that 6 meters performed spectacularly for so many over such a wide area that day?

Another outstanding day was March 12. About 1915Z, K7JCW informed those monitoring 28.885 that TI2NA's 6-meter signal was being received in Las Vegas. Al also said that Eric was reporting reception of the 50.038-MHz FY7THF beacon. It had the makings of a widespread opening. As I usually do when I hear a 6-meter opening reported on the 10-meter liaison frequency, I checked 50 MHz. I didn't really expect to hear anything, but was pleasantly surprised this time. I immediately detected the weak signals of the HC2FG beacon on 50.100. This was followed by a number of backscatter signals. Soon HC1BI was heard along with very loud signals from the Colombian repeaters plus a number of out-of-band telephone circuits and commercial harmonics well into the band. That was it here.

In many areas and during better times, these pickings would not have been considered much, but it was the first F_2 in this part of the country in more than two months — and very welcome! K5SW reports that the opening lasted from 1900 until 2158Z at his Muskogee, Oklahoma, QTH. San lists the HCs and HK repeaters the rest of us heard, plus the DL3ZM/YV5 beacon, XE1GE on backscatter, J6LOV, TI2NA, PJ9EE, 9Y4JW, C6ADV, the FY7THF beacon and VP2MO, as well as LUs 8YYO, 1YBV and 8WAT. I also learned that XE1GE picked up country number 40 this day by working C6ADV. An indication of the intensity of the March 12 opening can be gleaned from the report of WA5IYX that he, and others, observed the muf to be well into TV Channel 2, with several reporting actual pictures from South America, although no sound was received. Before the 6-meter signals from the south disappeared at this conductor's QTH, the distinct sound of aurora was apparent. Soon the band was loaded with many strong buzz signals, which persisted for well over an hour.

The Southern states were still in on the DX right up until deadline. I am informed that K2RTH/4 Miami worked LU8WAT on the 14th using a Swan 250 feeding a whip on his apartment balcony!

2 Meters — The North and the South each had a share in the 2-meter propagation during this reporting period. For the North, there were several good aurora sessions, and the Southern states were able to cash in on some of the wintertime tropo served up by the Gulf. The best days for aurora were March 2 and 12. On the 2nd, K2GK Plattsburg, New York, reports 18 contacts in 14 grids between 0130 and 0300Z. Max complains about a "cut-off" making it difficult to work anything west of Indiana and Michigan, but he did mention hearing a weak signal thought to be KØWLU. Unless Bill has moved again, Max, you may have heard Wyoming. WA1GTP notes working several Michigan, Ohio and West Virginia stations on ssb during the same buzz session. In addition, W3IWU near Philadelphia reported hearing the W3VD beacon via the aurora. The same beacon was heard quite weakly during the very strong aurora on the afternoon of March 12 by K8AET Cleveland (FN91). This is the same aurora, reported in the 6-meter section, which came on the heels of the South America F_2 opening. This conductor heard many strong 2-meter signals, one of the most outstanding of which was from K8AET. I had no difficulty working him with the 80 W I am running currently on 2 meters.

Down South, it was the Gulf tropo that provided the excitement. KC2TX/5 San Antonio reports that he worked WA4HMB Alabama during the morning of March 2 and, that evening, hooked up with KB4CRT Tampa, for two new states. Spencer uses 80 W to a single 14-element Yagi. Another that took advantage of this opening was N5EAD Austin. Lance also runs 80 W, but to an 8-element vertical Yagi. He notes that he spends a lot of time on fm. Power to run the rig is furnished entirely by solar panels and an automobile battery. With this setup, in a very good location overlooking the Texas capital city, he worked XE3TE on ssb after first contacting him along with XE3FC on fm through the Galveston repeater. N5EAD pleads for more ssb activity of the local and several-hundred-mile variety. Try flipping that antenna over, Lance. You will be surprised at what you can work. Several others along the Gulf Coast, including south Florida, reported excellent tropo conditions, with stations as far as San Antonio and Austin being workable.

With the new 1-1/4 meter record being set, one would expect the 2-meter conditions across the equator to have been good as well. KP4EOR tells me that they have, indeed. I will try to have details next month. In addition, several over-the-air reports have noted excellent tropo conditions across the Caribbean that appear to be related to the big Gulf opening just discussed. Typical are accounts such as stations in the U.S. Virgin Islands talking to Venezuela through one repeater or another. When repeaters are involved, it's sometimes confusing as to exactly what is happening. It is also difficult to get all of the facts straight when the account is given over the air, or even on the telephone, sometimes at a rather rapid pace. Written reports are much better.

From the far north, Minot, North Dakota, KVØF wants it known that there is 2-meter activity in his part of the world. Jerry says that he and about a half-dozen stations are on every night around 144.2. He says that he would welcome schedules from nearby states as he has yet to work any other states. Best DX so far is 110 miles to VE4MR in Brandon, Manitoba.

The Higher Bands — The Gulf tropo mentioned in the 2-meter section was felt, as might be expected, on 70 cm as well. W5VY San Antonio reports working about 20 stations in Louisiana, Mississippi, Alabama, Arkansas, Georgia and Florida. Pat says that he is also active on 23 cm with 50 W to one of the F9FT four 23-element Yagi arrays. His best DX on that band to date is Florida, which he was able to work on ssb.

WB5LUA writes that he has increased his 23-cm state total to 14 by contacting WØYZS Kansas City, Missouri, on March 3. What made the contact particularly outstanding was that WØYZS was running 1/2 W at the time. On top of that, Mike's rotator wasn't working and he was aimed about 60° off path. Nevertheless, his signal was 449 near Dallas, while A1's 400 W was 579 over the 425-mile path. WB5LUA also notes that WØYZS has also worked WØPW/Ø Missouri, K5MWH Arkansas and WØZJY Kansas on 23 cm.

Some time ago, I reported a 23-cm contact between W9AAG and WB5SNR, who bounced their signals off a grain elevator. I erroneously assumed that both were in the Chicago area. W9AAG notes that they are 110 miles apart. Dallas says that he was using an indoor antenna consisting of four 12-element Yagis from a second floor apartment at the time of the contact. He adds that he is approaching 74, and still builds his own gear.

K5JL tells me that he is back on 70-cm EME with a new 28-foot dish. Jay is very happy with its performance and is especially pleased to be able to rotate polarization, feeling that it has demonstrated its worth already in contacts that he would not have been able to make with the old Yagi array. In his first weekend of operation he worked 48 stations, including seven excellent ssb QSOs. As testimony that the dish works, he has been able to hear his own echoes with as little as 5 W. Since its center is 25 feet above ground, the new antenna should work well on tropo as well. Plans include 23 cm soon.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Scaling Antennas

From time to time, I get letters asking about scaling down antennas for use on the microwave bands. It is quite possible to take a proven vhf/uhf antenna and rescale it for use at higher frequencies if *all* the dimensions of the antenna are scaled. That is not only the element length and spacing, but also the element thickness and boom diameter must be scaled down. As an experiment, scale models of the 1296-MHz loop Yagi have been built for use at 10 GHz, and they were found to reproduce the larger antenna's performance quite accurately, provided that *all* the dimensions were scaled accurately.

One way to look at the scaling process is to consider all the antenna dimensions in terms of the wavelength for which the antenna is designed. Considered in this way, a 1/2-wavelength-long element is the same in a 1296-MHz antenna as in a 10-GHz antenna, but its physical length is different in the two cases. If it is impossible to achieve accurate scaling because materials of the correct dimensions are not available, then corrections must be made. In a Yagi-type antenna, if the element diameters are increased then their length must be reduced. The amount of reduction typically will be greater for the directors than for the reflectors and driven element. If the boom is larger than in the original design, then the element lengths must be longer to compensate. Optimum values must be found by experiment. It is also important to use the same materials of construction. If the original antenna uses an insulating boom (e.g., wood), then the scaled antenna must also. The boom should also be the same shape in both antennas. Using a square metal boom in an antenna originally designed with a round metal boom may affect its performance. It is quite difficult to predict how much difference small deviations from original design values will make. The best way to find out is to build it and see!

For further information, the interested reader may consult these references:

Hoch, G. "Yagi Antennas." *VHF Communications*, March 1977, p. 157.

Shen, L. C. and G. W. Raffoul, "Optimum Design of Yagi Array of Loops." *IEEE Transactions on Antennas and Propagation*, AP-22, No. 6, Nov. 1974.

Spector, J. O. "An Investigation of Periodic Rod Structures for Yagi Antennas." *Proc. IEEE*, Part B, Jan. 1958, p. 38.

10-GHz MOBILE

Kent Britain, WA5VJB, has written with details of some 10-GHz wide-band fm mobile experiments that he and W5ETG have been carrying out. Using Gunnplexers and 17-dB horns, they found they could maintain communication up to about a two-mile range, even over non line-of-sight paths. They found they could even maintain communication over nonline-of-sight paths when driving in the same direction and with both antennas pointing forward when they were approaching a large shopping center, presumably utilizing reflected signals. One problem that was evident was unlocking of the afc systems when signals dropped out because of local obstructions, requiring tuning of the radios to reestablish contact. Kent comments that 17-dB horns are probably not ideal antennas for mobile work. It would be interesting to try an omnidirectional slotted waveguide (such as recently described in this column) or a microstrip antenna for mobile use.

TRANSISTOR DEVELOPMENTS

A new transistor type, known as the ISOFET, is now in commercial production. The ISOFET is a silicon power device with MOSFET-like power capabilities. Its structure is similar to an inverted V-groove MOSFET, which places the channel closer to the surface of the device, where electron mobility is higher. What this boils down to is a 6 to 10 dB higher power gain than available MOSFET devices and a frequency capability four times higher, with f_t up to 5 GHz. As an example, the Acrian UMIL4OFT has a 40-W output rating with 20-dB gain from 200 to 440 MHz, and will operate over the range from 20 to 500 MHz with slightly reduced ratings. This broadband device is very forgiving with regard to VSWR, and is currently priced around $100. Perhaps before too long we may have a single power amp capable of covering all the uhf and lower microwave bands!

MICROWAVE COMPONENTS

Three new GaAs FETs are now available from Applied Invention, RD 2, Rte. 21, Box 390, Hillsdale, NY 12529: The Mitsubishi MGF1100, a dual-gate GaAs FET with a typical NF of 2.5 dB at 4 GHz; the MGF1202 (an MGF1402 chip in a 1200 package), which has a typical NF of 2 dB at 4 GHz; and the MGF1404, which has a NF of 0.65 dB at 4 GHz. Prices are $7.35, $9.70 and $66.60, respectively. Other microwave components, including Teflon pc board and chip capacitors, are available from the same source.

GaAs FET AMPLIFIER DESIGN

California Eastern Labs (3005 Democracy Way, Santa Clara, CA 95050), the U.S. distributor for N.E.C. semiconductors, has available a short manual (AN 82901) entitled *Application of Microwave GaAs FETs*. Somewhat technical in nature, it describes design techniques for low-noise, wide-band and power GaAs FET amplifiers, as well as information on bias circuits (the use of correct bias circuitry is very important to the health and well-being of GaAs FET amplifiers).

CORRECTION

In the 1296-MHz two-way power splitter described in the February 1983 New Frontier column, the length of the splitter (dimension H in Fig. 2) was incorrectly given as 4 inches. This dimension should be 3 inches, as would soon have become evident to those trying to build the splitter! Thanks to WA1HGV for pointing out the error.

1296-MHz ACTIVITY

Skip Jones, WD4AGO, reports plans to put up 8-16 10-el quagis on 1296 soon, so look out for signals from Bristol, Virginia. He also sends information that K4EJQ has eight quagis and 50 W from Tennessee.

CONFERENCE NEWS

The Ninth Annual Eastern VHF/UHF Conference will be held on May 13-15 at the Sheraton Tara, Nashua, New Hampshire (just north of the Massachusetts border). This is always an excellent conference with much of interest to the vhf/uhf microwave enthusiast. I hope to see you there. For details, see The World Above 50 MHz, this issue. QST

*103 Division Ave., Millington, NJ 07946

Strays

QST congratulates . . .

☐ Paulette Springer, PhD, KA5DOL, of Kilgore, Texas, whose biography has been selected to appear in Marquis's *Who's Who in the South and Southwest* and the American Biographical Institute's *Personalities of the South*, and who has been nominated to appear in the British biographical register *Women of the World*.

☐ QST Senior Technical Editor Doug DeMaw, W1FB, on being elected Senior Member of the IEEE. Doug will retire in May, after 18 years of service at ARRL Hq.

☐ Wally Burkett, WA4KXV, of Virginia Beach, Virginia, on being named Amateur of the Year by the Virginia Beach ARC.

☐ George Warneford, KA4UET, of Edgewood, Kentucky, on being named Chief of Communications for the Kenton County (Kentucky) Disaster Emergency Service.

☐ Ira C. Bechtold, W6NCP, of Walnut, California, on receiving the Institute for the Advancement of Engineering 1983 Outstanding Engineer Merit Award.

I would like to get in touch with . . .

☐ any hams who flew a B-24 with the 307th Bomber Group of the 13th Air Force during WW II. Mac Willard, KA2EXI, 1247 Brighton Rd., Tonawanda, NY 14150.

☐ anyone stationed in Europe with the 1st Infantry Division, 1st Signal Co., between 1948 and 1952. Don Smith, WB2ZJF, RD 2, Box 618, Woodstown, NJ 08098.

☐ anyone using the TI-99/4A microcomputer for sending and receiving RTTY or AMTOR. Steve Hobbs, WB5ZHW, 101 Brentwood Ave., Petal, MS 39465.

Silent Keys

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

W1BZH, Wallace F. Spaulding, Rockland, ME
N1CCF, Leon A. Richardson, Somersworth, NH
WB1FKH, James Vakshall, Westbury, NY
W1IIM, Jack H. Ferguson, Wayland, MA
K1IXD, Harry W. McCarter, Old Greenwich, CT
W1RFH, G. Donald Ferree, West Hartford, CT
W1UCC, Vernon H. Richards, Rutland, VT
W1VMO, Chesler L. Pattee, Sharon, MA
N2BMR, Leroy Carlson, Hampton Bays, NY
*K2CXO, James M. Forzono, Stony Point, NY
W2DFC, Henry W. Soller, Toms River, NJ
W2HIV, Richard J. Griffith, Dolgeville, NY
*K2IXN, Warren L. Spindler, Rome, NY
N2JF, Julio E. Fernandez, Bronx, NY
WB2MQF, Gordon Beckwith, East Pembroke, NY
W2NQF, Stephen J. Meintzinger, Wayne, NJ
W2ON, Richard C. Kleinberger, White Plains, NY
W2TVR, Curtis F. Spinning, Albany, NY
W2UBL, Douglas E. Church, Syracuse, NY
WA2WGA, Frank H. King, Woodbury, NJ
W2ZH, E. Stuart Davis, Union, NJ
KA3DVV, Volney G. Patton, Bethel Park, PA
K3GH, George A. Hooper, Glenside, PA
WA3GXN, Lewis W. Wilkinson, Aberdeen, MD
W3LYE, Randolph G. Wendel, Camp Hill, PA
K3NMP, Henry G. Klinges, Philadelphia, PA
W3RNO, Stanley Piotrowski, Aliquippa, PA
W3UUB, Michael Kotula, Leetsdale, PA
KB4AWN, William C. Walker, Jr., Naples, FL
WA4BBY, Helen R. Blanton, Kings Mountain, NC
W4CBN, William E. Conner, Knoxville, TN
*WD4CVR, John B. Black, Spartanburg, SC
WD4FCU, Frederick T. Peters, Plantation, FL
W4HT, Charles W. Durrell, Sr., Atlanta, GA
K4LIB, Arthur M. Godfrey, New York, NY
*N4LL, Francis W. Greenough, Spartanburg, SC
W4LTJ, Sam J. Moore, Knoxville, TN
W4MTB, Charles W. Reynolds, Winston Salem, NC
K4NN, John J. Schleich, Ft. Lauderdale, FL
W4PPS, Frederick R. Crownfield, Jr., Williamsburg, VA
W4PRY, William E. Bates, Nashville, TN
K4RHC, George W. Thompson, Chiefland, FL
K4UMG, Robert W. Compton, Oak Ridge, TN
K4WG, James B. Sackrider, Miami Springs, FL
W4YRO, Barney L. Abbott, Montgomery, AL
W4YXE, Donald W. Blanton, Kings Mountain, NC
W5AMN, Wayne P. Green, Lake, MI
N5ASV, John L. Caudry, Fort Worth, TX
KA5BFP, Robert B. McFarland, Pasadena, TX
W5BIY, Randall "Randy" Whitfield, Manchaca, TX
W5BL, Donald M. Hester, New Braunfels, TX
WA5DCO, John E. Faris, Magnolia, TX
WD5HSV, Robert H. Bibb, Muskogee, OK
W5KNX, Olin G. Rivoire, Houston, TX
W5KSM, Rene J. Bienvenu, Jr., Natchitoches, LA
WB5MWP, Walter S. Kinney, Norman, OK
W5NHY, Bobby H. Rigler, Amarillo, TX
WB5OHY, Lyle H. Hohenstein, Shawnee, OK
W5OZQ, Theo R. Jett, San Antonio, TX
K5QBA, James R. Sebesta, Austin, TX
W5RJW, Dan J. Louis, Bryan, TX
W5VJ, William P. Allen, Jackson, MS
K5ZCA, Wayne M. Thurman, Albuquerque, NM
K6APB, Fenton P. Loring, Berkeley, CA
W6FAX, Fay S. Elzey, San Francisco, CA
W6FIQ, Buell H. Dalton, Modesto, CA
W6KLQ, Robert W. Soelch, Covina, CA
WB6KSH, James A. Tronske, Ontario, CA
K6QXJ, Patrick S. Callahan, Oxnard, CA
K7AOZ, Mel C. Ellis, Spokane, WA
KC7HG, William J. Burns, Salem, OR
W7IKA, Theodore P. Hendrickson, Great Falls, MT
W7LDC, Joseph E. Bush, Eloy, AZ
W7PJX, Heber G. Brown, Rock Springs, WY
*W7PSW, Jay H. Howell, Mukilteo, WA
W7ZHZ, John P. Jenkins, Longview, WA
W8BNA, Damon L. Setliff, Beckley, WV
W8BOV, Raymond R. Fletcher, Englewood, OH
W8HBQ, Julius D. Gordon, Moundsville, WV
*WD8JCY, William T. McMannis, Springdale, OH
K8KEG, Joseph M. Feicht, Akron, OH
W8LAE, Howard A. Judd, Nunica, MI
W8MNJ, Alvin R. Adair, Conneaut, OH
WB8NWI, Mark Linden, Oak Park, MI
W8PDH, Roy A. Stockwell, Hartford, MI
WB8QYK, Robert H. Thomas, Kent, OH
W8ULY, Daniel H. Krug, North Canton, OH
WA8WEX, Edwin Kohler, Farmington Hills, MI
WB8ZVM, John A. Brown, Cincinnati, OH
N9CI, Alfred O. Phares, Jeffersonville, IN
W9CJE, Elmer D. Loock, Wisconsin Rapids, WI
W9FIW, Stanley M. Johnson, Fort Wayne, IN
WD9GVP, Lloyd E. Roberts, Connersville, IN
W9OKM, Henry Kampe, Joliet, IL
W9QOS, Adrian F. Fine, Petersburg, IN
W9SUC, Lyle A. Goff, Milwaukee, WI
K9TRN, Charles E. Piper, Madison, WI
W9WCR, Ralph Green, Sun City, AZ
WØACD, Lawrence E. Steimel, Denver, CO
WØCBS, Harold L. Berger, Topeka, KS
WØCXG, Herbert F. Giebler, Shoreview, MN
WAØFDH, Oral M. Pash, New Port Richey, FL
KAØGDS, Darren W. Watson, Hastings, MN
WØTI, Irving T. Patridge, Milbank, SD
WØTW, Carl W. Yarcho, Lakewood, CO
KØYDN, Harold R. Boyer, Watertown, SD
VE3BGT, Alex J. Skelton, Hamilton, ON
*VE3DHT, Thomas "Tommy" Wilson, Scarborough, ON
DJ8GF, Eduard Czenna, Trappenkamp, West Germany
PY7JI, Joaquim Moreira do Rego Barros, Brazil

*Life Member, ARRL

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

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

50 Years Ago

May 1933

☐ Broadcasters are asking for an extension of their band at the low-frequency end, displacing the mobile services there to above 1500 kc., with resultant domino-effect pressure on our 160-meter band. We are urged to continue heavy occupancy to show need, especially with the sunspot cycle favoring this portion of the spectrum.

☐ A disastrous California earthquake centered on Long Beach, and amateurs there were the sole means of external communication during the first few hours. We can be especially proud that, though it occurred in the midst of the DX contest, most hams gave up ambitions for a big score and pitched in to help.

☐ Class B modulation is "in," adopted by most amateurs since its presentation in *QST* a couple of years ago. But there are many poor signals because of a dearth of technical info; Art Collins remedies much of the problem with six pages of data summarizing extensive lab work, particularly as concerns distortion.

☐ Ross Hull urges more attention this summer to 28-Mc. work, particularly for short-haul uses; he says it performs better than 56 megs.

☐ But 5 meters gets a few plugs also. W2AOE presents his design of an oscillator-amplifier rig, suggesting that if we adopt this higher stability approach and then use superhets we can many times increase the potential occupancy of the band.

☐ Cal Hadlock, however, obviously believes superhets are long in the future, and sticks to the superregen circuit for his receiver design using a stage of tuned r.f.

☐ Gross Radio advertises a 3-tube short-wave receiver for $10.95 (plus $3.50 for the tubes). The National SW-3 is $15, plus coils and tubes. Power supply is additional in both cases.

☐ W1BNM has a mast of 2 X 4s which he extends to 90 feet by means of guide posts at the base and an automobile tire jack for raising section by section.

☐ The League's prexy, Hiram Percy Maxim, has written a new book, *Life's Place in the Cosmos.* Among other things, it predicts future DX in megamiles, and speculates as to life on other stellar objects.

☐ W4IS used a copper-oxide rectifier from an old trickle charger and a 1-mil meter to make an improved "tuning lamp."

☐ The Editor decries the use of tone modulation on telegraphy signals just to get attention; it diminishes the single-signal reception capability — and besides, it is illegal!

25 Years Ago

May 1958

☐ The Communications Policy Board set up by President Truman some years ago endorsed the concept of a strong amateur radio service. The newer Telecommunications Advisory Board, part of the Office of Defense Mobilization, has now reaffirmed that position as official U.S. policy. Hopefully, this will help allay fears of our prospects at the forthcoming international radio conference.

☐ We are running out of call signs in the 2nd and 6th districts, so more 2-letter prefixes are necessary. In addition to WN, Novices will be receiving WV calls, and others will get the WA prefix.

☐ Drawing heavily on W8JK's classic text, W6KPC has constructed a high-gain rotary for 10, 15 and 20 meters. Sixteen vertical elements, each 1/4 wave at 14 Mc., make up the "Driven Beast" array, with phasing sections and a 150-ohm, 4-wire feed line to attain maximum directivity on each band.

☐ W6DMN uses two mixers and a common oscillator in the i.f. section of his receiver to shift signals on nearby frequencies into and out of the passband — electronic tuning, in a sense.

☐ Lew McCoy continues his series on basic 50-Mc. gear for beginners with an oscillator-amplifier one-tube (6U8 dual purpose) rig, using a carbon button mike into a 6AQ5 modulator.

☐ The "cheap and easy" sideband rig described by W2EWL in *QST* a couple of years ago put a lot of hams on the air in that mode, largely because it used a surplus BC-348 for the basics. He has made a couple of improvements, summarized this month, such as a low-pass filter in the audio section to better isolate the phase-shift network.

☐ KH6OR blew quite a few traps in his tribander before he solved the flashover problem with vacuum capacitors.

☐ W1ZEO found that he could measure higher than usual power in an s.w.r. bridge by using a high ratio of values in the resistance arms, in preference to the standard 1-to-1 approach.

☐ W9KNK argues that a uniform-pitch helically wound mobile antenna performs better than the usual bumper mounted job, despite its compactness, because in the center of the roof it has the maximum amount of metal ground return.

☐ W2IOP, K4LPW and W4KFC were the top three in last November's Sweepstakes.

☐ The League's *Handbook* has now reached 3 million copies in 35 editions; it still is the top all-time best-seller in the technical field. — *W1RW* QST

In Training

Conducted By Steve Pink,* KF1Y

CHANGES IN TESTING ARE COMING: THE NOVICE EXAM

We've devoted a number of In Training columns in the last year to the League's proposed volunteer examining program, and the FCC has now responded in two Notices of Proposed Rule Making. ARRL registered instructors will play an important role in a volunteer examining program. We want to keep *you* informed in *your QST* column of the latest developments in our ongoing dialogue with the FCC. Changes are occurring in different ways for the Novice testing program and for the Technician and higher-class licenses program. We will examine the recent rule-making history behind both sets of changes and explain how the League has "picked up the ball" on these important issues.

THE FCC PROPOSAL

Over the last few years, the Commission has let the amateur community know, both formally and informally, that it wished to make changes to its Novice "mail-back" program. This is the procedure in which a qualified volunteer examiner administers a code test to an applicant and then sends the successful applicant's 610 Form to FCC offices in Gettysburg, Pennsylvania. The volunteer examiner then supervises the written exam and sends the test back to the FCC for grading and issuing of a license.

The Commission, in PR Docket 82-727, proposes to eliminate the mail-back program and substitute a deregulated procedure for obtaining a Novice license. Their main argument is that the present mail-back system is very expensive and, since 97% of applicants are successful under the system, the benefits to the Amateur Service fall far short of the cost to the Commission. In addition, the FCC says the present mail-back system causes delays, especially those frustrating delays that occur between the time when an applicant passes the code test and when the written test element arrives from Gettysburg. Unpredictably long delays also occur while the test is graded and a license is issued or the applicant is notified of failure.

So far, the League is in agreement with the Commission. We believe that the Novice program should be changed to eliminate both unnecessary costs to the Commission and delays to prospective amateurs. The Commission, however, proposes to eliminate the Novice mail-back program and substitute a written exam comprised of questions formulated by the volunteer examiner and based on the FCC Study Guide for Element 2. In other words, the Commission is proposing that each volunteer examiner create his or her own test questions. Each Novice applicant, then, may be answering questions that could be completely different than those on a test taken by another applicant.

THE LEAGUE'S PROPOSAL

The League's proposal and comments on PR Docket 83-727 preserves the cost-effective and time-cutting advantages of the Commission's proposal but also guarantees uniformity among written tests. Under the League's proposal, the mail-back procedure would be eliminated, thus saving money for the Commission and cutting delays for the applicant. The FCC, however, would publish a relatively large bank of questions from which the volunteer examiner would choose 20 (from appropriate categories). These 20 questions would serve as a Novice written exam. Under the League's proposal, the volunteer examiner would also grade each test, inform the applicant whether he or she passed or failed and send the required forms to the Commission for the issuing of a license. The chief difference between the FCC's proposal and the League's is that the League's proposal requires a standard bank of questions from which each Novice exam would be composed.

We feel that this is an important difference. Under the Commission's proposal, it is all too likely that prospective Novices could take written exams that varied significantly in difficulty. For example, it is conceivable for two questions on half-wave dipoles, a Novice syllabus category, to differ in depth so much that almost all Novice applicants could answer one correctly and almost no applicant could answer the other correctly. An FCC-approved bank of questions, large enough to make rote memorization unlikely, could solve this problem.

The League's proposal would also make use of the new law (P.L. 97-259) that allows the amateur community to help prepare questions for the Novice question bank. Instead of having each question created individually by each volunteer examiner, the collective talents of the amateur community could be utilized to build up a standard question bank. The only burden left to the Commission would be to scrutinize and choose the questions and, from time to time, update or enlarge the question bank. The League sees this as a minimum of burden next to the loss of uniformity of standards under the Commission's proposal.

Your role as an ARRL instructor is clearly defined in both of these proposals. The Training Branch has received quality feedback from its instructor corps, and the overwhelming opinion seems to be in favor of a large but standard bank of questions for the Element 2 (Novice) written examination. We are still interested in hearing feedback from you on this issue. The Training Branch will keep you aware of how the Commissioners decide on the important issue of Novice testing. They will soon be making their choice.

Next month, we will update the recent proposed changes to examining for higher-class licenses. Your role as ARRL instructor will be affected here as it will be for the Novice program. We will help you keep in touch with the latest details and rulings, and the alternatives available. Drop us a line or give us a call if we can further clarify any of these issues for you.

*Training Program Manager, ARRL

Club Corner

Conducted By Sally O'Dell,* KB1O

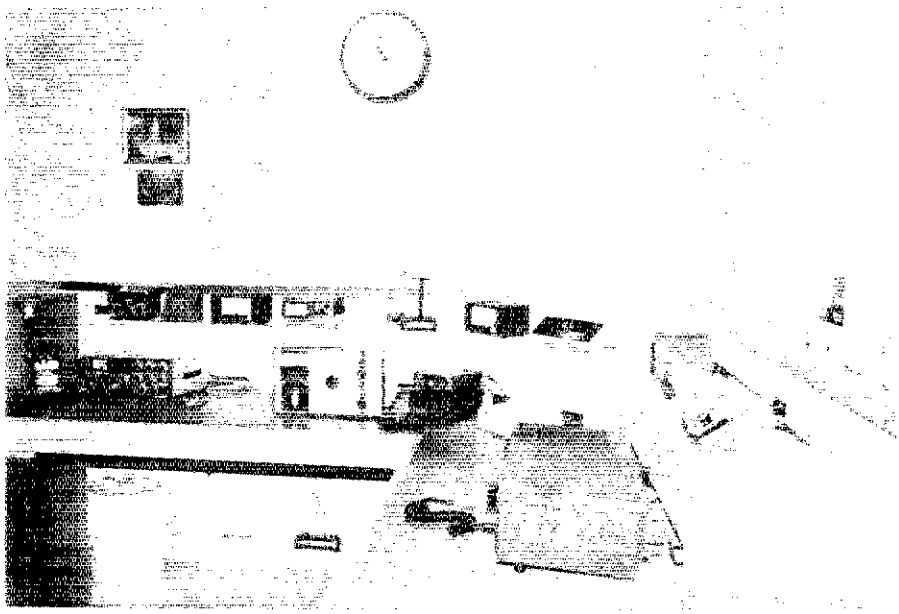
THE WELL-ORGANIZED CLUB

The year 1919 marked the first time radio clubs were affiliated with the ARRL. In that first year, a total of 11 clubs were affiliated. (Check Dec. 1979 *QST*, page 10, for a history of the first affiliated clubs.) This year, with 1819 clubs actively affiliated, many Amateur Radio clubs will celebrate either 50 years of existence or 50 years of ARRL affiliation.

Fifty years of affiliation with the ARRL is an achievement we recognize with a handsome golden anniversary certificate. Most of our 50-year clubs plan formal celebrations, and their 50-year certificate is presented by a League official when possible. (We maintain historical records of the original affiliation dates of our clubs at ARRL Hq.)

Our newly affiliated clubs can benefit from the years of experience of the older ones. You might want to have your club keep detailed records of its progress. Future generations will appreciate your organization and thoughtfulness. The club historian should be compiling one clean copy of all your club's newsletters in a binder. In addition, all of the secretary's minutes, notes and letters should be preserved and passed along to the next year's secretary. Similarly, when new officers are elected, they should pledge to compile and pass along the year's work to their successor.

Articles about your club's activities that are printed in the local newspaper should be clipped and saved, along with other publicity pertaining to your club. Documentation of the last club exhibit should be



An active, thriving Amateur Radio club is interested in community affairs and willing to "go the extra mile." This well-equipped station, organized by the Leisure World ARC (a retirement community in Laguna Hills, California), was put together by thoughtful, caring club members.

* Club Program Manager, ARRL

recorded and filed with all other exhibit information. (ARRL's Club and Training Department will provide exhibit materials in limited quantities to clubs preparing for exhibits. Write to ARRL Hq. for information.)

Every activity that your club becomes involved in should be documented and preserved. When your club comes up for its 50-year presentation, your historian can easily dazzle newcomers: "Here is how we presented an exhibit last year, the year before and 10 years ago. We've come a long way!" Everyone will be pleased that you were thinking ahead. Over 50 years ago, your club members were anxious to be well-informed and contributing members of this organization, and today it shows in your well-organized club.

When compiling a club history for your 50-year celebration, review all the notes that have been saved over the years and publish the most interesting and important ones in the history review book that you prepare for the event. Photos you've taken over the years also help.

The club amateur (or professional!) photographer should keep a loaded camera handy at each event. Group photographs should be taken, well-documented and carefully preserved in the club scrapbook. Photographs of individuals are also important, with captions identifying each of those pictured. And don't forget to photograph your Field Day activities, exhibits, contests, general interest programs and banquets each year. Finally, don't ignore the club station! A station photo every year will show how much the equipment has changed. Similarly, a slide show comprising shots from past years will be the hit of your banquet.

What can you do now to help your club and club historian? Gather your members together and plan for coming events. In your plans provide for documenting the activities. When the club is involved in events that can make members feel proud, write about them. List *everything* of importance to the club, starting with the largest item and working down to the smallest. But you have to begin planning now. When planning your next hamfest, exhibit or Novice class, don't forget that you are planning for your club history. Think how pleased your club members will be 50 years from now when your century anniversary arrives. You'll be ready!

Field Day's Coming

Field Day is coming, soon! Is your club prepared? A chairman should have been appointed by now; he or she has a committee and the whole club will soon be involved in active pursuit of Field Day "in the field." (See Page 86 for Field Day rules and guidelines.) Your well-organized chairman has already picked the location for Field Day 1983, and is just tying the ribbons for your club's participation now. At the same time, he or she is preparing for 1984. The lists of jobs have already been assigned — months ago. The "to carry" items are arranged in homes as club members wait for the big day.

What more is there to do except plan for Field Day next year! Well, there is more. Make sure that everything will run smoothly; although you *must* plan for Murphy, try to take everything into account. Field Day comes only once a year, so get out there and enjoy! QST

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,* W9KDR

PHASE IIIB LAUNCH COUNTDOWN

The June 3, 1983 launch of AMSAT's Phase IIIB spacecraft is firm as this is written (in late March). AMSAT launch crew members from South Africa, The Federal Republic of Germany and the U.S. will integrate the Phase IIIB spacecraft with the Ariane L6 launcher between April 25 and May 15 at the ESA (European Space Agency) launch site in French Guiana. This activity includes final checkout, filling the fuel and oxidizer tanks, and mating the satellite to the launcher. From then on to launch day, the team will be "babysitting" the spacecraft.

ALINS (AMSAT Launch Information Network Service) will include global coverage, including live feeds from important facilities supporting the launch and tracking effort. Monitor regular AMSAT nets and W1AW bulletins for details.

Check Out Your Phase IIIB Ground Station

The Jansky commemorative operations at the National Radio Astronomy Observatory are planned for two weekends, May 7-8 and 14-15. The EME activity on the second weekend is drawing enormous amounts of interest since the 140-foot dish will allow EME contacts with West Virginia by stations with very modest 70-cm equipment. Many AMSAT-Phase IIIB Mode B stations will be tuning up their rigs, using the EME run as preparation and checkout prior to the L6 Ariane launch in June. AMSAT President Tom Clark, W3IWI, reports that the primary call used at NRAO will be K8HUH, with W3IWI as backup. K8HUH will transmit 432.095-432.100 MHz and listen 432.000-432.200 MHz. The wide band for listening is designed to accommodate the crush expected to attend this event. K8HUH will transmit lhcp (left-hand circular polarization), so be prepared to receive rhcp (right-hand circular polarization), as the sense is reversed by reflection from the moon. *ASR* is planning extensive coverage of both weekends of the Jansky commemoration. Stay tuned! (from *ASR* 53/54, March 28, 1983)

AMSAT Hires General Manager

After a search process lasting nearly eight months, AMSAT has selected William L. Lazzaro, N2CF, of New York, to be its new general manager. The position also carries the title executive director.

The selection process began with the spring 1982 Board of Directors meeting, when the directors authorized that a search committee be established to hire a qualified individual. The search committee was constituted in July with committee persons Martha Saragovitz, W3IWI, K4YV (chairperson), K1HTV, W6SP, KB4ZJ, W3GEY and WA2LQQ serving. Advertisements were placed in major Amateur Radio magazines and newsletters. Other ads appeared in major newspapers. By November, scores of resumes had been received. Finally, each committee person, acting independently, selected 10 top candidates from among all the resumes. A half-dozen consensus candidates were interviewed in Washington. A group of three finalists was chosen, and negotiations with the prime candidate, N2CF, began in January. In early March, a majority of the Board ratified the agreement and N2CF thus became AMSAT's second general manager.

N2CF is a New York native in his early thirties, is married and has three boys. He holds an Extra Class ticket, and has been licensed since 1964 and active on OSCAR since 1978. He is currently activities manager of the Orange County (New York) ARC.

Bill holds a BS cum laude in science education, and was president of his college honor society. In addition, he earned an MSE and is working toward his Doctorate. (from *ASR* 53/54, March 28, 1983)

Tracking System Available

The AMSAT AMS-81 Tracking System was made available for distribution starting April 15, 1983. The program requires a Sinclair ZX-81 or Timex Sinclair TS-1000 computer and 16K of memory. It provides scheduling and tracking information for Phase II and Phase III type orbits. The program is available for $15. Send a check or money order made out to AMSAT to: AMSAT AMS-81 Tracking System, c/o Bob McCaffrey, K0CY, 3913 29th St., Des Moines, IA 50310.

The tracking system was first made available at the ARRL Midwest Division Convention during the weekend of April 15 and at the Dayton Hamvention the weekend of April 29. (from *ASR* 53/54)

Japanese Satellite Project Begins

JAMSAT, the Japanese AMSAT affiliate, will soon be designing and building an OSCAR, according to JAMSAT/AMSAT Liaison Officer Harry Yoneda, JA1ANG. (Harry also serves as AMSAT director.) The project will be a joint undertaking of JARL and NASDA. (JARL is the Japan Amateur Radio League; NASDA is the Japanese National Space Development Agency, similar to NASA or ESA.) JAMSAT will provide key technical support in areas of design, development, testing and integration. Dubbed JAS-1 for Japanese Amateur Satellite no. 1, the project was approved by Japanese authorities recently after several years of behind-the-scenes negotiations. The sensitive nature of the negotiations precluded earlier announcements, according to JAMSAT officials. A 1986 launch is anticipated.

Mikiyasu (Miki) Nakayama, JR1SWB, will head the JAMSAT team as task leader for the project. It is not clear at this time what the final name of the satellite will be. This will become Japan's first Amateur Radio satellite, although JAMSAT has been a very active contributor to prior projects. Most prominent is AMSAT-OSCAR 8, for which JAMSAT built the Mode J transponder. Several of the key components of both Phase IIIA and B also were JAMSAT contributions.

JAS-1 will be placed in a 1500-km circular orbit inclined 50°. Its orbit will be very similar to that of AO-7. According to JR1SWB, the payload will include both a Mode J type linear transponder and a PACSAT-like digital transponder. The launch vehicle will also be Japanese. The H-I launcher has recently enjoyed good success in placing communications and weather satellites in service. JR1SWB recently attended the West Coast Computer Fair in San Francisco, and traveled east visiting AMSAT officials. Miki represented JAMSAT at the Paris conclave of amateur satellite builders last October, and is a recognized leader in the community. (from *ASR* 53/54, Mar 28, 1983)

ASE Bulletin Board Hours

Monday-Thursday 0500 to 2300 UTC
Friday-Sunday 0500 to 1200 UTC

These are *minimum* times; availability at other times is possible, but less certain. To access the bulletin board, call 512-852-8194.

Satellite Listening Post

The times and dates (Central North America 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.

May 7- 8 — 9:00-11:30 P.M. and 7:30-10:00 A.M.
May 14-15 — 8:50-11:10 P.M. and 6:30- 9:00 A.M.
May 21-22 — 8:30-10:50 P.M. and 6:30- 8:00 A.M.
May 28-29 — 8:10-10:30 P.M. and 6:50- 7:00 A.M.

Monthly Listings

☐ *ASR* (Amateur Satellite Report) 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 a 4- × 9-in. self-addressed, stamped envelope with your call sign to ARRL Hq. Club and Training Department for a complete, monthly orbit schedule for all operating amateur satellites. A year's supply of s.a.s.e.'s may be sent at one time; be sure to include 1 unit of postage for each s.a.s.e.

☐ 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. QST

*OSCAR Program Manager, ARRL

Coming Conventions

By Marjorie C. Tenney,* WB1FSN

May 20-21
Atlantic Division/New York State

June 3-5
Oregon State

June 3-5
Texas State

June 4-5
Kansas State

June 5
Illinois State

ARRL NATIONAL CONVENTIONS

October 7-9, 1983
Houston, Texas

July 20-22, 1984
New York, New York

September 27-29, 1985
Louisville, Kentucky

ATLANTIC DIVISION/NEW YORK STATE CONVENTION
May 20-21, Rochester

The Atlantic Division/New York State Convention combined with the Rochester Hamfest will be Saturday, May 21, at the Monroe County Fairgrounds, Rte. 15A, Rochester. Commercial exhibits open at 8:30 A.M. The huge outdoor flea market opens at 6 A.M.

FCC exams may be conducted at the hamfest. At press time, it was not certain if it would be possible. Application for the exam should be submitted by May 1 to John Schooley, K2NC, 329 Fiesta Rd., Rochester, NY 14626. Your completed Form 610 should *not* go to the FCC. Indicate "Rochester Hamfest, Rochester, NY" in Section 11-B of Form 610.

Programs include such subjects as Packet Traffic, Understanding CATV Interference, Local Disaster Communications, Ten Meter FM Workshop and Microphone Equilization. A special feature is a League Forum presented by the Atlantic, Hudson and Canadian Directors. There will also be an opportunity to meet ARRL General Manager Dave Sumner, K1ZZ. Local and section nets will meet. A highlight will be the 4th annual W2RUF Memorial Code Contest. Van service will be provided to the nearby Marketplace Mall, Rochester's newest and largest shopping mall.

The annual banquet will be on Friday, May 20, the evening prior to hamfest. There will be *no* formal events Saturday evening. Registration is $4 in advance, $5 at gate; banquet $18. Flea market permits, $2 per parking space. For tickets, write to Rochester Hamfest Tickets, 174 Croydon Rd., Rochester, NY 14610. For all other information, call 716-424-7184 or 716-424-1100 during business hours.

*Convention/Travel Coordinator, ARRL

OREGON STATE CONVENTION
June 3-5, Seaside

The 1983 ARRL Oregon State Convention, cosponsored by the North Coast Repeater Assn. and the Oregon Tualatin Valley ARC, will be held at the Seaside Convention Center, Seaside, on Friday, June 3, through Sunday, June 5. Hours are 4 P.M. to 9 P.M. Friday, 8 A.M. to 9:30 P.M. Saturday and 8 A.M. to 2 P.M. Sunday. Pre-registration is $5 per single and $7 per couple, and $2 for teens with parents. Children 12 and under free.

Seminars: Packet Radio, DXpedition, FCC Rules and Regulations, National Traffic System, TV Cable Systems and "living with them," Alternate Power, Care and Feeding of NICADs, Basic Antennas and many others. Banquet speaker will be Richard Underwood, of NASA. Master of Ceremonies will be the Honorable Judge Greg Milnes, W7AGQ. Special ARRL guests are Dale Clift, WA3NLO, and Vice President Larry Price, W4RA. Banquet cost is $13.50 per person. Talk-in on 52 simplex and local repeater 144.85/145.45. For more information and/or reservations, write to Doc McLendon, W7GWC, P.O. Box 920, Seaside, OR 97132.

TEXAS STATE
June 3-5, Dallas

The ARRL Texas State Convention and the Sixth Annual Ham-Com Amateur Radio Convention will be held in Dallas June 3-5, in the Northpark Inn Convention Center. The convention will begin Friday evening with an AMSAT Hospitality room. Exhibits and flea markets will be open all day Saturday and until 2 P.M. Sunday.

The programs offered this year have been greatly expanded. A full slate of women's programs and activities have been added with an all-day tour (including JR's Southfork). Child care will be provided.

The Convention hotel is Northpark Inn, and special convention rates apply. The pre-registration deadline is May 28, with single registrations $5 and family registrations (one ham and up to three non-hams) $7.50. For more information contact Stevie Gentry, Registration Chairman, Ham-Com, Box 64, Richardson, TX 75080, or call 214-867-6766.

KANSAS STATE
June 4-5, Salina

The Central Kansas Amateur Radio Club (CKARC) of Salina, will be hosting the 3rd ARRL Kansas State Convention in Salina on June 4-5 at the Red Coach Inn Convention Center located on West Crawford and I-135.

Interesting programs are planned for hams and nonhams on both days. Gerald Hull, AK4L, of ARRL Hq. will present a program on technical matters in ham radio. A banquet is planned for Saturday night in the dining room of the convention center. A *free* flea market will be held in the parking lot adjacent to the center (bring your own umbrella in case of rain). For further information or reservations, send an s.a.s.e. to Bill Ringquist, KAØCUF, RR 1, Box 155, Gypsum, KS 67448.

ILLINOIS STATE
June 5, Princeton

Starved Rock Radio Club, W9MKS, celebrating 50 years in ham radio, will sponsor the ARRL Illinois State Convention. Plans include free outdoor swap area with a limited number of indoor rental tables at $10 each. Elaborate plans for ARRL exposure, include seminars featuring ARRL Legal Counsel Christopher Imlay, N3AKD, Central Division Director Ed Metzger, W9PRN, and Jim O'Connell, W9WU, telling of work on tower/antenna litigation. As in past SRRC-sponsored hamfests, all popular amenities are expanded to cover the numerous facets of our hobby. With good food, adequate parking and realistic prices, the day should prove to be one of the highlights on your list of priorities for the 1983 season.

Visitors with vans or campers can spend the night at the site for a small fee. Registration is $2.50 before May 20, $3 at the gate. Free doughnuts and coffee at 8 A.M. to each registrant. Talk-in on 72/12, 07/67 and 52 simplex. Princeton can be reached via I-80 and many state highways. Furnish s.a.s.e. for map, registration and complete info. Write to SRRC/W9MKS Golden Anniversary, RR 1, Box 171, Oglesby, IL 61348, tel. 815-667-4614.

Hamfest Calendar

†**Alabama:** Birminghamfest '83, sponsored by the Birmingham ARC, will be held on May 14-15 at the Birmingham-Jefferson Civic Center, Birmingham. Hours are 9 A.M., to 5 P.M. both days. Admission: adults $3, 12-18 years $1, under 12 free. Exhibitors, flea market, forums, banquet. Total security both days. Talk-in on 34/94. For further information, write to Birminghamfest '83, P.O. Box 603, Birmingham, AL 35201, tel. 205-823-1628.

Arkansas: The Northwest Arkansas ARC, Inc., will hold its 3rd annual hamfest/swapmeet on Saturday, May 21, at the Rogers Youth Center, 315 West Olive St., Rogers, from 8 A.M. to 4 P.M. Commercial exhibitors and flea market tables/space $2. First come, first serve. General admission is free. Doors open at 6 A.M. for set up. Doors open to the public at 8 A.M. Parking, eating establishments nearby; snack bar on premises. Talk-in on 16/76 and 52 simplex. For more information, write to Mary Webb, KA5HEV, P.O. Box 338, Prairie Grove, AR 72753

California: The North Hills RC will sponsor its 11th Annual Sacramento Valley Amateur Radio Hamswap on May 1, from 9 A.M. to 3 P.M., at the Placer County Fairgrounds, Roseville. Admission is free. Table sales will range from $6 to $8, and tailgate sites will be $5. Talk-in on K6IS repeater (144.59/145.19). For further info, contact Doug Long, KB6ZR, 8810 Swallow Way, Fair Oaks, CA 95628, tel. 916-961-0728.

†ARRL Hamfest

California: The 41st Annual Fresno ARC Hamfest will be held at the Hacienda Inn, Hwy. 99 at Clinton Ave., Fresno, on May 20-22. Participation by dealers, manufacturers and other organizations with interests in Amateur Radio. For further information, write to Fresno ARC, Inc., P.O. Box 783, Fresno, CA 93712.

Colorado: The Rocky Mountain VHF Society will hold its annual swapfest on Sunday, May 22, 9 A.M. to 4 P.M., at the Colorado National Guard Armory, 4750 North Broadway, Boulder. Admission will be $2, with no additional charge for display tables. Seminars, refreshments and lots of fun. Talk-in on 16/76 and 52 simplex. For additional information, call 303-494-6291.

Colorado: Superfest V, sponsored by the Northern Colorado ARC, will be held at the McMillen Exhibition Bldg., Loveland, on June 4, from 8 A.M. to 4 P.M. Admission is $3 per family. Swap tables, tech talks, ARRL forum, commercial exhibits. On-site food service. Talk-in on 25/85. For further information, contact H. E. (Gene) Bellamy, WDØDRM, 3124 W. 6th St., Greeley, CO 80631, tel. 303-353-8795.

Connecticut: The Eastern Connecticut ARA will hold its 9th annual radio and computer flea market on Sunday, May 1, from 8 A.M. to 2 P.M., at the Elks Lodge, Putnam, just off Exit 96 of Rte. 52. Excellent access from Providence and Hartford via Rte. 44, and just a short drive from Mass. Pike. Tables are $5 in advance, $7 at the door. Electricity available. Operating rain or shine; food and beverages available. Reservations or additional information from Don Amirault, K1APE, 66 Labonte Rd., Box 310, RR 1, Thompson, CT 06277, tel. 203-923-2727. Talk-in on K1MUJ repeater, 147.225 MHz.

Georgia: The Anderson, Hartwell and Toccoa ARCs will hold the 5th annual Lake Hartwell Hamfest on May 21-22 at the Lake Hartwell Group Camp, located on Hwy. 29, 4 miles north of Hartwell. Features include free admissions, free camping, and free flea-market space. Activities include a left-footed cw contest, sports and many other activities. On-site camping; campgrounds open at 6 P.M. on Friday. Talk-in on 19/79, 93/33 and 295/895. For further information contact Ray Pettit, WB4ZLG, Rte. 1, Dooley Dr., Toccoa, GA 30577.

Idaho: Kootenai ARS proudly presents Hamfest '83, at the North Idaho Fairgrounds, Coeur d'Alene, Saturday, June 11, from 8 A.M. to 4 P.M. Free swap tables, large RV parking area; food available on the grounds. Talk-in on 38/98 and 52 simplex. For further information, contact Vladimir J. Kalina, KN7K,

South 1555 Signal Point Rd., Post Falls, ID 83854.

Illinois: A Mini-Hamfest will be sponsored by the Chicago ARC on Wednesday, May 4, from 6 P.M. to 10 P.M., at Edgebrook Golf Course Field House, 6100 N. Central Ave, Chicago. Donation of $2 entitles seller to one card table space (about 3 × 3). Bring your own table. Buyers and visitors donation $1. This hamfest replaces CARC Spring Ham Auction. For space reservations or information, call 545-3622, or write to CARC, 5631 W. Irving Pk., Chicago, IL 60634.

†**Illinois:** The Knox County ARC, Inc., will sponsor a hamfest at the Knox County Fairgrounds, Knoxville (Ext. 51, I-74), on May 15. Gates open at 7 A.M., main bldg. at 9 A.M. Advance admission is $2, at the gate $3. Outdoor flea market, indoor commercial exhibits. Food provided by County Pork Producers. Camping available. Talk-in on 81/21 and 52 simplex. For further information, contact Stuart Schrodt, 208 E. Martin, Abingdon, IL 61410, or tel. Keith Watson, Hamfest Chairman at 309-342-7177.

†**Illinois:** The Danville Area Hamfest sponsored by the Illiana Repeater System, Inc., will be held at the Georgetown Fairgrounds, Georgetown, on Sunday, May 22. Gates open at 6 A.M. Advance admission $1.50, at the gate $2. ARRL booth, inside/outside flea market space. Inside setup $5, with two tables included. Talk-in on 22/82. For further information, contact Wendell Lyons, KA9AYS, 930 East Polk St., Danville, IL 61832, tel. 217-431-2124.

†**Indiana:** The Tristate ARS (TARS) will hold their annual hamfest on Sunday, May 15, at the Vanderburgh County 4H Center, Evansville. Grounds open at 6 A.M. (CDT). Admission $2. Indoors, air-conditioned, tables available. Also outdoor flea market. Talk-in on 75/15 and 19/79. For information and table reservations, contact Hal Wilson, WB9FNN, RR 8, Box 427B, Evansville, IN 47711.

†**Indiana:** The Wabash County ARC will hold its 15th annual hamfest at the Wabash County 4H Fairgrounds, Wabash, on May 15. Doors will open at 5 A.M. and close at 3 P.M. Free overnight camping. For more info send s.a.s.e. to Dave Spangler, N9ADO, 45 Grant St., Wabash, IN 46992.

†**Indiana:** MAARC Hamfest, sponsored by the Muncie Area ARC, will be held on May 22, from 8 A.M. to 3 P.M., at the Delaware County Fairgrounds Memorial Bldg. in Muncie. Advance admission $2, at the gate $3; tables $5. Forums, computer displays, Middletown USA-QSO party, flea market. Overnight camping (lights, water, sewage $5). Talk-in on 13/73, 223.10/224.70 and 52. For tickets, table reservations and general info, send an s.a.s.e. to MAARC, P.O. Box 8111, Muncie, IN 47302, or Ron Miller, WD9EHE, 5206 W. Jackson, Muncie, IN 47304, tel. 317-288-5741.

†**Indiana:** The 37th Annual Wabash Valley AR Hamfest will be held on Sunday, June 5, at the Vigo County Fairgrounds, Terre Haute, on US 41, 1/2 mile south of I-70. Open Saturday for overnight campers ($3 fee). Doors open Sunday at 8 A.M. (EST). Free outdoor flea market; covered flea market $3 for 12 × 12 ft space. Some ac; tables available on first come basis. Food and refreshments. Computer and ARES forums. Advance tickets are $2 or 3 for $5, $3 at gate; children under 12 free. Talk-in on 25/85 and 52 simplex. For tickets and information, send an s.a.s.e. to WVARA Hamfest, P.O. Box 81, Terre Haute, IN 47808.

Kentucky: NKARC annual Ham-A-Rama will be held on Sunday June 5, at the Burlington Fairgrounds, Burlington, off I-75 Burlington Florence Exit, Hwy. I-8 West. Tickets at the gate $5; flea market space $3. Indoor vendors, flea market, nets and group meetings; food and drinks available. Talk-in on 147.86 and 375/975. Any questions, write or call Dick Johnston, WA4KUB, 3113 Brookwood Dr., Edgewood, KY 41017, tel. 606-341-8759.

Maryland: The 9th annual Easton AR hamfest is May 15, rain or shine, from 8 A.M. to 4 P.M., in the Easton Senior High School Cafetorium on Rte. 50, just south of Easton at mile marker 66. Admission donation $2, additional $4 for tables or tailgaters. Talk-in on 146.445/147.045 and 52 simplex. Write to Van Herridge, WB3HGQ, Box J, St. Michaels, MD 21663, or Easton ARS, Inc., Box 781, Easton, MD 21601.

Maryland: The Maryland FM Assn. annual hamfest will be held on Sunday, May 29, at the Howard County Fairgrounds, West Friendship (about 30 miles west of Baltimore on I-70). Hours are 8 A.M. to 4 P.M. Admission donation $3 (commercial vendors must have proper tax-license certificates available). Tailgating $3; inside tables in advance $6 each — on the day of hamfest, $10 if available. Items offered for sale must be Amateur Radio related. For table reservations or more information, write to MFMA Hamfest Committee, c/o John Elgin, WA3MNN, 5495 Harpers Farm Rd., Apt. 2, Columbia, MD 21044, tel. 301-596-3741. Talk-in on 16/76 and 52.

Massachusetts: The Hampden County RA will host an all-day flea market on Saturday, May 14, at the Springfield Lodge of Elks, Tiffany St., Springfield, from 10 A.M. to 4 P.M. Admission is $1; tables $3, with 100 tables under cover and 200 tables outside. No reservations needed. For more information, contact Gent Lam, WA1CQF, at 413-737-9426.

Michigan: Wexaukee ARA announces its 23rd annual "Swap Shop and Eyeball QSO" on Saturday, May 14, from 8 A.M. to 2:30 P.M., located in Wexford Civic Arena, north end of Cadillac on US 131. Talk-in on WA8SUE repeater 146.37/97. Camping available in the area. Transportation available for anyone wishing to fly in. For further information, please write to Wexaukee ARA, P.O. Box 163, Cadillac, MI 49601.

Michigan: The Independent Repeater Assn. of Grand Rapids will hold its annual "Hamfestival" on Saturday, June 4, from 8 A.M. until 4 P.M. (dealers set up at 6 A.M.), at the Wyoming National Guard Armory, 44th St., just east of US 131 expressway. Free table space provided to all sellers. Admission is $3.50. Talk-in on 147.165/147.765. Programs include ATV, satellites, QRP, DX, cw rx contest, computers, Technician upgrade course, MARS and shack photo contest, in addition to a 15,000-ft^2 swap area. For table reservations or general information, call John Knoper, KC8KK, 616-534-5501, or write to I.R.A., 562 92nd St., S.E., Byron Center, MI 49315. Dealers welcome.

†**Michigan:** The Chelsea Communication Club Swap 'n' Shop will be held at the Chelsea Fairgrounds, Chelsea, on June 5, from 8 A.M. to 2 P.M. Advance admission $2.50, at the door $3. Trunk sales, women's tables. Special parking for handicapped. Gates open 5 A.M. Talk-in on 147.855 Chelsea repeater and 52 simplex. For information and reservations, write to William Altenberndt, WB8HSN, 3132 Timberline, Jackson, MI 49201, tel. 517-764-5785.

Minnesota: The North Area Repeater Assn. will sponsor the state's largest swapfest and exposition for Amateur Radio operators on June 4 at the Minnesota State Fairgrounds in St. Paul. Free overnight parking of self-contained campers on June 3. Talk-in on 25/85 and 16/76. Exhibits, booths, giant outdoor flea market. Admission $4. For more information or dealer inquiries, write to Amateur Fair, P.O. Box 857, Hopkins, MN 55343, tel. 612-420-6000.

†**Missouri:** The Pittsburg Repeater Organization will hold its annual hamfest on May 15, from 10 A.M. to 5 P.M., at Lincoln Center, at Lincoln Park, Pittsburg. Covered dish dinner, flea market. Admission $1 at the door. For further information, write to Pittsburg Repeater Organization, c/o David McCracken, Rte. 4, Box 112A, Joplin, MO 64801.

†**Missouri:** The 8th annual hamfest sponsored by the Indian Foothills ARC will be held on May 15 at the Saline County Fairgrounds in Marshall. Registration at 8 A.M. Tickets are $2 each, 3 for $5 at door, or 4 for $5 in advance. Air conditoned multipurpose building. Flea markets for all. No charge for tables; reservations requested. Displays of old and new equipment, 10-X booth. Talk-in on 84/24 and 52. For information and tickets, write to Fred Fellers, WØABW, 703 N. Main, Carrollton,, MO 64633, tel. 816-542-0223, 816-542-2655 or 816-886-2837.

†**Missouri:** The 8th annual Columbia Hamfest will be held Saturday, May 21, at the Columbia Ramada Inn. Banquet night is Friday, May 20, at the Ramada Inn. Keynote speaker will be Joel P. Kleinman, N1BKE, *QST* assistant managing editor. Banquet tickets are $12 each, advance purchase only. Commercial exhibits in the Ramada's 15,000-ft^2 carpeted, air-conditioned convention center. Admission to convention center is $2.50 in advance, $3 at the door. Large, hard-surfaced parking area near convention center is provided for the tailgaters. Reserved tailgate space is $2; $1 as you enter. Forums and amateur organization meetings scheduled. Free air-conditioned bus to overflow parking areas and to shopping centers. Talk-in on 16/76. Ramada group rates for overnighters: $37 single, $45 double. For guaranteed reservations, send credit card name, number and expiration date. For information, tickets or Ramada reservations, write to COLUMBIA HAMFEST '83, P.O. Box 283, Columbia, MO 65205.

New Hampshire: The 9th annual Eastern VHF/UHF Conference will be held May 13-15 at the Sheraton Tara, Exit 1, U.S. 3, Nashua. Friday night hospitality room, technical talks by well-known vhfers, "rap sessions" for the various vhf/uhf bands, noise-figure and antenna measurements, and other activities. Registration is $13.50, from Rick Commo, K1LOG, 3 Pryor Rd., Natick, MA 01760, before May 9. Registration at the door is $20. The Saturday night banquet is $14, payable before May 9.

New Jersey: The Tri County Radio Assn. annual hamfest and flea market will be held at the Passaic Township Youth Center, Valley Rd., Sterling, on Sunday, June 5, from 9 A.M. to 4 P.M. Donation $2.50. Tables $6. Hot food and refreshments available. Talk-in on 147.855/255 and 52. For further info, write to Jack Sammarco, KC2FS, 2062 Emerson Ave., Union, NJ 07083. For table reservations, write to or call Dick Franklin, W2EUF, P.O. Box 182, Westfield, NJ 07090, tel. 201-232-5955 or 270-3193.

New Jersey: The Jersey Shore Chaverim are sponsoring the Jersey Shore Hamfest and Electronic Flea Market on June 12, from 9 A.M. to 3:30 P.M., at the Jewish Community Center, 100 Grand Ave., Deal. Admission $3 per person (children under 12 and women free). Refreshments available. Table $5 and tailgating $2.50. Spaces may be reserved by an s.a.s.e. and advance payment to "Jersey Shore Hamfest," P.O. Box 192, West Long Branch, NJ 07764, by May 15. Talk-in on 147.645/045 and 52 simplex.

New York: The Putnam Emergency Amateur Repeater League (PEARL) will have its 2nd annual indoor hamfest on Saturday, May 7, from 9 A.M. to 4 P.M., at the JFK Elementary School, Foggintown Rd. (off Farmto Market Rd., off Rte. 312), Brewster. General admission $1, exhibitors $4. For advance table registration and information, contact Frank Konecnik, WB2PTP, RD 1-244 C, Carmel, NY 10512. Talk-in on 144.535/145.135 and 52.

New York: HAMFAIR '83 will be sponsored by LIMARC, the Long Island Mobile ARC, on Sunday, May 22, at the Islip Speedway, Islip Ave., Islip, just off the Southern State Pkwy., Exit 43. Sellers' spaces $5 per space. General admission and helpers $3. Open for buying from 8 A.M. to 4 P.M. For additional information, contact Al Flappin, WA2FBQ, 3743 Windsor Dr., Bethpage, NY 11714, tel. 516-796-2965.

New York: The Ebonaire ARS will hold its 2nd annual hamfest fleamarket on Sunday, June 5, from 9 A.M. to 3 P.M., at Southern Queens Park, 119-09 Merrick Blvd., St. Albans, Queens, near the St. Albans Veterans Hospital. Entrance on Merrick Blvd. There will be covers if it rains. Talk-in on 145.35/144.75 and 52 simplex. Donation, $2 to buyers and $4 per exhibitor/per space. Free parking. For more information, please call Vince, KA2CPA, at 212-528-0416, or Art, WA2VYG, at 212-523-2319, at nights.

†**New York:** On Sunday, June 5, the Rome Radio Club, Inc., will present the 31st edition of its "Rome Ham Family Day" at Beck's Grove in Rome. Talk-in on 28/88 and 52 simplex. A variety of technical presentations, a giant flea market, games and contests will be featured throughout the day. Food and beverages availabe. The day will be climaxed with a buffet-style dinner at which our Ham of the Year Award will be presented. For further information, write to Rome Radio Club, P.O. Box 721, Rome, NY 13440.

North Carolina: The Durham FM Assn. proudly presents the Durhamfest on Saturday, May 14, at South Square Shopping Center, Durham. Flea market, dealers; tables available for rent. Admission $4. Talk-in on 825/225 and 52 simplex. For more info, write to DFMA, P.O. Box 8651, Durham, NC 27707.

†**Ohio:** Sandusky Valley ARC, Inc., and Ottawa County Radio Club combined hamfest will be held May 22 at the Sandusky County Fair Grounds (North St. entrance), Fremont. Gate opens at 8 A.M.; dealers set up at 7 A.M. Advance registration is $2.50, at the door $3. Swap and shop, flea market, trunk sales, commercial exhibit spaces indoors. Talk-in on 31/91 and 52. For further information and ticket and table reservations, contact John Dickey, W8CDR, 545 N. Jackson St., Fremont, OH 43420, tel. 419-332-8066, or D. F. "Red" Bennett, 1002 Pine St., Fremont, OH 43420, tel. 419-332-7505.

Ohio: The Athens County ARA annual hamfest will be held on Sunday, May 15, at the Athens City Recreation Center, U.S. 33 and 50, from 8 A.M. to 4 P.M. Setup begins at 7 A.M. Paved flea market and parking surface. Some indoor space available on first-come, first-served basis. Tickets $1 advance, $2 at gate. Flea market space $2 outside, $3 indoors. Talk-in on 34/94. Tickets and info: ACARA, P.O. Box 72, Athens, OH 45701, or tel. Joe, WB8DOD, at 614-797-4874.

Ontario: The annual Southern Ontario Repeater Team Amateur Radio Flea Market will be held on Sunday, May 15, at Medway High School, Medway Rd., just west of Hwy. 4, Arva. Hours are 9 A.M. to 2 P.M. Admission $2 per person. Sellers: indoor or outdoor permits $1, indoor tables $2 each. Table reservations in advance accepted now. Doors open for sellers at 8 A.M. Sellers required to purchase admission ticket. Tickets $1 each or 6/$5. For further information, write to SORT, Inc., P.O. Box 73, Hyde Park, ON N0M 1Z0, Canada or call Dave Toth, VE3GYQ, 519-473-1643.

Ontario: The Guelph ARC, VE3ZM, presents the 9th annual Central Ontario AR Fleamarket and Computerfest on Saturday, June 4, from 8 A.M. to 4 P.M., at Regal Hall, 340 Woodlawn Rd. West, Guelph. Admission is $2, children under 12 years free. Vendors additional $3. Doors open to vendors *only*

from 6 A.M. Tables, 3 × 8, available at $5 each. Commercial displays, surplus dealers, computer software and hardware, indoor and outdoor displays. For further information, contact Al Krist, VE3KVI, tel. 519-821-4337, or Henry Christiansen, VE3BYU, tel. 519-743-9022, or write to VE3ZM, P.O. Box 1305, Guelph, ON N1H 4M9, Canada.

†**Pennsylvania:** The 9th Annual Northwestern Pennsylvania Hamfest, sponsroed by the Crawford ARS, will be held on May 7 at the Crawford County Fairgrounds, Meadville. Gates open at 8 A.M. Bring your own tables; $5 per table to display inside, $2 per car space outside. Admission $3, children under 12 free. Commercial displays welcome. Talk-in on 04/64, 81/21, 63/03. Details: C.A.R.S., P.O. Box 653, Meadville, PA 16335, Attn: Hamfest Committee.

†**Pennsylvania:** The Warminster ARC announces its annual hamfest to be held on Sunday, May 15, at the Middletown Grange Fairgrounds, Penns Park Rd., Wrightstown (Phila. area). Doors open 7 A.M. until 2 P.M. Admission $3 per ham, sellers $2 additional per eight-foot space. Inside space available. Pre-registration before May 1, $2 per ham. Talk-in on 69/09 and 52 simplex. For info, contact WARC, Box 113, Warminster, PA 18974, or call Frank, AK3O, at 215-968-3133, after 6 P.M.

†**Pennsylvania:** The Reading Radio Club Hamfest will be held at the Hamburg Field House, Hamburg, on May 22, from 7 A.M. to 3 P.M. Admission is $3, women and children under 16 free. Indoor tables $7 each; tailgating free. ARRL booth. Talk-in on 31/91 and 52. For info, contact Randy Light, KA3DSX, tel. 215-374-1219, or Reading Radio Club (Hamfest Committee), P.O. Box 124, Reading, PA 19603.

Pennsylvania: The 29th annual Breeze Shooters Hamfest is Sunday, May 22, from 9 A.M. to 5 P.M., at the White Swan Amusement Park, Rte. 60 (Parkway West), near Greater Pittsburgh International Airport. Free flea market, free admission. Family amusement park. Registration is $2 or 3 for $5. Under-roof tables for vendors by advance registration. Talk-in on 28/88 or 29 MHz. For further info, please contact Don Myslewski, K3CHD, 359 McMahon Rd., North Huntingdon, PA 15642, tel. 412-863-0570.

Pennsylvania: On Saturday, June 4, the Ridley School District AR Program and Delaware County ARA (DCARA) will present "Hamfest '83." Tailgate set up at 9 A.M.; doors open at 10 A.M. Tailgate admission $3, general admission $2. Dealers, satellite communications, computers, rigs, parts and junk! Join us on the football field at Ridley Junior High School, Ridley Park. Talk-in on 147.36.

†**Tennessee:** The Radio Amateur Club of Knox County will hold its 17th annual hamfest on May 28-29 at the Kerbella Temple Auditorium, just east of U.S. 441 at the Tennessee River, behind the Vol Inn Motel. Hours: Saturday 9-5, Sunday 10-4. Admission is $2 in advance, $3 at the door. Radio and computer forums, dealers, indoor and tailgate flea markets. Talk-in on 90/30. For tickets, dealer or flea market information, contact Mark Nelson, AJ2X, 4317 Foley Dr., Knoxville, TN 37918, tel. 615-587-9656.

Tennessee: The Humboldt ARC will hold its annual hamfest at Bailey Park, Humboldt on Sunday, June 5, from 8 A.M. to 4 P.M. Admission $2. Flea market, activities for all, lunches and refreshments, RV parking. Talk-in on 37/97. For further information, contact Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

†**Virginia:** Mayfest '83, sponsored by the Roanoke Valley ARC, will be held at the Roanoke Civic Center Exhibit Hall, Roanoke, on May 29, from 9 A.M. to 4 P.M. Advance admission $3, at the door $3.50. Cw contest, activities for women and children. Motels across the street, camping 3 miles, Hotel Roanoke 3 blocks. Inside flea market $3, outside $1. Dealers welcome, $10. Local attractions: Transportation Museum, Science Museum, Mill Mountain Zoo and Blue Ridge Pkwy. Talk-in on 385/985 and 52 simplex. For further information and advance tickets, contact Bill Johnson, W4NLC, 5129 D Overland Dr., Roanoke, VA 24104, tel. 703-989-5374.

†**Virginia:** Ole Virginia Hams ARC, Inc., will sponsor their 9th annual Manassas Hamfest at the Prince William County Fairgrounds, Rte. 234, 1/2 mile south of Manassas, on Sunday, June 5. Tailgate set up at 7 A.M.; general admission at 8 A.M. Admission $4 per person, under 12 free. Cw Proficiency Awards, indoor commercial exhibitors, women's programs, 25 acres for tailgating. Talk-in on 37/97 and 52 simplex. For further information, write to Bob Kelly, KA4NES, P.O. Box 1255, Manassas, VA 22110, tel. 703-361-9468.

†**Washington:** The 1983 Ft. Vancouver Hamfair, sponsored by the Clark County ARC (W7AIA), will be held on Saturday and Sunday, May 7-8, at the Clark County Fairgrounds, 7 miles north of Vancouver, on I-5 (Exit 9). Early bird extra closes by April 30. Admission: $4.50; Saturday night dinner $5.50 adults, $2 children under 12. Unlimited swap tables for ham and electronic equipment at $5 per day per table. Seminars, dealers, swap and shop, contests. Limited hookups for RV (self-contained) at $3 per day. Make checks payable to Clark County Amateur Radio Club. For further information and registration, write to Ft. Vancouver Hamfair, Registration Chairman, 3305 "G" St., Vancouver, WA 98663, tel. 503-282-4563 (8:30 A.M. to 5 P.M.).

†**Washington:** Yakima ARC (W7AQ) presents the Central Washington State Hamfest on May 14-15. Hours Saturday are 9-5, with lunch available; Sunday hours are 8-2, with breakfast and lunch. Locations is the Hobby Bldg. at the Central Washington State Fairgrounds in Yakima. Combination registration ticket is $4 in advance, $5 at the door. Contact Dan Haughton, P.O. Box 9211, Yakima, WA 98909, for pre-registration. Talk-in on 01/61. Activities include regional dealers displays and free swap and shop with plenty of tables.

†**Wisconsin:** The Central Wisconsin Radio Amateurs, Ltd., will sponsor a hamfest at Bukolt Park, Stevens Point, on Sunday, June 5. Admission is $2, children free. Swap tables, tailgate sales and other activities. Doors open 8 A.M. until ? Talk-in on 07/67 and 22/82.

[*Note*: Sponsors of large gatherings should check with ARRL Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

[*Attention* those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

Special Events

Conducted By Mark J. Wilson,* AA2Z

Pepin, Wisconsin: Wabasha Area ARC will operate KB9S/9 from the Little House in the Big Woods from 1700 to 2300Z *May 1*. Frequencies: phone — 3.980 7.277 14.282 21.285; cw — 52 kHz up from lower band edges, and 7.125.

Fairfield, Connecticut: Greater Fairfield ARA will operate WB1CQO from 1300 to 2200Z *May 7* during the annual Dogwood Festival. Frequencies: 3.975 7.235 14.330 21.420 28.710 146.55.

Grandview, Missouri: Southside ARC will operate KAØHXU from 1500 to 2400Z *May 7* from the Truman farm home to commemorate Harry Truman's 99th birthday. Frequencies: 7.230 14.290 21.355.

Charlotte, North Carolina: Charlotte Latin School ARC will operate WD4OHD from 1200 to 1900Z *May 7* during the school's 13th annual May Day Play Day celebration. Frequencies: phone — 7.250 14.310 21.375; cw — 7.125 21.125 28.125.

Dickson, Tennessee: Volunteer ARC will operate NY4N from 1300 to 2000Z *May 7* during Old Timers Day. Frequencies: cw — up from 7.100 and 21.100; phone — 3.980 7.280 14.280 21.380 28.580 146.52.

Green Bank, West Virginia: Hams at the National Radio Astronomy Observatory will operate K8HUH on *May 7 and 8*, commemorating the 50th anniversary of Karl Jansky's discovery of electromagnetic radiation from the center of our galaxy. Operation on 21.030 21.130 and 21.360 using Jansky's original antenna. EME activities on 432 MHz are scheduled for *May 14-15*.

Chicago, Illinois: World's Fair ARC is sponsoring the My Kind of Town contest from *May 8 to 15* to mark Chicago's 150th birthday. Contact L. Cotariu, 8041 N. Hamlin St., Skokie, IL 60076, for details.

Ogden, Utah: Ogden ARC will operate W7UR from 0001Z to 2400Z *May 10* from Promontory Point to commemorate the 114th anniversary of the driving of the golden spike that connected the East and West by railroad. Frequencies: 3.970 7.270 14.280 21.370.

Hackensack, New Jersey: Meadowlands ARA will operate N2BMN from the submarine *USS Ling* from 1500 to 2100Z *May 14*. Frequencies: phone — 7.250 14.310 50.125 144.160 146.55; cw — 7.115 14.060 50.095 144.100.

Greenwich, Connecticut: Stamford ARA and the Bruce Museum will operate N1AWJ from 1500 to 2100Z *May 14* to commemorate the first transatlantic radio transmissions between the U.S. and Europe. Operation 15 kHz above lower General phone-band edges, and 21.150.

Louisville, Kentucky: Amateur Radio Transmitting Society will operate W4CN from 2200Z *May 14* to 0400Z *May 15* and 1400 to 2230Z *May 15* to commemorate the 1983 Kentucky Derby. Frequencies: phone — 3.900 7.240 14.285 28.700; cw — up from 3.700 7.100 21.115 28.100.

Lomax, Indiana: IA-ILL ARC will operate WØLAC/9 from 0000 to 2359Z *May 14 and 15* from the "New City" to mark Lomax's 101st birthday. Frequencies: phone — 25 kHz up from General band edges; cw — 25 kHz up from Novice band edges.

Iron County, Missouri: WØTT and friends will operate from 0001Z *May 14* to 2359Z *May 15* from atop Taum Sauk Mountain, Missouri's highest point. Operation in the General class portions of 40, 20 and 15 meters, as well as ssb and fm operation on 144-148 and 220 MHz.

Taunton, Massachusetts: Pilgrim Amateur Wireless Assn. will operate N1AIS from 1300 to 2000Z *May 15* from the Annual Covered Wagon Derby sponsored by the Boy Scouts of America. Frequencies: 14.290 21.360 28.990.

Indiana, Pennsylvania: Indiana Co. ARC will operate *May 16 to 21* during actor Jimmy Stewart's birthday celebrations. Operation on all hf General and Novice bands.

Seattle, Washington: A group of amateurs affiliated with King County Search and Rescue Assn. will operate N7CJV from a ridge north of Mt. St. Helens as a commemorative for KA7AMF and W6TQF who lost their lives during the May 18, 1980 eruption (see July and Aug. 1980 *QST*). Operation from 0001 through 2400Z *May 18*. Frequencies: cw — 3.550 14.050 21.050 21.125; phone — 3.925 14.285 21.385; SSTV — 3.845 14.230 21.340; vhf — 144.220 146.55 146.58 and local RTTY repeaters.

Maple Lake, Minnesota: HANDI-HAM System will operate WØEQO from Camp Courage during the 14th Annual Spring Convocation. Operating schedule: *May 20* — 0100 to 0300Z on 40 and 80 meters; *May 21* — 1330 to 1400Z on 80; 1400 to 1700Z and 1800 to 2300Z on 20 and 15; *May 22* — 0000 to 0300Z on 80 and 40.

Memphis, Tennessee: Memphis Radio Relay Club will operate 1700 to 2200Z *May 20* and 1900 to 2300Z *May 21* during the Memphis in May International Festivals. Operation around 7.280 14.280 21.380 28.680.

Corvallis, Oregon: Oregon State University ARC will operate K7UYX during the Benton District Boy Scout Camporee from 0000Z *May 21* until 2000Z *May 22*. Frequencies: phone — 3.940 7.240 14.290 21.360 28.990; cw — 3.590 7.030 14.070 21.140 29.190.

Nantucket Island, Massachusetts: Algonquin ARC will operate W1BK from Nantucket Co. on *May 21 to 22*. Operation 60 kHz up from lower cw band edges and 60 kHz up from lower General phone-band edges.

Clark County, Washington: Clark Co. ARA will

*Assistant Communications Manager, ARRL

operate W7AIA from 0001Z *May 21* to 2359Z *May 22* to mark the third anniversary of the eruption that took KA7AMF's life. Frequencies: phone — 3.895 7.230 14.280 21.360 28.505; cw — 3.705 7.105 21.105 28.105.

Philadelphia, Pennsylvania: Olympia ARC will operate from the *USS Olympia*, Admiral Dewey's flagship, from 1300Z *May 21* until 2000Z *May 22*. Frequencies: cw — 3.590 7.050 14.050 21.090 28.150; phone — 3.890 7.235 14.285 21.360 28.600.

Dubuque, Iowa: Great River ARC members will be active from 1600 to 2400Z *May 21 and 22* from the Five Flags Civic Center during Dubuque's 150th anniversary celebrations. Operation about 25 kHz up from lower General class hf phone-band edges.

Washington, DC: Pentagon ARC will operate K4AF from the Pentagon for Armed Forces Day from 1700 to 2300Z *May 21*. Operation mainly in lower part of General class 40- and 15-meter phone bands.

Little Rock, Arkansas: Metropolitan ARC will operate KA5KNO from the annual Riverfest from 1800 to 2400Z *May 27 to 29*. Operation in General class hf phone bands and Novice bands.

Bishop, California: Bishop ARC will operate KF6JS from the "Mule Capitol of the World" during the annual Bishop Mule Days celebration *May 28*. Frequencies: 3.905 7.240 14.295 146.34/.94.

Arlington Heights, Illinois: Northwest ARC will operate W9LM from 1700Z *May 28* until 1700Z *May 29* to commemorate their 50 years in Amateur Radio. Frequencies: phone — 10 kHz up from lower 40, 20, 15 and 10-meter General class phone-band edges and 146.52; cw — 25 kHz from lower Novice band edges.

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 June 15 to make the August issue. QST

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

MAY

1

CW QRP Party, sponsored by the DL Activity Group CW, from 1300Z to 1900Z May 1. Cw only, 80 and 40 meters. Categories: A — max. 5-W input/2.5-W output; B — max. 25-W input/12.5-W output. Work stations once per band. Exchange signal report, serial number and category. Count one point for QSOs in your own country, two points for DX. QSOs with category A stations count double points. DXCC countries count as multipliers. Score each band separately, then add band totals for final score. Mail logs by May 31 (include s.a.e. and IRC for results) to Werner Hennig, DF5DD, Mastholter Strasse 16, D-4780 Lippstadt, West Germany.

4

West Coast Qualifying Run, 10-35 wpm, at 0400Z May 5 (9 P.M. PDT May 4). 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 include your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7-8

CQ-M Contest, April *QST*, page 86. There is some confusion about the CQ-M dates. The official rules say "the 2nd full weekend in May every year" (May 14-15 for 1983), but USSR amateurs questioned on the air say the contest will run on May 7-8 this year.

County Hunters SSB Contest, April *QST*, page 86.

World Telecommunications Day Contest, phone (no rules received).

Corona 10M RTTY Contest, sponsored by the Deutscher ARC, from 1100Z to 1700Z May 8. 28 MHz only. Classes: A-single or multioperator; B-SWL printer. Exchange signal report, serial number and name (U.S. stations also send state). Count one point per QSO. Multiply by total WAE and DXCC countries, U.S. states and VE/VO/VK call areas worked. Mail logs within 30 days to Klaus Zielski, DF7FB, P.O. Box 1147, D-6455 Erlensee, Fed. Rep. of Germany.

Seville World Wide Contest, sponsored by the Seville RC (Spain), from 2000Z May 7 until 2000Z May 8. 160 to 10 meters, phone and cw. Single operator, all band only. Work stations once per band, regardless of mode. Exchange signal report and serial number. Count two points for QSOs within your own country, three points per DX QSO. Multiply by the sum of DXCC countries worked per band. Entries must be postmarked by June 15. Mail to Radio Club Sevilla, P.O. Box 555, Sevilla, Spain.

Spring QRP SSB Activity Weekend, sponsored by the G-QRP Club. Times (UTC)/frequencies: 0900-1000/14.285; 1000-1100/21.285 and 28.885; 1100-1200/7.090; 1200-1300/3.690; 1300-1400/14.285; 1400-1500/3.690; 1500-1730/21.285 and 28.885; 1730-2000/14.285; 2000-2100/7.090; 2100-2200/3.690; 2200-2300/14.285. Contact Christopher Page, G4BUE, Alamosa, The Paddocks, Upper Beeding, Steyning, West Sussex BN4 3JW, England, for further details.

9

W1AW Qualifying Run, 10-35 wpm, at 0200Z May 10 (10 P.M. EDT May 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See May 4 listing for more details.

14-15

World Telecommunications Day Contest, cw (no rules received).

Georgia QSO Party, sponsored by the Atlanta RC, from 1600Z May 14 until 2400Z May 15. Categories: single op; multiop, single transmitter; GA mobile/portable outside home county. Work stations once per band and mode. No repeater QSOs. GA-to-GA QSOs allowed. Exchange signal report and QTH (county for GA stations; state, province or country for others). Suggested frequencies: phone — 3.900 3.975 7.245 14.290 21.360 28.600; cw — 1.805 and 60 kHz up from lower band edges; Novice — 3.718 7.125 21.110 28.110. Try 160 at 0300Z; try 10 on the hour and 15 on the half hour from 1300 to 2300Z. GA stations multiply total QSOs by sum of states, VE provinces and continents worked. Others multiply GA QSOs by number of different GA counties worked (max. 159). Awards. Mail logs by June 15 to Atlanta RC, Dave Thompson, K4JRB, 4166 Mill Stone Ct., Norcross, GA 30092.

21-22

Armed Forces Day, April *QST*, page 86.

Michigan QSO Party, sponsored by the Oak Park ARC, from 1800Z May 21 until 0300Z May 22 and 1100Z May 22 until 0200Z May 23. Work stations once per band and mode. MI-to-MI QSOs allowed. Work portables/mobiles again as they change county. No repeater QSOs. Exchange signal report, serial number and QTH (county for MI stations, state or country for others). Suggested frequencies: cw — 1.810 3.540 3.725 7.035 7.125 14.035 21.035 21.125 28.035 28.125; phone — 3.905 7.280 14.280 21.380 28.580 50.125 145.025 146.52. Count one point per phone QSO and two points per cw QSO. MI stations multiply by sum of states, countries and MI counties worked (max. 85). Others multiply by number of MI counties worked (max. 83). QSOs with club station W8MB count five points. VHF-only entrants may add multipliers from each band for total multiplier. Mail logs by June 30 (include large s.a.s.e. for results) to Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

26

W1AW Qualifying Run, 10-35 wpm, at 2000Z (4 P.M. EDT) May 26. See May 9 listing for more details.

28-29

CQ World Wide Prefix Contest, cw. See March *QST*, page 88, for details.

Indy 500 Sprint Contest, sponsored by the Indiana Radio Club Council, from 2100Z May 28 until 0520Z May 29. Two off-times at least 15 minutes each must be taken during the contest period. Use any or all bands/modes. Work stations once per mode per band. No repeater QSOs. Exchange signal report, state and your guess as to the winner of the race. Suggested frequencies: phone — 3.910 7.290 14.290 21.390 28.590 147.51; cw — 3.740 7.140 14.090 21.140 28.140. Count one point for each QSO with a station outside Indiana, two points for each QSO with a station in Indiana and five points for each QSO with a station on the Indianapolis Motor Speedway grounds. Mail entries to Ray Weghorst, W9OBF, 3030 Marquette Ct., Indianapolis, IN 46268.

31

West Coast Qualifying Run, 10-35 wpm, at 0400Z June 1 (9 P.M. PDT May 31). See May 4 listing for more details.

JUNE

4-5

New York QSO Party, sponsored by SUNY-Buffalo ARS, from 1600Z June 4 until 0400Z June 5. Work stations once per band and mode. Suggested frequencies: phone — 3.980 7.280 14.330 21.380 28.580; cw — 60 kHz up from lower band edges. Count five points per QSO. NY stations multiply by total states, provinces and countries worked. Others multiply by total NY counties worked. Exchange signal report and QTH (county for NY stations; state, province or country for others). Mail logs by July 1 to Scott Bauer, WA2LCC, 816 East Fillmore Ave., East Aurora, NY 14052.

7

W1AW Qualifying Run, 10-40 wpm, at 0200Z June 8 (10 P.M. EDT June 7). See May 9 listing for more details.

11-12

ARRL June VHF QSO Party, this issue, page 87.

World Communications Year RTTY Contest, sponsored by the Australian National AR Teleprinter Society, from 0000Z to 0800Z and 1600Z to 2400Z June 11, and 0800Z to 1600Z June 12. 3.5 to 30 MHz. Classes: A-single op; B-multiop; C-SWL. Exchange signal report, *CQ* zone and UTC time. Determine QSO points from CARTG zone chart. Multiply QSO points by number of countries worked, and then multiply that total by the number of continents worked. Add 100 bonus points for each VK/ZL worked on 14 MHz, 200 on 21 MHz and 300 on 28 MHz. Work stations once per band. Countries defined as DXCC countries, plus VK, ZL, JA, VE, VO and W/K call areas. Logs must be received by Aug. 19 by W. J. Storer, VK2EG, 55 Prince Charles Rd., Frenchs Forest, 2086 N.S.W., Australia.

World Wide South America Contest, sponsored by *Electronica Popular Magazine*, from 1500Z June 11 until 1500Z June 12. 80 through 10 meters, cw only. Single operator, single band or multiband and multioperator, single transmitter classes. No cross-band QSOs. Exchange signal report and serial number. Work stations once per band. Count two points for QSOs with South American stations and multiply by total South American prefixes worked per band. Mail logs by July 31 to WWSA Manager, P.O. Box 18003, 20772 Rio de Janeiro, RJ, Brazil.

18-19

All Asian DX Contest, phone.

Summer SMIRK Party

9-Land CW Contest

21

W1AW Qualifying Run

25-26

ARRL Field Day, this issue, page 86. QST

*Assistant Communications Manager, ARRL

Public Service

Conducted By Robert J. Halprin,* K1XA

A Perfect Sports Festival

Early in the morning hours on July 22, 1982, Amateur Radio operators listening to 2 meters in the Indianapolis area heard the soon-to-become-familiar call, "This is WA9MVP, net control station for the National Sports Festival Net." This marked the beginning of the nine-day National Sports Festival, an activity of the U.S. Olympic Committee, conducted in Indianapolis, Indiana. By the time the National Sports Festival ended and the final Gold Medal was presented on July 31, more than 1200 hours were expended by the local Amateur Radio operators in providing emergency and backup communications for the activity. The effort involved 110 individual amateurs, including the operation of a special events station that worked over 600 stations during the event.

"In my judgment, it was a perfect National Sports Festival," F. Don Miller, the executive director of the U.S. Olympic Committee, stated in a news conference. "This just shows what can happen when the private and public sectors work hand in hand for the benefit of amateur sports." Over 250,000 individuals attended various events during the festival, which drew more than 2,000 of America's aspiring and established world-class athletes. One visiting ham who stayed following the Sports Festival summed up the attitude of hams and other citizens of the area: "I have never been in a city where so many informed hams were so helpful in finding points of interest. Indianapolis is a great place."

Planning for this extensive Amateur Radio support began in March 1981 when Mike Haase, chairman of the Operations Committee, made contact with John Patton, WB9WPV, through a member of the Naval Avionics Amateur Radio Club. John was told that the U.S. Olympic Committee insists on the use of amateurs for emergency communications, based on many previous experiences. John Patton was later joined by Damon Duree, W9PEV, Richard Andrews, K9SVB, and George Ransford, W9VMT, who became the Amateur Radio planning group. The festival committee finalized its plans in May of 1982.

The first job of the Amateur Radio group was to obtain volunteers. They decided to contact all the clubs in the surrounding counties. A meeting was held in which Jay Peacock, the Festival Communications Committee Chairman, and Tom Smith, the Amateur Radio coordinator, explained the concept of operations to the Amateur Radio community. The sports events would be conducted at 19 separate sites, covering three counties. There would be 33 separate types of events. There would be a command center in the Natatorium on the campus of the Indiana University/Purdue University at Indianapolis. Amateurs would be required to be at each site during an event. The station for the amateur operator would be with the event controller. In addition, any time any site was in operation the command center would have an operator. Each operator would be assigned a messenger to run errands.

WB9WPV made sure that the torch-lighting ceremony at the National Sports Festival happened on schedule. *(photo courtesy WB9ZQE)*

While the major effort to obtain volunteers was being conducted through the clubs, the Amateur Radio planning group went to every 2-meter net in the area and announced the activity. The activity was discussed every day on all the local repeaters. It was discussed on the Indiana Section Traffic Nets and elsewhere in the ARRL National Traffic System. Every effort was made to pass the information to all amateurs who might be interested.

On July 15, more than 100 amateurs attended the final planning session, where precise schedules for each individual were handed out. Each amateur received a distinctive T-shirt and green cap. These were to be worn at each event to ensure that the amateurs could be recognized.

A technical team including Mike Sercer, WA9FDO, Richard Andrews, K9SVB, and Mark Calvin, N9AMN, tested each of the 19 sites to ensure that the repeaters being used during the event could be reached. The team installed the control station consisting of two transceivers mounted under the roof of the Natatorium and fed remotely from the command center three floors below. Dennis Carmichael, WA9DFE, installed a separate antenna at one location, and hand-held equipment could not reach the repeaters.

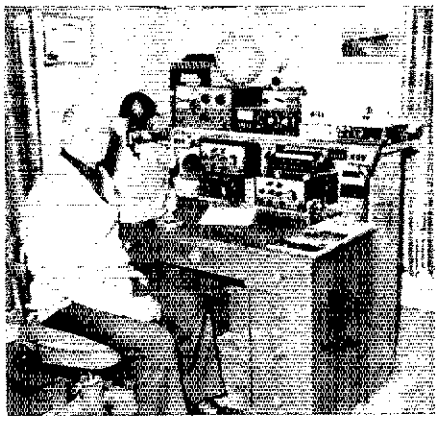
On Thursday, July 22, the first event was covered. The operation from the command center and the single event was successful. On Friday evening, 16 amateurs provided communications support for the opening ceremonies. There were 11 control points, a central point with the police communications center, and one with the major switchboard and public address system. Wes Murphy, N9AJM, had the best assignment of this activity — atop the Scottish Rite Cathedral tower overlooking the entire ceremony area. His assignment was to coordinate the involvement of the carillon. During the torch-lighting ceremony, the Amateur Radio operators reported that the torch being carried by the runner was not lit. This was reported by radio to the event director by WB9WPV, and the torch was lit on schedule.

On Saturday morning, amateurs provided observation coverage for emergencies during the "race-walk." This operation alone involved eight amateurs for six hours. A similar coverage was provided for the marathon. The coverage provided for the marathon received direct praise from the U.S. Olympic Committee officials as the best Amateur Radio coverage of a marathon they had witnessed. In February, a similar service had been provided to the Indianapolis Runners Group. The lessons learned in February helped to make the operations during the Sports Festival even better. The National Sports Festival committee had observed the coverage in February. It is felt this helped to convince them that amateurs were needed in all the events for emergency communications, and helped to establish the degree of respect they showed for the amateur community during the Festival.

On Sunday, the individual events picked up in earnest. One of the major repeaters being used, 146.16/76 developed an intermod problem and was moved from its far east-side location to a downtown location, much closer to the site of the National Sports Festival. The move did not hurt the operation; in fact it actually helped the coverage. This move was accomplished by Paul Bohrer, W9DUU, John Patton, WB9WPV, and Jim Baughn, K9EOH. The other repeater used, 146.10/70, had just been moved to a new location by Damon Duree, W9PEV, Bruce McClain, WB9PGW and Dale Smiley, WB9SFF, the week before. These members of the two technical teams can take pride in the fact that never before had two major repeaters been moved before such a large event and continued to give excellent service.

Tuesday, the 17th, started out different than the previous days. The National Sports Festival net control received a report of gas leaking from an overturned truck. A call to the fire department sent a fire truck to the location, at an intersection of two of the major expressways. About an hour later, Robert Droker, W9MOY, operating from one of the events, reported interference by a helicopter. This report was being made by the event coordinator. The report was fed to the appropriate authorities in the command center, and the

*Deputy Communications Manager, ARRL



One of the League's dedicated volunteers is Art, W1KK, who holds a host of ARRL field organization appointments in the Western Massachusetts Section.

helicopter left the area. Reports were then received that rain was coming down in the lake area where the water sports were being conducted. The local ATV repeater was brought into action to rebroadcast the weather radar. It was very helpful to follow the weather picture through the area.

At 11:27 A.M. Ray Braun, WB9YVL, contacted net control with a priority report: "Man down, electrical shock, Eagle Creek Venue." The site manager, Marty Risch, was the man down. Immediately afterward, it was reported that Roxanne Barton, who had just won the women's 500-meter kayak event, suffered from shock when struck by Risch. The electrical shock was caused when a cable that Risch was pulling into the tent shorted during the rain. Immediately after receiving the priority message, the note was taken to the medical section in the command center for dispatch of medical assistance, including an ambulance. Shortly thereafter, a third person at this location was reported in need of medical assistance. She had chilled and suffered hypothermia, officials said. At 12:24, WB9YVL reported all three patients had left in one ambulance for St. Vincent's Hospital.

During this activity, the Amateur Radio communications system was used to obtain a new public address system for the area at the lake, to move the location of the tennis matches and the softball games, and to report to the State Police two vehicle accidents on major interstates. At 7:21 P.M. George Hayden, K9VHE, reported a woman down at another event. This was passed to the medical control point, and an ambulance was on the scene by 7:28 P.M. Finally, at 9:50 P.M., a station reported a fire hydrant leaking; this report was relayed to the city police. Everyone was glad when this day was over. The amateur community had performed in an excellent manner, handling each communication in a speedy and calm fashion. Again the training and experience from similar operations in the past paid off. Many of these operators were ARES and RACES operators.

The week finished with no additonal emergency actions. The cooperation of all amateurs was more than outstanding. Not a single individual failed to show up without letting the net control know hours ahead of time. Each time someone said he could not make it, several backup volunteers were on the air immediately to take the assignment.

During the July 23-31 period, the IU-PUI campus Amateur Radio Station, W9PU, was operated by volunteers as a special-event station. A QSL card was designed with the National Sports Festival symbol and dates to commemorate the event. This operation was coordinated by Jeff McPike, N9CQS, and Bruce Woodward, W9UMH, the Indiana ARRL Section Manager. More than 600 stations were worked on four bands, as well as on a 2-meter simplex frequency.

This was a very successful operation for the Amateur Radio Service. It proved that amateurs from many clubs and groups could work together to accomplish a goal, and do it well. It won the admiration and respect of the community we serve and live in. — *Cornelius M. Head, WB9ZQE, SEC Indiana*

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Contra Costa County, California — December 31-January 1. During the closing hours of 1982 and the beginning hours of 1983, 15 Amateur Radio operators provided communications for a "Your Place or Ours" service. The plan, conceived by KA6BSN of the Sheriff's Posse and coodinated by KA6BSN, WA6HAM and the sheriff, was designed to give a ride home to people who had "over-celebrated" the holiday and could not drive safely. Eight vehicles were used, each with both a driver and an Amateur Radio operator to receive new pickup assignments from the dispatcher, WA6AEO, located in the sheriff's office. More than 100 people were driven home during the night. (Donald Simon, NI6A, STM East Bay)

COMMUNICATIONS SERVICE OF THE MONTH

When the Creeks Became Rivers

☐ During the latter part of January 1983, the San Francisco Bay Area was drenched with continuing rainstorms that completely saturated the ground. On the 25th and 26th, downpours created heavy runoff, making normal creeks into deep and wide rivers. Flooding of roads and homes occurred throughout the entire area. Amateurs were called upon to monitor water levels at vital points.

The flooding situation became acute on January 26. The City of Palo Alto asked the Southern Peninsula Emergency Communication System (SPECS) to set up a command post at the city emergency operation center (EOC), and to have amateur operators regularly report conditions at assigned locations. Simultaneously, the Palo Alto Red Cross Chapter established a shelter at Jordan Middle School for evacuees from the low-lying areas. Five amateurs assisted in this operation. After midnight the storm subsided, and when the water levels went down the evacuees returned to their homes. Operations at the shelter and the EOC were secured at 2 A.M.

Thirty-five amateurs were involved in monitoring creek levels, and in operating the shelter and the EOC. The area covered included Mountain View, Los Altos, Los Altos Hills and Palo Alto. Contact was maintained with the Sunnyvale EOC, the San Mateo Red Cross, the San Francisco Red Cross and the Santa Clara County OES.

Ninety-eight percent of the operators in this event were members of SPECS. The SPECS repeater, W6ASH/R, on 144.67/145.27 MHz, was used for mobilization, control and liaison with county OES. The San Mateo County Red Cross was given permission to move their evacuees to our shelter, but fortunately they had no need to do so. The city government was impressed and grateful for our assistance, and commended us on our professional operation. — *Walter Read, W6ASH, DEC-at-Large, Santa Clara Valley*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For February, 45 SEC reports were received, denoting a total ARES membership of 24,190. Sections reporting were: AL, AK, AB, AZ, CO, CT, DE, ENY, IL, IN, IA, KS, KY, LA, ME, MI, MN, MS, NE, NH, NLI, NC, NFL, NTX, OH, OK, ON, PAC, RI, SDG, SJV, SCV, SC, SD, SFL, STX, TN, VA, WA, WMA, WNY, WPA, WIN, WV and WI.

NATIONAL TRAFFIC SYSTEM

The cycle one for RN5 has been implemented, effective January 1. So far, WB5YDD reports that all seems well. Congratulations go out to KZ8Q, who was appointed an assistant manager of 8RN/c2.

February Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	28	1749	62.5	1.212	97.6	
CAN	28	1029	36.7	.699	100.0	
PAN*	56	923	16.5	.775	99.4	
Region Nets						
1RN	56	811	14.5	.568	96.4	100.0
2RN	56	924	16.5	.645	94.0	100.0
3RN	28	491	17.5	.669	94.0	96.4
4RN	56	986	17.6	.528	66.1	100.0
RN5	56	873	15.6	.480	98.2	100.0
RN6	56	608	10.9	.443	92.0	100.0
RN7	84	531	6.3	.353	76.5	100.0
8RN	56	399	7.1	.347	94.6	100.0
9RN						100.0
TEN	28	644	23.0	.593	93.3	100.0
ECN						89.3
TWN	56	272	4.9	.328	64.3	98.2
TCC						
TCC Eastern	99[1]	774				
TCC Central	73[1]	410				
TCC Pacific	101[1]	516				
Cycle Four						
Area Nets						
EAN	28	2287	81.7	1.771	95.2	
CAN	28	1021	36.5	1.136	100.0	
PAN	28	1299	46.4	1.323	99.4	
Region Nets						
1RN						96.4
2RN	86	1222	14.2	.780	95.7	82.1
3RN						100.0
4RN						100.0
RN5						100.0
RN6	56	819	14.1	.620	100.0	100.0
RN7	56	589	10.5	.899	95.2	100.0
8RN	52	516	9.9	.529	89.0	92.9
9RN						100.0
TEN	56	369	6.6	.411	81.0	100.0
ECN	56	316	5.6	.470	89.9	100.0
TWN	53	434	8.2	.419	94.8	98.2
TCC						
TCC Eastern	124[1]	983				
TCC Central	53[1]	365				
TCC Pacific	107[1]	917				
Sections[2]	7579	39,739	5.2			
Summary	8724	62,816	7.2			
Record	7378	58,689	24.3			

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (276): APSN ATN (AB), AENB AEND AENH AENJ AENK AENR AENV AENX AENY AENZ ATNM CATNM ECAARESN MCEN (AL), AGN ATEN HARC (AZ), BCEN (BC), NCN NCTN SCN/1 SCN/V (CA), HNN (CO), CN CPN NVTN RSN WCN (CT), DEPN DTN KCARC SEN (DE), DEN FAST FMSN FMTN FPON FPTN GN LCEN MCEN NFPN PBTN PEN PRVAN QFN QFNS SPARC SWFTN TPTN (FL), CGVHFN GCN GSN GSSBN GTN (GA), CIARES GLAREC IAPMN ISBN ITEN PCARES TLCN (IA), ILN ITN (IL), ICN ITN QIN (IN), CSTN KMWN KPN KSBN KWN QKS QKS-SS (KS), 4ARES 11ARES BARES CARN KEN KNTN KRN KSN KTN KYN KYPON MKPN PAEWTN PAWN SEKEN TSTMN WTEN (KY), MEPN MMN MTN WRIN (MB), CI2MN EM2MN EMRI EMIRPN EMRISS HHTN NEEPN (MA/RI), MDD (MD/DE), AEN CMEN MPSN OXRACES PTN SGN SPSN MACS MITN MNN QMN UPN (MI), MNWX MSN MSPN MSSN PICO (MN), ACE CMEN HN MEOW MON MOSSN MTTN NEMOE (MO), APN (MR/NF), MTN (MS), CFARS CMN JFKN M2MEN RARS THEN (NC), CN CSN (NC/SC), BVARESN CCN EN2MARES EN2MN MNARES NCHN NCW NE40 NE75 NE160 NMPN NSN PVTN SARES WNN (NE), GSFM GSPN MCEN NHN JSARS MCN NJM NJN NJPN NJSN OBTTN SJVN SOCTN TCETN (NJ), NSN (NV), BAVTN CDRN CNYTN EPN HVN NLI NLIPN NYPON NYS NYS/S OGTEN SCVHFTN SDN STAR WDN (NY), BN BRETN BSSN COARES HCARES LCNWOARES MCTN O6MN OSN OSSBN OSSN (OH), NON NWOSN OFON OLZ OTWN STN (OK), KYN OLN IPN OSN OSN2 OSND (ON), BSN ORARES OSN PTTN SOARES SOFM WCN (OR), CCAREC D3ARES D5ESN D6ARES NWPA2MTN PFN PTTN WARCVTN WPA WPA2MTN WPAPTN (PA), PTN (PAC), WQVUARES (PQ), BR2MN GPD2MN LC2MN SCNTN SCSSBN YC2MN (SC), SDCWN SDEMGN SDTN SDWXN (SD), TNCW TNPN TNVN TSRN (TN), BAREN TEX TSN TTN (TX), BUN DCEN UCN (UT), STARES SVEN VLN VN VSBN VSN VTN WARC (VA), VTN (VT), EWTN NTN NWSSBN PSTS SCARES WARTS WSN (WA), BEN BWN NWTN WCWTN WIN WNN WSBN WSSN (WI), WVARN WVFN WVMDN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	106	93.4	1532	774
TCC Central	84	86.9	820	410
TCC Pacific	112	90.2	1032	516
Summary	302	90.2	3384	1700
Cycle Four				
TCC Eastern	131	94.7	1897	983
TCC Central	56	94.6	699	365
TCC Pacific	112	95.5	1824	917
Summary	299	94.3	4420	2265

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (February) *Cycle Two* — Eastern Area (N2CER, Director) — AA4AT N3ADU N1BHH N2CER K1EIC WA2FJJ VE3GOL WB3GZU KO2H WA2HEB WB1HIH VE3HTL WA4LJI WD8LRT AH2M W8PMJ WB4PNY W1QYY W2RQ KB3UD AF8V AK1W N2XJ W1XX WB8YDZ. Central Area (W9JUJ, Director) — N5AMH N5AMK K5BNH N5BT N5CRU W5CTZ N5DFO WØFRC W4JL W9JUJ K5KJN W5KLV KD5KQ KA4MZY W9NXG KA4SAA KB5TC WB9WGD WF4X WB5YDD. Pacific Area (WØHXB, Director) — KT6A NØACW N7AFZ VE6CHK N7CSP KU6D W7DZX KD7EY W7GHT N6GIW K6HAP WØHXB KM6I W5JOV KBØMB WBØMTA K6OWA WA7OYI ND5T WB7TQF KV5U K6UYK WB7WOW WA7WQE KM7Z. *Cycle Four* — Eastern Area (W2CS, Director) — W1AF W3ATO VE3AWE W3BBN KI3C WA4CCK W2CS VE3CYR WB2EAG W1EFW K1EIR W2FR WD4FTK W2GKZ VE3GOL WB3GZU KO2H N4KB K2KIR K8KQJ AH2M WB8MTD N1NH K8OZ W8PMJ WB4PNY W3PQ W1QYY K3RZR WA2SPL W4UQ VE1WF WB8WKQ KS6X W2XD N8XX N2YL K4ZK. Central Area (W5GHP, Director) — WØAM W9CXY KØEZ K5GM WØHI W5LQ W5RB N5TC W5TFB K5TL WB9UYU KB5W KB9X W4ZJY. Pacific Area (KØDJ, Director) — ADØA WDØAIT W7AK KN7B KØBN KCØD KØDJ W7DZX W6EOT W7EP W7GHT WA7GYQ WØHXB K7KSA W7LCF W7LYA WB7NHR KAØNLI WØOGH WA7TEH W7VSE W6VZT VE6ZK.

Public Service Honor Roll February 1983

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

226
K7VW
200
WB7OGA
W2AHV
186
K5CXP
182
N1BGW
165
KA1GBS
147
WA3EHD
KB3FW
K3CR
145
W1EOF
144
KC9CJ
143
WD8LRT
141
N2AKZ
KM9B
140
KB2HM
KBØMB
139
W2TZO
137
WB2EAG
136
KA8CPS
KA1T
K4SCL
135
WB7WOW
134
WF4X
132
KR4V
129
KA4AMC
128
KCØOO
127
WB3GZU
WA1TBY
125
WB1GXZ
WB2OWO
124
N2CER
123
KUØG
122
WB2IDS
121
K2GXT
120
W9TLU
KA3DLY
119
WB2MCO
118
WA4QXT
W9YCV
W5DTR
K2ZVI
117
W2YJR
116
AG2R
115
WA4PFK
114
WD4ALY
WØZWL
KB3XO
KA5KRI
113
WA4JDH
112
W9DM
N2XJ
KC2QQ
K2VX
111
WB2ZJF
W2MTA
K8OZ
AF8V
110
N4FQD
KA5CXW
109
W1IDK
WØOYH
108
W9JUJ
NBDSW
KV5X
KC5NN
107
WØKJZ
106
WD4CNQ
WB4WYG
WB1HIH
W4ANK
KA1BHT
N7DNG
KI1M
KF8J
105
KA1BBU
K4JST
104
WB8WKQ
WA7GQO
WA2HEB
KS7I
KA4SAA
103
VE3HTL
NG4J
KAØJOG
102
WB5YDD
WB2ZCM
NI6A
AA4AT
101
WB2PKG
W4CKS
N8DSU
KZ8Q
KA4GFU
K7GXZ
100
WD4AWN
WA5RVT
WA2SDY
N9DIH
99
W6VOM
W2ZOJ
N6AWH
KA5HDT
K1JHC
AK1W
98
N1NH
97
W2AET
96
WA3WIY
KB3UD
95
WB7TQF
WB2TWQ
WA3DUM
94
WD8MIO
WAØTPC
KB4OG
KA1DB
K4VWK
AG9G
93
WB8MTD
VE3FGU
KA9HPQ
KA1EPO
92
WA4EIC
W7VSE
W6RNL
W4GPL
W2BIW
W1RWG
N5TC
N1BJW
AC3N
91
WA7LGN
W5CTZ
N8DTZ
N1ARI
KE6NO
KA3GJT
90
WD8RHU
WB3KUZ
WB2RBA
WA4CCK
W6NTN
N4PL
KA4GUS
KA3EJG
89
VE3GT
VE3DPO
KA8GJV
KAØARP
88
WB4WII
WA1YNZ
K6UYK
87
NP4D
KY4U
86
WB2GHN
WA2ARC
VE3WM
KB4OZ
KA2BHR
K8KQJ
AA2H
85
WA4LXP
WA2FJJ
N2BLX
N1AJJ
KB5UL
84
WB5LAT
WB1ABQ
WA8GMT
NØBDG
KX2L
KT6D
KT6A
KA9IKR
KA4MTX
83
W2XD
KA4AUR
K4IWW
82
WA4YPQ
W6JTA
81
WD4OCW
WD4HBP
80
KY2P
79
WDØAIT
WB2QMP
WØFRC
KD5FR
78
WA1DXT
KK1E
KA2GSX
K4ZN
77
WA2KOJ
W5KMF
N6GIW
KD9K
KC2SW
76
W5JOV
KS2G
KL7IJG
W9NXG
KG9B
75
WA4STO
W4LXB
VE3GOL
KD4PJ
KC3DW
74
WD8KBW
WB2OHR
WA3WQP
W5KLV
NT4S
KF4HA
KA4IUM
KA2NMA
K8JDI
K3JL
73
WB7OEX
WB4TZR
W3VA
K7LCA
KØSI
72
WB5MMI
N8AUH
KE1U
KA1AVU
71
WB4AID
VE3BDM
N9ATP
KA5AZK
AC5R
70
W6INH
NN4I
KU2N
NØCFS
KA7ELI
K6AGD
AK2E
69
WD9FRI
WA6QCA
WA4EYU
KN3B
KB4PW
68
WB8SYA
WB2VUK
W4SME
VE2EDO
67
WB5LBR
N5DKW
KA4BCM
66
WB3FKP
K9CMO
W9JIJ
NØEEH
VE3KK
KA8MEB
KA2FXB
K6YD
AI6E
65
WB6QBZ
WA8DHB
WA5QFD
W4HON
W1TN
N5AMH
K2ZM
64
WB4NTW
WA3UNX
W8EK
W6IPL
KT5Y
KI1I
KA2MBP
W1YOL
K4WJR
63
WB3DUG
N2DPN
KAØBWM
62
WØOUD
N4UF
WØMZI
KA3DTE
KA2GCZ
KAØBCB
61
WBØHOX
N5BT
N3ADU
KD5GM
KA1GCW
60
WD4BSC
W4FMZ
W1AF
N9BYK
KA9LAU
KA4BBA
KA2LEB
59
N1BYS/T
56
KA7AID/T
55
KA8GGZ/T
54
WD8ECM/N
52
N1CLV/T
N5EZM/T
47
N5FDL/T
46
K1LCO/T
45
N2CPX/T
43
KA9OBP/N
41
KA9NKQ/N

Brass Pounders League February 1983

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N1BBT KA1DB AG2R K4EUK WD4FTK WA4HXU K4JST WA4QXT W5CTZ N7AFZ KA7ELI KS7I KØJAN.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	410	3884	3591	12	7897
WA2SPL	292	1007	1362	22	2683
KA9CPA	45	1318	227	916	2506
N1BBT/MM	613	605	625	576	2419
W3VR	241	810	1021	9	2081
W1EOF	9	943	1036	49	2037
WAØHJZ	28	1300	21	596	1945
W7DZX	18	657	660	5	1340
WA1TBY	8	627	636	31	1302
KA1GBS	18	606	587	64	1275
W5SHN	18	596	650	2	1266
VE3BSY	22	591	600	6	1219
W9JUJ	4	576	586	7	1173
KBØMB	111	432	472	77	1092
N3ADU	0	555	533	2	1090
WB7OGA	106	410	435	81	1032
N4PL	29	343	373	36	791
WF4X	7	365	367	41	780
KB2HM	122	304	311	39	776
WA3WQP	0	416	345	7	768
K6UYK	45	352	352	11	760
WØMZI	0	403	5	314	722
WØZWL	0	416	0	287	703
KA8CPS	48	276	283	77	684
W7VSE	0	337	326	3	666
KCØAS	3	522	114	9	649
K4ZN	15	298	322	5	640
WD8MIO	31	308	251	30	630
N2CER	2	328	246	23	599
WB2EAG	13	291	260	31	595
WB1GXZ	22	242	307	24	595
WB2IDS	23	257	243	63	586
W9JIJ	18	279	267	12	576
KA1DB	4	279	279	10	572
KT6A	2	313	233	11	559
WB8WKQ	0	271	273	14	558
WA4JDH	0	275	273	7	555
AC3N	0	276	266	12	554
WB4PNY	0	252	292	2	546
KA8IAF	2	264	266	4	536
AK1W	1	257	273	3	534
W3ATQ	4	263	257	8	532
AA4AT	11	248	231	36	526
KA1T	2	257	229	35	523
KC3DW	2	250	250	12	514
WA4STO	3	239	267	3	512
WB7TQF	89	147	236	31	503
N1BGW	100	146	118	137	501
W3CUL (Jan.)	640	1095	1465	41	3238
W3VR (Jan.)	206	301	396	29	932
Multioperator stations:					
W4DUG	4922	52	4930	4	9908
WA2SDY	1184	20	295	80	1579
K4KDJ	598	63	624	18	1303
K3CR	405	143	476	69	1093
K2GXT	310	50	320	78	758
W2SZ	330	35	337	35	744
W1AF	1	326	374	2	703

BPL for 100 or more originations plus deliveries:

N5DFO	180	K5CXP	108
W4LX	131	W2AHV	107
KA1BBU	129	N1CLV	105
KB3FW	129	NI6A	103
KK1A	122		

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

Independent Nets (February 1983)

1	2	3	4
Amateur Radio Telegraph Society	31	387	206
Central Gulf Coast Hurricane	28	190	2401
Clearing House	28	444	360
Early Bird	28	344	1281
Empire Slow Speed	27	63	416
Golden Bear	28	187	1682
IMRA	28	665	1332
Mission Trail	28	129	1098
New England Novice	28	94	304
North American Single Sideband	24	78	241
Vermont Single Sideband	28	196	482
West Coast Slow Speed	28	119	415
20-Meter ISSB	24	2462	528
75-Meter ISSB	28	438	1135
7290 Traffic	44	554	3113

1 — NET NAME
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Field Day Rules

1) **Eligibility:** Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and NWT). Foreign stations may be contacted for credit but are not eligible to compete.

2) **Object:** To work as many stations as possible and, in so doing, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed upon skills and equipment developed to meet the challenge of emergency preparedness and to acquaint the public with the capabilities of Amateur Radio.

3) **Dates:** June 25-26, 1983.

4) **Field Day Period:** From 1800 UTC Saturday until 2100 UTC Sunday. Class A and Class B (see below) stations who do not begin setup until 1800 UTC Saturday may operate the entire FD period of 27 hours. Others must begin their setup no earlier than 1800 UTC Friday, and may operate no more than 24 consecutive hours; i.e., once on-the-air FD operation has started, it must end after 24 hours.

5) **Entry Categories:** Field Day entries are classified according to the maximum number of simultaneous transmitted signals, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Switching devices prohibited.

(Class A) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call sign (except when the Novice/Technician position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for one reason or another, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

Any Class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position (Novice bands only) without changing its basic entry classification. This station (including antennas) should be set up and operated by Novice and Technician licensees and should use the call sign of *one* of the Novice/Technician operators.

(Class B) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A. One- and two-person Class B entries will be listed separately in the results.

(Class C) Mobile: Stations in vehicles capable of operation while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

(Class D) Home station: Stations operating from permanent or licensed station locations using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points.

(Class E) Home stations — emergency power: Same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D and E.

6) **Exchange:** Stations in any ARRL section will exchange their Field Day operating class and ARRL section (see page 8 in any *QST*). For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." Foreign stations send RS(T) and QTH.

7) **Miscellaneous Rules:**

a) Operators participating in FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated.

b) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. Family stations are exempted.

c) Each phone and each cw segment is considered as a separate band. All voice contacts are equivalent, and RTTY/ASCII is counted as cw. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. No repeater contacts.

8) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and cw contacts count two points each. Power multipliers: If *all* contacts are made using a dc input power of 10 W (20-W PEP) or less (or 5-W dc output/10-W PEP output) *and* if a power source other than commercial mains or motor-driven generator is used (e.g., batteries, solar cells, water-driven generators), multiply by five. If any or all contacts are made using a dc input power of 200 W or less on cw and 400-W PEP or less on ssb, multiply by two. Multiply by one if any or all contacts are made using an input power over 200-W dc (400-W PEP). Batteries may be charged while in use for Class C entries only. For other classes, batteries charged during the FD period must be charged from a power source independent of the commercial mains.

a) **Bonus points:** The following bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Just check the box on the Field Day summary sheet to indicate that you qualify for the bonus, and attach the necessary proof.

1) 100% emergency power: 100 points per transmitter for 100% emergency power. *All* equipment and facilities at the FD site must be operated from a source independent of the commercial mains. Example: A club operating in Class 3A, using 100% emergency power may claim 300 bonus points.

2) Public relations: 100 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (example: a shopping center). Evidence must be submitted in the form of a clipping, a memo from a bc/TV station stating that publicity was given or a copy of material that was sent to news media for publicity purposes.

3) Message origination: 100 points for origination of a message by the club president or other FD leader, addressed to the SM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the FD period, and a fully serviced copy of it must be included with the FD report. The message must be in standard ARRL message form or no credit will be given.

4) Message relay: 10 points for each message received and relayed during the FD period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the FD report.

5) Satellite QSO: 100 points can be earned by completing at least one QSO via satellite during the FD period. The repeater provision of rule 7c is waived for satellite QSOs. A satellite station does not count as an additional transmitter. On the summary sheet show satellite QSOs as a separate "band."

6) Natural power: FD groups making a minimum of five QSOs without using power from commercial mains or petroleum derivitives can earn 100 points. Intuitively, this means an "alternate" energy source of power such as solar, wind, methane, grain alcohol, etc. This includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not wish to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

7) W1AW Message: A bonus of 100 points will be earned by copying a special ARRL FD bulletin sent over W1AW on its regularly announced frequencies just before and during FD (see chart). This message can be received directly from W1AW or by any relay method. An accurate copy of the received message should be included in your FD report.

9) **Reporting:** Entries must be postmarked by

Send For Your FD Package

Send Hq. a 9- × 12-in. self-addressed envelope with 3 units of First-Class postage for the official Field Day Entry Package. This package includes 1 Publicity Kit, 1 Field Day Summary Sheet, 1 large dupe sheet with instructions, and a check list to ensure that your entry is complete. If you require more dupe sheets, indicate in your request and affix 1 unit of additional First-Class postage to your s.a.s.e. for each two additional dupe sheets requested.

W1AW Field Day Bulletin Schedule

In addition to the regular bulletin schedule detailed on page 83 of April *QST*, extra cw bulletins will be run at 1400 UTC (10 A.M. EDT), and extra phone bulletins at 1500 UTC (11 A.M. EDT) both Saturday and Sunday mornings.

July 27, 1983. No late entries can be accepted. A complete entry consists of a summary sheet and a list of stations worked on each band/mode during FD, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets *or* an alpha-numeric listing of call signs worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as checklogs. A copy of FD logs should be kept by your FD group, but should not be sent in unless specifically requested later by ARRL.

10) **Disqualifications:** See January *QST*, page 85.

Rules, June VHF QSO Party

This year's June VHF QSO Party, to be held the weekend of June 11-12, has only a few minor changes from last year. The rules for last year included the addition of single-band entry classes and awards, and some changes in the use of fm. These changes were received enthusiastically and will remain.

For this year, the ARRL Ad Hoc Committee for VHF/UHF Contesting has turned the spotlight on the contest time frame. This year's event will start one hour earlier, at 1800Z (2 P.M. EDT/11 A.M. PDT) Saturday. The contest will end three hours earlier, at 0300Z Monday (11 P.M. EDT/8 P.M. PDT Sunday night). Along with the change in time frame, the Committee elected to drop the off-time requirement. All stations may operate as much of the 33-hour period as they wish. This will allow interested operators to engage in such time-consuming techniques as EME and scatter communications during the wee hours without hurting their scores.

The second area that has been fine-tuned is Rule 5, Scoring. The multiplier scheme has been modified slightly. In the 48 contiguous states, the multipliers remain the same as they always have (ARRL sections). In Canada, the multiplier list has been revised to include *provinces* rather than ARRL sections. This means that in the Maritimes section, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland/Labrador now count as separate multipliers. Previously, contact with any or all of these provinces counted as a single Maritimes multiplier. Also, the Yukon (VY1) and the Northwest Territories (VE8) now count separately. The other change in the multiplier scheme affects the West Indies and Pacific sections. Now, you may claim credit for each separate DXCC country you work. In the West Indies section, KP4, KG4 and KP2/KV4 all count separately. In the Pacific, KH6, KH2, KH8, etc., all count separately.

The third area that has been changed slightly is Rule 6, Use of FM. The intent of this rule has been clarified to give more flexibility in the choice of frequencies.

Official entry forms are available from ARRL Hq. for an s.a.s.e. It's to your advantage to get the correct forms so that we may list you properly in the results. The correct summary sheet for this year is form CD-68 (383). Incomplete entries are classified as checklogs and are ineligible for awards.

Rules

1) **Object:** To work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

2) **Contest period:** Begins 1800 UTC Saturday, June 11 and ends at 0300 UTC Monday, June 13.

3) **Categories:**

(A) Single Operator: one person performs all operating and logging functions.

(1) *Multiband.*

(2) *Singleband:* Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized both in *QST* score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) Multioperator: Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Name of section. VE stations send province name, DX stations send country name. Must be acknowledged by both operators for credit by either. A one-way exchange does not count. (Note: Exchange of signal reports is optional.)

5) **Scoring:**

(A) Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 420-MHz QSO. Count three points for each QSO on 1215 MHz and above. Crossband QSOs do not count.

(B) Multipliers count once per band. The following count as multipliers: 1) Each ARRL section in the contiguous 48 states (max. 63 per band); 2) Each Canadian province (Prince Edward Island, Nova Scotia, New Brunswick and Newfoundland/Labrador in the Maritimes; VE2 through VE7; Yukon — YV1; and Northwest Territories — VE8. Max. 12 per band); and 3) Each DXCC country (excluding W and VE), including KL7, KH6, KP4, KP2/KV4, KG4, KH2, etc. Foreign stations may work only stations in the U.S., Canada and U.S. possessions for credit.

(C) Stations may be worked once per band, regardless of mode. Example: W6XJ (San Diego) works AI6V (San Joaquin Valley) on 50, 144 and 220 MHz. This gives W6XJ 4 points (1 + 1 + 2) and also three section multipliers. W6XJ may contact other SJV stations on these bands for contact points, but no additional section multipliers.

6) **Use of FM:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies, including 146.76 and .94. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national calling frequency, 146.52 MHz, or immediate adjacent guard frequencies, is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national calling frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.10; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory, may* be used for contest purposes.

7) **Miscellaneous:**

(A) Fixed, portable or mobile operation under one call from one ARRL section only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(B) Only one signal per band (50, 144, 220, etc.) at any given time is permitted, regardless of mode.

(C) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least a mile).

(D) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHZ. Even then, a complete, different station must exist for each QSO made under these conditions.

(E) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (e.g. laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than July 12, 1983.

9) **Awards:**

(A) Single Operator

(1) Top single operator score in each ARRL section.

(2) Top single operator on each band (50, 144, 220, 432, and 1296-and-up categories) in each ARRL section where significant effort or competition is evidenced. (Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if K1FO has the highest single-operator all-band score in the Connecticut section and his 50- and 220-MHz scores are higher than any other CT single ops, he will earn a certificate for being the single-operator section leader *and* endorsement stickers for 50 and 220 MHz.

(B) Top multioperator score in each ARRL section where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

10) **Disqualifications:** See January *QST*, page 85.

Rules, 1983 IARU Radiosport Championship

The Radiosport enjoys very good participation from around the world, and many very hard-to-work countries are often QRV for this one. To run up a big score, you'll need to strike a balance between a large QSO total and a large multiplier total. While 10 meters doesn't have the best propagation in July and 80 and 40 meters are often very noisy with QRN, patience and good operating there will reward you with some extra multipliers.

For those not familiar with ITU zones around the world, a map of ITU zones is available from ARRL/IARU Hq. Send an s.a.s.e. or one IRC for the proper forms (including the map) early so you'll have them in time for the contest. Good luck!

Rules

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs in as many parts of the world as possible using 1.8 through 148 MHz.

3) **Date:** Second full weekend of July (July 9-10, 1983).

4) **Contest Period:** 0000 UTC Saturday until 2400 UTC Sunday, with single-operator stations operating a maximum of 36 hours.

5) **Categories:**

A) Single operator: Phone-only, cw-only and mixed-mode sections. One person performs all operating and logging functions. Use of spotting nets is not permitted. Off times must be at least 30 minutes long. All operators must observe the limits of their operator's license at all times. Single operator stations are allowed only one transmitted signal at any given time.

B) Multioperator: Single transmitter, mixed mode only; must remain on a band at least 10 minutes at a time. Only one transmitted signal allowed at any given time. All operators must observe the limits of their operator's license at all times.

6) **Contest Exchange:** All stations send signal report and ITU zone. The *complete* exchange must be logged for each valid QSO.

7) **Valid Contact:** The same station may be worked once per frequency band. Cross-mode, cross-band and repeater QSOs do not count.

8) **QSO Points:**

A) Contacts within your ITU zone count one point.

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** ITU zones worked on each band.

10) **Scoring:** Multiply total number of QSO points by the sum of ITU zones worked on each band for the final score.

11) **Reporting:**

A) All entrants are encouraged to use forms available from IARU/ARRL Hq. (s.a.s.e. or one IRC).

B) Logs must indicate times in UTC, bands, calls, complete exchange. Multipliers and off times should be clearly marked in the log. Cross-check sheets (dupe sheets) are required if more than 500 QSOs total are made.

C) Entries must be postmarked within 30 days after the contest (by August 10, 1983). Any entry received after mid-October 1983 may not be in time to be included in the printed results.

12) **Awards:** A certificate will be awarded to the high-scoring cw-only, phone-only, mixed-mode and multioperator entrant in each ARRL section, each ITU zone and each DXCC country. In addition, achievement-level awards will be issued to those making at least 250 QSOs (1000-QSO sticker also) or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each country's IARU society.

13) **Conditions of Entry:**

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his licensing authority and by the decisions of the IARU/ARRL Awards Committee.

B) Disqualifications: An entry may be disqualified if the overall score is reduced by more than 2%. Score reduction does not include correction of arithmetic error. An entry *will* be disqualified if more than 2% of duplicates are left in the log, or if the log shows excessive operating time (single-operator stations). A penalty of three QSOs will be assessed for each duplicate QSO found during ARRL/IARU log checking or for each miscopied call sign. See January 1983 *QST*, page 85, for complete details.

Prefix/ITU Zone

A2	57	FH	53	W1	08	PY	13, 15	UH8,		VS6	44	3D2	56
A3	62	FK	56	W2	08	PYØ	13	UK8H	30	VS9	41	3D6	57
A4	39	FM	11	W3	08	PYØ	15	UI8, UK8	30	VS9K	39	3V	37
A5	41	FO	10, 62, 63	W4	08	PZ	12	UJ8,		VU	41	3X	46
A6	39	FP	09	W5	07	S2	41	UK8J/R	30	VU7	49	3Y	67
A7	39	FR	53	W6, 7	06	S7	53	UL7, UK7	30	VU7	41	4S	41
A9	39	FS	11	W8, 9	08	S9	47	UM8		XE	10	4U1ITU	28
AP	41	FW	62	WØ	07	SM	18	UK8M, N	31	XF4	10	4U1UN	08
BV	44	FY	12	KC4	67, 69,	SP	28	UO5,		XT	46	4W	39
BY	33, 42, 43, 44	G	27		70, 71,	ST	48	UK5O	29	XU	49	4X, 4Z	39
C2	65	GD	27		72, 73,	SU	38	UP2,		XV	49	5A	38
C3	27	GI	27		74	SV	28	UK2B/P	29	XW	49	5B, ZC	39
C5	46	GJ	27	KC6	65	T2	65	UQ2,		XZ	49	5H	53
C6	11	GM	27	KC6	64	T30-1	62	UK2G/Q	29	Y2-9	28	5N	46
C9	53	GU	27	KG4	11	T32	61	UR2,		YA	40	5R	53
CE	14, 16	GW	27	KG6/KH2	64	TA	39	UK2R/T	29	YB	54	5T	46
CEØA	63	H4	51	KHØ	64	TF	17	VE1	09	YI	39	5U	46
CEØZ	14	HA	28	KH1	61, 62	TG	11	VE2	04, 09	YJ	56	5V	46
CEØX	14	HB	28	KH6	61	TI	11	VE3	04	YK	39	5W	62
CM, CO	11	HBØ	28	KJ/KH3	61	TI9	11	VE4, 5	03	YN	11	5X	48
CN	37	HC	12	KL	01	TJ	47	VE6, 7	02	YO	28	5Z	48
CP	12, 14	HC8	12	KM/KH4	61	TL	47	VE8	02, 03	YS	11	60	48
CR9	44	HH	11	KP4	11	TN	52		04, 75	YU	28	6W	46
CT	37	HI	11	KP6/KH5	61, 62	TR	52	VK1, 2, 3,		YV	12	6Y	11
CT2	36	HK	12	KS6/KH8	62	TT	47	5, 7	59	YVØ	11	70	39
CT3	36	HKØ	11, 12	KV/KP2	11	TU	46	VK4, 8	55	ZA	28	7P	57
CX	14	HL, HM	44	KW/KH9	65	TY	45	VK6	58	ZB	37	7Q	53
D2, 3	52	HP	11	KX	65	TZ	46	VK	60	ZD7	66	7X	37
D4	46	HR	11	KZ	11	UA, UK,	19, 20,	VK9	60	ZD8	66	8P	11
D6	53	HS	49	LA	18	UV, UW/1,	29, 30	VK9	54	ZD9	66	8R	12
DJ	28	HV	28	LU	14, 16	3, 4, 6		VK9	55	Z2	53	8Z4	39
DU	50	HZ, 7Z	39	LX	27	UA2, UK2F	29	VKØ	68	ZF	11	9A(M)	28
EA	37	I, IT	28	LZ	28	UA, UK, UV,		VKØ	60	ZK1	62, 63	9G	46
EA6	37	IS	28	OA	12	UW9-Ø	20-26,	V3	11	ZK2	62	9H	28
EA8	36	J2	48	OD	39		29-35	VP2E	11	ZL	60	9J	53
EA9	37	J3	11	OE	28	UB, UK,		V2A	11	ZM	62	9K	39
EI	27	J5	46	OH	18	UT, UY5	29	VP2V	11	ZP	14	9L	46
EL	46	J6	11	OHØ	18	UC2, UK2A/		VP2M	11	ZS	57	9M2	54
EP	40	J7	11	OJØ	18	C/I/L		VP2K	11	ZS3	57	9M6, 8	54
ET	48	J8	11	OK	28	O/S/W	29	VP5	11	1S	50	9N	42
F	27	JA	45	ON	27	UD6, UK6		VP8	16	3A	27	9Q	52
FB8Z	68	JD	45	OX, XP	05	C/D/K	29	VP8	73	3B6, 7	53	9U	52
FB8W	68	JT	32, 33	OY	18	UF6, UK6F/		VP9	11	3B8	53	9V	54
FB8X	68	JW	18	OZ	18	O/Q/V	29	VQ9	41	3B9	53	9X	52
FC	28	JX	18	P2	51	UG6,		VR6	63	3C	47	9Y	11
FG	11	JY	39	PA	27	UK6G	29	VS5	54	3CØ	52		
				PJ	11								

Results, 49th Annual ARRL November Sweepstakes

By Mark J. Wilson,* AA2Z and Bill Jennings,** K1WJ

It's 1900Z Sunday on Sweepstakes weekend. Across the U.S. and Canada, hundreds of SSers carefully tune the bands. Bodies tense, ears alert, they sweep first 10, then 15, then 20, then 40 looking for those last few rare multipliers. Only a few more hours remain in the contest; just a few more hours to make that Clean Sweep. After all, what's Sweepstakes without a Sweep? There's something magical about working section number 74. Assuming that you work 1000 QSOs, the difference between 73 multipliers and 74 is only 2000 points. Big deal! But for most, the satisfaction of crossing that last multiplier off the check sheet transcends the excitement of increasing the score a few points. When you cross off that last section, you've worked them *all*. Sweepstakes is the only contest in which you can do that — work them *all*. In a DX contest, nobody ever works all the possible multipliers. In a prefix contest, nobody ever works all of the prefixes. But in the SS, working them all is an achievement well within reach of all SS participants, no matter where they live. If you have a rig and a dipole, you can make a Sweep.

It's no wonder that many contesters shoot for the Sweep. For many, the chances of winning a section or division award are slim. Yet working a Sweep is a realistic goal. And it is also an achievement. Of the 1990 official entrants in this year's SS, only 207 (10.4%) completed a Sweep on either mode. There were more Sweeps on phone (160 Sweeps out of 1035 entrants) than on code (47 out of 955).

In an effort to help the 1783 of you who didn't make a Sweep plan for next year, we've enclosed a chart showing where and when the 20 ops cleaning up on both modes worked their last three sections. From the logs, this year's four toughest sections appear to have been Mississippi, Western Massachusetts (!), Alberta and Yukon/N.W.T. What were yours? The biggest surprise on the cw weekend was the appearance of Jim, VE8JG, late Sunday afternoon. Starting at 1945Z Sunday, Jim worked 91 of the deserving, although he was "not in the contest."

Okay, so the sections were there. But what about the QSO totals? And what about the scores? On cw, the top-scoring single ops didn't have to do quite as well as last year's to make the Top Ten. K5ZD operated N5AU to first place again this year, but his score is 30 QSOs behind last year's. N4TO operating at NP4A turned in the number two code score, finding only 10 fewer QSOs than Randy. There is a gap of about 7000 points between these two superstars and the number three man, K3LR. The rest of the Top Ten box is filled out with seven scores a scant 5000 points apart. The top scores represent a good cross section of the country. No clear East Coast or West Coast domination this time.

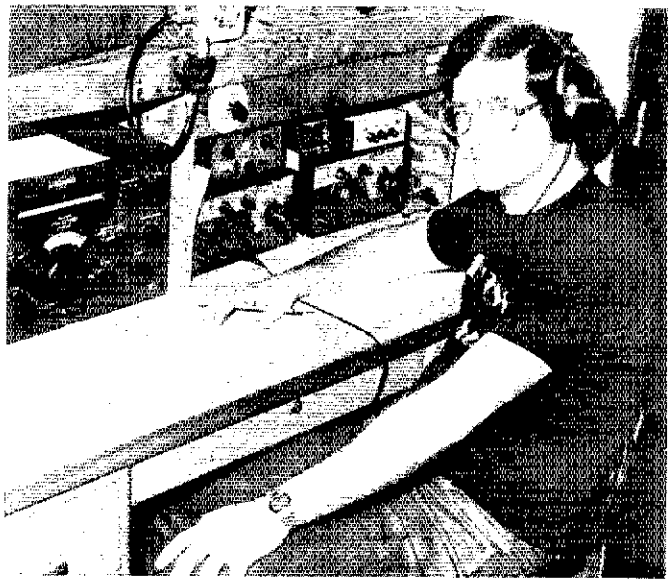
Among the low-power ops, N6IG just edged out W2TZ by the equivalent of a three-QSO margin. Actually, W2TZ's 975-QSO total is significantly higher than N6IG's 937, but '1G's three additional sections made all the difference in the world. Perennial low-power Top Tenner K4XU finished third, and he was followed by many familiar calls from around the country.

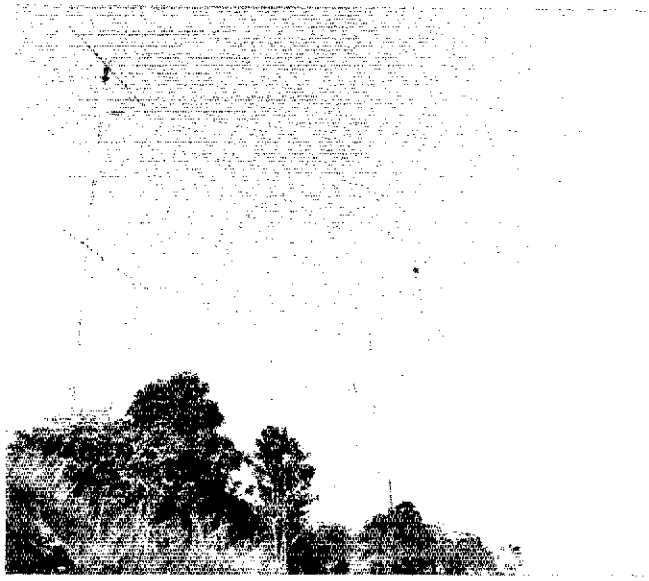
After several tries, the Northern Ohio ARS/Mad River RC crew at WB8JBM finally found all the needed ingredients to take home the cw multiop honors. Their score is significantly higher than second-place N5CG's. Like last year, stations in the Midwest seem to have a handle on the necessary ingredients for a winning multiop effort.

Contact totals were generally down on phone, also, although you wouldn't know it from K1ZM's 2442-QSO total from NP4A. Besides setting the pace for phone single ops, Jeff also set a new all-time phone record (and hence a new Southeastern Division record). Actually, Jeff could have quit at 1930Z Sunday, after only 17 hours of operating, and still won. Among the mere mortals, AA5B put his great New Mexico location to good use for a second-place finish. The rest of the Top Ten phone list looks like a Who's Who from years past.

The phone low-power pack contains scores from all over, led by KØUK from Colorado. Looks like almost anywhere is a good place to give the phone contest a shot barefoot,

*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL





NP4A opened his truly impressive superstation to Jeff, K1ZM, for the phone portion. According to Jeff, "After many years of frustration participating from the East Coast in the SS, this one contest goes a long way toward soothing one's soul."

although the fifth call area is apparently a great place to be.

Multiop phone entrants were led by N6BT, who in turn was closely followed by AJ6O. KØWA, last year's winner, placed third. It's interesting to note that, as on cw, the top-scoring multiop would not have made the single-op Top Ten listings. Any ideas on why this is?

Affiliated-club competition is still as intense as ever, with about half of this year's official entrants indicating club affiliation. A trend we've observed during the past few years stands out crystal clear this year — the battleground for the top clubs in the country is migrating to the Medium Category as more and more of the bigger clubs have problems promoting more than 50 entries. This time around, the only club left in the Unlimited Class is the Potomac Valley Radio Club. With 84 entries, they posted a fine 7 million point score. In the Medium Category, the Texas DX Society took top honors with a score well above the others.

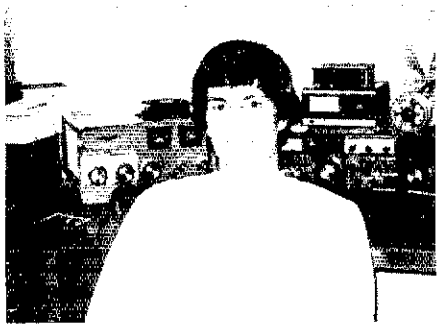
How did they do it? A look at the South Texas section on both modes will give you a clue. Teamwork, combined with stations and operators capable of turning in 200K scores on phone and 140K scores on code will do it every time. In the Local Category, an enthusiastic group from the Midwest won the gavel. The Lincoln ARC, voted Most Improved Club in the ARRL DX Contest last year, has proven that they can do the Sweepstakes as well. Our thanks go to all club members who got on to help out their aggregate club score, and in doing so made the SS a little more exciting for everyone.

In closing, we have a couple of administrative notes. Several people have written asking what we want in the way of computer-generated dupe and log sheets. For log sheets, the primary requirement is that they look like the official ARRL log blanks. They should have 50 QSOs per page, and they should contain the same columns of information (in the same order) as the official logs. If you submit something radically different, you run the risk of being classified as a checklog. Dupe sheets may take many forms. The basic idea is to provide us with an alpha-numeric sort of the call signs you worked during the contest. The list must be readable. If the order of the sort is not obvious, you must provide us with a key so we can figure out what you did. In all cases, you should send for the official summary sheet and submit it with your entry. The summary sheet contains all the information we need to properly list your score. If you leave out some vital information, you could end up listed with the checklogs.

In the club competition, it is apparent that some clubs have not read the club competition rules as outlined in the January issue of *QST*. Specifically, the secretary (or another officer) of each club wishing to enter the affiliated-club competition must send us a complete list of all club members meeting the distance and attendance requirements. Besides listing *all* club members, the secretary's letter must indicate which level of competition the club wants to enter. This list is due at ARRL Hq. at the same time the logs are due.

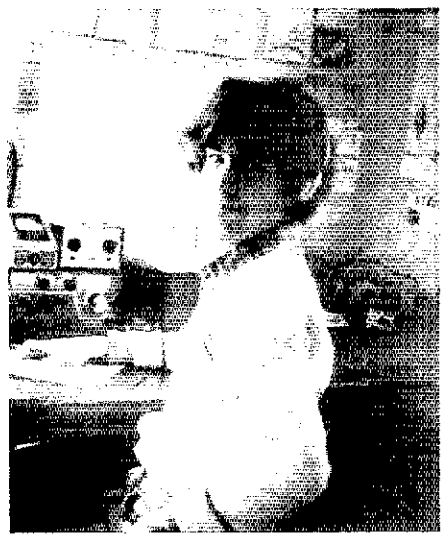
The other point some clubs seem to miss is that it is not within the spirit of the club-competition rules to manipulate the number of club entries to fall into a lower classification. If 15 of your club members participate in Sweepstakes, we expect to see 15 entries for your club. We do not expect to see only the 10 highest with a note saying you want to enter the Local Category.

That's all for this year. Certificates will be in the mail around May 16. Work on your antennas, plan your strategy, and we'll see you this November.

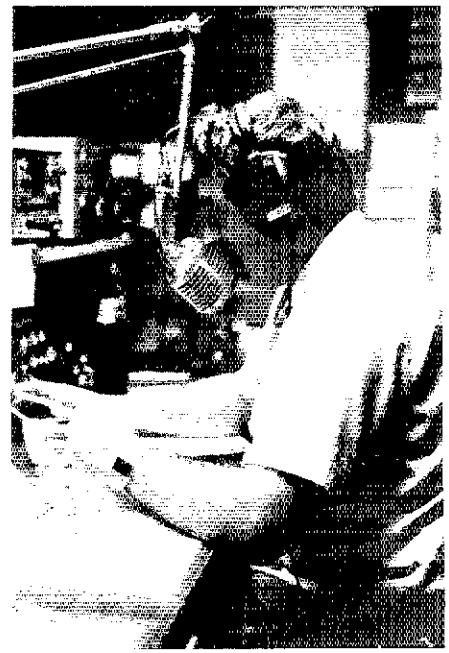


Bruce, AA5B, finished second overall in the phone portion. How did he do it?: "(1) I took down my 40-meter triangle and replaced it with an inverted V at 50 feet. (2) I bought a new mechanical pencil with 0.7-mm leads. (The 0.5-mm leads broke about every five QSOs last year.) (3) I smiled a lot."

The faces behind the stations of the RCCC team score (left to right): K7LXC, AG7M, K7SS, KC7RN, K7HBN, K7LR, W7WA, KB7G. *(NC5U photo)*



Mike, WA6JAH, keyed his way to a first-place finish in the Orange section on code. *(KA6TEV photo)*



Chuck, KCØDB, played host to the top-scoring Iowa multiop. One thing Chuck (and several others as well) noted was that a number of stations with relatively low serial numbers called him several times. He asks that all entrants keep and use dupe sheets.

Top Ten Single Op

Phone		*Cw*	
NP4A (K1ZM)	361,416	N5AU (K5ZD)	179,968
AA5B	287,860	NP4A (N4TO)	178,488
KØRF (WØUA)	278,536	K3LR	171,236
WA7NIN (W6OAT)	274,688	W2YV (N2NT)	169,200
N6BV	273,208	W3LPL	168,720
N6TR	268,768	K7RI (W7WA)	167,462
K7RI (K7SS)	257,732	KØRF (WØUA)	167,388
W7RM (W7WA)	263,144	K3UA	166,944
WØYK	259,000	K5GO	166,352
W5WMU	256,366	N6RO	164,688

Top Ten Low Power

Phone		*Cw*	
KØUK	185,328	N6IG	136,802
N5RZ	167,024	W2TZ	136,500
K4XS	164,872	K4XU	133,200
KR2N (KQ2M)	155,928	N7CW	131,546
K5IID	151,404	NØNO	131,040
WB5VZL	150,526	K1EA	129,204
N4RJ (K2PO)	148,000	AD7K	128,880
KM5H	137,240	N5JB	127,428
WØLSD	128,908	KØLUZ	126,288
WA2STM	128,880	KØVBU	121,508

Top Ten Multiop

Phone		*Cw*	
N6BT	245,134	WB8JBM	154,944
AJ6O	239,316	N5CG	143,136
KØWA	228,216	KJ9D	141,552
K5CM	227,032	KM9D	139,268
WB8JBM	205,128	AG7M	137,882
N6MG	197,876	W6BIP	130,536
K5RX	196,544	K1LT	125,528
WØSOE	193,584	KM1C	124,040
WA5TCL	192,992	NØIN/5	122,544
K5GA	190,180	KØVVY	122,080

Division Leaders — Phone

Division	High Power	Low Power	Multioperator
Canadian	VE1YX (AA2Z)	VO1QU	K2IQ/VE2
Atlantic	K3UA	KF3V	W2OW
Central	K9RS	W9OBF	KJ9D
Dakota	AKØT	WAØARS	KØVVY
Delta	W5WMU	N5ATW	WA5TCL
Great Lakes	K8ND	WD8MGQ	WB8JBM
Hudson	K2TR	KR2N (KQ2M)†	W2XL
Midwest	K4VX (KRØY)	KVØI	KØWA
New England	K1AR	KA1VC	W1OD
Northwestern	K7RI (K7SS)	KØEJ	AG7M
Pacific	WA7NIN (W6OAT)	K2GMY	N6BT
Roanoke	N8II (K4PQL)	WD4AVY	W4IY
Rocky Mountain	AA5B	KØUK	KB7M
Southeastern	NP4A (K1ZM)†	K4XS	NY4F
Southwestern	N6TR	N6ND	AJ6O
West Gulf	K5RC (K5GN)	N5RZ	K5CM

†new division record

Division Leaders — Cw

Division	High Power	Low Power	Multioperator
Canadian	VE5XK	VE3ATD	VE3ART
Atlantic	K3LR	W2TZ†	K3CR
Central	K9KM	W9NEC	KJ9D
Dakota	AKØT	NØNO	KØVVY
Delta	K5GO	K4XU	KY5M
Great Lakes	WA8YVR	K8BL	WB8JBM
Hudson	W2YV (N2NT)	WA2STM	KC2FV
Midwest	NØGA	KØLUZ	KØDI
New England	K1TO	K1EA	KM1C
Northwestern	K7RI (W7WA)	W7WHO	AG7M
Pacific	N6RO	N6IG†	W6BIP
Roanoke	N8II	KD8G	W4POX
Rocky Mountain	KØRF (WØUA)	ADØO	KCØD
Southeastern	NP4A (N4TO)	K4XS	K4MLR
Southwestern	K6LL	N7CW	K6AA
West Gulf	N5AU (K5ZD)	N5JB	N5CG

†new division record

How to Make a Clean Sweep on Both Modes

Only 20 (about 1%) of 1982's SS participants found all 74 sections on both modes. To give those of you who didn't make it some food for thought when planning this year's operating strategy, we've looked through the logs of those who did to try to find out how they did it. The following chart shows the last three multipliers that each of the lucky "Sweepers" worked, and tells where and when he worked them.

Call	Mode	#72 Sect.—UTC—MHz	#73 Sect.—UTC—MHz	SWEEP! Sect.—UTC—MHz
K1CC	cw	WMA—1240—7	VE8—2245—21	VE4—0150—7
	phone	KL7—1936—21	UT—1942—21	VE6—2108—21
W1WEF	cw	VE7—1718—28	VE4—2213—28	VE8—0022—21
	phone	WIN—0140—14	WVA—0212—7	VE6—0806—7
W2RQ	cw	VE6—1709—28	VE1—1747—14	VE8—0016—21
	phone	WMA—0501—3.5	MS—0545—14	VE6—2053—28
K3SA	cw	VE6—2201—14	VE1—2202—14	VE8—0242—14
	phone	DEL—0723—3.5	VE1—1247—14	PAC—2028—28
K3UA	cw	VE4—2141—21	VE8—2339—21	WMA—0222—7
	phone	VE6—1810—28	KL7—2047—21	VE8—2054—21
K2NA/4	cw	VE6—1600—28	VE4—2256—21	VE8—0006—21
	phone	ME—0535—3.5	SC—1215—3.5	VE8—1859—28
N4BP	cw	VE4—2158—21	MS—2337—14	VE8—0026—14
	phone	ORG—1558—28	PAC—1811—28	VE8—2107—28
K5GN	cw	VE1—1852—21	VE4—2306—21	VE8—0214—14
	phone	NM—0515—7	LA—0520—7	VE8—2324—28
K5WA	cw	VE1—1634—28	VE5—1749—28	VE8—2149—21
	phone	SF—2048—28	MS—2305—21	VE6—2359—28
K5ZD	cw	VE1—1501—14	VE6—2205—28	VE8—0024—21
	phone	KY—2243—14	UT—2246—14	VE8—0042—14
KG5U	cw	VE6—1807—28	VE4—2347—21	VE8—2256—21
	phone	WYO—0830—3.5	VE1—1600—21	VE6—2150—28
KM5R	cw	VT—1922—21	VE8—2346—21	MS—0057—7
	phone	PAC—2356—28	VE6—2358—28	VE8—0004—21
KZ5M	cw	MS—1405—14	VE8—2027—21	VE6—2229—28
	phone	ALA—0654—7	SC—1550—21	VE8—2319—21
N5DU	cw	VE6—2214—28	VE4—2242—28	VE8—0117—21
	phone	PAC—1915—28	VE6—2026—28	KL7—2120—21
N5JB	cw	NE—2006—14	VE8—2051—21	VE4—2354—21
	phone	MS—0622—3.5	NM—0630—3.5	WYO—1432—14
W5JW	cw	VE6—2056—28	VE8—2323—14	KL7—2330—14
	phone	UT—2340—14	OK—0018—14	WYO—0041—14
W5WMU	cw	VE6—1740—28	WMA—2122—28	MS—0015—3.5
	phone	WYO—0606—7	WIN—0745—7	MS—1435—21
KØVBU	cw	VE4—2120—21	VE6—2200—28	VE8—0258—14
	phone	MS—2307—21	PAC—2334—21	SC—2337—14
KRØY	cw	VE6—1629—28	VE4—2215—21	VE8—2308—21
	phone	SV—0310—14	VE7—0524—7	PAC—0715—7
WØUA	cw	VE4—2233—28	VE8—2353—14	VE6—0231—7
	phone	PAC—0749—7	VE8—1900—28	VE5—2006—28

Phone

No. 3 Low Power — K4XS — Northern Florida
Transceiver: TS-930

Antennas: KT34XA Tribander up 100 feet; two-element 40-meter quad up 100 feet; inverted V on 80 meters up 90 feet

Hour (Z)	No. of QSOs	Multiplier Total	Band Changes	Time Off
21	67	28	20	—
22	74	39	20	—
23	60	49	20-15	—
00	53	59	15-20	—
01	46	65	20	—
02	36	66	20-40-20	—
03	53	67	20	—
04	53	—	20-40	—
05	42	—	40	—
06	42	69	40	—
07	39	70	40	—
08	50	—	40	—
09	38	72	40-80-40	—
10	18	—	40-80-40	30
11	44	—	40	—
12	38	—	40-20	10
13	—	—	—	60
14	40	—	15	05
15	56	—	15-10	—
16	25	—	10-15	25
17	21	—	15-10	30
18	31	—	10-15-20-10	01
19	10	—	10-15	34
20	11	73	15-20	30
21	36	—	10	10
22	35	74	15	—
23	48	—	15-20	—
00	48	—	20	05
01	—	—	—	60
02	—	—	—	60
	1114 QSOs	74 multipliers	22 band changes	6:00 time off

Cw

No. 1 Low Power — N6IG — East Bay
Receiver: R4C Transmitter: T4XC

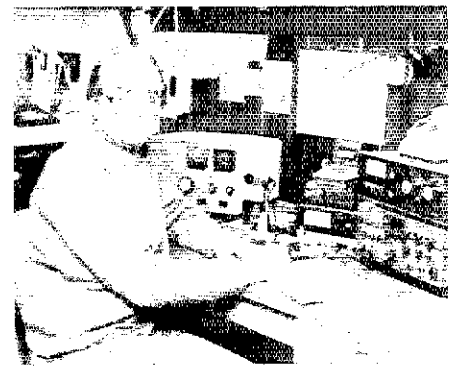
Antennas: KT34XA Tribander up 75 feet; inverted Vs on 80 and 40 meters

Hour (Z)	No. of QSOs	Multiplier Total	Band Changes	Time Off
21	72	34	10	—
22	71	43	10	—
23	61	52	10-15	—
00	66	54	15	—
01	62	58	15	—
02	51	61	15-20	—
03	39	—	20	10
04	22	63	20-40	20
05	34	69	20-80-40-80	—
06	36	—	80-40	—
07	34	—	40-80-40	—
08	17	71	40-80	25
09	22	—	40-80-40	05
10	04	—	40	50
11	—	—	—	60
12	—	—	—	60
13	09	—	20	40
14	29	—	20	—
15	33	—	20	—
16	35	72	15	—
17	31	—	15-10-15	—
18	20	—	15-10	20
19	24	—	10-20-15	10
20	26	—	15-10-15	—
21	19	73	15-10	—
22	21	—	10-15	10
23	25	—	15	20
00	34	—	15	—
01	13	—	15	30
02	27	—	20-40	—
	937 QSOs	73 multipliers	27 band changes	6:00 time off

Affiliated Club Competition

Unlimited Category	*Score*	*Entries*	*Phone Winner*	*Cw Winner*
Potomac Valley Radio Club	7,117,348	84	W3LPL	W3LPL
Medium Category				
Texas DX Society	6,013,316	49	K5RC	N5JJ
Yankee Clipper Contest Club	3,918,312	41	K2TR	W2YV
Northern California Contest Club	3,700,132	32	WA7NIN	N6RO
North Texas Contest Club	3,520,262	39	K5OY	N5AU
Mad River RC	3,338,969	28	K8ND	K3LR
Murphy's Marauders	2,912,676	32	W1WEF	K1TO
Rubber Circle Contest Club	1,876,754	11	K7RI	K7RI
Ill Wind Contesters	1,440,070	19	K9RS	K9KM
Murgas ARC	1,234,420	33	WB3FAA	N3CXB
Southern California Contest Club	1,084,056	11	N6TR	W6UE
Radio Club of Tacoma	1,011,204	32	AJ7Y	KG7V
South Jersey Radio Assn.	863,860	30	K2AA	W2LYL
Eastern Iowa DC Assn.	852,686	11	KØLUZ	NØGA
Northern Ohio ARS	817,492	16	N8DEQ	K8CV
Schenectady ARA	793,028	15	KB2T	KB2T
Colorado Contest Conspiracy	661,526	4	—	—
Frankford RC	557,278	8	—	W2GD
Eastern Michigan ARC	548,236	15	K8JLB	K8DD
Fort Wayne RC	534,496	10	KB9MO	W9LT
Gloucester County ARC	503,438	10	WA2OOS	N2BCF
Reading Radio Club	465,284	17	WA3SPJ	K3WGR
Foothills ARS	424,068	14	K6MA	N6AUV
Utica ARC — DX Corps	335,380	9	KJ2Q	—
Central Michigan ARC	332,808	13	WA8QCW	W8VPC
Rockford ARA	328,856	12	K9GH	K9LJN
West Park Radiops	231,178	9	KC8F	W8IDM
Boeing Employees ARS	196,750	13	WB7DNS	WB7WUM
Lower Yellowstone ARC	195,222	4	—	—
Grumman ARC	132,294	11	WB2FMP	K2QAI
Local Category				
Lincoln ARC	957,238	9	KØSCM	—
Kansas City DX Club	829,590	9	KUØG	KBØG
Overlook Mountain ARC	806,550	9	WA2STM	K5NA
River City Contesters	804,532	9	KV6H	K6SG
New Mexico Big River Contesters	731,812	5	—	AA5B
Point Radio Operators Society	644,112	5	—	K3UA
Western ARA	583,312	6	—	—
Western Washington DX Club	564,684	8	N7TT	K7WA
University of California ARC	536,762	4	—	—
Central Arizona DX Assn.	513,018	5	—	K7OX
Central Florida DX Assn.	503,000	5	—	N4WW
Willamette Valley DX Club	437,530	4	—	—
Wichita ARC	437,340	7	NØDEE	KFØM
Binghamton ARA	417,794	7	WB2QPR	—
ARINC ARC	396,978	6	KD4VU	W3HVQ
Twin City DX Assn.	393,860	5	—	NØNO
Rochester (NY) DX Assn.	380,094	8	KB2SE	W2TZ
Eastern Connecticut ARA	367,172	7	K1YRP	K1YRP
Ventura County ARC	349,452	9	WA6DJS	—
Fox River Radio League	343,620	5	K9LUW	—
North Florida ARS	339,832	7	NO4J	N4UF
Arrowhead Radio Amateurs Club	336,746	3	—	—
Amateur Radio Transmitting Soc. (KY)	335,108	3	—	—
Flyweight DX Group	313,422	4	—	—
Grand Mesa Contesters	304,131	3	—	—
Larkfield ARC	301,500	5	KK2E	—
Northrop Radio Club	294,718	7	W6CN	—
Saginaw Valley ARA	290,170	7	—	KO8M
Ohio Valley ARA	262,428	5	—	W8RSW
United Radio Amateur Club	246,510	3	—	—
Valley Radio Club of Eugene	241,946	5	AI7W	—
Central Virginia Contest Club	224,360	3	—	—
Sevier County ARC	224,138	5	WB4SFX	—
Mississippi Valley DX and Contest Club	218,390	3	—	—
Southeastern DX Club	214,742	3	—	—
Splitrock ARA	214,124	6	K2RF	K2RF
Lynchburg ARC	213,722	7	WD4ELJ	—
Connecticut Wireless Assn.	212,057	3	—	—
Rappahannock Valley RC	207,866	10	WA4EMU	KA4RLJ
Long Island Mobile ARC	203,086	5	KS2G	—
Utah ARC	195,174	3	—	—
Wireless Institute of the Northeast	186,008	3	—	—
Valley ARA (VA)	173,416	3	—	—
Providence Radio Assn.	179,136	5	KA1AWS	—
Rip Van Winkle ARS	162,026	4	—	—
Nashua Area RC	154,046	4	KE1E	—
Codex Ch. of Motorola ARC	134,726	3	—	—
Genesee Radio Amateurs	127,624	5	WB2ODH	—
Columbus ARA	121,848	6	N8LM	—
Coconino County ARC	121,152	3	—	—
West Allis Radio Amateur Club	113,050	4	—	—
Wisconsin Valley Radio Assn.	111,468	4	W9NA	—
L'Anse Creuse RC	97,184	9	WA8QAF	WA8VEB
Davenport Radio Amateur Club	95,976	5	K9AYK	—
Ozarks ARS	93,220	5	—	WDØARX
Everglades ARC	90,108	3	—	—
Motor City RC	78,900	3	—	—
Lockport ARA	77,844	4	—	—
Big Island ARC	72,696	3	—	—
Tri City ARC	63,548	5	KA1YE	—
Rowan ARS	58,114	7	N4UH	—
Tulare County ARC	44,034	3	—	—
Megahertz Manor Maniacs	41,860	3	—	WØYBV
IBM Owego RC	38,996	4	—	—
Clover Leaf Farms ARC	35,148	3	W4ILE	—
Brooklyn Tech. High School ARS	32,042	3	—	—
Lake Success RC	30,066	5	WA2DZD	—
Palo Alto ARA	16,488	5	WA6SLF	—
Kettle Moraine Radio Amateurs	9136	3	—	—

N6HE (operating) and K5TTE participated along with three other ops in the cw multiop effort from K6AA in the Los Angeles section.



KA1YS from the Connecticut section handed out a few points during the phone portion.

SOAPBOX

If any Extra terrestrials had passed by our solar system in late November and had tuned across the amateur bands, they might have concluded that everyone was frantically trying to phone home at once! . . . or else reported that a planet with no intelligent life had somehow discovered radio! . . . Definition of Sweepstakes: A North American rf orgy! (WD5GSL/WBØTEV). This was my 25th consecutive cw SS. Can I consider myself a veteran? (K2AU). Would you believe four (count 'em) four VE8/VY1s? (K5IID). Listening to the contesters versus the non-contesters debate on who owns the frequency makes me wonder if some Amateur Radio operators shouldn't be called Immature Radio operators (KSØE). Had a great time. Hadn't been in the SS for 19 years. Won as a Novice in the SCV section 19 years ago. Looking forward to next year (WB6OEB). When the incandescent lights in the bedrooms lit brightly on voice peaks, I knew that Murphy had arrived (N3JT). How about for the 50th SS make it a once worked *per band?* What an exciting marathon that would be. Much more so than the Sunday afternoon SS blues that most of us are familiar with at present (KW8N/WB8JBM). Doubled my score this year. After chasing the chickens off the antenna and getting the XYL to take the second harmonic out of the shack, I was able to devote two more hours of operating time to this year's bash (WA6GFR). I had a fun time . . . But I wish that the fellas would stop calling me "OM" (KA6V). [Roger that comment, OM — Ed.] It figures: This year I work North Dakota right off the bat, but I don't have much time to operate (KB3XB). After I had been on one frequency for almost a solid hour (on 20 meters, of course), the QRM started moving in . . . One guy told me to get off *his* frequency. After I told him that I had been there for the past hour with no problem, he said that he had been using the frequency since 1958. What the hell could I say? After I picked myself up off the floor, I changed frequency (KF3V). While getting up on my soapbox, I slipped and cracked my shin ((#%&*!). The thing that bothered me the most while operating in the phone portion of the contest were the fellows who, in their rush to turn in a big score, talked so fast that they could not be understood. One

Antennas Used By Top-Scoring Stations

Phone — High Power

Call	*Antennas*
NP4A	"Beams all bands"
AA5B	80-m & 40-m Inv. V (50'); KT34XA (60')
KØRF	"Big ones/Little ones"
WA7NIN	"Beams"
N6BV	80-m dipole; 40-m 3-el beam; 20/15/10 5-el beams
N6TR	80-m 4-el vertical array; 40-m 4-el beam; 20/15/10 7-el beams
K7RI	80-m slopers; 40-m 4-el beam; 20/15/10 pair of KT34XAs
W7RM	80-m bisquare & dipole; 40-m 3-el Yagis & lazy H; 20-m 4-el quad & 3 over 3 Yagis; 15-m 4-el quad & 6 over 6 Yagis; 10-m 7-el quagi & 4 over 4 Yagis
WØYK	80-m dipole (115'); 40-m 2-el beam (90'); 20-m 5-el beam (118'); 15-m 4-el beam (118'); 10-m 7-el beam (128'); KT34XA (40')
W5WMU	"Multibanders"

Phone — Low Power

Call	*Antennas*
KØUK	80-m dipole; 40-m 2-el beam & dipole; 20-m 4-el beam; 15-m 4 over 4 beams; 10-m 5 over 5 beams; TH6DXX
N5RZ	80-m Delta loop (85'); 40-m inv. V, (90') & Delta loop (40'); 20/15/10 KT34XA (90') & CL33 (45')
K4XS	80-m inv. V (90'); 40-m 2-el quad (100'); 20/15/10 KT34XA (100')
KR2N	80-m wire beam (120'); 40-m 3-el beam (70'); 20-m 4 over 4 beams (120'/60'); 15-m 5 over 5 over 5 beams (130/85/50'); 10-m 5 over 5 beams (90/75')
N4RJ	80-m dipole; 40-m 3-el beam; 20-m 4 over 4 beams; 15-m/10-m 5 over 5 beams
K5IID	80-m dipole; 40-m Delta loop; 20/15/10 2-el quad
WB5VZL	80-m & 40-m dipoles (30'); 20/15/10 2-el quad (40')
KM5H	80-m sloper; 40-m 2-el beam; 20/15/10 KT-34XA
WØLSD	80-m & 40-m V beams; "Beams"
WA2STM	80-m, 40-m & 20-m dipoles; 15-m/10-m 4-el Yagis

Cw — High Power

Call	*Antennas*
N5AU	"Lots"
NP4A	40-m 3-el beam; 20-m 5-el beam; 15-m/10-m 6-el beams
K3LR	80-m dipole (75'); 40-m dipole (35') & 4-el beam (75'); 20-m 5-el & 3-el beams (80/60'); 15-m 6-el, 4-el & 3-el beams (90/45/57'); 10-m 7-el & 6-el beams (80/40')
W2YV	80-m dipole; 40-m 2-el beam; 20-m 4-el beam; 15-m 5-el beam; 10-m 6-el beam
W3LPL	80-m dipole; 40-m 3-el beam; 20-m 4-el, 6-el & 8-el beams; 15-m 6-el beam; 10-m 6-el & 4-el beams
K7RI	80-m sloper; 40-m 4-el beam; 20/15/10 pair of KT-34XAs
KØRF	"Large and high/small and low"
K3UA	80-m dipole (30'); 40-m inv. V (35'); 20/15/10 TH6
K5GO	"Various beams, wires"
N6RO	80-m 2-el quad; 40-m 4-el beam; 20-m 5 over 5 beams; 15-m 6 over 6 over 6 beams; 10-m 6 over 5 over 5 beams

Cw — Low Power

Call	*Antennas*
N6IG	80-m & 40-m Inv. V; 20/15/10 KT34XA (75')
W2TZ	80-m dipole; 40-m rotary dipole; 20/15/10 KT34XA
K4XU	80-m & 40-m dipole, vertical, loop; 20/15/10 TH6
N7CW	80-m & 40-m Delta loops; 20/15/10 TH6DX (70')
NØNO	4BTV vertical; 40-m 4-el (105'); 20-m 6-el (90'); 15-m 6-el (75'); 10-m 6-el beam (60'); CL-36 (60')
K1EA	80-m & 40-m dipoles; 20/15/10 Yagis (130')
AD7K	80-m inv. V (48'); 40-m inv. V (30'); 20/15/10 KT34A (52')
N5JB	80-m inv. V; 40/20/15/10 4-el beams
KØLUZ	80-m sloper; 40-m coaxial dipole; 20/15/10 TH6DXX (43')
KØVBU	80-m inv. V; 4BTV vertical; 20/15/10 TH6DXX

operator sounded like a popcorn machine, and I never did copy his call (KC8YR). 20 over QRM, no sleep, pandemonium — What more could you ask for? Why, SS weekend, of course (A17W). Here's a new twist to the old Superman jingle that just may fit some of our top contesters in this event: Faster than a speeding radiowave, stronger than a 2-kW amp, able to make more contacts in an hour than the local village gossip . . . look, it's a bird . . . it's a plane . . . no, it's supercontester (K1VUT). Another great SS! The venerable "bug" still sounds great from W4KFC, W3GRF, W3GN and a very few others. Programmable keyers abound, but give me my bug! (W4YE). The following is something that my multiop partner wrote while I was working Hawaii for a new section: But soft, what code through yonder speaker crackles? It is 10 meters, and the QTH is Hawaii! Hear me, O Hawaii, and give me a multiplier. It calls! But not to me, I fear. Two of the most powerful stations in all Texas, having high antennas, doth entreat this contact. What if we were to exchange places? The strength of my signal would shame those toads as daylight doth a lamp. My signal would through the airy regions stream so fast, that others would tremble lest they collapse. See how they score 1200 QSOs. Oh how I wish that I could too, so that I might win! (KA2IPV/KC2FV). Who says that a 40-meter dipole can't be used successfully on five bands without an antenna tuner? . . . well, maybe my score does (K3QM). I lost all will to continue when one station said he couldn't work me because my call would not fit into his computer due to a glitch in the program (KX4V). My first year in the SS since going off the air for WW II (W9UIX). I was in class B/A because my linear committed suicide 30 minutes into the SS (W8CAR). As always, a very good contest. Succeeded in making my first "clean sweep," but just barely! I was on the verge of admitting defeat once again with only 73 sections when I stumbled across VE8JG with only 9 minutes left (AE4Y). With the blessings of the Deer Lakes High School Volleyball Team, I had to do better this year (KA3BMU). Do any Corn Huskers work Corn Whiskey? My second year in a row to miss Nebraska (VE3GP). Five members of our local club (Utica ARC) pulled apart our stations, antennas and camping gear, and went on a mini DXpedition to the Province of Quebec. It seems that in the past the QUE Section was always a rare one, and we thought that we might help out the cause a little bit (K2IQ/VE2/KK2B).

FEEDBACK

Please refer to May 1982 *QST*, page 71, for the following corrections to the results of the 1981 ARRL November Sweepstakes contest. On cw, the third-highest scorer in Eastern New York, W2XL, was using high power, not low power. In Colorado, top multiop KCØD's operator list should include WAØUJO, not WAØUJD. On phone, please add W7GXC 50, 864-374-68-14-A to the Utah section.

Scores

Cw scores are listed first, followed by phone. Within each call area, scores are listed by ARRL section. Within each section, single operator scores are listed first in descending numerical order, followed by multioperator scores. Each line score lists call sign, final score, number of QSOs, number of sections worked, hours operated and input power used (A = less than 200 W, B = more than 200 W). Example: In Connecticut, K1TO worked 1060 stations in 74 sections for a final score of 156,880 points. He operated 24 hours and used more than 200 W.

CW

Connecticut

K1TO	156,880	1060	74	24	B
K1CC	151,256	1072	74	24	B
AA2Z	145,810	985	73	24	B
K1XA	141,036	966	74	24	B
W1WEF	136,308	921	74	24	B
W1EGR	108,204	762	71	23	A
K1WA	106,848	742	72	24	B
W1GNC	103,740	741	70	19	B
K1RM	101,956	718	71	16	B
W1GNR	98,568	694	71	21	B
K1YBP	96,880	692	70	24	A
W1BIB	88,608	624	71	12	B
K1DW	67,048	493	68	24	A
KG1O	65,130	501	65	18	B
N1CC	48,106	359	67	9	A
K1DM	41,472	324	64	17	A
WA1FCN	36,060	265	68	24	A
W1VV	32,736	264	62	7	B
N1BGA	30,324	266	57	14	A
SA1VC	29,590	269	55	13	B
W1PMR	27,864	228	56	12	B
KM1G	23,920	191	60	14	A
K1IV	19,952	172	58	11	A
WA1SVR	17,052	174	49	18	A
EB1H	16,648	177	47	6	B
WA1RVN	11,250	125	53	6	A
AB1H	7728	89	36	5	A
K1BV	2612	106	16	3	B
WB9EMB/1	4692	69	34	10	A
K1RI	3484	67	26	1	A
KA1YE	1200	30	20	3	A

Eastern Massachusetts

W1WAI	132,768	922	72	24	B
K1EA	129,706	873	74	24	A
K1KM	118,998	813	73	24	A
W1MK (ADIC, opr)	102,816	716	72	22	A
K1AR	100,886	691	73	17	B
K1VDT	99,116	698	71	24	A
W1PM	91,164	642	71	21	A
KG1V	78,576	551	71	23	A
W1AX	57,600	400	72	11	B
WA1OSU	56,166	419	67	21	A
WB1CNM	56,030	431	65	19	B
W1BND	54,730	421	65	13	A
WA2TBA	52,542	417	61	19	A
KA1CLV	48,008	353	68	23	A
K1UCA	40,032	278	72	24	B
K1PAD	38,733	356	54	8	A
KE1D	37,922	281	67	8	A
K1VR	33,540	304	55	7	B
W1HIN	26,510	241	55	6	B
WA@AXH/1	24,944	208	59	11	A
W1TMM	24,012	207	58	15	A
N1AU	20,976	184	57	14	A
KA1KMQ	20,748	182	57	21	A
KA1CHR	20,414	173	59	17	A
N1ASH	17,940	165	53	9	A
W1SB	17,050	155	55	5	A
N1RC	10,904	116	47	4	A
W1AF (K5KX, opr)	9600	100	48	6	A
W1PLJ	8976	102	44	11	B
WA1EOT	5448	115	28	3	A
K1ZXT	6240	80	39	5	A
EB1OF	220	11	10	6	A

Maine

W1KX	56,994	413	69	11	A
WB1GLH	51,360	398	65	20	A
W1HBV	42,210	315	67	13	A
K1JB	40,920	310	66	10	B
WA1YXL	37,674	299	63	17	A
E1SA	7176	92	39	2	A
W1YA (KA1s 821,600, JMF, N1ATN, oprs)	15,264	159	48	24	A

New Hampshire

AK1A	127,750	875	73	24	B
W1PU	120,240	835	72	23	A
W1JY	28,180	258	55	12	A
N1BEY	14,490	105	69	12	A
K1GW	8316	99	42	4	A
N1CHO/N	720	20	18	3	A
KM1C (+KB1T)	174,040	886	70	24	B
N1NH (+K1OSM,K1IM,W1TN)	20,262	509	69	24	A
K1IR (+KA1CJI)	25,896	269	52	14	A

Rhode Island

WA1UVF	31,870	513	70	12	B
K1MXO	53,584	394	68	17	A
W1REQ	22,940	185	62	7	A
WA1DHW	316	12	9	6	A
W1OP (KA1AWS,N1s,AK0,BUM oprs)	48,236	389	62	16	B
WB1EDY (+KA1DHV)	23,640	197	60	14	A
K1JYM (+KA1CQW)	8730	97	45	15	A

Vermont

WB1CQR (WB2JSJ,opr)
114,048- 247-72-24- A
K1TK 102,574- 722-71-20- B
W1RQ 40,138- 329-61-14- B
N1QY 39,786- 349-57-14- A
WA1GUV 31,124- 251-62-16- A

Western Massachusetts

KB1W 90,984- 669-68-16- B
W1PUO (WA1PCO,opr)
10,416- 124-47-11- A
K1TJU 5610- 85-33- 4- A
W1YK (WB1DSO, WA2YBZ,opr)
14,580- 162-45-14- A

2

Eastern New York

W2YV (N2NT,opr)
169,700-1175-77-28- B
K5NA 127,896- 876-73-26- B
W2XL 121,764- 834-73-26- B
W2AZO 118,860- 849-70-23- B
WA2STM 111,612- 786-71-24- A
KB2T (AB2X,opr)
98,542- 701-71-24- B
W2ARQ 77,672- 548-72-26- B
K2UF 69,580- 490-71-19- A
K2HA 66,792- 484-69-23- A
WA2OCA 54,974- 398-69-24- A
W2DW 34,298- 321-69- 9- B
N2JJ 43,282- 323-67- 9- B
AA2Y 37,450- 275-54-12- A
N2AZS 31,620- 255-62- 9- A
K2TR 19,276- 158-61-19- A
WB2KMY 19,488- 174-56- 7- A
W2NRD 17,484- 141-62-15- A
K2AE (W2OHC,opr)
10,584- 126-42- 4- B
W2PKY 5418- 63-43- 4- A
KA2QBD 1296- 36-18-19- A
KW2D (+KC2KK,WA2VYM)
40,434- 293-69-16- A1
K2GBH (+WA2KCL,WA2VN)
39,766- 417-59- 7- B

New York City L. I.

KQ2M 128,084- 902-71-27- B
K2AU 120,078- 811-74-24- B
KK2N (N1EK,opr)
109,624- 772-71-24- A
KK2E 89,488- 658-68-24- B
K2SX 86,380- 670-70-14- B
KA2AEV 74,900- 535-70-14- A
W2LPA 64,108- 466-69-23- A
W2CKZ 43,792- 322-68-12- B
WB2AZC 38,366- 311-62- 9- A
W2UP 27,204- 187-61- 7- A
K2HVN 18,144- 126-72-24- A
K2QAI 12,288- 128-48- 6- A
KK2DH 10,600- 106-50-15- A
WB2CBA 6840- 90-38-10- A
WT2ZK 6930- 94-35-10- A
W2TCK 3564- 66-27- 8- A
N2BAR 3286- 53-31-14- A
WB2FMP 1167- 51-31-10- B
WA2BFS 2842- 49-29- 8- A
WA2YI 2756- 51-27- 7- A
K2ODD 800- 25-16-16- A
W2CZZ 760- 20-19- 1- A
K2RO 240- 15- 8- 3- A
N2CKN (+W2NN)
5168- 26-34- 4- A

Northern New Jersey

W2RQ 158,656-1072-76-28- B
W2VJN (WA2ZKZ,opr)
139,248- 967-72-24- B
W2SHM 96,320- 688-70-22- B
N2OWY 89,760- 660-68-23- A
WB2FUE 57,556- 562-69-24- A
N2CS 61,410- 445-69-18- A
KW4E/2 53,682- 389-69-18- A
WA2JAX 45,016- 331-68-23- A
K2RF 30,132- 241-62- 8- A
WB2KWW 30,080- 235-66-11- A
N2NN 29,680- 208-53- 7- B
WA2ASQ 28,116- 213-66-22- A
K1ZQ 27,720- 231-60-10- A
KT2D 16,854- 159-53- 8- A
WA4PFN 15,680- 160-49- 8- A
WA2BYX 15,186- 157-49-14- A
K2ZB 15,030- 167-45- 7- A
W2TI 13,748- 138-48- 5- A
WA2UDT 11,616- 132-44- 5- A
W2JEK 972- 27-18- 3- A
KC2FV (+KA2IDV,WA2SSH)
119,560- 856-70-24- B

Southern New Jersey

W2CD 161,172-1089-74-28- B
N2BGF 63,960- 533-60-23- A
W2LYL 53,312- 392-68-15- A
K2AA (WA2KOE,opr)
52,390- 404-65-20- B
K2OSV 36,200- 350-66-20- B
K5ZV 33,166- 327-66-12- A
W2BK 21,724- 166-57-21- A
W2PAU 14,344- 256-68- 8- B
WA2HVB 23,940- 210-57-16- A
KA2BEW 23,218- 201-59-10- A
WA2GGY 21,452- 173-67-19- B
K2YY 19,200- 200-68-24- B
W2BLV 17,448- 143-61-14- A
N2RF 16,567- 169-69- 7- B

K2KA 12,240- 107-60- 8- B
KA2NVU 11,520- 120-48-18- A
KK2M 8670- 85-51-18- B
N2DJZ 4092- 66-31- 6- A
N2MR 3036- 66-23- 2- A
KA2KFO (8- 3- 3- 5- A
W2YC (+KC2HPV,N2CQ)
85,820- 613-70-22- A
N2CQ (+WA2NPD,WB2GKS)
36,478- 299-61-20- A

Western New York

W2TZ 136,500- 975-70-24- A
WB2VU/2 98,496- 684-72-23- B
WB2ROE/2 72,384- 569-68-22- A
WA2DHS 73,584- 504-73-20- A
KQ2R 65,660- 490-67-21- A
WA2EYA 48,940- 395-66-14- B
KA2MRP 33,634- 251-67-18- A
K2XU 30,680- 260-59- 8- A
AA2T 29,160- 270-54- 8- A
WB2YQB 28,000- 200-70-12- A
WB2FQE 26,660- 215-62-18- A
WA2LEZ 21,594- 183-59- 7- A
KK2R 20,048- 179-56-10- A
K2GWN 13,552- 121-56- 4- A
KA2HRS 12,000- 120-50-12- A
KA2ARC 9810- 109-45-16- A
N2GO 9108- 99-46- 5- A
KA2TGH 6216- 84-37-10- A
K2UAN 4108- 79-26- 6- A
KA2PAA 2240- 40-28-14- A
KA2EGC 1984- 36-22- 8- A
WA2EQE 1320- 30-22- 8- A
K2QR 768- 24-16- 1- A
K2VV 864- 24-18- 1- B
WZ0W (K1ZP,N2& AEY,HR,oprs)
94,430- 665-71-23- B
KW2J (+W2IMO)
65,660- 469-70-24- A
KG2QQ (+KB2QS)
31,496- 254-62-24- A

3

Delaware

K3UBP 46,860- 330-71-12- A
N8NA/3 13,056- 136-48- 3- A

Eastern Pennsylvania

N3AD 134,828- 911-74-24- B
KC3M 102,018- 753-73-24- A
KC3M 73,220- 523-70-18- A
K3WGR 71,260- 509-70-19- A
W3CNN 64,998- 471-69-16- A
W3FAF 59,734- 433-69-11- A
WA3JLD 58,236- 427-69-16- A
K3DTD 53,726- 407-66-19- A
K3VYA 43,608- 316-69-18- B
WA3MVP 43,110- 355-61-13- B
N3CXB 36,722- 301-61-18- A
K3BCK 34,170- 255-67- 9- A
WB3CAC 31,460- 286-55-10- A
N3KR 30,552- 268-57-11- A
W3ARK 28,768- 248-58- 7- A
KD3H 28,608- 298-48-13- A
WA3YON 26,860- 220-61-15- A
W3ADE 26,334- 209-63-10- A
K3JK 20,886- 177-59- 8- B
W3WJK 11,328- 116-49-17- B
W3CEI 19,656- 182-56- 9- A
WA3JXW 14,300- 143-50-26- A
KB3GL 12,852- 126-51-12- A
N3CPI 12,600- 126-50- 9- A
KC3CB 11,466- 117-49-12- A
WA3SPI 9520- 119-40- 8- A
WA3PYT 9200- 100-46-13- A
K3NL 8988- 107-42- 6- B
W3DZB 8272- 88-47- 6- A
K3GZR 7956- 102-39-14- A
KA3CAN 7220- 95-38- 5- A
K3UPW 6350- 73-29- 7- A
KB3YL 6144- 58-47- 2- A
KA3JGB 5000- 50-40-11- A
KA3DLY 1804- 41-22- 5- A
AD3L 1426- 31-23- 4- A
KA3LLE 1360- 34-20-23- A
KB3YV 1218- 29-21-19- A
N3DCG 704- 22-16-17- A
WA3UGS 160- 10- 8- 3- A
WB3FAA (+WB3CAT)
92,016- 668-71-24- A
W3GM 10,952- 74-74-11- B

Maryland D.C.

W3LPL 168,720-1140-74-24- B
K3SA 142,376- 962-74-24- B
N2FB 141,766- 971-73-24- B
N3AM 136,656- 949-72-23- B
W3QHF (WD4AXM,opr)
134,900- 950-71-23- B
K3KU 130,176- 904-72-26- B
K3ZZ 128,240- 916-70-24- B
K3NA 127,166- 871-73-24- B
K3TM 108,330- 785-69-23- A
K3DI 103,460- 738-70-21- B
K3ZO 101,664- 706-72-17- B
K3WUW 100,536- 708-71-26- A
KC3H 92,726- 653-71-21- A
KA1GD 88,808- 653-68-17- B
W3CRF 83,780- 590-71-24- B
W3FC 80,372- 566-71-24- A
W3ICM 78,100- 550-71-21- B
K3AO 74,408- 524-71-24- B
K3CU 65,660- 469-70-11- B
W3AZ 64,540- 461-70-18- B
W3HVQ 63,888- 484-66-11- B
KD3U 60,060- 429-70-24- A

W3FA 59,532- 451-66-15- B
W3GN 58,788- 426-69-12- B
K2ITG 48,608- 392-62-20- B
W3HVM 39,600- 300-66-13- B
WA3VPI 34,902- 277-63-13- A
N3GB 33,264- 264-63- 8- B
W3IDT 32,208- 264-61-27- A
NA5E/3 31,860- 270-59-11- A
K3NCO 29,760- 248-60- 9- A
K2PLF/3 26,696- 284-47- 9- A
K3CN 18,564- 182-51-11- A
W3EF 18,032- 161-56- 7- A
N3CW 12,480- 120-52- 2- B
WB3JBU 10,810- 115-47-24- B
W1FCR 7442- 61-61-14- A
K1SO 6840- 95-36-10- A
KG3Z 6132- 73-42- 7- B
KA9X 4620- 66-35- 6- A
K4CGY 1776- 37-24- 7- A
W3FZY 1320- 44-15- 2- A

Western Pennsylvania

K3LR 171,236-1157-74-24- B
K3UA 166,944-1128-74-24- B
K3VR 99,120- 708-70-21- A
KG3V 75,576- 564-67-24- B
WA3MDY 73,440- 540-68-23- B
KA3BMU 70,956- 521-68-22- A
W3GNR 58,080- 440-66-20- A
AC3R 56,000- 490-70-19- A
K3MC 51,060- 379-70-21- A
W3IOR 44,020- 310-71- 8- B
WA3BYJ 13,200- 150-44- 3- A
K3CR (K3ED,KI3C,KB3RKX,oprs)
104,832- 709-74-23- B
N2MA/3 (+WA2YA)
82,856- 646-68-24- B

4

Alabama

N4RG (N4QB,opr)
112,840- 806-70-22- B
KA4TSE 68,120- 524-65-18- A
KA1QJ 43,014- 321-67-11- A
K2AB 19,528- 116-54-24- A
WB1M 6600- 100-33- 4- A
KA4NLR (+KC4ZV)
86,940- 621-70-23- B

Georgia

K4HAI 140,160- 960-73-24- B
N4VX 88,992- 618-72-21- B
K4BAM 79,056- 549-72-23- A
K3PC/4 69,680- 536-65-21- A
WB4UEH 67,402- 503-67-20- B
N4HRJ 59,892- 434-69-22- A
K1AY 13,970- 127-55- 6- A

Kentucky

K1AO 137,472- 907-71-24- B
N4XM 106,416- 739-72-24- B
WB4FOT 92,726- 653-71-24- A
K4FD 76,016- 514-72-19- B
W4OYI 27,974- 197-71-24- B
WB0M 16,464- 147-56- 9- A
K2AG 9400- 100-47- 4- A
N4OBH (+KA4TAY, KD4U, KK4Q, N4s RTY,FY, NP4R)
81,860- 599-70-24- A

North Carolina

N4AA 107,712- 748-72-19- B
K4JEX 98,240- 448-65-11- A
W1RTF/4 11,904- 96-62- 8- A
KT4W 4224- 64-44- 2- B
W4BFB (N4DNX,WB5YMS,oprs)
96,440- 615-68-24- A

Northern Florida

N4WW (NX4N,opr)
149,104- 966-72-24- B
N4SA 137,810- 965-71-22- B
K4XS 118,944- 826-72-24- A
WCak 87,416- 606-68-20- A
N4UF 51,030- 405-63-11- B
W4VQ 38,090- 293-65- 6- B
W4ILE 23,880- 199-60-11- A
WD4FNX 9900- 110-45-10- A
N4HQM 3584- 64-28- 8- A
WD6FHT 2880- 40-36- 5- A
KA4GLL 1168- 36-19- 9- B
KA4ZKD 736- 23-16-14- A
KF4GZ (+KF4HA)
31,020- 254-65-21- A

South Carolina

AE4Y 107,448- 726-74-22- B
N4WL 40,040- 364-55-15- A
K4ADI 33,000- 250-66-11- A
N4EE 19,992- 204-49-15- B
KA4YUZ 13,340- 145-46-13- A

Southern Florida

N4BP 150,720-1015-74-24- B
WD4AHZ 75,744- 526-72-24- A
K4QS 59,898- 447-67-22- A
K4XB 59,664- 452-66-21- B
N4KB 31,872- 249-64- 8- B

KD4XN (XB4CDH,N4FZR,oprs)
35,264- 304-58-18- A
KA4BVJ (+WA4DXI,WD4MSA)
20,130- 183-55-12- A

Tennessee

N4ZZ 157,672-1064-74-24- B
K4XU 133,200- 900-74-24- A
N4KC 107,440- 790-68-16- B
N1AM 101,952- 712-73-22- A
WB6ZEG/4 59,268- 449-66-18- A
K4OAQ 55,250- 425-65-12- B
WB4MUZ 45,408- 346-66-18- B
KD4PP 2800- 50-28- 5- A
K4XO 1920- 40-24- 1- B
WA4UCE (KA4MGC,NQ4Y,NS4W.
NS4X,WA4OIE,oprs)
49,536- 387-64-15- B

Virginia

K4PQL 138,700- 950-73-24- B
K4CG (K7BV,opr)
136,510- 935-73-24- B
K2NA 125,356- 847-74-24- B
W4YL 106,178- 737-72-18- B
N4KA 103,248- 717-72-19- A
W4KFC 101,530- 715-71-16- B
W4QQ 96,782- 681-71-20- B
K4JSI 95,900- 685-70-23- A
W4XD 81,340- 581-70-17- B
K4OXQH/4 81,056- 596-68-23- A
K4IF 74,976- 528-71-11- B
N4GW 72,940- 521-70-15- B
WK4B 70,980- 507-70-24- A
K4RJW 65,416- 481-68-21- A
N3QS 62,016- 456-68-19- A
K4TM 60,444- 438-69-15- A
WD4E 58,740- 445-66-10- B
K4OD 57,822- 419-69-16- B
K4PPF 57,456- 417-69-20- A
KX4V 56,580- 410-69-12- A
W4MD 55,870- 390-69-20- A
KA4S (WA4YZA,opr)
41,992- 367-58- 8- B
K8EI 39,438- 313-63-10- A
KT4U 38,704- 328-59- 8- A
WA4MTP 36,600- 305-60-11- A
KA4RLJ 27,956- 241-58-15- A
WD4JHY 27,840- 232-60-11- A
WA4FKK 23,188- 187-62-14- A
N4RA 19,344- 186-52- 5- A
WB4INT 18,914- 193-49-13- A
KA4OKD 15,974- 161-49-24- B
KC4EM/4 13,056- 128-51- 6- A
N3JT 10,658- 73-73-13- B
KA1CQ 9952- 92-18- 4- A
KC4ZV 3403- 63-27- 8- A
WA4EMU 1440- 36-20- 2- A
KA4YFK 690- 23-15- 1- B
W4POX (AA4AT, KA4s, LLK, LLO,
N4FLF, WA4TDS, oprs)
81,464- 599-68-18- B
W4IY (AF2T,KD4IC,WA2CR,WB4RDV,
WL4A,oprs)
41,072- 302-68-21- B

West Indies

NP4A (N4TO,opr)
178,488-1206-74-24- B

5

Arkansas

K5GO 166,352-1124-74-24- B
KM5G 98,670- 715-69-26- A
WA0GG 18,144- 162-56- 6- A
W5KL 3840- 64-40- 2- B
KY5M (AA5M; K5SUS, KA5s,NLA
PGA, KB5QL, NS5RP,WA5VVI,
WB5s LRP,WMG,WD5BIV,oprs)
67,134- 501-67-24- B

Louisiana

W5WMU 151,846-1078-74-26- B
KA5B 68,640- 520-66-22- A
N5KUY 54,136- 404-67-24- A
NB5F 53,406- 387-69-23- A
W5WG 50,410- 355-71-24- A
KA5BER/5 6464- 101-32- 5- A

Mississippi

N5XA 20,650- 175-59- 4- B
KK5K 12,004- 123-49-22- A
KV5F 2800- 50-28- 8- A

New Mexico

AA5B 152,496-1039-72-24- B
W5JK 147,704- 998-74-24- B
K7UP/5 84,180- 610-69-18- A
KN5D 40,300- 310-65-24- A
N5RR 37,170- 290-64- 8- A
KT5R 24,644- 202-61- 4- B
N5EZA 9944- 113-44-21- A

Northern Texas

N5AU (K5ZO,opr)
179,968-1216-74-24- B

K5RX (KM5R,opr)
147,556- 997-74-24- B
N5CR 138,504- 949-71-24- B
K5NW 131,200- 925-72-23- B
N5JB 127,478- 861-74-24- A
AF5K 116,824- 839-68-23- B
K5MM 108,000- 750-72-20- B
K5FUV (K5MR,opr)
104,400- 725-72-16- B
W9PL/5 103,496- 761-68-24- B
KB5UL 91,420- 653-70-24- A
N4US 86,380- 617-70-24- A
KA5GFJ 60,978- 448-68-23- B
KY5N 58,098- 421-69-18- A
K5ME 50,750- 375-67-20- A
K5HM 42,880- 335-64-17- B
W5AH 37,620- 285-66-24- B
K5PO 21,890- 199-55-13- A
N5EG 19,300- 193-50- 6- B
NN5BQQ 18,480- 165-56-14- A
N5BT 10,890- 121-45- 6- B
KA5OPZ 850- 25-17- 9- A
WB5VZL (+N5HD)
104,940- 795-66-24- B

Oklahoma

KN5K 106,872- 742-73-24- A
W7EC 58,660- 570-69-16- B
K5HR 52,512- 354-66-14- A
K7CW/5 22,246- 239-57- 9- A
KC4WQ 23,100- 210-55-11- A
AB5ZQ 5544- 66-42- 5- A
N5EST 4624- 68-34- 6- A
N5CC (+K5CR,N5KW)
143,136- 994-72-24- B
N0IN/5 (+W5AS)
122,544- 828-74-24- B

Southern Texas

N5JJ 157,680-1080-73-24- B
K5GA 154,512-1044-74-24- B
K5ZM 153,328-1036-74-24- B
K5GN 150,960-1028-74-24- B
K5IY (KN5K,opr)
150,812-1019-74-24- B
K5WA 149,480-1010-74-24- B
K5LZO 145,416- 986-73-24- B
NA5R 133,590- 915-73-24- B
N5OU 130,536- 882-74-24- B
K5SO 126,024- 838-74-24- B
K5RG 119,520- 810-72-22- B
K5MA 119,428- 818-73-24- A
K5MD 101,640- 726-70-24- A
N5EA 97,412- 686-71-19- B
W5ASP 89,512- 668-67-24- A
K5VWW 87,672- 616-71-19- B
KN5A 81,708- 619-66-19- B
AC5K 81,072- 561-72-19- A
W5JQ 75,544- 532-71-13- B
W5HNS 74,766- 523-71-20- B
K5GB 73,500- 525-70-15- B
KA7MT/5 62,640- 435-72-16- A
W5SG 56,000- 400-70-17- A
W5PWG 52,664- 376-70-17- A
W5NR 51,680- 364-60-12- B
KC5GP 15,960- 140-57-16- A
W5LIT 13,600- 136-50- 6- A
WN5GMB 12,402- 117-53-11- A
WD8DKJ/5 7188- 87-69-15- A
KD5SP (+KY5A,WB5WHR)
119,280- 840-71-24- B
KU5C (+K2TNO,KB5KH)
114,240- 816-70-24- B

6

East Bay

N6KU 164,688-1128-73-24- B
N6TR 136,802- 937-73-24- A
K6MIV 103,460- 739-70-24- A
N6KB 98,980- 707-70-22- B
K6ATV 76,680- 540-71-23- A
K5GN 64,582- 459-69-24- A
K6ZM 58,098- 421-69-14- B
K7UNY 41,268- 332-62-12- A
K6CSL 23,968- 214-56-20- A
KA6SOC 12,204- 113-54-16- A
K5GQ 800- 25-16- 3- A

Los Angeles

WA6E (AA6RX,opr)
142,496- 976-73-24- B
W6AQ (WA6OTU,opr)
136,364- 934-73-24- B
AK6I 92,680- 662-70-24- B
N6PN 89,607- 611-71-17- A
WB9BRO/6 80,920- 580-67-22- A
WB6VVS 33,306- 273-61-18- A
WA6HQS 5180- 74-35-11- A
WA6ACN (K6TTE,KN6L,NB6E,WB6HRU,
WD6ACN,oprs)
120,384- 816-72-24- B

Orange

WA6JAH 119,136- 816-73-23- B
AL6E 91,980- 630-73-24- A
AA6DP 54,144- 423-64-12- B
K6RRT 36,478- 299-61-15- B
WA6CFR 800- 25-16- 3- A
NA6SR (KA6s, HWV,RUX,N6FPN,
oprs)
20,020- 182-55-24- A

Pacific

AH6BR 113,760- 790-72-17- B
AH6J 1000- 50-10-24- B

Sacramento Valley

AI6V 111,470- 785-71-23- B
K6SG 99,792- 693-72-22- B
KV6H 88,184- 604-73-23- B
KF6A 68,900- 530-65-14- B
K6FO 59,892- 434-69-16- B
AA6DX 57,156- 433-66-18- A
W6EGX 51,060- 370-69-17- A
WA6BRV 7912- 92-43- 7- A
N6GQA 2464- 44-28-20- A
N6JM 240- 12-10- 1- A

San Diego

N6ND 116,216- 796-73-24- A
NI6W 102,060- 729-70-24- B
AA6EE 62,152- 457-68-16- B
N6BFE 58,504- 412-71-24- A
K6ZH 47,916- 363-66-12- A
W6JXA 22,448- 184-61-12- A
W6JL 10,340- 110-47- 4- A
W6NWG (AD6Z, K5GZ,K6NS KF6BL, N6s GKA,GKI,W6s UWE, OLQ, WA6OLI,WD6FUE oprs)
31,808- 284-56-24- B

San Francisco

WA6AUE 81,508- 574-71-24- A
K6LRN 27,342- 217-63-10- A
WD6FMC 40- 5- 4- 2- A
W6BIP (+WA6DJI)
130,516- 882-74-24- B

San Joaquin Valley

N6CG 127,020- 870-73-24- B
K6BPB 29,610- 235-63-18- A
W6SX 18,360- 170-54- 3- B
N6AVV 8478- 98-43- 8- B
W6MUV 3000- 50-30- 8- A
WD6DET (+WB6YMK)
32,096- 272-59-23- A

Santa Barbara

N6TR 77,870- 599-64- 8- B
W2KVA/6 70,356- 533-66-27- B
W6TKF 51,940- 435-62-16- A
WA6VNN 49,404- 358-69-21- A
KR6B 38,960- 295-66-13- A
KD6JY 35,466- 257-69-10- A
KA6GKU 9776- 104-47- 6- A

Santa Clara Valley

N6BV 153,354-1049-73-24- B
N6CM 136,802- 937-73-24- B
AJ6V 127,516- 898-71-24- B
KD6PY 120,620- 815-74-24- A
N6BT (N6XI,opr)
114,316- 796-72-24- A
NI6C 110,160- 765-72-24- B
N6AHV 110,112- 744-74-24- B
W6IO 94,640- 676-70-22- A
N6SJ 93,840- 680-69-24- A
K6OMB 83,580- 597-70-22- A
N6CN 78,384- 552-71-13- B
N6KL 44,460- 342-65-18- A
K2OMH/6 43,248- 318-68-13- A
W6PRJ 41,340- 318-65-24- A
N6NF 41,160- 343-60- 7- B
WB6IYS 23,868- 221-54-24- A
K6OC 14,632- 118-62-10- A
N6ST 13,020- 155-42- 3- B
WB6YZI 9720- 108-45- 4- A
AA6PZ 9040- 113-40- 4- B
WD6DXH 1600- 40-20- 3- A
K6URO 1188- 33-18-10- A
K6MA 640- 20-16- 2- A
N6KJG 504- 18-14-11- A
WA6AZP 442- 17-13- 6- A
WA6HAD 416- 16-13- 5- A
WB6AAJ 128- 8- 8- 1- A
W6YX (NI0O,N3ER,W3KF,W5XU, WA2BSB oprs)
111,160- 794-70-24- B

7

Alaska

AL7EO 83,440- 596-70-17- B
KL7Y 79,278- 543-73-16- B
KL7HG 12- 5- 2- 1- A

Arizona

K6LL 167,876-1147-71-24- B
K7OX 139,430- 955-73-24- B
N9BT/7 133,590- 915-73-24- B
N7CW 131,546- 901-73-24- A
W7ZMD 94,288- 664-71-23- B
KN7N 80,668- 607-67-20- A
N7CPL 71,710- 505-71-22- A
W7YS 53,592- 406-66-16- A
WA7NXL 42,600- 300-71-12- A
KC7V 5624- 74-38- 4- A

Idaho

KØEJ 111,888- 756-74-24- A
K7QD 109,072- 802-68-23- A
K7NHV 101,920- 728-70-12- B
WB7FAR (KS7V,opr)
86,536- 601-72-24- A
KE7X 57,200- 440-65-19- A
WB7TJI 39,704- 297-66-15- A

Montana

K7ABV 65,076- 493-66-24- A
WA7GVT 8652- 103-42-14- A
KA7LVI 540- 18-15- 4- A
KS7T (+KA7GVI)
114,048- 792-72-23- B

Nevada

WA7NIN (W6OAT,opr)
158,848-1088-73-24- B
WA7UEC 139,824- 971-72-24- B
AD7K 128,880- 895-72-24- A

Oregon

W7NI 138,460- 989-70-24- B
W7WHO 118,406- 811-73-24- A
N7ACO 78,368- 632-62-24- A
K7KJM 69,144- 516-67-23- A
W7YAQ 67,024- 472-71-17- A
W7TC 65,472- 496-66-22- A
W7KN 54,936- 436-63- 7- A
WA7OEM 51,724- 386-67-18- A
K7OBV 48,714- 353-69-22- A
WB7UFJ 37,888- 296-64-23- A
N7DG 19,668- 149-66-12- B
AI7W 18,368- 164-56-20- A
K7WPC (+KM7R)
91,908- 666-69-24- B

Utah

K7CPC 85,400- 610-70-23- A
KN7H 29,696- 256-58-13- A
K1FR/7 16,652- 181-46- 7- B

Washington

K7RI (W7WA,opr)
167,462-1147-73-24- B
W7RM (KB7C,opr)
156,672-1088-72-24- B
K7LR 141,932- 959-74-23- B
KR7G 119,990- 845-71-22- B
K7WA 115,632- 803-72-24- A
KG7V 100,962- 711-71-24- B
KI7Y 98,000- 700-70-18- B
W7LKG 94,500- 675-70-24- B
W7BUN 90,020- 643-70-22- B
K7FR 85,408- 628-68-18- A
N7TT 80,780- 577-70-24- A
N7ENL 74,256- 546-68-22- A
W2JWF/7 58,512- 424-69-23- A
WB7WUM 53,856- 408-66-17- B
K7NF 33,280- 260-64-11- B
W7EOF 27,040- 208-65-16- A
W7PRG 16,932- 166-51-14- A
KS7I 16,200- 135-60-11- A
K7BFL 15,402- 151-51- 8- A
KA7GXU 15,120- 140-54-22- A
K7OU 13,530- 165-41- 5- A
AI7K 12,900- 129-50-14- A
W7PK 11,662- 119-49- 5- A
N7RV 11,514- 101-57- 8- A
W7BYK 10,400- 100-52- 8- A
W7JTE 4896- 68-36- 4- A
W7RCD 4026- 61-33-12- B
W7TEU 3762- 57-33- 4- A
N7DX 2800- 50-28- 2- A
AK7S 468- 18-13- 3- A
AI7N 288- 12-12- 1- A
W7WC 256- 16- 8- 5- A
KC7NA 72- 6- 6- 5- A
KA7FHH 32- 4- 4-10- A
K7SS 24- 6- 2- 1- A
AG7M (multi-op)
137,882- 971-71-24- B
N7COV (+KT7H)
66,528- 504-66-20- A

Wyoming

K7ID 90,160- 644-70-22- B
WA8MAN/7 84,140- 601-70-24- A
WØETT/7 72,420- 510-71-17- A
KA7FKT 60,288- 471-64-18- A
WB7CFL 45,408- 344-66-17- A
KW7L 28,652- 247-58-22- A
KA7LWY 3248- 58-28-19- A

8

Michigan

WA8YVR 142,080- 960-74-24- B
K8DO 111,544- 764-73-23- B
KO8T 111,504- 808-69-24- B
K8SS 95,336- 701-68-18- B
K8MW 95,046- 651-73-24- A
K8KA 91,542- 627-73-24- A
KJ8A 90,454- 637-71-23- A
N8EA 86,180- 617-70-16- B
W8LVN 78,780- 606-65-23- A
KO8M 75,486- 547-69-24- A
W8VPC 72,800- 520-70-22- A
KS8Q 62,968- 463-68-24- B
AC8W 56,980- 407-70-10- B
W8UE 53,248- 416-64-16- A
AJ8C 47,616- 384-62-19- B
K8CV 45,952- 359-64-21- A
K8SIA 45,500- 350-65-17- B
KO8H 44,888- 362-62-22- A
KW8G 40,560- 312-65-22- A
K8JCB 40,424- 326-62-10- B
I8RW 33,604- 271-62-16- A
WB8AAX 30,740- 290-53- 9- A
N8CQA 29,070- 255-57-17- A
K8OT 28,396- 229-62-24- A
W8EGI 27,404- 221-62-10- A
WA8VEB 22,680- 180-63- 8- A
KA8JBK/N 21,480- 179-60-18- A
W8PVI 17,236- 139-62-10- A
WA8BSF 15,476- 146-53-13- B
K8QWG 14,484- 142-51-17- A
W8SCW 13,000- 130-50- 6 A
WB6NYR 10,716- 114-47- 9- A
KA8NCR 10,710- 119-45-17- A
N8AOE 7488- 104-36- 5- A
KA8IIN 2542- 41-31- 5- A
KE8X 1680- 35-24- 2- A
KA8APL 1240- 31-20- 9- A
WB8TCY 540- 18-15- 5- A
KA8QKO 162- 9- 9- 3- A
KR8L 160- 10- 8- 1- A
K8JM (+N8BVY)
79,626- 577-69-22- A
K8DAC (K8s,CQF,DO,WS,KA8PWO, KY8C,WD8JQL,oprs)
41,236- 338-61-24- A
W8PLP (+N8DPH)
17,600- 160-45-17- A

Ohio

K8ND 139,536- 969-72-24- B
W8FN 134,496- 934-72-24- B
K8MN 134,028- 918-73-24- B
W8LNO 114,452- 806-71-21- B
K8BL 110,016- 764-72-24- A
KU8E 109,872- 763-72-24- A
W8RSW 106,536- 772-69-24- B
W8KRR 100,656- 699-72-21- B
W8CAR 97,160- 694-70-24- B
K8MR 87,360- 624-70-12- B
W8UPB 85,968- 597-72-24- B
KF1V 83,916- 567-74-24- B
K8DB (K8MR,opr)
77,142- 559-69-12- B
KV8Q 76,112- 536-71-24- A
KR8Y 74,906- 559-67-23- A
WB8NBA 70,528- 551-64-18- B
KA8HUZ 59,080- 422-70-18- A
W8IDM 47,320- 364-65-15- B
N8BJQ 45,990- 365-63-11- A
N8TN 65,144- 342-66-11- B
K3JT 44,354- 331-67-14- A
W8VQI 44,352- 352-63-17- A
AC8X 43,952- 328-67-14- A
K8LGA 42,420- 303-70-17- A
KA8ETK 38,860- 335-58-13- A
WA8EUK 36,704- 296-62-10- B
N8CRF 33,794- 277-61- 8- A
WB8LZR 32,774- 303-54-21- A
KC8JH 31,000- 250-62-13- A
W8DWP 27,404- 221-62-16- A
W8GOC 24,024- 211-57- 7- A
W8EAR 23,826- 209-57-12- A
W8EAO 20,300- 175-58-15- A
W8PN 16,416- 152-54-10- A
AF8C 15,120- 140-54-13- A
W8BO 9400- 100-47- 5- A
KC8YR 7476- 89-42-23- A
KA8OKH 7326- 99-37- 8- A
KJ8I 7072- 106-36-24- A
KA8PYE 6160- 65-32-15- A
W8DXT 3840- 60-32-18- B
W8VZK 3498- 53-33- 5- A
W8XT 3422- 59-29- 3- A
N8ATT 2184- 52-21- 5- A
N8KGD 1650 33-25-17- A
W8XH 816 24-17- 1- A
WD8IDF 630- 21-15-11 A
WD8IBM (K8OS,KC8XK,KW8N,N8s, ATR,DCI,DMM,WB8LGN,WD8s AHB, LIP,oprs)
154,944-1076-72-24- B
K1LT (+K8LT)
125,578- 886-71-26- B
W8UPD (KA8ICH,KK8H,KK8L,oprs)
80,730- 585-69-21- B
KC8ZH (+KA8QLM,WD8LJD)
23,600- 200-59-20- A

West Virginia

N8II 151,548-1038-73-24- B
KD8G 115,778- 793-73-23- A
WA3EOQ/8 80,784- 561-72-23- B
W4NW/8 79,776- 554-72-14- A
K8BFJ 73,556- 518-71-17- B
W8JWX 28,476- 226-63-10- A
W8LRL 3200- 50-32- 3- B
WD8CZA 850- 25-17- 5- A

9

Illinois

K9KM 145,286-1023-71-24- B
K9RF (K9GL,opr)
143,518- 983-73-24- B
WAØAVI 117,384- 804-73-24- B
K9RS 114,954- 833-69-17- B
W9NEC 107,744- 728-74-24- A
N9ACJ 100,800- 700-72-24- A
K9BG 92,680- 662-70-24- A
K9JU 90,596- 638-71-22- A
WD9DBC 78,870- 563-70-24- B
K9LUW 78,242- 551-71-24- A
N9EP 73,698- 519-71-17- A
N9CW 60,836- 454-67-17- A
K9YAX 58,072- 427-68-12- B
AI9H 56,440- 415-68-24- A
N9TI 52,800- 400-66-10- B
N9BWE 46,092- 334-69-10- A
N9NA 45,630- 351-65-10- A
N9AUZ 41,600- 325-64- 9- A
WB9NIC 41,406- 309-67-14- A
WA9MRD 33,150- 255-65- 9- A
WB9TBD 31,824- 234-68-17- A
K9BQL 27,186- 197-69-10- A
K9NO 23,328- 216-54- 6- A
W9REC 22,016- 172-64-14- A
W9ZEN 21,960- 180-61- 8- A
W9QWM 19,372- 167-58- 8- A
W9LNQ 12,180- 87-70- 9- A
W9HBI 8568- 102-42- 5- A
W9ACM 2800- 50-28- 3- A
N9ANK 660- 22-15- 4- A
AK9N 220- 11-10- 1- A
W9JWC (KA9KIH,KAØCIL,KO2R, N9CAG,WB9UTY,oprs)
52,800- 400-66-21- B

Indiana

W9RE 140,438- 989-71-24- B
W9LT 127,374- 897-71-24- B
W9OBF 94,360- 674-70-24- A
N9CR 85,848- 588-73-24- A
AE9Y 82,104- 622-66-24- A
W9JOO 80,154- 549-73-24- A
W9XD 75,260- 530-71-20- A
W8UT 59,328- 412-72-19- A
W9UDX 5254- 71-37-19- A
W9QLW 3696- 56-33- 3- A
K1TH/9 1240- 31-20- 4- A
KJ9D (+KK9V)
141,552- 983-72-24- B
KM9D (+KB9YD,n9s NB,NC, WB9POH)
139,768- 941-74-24- B
W9YB (DF4CK, KA9s DSM,NOH, KK9W, N9s GUZ,EI,oprs)
71,424- 496-72-24- B

Wisconsin

W9YT (WB9PYE,opr)
131,868- 891-74-24- B
W9OP 111,896- 788-71-24- B
W2WOX/9 94,288- 664-71-23- B
K9LJN 80,802- 603-67-21- A
K9GDF 76,580- 547-70-12- B
N9NE 71,424- 496-72-16- A
N9CIQ 64,446- 467-69-17- A
N9TD 56,856- 412-69-20- A
KB9S 56,168- 413-68-14- A
WA1UJU/9 51,408- 408-63-19- A
W9CHD 51,136- 376-68-17- A
N9BYK 48,422- 341-71-13- A
AJ9U 48,312- 396-61-24- A
K09Q 33,410- 257-65- 7- A
K9KR 20,832- 186-56-10- A
KB9W 20,790- 189-55- 7- A
N9AW 19,560- 163-60- 9- A
WB9LKO 17,100- 150-57- 9- A
WB9UGS 16,192- 184-44-24- A
N9KS 3400- 50-34- 2- A
KG9SM 2080- 40-26- 6- A
KØFVF/9 (+KØTG,KHØO,WAØRBW)
121,824- 846-72-24- B

Ø

Colorado

KØRF (WØHA,opr)
167,388-1141-74-24- B
N2IC 153,936-1069-72-24- B
WØYK 143,520-1040-69-21- B
KNØE 118,116- 946-73-23- B
ADØO 98,406- 675-[illegible] A
WØCP 96,120- 688-70-17- A
ACØS 88,448- 660-67-18- B
KØGN 87,360- 580-71-[illegible] B
K1ØJ 55,610- 415-67-19- A
WØDK (KRØU,opr)
53,596- 366-63-12- A
KØUK 25,278- 218-53- 6- A
WØSC [illegible] 202-60-10- A
KVØL 3360- 48-35-10- A
KAØIXW 12- 3- 2- 9- A
KLØU (+KDØY,WAØUJO)
115,736- 851-68-24- B
W7XG (+KJØG)
93,578- 659-71-24- A

Iowa

NØCA 153,738-1055-73-24- B
N4RR/Ø 141,840- 985-72-24- B
KFØH 139,824- 971-72-24- B
KØLOZ 126,288- 877-72-24- A
KØIS 105,980- 757-70-24- A
KØLCI 14,700- 147-50-24- A
WØIZ 87,640- 626-70-23- A
KØMM 60,984- 462-66-10- B
KKØR 36,120- 301-60-14- A
WBØGSG 34,720- 280-62-14- A
WØYBV 26,640- 176-70-24- A
WØJTC 24,624- 216-57-13- A
AKØM 20,272- 181-56- 5- A
WB9IOG/Ø 18,920- 172-55-11- A
KBØPR 8528- 104-41-11- A
KEØY 8528- 104-41- 6- A
K9AYK/Ø 6396- 82-39- 8- B
WØANZ 2520- 45-28-24- A

Kansas

KBØC 130,924- 922-71-24- B
KØVBU 121,508- 821-74-24- A
KØWA 112,748- 794-71-20- B
KFØM 82,040- 586-70-24- B
WØSOE (WAØVIF,opr)
74,520- 540-69-18- A
WØQQQ (WBØQFV,opr)
53,332- 398-67-19- B
ACØE 23,004- 213-54-11- A
NØDEE 22,184- 188-59-14- A
WØBT 16,642- 157-53-15- A
WDØHAC 630- 21-15- 3- A
KØYBV 308- 14-11- 7- A

Minnesota

NØNO 131,040- 936-70-24- A
WØHW 122,932- 842-73-24- B
KQ8M/Ø 121,248- 842-72-23- B
KØIJL 117,360- 815-72-24- A
WØWDW 110,568- 813-68-23- B
K3WT 97,152- 704-69-24- A
KØFZG 91,590- 645-71-24- A
WØYCR 85,960- 614-70-20- B
KNØO 66,660- 505-66-22- A
KSØT 48,688- 358-68-14- A
WAØACF 47,460- 339-70-15- A
KØTK 39,680- 320-62- 5- B
KØMPH 37,926- 301-63- 7- A
KBØM 26,908- 217-62-14- A
NØBSH 25,010- 205-61-13- A
WØISJ 21,816- 202-54- 4- B
WAØWWW 21,670- 197-55-12- A
KØIHC 19,470- 177-55- 4- A
WØTIV 16,016- 143-56- 5- A
WA2HFI/Ø 15,504- 136-57-12- A
WAØWHT 11,500- 125-46-10- A
KØVW 9306- 99-47- 3- A
KCØTY 6804- 81-42- 9- A
WBØGGM (+WAØRLW)
49,500- 375-66-23- A
ACØW (+WBØRSW)
27,060- 205-66-18- A

Missouri

K4VX (KRØY,opr)
151,032-1034-74-24- B
KØRWL 113,472- 788-72-24- A
KMØL 112,896- 784-72-23- B
NØTT 112,322- 791-71-24- A
KØDEQ 109,296- 759-72-22- B
NØAX 69,860- 499-70-22- A
KUØC 62,100- 450-69-13- A
KMØA 44,336- 326-68-12- A
WØRNC 36,046- 269-67-11- A
K9DF/Ø 23,896- 206-58-11- A
WA5KCS/Ø 20,592- 198-52-10- B
WØKCG 11,000- 100-55- 5- A
WDØARX 10,500- 125-42-16- A
KEØI 6900- 75-46- 4- A
NØAQC 2640- 44-30- 7- A
KAØP 1820- 35-26- 2- A
KMØP (KMØR,WØHBH,WAØLTF, oprs)
78,680- 562-70-19- B

Nebraska

KVØT 84,822- 633-67-22- A
NØBNY 9990- 111-45- 4- A
KØDI (+KØNB)
107,136- 751-68-10- B
KØSCH (+NØDMV)
72,488- 533-68-18- A

North Dakota

AKØI 129,4[illegible]- 938-69-2[illegible]- B
WØ[illegible] [illegible]- 50[illegible]-6[illegible]-11- A
KIØF 1[illegible]- 110-59-10- A
WØ[illegible] [illegible]- [illegible]-51- 8- A
K[illegible]ØH [illegible]- [illegible]-11- A
KCØW [illegible] [illegible] A

South Dakota

WDØLXH 36,424- 314-58- 6- B
KØIV 30,210- 265-57-11- A
KIØD 29,400- 245-60-22- A
KØVVY (KAØs CVY,KQD,MXR,NQQ, KBØQA,WB7VDZ,WDØEWA,oprs)
122,080- 872-70-24- B

VE

Maritime-Newfoundland

VO1QST (VO1AW,opr)
12,600- 126-50-24- B

Quebec

VE2DPO 60,340- 431-70-24- A
VE2FFE 12,576- 131-48- 5- B
VE2UN (VE1BHA, VE3JRC,oprs)
68,340- 510-67-24- A

Ontario

VE3GP 79,560- 585-68-24- B
VE3ATD 73,554- 533-69-22- A
VE3IRF 60,168- 436-69-20- A
VE3AWE 37,560- 313-60- 9- B
WA4TNI/VE3 8428- 98-43- 9- A
VE3FML 208- 13- 8-10- A
VE3ART (VE3s,ABG,DAO,FBI,GAS, GLD,HAS,oprs)
109,072- 802-68-21- B

Manitoba

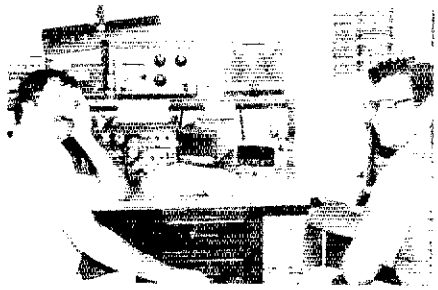
VE4RF 17,818- 151-59- 7- A

Saskatchewan

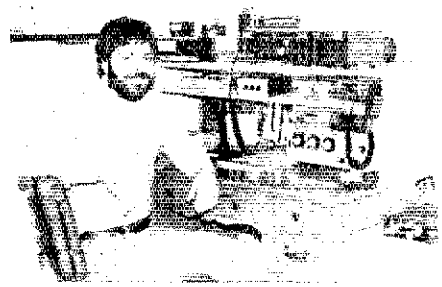
VE5XE 145,550-1025-71-24- B
VE5BBQ 8160- 102-40- 2- A

Yukon-N.W.T.

VY1DD 1564- 34-23- 2- A



NY4F (left) and N4FOC finished the contest wondering if it was all worth it. Guess it was, because Don is threatening to have a 40-meter beam for November 1983.



Dave, ND4Y, finished tops on phone in Kentucky.

NØAKC (left), K9FYZ, N9BLR and NØBSH operated K9FYZ to the top phone multiop slot in Wisconsin.

PHONE

1

Connecticut

W1WLF	198,264-1341-74-24-	B
K1TO	186,917-1298-72-24-	B
K1WA	152,536-1094-72-24-	B
K1CL	125,652- 849-74-11-	B
K1NYK	71,266- 836-74-22-	B
KA1VL	112,470- 770-73-24-	A
KA1DZV	102,276- 771-69-24-	A
N1CC	86,600- 600-72-16-	A
K1DD	76,608- 537-72-16-	B
K1AV	70,140- 501-70-18-	B
K1YNP	54,500- 425-70-17-	A
KG1D	53,900- 385-70-24-	B
N1NCA	48,410- 365-67-17-	A
N1LW	46,298- 371-69- 1-	A
W1VV	41,646- 317-69- 6-	B
K1DW	36,992- 289-64-24-	A
K1NCO	30,208- 236-64-15-	A
K1DM	28,670- 235-61-17-	A
KA1YE	25,872- 208-58-12-	A
K1EM	19,404- 156-63- 9-	A
W1PNR	17,114- 144-43-15-	B
KA1YS	15,386- 151-49-20-	B
W1BIB	15,234- 103-74- 5-	B
AB1U	10,638- 79-35- 6-	A
AA1R	7056- 112-44-10-	A
FM1G	6150- 75-41- 5-	A
WB9FMR	3864- 69-28- 9-	A
K1DII	2800- 50-28- 2-	A
K1EI	1268- 33-17-14-	A
W1OD (+AK4L)	188,637-1297-73-26-	B
K1AS (+KB1S,II,L,WA1S,HYN, RLV)	135,926- 931-75-22-	B
WA1DBW (+K1VRT,W1ODY,KR2V)	112,752- 784-72-23-	B

New Hampshire

K1AR	209,420-1415-74-21-	B
KM1C (WB8BTH,opr)	194,856-1266-74-24-	B
AF1T	111,148- 912-72-21-	B
WA1TRH	96,252- 698-72-22-	A
N1BEY	64,824- 444-73-22-	A
KE1E	62,472- 321-66-19-	A
AC1C	29,232- 232-63- 9-	A
AC1J	12,546- 123-51- 6-	A
KE1M	12,200- 127-50- 8-	A
K1GW	7656- 87-44- 3-	A
N1BEL	2016- 16-28- 3-	A

Rhode Island

WA1CVF	105,548- 774-74-17-	B
K1VSI	96,700- 650-74-21-	B
W1RKQ	8192- 64-64- 1-	A
KA1AWS	5760- 87-15-10-	A
W1LQA	2720- 61-15- 3-	A
W1OP (N1S ARU,BRM,WA1RKL, WB1FBY,opers)	76,440- 546-70-22-	B
WB1FBY (+KA1DBV)	25,080- 209-60-16-	A

Vermont

WB1GQR	188,496-1273-74-24-	B
W1KO	38,344- 429-68-14-	B
WA1JGK	40,392- 297-68-12-	B

Western Massachusetts

WA1ZAM	82,080- 570-72-23-	A
N1SK	34,680- 289-60-10-	A
N1XZ (+WA1VEL)	114,624- 796-72-22-	B
W1YK (AK1J, WA2YHZ,WB1BSO, opers)	92,300- 650-71-24-	B
W1PGO (KA1BDB,KF1R,WA1FED, WB1ODF,KR4N,opers)	56,516- 398-71-24-	A

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Eastern New York

K2TR	244,940-1655-74-24-	B
WA2SIM	128,880- 895-72-24-	A
KB2T (AG2Z,opr)	125,208- 846-74-24-	B
W2ARQ	113,664- 768-74-24-	B
K2QF	95,192- 652-73-21-	A
KU2G	86,360- 635-68-20-	B
W2HES	62,580- 447-70-16-	B
N2BHP	56,816- 424-67-16-	A
KB2HQ	52,080- 372-70-19-	B
KW2T	44,472- 327-68-22-	A
W2DW	42,504- 308-69-10-	B
WB2ENA	37,296- 311-68-16-	A
WA2KLV	32,210- 315-67-19-	A
K1ZB	28,116- 198-71-19-	A
KU2W	25,578- 203-63-14-	A
N2II	23,936- 176-68- 8-	B
WB2OBV	23,230- 179-65- 9-	B
KA2DVK	20,300- 145-58-17-	A
WA2DWD	18,576- 177-54-15-	A
K2QF	15,300- 150-51- 6-	B
WA2EQW	1448- 56-31- 2-	B
W2XL (+KA2KVZ)	110,814- 759-75-10-	B
WB2KMY (+N4FFD)	84,664- 581-72-23-	A
KW2D (+KC2KK)	34,790- 245-71-16-	A

N.Y.C. & Long Island

KR2N (KQ2M,opr)	154,928-1068-73-24-	A
KK2E	143,980- 957-70-24-	B
K2AU	82,782- 567-73-19-	B
WB2EKC	73,500- 525-70-20-	A
K9ZG	71,148- 515 71-16-	A
KA2AEV	71,008- 507-72-13-	A
N2BZK	58,752- 408-72-16-	A
WA2JCK	57,840- 403-67-15-	A
WB2FMP	41,248- 268-63-16-	B
K2QAI	40,080- 235-64- 9-	A
N2BAR	39,552- 214-69-10-	A
K2DOD	24,318- 187-57-19-	A
K2IVS	20,624- 148-69-10-	A
WA2DJD	16,864- 136 67-10-	A
N2RQ	16,512- 197-43- 9-	B
KC2DI	14,410- 111-54-14-	A
WC2CB	14,300- 146-50-15-	A
N2CKN	14,112- 144-49- 9-	A
KC2I	10,920- 105-52- 8-	B
WB2RZB	10,668- 171-44-24-	B
WA2ARC	9864- 101-46- 8-	A
K2RO	8976- 102-44- 7-	B
W2AYI	5040- 80- 9- 4-	A
W2ZZF	1304- 59-28- 2-	A
WA2NLF	624- 24-14- 3-	A
KB2UB	144- 9- 8- 2-	A
WB2CXN (KB2SS,N2RQ,opers)	15,290- 119-55- 6-	A
WB2WAQ (+N2CMO)	9888- 101-48-14-	A

Northern New Jersey

W2HQ	196,248-1326-74-20-	B
K2YBV	81,904- 608-69-18-	A
K2RE	68,728- 484-71-18-	A
WA4PEN	58,290- 435-67- 9-	A
WA2BYX	39,168- 306-64-15-	A
KW6E/2	37,118- 277-67-13-	A
N2CS	35,360- 260-68-11-	A
N2MY	31,098- 219-71-11-	A
N2CJJ	27,984- 217-66-16-	B
KD2ZQ	27,846- 221-63-10-	A
K2QB	26,264- 196-67-12-	A
W2CNW	25,872- 196 66-15-	A
K2ZN	12,052- 111-46- 8-	A
WB2LUI	7560- 59-30- 6-	B
W2SHM	2888- 38-38- 2-	B
N2CWC (+WB2UVH)	77,352- 586-66-15-	A
K2CS (+KA2QKM)	31,817- 241-66-10-	A
KG2UM (+KA2QAR)	15,737- 121-46-18-	A

Southern New Jersey

WA2UOS	141,044- 954-74-21-	B
K2AA (WA2KOK,opr)	102,638- 781-71-24-	B
WB2VFT	102,200- 780-71-24-	A
WA2WJL	68,832- 478-72-16-	A
N2NCE	66,500- 473-70-21-	A
W2FGY	58,374- 423-69-22-	B
W2PAO	49,700- 355 70-12-	B
KA0SV	16,417- 131-62-11-	A
K2YY	28,188- 203-68-24-	B
W2ORA	22,880- 205-68-11-	A
K2HPV	25,200- 210-60-11-	A
WB2EBC	23,814- 189-63-20-	B
W2BLV	17,040- 120-71- 8-	A
WA2RCR	14,580- 115-54- 6-	B
WB2CKS	13,904- 124-48- 4-	A
WA2AWS	10,440- 116-45- 6-	A
WB2UVB	6868- 101-14- 6-	A
N2RF	4250- 75-25- 2-	B
N2MR	3036- 69-22- 3-	A
K2AWC	2600- 50-26- 9-	A
K2TEA	128- 8- 8- 1-	B
AB2Y (+AB2Z,KA2MVV)	69,156- 487-71-21-	A

Western New York

WB2YQO	74,016- 514-72-21-	B
KJ2Q	69,580- 497-70-13-	B
WB2ODH	63,420- 453-70-26-	B
WA2RKO	62,664- 488-64-18-	B
WB2NFB	54,672- 408-67-13-	A
K2UOT	48,816- 339-72-20-	B
KB2SE	42,420- 303-70-11-	B
W2TZ	41,344- 304-68- 6-	A
WA2FQE	39,192- 284-69-23-	A
WB2MVF	34,348- 277-62-13-	A
WB2QDR	34,036- 256-67-17-	A
WB2YQB	29,200- 208-73-11-	A
W2VDX	28,860- 195-74-15-	B
AB2T	28,500- 250-57-11-	B
WB9FDR	26,624- 208-64-14-	A
K2YFP	27,968- 198-58-11-	B
WB2TGU	21,480- 179-60-11-	A
WB2QPR	19,272- 173-57- 4-	A
KA2ECC	18,600- 155-60-13-	B
KA2HAR	17,700- 150-59-10-	A
W2WNK	13,230- 147-45-17-	A
WB1GHG	10,900- 109-50- 7-	A
WA2PHA	8712- 99-44- 3-	B
KB2NU	8080- 100-40- 2-	B
WB2SGS	6708- 78-43- 6-	A
WB2OBC	5544- 84-33- 6-	A
KC2Z	5056- 79-32- 4-	A
K2QR	3610- 65-26- 1-	A
KA2KFV	2000- 50-20-10-	A
WA2LKZ	1960- 49-20- 1-	A
KE2A	504- 18-14- 3-	A
W2GW (K2DC,KA2LDE,KI2P, N2HR,N6IN,oprs)	186,132-1259-74-24-	B
KF2X (+N2s, 8KC,CEN)	91,854- 629-73-24-	B

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Delaware

K3DVS	119,008- 850-70-23-	A
K3HBP	51,800- 350-74-12-	B
N8NA/3	36,162- 287-63- 8-	A
AC3I	9240- 105-44- 3-	A
K2CE/3 (K2MS,N2CYM,WA2NXR, WB2A ANM,ONA,opr)	16,842- 157-53- 8-	A

Eastern Pennsylvania

WB3FAA	141,182- 967-73-24-	B
WB3EMG	127,896- 876-73-23-	B
WA3JWP	111,982- 764-73-23-	B
WA3SPJ	90,440- 665-68-17-	B
K3MRC	86,380- 612-70-18-	A
WA3YDN	69,828- 506-69-19-	A
WB3FKQ	59,276- 507-69-13-	B
WB3FYT	58,256- 424-72-24-	A
WB3IWZ	60,918- 429-71-22-	B
AA3R	59,228- 442-67-14-	A
K3OS	57,816- 408-66-24-	A
KB3YJ	54,460- 389-70-17-	A
W3AWK	42,770- 329-64- 9-	A
W3WJC	42,214- 331-61-17-	B
W3QZH	42,000- 300-71-18-	A
KA3A	35,000- 250-70- 6-	B
WB3AAK	34,866- 287-62-18-	A
KA3DTL	32,512- 256-64-15-	A
K3LIK	30,366- 241-63-10-	B
K3PSF	27,064- 199-68- 8-	A
KA3DSW	26,400- 200-66-10-	B
KE3J	26,856- 219-57-17-	A
W3KOK	26,522- 201-61-24-	A
N3AVZ	24,246- 209-58-17-	B
N3CXB	24,020- 230-52- 9-	A
K3VYA	22,800- 200-57-10-	B
K3WGR	22,204- 182-61- 7-	A
WA3KBH	21,306- 201-53-16-	A
KC3CB	15,340- 110-59- 7-	A
AD3L	15,140- 155-49- 8-	A
WB3FPL	10,400- 104-50- 5-	A
KC3M	10,240- 80-64- 8-	A
WB3EPW	9476- 103-46- 8-	A
WB3BDT	8868- 78-56- 7-	A
K3DTD	7392- 88-42- 6-	A
KB3GB	6460- 85-38- 6-	A
KA3AXB	5372- 79-34- 8-	A
K3DCG	2650- 53-25-10-	A
KB3XB	1944- 54-21- 4-	A
WA3JKW	1144- 52-22-24-	A
K3YTL (K3ZGC,WB3CAJ,opers)	27,258- 211-59-14-	A
W3AVK (KA3EDX,KC3EC,N1CHB, opers)	21,504- 192-56-23-	B
KB3QI (+KA3GRS)	2862- 53-27- 6-	A

Maryland — D.C.

W3LPL (WD4AXM,opr)	210,604-1423-74-24-	B
K3ZJ	(81,300-1225-74-24-	B
KA1GD	(78,488-1206-74-24-	B
K3NA	170,064-1181-72-24-	B
KZ4TG	143,116- 967-74-22-	B
N3RL	142,968- 966-74-21-	B
K3ZZ	140,274- 964-73-24-	B
KJ7M	139,536- 956-73-20-	B
K3DT	131,868- 891-74-22-	B
WA3VHQ	120,158- 871-73-16-	B
W3COM	113,664- 768-74-22-	B
WA1EKL	110,448- 767-72-24-	B
N1GB	108,864- 756-72-17-	B
K3WOW	103,122- 707-73-24-	A
K3SA	92,500- 625-74-14-	B
W3IDT	88,356- 597-74-24-	A
W3JPT	77,000- 500-77-22-	B
W3QD	69,768- 519-68-11-	B
W3AZ	62,824- 432-71-17-	B
KA6GGY	52,008- 394-66-14-	B
WA4CYR	51,060- 370-69-15-	A
WB3LLL	43,344- 301-72-18-	A
K3AD	39,058- 275-71-24-	B
WA3VPL	36,292- 292-63-14-	A
W3FQE	32,964- 246-67-14-	B
K3CB	32,168- 238-68- 7-	B
K3SO	31,248- 248-63-18-	A
N3AUK	29,980- 208-60-16-	A
W3ES	20,532- 174-59- 9-	A
K2PLF/3	18,220- 195-48- 9-	A
N3AUB	16,188- 142-57- 7-	A
K3RU	15,120- 168-45- 5-	B
WB3IBD	14,708- 149-46-24-	B
N3APT	10,560- 120-44- 7-	A
W3BGR	10,168- 77-47-12-	A
N3CW	7688- 62-62- 5-	B
N3AM	6840- 95-36- 5-	B
WA3KUQ	6320- 79-40- 3-	A
W3PWD	6120- 85-36- 2-	A
ED3H	4140- 69-30- 4-	A
W3GNQ (W3HCG)	132,904- 898-74-23-	B

Western Pennsylvania

K3DA	219,338-1482-74-24-	B
K3EKM	150,072-1014-74-24-	B
KF3V	138,070- 865-74-23-	A
AC3U	60,976- 412-74-14-	A
W3QII	14,688- 136-54- 9-	A
WA3PCX	178- 8- 8- 1-	A
K3CR (K3FD, KT3C,opers)	62,488- 478-74-17-	B

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Alabama

N4KG (KC4ZV,opr)	189,144-1278-74-24-	B
K4ZGB	68,256- 474-72-14-	A
K4IQJ	57,870- 414-70-16-	A
N4FUU	52,364- 379-58-14-	A
K4RY (KA4s, PK8,Y, KB4s BBD, OX, WA4s LJU, SKT, WB4VHH, WC4Q, WD6AAP,oprs)	73,414- 517-71-24-	A

Georgia

W4BJ (KZ4PO,opr)	148,000-1000-74-24-	A
K4KKJ	126,246- 851-73-21-	B
KC4DC	48,780- 340-71-18-	A
K4BAI	29,116- 251-58- 4-	B
K4VA	21,228- 174-61-24-	A
K1AY	13,620- 122-55- 6-	A
K4BAH	11,440- 110-52- 6-	A
WA4LS	8272- 94-44-10-	A
W4AQL (N4s CKF,HYD,WA4s ABY, EBO,WB4AYP, WD4s IZC, OLP, WA2I,oprs)	131,424- 888-74-24-	B

Kentucky

ND4Y	109,224- 738-74-24-	B
K4EU	99,456- 672-74-16-	B
KA4LDW	55,466- 394-67-24-	A

KA4CQB 27,840- 240-58-18- A
KA4MAP 27,816- 228-61-19- A
K4AVX 8232- 98-42- 4- A
W4CN (KA4TAT,KC4MK,KD4U, KK4Q,N4s TV,XM, MO4R,oprs) 144,832- 992-73-22- B
KE4HS (+KA4s KJG,KJH,NN4H, WB4s OJM,VFW,WD4GDA) 49,248- 342-72-26- A

North Carolina

N4AA 144,300- 975-74-19- B
K4JEX 87,477- 616-71-10- B
WD4AVY 55,042- 377-73-19- A
KT4W 43,117- 317-68-10- B
N4UH 25,090- 193-65- 4- B
KA4RTJ 11,328- 118-48-14- A
WB1UP 10,918- 103-53- 7- A
WD4KJZ 9600- 100-48-13- A
W4ZBY 7776- 81-48- 9- A
WA4NOT 2448- 51-24-24- B
AF4D 2312- 34-34- 4- A
N4YM 1260- 30-21- 2- A
KA4MPP 248- 22-17- 3- A
K4MOB (+KC4AO) 61,568- 416-74-20- B

Northern Florida

N4SA 179,376-1212-74-19- B
K4XS 166,872-1114-74-24- A
NO4J 122,699- 829-74-23- B
NU4Y 121,212- 819-74-19- B
WB5YLT/4 64,610- 455-71-21- A
WC4E 59,780- 427-70-18- A
WA1IR 45,792- 318-72-18- B
WA4MOJ 35,496- 261-68-15- A
N4MS 32,292- 234-69-12- B
WA4T 22,032- 153-72-18- A
W4VQ 9400- 100-47- 2- B
W4PTT 5382- 69-39- 5- A
WA0SE 2958- 51-29- 7- A
N4UF 2912- 52-28- 1- B
KD4JS 1600- 40-20- 4- A

South Carolina

K4ADI 51,552- 358-72-16- A
AE4Y 31,616- 247-64- 7- B

Southern Florida

N4BP 181,152-1224-74-21- B
WA4FSP 92,648- 676-74-24- A
WA4FJB 58,546- 401-73-21- A
W4PZV 22,484- 154-73-17- A
W4LEP 1512- 27-28- 4- B
W2HAK 1160- 29-20- 2- A
N4KB 756- 21-18- 2- A
NY4F (+N4FOC) 168,046-1151-73-23- B
WB9IVR (+KG4B) 25,376- 208-61-10- B
KA4BVJ (+WD4NSA) 10,080- 105-48-10- A
N4FZH (+KB4CDH) 10,012- 114-44- 3- A

Tennessee

NA4K 152,132-1042-73-17- B
W4OCG 56,940- 390-73-19- B
N1GM 55,648- 376-74-16- A
WB4SFX 47,952- 333-72-17- A
KD4PP 33,396- 253-66- 8- A
WA4ZZU 27,876- 202-69- 9- A
WA8GKH/4 21,376- 167-64-15- A
K4XD 9200- 100-46- 3- A
W4VSV (WA2EPK,opr) 8836- 94-47- 3- B
WB6ZEG/4 7780- 65-56- 2- A
K4XU 6790- 97-35- 2- A
WB4MUZ 1368- 36-19- 3- A
W4JD (K4LSP,N4DW,WA4MCZ,oprs) 169,756-1147-74-24- B
WA4UCE (N4GAK,NQ4Y,NS4R, oprs) 16,830- 165-51- 5- B

Virginia

KD4NL 173,604-1173-74-23- B
W4MYA 172,568-1166-74-24- B
K4CC (K7SV,opr) 171,976-1162-74-24- B
K2NA 146,520- 990-74-21- B
KB4C/4 98,784- 686-72-21- B
N3JT 96,192- 668-72-14- B
K4OD 72,432- 503-72-20- B
K4CKD 61,048- 426-74- 8- B
W4XD 55,476- 414-67-15- B
WC4B 50,646- 367-69-24- A
K4FPF 48,720- 348-70-16- A
K4FJ 47,818- 357-67-10- A
WA4EMU 46,096- 344-67-17- A
W4YE 44,800- 320-70- 7- B
K4YF 37,257- 278-67- 5- B
N4RA 36,660- 282-65- 8- A
WB4LNT 33,824- 302-56- 6- A
W4NND 33,642- 267-63-17- B
KA4RLJ 32,868- 249-66-14- A
WD4ELJ 30,774- 223-69-13- B
W8KPI 28,148- 227-62-11- B
KA4TUM 26,880- 210-64-13- A
K4YI 26,800- 200-65-24- B
K8EI 24,640- 197-60-11- A
WD4KQJ 23,520- 196-60-12- A
W4JVN 21,760- 170-64- 7- B
NN4U 19,942- 169-59- 8- B
N4NW 15,476- 146-53- 3- B
KD4VO 14,790- 145-51- 6- A
WB4FDT 12,784- 136-47- 4- A
KA4ERK 12,584- 121-52- 9- A
W4WWQ 11,880- 108-55- 6- B
N4HDK 10,472- 119-44- 7- A
KA1CQ 10,192- 98-52- 6- A
N4BIX 9800- 100-49-11- A
W4JLS 9360- 120-39- 7- A
KP4FD 9266- 113-41-10- B
N4PDR 8352- 68-32- 9- A
NJ4Q 2604- 42-31- 1- B
K4TN 2052- 38-27- 2-A
WB4IUB 192- 12- 8- 2- A
W4IY (K2YUB,KB4ADS,KD4IC KK4EV,WD4SKQ,WC4A,WB5ODD, oprs) 76,664- 518-74-23- B
KA4KEC (+KA4TKQ) 17,952- 176-51- 9- A

West Indies

NP4A (KI2M,opr) 161,416-2442-74-24- B

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Arkansas

N5DX (K8CC,opr) 187,040-1230-74-18- B
KA5FZM 47,610- 345-69-16- B
WB5EET 1200- 30-20- 4- A
WA5TCL (+K5GO,KA5s ETD,PHI, N5DZQ,WA5ZGT) 192,992-1304-74-24- B
KY5M (+AD5M, KA5s KND,NLY, KB5QE,KC5WJ,KD5LA,N5s CMA, ERP, WA5VVT,WB5s GVA,LRP, WD5BIV) 104,860- 749-70-24- B

Louisiana

W5WMU 256,336-1732-74-24- B
N5ATW 79,530- 545-73-21- A
W5WG 48,564- 342-71-22- A
N5FIY 11,400- 114-50- 8- A

Mississippi

N5DSK 134,466- 921-73-17- B
KV5F 18,040- 164-55-10- A
N5GFU 18,020- 170-53-11- A
W5YD (KA5s AJF,IOT,MJV,MSR, NXW,KB5ZO,WD5s,ETA,GNR,oprs) 71,540- 490-73-21- A

New Mexico

AA5B 287,860-1945-74-24- B
W5JW 103,452- 699-74-13- B
KN5S 16,254- 129-63- 7- B
K7UP/5 286- 13-11- 2- A

Northern Texas

K5QY 201,132-1359-74-24- B
K5RW 175,824-1188-74-24- B
N5RZ 167,024-1144-73-24- A
K5TID 151,404-1023-74-21- A
WB5VZL 150,526-1031-73-24- A
WD5GSL (WB0TEV,opr) 143,518- 983-73-24- B
N5IR 102,416- 692-74-14- B
K5ZD 102,120- 690-74- 7- B
KM5R 100,344- 678-74-13- B
WB3DBJ/5 93,388- 631-74-24- A
N5AU 91,908- 621-74- 8- B
KD5BE 88,356- 597-74-24- A
N5EG 85,680- 630-68- 8- B
K5MM 68,880- 492-70-13- A
K2SGB/5 67,937- 459-74-18- B
KV5B 60,350- 425-71-24- B
W5LRP 58,692- 407-73-18- A
K5MR 51,188- 387-67-12- A
W5AH 47,334- 343-69-24- B
KY5N 47,056- 346-68-11- A
N5UA 39,760- 280-71-14- B
N5CM1 28,098- 223-63- 8- B
W9PL/5 26,676- 208-64-11- A
KC5EA 26,082- 189-69- 8- B
W5DLM 23,937- 193-62-13- A
WA5DTK 18,408- 156-59- 4- A
W5JD 10,780- 110-49- 4- B
N5DXQ 9200- 100-46- 9- A
KC5BA 8970- 102-44- 6- A
KX5U 8624- 88-49- 8- A
K5RX (+KM5K) 196,544-1328-74-24- B
K5FUV (+K1RX,K5ZD) 162,060-1095-74-16- B
K5OJT (K5BM,WB0CQT oprs) 102,666- 723-71-22- A
K5JEF (WA6IUS,WD8IWN,N9BAH, oprs.) 6188- 91-14-10- A

Oklahoma

KM5R 137,240- 940-73-24- A
W7EC 112,480- 760-74-11- B
KD5BJ 73,438- 503-73-18- A
KB5ZQ 17,172- 159-54- 6- A
KC4WQ 3100- 50-31- 2- A
N5ESF 140- 10- 7- 1- B
K5CM (+N5s CC,RW) 227,032-1534-74-24-B

Southern Texas

K5RC (K5GN,opr) 230,288-1556-74-24- B
N5JJ 223,184-1508-74-24- B
KZ5M 221,857-1499-74-24- B
NA5R 214,896-1457-74-24- B
K5LZO 210,752-1424-74-24- B
RD5SP 164,280-1110-74-24- B
K5DX 162,948-1101-74-24- B
KC5CP 157,672-1066-74-24- B
N5DU 153,772-1039-74-20- B
K5WA 147,196- 927-74-17- B
N5EA 136,604- 923-74-16- B
AA5Y (KG5W,opr) 126,984- 858-74-23- B
KB5FU 126,576- 879-72-20- B
KN5A 119,436- 807-74-20- B
K5GB 108,488-764 -71-15- B
KJ5BZU 98,842- 677-73-23- A
K5IY (KN5H,opr) 96,336- 669-72- 9- B
W5RRR (KN5H,opr) 87,040- 640-68- 7- B
W5ASP 74,106- 537-69-14- A
(A51YX 56,536- 382-74-20- A
V5Q 45,610- 351-65-10- A
KC5M 43,216- 292-74-21- A
KB5MU 40,608- 282-72-17- A
AK5B 34,848- 244-71-15- A
W5JWM 29,376- 216-68-13- B
N5CMF 25,488- 177-72-15- A
WB5UGL 20,862- 171-61-10- A
K5MA 20,300- 175-58- 4- A
WD8DRJ/5 6450- 75-43-16- A
K3ZMI/5 1350- 27-25- 1- A
K5GA (+KY5A,WB5WHR) 190,180-1285-74-23- B
K5KG (+K5MA,KC5M,W5ASP) 189,292-1279-74-24- B
WA2PRB/5 (+WA5ZUP) 148,066-1021-73-23- B
K7TNO/5 (+KA5s OAT, PJC) 46,438- 351-69-14- A

6

East Bay

N6NE 237,046-1602-74-24- B
K2GMY 117,792- 818-72-20- A
WB6FGR 101,676- 687-74-18- A
KS6H 43,112- 317-68-12- A
NN6Y 11,200- 100-56-15- A
KS6Q 3240- 54-30- 4- B
KE6RV (+KA6QGV,KB6UV,NA6Q, WA6LPR,WB6EZI) 108,188- 731-74-24-
W6BB (AG1E,KF6AM,oprs) 52,704- 366-72-19-

Los Angeles

N6HC 178,488-1206-74-20- B
N6HE 98,784- 686-72-14- A
WN6N 72,076- 487-74-22- A
WB6KS/6 64,240- 440-73-23- A
N6AXQ 49,640- 365-68-21- A
WA6OEB 34,706- 259-67-18- A
WD6AGN 27,342- 212-63- 7- B
WB6VVS 25,088- 196-64-16- A
WB6NFO 21,780- 152-70-15- A
N6IC 14,800- 100-74-13- B
N9OD 13,260- 130-51- 8- A
N6NXB 8700- 87-50-10- A
W6OXX 98- 7- 7- 2- A
AJ6O (+N5FA,KL6EL) 239,316-1617-74-24- B
WB6BIM (+KA6s,SIL,SOP,N6s DWR,GDE,GPZ,TYO,WA6UYB) 96,600- 690-70-21-B

Orange

K6JQL 56,880- 395-72-24- A
A16E 47,436- 354-67-10- A
NC6U 31,488- 246-64- 8- A
WA6CFR 29,232- 232-63-15- A
KG6F/6 10,368- 72-72-13- A
NB6U (+AC6L,K6RUB,KB6TR, WB6s SKE,WAJ) 175,528-1186-74-24- B
N6AWF (+KE6JS, N6s CYL,DJX, DJW,ECA,FBT,FMD,RJ,WA6s JBR, JBT,WB6QKB) 167,240-1130-74-23- B
N6EGC (+W6RIT) 142,524- 963-74-24- B
K6HRT (+N6BLH) 122,546- 863-71-23- B
K6GIU (+KA6s BWV,BRA,RUX,TJJ UK1,UKM,N6s,FPN,FSK) 69,012- 486-71-22- A
W6FSA (+KA6s,ART,DFO,N6DBF, WD6GSH) 54,912- 416-66-24- A

Pacific

AH6J 66,096- 459-72-24- B
AH6BK 18,688- 146-64- 9- A
KH6IU 18,232- 172-53-13- A
KH6IJ 3600- 50-36- 3- B

Sacramento Valley

A16V 277,180-1555-74-24- B
KV6U 151,032-1036-74-24- B
K6SG 125,060- 845-74-21- B
KF6A 108,188- 731-74-19- B
K1GQ 59,472- 413-72-24- B
WB6RDA 42,012- 289-54-12- A
N6GQA 21,504- 192-56-21- A
WA6BRV 9000- 100-45- 6- A
KA6BIM 7392- 88-42- 5- A
N6JM 3600- 50-36- 3- A

San Diego

N6ND 110,112- 774-74-23- A
N6BEE 66,384- 461-72-24- A
WA6HFY 57,378- 393-73-19- B
W6JXA 19,950- 175-57-11- A
K6ZII 19,604- 169-58- 5- A
AA6KE 18,762- 159-59- 8- B
W6KBD 9240- 70-61- 8- A
W6NWG (K6NS,KA6FRS,KF6BI, KM6K,N6s DYO,CKA,GZI,WA6OLI, WD6FWR,W9SQN,Oprs) 114,026- 803-71-23- B

San Francisco

W6BIP 132,460- 895-74-18- B
WA6AUS 100,492- 674-74-24- A
K6LRN 24,684- 187-66- 7- A
WA8ILY 15,616- 128-61- 7- A
WD6FMG 10,564- 139-38- 3- A

San Joaquin Valley

N6PR 100,536- 708-71-22- A
KE6RN 32,234- 227-71- 8- A
WD6DET 8918- 109-41- 6- A
WA6SLF 8372- 91-46- 8- A

Santa Barbara

N6TR 268,768-1816-74-24- B
W2RVA/6 117,384- 804-73-22- B
WA6DJS 89,176- 628-71-18- B
WA6VNN 87,984- 611-72-20- A
K6VMN 84,672- 588-72-18- B
W6TKF 82,644- 582-71-15- A
KD6LB 76,020- 543-70-19- B
KA6V 45,962- 343-67-14- B
WA6IJZ 21,842- 163-67- 8- A
NM6U 14,976- 144-52-10- A
KD6CN 14,000- 125-56- 9- B
AA6BB 4100- 50-41- 4- A
KA6LKU 3904- 61-32- 2- A
KA6L (+KA6EFC,KD6QX) 86,940- 621-70-15- B
WA6IAR (K6CAB,KA6VRW,KD6ZM, KE6LO,N6s BED,DBU,GAU,W6s RDY, ZZN, oprs) 69,440- 496-70-20- B

Santa Clara Valley

N6BV 223,208-1846-74-24- B
K6HNZ 206,016-1392-74-24- B
K6MA 112,974- 763-74-19- B
N6AUV 90,576- 629-72-24- B
N6NF 85,104- 591-72-11- A
N6KL 57,888- 402-72-18- A
KN6VGW 36,694- 257-71-12- A
WA6UCV 35,980- 252-70- 5- B
WB6VAL 33,408- 261-64-17- A
KF6AM 31,964- 262-61-11- A
W6OKE 16,520- 140-59- 4- A
AA6PZ 13,640- 155-44-24- B
N6RZ 10,658- 73-73-12- A
WA6AZP 6156- 81-38- 8- A
WB6AAJ 5624- 76-37- 7- A
N6XI 4896- 72-34- 2- A
N1GL 1886- 41-23- 5- A
K6URO 330- 15-21- 6- A
N6BT (+WA6VEE) 249,134-1679-73-24- B
N6MG (+KD6PY) 197,876-1337-74-24- B
W6YX (N1OO,WA1LTJ,WA2BSH, N3ER,W3KF,W5XD,N6FUM,WA61TV, EA1QO,oprs) 150,528-1031-73-23-B

W7WHO (who?) finished first in Oregon in the low-power category, adding another certificate to his collection from his 1975, '79, '80 and '81 wins.

If you missed Quebec on phone, it wasn't the fault of the Utica (NY) ARC. WA2AZA and KA2MTB, along with K2OZV, KA2CFH and KK2B, worked 675 of the SS faithful and captured the Canadian Division multiop title.

Lynn, KA2NVU, says she had a great time, although it's too band that more stations don't frequent the Novice bands.

Alaska

AL7CQ 107,897- 799-74-18- B
KL7IEH 100,740- 690-71-19- B
AL7FFR (KL7s BCS,BUS,BYA, EMA,FNH,FSO,MS,WL/AMM oprs.) 70,794- 513-69-17- B
KL7CQ (AL/EJ,KL7s BFQ,LO,SK, oprs.) 68,448- 496-69-16- B

Arizona

KJ0X 219,000-1500-73-24- B
W7PGT 157,824-1096-72-21- B
KL1L 157,192-1093-72-15- B
K7TR 44,428- 383-58- 8- B
W7ZMD 28,616- 196-73-15- A
W7VS 24,960- 208-60- 8- A
KG7V 17,400- 150-58- 6- A
K7GM 10,957- 74-74- 6- A
W7GYX (+WA1NCC) 88,176- 668-66-17- A

Idaho

KØEJ 124,916- 856-73-23- A
WB7TJI 40,900- 350-67-14- A
KK7X (+WB7WIA) 62,580- 447-70-18- A
KB7CJ (+KA7NTN) 19,470- 165-59-10- B

Montana

WA7GVT 79,278- 543-73-18- A
KC7TIC 41,046- 406-54- 4- B
KL7/KD0JJ 32,088- 304-61-17- A
K7TT(+KA7GVI) 15,180-1087-70-24- B
W7YB (KA/s LRD,OLK,KK7X, WB/s CFQ,KAB,oprs) 145,072- 918-72-23- B

Nevada

WA7NIN (W6OAT,opr) 224,688-1856-74-24- B
KA7BRE 61,904- 424-73-19- A
W67VVH 33,396- 242-69-15- B
KB7WV 29,380- 226-65-12- A

Oregon

W7NI 196,662-1347-74-22- B
W7YAQ 111,888- 756-74-22- A
AI7W 39,424- 344-73-23- A
W7TWL 65,178- 459-71-22- A
WA7OEM 59,500- 425-70-14- A
KB7WY 48,564- 342-71-24- A
W7GUR 47,472- 344-69-14- B
KJ7WPC 15,810- 155-51- 9- B
WA7RZF 8690- 70-55- 8- A
K7KJM 7470- 84-49- 6- A
WA7PZW (KA7s JDZ,JKP,KD7s AA, 6D,WA7IZU,oprs.) 70,840- 506-70-24- A
E7CON (+WB7TG2) 67,024- 472-71-24- B
KG7YQ (multiop) 28,566- 207-69-22- B
WB7USF (+KA7IWH) 26,268- 199-66-23- A

Utah

KB7IDM 157,876-1081-73-20- B
W7GXC 86,117- 598-72-19- A
KC7O 20,696- 199-52- 7- B

Washington

K7RI (K7SS,opr) 707,737-4809-74-24- B
W7RM (W7WA,opr) 263,144-1778-74-24- B
K7LK 211,992-1452-73-23- B
K7MX (KB7G,opr) 208,384-1408-74-22- B
AJ7Y 173,604-1173-74-24- B
N7TT 122,348- 838-73-24- A
W7NG 114,404- 773-74-23- B
KC7V 102,930- 705-73-18- B
N7AVF 102,860- 695-74-17- A
WA7PVE 70,437- 496-71-22- A
WA7RWK 66,632- 448-67-14- A
KA7FRI 40,040- 286-70-18- A
WB7BLQ 34,220- 295-59-11- B
WA7LVO 28,560- 238-60- 5- B
AI7K 26,760- 223-60-17- B
WB7DNS 25,740- 198-65-15- A
W7WIA 24,036- 196-67-11- B
KA7CXU 22,897- 194-59-16- B
W7LKG 20,910- 205-51- 6- B
KB7WD 18,924- 166-57-10- A
W7DWI 18,040- 164-55-17- A
KB7JL 18,037- 161-56-10- A
K7WA 16,617- 126-66- 8- A
AK7S 16,200- 150-54- 7- A
WB7OKA 15,196- 131-58- 6- A
W7DWW 12,576- 131-48-11- A
K7NF 12,446- 127-49- 6- B
W7KXS 12,200- 122-50-11- B
KL7NA 7998- 91-43-15- A
N7KFC 7400- 74-50- 6- B
KS7I 7008- 73-48- 6- A
W7WC 6560- 80-41- 4- A
K7RS 5780- 66-40- 5- A
K7UU 4712- 76-31- 1- B
KJ7QLC 4410- 63-35- 3- A
KJ7GYP 2376- 44-27- 6- A
N7DNG 2128- 38-28- 5- A
WB7QCN 1584- 33-24- 3- A
KA7NSR 112- 8- 7- 2- A
AC7M (multiop) 164,724-1113-74-19- B
KJ1XC (+K7HBN,KC7RN) 154,030-1055-73-24- B
KR7R (KI7H,NJ7CO,oprs) 107,476- 736-73-24- B
WJ7K (AJ7P,K7s ETB,GYP,QLC, KA7NSK,W7s OWW,WG,WA/s FUS OIL,WB7sOXA,OCW,oprs.) 91,980- 630-73-24- B
KC7EJ (+KA7s MKY,MEZ,MMQ,MWF, N7s DAY,KLG,ELI) 11,720- 781-60-24- A
N7RV (+K7YST) 13,536- 94-72-15- A

Wyoming

NJ7CG 159,528-1093-73-22- B
KI7PAO/7 117,300- 850-69-23- A
WB7CFL 99,826- 703-71-23- A
WA8MAH 59,214- 417-71-17- A
KB/M (+KA7EYA,KB/WN,KV/L) 161,700-1155-70-24- B

Michigan

N8DEQ 152,144-1028-74-24- B
WD8MGQ 116,476- 787-74-24- A
WD9IME 81,648- 567-72-18- A
NRCLX 80,352- 558-72-24- A
KU8V 53,414- 417-71-16- A
KB8LIB 59,920- 428-70-10- B
KO8M 59,382- 421-71-18- A
KS8Q 59,477- 411-72-24- B
WA8MJY 55,440- 385-72-19- A
N8DBI 55,300- 395-70-17- A
WA8BSF 49,840- 346-70-12- A
WA8QAF 48,860- 349-70-12- A
WA8QCW 42,912- 298-72-17- A
N8BTU 42,240- 330-64-14- A
K8CV 41,844- 317-66-17- A
WB8VPC 41,328- 328-63-15- A
K8DD 38,918- 319-61- 6- B
AC8W 35,360- 272-65-24- B
WA8ZTQ 34,056- 258-66-17- B
K8SIA 31,720- 254-65- 7- B
KC8LD 25,080- 190-66-17- A
KA1CE 25,048- 202-62- 7- B
KW8G 23,424- 181-64- 9- A
N8CQA 21,280- 196-60-14- A
K8KUH 19,008- 176-54-10- B
N8BHD 18,792- 162-58-14- A
KA8LIN 18,590- 169-55-14- A
W8LCI 17,400- 150-58- 8- A
WA8OWG 10,937- 74-74- 8- B
WD8LBD 9840- 123-60-12- A
WB8TGY 9688- 79-16-11- A
KB8QLM 6056- 78-76- 7- A
AJ8C 4050- 61-25- 3- B
N8DVO 2842- 44-29- 4- A
KB8TD 1736- 31-28-11- A
N8AOE 950- 25-19- 2- A
KA8EHT 286- 13-11- 2- A
WD8CRY (+KR4QM,KA8EEA,KB8HW, KC8s A,KQ,N8UM,WB8VBP,WD8LCD) 179,376-1219-74-24- B
KB8S (+N8DET) 150,672-1032-73-20- B
N8BNE (+AA8U,K8LF,KA8JSK, EC8EK,KD8B,N8s,AW,CRA) 118,400- 800-74-24- B
W8UM (KA8LJC,KC8s,ES,LX, EN8I,KT8K,WD8sDPA,PFS,oprs) 103,248- 717-72-24- B
KC8P (multiop) 80,884- 554-73-24- A
WB8CUS (+WB8WIK) 51,684- 354-73-24- A
WA8BAP (+KA8BHA,KA8OEY) 38,920- 278-70-21- A
K8JM (+K8s PC,IDZ,KC8OH,N8s BVY,ODV) 31,868- 257-62-13- A
WRG8R (+KA8s CVE,KYR,WD8s OWA,RUQ) 23,760- 432-55-12- A

Ohio

K8ND 199,208-1346-74-24- B
WK1I (WB8MZZ,opr) 196,988-1331-74-24- B
KR8Z 184,816-1242-74-24- B
K8MN 162,060-1095-74-24- B
N8KA 148,920-1020-71-24- B
K8MR 146,076- 987-74- 6- B
N8AID 128,772- 882-73-24- B
W8RN 120,120- 858-70-18- B
KC8JH 114,700- 775-74-19- B
N8IJ 113,458- 799-71-23- B
K8EE 113,150- 775-73-24- A
W8LNO 102,200- 700-73-17- B
K8BL 91,398- 626-73-27- A
WB8UPH 89,568- 622-72-24- B
N8CWU 82,344- 564-73-24- A
KU8E 77,274- 529-73-14- B
AD8P 60,587- 439-69- 7- B
KR8X 56,420- 414-65-18- A
WR8N8A 51,940- 371-70-15- B
W8ANM 49,494- 339-73-17- B
W8LBV 46,434- 327-71-16- B
K8LM 46,020- 354-65-12- B
WB8VPA 43,332- 314-69- 8- B
W8UXF 38,174- 286-67-17- A
WB8LZR 37,200- 300-62-17- A
N8EFY 36,790- 283-65-23- A
N8CLR 33,184- 244-68-11- B
KC8F 33,132- 257-66-14- A
WD8BKT 32,340- 245-66-17- B
AF8C 31,188- 276-69-16- A
WD8QYD 30,870- 245-63-11- B
WR8YEW 30,868- 241-64-21- A
K8BRA 30,284- 226-67-19- A
N8TN 24,400- 200-61- 7- A
NA8T1 23,040- 180-64- 9- A
KC8YR 22,428- 178-63-23- A
N8BJQ 20,984- 172-61- 6- A
N8ERS 20,770- 155-67-17- A
N8AUH 17,136- 153-56-11- A
KC8HJ 15,846- 139-57- 7- A
WR8MIP 15,158- 143-53-24- B
KA8LLT 15,048- 132-57-11- A
N8EAN 13,566- 114-51-14- A
K1BO 13,250- 125-53-18- A
KV8B 11,750- 125-47- 7- A
WD8KTH 11,662- 119-49- 5- A
WD8NVM 10,952- 74-74-15- A
KB8SH 10,810- 115-47- 6- A
W8DWP 9800- 70-70-10- A
W8XU 9016- 98-46- 4- A
WA8RCN 8978- 67-67- 5- B
W8CMF 8400- 105-40- 6- B
W8VZB 7242- 74-49- 6- A
WD8MRP 4884- 66-37- 6- B
W8IOM 4060- 58-35- 5- B
KB8WB 3100- 50-31- 3- A
N8CXD 2400- 30-26- 2- A
N8CCG 1560- 26- 7- 7- A
WB8JBM (KBs DB,DS,KC8sMK,XK, EW8N, N8s, ATR,DB,DMM,EDK, WACAR,WB8JMP,WD8LJP,oprs) 205,128-1386-74-24- B
KV8A (+KA8IIN,WA8OSR,W8MM ERO,IAF,WD8sSDA,RJR) 158,676- 917-74-24- B
K1LT(+K8LT) 147,678- 943-73-24- B
N8CSL (+KA8MLA,KB8WC,WD8IVL) 123,120- 855-72-24- B
WA8JKR (+WB8OCL,WB8JCJ) 107,712- 748-72-23- B
KC8QR (+WB8ILDY,WD8INN) 59,709- 429-69-14- B
KR8B (+KA8s BAQ,QQF,W08s OEB, RUQ) 53,856- 374-72-23- A
N8BJK (+KC8ILB) 840- 80-14- 7- A

West Virginia

NB1I (K4POL,opr) 186,912-1298-72-24- B
KB8YJ 90,144- 626-72-14- B
WD8CZA 75,460- 510-74-18- B
K8BS 49,580- 335-74-18- A
W8VKN 47,980- 307-70-24- B
K3UH/8 (+K3QDC,W3s PYE,QQR) 47,601- 400-72-24- A

Illinois

K9RS 216,820-1465-74-24- B
WB9HAD 176,616-1196-73-20- B
K9LUW 143,560- 970-74-24- B
N9ABJ 55,152- 383-72- 9- A
K9BQL 47,436- 354-67-13- A
WA9ZVC 45,500- 325-70-20- A
AD9H 42,296- 311-68-16- A
K9VII 40,066- 299-67-23- B
K9GII 38,564- 311-62-20- B
WS9CAI/9 37,812- 276-69-21- A
KC9QM 23,598- 207-57-11- B
W9QKM 22,620- 174-65- 9- A
W9KEC 20,800- 160-65-14- A
AK9N 19,278- 189-51- 6- A
K9AUZ 14,877- 143-52- 6- A
WB9YES 13,770- 140-49-15- A
WA9MRH 13,500- 125-54- 7- A
KA9IHJ (KC9VW,opr) 13,464- 137-51-12- A
KK9A 9760- 122-40- 1- B
KA9JNN 9400- 100-47- 8- A
K9NO 9180- 102-45- 4- A
KC9LI 8148- 97-44- 7- A
WD9BBC 6396- 78-41-26- B
N9NA 6216- 84-37- 6- A
N9UK 5408- 52-52- 6- A
WA9ZZG 4352- 68-32- 5- A
W9VTL 3500- 50-35- 6- A
K9OIY 2968- 56-28- 1- A
KD4BU/M 1596- 38-21-10- A
KA9JUF 920- 46-10- 8- A
K9RX (+KQ9L) 148,774-1019-73-22- B
W9IWC (KO2R,KA9EIM,N9CAC, WB9UTY,KA0CIH,,KH0PQoprs) 98,568- 666-74-22- B

Indiana

W9OBF 120,596- 826-73-24- A
K9MMO 94,780- 647-70-10- B
N9CR 66,156- 447-74-23- A
W9IDO 60,590- 415-73-22- A
KA9DOO 55,334- 379-73-22- A
KC9FC 46,976- 367-64-20- B
WO9NZW 46,428- 318-73-21- A
KA9FTN 39,260- 307-65-18- A
WB9ZGY 26,664- 202-66-11- A
W9UIX 12,384- 121-52-16- A
KA9IPR 3600- 72-25- 8- A
W9QLW 868- 31-14- 3- B
WB9QBZ 690- 23-15- 1- B
KJ9D (+KK9V,KM9S) 183,076-1237-74-24- B
W9CT (+AE9Y,KB9PT) 153,032-1034-74-24- B
W9YB (KA9s DSM,MHO,NOH,OLT, EC9RG,KK9W,N9s CUE,NB,NC, WD9CET,oprs) 85,284- 618-69-18- B
NA9KK/9 (+1opr) 62,160- 444-70-22- B
K9KB (+KA9JHR) 77,864- 558-54- 4- B
WA9NFC/M (+2 oprs) 15,080- 145-52- 8- A

Wisconsin

KB9A 148,000-1000-74-24- B
W9NA 90,432- 628-72-15- A
WA1DJH 87,552- 608-72-20- A
WA9RAW 74,266- 523-71-19- B
EO9Q 69,764- 481-72-17- A
AI9U 60,670- 413-70-21- A
K9KR 58,176- 406-72-16- B
N9HDM 37,346- 263-71-21- B
K9LJN 31,248- 217-67- 6- A
WO9GKJ 25,704- 189-68-11- A
K9CDF 25,680- 214-60- 5- B
WB9TOC 19,260- 152-65-13- A
WB9HCS 17,850- 175-51-24- A
N9CWN 14,256- 137-54-24- B
KC9QN 11,700- 112-50- 4- A
WB9IRO 9568- 104-46- 6- A
N9AW 9504- 88-54- 5- A
W9KT 6720- 60-56- 9- B
N9CWO 6480- 81-40-10- B
N9RS 3900- 50-39- 2- A
EB9DZ 2736- 43-24- 3- A
EC9SH 1924- 37-26- 1- B
N9DIJ 884- 26-17- 1- B
KA9JPS/M9 880- 15-10- 2- A
K9FYZ (+WN9LGR,N9s,AKC,BSH) 158,804-1073-74-24- B
KØFVF/9 (+KØTC,WAØRBW) 153,156-1049-73-24- B
KB9S (+N9ARX,KCØQM,KIØR) 107,778- 759-73-21- B

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Colorado

KØRF (WØUA,opr) 278,536-1887-74-24- B
WØYK 259,000-1750-74-24- B
NZ1C 226,446-1557-73-24- B
KØUK 185,378-1283-72-24- A
WØLSD 128,908- 871-74-24- A
KB1KT 114,282- 817-73-23- B
KSØE 107,624- 746-72-24- A
ADØO 76,964- 562-71-15- A
WØTPO 54,192- 376-71-17- A
KØTIV 25,728- 201-64- 8- A
WØLZV 21,358- 181-59-14- A
NRAWD/Ø 6384- 76-42- 9- A
KVØI 3540- 30-30- 5- A
KØBP (WB8TGA, WHØs LOU, OLX, oprs) 129,646- 913-71-24- A

Iowa

KØAI 142,080- 960-74-22- B
KEØH 134,904- 926-74-15- B
KØTGH 106,288- 728-73-23- A
KØLIDZ 102,416- 692-74-13- A
KBØPR 88,760- 634-70-12- B
KØAYK/Ø 46,852- 356-69-11- B
WØMPF 44,200- 325-68-19- B
KCØGM 43,878- 309-71-15- A
KAØD 42,884- 302-71-23- A
WBØTGC/Ø 33,232- 248-67-13- A
WØBVK 12,296- 106-58- 6- A
WHØERP 6764- 87-36-14- A
KAØNUY 936- 26-18- 4- A
KCØBR (+KAØKDJ,NØs AZF,CLW, WDØECWH) 154,030-1055-73-24- B
NØEEN (+NØDIZ) 13,528- 154-46-22- A

Kansas

KØVBU 61,420- 415-74- 8- A
NØDEE 59,128- 392-67-18- A
WAØBWH 45,254- 307-61-11- A
KØEUX 11,438- 133-43- 9- A
KØYBV 4320- 60-20- 6- A
KØWA (+KBØEC, WDØEWK) 228,216-1542-74-24- B
WØSOE (KFØM,WAØVJE,oprs) 191,584-1308-74-23- B
ACØE (+KØLOH, NØs BXW, CPC, +1 opr) 93,980- 710-69-24- A

Minnesota

KØDD 208,932-1409-74-24- B
KØFIL 182,040-1230-74-23- B
KQ8M/Ø 173,740-1190-73-24- B
KØFZG 77,848- 526-74-24- A
WAZHR1 67,496- 466-72-19- A
WAØMOJ 60,976- 412-74-12- B
WAØCQG 53,400- 380-70-15- B
WBØDBS 44,928- 326-69-14- B
WAØWWW 40,528- 298-68-12- B
KNØD 39,054- 283-69- 9- A
KBØM 37,674- 273-69-15- A
KØMPH 28,854- 229-63- 6- A
NØNO 27,772- 262-53- 6- B
WØWDW 27,328- 238-61- 6- B
WAØVOR 13,000- 100-65- 9- B
WHØYHC (+WDØFDF) 106,776- 731-73-23- B
NØEDO (+KBØE) 92,176- 631-73-24- B
WAØQIT (+WDØGPX) 77,760- 540-72-23- A

Missouri

K4VK (KRØV,opr) 236,060-1595-74-24- B
KHØG 69,708- 471-74-21- A
KRØBQ 60,444- 468-64- 9- B
KTØY 52,640- 376-70-16- A
KMØL 45,240- 348-65- 7- B
KMØA 43,716- 314-72-13- A
WMØH 42,600- 270-60- 4- B
KCØLX 32,000- 250-64-17- B
WØSPF 15,278- 161-49-16- A
NØBCW 14,820- 170-57-16- A
WDØBBN 14,000- 125-56- 8- B
KEØI 2400- 34-28- 2- A
KVØW 1596- 38-21- 3- A
KAØP 1144- 26-22- 2- A
FMØR (+KMØP, WØHSH,WAØLIF) 107,110- 715-73-20- B
NØAQC (+KAØOIS, NØDMX) 70,180- 510-69-24- B

Nebraska

KØSCM 160,284-1087-74-19- B
KVØI 110,448- 767-72-16- A
WDØEMR 107,436- 736-73-24- B
KAØJQF 61,040- 434-70-21- A
KØDI 60,350- 425-71- 8- B
WØKR 60,92- 394-66- 4- A
KØCND (+KØLR,KAØCGF,WAØWRI WBØWSL,WDØs,DMS,RQK) 141,474- 969-73-21- B
WAØYPY (+KBØWS, NØDMX, WAØASM) 97,980- 710-69-20- B

North Dakota

AKØT 230,288-1556-74-24- B
KFØA 115,488- 807-72-17- B
KCØUM 46,018- 261-69-17- A
KCØW 29,862- 194-67-17- A

South Dakota

JHØMWJ 147,408- 996-74-21- B
WAØARS 98,670- 665-74-18- A
WBØCXU 50,826- 417-61- 6- B
KØJV 42,280- 302-70-11- A
WAØSHA 41,470- 319-65-15- A
NØKAL 40,920- 310-67-16- A
WØWHO 9618- 53-53-24- A
KØVVV (KAØs CVY,MXR,NQQ, <KBØQA,WBJVDZ,WDØBWA oprs) 137,030- 965-71-24- B

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Maritime-Newfoundland

VE1YX (AA2Z,opr) 229,404-1523-74-24- B
VO1QO 60,248- 441-68-24- A
VO1QST (VO1AW,opr) 16,482- 123-67- 9- B

Quebec

VE2PD 14,272- 238-72-19- B
VE2GBZ 11,088- 237-67-16- A
VE2FSU 18,354- 161-57-14- A
KZ1Q/VE2Z (KZ2V,KA2s,CEH,MTB, KK2B,WA2AKA,oprs) 88,750- 625-71-23- A

Ontario

VE3GAS 167,022-1007-73-13- B
VE3CUP 114,624- 796-72-24- B
VE3GHT 51,120- 360-54- 7- B
VE3MEJ 17,697- 167-18-13- A
VE3EKA 4996- 119-42- 7- A
WA4(N1/VE3 469B- 81-29- 5- A

Manitoba

VE4GN 21,136- 176-68-18- A

Saskatchewan

VE5GA 162,060-1110-73-19- B
VE5NRQ 2600- 100-38- 2- A

N.W.T.-Yukon

VY1CC 57,084- 402-71-12- A
VY1DD 1120- 35-16- 2- A

Checklogs

AAØM,KAØJPH,KAØKKV,KKØU, KA1BNK, K1IC,KB2IH,KO4D, K6VL,KE6VFF,KK7P,N2UXB,NP4P, N7EUV,N9DHD,VE4AKN,WB0DXP, VE6JG,W6MIV

Disqualifications

CW: KI8X (call sign/exchange errors); KA3A (+WB3FKQ) (call sign/exchange errors)

Phone: W7LQT (+WB7WB7) (excessive duplicate contacts)

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADIAN DIVISION

ALBERTA: SM, E. Roy Ellis, VE6XC — SEC: VE6XC; ASM: VE6AMM. STM/DEC/NM(APSN & ATN): VE6ABC. ECs: VE6AGH VE6AVV VE6FV VE6AMM VE6AHC VE6ABC VE6ASL VE6AFO. Clubs are busy supplying radio communications for different winter activities. CARA gearing up for massive job of communications for the Boy Scout World Jamboree when 20,000 will descend upon Kananaskis 4-14 July. VE6AGH lining up the Waterton International Hamfest to be held 15-16-17 July. Traffic: VE6CHK 253, VE6ABC 31, VE6SU 10, VE6AMM 4, VE6NA 3, VE6AHC 3, VE6CAA 2.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — British Columbia Emergency Net, 3650 kHz, 0300Z NM, VE7OSI-QNI 289 QTC 236. B.C. Public Service Net, 3755 kHz, 0200Z, NM VE7QC QNIs high 216, low 106, total 4927. VE7SM, new Collins line and teaching code and theory to White Caners. Well your SM was in hospital five days, hernia operation, and is going through emergency. Sure is an experience to behold. Burnaby ARC held their twenty fifth banquet; very successful. Traffic: VE7BNI 77, VE7ZK 45, VE7CSI 42, VE7CDF 37, VE7FB 33, VE7CTJ 17, VE7BZI 10.

MANITOBA: SM, Peter Guenther, VE4PG — ASM: AJE. STM: RO. SEC: HK. OO: FK. NMs: VJ ACX TE HW NM. We regret the passing of VE4UP and VE4OK. VE4FK is spending some time with his family in the British Isles. The CW net, CTN, needs a lot more support if it is to fill its function as a direct routing for traffic. MEPN QNI 1114, QTC 22, sess. 28. MTN QNI 176, QTC 50, sess. 28. WRIN QNI 309, QTC nil, sess. 8. MMN QNI 397, QTC 32, sess. 28. Traffic: VE4RO 57, VE4ACX 48, VE4JA 42, VE4AJE 40, VE4TE 29, VE4PG 28, VE4AAD 12, VE4CR 9, VE4ID 7, VE4NE 6, VE4ADS 5, VE4FK 5, VE4LB 4, VE4JF 2, VE4TL 2.

MARITIME/NEWFOUNDLAND: SM, D. R. Welling, VE1WF — ASM: VO1FG. NMs: VO1JN VE1WF. SEC: VE1EI. STM: Open. Hospital: VE1ACC. Silent Keys: VE1GB VE1CCH. VE1VX (ex-BSH) on business in B.C. VE1WF and VE1ASJ presented program at recent MAARC meeting. CRRL Outgoing Bureau catching on and cards are arriving from across Canada. There are many vacant appointments available. If anyone is interested in one of these, plese contact the SM for details. VE1SH will be reading CRRL bulletins on Mar. Phone Net. VE1ASJ has very interesting program on QSL bureaus and VE1SPI Operation. APN: sess. 28, QNI 155, QTC 72, time 325 mins. Traffic: VE1WF 369, VE1BXA 72, VE1XF 42, VE1LCR/RO 34, VE1BKM 14.

ONTARIO: SM, Larry Thivierge, VE3GT — SEC: VE3GV. STM: VE3GFN. Congrats to the section's first DEC appointment, VE3JJA at Sioux Narrows. He is, at long last, a major leadership appointee in Northern Ontario and will be responsible for ARES activities north of the "Soo." VE3GFN busy last month with his first TCC sked and also with his first 2X RTTY QSO on 20 meters with Jackson, MS. The 15th Boy Scout World Jamboree will be held in Calgary during July. The event will attract 20,000 scouts and leaders, mostly from outside Canada, and will feature many sessions and demos related to the electronics industry. VE1ASJ and his helpers doing a great job with the CRRL Incoming and the new Outgoing QSL Bureaus. Quinte ARC special awards have been presented to VE3GPJ and VE3LGQ. Our SEC spoke to the LEMO group, which included members of the Woodstock ARC. VE3s BTP NDQ HLE CIW VY and K6GMU/VE3 of the Welland Co. ARC helped to make the Red Cross Blood Clinic a success by providing communications and cars. Guelph ARC members were treated to an outstanding talk and display on packet radio by VE3DNM and VE3DSP. Ontario amateurs may use the call prefix CY3 from May 17 till July 17 to commemorate World Communications Year. Oakville ARES group now meeting on local rptr VE3OAK. The TFM group has been testing a brand new replacement rptr for VE3RPT in the Yonge-St. Clair street area after which it will be moved to the existing Uxbridge site. VE3RPT has been in operation since 1965. VE3CAB has been doing some site testing from the Aurora Radge that will eventually see rptrs VE3GER TTR ZAP MTR OD DRW linked on UHF. New officers of the Algoma ARC are VE3s CWE MOL MOF EGC JIX AYJ. Winners of the Trillium weekend contest were VE3s COH CLT and IRS. NPARC Pres. VE3FOI presented the Peterborough ARC with a plaque congratulating the club for their public service activities work over the years. Traffic: VE3HTL 434, VE3KK 252, VE3GOL 200, VE3GT 145, VE3GFN 118, VE3DPO 114, VE3CYR 107, VE3WG 84, VE3KCZ 75, VE3JSM 74, VE3FGU 71, VE3KXB 61, VE3BDM 51, VE3AJN 49, VE3WM 26, VE3EWD 22, VE3EHL 12, VE3WV 11, VE3KLX 7, VE3BAJ 4, VE3DZH 1. (Jan.) VE3FGU 63, VE3DZH 2. (Dec.) VE3DZH 21.

QUEBEC: SM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2EDO. NMs: VE2EDO VE2FSA. New appointment: VE2EDO, now STM. Owing to his health, VE2PJ had to resign as STM. Sincere thanks to him for all his services. Prompt recovery also to VE2EC, who is back home after a spell in hospital. Silent Key: VE2EBQ VE2BTL. Felicitations a VE2EVX qui a ete elu directeur pour la region de l'Estrie (RAQI). Le club VE2CSS (Sherbrooke) a donne encore cette annee, une bonne demonstration de la radio amateur le 24, 25 et 26 fevrier. VE2AOT a de nouveau ete le meilleur en cw. Avec regret, le dois vous annoncer te deces de VE2EBQ et VE2BTL. Traffic: VE2ALE 217, VE2EDO 67, VE2BP 39, VE2EKC 29, VE2GAG 22.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3WIY WA3DUM K3JL WB3DUG. KCARC 2-meter net, normally meeting Wed. 7 P.M., was activated during blizzard Feb. 11 with KA3BDR in charge. They were operating from the court house, and were on the air a total of 17.5 hours, using the 146.97 rptr. Several travelers were aided. SEN on 147.075 as well as DEPN on 3.905 were on alert but services were not required. AWARE welcomes new members K3MYG N3BLU KA3KHX KA3AAU KA3KCN KA2QZM and KA2QZL. N3CZR to Extra. DTN QNI 348, QTC 42 in 20 sess. DEPN QNI 62, QTC 19 in 4 sess. SEN QNI 21, QTC 6 in 4 sess. KCARC QNI 28, QTC 0 in 3 sess. Traffic: W3PQ 159, WB3DUG 91, WA3WIY 60, WA3DUM 46, W3QQ 36, W3WD 15, K3JL 14, WA3PWT 10, N3AXH 2, KC3FW 2, K3ZXP 1.

EASTERN PENNSYLVANIA: SM, Karl W. Pfeil, W3VA — ACC: KB3NE. 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	524	580	28	WA3EHD
EPA	3610	7/10 P.M. Dy	436	306	55	AA3B
PTTN	3610	6:30 P.M. Dy	197	65	28	WB3EPU
PFN	3958	5 P.M. Dy	305	620	28	WA3WQP

Local and vhf nets reporting (QNI/QTC/sess.): D3ARES 151/25/4; D5ESN 66/16/4; D6ARES 22/8/4; CCESN 29/6/4; WARCVTN 44/22/4. New appointments: KB3NE to ACC; KA3IME to OES & ORS. Congrats. BPL: KB3FW WA3WOP. KA3HBK appointed control of Mid-Atlantic Rpt. OBS reports: K3EBZ KA3EJG W3AVJ W3CL W3VA WB3CAI WB3FVJ. PSHR: KA3DLY KA3EJG KA3GJT KB3FW KB3UD KB3XO W3GOA W3VA WA3EHD WA3WOP WB3FKP WB3KUZ. KB3FW made BPL for first time, congrats. WB3FKP will be on with new keyer and as NCS on PTTN with a TI-9914A. AF3Z now using new Vic20 on cw nets. Upgrades: KA3HBK KA3KGT to Gen; KB3HV to Extra. EPAEPTN welcomes WA3SPV. PTTN welcomes KA3IME. New officers for Carbon ARC: WB3JYY, pres.; WB3JZE, v.p.; WB3FVJ, secy./treas. New gear: K3MZO IC-2001; KA3KMH Argosy; KA3KGT TS930S; WA3NVK IC-3T; WB3CQD TS520S. W3ABC was guest speaker at recent Warminster ARC meeting. KA3KKM new Novice in W.B. area. WB3BOT now active on RTTY. WB3KUZ received 25 wpm CP endorsement. AA3B NM EPA needs 3RN reps; any help gang? WA3PZO reports section has 300 ARES members, 36 local emergency nets active with 34 having liaison with NTS and 144 sess. in Feb. Affiliated clubs please note that KB3NE is now the Affiliated Club Coordinator (ACC). He will help you get started in administering the Special Service Club (SSC) Program and in assisting affiliated clubs in this section. Traffic: WA3WQP 768, KB3FW 417, WA3EHD 322, KB3UD 216, KA3DLY 172, WB3KUZ 169, W3KAG 167, W3IPX 166, KB3XO 152, KA3GJT 133, W3DP 128, W3VA 123, AA3B 100, N3AIW 86, WB8KPE 82, KB3LF 80, W3AQN 67, N3COY 65, N3CD 57, WB3FKP 50, WB3CAI 36, K3ARR 30, N3BFL 30, KA3EJG 29, W3TWV 27, W3ADE 24, N3AKQ 19, W3HK 18, W3AVJ 17, WB3FVJ 15, KE3U 15, W3CL 14, KC3AK 11, W3FAF 9, AF3Z 8, N3CMC 5, W3EEK 5, K3EBZ 4, K3QXC 4, N3BHF 3.

MARYLAND — DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — The Mountain ARC selected K3IFB as their Ham of the Year. Congrats. The Chesapeake Bay RA had their FB annual dinner with Atlantic Division Director W3ABC giving the main word. KC3D is slowly recovering from the DX tests. KA3R and W3IK resident OOs were checking up on you, and helping with RTTY problems. Ah, these new computers! KC3EK has joined the OO gang. KB3WL's signal crosses state lines to get into southern MD. W3CDQ enjoyed the QCWA and YL/OM parties. W3ZNW is an ARES/RACES man. W3MSN says W3CVE impressed him as a cw virtuoso! KJ3E on a travel trip reports in by radio relay. W3CYY records his net sessions. WB3KJT says 6 is his magic number — he makes skeds at both 6 A.M. and 6 P.M. W3LDD celebrates a year of retirement. KC3DW takes top honors this month. W3UT's temporary absence was the result of a broken ankle. W3FZV found stim pickins in the QCWA contest. WB3BFK is supporting the old PONs. KB3NL is another computer owner. N4DR finds much DX on 30 meters. W3YVQ is also a two-mode man. KK3F has a problem with skip. WB3GZU says February is 3 days too short for ham radio. Correspondence from FAR, Ham Arundel News, Chesapeake Bay RA and the Southern MD ARC is appreciated. SMARC's new slate: W1ZK, pres.; W3HVM, veep; KA3EUH, secy.; KA3DUE, treas.; KC4SO, activities. W3IEZ W3CQB KF3T, directors, N3CAF, EC; KJ3T, Editor. Congrats to you all. Also congrats to KB3QP now KM3R, and to KB3KM now KM3O new Extras, to NC3YS a new General, and to KA3JRA new Tech. With the nets: Net/manager sess./traffic/QNI average: MDC PON/W3OYY 4/16/21.5; WC 2-Mtr/KC3DW 4/1/21.3; WR PON/WB3BFK 20/43/15.7; AARC 2 Mtr/WA3KCY 2/3/15; MDD/W3PO 56/271/8.5; MEPN/WB3GZU 31/231 34.4. Brass W3FA and KC3Y. Missed 3 or less: N3AGM KA3ARH WB3BFK KC3DW W3FA W3LDD KB3WL WA2YFM W3YVQ. Traffic: KC3DW 514, WB3GZU 492, W3FA 253, W3CVE 225, W3YVQ 123, KB3WL 85, W3FZV 80, KK3F 41, WB3KJT 19, W3ZNW 12, WB3BFK 10, N4DR 5, W3UT 4, KB3NL 4, W3LDD 4, KJ3E 2.

SOUTHERN NEW JERSEY: SM, Edward E. Wood, N2CER — SEC: W2HOB. STM: WA2HEB. SGL: W2XQ. BM: WB2BWL. Next month is the month of one of the highlights of the year for Amateur Radio, Field Day. Any licensed amateur can participate. One can go it alone or as a member of a group. The rules are covered elsewhere in this issue. Beam antennas, engine generators, etc. are not necessary in order to become a participant. These days of solid state rigs make it practical for many of us to operate with silent battery power, using your automobile, camper, travel trailer, or whatever. Go on out there, hang a wire from a tree and you can have a great deal of fun. Try it. You will like it. Would you like to improve your cw operating skills? Join the New Jersey Slow Net, cw call NJSN, which meets daily at 6:30 P.M. local time on or near 3735 kHz. It is a great way to increase your code speed and to learn traffic handling, a fascinating facet of our hobby. Also WB2IQJ, net manager of NJSN, conducts code practice at the conclusion of each net session at various requested speeds. Traffic: N2CER 599, WB2ZJF 442, WA2HEB 204, WA4JRP 88, WB2PKG 77, KM2E 68, AA2H 68, WB2PXD 52, KC2PB 42, WA2GYF 40, KA2GSL 38, KC2PO 32, KA2GTE 19, W2IU 10, KY2T 10, KD2Q 4.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ASM: W2GLH. DEC: WA2AIV KA2BHR WB3CUF W2GJ (acting) WB2NAO. APPTS: ORS-WB2IDS WB2OWO; OES-WB2NAO; EC-WB2PID, Erie; DEC-WB2NAO, Northern. BPL: K2GXT WB2IDS WA2SDY.

Net	Freq.	Time/Day	Mgr.	QNI	QSP	QND
NYS/1*	7077	1000/Dy	WB2EAG	234	174	24
NYSCN	3677	1000/Sn	W2MTA	39	16	4
M. Farad	3925	1300/M-S	VE2FMQ	186	150	24
THIN	3913	1600/Sn	WA2KOJ	52	—	4
NYPON*	3913	1700/Dy	KC2SJ	672	754	28
NYSPTEN	3925	1800/Dy	WB2HKU	664	96	28
ESS	3590	1800/Dy	W2WSS	416	63	27
Lewis Co.	43/03	1815/Sn	WA2OEP	24	—	4
OCTEN*	34/94	1830/Dy	WB2HLY	638	124	28
Q Net	31/91	1830/Dy	KA2CMQ	330	8	28
STAR/E*	99/39	1830/Dy	N2BLX	56	21	23
WDN/E*	04/64	1830/Dy	KC2QQ	588	239	28
NYS/4*	3677	1900/Dy	N2APB	561	415	28
SLVARES	31/91	1930/Sn	WB2NAO	41	—	4
JCARCN	10/70	2000/Dy	WA2WAX	416	12	28
OARCN	25/85	2000/Wed	K2VTT	76	0	4
WNYECN	3955	2000/3Sn	W2BCH	(ARES)		
BRVRN	055/855	2100/Dy	WB2OFU	367	9	28
CNYTN*	90/30	2115/Dy	WA2PUU	479	246	28
STAR/L*	325/925	2130/Dy	N2BLX	57	45	21
WDN/L*	04/64	2130/Dy	KC2QQ	576	255	28
NYS/5*	3677	2200/Dy	N2APB	355	463	28

*NTS. VHF THIN 04/64 2000 Tues. PSHR: W2AET KA2BHR N2BLX WA2FJJ KA2GCZ K2GXT WB2IDS WA2KOJ W2MTA KU2N WB2OWO KC2QQ WB2RBA WA2SDY KC2SW W2ZOJ. Club Officers: Skyline-KA2OHA KA2PPV N2DBW K2LFB; GRAM-WB2ODH KD2Y WA2ODD WA2HED; Drumlins-KB2XI WA2MCB N2DIT KA2HWW; Tompkins-KA2MKU KO2X W2CFP; Tioga-KC2TB K2UNY K2OH; Salt City-K2PZ KB2DM KA2GMT KB2G; Niagara-WA2PYT WA2UJR W2UMS G4OYA; Otsego-WB2PEE KA2MUS KC2FY; Kodak Park-KW2X KB2BN WA2JRP; Allegany Highlands-KW2J WB2OQY K2UPH K2PLQ; Rochester DXA-KB2NU W2TZ KS2F; RAGS-WA2VSU WA2URK K2SDD WA2PUU WB2KFA; Genesee Repeater-K2OXT W2GV K2VI; Carlton Webster JHS-W2FUI KA2FQY. COMMS: Waterville ARC at New York Learning Fair-WD2ALL. HONORS: Plattsburgh Mayor and City Council commended WA2HSB for 22 years service in Civil Defense; W2AXW recipient QCWA 50-Year Gold Certificate Award; K2CS has 71 years as a ham; W2RNH hamming for 68 years. Hamfests: Owego May 7; Rochester May 20/21; Rome June 5. Traffic: WA2SDY 1579, K2GXT 758, WB2IDS 586, W2MTA 449, W2AET 423, WB2OWO 421, WB2QIX 288, KC2QQ 214, WA2KOJ 209, W2ZOJ 205, WB2RBA 179, KA2BHR 167, WA2FJJ 143, W2FR 142, KU2N 132, N2BLX 119, KA2GCZ 108, KC2SW 87. AF2K 83, VE2FMQ 82, W2UYE 80, KG2D 72, WA2NPQ 68, KC2SJ 66, KA2DBD 60, N2DZF 51, W2HYM 50, KA2BCH 44, WA2RXO 40, WA2SMZ 40, N2ARD 39, WB2PEE 39, W2TZ 37, WB2PID 31, KA2BCE 22, N2ABA 21, WA2AIV 20, WB2NAO 20, KA2DQA 16, K2IUT 16, WA2OEP 16, W2GJ 14, K2RN 5.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB — SEC: AB3Q. STM: AC3N. OO/RFI Coord.: KN3B. ACC: N3EE. PIO: WB3CEW. SGL: W3OKN.

Net	QNI	QTC	Sess.	kHz	T/D	NM
WPACW	374	313	28	3585	7:00	P/D WA3UNX
WPAPTN	727	371	28	3983	6:15	P/D N3ADU
WPA2MTN	433	209	28	146.28/88	8:00	P/D W3MML
NWPA2MTN	448	12	28	146.04/64	9:00	P/D WB3JDI

Upgrades: Novice KA3NKM; Tech KA3JBL; Generals KA3COX & KA3JQE; Extras KN3B (ex-N3BKU), KM3Y (ex-WA3KSA), KA3CUF. Congrats to KA3CEO, district chairlady for the YLRL #RD DISTRICT. I would like to congratulate the amateurs in the WPA section counties involved in the PEMA drill which simulated a leak at the Beaver Valley Nuclear plant at Shippingport. On Feb. 16 the drill was put into action and as the situation developed and became more serious the amateurs in adjacent counties were alerted and told what was required and whom to report to. Two-meter rptrs and the RACES frequency 3990.5 were used. Contact was maintained with the PEMA headquarters in Indiana, PA. The Western PA Hq. has a fully equipped underground shelter and can be kept manned for several days. All phases of communications, telephone RTTY, and Amateur Radio are used. I also urge all clubs to appoint a Public Information Officer. He or she should contact WB3CEW, the section PIO. Traffic K3CR 1093, N3ADU 1090, AC3N 554, WN3VAW 260, W3IQD 161, W3OKN 159, W3NEM 100, WA3UNX 96, KI3C 86, W3KUN 76, WA3QNT 76, K3SMB 73, KN3B 72, KB3DT 63, KA3ETC 63, W3RUL 63, K3NPW 58, W3SMV 57, N3CKQ 54, W3KMZ 54, W3NGO 52, N3FM 50, W3MML 48, KB3NV 48, WB3HBE 33, K3VQV 29, K3HCT 24, KB3BG 20, KA3COX 20, W3TTN 20, K3LTV 18, KA3HDL 16, K3TUA 15, WB3GUK 14, N3KB 13, W3SN 13, KB3YC 11, KF3V 8, W3LOD 3. (Jan.) W3SN 15, KA3ETC 10, WB3GUK 10.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH. STM: KB9X. OO/RFI: K9MX. BM: K9ZDN. ASM: K9ORP.

Net	Freq.	Time(s)Z days	QNI	QTC	Sess.
ILN	3690	0030/0400 Dy	498	227	55
IPN	3915	2230 Dy (xSn)	—	—	—
NCPN	3915	1300 Dy	474	75	24
NCPN	7270	1815 Dy	141	284	24
ITN	3705	0100 Dy	253	106	28
IEN	3940	1500 Sn	101	9	4
IARES	3915	2230 1&3 Sn	28	0	2

9RND 100% stations: W9HOT W9NXG WB9ODN W9HLX WA9BXB WB9WGD N9CQ. CAND 100% stations: WB9WGD W9HOT W9NXG WB9ODN. K9AXS reports 54 QNI, 23 QTC in 4 sessions for the W9VEY/mem net. Congrats to the members of WCRA for yet another fine mid-winter hamfest. Watch out DAYTON . . . they're catchin' up to ya!! In addition to the huge indoor flea

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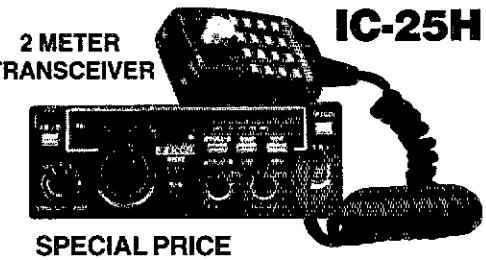

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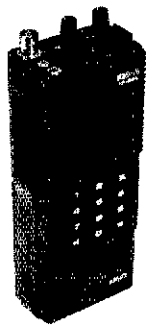

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BP-5, 425 ma, 10.8V batt	**$49.50**		

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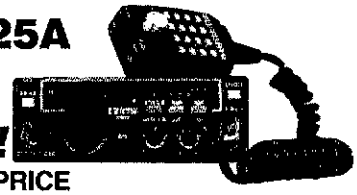

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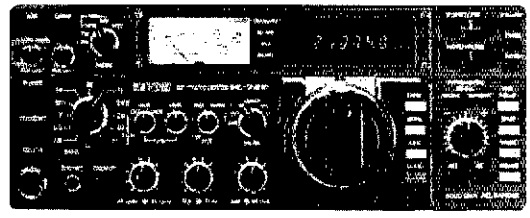

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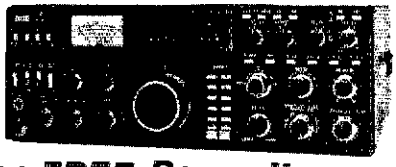

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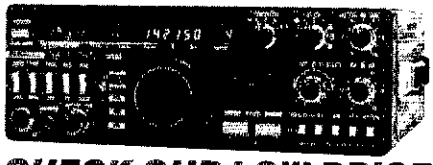

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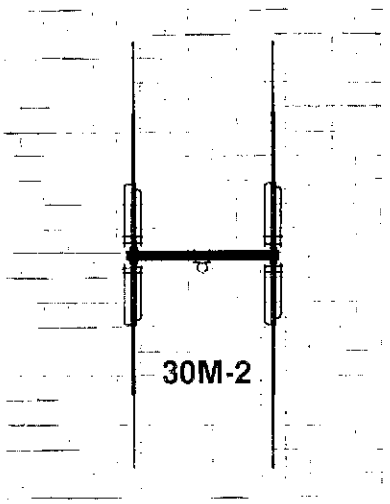

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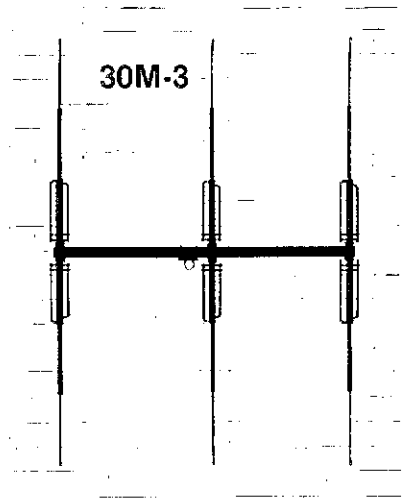

30M-2: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain:
VSWR: **less than 1.5:1**
F/B:
Feed Impedance: **50 ohms**
Element length: **35'3"**
Boom: **3"O.D. x 12'**
Turn Radius: **18'6"**
Weight: **35 lbs**
Windload: **4 sq ft**

30M-3: SPECIFICATIONS
Bandwidth: **10.1 to 10.150 MHz**
Gain:
VSWR: **less than 1.5:1**
F/B:
Feed Impedance: **50 ohms**
Element length:**35'3"**
Boom: **3"O.D. x 24'**
Turn Radius: **21'5"**
Weight: **50 lbs**
Windload: **7 sq ft**

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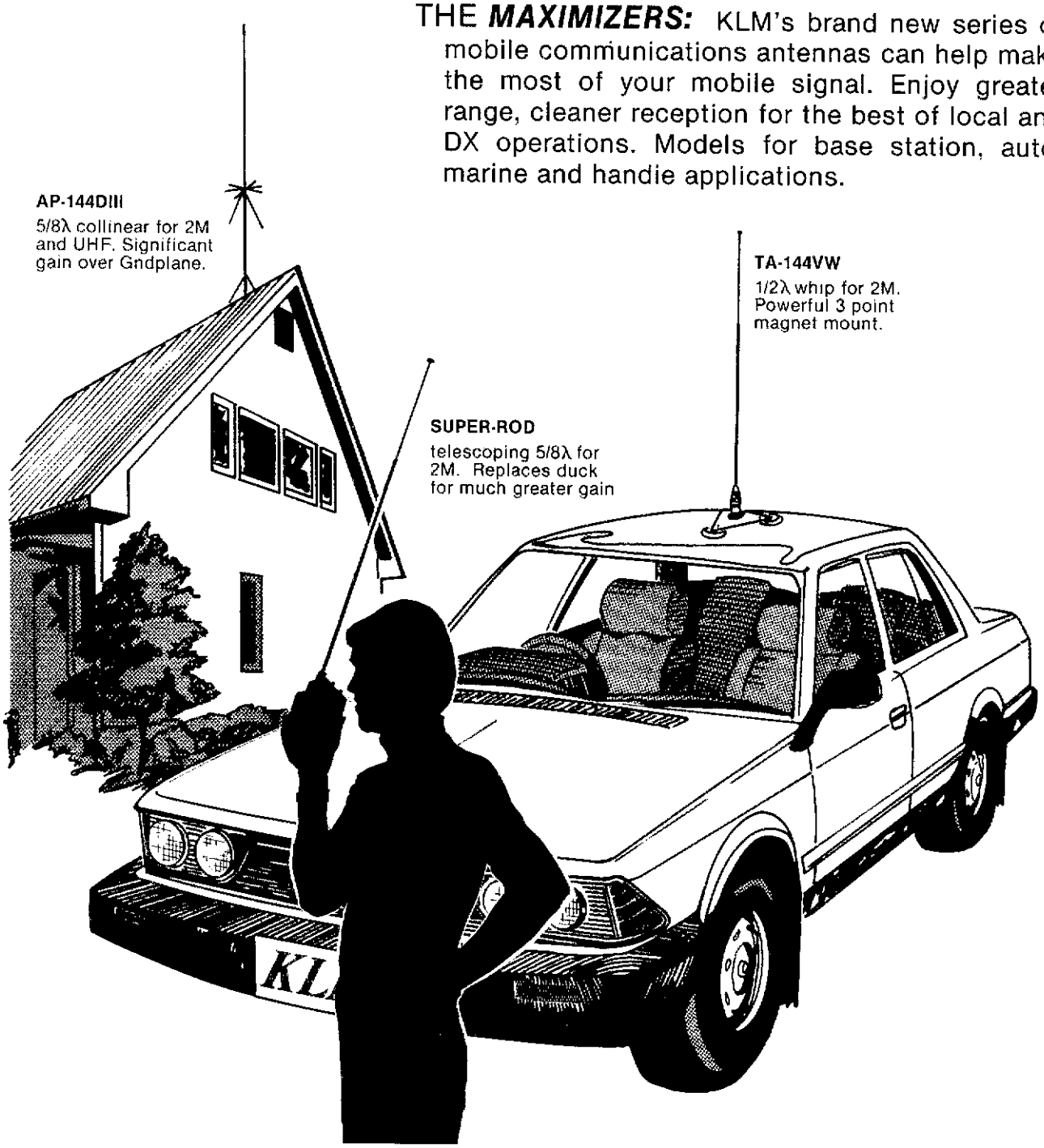

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market and many fine forums, the now-annual WCRA Hamfest IL ARES meeting was held and conducted by W9QBH who did his usual fine job, and was joined on the speakers platform by SM WD9EBQ, STM KB9X and DD W9PRN. On Feb 11, Kay Harmon, administrator of Peoria ESDA (and IESMA *UPDATE* editor) presented a program on tornado spotting for the PAARC hams. WD9EED reports that he and WA9SID KA9NLV KA9NNH WD9CJY completed an 8-hour first aid course. KA9KRV and KA9EYS of the Radio Amateur Downstate Organization (RADIO) have been attending a class on emergency simulation training which intends to keep the county disaster plan up to date with regards to resources from all sectors. Mr. H.L. Chadbourne of 530 Midway Street in LaJolla CA (92037) is working on some research regarding a Mr. Leonard D. Wildman (1868-1928) who lived and worked in the Chicago area from 1917 until Wildman's death. Mr. Wildman, who made important contributions to the state of the radio art in his time, may or may not have been a ham. If any of you OTs in the section have any info on him, Mr. Chadbourne would very much like to hear from you. SEC W9QBH reports that in addition to the ARES forum at the WCRA hamfest, he gave ARES talks at the McHenry Co. Wireless Assn. meeting on Feb 1st and at the Six Meter Club of Chicago meeting on Feb 11th, as well as to the Schaumburg ARC meeting on the 17th. He also reports the following new ECs: K9CI, Washington Co.; WB9YUN, Peoria Co.; KC9GT, Jefferson Co. WELCOME ABOARD! Looks like he had a busy month! APPOINTEES: Please remember to send a CD-210 or a radiogram with the same information (including appts held pse) to me by the 6th of each month for inclusion in *QST*. Late reports are tabulated and filed for section records so your appointment will be kept up, but are not included in *QST* publication. Note also that *I must receive* the info by the 6th, so send it ASAP after the 1st. Traffic: W9JIJ 578, W9HOT 408, W9HLX 359, W9NXG 313, K9CMO 213, KA9EGW 183, KB9X 180, W9TLU 172, KD9K 124, W9OK 99, KA9NWO 83, WB9UEA 80, N9DIX 74, WA9SHE 73, WD9IBH 43, KN9BAM 40, K9QEW 30, K9WMP 19, WA9RUM 16, W9LNQ 15, W9HBI 13, KA9GJN 13, WD9CJB 10.

INDIANA: SM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9UJJ. SOOC: KJ9G. SGLC: WA9BVS. SRC: N9WB. SACC: K9TUS. SCC: W9OBF. STC: WD9ADB. SPRC: K9DIY. SDXC: N9MM. SOBC: KC9TA. NMs: ITN-W9QYY; QIN-KJ9J; ICN-KA9CZD; VHF-W9PMT; IWN-N9BHT; IPN-KO9F; I6SSB-WD9HQJ.

Net	Freq.	Time/UTC/Daily	QIN	QTC	QTR	Sess.
ITN	3910	1330/2300	1980	298	1771	56
QIN	3656	1430/0100/0400	773	394	1782	84
ICN	3708	0100	123	34	626	28
IPN	3910	2130	1090	307	1225	28
IWN	3910	1310	2354	—	427	28

Hoosier vhf nets QNI 5615, QTC 297, QTR 6464, bulletins 52 for 22 nets. D9RN 428 messages in 1253 min. In stns W9JUJ K9CGS W9URQ WB9MIK KB9NR WD9MRT. CAND-1029 in 28 sess. D9RN 100% in stns W9JUJ W9URQ. Appts: OOs-AB9A KA9GMM WB9JUV WB9EBI K9WG; ORSs-KA9OIU K9FW W9PMT K9DKB; ECs-WB9VEI for Howard Co.; WD9QBB Jefferson Co.; OBSs-W9PMT WA9KWH. Silent Keys: WA9CCH, Fort Wayne; W9FIW, Fort Wayne; W9LUS, Fort Wayne. W9WKM, Indiana Phone Net secy., very active traffic handler, ORS, a friend, Culver. There was no Indiana 6-Meter SSB Net report for February. WD9HQJ writes that he has changed jobs and can no longer devote 100% of his time to the net. The net needs help or it will fold completely. Anyone anywhere in the state that could try to keep the net alive contact W9UMH or WD9HQJ. Congrats to W9XD for his 5-band WAS #1146. KC9TA, Section Official Bulletin Coordinator, is transmitting ARRL Bulletins on 3630 at 0000Z on Tuesdays and Thursdays. K9DCX and KJ9G gave KA9FFO his General test and he passed. They have worked to put up antennas and to get him on the low bands. KJ9G wishes to thank everyone who helped with this project. Congrats to WB9VSQ, winner of the 1982 McCutchan Award given by the Tri-State ARC. The history of the award was most interesting. Congrats to the new ARRL affiliated Kokomo ARC. They are planning for the future. I am pleased with the activity from Purdue. W9YB. The article in the Columbus ARC *TRANSMITTER* by WB9WGD was very interesting. Traffic: W9JUJ 1173, K9FZX 291, KJ9J 229, WB9UYU 161, KM9B 158, W9URQ 149, W9EI 110, W5NPM 92, W9QYY 84, KB9HH 77, W9PMT 75, W9QLW 67, WA9QCF 66, N9AEI 65, WD9JAA 62, W9UMH 60, WB9ZQE 56, AB9A 53, K9DCX 53, KC9TA 52, KA9LAU 48, W9JZV 44, KB9NR 41, K9WWJ 41, KO9F 37, KA9FFO 32, W9BUG 30, WB9JUV 29, N9HZ 21, WB9PFZ 21, WB9MIK 17, N9CQS 14, K9KTB 12, WA9OKK 12, KK9N 11, WD9DWD 10, W9ZGC 10, KB9DE 9, W9RTH 9, WD9ART 8, WD9CIV 7, WB9UBC 7, W9BDP 6, KC9GX 6, N9DHX 5, K9OUP 5, K9SBW 4, W9XD 4, WA9KWH 3, N9AST 3, W9UPI 2, WB9AJY 2. (Jan.) KB9DE 4.

WISCONSIN: SM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1200Z QNI 1204, QTC 1318 WB9YPY. BEN 3985 1800Z QNI 615, QTC 273 WB9ESM. WSBN 3985 2300Z QNI 930, QTC 370 WD9ESZ. WNN 3723 0000Z QNI 213, QTC 77 KA9HPQ. WSSN 3645 0030Z QNI 178, QTC 37 KC9CJ. WIN-E 3662 0100Z QNI 342, QTC 136 W9YCV. WIN-L 3662 0400Z QNI 273, QTC 112 K9LGU. XPO 3925 1831Z QNI 315, QTC 21 WA9GYF. NWTN .34/.94 0030Z QNI 424, QTC 41 WB9YPY. Gr. Bay .72/.12 Thurs. 0245Z QNI 24, QTC 2 WB9NRK. WCWTN .31/.91 0030Z QNI 463, QTC 39 N9AUG. Are your net certificates up to date? They are good for one year from date of issuance or endorsement. To be a delegate of the WNA of the net you represent; your certificates must be up to date. I'm still looking for someone to volunteer to take the position of Technical Coordinator. New EC Menomonie Co. KC9VM. I regret to report the following Silent Keys: K9TRN W9CJE. Wisconsin hams WB9ECO and YF Vicki in San Francisco. WB9EWQ and YF Judy in Seattle. WB9EWP and OM Phil are in Monroe. The Madison DX club (MDXC) officers are: KC9LM, pres.; W9XM, v.p.; K9QXY, secy./treas. This club has 21 members who have more than 100 DXCC countries and meet once a month. KA9MCD is KC9XH, BPL to KA9CPA. Thanks to all who report into CAND, D9RN; it's much appreciated. A VIC-20 computer users group has been formed in Milwaukee. Interested persons should contact W9UW. Traffic: KA9CPA 2506, WA9WYS 425, KC9CJ 240, WB9YPY 224, W9YCV 211, W9UCL 200, K9GDF 171, K9FHI 169, W9DND 146, K9AKG 108, W9SO 91, N9DIH 87, KA9KLZ 82, KA9HPQ 80, N9AUG 78, KA9BHL 78, K9VSO 74, AG9G 70, W9CBE 68, W9LDO 68, N9BYK 63, N9ATP 62, WD9FRI 58, WB9NRK 58, WB9ICH 47, KA9IKR 47, KA9OBP 46, K9LGU 45, K9UTQ 44, N9BDL 39, WB9JSW 38, KB9NG 37, KB9GO 34, WB9JGA 31, WB9WNA 30, KG9B 29, KA9NOT 29, KA9MFV 26, N9DCF 25, KC9GW 24, K9HDF 23, W9FDY 20, WA9DXW 19, WA9GYF 18, KA9ODJ 18, W9UW 18, WD9IMZ 17,

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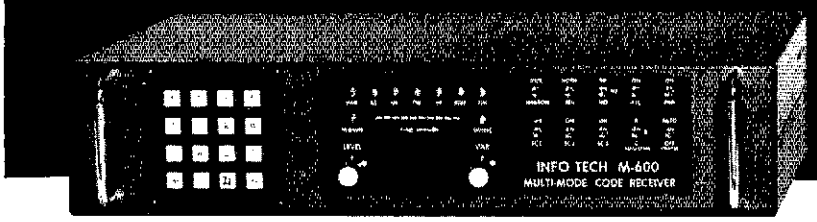

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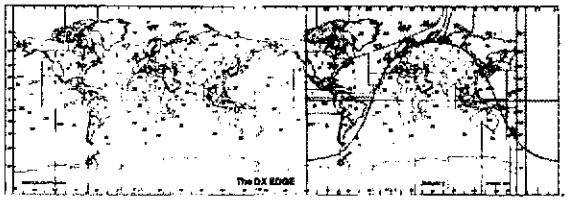

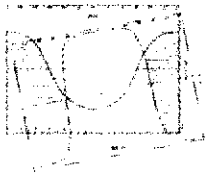

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DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, WBØHOX — STM: ADØS. SEC: KNØJ. Congrats to KAØPEF-Novice, NØEHK-Tech, KAØMIW & KAØNRU-Advanced & NØDUQ, on his Extra in less than 1 year. FB, NØCID has been a fine "Elmer" in the New Ulm club. Contact NØBMA for info on the New Ulm ARC. WØBCT, now a Silent Key, was a founder of the St. Paul ARC. Thanks for a fun evening at the St. Paul club, over 400 strong and active. It is with a lot of regret I must resign as the STM. I have too many obligations and my family must come first. I want to thank all of you for your help and friendship the past year. Thanks.

Net	Mgr.	QNI	QTC
MSN/2	KAØEPY	226	59
MSN/I	W9DM	282	143
MSPN/E	KCØT	391	196
MSPN/N	KAØJUX	604	73
MNWX	WAØONE	512	411
PICO	WØHZU	2671	228
MSSN	WBØWXU	76	19

Traffic: KBOMB 1092, WAØTFC 393, WØHZU 196, W9DM 179, KAØJUX 173, KAØEPY 168, KAØARP 145, NØCLS 121, WØGRW 113, WBØHOX 111, KDØCI 109, WDØCGM 89, WAØONE 86, WDØAHO 81, WØDFX 57, KTOR 51, ADØS 51, KØCSE 42, KTØU 42, NØJP 41, WDØHDD 32, KBØRW 28, KØOGI 18, WBØJUL 15, KNØU 12, NØDUQ 11, KAØJQO 8, WDØBGS 8, KAØODJ 7, KAØMZJ 6, KCØYG 5.

NORTH DAKOTA: SM, Dean R. Summers, KQØC — New officers for TRARC: WDØDAI, pres.; WDØDAJ, v.p.; WDØDAW, secy. Dickinson Novice class about 16, Bismarck about 10. Jamestown club meets 4th Tues at Parkway. New harmonic WBØGFZ and XYL; expecting WBØJMK and XYL. Just educated in insurance school WBØTEE and WDØGRC. Dakota Division Conv. Sioux Falls Sept. 23-25. Remember Field Day coming up. KB9EK has new Apple and KBØUK has new TRS-80 Model III. KØALL trying to work BY1. Tnx to all net controls KNØA NØAFP WBØGMD WØCDO KAØFSM & WBØGDD. Goose River net 4 sess., 70 QNI, 2 QTC. WØCDO sent 54, KAØFSM sent 30, rcvd 29, dlvd 2. DATA net: 23 sess., 254 QNI, 25 QTC. Peace Garden International Hamfest July 9-10 at the International Peace Gardens, near Dunseith.

SOUTH DAKOTA: SM, Fredric Stephan, KCØOO — ASM: WØKJZ. Come to life in the fast lane at 0100 UTC at approximate frequency 3650 daily. Mobridge Area ARC and Hot Springs ARC AGAIN conducting new Amateur Radio classes. Black Hills ARC had enjoyable well attended annual auction and flea market. Also, BHARC has largest and most active affiliated club in the SD Section. Congrats again. NTS TEN DTEN liaison stations were KØFRE WØKJZ WBØKWX and WØHOJ KCØOO and WBØSUM. SDTIN meets at 3960 at 1500 UTC. SD WX net 822 QTC, 941 QNI; SD Traffic info Net 80 QTC, 166 QNI; SDCW Net 19 QTC, 51 QNI; SDEMG Net 3 QTC, 125 QNI. PSHR: WØMZI WØZWL KCØOO WØKJZ NØCFS NØEEH. BPL: WØMZI WØZWL. Traffic: WØMZI 722, WØZWL 703, WØHOJ 155, KCØOO 151, KØAIE 100, WØKJZ 67, WAØUEN 62, WØDVB 53, WBØKWX 51, WAØVRE 49, KØFRE 46, NØCFS 42, KCØAF 32, WBØOMF 27, WØRWE 25, W7UDB 25, WØYMU 24, WAØBZD 23, WBØZMW 23, WAØAOY 22, WBØYDG 21, WAØCIP 20, NØDCM 20, KØKLQ 20, WBØSSC 19, WØNWM 18, WBØHTT 17, WBØRXF 15, NØCDX 13, NØEEH 11, KØTVJ 8, WØVQC 7, WBØSUM 6, WDØCPI 4, WBØLTV 4.

DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU — SEC: WB5IGF. Net reports: Mockingbird Net, QNI 720, QTC 37, 585 min; Ark Phone Net, QNI 380, QTC 37, 840 min.; OZK net: QNI 178, QTC 23, 389 min.; Ark Razorback Net: QNI 948, QTC 52, 415 min. DRN stations: WB5GQH W9YCE KA4DPT K5BIL WD5FCE KA5GEX. Congrats to Joel Harrison, WB5IGF, newly elected SM. Join your local 2-meter nets and provide liaison to 3.995 or 34/94 Little Rock during band weather. For details, join the Ark. Emergency Coordinator's Net on 3.995, 5:30 local on Sunday afternoons. Hope you didn't miss the FB hamfest in Little Rock. If you did, make plans for next year; you won't want to miss it. Traffic: W5TUM 52, W5QFU 39, W5UAU 30, W5KL 4, W5BED 1.

LOUISIANA: SM, John Meyer, N5JM — ASM: KC5SF. STM: W5GHP. SEC: AC5R. Busy summer in Baton Rouge with a big hamfest at Catholic High May 7-8, followed by the Special Olympic Games in July. Contact N5ADF for details on how you can participate. The LCARC is forging ahead in its summer publication date of a book with all the hams in La.; contact W5OVV on availability. The JARC, those folks who bring you AMACOM in Oct.; have some new faces: N5RH, pres.; N5CNJ, v.p.; WB5RNL, secy.; KB5GQ, treas.; WB5RNM K5PO KB5VC WA5HOD, directors. Two meters stays busy in N.O. with two marathons plus Mardi Gras traffic easily handled by GNOARC and NOVHF folks. K5OA still hoping to get on from TJ-land before his stint with Shell ends there. WB5SOT, Dec. for Troop F, reports 57 hams assisted in the Monroe flooding; congrats to all who helped! Try checking into at least one net a month!

Net	Freq. (kHz)	Time	NM
LAN	3615	Daily 7 & 10 P.M.	KC5SF
LTN	3910	Daily 6:30 P.M.	N5ANH
LSN	3703	Mon-Fri 7:30 P.M.	WD5CWK
LRN	3587.5	Sunday 6:30 P.M.	W5GHP
LEN	3910	Monday 8:00 P.M.	AC5R
CCTN	146.01/61	Mon-Fri 6:45 P.M.	GNOARC

Traffic: W5GHP 158, KA5HDT 140, K5TL 139, W5LQ 121, WB5LBR 45, WD5JFY 43, KD5XB 41, W5VMY 36, AC5R 33, WA5TQA 30, N5ANH 25, K5WOD 17.

MISSISSIPPI: SCM, Paul Kemp, KW5T — SEC: N5DDV. STM: KB5W. VHF Coord. KB9TN. Not much to report this month. Remember this is your column and your input is what makes it. It has been a pleasure to work with all of you the past two years and know you will support W4WLF, your incoming SM. He will be looking forward to assigning new appointments. CAND (W5KLV) sess. 28, QTC 1029. RN5 (KB5W) sess. 56, QTC 510. MTN (K5OAF) sess. 28, QNI 172, QTC 52. MTN/L sess. 28, QNI 45, QTC 3. MSBN (N5DSK) sess. 28, QNI 2256, QTC 67. MMN (WB5RMW) sess. 28, QNI 588, QTC 17. CGHN (W5JHS) sess. 28, QNI 2401, QTC 190. MSN (N5ERX) sess. 18, QNI 104, QTC 17. RACES (N5AMK) sess. 4, QNI 79, QTC 6. GSEN (KB5W) sess. 20, QNI 412, QTC 13. CAEN (KA5AGD) sess. 4, QNI 84, QTC 2. Traffic: N5AMK 418, KB5W 270, K5OAF 243, KD5P 100, N5RN 99, KT5Z 67, N5EZQ 41.

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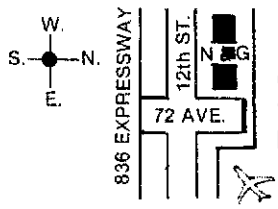

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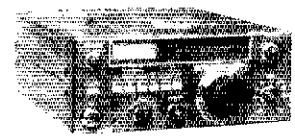

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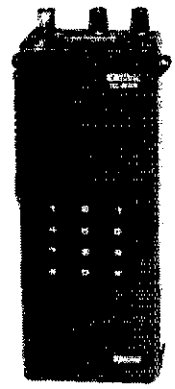

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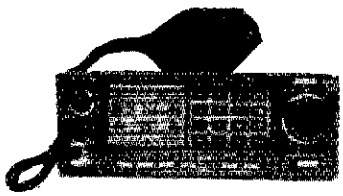

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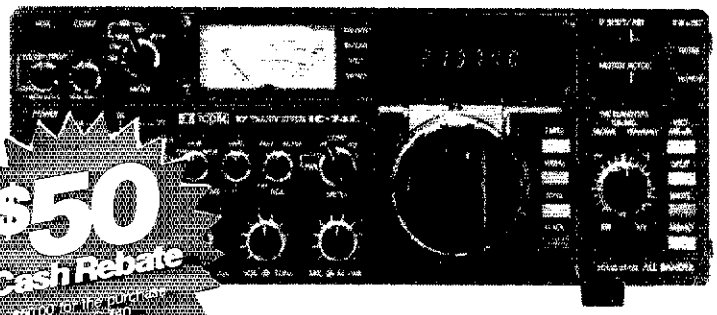

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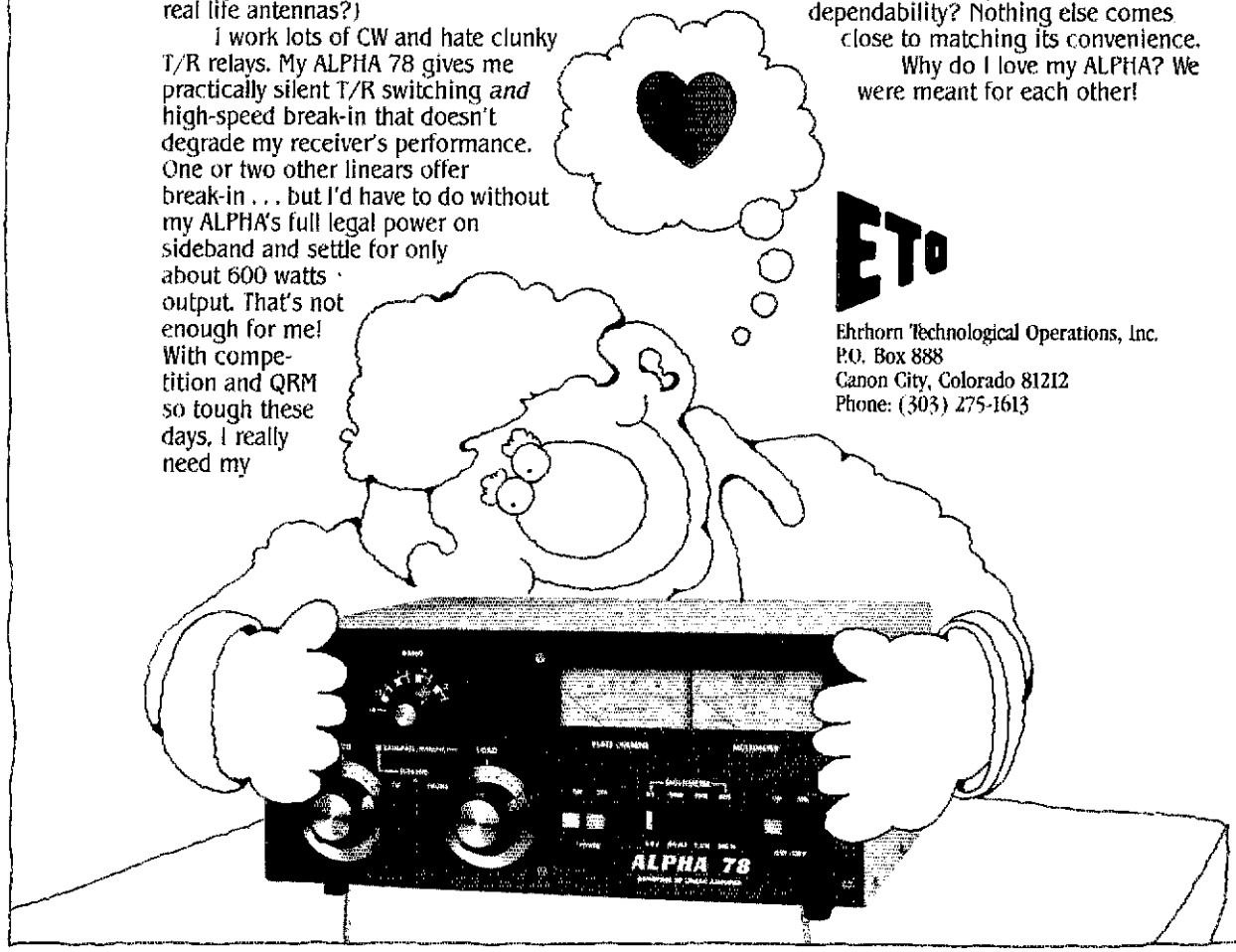

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Ridge, Dayton, Ohio and other hamfests are behind us. This month we have the Humboldt hamfest. So, all you fellows and gals, get out the old field gear and generators and get them all ready to make with the CQ Field Day QRM. Be sure to take time to get your reports in to ARRL. Also get the picks in especially of the YLs. Just got a new list of clubs from ARRL, which indicated that seven clubs have not submitted reports since 1981, 16 since 1982, and only 9 have returned the 1983 reports. How about taking time and sending a radiogram to let your Section Manager and Affiliated Club Coordinator know your 1983 club officers. Also send your ARRL club report back so current mailing can be effected. The 1983 section budget is based on the ARRL membership of the section. This budget indicates a drop of some 420 members from 1981 to late 1982. We need some club membership help to continue to provide the 32 various ARRL services to the amateur fraternity. Section traffic — LF sess. 94, QNI-4079, QTC-156; VHF sess.-82, QNI-2221, QTC-650; CW sess.-56, QNI-379, QTC-111; RTTY sess.-30, QNI-170, QTC-9. Where are all the RTTY operators? Just a reminder, the DRN5 is holding a new session at 1630 UTC on 7280 MHz. Get in and give a hand. I am sure that there was more traffic handled in the section than what is reported. How about sending in your report next time? If your club is sponsoring a special event, send a notice about two or three months ahead and it will be included in this column. It will let ARRL include it in the special activity section. The club at Dickson is doing that for OLD TIMERS DAY, May 7, with call NY4N. Traffic: NG4J 240, K4WWQ 148, W4DDK 114, W4ZJY 58, K4VM 40, W4MRD 38, W4TYV 35, KA4BSG 25, WD4GYT 25, KE4LS 19, K4WOP 18, WA4GLS 16, K4AMC 15, W4PFP 15, WA4UCE 15, NM4W 14, W4RUW 12, W4PMP 11, WA4RMP 9, WB4EOE 8, W4EWR 7, W4PSN 6, WA4HKU 6, NN4S 6, K4MZE 2. (Jan.) K4YOL 35, K4VM 34.

GREAT LAKES DIVISION

KENTUCKY: SM, Ann Sloan, KA4GFU — STM: KA4BCM. Section Nets (NTS):

Net	QNI	QTC
KRN	489	23
KYN	215	103
MKPN	1102	115
KNTN	351	110
KTN	1263	127
KSN	212	103

Local and ARES nets reporting: KEN 104/1; BARES 72/9; CARN 199/14; KYPON 71/12; PAWN 47/0; PAEWTN 231/29; SEKEN 39/1; TSTMN 379/52; WTEN 56/8; 4ARES 62/5; 11ARES 56/6. Thanks to all who voted in the Section Manager election. As the new SM, I will work hard to deserve your support. New section appointment: Michael Bruce, KA4BCM, STM. Congrats. Clubs interested in Special Service Club status, contact W4OYI. OES reporting: W4TPB KU4A. PSHR: KA4BCM WD4BSC KA4GFU KA4MTX KB4OZ KA4SAA WA4YPQ. Traffic: KA4SAA 229, WD4RWU 143, KA4GFU 126, WD4IYI 102, KZ4G 84, K4MHL 73, KA4BCM 70, WB4APC 69, KB4OZ 66, KS4V 61, WD4BSC 60, KC4WN 60, WA4YPQ 40, KA4SKV 37, W4WQV 36, KA4MTX 29, WA4EBN 28, WA4AVV 26, K4HOE 25, N4GD 16, KA4YIV 16, WB4AUN 15, KU4A 12, WD4CJO 11, WA4JAV 11, WD4CQF 10, W4PKX 9, KD4SN 8, WD4IYH 7, WA4AGH 6, KA4GBZ 6, WA4NOG 4, K4AVX 2, WA4SWF 2, NW4P 1.

MICHIGAN: SM, James R. Seeley, WB8MTD — ASM: WA8DHB. SEC: WA8EFK. STM: WD8RHU. OO/RFI Coord.: K8JH. ACC: K8SB. PIO: WA8PII. SGL: N8CNY. TC: WB8BGY. BM: KZ8V. Join the MI ARES net, Sn, 3932, 1730, and the Traffic Workshop, Sn, 3953, 1600 (times local). Silent Keys, with deep regret: KA8DZH KA8GUO. This is the first column in the new "traffic-less" format. The next traffic and net summaries will appear in the July issue, a three-month accumulation. Please continue to submit your traffic, PSHR and other items at the first of the month as always. Congrats and welcome to the affiliated club ranks to the Ausable Valley ARC. Less than a year old, this group already is among the more active and visible clubs in our section. K8OOB, Kalamazoo Co. EC, reports that as part of their 50th year celebration, Kalamazoo ARC's club station, W8VY, is on the air with the original transmitter set up by Art Collins at the Chicago World Fair. Look for them on 7050 kHz (the original frequency) and on other nearby freqs as new xtals are etched. New officers for the Chelsea Communications Club: KA8EKO, pres.; N8AYY, secy./treas.; KA8BKK, act. mgr. I am pleased with the response so far of MI members to the appeal for fillings on the codeless license docket. Whatever the outcome, we will have contributed our share of reasoned commentary. Best wishes to W8MAR in his search for greener pastures. He will be missed as EC for Marquette Co. and by the U.P. gang in total. I enjoyed my visit to Cincinnati for the Ohio convention. K8JE and the Hamilton Co. ARPSC provided a super setting and atmosphere for an ARRL convention. K8SB won a very crucial transmitter hunt in Riverview in Feb., tracking down a free-running TV antenna pre-amp whose oscillations were wiping out reception continuously over a wide area on two different channels. Naturally, an amateur in the area was being blamed by the neighbors and a formal complaint had been filed with the FCC. Again, the need is pointed out for ongoing PR efforts to counter the "hams and CBers" attitude *before* the fact. Vindication in cases such as this one can never entirely remove the bad taste left with the public. At the end of "the winter that wasn't (for southern lower MI, at least), there are sure signs of Spring in the many SKYWARN training meetings being held or planned, and even some long looks at Field Day. Are *you* ready? When I "closed the books" on the SCM office in Jan. there were a total of 158 League appointments in MI: Section Leadership 9; DEC 5; EC 55; NM 10; ORS 67; OO 6; OBS 6. Not all that many for a section with about 4000 members. If you are interested in any of these useful and rewarding activities, contact the appropriate leadership official for an application. Traffic: KA8CPS 684, WB8WKQ 558, AF8V 427, N8DTZ 351, WD8LRT 317, N8DSW 313, W8QHB 234, WB8MTD 214, WD8RHU 198, N8EGK 185, WA8DHB 156, K8KMQ 98, WD8MJB 93, K8GXV 85, K8KQJ 81, W8VIZ 80, N8BNC 74, KA8NCR 65, W8SCW 64, W8CUP 59, WB8YRY 59, N8DNC 56, WD8EIB 55, WD8ECM 53, KA8OWN 49, K8OCP 41, K8UPE 41, W8IHX 38, KZ8I 38, WB8SYA 34, W8YIO 34, K8LNE 29, KI8O 29, WB8TTA 28, WB8HPZ 27, WD8BSE 26, K8MJK 25, W8LDS 20, KS8P 19, WB8YWA 18, N8EBN 16, K8ZJU 16, KA9JFM 15, KO8P 14, KT8G 13, W8BEZ 11, W8YZ 11, WA8EFK 10, WA8LKC 10, N8CNY 9, KN8I 9, WB8POL 9, N8BBY 8, WD8IXZ 8, N8CQA 7, KA8JCL 7, KF8M 7, W8OW 7, W8LOU 6, WB8HSN 5, WD8OEP 4, K8DD 3, N8EOI 1. (Jan.) K8GXV 94, W8TBP 7, WB8HSN 6.

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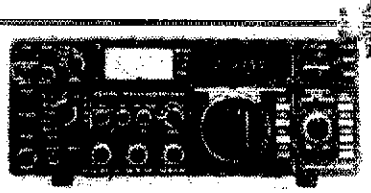

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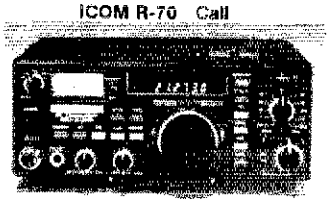
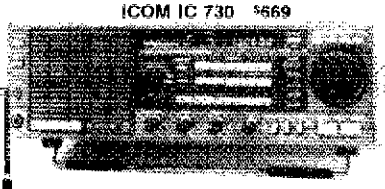


ICOM IC 730 $669



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OHIO: SM, Allan L. Severson, AB8P — ASM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW WA8DYX W8EK WA8GMT KF8J WD8KFN WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq
BN	388	280	54	6:45/10 p.m.	3.577
BNR	389	115	28	6:00 P.M.	3.605
BSSN	294	174	53	9:45 A.M./7:15 P.M.	3.927
OMN				6:30 P.M.	3.708
OSN	336	172	28	6:10 P.M.	3.577
OSSBN	2578	1256	84	10:30 A.M., 4:15 & 8:45 P.M.	3.9725
OSSN	166	83	27	6:45 A.M.	3.577
O6MN	405	18	28	9:00 P.M.	50.160

Happy to see so many of you at the Cincinnati ARRL Convention. Congrats to K8JE and his crew (wish I could list them all individually) for a super affair, and to Fr. Ed Schmidt, W9SI/OA4SS, for a tremendously inspiring talk (with slides) on emergency work and hamming in Peru. And what a privilege to have Director W8RC, Vice Director W4OYI, Mich. SM WB8MTD and Ky. SM KZ4G in attendance. Congrats to W8JOU for 50 years of active amateur life, from me and from his family who are all hams; W8AND KC8FF and KB8YZ. This year's ARRL Great Lakes Division Convention, to be held in Cleveland, is shaping up under the leadership of WA8CAE KC8KI and others too numerous to mention. Hope to see you all here. And not many realize (modesty, you know) that WA8CAE is one of the few who worked Heard Isle mobile (DX I-71). Club elections: CLARC-KS8W, pres.; KH6JCT, v.p.; KB8LA, secy./treas. Upgrades to Extra: WD8IDD KC8QZ and KB8VH (100% on theory and code!).

Local Nets	QNI	QTC	Sess.
ALERT	42	3	4
BRTN	241	166	28
COARES	104	6	3
Lorain Co.	17		3
LCNWO	511	172	47
Medina Co.	300	45	27
NEON	132	46	24
NCTW	20	42	8
RARA	51	4	4
TSRAC	1002	60	32
VWCEN	48	5	4

Traffic: WD8MIO 630, KA8IAF 536, W8PMJ 423, WD8KFN 336, N8DSU 306, K8YUW 253, K8OZ 247, WA8GMT 226, K8NCV 212, K8JDI 210, N8EMR 195, W8OZK 174, KF8J 154, KA8NFD 150, WD8IKC 147, KA8MEB 144, WD8KBW 142, AB8P 139, KA8GJV 134, W8UPD 127, WB8DMF 102, N8AUH 93, KA8HUZ 91, WD8NEC 88, WB8JGW 86, W8TXV 86, W8EK 84, WB8UBR 83, KA8ICB 82, W8SKP 82, N8EES 81, WA8SSI 76, WD8RIB 71, K8DL 69, N8CWU 68, KV8Q 68, W8LZE 65, N8AKS 63, KA8IUK 56, WD8RGP 51, N8BOK 49, W8FIJP 45, WB8KKI 45, WB8MRL 45, WB8HHZ 44, N8CSL 43, WD8MLN 43, W8MOK 41, N8EHR 40, K8TVG 40, K8AN 39, WB8QHV 38, W8BHL 35, WB8YTD 34, WB8NHV 33, WB8AWM 32, WB8SIQ 31, N8CW 30, KA8DJZ 29, KA8GGZ 26, WB8QHU 26, KC8JJ 25, N8JR 24, W8MVE 24, K8NJQ 24, WB8KWD 23, K3RC 23, WA8HED 22, KA8GMF 21, N8AEH 20, K8CKY 20, WA8DYX 18, WD8JAJ 17, WA8OYJ 17, WB8VOA 17, N8CJS 16, WD8RGS 15, WD8DOS 14, KA8DGO 13, KA8LNA 13, WB8YUS 13, WB7O 12, WD8AYH 11, W8RG 10, WB8SRC 10, WA8ZID 8, W8ZM 8, WD9HDZ 7, WD8OYK 7, WD8EKI 6, WD8ODV 6, K8VOY 6, N8AJU 5, K8EM 5, N8CGM 4, WB8NTR 3, W8OQL 3. (Jan.) N8EHR 45, KA8HUZ 45, WD8ODV 16, WD9HDZ 10, N8CGM 7.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ACC/SC: N2BFG. BM: WB2EAG.

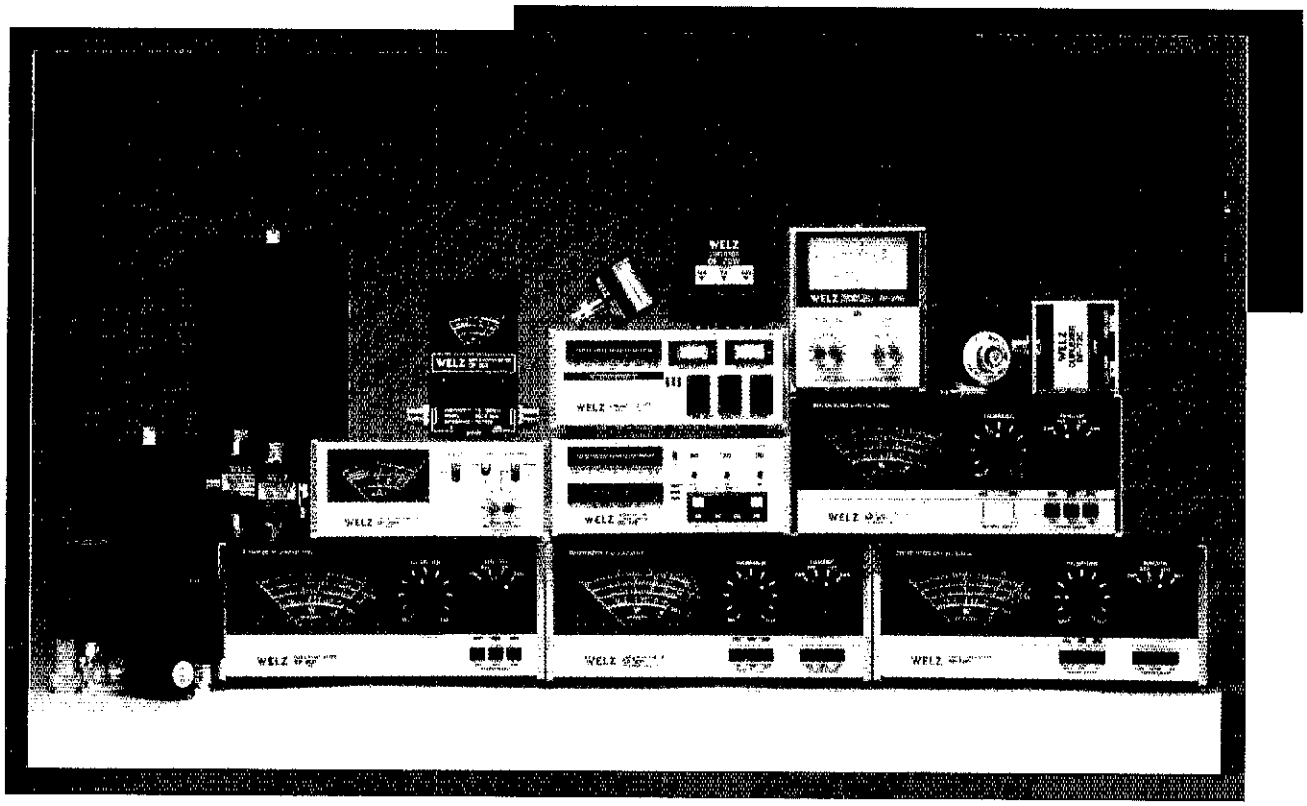
Net	Time/Day	Freq.	NM
EPN	2200Z	3.902	AG2X
ESS	2200Z	3.590	W2WSS
NYS	2300/0200Z	3.677	N2APB
NYS/M	1400Z M-S	7.077	WB2EAG
NYS/M	1400Z Sn	3.677	WB2EAG
NYPON	2100Z	3.913	KC2SJ
NYSPTEN	2200Z	3.925	KA2Q
NYS RATT	2230Z	3.625	W2ODC
CDN	2230Z	146.34/94	WB2ZCM
HVN	2330Z SSnM	144.535/135	N2BDW
HVN	2330Z T-F	146.37/97	N2BDW
SDN	0130Z	147.66-06	K2ZVI
SCRN	0000Z	147.735/135	KV2U

Albany ARA had W2ZCV speak on weather at March meeting. Annual dinner held on April 16. Reports W2JSQ Silent Key. Rip Van Winkle ARS is already working on Field Day plans. W2XL reports Ulster RACES active with 43 QNI during month. NYS/M QSP 174; NYS QSP 1756; NYPON QSP 754. Congrats to N2BFG Affiliated Club and Speaker Coordinator. Also to WB2EAG Bulletin Manager. BPL: WA2SPL W2SZ WB2EAG. PSHR: WB2EAG WB2MCO K2ZVI W2YJR WB2ZCM WB2TWQ W2BIW WB2OHR AK2E WB2VUK K2ZM KA2MBP N2CPX. Traffic: WA2SPL 2683, W2SZ 744, WB2EAG 595, WB2MCO 457, W2YJR 242, WA2JQL 174, AG2X 164, K2ZVI 163, K2ZM 153, W2BIW 151, WB2ZCM 147, W2PKY 125, WB2TWQ 91, AK2E 90, WA2JBO 89, N2AWI 63, KA2MBP 63, WB2OHR 48, WB2VUK 48, W2SWA 47, K2MI 46, KC2TF 32, K2HNW 31, AA2Y 27, N2CPX 22, WA2CJY 17, N2BFG 11, WB2SON 12, N2CBX 4.

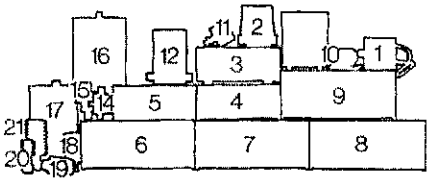
NEW YORK CITY-LONG ISLAND: SM, John H. Smale, K2IZ — SEC: WA2KKJ. STM: K2GCE.

NLI CW*	3630	1900/2200	W2LWB
NLIPN	3928	1815	K2GG
SCVHF	4.77/5.37	2030 M-F	WA2ARC
NCVHF	6.145/745	1930 M-F	K2MT
BAVHF	6.07/67	2000 M-F	N2BQD
ESS	3590	1800	W2WSS
NYS	3677	1900/2200	N2APB
NYS	7077	1000 M-S	WB2EAG

* Denotes section net; all times are local; please try and help out by checking in whenever possible. It is with deep regreat that we list N2BMR and K2ZHY as Silent Keys. N2BMR was the EC for Riverhead/Southampton, and K2ZHY was an instructor/foreman for Special Services with the NY Telephone Co. Many thanks to Grumman ARC for letting us get the Nassau Co. VHF Net going again on their machine. K2MT has been appointed as net mgr. Any help you can give would be appreciated. If you had an OVS appointment and want to get back into circulation with different ones, here's your chance. Contact K2MT and see if you can help out. WA2UWF has been appointed DEC for Suffolk Co. Metroplex has revived their swap and shop net, Thursdays at 2100 on 145.45 rptr. Metroplex also had KA2CNN give a talk on packet radio. If you have any questions or thoughts on this subject, why not contact KA2CNN. KA2LCC has upgraded to General. WA2OQO is home from the hospital recovering from surgery. Suffolk Co. ARC will set up a special event station for the town of Islip tercentennial.



INTRODUCING



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KA2GYH rescued a security guard who was stranded in a plant in Yaphank owing to the blizzard of Feb. 11th. K2SCX has a new Kenwood 430 on the air. New Novices for the Gt. South Bay ARC are KA2RGI KA2RGD KA2RGH. Congrats to W2AHV on making BPL, his third time. He also has a new toy, a brand new Vic 20 computer with the Kantronics CW/RTTY interface. WB2TQC is the proud father of another harmonic, a girl. Congrats. N2BQD was in the V.A. Hosp. and hopefully everything is ok. W2INJ and K2QAI joined the ranks of those licensed for 25 years. Traffic: W2AHV 440, N2AKZ 371, W2TZO 226, WA2ARC 208, K2MT 167, W2GKZ 84, W2DBQ 58, KS2G 40, KA2NMA 36, K2IZ 24, K2GCE 21.

NORTHERN NEW JERSEY: SM, Curtis R. Williams, W5DTR-SEC: WB2VUF. STM: W2XD. BM: N2BOP. ROC: W2CC. SGL: W2KB. PIO: WB2NQV. TC: AD7I. NMs: W2CC AG2R N2BNB KA2GSX KA2HNQ WB2IQJ KY2D N2XJ W2PSU.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJM	N2XJ	7063	1000 Dy	28	213	61
NJPN	W2CC	3950	1800 Dy 0900 Sn	32	487	333
NJSN	WB2IQJ	3735	1830 Dy	26	247	68
NJN/E	AG2R	3695	1900 Dy	28	378	266
TCETN	KA2GSX	147.255	1930 Dy	28	221	100
OBTTN	KY2D	147.12	2000 Dy	28	505	186
NJN/L	AG2R	3695	2200 Dy	28	290	166
NJVN	KA2HNQ	49/49	2230 Dy	No rpt.		
NJRTTY	W2PSU	147.51	Autostart			

The position of Affiliated Club Coordinator remains open under the new Section Manager structure. Any ARRL affiliated club in NNJ interested in becoming a Special Service Club should contact your Section Manager (page 8, *QST*). Congrats to KB2WI on his election as Section Manager effective July 1. No other candidate was running by the closing date, therefore KB2WI was declared the winner without balloting. Congrats to KA2PSL on upgrading to General and to N2BNB on Advanced. W2YJC has retired from Singer. Division Director W2IHA called the first division cabinet meeting recently to coordinate section activities and to get input for the next ARRL Board of Directors meeting. WA2VJH gave a talk at a recent Nutley ARS meeting on navigation and nautical astronomy, reports KJ2O. The Tri-County RA in Scotch Plains will hold their hamfest-flea market on June 5 reports chairman KC2FS. The Old Bridge Auction was a big success. The Ramapo Mountain ARC in Oakland publishes an excellent monthly newsletter — one feature is a listing of members' and spouses' birthdays and anniversaries. The Jersey Shores ARS also has an outstanding newsletter, *KA-CHUNKER*. Recent issue had articles by KB2IB on direction finding and KF2T on a tone activation circuit for alerting. The Raritan Bay RA in Sayreville has elected the following new officers: K2FD, pres.; N2BIL, v.p.; K2YSR, secy.; W2TIN, treas. KA2OEE has been appointed Emergency Coordinator for Somerville. Does you town have an EC? If not, your help could be used. Contact WB2VUF. WB2NQV and W5DTR have been appointed Assistant Directors by W2IHA. N2DSY presented a program on packet radio at a recent Metroplex meeting in Fort Lee. (Imagine ten conversations at once on a frequency without interference!). PSHR: KB2HM W5DTR AG2R K2VX N2XJ WB2GHN KX2L W2XD KY2P WB2OMP KA2GSX KA2FXB N2DPN KA2LEB. Traffic: KB2HM 778, N2XJ 345, AG2R 330, K2VX 229, KX2L 146, W2XD 124, KY2P 122, W2RQ 114, KA2LEB 111, WB2KLF 87, WB2GHN 85, W5DTR 84, WB2QMP 72, KA2GSX 60, KA2FXB 57, KC2MM 54, W2ZEP 54, N2BNB 26, KA2DOH 26, KB2WI 25, N2DPN 24, N2BC 18, W2CC 17, W2UH 10, W2NKD 8, N2EBA 4. (Jan.) W2RQ 106, W2RRX 10.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY — SEC: WA4VWV. STM: KØGP. TC: KØDAS. BM: KØIIR. ACC: WBØQAM. PIO: KBØZP. SGL: AKØQ. NMs: KQØI WAØAUX WBØAVW WØYLS. NCS please get your net reports to NMs on time so that I can get their reports for my reports!! Congrats to Davenport for a fine hamfest and a good EC meeting. Good to see everyone at the Midwest Convention. Congrats to WDØHND as the recipient of the "IOWA ARRL AMATEUR OF THE YEAR AWARD." He has been active on nets, is the NM of ICN, and has been very supportive of the ARRL in Iowa. Hats off to WDØHND . . . Thanks for all the fine nominations. Upgrades include KAØ ORI KAØDDX WDØFMW KAØLSG. New calls: KAØORJ/ NØEDH; NØBGI/KWØE; WAØUYW/KBØXJ. W4JL has received TCC appt this month. WBØQAM is new ACC; still looking for OO/RFI/Coord. Watch for RAGBRAI message relay details. Mail demo at Burlington. NIARC put on Disaster Demo with Red Cross in Mason City. Need PIA from each club. Send your PR to KBØZP. Let's get the word out. Not many reports this month, where are they? SKYWARN programs should be in full swing. Do you need help?

Net	Freq.	UTC	Dy	QNI	QTC	Sess.
75M Phone	3970	1830-2330	M-S	1969	122	24
TLCN	3560	0030-0400	Dy	334	139	56
ITEN	3970	2230	Sn	65	10	4
PM Net	3978	2130	M-F	164	2	19

Traffic: WAØAUX 365, WDØFWB 186, WØSS 173, KØGP 156, WØYLS 128, KAØJQG 86, KØCY 68, KCØSC 41, KAØADF 32, WBØUFF 31, W4JL 29, KØEHV 20, KEØY 20, WBØAVW 15, KØZQ 12, WØFQ 8, KAØMHJ 4. (Dec.) W4JL 95

KANSAS: SM, Robert M. Summers, KØBXF — Congrats to KBØEY on his appointment as Emergency Coordinator for Zone 14, Salina area. It looks like KØEQH will be the new EC for Zone 12 in SW corner of the state. WØKL reports the ARES membership still at 916; about one-fourth of our league membership in Kansas signed up to be of public service in the event of emergency. Are you one of the few?? Net reports: KSBN QNI 1350, QTC 168; KWN 934/671; KPN 386/37; CSTN 2003/158; QKS 317/67; QKS-SS 50/15; KMWxN 649/830. Hiawatha ARC visited WØFHF in Nebr. and toured his small town CATV operation. The Air Capital ARC rptr assn. has been participating in the national rptr teleconference net thru the Hutchinson rptr. For more info on the net contact KCØHF; he is on KSBN quite often. For those of you not yet informed, effective January 1, all examinations in the Kansas City office of the FCC will be given the FIRST TUESDAY of EACH MONTH. No appointment is necessary. Amateur and commercial exams will be given the same day, starting with amateur-not requiring code at 8:15 A.M., followed by 20 wpm code at 8:15 A.M.; 13 wpm code at 9:00 A.M. and 5 wpm code at 10:30 A.M. The commercial radiotelephone is at 11:00 A.M. Traffic: WØFRC 358, WØFIR 100, WØHI 84, WØOYH 83, WBØZEN 83, WØFDJ 69, WØKL 60, WØAM 52, KØBXF 40, NØBDG

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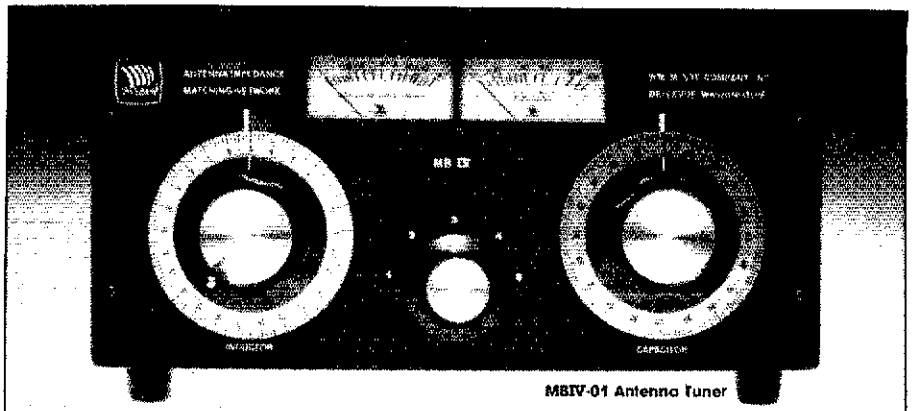

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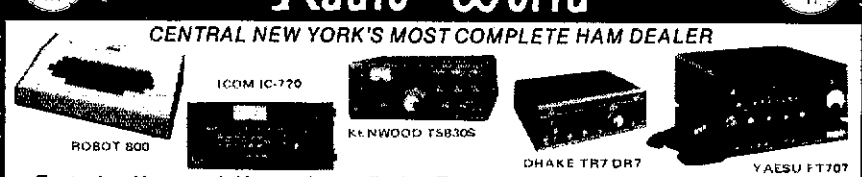

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The ARRL LETTER

FOR MEMBERS ONLY

We thought you might like to know a little more about the ARRL Letter and how we put it together. Since the last of October, we've been bringing you the very latest in news from the FCC, ARRL Hq. and the world of Amateur Radio. When we say latest—we mean latest!

For instance, we were in the mail with the details the very next day after FCC gave the okay for the use of 10 MHz. We were in the mail the very next day after the FCC adopted their NPRMs on no-code and the volunteer exam program. We brought the information to our subscribers first, we brought it to them in a readable, nonsensational manner and we brought it to them accurately.

There is a reason for that. Let's take a look at the process of putting together an issue. During the two-week period between issues, Peter O'Dell, KB1N, and Wayne Yoshida, KA6KGU, compile the top stories in Amateur Radio. On Tuesday morning of publication week, Pete, Wayne and other key staffers meet to discuss the top stories. We tentatively select a lead story, and the other stories are ranked in importance. The secretaries begin loading the stories into the word processor. Then we double check the facts and their meaning with the experts—people who really know what is going on. After all, one or two people can't be expected to fully understand the implications of all the complex stories making news in Amateur Radio today. With the Letter, it is a team effort.

Wednesday, afternoon, we do a rough layout. Thursday we do the final layout, and at 2 p.m. we turn camera ready copy over to the printer. By noon Friday he delivers the printed copies to our mailer, who has it in the hands of the Post Office by 5 p.m. That means the details are in the mail to our subscribers less than 36 hours after the story happens.

There's only one small hitch—the FCC meets Thursday mornings. We have just enough time to bring you the latest news from the FCC and still meet our deadline *(actually, we planned it that way)*. On days like those when the FCC adopted the order for the 10-MHz allocation or when they adopted the NPRMs on no-code and the volunteer examination program, we went through a "disaster drill" between 10:30 a.m. and 2 p.m. Funny, none of the local hams showed up with HTs to help us out though. It's more work for us, but it keeps our subscribers up-to-date on the very latest happenings.

We invite you to compare our track record with all the other sources of news about Amateur Radio. The ARRL Letter is FAST, READABLE, NONSENSATIONAL and ACCURATE. Subscribe today. *(Actively affiliated ARRL clubs can subscribe, also. You can use our material in your newsletter as long as you give us credit.)*

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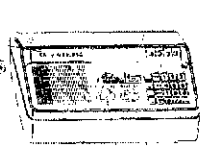

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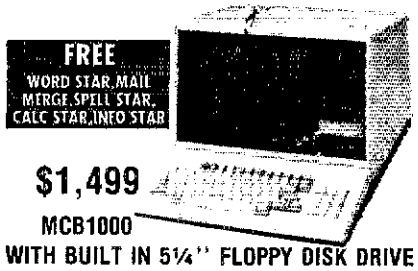

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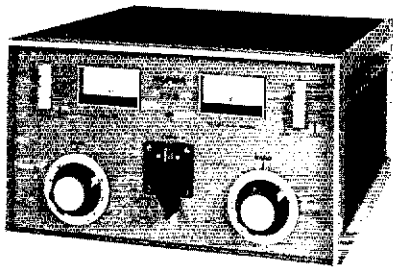

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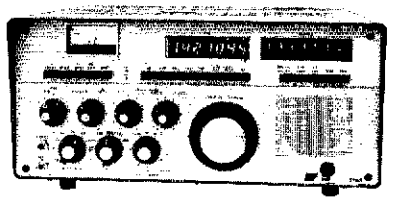

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38, KS0U 33, W0CHJ 30, W0PB 18, WB0YLP 18, KA0E 18, K0GSC 14, W0RBO 10, WA0OWH 4.

MISSOURI: SM, Ben Smith, K0PCK — 1983 club officers for PHD are: N0ELK, pres.; W0DJ, v.p.; WB0ROQ, secy.; WB0OCW, treas. New officers for Eastern Ozarks ARC; AF0J, pres.; WA0SXD, v.p.; W0FWY, secy.; WB0UEV, treas. As of Feb. 11 the Boonville rptr has been on the air. It is on 147.36 and has good coverage in Central Missouri. New field appointments for the past month are: WB0TEG, OBS; KA0GEA, PIA; WB0BZP, OO. We would like to see more stations apply for field appointments. KT5Y and I have received several good comments about the Missouri Section Newsletter, sent all ARRL members in the section. Owing to the cost of printing and mailing, our plans were to send one mailing to all members and two to all Affiliated Clubs. We are now hearing, send every printing to all section members. If enough people and clubs are interested and would like to make donations to the cause, just send donations to KT5Y. In the Missouri Section Newsletter the St. Charles Hamfest was not listed in the 1983 Hamfest dates. It is Sunday, August 28. A great job is being done by WB0JES and others who are putting out the *Audrain Communicator*. It is a fine newsletter. Traffic: KC0AS 649, K0SI 200, W0BMA 132, KT5Y 99, AI0O 86, N0DDZ 78, W0OUD 64, WB0SSB 59, K0PCK 58, WA0YJX 56, KU0G 45, K0DSQ 43, W0NUB 39, WA0KUH 17, N0CEE 15, WA8MAZ 12, W0OTF 10, KC0JA 6, K2ONP 6, N0BLB 5.

NEBRASKA: SM, Reynolds Davis, K0GND — Nebraska CW net is on and running. In fact, Net Manager WB0TED has added a second session at 0415Z on 3737 kHz. Aksarben ARC annual auction is May 8. Check in at 8 A.M.; selling starts at 9. Talk in on 34/94. Join the Blue Valley group for their Saturday morning get together at "Chances R" cafe at 10 A.M. in York. The Lincoln Club's Saturday dutch treat breakfast is at the Country Kettle, 49th & Holdrege. Time to start thinking about Victoria Springs weekend on July 30 & 31. Reservations will be taken on all ht nets. Listen for news on the Nebraska section weekly bulletin on ssb, RTTY & cw. Details on all nets. We need more representation on Central Area Nets (2030Z @ 14.322 & 0230Z @ 3670 or 7062) and 10th Region Nets (0145Z & 0330Z on 3679 or 7073 & 2145Z on 7232). Nice to see all in Sioux City. Traffic: K0DKM 77, KA0BCB 41, W0SCA 53, W0ZNI 47, K0GND 31, W0NIK 24, W0ERW 17, WA0BOK 16, W0RAM 14, KA0IOM 11, WA0OQX 8, WA0DXY 7, WB0GMQ 7, WB0GWR 6, WB0ITC 5, WA0BIE 4, W0GEO 4, W0EXK 3, W0RHU 3, K0SFA 3, KA0FXS 2, K0ODF 2, WA0TXY 2, W0YFR 2, W0WZR 2, KA0BOC 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, KA1KD — STM: K1EIC. SEC: K1WGO. OO/RFI: KA1ML. BM: WA1DWE. TC: W1HAD. ACC: N1AZF. SGL: K1AH. PIO: WB1AIU.

Net	Freq.	Local Time	QTC	QNI	NM
CN	3640	1900/2000	286	338	K1EIR
CPN	3965	1800/1000 Sn	123	228	W1OD
NVTN	28/88	2130	64	261	WB1ELA
WCN	78/18	2030	148	391	WB1GXZ
RTN	13/73	2100	146	344	WB1ESJ

Upgrades: Extra-KN1Y KN1X KB1EP; Adv-WB1ASK; Gen-N1CEG; Nov-KA1JXU KA1JZT. New OO-WA1LYS. WA1RXA new pres. of the Norwalk ARC. N1CKD transferred to New Orleans. New call: KA1JJO/N1COR. N1BVS selected as an Area Coordinator for ECARS. KA1YR won the first place slot in the IARU Radiosport Contest, single op phone. KA1EUD has been busy working on his doctoral dissertation-GUD LUCK. Stamford ARA will be sponsoring a special events station, May 14, commemorating the World Communications Year and the First Trans-Atlantic Radio contact. The US site for this memorable event was Greenwich, CT. The KA1YE/B (Beacon) is now in operation from Oakdale. It operates with a horizontal antenna, 425' above MSL, with a power of two watts, 24 hours a day on a freq. of 28.284, grid FN31VK. KA1YE hopes to have beacons up and operating on 50.063 and 144.053 soon. Reception reports are encouraged. KA1KD has been appointed to serve on the Cable Television Advisory Council to oversee the operations of Group W Cable in the Danbury-Bethel-Ridgefield area. The Annual CT Traffic Handlers Dinner sponsored by CPN/CN was another success. K1CE recently spoke to FARA on the latest rules, regs, and proposals out of Washington. FARA is also commencing a series of technical sessions hosted by N3AQJ. N1BYX is back in Germany signing DJ0ABU. SSC applications are now being accepted by N1AZF. Help get the word out, be an OBS, contact WA1DWE for more information. Traffic: WB1GXZ 595, W1EFW 341, N1CLV 217, WB2PJU 209, KA1BHT 200, WB1ESJ 151, K1AQE 132, K1EIC 108, W1XX 108, KA1EGE 86, W1YOL 83, K1EIR 74, WB9IHH 68, KA1XG 53, K1UQE 34, W1BDN 24, K3ZJJ 18, W1CUH 12, W1QV 9, N1BQA 6.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASM: K9HI. ACC: K1AZE.

Net	Mgr.	Freq.	Time (loc)/Dy	QNI	QTC
EMRI	WA1LPM	3.658	1900/2200/Dy	629	733
EMRIPN	KA1ON	3.959	1730/Dy	338	488
EM2MN	N1BNI	23/63	2000/Dy	443	438
NEEPN	K1BZD	3.945	0830/Sn	69	19
HHTN	KA1MI	04/64	2230/Dy	514	418
EMRISS	N1BHH	3.715	2030/Dy	100	42
CI2MN	N1BYS	045/645	1930/Dy	227	161

The Maritime Academy's training ship, the "State of Maine," is back in port after another voyage in which Amateur Radio played an important part. Over 1500 messages were originated from the ship and 80% had messages returned. Another outstanding performance by the EMRI traffic handlers, and a lot of great PR was obtained while providing the service. Well done! A special thanks to N1BBT/MM who originated all of the ship traffic. Quannapowitt club had interesting talk by WA1QZK on data communications, including various coding schemes and modulation techniques for transmitting digital data. Wellesley club is running a Novice class with 18 attending. Billerica club had an interesting talk by W1HL on hot air ballooning. Framingham club will commemorate its 50th anniversary by awarding certificates throughout 1983 to any station contacting the club station W1FY, which will be operating Saturday mornings on 14.280 to 14.290 MHz. Middlesex club had KA1SA give a talk on the fallacies of long range WX forecasting. The Algonquin club bulletin had a basic program, adapted by KA1EKR, to give bearing and distance to any DXCC country. Massasoit club bulletin reports good news for KA1G who lives in Stoughton. He finally got his permit to erect his tower. Colonial Wireless club reports that the Concord Cable TV Study Committee has two hams on the committee,

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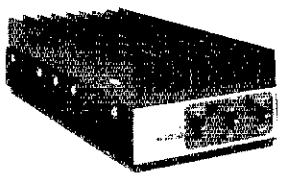

Model	Band	Pre-amp	Input	Output	DC Pwr	Sale Price
B23	2M	No	2W	30W	5A	$ 79
B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
D24	440	No	2W	40W	8A	$179
D1010N	440	No	10W	100W	20A	$289

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RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199

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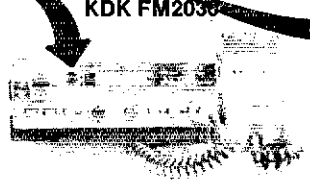

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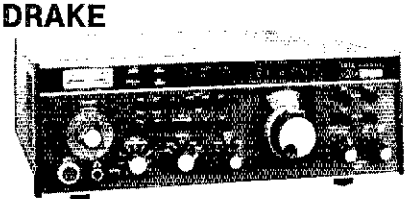

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Isopole® 144.....39	Isopole® 144 Jr.....29
WB-1 Moscow Mul®. 115	WB-1C for Xcvrs....135

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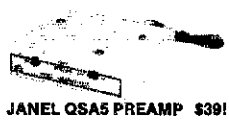

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494 Keyboard.....249
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624 Phone Patch.....59
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941C Tuner w/Meter.....79
949B Deluxe Tuner.....129
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N1BDA and W1NYL. Let's hope they can help keep any cable transmissions off channels E and K all together. Well I've been going to quite a few clubs lately trying to get a feel for what you think about this no-code license that the FCC is proposing. Most hams are not violently opposed, but everyone is real nervous about where such a license may lead us. In other words, what will the FCC force on us next. Today no-code and tomorrow no theory??? Traffic: N1BBT/MM 2419, WA1TBY 1302, KA1GBS 1275, W1AF 703, KA1DB 572, WA4STO 512, N1BGW 501, N1BHH 398, KA1BBU 301, WB3FOC 206, WA1DXT 188, N1AJJ 183, W1CE 153, W1IDK 152, N1BYS 140, KI1I 131, KE1U 120, N1BQG 113, WA1LPM 111, KA1EPO 105, K1GN 103, KA1MI 83, N1BUY 66, KA1ON 50, KA1AMR 43, WA1FNM 32, KA1DJV 30, KA1AE 29, K1BZD 29, W1QLL 21, K1LCQ 20, W1ZHC 16, KA1R 9, W1MJ 8. (Jan.) WA1LPM 92, KA1DJV 56, W1MJ 14.

MAINE: SM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. Congrats to AK1W and KK1A for making BPL. Arrostook ARA elected officers: KA1CNC, pres.; KA1SHW, v.p.; N1BGO, secy.; WA1YNZ, treas.; WA1SOX, tech. mgr. New PIO appointment: KA1TJ. Mid-Coast RC annual mtg June 12 (W1BDL). Also appointed KA1HJQ public relations/Field Day coord. PSHR: AK1W N1BJW W1RWG WA1YNZ KL7IJG KA1AVJ KA1GCW.

Net	Sess.	Checkins	Tfc.	Mgr.
SGN	24	910	280	K1GUP
PTN	48	484	227	AC1G/N1BJW
CMEN	8	102	15	W1WCI
RACES	4	38	2	W1RWG
AEN	4	60	0	WA1YNZ

Traffic: AK1W 534, KK1A 191, N1BJW 126, W1JTH 117, W1ISO 113, W1RWG 97, WB1BYR 82, K1NAN 76, KL7IJG 73, N1BLZ 63, W1BMX 59, WA1ZJL 59, KA1TJ 55, W1KX 47, W1AHM 42, KA1AVU 38, W1NHT 34, WB1EIL 26, WA1YNZ 24, W1GCB 21, W1CTR 19, W1OTQ 13, W1WCI 13, KA1ENL 12, KA1FTL 12, KA1GCW 11, WA1JHT 11, KA1BPJ 10, N1BME 8, KA1CNG 8, K1NIT 8, K1PV 6, KA1ENM 5.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — SEC: AK1E. NMs: N1NH W1VTP KI1M. New ARRL structure appts: SGL-N1AIX; PIO-WB1BRE; TC-W1JY; ACC-KI1M; BM-K1OSM. Welcome gentlemen and good luck. The meeting of New Hampshire radio clubs a success with 42 in attendance and 18 organizations represented. New radio club in Berlin meets first Wednesday of month at NH VoTec. Contact KB1CE for more details. New Nashua rptr on 222.68/4.28. W1BYS/4 enjoying Florida weather. Congrats Great Bay RA for 50 years affiliation with ARRL. KA1JLK and N1CHY now Advanced. Traffic: N1NH 252, KK1E 242, KI1M 183, W1TN 171, KI1R 118, AK1E 108, K1YMH 87, K1OSM 85, KA1BJ 81, W1VTP 77, N1ALM 73, WA1YZN 59, W1MHX 53, WA1PEL 53, W1CUE 44, KA1FKM 41, W1ALE 40, WB1CFP 39, N1AKS 28, K6UXO 23, K1UQX 16, KB1A 12, K1POV 11, K1ACL 7, KA1CJI 6. (Jan.) WA1MXT 50, K1PQV 10.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: W1EOF. NM WA1OSL reports for RIEM2MTN 20 sess., 134 QNI, 19 QTC. New appt: Technical Coordinator (TC)-AB1D. The following leadership positions are available: Official Observer/RFI Coordinator; Public Information Officer; Affiliated Club Coordinator; State Govt Liaison; Bulletin Manager. Further info available by giving me a landline. W1EOF keeps breaking BPL record, 2037 this month. KA1EHR trying to house-break a new Vic20. Section ARES net meets Wed at 1930 on 10/70. Traffic: W1EOF 2037, KA1EHR 40, AE1S 38, WA1CSO 33, N1RI 26, N1BEE 10, K1AOS 5.

VERMONT: SM, Reed Garfield, WB1ABQ — STM: N1ARI. BM: AE1T. Welcome & mni tnx to W1RNA as new PIO. Still need vols to fill appts for SEC, OO/RFI Coord., Tech. Coord., Affiliated Club Coord., State Govt. Liaison. If any of these fields interest you let me know. Lots of upgrades & new licensees recently incl. K1s HKI JYM LPS; KA1GTY; N1s BRT CBT COB; VP5J & others. Congrats to all. Vy 73 & bcnu.

VTN	28/154/111	VSBN	28/465/190
GMN	24/393/34	VFMN	28/328/56
VCN	24/455/27	VPN	4/80/7
RFD	4/68/36	CVFMN	4/45/4

Traffic: K1BQB 284, AE1T 143, WB1ABQ 138, N1ARI 123, W1KRV 79, N1COB 74. (Dec.) AE1T 317.

WESTERN MASSACHUSETTS: SM, William J. Hall, W1JP — KA1T does it again, earning the coveted BPL in handling heavy traffic load, courtesy of the Fla. State Fair and N1BBT/MM. The UMass station W1PUO now active in NTS, owing to efforts of WA1FCD and KF1R. Kudos to WMFN which achieved 98% representation in FRN in February. The Hampden Co. ARA celebrates 15 yrs as the W1/QSL Buro. The club still offers a dandy certificate to anyone who works 25 members. The N. Berkshire ARC reports a substantial financial drain in its successful effort to save the Mt. Greylock tower. Mbrs of the club coordinated a cross-country ski race for the handicapped. KIs IJU & IJV operating as VP2s KBE & KBD from Nevis in early March. W1JP and WB1ABF could not join the expedition this year. I rcvd nice letter from CMARA pres. WB1GSO reporting rapid growth of the club and its intensifying activites in public service. It is with deep regret that we must report the passing of member W1ENK, who became Silent Key on 25 January. Mt. Tom ARA active in well publicized CD exercise and very real life blizzard transporting hospital personnel. In closing I urge you all to read January N. Carolina "Activities" column. BPL: KA1T. PSHR: KA1T WB1HIH K1JHC. Traffic: KA1T 523, W1UD 177, WB1HIH 159, K1JHC 117, W1KK 88, W1JP 80, W1PUO 39, K1IJV 36, W1ZPB 29, KA1CDC 23, W1OP 18, K1BE 17, WB1ABF 6.

NORTHWESTERN DIVISION

ALASKA: SM, Richard Henry, AL7O — The Anchorage ARC prepares for communication support for the Alaskan Iditarod sled dog race from Anchorage to Nome. Scheduled starting date, 5 March. Arctic Amateur Radio Club (Fairbanks) is making plans for a summer of public service; no details yet. Southeast Club is planning hamfest in the spring; details next month. Welcome home to KL7JKW and KL7LA. Traffic: KL7VY 86, KL7LO 58, AL7AC 28.

IDAHO: SM, Dennis Hall, KK7X — Thank you to all those who have responded to my letter for appointments of official stations. Two repeaters back on air in northern Idaho; 146.98-38 and 145.33-144.73. An Idaho newsletter is in the works; look for it in September. Dean Bigler, KB7HN is State Government Liaison, congrats. Plan now for Northwest '83, ARRL northwest convention to be held in Spokane July 8-10. Promises to be a great event.

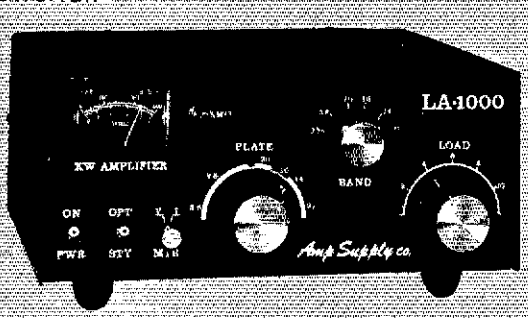
NET ACTIVITIES

Net	Freq.	Time	Sess.	QNI	QTC
Farm	3935	6:00 P.M. Dy	28	1803	30
CD	3990	7:10 A.M. M-F	20	658	13

THE AMPLIFIER CHOSEN BY IDXF

The Amp Supply LA-1000 was chosen by the International DX Foundation as the amplifier to be used in 1983 expeditions. The first DX-peditions with the LA-1000 were Heard Island and Nepal.

Heard Island's forbidding and desolate sheer black cliffs tower above the sea, layered alternately with black rock and glacial ice. The terrain is rugged and demanding, certainly not for the timid. The amateurs on this expedition needed amplifiers that were equally as rugged, dependable, and powerful.



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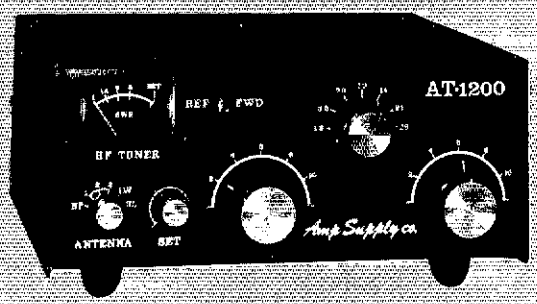
One of the best features of the LA-1000 is the price. At $349.50 you'll love it when you buy it, you'll love it when you use it, and you'll love it if you ever sell it.



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MONTANA: SM, Les Belyea, N7AIK — New Novice stations in the Helena area are KA7s PHT PKK PKL PKM. Welcome aboard. Officers for the Lower Yellowstone ARC: WA7GVT, pres.; K7IUI, v.p.; N7FUD, secy.; N7DYE, treas. N7ATT reports that the Billings rptr freq is somewhere in the two-meter band. However, if you try 147.96/36 (upside-down), it should work. Do you know your ITU and CQ zone numbers? Here in Montana we are in ITU Zone 6 and WAZ Zone 4, in case you did not know or forgot. Several Montana clubs are buying *QST* for their local libraries. Hope yours is one of them. DX notes, KE7X KF7T and W7LR all had contacts with the Heard Island VK@s (very rare), and WA7PZO had a QSO with FB8ZQ in the very far away Amsterdam Islands 11,700-plus miles, WOW. PSHR: WA7GQO.

Net	Sess.	QNI	QTC	Mgr.
MTN	20	820	60	K7TQM
IMN	20	158	58	K7JV
BSN	12	230	14	WB7UTJ
MSN	4	71	@	KB7SE

Traffic: WA7GQO 44, N7AIK 37, W7LBK 4.

OREGON: SM, William Shrader, W7QMU — STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. Welcome to two new members of the section team, N7SC, Official Observer/RFI Coordinator, and AK7T, RFI Coordinator. Positions to Technical Advisor and Bulletin Coordinator are still open. UPGRADES: KA7OOT (Novice), KA7NBV (General), and KA7FSE WB7QDX WB7PPY (Advanced). WB7VWX won OTVARC "Rusty Key Nite" as a Novice. Congrats to the new Emergency Coordinators who represent their various areas: WB7OIJ/Tillamook, WA7OYC/Lake, W6HSW/Klamath, K7RXV/Washington, KC7FI/Union-Wallowa, and WA7AWJ/City of Portland. At least four Oregon rptrs (Beaverton/Eugene/Medford/Klamath Falls) were tied into the Teleconference net to hear ARRL President W4KFC. KA7MOL is teaching an AR class at Lincoln Jr. High in Oakland and is successfully getting quite a bunch of young newcomers licensed. New club officers: Rogue Valley ARC-WA7IHS, pres.; N7DTX, v.p.; KO7S, secy./treas. Southern Ore. ARC-W7CPV, pres.; W7FQ, v.p.; WB7NLP, secy.; WA7CZG, treas. SALEM ARC-KA7GNQ, pres.; WB7TXF, v.p.; KA7BNB, secy.; KA7CVZ, treas. Hoodview ARC-KG7X, pres.; KJ7U, v.p.; KA7FJX, secy.; KA7KMQ, treas. OTVARC-W7JWG, pres.; KA7BSD, v.p.; N7CZY, secy.; N7CRP, treas. Traffic: W7VSE 666, WA7LGN 204, K7NTS 134, W7ZB 88, WB7OEX 86, KA7ELI 83, KI7Y 45, KA7AID 36, AL7W 8, W7DAN 7.

WASHINGTON: SM, Joe Winter, WA7RWK — ASM/BM: KD7G. SEC: K7SH. STM: W7GB. ACC: K7RS. TC: K7UU. PIO/SGL: W7CKZ.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0145/0445	547	175	56	N7CSP
WARTS	3970	0100	2862	235	28	W7SFT
NTN	3970	1900	814	52	28	W7UU
NWSSB	3945	0130	681	36	28	W7JGM
EWTN	146.64	0030/0430	106	88	50	WA7CBN
PSTS	145.33	0030/0530	145	90	56	W7IEU
SCARES	147.18	0230 (Wed)15		1	4	KA7AML

We are saddened that NW Div. Vice Director K7AOZ became a Silent Key of a heart attack, and that W7CNB and WA7NOO also became SKs. We shall miss them. Our sympathy is extended to their families. W7JIE was appointed to fill the unexpired term of V. Dir. K7AOZ. Congrats! All comments should now be filed on the No-Code License and the Vol. Exam. Dockets. We all trust that the FCC's decisions will enhance the Am. Serv. Congrats to WB7BLQ on his Pierce Co. ARES EC appt. Radio Club of Tac., 101 attend Awards Banquet. W7RGD received the Doc Spike Inspiration Award (2nd time). Congrats! New W7DK/rptr 222.92/4.52 should be on the air from Gold Mtn. Try it! KG7V gives Novice exams (16) to radio class at Kopachuck Mid School and accepts donated gear to set up school stn. The Annual ARES EC mtg. will be held in Yakima May 14th. Attend the Cent. Wa. St. HF in Yakima May 14th, 15th, Tri-Cities HF May 22-23, and Wenatchee HF June 3-4. SEC K7SH is first NCS for new Cowlitz Co. Emerg. Net formed for any emerg., particularly for the Mt. St. Helens situation. All hams are invited to check-in on Sunday, 6:30 P.M. on 147.90/.30. Mt. Baker ARC will hold awards banquet May 21st, Victor Comm. Club, 6:30 P.M. MBARC is very active in bunny hunts, auctions, training and ARES. Through the efforts of PIO W7CKZ the Amateur Radio serv. has been nominated for 1983 Wash. St. Governors Award for Distinguished Vol. Serv. for its public serv. & emerg. comms. Good work! He is now recruiting PIAs. Please contact him if you want to be a PIA in your area. We need you! Good PR is essential to Am. Radio. The WARNS news net (Mon. 7 P.M. 3940 kHz) will include PIO/PIA and other sec. activities. Tune in listen and give your *QST* or bulletin, etc. WB7VSZ Spokane Co. ARES EC, conducts successful SET with 18 mbrs. involved. W7JGM rpts all 3 hospitals in Skagit Co. now have ham ants. We welcome new NTN mgr. W7UU. A warm welcome to a new club the Everett ARS (EARS). Congrats to W7DZX WB7OGA & WB7TQF for again making BPL status. Traffic: W7DZX 1340, WB7OGA 1032, WB7TQF 503, WB7WOW 340, KS7I 262, N7DNG 217, N7AFZ 156, K7GXZ 137, N7ANE 111, W7GB 109, W7LG 94, W7HNA 82, N7DDP 62, N7AFY 58, W7IEU 52, K7CTP 42, WA7BDD 37, K7AJT 22, WA7JEB 22, KD7G 17, K7BFL 16, W7APS 11, KA7INX 7, K7OXL 6.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG — ASMs: W6ZF N6DHN VE2AQV/W6. SEC: W6LKE. STM NIGA made BPL again, this time for over 100 originations plus deliveries. He and W6VOM and K6AGD all made PSHR. Alameda Co. RACES, with help from members of Livermore RACES and SBARA and several individual operators put together a 43-person team of operators that provided emergency, administrative, and timing information for the Oakland Marathon. It was a wet & windy early Sunday morning event and everyone who said they would operate did! My thanks to all of those who did such a professional "amateur" job. MDARC featured K6RQ at their last meeting, speaking on troubleshooting & owner repair of equipment. EBARC's Salvation Army station, W6CUS, now boasts a 3-ele yagi atop a new tower. SBARA's *The Ground Plane* is now edited by WB6MRQ. LARK's vacant presidential post has been filled by N6DVY. HARC's WD6CAZ is again handling their Novice class. Traffic: NI6A 492, W6VOM 219, WB6DOB 181, K6AGD 141, K6APW 118, KD6BR 63, WB6UZX 36. (Jan.) KD6BR 58, N6FKK 11.

NEVADA: SM, William JD Marshall-Gratrix, KA7Q — STM: W7BS. WB5PTO, retired from the USAF and now living in Vegas, is active on all hf bands. W7SK has rebuilt his station and expects to be back on the air

WIRE & CABLE

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RG-58AU mil. spec	10.5¢/ft
RG-174 micro. mil. spec	8.5¢/ft
RG-11U foam, 95% braid	19¢/ft
RG-11AU mil. spec	24¢/ft
RG-59U foam, 95% braid	11.5¢/ft
RG-59U mil. spec	11.5¢/ft
300 ohm ladder line poly ins	6¢/ft
450 ohm ladder line poly ins	8¢/ft
450 ohm ladder line bare, 100 ft	$11.00
8 conductor rotor cable (2 #18/6 #22)	15¢/ft
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14 Ga. Stranded Copperweld, 140 ft roll	$9.00
12 Ga. Solid Copperweld 50 ft multiples	8¢/ft
14 Ga. Solid Copperweld 50 ft multiples	6¢/ft
18 Ga. Solid Copperweld 50 ft multiples	4¢/ft
14 Ga. Stranded Copper	8¢/ft
8 Ga. Solid Aluminum 50 ft multiples	8¢/ft

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VAN GORDEN Hi-Q 1:1 balun	$8.95
VAN GORDEN Center insulator	$5.75
B&W Traps 40/80-10mtrs	$26.75/pr
B&W 375 or 376 coax switch	$21.15
B&W 593/595 coax switch	$23.00/$27.35
B&W 5KW balun 1:1 or 12:1	$36.00
B&W 5KW balun 4:1 or 6:1	$45.00
DAIWA coax switch CS 201/401	$19.95/$61.95

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HUSTLER G6144B/G7144	$67.99/$98.99
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BUTTERNUT TBR-160HD	$47.50
BUTTERNUT RMK-11/STR-11	$37.90/25.50
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DAIWA Meters 520/540/550	$59.75/$68.95/$76.00
DAIWA Meters 620B/630/720B	$105.00/$124.95/$148.95
DAIWA Tuners 418/518	$165.99/$272.95
DAIWA Keyers DK200/210	$66.98/$79.20
DAIWA LA2035 30w 2mtr fm, ssb linear	$69.50
NYE VIKING MBIV-01/02 Tuners	$297.50/$330.40
NYE VIKING 3kw low pass filter	$23.50
TELEX HEADPHONES C1210/1320	$27.50/$39.25
TELEX HEADSETS Procom 200/300	$79.89/72.00
MFJ PRODUCTS	ALL AT BIG DISCOUNT
VOCOM 5/8 2mtr collapsible ant	$14.50
VOCOM 2w in 25w out 2mtr amp	$66.75
VOCOM 2w in 50w out 2mtr amp	$98.95
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shortly. This is the last report by this writer, who will be handing on the reins shortly. Nevada Sagebrush net meets week nights at 1930 local on 3905 MHz. Traffic: W7BS 56, WB5PTO 27.

PACIFIC: SM, Army Curtis, AH6P — Aloha and hats adai to all of the Pacific. EARC installed new officers: KH6GPI, pres.; KH6KL, v.p.; KH6JV, secy.; KH6JHY, treas. Congrats! Kauai has relocated their 22/82 rptr to Wilcox Hospital in Lihue with greatly improved coverage. KH6JWK now KH6WT. The Hawaii Afternoon Net, on 7290 kHz every afternoon at 4 P.M. local time, had 178 check-ins for February with all Hawaii counties represented several times each week. In addition, the swap and shop is now on the Sunday session. Check it out. All amateurs, especially Novices, are urged to contact KH6HIJ at 623-3590 or at his call book address for information on cw training. Here is your chance to improve your code proficiency and enjoy it in the bargain. Traffic: KH6B 160, KH6HIJ 94, KH6S 39, KH6H 14, W6ORS 4.

SACRAMENTO VALLEY: SM, Norman Wilson, N6JV — SEC: N6AUB. ASM: KI6T. Congrats to KE6NO and N6EPG on again making Public Service Honor Roll. The new president of the Yolo Co. RS is KA6HHI. KA6YZE is a new Sac. Valley Novice. The Sacramento Valley Traffic Net on 146.64/04 had 341 checkins in its first full month of operation. W6GO earned the California Award for his operation as FO6JO. Traffic: KE6NO 70, WA6WJZ 67, WD6AOE 28, N6EPG 8, KA6PDG 8, WB6SRQ 6, KA6VUC 6, WD6FEH 1, N6JV 1.

SAN FRANCISCO: SM, Bob Smith, NA6T — SEC: N6BLN. STM: K6TP. SFRC "Old Timers Nite" is July 8. Section appointments are being finalized. Do you want to be included? Let the SM know your wishes. 73 to WA6ICB, who is moving to the RENO POLICE DEPT. He has been the driving force in the FWRA-HARC and the North Section Repeater Intertie. Sorry to hear that W6QJA is a Silent Key. He was one of the original "ELMER'S" in Marin Co. SFRC Jeremiah O'Brien cruise schedule is finalized for this year. Contact N6UG for details. All the section clubs have voiced opinions about the "No Code License" NOI. Have you sent yours in yet? Pacific Division LO meeting is in April. Any comments? Traffic: W6IPL 292, K6TWJ 117, W6RNL 112, K6TP 94, NA6T 14.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. ASMs: W6TRP K6YK NF6K. All ARRL affiliated clubs should file their annual reports with the ARRL Club and Training Dept. to remain on the active affiliated club roll. Fresno ARC bought a generator but paid more than the retail price. W6ZFS and WA6EOE are Silent Keys. Appointments renewed: EC — WA6IQZ KB6CC WA6UOR. W6ILR is recovering from open heart surgery. K6XJ and N6BNW have computers. WB6DBJ has a TS430S. KB6DI is now on 40 and 80 meters. W6XP is a big gun on 80 meters from Fresno. AD6V has a Signal One, and KE6CS is looking for one. Congrats to the following new Novices in the SJV: KA6YST KA6YSW KA6YVX KA6YSS KA6YOM. The ARRL Pacific Division Convention is August 19-21 in Reno. The Fresno Hamfest is May 20-22 in Fresno. Traffic: N6AWH 156, W6DPD 24, W6SX 18, WA6YAB 12, WB6WYA 6, K9YBM 4, WA6JDB 3.

ROANOKE DIVISION

NORTH CAROLINA: SM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: KU4W.

Net	Time	Freq.	QNI	QTC	Mgr.
CMN	1245Z	3.927	490	186	W4EAT
CN E/1	0000Z/0300	3.573	551	343	AB4S
CSN	2300Z	3.715	228	92	NJ4L
JFKN	2330Z	3.923	887	193	WB4WII
THEN	2430Z	3.923	855	173	WD4LRG

February now belongs to history. I for one am glad it does. Band conditions were horrible. Some peculiar wx system gave us QRN over the whole Southeast right into March. Many thanks to those dedicated tfc handlers who hung in there to give us a very respectable count for the month. The section is still in need of more dual mode ops. Not including this stn, we only have 3 regulars: AB4S W4GRO KU4W. All of us are doing double and triple duty. To hear all the talk on the bands about how bad a no-code license would be, you'd think more Amateurs would use that hard won skill and get in on the fun. The section has two cw training nets: CSN @ 6 P.M., and CN @ 10 P.M. Both give good copy/send practice and you just can't find a friendlier, more helpful bunch of hams anywhere. CU there. The site is picked, the antennas are ready, the generator is working and Field Day is around the corner. Don't forget the log books. And the beer. Send me your FD story. The best one gets printed here. Some good work done on the newsletters this month. RARS with info and chuckles. Non-subscribers missed "Ma Bell's answer to Amateur Radio," "DXC Morons," info on satellites. W4FMN and his inscrutable column and much more. Good luck on the new home, RARS. Kinston ARS with a nice one pager. WB4UOU always does a nice job. Good luck to you new officers: N4AFU, pres.; WB4UOU, v.p.; W4ULD, secy.; KD4DU, treas. Forsyth club planning a tour bus to Dayton Hamfest this year — you fellows ever consider routing thru Murphy? Traffic: WB4WII 410, WD4CNQ 245, WA4OBR, 242, KU4W 188, NJ4L 166, KD4PJ 158, AB4S 122, K4NLK 105, WA4SRD 105, KA4KJI 87, WD4LRG 80, W8JUP 74, W4GRO 62, WD4HTE 60, K4IWW 57, W4EAT 56, KA4DHP 51, WB4CYN 50, KZ4A 42, WD4CEB 25, KC4AM 21, NT4K 20, WA4CUD 18, N4GGI 14, WD4JFR 13, W2JDB 12, W4EHF 8, W4TWD 6, KA4ATK 5, KA4UBN 5, WD4LOO 4, W4WXZ 4, W4RVE 2, N4UE 2, KA4VPL 2.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ — K4FRX was selected as SINGLE SIDEBANDER of the year for 1983. This award is presented each year by the SCSSB Net to the amateur who has exemplified the ideal net member and Amateur Radio operator. Congrats to K4FRX for achieving this honor. K4ZN earns BPL for efforts in traffic for Feb. KA4LRM was elected NM of the SCSSB Net for the next 2 years. She begins her service during the 25th anniversary of the net. I have learned that ARRL President, W4KFC has awarded the SCSSB Net a "Certificate of Merit" for 25 continous years of service to the ARRL NTS. Plans are being made for a formal presentation during the Roanoke Planning Meeting in May. Do you know our section level officials?

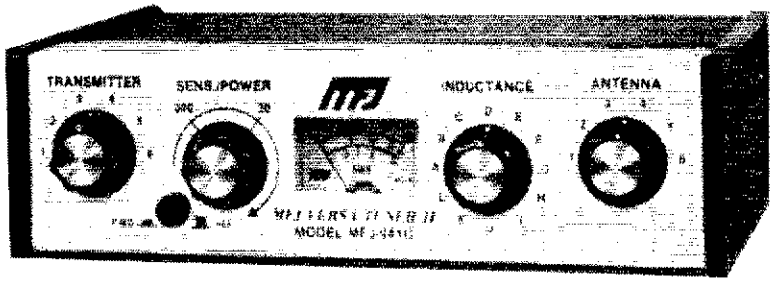
SEC	K4SUG	Ray Allison	Travelers Rest
STM	W4ANK	Hunter Wood	Charleston
PIO	WD4NMF	Charles Catoe	Lancaster
OO/RFI	W4NTO	Fritz Nitsch	Spartanburg
TC	NE4G	Ed Grooms	Greenville

Traffic: K4ZN 640, K4WJR 156, W4ANK 147, W4NTO 129, KA4AUR 121, W4FMZ 112, K4ZB 59, K4FRX 55, WB4UDK

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



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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.

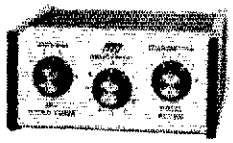
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

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 air-wound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

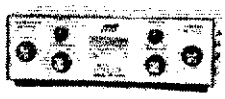
Operate all bands with one antenna.

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.

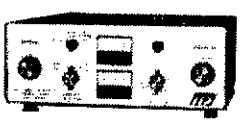
6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

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



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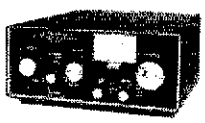
MFJ-989 VERSA TUNER V



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VIRGINIA: SM, Phil Sager, WB4FDT — STM: WD4ALY. SEC: WB4UHC. Chief OO: W4HU. Chief OBS: K3RZR. Club Coordinator WD4KQJ.

Virginia Nets

Virginia Traffic Net	7260	1 P.M.	WD4FTK
Virginia Sideband Net	3947	6 P.M.	NN4I
Virginia Slow Speed CW Net	3680	6:30 P.M.	K4VWK
Virginia CW Net	3680	7:00 P.M.	K4JST
Virginia CW Net	3680	10 P.M.	W3ATQ
Virginia Late Net	3947	10:15 P.M.	KA4IUM

Activity seemed light in this year's Virginia QSO Party for both in-and-out-of-state stations. It's unfortunate that Virginia amateurs can't be more active in this contest. It provides us with our one opportunity during the year to be as sought after as any rare DX station. Clubs should try to have a pre-Field Day exercise by operating in some rare county during the contest. The QSO party is always held the second weekend of March so start planning now. *Four* BPLs this month-K4KDJ WB3PNY W3ATQ AA4AT. Fourteen PSHRs-KR4V WD4ALY K4JST AA4AT KB4OG K4VWK WA4CCK WD4OCW W4LXB KA4IUM NT4S NN4I KB4PW KA3DTE. Total traffic points made by Virginia amateurs during the month was exactly 7500. K4KDJ originated over 500 Valentines Day greetings. K4RC and K4JST went mobile in Va QSO Party. WA6BJH is a lawyer and Civil Engineer and just passed Extra Class exam. STARES reports 28 sessions and 43 QTC. SVEN reports 28 sessions and 57 QTC. Regret K4VYN, trustee of the Tysons Corner NVFMA 146.31/91 rptr, is now a Silent Key. K2NA editing PVRC newsletter. Judging from the club newsletters I have received, there seems to be surprising *support* for a codeless amateur license. W4KFC was active in the Va QSO Party and spoke before the Northern Virginia ARC on various FCC proposals. Traffic: K4KDJ 1303, WB4PNY 546, W3ATQ 532, AA4AT 526, WD4ALY 386, WA4LJI 348, WA4CCK 345, K4JST 276, KR4V 248, W3BBN 246, WD4FTK 239, KA3DTE 216, KB4OG 156, WB4FLT 145, K4JM 139, K4VWK 135, KB4PW 129, W4UQ 129, WB4KIT 121, WD4OCW 120, KA4IUM 117, W4NFA 106, N4EBU 101, N4YQ 88, NN4I 86, KA4ZTB 78, W4NWM 65, N4HAK 60, WB4DQZ 57, NT4S 50, NT4U 40, KC4HN 37, NW4O 34, W4PVA 34, WB4ZNB 32, KA4JXZ 30, W3BBQ 24, KØJH 20, W4CFV 18, WA4TVS 17, W4KXE 15, K4MLC 15, WB4UHC 15, KB4WT 15, W4LXB 14, KI4W 11, N3RC 9, N4FNT 7, W4TZC 6, KM4X 6, N4BJX 5, WA1VRL 5, WD4KQJ 3, N4LE 2, NF4T 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. Rptr. Coord.: WD4KHL. ACC: WA8CTO. TC: K8CG. WV state ARRL Conv. will be Jul. 2 & 3 at Jackson's Mill. Contact K8LG for details. Fayetteville H. F. on Feb. 27 was well attended and enjoyed by all. K8MHR is recuperating after surgery. W8DPQ is now Silent Key. W8HZA is partially inactive owing to illness of XYL.

Net	Time	Freq.	Sess.	QTC	QNI	NM
WVN	7:00	3567	27	38	143	W8LYV
WVFN	6:00	3990	28	126	563	N8AJC
WVMD	11:45A	7235	28	35	598	W8FZP
Hillbilly	1:00P	14290 Sn	4	22	126	KC8YU
KFC 2M	8:30M	87/47	4	3	50	WD4KHL

Traffic: KZ8Q 123, N8AJC 74, WA3NUI 66, K8KT 42, K8QEW 40, KA8HCT 37, W8CAL 28, WA8KCJ 28, N8EMQ 24, W8FZP 24, KC8CR 23, KD8G 18, N8FCY 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WDØAIT. Because of WØACD's untimely death, I have taken on this project for the first time in my life. I never realized the amount of work required to put this thing together. Now I really respect the fine job the Section Manager's do in putting this column together. WØACD did a great job during his term. There is a large gap to be filled because of his absence, one which is not easily filled. As WØACD said that he would do, I have gathered together some of the swapfests I have heard about. The annual Superfest will be held in the Loveland Exhibition Building on June 4th. The Rocky Mountain Division Convention will be held in conjunction with WIMU (Wyoming-Idaho-Montana-Utah) again this year in Jackson Hole, WY, on August 5-7. The event was successful last year, and should be better this year. BARC-test '83 will be held in Boulder on Sept. 25th. I think the location will be the same as in years past. For the western part of the state, CCARC will hold a swapfest and meeting sometime this summer in Glenwood Springs. Sorry I do not have more information now. Hey traffic guys, any ideas about where and when to hold the traffic banquet this year? My apologies for not getting the word out very well that I was collecting traffic reports this month. New editor of this column next month, so this is my last hurrah! 73, WDØAIT. Nets: CWN-sess. 27, QNI 212, QTC 144, QNF 832. Traffic: WAØHJZ 1945, NØBQP 1930, WDØAIT 270, WØWYX 257, KØDJ 241, WAØOYI 228, KBØZ 102, WA7GYQ 96, KAØNLI 89, WØNFW 25, WBØNHA 10.

NEW MEXICO: SM, Joe T. Knight, W5PDY — DEC: KB5XD. STM: KV5U. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 194 msgs with 185 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 at 0100 UTC and handled 65 msgs with 1042 stations in. New Mexico Breakfast Club meets daily on 3.939 at 0630 local and handled 78 msgs with 988 checkins. Yucca 2-Mtr Net 78/18 & 93/33 handled 18 msgs with 78 checkins. Caravan Club 2-Mtr Net 66/06 handled 12 msgs with 113 checkins. Vy sorry to report the passing of KC5JT & K5BN. They will certainly be missed. W4KFC's teleconference was enjoyed by all. Traffic: W5DAD 202, ND5T 164, K5DUV 162, W5JOV 144, W5ENI 94, N5SJ 72, K4EJ 45, KB5LI 20, WA5MIY 18.

UTAH: SM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. STM: W7OCX. WIMU ARRL Rocky Mountain Division Convention August 5-8 1983 at Jackson Hole, WY. WB7TYK and KA7FHF have upgraded to Advanced. W7VAG reports 96/36 back on the air from Park West. K7HK reports 144.83/145.43 on the air from Tooele. 147.99/39 on the air from Little Granite Mountain will be moved back to Cedar Mountain later. OARC 1983 officers: W6KP, pres.; KC7UB, v.p.; KA7INM, secy.; K7SDN, treas.; KA7MNK WB7RLW, dir. KA7EGC W7ETR KA7JZC and K7QEQ discussing plans to link Salt Lake City-Provo-Price-Moab on 2M. WA7VYJ reports BYU ARC station, W7OHR, new antenna system works well and running phone patches. Traffic: WA7KHE 110, WA7MEL 97, NA7G 43, KN7U 30, W7PBV 22, K7CKF 14, W7OHR 12, W7OCX 9, W7RO 9.

WYOMING: SM, Dick Wunder, WA7WFC — SEC: W7TVK. STM: WØOGH. The Rocky Mountain Division

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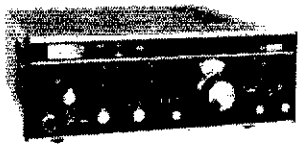

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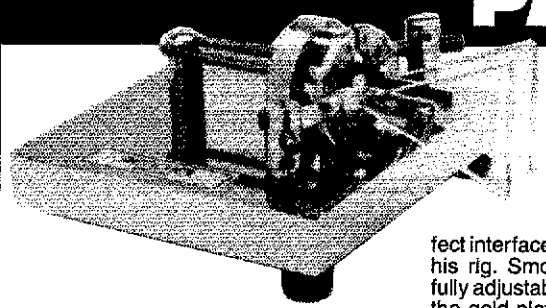

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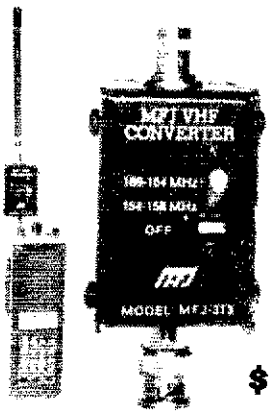

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ARRL Convention will be held at Jackson, WY Aug. 5-7 this year & is sponsored by the WIMU Hamfest. The Wyoming Hamfest will be held the third weekend in July at Meadow Lark Lake & is sponsored by the Sheridan Amateur Radio League. Hope to meet many of you at these fine hamfests. Recent upgrades include N7DIL & KA7KEH to Advanced. Congrats to all. WA9PFJ reports the Wyoming Jackalope Net held 24 sess. with 637 QNI and 2 QTC. WB7NHR reports the Wyoming Cowboy Net held 20 sess. with 828 QNI and 14 QTC. My thanks to all concerned in helping with implementing the new Field Organization. Traffic: WB7NHR 380, KD7EY 132, K7SLM 47.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Hubert H. Wheeler, W4IBU — ASCMs: WA4RNP KA4WVU. SEC: N4DMA. STM: WA4PIZ. An early spring in late February and early March with record temperatures brought on some rough weather with more probably in the future. ARES is much better prepared this year owing to new ECs volunteering for duty in the following: Bibb-KA4YKH; Choctaw-WB4KVD; Clarke-K4TSN; Etowah-WD4FFA; Winston-W4GKO; Wilcox-N4HIR. Thanks guys! Coverage still needed in Baldwin, Bullock, Chilton, DeKalb, Franklin, Geneva, Henry, Houston, Jackson, Lawrence, Limestone, Madison, Marenso, Marion, Mobile, Perry, Pike and Washington Cos. Care to volunteer YOUR services in this worthwhile cause? If you did not file comments on the no-code license proposal, it is now too late and we will have to live with the decision of the FCC. Remember that silence gave consent whether you approved or not. Not much response to a General class cw net! Is there any interest in a state-wide RTTY net? If so, advise the STM! We ALL appreciate KA4IJT's revoking her resignation as ATNM manager. Alabama represented 100% on CAND by W4CKS and N4FQD. Also 100% representation on DRN5 by WB4IXA WA4JDH N4FQD W4AAY W4CKS KC4GS N4BEN W4WJF W4IBU NW4X W4EWX and KB8GT. PSHR: WA4JDH N4FQD W4CKS WA4LXP. Traffic: WA4JDH 555, N4FQD 136, W4CKS 99, WB4IXA 94, WA4LXP 50, W4IBU 45, KC4GS 35, NW4X 18, K4GXS 14, WA4ZPZ 14, WA4JPK 14, K4AOZ 8, W4DGH 8, WD4DHI 6, WB4TVY 5.

GEORGIA: SM, Eddy Kosobucki, K4JNL — "Anyone with information concerning local ordinances affecting Amateur Radio, or if you know of anyone in the Georgia State Legislature who is an amateur," get in touch with W4BTZ, who is the section SGL. The Atlanta RC is again sponsoring three $500 scholarships to licensed amateurs who are graduating high school seniors. For info & application forms, contact Phil Latta, W4GTS, Secy. Remember all transcripts must be postmarked by July 31, 1983. The first Albany ARC Hamfest is scheduled for May 7th. Much effort is being put out so they ask you to please support them. If you hear of a Silent Key *please* send me the obituary out of the paper if possible. This will expedite the notice in the column. Also if your club is planning an event & you desire publication in *QST* it must be sent directly to the League at least three (3) months before the publication date. Do not send them to me but directly to the League. As of this writing I am still looking for both an OO/RFI Coordinator and a Bulletin Mgr. I know that there are many qualified in the section who can do a FB job. So won't you please contact me? Augusta ARC officers are: NA4I, pres.; K4FRM, v.p.; KF4LM, secy./treas. By now all affiliated clubs have received the info on how to become an ARRL Special Service Club. Wonder who's going to be #1?. There are many advantages in becoming an affiliated club, so bring it up at your next club meeting. We must congratulate all the YLs that are involved with MALARC. The efforts that they have put in thus far is putting them on the front burner. Don't know what the rest of this Spring will bring as far as nasty wx is concerned but I know that all of you in the Georgia section are ready. Owing to a drastic cut in the section budget, I will not be able to make all the hamfests I made in previous years, but I'm hoping to see you all at one place or another. Traffic: W4WXA 335, KA4ATM 108, KL7FX/4 101, W4PIM 100, N4BIM 80, K4JNL 57, K4NM 49, WB4NTW 44, W4HON 24, W4AAY 18, K4EV 17, W4JWO 16, K4BAI 10, AA4EI 6. (Jan.) KL7FX/4 19.

NORTHERN FLORIDA: SM, Billy F. Williams, Jr., N4UF — SEC: W4UEA. STM: WF4X. ACC: N4ADI. All affiliated active clubs in the section have been sent applications for SSC status. Those desiring to apply should complete the forms and return to N4ADI ASAP. KF4U has a new Ten-Tec Omni-D & has been busy helping a prospective Novice get his ticket. Putnam Co. ARES, under direction of EC WB4UBK, provided comm. for festival in Crescent City including a parade and 3-mile race. W4MGO busy on ISSBTN. DBARA had nice annual banquet which I took pleasure in attending. KF4EU had great article on OO program in Orlando ARC Listening Post and W4IPM of Valparaiso was featured in nationwide AP article on the role of Amateur Radio in educating students. Great piece of publicity including picture! Local informal RTTY net active on Orlando ARC rptr. and also on the weekly Orange Co. Emergency Net on Fri. HCARA celebrated 6th anniversary. BARS to provide comm. for King Mackeral tournament at Mayport. KH6FMD in charge. NE4Z presented plaque for his work with BARS newsletter. TARS annual auction held at March meeting. Jax area hams thru RANGE are ordering tone alert modules for ARES work. New EC for Duval Co. is WA4RGO, who succeeds WA4VZF. In St. Johns Co., the new EC is WA4MST. Orlando Ham of the Year for 1982 is WA4OPA, EC Orange Co. TARS and GCARC busy with public service events. N4ARJ voted Sheriff's Reserve Officer of the Year in Clay Co. He is also EC there. Santa Rosa ARA plans early affiliation under the new SSC program. All section hams are urged to submit their opinions. Traffic: N4PL 791, WF4X 780, WB4ADL 386, WA4QXT 387, W4MGO 364, WD4HBP 220, W4ILE 168, WD4IIO 138, WA4EYU 135, N4GDT 129, N4ADI 105, KD4KK 91, KA4VXT 91, KA4RVQ 87, WB4TZR 87, KF4HA 84, KB9LT 83, W4WGR 80, KF4U 72, AA4FG 61, KB4T 56, W4GUJ 49, WD4MLQ 46, WB4FJY 43, NF4O 40, KB4LB 37, NO4P 35, WA4STZ 35, NS4C 27, KD4QZ 27, N4UF 27, KA4ETX 26, WB4DTS 23, KF4EU 19, W4DTV 18, WD4ORO 17, WB4AWG 16, WB4YQP 11, N4BLD 8, K3AOY 6, KA4RBY 6, W3IDO 5, KA4RMH 5, KF4GY 5, WB4OOS 4, WA4PUP 4, WA4PUO 1. (Jan.) WB4GHU 96, WD4GUZ 7.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS. STM: K4ZK. Another great Tropical Hamboree in February — the SM/STM/SEC meeting resulted in the approval of the combined section net agreement, which WF4X initiated, as well as an explanation by W4PPC regarding the liaison of the International Assistance and Traffic Net with Eastern Area. K4ZK

hosted a very informative traffic handlers breakfast, and there were many other excellent meetings including the ARRL forums and the FCC presentation. The Florida Repeater Council approved the following at their meeting in Miami: 1)The Council should divorce itself from making any recommendations or coordinating frequencies for simplex autopatch use; 2)It is recommended that simplex autopatch users check with their local EC for any conflict with the local emergency simplex frequencies. Thanks to KI4T for his interest and his work with the repeater council. The annual Pageant of Lights parade was held in Ft. Myers with many amateurs assisting with the communications. W4SS reported that the National Weather Service gave a very informative program for the Palm Beach Co. amateurs. KE4DA said he hopes to work as portable 5Z4 in May from Kenya. WA4EIC is now an Official Bulletin Station and doing a FB job. WA4JWK has been appointed Assistant EC of Osceola Co., and KA4GUS is now the manager of the Dade Emergency Net. I received a list of actively affiliated clubs, that is, those clubs with a current report form on file. They are: Brandon ARS, Brevard RA, Broward ARC, Inc., Cape Kennedy Area ARC, Central Florida Cypress Chapter, Charlotte ARS, Clearwater ARS, Collier Co. ARC, Dade RC, Everglades ARC, Fellowship ARC, Florida Institute of Tech ARS, Ft. Pierce RC, Inc., Ft. Myers ARC, Hollywood ARC, IBM ARC of Boca Raton, Indian River ARC, Key West ARC, Inc., Manatee ARC, Martin Co. ARA, Metropolitan RA, Inc., Naples FM Assn., North Dade Repeater, Platinum Coast ARS, Polk Co. CD ACS, Pompano Beach ARA, Radio Club de Cuba Exile, Inc., Sarasota ARA, Inc., Sarasota Emergency RC, Inc., South Florida DX Assn., South Hillsborough ARK, Space Center ARS, St Lucie RA, Inc., St. Petersburg ARC, Sun City Center ARC, Tamarac ARA, Tamiami RC, Tampa ARC, Inc., Tampa Bay RA, Inc., Univ. of Miami ARS and Vero Beach ARC, Inc., The Southwest Traffic Net issued certificates to W1NJM W4UIQ KB4KB KA9AKY W3IJC W4VQE W4PKP WD4NXK WB4GJM and KA4FZI. W3CUL and W3VR were active with the Tampa State Fair, as usual, and reported 16 hour days even with RTTY at 100 wpm — their traffic count was W3CUL 7897 and W3VR 2081. Some kind of totals! The Tampa ARC extends sincere appreciation to all stations who assisted in handling this state fair traffic. 73 de WA4PFK. Traffic: W4DUG 9908, W3CUL 7897, W3VR 2081, VE3BSY 1219, K4SCL 419, WA4PFK 411, WA4EIC 406, W4NFK 318, W4LX 267, K4IA 252, NC4H 235, K4ZK 219, WD4AWN 210, K4EUK 197, W4YCL 192, KA4GUS 188, KA4TTS 176, W8BZY 164, KA4AMC 159, W4GPL 154, WA4HXU 133, KE4DA 127, WB4AID 112, KA4OAA 108, KY4U 100, KA4ASZ 87, W4PKP 85, KM4Y 85, W4DL 77, W1NJM 75, W4SME 70, N4ET 69, N4KB 62, KA4NXF 62, WD9AEP 60, KA4FZI 60, W4ESH 55, NJ4O 52, WA4RLV 44, K7LCA 41, KB4KB 40, KF4RL 38, KA4RWV 36, W3TLV 34, K5IHH 32, WA4UQQ 30, WK4F 29, W4SMK 29, WD4KPG 26, WB4GCK 22, KA4BBA 18, KA4YHS 18, N2WX 17, AA4BN 16, W4UIQ 15, WB2OUK 13, N4FQU 12, W4MPV 10, VE3SI 10, WA2UKE 9, KA9AKY 8, KA8CXQ 8, W4WYR 8, K4JLL 5, KA4WSY 5, N4CMW 4, W3IJC 4, AA4WJ 4, KF4JA 4, WA4CAP 3, KA4GDU 3, N4FNY 2, WB8SNT 2, WB4GJH 2, K4KKP 2, KE4MG 2, N8EL 2, WB8NHV 2, N4GQR 2, W4MFD 2, WA4LQO 1, KA4YHF 1, KA4YHE 1, K4OAC 1, WA4PIO 1, WA4GIE 1. (Jan.) W3CUL 3238, W3VR 932, NC4H 82, WF4E 3. (Dec.) WF4E 8.

WEST INDIES: SM, Julio Negroni, KP4CV — This is my last report since on april 1 KP4EW will start his term as the new SM of the West Indies section. I wish to express my gratitude to all the colleagues who have given me their wholehearted assistance during the past two years and I wish KP4EW the best of luck in his term, since the position has been expanded and the Section Manager has taken on considerably more duties. No doubt that with the able assistance of NP4D as STM and NP4CF as SEC the section is in good hands. WP4BCV reports the following totals for WINC: QND 417, QTC 37, QNI 504, 28 meetings. It is with deep regret that we note the passing away of the following old timers: KP4GH KP4DO KP4AFD. We surely will miss them. PSHR: NP4D. Traffic: NP4D 113, KP4DJ 72, KP4ABK 30, WP4ADG 6.

SOUTHWESTERN DIVISION

ARIZONA: SM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. February has passed and there seems to have been somewhat less activity than in the previous months. The Superstition ARC reports its members participated in providing communications for the Lost Dutchman Day Parade. Those participating were: KA7AKK WB7FAJ K7RDN WA7JZL WB7FDF W8KCW WB7CRK WA9YVC KA7JCP W8TNT KA7PFD WB7QZB WB3LQQ KA9KJA and WA8OKE. KB7XN and the CCARC report their club's participation by providing communications in 1983 Winter Special Olympics. Participants were WA7NXL W7YS WB7OPT KB7XN N7FU KA7MGO N7EDU N7CXF WA7LTH WB7CDO WB7EVX W7LUX KC7CY N7EIR WA7YUL KB7XX W7SCR WB7FBN WB7DDN WB7QDQ. W7KAX reports the following took part in a search for a missing body: W6TAZ KB6O KA7MUN KA7BFD WD7FDU KA6AXO N7AML WB7RYQ WA6MGR and WA6FTY. I had a pleasant chat with the new ARRL SW Division Vice-Director WA6WZO when he made a stop in Tucson at the beginning of the month. There still are openings in the new ARRL Field Organization. If you would like to be part of it here in Arizona please contact me. ATEN: QNI 1040, QTC 201. Cactus Net: QNI 963, QTC 134. PSHR: W5KMF. Traffic: W7EP 205, KB7FE 130, W5KMF 129, K6LL 88, W7AMM 78, K7UXB 55, WA7KQE 38, KA7JNU 26, K7NMQ 21, KA7HEV 15, N7CVT 14, N7CQY 10, WA7NXL 9, WA7YUL 9, N7EH 6, W7DQS 5. (Jan.) K6LL 71.

LOS ANGELES: SM, Stan Broki, N2YQ — SEC: N6UK. STM: W6INH. ACC: NF6D. Thanks to N6CIT and W6ORG, a man who collapsed during the Whittier Walk/Jog 5K/10K Race was saved when he had a heart attack while running in the race. ATV coverage was provided along with other amateur support for the 1983 Long Beach Marathon a 26-mile run. Net control was W6RO; radio coordinator was AK6Y. Don't forget the TRW Swap Meet the last Saturday of each month. I missed January and February because of all the rain. The Club-to-Club Radio Net meets weekly at 7:30 P.M. Wed. on K6QQN/R 147.705, down 600. The IDier on the K6QQN rptr died because of lightning. Boy, the storms did a number this winter. ARES groups throughout the section were kept busy manning Red Cross shelters and helping with disaster assessment. WA6LAU and his group did an outstanding job in the Malibu area. Cw practice is held every night, except Mondays, 8 to 9:30 P.M. by W6QIE on 3590 kHz. Speeds are from 5 to 30 wpm. QO reports: WB6YID 1; K6KA 40. Traffic: K6UYK 760, W6INH 361,

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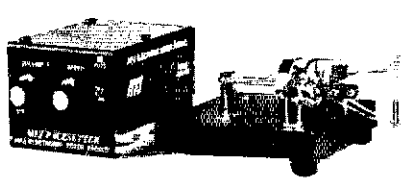

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ORANGE: SM, Fried Heyn, WA6WZO — SEC: W6UBQ. STM: WA6OCA. ACC: KA6NLY. BM: W6DXL. OO/RFI Coord.: N6PE. PIO: KA6HNY. SGL: N6HIQ. TC: AA6DD. DECs: WB6JBI W6LKN K6GGS WB6YZY. Once again Orange Co. ARES and RACES was called out owing to rain and high tides; Huntington Beach sustained the most damage, and 3 nearby high schools were used by the Red Cross as evacuation shelters; thanks to an interview with AEC WA6TLE (past OC DEC) *the LA Times* had a super article including pictures on ham radio communications support — for a copy send **s.a.s.e.** to me (WA6WZO). West Coast ARC has started a round table net on Thurs. 8 P.M. with N6HVS net control in addition to their Mon. & Tues. 5 P.M. nets all on 144.33 simplex. Fullerton RC is sponsoring a "Star Party" April 9th at N6PY's cabin in the Desert Hot Springs area. New club officers for 1983 — Beach Cities Wireless Society (San Clemente): KA6NMS, pres.; KE6RG, v.p.; W6FQX, secy., WB6GGF, treas. Anza Valley RC: N6CFN, pres.; OES WB6NSX, v.p.; Victor Valley ARC supports licensed classes taught by W6OUU assisted by KB6TE and WA6JYA. EC K5EDS with AEC WA6OFT & WA6QYH installed hf & vhf RACES station in Victorville main fire station. Riverside Co. ARA has started a swap & shop net Tues. 7 P.M. with net control AH6CL on the club rptr 146.28/.88. W6TJ/R (in addition to their potpourri net Wed. and ARES/RACES net Mon). If you would like to operate W6RO on the Queen Mary regularly or as a substitute, contact W6TNB. For nightly code practice except Mon., listen to 3590 kHz (W6QIE) from 8 to 9:30 P.M. with speeds starting at 5 and ending at 30 wpm. KA6HJK announded the beginning of a vhf RTTY traffic net to begin on April 1st 10 A.M. daily probably using 146.10/70 linked to other rptrs. Congrats to Fontana Jr. High School ARC with sponsor WA6ZEF on ARRL affiliation. PSHR: W6NTN AI6E N6GIW WA6QCA WB6QBZ.

Net	Freq.	Time	QNI	QTC	NM
SCN/1 (—20)	3598 kHz	7 P.M.	424	514	K6XI
SCN/2 (∝13)	3598 kHz	8:15	176	154	KE8LO
SCN/V (FM)	146.645	9 P.M.	561	400	WA6QCA

Traffic: W6NTN 292, N6GIW 250, WB6QBZ 194, AI6E 152, K6HI 125, WA6QCA 88, N8GOT 57, W6RE 53, KA6BNW 46, K6GGS 42, KA6HJK 23, KA6WSI 23, K6ZCE 21, W6TKV 13, WA6WZO 7, W6CPB 6, WA6WZN 3, WB6LGL 2.

SAN DIEGO: SM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Calif Dept of Forestry needs volunteers for its Volunteers in Prevention (VIP) program. VIPs take part in Red Flag Patrols during high fire hazard weather. Contact W6INI, 273-1120. ARES has breakfast (0800) and meeting (0900) on second Saturday each month at Normal Heights United Methodist Church, 4650 Mansfield. All are welcome. Amateur Radio Swap Meet first Saturday, monthly, at Santee Drive-in, 10990 Woodside Av, Santee. Time 0700. New officers for San Diego RA: WA6URS, pres.; N6FUY, v.p.; W6OGC, secy.; WA6CGT, treas. WA6CUP has authored two excellent booklets detailing the organization of ARES in support of the Coronado Police Dept. Available to any fire or police dept. Write to Jerry Boyd, Coronado Police Dept, 578 Orange Ave., Coronado 92118. KM6S continues as pres of Convair ARC, aided by N6FNQ v.p., K6DBJ secy., N6BLQ treas. Heading Poway ARS for '83 are: K7DCG, pres.; NG6Z, v.p.; WA1RIP, secy. South Bay ARS meets first Thurs at Norman Park, 270 F St., Chula Vista at 1930. Traffic: KT6A 559, KM6I 382, KU6D 280, K6HAP 171, KB6AI 110, N6AT 36, W6HUJ 29, N6GW 27, WA6IIK 19.

SANTA BARBARA: SM, Robert N. Dyruff, W6POU — FCC no-code docket strongly opposed. Sctn leaders W2KVA & WB6HJW gave well-reasoned rebuttals. Estero and Satellite ARCs inquire into new SPECIAL SERVICE CLUB (SSC) status. W6ZZN named Sctn Affiliated Club Coord. Novice thru Gen. classes by Estero ARC under W6ECY W6JU W6ELK & W6JTA. Passed Novice to Extra in one day: KA6WZR KA6WZS-Ventura. Note club editors: Paso Robles ARC-N7DKV; Conejo VARC-KE6LO; SBARC-WA6ISS; Poinsettia ARC KA6KTU; Ventura CARC-K2BAH. Congrats! Your help needed to fill sctn posts Technical Advisor, Publ. Info. Officer, OO/RFI Coord. Longest, most destructive rains/floods of century say ARES busy all 3 counties. Four ARC shelters opened Vent. Co. round-the-clock comms by Simi ARES under WD6EVT CP5NP plus 20 ops; 30 hr. stint by KA6BPH. ARC Chapter Hq comms used 20 ops led by WB6RVA. SBAR So. Co. ARES aided S&R and Nat'l Guard at S.Y. River xing. SLO ARES serving CDF, NWS, ARC. Emerg. Medical drill SBar So. Co. saw 15 ARES ops under WD6ESU. 4KW emerg. generators added at QTHs of W6PN W6MSG KD6JD & KD6KN. Sctn traffic net support at all-time high, tnx to K6YD N6WP KA6JWK and large team. W6HDO experimenting on 1750 meters (189 kHz) mobile Morro Bay — 10 miles range! Traffic: W6JTA 92, K6YD 66. (Jan.) W6JTA 64.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC — The Panhandle and South Plains ARES groups had their hands full the first two weeks in Feb. with several full-blown blizzards. The Amarillo ARES unit was activated by CD officials on Feb. 4-5 and 8-9, providing communications, transportation, ambulance service, and drug delivery. Several 4-wheel-drive vehicles were donated by the public and outfitted with 2-mtr radios to cope with the 3-4 foot snow drifts on the city streets. K5AVG reports about the same type of services provided by the ARES in the Tulia area. DEC WA5DUQ reports that the situation in Lubbock area about the same as Amarillo, with Lubbock ARES providing many services. A job well done by all, and much PR and credibility gained for ARES in West TX! Garland ARC sporting ten new Novices! New officers Dallas ARC: KC5YB, pres.; KS5O, v.p.; KA5ODN, secy.; N5CBD, treas.; WB5FDF KC5DX AA5D KC5WH N5AQC K5DTN, directors. KC5PU new EC for Hale Co. Our new (and first) Public Information Officer for our section is David Coursey, N5FDL. He is a member of the press himself, and will assist all clubs and ARES units in getting our story of Amateur Radio to the public. We desperately need a District EC for the San Angelo area; contact W5GPO asap! PSHR: KA5AZK KB5UL N5DKW WA5QFD KC5NN WB5LAT N5BT KD5FR N5EZM N5FDL. Traffic: N5BT 194, KA5AZK 171, W9OYL 80, KD5FR 70, WB4HML 63, KC5NN 56, KB5UL 48, WA5QFD 43, N5DKW 27, WD5EEH 24, WB5LAT 21, W5PBN 20, K5PC 14, N5EZM 13, K5HGX 12, AJ5F 8, N5FDL 5, W5YK 4.

OKLAHOMA: SM, Art Roberts, W1GOM — SEC: W5ZTN. New appointments: STM-KV5X; OO/RFI-KB5EK; TC-W5QMJ; BM-W5AS. Greetings to the OK section. Thanks

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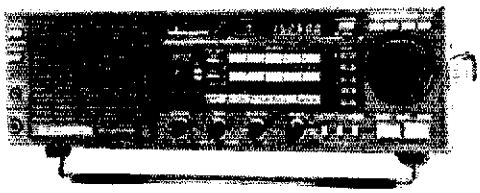

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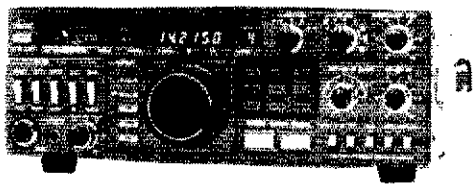

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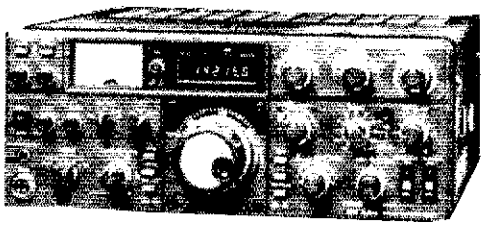

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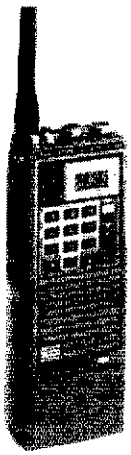

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go out from all of us to W5REC for duty above and beyond. He will now serve as Assistant Director-at-large. Congrats to new amateurs: KA5QCW KA5QCX KA5QCY. Also to upgrades: Extra-KA5NHB; Adv-N5FEM WN5LUI; Tech-KA5ODI KA5PIW KA5PTP KA5PUB KA5PWM. We will miss SK WB5OHY, Shawnee. KB5XI had short stay in hospital. KA5ODI helped apprehend a wanted criminal. WB5UIY's son winner in a baby contest. WB5MRE and WD5EAA attended Red Cross Disaster Training class. W5JJ now life member IEEE. WD5AII/R EARC ran teleconference with W4KFC. Thanks to KCØHF and WØTN with last minute hook-up. I appreciate the enthusiastic response since my taking over as SM. This truly is the OK section. Traffic: K5CXP 243, W5AS 200, KA5CXW 176, W5RB 175, KV5X 127, WB5ELG 102, W5REC 94, WA5QUV 56, WB5EAY 49, W5SUG 46, W5VXU 43, WD5IFB 40, KB5XI 40, WD5EAA 38, KD5GB 32, W5VLW 25, W5VOR 24, WA5ZOO 24, WA5OGC 21, KC5OU 19, K5CAY 13, N5EO 11, NØIN 6, W1GOM 5, WB5LSW 3, W5JJ 2.

SOUTHERN TEXAS: SM, Art Ross, W5KR — SEC: WA5RVT. ASM/STM: N5TC. BPL: W5SHN N5DFO. ORS K5RVF says Port Arthur ARC enjoyed an eatin' meetin' Feb. 24 with 32 present. WB5FQU experimenting with indoor antennas and getting out fairly well. ORS N5CRU has been appointed Asst for Net Operations in Navy MARS. N5EHO upgraded to Advanced, and put up a new beam. CONGRATULATIONS on both! CAND mgr W5KLV reports DRN5 represented 100% by Southern Texas stations WB5YDD W5KLV N5AMH W5URN W5SHN N5DFO N5CRU KD5KQ W5CTZ. N5AVR reports QNI 26 times in TEX SLO SPEED for one msg rcvd and dlvd. ORS WD5FGY happy to be back on air. DRN5 mgr WB5YDD reports Southern Texas represented 100% by KA5KRI WD5FRB W5URN KD5KQ W5KLV W5CTZ N5DFO N5CRU K5OWK WA5RVT WA5OYS W5SHN WD5ATP N5AMH K5WOB WB5YDD. SEC WA5RVT attended Texas DPS State Emergency Management Conference and National Weather Service STORMCOM programs; also announced Southern Texas ARES DEC/EC Net will be held first and third Sundays each month on 7.283 MHz at 4:30 P.M. Central time. EC N5AMH had busy month working with handicapped students (3 wheelchair, 5 sightless); hopes to have 6 new Novices and 2 upgrades soon; also worked Simulated Emergency Test for new county judge and commissioners in San Jacinto Co., with K5ZOD set up in county court house; N5AMH handled initial NCS duties. Other helpers are W5DHN N5DC W5TBC W5KKS; county officials were quite impressed. OBS W5KLV busy as usual with 98 readings on ten nets. K5KJN is the new State Government Liaison for this Section, the first appointment in the new organization alignment. Traffic: W5SHN 1266, N5DFO 475, WB5YDD 457, W5KLV 422, W5TFB 412, W5CTZ 400, N5AMH 145, N5TC 124, N5CRU 103, KA5KRI 75, WB5MMI 56, KD5GM 34, ND5C 34, W5KR 32, WB5FQU 30, K5HZR 24, W5BGE 22, WD5FGY 20, WA5RVT 19, KS5V 16, WD5GKH 14, K5RG 11, K5RVF 8, N5AVR 2. (Jan.) KA5MFG/N5EHO 4.

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TUNERS—TOKYO HY-POWER
HC200 200-watt SWR/Watt Meter/Coax Switch.....86.95
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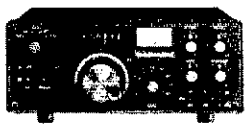

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B3016 2m Amplifier, 30 in, 160 out.....199.95

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Computer Software for the VIC-20

Ham Data now offers a complete line of creative Amateur Radio software for VIC-20 owners! Written exclusively for Hams by a Ham, these programs are far superior to modified "Home Inventory" routines. Save your *complete* log on tape or disk. Here is a sample of our software library:

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For a complete software list, send a stamp to EGE.
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LARSEN LM-150 5/8 Mag Mount.....36.00
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ANTENNA SPECIALISTS.....CALL

CUSHCRAFT (Other antennas in stock)
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3219 SSB DX 2m Boomer.....81.50

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144-148-13LB 2m 13-element with Balun.....77.95
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6-BTV 10-80m Vertical with 30m.....116.95
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HF MOBILE RESONATORS	Standard	Super
10 and 15 meter	8.25	14.00
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200 mW in, 25 watts out 2m Amplifier.....78.95
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TELEX HEADSETS/HEADPHONES
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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 achievments 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 non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

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.

YAESU Owners — Join your International Fox-Tango Club — now in its twelfth 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.

ROCHESTER Hamfest - Atlantic Division/New York State Convention Saturday, May 21. Monroe County Fairgrounds. Hotel headquarters, Rochester Marriott Thruway. More info? Write or call Rochester Hamfest, 300 White Spruce Blvd., Rochester, NY 14623 716-424-7184.

ANNUAL Evansville TARS Hamfest May 15, 1983. Vanderburgh County 4H Fairgrounds. Open at 6 AM CDT. All indoor-inside and outside flea market. Admission $2, indoor tables $5, outdoor flea market $1.50. Talk-in on 147.75/.15 and 146.19/.79. For table reservations and information, contact Hal Wilson, WB9FNN, R.R. 8, box 427B, Evansville, IN 47711.

THE WABASH County Amateur Radio Club will hold its 15th annual Hamfest at the Wabash County 4-H Fairgrounds, Wabash, IN on May 15, 1983. Doors will open at 5 AM, and close at 3PM. Free overnight camping. For more info send SASE to Dave Spangler 45 Grant St., Wabash, IN 46992. N9ADO.

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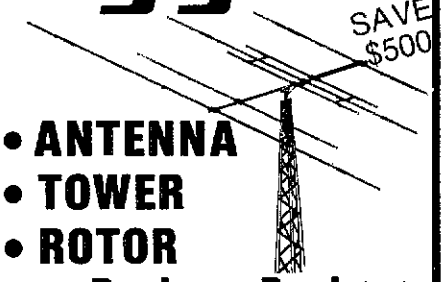

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Hy-Gain EX-14 Explorer 14 20-15-10 meter beam. New driven element design, covers full band under 2:1. Maximum legal power; 14' × 1½" boom; 7.5ft² wind area; stainless hardware; 1:1 balun; 43 lbs.

Hy-Gain HG52SS 52' Self-Supporting Crank-Up Tower. Rated 9 ft² @ 50 mph. Galvanized steel, includes hand-cranked winch; retracts to 21'. With base, rotator plate, 10' mast and (3) coax support arms.

Hy-Gain CD-45-II Medium duty rotor for arrays up to 8.5 ft², in-tower mounted. Bell design, 98 ball bearings and disc brake system. Independent brake release & CW/CCW rotation switches. Meter readout accurate to ± 1°. Requires 8-conductor cable.

Package components:	*Regular*
EX-14 antenna w/BN-86 balun	**$ 399.95**
HG52SS crank-up tower	**1095.00**
HG10 10' mast	**68.50**
HGCOA coax arms (3), $13 ea	**39.00**
CD-45-II rotator	**164.95**

Total Regular Value - $1767.40

PACKAGE PRICE - $1267.40

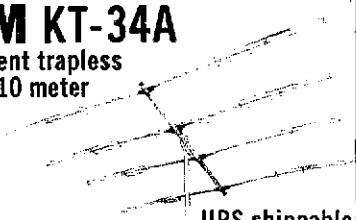
(YOU SAVE $500.00 + SHIPPING)

or

You choose a Package!... Purchase any other Hy-Gain Tower/HF Beam/Rotor Combination, add any other Hy-Gain or TELEX items and receive an additional 10% Discount from our already Low Sale Prices on the entire package, plus get FREE Shipping. Does not include Hy-Gain log-periodics or R-3501 rotor. *Ends 6/30/83 - Order Now!.*

KLM KT-34A

4-element trapless 20-15-10 meter beam

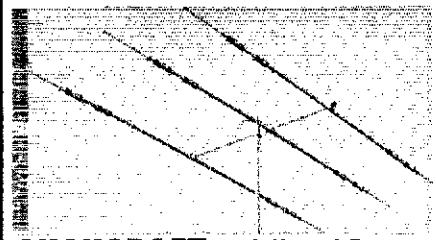


Regular $389.95

Special $299.95

UPS shippable

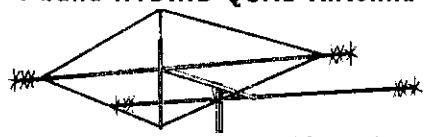
Limited quantity at Special Price



CUSHCRAFT Multiband Beams

Model		Regular	SALE
A-3	20/15/10m, 3-el, 14' boom	$249.95	179.95
A-743	40 or 10 MHz add-on kit	89.95	69.95
A-3SK	Stainless steel hardware kit	49.95	39.95
A-4	20/15/10m, 4-el, 18' boom	329.95	229.95
A-744	40 or 10m add-on kit	89.95	69.95
A-4SK	Stainless steel hardware kit	54.95	44.95

Mini-Products HQ-1 4-band HYBRID QUAD Antenna



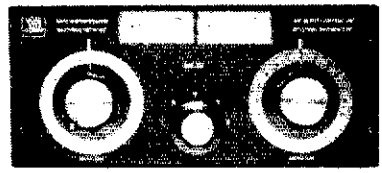
A compact, gain antenna that providing maximum efficiency in the smallest practical size. Uses a unique loaded quad reflector and overcoupling principle that results in a wide bandwidth and good forward gain. Bands - 6, 10, 15 & 20 meters; Power - 1200W PEP; Element length - 11'; Boom - 4½'; Wt. - 15 lbs. Install & turn w/TV hardware. (Reg. $159.50) ... **Sale $139.95**

BUTTERNUT Vertical

Model		Regular	SALE
HF-6V	80/40/30/20/15/10m vertical	$169.50	119.95
TBR-160HD	High power 160m adapt.	55.50	49.95
RMK-II	Roof mount kit w/radials	47.00	42.95
STR-II	Radial kit, only	33.50	29.95

Famous SLINKY Dipole

Short ant. for any (1) band (Reg. $67.95) **Sale $59.95**

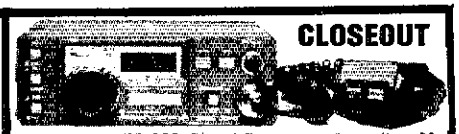


NYE VIKING MBIV-01 3KW antenna tuner. Automatic SWR meter; no calibration needed. Separate 300/3000 watt power meter. Covers 1.5-30MHz continuous; tunes 40-2000 ohm antennas. Optional balun for 200-1000 ohm twin feeders or unbalanced output down to 20 ohms. Heavy duty, silver plated continuously variable inductor; 25:1 vernier; Extra high-voltage capacitors. 14.2"w × 6.7"h × 13.4"d, 13 lbs..... **Sale $329.95**

BELDEN 8214 RG-8 (foam-type) coaxial cable **100' bulk roll - $36.95; other lengths, 42¢/ft.**

BELDEN 8448 8-conductor rotor cable **100' bulk roll - $29.95; other lengths, 33¢/ft.**

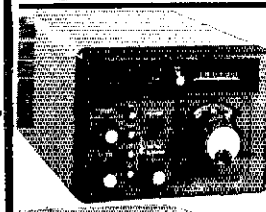
BELDEN 9405 8-conductor, hvy-duty rotor cable **100' bulk roll - $39.95; other lengths, 44¢/ft.**



CLOSEOUT

KENWOOD DFC-230 Digital Frequency Controller. 20 Hz step Digital VFO w/(4) Memories. Frequency control by UP/DOWN microphone (supplied) or front panel switch. Scan speed selecable in single, slow, or fast cont. 20 Hz steps from mic. Transfer frequency from VFO-memory or memory-VFO; split-freq with xcvr VFO on transmit and DFC-230 on receive. For KENWOOD TS-120S, 130S/SE, 530S, 830S. 5⅞"w × 2"h × 6¾"d.

Regular $289.95 - ***Closeout $189.95***

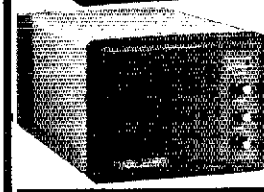


YAESU FV-101Z VFO

External VFO for the FT-101Z/ZD, FT-901/902-series transceivers.

Regular $175

Closeout $129.95

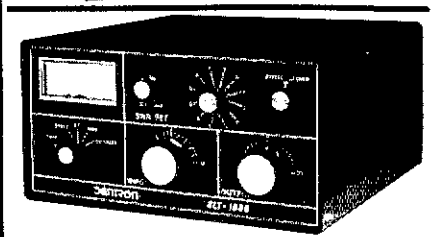


SP-901P Speaker/Patch

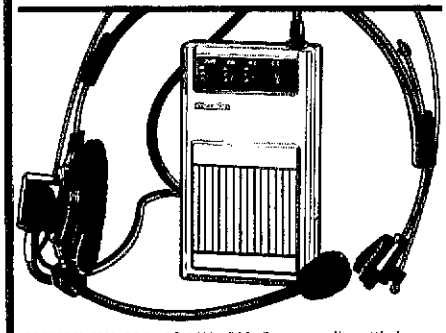
Speaker & hybrid phone patch combination for the FT-901 transceiver.

Regular $76

Closeout $59.95



DENTRON GLT-1000 Antenna tuner. 1.8-30 MHz cont. Tunes coax/balanced line; 1.2 KW PEP. 11"w × 4¾"d × 12"d, 18 lbs. (Reg $198.50)..... **Closeout $179.95**



MAXON MX-49S 49 MHz FM, 2-way radio with boom mic headset/whip ant. Clips to belt/pocket; Manual or ***"hands-free"*** VOX operation. **Great for tower work!** 100mW; up to 1/2 mile range. 4¾"h × 2½"w × 1"d, 9 oz. Uses (1) 9v battery. **$49.95** each; **$44.95** each, in pairs.

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MUSEUM now open for radio historians and collectors. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 replica store and telegraph displays. 15,000 items. Write A.W.A. for details: Bruce Kelley, W2ICE, Holcomb, N.Y. 14469.

NEW JERSEY - The Jersey Shore Chaverim are sponsoring the Jersey Shore Hamfest and Electronic Flea Market on June 12, 1983, 9 AM to 3:30 PM at the Jewish Community Center, 100 Grand Ave., Deal, NJ. Admission $3 per person (children under 12 & XYLs free). Refreshments available. Many awards. Table ($5) and tailgating ($2.50). Spaces may be reserved by SASE and advance payment to "Jersey Shore Hamfest", PO Box 192, West Long Branch, NJ 07764 by May 15. Talk-in on 147.045 + .6; 146.52 Simplex.

WHEELING WV Hamfest, Wheeling Park, Sunday, July 24. Major award plus cash award. Dealers most welcome, tables available, indoor displays only $2 admission fee required but reserve space. Contact: TSRAC Box 240, RD 2, Adena OH 43901. Phone 614-546-3930.

NJ Computer Fleamarket (4th. year). June 11-12, Meadowlands Hilton Hotel - Rte. 3 - Exit 16W NJ Turnpike. Buyers $5, sellers $12. Fleamarket in covered parking lot! W2TGH, 201-297-2526, Kengore, POB 13, Franklin Park, NJ 08823. (Also-Fall show on Oct. 15-16.)

NORTHWEST '83, The Northwestern Division Convention, will be in Spokane's Convention Center, July 8-10, 1983. Technical Seminars, Displays, Swapfest, Banquet with NBC's Roy Neal, DX Breakfast, and more. For information write: Kyle Pugh, KA7CSP, Box 3933, Spokane, WA 99220.

HAMFESTIVAL - Atlanta, largest in Southeast, June 18/19, new location, Atlanta Civic Center, 70,000 SF exhibitor space, 500-700 Flea Market spaces. Ample parking. Ladies/children's activities. Hourly awards. Forums. Advance registrations, mail: Atlanta Radio Club, Inc., P.O. Box 77171, Atlanta, GA 30357. Phone: Jack Bolton, WA4PNY, 404-394-4296, 237-1577.

COLUMBUS, OHIO hamfest - 3rd Annual - Saturday June 18. Free parking. Trunk sales - $2 per space. Admission -$1. Location - Battelle Memorial Institute Auditorium parking lot (Rt 315 and King Ave). Talkin -75/15 and 52. Info - Bill, W8LLU, 614-261-7053 or Kevin, WA8OHI, 614-891-2205. Sponsored by the Battelle Amateur Radio Club - W8CQK.

NEW Shortwave Club being formed. Awards, contests and more. For details send s.a.s.e. to: Great Circle Shortwave Society P.O. Box 874, Kankakee, IL 60901.

SUPERFEST V,a Colorado Hamfest will be held on June 5 1983 in the Larimer County Fairgrounds in Loveland, Colorado. The Hamfest will run from 8:30 AM to 3:30 PM, and will feature family activities, technical talks and a swapfest. Awards of all kinds. For further information contact Rick Hubbard WAØDDC 303-353-8366.

HAMFAIR '83 will be sponsored by LIMARC, the Long Island Mobile Amateur Radio Club, on Sunday, May 22, 1983 at the Islip Speedway, Islip Ave, Islip, NY just off the Southern State Parkway Exit 43. Sellers spaces are $5 per space. General admission and helpers are $3. Open for buying from 0800 to 1600. For additional information contact Al Flappin WA2FBQ, 3743 Windsor Drive, Bethpage, NY 11714 or call 516-796-2965.

HAMFEST EXHIBITORS - new larger site - Atlanta HamFestival, June 18/19, 1983, Atlanta Civic Center. 70,000 SF air conditioned hall. High (32 ft) ceilings for antenna exhibits. Same LOW booth rates. Carpeted aisles. Call or write for reservations: Atlanta Radio Club, Inc., P.O. Box 77171, Atlanta, GA 30357, 404-237-1577, 394-4296.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cars, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill, NY 12198.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: wil give quote. Little Print Shop, Box 9848, Austin, TX 78766.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

QSL samples — 25c Samcards - 48 Monte Carlo Dr., Pittsburgh, PA 15239.

999 LABELS, name, call address $2.50 (sample s.a.s.e.) U-print, Box 249, LaVerkin, UT 84745.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

CADILLAC of QSLs — Completely different! Samples $1. (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

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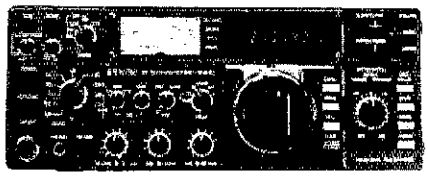
HF Transceivers:	Regular	SALE
IC-730 8-band 200w PEP Xcvr w/mic	$829.00	649.95
FL-30 SSB filter (passband tuning)	59.50	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
HM-10 Mobile scan microphone	39.50	



	Regular	SALE
IC-740* 9-band 200w PEP Xcvr	$1099.00	949.95

*plus **FREE** PS-740 Internal power supply &
$50 Factory Rebate until 7-31-83

IC-740 Internal power supply	159.00	149.95
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-44 455 KHz SSB filter	159.00	129.95
FL-45 9 MHz 500 Hz CW filter	59.50	
FL-54 9 MHz 270 Hz CW filter	47.50	
FL-52 455 KHz 500 Hz CW filter	96.50	89.95
FL-53 455 KHz 250 Hz CW filter	96.50	89.95
MB-12 Mobile mount	19.50	
HM-10 Mobile scan microphone	39.50	
IC-720A 9-band Xcvr/.1-30 MHz Rcvr	$1349.00	999.95
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 KHz AM filter	49.50	
MB-5 Mobile mount	19.50	
IC-7072 transceiver unit, 720A/R-70	112.50	

Common accessories: 720/730/740	Regular	SALE
PS-15 External 20A power supply	$149.00	134.95
EX-144 Adaptor; CF-1/PS-15	6.50	
CF-1 Cooling fan for PS-15	45.00	
PS-20 20A switching ps w/speaker	229.00	199.95
CC-1 Adaptor; HF radio to PS-20	10.00	
CF-1 Cooling fan for PS-20	45.00	
SM-5 8-pin electret desk mic	39.00	
SP-3 External speaker	49.50	
Speaker/phone patch (specify radio)	139.00	129.95
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile ant w/tuner	289.00	259.95

HF Linear Amplifier	Regular	SALE
IC-2KL 160-15m/WARC solid state linear	1795.00	1299

VHF/UHF Multi-modes:	Regular	SALE
IC-251A* 2m FM/SSB/CW Xcvr/AC ps	$749.00	599.95

***$50 Factory Rebate** until 5-31-83

IC-551D 80w 6m Xcvr	699.00	599.95
PS-20 20A switching ps/spkr	229.00	199.95
CF-1 Cooling fan for PS-20	45.00	
EX-106 FM adaptor	125.00	112.95
IC-451A 430-440 SSB/FM/CW Xcvr/ps	899.00	769.95
IC-451A/High 440-450 MHz Xcvr/ps	899.00	769.95
AG-1 15 db preamp for IC-451A	89.00	79.95

VHF/UHF FM:	Regular	SALE
IC-25A 2m, 25w, up-dn-ttp mic, grn leds	$359.00	319.95
IC-25H as above, but 45 watts	389.00	349.95
IC-25A '82 model; 25w, ttp mic, red leds	349.00	289.95
IC-45A 440 FM xcvr, 10w, TTP mic	399.00	359.95
IC-120 1.2 GHz FM mobile	TBA	
RP-1210 1.2 GHz, 10w repeater	TBA	
IC-22U 10w 2m FM non-digital Xcvr	$299.00	249.95
EX-199 Remote frequency selector	35.00	
IC-471A 430-450 MHz, 10w base	TBA	
RP-3010 440 MHz repeater	TBA	
IC-290H 25w 2m SSB/FM Xcvr, TTP mic	549.00	489.95
IC-560 10w 6m SSB/FM/CW Xcvr	489.00	439.95
IC-490A 10w 430-440 SSB/FM/CW Xcvr	649.00	579.95

VHF/UHF Portables:	Regular	SALE
IC-202S 2m port. SSB Xcvr, 3w PEP	$279.00	249.95
IC-505 3/10w 6m port. SSB/CW Xcvr	449.00	399.95
BP-10 Internal nicad battery pack	79.50	
BC-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
IC-3PS Power supply	95.00	89.95
IC-20L 2m amp, 10w PEP or FM	98.00	89.95
IC-30L 432 amp, 10w PEP/FM	105.00	94.95

Shortwave receiver:	Regular	SALE
R-70 100KHz-30MHz digital receiver	$749.00	649.95
EX-257 FM unit	38.00	
FL-44 455 KHz SSB filter	159.00	129.95
FL-63 9 MHz 250 Hz CW filter	48.50	
SP-3 External speaker	49.50	
EX-299 (CK-70) 12V option	9.95	

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The Transceivers. The IC-2A features full coverage of the 2 meter ham band. The IC-3A covers 220 to 224.99 Mhz, and the IC-4A, 440 to 449.995 Mhz. Each comes with BP-3 rechargable battery, AC wall charger, flex antenna, earphone, wrist strap, and belt clip. Accessories are interchangable. Slide on, removable battery pack allows quick change and may be charged while removed from transceiver.

2 meters:	Regular	SALE
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IC-2AT .15/1.5w 2m HT/batt/cgr/TTP	269.50	219.95
220 MHz:		
IC-3A 220 HT/batt/wall cgr	269.95	229.95
IC-3AT .15/1.5w 220 HT/batt/cgr/TTP	299.95	239.95
440 MHz:		
IC-4A .15/1.5w 440 HT/batt/wall cgr	269.95	229.95
IC-4AT .15/1.5w 440 HT/batt/cgr/TTP	299.95	239.95

Hand-held Accessories:	Regular
BC-25U Extra 15-hour wall charger	$10.00
BC-30 1/15-hour drop-in charger for BP-2/3/5	69.00
BP-2* 450 ma, 7.2v 1w extended time battery	39.50
BP-3 Extra standard 250ma 8.4v 1.5w battery	29.50
BP-4 Alkaline battery case	12.50
BP-5* 450 ma, 10.8v 2.3w high power battery	49.50
**BC-30 required to charge BP-2 & BP-5*	
FA-2 Extra 2m flexible antenna	10.00
CA-2 Telescoping ¼-wave 2m antenna	10.00
CA-5 ⅝-wave telescoping 2m antenna	18.95
CA-3 Extra 220 flexible antenna	9.12
CA-4 Extra 440 flexible antenna	9.12
CP-1 Cigarette lighter receptacle charger for BP-3	9.50
DC-1 DC operation module	17.50
HM-9 Speaker/microphone	34.50
LC-2A Leather case without TTP cutout	34.95
LC-2AT Leather case with TTP cutout	34.95
ML-1 2m 2.3/10w HT amplifier (Reg. $89)	SALE 79.95
ML-25 2m 20w HT amplifier (Reg. $199.50)	SALE 179.95

Marine band:
IC-M12 12 ch Marine hand-held **SPECIAL $199.95**

Misc. accessories:	
24-PP 24-pin accessory plug	$ 4.00
BC-10 Memory back-up; 551/720/730/740	8.50
BC-20 Nicads & DC-DC charger for portables	57.50
BU-1 Memory back-up; 25A/290A/490A	38.50
EX-2 Relay box w/marker; 720A/730/701	34.00
HM-3 Deluxe mobile mic, specify radio	17.50
HM-5 Noise canx mobile microphone, 4 pin	34.50
HM-7 Amplified mobile microphone, 8 pin	29.00
HM-8 Touch-tone mic; 255A/260A, 8 pin	49.50
HM-10 Scan mic.; 255A/260A/290A/25A	39.50
HM-11 Scan mic.; 490/25A/290A	39.50
HM-14 Scanning/TTP mic; IC-25A/45A	49.50
SM-2 4-pin electret desk microphone; 551D	39.00
SM-5 8-pin electret desk mic.; 251A/451A	39.00
Mobile mount, specify radio	19.50

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QSLs, Catalog 50¢ N&S Print, 2523 West Orangewood Avenue, Phoenix, AZ 85021.

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QSLs by W6BA "customized" $19.75 per 1000. Star Route 2, Box 241, 29 Palms, CA 92277.

LOW COST QSLs samples s.a.s.e. Koepke, 6 Katherine Road, Albany, NY 12205.

NEW KID on block — for QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing and SWL's. Stamp appreciated.

PICTURE QSL cards of your shack etc. from your photograph or black ink art work. 500 $21, 1000 $29.50. Send stamp for illustrated literature. Generous sample pack $1; half pound of samples $2. Custom printed cards, send specifications for estimate. Raum's 4154 Fifth Street, Philadelphia, PA 19140. Phone; 1-215-228-5460.

RUBBER Stamps custom made to your satisfaction. Free literature. J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

CLUB Call pins: 3 lines 1-1/4 × 3-1/4 $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner, WA2ZHA, 2041 Lidnen, Ridgewood, NY 11385.

STAMP brings QSL catalog of new designs and samples, from $7 up. 22 years custom printing. WA8SOK, 4056 Acacia, Riverside, CA 92503.

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General

MICROWAVE MODULES transverters MMT1296/144 $319, MMT432/144 $299, MMT432/28 $279, MMT220/28 $249, MMT144/28 $189. Hans Peters (VE3CRU) 416-759-5562.

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.

IBM PC-DOS software needed. Karl, DJ2VU, 2839 Mellinghausen 22 West Germany.

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SERVICE by W9YKA. Amateur and Industrial SSB-FM repairs, calibration. Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

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FC-30-A	30 amp choke on Ferrite Core	$ 8.50

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SC-8877	8877 socket	$14.50
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X-572B	Four 572B amplifier XFMR	$69.50
X-6MJ6	Four Sweep tube amplifier XFMR	$52.50
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APS-1 3000 volt power supply complete 3000 volt DC @ 1 Amp and 12 VDC @ 2 Amps — includes power transformer 117/234 AC 50/60 Hz, electrolytic capacitors, diodes, bleader resistors, PC board. Completely assembled, chassis and cabinet not included — $149.50

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LK-500Z-2	2 3-500Z 10-160 Meter	$ 444.50
LK-8877	1 8877 10-160 Meter	$1200.00
LK-30M	4 6MJ6 30 Meter	$ 199.50
LK-1000Z	3 1000Z 10-80 Meter	$1260.00
Econo-Amp	4 6MJ6 any band-mono band specify frequency	$ 200.00

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HAMS for Christ. Amateur Radio bible tracts. New address — Dave Friar, AF8D, 4656 Krental Street, Holt, MI 48842. Nets 14300kHz at 2100Z; 7230kHz at 2200Z. Info: in South Pacific/Oceania write to - ZL1UE, in New England, - AC1Y.

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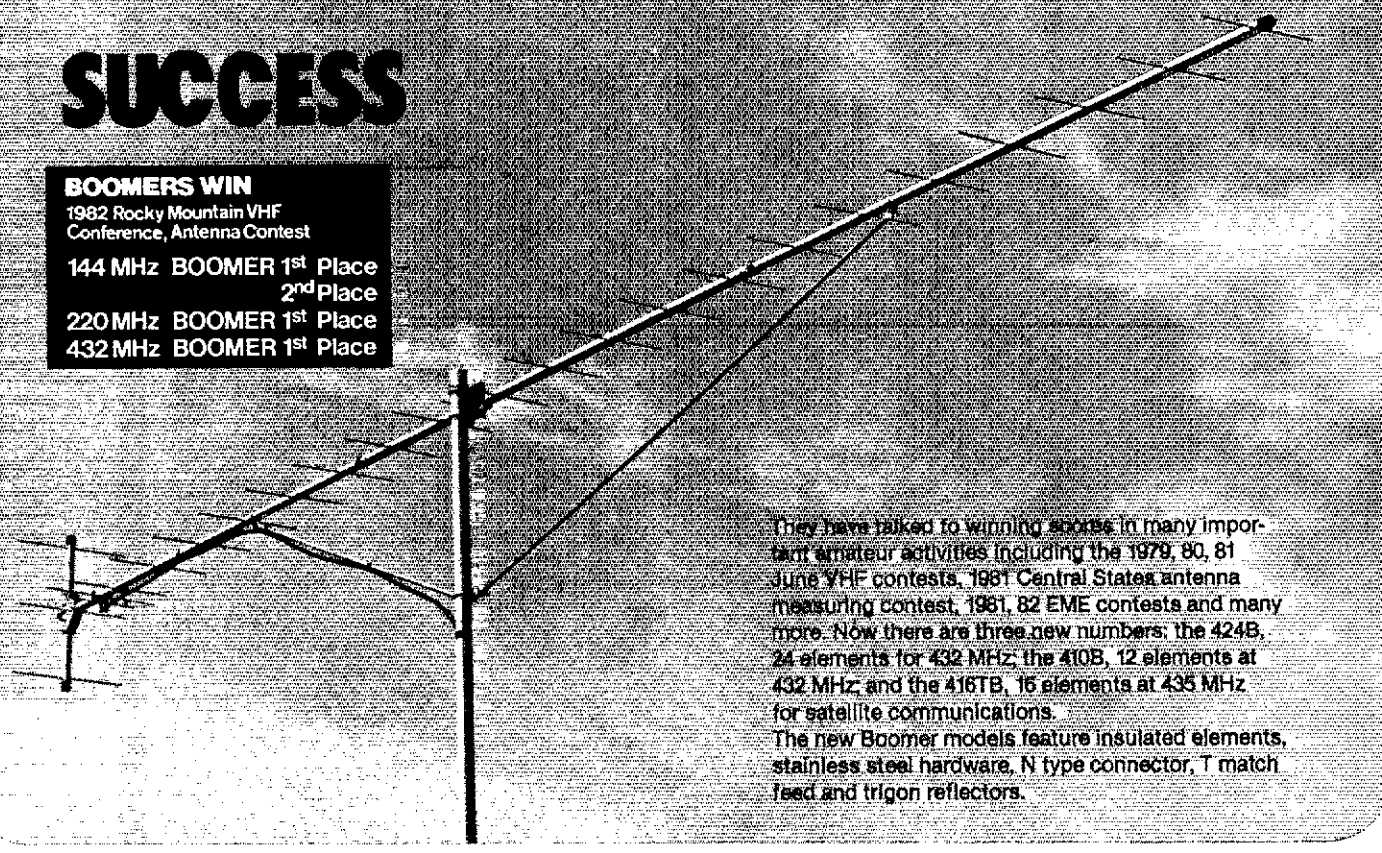

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424-435 MHz, 7.6λ, gain *maximized, F/B ratio *excellent, beamwidth 19*, length 17.42 ft. 5.2 m.

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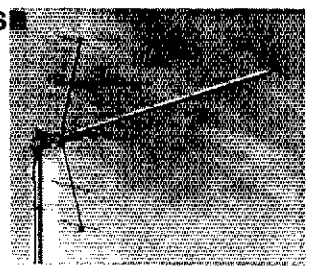
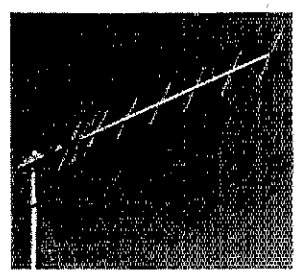
428-438 MHz, Circular Polarization 2.2λ gain *maximized, F/B *excellent, beamwidth 34*, length 6.7 ft. 2.03 m.





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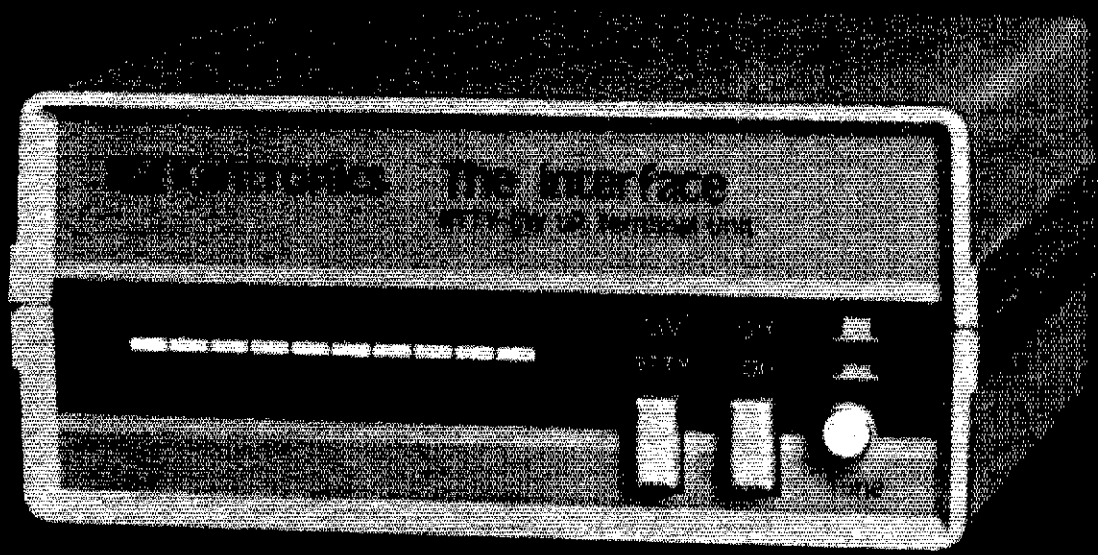

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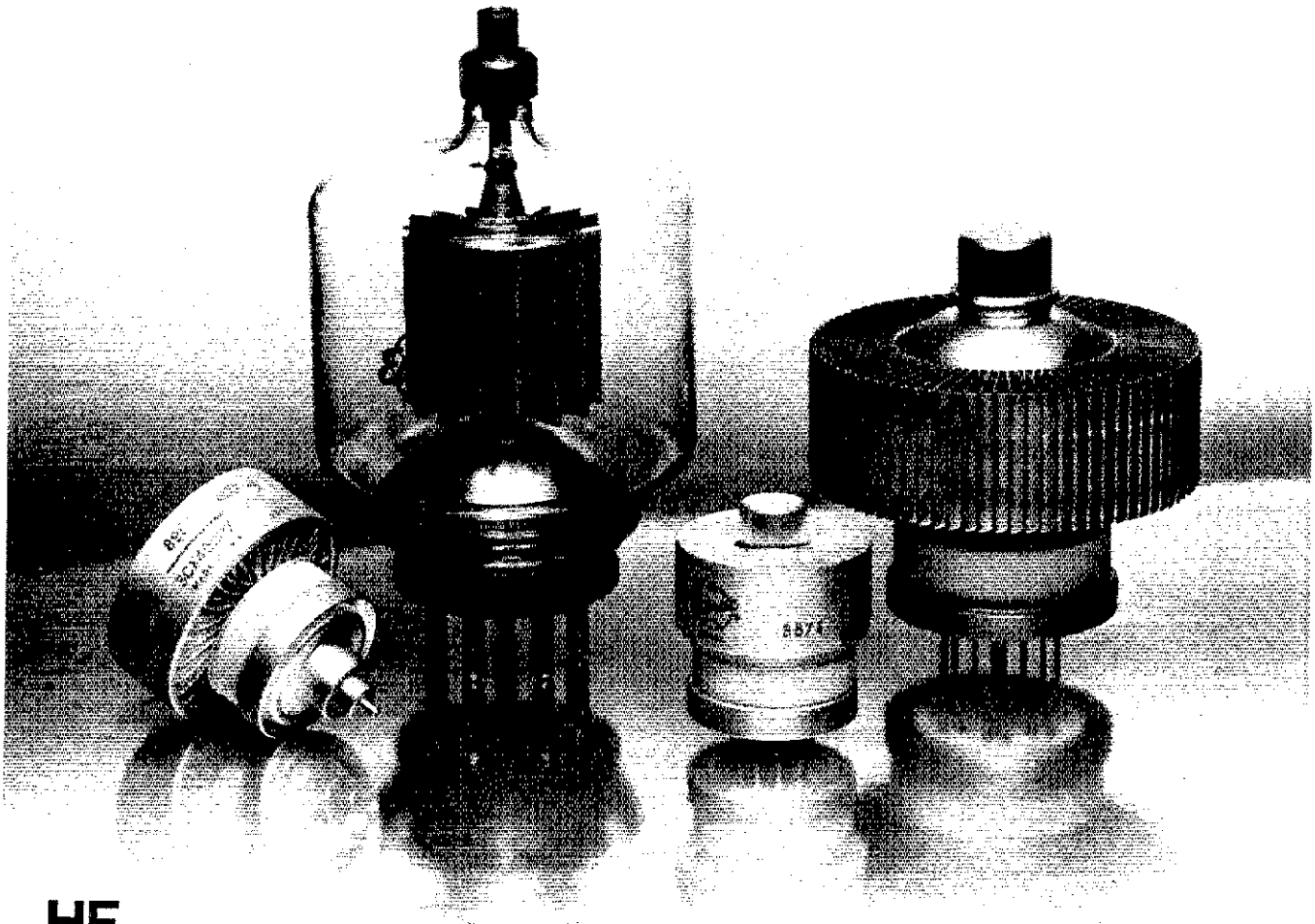

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WANT: 30S-1 in good condition with manual. AC1Y c/o ARRL Hq.

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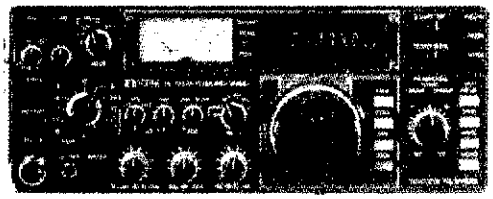

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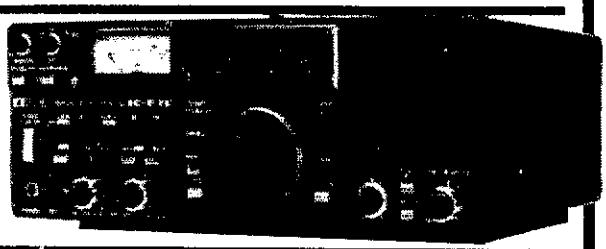
NEW IC-R70

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

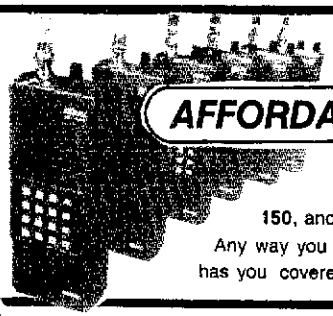
The IC-290H features a powerful 25 watt output and a highly sunlight readable green readout, in the same compact package as the IC-290A. Other features and styling of the IC-290H are the same as the previous model - the IC-290A.

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.
- Scanning of memories or band

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.

CALL TODAY & SAVE



AFFORDABLE

400, 220, 150, and 146MHz. Any way you go, **ICOM** has you covered.....

The **IC-730** is truly a superior grade transceiver at an affordable price.

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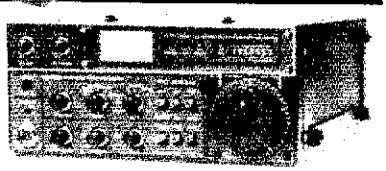
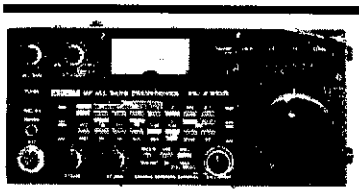
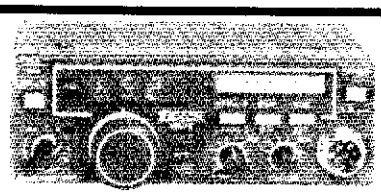


The **IC-251A** has excellent sensitivity and crystal filters having an exceptional shape factor giving good selectivity. Includes AC Power Supply.



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.

2900 N.W. VIVION RD. / KANSAS CITY, MISSOURI 64150 / 816-741-8118

SWAN 350 and ps for sale, good condition, best offer 205-222-4321 KA4BED.

NOSTALGIA: Drake 2-B rcvr with Q-Mult, QF-1A audio filter, MFJ preselector, $225. Hallicrafters HT-32B, mint, $200 local. Dentron Super Tuner, $40. Heath HM-15 SWR meter, $15. KD5CL, 713-893-3475 after 7 PM.

MINT Drake 2B/2BQ ($130). Regency 2 meter HR-2 ($90) + HR-212 ($115). Nice. N9BPE - 114 West Ensey, Tuscola, IL 61953.

SELL Kenwood twins T/R599D with digital readout DG-5 installed, includes 2 meter converter and MC-50 microphone $650; Yaesu FTV-650B 6 meter transverter $150; Johnson 6N2 $50; Kenwood TR7850 2-meter FM $275; Kenwood TR7400 2-meter FM $200. All include manuals. Want IC502 and IC402. Ron N3AR eve and weekends 215-326-6336.

MADISON May antennas: TH7/DX $379; V2S $39; Cushcraft A3 $179; A4 $229; TriEx W51 crankup $799 (FOB California); Hustler 6BTV $139; 5BTV $115; AEA Isopole 144 $39; Isopole 440 $59; Ham4 $199; T2X $249; Belden 9258 RG8X 19¢/ft; 8214 RG8foam 39¢/ft; 8267 RG213 46¢/ft; Belden, Consumers, BerkTek, Columbia, Consolidated - call; Amphenol 83-1SP PL259 silverplate $1; 8261 Nmale $3; RG8X reducer 30¢; coax seal $2; Tokyo HiPower HC200 tuner $89; Nye MB4/balun matchbox $345; Butternut HF6V $125; 2MCV5 $39; stranded radialwire 3¢/ft; Valor 80-10m mobile antenna $20 ea; Prices FOB Houston. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268, 1-800-231-3057 (orders). Mastercard/VISA.

HAL DS-2000-KSR RTTY/CW communications terminal, like new, $225 — K2EW 914-877-6514.

HAL DS-2000 all mode video terminal $250, Kenwood TS-120S with CW filter $400, Kenwood VFO-230 $175, All like new in original boxes, Frank, W7IS, Rt 1 Box 142, Elma, WA 98541, 206-426-7192.

WANTED: Heath SB500 Transverter WA2BYX.

HEATHKIT: HW-2036A with Micoder $200, HP-23 ac supply, HP-13B mobile supply $50 each, HW-12 with both power supplies $120. WD4JTN 4576 Sawmill Dr. #6, Memphis, TN 38128.

WANTED: Viking Valiant and Viking 500, must be mint. Sell KWS-1 $650, pick up only NYC area. Chris Milano, 212-837-4520.

YAESU FLDX 400 transmitter $150 H. Johnson 516-549-8929.

WANTED: Eimac Air-System sockets and/or chimneys for 4-400 A tubes (SK-410, SK-406). KC1V, c/o ARRL. 203-666-1541, ext. 273.

STODDARDT NM-62A Rifl, 1-10 Gigacycles, needs work, $2000; Box 280, Wamsutter, WY 82336 P. Schnobe.

WANTED: Heath HW-8 in mint condition at reasonable price. WP2ACU, Box 1345, St. Thomas, USVI 00801. 809-774-1086.

DRAKE T4XB/R4B $590 ex-cond, TR22 $110, Bird 43 new $100, Fluke 8000A DVM gd used $200, 4-400 new in carton $35, two used 4D32's $35 ea, two 50PF 20kV vacuum fixed caps $20 ea. Hickok 800A mutual conductance tube/transistor checker $150, Sencore CG141 color generator $75, Stancor xformer 5V 030A $15, Curt K8IBQ 513-791-1911 evenings.

WANTED: European-made audio tubes (Telefunken, Mullard, Amperex, Siemens, Genatex, Phillips, etc.). Especially need ECC83/12AX7 and EL34/6CA7 types. Dennis, W1LJ 589-7247 evenings.

FOR SALE: Model 15 KSR Teletype. TD, and pwr. supply (1) 2mtr. AM Gonset, (1) 6mtr. AM Gonset, all gear operational, call after 6 PM 203-435-9331 WA1BAL, no shipping.

WANTED: old bugs for my key collection. Need Vibroplex, Martin, Bunnell, McElroy, Electro, etc. Also need spark keys, military, homebrew, and keys of historical significance. K5RW Neal McEwen 1128 Midway, Richardson TX 75081.

WANTED: Collins linear 30-L. Woody 816-561-6288 NØGYB.

WANTED: Small spy transmitters and receivers. Looking for RS-6, RR-6, RT-6. Want other small military types. Write or call Bob Parsons KA6ULX, PO Box 205, Penryn, CA 95663; tel 916-663-3837.

WANTED: Parts from the 1930s. Capacitors, coils, dials, miscellaneous, etc. National, Hammarlund, Millen. Gary Legel, N6TO, 1306 Sheppard Drive, Fullerton, CA 92631.

WANTED RCA 77, 44 microphone, Vibroplex Blue Racer White, 55 Walden, Burnsville, MN 55337.

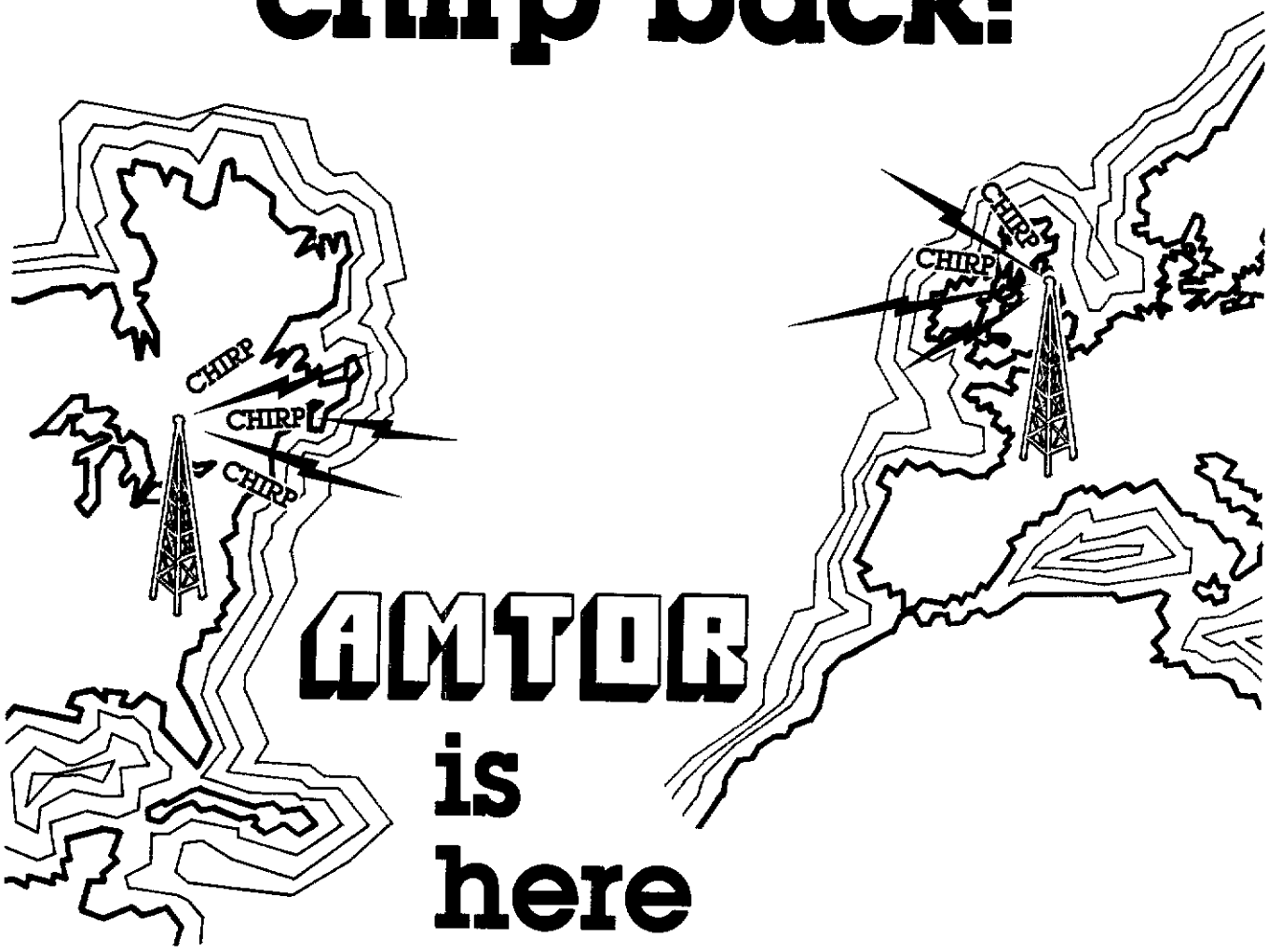
FOR SALE: Drake RV4C remote VFO, $55; Drake TR4C transceiver, $400; Drake AC4 power supply, $90; Heathkit HiBrid phone patch, $40; Astatic mike, model D104, $18; Telechron 24 hour clock, $15; Mosley Beam, TA33, $100; CDE rotator and control, $100; Vibroflex key, $18; Lefor paddle key, $20; Heathkit reflected power meter, $50; navy key, $3; oscillator, $6; home brew linear amplifier, $100. Call Bob Kislik at 914-948-4123, White Plains, NY.

INFO-TECH M200F Code Receiver/converter Morse/Baudot, ASCII. Brand new - as advertised Jan QST Page 153. Sale price $385. L. L. Hawes KA4QZQ, 436 Bradenton Rd., Venice, FL 33595 813-493-8238.

TECH manuals on military surplus electronics, no lists. Send SASE for price quote or availability, write Slep Electronics Company, Highway 441, Otto, NC 28763.

COLLINS 75S1, excellent condition, $160. Will ship. Bob Tschannen, W9LUO, 2502 Creekwood Dr., Ft. Collins, CO 80525. 303-221-5647.

Now you can chirp back!



AMTOR is here

Been wondering what those "chirp-chirp" signals were around 14075? They're AMTOR, AMateur Teleprinting Over Radio. European hams have been enjoying the benefits of error free RTTY for sometime. (It's a must for commercial Maritime traffic.) Now, U.S. Amateurs are on the threshold of a new era of RTTY.

Old problems of QRM, QRN, & QSB are gone! If a propagation path exists, AMTOR will get the message thru — with no "hits" — "newspaper" perfect copy!

Two modes are available; AMTOR mode A transmits a three character block specially coded so that the receiving station can recognize an error. The three character block is repeated until the receiving station confirms reception by replying with the proper control code signal. Flawless print is possible with this "hand-shake" style operation.

Mode B, "FEC" or Forward Error Correction, is actually a time diversity mode where text is repeated and intermixed in the transmission. The receiving station unscrambles it and prints the clear text. This "broadcast" mode allows more than two stations to communicate. It's more effective than conventional Baudot or ASCII, but not as reliable as AMTOR mode A.

The actual DATA transfer in either AMTOR mode is nominally equivalent to conventional RTTY at 50 baud, or 66 WPM.

A receive only "Listen" mode is also available for reception of mode A data by a station not directly involved in the "hand-shake" communication.

Start with a new AMTOR ACT-1, ATR-6800, or update your present system.

Microlog is ready with AMTOR! Give us a "chirp" at Microlog Corporation, 18713 Mooney Drive, Gaithersburg, MD 20879. TEL (301) 258-8400. TELEX 908153

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Race car communications demand the best from an antenna under some of the worst conditions. Split second decisions require reliable signals at exceptionally high speeds. That's why Larsen Antennas are used on race cars at the Indy 500. Because Larsen Antennas are designed to take high speed with minimal signal distortion. Proving they can travel in the fast lane without putting a drag on their performance. Larsen's precision tapered stainless steel whip provides maximum flexibility while minimizing radiation pattern distortion, giving you a clear consistent signal. And Larsen's exclusive Külrod® plating, gives your antenna high conductivity to assure that maximum power goes into communicating — not heat.

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So, whether you're following the racing circuit or a local rescue effort, you'll find Larsen Antennas will keep you ahead of the situation with dependable performance. Ask your favorite Amateur dealer to demonstrate how you can hear the difference with Larsen Antennas. Write for our free Amateur catalog.

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FOR SALE: Kenwood remote VFO-820. Excellent condition, 2 years old. $100. Will ship KE1K 203-569-0410.

COLLINS 75S3-B, winged emblem, mint cond, with all filters including 200 and 500 Hz CW $600. FT-101 with 160 meters and all factory mods, $450. Kirk Helical 3 element 40 meter beam, never erected, $325. K2YY, John Hill, 130 W. Central Ave., Moorestown, NJ 08057 609-235-5270.

SIGNAL/ONE CX7. All improvements, one year service warranty, $3200. Mandelkern, 505-523-2897.

WEATHER facsimile recorder RJ4, $250 plus shipping. Chuck KA8CKB 513-426-0984.

NON-PROFIT, tax-exempt organization seeking Amateur Radio equipment. Donations for Legacy International Youth Program to establish an International Youth Amateur Network. Quality working equipment please. You may write or call: 1141 No. Glebe Road, Arlington, VA 22201 703-522-1407.

FRR 60 WANTED, all mail answered. W. Pilon, Tuckerman Hall, 10 Tuckerman St., Worcester, MA 01609.

SELL: Collins 51S1 $700; 75A4 $300; SX-115 $200; Ranger II $125; manuals, all excellent. WA2DUV 201-691-8737.

MADISON - Collins KWM2/S-Line quality repair. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268 Texas; 1-800-231-3057.

WANTED — any vacuum tube type hi-fi equipment. Power amps and preamps by Dynaco, Marantz, Audio Research, Conrad Johnson, etc. What have you collecting dust? Dennis Lusis, W1LJ, 160 Curtiss St., Bristol, CT 06010.

WANTED: Schematic-service manual for Knight Star Roamer Model 83Y102 receiver KA3CAB 814-723-7268.

IC740 and PS15 little used $940, new unwanted present FRG7 gen. cov. rx $225, new IC502A 6M SSB portable $175, 120 channel IC22S 2M fm mobile $160, MFJ484 Grandmaster keyer $50, DAve G3UUR/W3 301-730-8752.

CONTESTERS, DXers: A homebrew linear amplifier. Very professional looking. Using 8877 tube, 50 watts drive for 1kw plus output. $2000, WB8JEY 814-548-7578.

WANTED: Inverter 12V dc to 115V ac 350 watts W6RQZ TeleWrite.

ICOM IC-701, as new, with mic and p.s., $790 postapid. Heath HW-8, mint, warranty, $140 p.p. ARC-5 rcvr, 80m AM-CW-SSB, built-in p.s., $36. Hank, WA2OVG, 401 Park Ave. So. — 5th Flr, NYC 10016. 212-696-4000.

CABLE/CONNECTORS, wholesale. Call or write for free catalog. Amphenol PL-259 .74¢, silver $1.29 ea, Teflon $1.39 ea. Type N UG-21D/U $2.46, 24 piece minimum. RG-8/U 80% shield foam $145/1000 feet. HG-58/U mil spec $68/1000 feet. RG-213/U mil spec $269/1000 feet. Shipping: Connectors add 10%-$3 minimum, cable freight collect. Nemal Electronics 1325 NE 119 St. N., Miami, FL 33161 305-893-3924. See our display ad. See us at Dayton.

ANNUAL demonstrator sale. Kenwood TR-7850 $299, TR-7800 $269, TR-9130WTT $429, TS-930S $1345, TS-930SWAT $1495, TS-130S $579, AT-130 $119, TR-773 OTTM $279, TR-8400 $379, VFO-230 $199, Icom IC-25A $279, IC-22U $189, EX-199 $19, IC-2AT 239, FL-30 $39, All above new in carton and carry full warranty. Quantites limited so hurry! Used Signal/One CX7 works good with new tube $395. CX7B all mods, manuals with both CW filters, excellent $695, less filters $595. Been in ham business 37 years with thousands of satisfied coustomers. Bob Douglas, W5GEL, Douglas Electronics, Box 30994, 1118 S. Staples, Corpus Christi, TX 78404 512-883-5103.

FOR SALE: Swan 350D very good condition $300 Swan 600T transmitter needs some repair $150. Cushcraft A44-20T antenna $50 (carton never opened) Sell singly or complete package $450. Will ship UPS. Fred Stiff, K5WPP, 1-214-542-0443.

ICOM 720A/PS15 with CW filter, super clean in boxes, xmit time only hours. I ship $1050 call Glen Read 206-632-9089.

SELL: all Heathkit equip; 1-HX-10 (Marauder) xmiter 1-DX-100B xmiter; RX-1 (Mohawk) recvr + 1 SB-10 SSB adapter; all in good to vry good condx + all need some minor work done; Pick up only! Sell all for $400 or Individually. Phone 914-452-2482 (S.E.N.Y.) Except Wed + Th. evenings + call Sat. morn (Stu WA2BSS)

KENWOOD TS820S absolute mint, carton, manual $575 WB4BFB 305-421-6476.

WANTED: TV-10 series tube tester. N4TQ.

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HEATHKIT 2mtr. Must sell-going to sea duty. VF-7401, $215/b.o., VF-2031 HT w/leather case $100/dicker, Telex CM-1210 headset w/h1Z mic $30. Dave WA6KHH, 1075 Turner Dr., Novato, CA 94947.

FOR SALE: Entire station, equipment and magazines. W8NTQ.

DRAKE L4B amp 80/10 $560, pickup only. Hal, W6LXZ, 714-679-7837.

WANTED: R-1004/GRC-109 or RR-2 rcvr. Send SASE for list. Cain, 1428 Marigold, South Bend, IN 46617.

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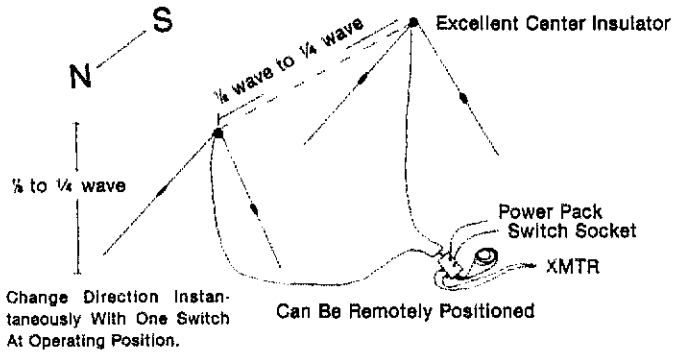
INTRODUCING.....THE HJ-SERIES COAXIAL DIPOLES AND PHASING KIT.....

Specifications:

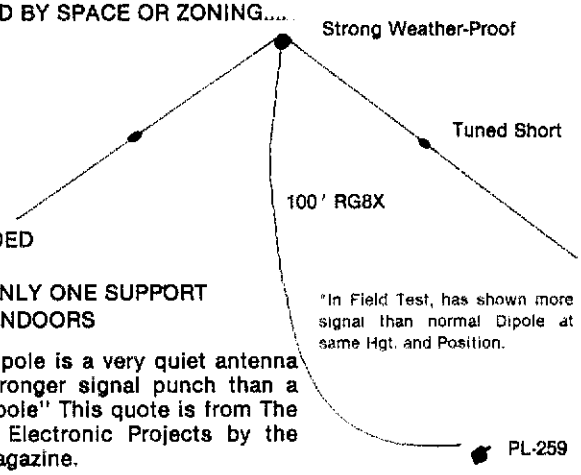
Example
Antenna Tested ON 7.2mc, ¼ wave spacing
at 18′ at APEX.
ENDS AVERAGE HGT. 6′
SWR-FLAT or BELOW 1.5 to 1 over Phone Band

* When Testing just one of
2 Antennas - SWR was Flat
or Below 1.5 to 1 over Entire Band...
7.0 to 7.3 MHZ



FOR THE HAM WHO WANTS
A BETTER SIGNAL ON THE BAND,
BUT IS LIMITED BY SPACE OR ZONING....

HJ-DIPOLE*



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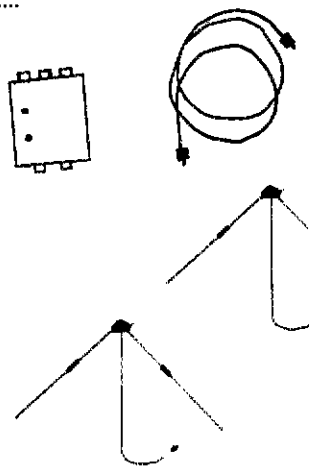
* REQUIRES ONLY ONE SUPPORT
* CAN WORK INDOORS

"The Coaxial Dipole is a very quiet antenna with slightly stronger signal punch than a conventional dipole" This quote is from The Giant Book of Electronic Projects by the Editors of 73 Magazine.

* THE SINGLE HJ-DIPOLE CAN BE UPGRADED TO A PHASED ANTENNA SYSTEM AT A LATER DATE...NO TUNER REQUIRED, HOWEVER, WITH A TUNER ANTENNA CAN BE LOADED UP ON A HIGHER FREQUENCY...

THE HJ-PHASING KIT...CONTAINS EVERYTHING YOU NEED,
BUT A PLACE TO HANG THEM....*

Contents:
9-PL-259
2-Coax Tees
1-Barrel Connector
5-Female Connectors
2-Male Phono Plugs
2-Female Phono Sockets
1-Cabinet
1-Power Pack
4-Short Covers
2-Center Insulators
5-Stainless Steel 1⅞₂ Screws
5-Stainless Steel 1⅞₂ Nuts
1-Relay
3-Sets of ¼ wave coax lines
2-100′ lengths of coax feedline
2-Antennas Cut and Tuned



* ALL ANTENNAS ARE ASSEMBLED-PHASING LINES CUT AND HAVE PL-259S INSTALLED...LEAD-IN CABLES PL-259 ARE INCLUDED BUT NOT ATTACHED FOR USER CONVENIENCE...PHASING BOX IS ALSO ASSEMBLED AND READY TO USE...

PRO-SEARCH™ has designed quality into simplest of antennas...Center insulator is made up of high qual material that is virtually unaffected by heat, cold or impact...will withstand rugged use and extreme vironments...RG-8X has 93% shield...Antennas are very flexible and very portable...good for vacation or fi day...apartment dwelling...Tuned shorts are weather-proofed with gripping covers which also add strength to t area of the antenna...Stainless steel hardware, of course...Antennas can be made for any frequency...The most portant part, we stand behind our products...That's a Promise...

FREQUENCY	SINGLE ANTENNA	TUNED PAIR OF ANTENNAS	PHASING KIT	TOTAL
1.8	$139.95	$251.91	$110.95	$362.36
3.5	96.95	174.51	110.95	285.46
7.0	73.95	133.11	110.95	244.06
10.0	68.95	124.11	110.95	235.06
14.0	64.95	116.91	110.95	227.86
18.0	61.95	111.51	110.95	222.46
21.0	59.95	107.91	110.95	218.86
24.0	57.95	105.91	110.95	216.85
28.0	56.95	102.51	110.95	213.46

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Prices and specifications subject to change without notice or obligation.

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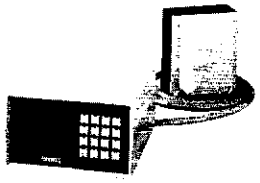
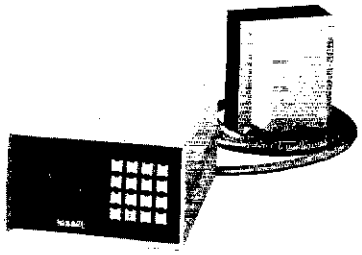
NOW THREE MODELS OF OUR DIGITAL ANTENNA CONTROL

Your Choice Of Center, North Or South



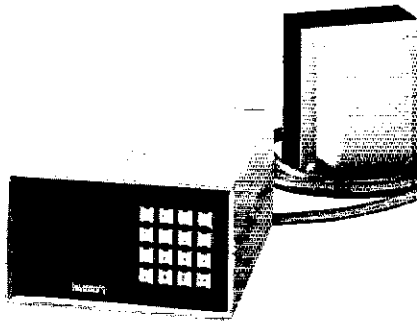
GOOD
PSE-1A

The "CONTESTER" provides the least expensive DIGITAL CONTROL UNIT WITH COMPLETE COMPUTERIZED CONTROL, BUT WITH LESS FEATURES, than the "DX'ER" and "DELUX".
This unit gives you the current position of your antenna digitally. It has 10 memories and command modes, plus single button operation. The "CONTESTER" comes with a 7.0 amp continuous duty motor supply.
It is not capable of being modified to talk or accept the computer interface or remote interface.
It is completely shielded and made of the same quality components as the other models.
The warranty on our unit is one year on materials and labor, and ninety days on parts.
This unit is a very inexpensive way to have the best of both worlds. A real time saver during contests. Hands off operation will save many hours of hanging on the rotor. Just a few dollars more than the manual control box, but worlds apart in state-of-the-art and operation. Price $229.95



BETTER
PSE-1, PSE-3

The "DX'ER" is the top of the line of the non-voice synthesized units, and is for the ham who is in need of more features on their controller. It has "2" digital readouts, one to show the antenna's current position, plus a storage readout which holds a heading or digitally displays your last position. This is valuable for switching between long path or short path, or checking front to back, or working between two different stations...a real time saver and just a nice convenience.
The "DX'ER" also has "5" scan functions: 0-90, 90-180, 180-270, 270-360, and 0-360. This is a real aid in looking for that dogleg opening or peaking a weak signal.
It can be expanded to talk, and does have the hardware necessary to use with the computer interface.
It can be remotely keyed, where verbal confirmation isn't required. Price $362.95



BEST
PSE-2, PSE-4

This is the ultimate in rotor controls. Nothing t
this one.
It has all the features of the other models, plu
talks...Yes, it talks.
The "DELUX" has a voice synthesizer which
firms your entries, plus tells you your heading
you enter it and when your antenna arrives.
All commands are spoken, plus as your ante
turns you hear a 400HZ tone going in one direc
and a 80HZ tone in the other. This gives
positive verification of movement.
This unit, as the others, will combine with
HAM IV, T2X, and HDR-300, giving you the b
antenna rotor combination you could ever war
any price. Price $469.00

INTRODUCING THE ULTIMATE PACKAGE...FROM PRO-SEARCH™ NINE COMBINATIONS OF OUR CONTROL UNIT AND THE TELEX/HYGAIN* ROTOR MOTORS...
FOR JUST A FEW DOLLARS MORE YOU CAN HAVE THE CONTROLLER OF THE FUTURE TODAY!

Package #1 PSE-1A

#1 The "Contester" Package...try one of these TELEX/HY-GAIN rotors with our PSE-1A/3A. A system which is low in cost, high in performance.

HAM IV*

T2X*

HDR-300*

PSE-1A will save you lots of time in your favorite contests. No more hanging on the rotor control...Gives you positive control with DIGITAL readout plus 10 memories, command positioning, and single button manual movement.

Package Special

PSE-1A + HAM IV	$369.95
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The "DX'ER" Package...Couple this unit with a rotor and you have the best non talking control we make. Expandable, plus has 5 scan functions, 2 DIGITAL displays and REC/LAST to check long path or short path. Has all internal hardware to plug into our computer interface. Can be remotely controlled from accessory jack.
Try this with any of the TELEX/HY-GAIN* Rotors! This will give you the broadest of functions with a mid-range price.

Package Special

PSE-1,3 + HAM IV	$508.95
PSE-1,3 + T2X	548.95
PSE-1,3 + HDR-300	677.95

Package #3 PSE-2/PSE-4

The "Delux" is the most sophisticated ante
control unit ever made. With the "Delux" you h
all the functions of our other units, plus
talks...Yes it talks. Not only do you have y
headings digitally displayed, but is also said
your antenna stops...All commands are spok
plus as your antenna turns you hear a 400Hz t
in one direction and an 80Hz in the other, giv
you positive varification of movement. This u
when combined with the HAM IV, T2X or HDR-
gives you the best buy anywhere at any price..

Package Special

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PSE-2,4 + T2X	655.00
PSE-2,4 + HDR-300	784.00

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Controllers also available for other rotors.

Prices and specifications subject to change without notice or obligation.

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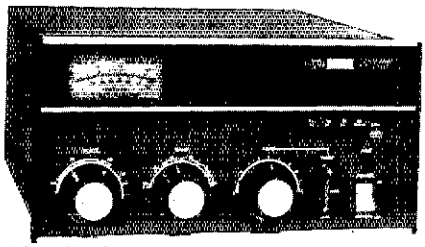
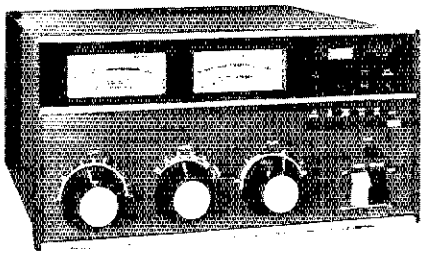
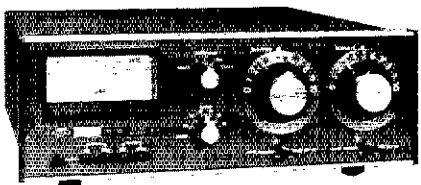
DRAKE Linears
New Low Prices!



L-75 160-15m Linear; 1200w PEP, SSB, 1000w CW, AM, RTTY & SSTV. (1) 3-500Z, tuned input; 60w drive SSB, 50w CW, AM, RTTY & SSTV. Built-in power supply; 2-speed fan; bypass switch. 13¾"w × 6¾"h × 14¼"d, 42 lbs. **With tube;** (Regular $854.95)..... **Sale $699.95**



L-7 160-15m; 2000 watts PEP, SSB & AM, 1000 watts CW, RTTY, SSTV - all modes full rated input, continuous duty cycle. (2) 3-500Z's, tuned input; 100w PEP drive SSB, 75w CW, AM, RTTY & SSTV. Desk top rf unit & separate power supply. Built-in RF wattmeter, adj. AGC, 2-speed fan; bypass switch. Size: (amp) 13¾"w × 6¾"h × 14¼"d, 27 lbs; (supply) 6¾"w × 7⅞"h × 11"d, 42 lbs. **With tubes;** (Regular $1400)..... **Sale $1129**



MN-2700 Matching Network. 1.8-30 Mhz; 1000w or 2000w PEP. Tunes antennas fed with coaxial cable, balanced line (w/B-1000 balun), or random wire. 13" × 4½"h × 8½"d, 10 lbs. (Reg. $349).. **Sale $309.95**

DRAKE Wattmeter
WH-7 Directional, in-line type for 1.8-30 Mhz. Scales: 0-20, 0-200, 0-2000 watts & VSWR. Accuracy: 5%/reading. Coupler removable for remote metering. 5⅝"h × 6¾"w × 7½"d, 3 lbs.
Reg. $129 - **Sale $79.95**

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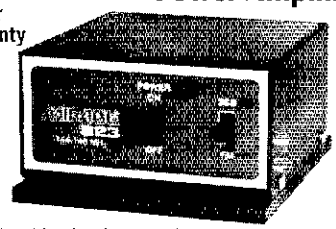


B23 2m 30w Amplifier for low power HT's, etc. All-mode, 100mw-5w drive; 2w in-30w out. 4"w × 2¼"h × 4¾"d, 1¼ lbs. 13.6vdc/5A (Reg. $89.95) **Sale $79.95**

C22 As above, but for 220MHz All-mode, 500mw-5w drive; 2w in-20w out. (Regular $89.95) ... **Sale $79.95**

D24 Same as B23 except for 440 MHz. All mode, 2w in/40w out. (Regular $199.95) ..... **Sale $179.95**

D24N As above, but with low-loss Type-N coaxial connectors (Regular $208.95)..... **Sale $187.95**

B108 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. 5⅜"w × 3"h × 8"d, 3 lbs. 13.6vdc/12A. (Reg. $179.95)..... **Sale $159.95**

B1016 Same features as B108, except rated 160w. 500mw-15w drive; 10w in-160w out. 5½"w × 3"h × 12"d, 5 lbs 13.6vdc/20-25A. (Reg. $279.95)..... **Sale $249.95**

B3016 Same as B1016 but 15-45w drive; 30w in-160w out. 13.6vdc/20-25A (Reg. $239.95) **Sale $199.95**

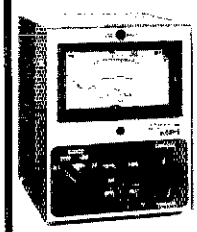
C106 Same as B108, except 60w for 220 MHz. All-mode, 10w in-60w out. (Reg $199.95)... **Sale $179.95**

C1012 Same features as C106, except rated 10w in 120w out; 2w in - 45w out. 5½"w × 3"h × 12"d, 5 lbs. 13.6vdc/20-25A. (Regular $289.95)..... **Sale $259.95**

D1010 100w 430-450 Mhz UHF Amplifier. All-mode, 300mw-15w drive; 10w in-100w out. 5½"w × 3"h × 12"d, 5 lbs. 13.8vdc/20 A. (Regular $319.95) **Sale $289.95**

Model D1010N (with Type N connectors) ... add $9.00

RC1 Amplifier remote control w/18' cable. Duplicates all switches. 1¾" × 3¾" × 2½" **$24.95**



MIRAGE Wattmeters
MP1 for 1.8-30 Mhz. Peak/Average. 25, 200 & 2000w fwd & rev power scales & VSWR scale. 1-2w VSWR sensitivity. Remote coupler, requires 9v batt. or ext. AC adaptor. 5¼"h × 4½"w × 5¾"d, 3 lbs.
Reg. $119.95 - **Sale $99.95**

MP2 VHF Wattmeter. Same as MP-1, except 50-200 MHz; 50, 500 & 1500w scales & VSWR
Reg. $119.95 - **Sale $99.95**

ETO Alpha Linears

ALPHA 76A Manually tuned, covers 160-15m, 1.8-2.0, 3-22 MHz & WARC bands. 2.5 KW PEP SSB input, 1 KW average, CCS - No Time Limit. (2) 8874's - 60w CW. 110w PEP SSB drive. 1.5KVA transformer, forced air cooling. 7½"h × 17"w × 14¾"d, 65 lbs ..... **Sale Price $1449**

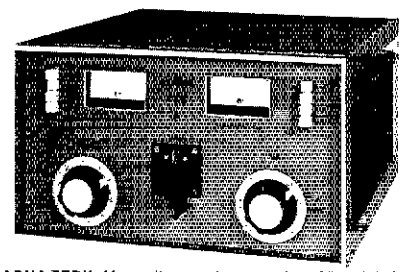
76A with Lightweight Hipersil® xfmr ..... **$100** *extra*

ALPHA 76PA Identical to 76A except uses (3) 8874 tubes For extended FSK/SSTV.. **Sale Price $1749**

ALPHA 76CA Same as 76PA, but uses 2.4KVA Hipersil® extra-duty transformer ..... **Sale Price $1949**

ALPHA 374A Adds "No-Tune-up" convenience to the basic 76A chassis. Provides instant bandswitching on the popular amateur bands & full coverage manual tuning on 1.8-2.0 & 3-22 MHz ranges..... **Sale Price $1869**

ALPHA 78 Combines the best features of all other ALPHA amplifiers. (3) 8874's, QSK, 2.4KVA Hipersil® transformer and "No Tune-up" convenience on 160-15m. 7½"h × 17"w × 14¾"d, 65 lbs ..... **Sale Price $2499**



ALPHA 77DX Manually tuned, covers 160-15m, 1.8-2.0, 3-22 Mhz & WARC bands. DC plate input; 3 KW PEP or continuous carrier - No Time Limit. Single 8877 requires 100 watts drive for 2 KW input nominal. Vacuum relay QSK-T/R system, air cooled, 120/240v encapsulated 4+ KVA Hypersil® transformer, vacuum variable. 11"h × 19½"w × 22"d, 103 lbs; Air Frt ... **Sale Price $3895**

77DX *Drop shipped from factory*..... **3795**

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VIC-20 CW hardware/software. Complete send/receive package is ready to plug in and use. Nothing extra to build or buy. No memory expansion needed. $49.95 plus $2 for postage and handling. WB5URY RAM-SOFT 6363 Beverly Hill #166, Houston, TX 77057.

RTTY: HAL-ST-6000 with deluxe DS-3000KSR (3X version) keyboard with five speeds. Baudot ASCII Morse to 175 WPM all controlled from keyboard. Full seventy two-character lines, many other features $900. Money order, certified check. W4VDC Harry 904-641-0846.

FOR SALE: QST's some issues each year 1923-1963. All issues 1964-1982. Total price $175. to settle estate. Moses, 282 Auburn Road, West Hartford, CT 06119.

HW-8, new, works great. $125. WB7VOO, 602-298-4820.

WANTED - SA-2040 Heathkit tuner - QF-1A filter -KA4EBW, Callbook.

WANT 1 Yaesu FL-101 xmiter w/30 meter aux band installed (Stu WA2BSS) phone 914-452-2482 (S.E.N.Y.) except Wed & Th. evenings + call Sat. morn.

SELL - Regency HR-212 2-meter FM $125. Midland HT 13-520 2-meter FM $75 KC8QM 216-333-2888 after 5:30 P.M.

*CROWN * ROM-116 TRS-80 interface $275; Kenwood R-1000 $345; ARR P432/435VD $55; VHF Engineering BLE10/40 70cm linear $115; Klitzing 2m 80W linear $95; MMElectronics MSB-1 audio filter $60. WA6ERB/0 303-986-0189(e).

SELL: Icom '720A w/hand mike, one owner, new condition, Icom shipping container and manual. $875 KQ40 803-871-3190.

WANTED: low power, breadboard, AM, CW transmitter from late 20s-30s, also UV-203 tube, W3HWT 329 Evergreen, North Wales, PA 19454.

STOP looking for a place to donate your old equipment. The students at Junior High School 22 on Manhattan's Lower East Side will help you. WB2JKJ via Callbook for details.

WANTED in as-new condition: electrically and in appearance, HT-37, HT-41, and SX-115. Would be cared for as you have. Will pick up. Mike Malta WA4FRB, Box 229, Riverton, VA 22651. 703-636-1607, 703-636-6245.

SELL: Kenwood TS180S/DFC with mike - $550, PS30 -$75, Yaesu FRG 7700 - $375, Bearcat 100 - $250, MC50 mike - $40, Apple II + $900. Don Maclean, KC8ZL, 7422 Lascala Dr., Hudson OH 44236 216-656-1766.

HW-12A transceiver, HP-23B power supply, HRA-10-1 calibrator, HS-24 speaker, hand held mike, all cords and manuals, $135. W4MPL 7502 Oakmont Drive, Richmond, VA 23226, 804-266-5286.

WAVEMASTER™ — complete and assembled multiband antenna. "Highest quality technology" 80-10M, 2kWPEP, 2-trap dipole, 110 feet. Includes balun, 90-feet Mini RG-8, connectors, nylon guy rope and 90-day Warranty. Only $79.95 postpaid. Hawk Technical Products, PO Box 36384, Denver, CO 80236.

YAESU FT-101EE. Like new. Perfect condition. Call Groover, 912-764-3837 or 912-852-5467. $500.

FOR SALE: Drake DC-3 power supply...$35. Drake SC-2 2-meter converter with power supply new...$45. Drake L4B linear...$695 W2SVV

SELL near new Rohn FK2548 tower with heavy duty hardware, $595. Icom IC-211 mint, $379. Two KLM 144-148-16LB antenna w/baluns and 2-way power splitter $135. Deliver 150 miles. WØLPZ 402-334-8524.

DRAKE TR33C 2m portable w/case, mobile bracket, carton. Excellent $125. K1NYK 203-649-3515.

WANTED: From 1930s, Meissner 5-inch TV receiver; Hallicrafters Diversity receiver. Nagle, 12330 Lawyers, Herndon, VA 22071.

NOVICE STATION: Heath DX60A, 75W AM/CW, HG10A VFO, Hammarlund HQ100A receiver, $150 negotiable, KC2WQ 201-944-7914 evenings.

HEATHKIT SB-104A transceiver, speaker, power supply, CW filter. $450. I'll ship. Michael Price, WA5ZWQ 318-949-4433.

HEWLETT PACKARD square wave generator. Model 211A. Excellent $85. Tektronix 4MHz scope Type 310, needs work. $175 K1NYK 203-649-3515.

HAMMARLUND HQ129X receiver purchased new. Make offer K.D. Hendrix, 110 Kew Drive, Springfield, NJ 07081.

YAESU FT-225RD e/c $700 firm. KF6BV 619-423-5152.

TI99/4A users. Type any ARRL country prefix; get exact beam heading, great circle distance, MUF for any sunspot no., date, time for your QTH. Diskette $30. WØZVM 145 Calverton Rd., Ferguson, MO 63135.

COLLINS 55G-1 preselector for 51S-1 or KWM-380. $195 John White, 612-894-6394.

SELL or trade: SuperPro SP200 receiver, needs repair, 6ft. rack. Navy RDZ-1 VHF/UHF receiver, excellent. Several large xfmrs, want CW rig. W5VGU 905 Crown #1 Edmond, OK 73034, 405-341-4189.

ROHN TOWERS - Wholesale direct to users. All products available. Write or call for price list. Also, we are wholesale distributors for Antenna Specialists, Regency, and Hy-Gain. Hill Radio, P.O. Box 1405, 2503 G.E. Road, Bloomington, IL 61701-0887 309-663-2141.

TEN-TEC Argosy with 8 pole SSB and CW filters, noise blanker, calibrator and Astron RS-12A power supply. All mint. $475. WB7VOO, 602-298-4820.

COLLINS 51J4 (SN5778) and Hammarlund HC-10 SSB converter. Good, clean condition. Asking $500 plus shipping. K6EID.

SELL: HQ-1 Mini Quad $60 K2GIN, 516-324-6136.

WANTED: Squires-Sanders "FM-Alert" KA6NNR, Box 71703, Los Angeles, CA 90071 213-687-3395 days.

KENWOOD TS-120S, with VFO120, SP120 spkr, CW filter, all manuals, boxes, mike. Mint, never mobile, orig. owner. $550 after 0000Z. KJØU 314-642-8402.

HEATHKIT HW-101 with pwr supply and mike. New finals and tubes, mint, factory aligned, $325, you ship. Want DG-5 for TS-520S Phil 805-962-8957. KA6VDU.

MUST SELL entire station. TS-180S (back from factory with WARC bands) PS-30, speaker - $580; Tuner AT200-$50; MiniQuad $50; Cushcraft 4ATV-$40; KY7H-600 Highland Park, Missoula, MT 59803. 406-721-3318.

SELL: Icom 551D w/ps + f.m. mint $575. New: Scope B+K 1405 $150, EICO 1200 frequency counter equipment - (to 250 Mc) $95. microphone Shure 526T $30, Eimac 8875 tubes (new in carton) 2 each $125 each, Cushcraft DXK-180 stacking kit $125, Cushcraft DX-120 2 each $50 each KB4XU 803-766-2831.

VIC20 software makes video pictures for ATV SSTV or home VCRs, also fantastic CW keyboard program, SASE for details. Jim Grubbs, PO Box 3042, Springfield, IL 62708.

CRYSTALS: Build something! Good starter- QRP oscillator like "Cubic Incher" July QST. We'll supply the crystals and sockets. FT-243 General, Novice, any frequency. .01% 4001-8700 kilocycles (including 30M doublers), $2, minimum five $1.75 each. 30M fundamentals 10100 - 10150, .01% $2.95, five $2.45. 3500-4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50c. Postage- Airmail 25¢ per crystal. "Crystals Since 1933." WØLPS. Stamp for 1700 to 6000 kilocycles-listings-circuits. C-W Crystals, Marshfield, MO 65706.

DRAKE TR-4C xcvr. With full 10 mtr., n.b., MS-4, AC-4, new xtal filters & tubes $400. Drake R-4B rcvr with new tubes & extra SW xtals $215. Hallicrafters SX-146 rcvr. With full 10 mtr., SSB, CW AM filters $85. WØKRF 316-327-2633 anytime.

SELL OUT: Atlas 350XL compact transceiver with aux VFO built in with CW filter RIT digital ac beautiful $690 Johnson Thunderbolt 2000 watts PEP $475 Invader 200 transmitter $185 6+2 transmitter with little VFO $85 oldies: CE20A with VFO $75 Meisner Signal Shifter $75 National 98 $65 173 general coverage $85 NCX 200 $175 Harvey-Wells transmitter $85 Hallicrafters SR-20 $75 S-40 $65 SX-85 $65 early Swan single banders 40-75 or 20 meters $85 each N4LX F.E. Coble 251 Collier Ave., Nashville, TN 37211 phone 615-833-2724.

R4C - AM, .5, .25 filters, NB, xtra xtals, $300 T4XC-xtra xtals, $300 AC-4 power supply, $75. KB3MP, Don Weyel, RD #1, Conneaut Lake, PA 16316.

FOR SALE: Hallicrafters SX-117 rcvr, LF converter, Johnson Invader 200 xmtr, cables, relay, package, $275, you ship, Don, KA1WV, 203-621-5211.

WANTED: HRO-50 coils "H" and "AC". KT2L, 117 N. Ridge, Ryebrook, NY 10573 914-937-2535.

OMNI, digital, series C transceiver by Ten-Tec. Extra 1.8 (SSB) and .5 (CW) filters, owner's manual. Perfect condition. $785. UPS prepaid. K6AY, 2819 Park Boulevard, Oakland, CA 94610 415-452-3466.

YAESU FT101E, mike AC & DC cables, manual $450. SSTV CRT #5BCP7 new $15. Cushcraft 5 element 50 MHz beam $35. UPS included - B. Carling, AF4K, 5131 Raywood Ln., Nashville, TN 37211. 615-834-3204.

FT101B, CW filter, recently Yaesu serviced, $444. Collins 32V-3, manual, $125. You ship. ADØH Walter, 107 Meadow, Macomb, IL 61455 309-833-3197.

FOR SALE: Heathkit HW-101, PS-23, new finals, driver, alignment; top performer, $350, you ship. Don, KA1WV, 203-621-5211.

SIGNAL-ONE CX7A-late Calif serial-RIT mod-Zener & MOV protected. Spare 8072 Final - $750 - W6RW.

INFO-TECH Model 30 Morse code converter with monitor, prints 8 lines of 32 characters $250. Drake R-4B, T-4XB, MS-4 speaker and AC-4 ps $625. All excellent condition. Will take offers. Larry, WA7MAI 509-632-5603.

ROSS $$$ New Bargains: Hustler 5-BTV $98.50, 6-BTV $124.90, 3-TBA trl band beam $189.50, Kaypro-II portable computer $phone$, Icom IC-730 $634.90, IC-25A $279.90, IC-4AT $229.90, IC-2KL $1259. Every day is Icom day at Ross's. Kenwood TR-2500 & PB-25 $phone$, R-600 $289.90, TS-830S $799.90, R-2000 $455.90, DFC-230 $239.90, Yaesu FRG-7700 $389.90, FT-102 $885.90, FT-980 $1279.90, FT-77 $529.90, FT-One with filters $1999.90 Used Dentron MLA-2500 $495.90, Super Tuner 3 kW $159.90, Kenwood TS-120S $449.90, TS-180S/DFC $579.90, TR-2400 $189.90, TR-7600 $195, TL-922A $929.90, Limited time offer, Mention this ad to receive these bargain prices. All prices cash, FOB Preston. Closed Monday at 2:00 Ross Distributing Company, 78 South State, Preston, ID 83263 208-852-0830.

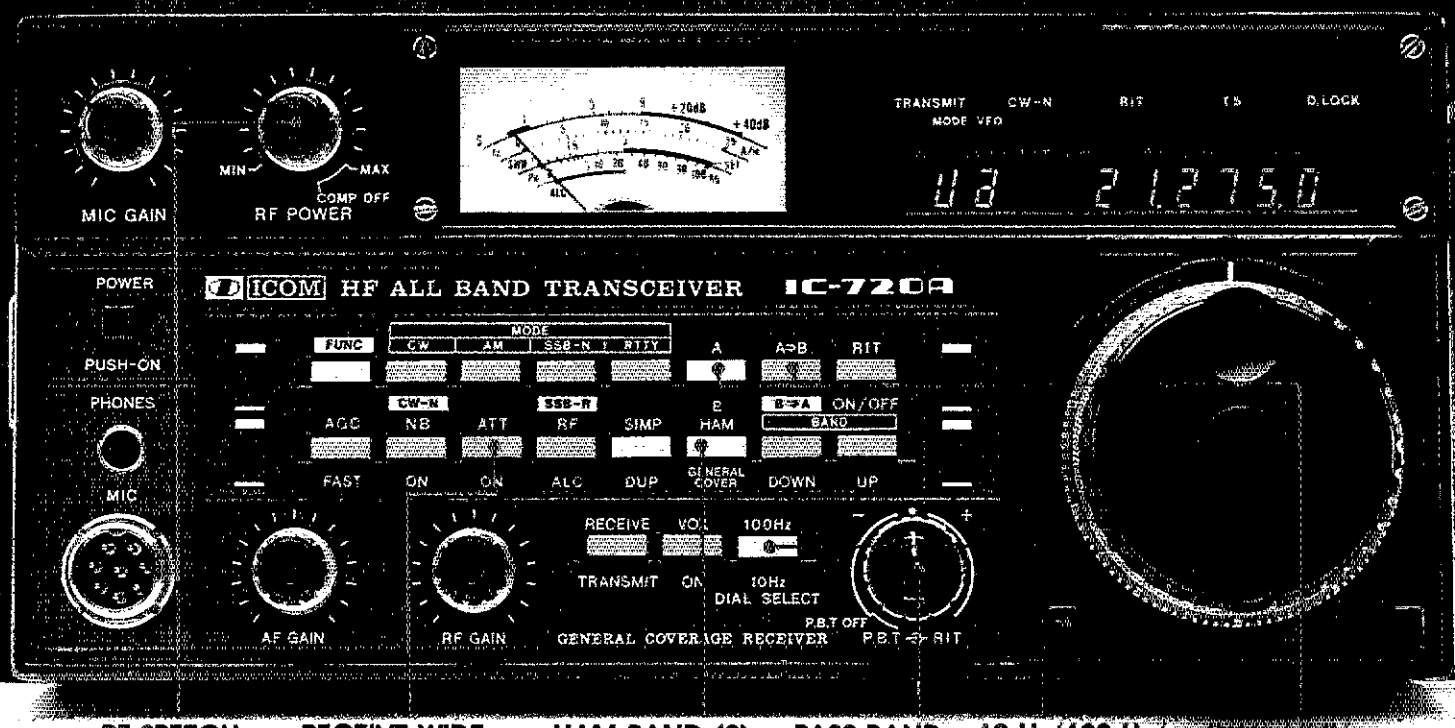
DRAKE R4C receiver T4XC transitter MS4 speaker AC4 power supply MN2000 antenna matching system N4B noise blanker WWV crystal 160 through 10 meters with manuals $775. L4B linear amplifier with power supply, with manuals. $775. All equip looks like new. Half freight 209-686-6159 WA6KCQ.

WEATHER facsimile recorder. Westrex RJ-4 with manual. Excellent condition. Copies FAX via SW & direct satellite transmission. Sacrifice $300. Will crate and ship freight collect. Steve Padar, 1800 Towhee Lane, Sarasota, FL 33581. Call 813-922-9137.

KENWOOD T599D, R599, Heath HD-15 patch, all mint -$550 complete (or best offer). Patch alone $20. Johnson Fleetcom II 558 UHF-FM on 461.250/466.250 - make offer. You ship - Hank WB9QDT 608-429-2009.

ICOM IC-720A

Study the Face of Success



RF SPEECH PROCESSOR | **RECEIVE WIDE BAND RF AMPLIFIER CONTROL** | **HAM BAND (9) OR GENERAL COVERAGE (30-1 MHz Bands)** | **PASS BAND TUNING** | **10 Hz/100 Hz/ 1 KHz TUNING CONTROLS** | **DUAL VFO's EQUALIZING**

IC-720A.

ALL HF BAND SSB/CW/RTTY 100 WATT TRANSCEIVER — GENERAL COVERAGE RECEIVER.

The IC-720A is a proven champion that sets the pace in amateur communications.

Receiver.

The IC-720A utilizes an **up conversion** receiver scheme having its first IF at 39.7315MHz. This principle allows the receiver portion to tune from **100KHz to 30MHz** with virtually no spurious responses.

At the front end of the receiver section is a **wide band RF amplifier** with 2SK125 FETs in a low noise, wide dynamic range, push-pull configuration. Since the low pass filter before and the high pass filter after the amplifier are switched for each band, responses due to out of band signals are kept to a minimum.

The gain portion of the receiver is the 9.0115MHz second IF which includes the **Pass Band Tuning System.** This PBT system narrows the pass band width from either direction, and thus eliminates adjacent signals more effectively than IF shift alone . . . plus adding 8 more poles of filtering.

Transmitter.

The IC-720A's transmitter is durable, composed of two 2SC2097 transistors in a wide band, push-pull power amplifier. The final is fully protected against overload, and an efficient heat sink with internal cooling fan provides for a transmitter that is highly reliable that can stand high SWR and continuous duty on CW and RTTY.

The IC-720A has a highly refined **RF speech processor** to increase average SSB power and to improve intelligibility for DX QSO's. An additional 8 pole crystal filter is added to the IF section during speech processor use and eliminates unwanted components. This results in a clean, distortion free signal.

Control Functions

Many advanced features are found in the IC-720A that are provided for operator convenience and speed of operation.

Dual VFO's, available at the push of a button, provide simplex or split frequency operation and when used with the equalizing button, provide a receive VFO readout that covers the full transceiver range equivalent to an RIT readout.

10Hz/100Hz/1KHz Tuning gives the ultimate in precision from 1KHz per knob rotation to 100KHz per turn for fast QSY.

UP/DN Band buttons when used with the Ham/General Coverage button, provide operation only on the ham bands or continuous tuning on each of 30, 1 megahertz bands.

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**

In 2 Meters Today...
ICOM Leads the Way!

ICOM IC-251A

ICOM has always been the amateur communications equipment industry's leader in 2 meter solid state digital technology. ICOM continues its established leadership with the all new IC-251A 2 meter multi-mode base transceiver. ICOM's advanced engineering incorporated a multi-memory system, 2 programmable scanning systems, 2 internal VFOs, and built in repeater offsets.

The New ICOM 251A is the most advanced, flexible 2 meter system on the market, incorporating features customers ask for most:

- ☐ Memory [illegible] automatically stop [illegible]
- ☐ 3 memories built in (quick access to your favorite frequencies)
- ☐ Programmable band scan — scan the whole band, or any portion of it you desire (adjustable scanning speed). Automatically resumes scanning after 16 seconds if desired.
- ☐ Squelch on SSB! The 251A will automatically and silently scan the SSB portion of the band seeking out the SSB activity on 2.
- ☐ Multi-mode operation — USB, LSB, CW, FM. Great for getting into Oscar, plus enjoying SSB rag chewing as well as repeater operation (including the new subband).
- ☐ 600kc Repeater offset built in. Easy repeater operation on the FM portion of the band.
- ☐ Variable repeater split — with the 2 built in VFO's, it's possible to work the odd splits plus accommodate future repeater band plan changes.

The RF amplifier and first mixer circuits using MOS FET's, and other circuits provide excellent Cross Modulation and Intermodulation characteristics. The IC-251A has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having the high shape factors, exceptional selectivity.

$50 Cash Rebate

$50.00 for the purchase of an IC-251A
Begins Mar 1, 1983
Expires May 30, 1983

VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

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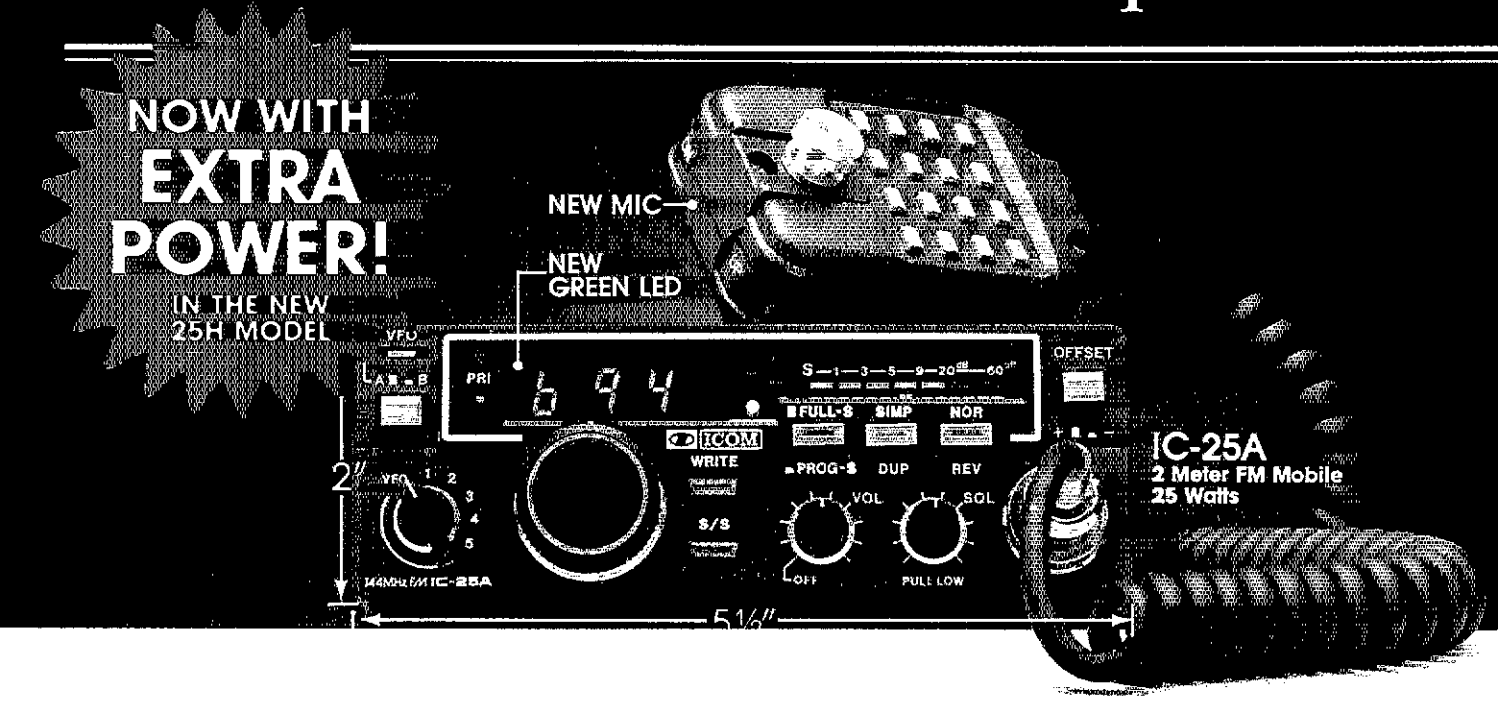
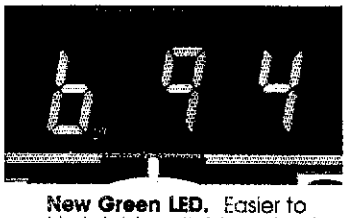
All stated specifications are approximate and subject to change without notice or obligations. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

ICOM IC-25A/H

More Features Per Square Inch!



The smallest 2 meter FM mobile on the market is now even easier to read and use with a green LED readout and a compact touchtone™/scanning microphone and gives you the option of 25 or 45 watts.



New Green LED. Easier to read in bright sunlight, and not glaring at night, the IC-25A(H)'s new readout provides good visibility under all conditions.

5 Memories. Instant access to most used frequencies. VFO A information is transferred to the selected memory by pushing the write button.

Priority Channel. Any memory channel may be monitored for activity on a sample basis, every 5 seconds, without disruption of a QSO conducted on a VFO frequency.

New HM14 Microphone. Smaller and lighter . . . the HM14 microphone provides a 16 button touchtone™ pad as well as up and down scan buttons adding easy frequency control of the radio and additional tones for repeater control.

NOR/REV Capability. Use of this button in the duplex mode allows one touch monitoring of the repeater input frequency. If simplex operation is possible you will know instantly.

Scanning. Pushing the S/S button initiates the scan circuitry. With the mode switch in a memory position the unit will scan all 5 memories plus the 2 VFO frequencies. With the mode switch in a VFO position, the unit will scan the entire band or the portion of the band defined by memories 1 and 2. Full band scan or program band scan is selected from the front panel and internally switched scanning choices of adjustable delay period after a carrier is received then resume scan, or resume on carrier drop, are standard.

The New 45 Watt IC-25H. Only slightly longer than its companion IC-25A, the IC-25H packs a powerful 45 watt punch. This 45 watts of power eliminates the need for an external power amplifier in fringe areas and gives a savings of space and wiring.

The IC-25H has all of the standard features of the IC-25A that have made it the most popular 2 meter mobile ever, plus the new green LED readout, new HM14 microphone and extra power. These new features make the IC-25H the best 2 meter mobile value on the market.

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The World System

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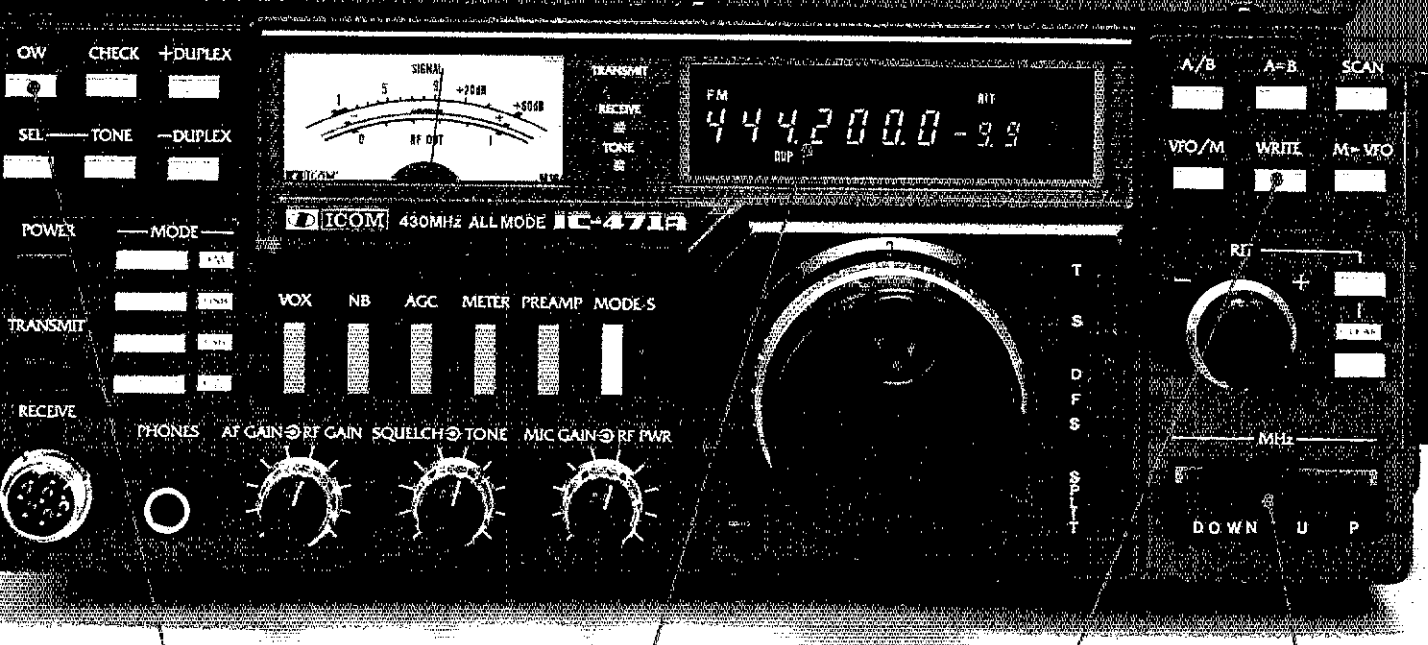
IC-471A

NEW!

The New Deluxe 430-450 MHz Base Transceiver from ICOM



WRITE OFFSET INTO MEMORY

NEW DISPLAY

32 CHANNEL MEMORY

1 MHz UP/DOWN FOR FAST QSY

32 full function memories / baudible tones / PLL locked 10 Hz / two color florescent splay / RIT readout / scanning / w size.

32 Memories. Each emory holds frequency, mode, set direction, offset frequency d subaudible tone for easy urn to an oft used frequency for remembering a new peater or simplex frequency.

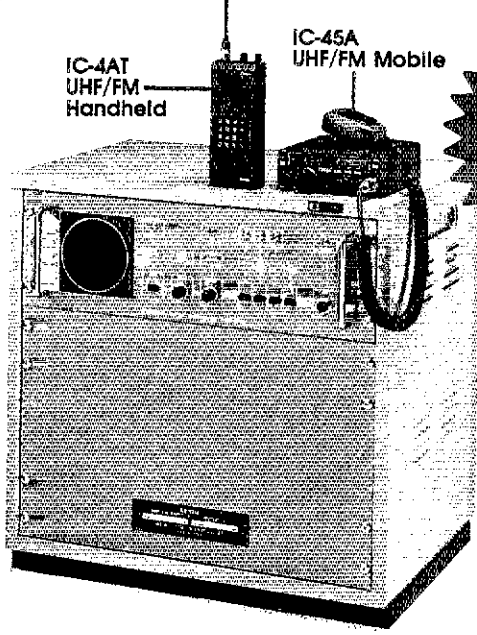
Subaudible Tones. baudible tones are selected rotating the main tuning ob. These tones may then be red into memory along with frequency, offering ease of eration.

Phase Lock Loop. Extremely low noise and good signal to noise ratio PLL design allows the IC-471A to lock to 10 Hz for extreme accuracy.

New Display. ICOM's new easy-to-read two color florescent transceiver situation display shows frequency, mode, offset direction, VFO in use, memory channel, and RIT offset direction and amount.

Scanning. Scanning of memories, programmable band scan, and mode scanning are available and easy to use.

New Size. Only 11¼"W x 4⅜"H x 10¾"D the IC-471A is styled to look good and engineered for ease of operation.



NEW 440 MHz Repeater

IC-RP3010
FM Repeater

Now a 10 watt 440 MHz FM repeater from the leader in VHF communications. The IC-RP3010 features high stability crystal controlled channels, CTCSS system, ID'er, remote control through a DTMF decoder and microprocessor controlled circuitry.

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Introducing the hy-gain® EXPLORER™ 14

Remarkably Compact, High Performance Broadband Tribander with Quad-Band Option

New Para-Sleeve Design

The Explorer 14 is a new antenna design we call PARA-SLEEVE which uses an "open-sleeve" dipole optimized for maximum bandwidth and directivity. Here is the concept. A central dipole, driven directly by the transmission line, has a ½ wave resonance on the lowest operating frequency. Two shorter sleeve elements, tightly coupled to the central dipole, modify its impedance to create a ½ wave resonance on the highest operating frequency. This para-sleeve system is expanded by the addition of 15 meter traps and 20 meter element tips. A revolutionary new concept for HF tribanders. *So unique, we've applied for a patent.*

Broadband Performance

The Explorer 14 will load solid state transceivers to maximum output with VSWR below 2:1, eliminating the need for an antenna tuner. You'll have edge to edge broadband performance on 20, 15 and 10 meters with gain and front-to-back ratio competitive to giant tribanders that cost twice as much or more. You'll be able to work stations you cannot even hear with a dipole antenna. And, the Explorer 14 handles maximum continuous legal power with a respectable safety margin.

Short Boom Save Space and Money

If your space or budget was too limited for a long boom tribander, chances are the Explorer 14 will fit both. The boom is only 14' (4.3 m) long and the turning radius requires only 17'3" (5.3 m). The compactness of the Explorer 14 reduces its overall weight and windload surface so you can mount it on a roof tripod, a mast or a tower. For example, the Hy-Gain CD-45II rotator and HG52 tower are a perfect match for the Explorer 14. This saves you the cost of an extra heavy-duty rotator or tower.

Superior Construction

The Explorer 14 includes passivated stainless steel hardware and heavy gauge, pre-formed element and mast brackets. High grade 6063-T832 thick wall swaged aluminum tubing is used throughout. A BN86 balun is included and a new Beta Multi-Match provides DC ground to reduce lightning hazard and precipitation static. It's a rugged, easily assembled antenna that survives winds to 100 mph (160 km/h).

Quad Band Option

You can add a fourth band, either 30 meters or 40 meters to the Explorer 14 with the QK-710 kit. A kit that attaches to the central dipole and is easily adjusted for either 30 meters (WARC) or 40 meters at minimal extra cost.

Lew McCoy, W1ICP is among the most authoritative writers in amateur radio. For over 30 years he served on the ARRL technical staff with his last position as assistant technical editor. Presently he is the technical editor for CQ magazine. Here is what he had to say about the Explorer 14:

"In my opinion, with Explorer 14, Hy-Gain produced a truly high gain, high performance antenna in a small package. The "para-sleeve" design provides the amateur a whole new ball game, particularly in the area of broadbanding. I was really surprised when I actually verified the gain, front-to-back and bandwidth during my recent visit to the Hy-Gain labs and antenna range in Lincoln, Nebraska. The Explorer 14 is a winner."

SPECIFICATIONS

Electrical

Frequencies of operation:	20M	15M	10M
Under 2:1 VSWR (MHz)	14.0-14.35	21.0-21.45	28.0-29.7
Maximum F/B Radio (dB)			
Maximum Gain (dB)			
Maximum Power	Maximum Legal		
Lightning Protection	DC Ground		

Mechanical

Boom Length	14'1½" (4.3 m)
Turning Radius	17'3" (5.3 m)
Net Weight	43 lbs. (19.5 kg)
Wind Surface Area	7.5 sq. ft. (.69 m²)

SPECIAL INTRODUCTORY OFFER*

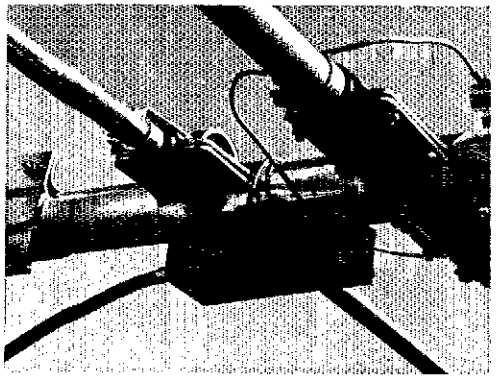
SAVE $472.40

Complete Antenna Rotator & Tower System

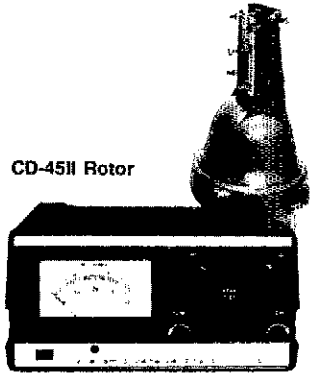
PLUS FREE DELIVERY.

	Ham Net Price
Explorer 14 Tribander Antenna Ham net Price Includes BN-86 Balun and Beta Multi-Match	$ 399.95
Hy-Gain CD-45II Rotator	164.95
Hy-Gain 52 foot (15.8 m) Crank-Up Tower Model HG52SS	1,095.00
Antenna Mast, 10 feet (3.5 m)	68.50
Three Coax Arms	39.00
Total Ham Net Value	$1,767.40
Special Introductory System*	$1,295.00
YOU SAVE	**$ 472.40**

*Any other Hy-Gain antenna, rotator or tower may be substituted at regular Ham net. Free Delivery is offered for shipping points within contiguous 48 United States only. Offer is extended through participating Telex/Hy-Gain Amateur products distributors only.



Feed point and balun.



CD-45II Rotor

ACT NOW!
Offer Expires June 30, 1983.

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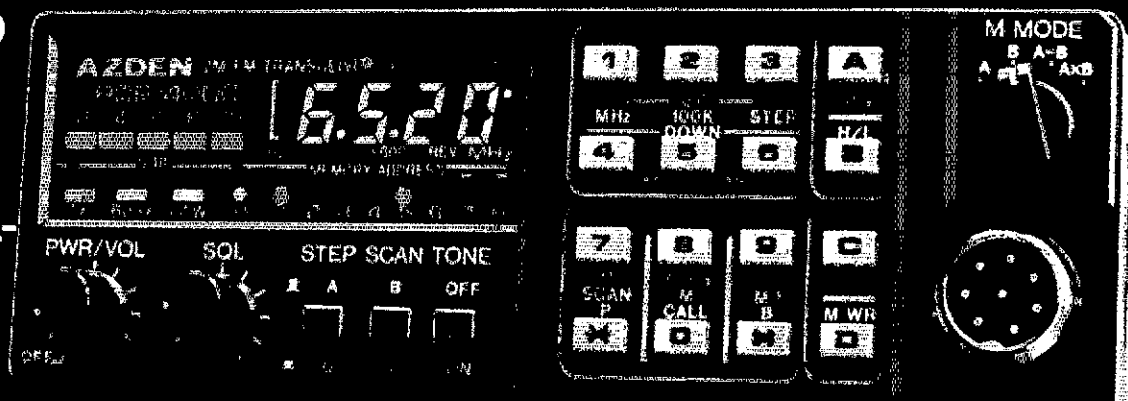

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IT CARRIES A 1 YEAR LIMITED WARRANTY!

- **8 MHZ COVERAGE, CAP/MARS BUILT IN:** 142.000-149.995 MHz in selectable steps of 5 or 10 kHz. **COMPARE!**
- **TINY SIZE:** Only 2" H x 5.5" W x 6.8" D! **COMPARE!**
- **MICROCOMPUTER CONTROL:** At the forefront of technology!
- **UP TO 8 NON-STANDARD SPLITS:** Ultimate versatility for CAP/MARS. **COMPARE!**
- **16-CHANNEL MEMORY IN TWO 8-CHANNEL BANKS:** Retains frequency and standard offset.
- **DUAL MEMORY SCAN:** Scan memory banks either separately or together. **COMPARE!**
- **TWO RANGES OF PROGRAMMABLE BAND SCANNING:** Limits are quickly reset. Scan the two segments either separately or together. **COMPARE!**
- **FREE AND VACANT SCAN MODES:** Free scanning stops 5 seconds on a busy channel. Vacant scanning stops on unoccupied frequencies.
- **DISCRIMINATOR SCAN CENTERING (AZDEN EXCLUSIVE PATENT):** Always stops on frequency.
- **TWO PRIORITY MEMORIES:** Either may be instantly recalled at any time. **COMPARE!**
- **NICAD MEMORY BACKUP:** Never lose the programmed channels!
- **FREQUENCY REVERSE:** The touch of a single button inverts the transmit and receive frequencies, no matter what the offset.
- **ILLUMINATED KEYBOARD WITH ACQUISITION TONE:** Unparalleled ease of operation.
- **BRIGHT GREEN LED FREQUENCY DISPLAY:** Easily visible, even in direct sunlight.
- **DIGITAL S/RF METER:** Shows incoming signal strength and relative output.
- **BUSY-CHANNEL AND TRANSMIT INDICATORS:** Bright LEDs show when a channel is busy and when you are transmitting.
- **FULL 16-KEY TOUCHTONE® PAD:** Keyboard functions as autopatch when transmitting.
- **PL TONE:** Optional PL tone unit allows access to PL repeaters. Deviation and tone frequency are fully adjustable.
- **TRUE FM:** Not phase modulation. Unsurpassed intelligibility and fidelity.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-range communication and battery conservation. (Transmitter power is fully adjustable)
- **SUPERIOR RECEIVER:** Sensitivity is 0.2 uV for 20-dB quieting. Audio circuits are designed to rigorous specifications for exceptional performance, second to none. **COMPARE!**
- **REMOTE-CONTROL MICROPHONE:** Memory A-1 call, up-down manual scan, and memory address functions may be performed without touching the front panel! **COMPARE!**
- **OTHER FEATURES:** Dynamic microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.
- **ACCESSORIES:** CS-6R 6-amp ac power supply, CS-AS remote speaker, and Communications Specialists SS-32 PL tone module.
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Cleanliness in the TEN-TEC CORSAIR means unusual spectral purity of both received and transmitted signals.

In Receive mode, even with the r.f. preamp in operation, the 3rd order intercept (at 20 kHz tone spacing) is +5 dBm. With the preamplifier off, the 3rd order intercept rises to a superlative +18 dBm and remains constant even at 3 to 6 kHz away from the pass-band.

In Transmit mode, if you look at the output of the CORSAIR on a spectrum analyzer, you note an almost complete absence of phase noise—a phenomenon which plaques most PLL transceivers. At 20 kHz from the carrier, the generated phase noise in the CORSAIR is a spectacular −148 dBc/Hz, and at 1 kHz it is −132 dBc/Hz.*

This breakthrough in circuit design, using proven crystal mixed oscillators with the latest USA solid state technology, is setting new standards of cleanliness and purity of signals. All of which means enhanced reception with less fatique, lower noise floor, no overloading and more DX worked. And your signal will be a bit easier to read under adverse conditions. Compare.

Other virtues of the CORSAIR include:

• All solid state, broadband design • All 9 hf bands • Triple conversion receiver with 0.25 μV sensitivity on all bands and better than 90 dB dynamic range • Variable bandwidth plus Passband tuning • Dual range, Triple mode, Offset tuning • Variable Notch filter • Built-in Speech Processor • Built-in Noise Blanker • 200 W input, 100% duty cycle • Dual-speed QSK (full or semi) • Many operating conveniences including headphone attenuator, cw signal spotter, 5-function meter, WWV reception, adjustable ALC threshold lighted status indicators, selectable AGC, adjustable pitch and volume of sidetone, complete interfacing. • Full accessory line including remote VFO, keyers, microphones, power supplies, antenna tuners, ssb and cw filters. • Reliable American manufacture and service, fully warranted.

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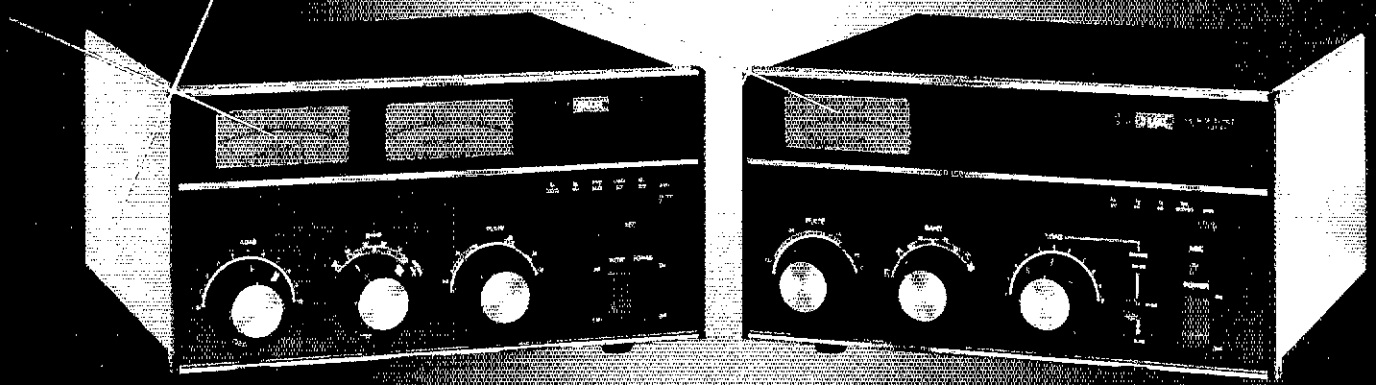
**Specifications measured by independent laboratory*

POWER UP!



DRAKE L7
2kW Linear Amplifier

• 2kW PEP, 1kW cw, RTTY, SSTV operation — all modes full-rated input, continuous duty cycle • 160-15* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services. • The Drake L7 utilizes a pair of 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. • Accurate built-in rf watt-meter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales. • Temperature controlled two-speed fan is a high volume, low noise type and offers optimum cooling. • Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control. • By-pass switching is included for straight through, low power operation without having to turn off amplifier. • Bandpass tuned input circuitry for low distortion and 50 ohm input impedance. • Amplifier is comprised of two units — rf deck for desk top, and separate power supply. • Operates from 120/240 V-ac, 50/60 Hz primary line voltage. • Manufactured in U.S.A. •

*Export model includes coverage of the 10-meter Ham Band.

DRAKE L75
1.2kW Linear Amplifier

• 1.2kW PEP, ssb continuous, 1kW cw 50% duty cycle. • 160-15* meter band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services. • The Drake L75 utilizes a 3-500 Z triode for rugged use, and lower replacement cost compared to equivalent ceramic types. • Built-in relative power reading for output indication. • Temperature controlled two-speed fan is a high volume, low noise type and offers optimum cooling. • Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control. • By-pass switching is included for straight through, low power operation without having to turn off amplifier. • Bandpass tuned input circuitry for low distortion and 50 ohm input impedance. • Built-in power supply. • Operates from 120/240 V-ac, 50/60 Hz primary line voltage. • Manufactured in U.S.A. •

*Export model includes coverage of the 10-meter Ham Band.

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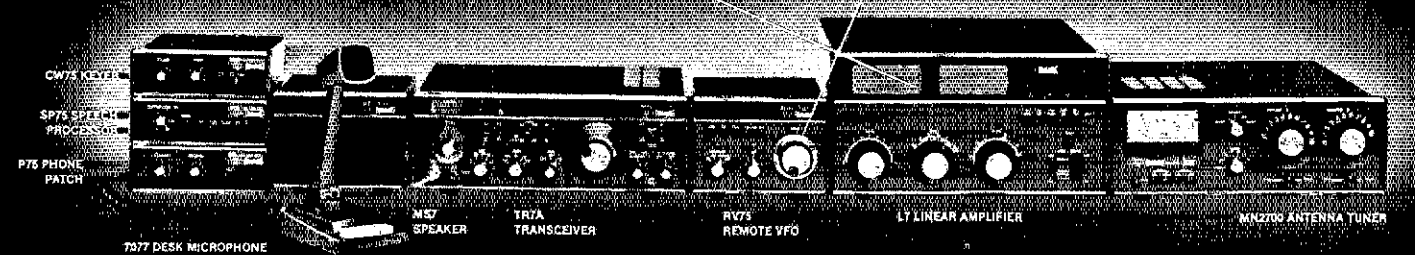

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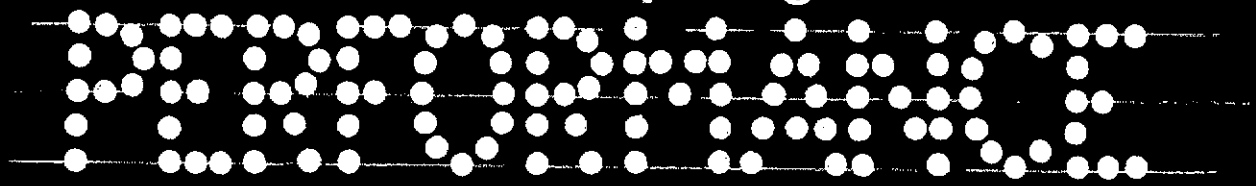
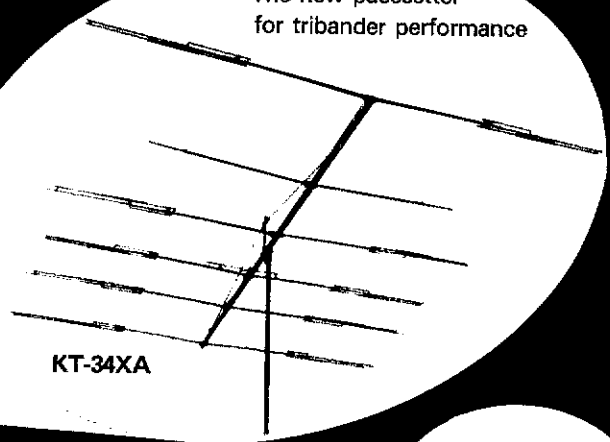


The new pacesetter for tribander performance



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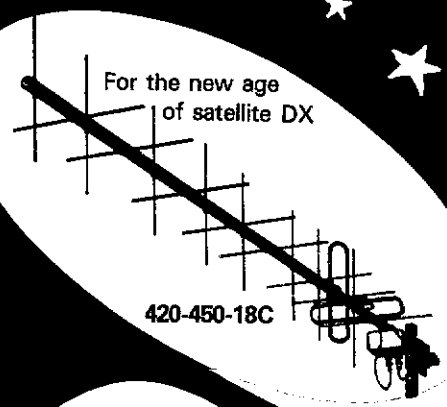

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Get on 30 meters (10 MHz) Now!
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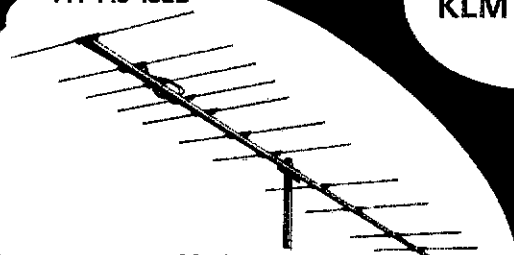

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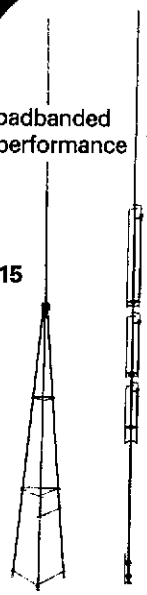
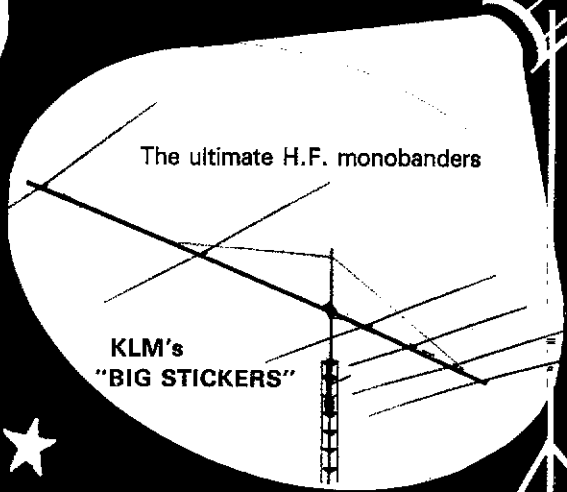


SSV
80-40-15

40-10V

The ultimate H.F. monobanders



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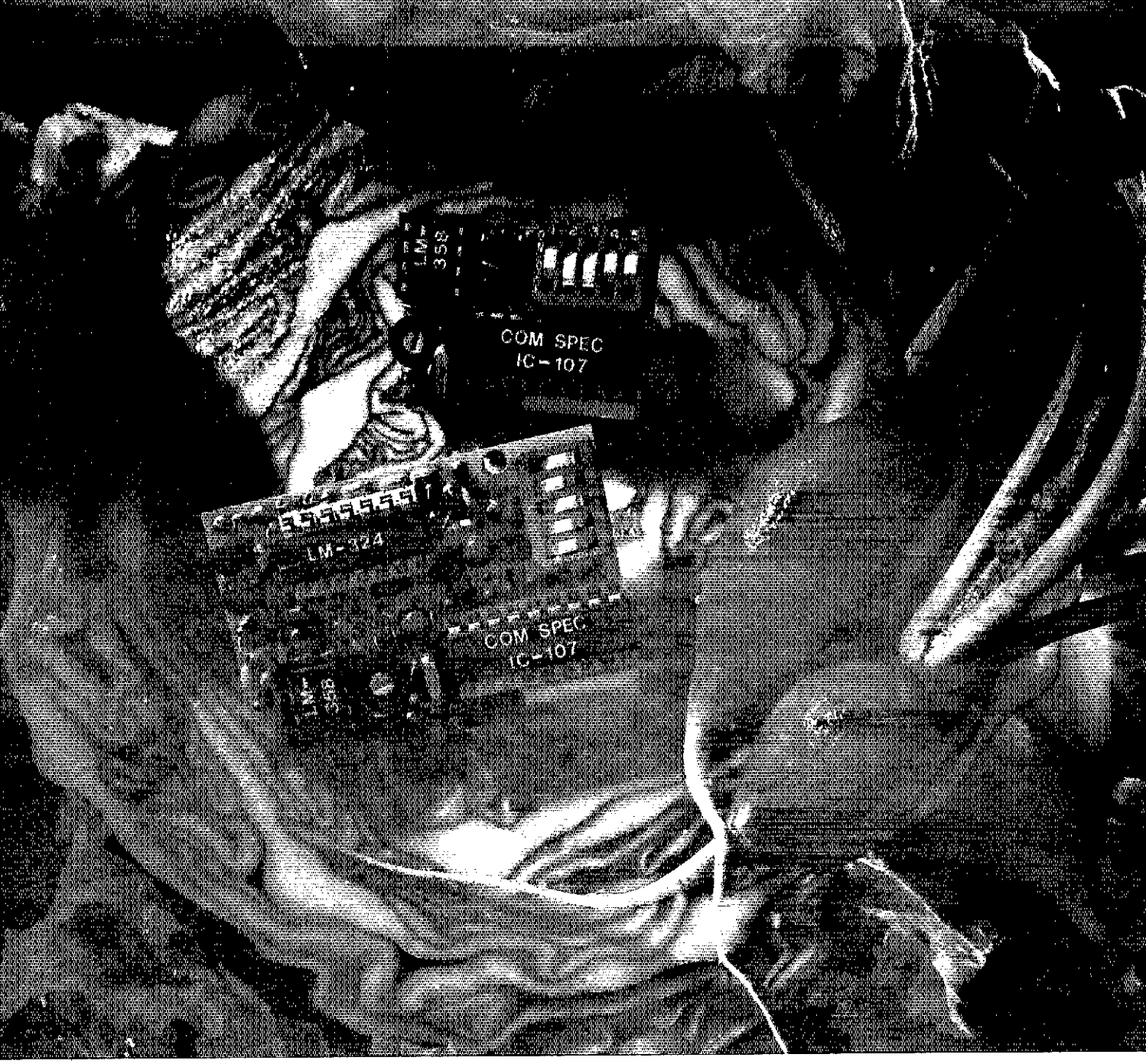

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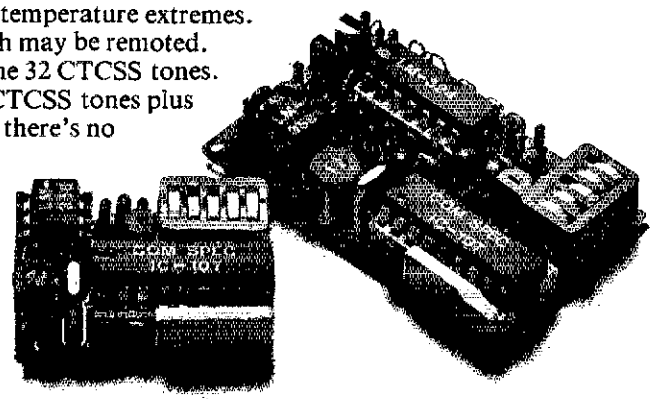
Our new crop of tone equipment is the freshest thing growing in the encoder/decoder field today. All tones are instantly programmable by setting a dip switch; no counter is required. Frequency accuracy is astonishing ±.1 Hz over all temperature extremes. Multiple tone frequency operation is a snap since the dip switch may be remoted. Our TS-32 encoder/decoder may be programmed for any of the 32 CTCSS tones. The SS-32 encode only model may be programmed for all 32 CTCSS tones plus 19 burst tones, 8 touch-tones, and 5 test tones. And, of course, there's no need to mention our one day delivery and one year warranty.



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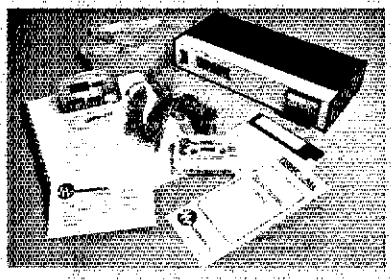
TERMINALL

apple TRS-80* ATARI*

MORE FOR YOUR MONEY.



TERMINALL is a hardware and software system that converts your personal computer into a state of the art communications terminal. Terminall features simple connections to your computer and radio plus sophisticated and reliable software.

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse Code or radioteletype (RTTY). Plug into your CW key jack and send Morse Code. Attach a microphone connector and send Baudot or ASCII RTTY using audio tones (AFSK). That's all there is to hooking it up.

The software is loaded into your computer from disk or cassette. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse Code, it's fully automatic and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting in any mode, in minutes. As we said, TERMINALL is simple.

More for your money.

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost.

■ **Fantastic Morse reception.** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Received code speed displayed on status line.

■ **Outstanding documentation.** Professionally written, 90 page user manual contains step-by-step instructions.

■ **Built in, separate, multi-stage, active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 170 and either 425 or 850 Hz shift-keyboard selectable - and uses either the panel meter or scope outputs for easy tuning. Copy the weak ones. Copy the noisy ones. Copy the fading ones.

■ **Built in crystal controlled AFSK.** Rock stable for even the most demanding VHF or HF applications. A must on many VHF RTTY repeaters.

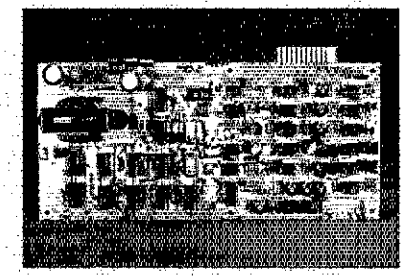
■ **Built in 110 or 220** volt AC power supply.

■ **Built in parallel printer driver software.** Simply attach a parallel ASCII printer (e.g. the EPSON MX-80) to your printer port to obtain hardcopy in all modes.

■ **Multi level displays** - allows examining and editing of historical text.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, multiple user-defined WRU, transmit delay (fixed, none or auto adaptive), break mode and more!

NO COMPROMISE HARDWARE.



■ **The all-in-one TERMINALL design** makes it great for use on HF or VHF, Ham, Commercial, SWL or MARS! SWL's: TERMINALL may be jumpered for either 425 or 850 Hz reception to copy news and weather services.

15 Day Money Back Trial Period on Factory Direct Orders

System Requirements

TERMINALL T1 Communications terminal for the TRS 80 Model I. Requires a Model I TRS-80, 16K RAM and Level II BASIC. Includes software on cassette and disk, assembled and tested hardware and an extensive instruction manual. **$499.**

TERMINALL T3 Communications terminal for the TRS 80 Model III. Requires a Model III TRS-80, 16K RAM and Model III BASIC. Includes software on cassette and disk, assembled and tested hardware and an extensive instruction manual. **$499.**

TERMINALL T2 Communications terminal for the APPLE II. Requires an APPLE II or APPLE II Plus with 48K RAM and disk. Software is provided on disk in DOS 3.2 format. Use MUFFIN utility to convert to DOS 3.3 format. Includes software on disk, assembled and tested hardware and an extensive instruction manual. **$499.**

Add $4.00 shipping U.P.S. reg. delivery. CA residents add 6% sales tax.

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*Atari is a Registered Trademark of Atari Computer Inc.
1 yr. parts & labor limited warranty.

NEW! TERMINALL FOR ATARI 400/800* NOW AVAILABLE

The communications terminal that does it all!

HEWLETT-PACKARD HP431A solid state power meter, with 10MHz to 10GHZ compensated thermistor mount and cable. $195. HP340BR automatic noise figure meter, rack mount. $150. HP343A noise source, 10MHz to 600MHz. $75. Northstar Horizon Computer, with disk, 16K, and software. $895. Heathkit H14 dot matrix printer. $325. Intel Single Board Computer 80/10. $85. Motorola Single Board Computer MEK6800D2. $85. All in good condition. Bob Seydler, N5BMT, Rt 2 Box 2170, Boerne, TX 78006 512-249-2152.

COMPUTER Software - VIC-20/C64/Atari 400/800 and PET "CW Morse" send/receive with I/O connector, schematic for homebrew interface, documentation -$17.95 + $2 shipping - Free catalog - RAK Electronics, Box 1585, Orange Park, FL 32067-1585.

COLLINS, 75S-3B, 32S-3, 516F-2, WARC, dual VFO, w/e $995, KWM-2, w/e, $395. All excellent, all aligned by Collins Engineer Feb 83, PM-2 ac, $69, MP-1 dc, $39, Ameco PT-2 preamp new, $50, Bob KQ7J, 1121 College, College Place, WA, 99324 509-529-4350.

SLEP Specials: Collins KWM-380 transceiver with factory installed 4 filters, n/b control interace with latest December 1982 Collins factory installed up-dates, 1 year customer warranty, last chance at old discount price, $2,850. Ten-Tec 560 Corsair, $995, 280 p/s $149, 260 p/s $179, 263 VFO $179, Drake R-7A receiver $1,349, TR-7A $1,389, TR-5 $669, PS-7 p/s $269, PS-75 $179, Icom IC-R70 receiver $649, Phone 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

HEATH HW101 with C.W. filter, HP23A p.s., HS1661 speaker; Astatic D-104 "grip-to-talk" microphone; SWR bridge, coax switch, L.P. filter. Excellent condition! $425 N8CPU, Box 192, Walled Lake, MI 48088, 313-669-9481.

STODDART RFI meter, General Electronic 13CI VHF receiver manuals wanted for copying. Also coil sets for BC-229/429 covering 5-12 MHz W4PSJ 12317 Hanger Rd., Fairfax, VA 22033.

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 RD4 Mountaintop, Pennsylvania 18707 info/orders M-F after 6:00 PM, weekends anytime! 717-868-6565. 2 stamps/catalog MC/VISA.

VHF Shop - Phase III/1296 MHz - UHF units: 1269-144 linear transmit upconverters: 1W $300, 3W $365, transverters: 1296-144 - 1W $291, 3W $360, 1296-28-1W $350 1269-1296 MHz linears: 50W $219, 120W $302 F9FT 1296MHz Yagis $48.35. Call for our Super Deal on Santec ST144uP, ST440uP, and Tokyo Hy-Power amplifiers. Belden 8214 .39¢/ft, Lunar 50-450MHz DBM converter kits including ATV models from $35.95, Lunar/ARCOS kW amplifier kits 50-450MHz call! MMT432/435-50S $279.95, MMT220-28 $260. Puma 1296 MHz 1-in-15W out linears call! KLM144-148-13LBA $77.95 Lunar/Tama 432 MHz Yagis (RIW-type) $69.95 K3MKZ 717-868-6565.

CX-7 Signal/One formerly owned and modified by W2PV. Works fine, $725 prepaid. K9LWT, 414-554-9170.

FOR SALE: Drake TR7, 4 filters, noise blanker, little use, mint $800; Drake R7/DR7 as new, never used, noise blanker, 4 filters #2238, $900; Drake L7 linear with tubes, unused as new #524, $750; Icom-720A new with FL-32 and-34 filters $900; Microlog ATR-6800 with application module, monitor, little use, mint $1,500; all above with manuals. Prefer local pickup, will ship UPS. H. R. Denius, KO7U, 600 Courtland Street, #490, Orlando, FL, 32804, phone 305-645-1188.

FOR SALE, Heath SB-230, some old QST's, tubes and parts. Try Bill's mini-flea market. Send for list. NØZX, 241 So 111th St., Omaha, NE 68154.

KENWOOD TS-520 with 500 Hz CW filter, manual and original packing. Works great, looks great $435. Karl, KB2XG 518-489-7254.

EXCELLENT rig! Kenwood TS-180S/DFC, 2x SSB and 1xCW filters, Astron power supply, SP-180 speaker, MC-60 microphone, Heil microphone equalizer, $680, KA1LD, 127 Bridle Path, N. Andover, MA 01845, 617-687-7699.

CUSTOM HANDKNIT Amateur Sweater Jackets. SASE details. WB9NCT, Box 541, Marinette WI 54143.

DX HEADING world maps centered on the following cities: Baltimore, Philadelphia, NYC, Boston, LA, Detroit, Dallas, St. Louis, New Orleans, and Atlanta. Mercator projection. Signal path shown for every 10° heading. Package of 22 × 34" blue print, 11 × 17" black on white, and call to location listing. Shipped folded. $5.95 post paid. Specify city. W. Massey, P.O. Box 397, Hainesport, NJ 08036.

SELL: Clipperton-L amplifier, mint, used 1/2 hour, $500 UPS paid 48. Details SASE. K6WM, 850 Groff, Pomona, CA 91768.

WANTED: Used Tempo VHF/ONE 2-meter xceiver for parts. K7LT Fred Kost, Box 5113, Incline Village, NV 89450.

SELL: TS-820, $500; VFO-820, $120; both, $600. KDK FM-144, $175. Drake TR-22C, $125. Unicom UX-502 10-meter synthesized FM (similar to Comtronix-80), $135. Heath HWA-202-1 2.2 amp, 13.8 VDC supply, $27.50; HWA-10-1 xtal cal $8. Consider trade for synthesized 2-M HT. Call before 10 ET. Paul, W1ETH 413-533-0674.

MINT HW-101, CW filter, HP-13A p.s., mobile mount, spare finals, $350 W3FYC, P.O. Box 1296, North Wales, PA 19454.

GALAXY V MK2 transceiver, VOX, special VFO 3.3-4.85 MHz, ac & dc supplies, $300. Mark Tyler, K5GQ, 713-371-0272.

DRAKE T-4XB, R-4B, AC-4 power supply, speaker, D-104 mike, cables, manuals. Excellent operating condition. $395. W4YHB, 305-732-1673.

I WOULD like to get in touch with a licensed amateur who is also a licensed residential architect in the Ormond Beach/Daytona, Florida, area, who can design an oceanfront house for me that will completely conceal a full-sized rotary (Yagi) beam in the upper level. W4EKK, G. Brady, 9761 S.W. 158 Street, Miami, FL 33157.

FOR SALE: TS-820(S) with WARC bands, 4 filters, dc supply, VFO-820, manuals $700/BO. Chuck Vaughn, AA6G, 408-732-9847.

HW104A mint condition, lightly used, recently aligned by engineer. $400. WA1LPM 617-669-5927.

GALAXY V MK2, ps, manual fair, $170. Ameco TX86, no ps, $18. KQ7L/W2IMS 503-648-1857.

KENWOOD T7850 with Communications Specialists SS-32 PL installed, $260. MFJ 941-B tuner. $50. Both excellent with manuals. W6DJZ, 619-436-1689.

DRAKE TR3, acps, VFO, sp, mike spar tb, crystal adapters ph $275 or swap? Linear: Henry K 2000 $450 RCA oscil, sweep gen, magazines, electr. Germens Funkshau 1963-68 completely. Practica camera $70 swap? WB6EYA, 1608 Charles Rd., San Leandro, CA 94577.

ICOM T211 excellent condition. $379 original owner, mike and manual included. Drake SC-2, TC-2, CPS, CC1, XCU $299. Call or write Dave, WA9FPH, Rt. 2, Brooklyn, WI 53521, 608-835-7110 (eves).

220 MHz Repeater - Micro Control model 3CR with built-in microprocessor controller, PL, Phelps Dodge duplexer model 506-2, $1920; Tempo S2T 220 MHz H.T. with PL, TTP, rubber ant, belt clip, $160; Amcomm S-2-25 2mtr mobile, synthesized, PL, 140; Gerry, N2ASF, 5-6PM EST, 516-283-3070, Box 585, Water Mill, NY 11976 Enclose SASE.

CHARTER 45' sailboat in Bahamas now or in Mediteranean this Fall or Winter and operate from shack aboard. Write D.K. Green, 63 Kelsey Hill Rd., Deep River, CT 06417 $1800/wk.

TI99/4-4A Basic & Extended Basic Programs. CW Practice, CW Transmit,SSTV keyboard, Children's CW, Children's Math Amateur Call Locator, DX Log/Locator. Write Sam Moore, AC5D, Box 368, Stigler, OK 74462.

WANTED: Yaesu FV707DM, FP707 mint only and 160 meter xcvr Atlas 215, Yaesu, Kenwood, Davis. Box 182, Mackinaw City, MI 49701.

BIRD Model 74 coax switch, new condition $55 plus ship. WBØEYT - Bernie Chap, 2811 Bonnie St., Omaha, NE 68147, 402-731-0128.

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SELL - 3-500Zs $45 W6HHN 415-494-1791.

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COUNSELORS...Maine Boys' camp ham radio, Electronics, code, General License, may bring own equipment. Write: Richard Krasker, 95 Woodchester Dr., Chestnut Hill, MA 02167.

COUNSELORS: Connecticut brother-sister camp. Completely equipped with ham radio station. Program includes electronics, kit building, code and communications. June 25 - August 22. Send resume: Lloyd Albin (N2DMQ) Ken-Mont and Ken-Wood Camps, 2 Spencer Place, Scarsdale, NY 10583.

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HAM RADIO, broadcasting counselor, 21 years or older, for summer sleepaway camp near Pittsfield, Massachusetts. Camp Emerson, 5 Brassie Road, Eastchester, NY 10707 914-779-9406.

HAM Counselor wanted. New Hampshire Boy's Camp. June 21-August 22. Write: John Klein, 28349 Chagrin, Cleveland, OH 44122. 216-831-4330.

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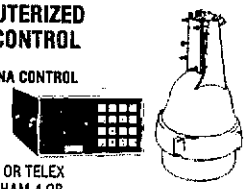

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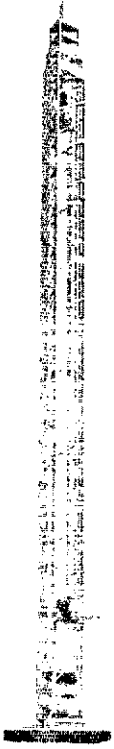
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429



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RG-58/U	52	1.4	1.9	6.0	12.5
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⅞" Heliax	50	.1	.2	.5	.9

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KLM

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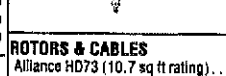
6el-10mtr Big Stick Monoband Beam ... $229
10-30-7LP Log Periodic Broad Band Beam ... $599
144-14B-13LBA 13-el 2-mtr Beam ... $79
143-150-14C 14-el 2-mtr Satellite Antenna ... $79
420-470-18C 435 MHz Satellite Antenna ... $59
432-16LB 432 MHz Long Boom Antenna ... $59

MINI-PRODUCTS HQ-1 only $139!



Wing Span - 11 ft
Boom - 54 in. long
Wind Area - 1.5 sq ft
1200W P.E.P. Input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating) ... $99
Alliance U100 (for small beams & elevation) ... $49
Telex HAM 4 (15 sq ft rating) ... $199
Telex Tailtwister (20 sq ft rating) ... $249
Telex HDR300 Heavy Duty (25 sq ft rating) ... $439

Standard 8 cond cable $.19/ft
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft
(vinyl jacket 2-#16 & 6-#18 ga)

UNR-ROHN GUYED TOWERS

10 ft Sections 20G $32.50 25G $41.50 45G $93.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	$789
FK2558	58 ft	13.3 sq ft	$879
FK2568	68 ft	11.7 sq ft	$959
FK4544	44 ft	34.8 sq ft	$1099
FK4554	54 ft	29.1 sq ft	$1219
FK4564	64 ft	28.4 sq ft	$1329
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

All Foldover Towers Shipped Freight Pre-Paid!
Foldover prices 10% higher west of Rockies.
All Rohn 25G & 45G Accessories in stock - Call!

TOWER/GUY HARDWARE

3/16" EHS Guywire (3990 lb rating) ... $.12/ft
1/4" EHS Guywire (6000 lb rating) ... $.15/ft
5/32" 7 × 7 Aircraft Cable (2700 lb rating) ... $.12/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable) ... $.35
1/4" CCM Cable Clamp (1/4" Cable) ... $.45
1/4" TH Thimble (fits all sizes) ... $.30
3/8EE (3/8" Eye & Eye Turnbuckle) ... $5.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle) ... $6.95
1/2" EE (1/2" Eye & Eye Turnbuckle) ... $8.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle) ... $9.95
3/16" Preformed Guy Grip ... $1.79
1/4" Preformed Guy Grip ... $1.99
6" Diam - 4 ft Long Earth Screw Anchor ... $12.95
500D Guy Insulator (5/32" or 3/16" Cable) ... $.95
502 Guy Insulator (1/4" Cable) ... $1.95
5/8" Diam - 8 ft Copper Clad Ground Rod ... $11

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating) ... $.29/ft
HPTG4000 Guy Cable (4000 lb rating) ... $.43/ft
HPTG6700 Guy Cable (6700 lb rating) ... $.59/ft
9901LD Cable End (for 2100/4000 cable) ... $4.95
9902LD Cable End (for 6700 cable) ... $5.45
Socketfast Potting Compound (does 6-8 ends) ... $8.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$25	$39	$59	$79
18 in Wall	$39	$69	$99	$109
.25 in Wall	$69	$129	$189	$249

SOUTH RIVER ROOF TRIPODS

HDT-3 3 ft Tripod ... $19 HDT-5 5 ft Tripod ... $29
HDT-10 10 ft Tripod ... $49 HDT-15 15 ft Tripod ... $69

Heavy Duty Tripods include mtg hdw-UPS Shippable

TEXAS TOWERS

DIV. OF TEXAS RF DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri.: 8:30 a.m. - 5:30 p.m. Sat. 9 a.m. - 1 p.m.

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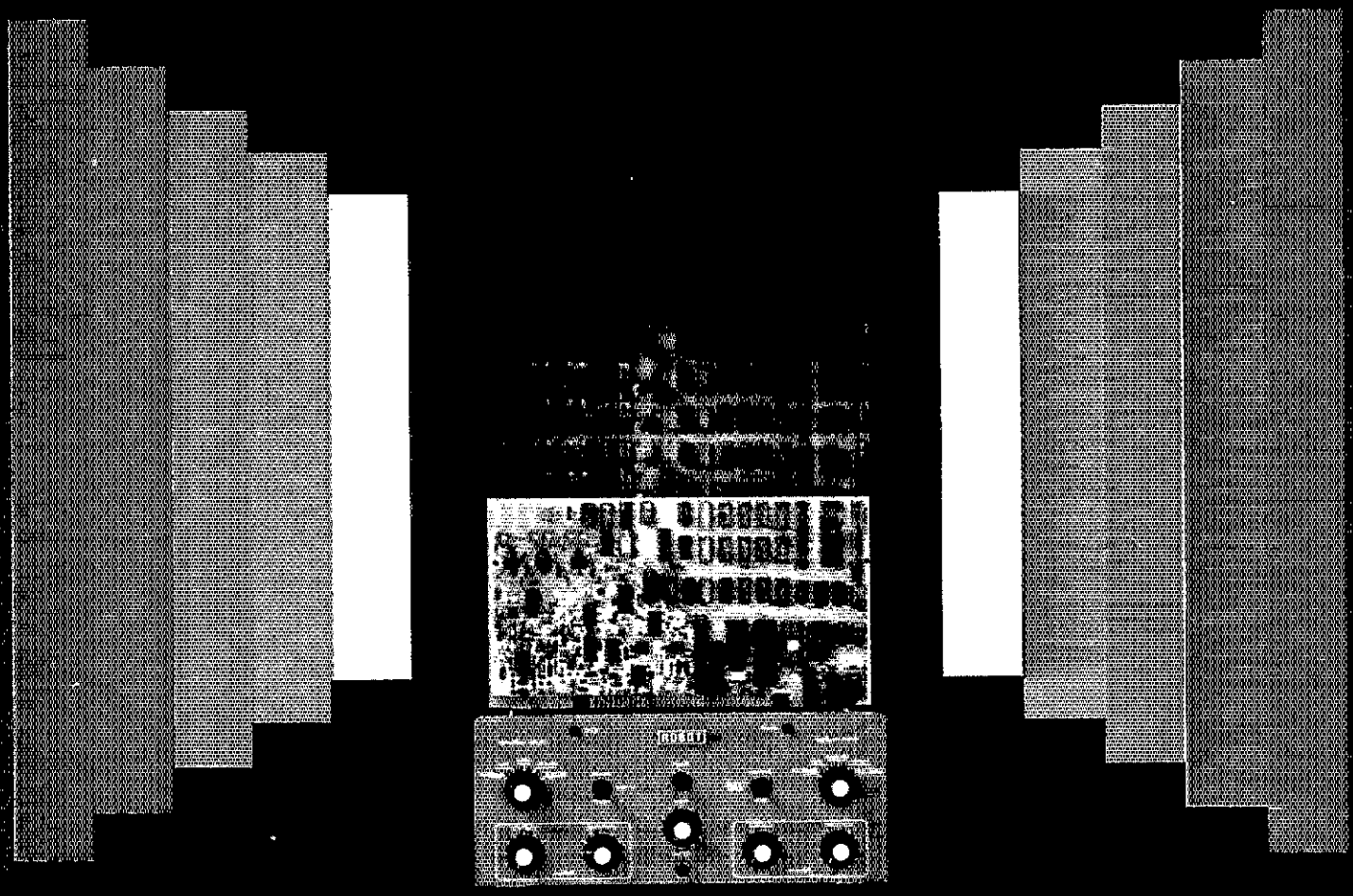
ROBOT BREAKTHROUGH



Robot Single Frame Color Slow Scan TV

Robot's color slow scan TV provides you with a whole new dimension of Amateur Radio activity. Now you can exchange color pictures of your latest DX QSL card, the best stamp in your collection, or even that terrific sunset scene you shot last summer.

Robot's new microprocessor controlled, color SSTV equipment, available now in retrofit board to convert Model 400's to full color, provides 12 second single frame transmission of color images. It is black and white compatible, and offers sharp, clear color picture quality never before possible.

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Also introducing our new Super Terminal with color graphics capability when used with the new Robot color scan converter. Also has expanded memory, printer interface, and non-volatile message memories for RTTY and Morse.

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World Leaders in Slow Scan TV, Phone Line TV and Image Processing Systems.

INTRODUCING . . .

THE FT-980 CAT SYSTEM ! ! !

Join the computer revolution in Amateur Radio with the Computer Aided Transceiver . . . the new FT-980 from Yaesu Electronics!

- 8-Bit microprocessor for greater operating flexibility.
- High-voltage, all solid state transmitter PA for excellent linearity.
- Keyboard entry of frequencies into any of twelve independent VFO/memory registers.
- Amateur band transmit plus general coverage receive capability.
- Full CW break-in with quiet solid state switching.
- CW Spot switch on front panel.
- Digital frequency display with resolution to 10 Hz. Digital readerboard-type coarse frequency sub-display.
- Keyboard entry of sub-bands for Novice, General, or Advanced Class operators. Separate sub-bands may be programmed on each memory.
- Up/Down scanning plus instant ±5 kHz/step QSY from front panel.
- SSB/CW/AM/FSK/FM operation built in. CW and AM Wide/Narrow selection using optional filters.
- Wide dynamic range and noise floor maintenance provided by husky front end design and IF filter gain balancing.
- 10 Hz synthesizer steps. Quick frequency change via keyboard or scanning controls.
- IF Notch filter at 455 kHz for interference rejection.
- Audio Peak Filter for narrow band CW signal enhancement.
- RX Audio Tone Control for signal laundering in AF line.
- Variable IF Bandwidth and IF Shift using cascaded filters.
- Memory storage of both frequency and operating mode.
- Pushbutton Memory Check feature for verification of memory frequencies without actually changing operating frequency in use.
- Pushbutton Offset Check feature for verification of memory-to-VFO frequency difference.
- Variable Pulse Width Noise Blanker.
- IF Monitor with front panel volume control.
- RF Speech Processor.
- Dual metering of Vcc, Ic, ALC, Compression, Discriminator Center, Relative PO, and SWR (Calibrated).
- Selectable AGC: Slow/Fast/Off.
- Separate RX-only antenna jack.
- Three FSK shifts built in.
- Optional Electronic Keyer Module.
- Optimization of audio passband for mode in use, for preservation of noise figure with changing bandwidth.
- Computer interface optional module available mid-1983, for remote transceiver control from personal computer terminal.

For a detailed brochure covering the FT-980 CAT System, call or write your Authorized Yaesu Dealer.

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU

The radio.

0183

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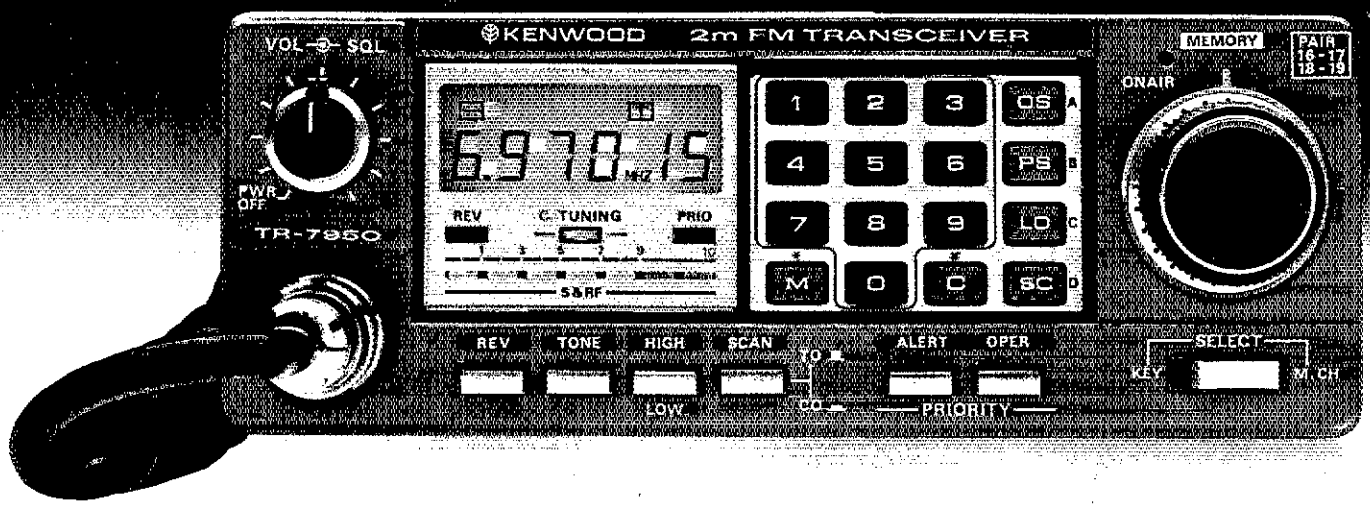
NEW

Watts to see...



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

TR-7950/7930

Outstanding features providing maximum ease of operation include a large, easy-to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch encoder, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7950/TR-7930 FEATURES:

- **NEW, large, easy-to-read LCD digital display**
  Easy to read in direct sunlight or dark (back lighted). Displays transmit/receive frequencies, memory channel, repeater offset, (+,S,–), sub-tone number (F-0, 1, 2, 3), tone, scan, and memory scan lock-out. Includes LED S/RF bar meter, and LED indicators for REVERSE, CENTER TUNING, PRIORITY, and ON AIR.
- **21 NEW, multi-function memory channels**
  Stores frequency, repeater offset, and optional sub-tone channels. Memories 1 through 15 for simplex or ± 600 kHz offset. Memory pairs 16/17, and 18/19 are paired for non-standard repeater offset. Memories "A" and "B" set upper and lower scan limits, or for simplex or ± 600 kHz offset. In MEMORY mode, a circle of light appears around the memory selector knob. When the memory selector knob is rotated in either direction to channel 1, an audible "beep" will sound.
- **Choice of 45 or 25 watts output**
  The TR-7950 provides a hefty 45 watts output, while the TR-7930 features a more modest 25 watts. A HI/LOW power switch allows power reduction to approx. 5 watts.
- **Long-life lithium battery memory back-up**
  Built-in lithium battery has an estimated 5 year life.
- **Automatic offset**
  The microprocessor is pre-programmed for simplex or ± 600 kHz offset, in accordance with the 2 meter band plan. "OS" key allows manual change in offset.
- **Programmable priority alert**
  The PRIORITY channel may be programmed in any of the 21 memories. With ALERT switch "ON," a dual "beep" sounds when a signal is present on the PRIORITY channel. An OPER switch allows an easy move to the PRIORITY channel.
- **Programmable memory scan lock-out**
  "LO" key for programming scan to skip selected memory channels, without erasing the memory.
- **Programmable band-scan width**
  The lower limit may be programmed into memory "A," and the upper limit into memory "B."
- **Center stop during band-scan, with indicator**
  Stops in center of channel during band-scan, with center tuning indicator.
- **Scan resume selectable**
  Scan stops on busy channel. Selectable automatic time resume-scan (approx. 5 sec., adjustable), or carrier operated resume-scan. A scan delay of approx. 1.5 seconds built-in.
- **Scan control using up/down microphone**
  Momentarily pressing UP or DOWN button on microphone tunes one step in the selected direction, on memory or on 5-kHz step tuning. Holding the button for about 2 seconds starts UP or DOWN automatic scan action. Scan start also possible using "SC" key on keyboard. Scan may be cancelled by momentarily pressing the PTT switch, or by pressing both UP/DOWN buttons simultaneously.
- **Programmable sub-tone channels**
  Optional TU-79 3 frequency sub-tone unit provides keyboard selectable sub-tone channels, which may be stored in memory.
- **Built-in 16-key autopatch, with monitor**
  The keyboard functions as a 16-key autopatch encoder during transmit. DTMF tones appear in the speaker output when a key is pressed during transmit.
- **Front panel keyboard control**
  Used for selecting frequency, offset, programming memories, controlling scan, and autopatch encode. Keyboard lighting is provided.
- **Extended frequency coverage**
  Covers 142.000-148.995 MHz, in 5-kHz steps.
- **Repeater reverse switch**
  Locking-type switch, with indicator.
- **"Beeper" amplified through speaker**
- **Compact, lightweight design**
- **Easy-to-install adjustable-angle mobile mounting bracket**

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.

More information on the TR-7950 and TR-7930 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.