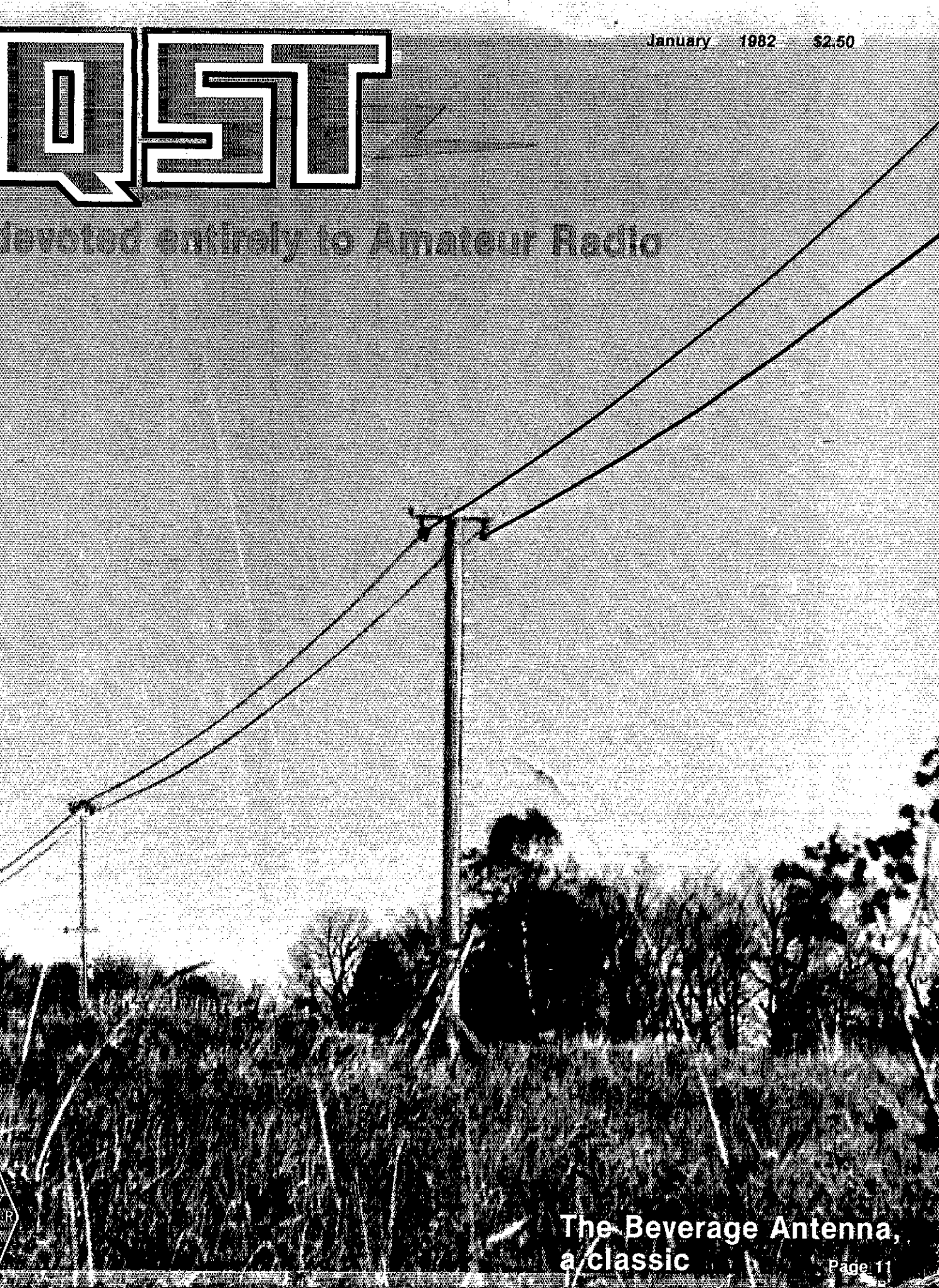
QST

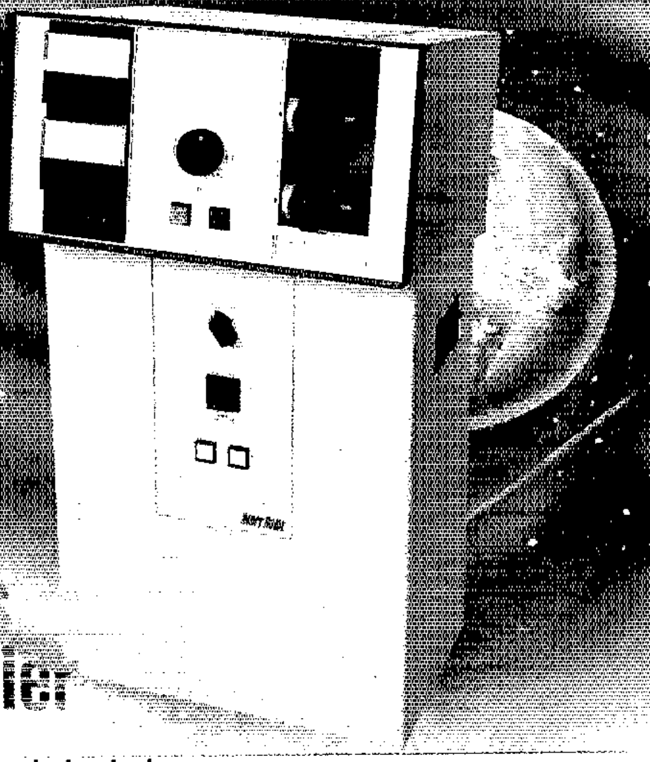
January 1982 $2.50

devoted entirely to Amateur Radio



The Beverage Antenna, a classic

Page 11



2K Classic

A new edition of the world's most famous linear amplifier

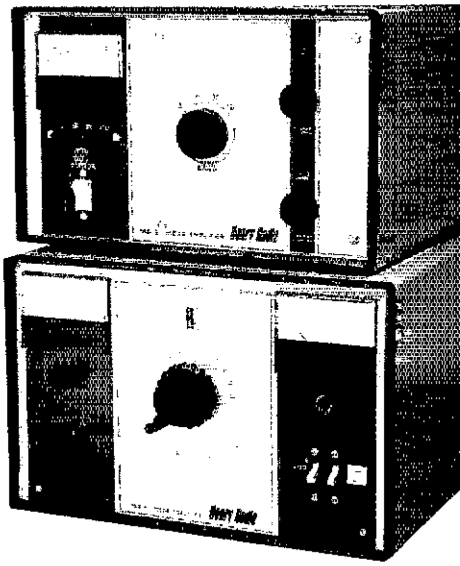
The 2K Classic represents the culmination of fifteen years experience in developing, manufacturing and improving the 2K series. It remains as always a "workhorse", engineered and built to loaf along at full legal power for days or weeks without rest. A look inside shows why! No expense has been spared to make the 2K a truly "Classic" Amateur amplifier. Heavy duty, top quality components along with its rugged construction assures you of trouble free operation. The 2K Classic offers engineering and features second to none. It will put your signal on the air with greater strength and clarity than you ever dreamed possible. The 2K Classic operates on all amateur bands, 80 through 15 meters (export models include 10 meters).

Features:

- Two rugged Eimac 3-500Z grounded grid triodes
- Pi-L plate circuit with silver plated tank coil
- Resonant cathode pi input circuit
- Maximum legal input on all modes

***The* 1KD-5** ...Another fine member of the famous Henry Radio family of superior amplifiers. And we're still convinced that it's the world's finest linear in its class. The 1KD-5 was designed for the amateur who wants the quality and dependability of the 2KD-5 and 2K-4, who may prefer the smaller size, lighter weight and lower price and who will settle for a little less power. But make no mistake, the 1KD-5 is no slouch. Its 1200 watt PEP input (700 watt PEP nominal output) along with its superb operating characteristics will still punch out clean powerful signals...signals you'll be proud of. Compare its specifications, its features and its fine components and we're sure you will agree that the 1KD-5 is a superb value at only $695.

***The* 2KD-5** We have been suggesting that you look inside any amplifier before you buy it. We hope that you will. If you "lift the lid" on a 2KD-5 you will see only the highest quality, heavy duty components and careful workmanship...attributes that promise a long life of continous operation in any mode at full legal power. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. It operates with two Eimac 3-500Z glass envelope triodes and a Pi-L plate circuit with a rotary silver plated tank coil. Price $945.



And don't forget the rest of the Henry family of amateur amplifiers...the Tempo 2002 high power VHF amplifier and the broad line of top quality solid state amplifiers. Henry Radio also offers the 3K-A and 4K-Ultra superb high power H.F. amplifiers and a broad line of commercial FCC type accepted amplifiers for two way FM communications covering the range to 500 MHz.

Announcing!

A brand new "super" linear...the 3K Classic! Designed for the most critical Amateur Radio operator...the individual who wants and appreciates owning the finest.

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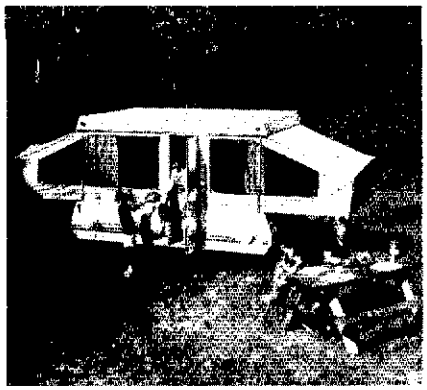
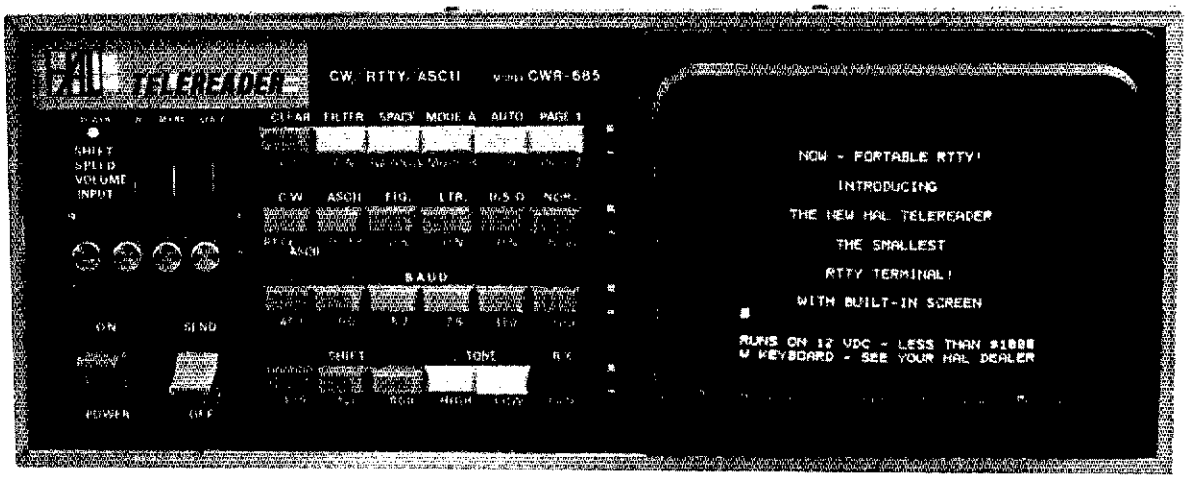


RTTY To Go.

Loud and Clear.



The Portable HAL Telereader CWR-685A.

Now RTTY can hit the road with you, when you take along this portable telereader from HAL.

HAL offers the smallest RTTY terminal you can find. It's easy to pack and go — on long drives, camping trips, boating, anywhere away from home.

Pick up your portable HAL Telereader at your favorite amateur dealer store today — you can order it *to go!*

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- **Baudot, Morse, ASCII**
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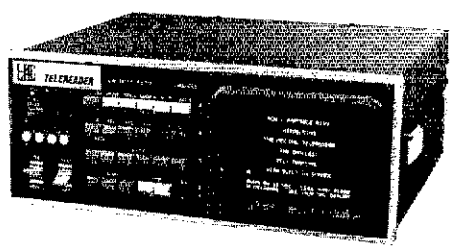
- **Built-in 5" Green CRT**
- **Four-page Display**
- **Compact Size (12¾W x 5H x 11½"D)**
- **With External Keyboard**
- **Runs on 12 VDC**



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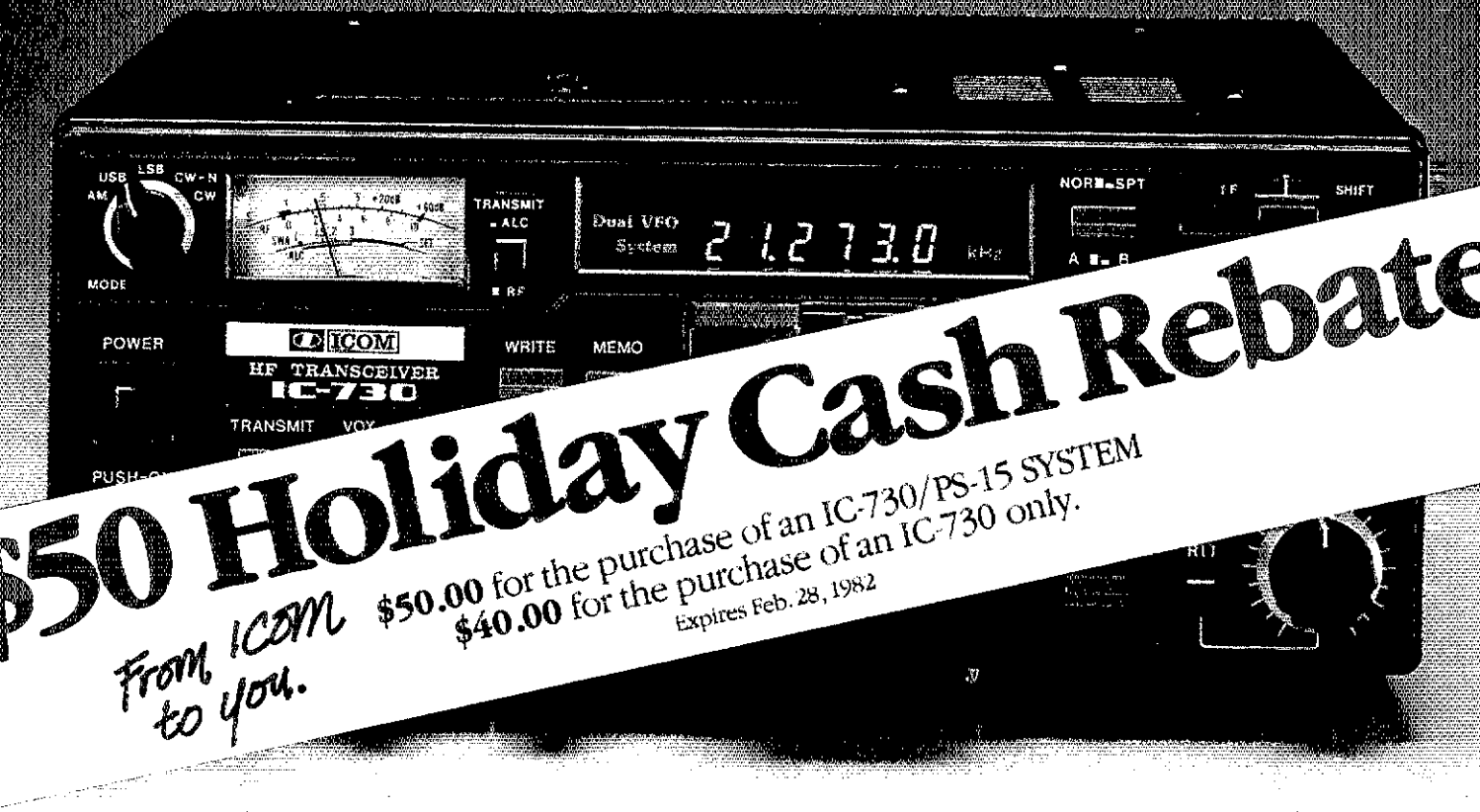
ICOM IC-730

ICOM's Go-Anywhere HF Rig for Everyone's Pocketbook



$50 Holiday Cash Rebate

From ICOM to you.

$50.00 for the purchase of an IC-730/PS-15 SYSTEM
$40.00 for the purchase of an IC-730 only.

Expires Feb. 28, 1982

Compact.

Only 3.7 in (H) x 9.5 in (W) x 10.8 in (D) will fit into most mobile operations (compact car, airplane, boat, or suitcase)

Affordable.

Priced right to meet your budget as your main HF rig or as a second rig for mobile/portable operation.

Convenient.

- Unique tuning speed selection for quick and precise QSY, choice of 1 KHz, 100 Hz or 10 Hz tuning.
- Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
- One memory per band, for storage of your favorite frequency on each band.
- Dual VFO system built in standard at no extra cost.

Full Featured.

- 200W PEP input—powerful punch on SSB/CW (40 W out on AM)
- Receiver preamp built-in • VOX built-in
- Noise blanker (selectable time constant) standard
- Large RIT knob for easy mobile operation
- Amateur band coverage 10-80M including the new WARC bands
- Speech processor—built-in, standard (no extra cost)
- IF shift slide tuning standard (pass band tuning optional)
- Fully solid state for lower current drain
- Automatic protection circuit for finals under high SWR conditions
- Digital readout • Receives WWV • Selectable AGC
- Up/down tuning from optional microphone
- Handheld microphone standard (no extra cost)
- Optional mobile mount available

ICOM

2112 116th Avenue N.E., Bellevue, WA 98004
3331 Towerwood Dr., Suite 307, Dallas TX 75234

January 1982 *Volume LXVI Number 1*

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THE COVER

"Wichita Lineman's" work? No, it illustrates the classic two-wire Wave Antenna pioneered in 1922 by H. H. Beverage and R. B. Bourne. See the update and reprint beginning on page 11.

Contents

ST-144/μP, 2 Meter FM

It's Time!

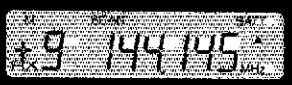
■ It's time you got your share of the excitement of full-feature synthesized handheld operations. ■ SANTECnology zaps to the lead of the state-of-the-art in 2 meter handhelds with the new ST-144/μP. ■ Only SANTEC hands you all the up-to-the-minute features of this "clockwise" precision jewel.

■ The 24 hour format digital clock on the LCD display is uniquely SANTEC, and it typifies the thoughtful operator-oriented design incorporated throughout the ST-144/μP. ■ Not only does it give you accurate time checks whenever you want, but also it can display the time instead of the frequency, while this handful of radio continues to operate on your "favorite" frequency.

24 Hr Clock provides time of day even while the radio is turned off, or it can be selected by the front panel switch while in QSO

Full Frequency Display showing offset selected, battery condition and current scan mode. At turnon, the contents of M-1 are loaded into the operating register and the display looks like this.

The Memory Mode is indicated by the small "M" above "+", the "5" indicates that the data were stored in Memory 5 before recall. The "+" indicates that the + offset was stored with the frequency

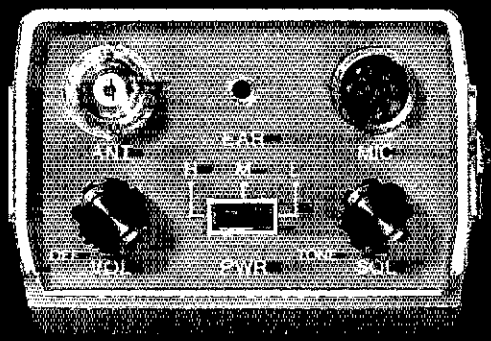


Memory Scan with "Priority Scan Auto-Resume" has stopped on Memory 9 to listen for a few seconds.

Transmit is indicated on a minus 600 kHz offset from 146.820 MHz which was stored in M-6. Activity on Memory 6 was found by using the "Search" mode of Scan

■ The 10 frequencies that you put into the memories are stored with your repeater offsets, and you can have them scanned, searched or instantly recalled at the touch of a button. ■ Memory 1 even gets priority treatment in the memory scan mode. ■ That's timely complexity made amazingly simple: and the high power option of 3.5W (nominal) is simply the greatest reach you've ever held in your hand.

■ "Battery saver" function by the computer to hoard battery power when the frequency is quiet ■ Programmed limits for both ends of bandscan ■ Simplified frequency entry only by keyboard ■ Full capacity, low impedance audio output to drive an external speaker ■ Wide band span for MARS, CAP, AF MARS: 142.00-149.995 MHz ■ Quick-change 500mAh battery ■ Separate level controls for MIC, TT, PL and DEV ■ & so much more that we don't have space to mention ■ SANTEC hands it all over, while others can't even give you the time of day.



All stated specifications are subject to change without notice or obligation

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

Sale of the ST-144 μP is subject to FCC certification approval and availability expected January, 1982.

SANTEC

1981, Encomm, Inc.
2000 Avenue G, Suite 800 Plano, Texas 75074
Phone (214) 423-0024 • INTL TLX 203920 ENCOM UR

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Plano TX 75074

Please send me more information about:
- ☐ The ST-144/μP
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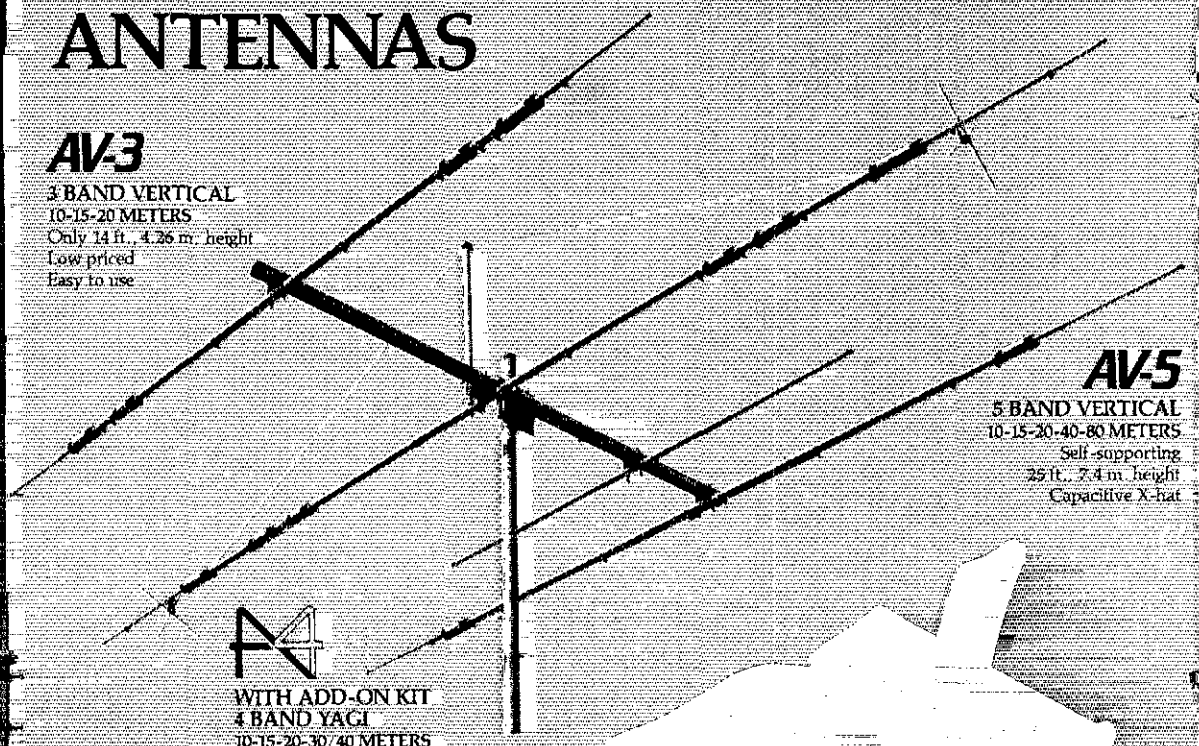
CUSHCRAFT HF MULTIBAND

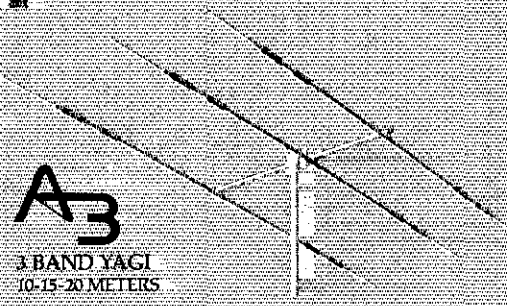
CONTEST WINNING ANTENNAS

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



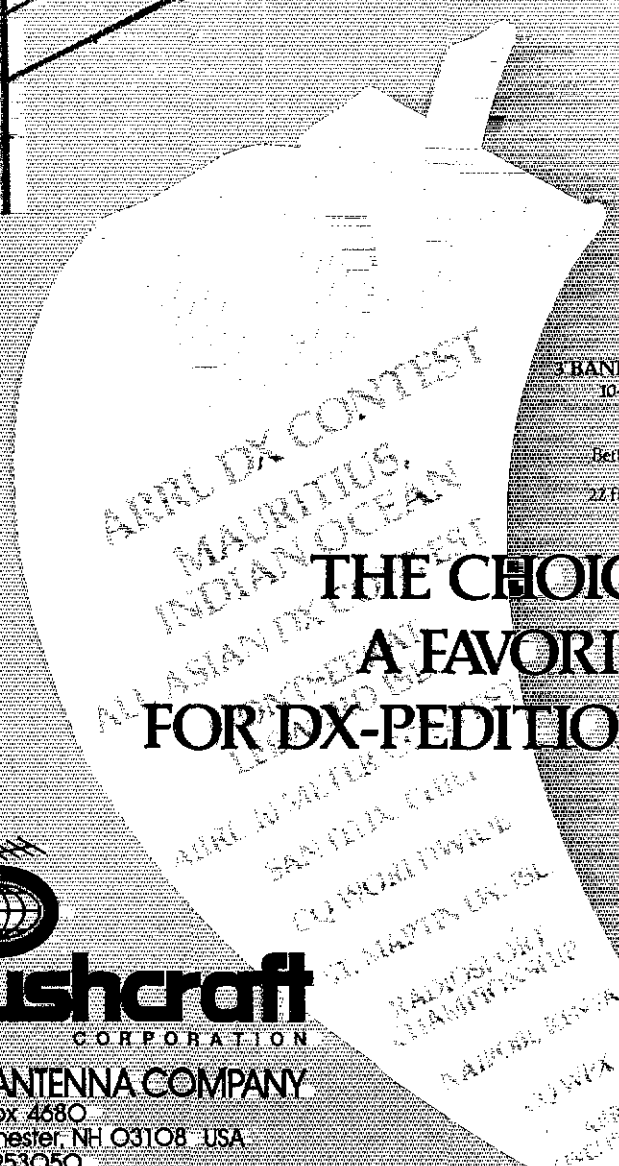
A3
3 BAND YAGI
10-15-20 METERS

R3
3 BAND VERTICAL
10-15-20 METERS
No radials
Remote tuning
Better than average performance
22 ft., 6.7 m. height

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

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

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



THE CHOICE, A FAVORITE FOR DX-PEDITIONS

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CORPORATION

THE ANTENNA COMPANY
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Manchester, NH 03108 USA
TELEX 953050

TS-130S/V

"Small wonder"...speech processor, N/W switch, IF shift, digital display

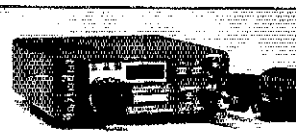
The compact, all solid-state HF SSB/CW mobile or fixed station TS-130 Series transceiver covers 3.5 to 29.7 MHz, including the three new bands.

TS-130 SERIES FEATURES:

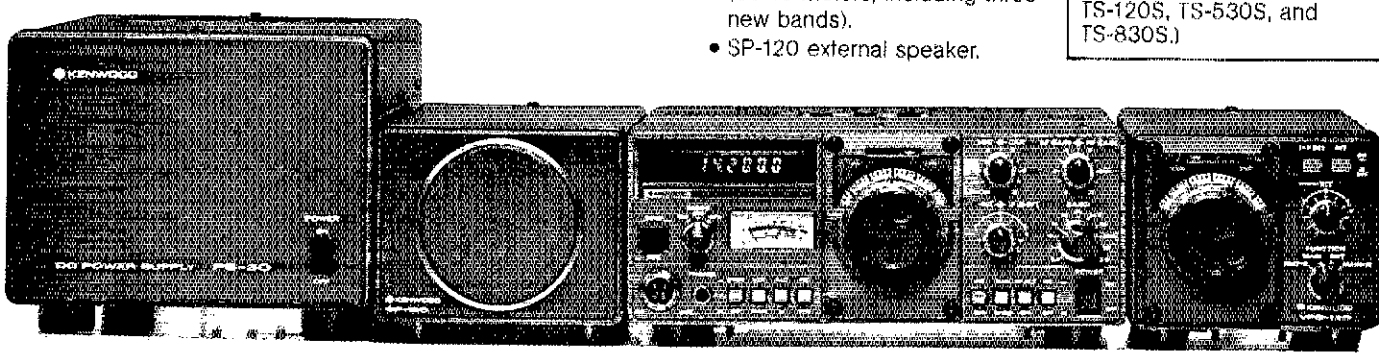
- 80-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- TS-130S runs 200 W PEP/160 W DC input on 80-15 meters and 160 W PEP/140 W DC on 12 and 10 meters. TS-130V runs 25 W PEP/20 W DC input on all bands.
- Built-in speech processor.
- Narrow/wide filter selection on both CW (500 Hz or 270 Hz) and SSB (1.8 kHz) with optional filters.
- Automatic selection of sideband mode (LSB on 40 meters and below, and USB on 30 meters and above). SSB REVERSE switch provided.
- Built-in digital display.
- Built-in RF attenuator.
- IF shift (passband tuning).
- Effective noise blanker.

OPTIONAL ACCESSORIES:

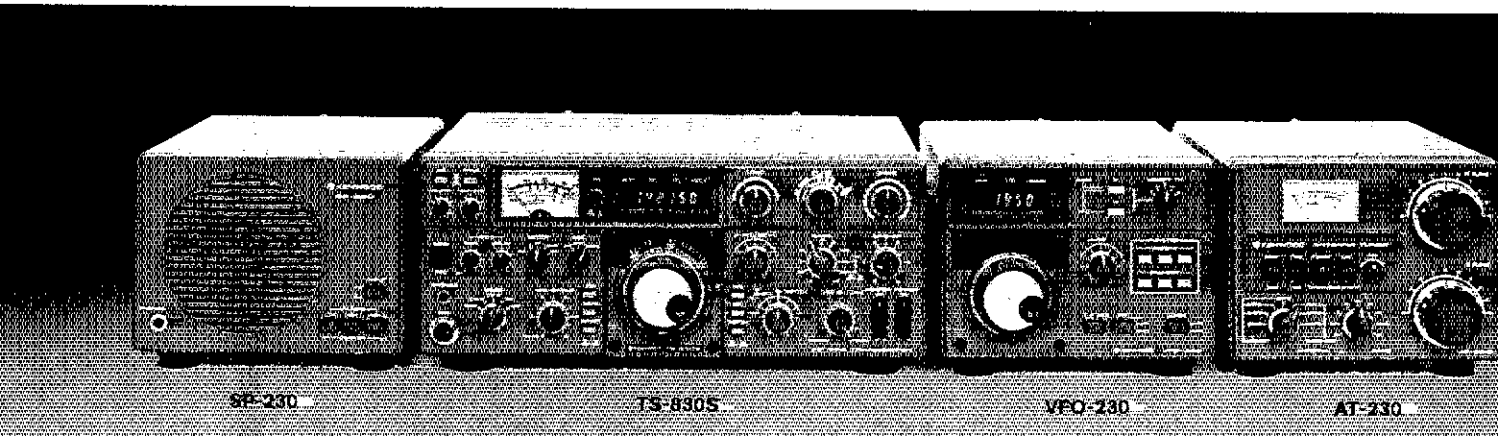
- PS-30 base-station power supply.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.
- AT-130 compact antenna tuner (80-10 meters, including three new bands).
- SP-120 external speaker.
- VFO-120 remote VFO.
- MB-100 mobile mounting bracket.
- PS-20 base-station power supply for TS-130V.



Optional DFC-230 Digital Frequency Controller
Frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-23 Four memories and digital display. (Also operates with TS-120S, TS-530S, and TS-830S.)



PS-30 SP-120 TS-130S VFO-120



SP-230 TS-830S VFO-230 AT-230

TS-830S

"Top-notch"... VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog dial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES:

- SP-230 external speaker w selectable audio filters.
- VFO-230 external digital VF with 20-Hz steps, five memories, digital display.
- AT-230 antenna tuner/SWR and power meter/antenna switch. 160-10 meters, including three new bands.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filte for 8.83 MHz IF.
- KB-1 deluxe heavyweight k
- (VFOs for TS-830S, TS-530S TS-130 Series, and TS-120S are compatible with all four series of transceivers.)

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

Digital world clock with two 24-hour displays, quartz time base

The HC-10 digital world clock with dual 24-hour display shows local time and the time in 10 preprogrammed plus two programmable time zones.

R-600

"Now hear this"... digital display, front speaker, easy tuning

The R-600 is a high performance, general coverage communications receiver covering 150 kHz to 30 MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

R-600 FEATURES:

- 150 KHz to 30 MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1 MHz wide, for easier tuning.
- Five digit frequency display, with 1 KHz resolution.
- 6 kHz IF filter for AM (wide), and 2.7 kHz filter for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity, and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20 dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SINPO-S scale, plus conventional "S" meter scale.
- Coaxial, and wire antenna terminals for low impedance (50 Ω). Wire terminals for high impedance (500 Ω).
- 100, 120, 220, and 240 VAC, 50/60 Hz. Selector switch on rear panel.
- Optional 13.8 VDC operation, using DCK-1 cable kit.
- Other features: carrying handle, headphone jack, and record jack.

OPTIONAL ACCESSORIES:

- DCK-1 DC Cable kit.
- SP-100 External Speaker.

R-1000

"Hear there and everywhere"... easy tuning, digital display

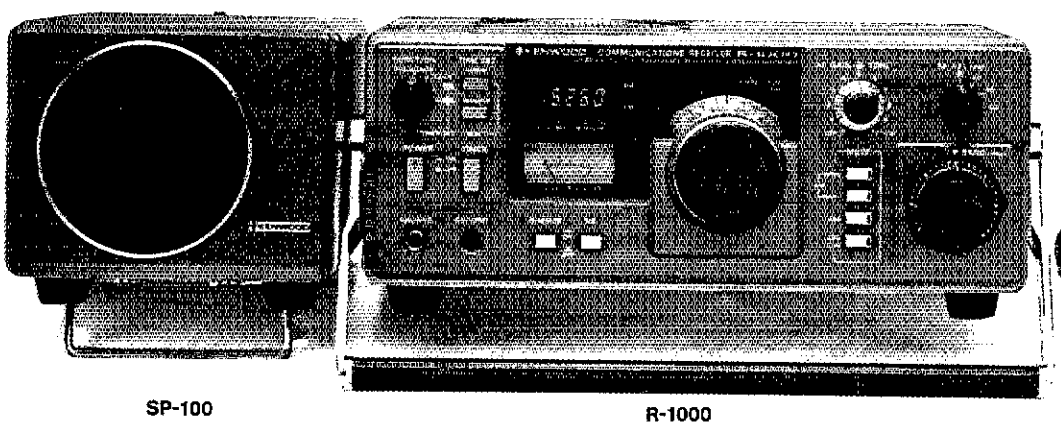
The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

R-1000 FEATURES:

- Covers 200 kHz to 30 MHz continuously.
- 30 bands, each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW, 12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax terminal for 2 MHz to 30 MHz.
- Voltage selector for 100, 120, 220, and 240 VAC. Also adaptable to operate on 13.8 VDC with optional DCK-1 kit.

OPTIONAL ACCESSORIES:

- SP-100 matching external speaker.
- HS-6 lightweight, open-air headphone set.
- HS-5 and HS-4 headphones.
- DCK-1 modification kit for 12-VDC operation.



SP-100

R-1000

HS-5

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

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*Executive Committee Member

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us . . ."

The Wouff Hong

In an institution as old as Amateur Radio, traditions and symbols of the art appear and become part of it. Our traditions are many, among them our long record of self-policing, our dedication to public service in experimentation, our instant response to the call of our country in time of war. But of the symbols, only one — aside from the ARRL diamond — has become a part and parcel of the framework of Amateur Radio, the symbol of its finest traditions, its long and glorious history.

That symbol is the Wouff Hong. Every ham should know its origin.

It seems to us that now is a good time to retell the story of this famous and beloved part of the very fabric of Amateur Radio. Visitors to Headquarters and to W1AW seeing either the original or one of the many replicas in our buildings ask what it means. New members of the Royal Order of the Wouff Hong, initiated during the midnight convocations of the Order at League Conventions, ask, "But where did it come from, in the beginning?"

It started back in 1917, in the very earliest days of ARRL and *QST*, when an anonymous amateur, writing under the title "The Old Man," created a wonderful series of humorous stories in the magazine. In a pithy, irascible style he assailed all that struck him as criticizable about ham radio operation of the period in his famous "Rotten Radio" series, beloved to this day by all who read it. He pitilessly exposed the poor operating practices of the day, yet did it in a way which drew chuckles even from those recognizing themselves as the special targets of his ire.

In one of those stories, "Rotten QRM," he launched forth with examples of some of the poor sending cluttering up the band in a particular QSO to which he was listening. The gibberish included the words "wouff hong" which, apparently, was being used by someone or somebody else.

It turned out to be one of those priceless pieces of spontaneous word invention. Instantly, it caught on with the gang. Although T.O.M. himself admitted at the time he didn't know exactly what a wouff hong was, it quickly became something with which both to attack bad operating practices and to discipline their perpetrators. Within three months, the editor of *QST* found it necessary to write an editorial on the growing demand from the membership for wouff hongs. How rapidly this situation might have developed had not World War I intervened is a matter of speculation. But the tradition had been established, the Wouff Hong created in the minds of thousands of amateurs as some mythical instrument of torture to be used in enforcing good operating practice in Amateur Radio.

When *QST* resumed after the war, one of its first contributors was T.O.M. In an early 1919 issue he contributed an article "Rotten Starting" to work off steam on the slowness with which our government was getting around to let us operate again. At the conclusion of this article appeared the following: "In the meantime . . . I am sending you a specimen of a real live Wouff Hong which came to light out here when we started to get our junk out of cold storage. Keep it in the Editorial sanctum where you can lay hands on it quickly in an emergency. We will be allowed to transmit soon and then you will need it."

The object was duly received at Hq. The Editor, fully mindful of the historic significance of the occasion, took the instrument to one of the first Board meetings, in New York, May 3, 1919, subsequently duly reporting in *QST* that "each face noticeably blanched when the awful Wouff Hong was . . . laid on the table." By an action still a part of the League's official records, that Board voted that the Wouff Hong be framed and placed on display in the Hq. offices of the League. There it remains to this day.

We know the significance of the Wouff Hong. We don't know the significance of its weird shape. Not even the beloved T.O.M. (revealed, after his death, as none other than our first president, Hiram Percy Maxim) ever explained that. Nor was the precise manner of its use ever prescribed, although it perhaps may be guessed with a little imagination. But as the years passed, it continued to grow in the affections of amateurs the country over, old-timer and youngster alike. It became the inspiration of the Royal Order of the Wouff Hong, the amateur secret society of ARRL convention. Today, it is thoroughly entrenched in the lore of Amateur Radio as its most sacred symbol.

The Wouff Hong! — see it when you next visit ARRL hq.

League Lines...

Happy New Year! If you'd like to know what's in store for 1982, turn to the Operating Events and Conventions listing on page 86. Page 85 has the latest license renewal information, along with U.S. frequency and mode allocations. Cut out the page on the dashed line, or make a photocopy, to keep it handy throughout the year.

Amateurs in some countries will be permitted to use the new band at 10.100-10.150 MHz as early as January 1, 1982. This is not the case for U.S. amateurs! The WARC-79 Final Acts first must be ratified by the Senate, and FCC regulations governing the use of the band must be adopted, before any U.S. operation can take place. Unauthorized operation could cause considerable damage to long-term Amateur Radio interests. Amateurs are often critical of operators in other services who operate outside their authorized bands; let's not expose ourselves to the same criticism.

Amateur facsimile and television transmissions will be permitted on all amateur phone frequencies between 3.5 and 29.7 MHz, according to the FCC initial announcement of its action taken in PR Docket 80-252. The rule change will have the practical effect of allowing operators holding a General class or higher license to use facsimile and slow-scan TV on all the hf bands. The effective date will be announced over W1AW. For information about the proposal that brought about this action, see "Happenings" in August 1980 QST.

Good news for Canadian amateurs! Tariff Item 44534 2 has been reworded to permit duty-free entry of amateur transmitters, receivers, transceivers and related equipment with provisions for WARC bands or with general-coverage receive functions. Details appear in this month's "Canadian NewsFronts," page 62.

According to a recent FCC Order, "Part 97 stands unambiguously for the proposition that a licensee of a repeater station in the Amateur Radio Service is responsible for the content of the repeater station's transmissions." The Commission's Order denied a petition for rulemaking, RM-3618, that requested that repeater licensees be responsible for maintaining the technical standards of the repeater only and that user stations be solely responsible for the content of their transmissions.

As a result of the ARRL Board action at Minute 55 of the September 1981 meeting (see November 1981 QST, page 54), all ARRL Advisory Committee appointments presently in effect remain unchanged. Nominations are always accepted and will remain on file for consideration as vacancies occur.

The FCC has proposed to authorize the unattended automatic control of beacons in PR Docket 81-823 and limit all beacon operation to designated sub-bands. The amount of spectrum proposed for each sub-band depends on propagation conditions, use congestion and the spectrum range of the particular amateur band considered. The beacon proposal also includes a 100-watt power input limit, special identification requirements and a prohibition of beacon operations on more than one frequency in the same band from the same location. The comment deadline is March 15, 1982. Replies are due April 15. Details of this proposal, including a list of the frequencies proposed for beacon operations, will appear in next month's "Happenings."

Ballots were in the mail December 1, 1981, to all ARRL Full Members of record as of November 2 in the Great Lakes and Pacific Divisions. These elections are for the office of director only. Full Members in those divisions who do not receive a ballot by January 1 should immediately contact Donna Frechette at Hq. See page 58 for details about these elections.

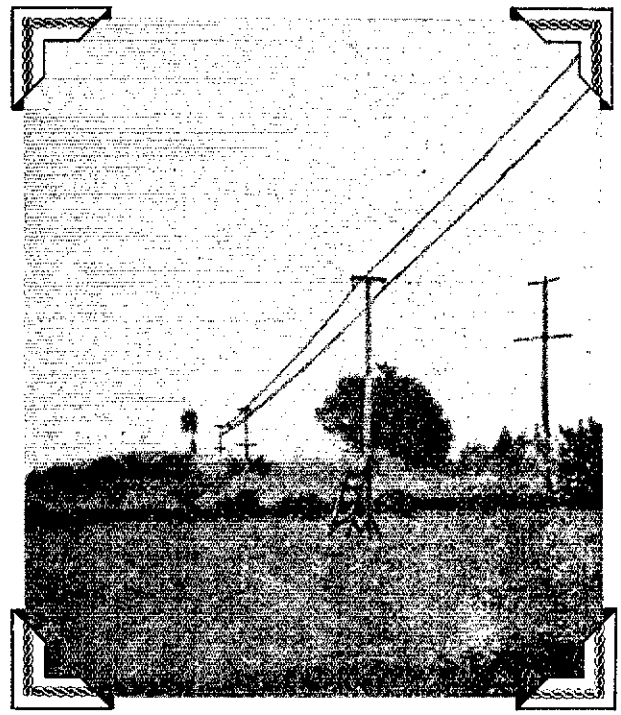
QST is looking for an editorial assistant/copyeditor for an immediate opening at League Hq. Responsibilities include editing fillers and general interest material for publication, and conducting the "QST Profiles" column. The successful candidate will have a journalism or English background, and will hold an Amateur Radio license. Contact Joel Kleinman, N1BKE, at Hq.

The article "Phone-Line Interface -- Do it Solid-State Style," in October QST does not include all of the information that is necessary for legal operation of the phone-line interface. Before an interface device (terminal equipment) may be connected to the telephone network, it must be registered with the FCC or connected through a registered protective coupler. Part 68 of the FCC Rules and Regulations specifies the conditions for connection of terminal equipment to the telephone network. A copy of Part 68 can be obtained by purchasing Volume X of the FCC Rules and Regulations from the Government Printing Office, Washington, DC 20402.

The Classic Beverage Antenna, Revisited

Established theory is timeless, but many amateurs do not have access to the archives that contain classical data of present-day interest. Medium-frequency DXers should appreciate this update on an historical 1922 QST article.[1]

By H. H. Beverage,* ex-W2BML and Doug DeMaw,** W1FB



(reproduced from November 1922 *QST*)

Why the Beverage or "wave" antenna? That's a question the seasoned 160-meter DXers need not ask, for many of them have used Beverage antennas to enhance the effective signal-to-noise ratio while attempting to extract weak signals from the sometimes high levels of atmospheric noise and QRM. Alternative antenna systems have been developed and used over the years, such as loops and long spans of unterminated wire on or slightly above the ground, but nothing seems to surpass the Beverage antenna for 160-meter weak-signal reception.

The practical limitation for many amateurs is the size of their property: a Beverage antenna must be a wavelength or greater in dimension, which for 160-meter work requires a minimum practical antenna length of 166.6 meters (546.8 feet) at 1.8 MHz (feet = meters × 3.281). In an ideal situation, one would deploy a number of Beverage antennas in order to facilitate weak-signal reception from a variety of favored directions, such as Europe, South America, Africa and Oceania. The magnitude of the property-size requirements for such a system might seem incomprehensible to the urban amateur, but the objective can be, and frequently is, realized by amateurs who live in rural areas. Some amateurs are part-time users of Beverage antennas. That is, they erect one or more of these antennas for short periods of time (with the kind permission of neighbors), mainly to improve reception during 160-meter contests and DX operations. One well-known top-band DXer has for many years stretched a Beverage antenna across and beyond an interstate highway (not recommended) for use during 160-meter contest weekends.

The property requirements are complicated further by the need for an effective ground system at the terminated end of the wave antenna. Although the ground screen or radials are normally buried a few inches below the surface of the earth, one cannot, without permission, bury a ground system on someone else's property. Some amateurs have reported reasonable success by driving a number of rods into the ground near the terminating resistor, then bonding the rods to one another by means of heavy conductive strap. However, the characteristics of the antenna are subject to change with the season in accordance with the conductivity of the soil, which is determined in part by the moisture content. The same is true, but to a lesser extent, when buried radials are employed for the ground screen.

Numerous attempts have been made to develop short or "baby Beverages," but the performance was always a compromise to that of a full-size Wave Antenna.[2] It is recognized, however, that some improvement in mf weak-signal reception is better than none, so the shortened version of a Beverage antenna may be worth investigation by those who have limited property.

It is ironic that arrays of small receiving loop antennas, operated in phase and simultaneously rotatable, have been proven to be highly effective in medium- and low-frequency weak-signal reception. But these arrays also require considerable property if they are to be utilized correctly. Furthermore, the cost of such a system, as opposed to a Beverage antenna, is substantially greater.

There seems to be a popular misconception about the frequencies for which the Beverage can provide the stated performance. It is not a suitable antenna for high-frequency reception. One *must* follow the general rule that applies to loop antennas: *employ the Beverage antenna at*

[1]References appear on page 17.
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**ARRL Senior Technical Editor

medium frequencies and lower. Although some have reported improved reception from Beverage antennas at 3.5 and even 7.0 MHz, the suggested upper frequency limit is 2.0 MHz. Occasional improved reception at hf may result from propagation conditions at a given time, but because the incoming sky waves above medium frequency arrive at moderate and high angles, and with changing polarity because of being reflected from the ionosphere, the Beverage is not suited to effective use in that part of the spectrum.

The wave antenna is responsive mostly to incoming waves of low angle — those that tend to follow the contour of the earth and maintain a constant polarization. This reasoning is applicable to loop antennas as well. The apparent effectiveness of Beverage antennas above 2.0 MHz probably results from a reduction in local QRN and QRM off the sides and back of the antenna. A loop antenna would provide a similar improvement in reception, especially if a sense antenna were included to ensure a cardiod response.

The successful deployment of a Beverage antenna is dependent in part on understanding the concept and development of the system. The following text has been taken from the original disclosure in the amateur literature, which appeared under the H. H. Beverage byline in November 1922 *QST*. With the recent return of the 1.8- to 2.0-MHz band to U.S. amateurs, and with the easing of the earlier power restrictions in that band, it seems timely to present the original paper again.

Theory and Development

The Wave Antenna, which later became known as the Beverage Antenna, is a unidirectional antenna. It was developed by author H. H. Beverage, Chester Rice and E. W. Kellogg of the General Electric Co., and is covered by patents and applications. The Wave Antenna was first brought to the attention of the amateurs by Paul F. Godley, who described it in his report on the reception of American amateurs at Ardrossan, Scotland.

Theory

If a wire is suspended in space, it has a certain capacitance and inductance per unit length, which bear a definite relation to each other. This relation may be expressed as $1/\sqrt{LC} = V$, where V is a constant. This constant is the velocity of light. For example, if L and C are expressed as the capacitance and inductance per meter, then $V = 3 \times 10$ meters, which is the velocity of light in meters per second. If a larger wire is used, or if two or more wires are used instead of one, in the ideal case the inductance decreases in the same ratio as the capacitance increases, so that $L \times C$ is always a constant. This means that, for the ideal wire, the currents induced in that wire will always travel along it at the velocity of light, independent of the size or number of wires.

A Beverage Antenna needs to be supported at several points and must run horizontally within a few feet of the earth. The effect of the supporting insulators and the proximity of the earth is to increase the capacitance in a greater ratio than the inductance decreases, so the velocity of the currents on a practical wire is always somewhat less than the velocity of light. On short wavelengths, however, the velocity approaches very close to the velocity of light, generally between the limits of 85% and 98% of the velocity of light for 200 meters (1.5 MHz), depending upon the size and number of wires.

In Fig. 1 is shown the simplest form of Wave Antenna. It consists simply of a wire, at least one wavelength long, stretched in the direction of the transmitting station. For explanation purposes, it may be assumed that the transmitting station is east of the receiving station, and that the receiver is placed at the west end of the antenna, as shown. The traveling wave from the transmitting station moves from east toward the west at the velocity of light. As the wave moves along the antenna, it induces currents in the wire that travel in both directions. The current that travels east moves against the motion of the wave and builds down to practically zero if the antenna is one wavelength long. The currents that travel west, however, travel along the wire with practically the velocity of light, and, therefore, move along with the wave in space. The current increments all add up in phase at the west end, producing a strong signal as shown by curve A in Fig. 2. In a like manner, static or interference originating in the west will build up to a maximum at the east end of the antenna as shown by curve B in Fig. 2.

If the east end of the antenna were open or grounded through zero resistance, all of the energy represented by curve B would be reflected and would travel back over the antenna to the west end, where part of the energy would pass to earth through the receiver and part would be reflected again, depending upon the impedance of the receiver input circuit. The horizontal plane intensity diagram would be bidirectional, as shown in Fig. 3. The reception from the west is not as good as from the east because some of the energy is lost because of attenuation in the wire as the reflected wave travels back from east to west.

In order to make the antenna unidirectional, it is necessary to stop the reflections at the end farthest from the receiver end. This is accomplished simply by placing a noninductive resistance between the antenna and ground at the far end. If this resistance is made equal to the surge impedance of the wire, it absorbs all of the energy and prevents any of it from being reflected back to the receiver. The intensity characteristic becomes unidirectional, as shown in Fig. 4.

The value of the surge impedance depends upon the size, number and height of the wires above ground, but is independent of the length of the wire. For practical construction with one or two no. 12 copper wires, the surge impedance lies between 200 and 400 ohms. The

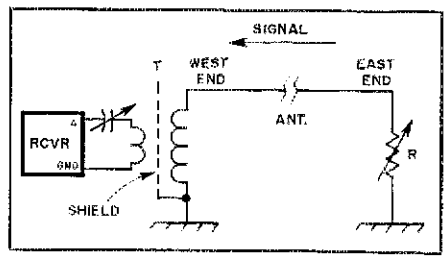


Fig. 1 — The simplest form of Wave Antenna.

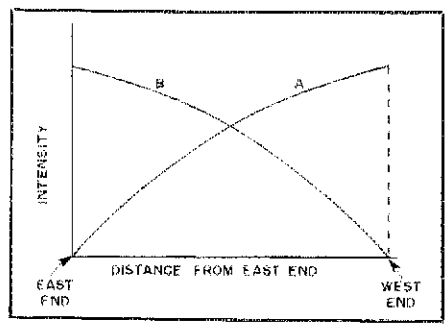


Fig. 2 — Curve A shows how the current increments add in phase at the west end of the antenna. Curve B illustrates how the static and interference add at the east end of the antenna (see text).

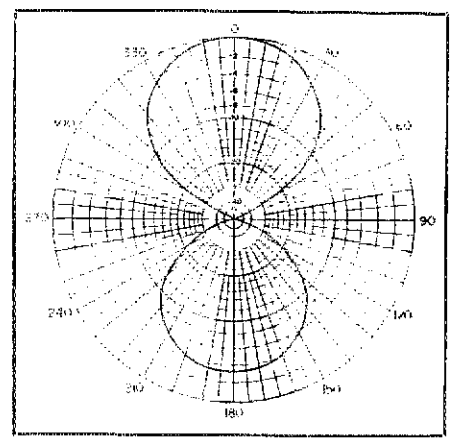


Fig. 3 — Directivity pattern of a Beverage antenna that is one wavelength long. It does not have a damping impedance included.

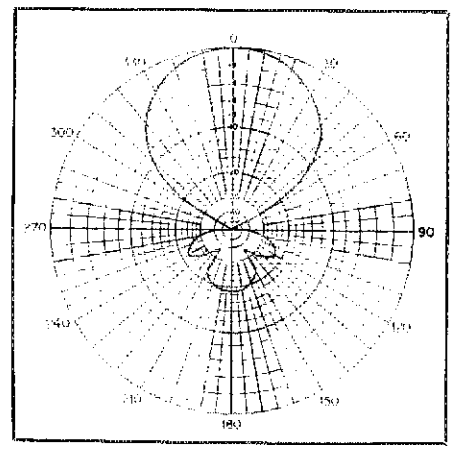


Fig. 4 — Directivity pattern for the antenna of Fig. 3. The antenna has been damped properly.

surge impedance is theoretically equal to $R = \sqrt{L/C}$, where L and C are the inductance and capacitance per unit length.

Godley used the simple form of wave antenna shown in Fig. 1. However, this is not the most practical form, as it is necessary to go to the far end to make adjustments of the damping resistance.

Feedback Antenna

If two parallel wires are used, the Wave Antenna becomes very flexible, and the receiver may be placed at either end with local control of the damping. In Fig. 5, for reception from the east, the receiver at the west end is replaced by the primary, P, of transformer T2. The primary is coupled to the secondary, S, as closely as possible, and feeds the energy over the two wires as a transmission line. A second transformer, T1, at the east end, feeds the energy from the transmission line into the receiver. The energy fed over the transmission line circulates around the line as in an ordinary telephone line and, therefore, the currents pass through both halves of the primary of T1 in the same direction, inducing voltages in the secondary, that feed into the receiver. On the other hand, currents coming over the wires as an antenna, that is, from the west, are equal and in phase on both wires, and upon passing to ground through the two halves of the primary of the output transformer, T1, they pass through the winding in opposite directions and neutralize. With this circuit, the energy reaching the receiver is the same as it would be if the receiver were placed at the west end, except for the transmission-line losses, which ordinarily are 20 to 25% with proper design. With this feedback system the operator can make adjustments of the surge resistance without leaving the station, and can listen to the signals while he or she is making the adjustments.

Fig. 6 is equivalent electrically to Fig. 5, but in this case T2 has been replaced by a simpler circuit. By grounding one wire and leaving the other wire open, the energy is reflected on each wire, but the reflected currents on the transmission line are 180 degrees out of phase on the two wires and, therefore, a difference of potential exists across the terminals of the primary of T1, exactly the same as when the reflection transformer, T2, of Fig. 5 was used. If the ground resistance at the reflecting end is zero, the reflection of energy with the connections of Fig. 6 would be 100% efficient, and the only loss would be the transmission-line losses. The open ground reflection connection is preferable to a transformer, on short wavelengths particularly.

It is possible to damp a two-wire antenna from either end. In the case of Fig. 6, the signal from the east built up to a maximum at the west end, and was then reflected up to the east end, where the receiver and damping circuit were placed. In the case shown in Fig. 7, the receiver is placed at the west end as in the case of the simple antenna of Fig. 1. Instead of placing the damping circuit at the east end, however, it is placed across the transmission line at the west end, where the receiver is. This damping circuit is practically just as effective as it would be if actually placed at the far end. This circuit also has the advantage that the desired signals do not pass over the transmission line, and the transmission-line losses are avoided.

In order for the damping circuit to be effective, it is necessary that the two wires of the

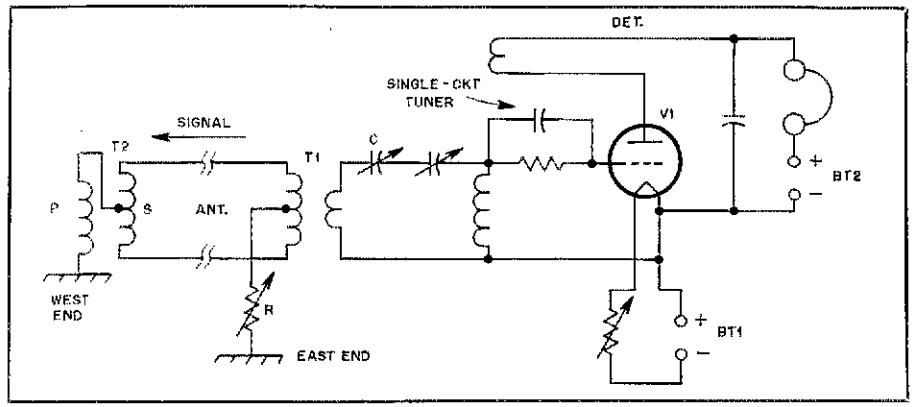


Fig. 5 — The receiver at the west end of the antenna is replaced here by primary P of T2. (See text.)

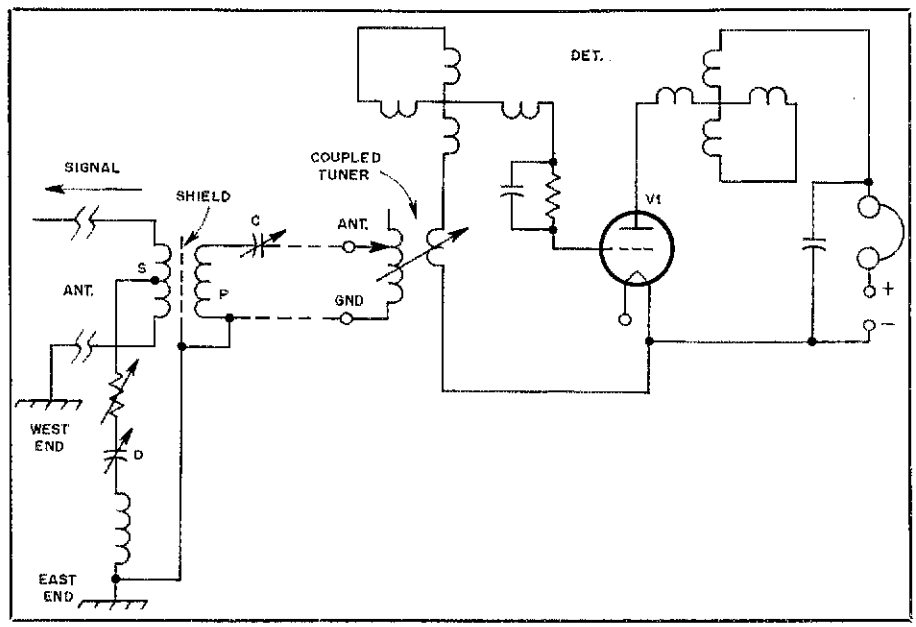


Fig. 6 — This circuit is equivalent to that of Fig. 5, except that T2 has been replaced by a simpler circuit. The damping circuit is labeled "D."

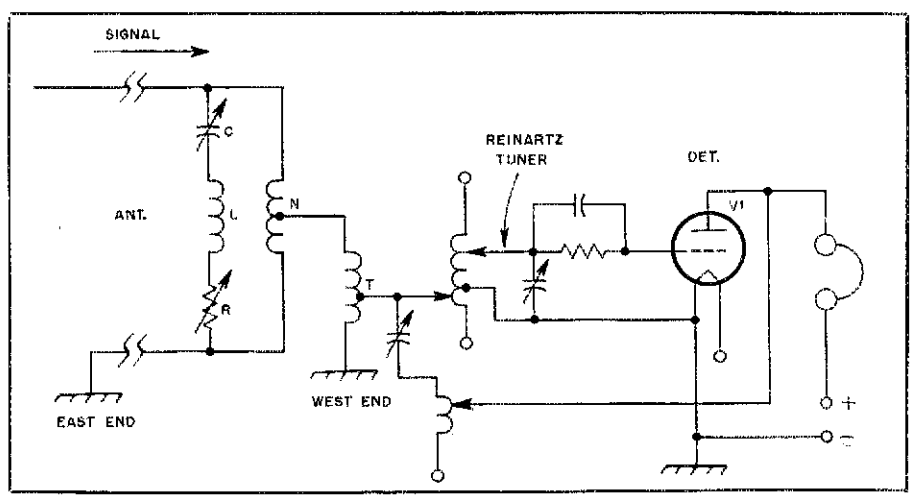


Fig. 7 — This example shows the damping circuit, D, across the two-wire Beverage antenna. The value of the damping resistance will vary with the wavelength.

antenna be joined through an inductance that is of high impedance compared with the impedance of the damping circuit. The best way to accomplish this result is to use a coil with a midpoint tap, as shown at N in Fig. 7. With respect to the transmission line, the two halves of this coil are adding, so the inductance across the line is high. With respect to the receiver, however, the two halves of the coil are opposing, so that the impedance in series with the output transformer amounts only to the leakage reactance of the coil, N, which can be made very small. A satisfactory inductor for N, for 200 meters, was a 24-turn coil, 7 inches in diameter, with a tap at 12 turns for feeding the output transformer, T. This coil was about 0.3 mH across the line, or 1900 ohms at 300 meters (1 MHz), and nearly 3000 ohms at 200 meters, which was high enough to have no appreciable influence on the damping circuit, and yet had low enough leakage reactance to allow the signals to pass to the receiver without noticeable weakening.

Damping Circuits

In Figs. 6 and 7, damping circuits D are shown that consist of resistance, inductance and capacitance in series. Because of distortion on the antenna, to back-wave effects, to interfering signals or static coming from such a direction as to be received on one of the little "ears" on the back of the antenna, as shown in Fig. 4, and so on, it often happens that there are appreciable residuals that are desirable to eliminate. This is possible by making the damping-circuit reactance either slightly capacitive or slightly inductive, instead of purely resistive. In some cases it may be desirable to reflect a small amount of energy to neutralize undesirable signals from the back end. This is readily accomplished by adjusting the resistance and capacitance of the damping circuit. The capacitance and inductance in this damping circuit are usually found to practically neutralize each other for the best adjustment; that is, they should tune approximately throughout the band of wavelengths it is desired to receive. If the wavelength being received is varied over wide limits, it is necessary to readjust the damping circuit capacitor for best results, although the adjustment is usually quite broad. The resistance does not need readjustment except in special cases.

For a range of 180 to 360 meters (1.66 to 0.83 MHz), the damping circuit consists of an inductance of about 0.08 mH, a variable capacitor of 0.0015-μF maximum capacitance and a noninductive variable resistance in steps of 1 ohm from 0 to 500 ohms. A decade box is ideal for this purpose. However, ordinary wire-wound potentiometers (inductively wound) have been used with success in damping circuits. It is necessary to select a potentiometer with sufficiently low inductance to tune well below the shortest wave it is desired to receive; then the inductance of the potentiometer is taken into account when calculating the value of inductance to be used in series with the resistance and capacitance. In this manner the inductance of the potentiometer used for the variable resistance may be tuned out, and the damping circuit may be made a pure resistance for any one particular wavelength.

When the damping circuit is placed across the transmission line as shown in Fig. 7, the value of the damping resistance may vary considerably with wavelength, becoming lower for short wavelengths, owing to the increase in attenuation at short wavelengths partially damping the antenna. In other words, the transmission line acts as a resistance in series with the damping circuit, and the transmission-line resistance becomes appreciable at short wavelengths.

Antenna Design

It is obvious from the theory of the Wave Antenna just given that it must point toward the desired signals or directly away from the desired signals. In case the antenna is pointed away from the signal, then the maximum signal occurs at the far end and must be brought up over the transmission line to the receiver, as shown in Fig. 6. In case the antenna is pointed toward the signal, it is necessary to put the damping circuit on the transmission line, as shown in Fig. 7. It is possible to use a single antenna for reception from either direction by switching arrangements to change to either the connection of Fig. 6, or that of Fig. 7, at will. It is preferable on short wavelengths to point the antenna toward the signal, using the connections of Fig. 7, but the feedback of Fig. 6 gives practically the same results except that the signals are not quite as loud as a result of the transmission-line losses.

It is necessary to run the Wave Antenna in as straight a line as possible and not nearer than 200 feet (61 m) to other parallel wires, such as telephone and power lines, as the influence of these wires is liable to distort the directive characteristic of the antenna. Other wire lines may be crossed at right angles without undesirable effects. In cases where it is not feasible to run the Wave Antenna in line with the desired signals, it is possible to get good reception with the antenna somewhat "off line" by sacrificing signal intensity. By referring to Fig. 4 it is seen that for the average antenna one wavelength long, it is possible to be 45 degrees off line before the signal drops to half intensity. Beyond 45 degrees the signal falls off very rapidly. Twenty degrees off line, the signal intensity has fallen off only 10%, so very good reception may be obtained. If the antenna is two wavelengths long, it is more directive, and it is not possible to receive well if it is more than 25 or 30 degrees off line.

The antennas are constructed of copper or other nonmagnetic material, although Cutler of W7IY reported in October 1922 *QST* that he had obtained good results on a galvanized-iron wire. The size of the wire is usually between no. 10 and no. 14 B&S, although it is possible to get fair results even with no. 18 bell wire. The usual construction is to put up two wires on a cross arm about 2 to 3 feet long. The wires are suspended by porcelain cleats, or in more permanent construction standard telephone pins and high-grade insulators are used.

The height of the wires above ground has a marked influence on the velocity of the currents along the wires when the wires are close to the ground, but if the wires are 10 feet above the ground there is little to be gained in velocity by making them higher, as shown in the curves of Fig. 8. These data were taken on an antenna at Belmar, New Jersey, by H. O. Peterson. This antenna extended over fairly conducting soil. The character of the soil underneath the antenna influences the velocity to some extent, but the data of Fig. 8 are about the average velocity. These curves show that the velocity becomes lower at longer wavelengths.

If the velocity is too slow, then the currents in the wire lag in phase behind the wave in space, and a point is soon reached when the current in the wire from the far end is so far behind in phase that it not only does not add to the increments from points close to the receiver, but may actually subtract. The maximum length that it is feasible to use is that length at which the current in the wire lags 90 degrees behind the wave in space. This length is given by

$$L = \frac{\lambda}{4\left(\frac{100}{C} - 1\right)}$$

where

λ = wavelength in meters

C = signal velocity on antenna expressed in percent velocity of light.

For example, from Fig. 8 we find that the velocity of the currents in the two wires suspended at a height of 10 feet is about 88% of the velocity of light for 200 meters, so the maximum usable length is:

$$L = \frac{200}{4\left(\frac{100}{88} - 1\right)} = \frac{200}{0.544} = 367 \text{ meters}$$

Therefore, it is not feasible to use a two-wire antenna suspended at a height of 10 feet for an antenna that is more than two wavelengths long for 200 meters. By increasing the height, the velocity will increase, and longer wires may be used. Fig. 8 shows that the velocity increases slowly with the height about 10 feet, so the wires must be much higher to be of material advantage. Making the wires too high introduces a difficulty on short waves that does not occur on long waves, and that is the "end" or vertical-antenna effect. The effective height of a 200-meter Wave Antenna is about 5% to 10% of its horizontal length, depending upon the nature of the earth beneath the antenna, and so on. If an antenna is 200 meters long, therefore, the effective height will be between 10 and 20 meters. If the antenna is on supports 10 feet high, the vertical or end effect may be equivalent to an effective height of nearly 3 meters (10 feet), distorting the directive curve. In Fig. 9 is shown the directive curve of a Wave

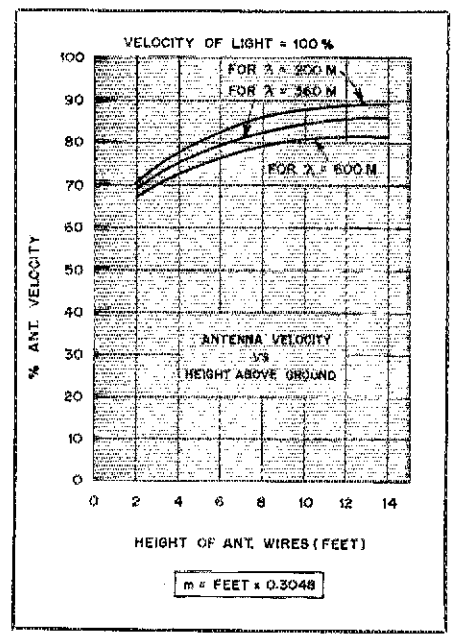


Fig. 8 — Curves that show the antenna velocity factor as a function of the height above ground.

Antenna of 15-meters effective height with a vertical or end effect of 3 meters superimposed upon it. It will be noted that the end effect may mount up to very serious proportions if the antenna is made too high. It is, however, possible to balance this end effect by means of a separate vertical antenna, as shown in Fig. 10. P1 is the standard primary, while P2 is a second primary coil of about the same number of turns, which is wound over P1 but in the opposite direction. In practice, however, the end effects seem to be very much smaller than predicted theoretically, so as a general rule if the antenna is not over 10 feet high the end effects are so small that it is not worth the trouble to balance them. From the foregoing considerations, it is evident that 10 feet is a good average height for short Wave Antennas.

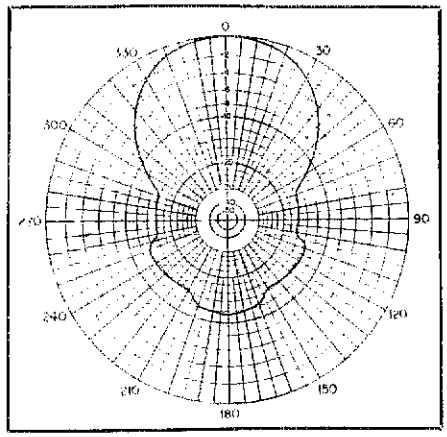


Fig. 9 — Directivity pattern of a Beverge antenna with an effective height of 15 meters, with a vertical or end effect of 3 meters superimposed upon it.

Design of Transformers

With the feedback circuit of Fig. 6, only one transformer is necessary. The output transformer, T1, was wound on a 7-inch cardboard tube. The primary, P, was 20 turns of no. 24 enameled copper wire, with a tap at 10 turns or the exact center. Over the primary was placed a shield consisting of a piece of tinfoil insulated from both windings by means of paper. This shield was grounded to cut out capacitive currents between primary and secondary. It is important that the tinfoil or other metal foil be not quite a complete turn around the primary; the ends must not touch or it will act as a short-circuited turn and introduce high losses. The secondary consisted of 5 turns of no. 18 bell wire wound over the tinfoil shield. The center of the secondary winding was lined up carefully over the center of the primary winding; otherwise the transformer would not be balanced. With the circuit of Fig. 6, the transformer balance was tested by opening both wires at the west or reflection end. When T1 was properly balanced, the receiver was quiet, indicating that the two halves of the primary were perfectly symmetrical with respect to the secondary.

T1 of Fig. 6 was designed to work with a coupled receiver. The secondary of the output transformer was connected in series with the primary winding of the receiver input transformer and was tuned by the series capacitor, C. For 200 meters, it is usually better to use a separate capacitor, C, outside of the tuner capacitor as shown in Fig. 5, but for longer wavelengths this series capacitor may be omitted.

When the circuit of Fig. 7 was used, the transformer just described was used with success, but better results were obtained by cutting the primary turns down to 15 instead of 20. This transformer is shown in Fig. 1, but may be used with the connections of Fig. 7. A metal-foil shield is used between primary and secondary, and is grounded as shown. In all of these transformers the coupling between primary and secondary should be as close as possible.

Fig. 7 illustrates an auto-transformer, T. The total turns are 15, and the receiver is tapped off at 5 turns. The diameter of the turns is 7 inches, but smaller diameters have been used by increasing the number of turns to obtain the same inductance. This auto-transformer connection was once adapted to a Reinartz tuner with excellent results by Roland Bourne, W1ANA, at W2BML.[3]

Surge Resistance and Velocity Factor

The velocity factor and surge resistance were easily determined by oscillator tests. An oscillator was coupled to the antenna, as shown in Fig. 11. A coupling coil, L, was included in the antenna circuit. It consisted of only two turns. The far end of the antenna was left open for the first test, and a resonance curve of the antenna was taken. The curve is plotted as curve A in Fig. 12. Then both wires of the antenna were grounded at the far end, and the resonance curve taken again. This is shown as curve B in Fig. 12. In order to find the velocity, it is necessary to calculate what the resonance points would be if the velocity of the currents on the wires were equal to the velocity of light.

The length of the antenna was carefully measured. In the case of this particular antenna at Belmar, New Jersey, the length was 240 meters. Assuming that the velocity of the currents on the antenna is equal to the velocity of light, the first resonance point with the far end of the antenna open will be the quarter-wave oscillation, as in an ordinary antenna. The wavelength will be 4 × 240 = 960 meters. The next resonance point will be the three-quarter-wave oscillation, or 4/3 × 240 = 320 meters. The next will be the 5/4 oscillation, or 4/5 × 240 = 192 meters, and so forth, for all odd multiples of the quarter-wave oscillation. In a like manner, with the far end of the antenna grounded, the antenna will oscillate at all even multiples of the quarter-wave oscillation. These calculated values are recorded in Table 1. In the next column, the observed values taken from Fig. 12 are recorded. By dividing the calculated value by the observed value, we get the actual velocity at that particular wavelength in terms of percent of velocity of light.

To determine the surge resistance, a noninductive resistance was placed between antenna and ground at the far end, and the resonance curve was taken again. Fig. 13 shows the results

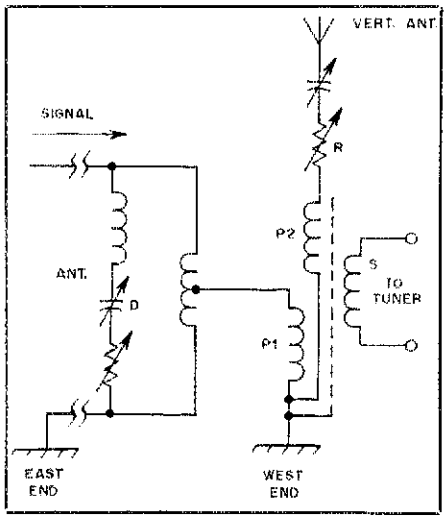


Fig. 10 — A separate vertical antenna can be used to balance out the end effects discussed in the text. The circuit arrangement is depicted here.

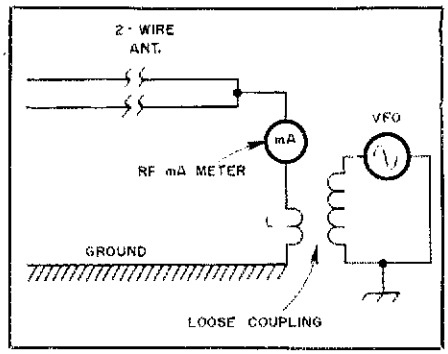


Fig. 11 — An oscillator can be coupled to the antenna, as shown here, to determine the velocity factor and surge resistance.

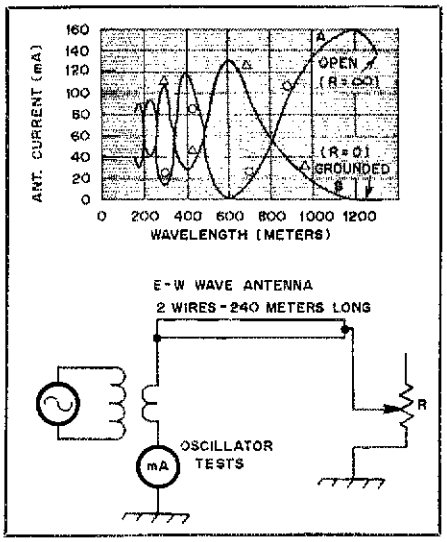


Fig. 12 — Curves obtained with oscillator tests of a 240-meter-long Beverage antenna (see text).

Table 1

Calculation of Velocity of Currents on Antenna

Length — 240 meters, 2 no. 10 wires, 3 meters high

Mode of Oscillation	*Wavelength Calculated*	*Wavelength Observed*	*Vel/Wires Vel/Light*
1/4	960	1200	80%
2/4	480	590	81%
3/4	320	390	82%
4/4	240	280	86%
5/4	192	220	87%
6/4	160	180	89%

of this test on the Belmar antenna. Curve A, with 500 ohms at the far end, shows broad but unmistakable resonance points at open oscillation wavelengths. On the other hand, curve B, with 200 ohms at the far end, shows grounded resonance points. Curve C, with 300 ohms at the far end, shows no resonance points, indicating that the antenna is quite aperiodic. Therefore the surge resistance for this particular antenna is approximately 300 ohms. The downward bend of curve C below 200 meters is not caused by the antenna, but results from the oscillator output falling off when the coupling capacitor approached zero setting.

When one of the wires was grounded at the far end, the other wire was left open and the damping resistance was placed across the wires at the station end, as shown in Fig. 7, a smooth curve, similar to the curve C of Fig. 13, was obtained when the noninductive resistance was 500 ohms. In this case, however, there were slight irregularities in the curve that do not appear in curve C of Fig. 13.

Fig. 14 shows the resonance and damping curves taken on a single-wire antenna by R. B. Bourne at W2BML/W2EH. This wire was 195 meters long, and was suspended from trees at a height varying from 15 to 20 feet. It was interesting to note that Bourne's antenna had a velocity of approximately 93% of the velocity of light at 200 meters and, therefore, showed that a single wire could be used up to a length of over three wavelengths, or approximately 2000 feet. Such an antenna should show very directional properties, but lacks the flexibility and ease of adjustment of the two-wire antenna.

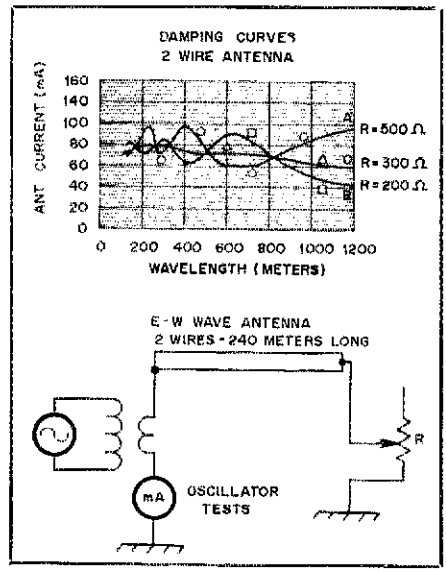


Fig. 13 — Damping curves for a two-wire Beverage antenna (see text).

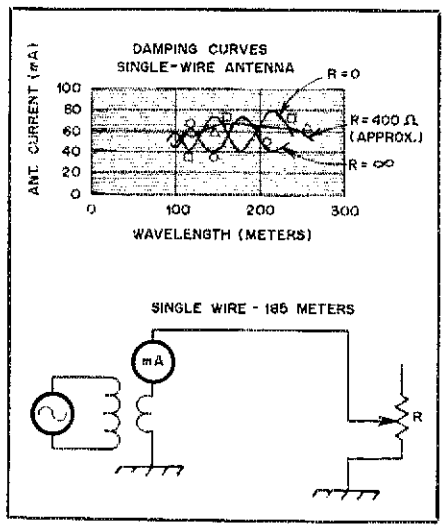


Fig. 14 — Damping curves for a single-wire Beverage antenna.

Performance

Two 200-meter Wave Antennas were erected at Belmar, one running west from the station and the other running south. These antennas were arranged with switching such that the connections of Fig. 6 or Fig. 7 could be selected at will on either antenna. That is, the west antenna could be used for reception from either the east or the west, and the south antenna could be used for reception from either the north or south. For comparative purposes a flat-topped single-wire antenna, 40 feet high, was erected. The effective height of this vertical antenna was estimated as approximately 8 meters. The signals on the Wave Antennas were about 50% stronger than on the vertical, giving an effective height for the Wave Antennas of 12 meters. This figure corresponds to about 5-1/2% of the horizontal length of the Wave Antennas.

Listening tests on these antennas showed marked directive properties, as expected. Listening south, most of the stations heard were in the third and fourth districts, but careful adjustments were necessary to eliminate second-district stations to the north. With the antenna directive toward the north, the best reception was from the first and second districts, although several eighth-district stations were heard. The east-west antenna worked better than the north-south antenna, probably because the ground resistance at both ends was less than an ohm, whereas the ground resistance at the far end of the north-south antenna was very high (nearly 300 ohms) making it difficult to operate the damping circuit effectively. The reception from the west was excellent, great numbers of Midwest, Southwest and West Coast cw stations being heard without interference from first- and second-district stations. With the antenna directed east, only local W2s, Long Island W2s and a few W1s were heard. There was considerable QRN reduction at times on the eastward reception, as the QRN was often heavy in the south or west.

On the 360-meter broadcast station wavelength, very good results were experienced in eliminating interference, particularly when using the antenna for west reception and cutting out New York and Schenectady interference. Station WOC at Davenport, Iowa, was received particularly well on the Wave Antenna at times when reception was impossible on the vertical antenna, owing to local interference.

Even on 600 meters, these Wave Antennas showed very good directivity, particularly for reception from ships at sea.

Bourne's antenna at Riverhead, Long Island, ran in a direction about 10 degrees north of west. He reported his results as follows: "Signals from the south and southwest come in with about 25% to 50% increase in signal strength over a vertical antenna 60 feet high. Signals from New England are, in general, very weak, and in some cases cannot be heard at all when using the Wave Antenna. No interference from ships or shore stations using commercial wavelengths was noticed. WSA, at Easthampton about 20 miles away, at times had a very strong harmonic on about 225 meters, which interfered seriously with 200-meter reception when the ordinary antenna was used, but because this station was southeast, no interference was experienced when using the Wave Antenna. Radiophones on 360 meters came in with about the same intensity as with the vertical antenna, but often the signal-static ratio was much improved with the Wave Antenna, and, as with 200-meter reception, interference from WSA and WBC (East Moriches, 10 miles away) was entirely done away with."

The amount of static reduction experienced with the 200-meter Wave Antenna at Belmar depended entirely upon the distribution of the static at different times. On several occasions a marked improvement was noted in the signal-static ratio when receiving from the east and north, and sometimes when receiving from the west, but it was rarely observed to make any marked improvement when receiving from the south.

The author wishes to acknowledge the valuable assistance received from Messrs. H. O. Peterson, R. B. Bourne and A. B. Moulton, in the collection of these data on the 200-meter Wave Antennas.

Practical Considerations

The foregoing text from the 1922 *QST* article discusses slight differences in overall performance with respect to the wire gauge used in a wave antenna, with the smaller-diameter wire being the less desirable choice. In a practical amateur installation it is unlikely that one could discern a performance difference without having two antennas to compare — one with heavy-gauge wire and one with, say, no. 20 wire. Many amateurs have reported good results when using the smaller wire sizes for single-wire Beverage antennas. But, if the heavier wire is available, it should be employed in the interest of optimum performance. The longevity of the system under the stresses of wind and icing will be superior when the antenna is made from no. 10 through no. 16 wire. If for some reason it is desired to have a measure of "invisibility" for the antenna, one should not overlook the possibility of

using light-gauge wire.

Quality insulators are required at the support points of the wire. Some amateurs have merely secured their Beverage antennas along the span by wrapping the conductor around tree trunks and fence posts. This is not recommended if proper performance is desired. The incoming signal energy should be able to traverse the wire without propagation discontinuities and losses along the antenna length. Good insulators will help to make this possible.

The least complex of the Beverage antennas is the single-wire version, although the two-wire type offers greater flexibility of adjustment. In any event, the integrity of the termination and ground system is a matter of prime importance. Some amateurs have simply driven an 8-foot pipe into the ground at the far end of the antenna, then attached the terminating resistor to it. Depending upon the earth conductivity at a given location, this technique may represent no ground system whatsoever! A quality ground system contains a substantial number of buried radial wires, as is the case with quarter-wavelength vertical antennas. If an extensive ground arrangement isn't practical, the amateur should use as much wire as possible, even if some of the radials are quite short. Sufficient wire should be used to ensure that the ground resistance is as low as possible.

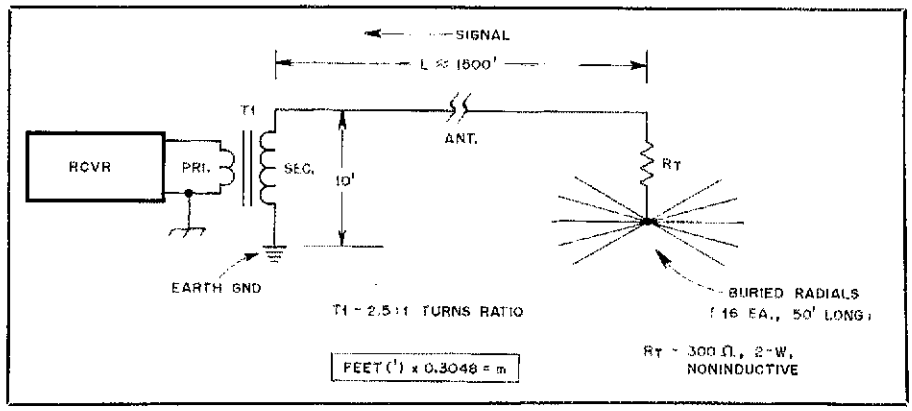


Fig. 15 — Circuit of the 160-meter Beverage antenna used at W8HHS for DX reception. The primary and secondary windings of T1 were returned to separate ground points to resolve unwanted common-mode bc-band signal coupling that affected receiver performance.

Other Considerations

Fig. 15 illustrates a Beverage antenna used by W1FB (then W8HHS) in Michigan for 160-meter reception in the early 1950s. It was roughly 1500 feet (three wavelengths) long, which posed no physical problems on the 40-acre farm site. The terminated end was toward the northeast to accommodate reception from Europe. The transmitting antenna was a 60-foot vertical with center loading and 20 buried radials that were dispersed uniformly from the base of the vertical to a length of 80 feet each. Signals that could not be heard in the noise while receiving with the vertical could be elevated above the atmospheric noise by as much as two S units when using the Beverage antenna for DX work to Europe. Owing to the majority of the noise fronts existing to the southwest, in the Gulf of Mexico region, and because of the back-rejection of the Beverage, such an improvement was possible. Heavy QRN could often be heard with the vertical, even though the weather was clear locally and for a thousand miles or more to the southwest. Noise from storms can be propagated a great distance when conditions are other wise good at 1.8 MHz.

One problem that was experienced with the antenna of Fig. 15 became manifest as severe receiver overloading from a nearby commercial a-m station on 1240 kHz. The receiver dynamic range and front-end selectivity of that period were generally anything but spectacular. Hence, cross-modulation and other overload effects were not uncommon to 160-meter operators. The difficulty was resolved by breaking up the common-mode transfer path from the antenna to the receiver. At first the return ends of the primary and secondary windings of T1 were brought a common ground point. By returning the low end of the T1 primary to the receiver ground terminal and the low end of the secondary to the earth ground, the overloading ceased. The Beverage antenna was an effective collector of bc-band energy! T1 was used to provide a broadband transformation from 300 ohms (unbalanced) to 50 ohms unbalanced at the receiver input. A small TV-set flyback transformer core was used in the transformer. A 900 μ_i ferrite toroid core would be excellent for the purpose today. QST

References

[1] H. H. Beverage, "A Wave Antenna for 200-Meter Reception," *QST*, November 1922, p. 7. The professional disclosure of the wave antenna was presented by H. Beverage, C. Rice and E. Kellogg ("The Wave Antenna, a New Type of Highly Directive Array"), in the *Transactions* of the AIEE for 1923. It contains 51 pages of technical information.

This presentation of the original *QST* work by Beverage has been edited for style, tense and terminology to bring it up to present-day *QST* technical language. The diagrams, curves and radiation patterns have been redrafted to conform to present-day symbology and style. Nothing else has been changed. The reprint of the article is presented in smaller type size to differentiate between the writing of H. H. Beverage and D. DeMaw.

[2] B. Booth, W9UCW, "Weak Signal Reception at 160 — Some Antenna Notes," June 1977 *QST*.

[3] J. Reinartz, W1QP, "Some Further Improvements in My Tuner," *QST*, October 1922, p. 12.

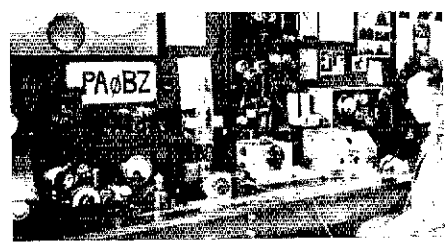
Strays

I would like to get in touch with . . .

☐ amateurs who are interested in the use of home-built QRP transmitters. Bill Copeland, WB6RVE, P.O. Box 191, Duarte, CA 91010-0191.

☐ amateurs who could advise me about getting a 3CV 1500A7 vapor-cooled transmitter tube for the Alpha-70V. C. L. Hine, N2AQS/AFAIRJ, 517 Charles St., New Milford, NJ 07646-1999.

Members of the Alexandria, Virginia, ARES are shown on a tour of the city's new emergency communications bus. W4HFH, the Alexandria ARC station, is located in the bus along with radios for the police, fire and city traffic departments. *(K4BAV photo)*



PAØBZ was the first Dutch amateur to receive a transmitting license, in 1929. The Hartley transmitter with series feed is shown at the left; behind it is the anode power supply. Other pieces of gear on the bench are a wave meter, receiver and receiver power supply. *(photo courtesy of University Museum, Utrecht, Netherlands)*

Designing a Microprocessor-Based RTTY Speed and Code Converter

Part 1: Make your old teleprinter much more useful! This construction project gives the RTTY enthusiast a perfect opportunity to learn fundamental microprocessor-system design techniques.

By Greg McIntire,* AA5C

Recent advances in integrated-circuit technology have provided a real opportunity for the RTTY enthusiast. Every day, more and more mechanical teleprinters, and even some video displays, are being replaced by state-of-the-art terminals. The old equipment frequently ends up in the surplus market where it can be purchased by amateurs at a low cost. These same advances in technology have also created a problem: In the past, most RTTY operation was at 60 wpm using the Baudot code.[1] Now 60- and 100-wpm Baudot is common, and 110-baud ASCII is becoming increasingly popular. A few other speeds are also encountered occasionally (67- and 75-wpm Baudot, for example). How can the amateur handle all of these different speeds and codes?

Usually a machine will operate only at one speed and with one code. Often, as in my case, the gears needed to run a machine at a different speed can cost as much as the machine itself. Even with different gears the teleprinter is still limited to operation at one speed and with one code. What is needed is a device that will convert the incoming signal to the code and speed accommodated by your machine. A home computer can be programmed to do the conversions, but this ties up an expensive resource. To provide a flexible and inexpensive solution to the problem I chose to build a microprocessor-based converter.

This converter costs approximately $50 to build and has the following features:

1) 60- to 100-wpm Baudot speed conversion.

2) 100- to 100-wpm Baudot buffering.

3) 110-baud ASCII to 100-wpm Baudot speed and code conversion.

4) Selective calling (SELCAL) with teleprinter motor control.

The delight of using a programmable converter is that different teleprinters can be accommodated by changing the software — no hardware changes are required. Four versions of the software are now available. They will accommodate 60-, 67- and 100-wpm Baudot and 110-baud ASCII machines.

The Design

Many trade-offs must be considered when solving a problem with a microprocessor. One important consideration is how much hardware versus software is to be used. In this design I have chosen a minimal-hardware approach to keep the cost as low as possible. This, however, implies that the complexity of the software is increased.

The hardware required consists of 11 commonly available ICs, three transistors and a few resistors and capacitors. It all fits on one 4- × 4-inch (mm = in. × 25.4) Radio Shack prototyping board (Radio Shack number 276-1555). The software is contained in a 2716 EPROM.[2]

In any application of a microprocessor, the system interface requirements should be well defined before the detailed design of the hardware begins. This unit interfaces with my system as shown in Fig. 1. The necessary interface connections are:

MODE — Selects the speed and code conversion to be made.

TXRX — Indicates the direction of the conversion.

DEMODULATOR — Input of the received signal from the demodulator unit (1 = space, 0 = mark).

MOTOR START — Signals the presence of a valid received signal. This is normally used to control the teleprinter motor.

SELCAL — Turns the selective calling function on and off.

CURRENT LOOP — Standard teleprinter current loop that carries information to and from the teleprinter. Some builders may wish to include opto-isolation in this line.

STANDBY — Provides a means of turning the teleprinter motor on and off manually.

BUFFER EMPTY — LED to inform the operator that the buffer has been emptied.

BUFFER OVERFLOW — LED indicator that lets the operator know that, unless the incoming information is stopped, data will be lost. This indicator should be monitored when converting from a higher speed to a lower one.

AFSK — Output to key either an afsk generator or transmitter fsk input.

MOTOR RELAY — Controls the teleprinter motor relay.

The Microprocessor and Support Hardware

With the system interface defined, the hardware can now be designed. Most of the readily available microprocessors interface with the outside world through TTL-level compatible signals. This makes it necessary to convert the various interface signals to or from TTL levels. Fig. 1 shows how these conversions are made. The microprocessor I chose to use is the Intel 8085A.[3] It is inexpensive, readily available, runs on a single 5-V supply, and has the clock generator and several other system functions built into the chip. A

'Notes appear on page 21.

*5232 Aztec Dr., Box 77512, Lewisville, TX 75056

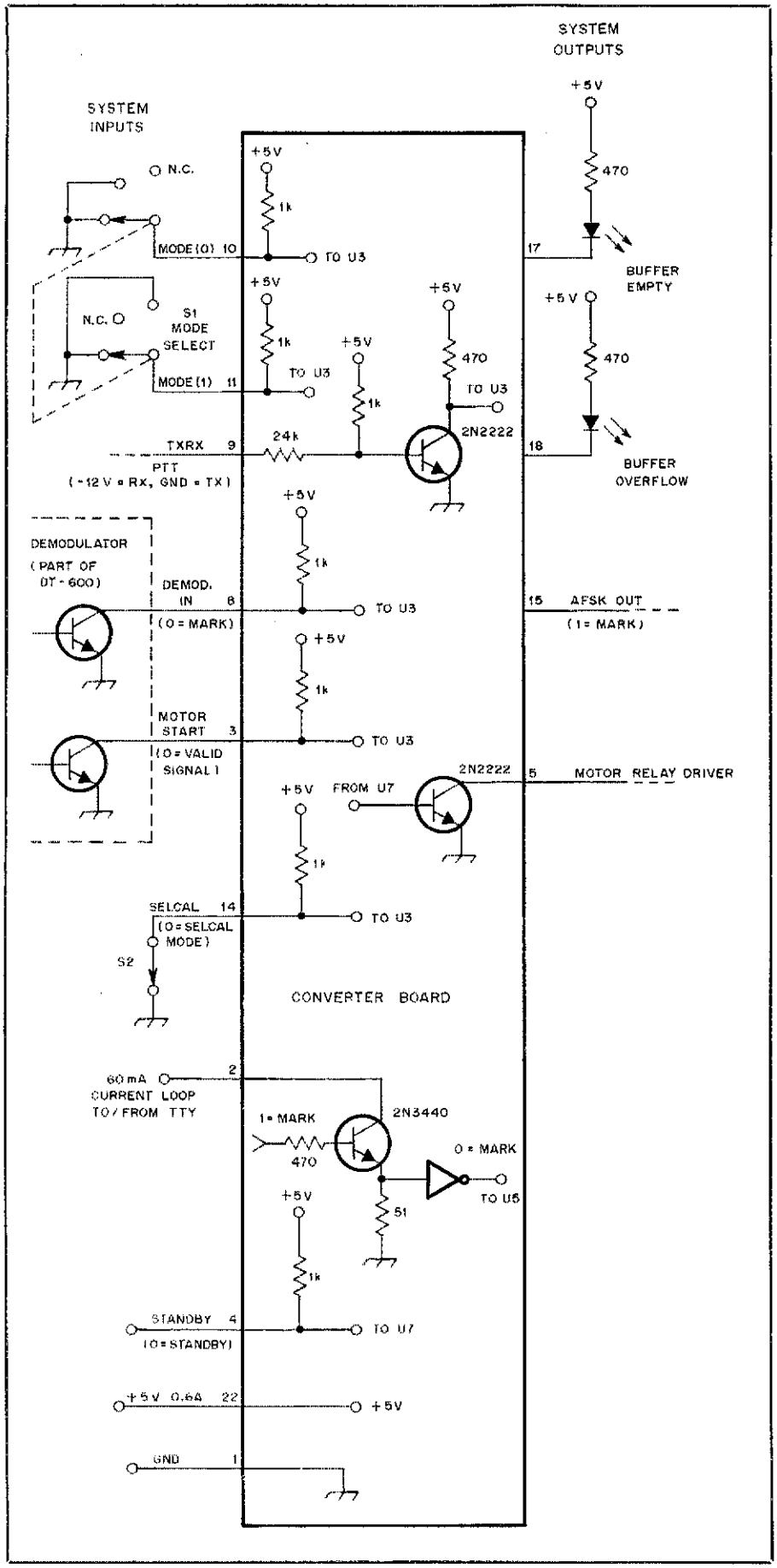


Fig. 1 — Interface diagram of the AA5C Code/Speed Converter. On the left are the inputs to the system, and the system outputs are shown on the right. The teleprinter current loop serves as both an input and an output.

more important reason for choosing the 8085A is that a large amount of software support exists for the 8085/8080 and Z80 families of microprocessors. The TRS-80, for instance, can be used to develop software for the 8085 as well as the Z80. Because I decided to use a software-intensive approach, this is a very important consideration.

The block diagram of the microprocessor and support hardware is shown in Fig. 2. The system clock is provided simply by connecting a crystal to the 8085A. All of the necessary oscillator circuitry is contained on the chip. The maximum crystal frequency of 6.00 MHz is used to obtain the greatest possible processor execution speed. Internally the 8085A operates at a clock frequency equal to one half the crystal frequency, or 3.00 MHz in this case. An external 2-kHz oscillator, driving one of the processor interrupt inputs, provides an asynchronous, real-time reference for the microprocessor. This enables the software to make use of known time intervals without having to count instruction cycles. Anyone who has programmed software timers will appreciate the relief that interrupt driven timers afford the programmer.

It is important to understand the concept of a "bus" when working with microprocessors. A bus is simply a set of wires carrying related signals between the various devices in the system. The devices, such as the processor, memory and the input/output (I/O) ports, are connected to the bus in parallel. For example, the data bus is the set of eight lines that carry the signals making up a data word (or byte). The 8085A has three buses: a 16-bit address bus, an eight-bit data bus and a control bus.

To reduce the number of pins required on the microprocessor package, the 8085A multiplexes the least-significant eight bits (or LS byte) of the address with the data bus. During the first clock period of each machine cycle, the 8085A outputs the LS byte of the address on the address/data bus pins. At the same time it outputs a control signal ($\overline{ALE}$) to the address latch (U3), enabling it to latch the address bits. The bus is then free for data transfers during subsequent clock periods of the cycle. Information travels both to and from the processor on the data bus. This means that devices connected to this bus must have selectable, high-impedance output states so that multiple driver conflicts can be avoided. The address bus is decoded by U6 and used to independently select which device is to use the data bus. Device selection is further qualified by the control signals: The IO/$\overline{M}$ is used to make the distinction between memory and I/O operations, while the $\overline{RD}$ and $\overline{WR}$ signals indicate whether the operation is a read or write. If $\overline{RD}$ is low the operation is a read (information transferred to the processor), and if $\overline{WD}$ is low the operation is a

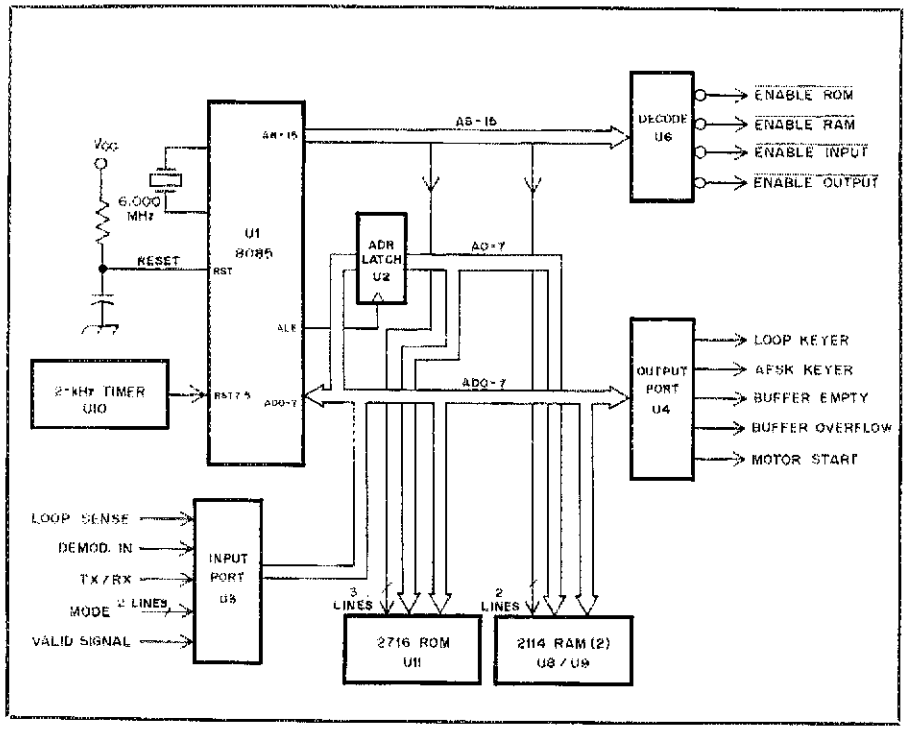


Fig. 2 — Shown here is the block diagram of the RTTY converter.

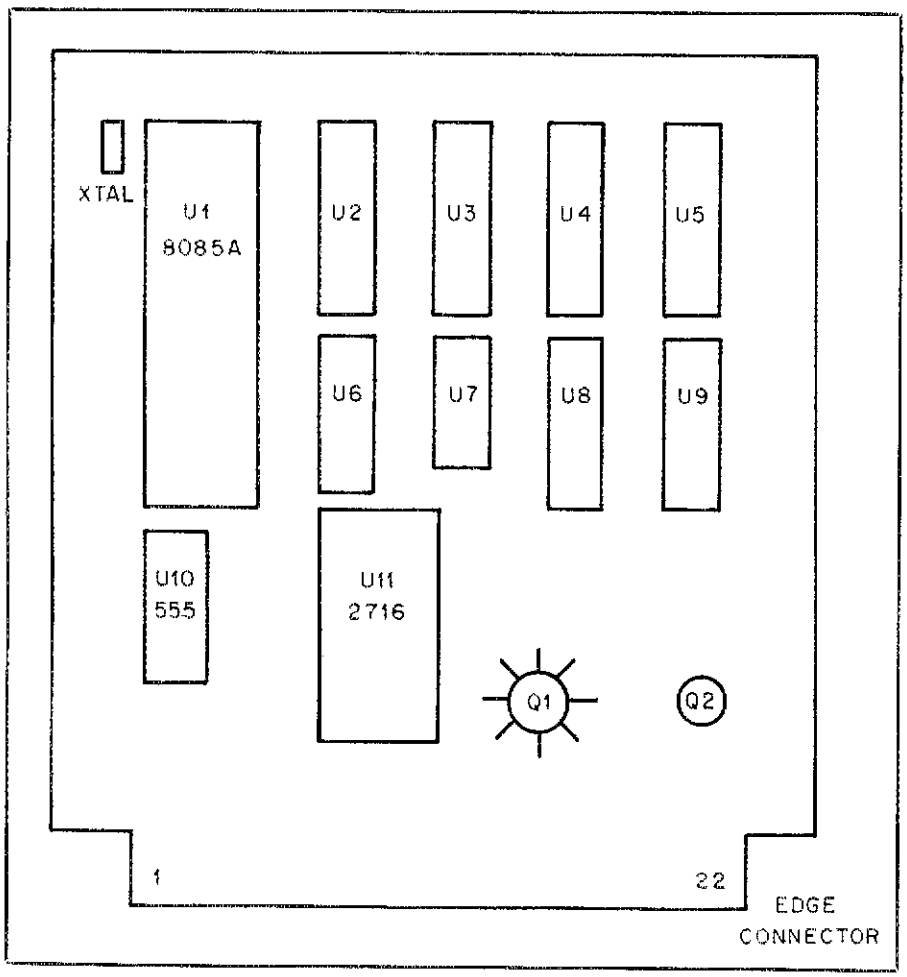


Fig. 3 — Component placement diagram for the RTTY converter.

Fig. 4 — Schematic diagram of the AA5C Code/Speed Converter. Components not listed below are numbered for text reference only.
C1 — 0.047 μF Mylar or polystyrene capacitor.
Q1 — High-voltage silicon transistor. V_{CEO} = 250 V, I_C = 1 A, P_D = 1 W, Motorola 2N3440 or equiv.
U1 — Intel 8085A microprocessor.
U2, U4 — 74LS374, octal D-type flip-flop with 3-state outputs.
U3 — 74LS244, octal buffer/line driver with 3-state outputs.
U5 — 74LS240, octal buffer/line driver with 3-state outputs.
U6 — 74LS138 or 8205, 1 of 8 decoder/demultiplexer.
U7 — 74LS00, quad dual-input NAND gate.
U8, U9 — Intel 2114 static RAM.
U10 — NE555 timer IC or equiv.
U11 — EPROM, Intel 2716 or equiv. The author will make programmed EPROMs available for $25. See details in Part 2 of the article.

write (information being output by the processor).

Construction

The schematic diagram of the converter is shown in Fig. 4, and the placement of the components on the prototyping board is shown in Fig. 3. This version of the converter was constructed using wire-wrap techniques. A printed-circuit version does not exist at this time and would probably be of moderate layout difficulty. Good construction practices should be used throughout. The current loop needs to be located near the edge of the board and not amid the logic. The current loop transistor (Q1) requires a finned heat sink if a 60-mA, high-voltage loop is used. If a different loop current is used, the value of R1 must be chosen so that 3.5 volts is developed across it when the loop is in the mark condition. It is important to bypass the 5-V supply to ground with a 0.1-μF ceramic capacitor at each IC. The supply voltage should be further decoupled by means of a 10-μF electrolytic capacitor at the point where it enters the board. The power supply requirements are 5 V at 0.6 A (only 3 W to solve the problem!). The capacitor used in the timer circuit (C1) should be a polystyrene or Mylar type to minimize frequency drift with temperature.

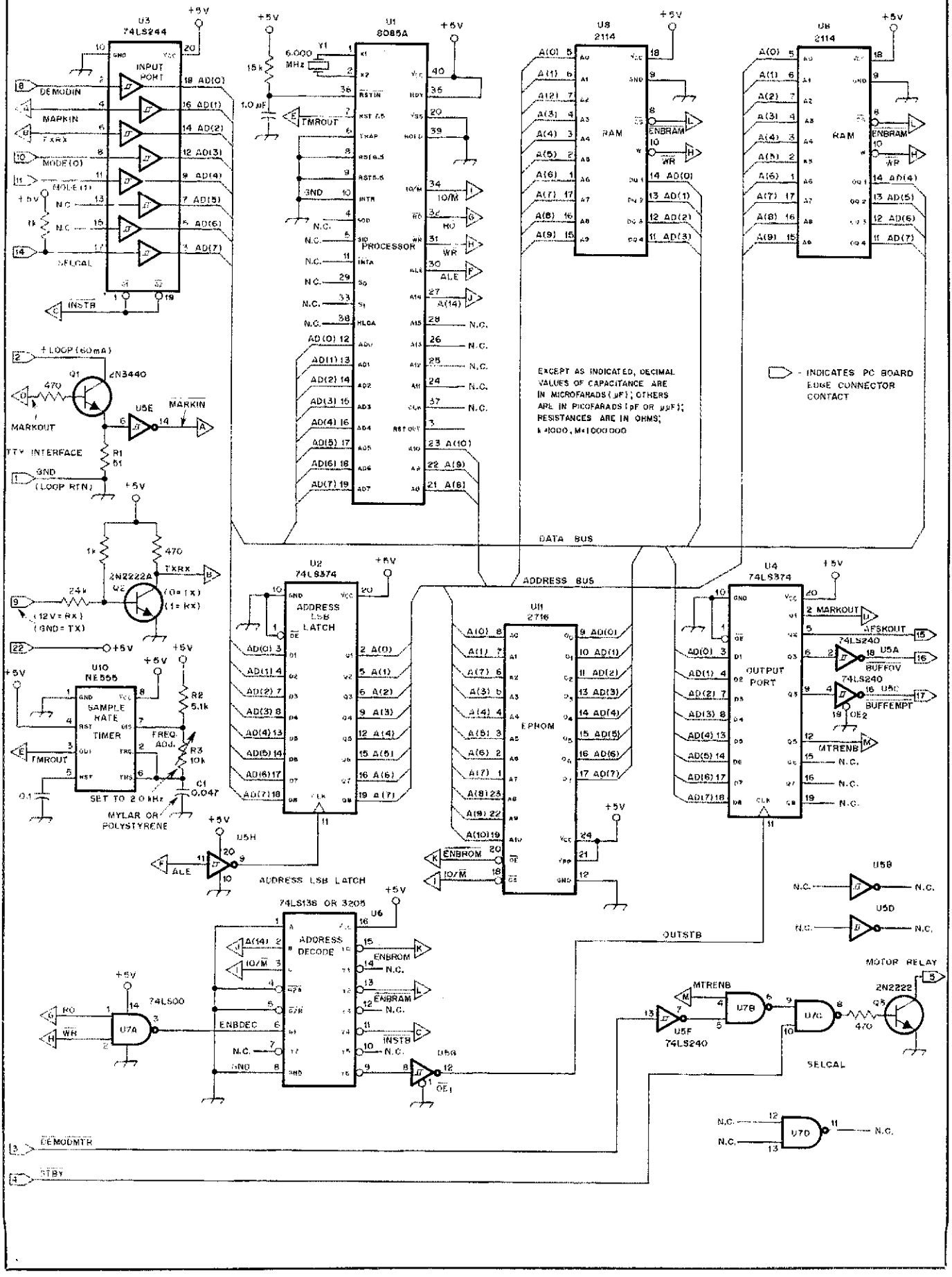
The final steps in implementing a microprocessor application are the design of the software and getting the system "up and running." Those steps involved in solving the RTTY speed and code conversion problems will be covered in Part 2 of this article.

Notes

[1]The five-unit teleprinter code commonly used by amateurs, and called the Baudot code, is actually the Murray code.

[2]The author will make programmed EPROMs available for $25. Details of the software and EPROM are given in Part 2 of this article. A listing of the PL/M/80 source program and the object code will be available from ARRL — details are given in Part 2.

[3]Complete details and specifications for the 8085A and other microprocessor components can be found in the *Intel Component Data Catalog*, available from Intel Corporation, Literature Department, 3065 Bowers Ave., Santa Clara, CA 95051.


U3
74LS244
INPUT PORT
DEMODIN
MARKIN
RXRX
MODE(0)
MODE(1)
N.C.
SELCAL
INSTB
AD(0)
AD(1)
AD(2)
AD(3)
AD(4)
AD(5)
AD(6)
AD(7)
+5V
U1
8085A
6.000 MHz
Y1
15k
1.0 µF
TMROUT
RSTIN
RSTOUT
RST 7.5
RST6.5
RST5.5
INTR
SOD
SID
INTA
S0
S1
HLDA
ADO
A01
A02
AD3
AD4
AD5
AD6
AD7
A08
A09
A10
A11
A12
A13
A14
A15
CLK
RSTOUT
PROCESSOR
10/M
RD
WR
ALE
A(14)
N.C.
A(10)
A(9)
A(8)
U8
2114
RAM
ENBRAM
WR
A(0)
A(1)
A(2)
A(3)
A(4)
A(5)
A(6)
A(7)
A(8)
A(9)
AD(0)
AD(1)
AD(2)
AD(3)
AD(4)
AD(5)
AD(6)
AD(7)
EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF OR µµF); RESISTANCES ARE IN OHMS; k=1000, M=1000000
- INDICATES PC BOARD EDGE CONNECTOR CONTACT
DATA BUS
ADDRESS BUS
+LOOP (60mA)
Q1
2N3440
470
MARKOUT
U5E
MARKIN
TTY INTERFACE
R1
51
GND
(LOOP RTN)
1k
470
2N2222A
Q2
TXRX
24k
(12V=RX)
(GND=TX)
(0=TX)
(1=RX)
U10
NE555
SAMPLE RATE TIMER
FREQ. ADJ.
R2
5.1k
R3
10k
C1
0.047
0.1
SET TO 2.0 kHz
MYLAR OR POLYSTYRENE
U2
74LS374
ADDRESS LSB LATCH
U11
2716
EPROM
U4
74LS374
OUTPUT PORT
MARKOUT
AFSKOUT
74LS240
U5A
BUFFOV
U5C
BUFFEMPT
OE2
MTRENB
N.C.
U5H
ALE
ADDRESS LSB LATCH
ENBROM
10/M
OUTSTB
U5B
U5D
74LS138 OR 3205
U6
ADDRESS DECODE
ENBDEC
INSTB
U5G
OE1
74LS00
U7A
RD
WR
MOTOR RELAY
U7B
U5C
U5F
74LS240
2N2222
Q3
470
SELCAL
U7D
EEMODMTR
STBY

WARC Bands and 160 Meters on the 75S-1

A handful of parts and a couple of hours is all you need to modernize your station receiver. You'll say, "Look, Ma, no holes!"

By Earl Bray,* VE3EB

The Collins 75S-1 is a classic tube-type ssb/cw/a-m receiver. It covers fourteen 200-kHz band segments between 3.4 and 30 MHz. Changing the heterodyne crystal-oscillator frequency changes the band-segment frequencies. The crystals provided with the receiver give complete coverage of 80 through 15 meters, plus WWV at 15 MHz and portions of 10 meters.

I wanted coverage of the new WARC-sanctioned bands and 160 meters without giving up coverage of the other bands. Additional crystals and a switching method are all that is necessary for adding the WARC bands. Adding 160-meter coverage presents more of a challenge because it requires a slight modification to the input and oscillator circuits.

These modifications do not degrade performance or lessen the resale value. No holes are drilled; rewiring is simple and straightforward. You will need the owner's manual (schematic diagram), a few parts and some tools.

Before buying the required parts, remove the cabinets and observe the space that is available for the additional components. Also, study the schematic diagram. In other words, plan ahead, and avoid the crush when it's time to reinstall the cabinet.

Step By Step

Remove the rf gain control from the panel and replace it with a fixed-value 10-kΩ, 1/2-W resistor (R156, Fig. 1). Place it in a piece of heat-shrink tubing, and secure it in the nearby chassis grommet.

Mount a three-pole multiposition wafer

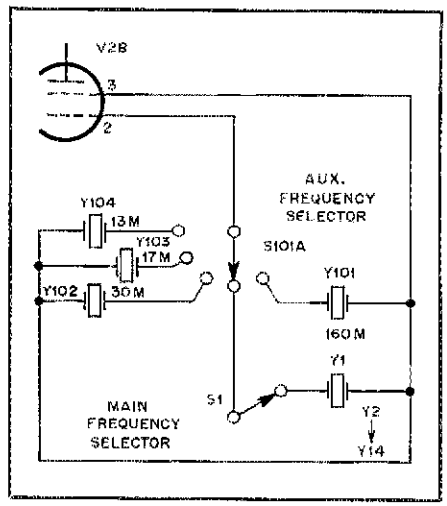


Fig. 1 — New switching arrangement for the 75S-1 (see text for details).

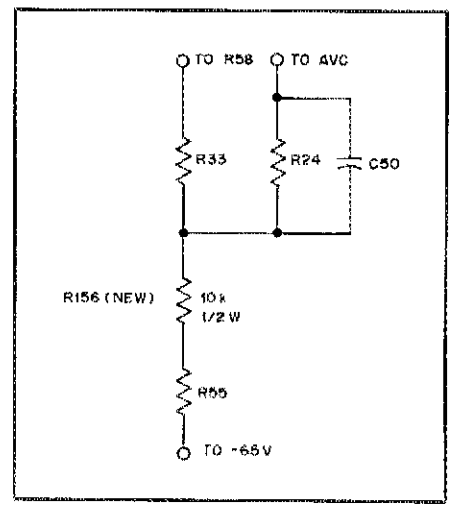


Fig. 2 — Revised rf-gain control circuit. R156 replaces the potentiometer.

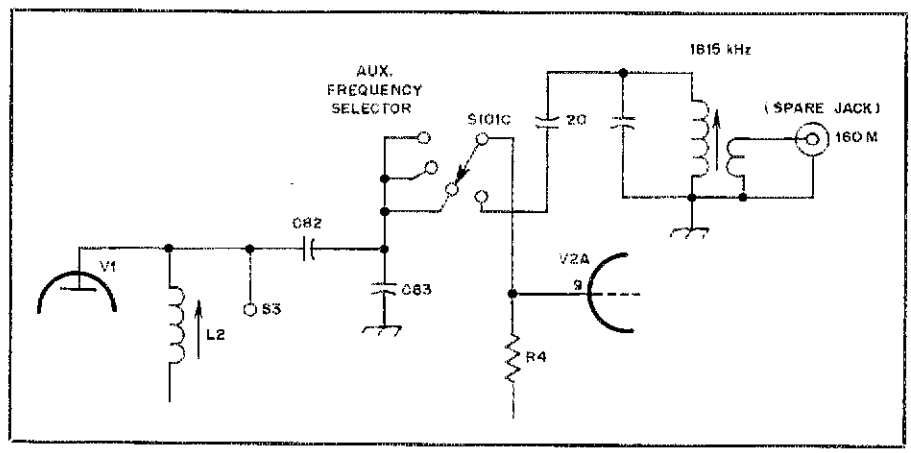


Fig. 3 — 160-meter input network.
C1 — 750-pF polystyrene capacitor.
L101 — 4 turns of no. 24 enam. wire over the center part of the L102 winding.
L102 — Slug-tuned inductor, 9 μH nominal.

J. W. Miller Co., no. 42A826CBI or equiv. (19070 Reyes Ave., Box 5825, Compton, CA 90224).

'Notes appear on page 24.

*Lakewood Park Dr., RR 1, Huntsville, ON PØA 1KØ

switch, designated S101, in the vacated panel hole. The number of switch positions, less one, determines the number of additional band segments. One position is used for "normal" operation.

Remove the coaxial cable from S1, and connect it to the common terminal of S101A (see Fig. 2). Run a bus wire from S1 common to the S101A terminal you elect to use as "normal." Install additional crystals (4955 kHz for 160 meters and others, as per the 75S-1 formula; HC18/U types are ideal) between the common bus on the crystal board and selected S101A terminals.

Remove C82 and C83 from V2 pin 9, and connect a stiff bus wire from the common junction to S101C terminals (Fig. 3). Install a 1.8-MHz tuned circuit in the area of the V2 terminal strip. Connect it through a 20-pF mica capacitor to the selected 160-meter terminal of S101C.

Route coaxial cable from 1.8-MHz antenna tap or winding to the spare phono jack on the rear apron. Connect a rigid bus wire from S101C common to V2 pin 9.

Remove the shield can from T6/S2, and connect an insulated wire from the C69/C70 terminals of S2 (these are adjacent to the chassis) to the 160-meter terminal of S101B through a 180-pF, silver-mica capacitor (Fig. 4). Dress the wire and capacitor close to the chassis. Replace the shield can after filing a 1/8-inch "U" notch in the lip of the can to let the wire exit the compartment. Attach the common terminal of S101B to ground.

It is possible to run a no. 20 enamel wire through the band switch shaft hole without the notch in the can. The 180-pF capacitor could be connected directly to pin 6 of V2, in which case all trimmers associated with S2 would have to be readjusted.

Depending on switch size, the wafers may have to be held apart with longer spacers (Fig. 5). The wafers will clear the crystal board wiring with one forward and two behind the crystal board. If you can obtain a physically smaller switch with more positions, so much the better. I chose to use position 2 as normal (or straight-through positions), 1 as the 160-meter position, and positions 3, 4 and 5 for the WARC bands. The old rf gain control markings on the front panel have 30° separation and coincide with the switch detents of my 12-position switch.

The preselector control, now simply an injection-level control, peaks the low-end 160-meter signals at about 1.5 on the log scale (main band switch set in any 80-m position). This control also performs adequately as an rf-gain control. If you desire an rf-gain control, the af-gain control can be replaced by a dual unit.

More Modifications

My 160-m front end is a simple tuned circuit peaked at 1815 kHz. There is space for a preamplifier or a band-pass filter, which would enhance the performance. A separate 160-m receiving antenna is required. At present, I use an outdoor loop and FET preamp, but for casual operating, a simple random-wire antenna seems sufficient.

The method of mounting and securing the 160-meter tuned circuit will depend upon the type of coil you use. It may be cemented to a small scrap of circuit board, and this in turn secured to the chassis with some more cement. Or you might consider using double-sided tape. I recommend that C170, the 160-meter oscillator padder, be secured with cement as well. A length of hook-up wire, loosely coupled between the Y17 wiring and the 160-meter coil, provides an adequate calibration signal.

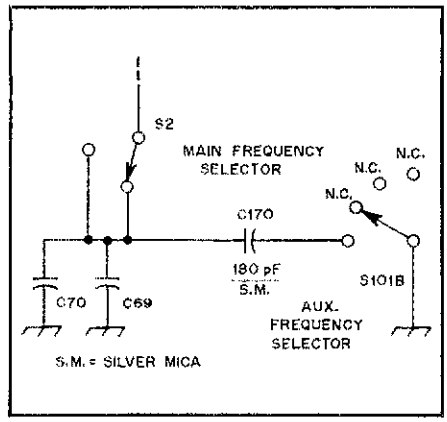


Fig. 4 — Circuit for switching in additional capacitance during 160-m operation. See text for details.

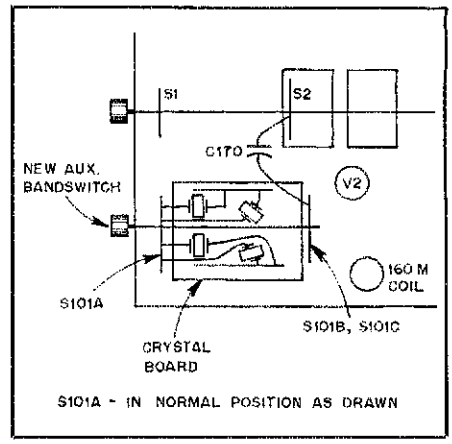


Fig. 5 — Physical arrangement of new switch and associated components.

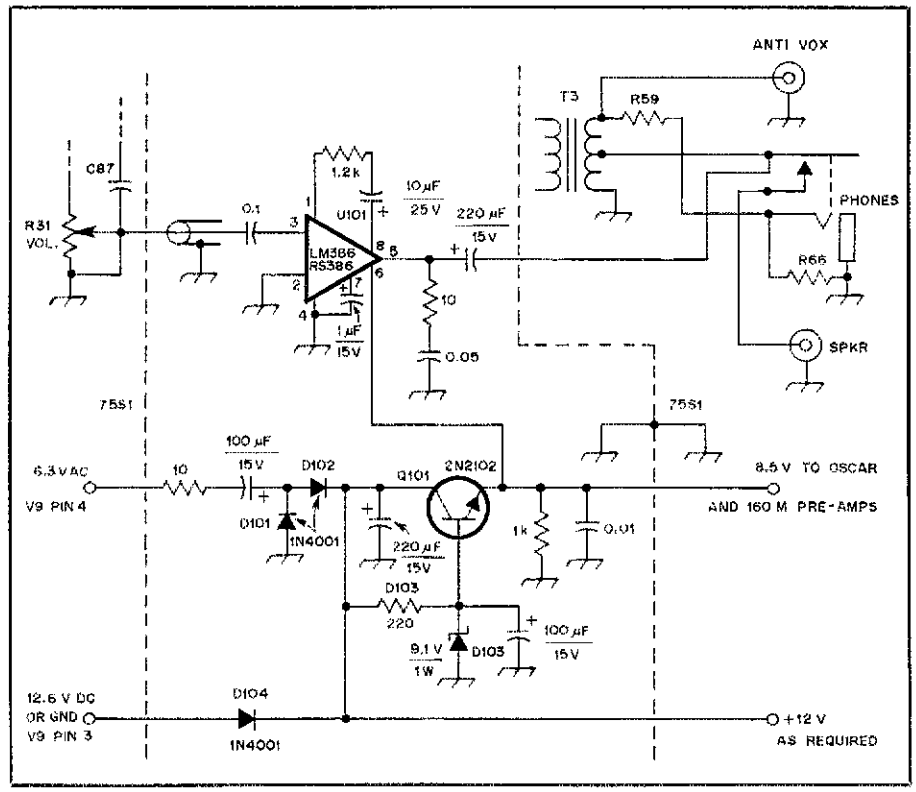


Fig. 6 — Diagram of new audio-amplifier stage and power supply. Resistors are 1/2-watt, carbon-composition types. Capacitors are disc ceramic, except those with polarity markings, which are electrolytic.

D101, D102, D104 — Silicon power diode, 1 A, 50 PIV, 1N4001 or equiv.

D103 — Zener diode, 9 V, 1 W, 1N4739 or equiv.

Q1 — Silicon power transistor, npn, 2N2102 or equiv.

U1 — Audio-amplifier IC, 1 W, LM386 or equiv.

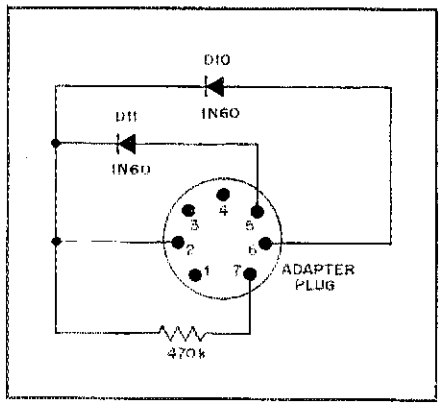


Fig. 7 — Plug-in diode detector to replace tube version. D110 and D111 are 1N60 diodes. See text for discussion.

I decided to add a solid-state audio section by replacing V7 and V8 with an IC that delivers plenty of audio with a fraction of the heat.[2] No original wiring is disturbed, and restoration to standard should be quick and easy.

I built a "bare-bones" adaptation of Rusgrove's amplifier on a circuit board. It replaces the noise blanker plate (see Fig. 6). It could be made more compact than this and could be mounted in one of several places above or below the chassis. A voltage-doubler circuit supplies operating potentials of approximately 12.5 and 8.5 volts dc. Note that an extra diode is included that would supply power in the event of 12-Vdc operation of the 75S-1.

No attempt has been made to rearrange the heater buses for 12- or 24-Vdc operation. I do not contemplate other than normal ac operation.

I made a plug-in diode-detector module for the vacated 6AT6 (V7) socket (Fig. 7), but the components could probably be plugged directly into the socket pins. A 470-kΩ resistor (pin 2 to pin 7) simulates the normal +2.5-Vdc cathode bias.

Try these modifications. I hope you'll agree the classic 75S-1 is even better now! QST

Notes

[1]Millimeters = inches × 25.4.
[2]J. Rusgrove, "A General-Purpose Audio Amplifier," *QST*, November 1976, p. 32.

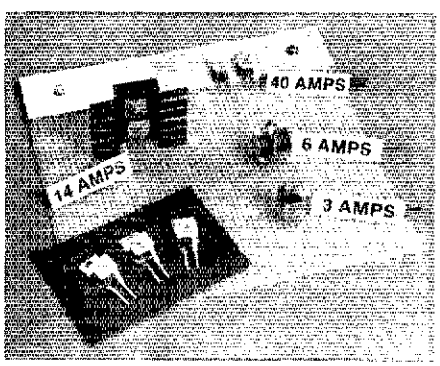
New Products

TAB-MOUNTED STANDARD AND FAST-RECOVERY RECTIFIERS

☐ Motorola has introduced a 10-device series of standard- and fast-recovery power rectifiers. The Motorola 339-02 case (a TO-220 configuration) offers the installation flexibility of chassis mount and pc-board mount with or without a heat sink. According to the manufacturer, they are less expensive than stud-mounted devices with equivalent current capacities.

The devices in this series can handle voltages from 50 to 600 V and currents from 3 A in a pc-board mounting (without heat sinking) to 40 A in a chassis-mount situation. The fast-recovery rectifiers are designed for applications such as switching power supplies, inverters and converters.

The fast-recovery types have a "soft" recovery time of 200 ns maximum, providing high efficiency at frequencies up to 250 kHz. The standard rectifiers are designed for applications requiring a high-current surge (400 A at T_j = 175° C) and peak performance at an elevated temperature — 24 A at T_c = 150° C. Delivery is from OEM stock and through authorized Motorola distributors. For further information, contact Motorola Semiconductor Products Inc., P.O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB*



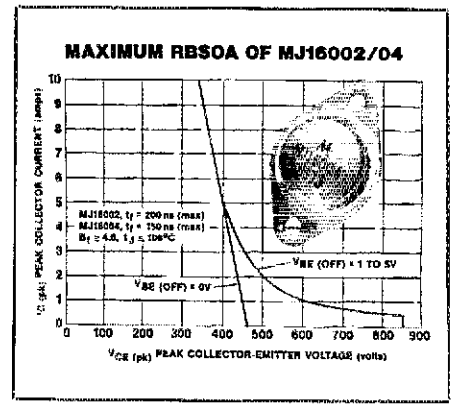
MOTOROLA SWITCHMODE III POWER TRANSISTORS

☐ A low-priced line of Motorola's Switchmode III power transistors has been introduced for applications requiring reduced current ratings. The MJ16002 and MJ16004 can handle 5 A of continuous collector current.

Npn devices, the MJ16002 and MJ16004, rated at 450 V and 125 W, are designed for high-voltage, high-speed power switching in inductive circuits where switching speeds are critical. They are well-suited for line-operated high-frequency switchmode applications. The MJ16004 is a selected high-gain version of the MJ16002 for applications where drive current is limited.

A unique feature is the speed at which these devices can switch — speeds approaching those of power MOSFETs. At a current of 3 A in an inductive circuit at 212° F (100° C), the MJ16004 typically has the following switching times: fall time, 80 ns; crossover time, 90 ns; storage time, 400 ns. These devices can switch through a 500 mA current at the rated V_{ce} of 850 V.

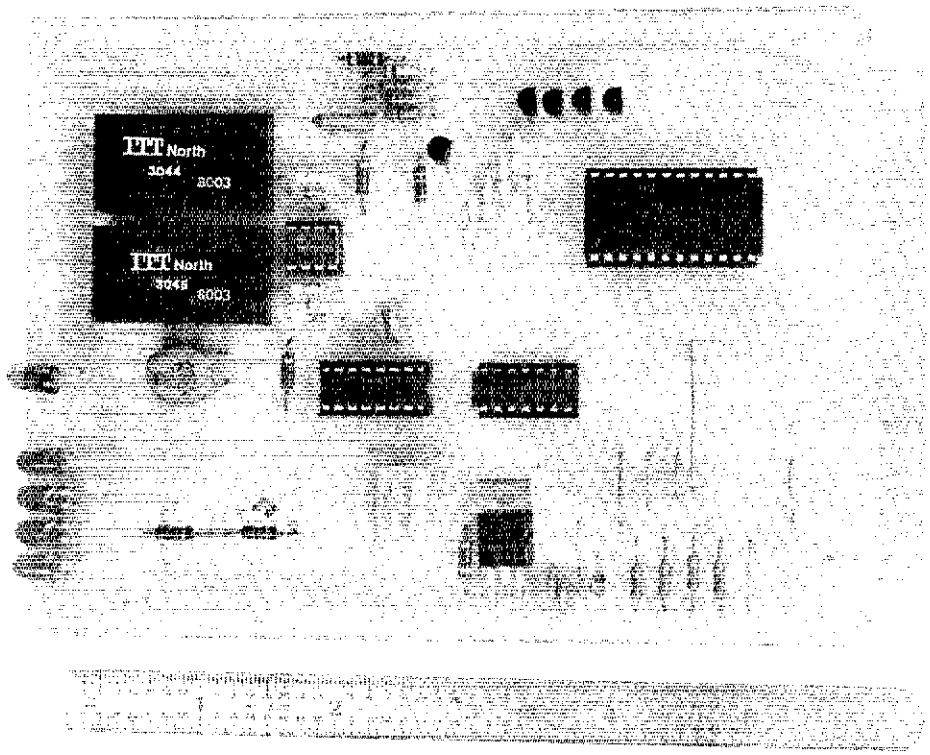
Switchmode III devices offer new performance potentials for applications such as switching regulators, inverters, solenoid and relay drivers, motor controls, and deflection circuits. Both devices are available in the standard TO-3 metal package. Prices for the devices in 100 to 999 quantities are: MJ16002, $2.70; MJ16004, $4.30. For further information contact Motorola Semiconductor Products Inc., P. O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB* QST



The DTMF "Easy-Ceiver"

Tired of fighting with your Touch-Tone receiver? Do certain voice frequencies turn the autopatch on or off? Does the repeater control system need a reliable DTMF receiver to make it work properly? Yes? Then here's the answer!

By Joe Jarrett,* K5FOG



Most people who have been around the repeater ranks for a while are aware of the 567 IC PLL decoder. Decoders using seven or eight of those ICs are not only complex, but suffer from frequency-drift problems and are difficult to protect from voice "talk off." Even when polystyrene capacitors and metal-film resistors are used, the free-running oscillator in each IC drifts with temperature. This necessitates occasional trips to the repeater site to readjust the decoders.

Another problem with that method of DTMF (Dual Tone Multi-Frequency) decoding is that the exact phase of the free-running oscillator with respect to the incoming tone frequency is impossible to predict. This means that some detection times are in microseconds (when the incoming tone and free-running oscillator are almost in phase). Other detection times are tens of milliseconds in length (when the two frequencies are far out of phase). The values of the low-pass filter and output-filter capacitors can be adjusted to slow down the decoders, but often the result is a slow DTMF receiver that occasionally responds erroneously to the "right" voice.

Several manufacturers now produce IC DTMF decoders that eliminate drift and largely eliminate the talk-off problems. These ICs unfortunately require band-split filters that are tedious to design and build. While some attempts to solve the filter problem have been made by using active filters, these filters often require hand tuning, and use of polystyrene capacitors and metal-film resistors for stability. The designs that don't require precision components use extra filter stages that are even more intricate. There is, fortunately, another choice.

A Solution

Hybrid versions of the required filters are available from several manufacturers. While these are more costly than the hand-built filters, they simply plug in and work without adjustment. This means that a DTMF receiver can be built with relatively few components, will exhibit a wide dynamic range and will never require tuning. This is a description of just such a receiver. It uses the Mostek MK5102(N)-5 or MK5103(N)-5 DTMF decoder and the ITT North Microsystems model 3044 and 3045 hybrid filters.

The MK5102 and MK5103 tone decoders are identical except for their internal tone detection algorithm. Both circuits

*4501 Hudson La., Tampa, FL 33624

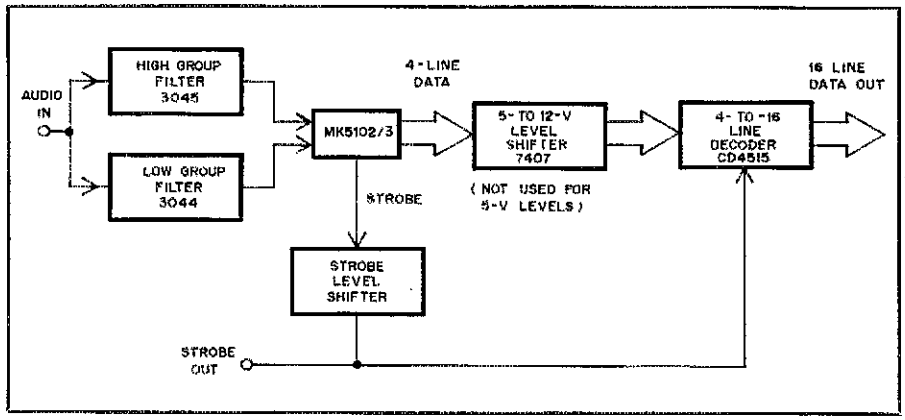


Fig. 1 — Block diagram of the MK5102/3 DTMF receiver.

Table 1

Output Level Jumper Connections

12-V CMOS Output Levels	*5-V TTL Output Levels*
W3 from E to G.	W3 from E to F.
W11 from I to H.	W11 from J to K.
Install R10-R13, incl.	Omit R10-R13, incl.
R14-R17, incl., are 1 kΩ.	Omit U5 and socket, and jumper U5 pin connections: U5 pin 1 to U5 pin 2 U5 pin 3 to U5 pin 4 U5 pin 5 to U5 pin 6 U5 pin 9 to U5 pin 8. R14-R17, incl., are 470Ω.

Input Voltage Jumper Connections

Input Voltage	*Card Edge Connector*	*Jumper*
12 V	A	W1 from A to B
12 V	B	W2 from C to B
(Note: If 5-V on-card regulator is used, the following jumpers are not required.)		
5 V	A	W1 from A to D
5 V	B	W2 from C to D

Table 2

4-Bit Binary Decoded Digit Display Map

Tone	*DS1*	*LED DS2*	*DS3*	*DS4*
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
Ø	1	0	1	0
*	1	0	1	1
#	1	1	0	0
A	1	1	0	1
B	1	1	1	0
C	1	1	1	1
D	0	0	0	0

A "1" indicates the LED is on, and a "0" that it is off. When the incoming signal ceases, the LEDs will indicate the last decoded digit.

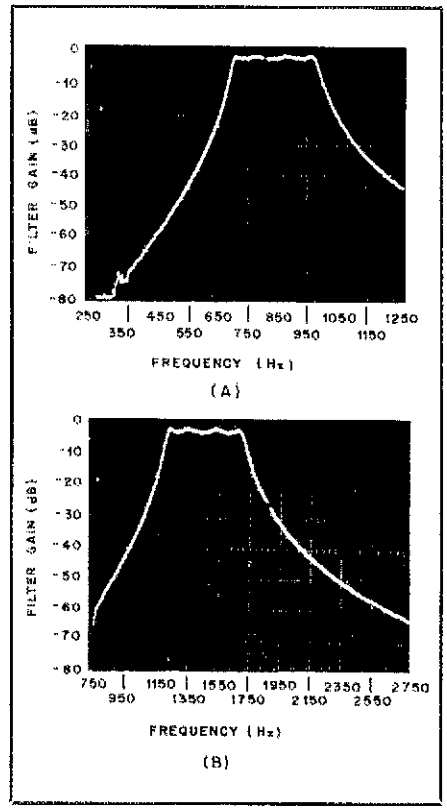


Fig. 2 — Frequency-response diagrams of the ITT North Microsystems filters. At A, the response of the low-group filter; that of the high-group filter is at B.

do half-period, whole-period, sub-group averaging and multiple sub-group averaging in the detection of a valid DTMF tone pair. The detection criteria for the MK5102 are more severe than that of the MK5103, however. The MK5102 is therefore less apt to be fooled by certain voice frequencies, yet is more susceptible to noise interference. An MK5103 is better suited for use in noisy environments, but I have found that in most applications, either unit will work satisfactorily.

The Easy-Ceiver

Fig. 1 is a block diagram of the DTMF Easy-Ceiver. Incoming audio is fed in parallel to both the high-group and low-group filters. Each filter has the correct band-pass response (see Fig. 2) for the associated tone group. The output of each filter is fed to an op-amp limiter, which "outputs" an approximate square wave to the MK5102/3. Since the output of the decoder is a 4-bit binary code, a 4-to-16 line decoder is used to provide the necessary 16 outputs. The decoder strobe output is buffered and provided for off-card use.

The board[1] used in this design may be programmed by means of jumpers (see Table 1) for either 5-V TTL or 12-V CMOS outputs. A single 12-V supply can be used because provisions have been made for the installation of an on-card 5-V regulator that will provide the operating voltage for the MK5102 decoder and the 7407 open-collector TTL buffers. The edge connector may also be strapped to bring 5 or 12 volts to the board and can thus work in bused systems with a 5- or 12-V supply. The strobe and 4-bit binary outputs from the decoder are also sent to LED drivers that indicate which digit was decoded. This decoding scheme is shown in Table 2.

A special circuit technique is used to interface the filters and op-amp limiters (which normally require a dual-voltage supply) to the decoder board 12-V supply. A pseudo ground at +6 V is developed by means of a divider consisting of R6, R7 and C8 of Fig. 3. This is connected to the noninverting input of the limiters and to the ground pin (18) of the filters. The negative supply-voltage pins of the limiters and filters are then connected to the 12-V ground of the decoder board. This allows the filter input voltage swing to be as high as 11 volts peak-to-peak, enough for almost all applications. Simple diode limiters used with U3 produce an output square wave of approximately 1.4 volts peak-to-peak. This is adequate to feed the decoder.

The 4-bit binary output code of the MK5102/3 is selected by connecting the format control pin (5) to the +5-V supply. While not compatible with the board used here, a 2-of-8 output code may be selected by letting pin 5 float. (This output code is shown in Table 3 and a representative circuit is shown in Fig. 4.)

U5 is used as a level shifter to convert the 5-V outputs of the decoder to 12-V CMOS compatible outputs. If the board is to supply 5-V output levels, the U5 may be omitted and jumpers placed between the input/output pin connections. R10 through R13 should also be removed.

U6, a 4-to-16 line decoder, provides negative logic outputs; i.e., the outputs are normally high, and the decoded digit output goes low. If positive logic outputs are desired, a CD4514B may be substi-

[1]Notes appear on page 29.

tuted directly for the CD4515B. Q5 inverts the strobe signal, drives the strobe LED (DS5) and provides the level-shifting function if necessary.

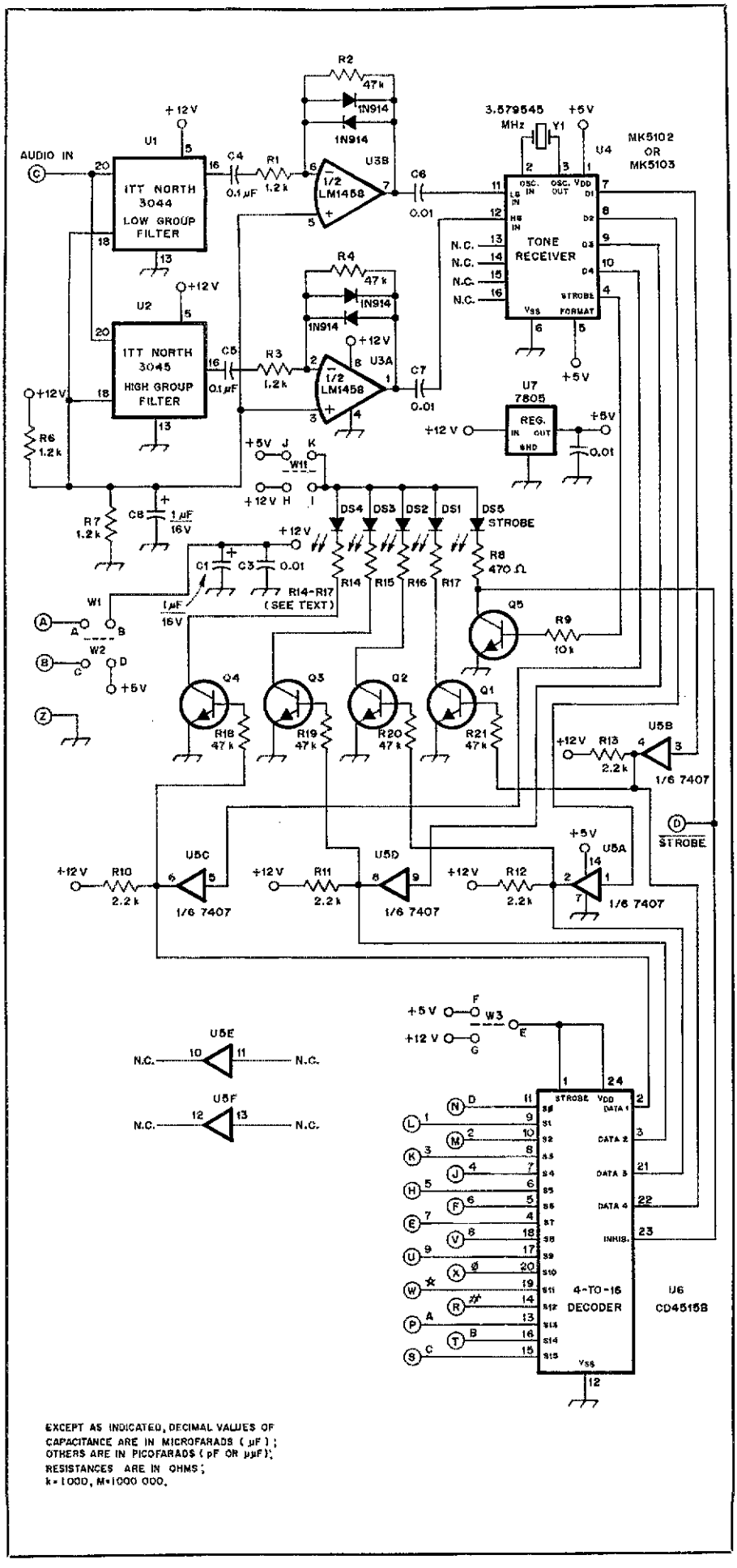
Envelope-Decay Detector

The MK5102 has a worst-case decode time of 33 ms and an interdigit time of 35 ms, while the MK5103 exhibits times of 30 and 35 ms, respectively. The actual decode and interdigit times are somewhat filter-dependent. Filter delays and ringing can cause these times to be lengthened by 10 ms or more. A Mostek application note describes an envelope-decay detector (Fig. 5) that works with the limiter. This circuit allows the receiver to perform at maximum speed. If decode speed and interdigit timing are critical factors, this circuit should be added.

The envelope-decay detector of Fig. 5 consists of two precision rectifiers, two sample-and-hold circuits and a comparator. Circuit action compares the instantaneous peak voltage (at the noninverting input of U2) with a voltage equal to one half the peak value (at the inverting input of U2) and senses when the input voltage amplitude of U1A is starting to decrease. The decrease indicates that the input tone is no longer present and that the filters are in a decreasing-amplitude ringing condition. When this is sensed, the envelope-decay detector immediately cuts off the low-group tone input. Thus, interdigit timing is decreased significantly, enabling the tone receiver system to run at maximum speed, greater than 12 digits a second.

Construction

For the sake of simplicity and cost effectiveness, the pc board was designed as a single-sided one. Because of this, there are 11 jumpers to be installed; all are required except W2, which is optional. Refer to Table 1 for the appropriate jumper connection information.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (pF OR µµF); RESISTANCES ARE IN OHMS; k = 1000, M = 1000 000.

Fig. 3 — Schematic diagram of the Easy-Ceiver. The circuit board edge-connector pads are indicated by the circled letters. W = jumper. All resistors are 1/4-watt, 5 or 10% carbon composition or film types.
DS1-DS4, incl. — Red LED.
DS5 — Green LED.
R14-R17, incl. — 470 or 1000 Ω (see Table 1).
Q1-Q5, incl. — Npn general-purpose switching transistor, 2N2222A or equiv.
U1 — ITT North Microsystems Division 3044 low-group filter.
U2 — ITT North Microsystems Division 3045 high-group filter.
U3 — Dual op amp, LM1458 or equiv.
U4 — Mostek MK5102(N)-5 or MK5103(N)-5 DTMF decoder (see text).
U5 — TTL hex open-collector buffer (see text).
U6 — CMOS 4-to-16 line converter CD4514B or CD4515B (see text).
U7 — Three-terminal regulator, 5 V, 1 A, MC7805CT or equiv.
Y1 — 3.579545-MHz TV color-burst crystal in HC-6/U holder.

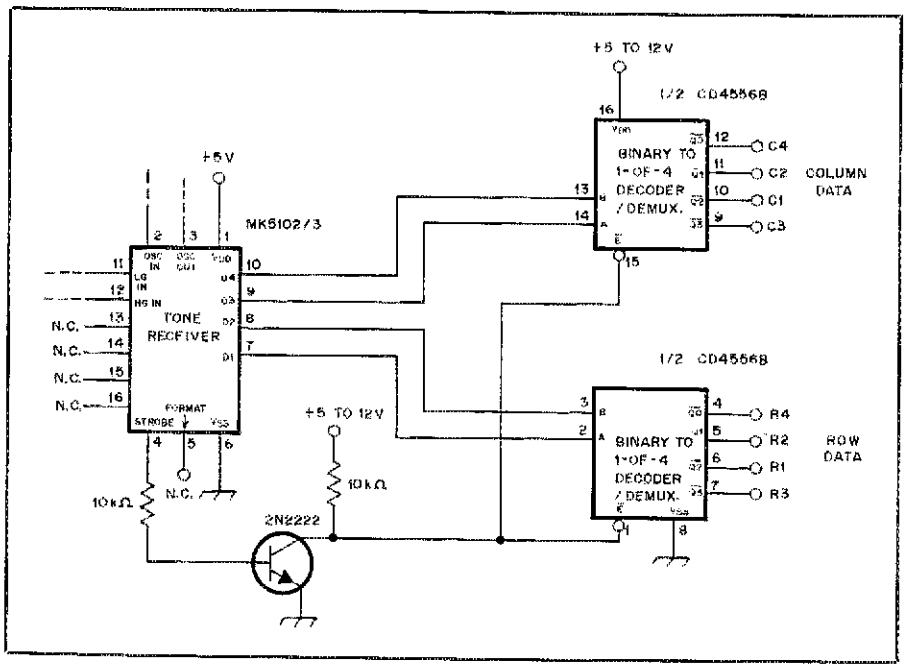


Fig. 4 — This circuit can be incorporated in the DTMF receiver should a 2-of-8 output be required.

Table 3

2-of-8 Decoded Digit Display Map

Tone	DS1	LED DS2	DS3	DS4
1	0	1	0	1
2	0	1	1	0
3	0	1	1	1
4	1	0	0	1
5	1	0	1	0
6	1	0	1	1
7	1	1	0	1
8	1	1	1	0
9	1	1	1	1
0	0	0	1	0
*	0	0	0	1
#	0	0	1	1
A	0	1	0	0
B	1	0	0	0
C	1	1	0	0
D	0	0	0	0

This output code may be used with a CD4556B as shown in Fig. 4 to result in a true 2-of-8 output. An MK5089 DTMF generator or pulse dialer IC can be driven directly by the CD4556B.

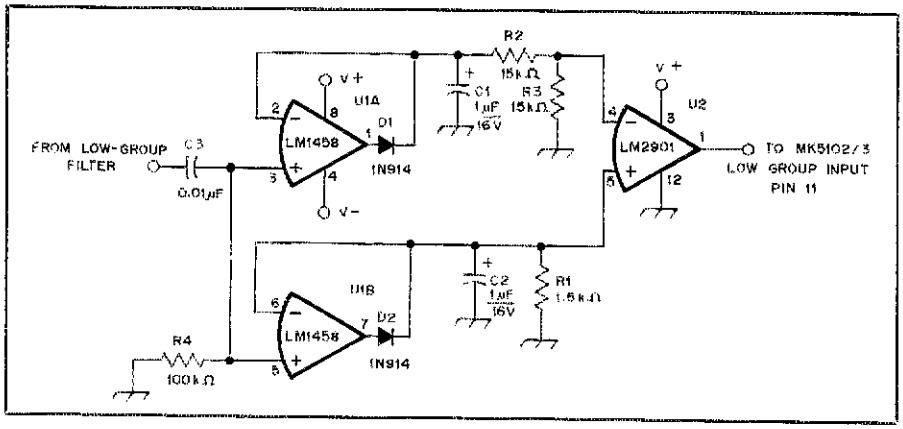


Fig. 5 — Envelope-decay detector schematic diagram. This circuit permits the DTMF receiver to operate at maximum speed by eliminating the effects caused by filter ringing and delay.

Install resistors and capacitors first, making sure the two electrolytic capacitors are polarized correctly. Sockets should be used for the MK5102/3 and CD4515B. The two CMOS parts should not be installed until just prior to board testing.[3] U7 should be installed if a 5-V supply external to the board is not to be used. C1 through C3 should be mounted on the board even if U7 is not used. DS1 through DS5 are placed at the board edge with the anodes pointed toward the outside continuous printed circuit run.

Audio Interface

Audio supplied to the DTMF Easy-Ceiver should have a flat response between 300 and 3000 Hz. If the response is not flat, it will lessen the dynamic range of the receiver. Should CTCSS (Continuous Tone Coded Squelch System) be used, receiver operation will not be affected since these subaudible frequencies are filtered out by the 3044 and 3045 filters. Audio derived from an fm receiver discriminator should be de-emphasized before it reaches the DTMF receiver. With proper interfacing, the dynamic range of the receiver should be in excess of 30 dB.

The ITT North filters have internal input-blocking capacitors, so audio from almost any source can be connected to the card. An audio level of 0 dB, approximately 0.7 volt as measured with a high-impedance VTVM, is sufficient. A typical set-up for an fm repeater system would involve setting levels while receiving a 3-1/2 kHz deviated DTMF signal. This assumes a nominal 5-kHz maximum peak deviation is being used. Wide-band systems should use about the same 70% ratio.

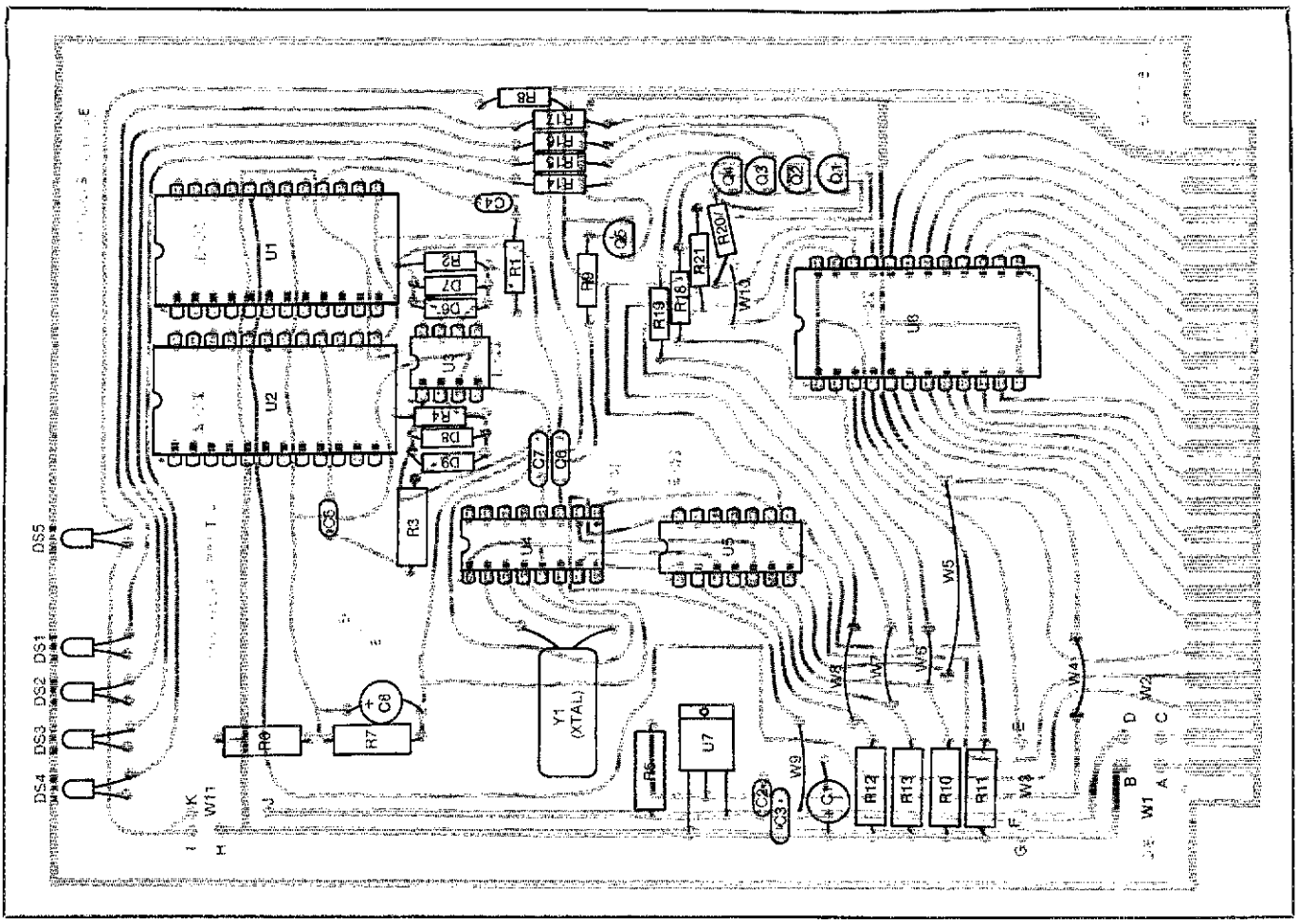
Operation

The only problem you may have with the operation of the DTMF receiver is that caused by clipping. If *any* stage between the DTMF generator and the receiver is driven into clipping, the receiver may not decode. It won't "false"; it just will not decode at all. Signal clipping causes the row tones (especially those of rows one and two) to produce second harmonics in the column tone-filter passband. These harmonics are passed by the high-group filter to the decoder. (Note that any stage that clips will produce these harmonics, and most fm transmitters have a clipper as part of their deviation-limiting circuit.)

The "fix" is simple — turn down the DTMF level feeding the individual transmitter. You'll find that deviation levels of below 2 kHz will work in a properly set up system. Incidentally, the reason a 567 PLL decoder will work with a clipped DTMF signal is the same reason it falses so badly. Think about it.

When removing or installing the Easy-Ceiver card, power should always be removed. Failure to do so could destroy the MK5102/3 and U6. All parts on the board may be damaged if the card is plugged in upside down. A sawed slot and card-edge key could save you some time, trouble and damaged parts.

This DTMF receiver design has been in use in fm repeater systems for over two years with excellent results. In one instance, the receiver replaced a Bell 247B that had a voice talk-off problem. The problem was eliminated by the Easy-Ceiver. While no DTMF receiver is totally voice glitch free, this design comes as close as any I have seen. It is gratifying to hear even noisy signals operate the control system. As long as signal levels are kept from clipping, few users have the "pad problems" so common with other DTMF receivers.



Parts-placement diagram for the Easy-Celver. Components are mounted on the nonfoil side of the board. Shaded areas represent copper on the foil side of the board. The circuit-board etching pattern appears on page 50.

I would like to thank Bill Martin, WA4LEN, for his help with artwork and photography, and Bill Dudley, WA4IBM, who talked me into writing this article. I also want to thank the users of the 60/00 repeater in St. Petersburg, Florida, for their patience during the testing of the prototypes of the Easy-Celver.

Notes

[1]A kit including an MK5103, filters, pc board and all other miscellaneous parts is available from Sun Coast Electronics, 1539 S. Dale Mabry Hwy., Tampa, FL 33607. Price is $150 including postage in the continental U.S. Write for cost of individual components. ITT North Microsystems filters may be obtained from ITT North Microsystems Division Customer Service, 700 Hillsboro Plaza, Deerfield Beach, FL 33441-1796. Cost for both filters is $60.80 plus shipping charges. [The MK5102(N)-5 is also available from Circuit Specialists, 1344 N. Scottsdale Rd., Tempe, AZ 85281 — Ed.] The ARRL and *QST* in no way warrant these offers.

[2]Caution: Use care in handling CMOS parts. You will probably receive them in an antistatic bag or shorting socket. They should not be handled or removed from their protective device until just prior to installation. When installing CMOS parts, make sure your body and the pc board are in contact and grounded. While CMOS part damage is rare, a dry day and a carpeted floor can cause static problems.

Strays

REMINISCENCE BEARS FRUIT

☐ Speaking before the Falmouth (Massachusetts) ARC, Dr. Yardley Beers, WØJF, a former physics professor, senior physicist with the National Bureau of Standards and well-known *QST* author, related a story about his youth that at least one member of the audience could identify with. Students at Phillips Academy weren't allowed to have electrical appliances in their rooms in those days. To get around that regulation, Beers decided to build a "lunchbox" rig. The results, he told the group, were admirable.

During the question-and-answer period, someone in the back of the room raised his hand and asked where the idea for the "lunchbox" rig came from.

"From a magazine, sir," Beers replied.

"The magazine perchance, wasn't *QST*?"

"Why yes it was. Why do you ask?"

Because, replied Edward Braddock, W1XV/W2BAY, "I was the author of that [July 1929] article!"

"How wonderful it is to meet you after all these years," Beers responded. "You set me on my life's course." With that, the entire club stood up and cheered. — *information courtesy Edward Braddock, W1XV/W2BAY, and the* Falmouth Enterprise

QST congratulates . . .

☐ Richard Frost, K1JVM, who was named one of the top entrants in a nationwide competition for computer projects, sponsored by Johns Hopkins University, to stimulate research in personal computing to aid the handicapped.

Ionospheric Scatter By Field-Aligned Irregularities at 144 MHz

The best 2-meter path is not always a straight line. You can use FAIs to work DX, if you know where to aim your antenna.

By Thomas F. Kneisel,* K4GFG

As a result of work conducted by a Stanford University research team, the scientific community first recognized Field-Aligned Irregularities (FAI) in the ionosphere 30 years ago.[1] Amateurs have made little intentional use of them for communication. In 1974[2,3] and again in 1979,[4] powerful ground-based transmitters "heated" localized sections of the ionosphere, producing scattering irregularities in the E and F layers. These scatterers aligned with the magnetic field of the earth and reflected Amateur Radio signals over distances of up to 1100 miles[5] on 2 meters and other vhf frequencies. The propagation was short-lived and disappeared when the heaters were turned off. Although these FAI were man-made, Victor Frank suggested that FAI also occur weakly in nature.

Early Studies

Radar echoes from field-aligned scatterers in the E layer were reported as early as 1955. Working with 17-MHz radar, the Stanford University team detected a rapidly fading signal backscattered from within the E layer almost every night during late spring and early summer in 1955.

In July of 1958, Heritage, Weisbrod and Fay used high-power transmitters and narrow beamwidth antennas at 200 MHz to study the features of field-aligned scattering in the E layer.[6] They employed a forward-scatter path from Texas to California as shown in Fig. 1. Note the deviation from the great-circle path. Signals were characterized by a rapid flutter and lasted as long as 1/2 hour. Most activity was found during the hours of darkness.

An extensive 5-year radar study of FAI was performed in the early sixties by Basu, Vesprini and Aarons.[7] They used a radar with frequencies of 19 and 49 MHz, located in Massachusetts, to observe the FAI and to correlate it with the occurrence of sporadic E. During evening hours, FAI accompanied sporadic E almost 50% of the time at 19 MHz. The FAI would last for perhaps an hour or more, becoming *more* intense as the sporadic E weakened. Daytime sporadic E, however, had no detectable FAI accompanying it. The FAI showed a strong summertime peak in activity, with a small peak in the winter, similar to sporadic E. At 49 MHz, similar seasonal and daily FAI peaks were observed; however, only one-third as much FAI was detected at this frequency.

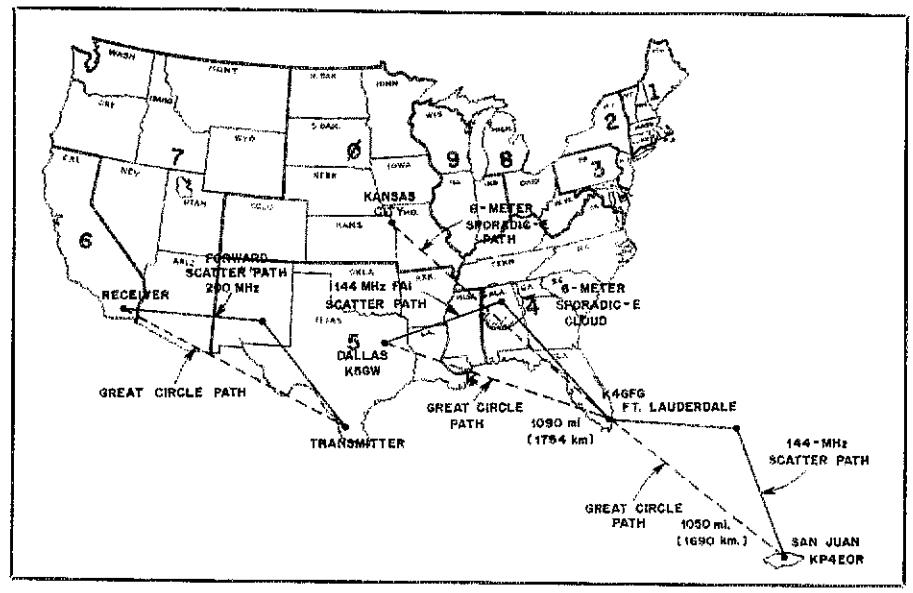


Fig. 1 — FAI scatter paths (solid lines) compared with great-circle paths (broken lines). The cloud over Alabama serves both the 6-meter sporadic-E circuit and the 144-MHz FAI path.

Amateur Observations at 144 MHz

In the summer of 1978 I set up an evening schedule with Dave Ternent, KP4EOR. We tried to work the 1050-mile distance between Florida and Puerto Rico. Dave was running a kilowatt amplifier and four Yagis, and I had a kilowatt amplifier and two Yagis. This corresponds to a maximum allowable path loss of approximately 248 dB. At 2105 EDST on June 19, I received a telephone call from Doug Welcker, WB4KGY, in West Palm Beach. He reported hearing KP4EOR up the band, 3 kHz! The signals were weak and fluttery with a T5 cw note similar to that caused by aurora. Antennas at each end of the path peaked about 20 degrees north of the great-circle path (Fig. 1). The band stayed open for 2 hours 40 minutes while KP4EOR worked WA4OWC and W4WD, and heard WA4JID and K4DZP, all from south Florida. Schedules through early

[1]Notes appear on page 32.
*1600 SW 115 Ave., Davie, FL 33325

September yielded five similar contacts.

In the spring of 1979, we maintained more rigorous scheduling on half hours throughout the evenings. Forty-seven days of scheduling from May through August resulted in identification of 24 occurrences of this propagation (51%)! Signals were generally weak, but on six occasions the levels rose to 30 dB above the noise. Several stations in Florida and Puerto Rico with only 100 watts and single Yagis participated at times. We did not observe 144-MHz sporadic E.

On the evening of July 21 I noticed 6-meter sporadic E over the Gulf states. I aimed the antennas northwest and heard Gerald Williamson, K5GW (near Dallas, Texas) calling CQ on 144.200 MHz. The signal was weak and fluttery; our QSO lasted only a few minutes. He was quite surprised at the antenna heading required to work a south Florida station (Fig. 1). Another FAI opening from Florida to Texas early in August lasted 2-1/2 hours. I netted five contacts with stations from Dallas to Houston.

During July through September of 1980, I heard or worked the Florida-to-Texas FAI path 13 times. The first QSO was by chance. Chuck Stewart, N5AXP (in San Antonio, Texas) was running four Yagis but only 100 watts. I had only a single Yagi at the time. We consistently noted the auroral flutter and a beam offset to the north of the great-circle path.

On June 21, 1981, I worked a different type of FAI path. My antenna was aimed north to work WA4CQG in Auburn, Alabama. He also had to aim his antenna north and elevate it 35 degrees above the horizon! The scatterer was in the E-layer approximately 120 miles north of him. The reflected signal bounced back over his station towards Florida 600 miles to the south!

Comparing the Details

The most striking feature of FAI is the antenna offset from the great-circle bearing required to work this propagation mode. Repeated attempts to work the great-circle path failed. Geometry calculations confirmed scatterers aligned with the magnetic field and located in the E layer would produce the antenna offsets observed. The calculations fail to predict the observed azimuths when the scatterer is assumed to be at F-layer heights.

Antenna elevation tests with the help of the K5GW 16-Yagi EME array also confirmed that the scatterer must be located in or near the E layer. The measured signal arrival angle was essentially on the horizon. If the scatterer had been in the F layer, there would have been a 10- to 15-degree elevation.

The identifying feature of the FAI that sets it apart from sporadic E or tropo is the rapid flutter. It is similar to auroral propagation in sound, but not as disruptive. Frequency components of 30 to 100 Hz are typical. Ssb is quite intelligible when signals are somewhat above the noise. On two or three occasions, however, Texas and Puerto Rico stations reported that parts or all of 60-second Florida transmissions were clear — without the flutter. This remains unexplained. The signals do not exhibit the deep fades characteristic of tropo or sporadic E, but remain very consistent from minute to minute.

Our experience at 144 MHz tends to confirm the link between FAI and sporadic E observed by the early researchers. Intensive scheduling during February through April for FAI failed. May through early September yielded an abundance of FAI. Late September through October produced no FAI. Although we have done little scheduling at other times of the year, we believe the data tend to indicate a summertime peak similar to that of sporadic E. Our experiments occurred near the peak of a solar cycle, but others[5] were done nearer to solar minimums, indicating FAI occurs throughout the solar cycle as does sporadic E.

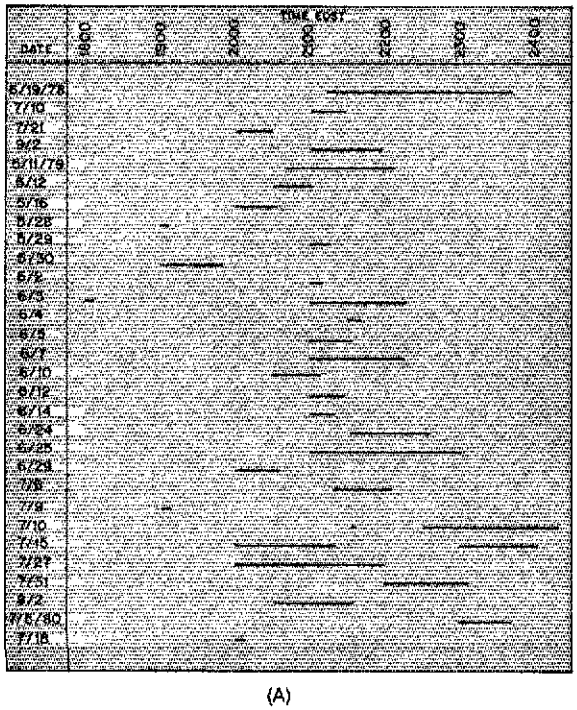
6-Meter Barometer

During 1980, 144-MHz FAI to Texas occurred on 53% of evenings having 6-meter sporadic E to the west or northwest of Florida. Fig. 1 shows 6-meter sporadic E to the northwest indicating the presence of ionization near the scattering location used to work Texas on 144-MHz FAI. The FAI generally appeared late in the evening after the sporadic E was well developed. Sometimes it appeared just after the 6-meter band had closed. Typically, the 144-MHz FAI outlasted the 50-MHz sporadic E by 30 minutes to an hour.

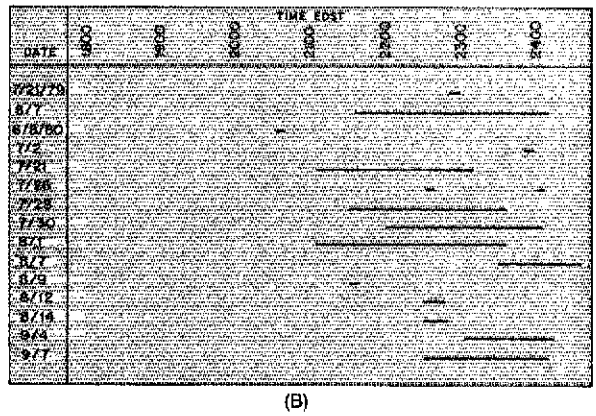
Fig. 2 shows the time of day of occurrences of FAI to Puerto Rico and Texas. Schedules were generally on the half hours, and although the data is biased by operating habits, it seems to indicate that many openings begin from mid to late evening.

Determining Antenna Bearings

The key to success with FAI is to predict the correct antenna headings for



(A)



(B)

Fig. 2 — At A, evening occurrences of 144-MHz FAI from Florida to Puerto Rico, 1978-1980. Scheduling generally began at 2000 local time. At B, evening occurrences of 144-MHz FAI from Florida to Texas, 1979-1980. Scheduling generally began at 2100 local time.

the particular path you want to work. As an example, a map of the U.S. (Fig. 3) depicts magnetic field direction. These are the short straight lines pointing toward magnetic north. Lines of equal magnetic inclination, or dip angle, have also been drawn across the country from east to west.

Let's choose a path that is to be worked, say Chicago, Illinois, to Denver, Colorado. The scattering center will be located somewhat north of the great-circle path; therefore we use a contour set for a 74-degree dip angle. These are the heavy lines with an X at the location of the scattering center.

The contours are labeled in degrees and represent the mathematical complement of the incident or reflected ray angle with respect to the scattering axis. When a station anywhere on the −5 degree contour transmits toward the scatterer, the reflected signal returns to earth not at one point, but along the entire arc of the +5 degree contour. Similarly, a station on the −2-1/2 contour can work a station anywhere on the +2-1/2 contour, and so on. A station on the 0-degree contour can work any other station on the 0-degree contour, including itself (the radar case).

Chicago on the +2-1/2 contour lines up with Denver on the −2-1/2 contour. The scattering center, located by the X, is over Fargo, North Dakota. Both operators must aim their antennas there to work each other.

For many paths, especially the shorter ones, there will not be just one unique solution, but a locus (curve) of points for the scattering center. Theoretically FAI at any of these points will support communications. Path length, elevation considerations and perhaps the angle of scattering may make one area yield stronger signals. Experiment with beam headings after contact is established. We have detected some movement of the scattering point during 144-MHz contacts.

Once you have the correct azimuth, check to see if antenna elevation is required to intersect the scatterer in the E layer of the ionosphere. Each contour has been extended to where the perimeter represents the maximum working range, which corresponds to the scatterer being located on the horizon. A partial circle has been drawn around the scatterer to indicate the distance that requires a 10 degree antenna elevation. If you don't have antenna elevation control, you may want to stick to the long east-west paths outside of the circle, as I did.

Station Requirements and Operating Tips

As with many other weak-signal modes of communication, best results will be obtained through persistent scheduling and the use of cw. Once you have chosen the station you want to work, determine the antenna headings, and set up a schedule.

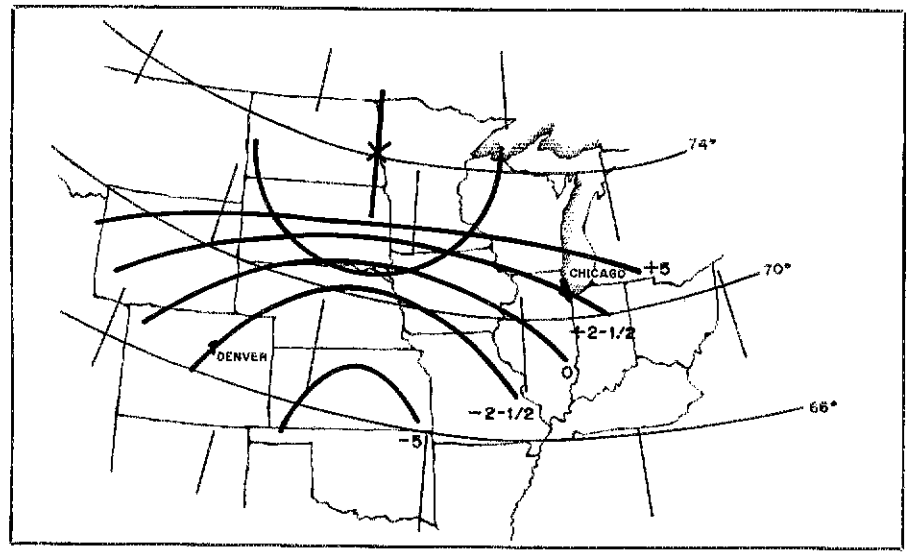


Fig. 3 — Alignment of contours for the Chicago-to-Denver path.

Four or five minutes of transmission at the beginning of each half hour throughout the middle to late evening is recommended. If both stations are able to monitor 6 meters, you may wait until sporadic-E clouds are formed above the appropriate area. Continue scheduling for at least an hour after 6 meters has closed, or you may miss an opening!

My statistics indicate that two Yagis (horizontally polarized), kilowatt amplifiers and a quiet location on each end produce results. You should be able to detect 144-MHz FAI on about half of the summer evenings that exhibit 6-meter sporadic E in the appropriate area.

On many evenings the signals may be barely detectable for 5 to 10 minutes, then disappear with little *real* communications possible. Several evenings per month they may be many decibels above the noise and may last for 2-1/2 hours or more. As station power and antenna gain is reduced, the result will be fewer QSOs of shorter duration. A station with a single Yagi antenna and 100 watts of output power should be able to work another station similarly equipped, but perhaps only a few times each summer when the FAI intensity is the strongest.

Other Frequencies

Basu, Vesprini and Aarons have observed FAI at 19 and 49 MHz.[9] Well-equipped amateur stations on the upper hf bands as well as 50 MHz should have no difficulty working FAI, and may already have done so without recognizing the mechanism. We have observed FAI at 144 MHz, with path-loss figures occasionally as low as 218 dB, which is easily within reach of amateur stations today. Heritage, Weisbrod and Fay observed FAI at 200 MHz with a *typical* path loss of 248 dB.[10] This is certainly within reach of better equipped 220-MHz amateur stations.

What about ionospheric scatter at 432 MHz? Given a boost by FAI, it may be possible. Although I have not found any direct measurements of naturally occuring FAI path loss for uhf, it is likely to be much higher than for 144 MHz.[11] EME capabilities on both ends of the path will almost certainly be required.

Acknowledgments

I would like to thank Doug Welcker for his contributing support and the many long hours of discussion of FAI during the past three years, and Dave Ternent and Chuck Stewart for scheduling night after night in quest of FAI. A special thanks to my wife, Kay, for her patience and understanding.

[Editor's Note: A map of the United States and a set of contour overlays along with the basic equations are available from ARRL Hq. for $3.] QST

Notes

[1] A. M. Peterson, O. G. Villard, Jr., R. L. Leadabrand and P. B. Gallagher, "Regularly-Observable Aspect-Sensitive Radio Reflections from Ionization Aligned with the Earth's Magnetic Field and Located Within the Ionospheric Layers at Middle Latitudes," *Journal of Geophysical Research*, Dec. 1955, pp. 497-512.

[2] V. R. Frank, "Scattering Characteristics of Artificial Radio Aurora," *Ham Radio*, Nov. 1974, pp. 18-24.

[3] V. R. Frank, R. B. Fenwick and O. G. Villard Jr., "Communicating at VHF via Artificial Radio Aurora, *QST*, Nov. 1974, pp. 27-31, 34.

[4] W. A. Tynan, "The World Above 50 MHz," *QST*, Aug. 1979, p. 86.

[5] km = miles × 1.6

[6] J. L. Heritage, S. Weisbrod and W. J. Fay, "Evidence for a 200-Megacycles per Second Ionospheric Forward Scatter Mode Associated with the Earth's Magnetic Field," *Journal of Geophysical Research*, Sept. 1959, pp. 1235-1241.

[9] S. Basu, R. L. Vesprini and J. Aarons, "Field-Aligned Ionospheric E-Region Irregularities and Sporadic E," *Radio Science*, March 1973, pp. 235-246.

[8] See note 7.

[7] See note 7.

[10] See note 6.

[11] See note 2.

A Simplified Procedure for Locating and Tracking the Moon

Track the moon? No, it doesn't leave footprints! But there's more to finding it than looking out the window. Some simple calculations will help you track it with your telescope or EME antenna.

By Arthur L. Barber, Jr.,* KC2BO

The best transceiver, low-noise preamplifier, power amplifier and high-gain antenna will produce only marginal results if you cannot locate and continuously track the moon during an EME QSO schedule. Moonbounce can be one of the most demanding modes of communication for the radio amateur. Valuable operating time ought not be wasted in detailed calculations, which are only a means to an end. A simple, straightforward method of precalculating the azimuth and elevation for aiming your EME antenna is described. This brief explanation will not make you an accomplished navigator or radio astronomer, but it will give you a better understanding of the theory behind the calculations.

The earth is an oblate spheroid, flattened at the poles, 24,875 statute miles[1] in circumference, with a radius of 3959 miles. It makes one complete rotation (360 degrees) every 23 hours 56 minutes on its polar axis, which is inclined at an angle of 23.5 degrees to its plane of orbit around the sun. During this time the earth revolves about 1 degree in its orbit around the sun. The earth must rotate slightly farther to catch up, producing our day of 24 hours. The tilt of the axis accounts for our change of seasons. When the axis is inclined toward the sun it is summer in the northern hemisphere and winter south of the equator. Distances north and south (latitude) are measured from the equator toward the poles (0 to 90 degrees). Distances east and west (longitude) are measured from the prime meridian, a great circle that passes through both poles and Greenwich, England. One degree = 60 minutes of arc = 60 nautical miles along the equator. Since 24 hours ≈ 360 degrees of arc, 1 hour ≈ 15 degrees of longitude. It then follows that there are 12 time zones west and 12 time zones east of the prime meridian. For example, New York City is approximately 75 degrees west, so when it is noon in New York, it is 5 P.M. in Greenwich. The time-angular difference between any two points on the surface of the earth is the basis of celestial navigation. By knowing the exact location of a radio station and the geographic position of the moon, it is possible, by calculation, to locate the moon accurately in terms of azimuth and elevation.

The moon, the only natural earth satellite, is 2162 statute miles in radius, and varies in distance from the earth between 223,000 miles at perigee and 253,000 miles at apogee during its 29.5-day synodic period of rotation about the earth. It has a sidereal rotation about its own axis of 27.3 days. The moon rises later each day, changes azimuth, altitude [this is the navigational term for the angle measured from the horizon to the celestial body, essentially the same as what amateurs call elevation angle — Ed.] and declination rapidly compared with the stars, and swings approximately 20 degrees north to 20 degrees south of the equator every 14 days.

Visualize a line drawn from the center of the earth to the center of the moon, as

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[1]Notes appear on page 35.

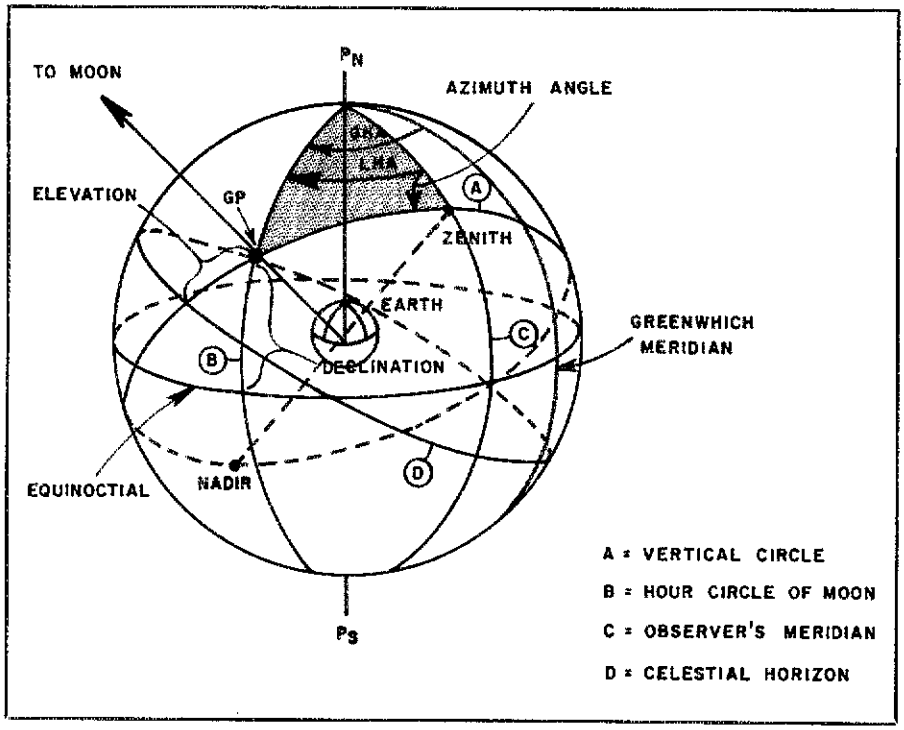


Fig. 1 — Spherical coordinate system for recording azimuth and elevation of celestial bodies.

shown in Fig. 1. The point this line makes as it intersects the earth's surface is known as the G.P. (geographic position) of the moon. The angle from the equator to this point is called declination. The angle measured from the Greenwich Meridian to the meridian going through the G.P. is called the Greenwich Hour Angle (GHA). The angle from the observer's meridian to the G.P. is called the Local Hour Angle (LHA).

The *Air Almanac*[2] will tell you whether the moon will be in a favorable position for a QSO at a proposed time. Your own position in latitude and longitude can be determined by referring to a map. The declination and GHA of the moon may be found in the almanac for the appropriate time (see Table 1), and LHA may be calculated. Subtracting your latitude and the declination of the moon respectively, from 90 degrees, you will see that you now have two sides and an included angle (LHA) of a spherical triangle (see Fig. 1).

Calculate the azimuth and altitude using Eqs. 1 to 4. The calculated altitude is easily corrected for paralax by inspection of the P. in A. (Parallax in Altitude) table in the *Air Almanac*. This takes into account the increment of error caused by an operator's geographic location when the moon is at low altitudes. This error decreases to zero as the altitude approaches 90 degrees.

A Typical Calculation

On Sunday, March 11, 1979, the author had scheduled an EME QSO with a friend in Jefferson City, Missouri, at 8 P.M. (2000) EST. UTC = 2000 + 5 ZD = 2500 − 2400 = 0100 UTC March 12 (ZD is zone description). This time had been selected as a mutual convenience after consulting the almanac for moonrise. The starting point of a moonbounce QSO is a determination of the relative position of the moon with respect to both stations. Low altitudes are undesirable, and the moon, when on the other side of the earth, is useless! It must be above the horizon for both stations, to establish contact. An inspection of the moonrise table of the daily page of the *Air Almanac* for March 11, at the latitude of the Missouri station, plus the ZD will define the UTC of moonrise with sufficient accuracy. Jefferson City, Missouri, has a latitude about the same as the author's QTH (Alpine, New Jersey), 40° 57′ (40.95°) N latitude and 73° 56′ (73.93°) W longitude. This QTH is almost on the 75th meridian, in the Eastern Time Zone. The time difference relative to UTC is 5 hours ZD. The ZD for the Missouri station is 6 hours.

Inspection of the Moonrise Table (Table 2) indicated that moonrise for 40° N latitude would occur at 1559 UTC. Moonrise for the Missouri station is found by: 1559 UTC + 6 hr ZD = 2159 UTC, March 11, 1979. This time is approximate, but close enough for our purpose. We see that the moon will be up for about 3 hours before the scheduled QSO. The relative position of the moon, and moonrise, can be estimated if it has been observed on previous days.

The position of the moon can be

Table 1

Part of the March 12 Daily Page from the 1979 *Air Almanac*.

GHA and dec of Sun, Aries, Venus, Jupiter and Saturn have been deleted to save space.

(DAY 071) GREENWICH
A.M. 1979 MARCH 12 (MONDAY) 141

GMT	MOON GHA	MOON Dec.	Lat.	Moonrise	Diff.
h m	° ′	° ′	N		
00 00	17 23	N 9 56	°	h m	m
10	19 49	54	72	15 40	48
20	22 15	53	70	15 52	45
30	24 40	52	68	16 01	42
40	27 06	50	66	16 09	40
50	29 31	49	64	16 16	38
01 00	31 57	N 9 48	62	16 21	37
10	34 22	46	60	16 26	35
20	36 48	45	58	16 31	34
30	39 13	44	56	16 35	33
40	41 39	42	54	16 38	32
50	44 05	41	52	16 41	32
02 00	46 30	N 9 40	50	16 44	31
10	48 56	38	45	16 50	29
20	51 21	37	40	16 55	28
30	53 47	36	35	17 00	27
40	56 12	34	30	17 03	26
50	58 38	33	20	17 10	25
03 00	61 03	N 9 32	10	17 16	23
10	63 29	30	0	17 22	22
20	65 55	29	10	17 27	21
30	68 20	28	20	17 33	19
40	70 46	26	30	17 40	18
50	73 11	25	35	17 43	17
04 00	75 37	N 9 24	40	17 48	16
10	78 02	22	45	17 53	15
20	80 28	21	50	17 59	13
30	82 54	19	52	18 01	12
40	85 19	18	54	18 05	12
50	87 45	17	56	18 08	11
05 00	90 10	N 9 15	58	18 12	10
10	92 36	14	60	18 16	09
20	95 01	13	S		
30	97 27	11			
40	99 53	10			
50	102 18	09			
06 00	104 44	N 9 07			
10	107 09	06			
20	109 35	04			
30	112 00	03			
40	114 26	02			
50	116 52	9 00			
07 00	119 17	N 8 59			
10	121 43	58			
20	124 08	56			
30	126 34	55			
40	128 59	53			
50	131 25	52			
08 00	133 50	N 8 51			
10	136 16	49			
20	138 42	48			
30	141 07	47			
40	143 33	45			
50	145 58	44			
09 00	148 24	N 8 42			
10	150 49	41			
20	153 15	40			
30	155 41	38			
40	158 06	37			
50	160 32	35			
10 00	162 57	N 8 34			
10	165 23	33			
20	167 49	31			
30	170 14	30			
40	172 40	29			
50	175 05	27			
11 00	177 31	N 8 26			
10	179 56	24			
20	182 22	23			
30	184 48	22			
40	187 13	20			
50	189 39	19			
Rate	14 33.4	S0 08.2			

Moon's P. in A.

Alt.	Corr.	Alt.	Corr.
°	+	°	+
0	′	57	′
9	54	58	29
14	53	59	28
18	52	60	27
21	51	61	26
24	50	63	25
26	49	64	24
28	48	65	23
30	47	66	22
32	46	67	21
34	45	68	20
36	44	70	19
38	43	71	18
40	42	72	17
41	41	73	16
43	40	74	15
44	39	75	14
46	38	76	13
47	37	77	12
49	36	78	11
50	35	79	10
51	34		
53	33		
54	32		
55	31		
57	30		
58	29		

Sun SD 16′.1
Moon SD 15′
Age 14d

Table 2

Moonrise Data from the March 11 Daily Page

Lat.	Moon-rise
N	
°	h m
72	14 04
70	14 23
68	14 38
66	14 50
64	15 01
62	15 09
60	15 17
58	15 23
56	15 29
54	15 34
52	15 38
50	15 43
45	15 52
40	15 59
35	16 06
30	16 11
20	16 21
10	16 30
0	16 38
10	16 46
20	16 54
30	17 04
35	17 09
40	17 16
45	17 23
50	17 32
52	17 36
54	17 40
56	17 45
58	17 51
60	17 57
S	

predicted by the following equations:

$$LHA_{moon} = GHA_{moon} \begin{matrix} +\text{East} \\ -\text{West} \end{matrix} \text{longitude} \quad \text{(Eq. 1)}$$

$$H_c = \sin^{-1}[(\cos LHA)(\cos dec)(\cos L) + (\sin dec)(\sin L)] \quad \text{(Eq. 2)}$$

$$Z = \cos^{-1}\left[\frac{(\sin dec) - (\sin H_c)(\sin L)}{(\cos H_c)(\cos L)}\right] \quad \text{(Eq. 3)}$$

$$Z_n = \begin{cases} Z: \text{ when } \sin LHA < 0 \\ (360° - Z): \text{ when } \sin LHA \geq 0 \end{cases} \quad \text{(Eq. 4)}$$

where

LHA = local hour angle
GHA = Greenwich hour angle
H_c = height calculated (elevation angle)
dec = declination angle
L = latitude of station (+N/−S)
Z = calculated azimuth
Z_n = actual azimuth at station location

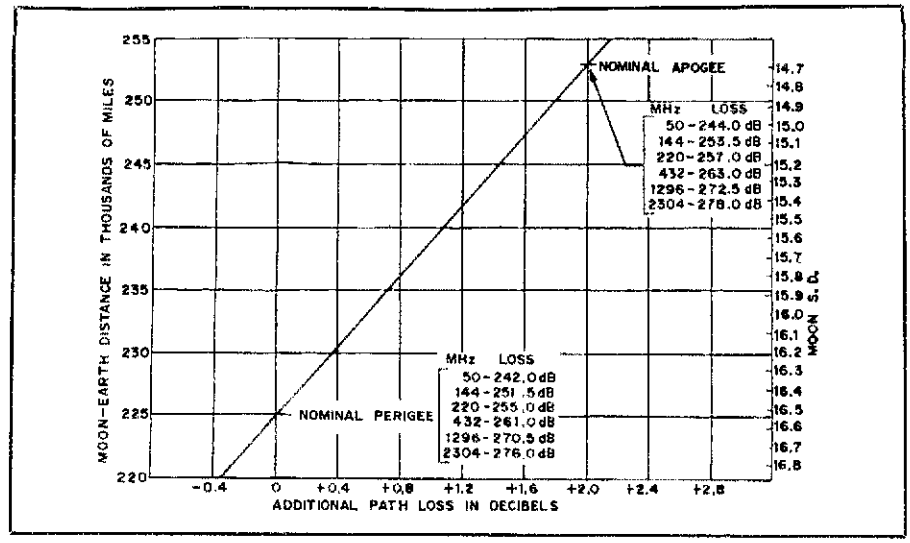


Fig. 2 — Variations in EME path loss can be determined by this graph, taken from *The 1981 Radio Amateur's Handbook*.

A calculator with trigonometric functions will make solving these equations easier. A programmable calculator with memory makes repeated calculations fast and easy.

See Table 1 for the entering arguments for our calculation. $GHA_{moon} = 31.95°$, $dec_{moon} = 9.8°$ N and L = 40.95° N. (Note that decimal angles have been used to make calculation easier.) By Eq. 1:

$LHA_{moon} = 31.95° + (-73.93° W)$
$= -41.98°$

and adding 360° to get the positive angle, 318.02°. Then by Eq. 2:

$H_c =$
$\sin^{-1}[(\cos 318.02°)(\cos 9.8°)(\cos 40.95°) + (\sin 9.8°)(\sin 40.95°) = 41.67°$

A correction for horizontal parallax of the calculated altitude was found in the Parallax in Altitude table (P. in A.) of the daily page of the *Air Almanac* for March 12, 1979 (Table 1). Since H_c is between 41° and 43°, the required correction is −40′, or −0.67°. The correct elevation angle, then, is 41.67° − 0.67° = 41.00°. This correction is always subtracted.

Using Eq. 3 to calculate azimuth we get

$$Z = \cos^{-1}\left[\frac{(\sin 9.8°) - (\sin 41.67°)(\sin 40.95°)}{(\cos 41.67°)(\cos 40.95°)}\right]$$

$$= 118.07°$$

From Eq. 4 we note that sin LHA = sin 318.02° = −0.669, which is less than 0, so $Z_n = Z = 118.07°$, the azimuth of the moon from true north, relative to the station.

The rate of change in azimuth and altitude was determined by a second calculation for one hour later (0200 UTC). It was necessary to know these rates to be able to track the moon continuously during the QSO. The following figures were obtained from Table 1 and Eqs. 2 and 3.

	Time UTC	*Altitude (corrected)*	*Azimuth*
	0200	49.87°	134.52°
(subtracting)	−0100	−41.00°	−118.07
	1 hr	8.87° arc/hr	16.45° arc/hr
	or	8.87′ arc/min	16.45′ arc/min

When the moon approaches or departs from within 30° of its highest point (zenith) it is best to make one or more additional calculations at half-hour intervals to correct for the decrease and then increase in the rate of change in altitude as the moon passes its zenith. The rate of change of azimuth will be almost constant over any reasonable period of transmission.

The daily pages of the *Air Almanac* tabulate GHA and declination of the moon for every 10 minutes of the day. These pages also indicate the age, phase and semi-diameter of the moon. Age relates to the 28-day cycle of the moon orbiting the earth, and semi-diameter is half the vertical angle formed between the upper and lower limbs of the moon. Semi-diameter may be used to determine the variation of EME path loss by Fig. 2. On March 12, 1979, the S.D. of the moon was 15′ of arc. The path loss was: 251.5 dB + 1.8 dB = 253.3 dB at 144 MHz.

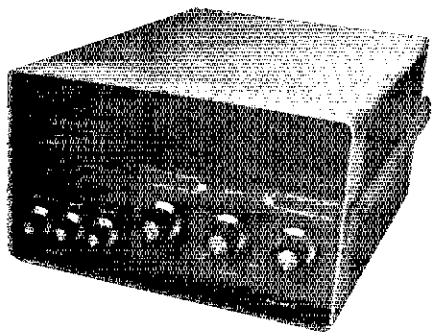
That's all there is to it. Now isn't it quite simple? QST

Notes

[1]km = mi × 1.6093.

[2]The *Air Almanac* is prepared by the Defense Mapping Agency, Hydrographic/Topographic Center, Washington, DC 20315, in cooperation with the Royal Greenwich Observatory, Herstmonceux Castle, East Sussex BN27 1RP, England. It is sold through the U.S. Government Printing Office, Washington, DC 20402, stock no. 008-054-00077-1. Cost is $13 for an edition, which covers 1/2 year.

Extend the Versatility of Your Heath SB-614 Monitor Scope



Now you can display received cw/ssb envelopes and transmitter trapezoidal patterns automatically — no knobs to twist!

By William K. Springfield,* AE4A

A Heath SB-614 monitor scope at my station is used primarily to display trapezoidal linearity patterns of the transmitted signal and to indicate output power during tune-up. Therefore, the front-panel mode switch is most often set to the TRAP position. In the past few years, the '614 has also been used to monitor the quality of received cw and ssb signals. Many visitors to the station get a kick out of seeing the received signal patterns. These types of displays require the scope mode switch to be placed in the SSB position. This prompted me to evaluate the possibility of automatically switching the '614 between the TRAP mode during transmitting periods and the SSB mode during receive. Certain criteria had to be met — low cost, no extensive circuit changes to the SB-614, no sophisticated transceiver/exciter/amplifier interconnections and no SB-614 front-panel deface-

*2607 Deerdell La., Reston, VA 22091

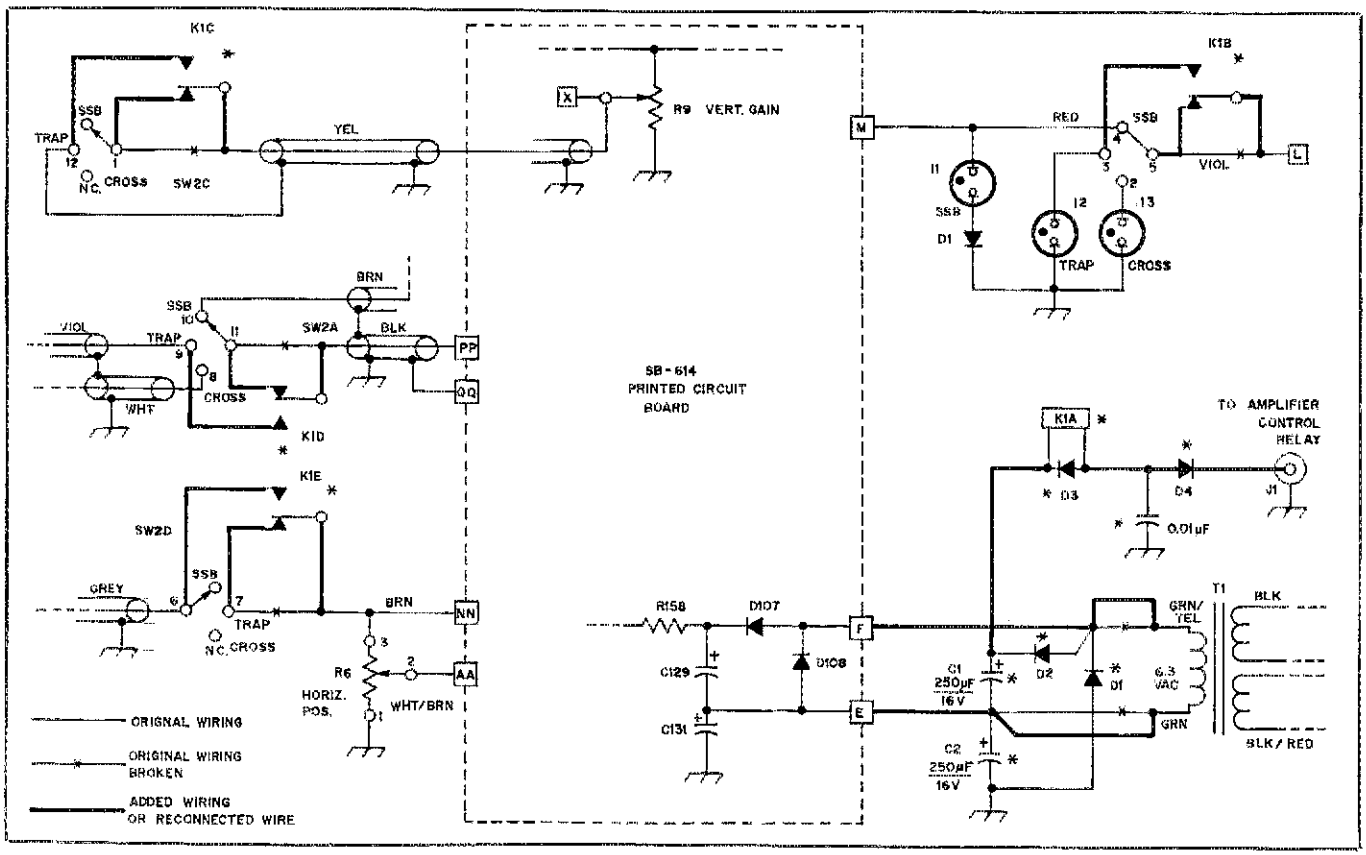


Fig. 1 — SB-614 monitor scope wiring modifications. Added components are indicated by an asterisk. Other component designations are those of the manufacturer.
D1-D4, incl. — Silicon, 50 PIV, 1 A, 1N4001 or equiv.
K1 — See text.

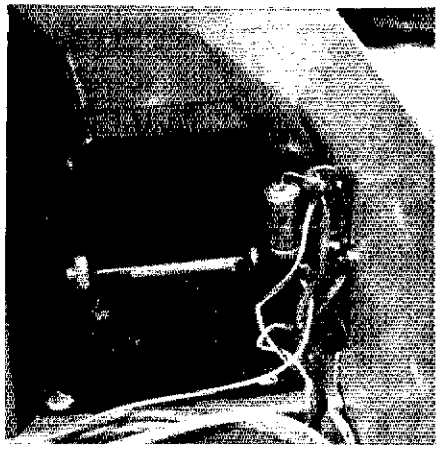


Fig. 2 — Physical positioning of the added power-supply components is shown here.

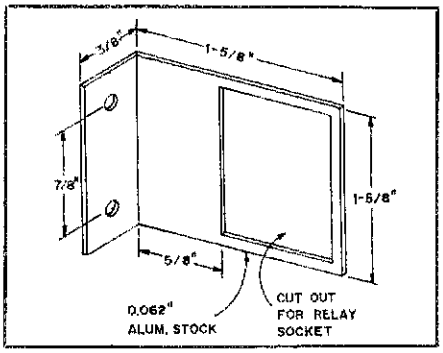


Fig. 3 — Relay assembly mounting bracket. Inches (") × 25.4 = mm.

ment. I also wanted the scope to be transparent to the modification when the new feature wasn't used.

Circuit Changes

Close examination of the '614 diagram suggested that a 4pdt low-voltage relay, correctly wired to the mode switch (SW2) and controlled by the exciter/transceiver amplifier control relay contacts, would do the trick. Fig. 1 shows how this is accomplished. The normally closed (NC) contacts of the relay are placed in series with the movable contact arms of the switch (terminals 1, 5, 7 and 11) so the scope operates as unmodified when the relay is de-energized. For automatic operation, the mode switch is set to the SSB position. When the relay is energized, the normally open (NO) contacts switch to the TRAP mode.

The relay I used (Radio Shack 275-214) has a 160-Ω, 12-V coil requiring a nominal current of 75 mA. This demand was found to be a bit stiff for the 9-V regulated supply of the '614, so an additional voltage-doubler rectifier/filter circuit was added using the existing 6.3-V winding of the power transformer. Components are mounted on a 4-lug terminal strip that is oriented vertically and mounted using 6-32 hardware and an existing hole in the aluminum side panel

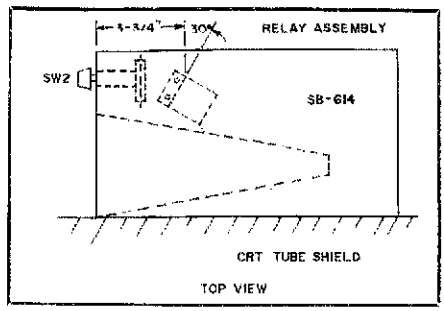


Fig. 4 — Physical placement of the relay assembly in the SB-614. The assembly is tilted approximately 30°. Inches (") × 25.4 = mm.

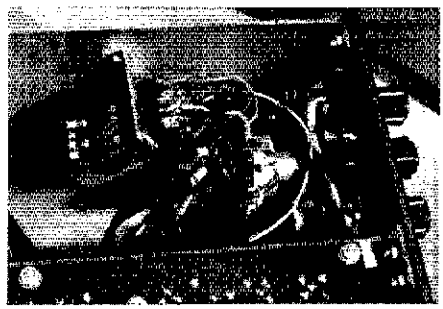


Fig. 5 — Mounting position of the added relay. Leads removed from the mode switch need not be lengthened, and the relay terminals are readily accessible.

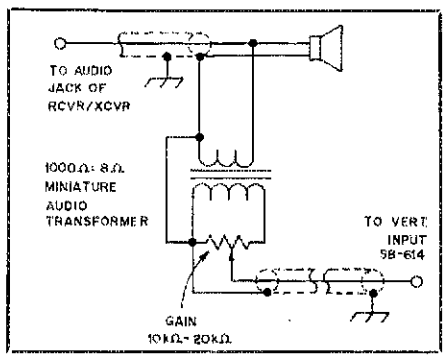


Fig. 6 — This simple circuit may be used to increase the level of the received signal for presentation on the SB-614 CRT.

close to the power transformer. See Fig. 2. I chose to remove the transformer leads (green and green/yellow) from the pc board to which they were originally attached and to connect them to the terminal strip. A twisted pair was connected from the terminal strip to the pc board. *Caution!* Make certain the 6.3-V leads are wired to similar points in the two rectifier/filter circuits, C129/C131/D107/D108 and C1/C2/D2/D3. Failure to wire this correctly will create a low-voltage, poorly regulated supply for the SB-614 amplifier circuitry.

Mechanical Installation

The 4pdt relay plugs into a socket (Radio Shack 275-221), which is mounted on a 0.062-in. (1.6-mm) thick aluminum mounting bracket as shown in Fig. 3. Mount the bracket using two 6-32 screws through holes drilled in the aluminum side panel of the scope close to the mode switch, SW2, as shown in Figs. 4 and 5. Incline the relay assembly about 30° from the vertical so that the solder tabs of the relay socket assembly near the CRT tube shield, ensure that enough room exists so that the relay can be removed readily.

Using this arrangement, it was not necessary to increase the length of any of the wires removed from SW2 and reconnected to the relay socket. To perform the wiring, SW2 must be removed from the front panel. The shaft end is pushed downward to expose the terminal wiring. Using the SB-614 wiring diagram, it is easy to identify the wires and to trace the switch numbering system. When soldering, use a low-wattage iron. Connect D3 and about 12 in. (305 mm) of wire to the relay coil terminals *before* mounting the assembly to the side panel. Install the wires to the operating arm, NO and NC socket terminals, in that order.

The control lead to K1 is routed along the cable harness and terminated at a 2-lug terminal strip mounted in the rear compartment (where the transformer primary and line cord are connected). The terminal strip is secured to the chassis using one of the two screws that fasten the pc card channel member. A phono jack is mounted directly opposite the terminal strip, and D4 is connected between them.

Received-Signal Amplifier

You may desire to increase the level of the received signal for presentation on the CRT in the SSB mode. With my TR7, a comfortable received audio level produces a CRT vertical deflection of only 1/4 to 1/2 in. (6.4 to 13 mm) when the '614 vertical gain is set to display a nearly full-scale trapezoidal pattern. The simple circuit of Fig. 6 compensates for this lack of amplitude. All components are mounted on a terminal strip located in the transceiver speaker cabinet.

Operation

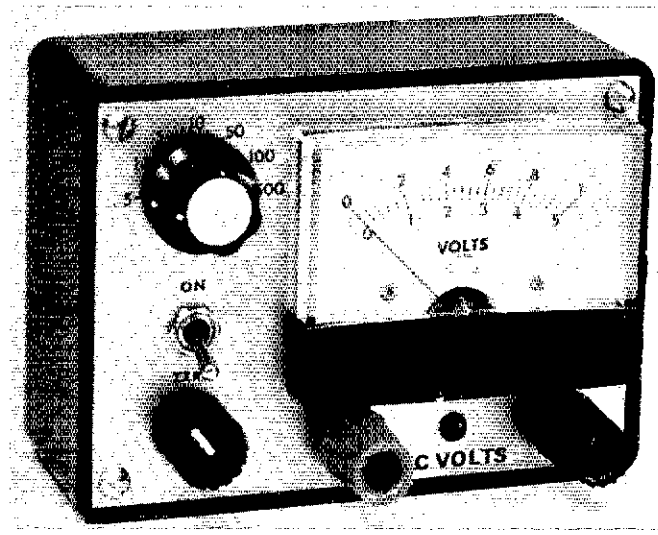
To operate K1, it will be necessary to gain access to the exciter/transceiver amplifier control relay contacts. If multiple connections to these contacts are required, the use of a quad phono jack assembly (Radio Shack 274-322) and phono plug equipped cables can provide an easy solution.

To use the automatic switching feature, place the SB-614 mode switch in the SSB position. K1 will transfer the circuitry of the scope to the TRAP mode when the transmitter is keyed. Set the '614 VERTICAL GAIN control for the required level while in the TRAP mode using the amplifier. If the circuit of Fig. 4 is used, set the potentiometer for the desired CRT display amplitude while listening to a clear signal at a comfortable audio level. Simple, isn't it?

BEGINNER'S BENCH

Some Basics for Equipment Servicing

Part 2: Dc voltage measurements are fundamental to trouble-shooting amateur equipment. This month we'll look at how to make these measurements and show you a "hi-Z" voltmeter you can build in a weekend.



By George Collins,* KC1V

In Part 1 of this series we looked at a number of techniques for testing solid-state devices. With these basics under our belts we are ready to address the next question in troubleshooting: "Which components should I check first?" It's an important question. A modern transceiver may contain over 100 solid-state devices; to randomly test each of them would not be productive. We need to zero-in on the defective circuit so that our effort can be concentrated where it will do the most good.

Where to Look?

The first source of information to consider is the defect itself. If the RIT (receiver incremental tuning) stops working, we wouldn't begin testing transistors in the audio amplifier! Try to gain as much information as possible from the symptoms. "The RIT won't work" is a start, but you should examine the problem in more detail *before* you begin making measurements and testing components. Ask yourself questions. Does the RIT control affect the receive frequency at all? Does it change both the receive and the transmit frequencies, or does the frequency shift when the RIT switch is turned on, but the variable control fails to function? The answers to questions like these can provide valuable clues in tracking down the guilty component.

Some problems, like the RIT example, are fairly simple to isolate. In this case, the number of components is small, and the settings of other controls (band switch, rf gain and so forth) are not likely to affect the problem. We should have little difficulty locating the circuit and components causing the malfunction. When we encounter more complex problems (Murphy's law indicates that we will!) it is often helpful to make notes of exactly what the symptoms are. Later, when testing has begun, keep notes on what tests have been made and the results.

Voltage Measurements

One of the fundamental trouble-shooting techniques is to check the voltage present at various points in the circuit. The measured voltage is compared with the voltage we *expect* to find at that point. Knowing what to expect is important. If we don't have some idea of what the voltage should be, measuring it won't tell us very much. This is where our knowledge of the circuit pays off. "Okay, knowing exactly how a circuit works is great, but what if I don't know what to expect?" Remember rule no. 1 from Part 1? Purchase the factory service manual! Generally, the important voltages are shown on the schematic diagram. These values will give us a starting point for our investigation. Unfortunately, not every circuit voltage is given, and sometimes the service manual for a particular rig is unavailable. We must then rely upon our knowledge of how the various devices in the circuit function.

Fig. 1 shows a typical rf amplifier circuit that contains an npn transistor. If we suspect this circuit is malfunctioning, but don't have the circuit voltages, how do we proceed? All we need is Ohm's Law and a few basics about transistors, and we can determine all the important circuit voltages. For example, R1 and R2 form a voltage divider that supplies dc bias to the base of the transistor. To find the value of the base voltage we apply Ohm's Law:

$$E_b = \frac{12\ V}{10\ k\Omega + 2.2\ k\Omega} \times 2.2\ k\Omega$$

$$= 2.2\ V \qquad \text{(Eq. 1)}$$

The voltage at the collector will be nearly

*Assistant Technical Editor

the supply voltage (12 V) because the voltage drop across L1 (which should have a low dc resistance) will be very small. The voltage at the emitter can also be estimated. For a transistor to act as an amplifier, the emitter-base junction must be forward biased. For an npn transistor, this means that the base must be at a more positive voltage than the emitter. Also, we know that the voltage drop across the junction will be about 0.7 V (for a silicon transistor) when it is forward biased. We have already calculated the base voltage, so the emitter voltage is simply:

$$E_e = E_b - 0.7\ V = 2.2\ V - 0.7\ V = 1.5\ V \qquad \text{(Eq. 2)}$$

We now have our "expected values" for the circuit. If we measure the voltages and find that the collector is at a potential of 12 V, the base at 2.5 V and the emitter at 0 V, we know immediately that there is a serious problem. It is likely that the base-emitter junction has opened. Now is the time to remove the transistor and confirm that it is defective by using the ohmmeter checks described in Part 1.

Before the defective transistor is replaced, it is wise to try to determine the cause of the failure. The base and collector voltages have already been found to be correct so we can eliminate them as the possible cause. With the transistor removed from the circuit, an ohmmeter can be used to check R3 and the 0.1-μF bypass capacitor. If a low resistance is found (less than the correct 82-Ω value for R3), one end of the resistor or capacitor can be disconnected so that the defective component can be isolated. (The capacitor should not provide a resistance reading.

Often the voltages we measure will not agree exactly with our expected values. Small variations are normal and do not mean that the circuit is not operating as it should. Component tolerance and meter errors are the primary causes for these variations. In the npn rf amplifier example we calculated that the base voltage should be 2.2 V. When measured, the value was found to be 2.5 V. Is this too far from the expected value to be considered within the range of normal variations? Generally, any voltage that is within 15 to 20% of the expected value is acceptable. In our example the measured value differed from the excepted value by only:

$$\frac{2.5\ V - 2.2\ V}{2.2\ V} \times 100\% = 13.6\% \qquad \text{(Eq. 3)}$$

This is within the range of acceptable values and should not cause us any concern.

The same approach can be applied to circuits using JFETs or MOSFETs. As an example, let's look at the MOSFET i-f amplifier shown in Fig. 2. Again, using only Ohm's Law, we can determine approximately what the voltage should be at each point in the circuit. The gate 2 bias voltage is supplied by the voltage divider, R1 and R2. It is:

$$E_{g2} = \frac{12\ V}{33\ k\Omega + 100\ k\Omega} \times 33\ k\Omega = 3.0V \qquad \text{(Eq. 4)}$$

The drain potential is simply the supply voltage (12 V), and because it has no dc bias applied to it, gate 1 is at ground (0 V). Determining the exact value of the source voltage requires that we know the drain current under these particular circuit conditions. While this information could be obtained from the transistor data sheet, we don't really need to know the exact voltage. Having an idea of the range of voltages to expect will suffice. The drain current in a typical small-signal FET amplifier, as might be used as an rf or i-f stage in a receiver, will fall between 2 and 17 mA. This range of current will produce a potential of 0.2 to 1.7 V across the 100-Ω source resistor. Any value between those limits indicates that the circuit is likely to be functioning correctly. If the measured value is far from the expected range, such as 0 or 12 V, one or more of the circuit components is defective. Removing the transistor and testing each component with an ohmmeter will identify the defective part.

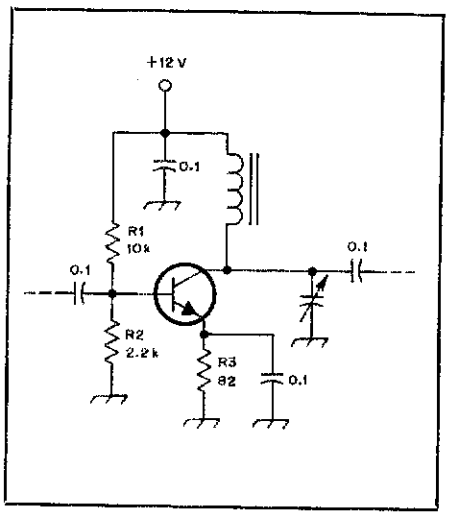


Fig. 1 — Schematic diagram of a typical rf amplifier. Circuits similar to this one are commonly found in transmitters and receivers.

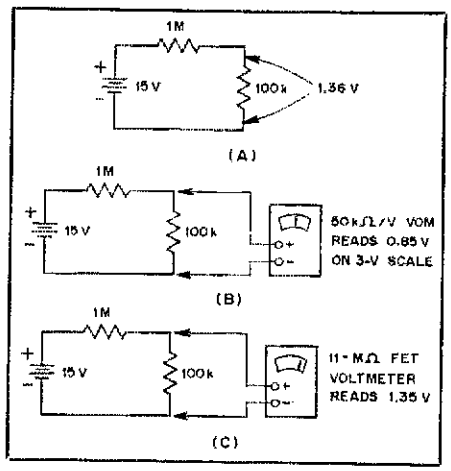


Fig. 3 — The circuit at A is a high-impedance voltage divider. Using a standard VOM (B) results in a 37% error because of meter loading. An 11-MΩ meter does not load the circuit appreciably; the error is less than 1% (C).

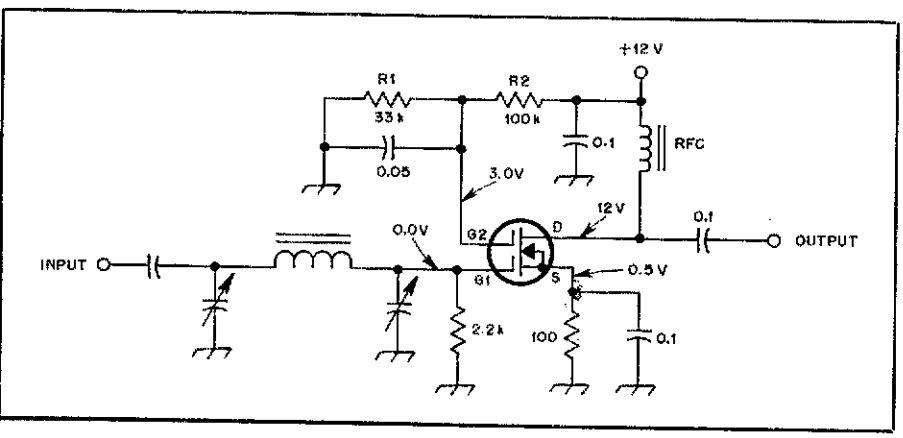


Fig. 2 — Another common rf amplifier circuit uses a MOSFET. Trouble-shooting this type of circuit is discussed in the text.

Voltmeter Loading Effects

The circuit in Fig. 2 brings up a problem often encountered when making voltage measurements on circuits using FETs. Because the impedance levels involved with FETs are very high, the bias circuits may require high-value resistors. The difficulty arises when we attempt to measure the bias voltage with a VOM (volt-ohm-milliammeter). A typical VOM will have a sensitivity of 20 kΩ per volt, while the more sensitive VOMs are rated at 50-kΩ per volt. The meter sensitivity multiplied by the full-scale voltage of the meter gives the impedance or resistance of the meter. A 50-kΩ-per-volt meter, used

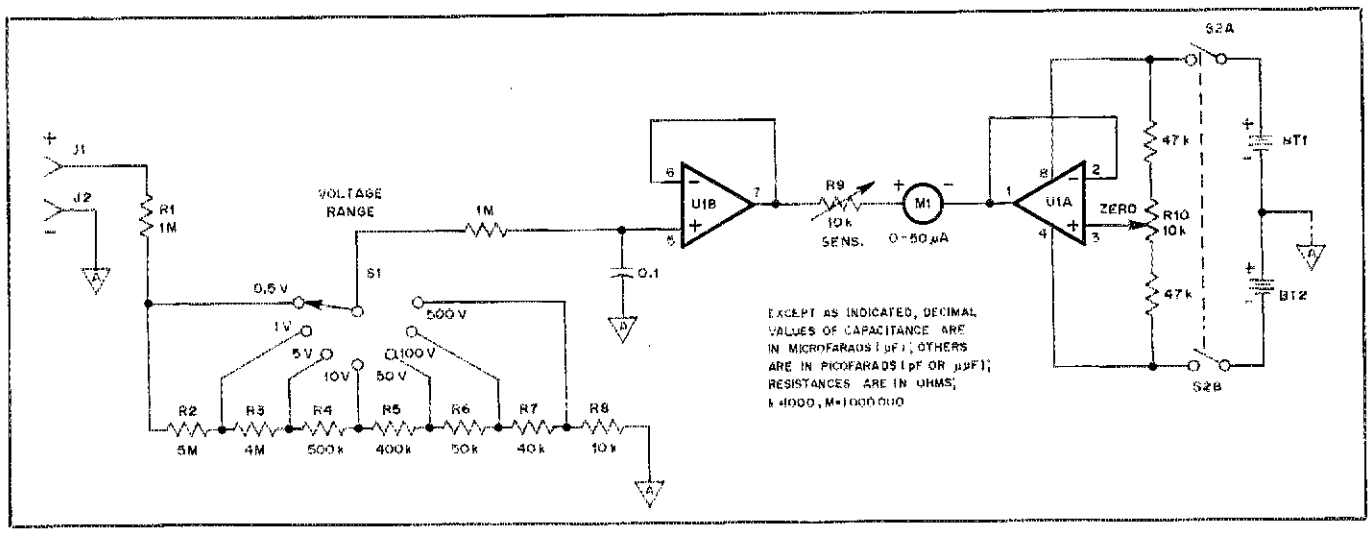


Fig. 4 — A high-impedance dc voltmeter need not be complex. This circuit uses a single IC.

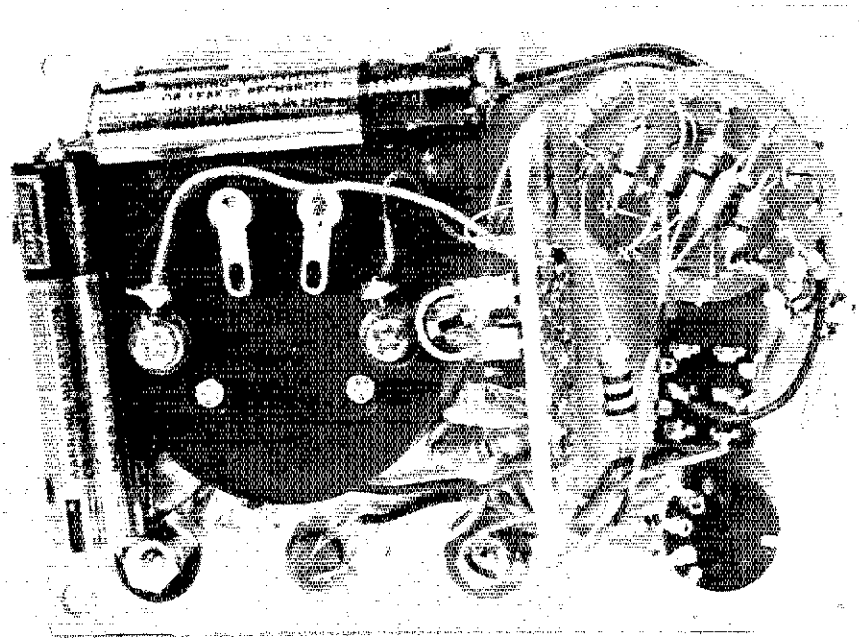
BT1, BT2 — 2 AAA (or AA) cells in holder or 9-V transistor radio battery (see text).
J1, J2 — Banana jacks, 500-V insulation (see text), RS 274-662 or equiv.
M1 — 50-μA dc meter movement, RS 270-1751.
U1 — LF353N dual JFET op amp, RS 276-1715 or equiv.
R1 — 1.0-MΩ, 1/2-W, 5% resistor.
R2 — 4.7-MΩ and 300-kΩ, 1/4-W, 5% resistors in series.
R3 — 3.9-MΩ and 100-kΩ, 1/4-W, 5% resistors in series.
R4 — 470-kΩ and 30-kΩ 1/4-W, 5% resistors in series.
R5 — 390-kΩ and 10-kΩ 1/4-W, 5% resistors in series.
R6 — 47-kΩ and 3-kΩ, 1/4-W, 5% resistors in series.
R7 — 39-kΩ and 1-kΩ 1/4-W, 5% resistors in series.
R8 — 10-kΩ, 1/4-W, 5% resistor.
R9 — 10-kΩ, 1/4-W PC-mount potentiometer, RS 271-218 or equiv.
R10 — 10-kΩ, panel-mount potentiometer, RS 271-1722.
S1 — 1-pole, 7-position rotary switch (see text), RS 275-1385 or equiv.
S2 — 2-pole, 2-position toggle switch, RS 275-614 or equiv.

on the 3-V (full-scale) range, for example, has an impedance of:

$$50\ \text{k}\Omega/\text{V} \times 3\ \text{V} = 150\ \text{k}\Omega \qquad \text{(Eq. 5)}$$

This resistance is placed in parallel with the circuit resistance whenever we make a measurement. Often (when the circuit resistance is much lower than the meter resistance) it is unimportant, but when dealing with high-impedance devices like FETs we must be aware of the effects of meter "loading." Fig. 3 shows the type of error that can be caused by using even a 50-kΩ-per-volt VOM in a high-impedance circuit. If a high-impedance meter, such as an FET or vacuum-tube voltmeter, is used (Fig. 3C) the error caused by meter loading becomes very small.

This does not mean that a standard VOM is useless. For many measurements they serve well. They are versatile and, most important, inexpensive. While high-impedance (11-MΩ) VOMs are available, even the lowest-priced units are somewhat costly. By building our own FET voltmeter we can circumvent the high cost of a commercial meter and have some fun at the same time!



Inside view of the dc voltmeter. This version was built from an available parts kit. Other components and construction styles can be used as well.

A "Weekender" FET Voltmeter

Shown in Fig. 4 and the photographs is an easy-to-build, high-impedance dc voltmeter. All of the parts are readily available, calibration is simple and the cost is low. Construction of this meter can be considered as an easy weekend project. The input-impedance is 11 MΩ, and accuracy is better than 10%. With the rf probe shown in Fig. 5, this meter can be used to make reasonably accurate rf voltage measurements at frequencies up to 30 MHz.

Circuit Details

The input impedance of the meter is determined by the total resistance of the range-selector voltage divider (R1 through R8). The values of the individual resistors have been selected to provide the desired full-scale voltage ranges and a total resistance of 11 MΩ. Some of the resistance values needed for the divider are not found in the standard series of 5%-tolerance resistor values. To avoid having to buy expensive (and hard to find) 1% resistors, two 5% units are used in

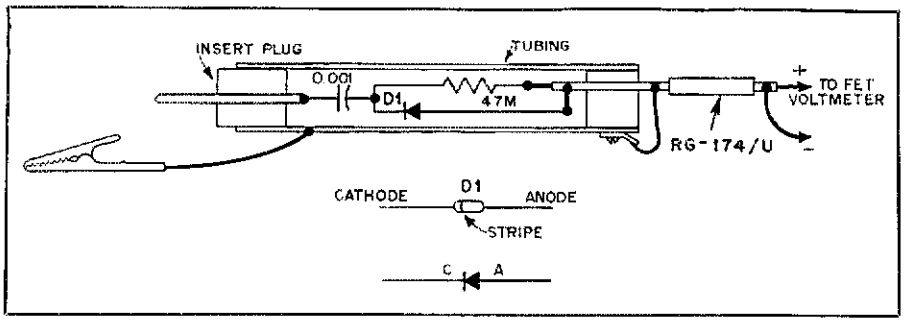


Fig. 5 — When used with an 11-MΩ voltmeter, this rf probe will allow you to measure voltages at frequencies up to 30 MHz. The maximum rf voltage applied to this probe should be limited to 35.

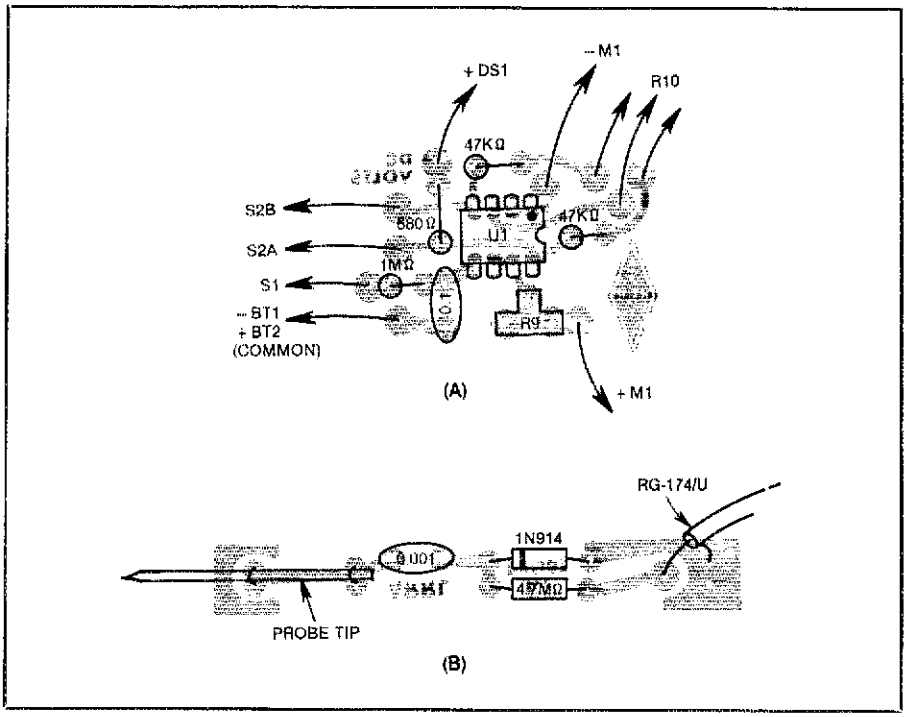


Fig. 6 — Parts-placement diagrams for the dc voltmeter (A) and the rf probe (B).

series for each of the nonstandard values.

To keep the meter movement from loading the 11-MΩ divider, an operational amplifier (op amp) with JFET inputs is used to drive the meter. The LF353N IC (U1) contains two of these op amps in the same package: U1B drives the meter movement, while U1A serves as an adjustable voltage reference point. Both of the op amps are connected as voltage followers.[1] This means that the input and output voltages are the same (a gain of 1). What makes the voltage follower useful is that the output can supply several milliamperes of current while the input draws a very small current (the input is high impedance).

By varying the voltage at pin 3 of U1 with R10, the zero setting of the meter can be adjusted to compensate for changes in battery voltage and room temperature. The fact that both op amps are in the same package helps reduce drift caused by temperature changes. R10 is mounted on the front panel so that the operator can adjust it easily. R9 is the calibration control; it adjusts the meter sensitivity. Once the meter has been calibrated, R9 does not require further adjustment, so it is mounted inside the case.

Two batteries are used to power the meter circuit. Any battery voltage between 3 and 9 V can be used without changes in the circuit. In the unit shown, four AAA penlight cells are used. These give the needed 3 V and have long life. Two 9-V transistor radio batteries will also work.

Construction

Almost any type of case can be used to house the voltmeter. The exact size needed will depend on the dimensions of the batteries, meter movement and switches used. A plastic case, only 2-7/8- × 4- × 1-5/8-inches (mm = in. × 25.4) houses the meter shown in the photographs. If a larger meter movement is used (such as the Radio Shack 270-1751), an enclosure measuring 2-5/8- × 5-1/6- × 1-5/8-inches will be more satisfactory. When using a case with a metal panel, it is best if the negative jack (J2) is *not* connected to the panel. This allows us to measure voltages below ground without having a potential on the voltmeter case.

The voltage-divider resistors are mounted on the range selector switch (S1). If the switch has any spare lugs, they can be used as tie points for the series-connected resistors. If no lugs are available, simply solder the leads together; the remaining leads will support the resistors. The other components can be mounted on a small printed-circuit board,[2] although any method of wiring can be used. A quick and simple way of wiring the IC is to use a general-purpose IC-prototyping board, such as the Radio Shack 276-159.

With the resistor values shown in Fig. 4, the highest full-scale range is 500 V. If this range is included, *be sure* that the input connectors (J1 and J2) and the range switch (S1) are rated for 500 V or more. J1 and J2 should be of the type with plastic insulation that passes through the panel. Only thin, fiber washers are used to insulate some types of jacks from the panel. These are fine for up to 100 V, but are not recommended for higher voltages. If the 500-V range is not needed, R7 and R8 can be connected in series or replaced by a 50-kΩ resistor (the same as R6).

The rf probe should be housed in a shielded case. Copper or brass hobby tubing of 1/2-inch diameter is good for this purpose. The cable from the probe to the voltmeter should be shielded. The shield braid is connected to the probe case and the ground lead. Small-diameter coaxial cable, such as RG-174/U, can be used for this lead.

Calibration

Only the sensitivity control, R9, needs to be adjusted before the meter can be used. A good method of calibration is to use two fresh carbon-zinc batteries in series to form a source of known potential. Each cell, when new, should produce 1.54 V. To adjust R9, turn the meter on, and set it to the 5-V range. With the meter leads shorted together, adjust the ZERO control (R10) so that meter shows zero volts. Connect the two cells to the meter, and adjust R9 so that the meter reads 3.1 V. This completes the voltmeter, and it is ready to use in your experiments or to troubleshoot the rig next time it develops a problem.

Notes

[1]For more information on op amps see G. Woodward, "A Beginner's Look at Op Amps," *QST*, April and June 1980, pp. 15-18 and 25-31. Anyone interested in learning more about op amps should consider these articles required reading.

[2]Printed-circuit boards and parts for the voltmeter and probe are available from Circuit Board Specialist, P.O. Box 969, Pueblo, CO 81002.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu FT-127 220-MHz FM Transceiver

It's time to get a 220-MHz fm rig when your QSO on 2-meter fm is interrupted by that chap who makes auto-patch every evening at precisely the same time to let the family know he's coming home — and you feel guilty about inconveniencing *him*.

It's time to get a 220-MHz fm rig when you and several DXer buddies aren't able to use 2-meter fm simplex to coordinate an evening's DX activity. Why? Because one of your friends has to wait half an hour to tell you that VKØ (Heard Island), which you need in order to make the DXCC Honor Roll, is on 10-meter cw. This delay is caused by a couple of locals who are giving a blow-by-blow description of the 200th rerun of a 20-year old episode of "The Mickey Mouse Club" television show!

It's also time for a 220-MHz fm rig when you feel the first twinges of "mike-fright," as you wonder how many thousands of ears are tuned in to your QSO on 2-meter fm with one of those "oh-so-affordable" programmable scanners. Most of those scanners cover the 146- and 450-MHz amateur bands, but not usually 220-MHz. *Burglars have scanners and Callbooks, and know when you are mobile!* Get the picture?

Yaesu FT-127 220-MHz FM Transceiver Serial No. OHO10064

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency control: Crystal	Supplied with 223.50-MHz simplex.
Frequency display: 12-position channel selector.	As specified.
Receiver type: Double-conversion superheterodyne; 10.7-MHz 1st i-f, 455-kHz 2nd i-f.	As specified.
Receiver sensitivity (μV/20 dB quieting): Better than 0.35.	0.19.
Squelch sensitivity: Not specified.	0.1 μV.
Audio power output (8-ohm load): 1.5 W at 10% THD.	1.3 W.
Transmitter power output (50-ohm load): 10 W.	As specified.
Spurious emissions: At least −60 dB.	−60 dB.
Dimensions (HWD): 2.8 × 7 × 9.5 inches.	
Weight: 4.4 lb.	
Power requirements: 13.8 V dc (±10%), negative ground; 80 mA standby, 180 mA receive, 2.5 A transmit.	As specified.

Note: mm = inches × 25.4, kg = pounds × 0.4536.

Problems

Okay, it is time to get a 220-MHz fm rig — no problem, right? Maybe or maybe not. The problem might be in trying to get the *right* rig. Of course, you could lay out some "big bucks," $400 and more, for a nice, synthesized 220-MHz rig. But for most of us who care to use only a couple of repeaters (and perhaps a simplex channel or two), that's overkill. A less expensive, crystal-controlled unit is just what the doctor ordered. Around here it takes a lot of looking to find a new 220-MHz xtal rig: A used one is just not available — they become family heirlooms and never make it to the used market! That's the problem.

A Solution

Enter Yaesu with a solution — the FT-127. [This transceiver should not be confused with the Yaesu FT-127RA 220-MHz *synthesized* radio that was reviewed in the August 1979 *QST* Product Review column. — Ed.] The Yaesu FT-127 is a 220-MHz, crystal-controlled fm transceiver, designed to operate within a 3-MHz spread in the 220- to 225-MHz band, factory aligned for the 222- to 225-MHz segment with a rated output of 10 watts. I guess most of us use 2-meter and 220-MHz fm for convenience; that is, the convenience of reliable communications and ease of operation. Also, there is the convenience of being able to use the rig in either a fixed- or mobile-station situation. The folks at Yaesu made sure that the FT-127 fulfills those needs.

Assuming you have a proper power supply, a 220-MHz antenna, and coaxial cable with a PL-259 connector, the FT-127 comes complete and could be put on the air very shortly after opening the shipping carton. No doubt the '127 was designed with some heavy-duty mobile use in mind. A deluxe mobile mounting bracket (which can be top or bottom installed) and mounting hardware are included with the transceiver. The mobile bracket slides into heavy-gauge metal channels on the sides of the FT-127, which allows the user about 4 inches of front to rear travel in which to position the unit. The mobile bracket also allows about 60° of up/down tilt positioning and a system for positively securing the rig in the position selected. That the FT-127 has, for the past several months, made the daily 50-mile round trip to work in my flivver, which is pushing 165,000 miles (original shock absorbers, too) and still functions perfectly, is in itself testimony to the ruggedness of the rig.

Description

The front-panel layout is simple and functional. There is a POWER ON/OFF toggle switch, VOLUME control and a SQUELCH control with full ccw detent to activate the Yaesu optional tone encoder/decoder feature. There is also a large, easy-to-grasp knob to select one of the 12 available crystal positions (the FT-127 comes with 223.50-MHz simplex crystals installed). The front panel of the '127 also sports three indicator lights as well as a back light for the channel selector, which are labeled: BUSY to show that squelch has been broken and a signal is being received, TONE SQ to indicate that the optional (if installed) encoder/decoder unit is in operation, and TX to inform you that the unit is in the transmit mode.

The internal speaker is on the front panel where it belongs, pointed at the user. I found that even while driving the highways with the windows open, the built-in speaker provided plenty of audio, although the FT-127 back panel has an external speaker jack, should it be needed. The audio has a "bassy" quality compared to the "tinny" audio quality of some other fm mobile rigs — an almost broadcast quality sound . . . very pleasant with a lot of *presence*.

Yaesu offers a TONE SQUELCH subaudible

*Assistant Technical Editor

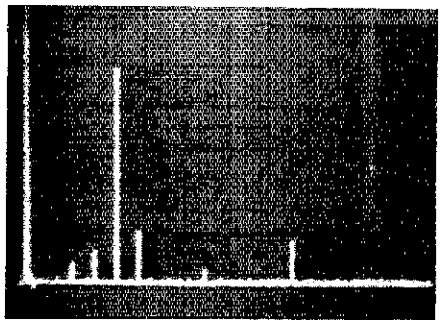


Fig. 1 — Spectral display of the FT-127. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The fundamental signal has been reduced in amplitude approximately 20 dB by means of notch cavities; this prevents analyzer overload. Power output is 10 watts at a frequency of 223.5 MHz. The close-in spur is approximately 60 dB below peak fundamental output. Tests were performed in the ARRL lab. The FT-127 complies with current FCC specifications for spectral purity.

tone encoder/decoder option for the FT-127. This assembly is on a small plug-in circuit board, which when installed and aligned will generate a subaudible tone on transmit and will allow the receiver squelch to be tripped only when receiving a signal with that same subaudible tone superimposed on it. Alignment of the tone option requires the use of an audio oscillator, a vhf signal generator and a frequency counter. Although the tone squelch unit was not supplied with the review model, there is no reason to believe that it would not perform as well as the transceiver.

The instruction manual included with the FT-127 is complete. There are sections on operation, circuit theory, transmitter and receiver alignment, TONE SQUELCH installation and alignment, component values and layout, and a schematic diagram.

From the time we took it out of the box and plugged it in several months ago, the FT-127 has seen almost daily service on simplex and the local repeater (WA1YHL/R) both from the fixed station and in mobile operation. The rig has worked flawlessly and gives every indication of working well for a long time to come. Since relative value is a question we all have to answer for ourselves, we'll simply say that if you want to go 220-MHz fm with a rig that looks good and works great, the Yaesu FT-127 is a way to go. The '127 is manufactured by Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723. Price class: $350. — *Bill Jennings, K1WJ*

HAMTRONICS XV-4 TRANSMITTING CONVERTER

☐ If you've been thinking of working OSCAR Mode U (much akin to its earlier Mode-B ancestors) on the upcoming Phase III-B, or simply trying your hand at terrestrial 70-cm (432-MHz) communication, the Hamtronics XV-4 is one alternative. The XV-4 is a *transmitting* converter. Hamtronics produces a companion receive converter that can be hooked in tandem with the XV-4 for two-way communication, or 435-MHz downlink reception, but this review deals strictly with the transmitting converter.

Description

The XV-4 transmitting converter is a linear translator that converts 1 mW of 28-MHz rf energy to 1 watt of PEP ssb, or 1-1/2 watts of cw or fm at 435 MHz. The unit incorporates two oscillators: the first is equipped with a crystal suitable for 435- to 437-MHz operation, the region used for several OSCAR uplink passbands; the second oscillator can be equipped with the crystal of your choice. You may wish to cover the 432- to 434-MHz terrestrial portion of the band, some other segment in our 70-cm allocation, or even to order special crystals that will allow the XV-4 to be driven from a CB rig.

As this transmitting converter is linear, it can be used on any mode of transmission — ssb, cw, fm or even ATV. Before purchasing the crystal for the second oscillator, decide what you'll be using the unit for and select the crystal that will put you in the right portion of the band. For example, 70-cm fm is usually used between 440 and 450 MHz.

Most 10-meter transmitters, transceivers or other types of exciters put out more than the recommended drive power. You'll need to reduce the output of your exciter to provide the required input levels. There are several solutions. Many modern transmitters or transceivers include transverter output jacks on the rear panel, which provide a small portion of 10-m rf energy before the final-amplifier stage. These levels vary from rig to rig, but the XV-4 comes equipped with an on-board attenuator circuit that will handle inputs of up to 500 mW. The instruction manual provides information useful in selecting the value of resistor, if any, that should be installed in the attenuator to bring the drive down to the appropriate level. For input levels above the 1/2-watt maximum, you'll need an outboard attenuator, the design of which depends on the amount of power that must be dissipated.

Those familiar with 70-cm operation will realize that the XV-4 1-watt output may be adequate for local work (though some openings may extend your communications range farther), but effective terrestrial DX work or Phase III satellite uplink transmission will require considerably more power.

Construction

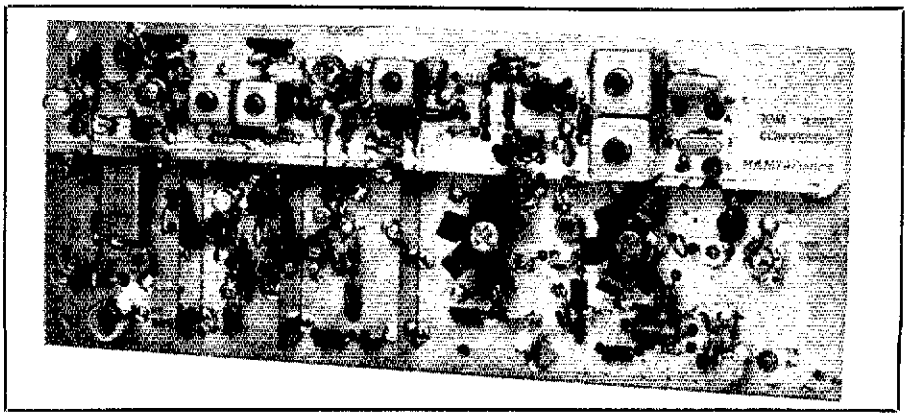
The XV-4 is available as a kit or wired and tested. The review unit was assembled from a Hamtronics kit. I found the kit unlike any I'd been accustomed to. You're not led by the hand, step by step; it's more like the procedure followed in magazine article construction projects. The manual is well written and provides more than enough guidance for the builder who reads the instructions at least once before plugging in the soldering iron. The kit consists of a double-sided, fiberglass circuit board, components (including the strips of metal used for shielding between stages), and a few incidentals such as a tuning tool. You'll need an enclosure (sold by Hamtronics and several other dealers) and a 13.6-volt dc supply, as well as a pair of coaxial cable patch cords to connect the unit to the exciter.

Despite the clarity of the instructions, Murphy can strike the builder who is "trying too hard." Don't make the mistake of winding the coils on the tuning tool handle when you are instructed to wind them on the thick portion of the tool shaft! You'll have trouble aligning the unit later. One very red face and countless disparaging comments from my Hq. compatriots later (something about a "short between my ears"), the coils were rewound and all tuned up as prescribed. The Hamtronics gang relayed that I was the first to have committed this "sin" (a dubious honor at best), and they have since changed the instructions for those who might suffer from a similar tendency to misinterpret clear directions.

The most common error in kit building is careless soldering: either "cold" solder joints

Hamtronics XV-4 UHF Transmitting Converter

Manufacturer's Claimed Specifications	*ARRL Lab Measurements*
Frequency coverage: 435-437 MHz (432-434 MHz with optional crystal), other portions of 70-cm band with suitable crystals.	As specified.
Rf input frequency: 28 to 30 MHz (27 or 50 MHz with suitable crystals.	As specified.
Input power: 1 mW to 500 mW with on-board attenuator.	As specified.
Output power: 3/4 W PEP on ssb, 1 W on cw and fm.	As specified.
Input/output impedance: 50 ohms.	Not measured.
Harmonic suppression: – 60 dB.	– 38 dB.
Third-order transmitter IMD: – 30 dB.	– 24 dB.
Oscillator frequency: 45.2222 MHz supplied for 435-MHz range; 44.8889 MHz optional for 432-MHz range.	As specified.
Size: HWD 1-1/4 × 7-1/2 × 3 inches (32 × 191 × 76 mm).	



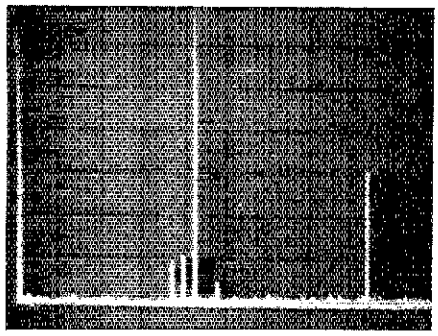


Fig. 2 — Spectral display of the Hamtronics XV-4. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 1 watt at 432 MHz. The second harmonic is approximately 39 dB below fundamental output.

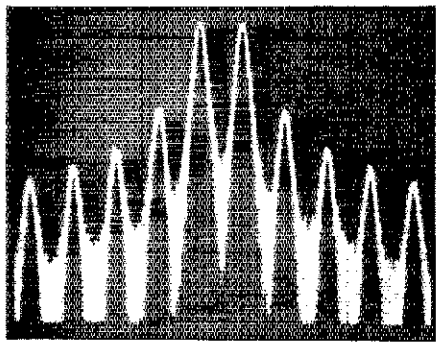


Fig. 3 — Spectral display of the XV-4 output during transmitter two-tone IMD testing. Third-order products are 26 dB below PEP output. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The XV-4 was being operated at 1/4-W PEP output at 432 MHz. H-P 8640B signal generators were used to supply the two-tone input.

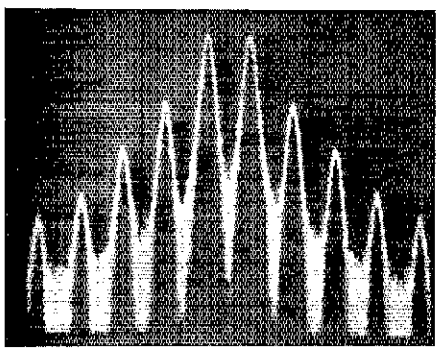


Fig. 4 — Spectral display of the XV-4 output while operating the unit at 3/4-W PEP output. Conditions of the test remained otherwise the same as that of Fig. 3.

or those insidious, almost invisible solder bridges between circuit-board traces. If worse comes to worst, factory service is available from Hamtronics for a modest cost; contact them before shipping any unit.

Alignment

When all the components have been loaded on the board and you've checked for shorts between circuit board traces, proper component placement and correct values, you'll be ready for the alignment procedure. For this you'll need the following equipment: a 2-watt, 50-ohm dummy load with low VSWR at uhf; a VTVM with a lowest dc range of at least 0.5 volt (0.15 V preferred); a relative rf output indicator (VSWR bridge or power meter); signal source at 28 MHz (a signal generator is not required — you can use 300 mV from your hf exciter); and a milliammeter capable of measuring 500 mA. A frequency counter, while handy, is not really needed.

The alignment procedure consists of adjusting a series of slug-tuned coils and variable capacitors stage-by-stage while monitoring the current level, checking various test points and component leads, and peaking the rf output. This procedure will pose little problem if you are careful and you complete each step successfully before going on to the next. Should the results not turn out as prescribed, consult the troubleshooting guide that is included in the manual. Typical beginners' mistakes and tables of nominal dc and rf voltages are listed.

The i-f input (28 MHz) is mixed with the output of a crystal oscillator multiplier chain in a doubly balanced mixer. For example, for 432-MHz coverage, a crystal oscillator at 44.8889 MHz is buffered, tripled twice to 404 MHz, then mixed with the 28-MHz signal from the exciter to yield 432 MHz. When the exciter VFO is tuned to 28.5 MHz the output of the XV-4 is at 432.5 MHz. This low level of 70-cm rf energy is then fed through a pair of rf amplifier stages, a driver stage and the final PA stage, yielding 432-MHz output.

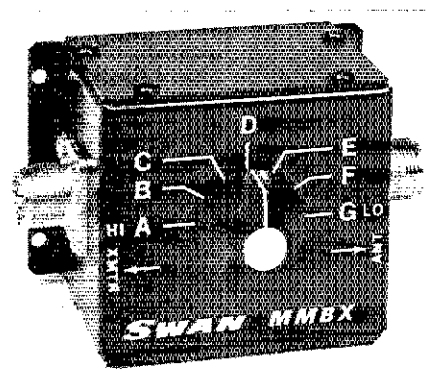
While using a frequency counter, we checked each step to determine that we hadn't tuned to the unwanted image frequency, 376 MHz. There are several ways to ensure that the transverter is tuned to the desired frequency, even without a frequency counter; they are clearly outlined in an addendum to the manual. Tuning to the image frequency is the most likely pitfall for the careless or impatient builder, though this problem can be avoided with caution.

As a transmitting converter, the Hamtronics XV-4 offers the potential 70-cm enthusiast an inexpensive alternative when equipping a station, and it will give the continuing satisfaction that comes from using a unit that you've assembled yourself. Price class: $100. Manufacturer's address: Hamtronics, Inc., 65 D Maul Rd., Hilton, NY 14468. — *Steve Place, WB1EYI*

THE CUBIC MODEL MMBX "MATCHBOX"

☐ Many hams, I'm sure, are excited at the prospect of working hf mobile, but run into problems when, try as they might, they can't get the VSWR of their mobile whips down to an acceptable level. This is especially frustrating if the transceiver has solid-state final-amplifier devices. A pi-network tube-PA rig is one answer, but it gets crowded in a small car when trying to use a rig such as the TS-820S! When I began using an Atlas 210X, the high-VSWR problem with my antenna was suddenly an enigma; however, the Cubic MMBX has provided an effective solution.

The MMBX is a multiple-tap, toroidally wound impedance transformer designed to match the typical lower impedance of a mobile hf whip to the nominal 50 ohms required by the transceiver. Cubic claims an rf power handling capability of 500 watts over a frequency range of 2 to 30 MHz. Under test in the ARRL lab, using a low-impedance load, Bird wattmeter, and a transmitter and amplifier capable of



1-kW dc input, the MMBX was subjected to 500-watts output. Cw and several minutes of key-down operation was attempted with no damage to the unit; heating of the toroid was only moderate. Certainly, the unit appears to be adaptable to high-power mobile operation, with ample reserve. The seven switched tap settings cover an impedance-matching range of approximately 3 to 50 ohms. The unit is wired in an unbalanced-to-unbalanced configuration.

Cubic suggests that the MMBX be mounted as close as possible to the base of the whip, using 18 inches of transmission line or less. This may be impractical for larger cars, but it has proved to be just right for my small car. Placing the unit just inside the trunk was ideal. The MMBX is housed in a durable steel box, but it's not weather-proof so outside mounting isn't recommended. SO-239 connectors on the unit make installation easy. Tuning is straightforward; once the mobile whip is tuned for lowest VSWR on the chosen band, the MMBX is inserted in the transmission line at the indicated point from the base of the whip, and the transmitter is keyed at low power on each of the seven tap settings. Log the position that gives the lowest VSWR indication, and the job is done. Cubic cautions against "hot-switching" the MMBX to avoid possible damage to the transceiver. If, by chance, the antenna impedance appears higher than that of the transceiver, the connections to the MMBX may be reversed to provide a step-up transformation. This I found was necessary for operation on 10 meters. I've kept a log of the tap settings for easy reference when changing bands and resonators.

The MMBX has taken care of my antenna mismatch difficulties, especially noticeable on 75 and 40 meters, and the small area of the unit — 2-1/2 × 3-1/2 × 2-1/2 inches HWD — takes up no appreciable space inside the car trunk. The MMBX is manufactured by Cubic Communications, 305 Airport Rd., Oceanside, CA 92054. Price class: $30. — *Sandy Gerli, ACIY*

KENWOOD TR-8400 UHF FM TRANSCEIVER

☐ Compact! It is synthesized? Ten watts output? Well, it must be a "bare-bones job," isn't it? No? How did they manage to put *so much* into such a small package?

Features

The TR-8400 uses a microprocessor-controlled PLL synthesizer and covers 440 through 450 MHz. The primary method of frequency selection is by means of the main tuning knob located on the front panel, with the

operating frequency displayed on an LED readout. This knob is connected to a rotary encoder shaft that permits the user to step the frequency up (clockwise) or down (counterclockwise). Two buttons (UP and DOWN) on the microphone can be used to change frequency without touching the front panel of the unit — a feature sure to delight the mobile operator.

The TR-8400 has what Kenwood calls a "two-VFO system" that functions as if there were two separate built-in oscillators. There are not really two VFOs, but rather two internal memories that control the oscillator. With the unit set for operation on VFO A, the user may select a particular frequency using the main tuning dial or the buttons on the microphone. Push one button, and the '8400 is operating on VFO B. The VFO B operating frequency is adjusted in the same manner as is the VFO A frequency. Pushing a button is all that is necessary to switch from VFO B to VFO A and back.

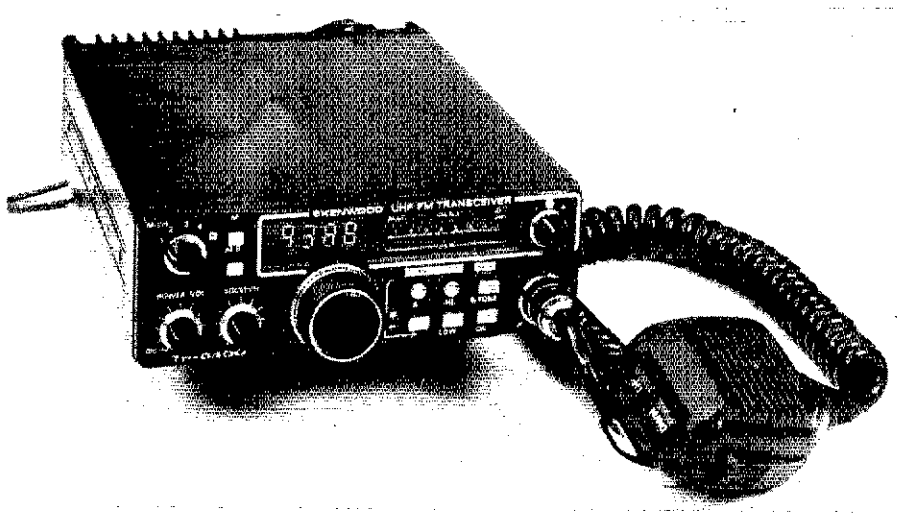
The TR-8400 has built-in repeater offsets of ±5 MHz, which makes it versatile. The operator sets the desired receiver frequency. Then the transmit offset switch is moved from s to − for transmitter operation 5 MHz below the displayed receive frequency or to + for 5 MHz above. This will handle most repeater requirements. However, Kenwood has provided a means for using the '8400 with a repeater having an "odd-ball split." One of the memory channels is specially equipped for this function.

Memory Channels?

It has memory channels, too? Four normal memory channels are included. A frequency from either VFO can be programmed into the memory at the touch of a switch. The user selects repeater or simplex operation for these memory channels with the transmitter offset switch, just as when using the VFOs. The fifth memory channel is different; the operator must program the receive and transmit frequency. Both may be any frequency in the range covered by the transceiver. (The microprocessor will disable the transmitter if an attempt is made to transmit outside the band.) This fifth memory channel will take care of any "odd-ball split."

The TR-8400 will scan the memory channels or the entire band. In either case, the transceiver will stop on any frequency at which the squelch opens, and remain there until the frequency is clear, when it will resume scanning. To retain a frequency that the scan function stops on, just press a front-panel switch (HOLD), or tap the PTT switch on the microphone. There are no provisions for the scan function to stop on an unused channel. It takes an appreciable amount of time to scan from 440 to 450 MHz in 25-kHz steps. We clocked it at 75 seconds! The time required to scan the five memory channels is much less. Perhaps a better method would have been to incorporate frequency limits on the bandscan function, as most repeater outputs are confined to the top or bottom 5 MHz of the band, depending on geographical area.

The '8400 does not have internal back-up batteries for retaining the memorized frequencies once the unit is completely disconnected from a power source. The memories require about 2 mA at 11 to 16 V to keep the stored information intact. Presumably, Kenwood felt that would make an internal NiCad back-up memory voltage source impractical. This would be of little concern to the mobile operator, but some operators are inclined to turn off everything, including power supplies, at the base station. The TR-8400 has an auxiliary jack on the rear panel for an external memory back-up supply.



Kenwood TS-8400 UHF FM Transceiver Serial Nos. 1060678 and 1060552

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 440.000 to 449.975 MHz in 25-kHz steps.	As specified.
Mode of operation: Fm.	As specified.
Readout: 4-digit, red LED digital display.	0.375-inch digits.
S-meter: LED bar type.	As specified.
S-meter sensitivity: (Not specified).	3.2 μV for S9.
Receiver sensitivity: Better than 1 μV for 30 dB S/N.	0.28 μV for 20-dB quieting.
Audio power output (8-Ω load): 2.0 W.	1.3 W.
Transmitter rf power output: HI 10 W; LO 1 W (adjustable).	As specified.
Spurious suppression: Better than 60 dB.	As specified (see spectral photo).
Current drain: 0.45 A, squelched receiver; 3.4 A HI power transmit; 1.4 A LO power transmit.	As specified.
Size (HWD): 2 × 5-13/16 × 7-5/8 inches.	
Weight: 3.3 pounds.	
Color: Brown/gray.	

Tones

A rear panel jack is wired for tone-pad hookup. One jack pin has 9 V available when the transmitter is keyed. The '8400 has provisions for adding a Continuous Tone Coded Squelch System (CTCSS or PL as it is commonly called) encoder. A front-panel switch will turn the encoder on and off once it is properly installed. Some operators having no need for a CTCSS encoder have used the switch for other purposes.

Operating Impressions

Two transceivers were sent to Hq., and we reviewed both units. The authors agree on most points of the review. The '8400 is usually an enjoyable radio to operate. It is relatively simple to change frequency as one drives along, using the microphone-mounted switches. The area coverage is somewhat reduced from that of 144 or 220 MHz, but that is not a problem in this area, where there is an abundance of 450-MHz repeaters in close proximity. In other regions, operators may find it advantageous to add an external power amplifier.

Both transceivers would lock occasionally onto a phantom channel during band scanning. Each had a different symptom. On one unit the received signal sounded like that of a broadcast station (probably an intermod product), while the other just locked up on a full-quieting carrier (probably an internal spurious product).

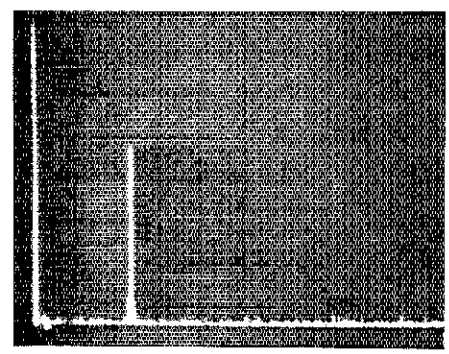


Fig. 6 — Spectral display of the Kenwood TR-8400. Vertical divisions are each 10 dB; horizontal divisions are each 200 MHz. Output power is approximately 9 watts at a frequency of 448.8 MHz. The fundamental has been reduced in amplitude by approximately 32 dB by means of notch cavities; this prevents analyzer overload. All spurious emissions are approximately 68 dB below fundamental output.

If you have been on 450 MHz for some time, chances are that you have a 40-lb "refugee" from the commercial service. The TR-8400 is an attractive alternative to the "boat anchors" of yesteryear. If you are thinking of moving up to 450 MHz, the TR-8400 is one way to travel in high style.

Price class is $500. Additional information can be obtained from Trio-Kenwood Communications, Inc., 1111 West Walnut St., Compton, CA 90220. — *Peter O'Dell, KB1N, and Gerald Hull, AK4L.*

Technical Correspondence

Conducted By
Doug DeMaw,* W1FB

MORE ON UNGUIDED LIGHT BEAMS

☐ In early 1963 while I was still at NASA Langley Research Center, one of the engineers in the Instrument Research Division, Numa E. Thomas, developed a passive optical communication system. He built a prototype, and I saw it in operation. It worked easily and well. Thomas subsequently got a patent on his system. It would be too long to describe in this letter, so I'm sending along a drawing of his system that illustrates the method (Fig. 1).

I asked the Patent Office at NASA about use of his patent, and was told there was no barrier to its use by others. If any amateur wishes to try it out, there is no problem, but credit should be given to Thomas if any publication results.

One of the applications Thomas had in mind was search and rescue, as well as field communications, since the end of the link at the user is entirely passive, small and light to carry. Two of the devices would be needed to ensure two-way communication. While Thomas demonstrated his device using voice, there is no reason why any other type of encoding could not be employed. I have always thought the device of Thomas would gain favor, and perhaps this note in *QST* will stimulate interest. Unfortunately, Thomas died shortly after his patent came to issue. — *S. L. Seaton, K4OR, 460 Windmill Point, Hampton, VA 23664*

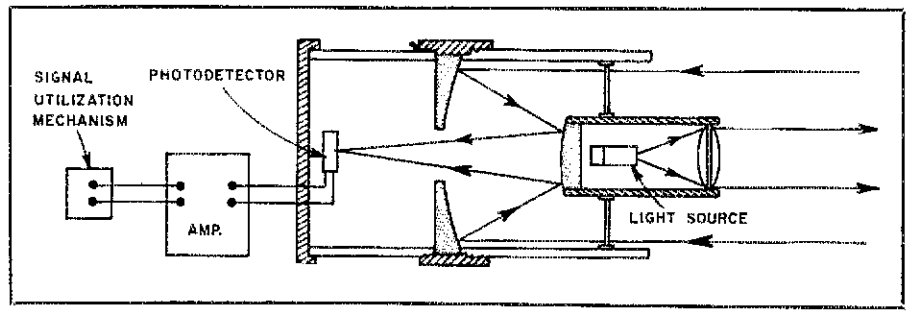


Fig. 1 — Mechanical details of the Thomas passive optical-communication mechanism.

SOLAR-ELECTRIC-POWER UPDATE

☐ Information in the amateur literature relative to solar-electric power generation seems to come in spurts. I thought this update, with excerpted information from the paper by P. Maycock and E. Stirewalt (*IEEE Spectrum*, September 1981, p. 40), would be of interest to *QST* readers. Although amateurs have been working with solar or photovoltaic panels for some years, nothing has been done on a grand scale. This is because the present-day costs for large arrays of solar-electric cells and compatible storage provisions (batteries) are beyond the practical and economic means of hams. However, large entities, such as the military, small communities and broadcast stations are finding the sun to be a worthwhile energy source.

Maycock and Stirewalt say that the largest independent solar-electric generator in the world is in place and operating at Natural Bridges National Monument in Utah. The 1712-square-meter photovoltaic array delivers an output of 210 A at peak sunlight. A quarter million solar-electric cells are contained in the array of this 100-kW generator. Lead-acid batteries provide a storage capacity of 600 kW hours. Thus far the batteries have not discharged below 40% of capacity. A fully charged system at this site yields one to three days of operation, depending on load conditions.

The authors go on to say that this system, since June 1980, has supplied ample energy for all of the electrical needs at the park. This includes water pumping, power service to several ranger residences, maintenance shops, a visitors' center and tourists' trailers. The quarter million cells in this system are divided into 4762 modules. A backup diesel power system is available, but is used only 0.4% of the time to boost batteries and to make up for poor isolation. They are used some 7% of the time for charge equalization.

The system was built under the sponsorship of the U.S. Department of Energy and the Department of the Interior at a cost of $4 million. It produces power at a cost of $1.49/kWh. The system designers think an improved version could be fabricated for somewhat less than $670,000, owing to cost-saving experiences gained while working with the prototype. This would drop the power cost to 25¢/kWh.

Other operating systems are being used at Papago Indian Reservation village Sil Nakya, 190 km west of Tucson, Arizona. A 3.5-kW solar-electric generator is used to light 15 houses for the 92 residents of the village. It also provides power for the fresh-water pumps, a washing machine, sewing machine and 15 refrigerators. Sil Nakya is 27 km from the nearest source of commercial electricity.

A 60-kW photovoltaic system is used to power the Air Force radar station on Mount Laguna, 80 km east of San Diego. I remember this site on Monument Peak from my association with the K6JCC civil defense group from Santee, California, during the late 1950s. We conducted some simulated evacuation/emergency drills from that radar site, with the kind permission of the Air Force. The elevation is approximately 6000 feet, and the air is clear (and crisp!), making the site ideal for the deployment of solar-electric panels.

The Mount Laguna system has been in operation since June of 1979, and on a typical day it will deliver some 45 kW for roughly 6 hours. The solar-power system has no storage batteries. It augments diesel power that is already in use. The output of the system is inverted to ac.

The demand for solar-electric power is expected to increase, and it is predicted that by the year 2000 as much as 30% of the nation's power will come from solar-electric systems. The demands for solar-electric cells will bring the cost down, which will no doubt encourage greater use by amateurs for repeaters, Field Day equipment and even home-station gear. — *Doug DeMaw, W1FB*

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EXPERIMENTAL ACTIVE KEY-CLICK FILTER

☐ I received local reports of severe key clicks while using my Trio/Kenwood 2-meter ssb/cw transceiver (TR-7010), even though the final amplifier was checked and found to be operating linearly. The original keying circuit is shown in Fig. 2. Although the TR-7010 may not be a widely recognized piece of equipment, this information on active click filtering may be helpful in treating other brands of gear.

I desired to use a high order key-click filter. Inductors could not be used because of limited space. With the circuit of Fig. 3 it is convenient to use op amps for the filter. A transistor has been added to provide some additional safety margin for the current that may be present in the keying circuit. R7 is used to prevent accidental damage from short circuiting.

The circuit was tested first without C1, but some bad overshoot was observed at the output of U1. The addition of C1 cured the problem. While the filter was designed to be a second-order type, it performs more like a third-order low-pass filter. It has been tested on the air, and no key clicks were noted up to above 1000 LPM (letters per minute),[1] which translates to 200 wpm. Above 1000 LPM I use a 1500-Hz, zero-crossing sine-wave oscillator, which is fed to the microphone input.

Another problem that arises at high keying

*Senior Technical Editor

[1]On-the-air reports indicate that distortion is noticed as a slight reduction of the dot-dash ratio at 1500 LPM.

speeds is ssb crystal-filter distortion. Even at 1000 LPM, the distortion is quite severe, as observed on an oscilloscope. This is only about 250 baud, and I wonder if anyone has thought about this problem when planning to use 600 or even 1200 baud on an ssb transmitter. Perhaps some type of equalizers will be used in amateur equipment soon. — *Jan Martin Noeding, LA8AK, Voielien 39/B, N-4620 Vaagsbygd, Norway*

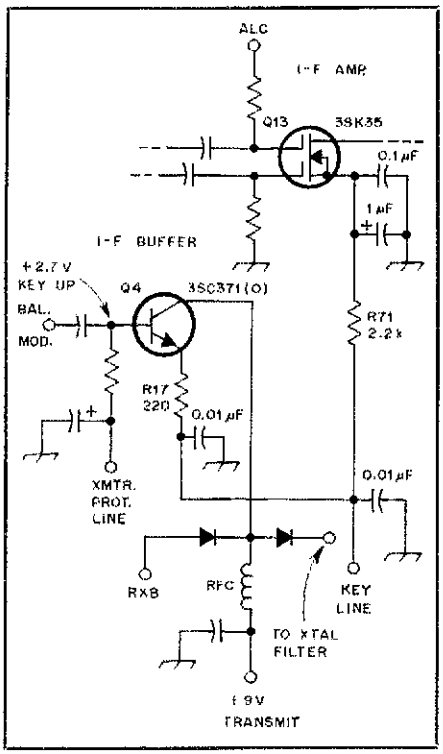


Fig. 2 — Original keying circuit of the Kenwood TR-7010.

IMPROVED FEED-HORN SUSPENSION FOR THE MONTGOMERY WARD DISH

☐ Recently, when I began copying horizontally polarized GOES CENTRAL and well as vertically polarized GOES WEST, the unwieldiness of the original unit[2] became very apparent. After a session at the drawing board a new suspension was devised and built. It corrected the former problems. Certainly other solutions are possible, but the present one is simple and effective.

The metal conduit supporting the can assembly in the original unit was cut off about 2 inches (in. = mm × 25.4) toward the can from the clamp/horizontal "mast" assembly (Fig. 4). Onto this stub was "epoxied" the threaded end of a 3/4-inch PVC female adapter. Into the PVC end was placed (PVC cement) a 1-1/2 inch length of PVC pipe, which in turn was cemented into the PVC end of another female adapter.

Into this latter female adapter is screwed the feed-can assembly. This unit is made from a male adapter, a 6-inch length of 3/4-inch PVC pipe and a disc cut from 2-inch foam insulation[3] that is pierced at the center to slide onto the PVC pipe (Fig. 1). The diameter of the disc should allow it to fit snugly into the anterior 2 inches of the feed can. The can and disc are adjusted for focus and then secured together with epoxy cement (PVC cement can't be used with the foam insulation).

The polarization is adjusted by rotating the can assembly where it is screwed into the dish assembly. To facilitate this adjustment, the PVC pipe is drilled to take a 3-inch length of wooden material to serve as a handle (optional). The focus is not adversely affected by the small adjustments necessary to obtain correct polarization. — *Lindsay R. Winkler, Rte. 1, Box 209, Walla Walla, WA 99362* QST

[2]Described in *QST*, March 1980, p. 48.

[3]Two-inch foam insulation is obtainable in 4- × 4-foot (m = ft × 0.3048) sheets at low prices. But what does one do with what's left over? If this is a problem, either scrounge some from a builder friend, or try using the odd-shaped pieces used in instrument packing.

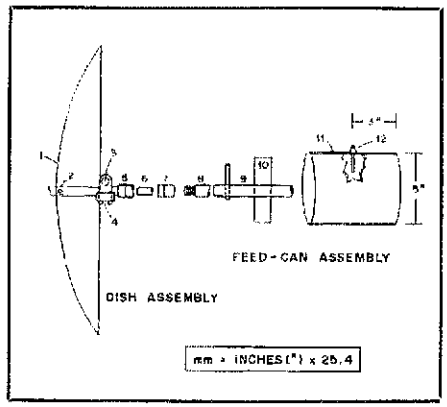


Fig. 4 — Details of the restructured feed system.

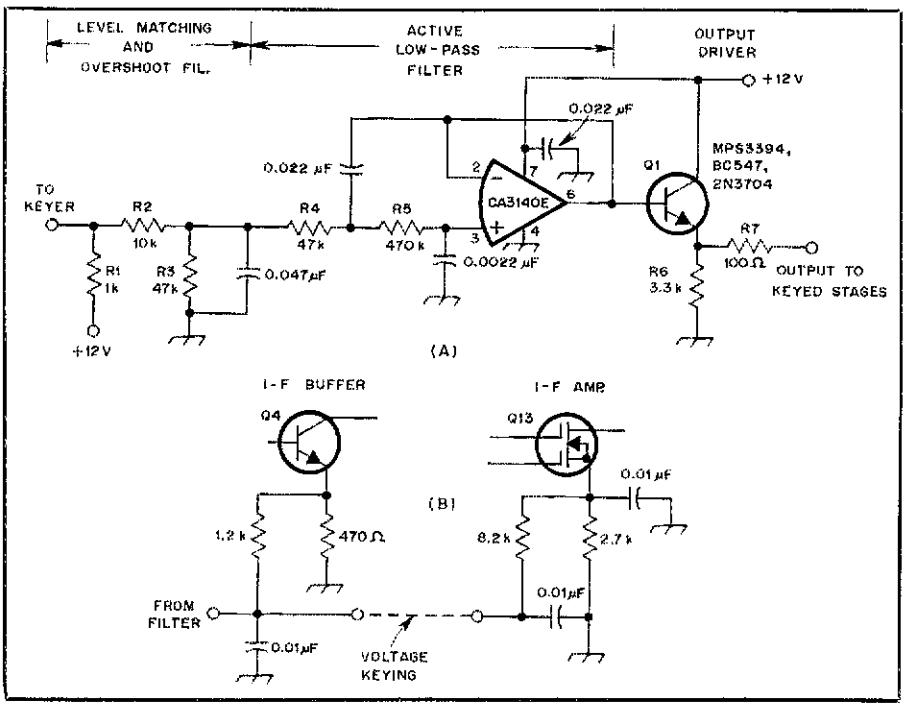


Fig. 3 — The LA8AK active key-click filter is shown at A. The circuit at B illustrates the original TR-7010 circuit after changes were made to the emitter and source resistors of Q4 and Q13.

Feedback

☐ In "A Progressive Communications Receiver," November *QST*, Table 3 incorrectly shows a subhead labeled *C22 (turns)*. This should be changed to *C22 (pF)*. Also, author Hayward points out his error in equation 3 of the appendix, page 4. C_v should be changed to read C_u.

☐ Dennis Boyd, KC7BE, spotted an error in Bob Heil's "Experience 10-Meter FM Operation" (Fig. 6, p. 26, August 1981 *QST*). In redrawing the pattern for publication, we omitted the trace between pins 3 and 4 of U1.

☐ Dave Geiser, author of the Technical Correspondence item, "Wave Traps with Three Components" (November 1981 *QST*, p. 47), advises that he erred in the captions for the drawings at A and B of Fig. 2. Fig. 2A is actually a circuit with anti-resonance *above* the resonant frequency, while that in Fig. 2B is a circuit with anti-resonance *below* the resonant frequency. The text is correct.

☐ Some dimension errors crept into Fig. 1 of "The New Frontier" in November 1981 *QST*. The millimeters-to-inches conversion should read "in. = mm × 0.03937." Several dimensions that were converted to millimeters should have been expressed in inches: The waveguide hole shown at the top left of the drawing should be 1/8 in. The other hole should be 1/4 in. The Teflon or Mylar at the upper right should be 1/8 in. dia. Finally, the width in the top view should be 0.5 in. on either side of the hole.

☐ The photos of nostalgic transmitters shown in a December 1981 Stray, page 31, are reversed. The Hartley 201 should be on the left, and the 59 Tri-Tet and 801 should be on the right.

☐ The "*QST* Abbreviations List," December 1981, page 68, includes "THz — tetrahertz." This should read, "THz — terahertz."

☐ Items for Product Review, Index to Volume LXV—1981 (December *QST*, pp. 226-231), are listed under appropriate categories. The full list appears in this issue, page 91. QST

Hints and Kinks

Conducted By Larry D. Wolfgang, * WA3VIL

THE POCKET MAG MOUNT

☐ Looking for a small, efficient magnetic-mount antenna that complements the convenience and portability of your hand-held? If so, this inexpensive project may be for you.

You will need a magnetic mike holder (Radio Shack part no. 21-1130), a chassis-mount female BNC connector (RS 278-105) and a solder lug to fit over the threads of the BNC connector. You will also need a length of RG-174/U coaxial cable and a BNC male connector.

Use needle-nose pliers to bend the entire "finger" part of the holder up at a 45-degree angle. Next, bend the last half of this section so it is parallel with the magnet (see Fig. 1A). The last bend is made to bring the ends of the "fingers" a little closer together to form a partial loop (see Fig. 1B). Place the BNC connector through the opening, and tighten the nut to hold the solder lug and connector in place. You may have to squeeze the loop to ensure a better fit. Prepare the end of the coaxial cable, and solder the shield to the solder lug. Next, solder the center conductor to the connector pin. To provide strain relief, thread the other end of the cable through the space between the mike holder and the connector (see Fig. 1C). Seal the exposed connections for weather protection, and install the male BNC connector on the remaining end of the coaxial cable.

You can now use your "rubber duckie" on the mag mount, or you can make a 1/4-λ antenna using another male BNC connector and 19 inches of wire. The mount serves nicely as a highly flexible patch cord when using the hand-held with additional equipment or antennas. Results have been gratifying. When not in use, the mag mount can be stored in the glove compartment of the car, or carried in your pocket. — *Steve Brtis, WA6FGW, Woodland Hills, California*

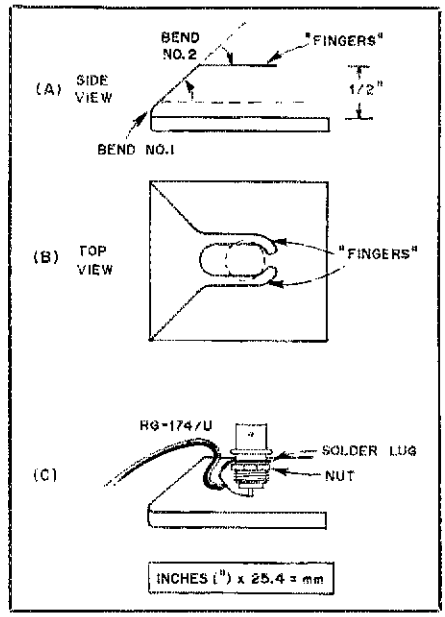


Fig. 1 — (A) Details showing how the mike holder is bent to form the base of the pocket mag mount. (B) Top view, showing the mike-holder fingers bent to hold the BNC connector. (C) Final assembly of the pocket mag mount.

COAXIAL-CABLE WIRE STRIPPER

☐ I have found that discarded RG-59/U cable (as obtained from cable TV sources) makes an excellent source of braid for ground-strap material. The wire can be used for ground radials or even for dipole antennas.

I made a simple device to remove the outer insulation. Use a scrap piece of pine "two by four," about 6 inches long (mm = in. × 25.4). Drill a 1/4-in. hole about 3/4 in. from one end. With the block fastened in a vise, drive a disposable steel blade used in a "sheet rock" (or "utility") knife into the wood, with the grain. Drive the blade nearly into the hole, being careful to keep the blade parallel to the hole. Now carefully tap one end of the blade into the hole as shown in Fig. 2.

Insert the coaxial cable, and pull it through from the other side with pliers. Watch your fingers! Adjust the cut by tapping the blade slightly deeper into the hole to ensure cutting the insulation but not the braid. Many feet of cable can be pulled through in a short time. — *P. K. Hurlbut, N5DHN, Midland, Texas*

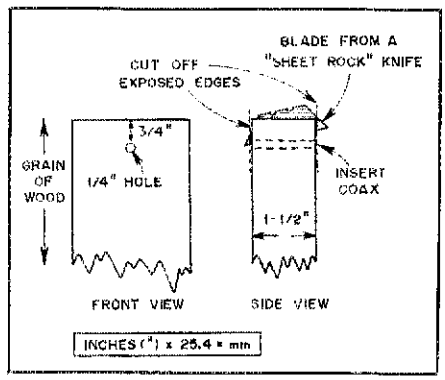


Fig. 2 — Construction details of a jig for stripping the outer insulation from large amounts of coaxial cable. [Exposed edges of the blade could be cut or ground off as a safety measure — Ed.]

A TWO-ELEMENT INDOOR ANTENNA

☐ Faced with indoor-only antenna restrictions, and knowing: (1) the antenna is more important than transmitter power, and (2) a multielement antenna is better than single-element types, I decided to build an indoor two-element wire beam. A two-element beam is only two parallel conductors separated by some fraction of a wavelength. Under ideal conditions it provides about 6-dB of gain (four times the power) and a lower angle of radiation than a dipole. Using data from *The ARRL Antenna Book*, I made the wire beam from no. 18 wire

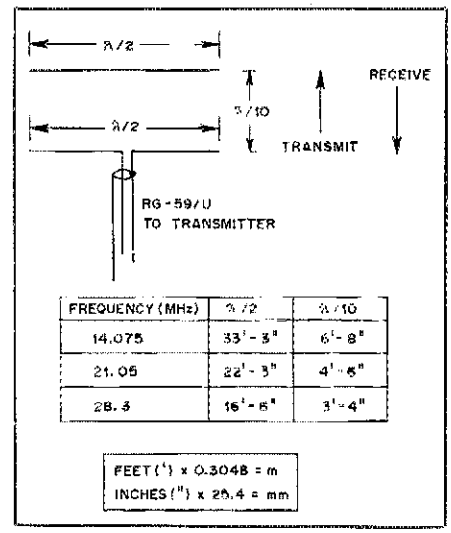


Fig. 3 — Construction details and dimensions for two-element indoor antennas for three hf bands.

and hung it from the ceiling of the apartment. I used a 20-meter version, but dimensions are given for three hf bands. This two-element indoor antenna is a significant improvement over the dipole it replaced. Fig. 3 shows the construction details. — *John Gallagher, K4GXY, Dhahran, Saudi Arabia*

LEFT-HANDED KEYER

☐ Here may be an idea of interest to left-handed cw operators — a simple adapter I wired when teaching a left-handed person how to send cw with a keyer.

For right-handers the convention is dots on the thumb, apparently because of its agility. Some "southpaws" learn on right-handed keyers, but when teaching a local ham to use a keyer, I thought I would give him the advantage of the thumb on the dot. Changing the wires at the keyer required disassembly. To get around this problem I wired an adapter with a three-wire shielded phone plug on one end, and a similar jack on the other end. The ground is common, but the tip of the plug connects to the ring of the jack, and vice versa. By plugging the paddle into the adapter and plugging the adapter into the keyer, the dot and dash wires are interchanged. Now switching from right- to left-handed keying is as simple as adding an adapter. — *Bill Conwell, K2PO, Atlanta, Georgia*

CLIPPERTON-L 60-Hz HUM

☐ The monitor 'scope showed considerable 60-Hz amplitude modulation when my Clipperton-L was switched in. Signal reports on cw and ssb confirmed the condition. A friend's Clipperton-L, in an identical set-up, behaved the same way.

The linear-amplifier schematic showed no filament winding center tap for the directly heated 572Bs. The bias Zener diode (D1) was connected to one side of the power transformer

*Assistant Technical Editor

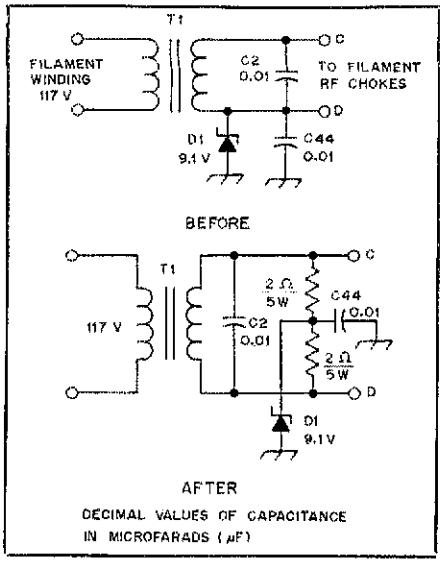


Fig. 4 — The addition of two 2-ohm resistors cures 60-Hz hum problem in the Clipperton-L amplifier.

filament winding. This effectively cathode-modulated the linear amplifier with the filament voltage.

I returned the amplifier to Dentron, and they cured the problem by modifying the circuit as shown in Fig. 4. The 2-ohm resistors create a 60-Hz balance to ground for the filaments and eliminate the 60-Hz hum.

If the Clipperton-L is loaded beyond about 500 mA on cw, 120-Hz ripple may be seen on the 'scope. This is caused by the normal ripple of the full-wave voltage doubler power supply when heavily loaded. I reduce the drive to the amplifier until the waveform on the 'scope is clean. This still produces 700 to 800 watts of dc input power. — *Manny Block, W0PIG, St. Paul, Minnesota*

HALLICRAFTERS HA-5 VFO IMPROVEMENTS

☐ The Hallicrafters HA-5 VFO exhibits a rapid change in frequency during the first few seconds of each transmission. This effect is caused by poor voltage regulation in the power transformer (T1), which causes a drop in filament voltage when the B+ supply is loaded during keying.

The cure for the problem is to disconnect the filament of the 6U8A oscillator, V1, from T1 and power it from a separate source. This can be a small 6.3-volt transformer capable of supplying 0.5 ampere. This transformer can be mounted on the grounding stud on the rear panel. The primary can be connected in parallel with that of T1, or ahead of switch SW1-F to keep the V1 filament powered when the VFO is turned off, which will reduce warm-up drift. The VFO in the Hallicrafters HT-44 transmitter has the same problem.

The HA-5, normally cathode-keyed, can be converted for use with grid-block-keyed transmitters with −80 volts or more on the keying lines, without making irreversible changes or drilling holes in the chassis.

The changes consist of disconnecting the cathode resistors, R12 and R21, from the orange lead of the CAL-OFF switch and grounding them to the chassis. Disconnect the ungrounded ends of R5, R7, R10 and R22, leaving them bent out of the way. Install new resistors of the same values, respectively, for R5, R7 and R10, so the long leads will reach to connect with the orange CAL-OFF lead.

The grid-block-keyed transmitter negative lead then goes to the terminal marked "+", and the transmitter ground connects to the terminal marked "⏚" on the VFO keying terminal strip. — *Tuckerman Jalet, AA1C, Stamford, Connecticut*

A DESK-TOP HOLDER FOR HAND-HELD TRANSCEIVERS

☐ This desk-top holder for my Kenwood 2400 has been a handy item. The base is made of 3/4-inch pine. The hole for the radio is cut with a saber saw. Strips of foam rubber are glued to the front and back of the opening to provide a secure fit. Rubber feet are added for additional stability. Fig. 5 shows construction details. — *G. Stewart King, KF8S, Tipp City, Ohio*

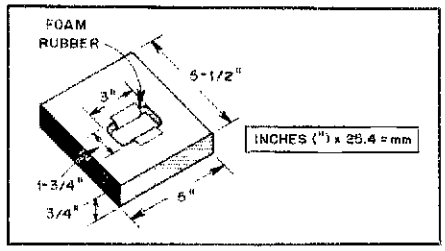


Fig. 5 — Construction details for the desk-top holder. Dimensions can vary to fit the shape of your radio.

NEEDLE-NOSE PLIERS VISE

☐ An alternative to the May 1981 *QST*, page 45, Hints and Kinks problem requires no drilling and tapping of the tool handle. Just stretch a rubber band, and wrap it tightly around the handle as shown in Fig. 6. This vise is useful for holding small items during assembly, or holding wires for soldering. — *Jack Rosen, KA8LFX, Farmington Hills, Michigan*

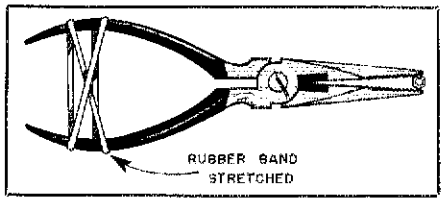


Fig. 6 — Using a rubber band to make a needle-nose pliers vise.

SECONDS SET FOR THE HEATHKIT GC-1107 DIGITAL CLOCK

☐ The Heathkit Model GC-1107 digital clock makes an attractive, electrically quiet addition to the shack. As it comes, it is impossible to set the seconds exactly, or even to view them. This can be corrected easily by placing a jumper wire from pin 24 to the unused pin 32 on the clock chip, IC1. To set the clock, first push the SNOOZE switch. The seconds and the least-significant-minute digit will be displayed. Keeping the SNOOZE switch depressed, push the FAST SET switch. The seconds will be zeroed, and the clock stopped. Simply release the FAST SET switch on the minute, and then the SNOOZE switch. Using the SLOW SET instead of the fast will stop the clock without changing the display. The other clock functions, including the alarm, are as before. It is common practice to use a full-feature clock chip with only the basic features used in inexpensive clocks. Check the pins on your particular chip to see if you can expand the features of your clock. — *Alan Biddle, WA4SCA, Huntsville, Alabama*

SELF-ADHESIVE EQUIPMENT FEET

☐ I have tried all of the usual methods — screws, carpet tape, rubber cement, and so on — for preventing small items such as keys and calculators from sliding around, but was never happy with the results. The equipment couldn't be moved easily, and either holes or adhesive residue were left behind.

The J. J. Morris Co. sells self-adhesive equipment feet disguised as eyeglass nose pads. They're great. I have even placed them on the regular rubber feet on my bug. The equipment will not slide! If I want to move it I have to pick it up. They cost about 10 cents each in packages of six.

Prior to installing these pads, clean the surface to which they will be applied with fine sandpaper or emery cloth. — *Dan Ringer, K8WV, Morgantown, West Virginia*

GARAGE-DOOR OPENER — THE KEY TO A TVI PROBLEM

☐ Interference on channels 2 and 6 persisted over a period of several years to the family color TV set whenever my amateur equipment was operated on 10 or 15 meters (especially on 10 meters). Considerable expense and effort was expended to add low- and high-pass filters, in addition to wrapping power cords around ferrite rods. Various transmitting antennas, antenna tuners and assorted commercially manufactured amateur transmitters in the 150-to 250-watt class were tried, but the TVI persisted. The logical conclusion was that some device external to the amateur equipment and the TV set was reradiating the transmitted wave with distortion. But what?

I remembered that several years ago the garage door would open, apparently without cause. To protect the family security, a more sophisticated radio-controlled garage-door system was installed. This add-on system (Sears 139.653300) operates near 390 MHz, and it should not be responsive to amateur transmissions below 30 MHz.

Suspicion dwelled in my mind about the 35-foot length of zip cord connecting the garage door opener to the actuating push button. The rf voltage, induced at the garage-door receiver, could be high enough to cause some nonlinear functioning.

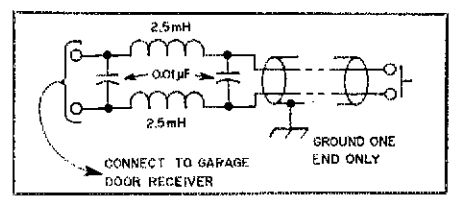


Fig. 7 — An annoying case of TVI was traced by John Hartung, W7THY, to his garage-door opener. Installation of a simple pi network, as shown here, and some shielded cable brought the TVI chase to a happy ending.

Temporary removal of the garage-door electronics to a shielded enclosure (the microwave oven — *not* turned on!) provided *clear* TV reception when the transmitter was operated.

Subsequently, the zip cord was replaced by a "shielded pair," and the connection to the replacement garage-door receiver was equipped with a pi network consisting of an rf choke in each lead and with 0.01-μF bypass capacitors, as shown in Fig. 7. This cured the interference!

The TV antenna is located only 7 feet from the garage-door receiver, and that may account for the severity of the interference. Fortunately, no TVI complaints were received from the neighbors. My experience may serve to alert other amateurs to another source of interference to TV reception. — *John W. Hartung, W7THY, Glendale, Arizona*

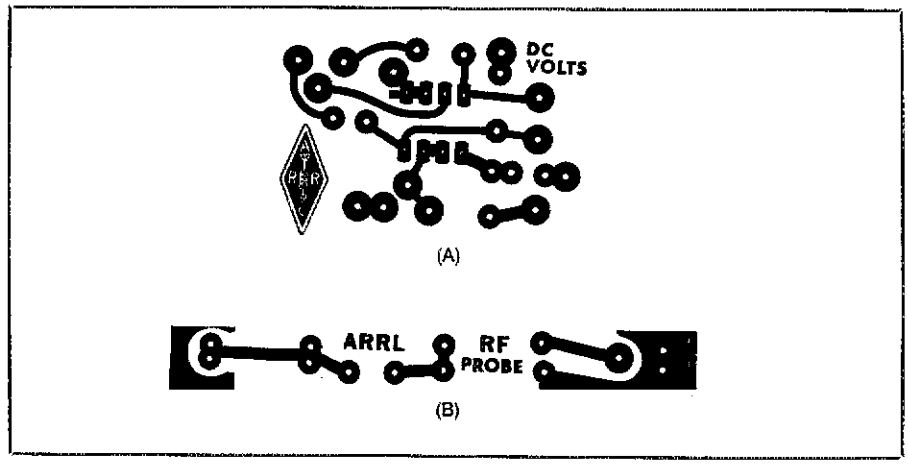
NICKED WIRE CAUSES TROUBLE IN KENWOOD 180S-DFC

☐ Periodically my newly purchased Kenwood 180S-DFC failed to operate. I traced the trouble to the B+ control lead connected to the ON-OFF switch. The insulation had been cut by the edge of a metal partition. The area affected is just to the left of the filter unit (X51-1180-00) as seen from the top and rear of the transceiver. See page 37 of the manual.

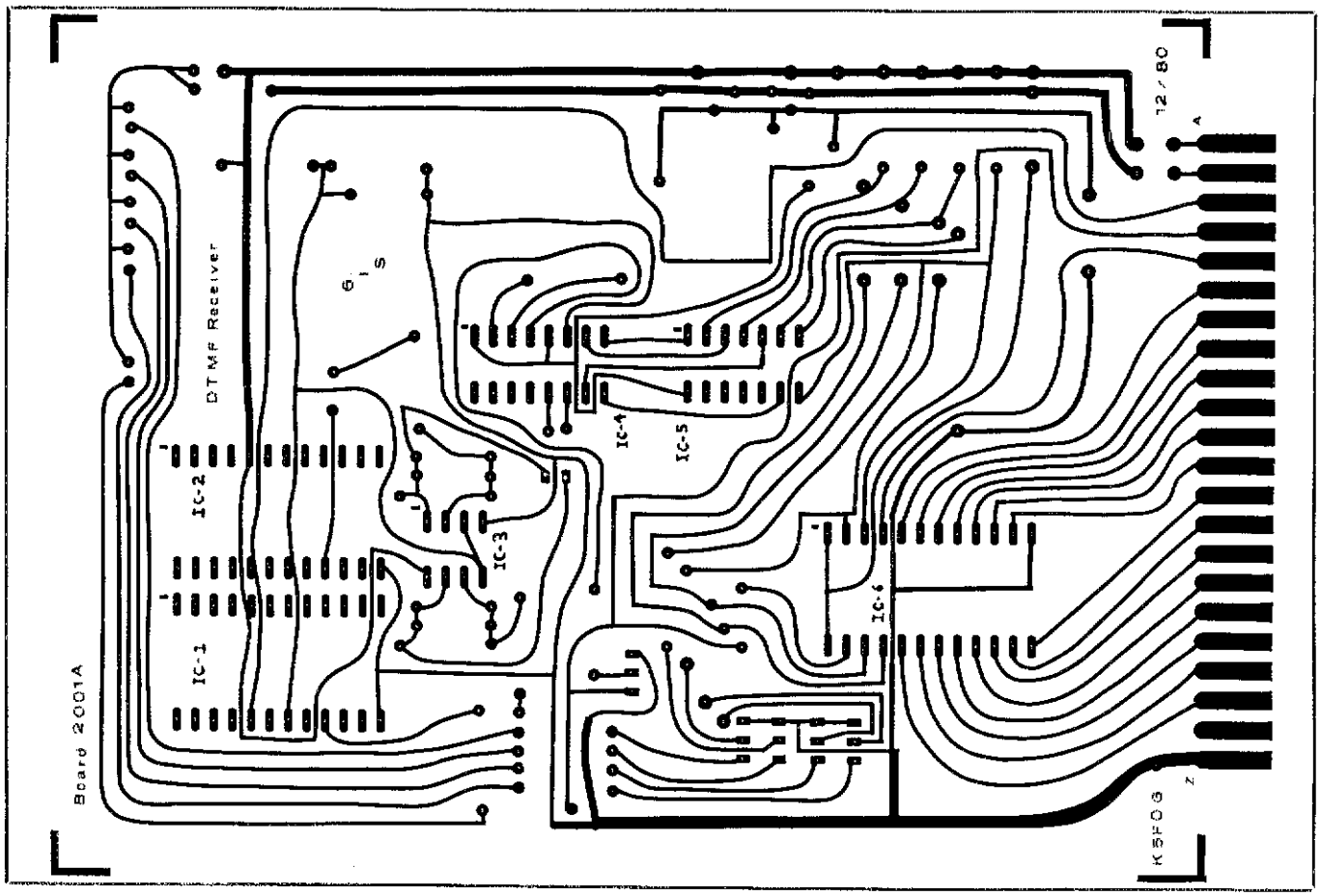
Since the insulation was nicked on other wires in the cable, I placed a piece of fish paper between the metal partition and cable harness. I hope this may help other 180S owners who may experience a similar difficulty, especially those who operate mobile — a situation which could aggravate this condition. — *J. M. Clarke, W6VBI, Sacramento, California*

TEN-TEC DELTA PARASITIC OSCILLATION

☐ The dc current limiter was shutting down my Ten-Tec Delta rig as I attempted to load it with a feed line that had a low SWR. My guess was that there was some connection between the parasitic oscillation and the load. There is a one-turn coil on a ferrite bead on the dc line to the final amplifier. In my unit the bead was about 1 inch (25 mm) from the final-amplifier compartment and was touching the case top. By pushing the bead along the wire closer to the final amplifier and bending the wire away from the case, I eliminated the problem. In my case, changing the length of the feed line might have helped also. — *Roger Graves, W1TZ/VE7, Victoria, British Columbia*



Scale pattern for the FET voltmeter (A) and rf probe (B). Components are mounted on the nonfoil side of the board. The black areas are unetched copper viewed from the foil side of the board. A parts-placement diagram appears on page 41.



Circuit-board etching pattern for the DTMF Easy-Ceiver. Black represents copper. The pattern is shown full size from the foil side of the board. The parts-placement guide appears on page 29.

Members Support 160-Meter Band Plan

Plan proposed in August QST receives backing of the membership; Board adopts plan with some changes that reflect member comments.

By David Sumner,* K1ZZ

On May 21, 1981, the Federal Communications Commission acted on an ARRL request filed almost a year earlier to return 160-meter amateur privileges, which had been "temporarily" curtailed after World War II. Amateur operation had been restricted to protect the Loran-A radionavigation system from interference. The Commission's action, which followed the cessation of domestic U.S. Loran-A activity on December 31, 1980, became effective June 10 and returned full frequency and power privileges in the band 1800-1900 kHz while easing the restrictions at 1900-2000 kHz.

Even before the Commission's action, some long-time 160-meter enthusiasts had been arguing for a clearer separation between the phone and cw modes in the band. One petition to FCC, RM-3761 filed by Charles T. Rauch, W8JI, sought an FCC-mandated exclusive cw sub-band at the low end of the band.[1] However, it was not likely that the Commission would take timely action on the request. Discussions with 160-meter operators confirmed that it was both desirable and necessary for the issue of band planning to be addressed by the amateur community before the winter operating season got into full swing. Accordingly, an article was prepared for August *QST* that outlined the problem and proposed a solution based on a voluntary band plan for 160-meter operation.[2] The article emphasized that nothing would be cast in concrete until the members had had the opportunity to comment, nor until the ARRL Board of Directors studied the matter and took some action.

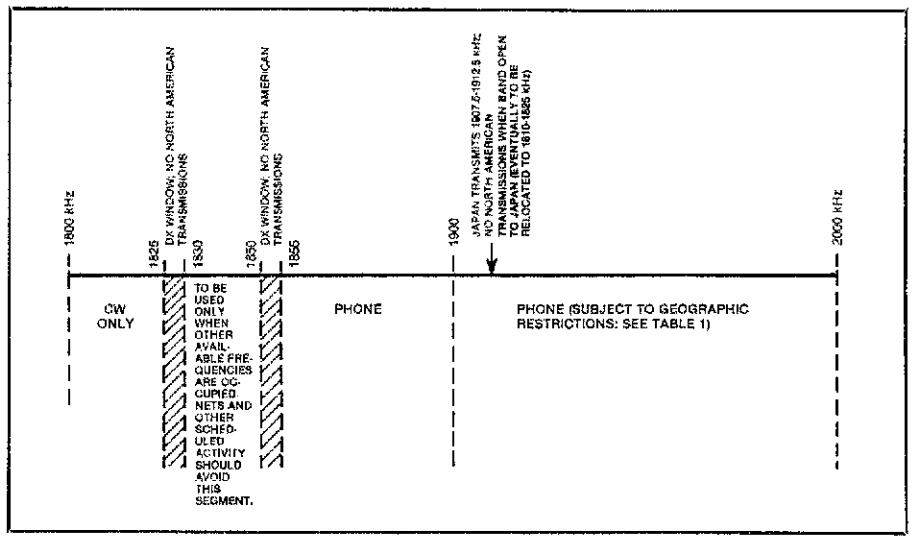


Fig. 1 — The band plan for 160 meters adopted by the ARRL Board of Directors. Effective December 1, 1981, participants in ARRL contests and other League-sponsored operating activities will be required to adhere to this plan. At all times, voluntary adherence by all amateurs is strongly encouraged. The plan is subject to review when the FCC acts on its proposal in Docket 80-739 concerning 1900-2000 kHz.

The Nature of the Band

The 160-meter band is the lowest-frequency amateur allocation. Its history can be traced to the earliest experiments at "200 meters and down." As are all amateur allocations, it is put to a variety of uses: local and regional ragchewing, DXing and some net operation. At present the available modes are limited to type A1 and type A3 (ssb or a-m) emission, although there is no reason to believe the FCC would turn down a request for other modes, such as F1 (RTTY, either Baudot or ASCII) or slow-scan television, in at least some portion of the band. The band is available equally to General, Advanced and Extra Class licensees.

For most amateurs, it takes a certain amount of ingenuity and hard work to radiate a good signal on 160 meters. The limiting factor is the antenna: A full-size antenna is larger than most amateurs' real estate can accommodate, so shortened skywires are the most common. For this

[1]Notes appear on page 53.

*Assistant General Manager, ARRL

reason the band is often thought of as a haven for antenna experimentation.

Interest in the 160-meter band has increased dramatically in recent years. More equipment is available that covers the band, amateurs overseas are enjoying increased access, and many amateurs are seeking a respite from the crowded and competitive conditions in the high-frequency bands (especially on phone) or are seeking new challenges. While many of those who have been active on the band for many years would like it to remain "just the way it is," the reality is that every weekend finds a host of newcomers swelling the population.

One feature of operation on 1.8 MHz is the use of "DX Windows," which permit weak signals from other continents to be heard. Narrow segments of the band are avoided by North American stations so their neighbors can hear DX stations without local interference. Were it not for the voluntary cooperation of all operators on the band in keeping these segments clear, DXing would be difficult and frustrating at best.

The Proposed Band Plan

The plan proposed in August *QST* was designed as a compromise between the various interests: particularly, cw vs. phone and DX vs. ragchewing. The plan was complicated by the fact that the future status of the band above 1900 kHz is uncertain.[3] Operation above 1900 kHz must be encouraged; if amateurs cluster on top of one another at the low end of the band they not only will cause one another needless QRM, but will also undermine the effort to retain access to the top half of the band. Yet another complicating factor is that the situation overseas is in a state of flux, with a trend toward the eventual centering of amateur operations in the 1830-1850 kHz segment. Certain kinds of domestic activity in this segment could make future DX operation difficult, if not impossible.[4]

In brief, the proposal was for amateurs to observe the following sub-bands voluntarily:

1800-1825 kHz cw only
1825-1830 kHz DX window
1830-1850 kHz mixed mode
1850-1855 kHz DX window
1855-2000 kHz phone

August *QST* requested comments from amateurs on this proposal.

Membership Reaction

By the time the Board of Directors met on September 10, comments had been received at Headquarters from 98 amateurs, all in the U.S. Of these, 70 expressed support for the plan as proposed, or with minor modifications, and 12 opposed the concept of the plan. Of the other 16, most suggested only minor changes in the plan, but because they did not specifically express support for the concept of a band plan they were not counted as supportive. Of the 70 supporters, 38 supported the plan in every detail. This was the largest single group of respondents. A number congratulated the League for taking the initiative on what they felt was an important issue. Typical were these comments: "Many thanks for the thought that went into this plan. I came away glad that someone cared enough to give it some thought." — *Bob Lucas, WAØDXZ, Mississippi State, Mississippi.* "Thanks for the initiative shown in August *QST*, supporting a *sensible* 160-Meter Band Plan." — *Tom Drake, KB8AC, Gahanna, Ohio.*

Of those objecting to some aspect of the proposed plan (including those who generally supported it as well as those who were opposed to the concept of a band plan), 20 felt that the plan did not provide adequate space for cw operation. The fact cited most frequently in support of this position was that the percentage of the high-frequency bands allocated exclusively to cw (and RTTY, which doubtless will be permitted one day on 160) was greater than that proposed. On the other hand, nine felt that the proposal was too generous to cw operators, citing impressions gained from their own monitoring of the band; they claimed to hear relatively few cw signals on a typical (noncontest) evening.

The other controversial aspect of the proposal was the amount of attention paid to the needs of DXers. Of the 98 respondents, 10 said *wider* DX windows were appropriate. The problem mentioned most frequently was that ssb stations using lower-sideband on the high edge of a window often did not realize that their signals occupy at least 3 kHz *below* their carrier frequency. This means, for example, that an lsb station operating on a carrier frequency of 1831 kHz (as indicated by the vfo dial or digital frequency readout) is, in fact, intruding at least 2 kHz into the 1825-1830 kHz window. The opposite opinion was expressed by nine respondents, who generally felt that DX windows tied up too much of the band for the benefit of too few people.

Comments on other issues did not follow a clear pattern. Four supported some sort of provision to permit continued a-m operation in the band (although the elimination of a-m had not been proposed, or even mentioned, in the article), but three favored more severe restrictions on a-m than now exist. Four supported setting aside some part of the band for net operation, either to encourage nets or to keep them segregated from other users of the band. Four favored a reduced power limit, either voluntarily or by FCC directive. A few suggested a cw-only segment at the *top* of the band, rather than at the bottom.

Several other comments addressed matters that would involve FCC rulemaking. Five supported FCC-mandated subbands, primarily because of doubts that a voluntary plan can work. Three mentioned the desirability of having F1 emission authorized (presumably in the cw segment), and one mentioned slow-scan television. Three supported a Novice segment. Three supported an Extra Class segment, but three others went out of their way to express opposition to an extension of the incentive concept to 160 meters.

One writer pointed out that operators of older Yaesu FT-101 equipment are cautioned in the instruction manual to use reduced power in the band 1820-1900 kHz, to avoid spurious emissions. The ARRL Technical Department is attempting to assess the seriousness of this problem, and to identify a remedy; we would like to hear from anyone having experience with possible modifications.

Despite the generally enthusiastic reception given to the proposed plan, it was apparent from the comments that some clarification of a couple of points was needed. While the August *QST* article proposed that the 1830-1850 kHz segment be used primarily for cw, with some DX phone activity permitted, some readers thought the segment was to be used primarily for DX phone. This seemed to explain a few of the comments that the plan was not sufficiently pro-cw, or that it was too DX oriented. Doug Jorgenson, K9PFA, summed it up:

> The proposed mixed-mode segment (1830-1850) seems to run contrary to the statement in the center column of p. 55: ". . . this lack of a definite dividing line between cw and phone has been the cause of some hard feelings." Shouldn't the plan try to remedy this situation rather than propagate it?

Fine-Tuning the Plan

The band plan is intended to spread activity more evenly throughout the available band, and particularly to encourage activity in the threatened 1900-2000 kHz segment, as well as to help avoid confrontations and conflicts between the users of different modes and between those pursuing different operating interests. As noted by K9PFA and others, the proposed plan appears to fall short of the latter objective at 1830-1850 kHz. The solution adopted by the ARRL Board of Directors is to encourage *all* occupants of the band to avoid transmitting in the segment unless the other parts of the band (below 1825 kHz for cw, and above 1855 kHz for phone) are fully occupied. During periods of high activity on one mode or the other, such as during contests, the overflow would extend into this segment; at other times it would be relatively quiet, with ssb stations occupying it as necessary from 1850 kHz *down* and cw stations from 1830 kHz *up*. Nets and other regular users of a particular frequency would be encouraged to select a frequency *outside* this segment for their activity, because

Table 1

Power Restrictions in the Band 1900 to 2000 kHz

Maximum dc plate input power in watts

States	*1900 to 1925 kHz*	*1925 to 1950 kHz*	*1950 to 1975 kHz*	*1975 to 2000 kHz*
Maine, Massachusetts, New Hampshire, Rhode Island	*Day/Night* 100/25	*Day/Night* 0	*Day/Night* 0	*Day/Night* 100/25
Connecticut, Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Vermont	200/50	0	0	200/50
Kentucky, North Carolina, Ohio, South Carolina, Tennessee, Virginia, West Virginia	500/100	0	0	500/100
Florida, Georgia, Illinois, Indiana, Michigan, Wisconsin	500/100	100/25	100/25	500/100
Alabama, Arkansas, Iowa, Minnesota, Mississippi, Missouri	1000/200	200/50	200/50	1000/200
The remainder of the states and territories	1000/200	1000/200	1000/200	1000/200

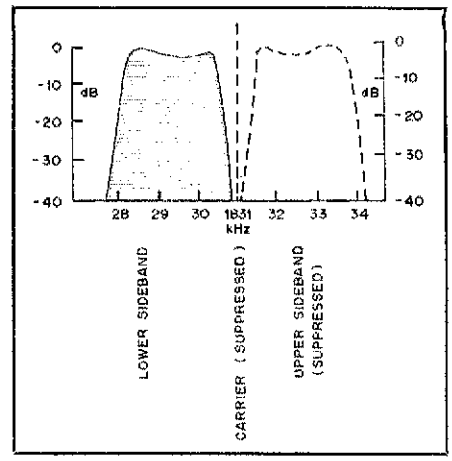


Fig. 2 — The power in a lower-sideband signal actually extends more than 3 kHz *below* the carrier frequency. In the example shown here, an ssb signal on 1831 kHz covers half the DX window.

otherwise there could be no assurance that they would not encounter interference from time to time. This approach retains the needed flexibility, but avoids confrontation. In those areas where access to 1925-1975 kHz is not available, the band above 1855 kHz presumably would fill up faster than in other areas, and phone operation would be more likely in the 1830-1850 kHz segment. In the event new restrictions are imposed in the 1900-2000 kHz segment, suitable adjustments could be made to offset any loss of privileges.

Some may regard this approach as letting prime operating frequencies lie fallow. Not so! At present the high end of the band is very much underutilized, despite the fact that there's room here for uninterrupted ragchews and interference-free nets. This is understandable; a habit of 40 years' standing, developed while there were severe restrictions on 160-meter operation, is not going to be broken overnight. A couple of years from now, however, as more and more amateurs try 160 and find they like it, we're going to need that high end — and unless it's populated *now*, the chances of its still being there will be greatly reduced. We know 1830-1850 will be there when we need it in the future; as discussed in April *QST*, the same cannot be said of the high end.

To set an example of upward migration, by the time you read this the W1AW phone bulletins will have shifted from 1835 kHz to 1890 kHz. You can hear the bulletin transmissions daily at 0230Z and 0530Z during the winter, and an hour earlier in the summer. For now the cw frequency will remain 1835 kHz, because there is no vacant frequency below 1825 kHz where we could shift.

Another bit of fine-tuning done by the Board addresses the problem of phone operation near the DX windows. Rather than make the windows wider, as suggested by some, the Board felt that the best approach was to remind phone operators of the need to observe band edges more carefully. Fig. 2 is a representation of a lower-sideband signal with a carrier frequency of 1831 kHz. As shown, the signal extends halfway into the DX window; the operator must shift at least 2 kHz higher to clear the window, and even then there may be enough energy in his signal below 1830 to cause problems in nearby receivers. (Incidentally, hf operators who crowd the low edge of a phone band on lower sideband, or the high edge on upper sideband, sometimes end up out of the band for the same reason.)

Let's See How it Works

Now that we have a plan, the next step is to see how well it works. Some of the correspondents were very skeptical; a voluntary plan will never work, they said, and ARRL should move immediately to petition FCC for a mandatory partitioning. We hope they are overly pessimistic, and that a spirit of cooperation will prevail. Only time will tell. If the plan isn't observed voluntarily, there is bound to be pressure for FCC action — action that at best will severely limit our future flexibility, and at worst will be unresponsive to the needs of the amateur community.

Voluntary band plans work well in Europe; they work well in North America at vhf. Let's hope they can be made to work in the oldest ham band of all.

Notes

[1]"Happenings," *QST*, December 1980, p. 69.
[2]D. Sumner, "160 Meters Lives Again!," *QST*, Aug. 1981, pp. 54-56.
[3]"Happenings," *QST*, April 1981, p. 66.
[4]Since the August article was prepared, Japan has announced that its amateurs eventually will be relocated from their present band of 1907.5-1912.5 kHz to a new, wider one at 1810-1825 kHz.

Strays

MOVING? UPGRADING?

☐ 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.

I would like to get in touch with . . .

☐ law enforcement officers who would be interested in exchanging patches. Sam Tomei, WA6EPG, 6291 Holt Canyon Rd., Anderson, CA 96007.

☐ amateurs who delight in growing all varieties of hot peppers. Al Trautman, K5MZG, P.O. Box 183, Lydia, LA 70569.

QST congratulates . . .

☐ Wendell Wilson, WØTQ, who was named Midwest Amateur Radio Operator of 1981 at the Midwest Division Convention held in Salina, Kansas, last fall.

An Amateur's Guide to Assisting Public Safety Agencies

If a paralyzing blizzard were to strike tomorrow, would your group know how best to coordinate with public safety officials?

By Gerald W. Boyd,* WA6CUP

My involvement in Amateur Radio began some 22 years ago at a relatively early age. In addition to ragchewing, working DX and other activities, I became attracted to the public service aspects of the hobby. Following several years of applying my Amateur Radio skills in the RACES program with the Los Angeles County Sheriff's Department, I developed a real interest in, and appreciation of, law enforcement as a profession. This interest, an outgrowth of Amateur Radio, led to what has proven to be a very satisfying career in law enforcement.

A simple jumpsuit, conservative vehicle and business-like demeanor all contribute to the positive, responsible image amateurs hope to give public service officials.

Valuable Resource

Throughout my career, I have remained convinced that Amateur Radio affords public safety agencies with an extremely valuable resource to be used in time of emergency. Over the past 14 years, I have developed some thoughts about how we as amateurs can be most effective as a public safety resource, acting in concert with local police and fire officials. These thoughts are based on a dual perspective — that of an Amateur Radio operator and a command-level police officer. It is my sincere belief that Amateur Radio is a resource sorely needed by the majority of public safety agencies.

Public service communications rendered by amateurs is based on a series of factors. Specifically, amateurs must be accepted by authorities, and once accepted, our continued ability to contribute in times of disaster is based on the efficiency and effectiveness of our performance. While acceptance, image, efficiency and effectiveness are all important to the ongoing working relationships between amateurs and police/fire officials, it is the initial acceptance that is often difficult to achieve.

Keys to Acceptance

The primary question, then, is how amateurs can be more readily accepted by local public safety personnel. A significant part of the answer is understanding something about what appeals to police officers and firefighters, and what doesn't.

Police and fire officials tend to be very cautious and skeptical concerning those who are not members of the public safety professions. This posture is based primarily on experiences in which well-intended but somewhat overzealous volunteers have complicated, and in some cases jeopardized, efforts in emergencies. The amateur operator or other volunteer who wishes to be of assistance must be aware of this perception.

The police have generally had their fill of "groupies" or "hangers on." They can ill afford to tolerate frustrated individuals who have always wanted to be police officers or firefighters, but for one reason or another have never reached that objective. There seems to be an abundance of people, especially during a crisis, who, if given any opportunity to assist in an official capacity, will quickly overstep the limits of their authority and responsibility. In their zest, such persons often inhibit the actions of trained personnel; but worse yet, they make an already dangerous situation even more so by their reckless abandon. With rare exception, Amateur Radio operators do not fall into this category. The problem is, however, that police officers in the midst of stressful operations may have extreme difficulty in distinguishing between those volunteers who are problem solvers and

*25881 Treetop Rd., Laguna Hills, CA 92653

those who are problem makers.

Those very few hams who behave emotionally, are overzealous in offering their services or in describing their abilities, or who abuse the established limits of their authority, are doing the amateur fraternity a real disservice. The typical police officer or firefighter, like the typical civilian, does not understand the vast differences among various radio services, the types of licensing involved or the high level of expertise and discipline that is characteristic of the Amateur Radio Service.

Moreover, keep in mind that state-of-the-art technology, and the capabilities that technology affords us amateurs, are foreign to most police officers or firefighters. When an amateur arrives at a scene and jumps out of a vehicle with a hand-held in each fist and two more clipped to the belt, all squawking at once, officials simply don't know how to respond. They are either overwhelmed by equipment they don't understand, or so awestruck that they try to avoid what they perceive as threatening.

Creating a Positive Image

How can amateurs create the desired positive image and professional working relationships with public safety agencies? My comments pertain primarily to major emergencies, where hams are working side by side with public safety officials.

1) As an amateur operator, do not take individual independent action, but rather work through an organized group, such as ARES, RACES or a local club. Police and fire departments are accustomed to working through a chain of command. They are far more likely to use the services of amateur operators if they have an ARRL Emergency Coordinator, for example, as direct liaison. When that occurs, a mission assignment can be given to the EC or other Amateur Radio representative, and the actual mechanics of accomplishing the mission can be carried out within the established ARES or RACES structure. Thus, police/fire officials will be left with the impression of an organized, efficient volunteer operation.

2) Local ARES, RACES or club officials should meet with public safety officials in advance of major emergencies, so each group will know the capabilities of the other, and so public safety agencies will already be confident of the amateurs' ability to perform.

3) It is extremely important, at the outset of the relationship, to be honest about what we as hams can and cannot do. If we are not certain we can handle a particular request, we need to say so, and to explain why. Nothing is worse than advising authorities that we can provide a particular service, and then fail to perform it. Safety personnel often lay their lives on the line based upon a fellow disaster worker's promise to perform. If the amateur group drops the ball, it won't be asked to assist again.

4) The Emergency Coordinator, or other representative, must present himself/herself professionally. A calm, businesslike demeanor, conservative attire and the minimum of equipment to get the job done are key points. A simple jumpsuit with an ARES patch contributes to the professional image and makes it easier for officials to identify the radio operators. A radio club jacket, with literally dozens of strange-looking, multicolored patches merely labels you as some weird conventioneer from Podunk.

5) Driving up in a vehicle with more flashing lights, signs, decals and antennas than the average police/fire vehicle won't be beneficial, either. Safety professionals are trained against overkill. They use the minimum resources necessary to get the job done. Arriving at the scene in what could pass for a mobile Voice of America transmitter is a guaranteed turn-off. You should have all needed gear and more available — just don't haul it out unnecessarily. Remember the philosophy mentioned earlier — use the minimum resources to get the job done.

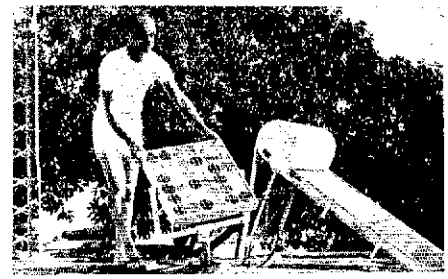
Radio Decorum

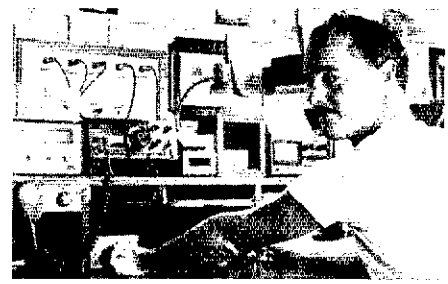
As but one representative of the public safety profession, I am very grateful, as are many police and fire commanders, for the valuable assistance that amateurs render. But the proper approach is the confident, low-key one. Don't push, don't try to take on too much and don't overwhelm officials with jargon or "bells and whistles." Above all, don't "play" with your radios in times of emergency. Maintain good radio discipline, keep chatter and ragchewing to a minimum, pass traffic accurately. Don't add to or delete from official messages. Don't assume more authority or responsibility than you've been given. Above all, if contacted by the press, restrict comments solely to the amateurs' role in the situation. Never give information to anyone on the status of the emergency. Statements of this type should come only from the press information officer of the government agency concerned.

If your group follows these suggestions, you will be asked to assist again. You will be able to develop close working relationships with municipal officials, and as the reputation of the competence and dependability of your ARES or RACES group becomes known, local officials will give you increased responsibility in future incidents.

The author is a captain in the police department of Irvine, a major population basin in Southern California. One of his collateral duties is coordinating emergency and disaster preparedness for this 45-square-mile city.

Strays





Taking full advantage of Florida's sunshine, Bob Patten, N4BP, of Miramar, adjusts (top) the Solec International 18-V, 1.2-A photovoltaic panel on his roof. (A passive, 32-gallon hot water heater sits beside the solar panel.) Power from the panel is brought into Bob's house with RG-8 coax. His station (bottom) includes a still rare sight — an interface box for the photovoltaic panel. Located on the wall above N4BP's rig, the set-up is a neat, attractive feature of his station. *(photos by K4GNP)*

I would like to get in touch with . . .

☐ USS Semmes/N1ZM shipmates for a ham reunion. Donald Miller, W2MQB, 517 Accabonac Hwy., East Hampton, NY 11937.

☐ amateurs who have an aviary for breeding bugerigars and/or finches. Bob Wilderman, K3SRO, 19 Glen Rd., Lansdale, PA 19446.

Larry Woods, ZF2CX (left), and Jim Livingston, WB7VEL, and families enjoyed two weeks together in the Cayman Islands after 2-1/2 years of getting acquainted through Amateur Radio. The two are shown operating ZF1HS, the high school club station that Larry sponsored. Now living in Wyoming, Larry and Jim continue to enjoy radio conversations — on 2 meters. *(photo courtesy WB7VEL)*

Moved and Seconded

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 391 September 12, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc. met at 8:59 A.M., EDST, Saturday, September 12, at the Headquarters offices of the League in Newington, Conn. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Directors Jesse Bieberman, W3KT, Frank M. Butler, Jr., W4RH, Lys Carey, KØPGM, Lionel A. Oubre, K5DPG, and Mary E. Lewis, W7QGP; International Affairs Vice President Noel B. Eaton, VE3CJ; Vice Directors Ross W. Forbes, WB6GFJ, Peter F. Mathews, WB6UIA, Linda S. Ferdinand, N2YL, and Hugh A. Turnbull, W3ABC; General Counsel Robert M. Booth, Jr., W3PS, and Chris Imlay, N3AKD, of his office; Canadian Associate Counsel B. Robert Benson, Q.C., VE2VW; Bruce Lutsk of Reid & Riege, P.C.; and Donna L. Frechette, Administrative Assistant to the General Manager.

The Committee proceeded at once to examine nominations in the director elections, with careful attention to the application of the eligibility rules concerning membership and conflict of interest. During the course of the above, the Committee was in recess from 9:42 A.M. until 10:02 A.M. while a telephone call was made to one candidate to clarify details of employment. The Committee made findings and ordered actions as detailed below, all by unanimous action of those present:

Atlantic Division

For Director: Jesse Bieberman, W3KT, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Atlantic Division for the 1982-1983 term without membership balloting.

For Vice Director: Alan H. Komenski, AC2K, and Hugh A. Turnbull, W3ABC, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

Canadian Division

For Director: Mitchell A. Powell, VE3OT, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Canadian Division for the 1982-1983 term without membership balloting.

For Vice Director: Thomas B.J. Atkins, VE3CDM, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Canadian Division for the 1982-1983 term without membership balloting.

Dakota Division

For Director: Garfield A. Anderson, KØGA, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Director from the Dakota Division for the 1982-1983 term without membership balloting.

For Vice Director: Theodore A. Olson, KØTO, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Dakota Division for the 1982-1983 term without membership balloting.

Delta Division

For Director: Clyde O. Hurlbert, W5CH, O. D. Keaton, WA4GLS, and Lionel A. Oubre, K5DPG, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

(A petition was received after the September 1 deadline date nominating Malcolm Keown, W5XX, a candidate for Director from the Delta Division.)

For Vice Director: Edward W. Dunn, W4NZW, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Delta Division for the 1982-1983 term without membership balloting.

Great Lakes Division

For Director: Joseph E. Miller, K4DZM, and Leonard M. Nathanson, W8RC, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Atlee S. Hart, W8VR, was found lawfully nominated. The Committee was in receipt of a mailgram from Mr. Hart withdrawing his name as a candidate. George S. Wilson, III, W4OYI, was found lawfully nominated and eligible. Being the only eligible nominee, he was thereupon declared, pursuant to the By-Laws, to be duly elected as the Vice Director from the Great Lakes Division for the 1982-1983 term without membership balloting.

Midwest Division

For Director: Paul Grauer, WØFIR, and Robert S. McCaffrey, KØCY, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Claire R. Dyas, WØJCP, was found lawfully nominated and eligible. Being the only eligible nominee he was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Midwest Division for the 1982-1983 term without membership balloting.

Pacific Division

For Director: Michael W. Delich, WA6PYN, and William J. Stevens, W6ZM, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Ross W. Forbes, WB6GFJ, and Jettie B. Hill, W6RFF, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

Southeastern Division

For Director: Frank M. Butler, Jr., W4RH, and Stewart H. Woodward, K4SMX, were found lawfully nominated and eligible, and their names ordered listed on ballots to be sent to Full Members of the Division.

For Vice Director: Evelyn D. Gauzens, W4WYR, was found lawfully nominated and eligible. Being the only eligible nominee she was thereupon declared, pursuant to the By-Laws, to be duly elected as Vice Director from the Southeastern Division for the 1982-1983 term without membership balloting.

The Committee designated Messrs. Zak (chairman), Eaton and Powell as a Committee of Tellers at the November 20th ballot counting, with Mr. Huntoon as alternate.

The date of Saturday, November 21, was designated for the next meeting of the Executive Committee.

On motion of Mr. Powell, the Committee approved the affiliation of the Stark RTTY Group Amateur Radio Club, Inc. of Massillon, Ohio.

After discussion, the Committee reaffirmed the position taken by the League in its petition of January 16, 1979 (designated by the Commission as RM-3314) requesting that the FCC authorize Novice operation on the frequencies 220-225 MHz using A1, A2, A3 and F3 privileges with a maximum input power of 50 watts, and directed the staff, with the assistance of the General Counsel, to support FCC action on this petition.

The Committee then undertook an extensive review of the conditions under which the recall balloting in the Central Division would be conducted. The General Manager was instructed to advise each of the parties which would be including a statement with the ballot (ARRL itself, the incumbent director, and the Indiana Radio Club Council) that each statement should be provided to the League Hq. in camera-ready form, on not more than four 8-1/2 × 11 sheets, that no statement should contain any derogatory statements concerning any person or entity, and that any statements meeting these qualifications would be published without editing by the Hq. staff. Furthermore, in the interests of fairness to all parties, the League statement was to be prepared forthwith, with a copy to be deposited with Price Waterhouse prior to receipt of statements by the incumbent director and the IRCC, and that no editing or rewriting of the ARRL statement would subsequently be undertaken. The General Manager was further directed to develop a production schedule which would permit mailing of the recall ballots to the members of the Central Division as close to the first of October as possible, so that members would have the same amount of time available for returning their ballots as is the case in the regular director elections, and so that the recall ballots could be counted on November 20th.

After discussion, and upon motion of Mr. Powell, the General Manager was directed to pay $1031.65 (in Canadian funds) to the attorney representing Robert Forbes, Mississauga, Ontario, as partial compensation of fees and costs for successful appeal of Mr. Forbes' conviction under the Mississauga Noise By-Law.

During the course of the meeting the Committee discussed, without formal action, the problems caused by failure of director candidates to promptly return their ballot information questionnaires, the closing date for the receipt of nominations in CRRL elections, possible locations for the March meeting of the Board, and how the General Manager would handle director election statements which exceeded the 300-word limit.

There being no further business, the meeting was adjourned at 11:40 A.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 393 October 20, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 6:28 P.M., EDST, Tuesday, October 20, 1981. Present on the line were Harry J. Dannals, W2HD, in the Chair: Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also on the line was General Counsel Robert M. Booth, Jr., W3PS. (Director William J. Stevens, W6ZM, was not on the line during the initial part of the conference call.)

The Executive Committee had before it the October 15th letter of the General Manager concerning a complaint by the San Francisco Radio Club relative to the Pacific Division election and the statement of candidacy which exceeded 300 words. After extended discussion, during which Mr. Dannals asked for the views of each participant in the telephone conference call, it was determined that the Pacific Division election matter could not be settled until there was further discussion of the problem in the Great Lakes Division election, a matter which had been the subject of the October 13th meeting of the Executive Committee.

At this point, at 6:58 P.M., the General Manager contacted Director Stevens by telephone and Mr. Stevens thereupon joined the telephone conference call.

After extended discussion, the Executive Committee voted unanimously to reconsider its October 13th decision in the Great Lakes Division election. After further discussion, the Executive Committee voted, 3 in favor to 1 opposed, to reverse its October 13th decision, to declare the current election in the Great Lakes Division null and void, and to proceed with a new election. Mr. Zak wished to be recorded as voting opposed.

The General Manager stated that it would be possible to have new candidate statements and new ballot material printed and ready for mailing by December 1, 1981, with ballot counting to be scheduled for January 20, 1982. It was unanimously agreed by the Committee that each candidate would be requested to provide a new statement of candidacy, in camera-ready form, to fit in a space 7 inches wide by 5 inches high, and that each candidate was responsible for providing his own complete statement without editorial additions or deletions by the staff except in the case of statements derogatory to persons or an organization, or in the case of statements exceeding 300 words in length.

At this point, the discussion of the election problem in the Great Lakes Division having been completed, Mr. Stevens terminated his part in the telephone conference call and left the line, at 7:53 P.M.

The Executive Committee then proceeded to discuss the election problem in the Pacific Division. The Committee voted, 2 votes in favor to 1 opposed, to declare the present election in the Pacific Division null and void and to proceed with a new election. Mr. Zak requested to be recorded as voting opposed.

The Committee established the same deadlines as already specified for the new election in the Great Lakes Division, as well as confirming the same requirement for each candidate to provide camera-ready copy in a space 7 inches wide by 5 inches high, with each candidate to be responsible for providing his own complete statement without editorial additions or deletions by the staff except in the case of statements derogatory to persons or an organization, or in the case of statements exceeding 300 words in length. The Committee further instructed the General Manager, by a vote of 2 in favor to 1 opposed (Mr. Zak requested to be recorded as voting opposed) to reject any candidate statement which contained remarks that could be considered to be in poor taste.

The General Manager informed the Committee that current [director] ballots in the Great Lakes and Pacific Divisions would not be counted, but that the ballots would have to be opened on November 20 in order to remove the inevitable membership renewals and other correspondence which, despite instructions to the contrary, always accompanies ballots.

There being no further business, the telephone conference call was adjourned at 8:06 P.M., EDST.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 394 November 11, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 4:01 P.M. EST, on Wednesday, November 11, 1981. Present on the line were President Harry J. Dannals, W2HD, in the Chair; Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. (Director William J. Stevens, W6ZM, was not able to be present at that hour.)

The General Manager read to the Committee an exchange of correspondence with Clyde Hurlbert, W5CH, a candidate for director in the Delta Division, who wished to attend the ballot-counting in Newington on November 20, although he had not filed the petition required by By-Law 16. The Committee noted that the existence of By-Law 16 was known by Mr. Hurlbert. More importantly, the Committee noted that in all cases where an incumbent director standing for re-election happened to be present in Newington at the time of ballot-counting, he absented himself from the room while ballots for *his* division were being counted. For those reasons, the Executive Committee declined unanimously to extend to Mr. Hurlbert an invitation to attend the November 20th ballot counting.

The General Manager reviewed with the Committee the language of the statement by Mr. Delich, a candidate for director in the Pacific Division, and was authorized to include it with the ballots which are to be mailed to the members of that division on or about the first of December.

There being no further business, the telephone conference call was adjourned at 4:28 P.M., EST.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

(Note: Director Stevens was contacted at a later hour by the General Manager, who reviewed with Mr. Stevens the matter of attendance at the ballot counting. Mr. Stevens stated that he agreed entirely with the decision taken by the Executive Committee.)

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 395, November 21, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 10:45 A.M., EST, Saturday, November 21, 1981, at the Headquarters offices of the League in Newington, Connecticut. Present were President Harry J. Dannals, W2HD, in the Chair; Directors Gar Anderson, KØGA, Mitch Powell, VE3OT, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and First Vice President Carl L. Smith, WØBWJ. Because the presence of General Manager Richard L. Baldwin, W1RU, was required at a meeting of the Management and Finance Committee being held simultaneously elsewhere in the building, with the consent of the group Assistant General Manager David Sumner, K1ZZ, was present to serve as Secretary. Also present as observers were Directors Jesse Bieberman, W3KT, Jay Holladay, W6EJJ, and John Sullivan, W1HHR; Vice President Larry E. Price, W4RA; International Affairs Vice President Noel B. Eaton, VE3CJ; Membership Services Manager Harold Steinman, K1FHN, Deputy Membership Services Manager W. Dale Clift, WA3NLO; and Christopher D. Imlay, N3AKD, of the General Counsel's office.

On motion of Mr. Anderson, the Committee recognized the names of 92 members recently elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Powell, the affiliation of the following clubs was approved: Bastrop Amateur Radio Club, Bastrop, LA; Bureau Radio Amateur Signal Society, Washington, DC; Hancock Amateur Radio Club, Greenfield, IN; Katy Amateur Radio Society, Inc., Katy, TX; Libby Amateur Radio Club, Libby, MT; Louisiana Tech ARC, Ruston, LA; Macon Amateur Radio Club, Macon, GA; Mid Ohio Valley ARC, Gallipolis, OH; North Franklin Amateur Radio Society, Malone, NY; South Texas ARS (STARS), San Antonio, TX; Sugar Creek Repeater Assn., Inc., Crawfordsville, IN.

(With this action, the League now has 1993 Category I affiliated clubs, 9 Category II clubs and 369 Category III clubs.)

On motion of Mr. Zak, approval was granted for the holding of the following ARRL conventions: Roanoke Division, March 20-21, 1982, Charlotte, NC; Mississippi State, April 17-18, 1982, Jackson, MS; Alabama State, May 15-16, 1982, Birmingham, AL; Oregon State, June 5-6, 1982, Seaside, OR; West Virginia State, July 3-4, 1982, Weston, WV (Jackson's Mill); Illinois State, August 22, 1982, St. Charles, IL; Virginia State, October 9-10, 1982, Virginia Beach, VA; Tennessee State, October 23-24, 1982, Chattanooga, TN; Pacific Division, August 19-21, 1983, Reno, NV.

On motion of Mr. Stevens, after discussion, it was unanimously VOTED that the staff is directed to prepare, and the General Counsel is directed to file, a petition to FCC requesting reconsideration and stay of the effective date of certain Commission actions in Docket 20990. In this proceeding, initiated in 1976 but only recently concluded, the Commission has adopted new rules for devices such as burglar alarms, garage door openers, etc., which would permit their operation on most frequencies above 70 MHz. While this operation would be with low power and on a non-interference basis to allocated services, and while users would be warned that they would have to accept interference from licensed services, there is a high probability that these devices will cause difficulties for amateurs if operated in the amateur bands in residential areas. Thus, ARRL will request that the devices be prohibited in the bands 144-148, 220-225, and 420-450 MHz.

On motion of Mr. Anderson, after discussion, it was unanimously VOTED that, in light of the increasing number of complaints of cable TV interference to amateur radio, and of the susceptibility of cable TV systems to amateur radio transmissions through no fault of the amateur, the staff is directed to prepare, and the General Counsel is directed to file, a rule-making petition with FCC requesting that the Commission prohibit the use of frequencies allocated to the amateur service for cable television distribution; and further, that the cooperation of the FCC and representatives of the cable television industry be sought in finding a solution to this growing problem.

The Committee was in recess from 11:45 A.M. to 1:00 P.M.

The Committee then moved to a review of legal cases involving amateurs. In the Bynum (WB2SZK) case, an amateur in Winslow Township, New Jersey, was found guilty of violating a local ordinance prohibiting rf interference despite federal pre-emption of the regulation of radio transmissions, and despite a finding by FCC that his equipment and operation were not at fault. The conviction has been upheld by the Appellate Division in New Jersey, a finding which directly challenges the doctrine of federal pre-emption which is of great importance to amateur radio. The case has attracted considerable financial support from the amateur radio community. On motion of Mr. Stevens, it was unanimously VOTED that, provided the pending certification application to the New Jersey Supreme Court is successful, if required, ARRL financial support of up to $1250 shall be provided to further the appeal effort.

The Committee reviewed the Cron (WD5KHR) case, involving conditions, covenants, and restrictions on property in Lewisville, Texas, and the Ellis (WD8BCM) case, involving a zoning variance sought in Farmington Hills, Michigan, but took no action pending receipt of further information.

In the Guschke (N5SW) case, concerning a 35-foot height limitation on antennas in Oklahoma City, Oklahoma, on motion of Mr. Powell, it was unanimously VOTED that the General Counsel is authorized to file an *amicus curiae* brief dealing with the issue of federal pre-emption to support Mr. Guschke's position.

On motion of Mr. Stevens, it was unanimously VOTED to transfer $2000 of funds previously authorized by the Board for the year 1981 for travel by Section Traffic Managers to the account for travel by Section Emergency Coordinators.

On motion of Mr. Anderson, it was unanimously VOTED to authorize an additional $3000 for the year 1981 for travel by Section Communications Managers in furtherance of ARRL organizational activities.

On motion of Mr. Powell, it was unanimously VOTED to authorize an additional $4000 for the year 1981 for travel by National Traffic System officials above the section level in furtherance of ARRL organizational activities.

The Committee then moved to a discussion of actions taken by the ARRL Awards Committee in response to Minute 41 of the September Meeting of the Board, concerning single-mode DXCC awards. During the course of discussion, Messrs. Smith and Anderson left the meeting, at 2:50 P.M. It was noted that the Awards Committee had established two cutoff dates: October 1, 1981, after which crossmode contacts would not count for single-mode DXCC credit, and January 1, 1982, after which cards indicating crossmode contacts would not be accepted for credit regardless of the date of contact. On motion of Mr. Stevens, it was unanimously VOTED to suspend the January 1 cutoff date for submission of crossmode QSL cards pending affirmation of the Board's intent at its Annual Meeting in March 1982.

The Committee was in recess from 3:02 to 3:10 P.M., at which point Mr. Baldwin joined the meeting. Also joining, as observers, were Directors Frank M. Butler, Jr., W4RH, Paul Grauer, WØFIR, Edmond A. Metzger, W9PRN, and Raymond B. Wangler, W5EDZ; and Vice President Max Arnold, W4WHN.

The Committee designated Messrs. Sullivan (chairman), Huntoon (W1RW), and Goodman (W1DX) as a Committee of Tellers for the counting of ballots for Director of the Great Lakes and Pacific Divisions on January 20, with Mr. Tilton (W1HDQ) as alternate.

During the course of the meeting the Committee discussed, without formal action, possible sites for a 1984 ARRL National Convention; the implications for the amateur licensing and examination programs of the FCC's budgetary difficulties; a report prepared by the General Manager detailing progress on actions directed by the September Meeting of the Board; efforts by REACT to oppose the elimination of CB licensing; the death, on November 11, of retired ARRL Communications Manager and Honorary Vice President F. E. Handy, W1BDI, known to many as "Mr. Amateur Radio"; the ARRL presentation on H.R. 5008 to the House Telecommunications Subcommittee on November 19; the invaluable assistance provided by Assistant Director Stuart D. Cowan, W2LX, in designing a direct-mail campaign to promote League membership; a progress report from the convention committee for the 1982 ARRL National Convention in Cedar Rapids, Iowa; and the need for prompt reconciliation of travel expenses charged to ARRL.

There being no further business, the meeting was adjourned at 3:47 P.M.

Respectfully submitted,
David Sumner, K1ZZ
Assistant Secretary

LIFE MEMBER APPLICANTS
November 21, 1981

Phyllis Adams, W6STZ; Ronald A. Albrecht, KA4EPP; Marc L. Ames, K2RPU; Richard J. Assarabowski, K1CC; Robert G. Babcock, WA2YDG; Sid Balkman, K16L; Michael E. Beck, W7EDO; John R. Beidl, WA2RUX; Jeffrey S. Ben-Zvi, WA2GDW; Robert Boswell, W7LOU; Paul L. Bovaconti, WD9DJD; Ira S. Clarkson, III, WD5BVJ; Carol M. Collins, KA1DHO; William F. Comly, Jr., WB2OOA; Daniel T. Cooper, WA2HRY; Harry T. Cornwall, KA4VQR; Peter DeLair, WD9IBH; Robert S. Delinsky, AF8O; Joseph Dichard, KA2GTU; R. Gary Dixon, K4MQG; John V. Duncan, WB4HSC; Charles J. Ellis, WØYBV; Robert E. Farr, WA4FNP; David L. Filmer, WB9QPG; James A. Finley, Jr., KA5ADJ; Jim Fisher; Charles S. Fitch, W2IPI; Edward N. Flood, N2BLC; Robert Fox, K2MDM; Donald P. Hamilton, VE7BNQ; Norman Hanschu, WD8RJI; James D. Hawkins, K4JDM; Albert D. Helfrick, K2BLA; Hubert Henau, ON7HH; William L. Hilyerd, K4LRX; Robert Holcombe, WD5BWV; Gregory P. Holicky, WD9HFC; Richard E. Jackson, KB2N; David J. Johnstone, WB1COB; Diane M. Johnstone, KA1FVP; Bruce R. Jones, WA8HGX; Saburo Katoh, JA4AYU; Art Kellond, KD6KB; Wendell J. Kent, N6DIU; Robert Kinsella, WB2TTS; Mike Kirchmann, WA6BZA; James E. Kirkreit, K7YLM; Arnold L. Knick, KA7ISI; Steven D. Kostrub, WA2OFV; Geoffrey B. Lloyd; Andrew M. Lord, Jr., W5MHS; David Marshall, WB5MLA; K. W. McCullough, WD4ETU; Lee W. McCutchen, KB7ID; J. Philip Miller, N7DEV; Robert Morrison, VE1BPY; Jay R. Ollerenshaw, WB7SRU; Cheryl Ollerenshaw, KA7HIO; Steven Orland, AA6AA; George Palmer, KA1GHW; Brent A. Parker, WB4IBJ; Clifford A. Parker, KA2DBD; Howard S. Passel, KB4UY; Glenn E. Pederson, WB9QIQ; C. Robert Perschon, N7ATZ; Jolly A. Peterson, KH6INK; Lavern Peterson, KH6HQ; Richard K. Philstrom, KBØNR; Peter Putra, Jr., N9APB; Robert P. Putthach, WA4QZX; Cassandra Paula Randall, N2AGX; Damon S. Raphael, WA7IVZ; Steven Rapp, WBØQGI; Bob Ritter, Jr., WD9CTG; Dana F. Roode, WA6NGO; Joseph W. Sands, W7UV; James O. Sevast, AF3R; Frank W. Skutsch, WA2JCX; Robert L. Smith, KDØF; Clare R. Snelgrove, C6ADY; Tom Stelmak; Robert W. Thario, WB7UAI; Gary F. Thomas, WA1FJW; E. Muriel Turner, WB5YZH; E. Lee Ulrey, K5HZR; John R. Vick, WØMZC; Lear R. Warner, VE3CDA; Paul V. Watson, Jr., WB5FTR; Marc S. Webb, KB1D; Donald R. Welling, VE1WF; Robert A. Witt, K4ESI; Lawrence Yelinek, WB8WOD.

Happenings

Conducted By W. Dale Clift,* WA3NLO

ARRL Election Results: Five Winners in Director-Vice Director Contests; Pacific and Great Lakes Reballoting for Directors; Central Division Recall Fails

Ballot counters of the Committee of Tellers at ARRL Headquarters were kept busy November 20 tallying the more than 25,000 votes cast in the latest round of ARRL elections. They were not as busy as they could have been, however, because in two divisions the ballots for Director were not counted. Owing to problems with the candidate statements accompanying the Director ballots mailed to members in the Pacific and Great Lakes divisions, ballots for Director cast in those elections were not recorded. In one of the divisions, part of a candidate's statement was left out because of a misunderstanding between Hq. staff and the candidate. In the other division one of the candidate's statements exceeded the 300-word limitation established by the rules. To be fair to the candidates involved and to the members, the ARRL Executive Committee ordered that new elections be run in those divisions.

Reballoting

Prior to December 1, new ballots and candidate statements were mailed from ARRL Hq. to ARRL Full Members of record as of November 2 in the Pacific and Great Lakes Divisions. These elections are for the office of Director only. Ballots will be tallied on January 20. Full members in those divisions who do not receive a ballot by January 1 should immediately contact Donna Frechette at Hq. Your ballot must be received by Hq. no later than noon on January 20 to be counted.

Central Division Recall

Present Central Division Director Edmond Metzger, W9PRN, will continue in office after successfully facing down a recall challenge brought about by the efforts of the Indiana Radio Club Council (IRCC). The members of the Central Division cast 2931 votes in favor of retaining Director Metzger, while 2094 were cast in favor of recalling him. The IRCC sought the recall to protest the manner in which the resignation of the previous Director, Dr. Don C. Miller, W9NTP, was handled last year. Dr. Miller's letter of resignation had cited factors that also made him ineligible as a candiate for reelection, whereupon his only opponent, Mr. Metzger, had been declared elected by the Executive Committee.

Atlantic Division

Jesse Bieberman, W3KT,† begins his second term as Director from the Atlantic Division. Jesse is from Malvern, Pennsylvania, and was first licensed in 1920. He holds an Amateur Extra Class license and presently operates an outgoing QSL service. A retired high school mathematics teacher, Jesse also managed the ARRL Third Area QSL Bureau as a volunteer from 1947-1979.

Hugh A. Turnbull, W3ABC, received 4156 votes to return him as Vice Director for another term. Hugh's opponent, Alan H. Komenski, AC2K, received 1609 votes. First licensed in 1932, Hugh holds an Amateur Extra Class license. He resides in College Park, Maryland, and is a retired engineer. His former employers include the Federal Communications Commission, the Voice of America, and the National Aeronautics and Space Administration.

Canadian Division

Mitchell A. Powell, VE3OT,† will return to the ARRL Board as Director from the Canadian Division. For the past 15 years Mitch has been teaching master at Fanshawe College of Applied Arts and Technology. First licensed in 1949, he holds an Advanced Amateur Certificate and has been ARRL Canadian Division Director since 1980. He lives in London, Ontario.

Thomas B. J. Atkins, VE3CDM,† is the new Vice Director from the Canadian Division. Tom lives in Willowdale, a suburb of Toronto, and is employed by Standard Broadcast Sales Co., Ltd.-Television, as vice president and sales manager. Licensed in 1968 under his present call, VE3CDM, Tom first became licensed as G4ABN in 1950. He holds the Advanced Amateur Certificate.

Dakota Division

Garfield A. Anderson, KØGA,† continues as Director from the Dakota Division for another two-year term starting in 1982. He holds an Amateur Extra Class license. First licensed in 1926, Gar spent 40 years with North West Bell Telephone Company before retiring in 1977. He had attained the post of Assistant Secretary-Treasurer for the company. Gar lives in Minneapolis.

Tod Olson, KØTO,† will also serve another term as Vice Director from the Dakota Division. Tod holds an Amateur Extra Class license and lives in Long Lake, Minnesota. An executive with Control Data Corporation, he was first elected as Vice Director in 1976.

Delta Division

Clyde Hurlbert, W5CH, becomes the new Director for the Delta Division by winning 1031 votes. O. D. Keaton, WA4GLS, came in second with 894 votes, and Lionel A. Oubre, K5DPG, came in third with 788 votes. Clyde is an attorney with law offices in Biloxi, Mississippi. First licensed in 1946, Clyde holds the Amateur Extra Class license.

Edward W. Dunn, W4NZW,† is the new Vice Director for the division. Employed as a professor at the University of Tennessee (Knoxville), Ed is also a freelance radio/TV announcer and producer. He holds an Advanced class license and resides in Knoxville.

Great Lakes Division

The contest for Director between Joseph E. Miller, K4DZM, and Leonard M. Nathanson, W8RC, is being reballoted. However, the office of Vice Director from the Great Lakes Division has been filled. *George S. Wilson, III, W4OYI,*† is the new Vice Director. George, an Advanced class licensee, is from Owensboro, Kentucky, where he is an attorney engaged in general civil practice. He has been active in ham radio continuously since he was 16 years of age.

Midwest Division

Paul Grauer, WØFIR, received 1785 votes to win another term of office as Director from the Midwest Division. Paul's challenger, Robert S. McCaffrey, KØCY, received 1251 votes. Paul will be serving his fifth term as Director. First licensed in 1928, Paul presently holds an Amateur Extra Class license. A longtime resident of Wilson, Kansas, Paul is the owner and president of the Wilson Telephone Company.

Claire Richard Dyas, WØJCP,† returns as Vice Director of the division after having been nominated to serve another term. A retired Lieutenent Colonel in the U.S. Army, he has served as Vice Director of the Midwest Division continuously since 1976. First licensed in 1957, Dick presently holds an Advanced class license and resides in Lincoln, Nebraska.

Pacific Division

The contest for director between Michael W. Delich, WA6PYN, and William J. Stevens, W6ZM, is being reballoted. However, the election for Vice Director has gone forward, and *Jettie B. Hill, W6RFF,* has defeated Ross W. Forbes, WB6GFJ, by a vote of 1754 to 1501. Jettie has been licensed since 1939 and holds an Amateur Extra Class ticket. She is a senior quality engineer for RACAL-VADIC and lives in Cupertino, California.

Southeastern Division

Frank M. Butler, Jr., W4RH, defeated challenger Stewart H. Woodward, K4SMX, by a vote of 3508 to 2169. Frank is the incumbent Director and lives in Fort Walton Beach, Florida. Licensed in 1950 as W4RKH, he received his Amateur Extra Class license in 1952. Frank is an electronics engineer for the Department of the Air Force at Eglin Air Force Base.

Evelyn D. Gauzens, W4WYR,† begins serving another two-year term in 1982 as Vice Director of the division. Evelyn received her first license in 1952 and holds an Advanced

†Elected without membership balloting. Those eligible candidates without opposition are declared elected automatically by the ARRL Executive Committee.

*Deputy Manager, Membership Services, ARRL

class license. She is employed full time at home.

The ARRL Board of Directors

Every two years League members have the opportunity to determine who will represent them on the ARRL Board of Directors. Members also choose Vice Directors. In the event that a Director is incapacitated or is in some other way prevented to continue in office, the Vice Director succeeds to the office. A list of all Directors and Vice Directors appears on page 8 of every issue of *QST*.

Later this year, nominations for Director and Vice Director will be open in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions. The American Radio Relay League is a nonprofit membership organization incorporated under the laws of the State of Connecticut. ARRL members wanting more details about the organization are invited to request a copy of the ARRL Articles of Association and Bylaws. Please send a business-size, self-addressed, stamped envelope to AA&BL, ARRL Special Requests, 225 Main St., Newington, CT 06111.

PLAIN LANGUAGE REWRITE DROPPED

The proposal to rewrite the Amateur Rules into "plain language" is dead. The Federal Communications Commission has agreed that the wholesale rewrite project should be dropped. The proposal, PR Docket 80-729, was introduced late in 1980 and followed a trend that started with the rewrite of the Citizens' Band Rules into a simple question-and-answer format. (See January 1981 *QST*, page 64.)

One reason the Commission cited in originally proposing a "plain language" revision of the Amateur Rules was that many applicants and licensees are young persons. "Unlike many of our other radio services, there is no minimum age to qualify for the Amateur Radio license. The existing rules are not written to take into account this wide range of applicants and licensees." However, most radio amateurs filing comments did not agree that a rewrite was needed. ARRL members also made their League directors aware of their opposition by pointing out the many shortcomings of the proposed rules. (See July 1981 *QST*, page 9.) The League's comments filed with the FCC owed much to the input received from its members. ARRL found that the proposed question-and-answer format could lead to inaccurate conclusions about the rules. Furthermore, the League disagreed with the Commission's choice of priorities in using its limited resources to rewrite the rules when other FCC programs, such as enforcement and examination administration, were being cut back.

The Commission now agrees with the League and the majority of the hams who filed comments. It has dropped the entire project because of the "overwhelming opposition" of the Amateur Radio community. The Commission has said, however, that if the amateur community wants to pursue its own general rewrite of the Amateur Rules at some later date, the comments already filed in the docket would be helpful.

WARC IMPLEMENTATION: FOURTH NOTICE DEALS WITH EMISSIONS SYMBOLS AND FREQUENCIES ABOVE 40.5 GHz; ARRL FILES COMMENTS

The Federal Communications Commission has taken another step toward preparing for the ratification of the Final Acts of the World Administrative Radio Conference (WARC) by the U.S. Senate. The Commission has issued a Fourth Notice of Inquiry (NOI) in General Docket 80-739 to deal with the frequency allocations above 40.5 GHz. The Fourth NOI also proposes for domestic use the new system of emission designations adopted by the 1979 Conference. Three other NOIs in this docket have dealt with frequency allocations below 40.5 GHz and with the definitions to be included in Part 2 of the Commission's Rules. (See, for example, October 1981 *QST*, page 58.)

The Fourth NOI seeks comments on the discontinuation of such emissions designations as A3 and F3 (amplitude-modulated telephony and frequency-modulated telephony) in favor of the new designations such as J3E and F3E. The new system has three mandatory symbols as follows: (1) first symbol — the type of modulation of the main carrier; (2) second symbol — nature of signal(s) modulating the main carrier; and (3) third symbol — type of information to be transmitted. The Fourth NOI also seeks comments on whether there

Table 1

Proposed New Method of Designation of Emissions

First symbol — type of modulation of the main carrier	
Emission of an unmodulated carrier	N
Emission in which the main carrier is amplitude modulated (including cases where subcarriers are angle modulated	
• Double sideband	A
• Single sideband, full carrier	H
• Single sideband, reduced or variable level carrier	R
• Single sideband, suppressed carrier	J
• Independent sidebands	B
• Vestigial sidebands	C
Emission in which the main carrier is angle modulated	
• Frequency modulation	F
• Phase modulation	G
Emission in which the main carrier is amplitude modulated and angle modulated either simultaneously or in a preestablished sequence.	D
Emission of pulses[1]	
• Sequence of unmodulated pulses	P
Sequence of pulses	
• modulated in amplitude	K
• modulated in width/duration	L
• modulated in position/phase	M
• in which the carrier is angle modulated during the period of the pulse	Q
• which is a combination of the foregoing or is produced by other means	V
• Cases not covered above, in which an emission consists of the main carrier modulated, either simultaneously or in a preestablished sequence, in a combination of two or more of the following modes: amplitude, angle, pulse	W
• Cases not otherwise covered	X
Second symbol — nature of signal(s) modulating the main carrier	
• No modulating signal	0
• A single channel containing quantized or digital information without the use of a modulating subcarrier[2]	1
• A single channel containing quantized or digital information with the use of a modulating subcarrier[2]	2
• A single channel containing analog information	3
• Two or more channels containing quantized or digital information	7
• Two or more channels containing analog information	8
• Composite system with one or more channels containing quantized or digital information, together with one or more channels containing analog information	9
• Cases not otherwise covered	X
Third symbol — type of information to be transmitted[3]	
• No information transmitted	N
• Telegraphy — for aural reception	A
• Telegraphy — for automatic reception	B
• Facsimile	C
• Data transmission, telemetry, telecommand	D
• Telephony (including sound broadcasting)	E
• Television (video)	F
• Combination of the above	W
• Cases not covered otherwise	X

[1]Emissions where the main carrier is directly modulated by a signal that has been coded into quantized form (e.g., pulse code modulation) should be designated under "Emission in which the main carrier is amplitude modulated . . . " or "Emission in which the main carrier is angle modulated."
[2]This excludes time-division multiplex.
[3]In this context the word "information" does not include information of a constant, unvarying nature such as provided by standard frequency emissions, continuous wave and pulse radars, etc.

is a desire to have the optional fourth and fifth symbols included in the FCC Rules. (See Table 1.)

The Fourth NOI also lists the following frequency allocations for the Amateur and Amateur Satellite Services:
47-47.2 GHz (primary)
75.5-76 GHz (primary)
76-81 GHz (secondary)
119.98-120.02 GHz (secondary)
142-144 GHz (primary)
144-149 GHz (secondary)
241-248 GHz (secondary)
248-250 GHz (primary)
300-400 GHz (not allocated)

ARRL Comments

The American Radio Relay League has submitted comments in response to the Fourth NOI, addressing those matters affecting the Amateur and Amateur Satellite Services. The League finds satisfactory the frequency allocations proposed for the U.S. because this would implement the precise allocations that were agreed upon at the 1979 Conference. However, the League noticed that the proposed Table of Frequency Allocations does not list the frequencies above 300 GHz as being authorized to the Amateur Service, even though it maintains a reference to Part 97 of the FCC's Rules for these frequencies. The League asks that the rules continue to list the spectrum above 300 GHz specifically as being allocated to the Amateur Service. While it is arguable that an Amateur Radio license is not required to conduct laser communications experiments, amateurs have been engaged in such experiments. In order to gain access to certain hilltop sites for experimentation, amateurs have used the allocation listing to show that they are accountable to the FCC for their operations. This helps in gaining permission to use such sites.

The League agrees with the Commission that the required use of the new system for designating emissions should be limited to the three mandatory classification symbols. It should not be extended to either the optional symbols or to the bandwidth designations at this time. The League also anticipates some problems in modifying Section 97.61 of the Amateur Rules to reflect the new emission designators. For example, two methods of modulation are common in amateur high-frequency radioteleprinter operation: direct frequency-shift keying of the transmitted carrier, and modulation of a single-sideband, suppressed carrier transmitter with a frequency-shifted audio tone. If the transmitters are adjusted properly, the two methods result in signals that are spectrally identical, and the FCC has treated both as type F1 emission. (See May 1980 *QST*, page 55.) However, under the new system the former will be designated F1B emission, and the latter will be designated type J2B. ARRL assumes that these difficulties will be resolved later; however, it wants to call attention to the fact that implementing the new system in Part 97 will not be a trivial matter.

The Final Acts of the 1979 WARC become effective January 1, 1982, for those countries ratifying them; however, the United States has not yet taken up the question of ratification. As with the other WARC-related NOIs, the comment period for the Fourth NOI was very short. The League's comments, filed November 13, 1981, were made on behalf of its over 150,000 members nationwide.

FRANCIS EDWARD HANDY, W1BDI

All hamdom was saddened at the recent passing of former ARRL Communications Manager and Vice President F. E. Handy, W1BDI, on Nov. 10, 1981. Ed had been in poor health for a year or more prior to his passing.

The customary obituary rehashing the past accomplishments of this remarkable man does not seem appropriate, since his achievements over 42-plus years service to ARRL and the amateur fraternity are well known to most and legend to thousands of others. Ed was an early pioneer of the League and the founder of a number of ARRL activities on the air and traditions, such as the field organization now consisting of 73 SCMs and thousands of appointees, sole author of the first two editions of the *Radio Amateur's Handbook* (then affectionately known as "Handy's Handy Handbook"), originator of ARRL Field Day and the Sweepstakes contest, father of what is now the Amateur Radio Emergency Service, author of countless *QST* articles and bulletins to the field (not to mention correspondence that would fill volumes if printed, for no member's problems or criticisms were too minor or trivial to merit Ed's serious and conscientious personal consideration). All these things have been recorded elsewhere in *QST* at the time of the various milestones in his career — his graduation from the University of Maine with a B.S. in electrical engineering, a brief work stint at Westinghouse, his introduction to the staff in 1925, his hiatus in the armed forces during World War II, his election, in 1951, as a vice president (a post he held until 1966), his membership in a local radio club (the Connecticut Wireless Association), his able work as trustee of W1AW, his retirement in 1967. (See, for example, February 1967 *QST*, page 75.)

Perhaps the most remarkable and noteworthy things about Ed Handy's career at ARRL were his complete and utter dedication to his job, his full and eager acceptance of responsibility, his innovative ingenuity and his deep perception of the motivation and problems of the typical Amateur Radio operator. With all that, he was easy to know, interesting to talk with, fun to be with, a good friend to thousands of amateurs, League members or not.

Ed was no nine-to-five worker. He worked long and hard every day, usually coming in hours before anyone else and staying long after all others had left. Amateur Radio wasn't just his job, it was his life, a kind of obsession. In the evening at about 6 o'clock he hurried home from the office with a satchel full of club bulletins, letters he hadn't yet read and responded to, or other bits and pieces of work he had not finished during the long working day he had set up for himself. These he mused over during the evening while at the same time tending to his family's needs and other commitments. When not thus engaged, his clean signal and better-than-average fist was to be heard on the ham bands — handling traffic, making a token appearance in an ARRL-sponsored contest, or just chewing the rag. His daily occupation with Amateur Radio did not keep him from enjoying its hobby aspect. How he also found time to do construction and exprimental work is a mystery, but he did that, too.

Ed Handy leaves his wife, Winifred, two sons and three grandsons. He was "Mr. Handy" to very few, "Mr. ARRL" to many, and "Mr. Amateur Radio" to practically all hams during his lifetime. What a loss to Amateur Radio when it is deprived of the likes of Ed Handy, W1BDI. — *George Hart, W1NJM*

WELLS, KØMGQ, REVOCATION PROCEEDING UPDATE

Last November (page 70), we reported the license revocation proceeding against Jerry J. Wells, KØMGQ. Both Wells and the Federal Communications Commission have filed applications for review of the FCC Review Board decision to revoke KØMGQ; thus the decision has not yet been rendered final. The matter will be brought before the FCC at a hearing and will ultimately be decided by the full Commission. "Happenings" will carry news of developments.

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

The ARRL Foundation continues to receive fine support from the amateur community for its Twentieth-Anniversary Amateur Satellite Fund Drive. Why not become a part of tomorrow's telecommunications world today by sending your tax-deductible contribution to the ARRL Foundation, 225 Main St., Newington, CT 06111. Contributors of $100 or more include: UBA section Golden Spur, Kortrijk, Belgium; Claude Pressler, W5VVR; Amateur Radio Transmitting Society, Inc.; E. Allen Brown, WA3FYZ; Georgia Brown, WA3TBZ; Dr. Ronald H. G. Butcher, KB4MQ; Harold Nash, KA1EG; and Gerald A. Squires, K6LN.

With a Phase III-B launch scheduled for later this year, now is the time to make your contribution — get a piece of the action! — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

ROBERT M. BOOTH, JR., W3PS

Robert M. Booth, Jr., W3PS, General Counsel of the American Radio Relay League for some 20 years, died on Thursday, December 3, 1981, following surgery. A later issue of *QST* will provide more details on his long association with the League.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

A Break For Station Identification

Score another victory in the win column for unregulation. Recently, the FCC relaxed station identification requirements so that amateurs are no longer required to identify the station with which they were in contact. The sole exception applies to *international* third-party traffic: e.g., when amateurs are engaged in phone patching, or any other third-party-traffic activity involving foreign stations, *both* call signs must still be given. This provision also applies to RTTY stations. (Prior to the FCC action, RTTY operators were not required to i-d the other station at any time.)

Response to the commission's action has been generally favorable, and perhaps may be typified by the following excerpt from the *Murphy Message,* newsletter of the Murphy's Marauders Contest Club: "The former requirement of signing both calls was an unnecessary burden to contesters and DXers for a long time . . . The previous rule was totally impractical for high-volume QSO situations, and even though it took FCC four years to act, let's be glad that it finally happened, especially in time for this year's contest season."

Let us now turn to a subject close to home of the active amateur — station i-d.

Q. What is the language of the new i-d rule?

A. Part 97 of the Commission's rules was amended as follows.
In section 97.84, paragraph (a) is amended and paragraph (h) is added to read:
§97.84 *Station identification*
(a) Each amateur radio station shall give its call sign at the end of each communication, and every ten minutes or less during a communication.
(h) At the end of an exchange of third party communications with a station located in a foreign country, each amateur radio station shall also give the call sign of the station with which third party communications were exchanged.

Q. Does this new rule mean that amateurs don't have to give their call sign at the beginning of the contact?

A. Affirmative. Legally, amateurs may give their calls only at the end of the contact, and at least once every 10 minutes during the course of the QSO. As a practical matter, however, most amateurs will continue the tradition of i-ding often to promote efficient, effective communications. The new rules carry the most impact for contesters and DXers where brevity is their bread, and swiftness their butter. Also, the Commission felt that the simpler i-d requirement would mean smoother-flowing communications in emergencies and in emergency-preparedness exercises such as nets and roundtables. To a large extent, this should be true. Amateurs will no longer have to give lengthy i-ds when engaged in high-speed emergency traffic handling.

Q. Are there any other changes to the station i-d requirements?

A. No. The Commission's action does not affect other paragraphs of Section 97.84.

Q. What are the requirements for identification of a station in repeater or auxiliary operation?

A. A repeater, or an auxiliary station used to automatically relay signals of stations in a system, may be identified by voice or cw, but it must be made at a level that is intelligible through the repeated transmissions; the 10-minute limit also applies.

When a repeater is identified by phone, the station must sign its call followed by the word "repeater" — "W1AW repeater," for example. On cw, the slant bar $\overline{DN}$ and RPT or R must follow the station call sign — W1AW/RPT. This requirement does not apply to repeater station licenses with WR calls. (Incidentally, FCC no longer issues repeater station licenses, nor will they renew existing ones — WR calls will vanish from the face of the earth in a short time.) (§97.84[d][1]). Similarly, an auxiliary station must add "auxiliary" on phone, /AUX or /A on cw, to its i-d (§97.84[d][2]). The station in auxiliary operation may also be identified by the call sign of an associated station. For example, an auxiliary station relaying signals in a system of stations that includes W1AW/RPT, may identify itself with W1AW/RPT. (§97.84[e]).

Whenever an amateur installs and operates his station as a repeater, he uses his station's call sign with the additional identifier described above. If the repeater is operated by a club, the club station license call sign may be used, again with the repeater or auxiliary identifier.

Q. What is this "interim NY" I keep hearing in the bands?

A. A few years ago, the FCC eliminated the need for amateurs who are upgrading to endure the wait for the new license before commencing operation with their new privileges. FCC examiners issue interm permits that authorize use of the applicant's newly won privileges immediately.

In the period after passing the exam and before the new ticket arrives from Gettysburg, amateurs must add a special designator to their call signs when identifying operation with the new privileges. For example, a station operating in the Advanced portion of the band with a new Advanced class interim permit must give his call followed by (for example) "interim NY"; the NY is the FCC designator for the New York district office, where he had passed the exam. On cw, the slant bar is transmitted after the call sign, followed by the FCC office designator (§97.84[f]).

Q. I frequently conduct my QSOs in Spanish. It is okay if I identify my station in this language?

A. No. The rules specifically say that the i-d must be made in the English language. (§97.84[g]).

Q. May I identify my station using any code other than international Morse?

A. Sorry to be such a stick-in-the-mud, but the answer is an unequivocal no. When identifying with telegraphy, the i-d must be in international Morse code (§97.84[g]). Additionally, if the cw i-d is made by an automatic device used *only* for i-d purposes, the code speed must not exceed 20 words per minute (§97.84[g]).

Q. I have recently become active in ASCII operation. May I identify my station using ASCII?

A. No. As we said above, the station identification must be made in international Morse code when using telegraphy (§97.84[g]).

Q. Is it okay to give my call sign in phonetics when identifying?

A. Yes. The Commission encourages the use of a nationally or internationally recognized standard phonetic alphabet as an aid for correct telephone identification. The International Telecommunication Union (ITU) has developed such a list:

A — Alpha	N — November
B — Bravo	O — Oscar
C — Charlie	P — Papa
D — Delta	Q — Quebec
E — Echo	R — Romeo
F — Foxtrot	S — Sierra
G — Golf	T — Tango
H — Hotel	U — Uniform
I — India	V — Victor
J — Juliette	W — Whiskey
K — Kilo	X — X-Ray
L — Lima	Y — Yankee
M — Mike	Z — Zulu

For example, Linda, KA1GQJ, may identify her operation by transmitting the words "Kilo Alpha One Golf Quebec Juliette." Cute i-ds should be avoided when fulfilling the station i-d requirements (§97.84[g]).

Q. Is it legal to use "tactical" call signs when engaged in public service communications?

A. Yes; amateurs may use such "tactical" call signs as "Unit One" or "Checkpoint Charlie" to promote efficiency and coordination in public service communication activities. However, these types of identifiers are *not* substitutes for station call signs when fulfilling the identification requirements of §97.84. Amateurs must *always* identify their station's operation with its FCC-assigned call sign.

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

*Assistant Manager, Membership Services, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Answers to Your Questions About CRRL

Happy New Year! Over the past few months, you've asked us some questions! Some of them, and the answers, follow.

Q. Several years ago, I joined ARRL. Now I find I'm a member of CRRL. What happened?

A. Relax. You're still a member of ARRL. Every ARRL member lives in one or another division. When you joined, you were in the Canadian Division. In 1979, the Canadian Division changed its name to Canadian Radio Relay League — CRRL.

Q. So CRRL is a division of ARRL, but with a new name?

A. Yes, but it's also a whole lot more. Even when it was called the Canadian Division, it was special. The ARRL Canadian Director was responsible for representing Canadian amateurs to DOC and to IARU. With the change in name came incorporation, legal status in Canada, and a CRRL constitution that provided for a new five-person board. That board, and over 100 CRRL volunteers across Canada, ensure that members receive the best possible representation and service.

Q. What services are available?

A. First, all of the services of ARRL: *QST*; W1AW code practice and bulletins; free incoming QSL bureaus; field organization for public service; free films, slides, tapes, contest forms, net directories, operating aids and information handouts; and even technical and legal aid for individual amateurs. CRRL makes it easier for Canadian amateurs to receive many of these services by supplying them from a Canadian address. Then, CRRL adds some distinctively Canadian services: the central QSL bureau in St. John, New Brunswick; the CRRL "QST" bulletins aired weekly by 20 stations and mailed monthly to over 200 clubs across Canada; the *CRRL Newsletter*, which all members will receive next month; Canadian licencing materials; and of course, continual representation of Canadian Amateur Radio to DOC, other government agencies and IARU.

Q. Does CRRL have any paid staff?

A. Yes and no. CRRL is part of ARRL, so the people at ARRL Headquarters in Newington, Connecticut, are our paid staff. They keep track of our memberships and our accounts. They supply us with materials for our Canadian members. We find they are very interested in the Canadian members. They try to be helpful in every way possible. However, the bulk of the work — answering letters, producing Canadian materials, filling orders and even processing some memberships, is done in Canada by volunteers. They have recently been heard mumbling about setting up a real Canadian League headquarters with a Canadian paid employee. We think the idea has merit.

Q. Can I renew my ARRL-CRRL membership through the Canadian address?

A. Yes. For purely practical reasons, membership renewal notices will continue to come from Newington. We hope that these notices will indicate that Canadian League members may renew in Canadian funds, through CRRL, Box 7009, Station E, London, ON N5Y 4J9. CRRL workers will look after converting the money to U.S. funds, and forwarding the money and renewal application to Newington.

We'll continue with these questions next month.

TARIFF ITEM REWORDED

Finance Minister MacEachen's November 12 budget contained some good news, for amateurs at least. Tariff item 44534-2 was reworded to permit duty-free entry of amateur transmitters, receivers, transceivers and related equipment with provisions for WARC bands or with general-coverage receive. The item was not expanded to include antennas, presumably to protect Canadian companies that do manufacture these. CRRL, and particularly CRRL Counsel Bob Benson, VE2VW, deserves much of the credit for this success. Bob not only suggested the rewording that was adopted; he pressed for the rewording through extensive correspondence, telephone contacts, and personal visits with Tariff Board and Department of finance officials in Ottawa.

DOC NEWS

DOC recently announced its new guidelines for amateur call signs with special prefixes. For national anniversaries or events, a special national prefix may be issued for two months. For provincial or territorial anniversaries or events, a special provincial or territorial prefix may be issued for one month. For municipal anniversaries or events, a special municipal prefix may be issued for two weeks. An anniversary must be number 50, 60, 75, 100 or subsequent multiple of 25. An event must be significant and officially recognized by the appropriate level of government. DOC will issue only one special prefix per anniversary or event.

DOC has revised its guidelines for VEØ call signs. In the past, VEØ call signs were issued as short-term endorsements on an amateur's station license. They were frequently recycled and rarely became identified with individual amateurs. DOC will now issue VEØ call signs in the same manner as other call signs, with a separate station license and an annual licencing fee. VEØ call signs will be reserved for amateur stations on ships that work primarily out of Canadian waters. Amateur stations on ships that work primarily in Canadian waters will be operated as mobile stations, in accordance with the provisions of the station licence for the amateur's home station.

DOC exams will be held across Canada on February 10. If you plan to write, register *now*.

CRRL NEWS

☐ Over 1900 Canadian League members took advantage of a recent offer and renewed their memberships before a dues increase on October 15. Twenty-four took out League Life Membership — at $750 each! CRRL grew significantly during 1981. Current membership is 6300, not including some 200 subscriptions to *QST* sent to libraries and schools.

☐ Bill Skidmore, VE3AUI, is the CRRL-IARU Intruder Watch coordinator for Canada. Bill and his group listen for non-amateur stations operating in our bands in violation of international regulations. They report such operations to DOC monitoring stations for verification and to DOC, Ottawa, for action. Bill and his group meet on the air each Tuesday evening at 0130Z on 14.145 MHz. Amateurs interested in Intruder Watch are invited to call in.

☐ VE7QST, operated by Bill Kremer, VE7CSD, transmits the CRRL "QST" bulletins each Sunday at 1730Z on 14.14-MHz usb and again at 2200Z on 14.076-MHz RTTY. Bill points his beam east for good copy across Canada.

NOTES FROM ALL OVER

☐ This year is the 80th anniversary of Marconi's first transatlantic transmission, from Polduh in Cornwall, England, to Signal Hill in St. John's, Newfoundland. On October 29, Marconi's daughter, Mrs. Gioia Marconi Braga, visited St. John's while local amateurs reenacted Marconi's historic achievement. Clarence Mitchell, VO1AW, operated VO3MEA (that's for *M*arconi's *E*ightieth *A*nniversary!) and received the letter "S" from GB4MEA in Cornwall, England. Mrs. Braga, who had just delivered a lecture to the Association of Professional Engineers of Newfoundland, listened in on a receiver in the lecture hall.

☐ On September 19, Don Jarvis, VE2DWG, and Bob Pepper, VE2AO, opened Canada's new 33-cm band, with a transmission from Point Claire to Dorval, Quebec. Using commercial equipment and 4 watts to a simple antenna, signals were full quieting over the 2.6-mile path. This is the first documented use of the 33-cm band, which allows amateurs to use A3 or F3 communications on a secondary, shared basis between 902 and 928 MHz.

☐ Gil Frederick, VE4AG, has started a Canadian slow-scan television net. It meets each Sunday at 2100Z on 14.185 MHz. John Henry, VE2VQ, was reelected to the AMSAT Board of Directors. Vince Thorneycroft, VE1ACK, is sponsoring an award, "CW Operators of the British Commonwealth." For details, write to Vince at 35 Clearview Ave., Fredericton, NB E3A 1J9.

Bob Forbes, VE3QI (centre), with his cheque, payment in full for all legal fees and other costs incurred in the successful appeal of Bob's RFI case in Mississauga, Ontario. Making the presentation: (left) CRRL Counsel Bob Benson, Q.C., VE2VW, and (right) CRRL President/ARRL Canadian Director Mitch Powell, VE3OT.

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

YL News and Views

Conducted By Jean Peacor,* K1IJV

WAS Certificate #37,127 (SSB)

Certificate #37,127 (ssb) for Worked All States was issued on August 19, 1981, by ARRL to W. Shirley Hesketh, G4HES, of Chesham, Bucks, England. Obviously, many radio amateurs have earned this award. Shirley Hesketh, however, earned it in seven days.

News of this feat was sent in by William Marshall-Gatrix, KA7Q, who explained how it all began. KA7Q collects old Royal Air Force radio receivers. In trying to find one, he met Mrs. Shirley Hesketh, G4HES. Shirley later visited him in Reno, Nevada (April 29 to May 5 — a period upset by one of the better solar flares), and ended up working all states from his QTH operating as G4HES/W7.

Shirley was first licensed in 1974 as G8IWU. A G8 is similar to our Technician class, having voice privileges on vhf and up only. She upgraded to full license in 1978. Her husband, Jim, was and still is an SWL.

In 1964, Shirley was diagnosed as having multiple sclerosis. The fear of possible total disability spurred her on to learning more about radio. Hammond Innes's book, *The Land Lord to Cain*, had provided her with this inspiration. She holds a degree in mathematics, and after some years in aeronautical design, Shirley started teaching school. Her worsening illness forced her to leave full-time teaching. She later joined the Chesham Radio Society and went back to teaching mathematics part-time at Chorleywood College for Blind Girls. After receiving her Amateur Radio license, she immediately started teaching blind girls in the school's radio club. Because of this, and with the help of other radio amateurs, the school subsequently became licensed as G4GRL.

Shirley also teaches theory and code in courses held for beginners by the Chesham Radio Club. She is most interested in teaching methods, equipment and techniques for the handicapped and blind.

While visiting the Marshall-Gatrixes in Reno, Shirley also met W7SK, Nevada's SCM, who jokingly suggested she try for WAS while there. He had heard what a skillful operator she was. After watching her operate for just a brief time, he could see that WAS was a distinct possibility. Certificate #37,127 certainly proves his good judgment.

Shirley's interest in Amateur Radio has proven to be rewarding to many others as well as to herself. When operating from England, her signal stems from a transceiver into a G4MH mini-beam on a 60-foot Versatower. Those fortunate enough to QSO G4HES have found a YL who is contributing much to Amateur Radio.

Shirley Hesketh, G4HES/W7 *(photo courtesy of KA7Q)*

WHERE ARE THE YLS ON RTTY?

Louise Crawley, WB8JIB, asks the question, "Where are all the YLs on RTTY?" Louise became fascinated with RTTY as a Novice. It was then she promised herself that someday when she had more time, more money and a better understanding of radio theory, RTTY was a method of communication that she would try. Louise isn't sure that all these qualifications have been met, but she is now a RTTY operator, as is her husband, WB8ICL.

Invariably, Louise is told that she's a first YL contact by U.S. radio amateurs. It has been her experience to find there are far more South American and European YLs operating RTTY than there are U.S. YLs. She's puzzled in that she feels RTTY is a beautiful method of communication with interesting people, uncrowded bands and ease of operation.

Louise wonders if an autostart frequency and/or mailbox frequency couldn't be established among YLs? Interested YLs please contact her at 1688 Clifton Rd., Yellow Springs, OH 45387, or she can be found on the autostart frequency of 14.087.7. If more convenient, try the Midwest RTTY Net on 3.630 MHz at 0230 UTC daily.

*Country Club Dr., Monson, MA 01057

Louise Crawley, WB8JIB

TO ERR IS HUMAN

Thank goodness, for I definitely erred. With reference to November's YL column in which I referred to the YL ISSB Net, a net it is not. It is a System. Since at first glance I failed to see the difference, I've checked it all out in Webster's and have found that there is a definite difference.

System is defined as a regular method or order; assemblange of objects (in this case radio amateurs) united by some form of regular interaction or interdependence; thus, an organized whole. This surely defines what the YL ISSB System represents.

A net, on the other hand, is defined as anything fitted to entrap or catch; a snare. Now you know and I know that we radio amateurs aren't trying to do anything of the kind on the many established nets of the airwaves. All of which leads to the conclusion that "net" is really an abbreviation for "network" since this definition is far more in keeping with everyone's intent. Its definition is a system of lines or channels interlacing; a chain of radio stations.

So, there is a difference. YL ISSB is a system, as it is an organized whole, complete in itself, all on one frequency. National Traffic System (NTS) is a "system." It forms an organized whole; but it takes the "network" of all the Section Nets to complete the whole.

All of which I found most interesting. Never realized before that I was snared into WMN — hi!

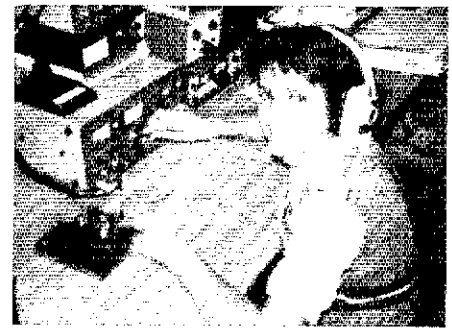
TASYLS

The Auto State Young Ladies (TASYL) was organized in December 1965 by nine very active licensed Michigan YLs. The first meeting was held to discuss by-laws, dues, and plans and qualifications for a certificate. The desire to select a name recognized by hams throughout the world as representative of Michigan was made more difficult because of all the things for which Michigan is so well known. Automobiles seemed most commonly associated to Michigan; hence the TASYLs were born.

Membership is open to all licensed YLs living in Michigan. There are three TASYL Nets: every Monday evening at 2300 UTC on 3.922 MHz, every Thursday morning at 1300 UTC on 3.950 MHz and each first Friday at 1300 UTC on 7.265 MHz. Net participation is open to all radio amateurs. Their annual meeting is held at the Annual ARRL Convention each year, with the ladies getting together each summer for a family picnic. The current president is Pat Stegega, WA8ATB, Milan, Michigan. The TASYL Certificate was designed by Nancy Feeny, K8IAI, with colors indicating sky-air-water, with sable and black signifying movability and constancy and, of course, with the automobile theme.

Criteria for TASYL Certificate

A signed and dated log must be submitted to Custodian Mary McCarthy, WA8WZF, Ludington, Michigan, showing date, time of contact, call signs, frequency, RST and TASYL number. Certification giving date and QTH must be on the original application and signed by one of the following: (1) two licensed amateurs, General class or higher, nonfamily (2) one official of a recognized club or (3) a notary public. Michigan stations must work 15 points. VE and others work 10 points. DX and vhf work 6 points. Charter members 1 through 50 count 2 points, all others 1.



Lorraine Axeman, KA8LDJ, of East Lansing, Michigan, became a brass pounder at the age of 11. She is the daughter of N8LA. As the picture shows, there is a sparkling personality behind her radio signal. Look for her on 40 meters.

International News

Conducted By Richard L. Baldwin,* W1RU

Region 1 Executive Committee Meeting

When the Executive Committee of Region 1 IARU met in Maidenhead, England, over the weekend of October 25, its first important task was to choose a secretary to succeed Roy Stevens, G2BVN, who had passed away on September 30. Their unanimous choice was Eric Godsmark, G5CO. G5CO first became interested in radar in the Second World War, served in cruisers on radar and took part in the landings at Anzio, Salerno and Normandy. After the war he returned to the British Post Office and eventually worked on frequency assignment and licensing of radio services. He spent 25 years in the Radio Branch of the British Post Office and Home Office and attended international radio conferences as assistant to the delegation leader; he received the Queen's Silver Jubilee Medal for services to the UK. He was licensed for Amateur Radio in 1954 and eventually became senior manager for all aircraft, maritime and mobile services in the UK. He resigned from the Home Office early in 1979 to prepare for and attend WARC-79 on behalf of the amateur service, and was a member of the IARU WARC team. He works cw on the hf bands and is occasionally heard on vhf. His other main interest (time permitting!) is music, and some years ago he played regularly in a band. Last year Eric spent a month touring the United States, which he concluded with a week at a seaside home in Bremen, Maine.

*Secretary, IARU

The Region 1 Executive Committee discussed at length such matters as the arrangements for the IARU Fox-Hunting Championships in Bulgaria next year, the EMC seminar to be held in Poland, the emergency communications meetings held in Italy earlier this year, plans for amateur opeations on 10, 18 and 24 MHz, and the possible expansion of the U.S. 20-meter phone band. W1RU promised to notify all IARU societies, as in the past, if and when FCC issues an NPRM re the ARRL's 20-meter phone petition.

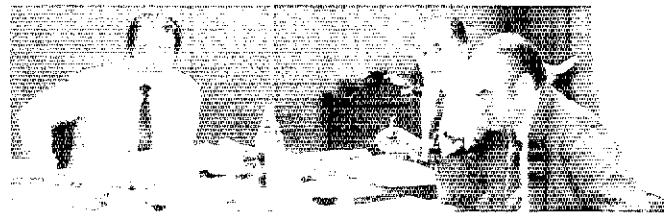
The Committee devoted an extended period of time to discussion of possible IARU restructuring and a number of specific proposals that had been made in Region 1. In brief, the Region 1 EC adopted a position endorsing the establishment of an Administrative Council consisting of two members named from each of the three regions, with president, vice president and secretary to come from the Hq. society, as now. The Committee also adopted a suggestion put forth by IARU Secretary W1RU in his letter of August 26, addressed to all members as the three IARU regional executive committees, proposing a procedure for resolving the second society problem.

Further, the Committee reaffirmed a position, subscribed to by the Hq. and others, that no specific restructuring proposals should be put forward to the membership of IARU until (a) after Region 3 has had an opportunity to discuss the subject at its April 1982 meeting and then (b) after the president of IARU has had an opportunity to have a worldwide meeting, to be called for some convenient time and location in the fall of 1982, when two representatives from each region can meet with the officers and put together a single coherent set of proposals for the consideration of the IARU membership.

The Committee heard a report from the chairman of the Region 1 HF Working Group, the essence being that there were many problems of improper operating practices on the hf, and that an operating handbook was in preparation. A discussion of a band plan for 160 meters indicated that the band plan put forth in August *QST* would serve as a guideline.

This meeting commenced at 1400 on Friday, October 23, and concluded in the early afternoon of Sunday, October 25. Those participating included PAØLOU (Chairman), SP5FM (Vice Chairman), LA4ND (Treasurer), G5CO (Secretary), DJ3KR, YU7NQM, VE3CJ (IARU President) and W1RU (IARU Secretary). Also present were Miss Audrey Jefcoate, longtime right hand of the IARU Region 1 Secretariat; PAØQC, Chairman of the Region 1 VHF Working Group; and G3FKM, Chairman of the Region 1 HF Working Group.

Stein Barlaug, LA4ND, Region 1 treasurer; and Noel Eaton, VE3CJ, IARU president.



PAØLOU; Wojciech Nietyksza, SP5FM, Region 1 Vice Chairman; and Juergen Rottger, DJ3KR, Region 1 Executive Committee member.

Audrey Jefcoate, Region 1 secretariat; Eric Godsmark, G5CO, Region 1 secretary; and Lou v.d. Nadort, PAØLOU, Region 1 chairman.

Case van Dijk, PAØQC, chairman of the Region 1 VHF Working Group; and Mirko Mandrino, YU7NQM, Region 1 Executive Committee member.

REGIONAL IARU SECRETARIES

The world has been divided into three regions for telecommunications purposes, and so we have the three regions of the International Telecommunication Union (ITU) and the International Amateur Radio Union (IARU). If you have news and other information about Amateur Radio in *your* region, please share it with your IARU regional secretary. Region 1 (Europe, USSR, Africa) — Eric Godsmark, G5CO, c/o Region 1 Secretariat, 1 Priory Court, Barley Lane, Goodmayes, Essex, England IG3 8XN. Region 2 (North and South America) — Pedro Seidemann, YV5BPG, P.O. Box 2253, Caracas 1010A, Venezuela. Region 3 (the Far East, Australia, New Zealand) — David Rankin, 9V1RH, P.O. Box 14, Pasir Panjang, Singapore 9111, Republic of Singapore.

BEACON EXPERIMENT AUTHORIZED FOR 10, 18 AND 24 MHz

The Federal Communications Commission has authorized the establishment of an experimental radio beacon on the bands 10.100-150, 18.068-168 and 24.890-990 MHz, the new bands allocated for amateur use by WARC-79. The experiment is intended to permit amateurs to become familiar with the characteristics of these bands (simplifying the scheduled future changeover to amateur use), to improve amateur use of these new parts of the spectrum, and to provide data on sharing among different services. An important element is securing data on propagation under weak-signal conditions, typical of natural disaster situations. It will be recalled that this use is one of the major reasons for these new authorizations, the first in many years.

The experiments will include two emission types, three operating modes and two time phases. Basic emission is unmodulated carrier (A0), interrupted each 10 minutes for an ssb (2.8A3J) identification and announcement occurring at 2, 12, 22, etc., minutes past the hour. Announcement will be of the form: "This is FCC authorized experimental station KK2XJM, Daytona Beach, Florida. QSL via W4MB. Next operation will be repeated _____ MHz starting on _____ ," and will be repeated.

Initial operations were at 3 watts erp, on 10.140 MHz, in October. Depending on results, the schedule operation will include, in stages, 18.108 and 24.930 MHz. Later phases will include operation at 30 watts erp, with sequencing from band to band, sometimes weekly, sometimes daily, as needed to make optimum use of the bands for propagation experiments, worldwide and to specific areas.

Licensee for the experiment is Robert P. Haviland, W4MB. Haviland has been an amateur for 50 years, and has participated in numerous CCIR and ITU conferences and preparatory work.

Success of the experiment depends on participation and reports by amateurs. Information needed is date, time and location of reception, strength of signal and of other signals on the band, and nature of the receiving installation. All reports will be acknowledged.

In addition to reception reports, proposal for special tests will be welcomed, subject to the limitations imposed by the license and by regulations for experimental stations. At this time there is no authorization for communications with amateur stations.

Reports, requests for schedules and proposals for experiments may be sent to R. P. Haviland, W4MB, 2100 South Nova Rd., Box 45, Daytona Beach, FL 32019.

60TH ANNIVERSARY OF THE RADIO CLUB ARGENTINO

The Radio Club Argentino celebrated its 60th anniversary during the week of October 12, 1981, with cocktail and informal dinner parties, a meeting of the Radio Veteranos, and ending with a banquet attended by 500 amateurs and guests on Saturday evening, October 17.

Carlos Kaufman, LU9CN, President of the Radio Club Argentino.

Officials representing the radio societies of Bolivia, Brazil, Chile, Paraguay, Uruguay, USA/Canada and the IARU Region II Executive Committee were guests of the Radio Club Argentino and presented President Carlos Kaufman, LU9CN, with gifts commemorating the 60th anniversary of the national society of Argentina.

Officers and members of the Board of Radio Club Argentino who planned and participated in the anniversary celebration were LU9CN, President; LU4AH, Vice President; LU2AB, Secretary; LU4ACT, Treasurer; and Board Members LU6EAM, LU3AKY, LU9AO, LU9BM, LU3DI, LU1BR, LU2DX, LU2AH and LU2BAT. Attending on behalf of IARU Hq. was IARU Vice President Carl Smith, WØBWJ.

Strays

SELDEN HILL REVISITED

☐ The "Legend of Selden Hill" has a nostalgic ring for long-time readers of *QST*. It goes back to 1931 when Ross Hull and Clark Rodimon, Associate Editor and Managing Editor, respectively, were looking for living quarters near the then-new ARRL office in West Hartford. A "Rooms for Tourists" sign on an old white farmhouse at the western edge of town caught their eye. It looked almost too good to be true: Its commanding view eastward over the Connecticut Valley would make it an unbeatable radio location, and it was a mere mile from Headquarters!

Ross and Roddy quickly convinced the owner that two nice young fellows whose whole life was wrapped up in radio would be preferable to unknown "tourists." Within a few days they moved in and took possession. The beautiful old house on the Hill would never be the same again, but it would become well known to readers of *QST* everywhere.

Selden Hill more than lived up to expectations as a ham radio site. Ross and Jim Lamb, W1AL, were just beginning work on 5-meter gear for *QST*, and the hilltop quickly became a major asset. Chapter One of the "legend" began with Hull's experiments with 5-meter antennas in the summer of 1934. When the signals of W1AL were heard regularly in the Boston area (with hills as much as 1200 feet above sea level near the midpoint of the 100-mile circuit) the line-of-sight bugaboo was laid to rest forever.

Months of propagation study resulting in eventual explanation of the mode as wave bending in the lower atmosphere, associated with weather phenomena, brought far-reaching recognition of the worth of the radio amateur in the field of wave propagation science.

The old house and its giant maple trees saw much experimentation with hf antennas, too. Byron Goodman (W6CAL, W1JPE, W1DX) spent a lot of time in those trees as he and Hull looked into amateur-style rhombic antennas. In addition to many scratches and severe cases of poison ivy, this work yielded outstanding DX results and showed that the "diamond" could stand liberal doses of typical ham haywire and ingenuity, and still give a good account of itself. (Rilla Selden, the owner, commented that "The roof never leaked until the hams came to the Hill!")

Selden Hill served as an unofficial League residence for many other Hq. staffers, and those who lived there came to regard that place as home. These included John Huntoon (W1LVQ, W1RW), and Arthur Budlong (W1JFN, W1BUD), both of whom would become ARRL General Managers in years to come.

In the late '30s the Hill was the scene of pioneering work with radio-controlled sailplanes by Ross Hull and Roland Bourne, W1ANA. By 1937, Hull was off on another typical adventure — experimentation with vhf television. With more weird-looking antennas and a room full of clip-lead-assembled receiving circuits, Ross picked up experimental TV signals from New York, an incredible 100 miles to the southwest. This work, later transferred to a home of his own in Bolton, Connecticut, would eventually cost this unique amateur his life.

Selden Hill was quiet during the War years, but it continued to be regarded as home by Hq. people. Included among these was Cy Read (W9AA), responsible for the "legend" label. On-the-air activity returned in October 1945 when Ed Tilton, W1HDQ, assumed the new ARRL post of VHF Editor. From the same two rooms once used by Ross Hull, Ed helped to promote interest in the new bands at 50 and 144 MHz. The high point of Ed's three years on the Hill came in late 1946 when G6DH was heard on 28 MHz shouting, "*I'm hearing you on 50 megacycles — I'm hearing you on 50 megacycles!*" The first transatlantic vhf QSO was history! Many photographs that ultimately appeared on *QST* covers were taken on the hill during this era.

These are just a few of the highlights of many years of association between members of the Hq. staff and the Selden family and their beautiful old home on the Hill. A reunion of sorts was held there recently, a sentimental gathering of some of the former "family," to remember and relive those wonderful days and to thank Rilla Selden for all her hospitality, tolerance and goodwill during those eventful times.

A few Selden Hill alumni assembled near the porch at Selden Hill. Left to right: Laird Campbell, W1CUT (ex-W5TQD), Managing Editor, *QST*; Byron Goodman, W1DX (ex-W6CAL and W1JPE), retired Assistant Technical Editor and ARRL *Handbook* Editor; Rilla Selden; Edward Tilton, W1HDQ, retired VHF Editor and author of the *VHF Manual;* and John Huntoon, W1RW (ex-W1LVQ), retired ARRL Secretary and General Manager.

QST References

Hull, "Airmass Conditions and the Bending of UHF Waves," June 1935 and May 1937.

Hull and Rodimon, "Plain Talk About Rhombic Antennas," November 1936, p. 28.

Hull and Bourne, "Radio Control of Model Aircraft," October 1937.

Editorial, November 1938 (Hull obituary).

Read, "The Legend of Selden Hill," August 1944, p. 46.

"World Above 50 Mc.," January 1947.

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

SAFETY IN THE SHACK

☐ This letter is in response to the article in November *QST*, "That First Ham Station and How To Set It Up." I think some items about voltage and wiring need to be pointed out to the amateur community. It should also be pointed out that besides being a radio amateur, I'm also a Master Electrician. Wiring in the shack and for equipment installations comes under the jurisdiction of the National Electrical Code. Section 810 covers radio and television equipment. Section 810C is devoted to Amateur Radio. I think it is important to point this out to all amateurs. The section on Amateur Radio is there for our own safety.

The "first home station" article mentioned some unsafe conditions in a beginner's shack. One doesn't have to be a Novice to be guilty of unsafe wiring and exposed lethal voltages. I've seen plenty of that in the shacks of General, Advanced and Extra Class licensees. These individuals can have unequaled expertise when it comes to radio theory or assembling equipment, only to make the shack unsafe when it comes to wiring power connections. I've heard many stories of hams being shocked by 120 volts. Accounts of short circuits and overloads are numerous, too.

As we amateurs move forward with technology let us not forget safety. Alongside of our radio handbooks there should be a copy of the 1981 National Electrical Code. Safety and technology have to exist together. — *John M. Huseman, WDØEZI, Lincoln, Nebraska*

[Editor's Note: The National Electrical Code is obtainable from the National Fire Protection Association, Battery March Park, Quincy, MA 02269. The price is $8.25 per single copy.]

THE ART OF QSLING

☐ While looking over recently received QSL cards, I noticed that more and more hams are not showing what station equipment was used.

Even though our equipment has evolved today into a handful of different transceivers, it still would be interesting to review QSL cards in the future and see what gear each amateur station used in the eighties.

Perhaps we should include our rig information on cards we send and provide a space on cards we have printed in the future. — *Paul Baillie, K1SWT, Belmont, New Hampshire*

☐ I never thought I would join the complaint of the month club. Many hams find enjoyment in working for the WAS, DXCC, 5BWAS, and other awards, as I do. But it sometimes becomes very frustrating when certain problems keep coming up. My call sign (along with many other call signs) ends in the letter "Q." I received nine cards, all for contacts I had made. These cards were addressed almost perfectly, except the letter "Q" didn't have a tail, so the cards aren't worth the paper they're printed on. Come on, guys, how would you like it? Similar examples include: an "R" that is printed as a "P" or a "G" that comes out as a "C." Give we poor hams that were unlucky enough to have a "Q" in our call signs a break. Be sure to print the call correctly on the QSL card. — *Fred Trecartin, KA1ECQ, Lynn, Massachusetts*

[Editor's Note: The moral of the story is to fill out QSL cards *slowly*.]

SPEAKING OF THE WOUFF HONG . . .

☐ Some months ago I read an article in *QST* about policing the bands to eliminate some of the bad operating habits.

It's a wonder to me that each operator doesn't police his or her self. I'm sure if hams took stock of their own operating habits, there would be far less lids and clowns on the air.

I'm fed up to the eyebrows with operators who: (1) Break into an existing contact without a break. (2) Call a DX station when that station is already in QSO. (3) Run a gallon of power, so that their signals slop over into other frequencies three or four kilohertz away. (4) Call a station at 10 wpm when the station is operating a 20 wpm. (5) Call a station who is calling a specific station. (6) Tell you to drop dead when you ask a station to move off your frequency.

I could list numerous other infractions of good operating practices and manners. I'm sure that my gripes are not the first you have received. Maybe a few will take heed and clean up their act. — *James M. Buntain, W6VYM, Fontana, California*

☐ As one who has been a licensed Amateur Radio operator for close to 30 years and a member of the American Radio Relay League for close to 30 years, I have second thoughts about renewing my membership with your organization.

I sincerely feel that Amateur Radio is becoming sick and if something isn't done to rid ourselves of the many poor operators on the air, the patient is apt to die.

In recent years, Amateur Radio has attracted *too many poor operators* from CB, who belong back on CB.

I and others get the distinct feeling that your organization wants to license every Tom, Dick and Harry in the United States.

I strongly urge the Federal Communications Commission to impose severe fines and prison sentences for violations by the many poor operators in Amateur Radio. I also recommend that the FCC make it required to pass a code test and written examination before a license could be renewed.

It is a crime of what has happened in the past 10 years to one of the world's finest hobbies, Amateur Radio. — *Bob Christensen, WØZPM, Humboldt, Iowa*

HOLIDAY HAMMING

☐ My wife and I have recently returned from a holiday in the USA. I had obtained a reciprocal license and took the opportunity of operating mobile and portable on 2 meters in call areas one, two, three, four and eight.

I would like to take this opportunity to thank the many amateurs I contacted and the repeater groups whose machines I used. What was already a most enjoyable holiday was made even more so by the warmth and hospitality of amateurs in all areas. We are looking forward to our next holiday in your country. — *Mike Prince, G4LZA, Aldershot, Hampshire, England*

NEXT BEST THING TO THE 6146B

☐ We hear conversations and discussions every day about our crowded band conditions, how we need more room, about "Narrow Band Sideband," digital techniques, and how the new hf bands will have to be cw only because they are so narrow.

All of these discussions are fine and necessary. *But* (the old 180 degree word), we have available to us now (and have had for some time) an extremely efficient, simple method of communication that is little used, discussed or exalted. I refer to QSK, full "break in" cw. Let's see some QRM about this untapped source. Why isn't everyone on cw using QSK? Why aren't all new rigs QSK equipped?

To you who have never used QSK, imagine this: Hearing the responses to your CQ, while you're still calling CQ! Knowing who else is calling that rare DX, while *you're* still calling the DX! Hearing the other operator laughing at your joke, while you're still telling it!

QSK is not the answer to all our problems, but it's the next best thing to the 6146*B*! Hi! — *David A. Cassata, K2DPC, Lakeland, Florida*

[Editor's Note: This subject is addressed in the *QST* article "Why QSK?" by David P. Shafer, W4AX. It can be found on page 53 of the February 1979 issue.]

TECHNICAL INFORMATION SERVICE

☐ On September 29, 1981 I wrote to the ARRL for advice on a particular antenna set-up that I am considering. On October 8, 1981, I received my answers. That is fantastic!! Today, one does not usually expect to get fast, personalized service from big organizations. (The ARRL fits my definition of big.) I received handwritten specific answers to my questions, which was a surprise. (I expected a form letter or copies of a past article.) If you get a chance, give the technical staff a very sincere *thanks* for me. This was the first time that I wrote the ARRL for technical advice and have discovered another of the really great services that is offered. — *Joe Davis, WB3LLI, Berlin, Maryland*

☐ Thank you for sending the information for my report, because I received an "A" on it. In the past years I have asked you a lot of questions and you have sent me a lot of information. Thank you again for being so helpful. Maybe I'll see you on the air someday. — *Dan Watt, KA1GYF, Bucksport, Maine* QST

*Membership Services Assistant, ARRL

How's DX?

Conducted By Ellen White,* W1YL/4

The Turbulent Sixties: Winds of Change

The perspective time affords reveals the '60s as the focal point for domestic unrest and worldwide upheaval of the status quo. The breakup of the colonial empires, the inauguration of new countries, the inception of 5-Band DXCC — all furnished the scenario for major changes in our own private world of DXing. Let's continue the theme begun last month (a look at post-WW II DXCC) and chronologically catalog DXCC events during the early '60s, a major decade of change.

1960: January *QST* noted an addition to the list of what we now call Agalega and St. Brandon, located in the Indian Ocean, approximately 260 miles NNE of Mauritius. Also new to the list was VK4, Willis Island. Willis is located in the Coral Sea, outside the Great Barrier Reef, Queensland, Australia (approximately 240 miles east of Port Douglas). A reminder, too, to the troops that altered cards are a no-no, regardless of who does the altering. April *QST* contained an interesting discussion on how DXCC criteria applies to country determination, vis-a-vis points 2 and 3 of the rules (geographical separation, and where foreign territory divides a country). Effective April 1 that year, a change took place in relation to the Palestine listing. DXCC credit, for some years, had been given for the Palestine listing for those stations operating in the city of Jerusalem and those stations operating in the U.N. Truce Supervisory Sector bordering the city of Jerusalem. Henceforth, confirmations for contacts with stations operating from the U.N. Sector bordering the city of Jerusalem would continue to be credited toward Palestine, but not so for those stations operating in the Israeli section of the city itself. A big brouhaha developed causing credits for LZ1DZ/ZA to be deleted from the DXCC records of the faithful.

Auckland and Campbell Islands became creditable as a joint listing. Both of these islands are located in the Pacific, south of New Zealand — Campbell about 500 miles south and Auckland about 150 miles closer. The September issue was a dilly with five new additions listed and five deletions announced. Marcus Island became a new one, located in the Pacific approximately 700 miles due east of Iwo Jima. Marcus is an isolated island neither attached to nor part of any island group. French West Africa (FF8) underwent fragmentation as new countries were born. In midyear, the Mali Federation (including Senegal and the Sudanese Republic) became independent. The new Mali Federation separated areas that had been identified with the French West Africa listing, in itself a forerunner of further changes to come. By virtue of this separation, Mauritania became a separate listing. Ruanda-Urundi, previously considered to be with the Belgian Congo because of administrative attachment, became separate. (At that time it was a U.N. Trust Territory administered by Belgium.) The Somali Republic came into being in midyear, comprised of the two former listings of British Somaliland and Italian Somaliland.

And now to what dropped off the list, in part because of the above. What with the new Somali Republic a fact, both the Somalilands dropped off the list. The Karelo-Finnish Republic was incorporated into the RSFSR and became a European Russia listing. Tangier became an integral part of Morocco, and thus joined CN8 and CN9 (good-bye CN2 and KT1!). A realistic look took place at Wrangel Island. This early listing met none of the criteria and inasmuch as no credits had been given for it, it too dropped off the list. Last month's column discussed the Caribbean changes in 1958. Note was made therein that the Caymans were not considered "separate." However, in September of 1960 we see that a review of the question of the separate status of the Caymans showed factors not considered at the time of the original decision. This happy change of policy resulted in what would prove to be a *lot* of happy DXing to take place from this great location. The final breakup of the French colonies in Africa was announced in the October issue, leading to the deletion of French West Africa as a separate entity (FF8), along with French Equatorial Africa (FQ8), and (accordingly) the new country status for Dahomey, Niger, Volta, Ivory Coast, Chad, Central African Republic, Congo and Gabon. A busy year for the DXCC crew!

1961: The Mali Federation was short-lived, however, with January announcing its deletion and replacement with the two listings of the Mali Republic and the Senegal Republic. (The Mali Republic was formerly known as the Sudanese Republic.) Kaliningrad, a Russian territory situated between Poland and Lithuania, was added. Radio-popular Bajo Nuevo, a Colombian territory in the Caribbean about 500 miles NNW of Colombia and 250 miles NNE of Providencia, joined the countables early in the year. (The DXCC listing of Serrana Bank and Roncador Cay separates Bajo Nuevo from the island of Providencia, in accord with points 2 and 3 of the then-criteria.) Kure Island and East Pakistan became "new ones." Although Kure is the westernmost island of the Hawaiian chain, its separation from the rest of Hawaii by Midway placed it under point 3 of the criteria. East Pakistan also came under that same point. More HKØ activity came in the form of Malpelo as of midyear. Some confusion developed regarding Damao and Diu, announced in August as two additions but clarified in September as one because of insufficient separation by foreign land. At year end the Kamaran Islands, located in the Red Sea off the coast of Yemen, were new.

1962: The new DXCC Honor Roll started taking into account, for the first time, deleted countries and their effect on overall totals. As hinted at previously, Damao/Diu dropped off the list, as did Goa. In midyear a firm stand was announced reflecting the European Band Plan feature of 14,000-14,100 kHz as exclusively for cw, and that no contacts would be credited toward DXCC for either station operating phone in this segment. Three additions and one deletion were noted in September. The additions were Ruanda, Urundi and Guam. The former U.N. Trust Territory of Ruanda-Urundi (under the administration of Belgium) became two separate and independent countries. As a consequence, the deletion of Ruanda-Urundi took place.

1963: After a quiet 1962, changes were rampant in 1963. Bouvet, a territory of Norway located in the South Atlantic approximately 1000 miles south of the Cape of Good Hope, was added to the list. A plebiscite was held in Eritrea, determining that it would unite with Ethiopia. Thus, Eritrea was deleted. Heretofore, the list contained just a single listing of Channel Islands. A review of the area took place, and the old listing was dropped and replaced by two listings, Guernsey and Dependencies, and Jersey. However, the change was not considered a deletion, and automatic credit took place for the entity worked. (Those "Dependencies of Guernsey" have interesting names: Alderney, Brechou, Great Sark, Little Sark, Herm, Jethou and Lithou.) Juan de Nova, encompassing the islands of Jaun de Nova, Bassas Da India and Europa, was added. The three islands are French territory under the administration of the Overseas Department of Reunion. Located in the Mozambique Channel, they are separated from Reunion by the Republic of Malagasy. Prior to the independence of Madagascar in mid-1960, the islands were under the administration of Madagascar. All credits were dropped from records for VQ9A/8C (Chagos). It developed that lack of proper licensing was the cause and effect, and a reminder noted that those interested in DXpedition-type operation should be sure that the legal requirements for their operation were met. Glorioso Island was added. It is French territory under the administration of the Overseas Department of Reunion and located off the northern tip of the Malagasy Republic, which separates them from Reunion. July 1963 reiterated the criteria for placing any land area in the world into a separate entity — government/administration, separation by water and separation by land. One addition and five deletions were announced, among the last of those interesting prefixes that meant exotic DX to those active in that era. Deleted were: JZØ, Netherlands New Guinea; PK1-2-3, Java; PK4, Sumatra; PK5, Netherlands Borneo; and PK6, Celebes and Molucca Islands. The new addition became Indonesia, encompassing the entire territory of Indonesia. A reminder, too, that Indonesia was still on the "banned list." More world change was reflected in the December DXCC Note with the addition of two to the list and with five dropping off. The five deletions were VS1, Singapore; 9M2, Malaya; VS4, Sarawak; ZC5, British North Borneo; and C9, Manchuria. The two additions were concerned with the Malaysia Federation and would appear on the list as VS1, 9Ms (Singapore, Malaya) and VS4, ZC5 (Sarawak, North Borneo). The separation of the Malaysia

*19620 SW 234 St., Homestead, FL 33031

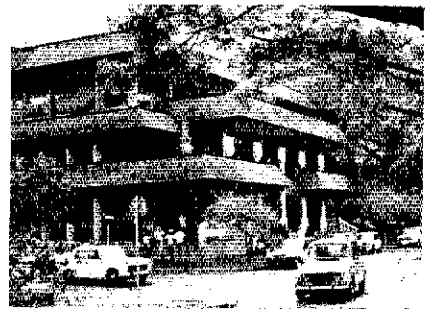
Federation into two separate entities was in accord with point 2(a) of the criteria shown in the July issue.

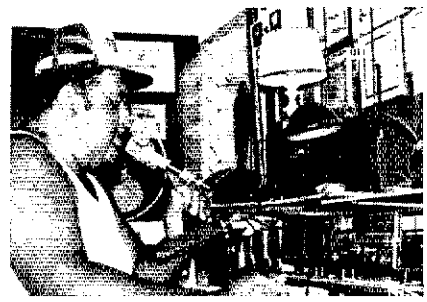
1964: Our January journal noted that the Kuria Muria Islands were countable (VS9H). They're located in the Arabian Sea off the southwest coast of Oman, and previously were British Territory administratively attached to Aden. (History will show that effective late 1967, contacts would count as Oman.) The islands have an interesting history. The five rocky islets were ceded by the sultan of Masquat to Great Britain in 1854 for a cable station, and then were ceded by the British to Oman in 1967. ITU (4U1ITU) appeared for the first time by virtue of its distinctively separate administration. Crozet (FB8W) became new for credit in early spring. Those five tiny islands (195 square miles) in the south Indian Ocean were discovered in 1772 by the French. An unusual (heretofore) entity joined the ranks in the form of the Saudi Arabia/Iraq Neutral Zone (distinctively separate administration). It helps to note that operation from anywhere has to count for *something* (land-based stations, that is!); hence rules evolved to adjudge such land masses fairly.

In the coming months we'll unravel the remainder of the skein and, in the interim, try to capture the flavor of an early DXpedition.

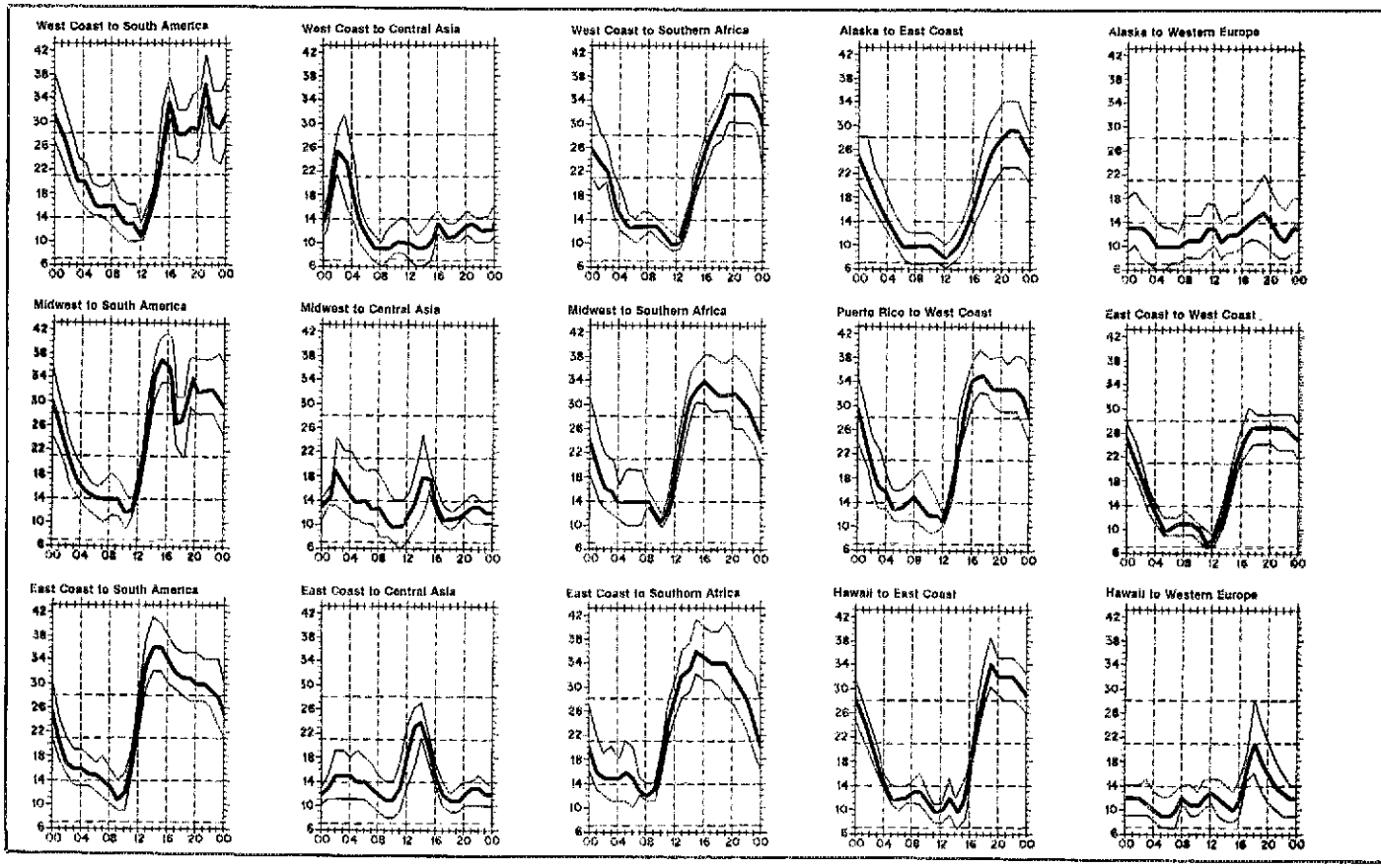
DX IS

If you're a lucky DXer you just might get a copy of *The Best of the West Coast DX Bulletin* in time for Christmas. The anthology by the legendary WA6AUD goes for $9.45. Orders go to Jim Allen, W6OGC, 1200





January is a wonderful time for a tropical vacation, and WB6GFJ picks Tahiti as the ideal spot to go. When venturing to French Polynesia you stop first (upper left) at the building that houses the Post Office and Telecommunications Offices to pick up your FOØ ticket. Then (upper right) you get greeted appropriately by FO8GW (left) and FO8CX (right). It's a quick trip then to FO8DF (lower right) for operating privileges for FOØFB. Ross, WB6GFJ, applauds FO8DF, past president of the Radio Club of Tahiti, who is instrumental in helping stations obtain their FOØ tickets, while Ross helps out from this end.



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

Third Ave., Suite 1200, San Diego, CA 92101. WA6AUD, "Cass," often chose to express himself about current DX events through the mechanisms of topical vignettes at the end of each bulletin. They usually consisted of a dialogue between himself and one of the many local QRPers, but sometimes he had to enlist the Old Timer for support. In this way we were introduced to the Eternal Enigmas, the Mysteries of the Ages and the knowledge that only comes to True Believers. The essence of topical poetry decorated the "WCDXB." In line with our historical overview these past two months: "The wind passeth over it, and it is gone: And the place thereof shall know it no more. Deleted!"

1982 WORLD'S FAIR

A unique opportunity awaits DXers on May 22-23, 1982. The Delta Division Convention will be held in Knoxville, Tennessee, site of the May through Oct. 1982 World's Fair. Many prominent DXers will be attending the convention, and it isn't too soon to start formulating your plans. Full details are available from Stephen Kercel, AA4AK, Convention Chairman, Rte. 4, Box 114, Seymour, TN 37865.

DXPEDITION FINANCING

Used to be you went on a DXpedition and paid for it yourself (or you just didn't go). What with the cost of major world jaunts these days, many prospective journeys require aid in getting there and back. The National Capitol DX Association takes a stand that contributions, financial aid, will be considered *after* the conclusion of a responsible foray. More details from K3KA, new president of the club.

THE CIRCUIT

☐ Randy Rowe, NØTG, and Joe Markowski, NØWL, had hoped to be QRV from Jamaica mid-December as /6YØ — only the second time that special prefix had been authorized. If it came off, QSLing was planned via NØBZE, 12484 Sealane Dr., Florissant, MO 63033.

☐ WD5DXB says she isn't a manager for 9G1DJ, and W3PJ disclaims responsibility for card handling for 9H1EQ.

☐ Bob Cregar, WD8NKT, manager for XE1s LCH OX OW GBM MDX (the Mexico DX Club) and special prefixes 6D7LCH, 4A9LCH, XB1OX, has a new address. Cards go to him at 208 South Sherman St., Bay City, MI 48706.

☐ AA4FL, ex-WB4ZVF, Jay Garlitz, 999-55 S.W. 16 Ave., Gainesville, FL 32601, is diligently looking for 1973 QSL info on ET3USE, '74 data for KC4AAD and SV1DB, '75 QSL whereabouts for KP6XX and FW8DA, and 1978 routing details for VE6CKS/SU.

☐ SWLing may indeed be undergoing a revival. WA4JWX has received three recently from his cw operations and is, himself, SWL WDX4JWA. Cw SWLing can be an excellent way to get good operators into the fraternity. Answer those SWLs you routinely receive, and encourage the new crop! QST

QSL Corner

Administered By Joan Becker

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

A22ZM (ZS5CU)
A6XJC (PEØMGM)
A7XM (DJ9ZB)
CM2TM P.O. Box 1, Havana, Cuba
EA6IT (WB1DQC)
EF7TV (EA7TV)
FK8CE (K2ROR)
FØAHY/FC (DL4FF)
FØOV/FC (HB9BEI)
HFØPOL (SP5EKZ)
IU6ONU (I6JVH)
IZ5ARI (I5HCH)
J5HTL (SM3CXS)
J88AQ (W2MIG)
OE5JTL/YK (OE5UYL)
PP5JD (PY2AA)
PZ5RC (WD9DAE)
SU1BA Box 2104, Cairo, Egypt
S79MC (AK3F)
TI2CC P.O. Box 7370, San Jose, 1000 Costa Rica
TU2IN (K3HBD)
T32AB (N7YL)
VP1UR (N5UR)
VP2EC (N5BET)
VP2VJK (VE3MJ)
VQ9JB (WD5BHP)
V3AUR (N5UR)
YBØIX Box 4190, Jakarta, Indonesia
YT6A (YU6SCG)
YU7PEF/HBØ (YU7GMN)
V2AJ (WB2TSL)
ZF1MA (VE3GCO)
ZF2CZ (WA3UFI)
ZF2DQ (WA3UFI)

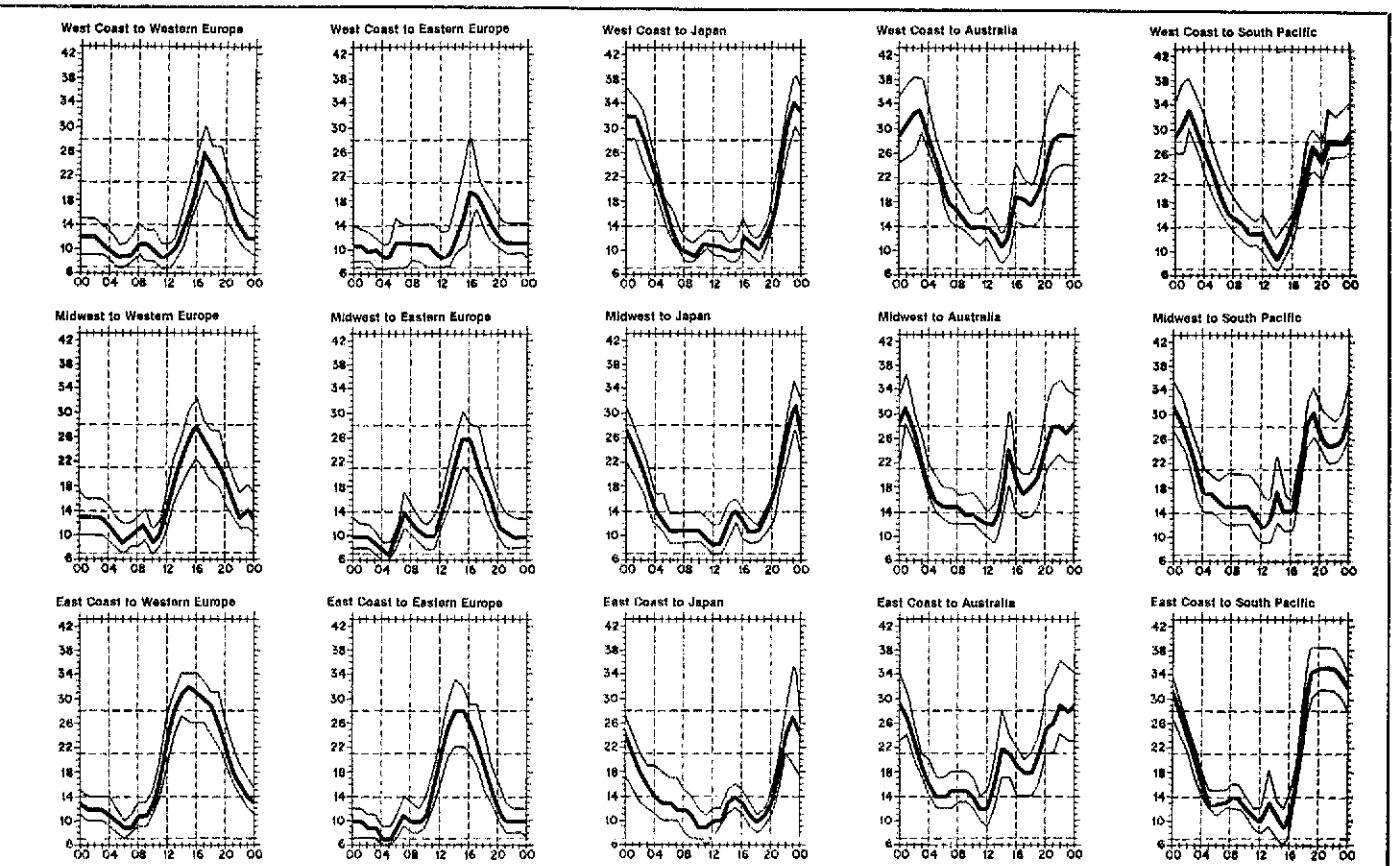
QSL MANAGER VOLUNTEERS

K1NCD N8CJV
K5QPT WB8RDN
K9HVS
N2AWM QSL manager for Asia and Africa

Be informed that, effective immediately, these bureaus addresses have changed:
ARRL 2nd district QSL Bureau
NJDXA
P.O. Box 599
Morris Plains, NJ 07950

Note

In September 1981 "QSL Corner," page 53, appears an explanation of the ARRL-Outgoing QSL Bureau. December 1981 "QSL Corner" contains information and addresses for the Incoming Bureaus. For information on bureau operation (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111. QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, *for a* complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for January 15 to February 15, 1982, assume a sunspot number of 118, which corresponds to a 2800-MHz solar flux of 164.

DX Century Club Awards

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. There are now 318 countries on the list, and the DXCC Honor Roll (published in the March and September issues) highlights those ops who are within 10 countries of that figure. Each DXCC certificate may be endorsed for additional countries over 100 — in increments of 25 up through 250, increments of 10 through 300 and increments of 5 over 300. This listing contains the call signs and exact country-totals of amateurs who've joined the DXCC or increased their country-totals during the period from October 1, 1979, through September 30, 1981, as well as current members of the DXCC Honor Roll. Think you may be ready for DXCC? Write Headquarters for details.

Mixed

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270

AC0A DL9NA I8RFD K1AR K1KTB K2MGR K4KUZ K4LNO K4WSB K5TA K6MT K6RSY K8TMK K9TUS KB0FZ N2RR PY4ALC SM5AJR W2FHY W2LOG W6YQ W7SFF WA5SUE WA6OEC WA9AEB WB5DDI WB8VPA WB8ZRV

269
14EAT K7GM KH6BZF N0ALL SV0AA W1CNU W5YH W0JIN

268
AE5H G4CNY K3CHP K4FX K7AII K8MN K8MPF K0JSY KA1NL N4IR ON6OS W4LF W9MCJ

267
AD1C JH7BRG K0KES N4HU OK2BBJ WD4RCC XE1OW XE1OX 5T5CJ

266
AA4KA AF6Y AG5H JR1FYS K1RH K1YHM K5OC K0MOL KA4C N8TT N0SS ON7WW SM5BFC W3KJ W5REA W6BZ W6SIJ W9IT WA1ZLD WA3DMF WB9NOV Y45RA

265
DK1YK DL7DX K1WC K2IJL K6QGV K9BIL KB4I KB9JH N2JV NA4D VE3CPU W6AYQ WA2MNM WB2MIY YU2BOP YU3TE

264
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263
AG1J I1BWI JR1EBE JA8GZV K2IGW K4FW K4PHE K9GN K9DEQ KA4BFT N6JT OH2AC W4ZWZ WA2LMW WB1GDG WB4PRM

YU4VTU

262
EA9IE G3ZQW IT9TNO JF1EZH JA2GBO JA7JWF K7CU K9US K0LST KB8ZW KH6DI KL7AF LA5IU PY2FNB W1RV W1WEF W4CEB W5YZ W6IA W8KBZ W9JF WB5ZGP

261
AA4MW JA5JGY K1HOO K6XN K8ZO KB8LT KB9BR KB0F KE9A KN8R LA1H N4ZS OH2BLD SM6ID VE2AGP W2MT W3WGS W6DBP W6DPD W6RQ W8PBO W8PCS W0KZV WA2NSM WA5ZUH WB2RKD WB5LBJ/DU6 YU2CDL ZL2ASM

260
AB1U AJ9D DL7WL DL9YC G3YDX HB9T JI1QPU JA5NG K2QF K2SX K4ON K8DJC K9TI K0ARS KA5ACC KB9UV KP4EBQ KS6A N1AJO N6VI SM0BZH VE3CF VE3MZ W1NB W2IFK W3ARK W3KH W4WXZ W5ISF W6CQ W6RON W7GB W8CEU W8MFW W8MYG W0RT WA1LJB WA4GIQ WA4JJW WA4SKE WA7NEQ WA8NDL WA9USE WB4KRH WB7QXK YU2CAW

259
AA4TP AG8B DF6CY JA1FGB JA2YKA K1EFI N4VG K5TF N4SX W3DO W4PRX WA8KEM WB6RWJ WB9LFD

258
AI3Q K5CG LU8BA W1GVZ W2HL W7ZI W9OFV WB4KCL WD4NKP

257
K2PZ K9ARZ KB2CV KB5DO KB6OZ N4HB VO1EJ W1AJO W2TE W8LJP W9NNE 5W1AU

256
DF2HL

JA2EIV JH6UJP JA8CYU K6GXO KA3BFX KB4HU KB5QA N4AYO SM7HCW W2PTI W6YX WA1BZS ZE3JO

255
AD5O AI3N DL7HT JA6VA K4DSE KB6JK N0XA VE3DZV W0JCB WA7CWM WB3CQN WB3GPR/ WB4BHQ WD9IRV

254
AF2O I2ZQD JH1APK JR6EFE K9IHA K0EQU KG4F N8SW VE7BAF W6LDI WA2FUE WA2IFS

253
AB1A DF3FI HP1AC I2AY K2LX K0BX KB9IG LA3SG N6JM NC4U W2MOF W9KXW WA4WPO WA5QCH WA9MGK WB4FTU WB7RUV WB9MSV 9J2BO

252
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251
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250
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KB4SH KC5HU KF6A KX4H N1AOZ N2BIM N2UN N5HB N6YI N0ZA VE3GFN VE6GY W1HEO W2FTY W2KN W3SOH W4TJC W4VN W5SG W6SSC W8GMH W8CHV W9NNC WA0ULU WA5TOS WA6YQW WA8EUK WB4MXI WB5PBA WB5TZZ WB6NHV

249
AJ6V DL1KS IS0LYN K4HHM KB8IZ WB4IWW WB9VIN

248
F8QB G4FEU K3WOK PY5EG W6UR W8MR WB3CHS WB5SKQ WB8GWB WD8NBD YU2AAU

247
AG4S AJ8J JH5FQO LA7QI N3WH N9DX N0TO WD5HRX 4X4KM 9Y4VU

246
F3CB IV3HL KB3TN KB4EN KU4N SM6BXV W4WEG W7OAX

245
I3BLF JA1EF K2PH K4TIA K4XQ K8DL KA4Y N9RB VO2CW W1PL W6NLG W9NSO W9TX WA2CYQ WB7WIM

244
HB9TE K4WJT W0QWS WA1KUL

243
K7EQM N6BFQ N8ACA WB6SHL

242
K2PX W5VJG WA7JWJ WB8AAX WD8RIU ZE3JJ

241
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240
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WB4QFH XE1JTR ZL3BK

239
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238
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237
AF7S JE2HCJ KC9W LA2GV LU1SE N6WK SM5DKJ W4WW W7DAA XE1VV

236
EA2QU KC8A KN2N SM6AYM VE3ECP VE4OP WD4NBX

235
IT9QDS K4GUS KA1DS KC9Z N6ADI WB2THN WB3FIY WB0UFL

234
AA4CQ DJ6BN DK2XX DL8MAG EA6ET K3OX N6SA WA6AIL

233
AA9U AJ3H G4BWP K4NS K5NV K8EM KG2A W1TN W4XC W6RLB WB4EBX WB9QPG WD8DXG WD9CPX 5T5ZR

232
AK4N HA5KBM I2GXS JA9DDM K1GFH KR4F N2YQ OK1MG OK2BLG PT2VE WA4ZMM WA9URY WB5YKD

231
AE3S AE3Y EA7OH JA7AWZ JA9MT K2BLL K5YT K7GD OK3CEE W1HR W5MND W6SJC WB2KCI WB4VUA WB8TRW WB9WAD YU1NZW

230
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229
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LZ1YE OZ7NJ W3GTL WA4GHO WB3FIZ WB5ZKR WB6FCR WB0LJU YU4VBR

228
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227
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226
AA5C DJ5PA DL8VN EA1SQ HA1SB JA1VDJ JR6BU JA9GPA K1ACL K2BSM K4JEZ K9BLY KA1R KB2HZ KB2QN KB3HE KB9DO KD0Q LA9LS N5CB SM6BZE W6TEX W6VWV WA2QAU WB9EIW WD8CBP YU3AE/>

225
AF2L AH2E AI8D HB9ANK HC1HV HB9HX I2MOV JA2DOU JA5ELM JY5ZM K1XA K2JGJ K4MRZ K5PR K6ASI K7LJQ K7NHV K8ES K9WA K0AL K0AXU K0CVD KB2RZ KC4B KC5M LA5WN N2WS N3VA N8BIK NL7M VE4IU W2HKE W2TZ W2XL W5IB W5JE W5SGT W9CA W9FPZ W0RYW WA1NSJ WA2AOG WA2OOS WA4DZM WA8RTF WB7TXY WB8DOD WB8SCD WB0LXM WD4GSF WD5GJB YU2JG YU2OM YU2RQN

224
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223
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222
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221
DF3TN HK3AXT JA2IU K1TO K6DZT K8BVV K8ZE KC4FX KV4X N4CT OK1DDS OZ7JB PY2BCQ SP3GEM VE7YC W4YE W7FF W9NYW WD8OWM ZL1ADI

220
AD7Z DL2QB HB9AIB JA1ATF JA1CZI JA5KT K3NS K4GFH K6ZOR N8BKF OK1ATZ OK2SW UV0EX VE6EO W2NL W6ZID W8RV W9ALP W0JIG WA0FBQ WB6RSU WB9UKK

219
AG6Q G3TMA I6CCI JA2HMF K0EVE KN8M N5MM N6MA N7ALX VE1MF W3GIA WA2KDB WA7RKJ WB3LGO YB0ADT

218
KC4OH KT4M N8AXY W6RPK WA4VCC

217
AE1T JA5QJD JA9SQO PA0BE WD9COI 4S7DA

216
F8OZ JA6PN KC4UQ KD7J N0YC SM6ARQ W2SR WA3EEE WB4CSK WB0YRN

215
DF9RW DJ7JC K1PNS K9VFE N4TZ SM7ABL WA8JOC

214
HZ1AB JA1JQY K2NT K4KSV KA5BML OZ5KU W1XK

W3FV W4QO W7FOF W7POC WA7RQS WB5ZAM WD0FSI YU2CBV

213
EA1QJ I1UNO JE1TTI JH6KXG K2PK K5ARH K6OP KC6X W9DS WA0HMP YU2ROZ YV1TO

212
AI3Y DF2ED EA6CE G3COJ JH6RYY K9RHY LA4LN N8BQB VE3CEF VE6CJO W4MOY W7RA WA1GSO WA4LRF WA4ZEC WB2CJL WB9MFC

211
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210
DJ6OV K9UJ KB4E KK6X PA0RRS VE3LDT W5FGO W6MYP WB1FRZ WB6TUH 4X6AG

209
AC6T DJ7YM DL1EV HS1ALP I2XIP JH7BDS K3RL KD2G N1NA N3ARK N3AUE N8BLZ W1JT W4GBU W9FAM W9NUD WA4LZR WB2QEU WB3EWB 9V1TL

208
AC7P EA7TV G3XTT HC4JL HK0EHM JA9NLE K1BUR K6SMH W6BL W0EJ WA2MUA WB8PHO WB8VKL WD6EQP

207
AB9V DJ3XD HA5AW HB9WZ JA7EMH K9MBQ KB6Q KB6ZL KG6GI N5CE SM5HYL VE3IKZ W4DKL W4FL W9UZ WA2NPD WA2YEX WB2LNY WB4DWU WD5BCY

206
AA6O AC1O AD8O AD8V DF9ZO HA5KKB K1ALP K3QIA K4FWR K7PM KA1HQ KB7SB KB9OF

KD0B N8BBJ N8BC N0IN SM6BGG W1ETH W9GN W9CYY W0JSN WA4PMU WB9IDU 9V1SH

205
DF4FO DK9MC IS0DTK K1FB K2FW K7RS K8IC K0SW KA1W KA3R KA7IJA N6VO N7WS SP9CAV VE3HGD W3PTV W4TL W6OUL W9EIZ WA6BXV WA8TKT WA9QDO WB1FSW WB3FID WB4SLV WB9EEE WD5HUD WD8LID

204
AI9F AI0O DJ4SO DJ4XC DL7DK DL7EW JH1OYH JR1ARK JA2FUJ JA5UP K0PCG KA3EGU N6BOI N8AAT SP8ECV W1QU W4FUI W6DH W7KHD WA4HHG WB2KJL WB3IGR WB5CRG WB5PLD WB6VSC WB8WKM WD4ABN WD4KWI WD4SHMX WD5JFM

203
DJ2OW DJ6DU DK6NJ DL4FL EA8RL HB9BZA K1THP K3RL K3JW K4JAG K6UGS K7JH KA4P N3ACU N4SN W1HSS W1JNN W1XX W3MPN W4QYL W6KUZ W9JI W0OIZ WA1LOU WA3FWA WA4JXI WA4TYJ WB3KAM WD4ARY YU1NSN

202
AF9C DJ7ZZ FG7XA HB9AGH HB9G JJ1KUV JR2XJO K4CGV K5GOE K7PY KB5WQ KC5I KM6K KM6N KQ4M LZ1AZ N1AFC N3TO N6IM N6PV N0JW SM6JAO SP6DMJ W1RFW W3BBL W6ESE W7JAC W9LOF WA1YWH WA2LJF WA4VDN WA6SZE WA7IHN WB2YJG WB3DJF WB0GGY

201
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200
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199
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198
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197
DL9HN KB4LX N5BA

W2KXL W7JKA YU3LF

196
AC3A K4ZGB K5DEC KL7JAI 6O1ND

195
K6UV K9MZJ KA3BDW KF4H WA2PHA

194
K2QXS NI4H OH2PQ W2YC WB7TLE

193
K4HTY WB6SRK

192
K4HAV K4ITV K6ELQ K7WA K9EN KR6Z W1BWS W3MR W0SA

191
N9ANR

190
DL9TW JA4ESR N4UV SL0AS W1PWK W6HPE WA4MIT WB0RSH WD9ACQ

189
CT1SH DL2GV G3HJC K3GQJ K4ELV OZ2E WA6WEI

188
JR3GWZ K7SZN OK3CFA W6LEN W9HI WA5NUK

187
F6EVS K9APW K9JU KB6KF VE4UJ W5VFJ WB0QP WB1FVO WB3BOA WB3KUH

186
AA4KY EA4YL G4GIR LA4AT N6NF SM7ASL

185
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184
K6QC KD8F W3GNQ W0RIC

183
DJ1QX HK3TF JH6BZI K1RB K9UQN KB3OM KN4F SM0HEP W9VY W0TU

182
AC2P DJ2YE DL9GH EA2LY GM3LYY W2KVA W8BCL W8GM WA9REC WB6TIJ WB8VKL WD8KCO YU3SE YU4EXA

181
AB2W

EA7AXA I3PQM I0ZSG K2IBW K6VL K7ZM K0FA KA3BVI KB5IY KB8EC KC4IB N4MA N4PY W2IY W6ZS W7SLU W9IVB WA2ECA WB1BVQ WB1GOO WB4YFF

180
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179
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178
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177
A51PN AF0O DK3YD K2QE K4KH K0IIR KB7SC KB6TE N4DVW SM6JNT W3FVX W6FAY W8CD WA1TIV WA4YZF WA6IGU WD9DCL YU2CCJ

176
AA2F GU4EON JA8MHG K6KCM K0RWL KF2G W5ONL OK3IF W4ZBA WA2CWP WA2PID WA6SIX WB3HTK

175
AD8J AF0Q DK8KC HK2YO I8SCV JE2LQX JA5CKD K2PF K3AER K8DD K0TB KA2FRW KB8IO KB9UG KD6LB N1CQ

N1II VE5ADA W3DDG W4OYI W5TZN W7LHO W8UPH W0BF WA4MCH WA4OAX WB1CNM WD9IOS YU2RTC

174
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173
AA8Z AK1N DF9RM DK0EK K1GVW K1KOB KA1DJ SM5BDV W4SYY W5RKK W7FLD WB3JUK WB6GFM WD8DXN YU3TFS

172
F6CXJ K5XE N6DHV VE6AJF W4HLY W4NTO W4OMY WA4JTE WA4VSL

171
CX7BY DL1NG KA9FKL KG5J OK1KRS PY5OGG W6TD W6TOG WA3VUQ

170
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169
DK7NL HB9ANM K6QPE KC8E OY9R VE4MG W0WAN WA2DFC WA4SNI

168
AJ4X F3CY JE1PNC JH6HYC K4SJ KA1KD KA6CQQ KB8LZ WA4FKK WB6VGY YU3UAR

167
AB2Y W1GUE YU3DTN

166
AB5G AJ8L HB9AJY JA2IIG K3VW K4ZIN K9BQL KC8BK OZ5MJ WB3CNB YU3TGN

165
DF2PW DJ6GK EI7CC I3VJW N1AEC VE4ADV YU2AAA W4TYZ W7HRD W7HZL WA4MDS WD6AKG YU1NOT

164
AK0M DL6UR JE1BQE JE1CYH K0HQW KA5CWE LA1S

OK1AUP W3UHP W8EY W0ANZ WA1YLN WA2JLM WA4ZEL WA8EQP WB4MCH WB8TZP WB3IET

163
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162
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161
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160
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159
DF1FX JA1DNZ N4NG N8FB PA0JIL SM6DEC VE3BXF VE3DOP W2JQ W4GIO W6CSI W7RYS W9FI WB1AIE WB9TOU

158
DJ1PT EA1JO HB9AJU JA1SFL JH4UVU K3CQY K6NN KA1DOS KA2GQW KD6F VE3XM W2FVJ WB6DQP WB6QPG WD9OKJ

157
AC2U AE4A AK5H DL3HC EA5FP HB9AUT

HB9JF JA2BOV K2RZ K0DEW N3AKO VE2FOU W3NQC W5QOT W6RDS WA1HXH WD8IDE 4X4JO

156
DF9ZP DJ3BE HB9ARH JA1NTK K1OXD K1TH KA4F KB5FV KB8AU OH9SV ON6RR OZ8XW SM5IMO WB6EKW ZS1JD

155
AI7P DL8AK I2DMI JH1RFR JH4UYB K0TVD KA1JE KA4GKQ KA7OBS KA0ALX KB5EK N9UN WA2PPV WA3UXU WB2IZX

154
AE7P AJ2P G3OLU I8EWM JR3RRY JH7AEP K2AVX KA4VB K0SI KA1CMP KJ4V SM7FYK SM7GCP W4FHI W9ISF WA9IAF WB2ICL WB2IRK WB5UFR WB6KJE WB9UIO 8P6IB

153
CT1GC DL3CT F8DU G3EGG JE3BIQ JA7BYA JH8NYK K5DPG KA8AEO KA8ANQ KC4FW KP4DGT KS4C LA6KU N9BAF N9RC W4WFB W6DSY WA4GQA WA4NTM WA8UYN WB3FHG WB5NBY WD6COR WD6EKO YU3TZZ

152
CT2CJ DL7ZR I8LPR JJ1AOS JA2JRG K1DII K1FPJ K3JZU K9TTM KA4BWO KA4DLC KB4CD KB9TN N6VV NI4Y PY2JSF VE4ADG W1ISD W4ET W6PKB W7SE W9GXR W9TWM WA1GTQ WA1ZVI WA4ZBK WA5YTX WB2QLO WB6WOK WB7PST WB7UXK

151
AK8A DF3FR G3EZZ I8MSY JA7RPC K3MD K4PR K8HF K0SCM KA3DBN KD6EU N1AFW N1AMB N4BCN N4DSR N7AYK N9BT OK3CO SM6NT

VE5JQ W1AUT W3IVG W5YB WA3VPL WA4OPV WA6MXD WA8TMI WB2HIQ WB2YEL WB3CJQ WB5YGS WB0AFO WN5MBS XE3RT

150
AB2C AD1V AG3H AI2F F6AZT G4JCC HA8CH JH1XUP JA6CBY K3UKO K9VFA K0KWU K0VGB KB9MI KC4PY KI4L KK4A KO4O N2AMS N4EZ N6DR N8AV N0CC VE2DPJ W2RC W5RKT W7SX WA2PYI WA2VCM WA3OFR WA4BBN WA6TDX WA0ECB WB1AHF WB2FUE WB3CZK WB4ETD WB4RZN WB4VMS WB5OON WB7NFK WB0OHI WD4MLO WD9CJG WD9HWY 4X4GD 4Z4OL

149
AA9L K0DQV KA1GC N1BHC N8BRT OZ9QW SM0JDR VE4ADA W1LMO W8ZNH WA6YTD WD4MJP WD8KZS

148
DK2PS EA3WZ K4HCA KD7P N9IF W4JD W6OA W8QID W0SL WB3KKX WB3TAH WB5NBY WD4KQC

147
AG0J DJ8CN K3LHD K0OGH KA1CH KA9ERV W2SEC W0OGJ WD5DKT

146
DL0II JA2JZT K2CC KF4N KL7JHI SM7EL W1AOQ

145
KA3CGM KB7OD WD8DSB

144
JA6EOR JA8BFY K4KWT K8KBB S8AAT WB1JVL WB7QFI WB9QDT WD5IAF WD6CMT WD6EEQ WD9GIQ WN4KKN

143
AB8J DJ6HD GM4FDM JA1KNZ N4OE N9EZ OH1FS W4JFL W4LSI W7KQH WA8WAS WB3JZN

142
JF3KNQ K5IMC KB4O KB6SP N2CM VE6ARN WA2JAS WA4WQH WA7PQL WB9JOV WD4BXI WD4HYH

141
JF1VST JH7IMX K6TMB KB4FO N2GW N8DL OZ1TD W1IQ W7JFI W7KE WA2GRG WA2PAT WB9UAO WD4KWU WD9EPE

140
AC2N G3PYM K1IJU K1UFS K2RSG K2ZSY K8QWG K9VTD N2OL N3MC N6AFI N7RC OE1KJW OK2BJU W3HMR W5UXE W8LNL W9WYN W0PXW WA4GFG WB4WHF WB9KHK WB0SYT WD4LRB

139
DF6NT DJ5TW F9GO G3GMY K3PA KA4LXZ KC9A N2DR N6JE NH6D W2CU W4ZEI W9JR WA2NDB

138
EA6GB JH6LLR JH7UJN K3KR K7CE W2HBL W9HPG WA0OVU WB6FDQ WD0AWP

137
AE1J AI4W DA1UO G4ISK K7CI KB3ES N4EY PY7OD W6DDB WA6URY WD2AGS YU1NHV

136
I2XRG KB3D KM5K KZ4D N2IT PT2LS VP2MM W4FCC WA5WDB WB1AUL WB3DDS WB4YOL ZL3PO/C

135
EA6FY F5WF FG0DYM/FS7 JA2CXK K4BZH K8BA KD6EO LJ2ZY W2ILT W8TWJ WA1VWQ WA3JLD WB2FTK

134
DJ3CQ K4QHN K7JWZ KB3FA KB8MG N8BFA N8MAW PY6ABZ VE6OA W5EW WA4HMQ WA8YWR WB2LUD WB3DIP WB3FKP

133
DK6EF JA1IHE KA2CDJ KF2U N6EL TR8AC VE2FMH WA4OXD WA6OMA WB1ACI WB5TEQ

132
AC5G AD4Y AD5E DF5DP DL0XX G4EXD HB9BKP JR2IEG JA7TJ JH7LVK JA9KGU K2QY K7FC K7JVM K9KK K0DFC KA2HTH KA5LT VE3JM W1IBZ W3NJL W4POH W5UO W8FN W0WDW WB0QOY Y51SA YU2HJ 6Y5RL

131
AC8Y DJ5KB EA7ALG HA0HS HK3SO K1QEH K9AYK K0FPC KA5ELC KB2MG KB9OX KK8K N4ARO OD5MX SM5CAH VE3LWL W0WJ WA2BXT WA4JZS WA9HNU XF4MDX

130
AA4RM AE1O DK9IM DK0ZR DL3RC F5DE F5JF HA8CZ JG3FEA JH3XGD JA0BMS K4EED K5IU K8HHZ KA2CLQ KA4JMZ KA5FUI K5ET N8BKZ N8IZ VE3KPD W1BDU W6ENK/KH4 WA2OVG WA9NAY WB5FGO WB6JMS WB9PIR WD8IAE YU2BST

129
DF9ND DK8BL DK8ZB HB9BMR JE2KSM JE3SAE JH7CUO K6OX KB8PK KB9PY N4AFU N9AGB OZ7MP PA0FDJ W5IMJ W7IMZ WA2VQS WA4GFC WB4PPW WB9JLL WD4NWW WD5JYU

128
AA9D AD2S DL3GK JA8IRI K2DSO K5JV K9AOK K9NR K0CY KA1ED KA2BLI KA2LKZ KB4Q KB8QD N4BBB W6FWX W8MD WB7RQE WD0FNF

127
AG7P AK6T AL7AC CT2DE DJ1BG F6EXC

HB9BMW JA2JJP K8IAI KA4DHX KC4OR KO5C LA6TW W3AIC W4WSZ W5WF W0IQZ W0MJN WA2SEL WA3VUE WA5SKY WA8CAJ WB1ARG WB5HBR WD9BHK

126

AF3B DF3FC DF6EX I2CR JA1JXR JR2HAE K2BLA K2EXI K3BFQ K0AYO KA2CFH KA5BOZ KC9C N2EO N4AII N9AQB 5B7AW VE3IIU W4DFU W5HEN WA1TQP WA2JCX WA4BCN WA9UCH WA0USA WB5NAA WB9TDR WD4PVI WD8KEO WD9DIO YB0ALT YU3LT

125

DJ7AT DJ8GM G2ANT G4ORS GI3ZCK HB9BOM JA1XIA K1FR K1GW K1MNR K8YZ K0ARR KA3CMR KA5AGB KB7SF KC4HR KG4FW KL7JC N4AIG N8BBK I2BEV W2HGI W2TV W3LDD W4PPT W5KNE W6DQ W6LUL W6MUO W7LI W9GGN W0BVY WA1YIO WA2OVE WB1FPF WB1HKV WB4YHF WB3GXD WB9BCR WB9JVR WB9WHQ WB0RHC WD4AJA WD4GSG WD9EJE

124

DF3TL HB9AUM K4ADI K5JII K5JN KB6XO KI7I KJ2H KL7IF N0BKY W1JA W2KHQ W5LBT W9COY WA9DYV WB1DRE WB2LJK WB5OFB WB7RBA WB7SGU WB8AJC WB9TZZ YV5CEZ 5H3FW

123

DL7HX F6AKZ HB9BBB IT9MTH K5YPV KA7GPR KA9EMF N2GZ OZ1ABA SM2BUW W4LWS W4OJV W0OIR WA4OMI WB0EHC WD5DHY WD8PKF YU3TBG

122

DL7OU I0FFO I0PVT K2YL K7BVT K9WWW KA9DOS KB2HC N9AHL OK1APS PA0JJB SL6DO SM6KRE W2JU WA4NXQ WA0GWC WB2RAJ WD4FIG

121

DL7EY EL2EV HK3BAE JF2ACK JH2JUK K3LVO K4IHI K0JTW OE1XBC OH2LP VE1BWW W1OD W9TNZ W0CZF W0PBK WA2ULA WA7PDW WB4GQL WB9JOH WD4OCO YU3EIJ

120

AA2P DL3WA EA8LK G3VTT JK1GDD JR1OLW JA2QVQ JE2GAL K2GLS K2UVG K5UBO K6ARE K0ZFL KH6CZ KH6IJA N2BJX N4DQ N5ASP N5BDH N5DU N5SW PY8HP VE6WV W1CUH W2AOY W2BKH W6FWK W9FFQ WA1ZDW WA3OVC WA8SJX WB2AMU WB2HJV WB4PUE WB5VDL WB7DBP WB7TFT WB8TGS WB9NMN WB0VYC WD4IZR WD6BQN WD6EDY

119

DF7AU DJ9HX DK0KO DL1NN JH2WBI K8XF KB9BX ON6IT SM0JHF VK5RD VP9DL W4NNF W7KEY W9FJ WA3GUT WA4KWC WB3HWB WB4VMB ZF2BP 4X4RD

118

DK7ML EA6AMR F6ARN JA1JAT JJ1RZN JA3UPM K4CRR K4CTY K5WA KC0DA N6AXD OE3PKU SM4CEZ VS5IX W4HL W8CU W8VUZ WA5HOD WA6GGC WA6IRN WA0EBZ WB3KAL WB4LJP WD0FAZ

117

DL6JT K2TY K0KCY KB8FJ KB0V KE5M N4BU OE1SKS VE3BFK W1III WB5UJN WB0UVN YU5XAF YU7ADA

116

DF1AI DF3NA EA5BRG J6LGL JH1BCY JH1OGX JA2CQX JE6EGC KA5CRO N2BIN P29NBF VK9YA W3ECN W4ERM W6ECI W6EDN WB3KAB WD9IPP

115

AG0U AK9Z DJ8TE DK7SS DL9MP HC1NS JA7NVF JA9UX K1GRB K4AHJ K4AXZ K5JEZ K5XI KA2EYR KA9M PP5AVV W2HKM WA1YGA WA4OHG WA9ZUC WD9IVL WN5FAI

114

AF6F AP2SA CT2CI DF6AI EA9GD G3ZSS HK5JS JL1BLW JH2PYX JA4UDP KA9DAO KB5AS KJ6F N8AJF PA0LIE SM7AVZ W4TAS W6LVY W8DCW W0NPH WA1IZS WA5JVQ WB3EVL WD4JNS ZS6ANL

113

AF9H DF2NL DL1VJ DK4ZZ DL1XT JR2JZR KA8ELW KB2CT KB9H KB9M KF6R N8ARA VK3BFQ W4RQA W8UT WA2NEW WA2PSU WA6CQW WA8WMC WB1BXS WB3FAA WB5EFJ WB8RUQ Y24IJ

112

H44SH JA1VS JA4COF JH4PRU K3LDR K4KYI KA1CEI KA4EMR KA0FPK KB4PY KB8XD KB8YG KL7HHX N2ZM NO4J W1KSC W6OGC W6IJE W6TJS W0GN WA2SXC WA3WOO WA4NRQ WB2GZU WB3GWS WB9TYT WB9VTG YU2LM YU3TIR

111

AI2O AJ6O CT2YB DF3MI JA1KFH JA7CCZ K3JS K4VHH K8QYC K9KVA K9QOF KA4BAS KA5CCO KG9E LA8QI LA9EF N4CIS N4CWL N4DSS N4TL N7CY N7NF OE7JLI SM7FPZ TF3AC VE2EDO W4MAT/SV W8HYQ W9YRZ WB5NXH WD4HZM YU3THI

110

AA5I AB6R AH2H AH4AA AI1E AJ9H DF6NW DK1EK DK5CI DK8BI DL3SM DL7UB DL9HP EA7FC G3BPV HA9RE HB9AOF HB9BDH HC8EE I6VYV IH9ZYP JA1AJK JA2FGL JA7AXB JA7WKG JH7DFZ JA8DON JH8MFS K2JEK K3QMR K5KW K5MHZ K8LDS K9VGE K0ZK KA1PF KA2CRN KA3CFR KA3CRC KA4MNT KA5AJB KA0BAI KA0FNY KB8LH KB9LB KB9LI KF5U KF0F KH4J LZ1AB N4DPT N4EOF N6LQ OK3KJF ON4EC PA0FKP SM0DZH TF5DC TG4NX/W4 VE1FH VE3KUH VK2AYK VK3LG VP1KS W2HFO W6QLD W6KHC W8GWC W9MMJ W0YHE WA2IFL WA2LBW WA4EAV WA4LBT WA4ZFL WA8FCH WA9SUG WB1CWT WB1HIX WB2ODN WB3COD WB3FYT WB4OIT WB4SMI WB5SVG WB6NXK WB7DHC WB7NKY WB7QYI WB7REV WB7VUF WB0NSA WD4ACJ WD6CKT WD0AKS WD0EWO YV5HUJ ZL2AUP ZS5NW ZS2MI ZS5BK ZS6ST

109

AA5E AB3D CX3BBH DF6MB DJ2JS DJ4EN DJ5FI DK5BQ DK6UR DL8WD G4FCT HB9BOO HB0QL JH2RWP JH5FTY IH6UBT JA7LDA K0BD K0MPH KA1BEE KA1CR KA5GHR KA5GJO KA8Y KB6MD KB7MM KB8JG KB8LL KD6BO LA9DP N2AFW N4BPO N8BBB N9AQT OZ4CG PA3AMN SM6HPL SM7CQY SM7HTH SM0BHF VE3ANG VE3OCU VP9JM W1JNZ W3FG W5RJV W8OJI W9NUF WA1SHR WA9CTH WA9RCQ WB2SJA WB3DCT WB6VJX WB7TIJ WB9MHX WB0RYN WB0URA WD9BAJ WD0CQW WD4FZO YU3CCD

108

AA4GA AA0U AF8N AF0W AG9V AI7M AJ3N DJ6LM DJ6PL DJ0HV DL0CM F6GXB G3VKO HA5MO JA3DBD JR6LKG JA8KSU K2FQU K5GTL K5NS K7QKA K8GAG K8RW KA1A KA2BYC KA2CIW KA2X KA6GBI KA8AWG KA9CKJ KB1H KB2KN KB3HB KB6UF KC4EY KG7P KK6K KN2Q N1ACU N2AIR N2NW N4CMJ N4QL N4XC N5BV N5FJ N5GE N7ES N8AHK N9ARL N0AIE OK1ADJ PA0MAW SM6AVM SL0FRO SP6HTQ VE3JFS VE3OY VP2KAH W1IAN W1PZR W3DGK W3POP W5EU W5UCY W6ABW W8QBY W8VK W9DCB W0GK WA1VTW WA2GIB WA2ISM WA2TCG WA4LLE WA7TNE WB2KKS WB2ODO WB5LBT WB8WFS WB9ZJW WD4EPX WD4LOZ WD4MPG WD5FVQ WD5CPR WD5GLL WD8DMX WD9GQV YU2CRM

107

AA4SS AI0M DF1PB DF6TC DF8BD DK0BN DK0RB DL2UE DL3HF DL0HC G3YEC GU3MBS HB9BKT HB9BZD I4KYO J6LGK J6LOO JA1EMQ JA4YPN JH4MUQ K6EKP K6QS K9RFW KA1Q KA2CVM KA4EWX KB3V KC8CN KD4BY KG0N N2AWM N5CAS N5PC N8SL N9ADL N9AMW N0AN NE4F PA0XSA VE2AJX VE3JGC VU2WA W1BK W3FPO W5EIU W5VJW W6MTV W8JCC W0LV W0RSR WA1SMH WA2KEK WA2RVF WA2VZQ WA4BVB/KH2 WA4OKW WA7ZUG WB1DLA WB1FYV WB1GLJ WB2ELV WB2QZZ WB3FVJ WB3HPJ WB4GFO WB4UNW WB6IYM WD8QBP WB8ZUW WD0CHC WD0EUP Y32VJ YN1FMQ 4Z4LG 7P8BH

106

AB2Z AB3P AB6M AF5W AG2M AG4V AG9E AI9L CJ1MK DF6JC DJ3TQ DK5ZZ FO8FU FP0MD GD4HOX HA5LV HB9BYZ HR9XX HB9Z JA1HEH JJ1IHS JR1CQZ JA4ENN JA7UFZ JH7AJY K1LGM K3OXS K4BAM K9DHI KA3DRO KA9BKW KA9FYA KB7ND KB0BL KD6GQ KR4P KS4Q LA4CW N2ABW N4CDZ N4CYX N6COG N6DW N6OU N8CLJ N9CIC N0BGI PA2RDL SM6KQK VE3GWM VE5TT W2SFN W4MAN W5CBN W6SWE W6TKF W7BYK W6SX W8BYK W9HAH W0LP WA1KSF WA4FUA WA4PCJ WA4PWF WA4SRD WA4YCB WA9AQN WB2DHY WB3JWJ WB4YFW WB5BSB WB5PKH WB5RYC WB5VIH WB5YPE WB6JGS WB6KXL WB7TAW WB8UZT WB8ZFB WB0TTA WD4BJS WD8MCP WD9DZV YU2CTG ZL3ADY

105

AB4Y AC9S AK0G CT2AO DK7XX DL6PI HI6XQL I0NFX J7DBB JA1GRH JF1TEU JJ1SOE JA4FCC JA6EIC K1TU K2KIQ K2KIT K3GEV K3JSZ K4MU K4TTO K6SR K8HMS K8MR K9SK K0HP KA1JZ KA3CTY KA4CAP KA4IKT KA5BTH KA8DDU KB2G KB3HZ KB7Q KB8SX KC4CS KF0Z KM4Q N1AFM N2DE N2WM N4BLV N6AFN N6HK N8BBD N8BCN N8RW N9ANP OK1AMU PA0EFI VU2AWL W1BET W3ADS W3WE W4WKQ W5AOH W5POG W5VNZ W6KG/TI5 W6NCR W6NOL W6TTK W7LT W7VCQ W7ZOI W8IRY W8LCU W9JOP W0PFX WA1UDU WA2ZKB WA4AFE WA4EMA WA4OET WA4SFN WA4SZZ WA4YNP WA5BDU WA5KOS WA6TFM WA8YJE WA9GFR WA0BNX WB1GXN WB2PVO WB3CDE WB4HDX WB4LMI WB5LWP WB5MTV WB5QPH WB5SRK WB6FHK WB7DZH WB7VCI WB8GSN WB9BBG WB9FFR WB9RFT WB9VQO WB9YLR WD4CJU WD4IIR WD5ETI WD5EWP WD8JSG WD8JXQ WD0DGU WD0EWQ WD4PEQ WD9BBL YO6AJF 4Z4NUT

104

AD5F AE1L AF9M AG5Z AK0B DJ0FV DK0SR DL6HN DL6YH DL9CA DL9XM EA8XS G4DNV HA1SQ HB9BOK HB9BQT HL9TO I3SYA J3ABV JR2MWZ JA0CIU K1CWG K1ITS K3ALL K3IJ K3YL K5HTF K5FZM K6TS K7ZOT K0IXC K0SUR KA1ML KA2ACM KA2ELT KA4BYS KA4CZO KA4GYU KA4HWG KA4RJC KA5CRT KA5FLX KA8A KA8DL KB3AP KB6N KB6O KB6YV KB7NP KB7QD KG4KG KG8B KM4M LA3JI N1AN N2HS N3ANP N3MW N5APA N6BFA N8BMQ N0GW N0LL PA0FRS SM5FBL VE3BAK VE4UX W2RUK W3TB W4CYT W5TEN W6TAG W6TWO W9MYY W9QUT W9YX WA1DWE WA1YOC WA2HZT WA2KGD WA3UIY WA4FXJ WA4HHJ WA5TWF WA6JQB WB1CSE WB1GKT WB2KHH WB2MCB WB2MMB WB2OLG WB2RME WB2SBO WB2UKT WB2VOQ WB3CMY WB3ICL WB4PIQ WB4YFZ WB7EIA WB7OGV WB7PAP WB8IXG WB0SAX WB0TEC WB0WOL WD4CBA WD4ILV WD4KSZ WD9DWC WD9ECT ZC4MT

103

AA9F AF2A AF2I AF3W AF7P AG6C AI9W AK1L DF6QG DJ5TU DJ8GO/W2 DK7EO DK7SB F6GBH G3SHL G3UFZ GU3HFN HM1QD I5LIN JH1FGR JE2JML JA6AKV JA7KPE JT1KAA K2RVQ K3CET K3CR K3KNL K4VUD K5IW K9AJW K9OAJ K9VSO K0BM K0JVN KA1BXW KA1KE KA2BYH KA2CWJ KA2DOX KA4OJY KA6UXY KA6IYE KA0UIL KB2TY KH4ZM KB6CC KB7JE KB8JX KB8XN KB9RM KC2L KD6NH KF4S KF5V KG6I KH6D KH6JOF KI5S KI7X KJ5W KN4Z N3FG N4RI N6KW N6WJ N7BIJ N7SU N8MK N9BN OE1OEW OH2KN OK1JST OK3KVE PA3AIK PY5CIG SM7GGK VE3GD VE3IFS VE3ILE VE3IQV VP1KG W1VS W2ODH W2YH W4BND W4NWM W4WN W5JQ W5OG W6KSF W6LK W7ABX W8ANM W8QZV W9EO W9MVR WA2RSU WA4BVX WA4NTP WA4QZR WA4VPH WA6BEX WA6BFG WA6NHP WA6OYV WA6POZ WA0MWZ WA0SXV WB1AAP WB1ACZ WB1ATJ WB1DED WB2IVO WB2LCH WB2SZM WB2ULI WB2VJO WB4RXR WB4SXN WB5NQW WB5OVI WB5WDA WB6ZJZ WB7FHH WB7QEP WB7SOH WB8WZI WB9EVH WB9JBF WB9NYG WB9QIZ WB9UKE WB9UNY WB9VOZ WB9YCK WB0FAQ WD4HKK WD4HUT WD4RJQ WD4SDA WD6ERN WD8DQR WD8LCF WD9AEU WD9OGA WD9FKS WD0EKL YU3TAN ZF2AG ZF2CI ZL2BDF 4Z4JS

102

AA5F AA4AT AA4FF AB8G AC1C CT2BD DF9BV DJ0TP DK3XY DK5WP DK6IB DK6ZN JA1VDL JE1OFL JA2LMY JA3MKM JA7TAP JA8GTO JH0BDK K1AH K2UKM K3CI K3YVA K4CMG K4CQL K4MZK K4XA K5PO K6PWP K8KM K8QJO K8YVT K9PVY K9WTF K9XL K0GSX K0JHH K0XB KA1CDC KA1CXC KA3BRG KA3CQB KA5FPK KA7CRP KA7DLC KA8JZR KA9DFS KA0AHR KB2CB KB3MC KB4JR KB4VJ KB5ZC KB7HH KB7OA KB8KS KC4IG KC4IH KC4WK KC0D KD2T KD6DY KM4C KR4H KR4J N2AGM N2AKR N3AKX N4IQ N5ANA N5MX N8ASU N0CP NJ4C OE1WHC OZ8AN PA2VDZ PA0NR PT7CLJ S83W SM3LGO SM7FHJ TF0TJ UA3LX VE3AVG VE3FJB VE3IMV UP2SAX W1CTF W2IFM W2KJN W4IAT W5HKA W5JW/KX6 W6NGX W6SBE W6SCC W7PGY W8IRT W8LQZ W8LUI W9CG W9OFF W0GCN W0UKK WA1UAW WA2BVN WA2JZL WA4EPN WA4UCU WA4WKL WA5GOT WA7VII WA8IMD WA9BBX WA9WGT WA0QID WB1FDY WB2FQI WB2JVE WB2KQE WB2SOU WB2WUN WB2YET WB3FPA WB3IMA WB4NAU WB4UAM WB4ZIH WB5LBR WB7ODR WB7PKO WB8UEL WB0RAO WB0WLI WB0WOM WD4LMJ WD5COV WD5EWQ WD8AFK WD8KKW WD9ARM WO9CYR WD9JBK WD0FIR/KL7 WN6CND ZL3AZ ZS5MY

101

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100

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Phone

363

W6AM W8GZ

362

PY2CK W2BXA W4EX ZL1HY

361

TI2HP VK6RU W6GVM W6BF

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K4HEF

358

I0AMU 4X4DK

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334

G3JEC I2SM JA1BRK K6JG K8RTW KH6BB N6AR SM6CKS SM0AJU W1JWX W4BRE W4JVU W5KC W6GH W6KNH W7EPA W9QLD W0SFU YV5AHR YV5BBU

333

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332

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331

EA4DO F2BS F8RU F9IE HB9AAA IV3PRK I4ZSQ I7SCA I0JX I0LLZ K2YLM K6EV K8VUR K0BUR LA8LF OE2FGL PY2CYK VE3GMT W1BIH W1ICU W6YB WA0OAH

330

CT1BH EA4LH K4BBF K6GA N4WF ON8XA SM5BHW VE3CTX W3RX W4QAW W5MQ W5IIX W6ARJ W6KZS W7JFO W7LFA W8RI W8VHY W8GKM WA1ATP WA3IKK

329

DK2BL I2LAG JA2AAU JA7MA JA8ADQ K6EXO K9MM OH3SR PY3CB SM6AEK VE3NE VE3UX W4OPS W0MYN WA5IEV YV1KZ 6W8DY

328

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327

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326

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324

CT1UE D4CBS F5VU F6AOI G3LQP I1APQ I1GEA IX1BGJ JA3APL K7NN K9SM K0CD OE1FF PP5UG W1WB W2FP W2FXA W2HZ W3XM W5LQC W5USG W6XP W7QK W8CNL

323

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322

I2AHG I2LPA K6XW KB5JX KE4I SM4EAC SM5DQC W2FG W4BBL W6KPC W7EZ W8MZ W0YDB WA2VEG

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320

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CT1RM G3WW I3ADI JA7EHU K2GOU K3SGE N2SS W6ZYC XE1J ZS6BBP

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312

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311

IT9SEZ K4MEZ K6YCM K8ZR K9RF OH2BR W1BUH W3GE W5UP WA1ORP WA4CXZ WA6AUD

310

DL8KS G3SJH I2SLA I7RNH JA3BQE JA8BAR K1CMI K6HTM K6XP KB3PJ N4ZC N5NW OA4BS PY2BW W2CC W2GA W2MIG W5OVU W6GTL W8FF W9ABA W9QQ WA4MMO ZL1AAS ZL1AMN

309

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308

EA3NC JH1CJQ JH1VRQ K6PZ N6ET OZ5EV W4CYC W0QLX WA1AER WA4JTI WB4NDX

307

AE4X DK6XR DL6NX JA1BWA JA3AQ K1ZSI K4XH W2PSU W4BFR WA0KDI WB2QMU ZL1ARY

306

CT1MW DJ6FN I5AFC JA3MNP JA8BIO K2UFM K5KR K6JAD K6MA LA3XI VE3II VE4AS W2SY W3AP W3ICQ W9MMZ WA4DRU WA4TLI WB9EBO ZP5CE

305

DK3SF EA3TT HP1XRK I1FNX JA1DFQ K1RAW K1UO K2BK K2POA K8CMO W9KB PY4AKL PY6CN VE1AVX W1JJ W2IOO W6KON W7BJ W8NVP W9YRM WA8PYL

304

HB9AOO I2BVG I0DUD JA3CMD K4TO K5VNJ K9PQG N4RA OZ5VT SM5AQB W2LZX W5SP W9ZTD

303

CT1UA EA3SA I5FCK I8JN I8LEL JH1HWN JR4OZR K1MEM K2UO K4PQV K5UKN K9ALL N4NX W4MWT W4NBV W6RRK W6RJI ZL1AH

302

AA6AA DL1MD I1HAG JA2HNP JA2JKV K6AO K8SQE W1BFA W3ACE W6BDI W9HJ ZL1BIL

301

AA4AR AE5B CX9CO K1DFC K4AEB K4NJS K8NA K8NW LU8CW N3ED N5DX VE4BI W1FJ W3IF W4YN W6TSH W8SET WA1KYW WA4NIB

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K9HMB K9IKP N3UN N4CQ N5FG N5UD N6RS VE3FJE WA4LO W6BCQ W6ORD W7EOI W8KNH W8MAW W8MEL W9RY W9XM WØRWC WA7UVO WB4QGI WB5HGJ WB6RIU WB9BGJ

299

DJ1BV EA3ALD K3WS K5FM K7SP KA4D N6MU N7US SK6AW W1YRC W2GT W9VCQ

298

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297

EA8OZ K4PI K7UT LU2AFH W4TFB W7BKR VE3MC W6GO

296

EA1FD EA3AOC F9IV I4WZK JH1ARJ K1MM PP5YC VE3AMJ W1LQQ W4DJJ W6RFX W8EZ W8YGR WA6UET WB6WHM YS9RVE

295

EA8LD F6DLM IØMBX IØZG JA7ZF N2KW N9BW SM6CMU TG4NX W8QBG WB4LFM

294

AI8S I1PHX F6DZU I1BAF JA8EL JA9ESZ K6RF K6NN KØFLL PAØKB W1RR W2OKJ W3CDG W6ZZ W9IVG W9ZWH WØBL

293

JA1FNA JA2JSF K5GO N3US N6SV SM6VR W6BJB W7BCT W7JVG W7YR ZL4LZ

292

DK5WS I2MQP JA3GM K4SE N6MB N6OC OE1BFW OE2GKL PY5GA W1PCD W3FDP W3HYJ W7ELU W8GIO W9DOR W9TA WA4LOF WA9PWN WB1DQC

291

AA4VK

AC4B DJ3AR DL7SY EA1QF HI8LC I2JQL I5KKW JA8HQI K2GBC K2JQG K3KA K7ICW KP4A LA9GV N2CW SM7BOL W4DUP W4EBO W7AE W8CY W8LU W8PCA WA3KCY WD8MGQ

290

AA4S DL8XL F6BDS I3DSE I8SAT JF1BSD JA3DGC K1GXU K5GZ K7UR K8HV K8VIR K9GX K9MD KØIUC KT4G SM5HPB W1HRI W1ICV W1KSZ W4LVM W2NC W4ZCB W5LQN W6PMT W7FP W7YEM W8PNC WA4OOM WB4JLO WB4RFZ WB6WIW YV5BPU YV5CIL ZL1AJL

289

DF1DB DJ3CP DL8CM I5BDE JA2APA K6SX KD4S KF2O KG4W PAØLOU W2IOZ W2JGR W2MPI W3FZE WA6OGW WB9HIP XE1NI

288

DJ3CN JA8BMK K6ZXS K7OXB K9HQM KA7AUH N9RS W1TPK W5MUG WA4DAN WB7NCD

287

AB9E G3VKW JA1GTF JA2KVD K4UAS K9KB N3RL N4QF N8BO SMØMC VE3BSJ VE3MRS WA1EOT W7LZF W7RQ W9XX WA2IZN WA4GKR ZE1BP ZL1ALE

286

DK8NG I5EFO JA1JWP K4QPR K7KD K8GWM K9KU K9VAL N5AJW W2SM WB2CEI WB3CIW WD8MOV

285

AA4CK DF4FX JI1WRM K2GX K4GXH KC5JW N4PB PY6TM W1VKQ W6OMR W6XH W9DE

284

AA4R CN8AK DF6FK

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283

AC8L IN3ANE IT9UAG K9VQK PJ2FR W2EV W2HXF W2QL W6TXL WA5EZQ WA8HTN WB6DFX WD9CWJ XE1CI

282

DJ8RI EA4AM HK3LT K1SF K8PCZ KØVRW KA1BU KB2XS KB6HT KB8BS PY2DSQ W1EED W2ZZ W6MUS W7TE W9RKP WA6OIU WB3FOB

281

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280

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279

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278

CE3GN

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277

DL7LV K1CV K3ZUF K9MK KB5FU N1TZ N9MP W2BHK W4FOD W4RA W6BWG W7GUR WØKU WB2AIO WB2HPP WB6WCW

276

IV3TQE IV3YRN K2EYJ K7LAY K8UNV KH6BZF N4YO SMØAQD W3KA WA1URV WBØOQV ZL2AFT

275

CT2BB EA3KW G4HUE K7GLL N2AQH KØSVX VE4JK W2IJB W6ILH WA1UVX WB6VSK WB9VDX WD9AHJ

274

AA4KT AD1S DA2DC I4FAF K3GBZ K5BG K8WD K9UA N4UU W5EFA W6CN W7DSZ WØVNZ WA4FVT WD8LJX

273

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272

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271

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270

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269

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268

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267

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266

AC6V N2KA SM6CTQ W3KJ W4JD W5EU XE1FX

265

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264

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263

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262

DK4YA DLØWU EA9IE JA3BG K1WJ KØJS KB9KB KC7T OE1GHC PT2TF W5AYZ W8GS W9RW WØYMH WB8RMD WD8JAB

261

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260

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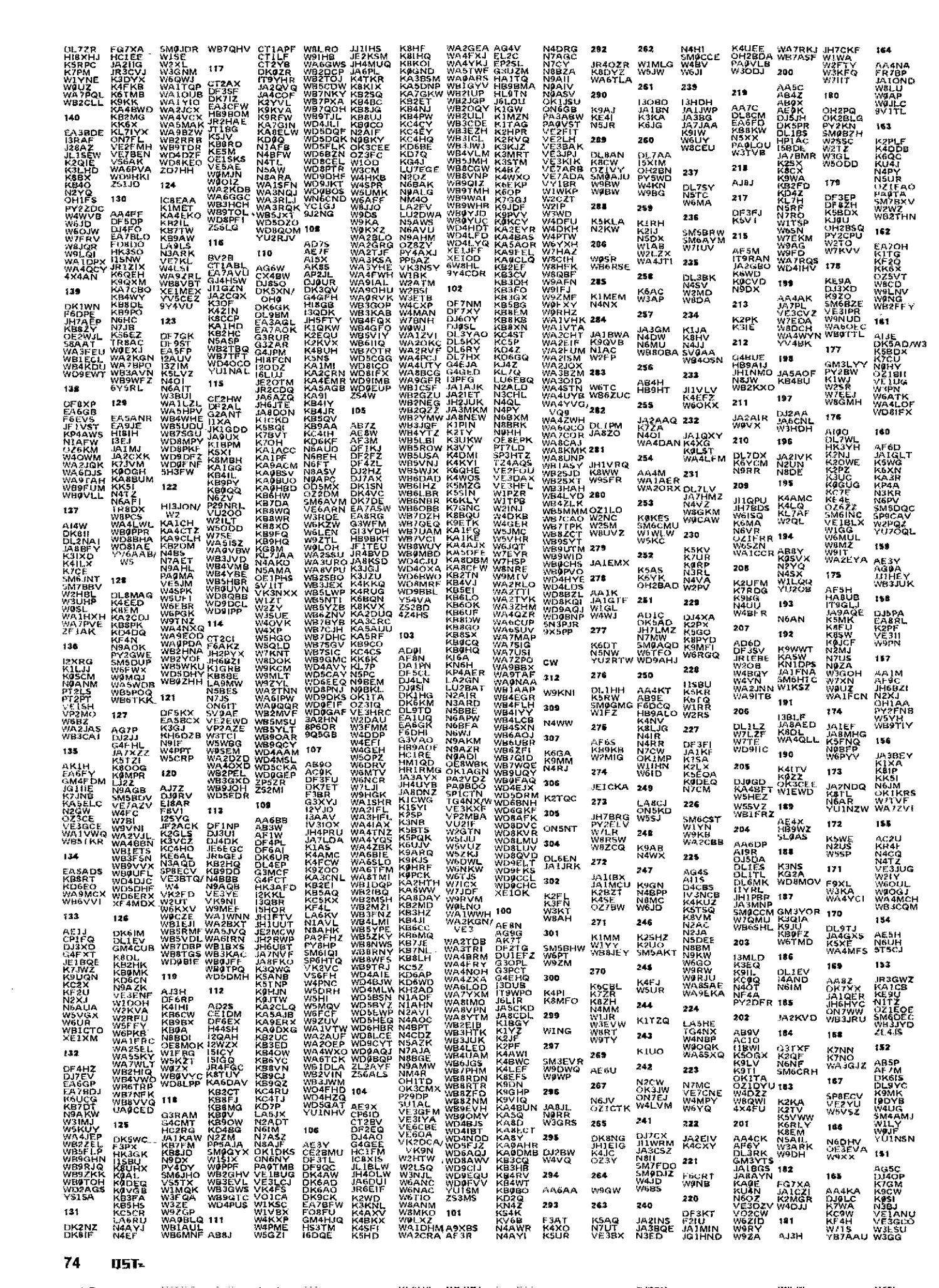

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WB9WRU
WD4AHZ
WD9EJE

124
AJ5Q
HB9BFU
I9YWH
JA7AWZ
K8BA
KB2BK
PY2BBO
W1IQ
W3FAF
WA4RRB
WD9DCL

123
AA2F
JA2JRG
JA8IRT
K9SM
W4MQX
W5ASP
XE1VV

122
DF5QH
JA2IU
K5PR
K7SP

121
HB9BBB
JA8CYU
K5IA
N4HU
LA5LT
SM7FYK
W7VF
WA6PNY
WB8TRW

120
AD3R
JH3XGD
K8HF
N6AXD
OK2QX
W3YY
WB9UKK

119
K4KFH
ON5EU
K7OEW
W9QKZ
WA1UVX
WD9GGY

118
K1EM

KA5CWE
KB6HT
PA3ABB
VE6CJO
W0EJ
WA1ZIC
YU2RSE

117
JA8DNZ
K2AIQ
K4LNG
N2IT
OH2EJ
OK2SW
VE3KUC
WA4FVT
WD9IVC
ZL1AMO

116
DK6NJ
DL1MD
DL5FF
JA3UPM
K4RS
N6LK
NE4F

115
KØDEW
KA3DBN
KA8DJZ
KD0Q
LA7XB
N4ARD
ON6RR
WBØBY
WBØYRN
4Z4OL

114
AA4FF
EA1JO
JH7AKT
K4QHN
9VISH

113
JA2IIG
K2LS
K2OB
LZ1YE
N9WA
W4FGH
W4GBU
W5AQ
W5IMJ
WB4WUO

112
DJ1QA
DK9NM
DL1VJ
HB9ASN
JG1QGT
K8YZ
KB8EC
N5DJT
N9YL
VE3DAP
WØGN
WB9VIN

111
AJ6O
EA2LY
EA7ALG
GU5CIA
GW3GWA
IK1OAR
JAØBMS
KØAQM
K8KBB
KBØF
N8AQV
NØXA
OH7KJ
SM6JNT
WA6FIT
WB9VTG

110
AG3D

F5QE
HB9BFU
I8JOV
JJ1AOS
JF3AUA
JH4UYB
JA5PUL
JA7AXB
JH8IVO
KA4HWG
KA6NNN
KM4D
N6DM
OH2VD
PA2FOR
VE2FDU
VE3FEA
W8REY
WA2HWJ
WA4OHG
WA4RDS
WA8KEM
WA8YWR
WB3FHO
WB4CSK
YV5HUJ

109
AG5X
DF7KG
DJ3BE
DK5XO
F5WF
K7DOR
KA1DOS
KA2EAO
KA2X
N4MI
N5FG
N6BJG
OZ1EOL
OZ1EUO
PP5AVM
SV1IW
W6CRE
W9CA
WA4YZF

108
AF5K
DK3OI
DK5XF
DK9PY
DL7CQ
G3EZZ
IT9ZGY
JA5PWW
K5EE
N7DA
OK3CAR
OZ8QW
VE1BGQ
VE2DQ
VK1PG
W6SZ
W7TC
WA9EOD
WB6FDQ
WB9WZN
WD5GLL
WD8KGZ

107
AK1A
DF3EC
DJ5VQ
DJ7IT
DJ7LI
G3VTT
JA7IKQ
KA1DS
KA2GCS
KB9LI
KD4U
N6IC
NØGA
OZ2E
PP2ZI
W1LJ
W3FE
WA2CSO
WA4EGQ
WB2FXK
WB3AVN
WB3GPR
WA4YZF

106
DL3MQ
JA1GRH
JI1FOL
JA2AOY
JH2WBI
K1ITS
K3OX
KØZK
KA2GQW
KD1O
KM5R
LB8CA
N9FC
NA4D
SL9FRG
SM5KAS
VE6CHW
VE7DRB
W2XL
W4MLA
W4NTO
W5VGX
WA4NEU
WA6KCX
WBØYLP

105
AB1J
AK2O
AK3X
DF1NT
DF1OF
OK9NH
EA1VM
JA2EGM
JH2IIH
JA3DBD
JE3FSD
JA4ENN
JH7ARV
K3IGJ
K3RL
K8MVZ
KA1Q
KA4Y
KA6AUX/5

KB9QK W2FCC WD4HWI WB3JZN PAØLUS JE1BQE
LA8KD W2IQB WD6GAR WB6VJX SM7EL JH1LME
ON6FX W7JAC WB7FCQ SMØJHF JR1EBL
PA2CHM W9HI WB8OZX VO1CA K2LFL
SM2EKM W9RKP WD8LCE W1GKJ '4KKJ
W1HSP WA4OML 102 YU2AAU W2GA K4PB
W3XN WB7NCD AF1U ZL1ADI W2MEL K6ZUR
W4NZR WB7NZI AJ7Z W3YAF K7EC
W8MD WD2ADX AK2H W4VP K9ARZ
W9NTY WD9GIQ DK7JI W5VGF K9GX
W9PEL WD9IFW G3GHY 101 W6IC KA3CGM
WØDZ YO2BTK G3XTT W6SYL KA4CPT
WØJIE ZS6ANL HB9BTX AA4AT W6TD KA5V
WA3BDU JA7UFZ AA4SS W7HZL KE5C
WB3FIY 103 K4JST AA6O W7YCK N1AJI
WB3HAZ AC6V K6TS AB0L W8GGX N7TT
WB8TUQ AK2L K6XT AFØQ W9RTD N9ACZ
104 EA5DD K7LAY DK7DO WA4DPU N9AIB
AA2Q EI4BK K9RR EI9CZ WB1BWX NN4B
DF7SE JH7QNG KØINR G3VDX WB1CWT OH2CE
AK5Q K3DZ KA7AUH HB9BMW WB5QOON SM5CCT
DL7IJ K3NB KB6ZL HBØNL WB5QPH VE2BP
DLØHSC K6OMB KB9RM JA1NW WB9UTY W1VFI
IN3KBZ KØIFL KD4BE JA1VDL WD4IIR W1YRO
IS0TC K9QQ KJ5W JF3FMR WD4SII W2IFK
JA1IHE KA1W KP6B JH7IMX WD8MRC W4KOP
JH1XUP KB2G KV4F JH7LVK WD9HSV W6NWS
JA0CIU KA3BOD KA7AUH K1OQG ZB2EO W4PCJ
JAØVBJ KA4CZO KB6ZL K1YHM W8TK
K2JF KA5A N1ATD K3KNL WØII
K3AO KB4UX N4BQC K7PM WA2VJF
K4KKQ KB7Q N6VT K9VQK WA4MFS
K4OAH KP6Q NØATT KA1CEI WA6OYV
K9RFW N1QY PAØRRS KA3CDQ WA7OBH
KA4IWX N4WQ SM6CNX KA7CDQ WBØATZ
KA9APB N4ZG VE3LWL KB1I 100 WB1DCC
KA7BDA PAØFKP W1AOQ KB2FS AA8A WB1EZI/
KC2X PY2CJW W2ZY KN6M AC1C VE2
KE2X VE1ACK W3MR KS4G AD9B WB2HDJ
N1JB VO1HO W4LWS LA9EF AF7S WB3BVL
N4KE W3DXK W5UJV N3CP AG6C WB4ANA
N6ADI W3GVR W6LEN N3MS AK9Z WB4STU
N6DFY W7SE W7IMZ N3SL DA2AA WB9PIR
N6DW WØUKK W9CG N5QQ DJ8GO/ WB9SPM
OE1WYW WA2ISH W9IZ N6NW W2 WBØNAA
OK1AXT WB3FSB WA1GSO N6SA DK7SS WDØAVG
TG9ML WB6TIJ WA1SPM N7IE EA5CQ YU2WG
VE2FYR WB8RUQ WA4SZZ OK3DA FG7TE YU3TAN
W6SWM WB9LHR WA7CWM OZ8XW G3YBH YU4VAI
HA8UA ZL1UJ

DXCC NOTES

Honor Roll Corrections:
Mixed — G3JEC 315/334.
Phone — G3ZBA 309/323.
September listing corrections:
CW — LA1ND/102, WD2ADX/104.
160 Meters: N4WW, N4SF.
5BDXCC Corrections:
FG7AM.

Strays

Would you give this license plate a second glance? If so, you probably enjoy antique radios, as does Robert Herbig, W6ME. The Oceanside, California, resident decided to display his enjoyment of that facet of Amateur Radio by choosing an old tube number for his license plate instead of his call sign. *(photo courtesy W6ME)*

This rock pile (middle foreground) near De Soto, Missouri, marks the country's center of population as determined by the 1980 census. Shown at their special-events station at this spot are (l-r) WA6POX, NØCPA, WØJZY, WBØJIX, KAØDCP, KAØLCT, KAØDCQ, KBØHK, WDØFNE and WBØOPO. *(photo courtesy KAØIAR)*

Paul Kangan, W4LAA (right), stock market commentator for "The Nightly Business Report," a PBS television show dealing with national business, financial and economic news, discusses material to be covered on the program with co-anchors Linda O'Bryon and Del Frank. An avid ham since 1952, Kangan affirms that Amateur Radio operating helped him develop his distinctive on-the-air personality. *(photo courtesy Gene Nichols & Associates)*

AGE NO BARRIER IN HAM RADIO

☐ Welcome aboard to these youthful licensees: Erica Burech, KA8NXV, and Peter Picard, KA1GKV (both 8-year-old Novices); Lesley Dale Walker, N4FTJ (10-year-old Technician); and Steve Mock, N6DTD, and Ted Bush, KA7DBO (13- and 14-year-old Extras, respectively). If you are looking for QSOs with any of the above, remember that a factor as important as UTC might be bedtime!

I would like to get in touch with . . .

☐ hams using Commodore PET computers for an idea exchange. Clark Stewart, W8TN, 104 Henrietta St., Ravenswood, WV 26164.

☐ any U.S. amateur who owns and preferably also trains harness race horses. Thomas Rylander, SM3DMP, Nyhamn 1164, S-87026 Bjartra, Sweden.

QST Profiles

Conducted By Carol Colvin,* AJ2I

Jean Shepherd, K2ORS: Ham, Humorist

With his distinctive, deep laugh, K2ORS affirms that ham radio is "in my blood. It's a calling, like the priesthood. I've been a ham since I was 12, and Amateur Radio still hasn't lost its fascination for me." That's saying a lot for this busy actor, author and entertainer. Jean has had his own television and radio shows, and has appeared on most of the big TV talk shows and at hundreds of universities across the country in his role as humorist. (Amateurs may have seen him at the Dayton Hamvention and at League gatherings in Tarrytown, New York, and Great Gorge, New Jersey.) As an author, Shepherd has amassed a faithful following in his over-20 years of writing regularly for publication, and his short stories have appeared in many major magazines. Two screenplays and six books are also to Jean's credit, the latest of which is A Fistful of Fig Newtons *(Doubleday).*

Shepherd grew up in Gary, Indiana (which he describes as "about as small-town and bucolic as Newark, New Jersey"), where he became obsessed with Amateur Radio, and cw in particular. At age 13, Jean had earned a 45-wpm code certificate, and his ham radio activities have been nonstop since then. As W9QWN, his first call, Shepherd enjoyed handling traffic and served as an Assistant SCM. He later went to Indiana University and was in the Army Signal Corps. There, he learned that "anyone of average intelligence, with motivation, could learn to send and receive code at 30 wpm in weeks — especially if you knew that if you didn't, you were going to go out and be a dog-faced rifleman."

Today, K2ORS especially enjoys DX — the feeling of uncertainty about it — and talking to new, interesting people. "To be able to sit down in your own room and talk anywhere in the world is quixotic. It's a romantic concept, and I can tell right away when I'm talking to someone who isn't philosophically a ham. There's a big difference between an amateur and a license holder."

With typical ebullience, Jean tells of his visions of Amateur Radio as an art and technique, of an amateur license as a privilege, and of operating as a joyous pastime. "Americans tend to think of a license as a right. Eventually, getting one will be about as hard as clipping out a coupon for 40¢ off Folger's coffee. There should be standards. Amateur Radio is a principle; it's almost like a religion itself." In listening to him, it's obvious that Jean Shepherd, K2ORS, is one of the dedicated disciples.

The man behind the wit, K2ORS, proves that Amateur Radio can be a "laughing matter."

QST: Your reputation as a comic storyteller and a ham dispels the belief that "hams have no sense of humor." Had any Amateur Radio experiences to quiet that myth once and for all?

Shepherd: Sure. I've always felt that life is like a gigantic play, and if you don't enjoy the show, you've missed the point of coming to the theater. Amateur Radio is the same, only it can be funnier in all kinds of ways. One time I participated in the 75-meter on-the-air wedding of two really crazy hams. They were married, each in their own shacks, 70 miles apart. The minister, also a ham, performed the ceremony from his shack in the rectory, 200 miles away. We, the congregation, all came on in unison at the end, amid the QRM. The groom faded out a couple of times, but when it was done, it was "official." I don't know whether they ever moved in with each other, since after all, they both had beautiful towers that neither was willing to give up.

Recently one night on 20 meters, I was talking to a guy in Christchurch, New Zealand; it was a great night for DX — 20 over, armchair copy. I was sitting there talking (we were both on VOX), and my little dog was asleep in the corner of the shack. All of a sudden I heard this hoopla, this uproar at his QTH. His dog had come into the room and started to bark about something. Immediately, my dog starts running around the room and barking. For about three minutes these dogs were barking at each other, having a conversation across 12,000 miles. We humans didn't say anything — just laughed like crazy. Since then I've appreciated my dog more because she's the only dog I know who's had a QSO on 20 meters.

QST: You've been an amateur for most of your life. What other unique encounters have you had that were related to radio?

Shepherd: Well, I got hit by lightning once — a truly unique encounter! I was on the air on 20 one day in the middle of August, talking to a guy in Denver. All of a sudden there was a gigantic blue-like explosion. I was knocked across the room and didn't know what had happened. My rig was absolutely ionized. It was gone — a smoking blue hole.

Then there was the time I had a run-in with Elmer the Shark. Five of us, all 16 years old and all hams, bought a huge, shoulder-high barrel full of millions of "surplus" parts from a joint on Chicago's "Radio Row," presided over by a guy named Elmer. We paid $10 (two bucks apiece) for the monster, and it must have weighed half a ton. We finally got it into our Ford V-8 after wrestling with the barrel for about two hours, and promptly broke the two back springs in the car. When we finally got it into our basement and began to parcel out the loot of millions of resistors, condensers and so on, we found that half of the barrel had been filled with concrete. Elmer the Shark had struck again! Instantly, five idealistic young hams were turned into mean, slit-eyed cynics, a condition that remains with some of us today!

QST: Everyone's first on-the-air contact is special. What was yours like?

Shepherd: My first contact, I remember it even now, was on 40-meter cw. It was roughly 10 at night. I was running a 6L6 oscillator, which I had gotten out of *QST*. It was called the "QSL 40" because it was the size of a QSL card. At that time you could buy a chassis exactly QSL-card size, 3 × 5 or whatever. It really worked! I even remember the frequency — it was right in the middle of the band because I figured it was a safe place to be. (I didn't want to have problems with harmonics and stuff.) So I bought that crystal, but I didn't realize that there were about five gigantic 5-kW stations right on that frequency. They blew me off every time I came on the air. I had an antenna called an extended double Zepp, and I was only running 9 or 12 watts. All of a sudden (this was the second night) a guy in Brooklyn came back to me. I was in south Chicago, and I went totally bananas. I don't remember his call, but I do remember one thing about it that really hurt me — he never sent me a QSL card!

QST: Where do you think the tide of Amateur Radio is taking us?

Shepherd: I can't even seriously remember when I wasn't a ham, so I've seen a lot of changes. I am a little disturbed by the proliferating dehumanization of Amateur Radio by the spread of computerized equipment that is capable of holding QSOs between machines, without human aid. It's spooky. Also, I have noticed a distinct trend among many amateurs who show no interest whatsoever in theory, construction and even operating procedures. That's sad. Another major movement is the worldwide interest in contests, which seem to be almost continuous, with an endless repetition of numbers. There are many days when an actual QSO seems to be an intrusion amid the uproar.

Nevertheless, I'm a totally dedicated ham, and would never willingly give up my license. It's one of my cherished possessions. QST

*Editorial Assistant, *QST*

Conducted By Stan Horzepa,* WA1LOU

CQ HBO

Our frequencies and operating privileges are in jeopardy. While we were concerned about possible losses at WARC in 1979, cable TV operators were quietly making plans to use our bands from 40 meters through 220 MHz. Admittedly, some of our bands are shared, as is the 420-450 MHz band; however, nowhere is broadcasting or cable TV mentioned as a shared user of any of our frequencies.

We did very well at WARC, keeping almost everything we had and even gaining valuable spectrum. Now we face a new problem. You can hear strong commercial television signals right in the middle of our 2-meter band here in beautiful downtown Lompoc (California), as well as in Arroyo Grande, Pismo Beach and San Luis Obispo. As noted in recent issues of various Amateur Radio publications, this problem is not limited to California; it is nationwide, affecting hams as well as aviation and other public service agencies.

Background

The cable TV operators receive services such as Home Box Office, Showtime, Cable News Network, and so forth, directly from satellites. It is impractical to distribute these signals as received, so the signals are scrambled and retransmitted on lower frequencies (scrambling makes it difficult for nonsubscribers to use the signal). The new vhf signal is then transmitted down the cable along with all the other TV channels.

Since most cable TV systems have already filled all 12 vhf channels with the standard TV stations, some frequencies outside the normal TV broadcasting frequency range must be used for the expanded service. Typically, users subscribe to either the standard service or to the extended service at an extra cost. If you opt for the extended service, a special converter is installed in your home to receive and decode the signal for reception by your television.

The Problem

Expanded spectrum is required to provide the expanded service. While it is possible to use the uhf frequencies already allocated for the broadcast service, it's more technically feasible and cost effective to use lower frequencies. The frequencies of 88 through 174 MHz, the "mid-band," are the most common choice. The cable systems are able to do this on the premise of being a "closed circuit" system. This is rapidly becoming recognized as a fallacy.

In recent actions by the FCC, severe interference problems to aviation frequencies have brought rule changes placing strict limitations on the cable industry. The FCC has fined several companies as much as $20,000 for violation of these new rules (see September 1981 *QST*, page 10, and FCC report no. 2504, dated April 24, 1981). The new rules require prior FCC notification and approval before any signal is placed on an aviation frequency. Operation will not be approved if there is any aviation user within 60 nautical miles of any part of the cable system.

In Lompoc, some hams can no longer monitor WB6QEV/RPT on 145.11 because of sidebands from channel E. Furthermore, it is impossible to communicate at all on several 2-meter channels. While the offending signals are stronger in some parts of town than in others, they are generally strong enough throughout the area to disrupt communications. Similar problems exist wherever cable TV exists.

While most ham activity in the 2-meter band is channelized fm, a number of hams are active in weak-signal operation. In contrast to fm operation, their activities are characterized by large antennas, high power and high-performance receivers. They typically work stations over 300-mile distances and operate moonbounce, meteor scatter and other exotic modes. A strong signal to them is 3 dB above their receivers' 1-dB noise floor. To these hams, leakage levels, such as those occurring in cable TV systems, are many orders of magnitude greater than the strongest signals they routinely use for communications.

Two-Way Street

Another problem exists. Cables that leak out also leak in. Low-powered operation (even hand-helds) can destroy channel-E reception for several city blocks, which, in a densely populated area, could affect hundreds of viewers. Amateurs, operating within their rights, may receive severe retribution from neighbors. If millions of cable TV viewers receive interference from a few hundred amateurs, who's going to put pressure on whom? We might face quiet hours or the loss of a band (or bands).

I am a degreed rf engineer responsible for a very small "closed circuit" rf system that gets telemetry from spacecraft under test a few hundred feet away. Since the system operates on the same frequency as "on orbit" satellites, leakage levels must be low enough so as not to interfere with Vandenberg Tracking Station, 10 miles away. While the system uses the highest quality cable and connectors, it is a constant problem keeping the system certified for closed-circuit operation. If it is so difficult to keep a small system with 15 or so connectors sound, how can it possibly be done with RG-59 and tin-plated, crimp-on connectors that are exposed to all of the elements?

In reality, the cable TV operators have no control over what is done with their signal once it reaches the customer. Unauthorized and illegal connections are often added. Agreements are often made in which the cable TV operator provides the drop with an apartment house owner, who is responsible for distribution, providing his own wiring and amplifiers. In both cases, it is common to find twin-lead, zip cord and single conductor hook-ups. It is also common for apartment dwellers to simply pull up the rabbit ears on their TV sets and get snow-free reception rather than bother with direct hook-ups.

Current Status

The operation of cable TV systems is regulated by various sections of FCC rules. §76.613b states that: "The operator of a cable television system that causes interference shall promptly take appropriate measures to eliminate the harmful interference."

That's very clear, and it's clear to the FCC. WB6GVO of Arroyo Grande complained to the FCC about interference in the 2-meter band. Only a week later, the FCC sent notices to the operators of the cable TV systems in Santa Maria, Lompoc and San Luis Obispo requesting that the offending operator contact WB6GVO and attempt to resolve the problem and to respond in writing to the FCC, within 15 days, describing the steps taken to suppress the interference.

How You Can Help

WARC has come and gone, and our frequencies are safe for another few years. However, the cable TV problem may well be the end of Amateur Radio. While the immediate problem is within the vhf bands, it is conceivable that it may affect other bands, including 40, 20, 15, 10, 6 and 220. The time to act is now, and we have to act fast before everyone is listening to channel E. The ARRL, Senator Barry Goldwater and many other concerned people are working on the problem, but they need lots of support. Here is what you can do: Complain to the FCC (Federal Communications Commission, Cable TV Bureau, 1919 M St. N.W., Washington, DC 20554, Attn: Cynthia Jeffries). Send copies of your complaints to the ARRL, Senator Goldwater and myself (I am compiling a central file of all complaints and comments).

Since the beginning of Amateur Radio, we have always operated on a noninterference basis. If the present trend continues, noninterference may well mean that we can only talk to each other on the telephone. — *Bob Couger, W6KPS, 1095 McCoy, No. 99, Santa Maria, CA 93455*

*72 Stiles St., Waterbury, CT 06706

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A VHF/UHF Primer — Finding the Moon

Last month, I promised to discuss methods of finding where the moon is in the sky in order to aim that aluminum monster of an EME antenna in the right direction. Accurate aim is quite important since, if one has built an antenna of sufficient gain to attain moonbounce capability as outlined last month, its 3-dB beamwidth will be in the order of 10 to 15 degrees.

The beginning moonbouncer may first try to aim the array simply by sighting the moon along one of the booms. This method is not particularly satisfactory for several reasons. The most obvious problem with it is that one must be able to see the moon; thus it can work only in clear weather. Not being able to operate when it is cloudy can be very frustrating to both you and the operator on the other end of the schedule.

The other difficulty with the visual sighting approach is that the direction of maximum radiation from the array may not quite match the direction of any of the booms. There can be a variety of reasons for this, from imperfect mechanical alignment to phasing or current distribution errors in the phasing harness. One way that many have employed to determine the actual center of their antenna beams is to use the sun as a signal source. This approach was described in July 1960 *QST* in an article by K2LMG and W2YBP. With the antenna pointed toward the sun, some have then affixed a properly oriented sighting tube to the structure so they can use it to sight the moon. This takes care of any boresighting errors, but doesn't help the weather problem.

A far better method is to be able to know where the moon will be at any particular time and to point your antenna at it, preferably from the comfort of the shack. There are two basic ways of determining where the moon will be. The simplest to implement and explain is the table look-up method using a U.S. Government publication entitled, *Tables of Computed Altitude and Azimuth HO214*, or the later version, *Sight Reduction Tables for Marine Navigation Publication No. 229*. The other approach, more exotic and less laborious, is to calculate the azimuth and approximate elevation of the moon for your particular QTH at the times of interest. The equations for doing this are:

$$\text{Elev.} = \sin^{-1}[\cos(\text{GHA} - \text{long.}) \times \cos\text{lat.} \times \cos\text{decl.}) + (\sin\text{lat.} \times \sin\text{decl.})]$$

$$\text{Azimuth} = \cos^{-1}\left[\left(\frac{\sin\text{decl.}}{\cos\text{el.} \times \cos\text{lat.}}\right) - (\tan\text{lat.} \times \tan\text{el.})\right]$$

Naturally, in this day and age, the way to use these equations is to run them on a calculator or computer. Numerous programs are available for doing this, many of which are presented in the *EME Notes* series available from Eimac Division of Varian, mentioned in last month's column. The table look-up method of coming up with the moon's azimuth and elevation, as do all of the programs based on the above equations, requires knowledge of the moon's position at a particular time in terms of Greenwich Hour Angle (GHA) and declination (decl.), the position in degrees north or south of the equator. This information is available in another government publication, *The Nautical Almanac*, published annually. Both this and the *Sight Reduction Tables* publication are available from the Government Printing Office. Also, many libraries have *The Nautical Almanac*. In addition to listing GHA and declination for the moon, *The Nautical Almanac* provides similar data for the sun. This information can be used to advantage in the antenna boresighting project described earlier.

Space limitations allow only this brief sketch of methods for locating the moon. The Eimac *EME Notes*, from the source of most of this information, goes into the subject in far greater detail than I can here, including instructions for using the azimuth and elevation tables. These are described by Joe Reisert, W1JR, in Numbers AS-49-1 and AS-49-26 of that series. [Editor's Note: For complete details on locating and tracking the moon, see *The Radio Amateur's Handbook*, 1982 ed., pp. 14-10 to 14-16. Also see the article beginning on page 33 of this issue, "A Simplified Procedure for Locating and Tracking the Moon," by Arthur Barber, KC2BO.]

In the forthcoming column, I will cover EME operating procedures.

ON THE BANDS

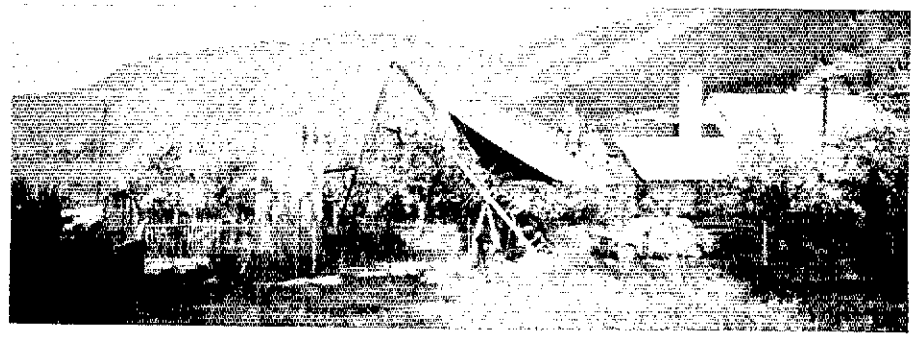
6 Meters — It is now clear that the F2 propagation this fall is exceeding everyone's fondest dreams. Conditions may even top those prevailing in 1979 when Cycle 21 peaked, according to the experts who keep track of such things. The sheer volume of DX contacts prevents any attempt to chronicle in any detail what has been taking place. I will, nevertheless, attempt to hit the higher spots.

October 23 was the first of the really exciting days for this reporting period, which runs from mid-October until mid-November. This was one day many a 6-meter DX hound sniffed the air and found a variety of reasons not to go to work. Their noses were proved right when an FB opening to South America netted a new country in the form of PJ9EE (Netherlands Antilles) for many, as well as producing LU9AEA, LU2DEK and PY2XB. Suddenly, from out of nowhere, came the strong voice of Kosie, ZS3E, who proceeded to work upward of 150 stations in the East, Midwest and West, providing a new country for most and the last continent for many. ZS6LN was also in on this occasion, working nearly two dozen stations in the 8th and 9th call areas. That afternoon brought the best Hawaiian opening to the East Coast that this conductor has ever heard. KH6s, IAA, HI and JJI all came through, along with the KH6EQI beacon. A number of hooky players finished their WASs that afternoon. The following day, a Saturday, was almost a repeat, but signals were not quite as strong. The level of activity and QRM was, of course, much higher. ZS3E and ZS6LN again worked many Ws, and the KH6s were into the East Coast again.

And then there was the North Atlantic path, which had also come alive during late October with crossbands as well as a number of interesting European calls on 50 MHz. The most prominent call, and definitely legitimate, was TF3SG. Thanks to WB5CTK, Sveinn has had access to an IC-551, and thanks also to WB6NMT of Lunar Electronics, a solid-state amplifier was dispatched to Iceland. Even before the amplifier arrived, TF3SG worked many U.S. and Canadian stations, as well as HC1BI, with only the barefoot transceiver.

A big day for a few fortunate 6-Meter DXers, including this conductor, was October 31. A station many of us never expected to hear came through with a very respectable cw signal on 50.112, if only for a few minutes. The country, Cyprus, and the continent, Asia, represented by 5B4AZ, went into the logs of those of us who happened to be in the right place at the right time. Talk about luck: W3XO, whose amplifier was down, managed to work the final continent with just 10 watts! That afternoon saw the best opening to Alaska and Canada's Northwest Territory in two years. Numerous KL7s and several VYIs put S-9 signals into the East Coast for about three hours.

The weekend of the SMIRK Contest, November 7 and 8, was variable to say the least. Once again the value of running contests such as this for 48 rather than 24 hours was demonstrated. The first day produced a very few contacts, although some worked EL2AV, and T32AB provided many contacts for the East Coast. The signal from Christmas Island was, no doubt, aided by another Lunar amplifier sent by WB6NMT. Sunday, the second day of the contest, brought more action with very good backscatter signals to the East in the morning along with a great variety of Caribbean and northern South American stations including J6LOV and J6LB, DL3ZM/YV5, YV5PE, PJ2DW, HP1AC, 9Y4LL and HKØBKX, all of whom provided lots of contacts and new countries.



This 18-foot (5.5-meter) moonbounce dish provides the OK1KIR club group with EME activity on 70, 23 and 13 cm. Check September 1981 *QST*, p. 75, for further details.

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 and record your message.

The site of FWØBK, which could certainly qualify as QTH of the month in W1YL/4's "How's DX?" column.

JA1BK operating FWØBK.

for a host of 6-meter DXers. Unfortunately, a strong transcontinental opening never materialized to really run up contest totals, but for a while backscatter was good enough to produce a few QSOs between the coasts. Later in the day, however, a string of KH6s furnished the interest for the West and midsection of the country.

Another great day was November 12. Following an aurora the evening before, the band opened early with the FY7THF beacon copied on the East Coast by 1130Z. This was followed by an excellent Caribbean opening, and a few snagged C5AEH (see below). A good transcontinental opening began here in the mid-Atlantic states about 1630Z, the second in two days, the KH6s, along with T32AB, were in as early as 1730Z. Once again, many found a way to stay home from work, and for a lot of them it paid off with their 50th state.

A DXpedition that is stimulating great interest as these lines are being written is the two-week trek by W6JKV and N6BFM to The Gambia, as C5AEH and C5AEG. These two are well set up on 6 meters with high power and stacked beams, and are conducting extensive liaison on 28.885. As of November 15, they had worked several hundred stations in all U.S. call areas. They had also worked KG6, VS6, quite a few Caribbean and African stations, plus ZB2BL and HC8VHF. More next month. In the meantime, for those lucky enough to work C5AEH, QSLs go to W6JKV.

Another DXpedition, one that will be history by the time these lines are read, is that of HC1MD/WB8ABN to the Galapagos Islands, as HC8VHF. Using a 10-watt Belcom (provided by HC1BI, and a two-element quad, Rick was off to a roaring start on his first day of operation, Friday the 13th. Only three days later he had racked up nearly 600 QSOs in 47 states and all continents. Prior to opening up from HC8, Rick had never before made a contact on 6 meters. QSLs for HC8VHF and HC8MD, the call used on the hf bands, go to P.O. Box 665 Cuenca, Ecuador.

The Japanese have been getting in on their share of the fun, too. Almost daily openings have been occurring between their island nation and large portions of North America — all but the part occupied by this conductor. Propagation for them to the rest of the world has also been exceptional. JA1VOK reports that he has been hearing the 5B4CY beacon on 50.501 since September and that on October 31, the same day that Cyprus signals made it to the U.S., he worked 5B4AZ for the first 6-meter contact between the two countries. This brings Hatsuo's total to 59. He believes that JA4MBM is now tops in the world, with 67 worked. Incidentally, K7ICW has been counting and finds that there have been 106 countries with some activity on the band over the past three years. So 6-meter DXCC is possible!

Speaking of country totals, I remind all who wish to be included in the next publication of the 6-meter DX standings box, to get their s.a.s.e.s to me as soon as possible so that I may send the proper forms for reporting your accomplishments. Plans are to carry the box again about May. To make that issue, I must have the filled-out forms back by early March. For those on the higher bands, this would be a good time to request forms for those standings boxes as well.

The great conditions have produced a Field Day for the SSTVers. AL7C (in Anchorage) reports working JI1AAF, JR3PSY and JK1BYK via this mode on November 8. WA9AHZ a prominent supporter of the slow-scan mode on 6 meters, cites a QSO with HC1BI on October 24, as well as SSTV two-ways with AL7C and XYL KL7HMH on November 10 and one with KH6IAA on the 12th. KB6CO also reports a slow-scan two-way with AL7C.

Another indication of the excellent conditions prevailing can be found in a report of the activities of K5CM and wife N5KW. Connie notes that both of them worked all continents over a 27-hour period October 31 and November 1. A similar tale is related by W2UTH. Hank says that he spent nearly 30 years on the band before making WAC, and now he has done it in about 44 hours.

I continue to receive many complaints about those who call the same sought-after stations day after day just to "say hello again." These operators not only make it more difficult for others who have not worked the station, but also run the risk of missing something they may need for a new country. Other frequent beefs are making long calls and calling while a station being worked is giving its information. I know it's difficult when this "sleepy, local band" all of a sudden experiences wild DX pileups, but we all must try harder. It will pay off in more DX for everyone.

2 Meters — All of the action wasn't on 6 meters. The higher bands came in for some excitement of their own, thanks to some fine tropo around the end of October. N4CD (Lynchburg, Virginia) reports an opening to the north on the evening of October 31, with VE3ASO and several New York state stations putting in S-9 plus signals. Good conditions also prevailed from the Great Lakes states to New England, although details are lacking as of this writing.

K5CM notes with pleasure the completion of contacts with all 48 continental states without the use of moonbounce by WØEMS, reported in the November issue. He points out, however, that he belongs in that exclusive club as well. Connie accomplished the feat in December 1980, so there are currently three who have achieved this difficult objective — WØSD, K5CM and WØEMS. Who will be number 4?

The W1JR trip to Rhode Island, over the weekend of October 17 and 18, was a real success in providing this rare state to many 2-meter EMErs. The efforts of Joe, along with K1KEC, K1MNS, W1RP W1UHE, AD1C, and W1FJH and son, produced the 50th state for WAØLPK/KL7, W5LUU, K5UGM and K7NW, and brought several others up to the 49-state point. Altogether, 25 stations were worked in less than 23 hours with only one station scheduled not contacted. This failure was laid to uncooperative Faraday. The smooth operation was helped a great deal by the hf liaison provided by AD1C and K1ICM, and by the fine scheduling job turned in by K4PKV. The contact with his 50th state was especially welcome to WAØLPK/KL7, as Jim had to take down his antenna system before bad weather arrived in order to prepare to leave Alaska for the lower 48 sometime in the spring. The array used at W1JR/1 consisted of eight 8-element Yagis on 12-foot booms designed by Joe. Spacing on each was 10 feet.

A new convert to 2-meter EME says that he's having a ball with the mode. After his old antenna system blew down last winter, WA4LYS (Jacksonville, Florida) decided, when he rebuilt it, to go all the way and achieve moonbounce capability. The new system consists of four 19-element Boomers at 110 feet. Naturally, both azimuth and elevation control are provided from the shack and Paul uses a GaAs FET preamp at the antenna. In the first two months of operation, seven new states were worked. What is particularly pleasing is that the array can be used for terrestrial modes as well as moonbounce. Anyone wishing a sked with Florida on any mode may call Paul at 904-641-2358.

1-1/4 Meters — Just as it has on 2 meters, moonbounce is showing its worth for state collectors on this band. In the past few months, K5FF (New Mexico) has worked six new states, three of which were via the earth-moon-earth path. The three states collected this way were Alaska, Pennsylvania and New Hampshire (the K1WHS DXpedition described last month). The Pennsylvania contact was with W3GPY, his first attempt at moonbounce. Another station becoming quite active on moonbounce is WBØTEM. Marc's array consists of sixteen 13-element home-built Yagis, with which he has boosted his state total to 31. His latest contact was with KL7NO, who is running a pair of 4CX250s to an array of four boomers. Another station to be on 1-1/4 meter moonbounce soon is WB5LUA (near Big D). Al should have an 8877 going by the time this appears. It will feed his 24-foot dish, a combination that should provide a potent signal indeed.

Not all activity on the band involves moonbounce. K4GL (South Carolina) is particularly interested in m.s. He worked W9UD and W3GPY during the Perseids last August, so he and the station have the capability. Unfortunately however, Jack has a TVI problem that prevents him from operating except between 2:30 and 6 A.M.

N4CD (Lynchburg, Virginia) reports that the same tropo session that produced fine 2-meter signals on October 31 also favored this band. On that occasion, Bob's 50 watts was sufficient to work W2PGC (western New York) for a new state.

70 Cm and Down — K4GL is in the process of assembling a 70-cm EME station. He has come to the conclusion that moonbounce on this band "separates the men from the boys," and finds that he is still a boy despite his mature years. He does not believe that he will encounter the TVI problem here that he has on 1-1/4 meters, as that is related to a fringe area channel 13 situation including a nearby translator for that station. Thus, Jack is particularly anxious to get going on 70-cm EME.

That same tropo enhancement, which produced 2- and 1-1/4-meter DX, also made its mark on the 70-cm band. The report for the best DX that I have heard about involves VE3FN (Ottawa). Ray found very good conditions, during the evening of October 31, lying along a narrow north-south corridor. This enabled him to work K4CAW (Greenville) and WB4ZIA (Charlotte, both North Carolina), for a new state.

In the 23-cm moonbounce department, WB5LUA has landed his 10th and 11th states as a result of one evening of work. Al hooked up with W6YFK (California) and W7GBI (Arizona), and then topped it off by QSOing DJ4AU and ZE5JJ. He has now completed EME contacts with a total of 11 different 23-cm stations.

In the terrestrial department, VE3CRU reports mounting 23-cm activity. As an example, Hans notes a seven-way roundtable that took place the evening of October 15. Stations involved were W2PGC, WA2FNB, WA2HQL, WA2BQL, VE3DKW, VE3QF and himself. All stations were running 1-watt transverters, which produced signals as high as S-9 plus 20 dB. Also active in the area is VE3BQN.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Calculating System Noise Temperatures

From time to time we all try to make improvements in our equipment in the hope of working weaker and more distant stations. Keeping in mind the old adage that "If you can't hear 'em you can't work 'em," improvements in receiving systems are always desirable. In real systems the components (antenna, preamps, etc.) are connected by feed lines that have loss. The information here should enable you to determine the effects of this loss, in conjunction with the other system parameters, on the overall noise temperature of a receiving system.

Fig. 1 shows the formula used to calculate system noise temperature in a receiving system consisting of two amplifier stages ahead of a receiver (or mixer). When you use this formula, if there is no loss between two components, set the feed-line loss between them (L1, L2, or L3) to 0 dB. If only one preamp is used in the system that you want to analyze, set the gain of the unused one to 0 dB and its noise temperature to 0 K.

Table 1 shows the results of a series of calculations for an EME system and a tropo system using typical (of a good system) values. As can be seen in Table 1(a) placing a good preamp at the antenna shows a 2.45 dB improvement in received signal-to-noise ratio over the same system with the preamp in the shack. Adding a second preamp at the antenna yields another 0.5-dB improvement, which is probably worth having for EME operation. Table 1(b) shows what happens with a tropo system where the antenna temperature (273 K) is much higher than in the EME system (50 K). Improvements are not so dramatic, but you can clearly see that putting preamps at the antenna generally gives a good improvement.

Before you go out and buy that expensive GaAs FET preamp to put in the shack, it might be instructive to calculate just how much improvement it is going to give you! Note: improvement (dB) = $10 \log_{10}$ (system noise temp 1 / system noise temp 2)

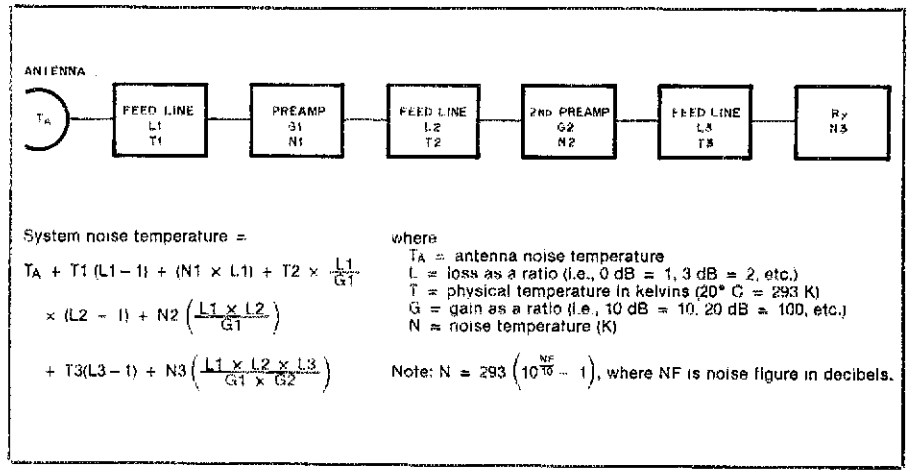


Fig. 1 — Calculation of overall noise temperature of a multicomponent system.

Table 1

(a) EME Antenna Temperature = 50 K

Configuration	*Noise Temp*	*Improvement*
1 — GaAsFET in shack	180 K	—
2 — GaAsFET at antenna	102.4 K	2.45 dB
3 — GaAsFET at antenna, 2nd preamp in shack	94.4 K	0.35 dB
4 — both preamps at antenna	91.3 K	0.15 dB

(b) Tropo Antenna Temperature = 273 K

Configuration	*Noise Temp*	*Improvement*
1 — 2nd preamp in shack	541.5 K	—
2 — 2nd preamp at antenna	446.3 K	0.84 dB
3 — GaAsFET in shack	403.1 K	0.44 dB
4 — GaAsFET at antenna	325.4 K	0.93 dB
5 — GaAsFET at antenna, 2nd preamp in shack	317.2 K	0.11 dB
6 — both preamps at antenna	314.2 K	0.04 dB

GaAsFET — 0.5-dB noise figure, 15-dB gain
Second preamp — 1.5-dB noise figure, 10-dB gain
Antenna feed line — 1-dB loss, 273 K
Receiver/mixer — 3.5-dB noise figure

EME NEWS

Africa is now represented on 1296 MHz EME. Peter Carey, ZE5JJ, a longtime operator on 432-MHz EME, has his 1296-MHz system operational and is making solid contacts using a two-tube (7289) amplifier, with more power on the way soon. Activity on 1296-MHz EME is still growing. One EME operator has been heard to remark that he is planning to get on 1296 MHz to avoid the QRM on 432 MHz!

The dish antenna that was used by the SK2GJ group earlier this year on 1296-MHz EME is now in use by EISCAT (European Incoherent Scatter Association) and is being used to study electrons in the upper atmosphere utilizing 1-GHz radar. No more information has been received concerning the use of the dish for future 1296-MHz EME tests.

OPERATING NEWS

K2DNR, now /7, is operational in Arizona on 1296 MHz and 10 GHz. Sam reports working K7IS, K7GNV, K7JTG and W7GBI using an indoor 24-el loop Yagi in his second-floor apartment, and a 1.35-W output transverter! He is also doing some mountain topping on both 1296 MHz and 10 GHz.

*111 Reinman Rd., Warren, NJ 07060

50 Years Ago

January 1932

☐ Associate Editor Ross Hull points out the advantages of "Selectivity in Radiotelegraph Reception" and shows how it can be obtained (at audio frequencies) by using simple filters. He warns that it takes at least several hours to appreciate the benefits.

☐ Secretary K. B. Warner explains what "Madrid, 1932" is all about, how the international radio convention is conducted and what the future of ham radio in North America looks like if all goes well.

☐ J. B. Dow of the Navy Department summarizes his *Proc.I.R.E.* paper in "Electron-Coupled Oscillator Circuits." Advantages include reduced "pulling" by load changes and improved resistance to voltage changes.

☐ Patent attorney Ben Chromy, W3AGE, writes "Concerning Inventions and Patents" and tells what might be patentable and what might not, and what to do if one decides to go after the protection.

☐ "56-Mc. Band Marching Ahead" is an account of the activity around the country by hams making good use of the techniques described by Ross Hull a few months ago. Apparently the push-pull transmitters and super-regen receivers are presenting few construction and operation problems. Ranges up to 40 and 50 miles are reported.

☐ In the "Correspondence" section, "The 'Nautilus' Cruise" is a long letter from operator Ray Meyers thanking hams for their help during the submarine's Arctic voyage. Ray apologizes for not being able to work more amateurs, and points out that a newspaper was a principal backer of the expedition and had first call on the communications. He goes on to report how conditions above 80° N weren't much good on 18 meters, and hence he elected to stay on 36, close to the active 40-meter band.

☐ Transformers for Class-B modulation systems are offered by several advertisers in the "goodies" section, reflecting the interest in this efficient new method.

25 Years Ago

January 1957

☐ "A Cool California Kilowatt," featured in a photo essay by Ray Rinaudo, W6KEV, uses a pair of 4-250As with band switching (including antenna outputs), vacuum variable capacitors and beautiful mechanical design. The "cool" refers to the use of a blower for forced-air cooling (but the overall arrangement would merit the current alternative meaning).

☐ "6L6GBs in a 2-Stage Novice Rig," by Lew McCoy, W1ICP, shows a transmitter 11 db down from the above, but it is an eminently practical design for the newcomer to ham radio, and that is the intent.

☐ "The 'Happy Accident' Ground Plane" of Wesley Hammond, K2GSO, is a description of a 10-meter antenna built for omni-directional work during a bad part of the solar cycle. Of the 35 or 40 built in the area, one builder found that raising the antenna from 10 to 40 feet above ground raised his signal 35 miles away from S3 to S8-1/2.

☐ Stan Dane, VE3PB, tells "How to Make a Folding Workbench" to solve the storage problem of many apartment dwellers. It is pointed out that the same principles could be applied to a collapsible operating table.

☐ Bob Resconsin, WITRF, describes his "Mobile Single-Bander," a 20-watt a.m. transmitter. Using a crystal-controlled oscillator and a 2E26 output stage, coil specs are given for all bands, 80 through 10 meters.

☐ Mason Southworth, W1VLH, IGY Project Coordinator, describes his "High-Power 50-Mc. Transmitter," which uses a 4-250A output stage, plate modulated. As required by such a project, special attention is paid to TVI reduction.

☐ Phil Boardman checked his log back through 1932 and found he had never worked Prince Edward Island, necessary for his Worked All VE award. He reasoned there must be others in a similar fix. This prompted his poor man's DXpedition, "W3LEZ/VE1," an entertaining and edifying account of his visit to our good neighbor to the north.

☐ "What's Wrong with Our Present Receivers?" is an attempt by W1DX to answer his own question. He is fortunate enough to obtain first samples of h.f. (2.2-Mc.) crystal filters as sharp as 200 cycles bandwidth, enabling him to build a receiving system with the selectivity in the plate circuit of the mixer of a single-conversion superhet. (This filter design breakthrough by David Kosowsky triggered the h.f. multi-pole filter designs now available.) A separate article, "Better A.V.C. for S.S.B. and Code Reception," calls attention to the "hang" a.g.c. principle designed for use in the i.f. amplifier.

☐ Most of the "Correspondence from Members" acclaimed "Your Novice Accent," by W6DTY in the November *QST*. However, one keen critic asked where the author got VA for "end of QSO," when everyone knows it is SK. (What happened to STA?) — *Byron Goodman, W1DX*

Strays

ISLAND "HAM" RADIO?

☐ According to a recent *Fresno Bee* editorial entitled "Ham Radio," the Los Angeles County Fish and Game Commission wants to equip, for monitoring and studying purposes, Santa Catalina Island's wild pig population with radio transmitters. The uncivilized pigs, it seems, are very prolific, and their growing numbers are destructive to the island's vegetation. Be advised: Strange radio signals from Catalina Island may not be kosher! — *Jim Lark, W5OYP, Fresno, California*

Mount Hood, Oregon, is the impressive background for the Field Day operations and mountain-climbing activities of W7EL, W7ZOI and KA7EXM. All the group's QRP equipment, backpacked to the site, was homemade; the sun provided power. Shown operating his 2-meter set-up and two-element quad, KA7EXM concentrates on one of the 238 stations worked during the contest. *(photo courtesy W7EL)*

Aki Ide, JG1IVI (seated) operates the station of his friend, Ellis Merry, W8KI, in Grosse Pointe Farms, Michigan. The two met on the air, and Ellis followed the progress and exploits of Aki as he bicycled across the U.S. last summer. Some of his observations: "The United States is very beautiful — every place has something new to offer. And the people here are very friendly, kind and beautiful." *(photo courtesy W8KI)*

I would like to get in touch with . . .

☐ amateurs who are also Dartmouth College alumni for a sked. Some of us already meet on 21.422 MHz at 2100 UTC weekdays and on 28.822 MHz at 1500 UTC weekends. Gay E. Milius, Jr., W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454.

I would like to get in touch with . . .

☐ amateurs who may have installation information about a suitable antenna for multi-engine aircraft. Del Popwell, K4NBN, 1946 Sweetbriar Ln., Jacksonville, FL 32217.

Two K6BAZs? Kenneth Lum-King (right) of Honolulu was K6BAZ before WW II; Warren Douglass of Glendale, California, presently holds the call. The two K6BAZs met at the Honolulu home of KH6IJ. *(photo courtesy KH6IJ)*

Silent Keys

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

**W1BDI, Francis E. Handy, West Hartford, CT
W1BJT, George W. Daniels, Wakefield, MA
W1GN/ex-WA1ARJ, Donald L. Yeo, Haverhill, MA
W1HOV, Kenneth A. Hodgkins, Cape Elizabeth, ME
K1MPD, Edward R. Miles, Reading, MA
W1MTH, William E. Renault, Northbridge, MA
WA1PLB, Chester F. Schwall, Jr., Guilford, CT
W1QVS, Hugh J. Karnes, Burlington, VT
W1RB, Earle G. Hewinson, Chicopee, MA
WA1VTY, Robert E. Carlson, Milford, NH
W2FPQ, Larry J. McLaughlin, Penn Yan, NY
K2JI, Elmer E. Fancher, Buffalo, NY
W2KBS, Jon J. Kark, Falls Church, VA
K2KXN, Frederick H. Schaefer, Mastic Beach, NY
WA2LHM, James A. Beneway, Ontario, NY
WA2SOZ, Monroe L. Gardner, Fulton, NY
K2VLL, Gerhard A. Buss, Schoharie, NY
W3AAT, Ralph A. Ohle, Sr., Hadley, PA
W3DY, Allen J. Gardenhour, Fayetteville, PA
W3FLZ, Alvin J. Sharbaugh, Carrolltown, PA
W3HYJ, Joseph J. Slotnick, Huntingdon Valley, PA
K3LGM, John M. Paraniuk, Conway, PA
W3LYO, Glendon Graff, Holland, PA
K3MNR, Louis J. Lombardi, Laurel, MD
W3PCN, Levin E. Williams, Harrisburg, PA
WA3RKV, William G. Ridgway, Jr., Glenside, PA
K4AXY, Bob C. Long, Birmingham, AL
KA4HJR, Theodore A. Baroody, Sanford, NC
W4IRN, Herbert O. Chrysler, Winston-Salem, NC
N4JO/ex-WB4KZU, Joseph S. White, Sr., West Palm Beach, FL
W4LFL, Albert H. Bates, Sr., Miami, FL
*WA4NED, George S. Haymans, Jr., Gainesville, GA
WB4ONC, George P. Reid, St. Petersburg, FL
KA4PZS, Junius T. Mount, Sr., Muldrough, KY
W4TUK, Albert M. Timms, Columbus, GA
W4WNE, Leason S. Gregg, Mountain City, TN
W4WS, Robert H. James, Dunedin, FL
K4YVK, John H. Roberts, Homestead, FL
WB4ZQS, Edward C. Faulkner, York, SC
K5ADV, Albert P. Craig, Dallas, TX
W5BZI, Howard B. Hamilton, Wagoner, OK
N5CSB, Milo P. Foster, San Antonio, TX
KA5EFT, Frank Weeks, Louisville, MS
KB5FF, Harry H. Mounce, Pineville, LA
*K5GDU, John T. Conniff, Dallas, TX
K5HEF, Fred A. Wright, Jr., Tyler, TX
W5IUG, Elwin "Doc" Hazelwood, Baton Rouge, LA
W5JAD, Ethel B. Eller, Pampa, TX
W5NVT, Leonard E. Wilson, Albuquerque, NM
W5QAA, George H. Fenton, Jackson, MS
W5SIH, Marwin R. Johnson, Okalhoma City, OK
WB5YCF, Max A. Reidel, Truth or Consequences, NM
WB5YWG, Richard W. Hall, Tahlequah, OK
K6AM, Claude C. Bullen, Chula Vista, CA
W6AW, Roland D. Richardson, Coarsegold, CA
W6BUT, Randolph B. Hopkins, Taft, CA
W6DOW, Karl W. Klein, Carson, CA
WD6DSP, Elbert R. Gilbert, Napa, CA
W6DWJ, Gus W. Hilpisch, Belmont, CA
W6FEE, Loren L. Dunford, Chowchilla, CA
WB6KUA, John W. Dillinder, San Diego, CA
WB6RVF, Harry E. Mason, Hesperia, CA
K6SEV, Fred E. Scott, Fresno, CA
WB6TDA, Harold L. Surrett, Escondido, CA
W6TON, Lewis D. Chilson, Imperial Beach, CA
W6TRR, Edward E. Johnson, Sacramento, CA
W6UBF, Wesley E. Grothe, Santa Maria, CA
WB6WWJ, Louis B. Kroell, Centerville, CA
W7AJ, Peter Fakkema, Oak Harbor, WA
WB7DNN, William V. Gates, Helena, MT
W7FDP, Clarence A. Beal, Seattle, WA
WA7GMX, Patricia L. Smith, Mt. Vernon, WA
KA7IKY, Bobby L. Dietrich, Yuma, AZ
W7KLL, Thomas L. Powell, Selma, OR
WA7LQJ, Henry T. Rogers, Billings, MT
W7QE, Glenn B. Lantz, Seattle, WA
K7QHM, Richard Bruce Wyman, Lakeview, OR
WB7REV, James T. Stanton, Payette, ID
W8CS, Edward B. Noel, Cleveland Heights, OH
W8DFE, Edward J. Brichta, Huntington Woods, MI
W8GO, George J. Woods, Alpena, MI
W8LYQ, Edmund C. Harry, Perrysville, OH
W8MAE, Martin Hornack, Strongville, OH
WA8UWI, Lewis O. Hayner, Portland, MI
WA8YUG, Helen L. Rozek, N. Olmsted, OH
W9AQD, James H. Thomson, Deerfield, IL
N9BF, James A. White, Chetek, WI
W9CNG, Jack D. Prichard, Sellersburg, IN
K9CWY, G. Raymond Franklin, Chambersburg, IL
WD9DSY, John A. Berard, Cecil, WI
W9EVK, Fred A. Pollitt, Morristown, IN
W9GRN, Elmer E. Taflinger, Indianapolis, IN
K9MIL, Jerry R. Mahoney, Manito, IL
W9NTA, Seth L. Baker, Martinsville, IN
W9NWO, H. Walter Jennings, Farmington, IL
WA9OAD, Cletus A. Harper, Odon, IN
K9QHK, Edward W. Reinsch, Cherry, IL
W9WNJ, James L. Kosik, La Grange Park, IL
*WA9YLE, Victor G. Self, Champaign, IL
N0COA, Russell L. Kemp, Ames, IA
WØUK, Wayne C. Hall, Lawrence, KS
VE6CJV, Archie E. Klaibner, Strathmore, AB
VE6EZ, Homer W. Crayford, Lacombe, AB
VE6WM, Michael W. Carrol, Calgary, AB
DF5TB, Arno Schapp, Sigmaringen, West Germany
F8LO, Rene Jourdan, Vanves, France
ZL4CA, A. R. Harris, Masgiel, New Zealand

*Life Member, ARRL
**Honorary Life Member

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

Special Events

Conducted By Mark Wilson,* AA2Z

North Bay, Ontario: North Bay ARC is sponsoring an award to commemorate the centennial of the coming of the railway to the area. To qualify, contact any three North Bay hams *anytime in 1982* on any band or mode (except repeaters). Send two QSL cards for each contact (one for the operator and one for a display at city hall) to: Box 624, North Bay, ON P1B 8J5 Canada.

Lewistown, Pennsylvania: Juniata Valley ARC will operate K3DNA from *January through March* to celebrate its 25th year as a bonafide club. Certificate for one contact with any club member. Send QSL card and large s.a.s.e. to: WB3IVX, 107 Washington Ave., Lewistown, PA 17044.

Bismarck, North Dakota: Mandan-Bismarck ARC will operate WØZRT from the Lewis and Clark wintering site from 1600-2100Z *January 2-3*. Frequencies: phone — 14.295 21.395 28.595; cw — 14.065 21.065 28.065; Novice — 21.125 28.125. Special QSL card for s.a.s.e. to: P. O. Box 978, Bismarck, ND 58501.

Morton, Illinois: Morton ARC will sponsor the Worked All Morton contest from 0001Z *Jan. 9* until 2400Z *Jan. 10* and 0001Z *Jan. 16* until 2400Z *Jan. 17*. Certificate for contacts with five or more residents of Morton or Morton ARC members. Send log information with large s.a.s.e. to 701 Columbus Ave., Morton, IL 61550.

Eugene, Oregon: St. Mary's Peak RA will operate from 1800-0200Z *Jan. 9-10* to demonstrate Amateur Radio to the general public. Operation on all hf and vhf bands. QSL to: WB7OVH, 271 Foch, Eugene, OR 97402.

Issaquah, Washington: Issaquah ARC will sponsor "Rat's Nest and Crooked Stick II" from 2100-2400Z *Jan. 10*. IARC members use homebrew antennas and barefoot rigs. Non-IARC members are unrestricted in gear and antennas. Rat Catcher Award for three or more IARC contacts during operation. Frequencies: phone — 21.350-21.450; cw — 21.100-21.200. Send list of IARC members contacted and large s.a.s.e. to WB7DHC, 675 S.W. Ellerwood St., Issaquah, WA 98027.

Philadelphia, Pennsylvania: Philmont Mobile RC will operate W3TKQ from 1300Z *Jan. 17* until 0100Z *Jan. 18* to commemorate the birthday of Benjamin Franklin. Operation on 80-10 meters in lower portions of General and Advanced subbands. Special QSL for s.a.s.e. to AK21, 1228 Heartwood Dr., Cherry Hill, NJ 08003.

Lake Saint Clair, Michigan: Tin Lizzy Club/Ford Amateur Radio League will operate AD8R/8 during their fourth annual "Freeze Your Arctic Off" expedition from 1700Z *Jan. 23* until 1800Z *Jan. 24*. Certificate for QSL (indicate contact number on card) to Box 545, Sterling Heights, MI 48077-0545.

Nashua, New Hampshire: Nashua Area RC will operate WB1FFZ from the Nashua Mall to demonstrate Amateur Radio to the general public from 1500Z *Jan. 30* until 0200Z *Jan. 31* and 1500-2300Z *Jan. 31*. Frequencies: phone — 10 kHz up from low end of general subbands; Novice — 21.175. Special QSL for s.a.s.e. to: N1AYI, 10 Buckmeadow Lane, Merrimack, NH 03054.

*Assistant Communications Manager, ARRL

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by January 15 to make the March issue. QST

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

Florida: The Martin County Amateur Radio Assn. will hold its annual PICNICFEST HAMFEST on Saturday, Jan. 30, from 8 A.M. to 3 P.M., at Langford Park, Jensen Beach. Admission will be free; picnic areas and a playground for children are available. For ruther details contact: WA4GQY, Vern, 305-334-6220; W4OST, Don, 305-286-0500; and WA4GUH, Mike, 305-334-6000 or 305-878-7111.

†**Florida:** Orlando Hamcation '82, sponsored by the Orlando Amateur Radio Club, Inc., will be held at the Central Florida Fairgounds (new location), Hwy. 50 West, Orlando, on Friday, March 12 through Sunday, March 14. Hours are 6 A.M. to 9 P.M. Friday, 8 A.M. to 5 P.M. Saturday, and 9 A.M. to 2 P.M. Sunday. Admission is $2; swap-shop tables are $10 each and may be reserved. Deadline for all reservations is Feb. 20. Computer forum, service nets, ATV seminar, Tailgating, AMSAT demonstrations, gigantic swap-shop, ARRL Forum, large commercial exhibit. The banquet will be "The Sea World Polynesian Luau," at Sea World, Saturday, March 13. Reservations at $14 per person; order early. A complete setlout is expected. Talk-in on 146.16/76 and 146.22/82. Info and reservations from Hamcation Chairman, P.O. Box 191, DeBary, FL 32712 (s.a.s.e. required), tel. 305-668-8437.

†**Illinois:** The Wheaton Community Radio Amateurs will hold their annual hamfest on Feb. 7 at Arlington Park Race Track EXPO Center, Arlington Heights. Free flea-market tables and expanded floor space. Large commercial area, including the new "computer" section. For commerical info call WB9TTE, tel. 312-766-1684; for general info call WB9PWM, tel. 312-629-1427. Clear, paved parking. Awards. Tickets $3 at door, $2.50 in advance. Send s.a.s.e to WCRA, P.O. Box QSL, Wheaton, IL 60187. Talk-in on 146.01/61 and 146.94. Doors open at 8 A.M. Be there!

†**Louisiana:** Southeastern LA University ARC (SLUARC), Southeast LA ARC (SELARC) and Washington Parish ARC (WPARC), will sponsor the 3rd annual Southeast Louisiana Hamfest at Southeastern LA University Campus (east side cafeteria) in Hammond, on Saturday, Jan. 16. Free admission. Swap activities, speaker, forum, food, prizes. Talk-in on 146.40/147.00, .52 and 7.245 MHz. For further information contact Joe Dick, WB5UTY, tel. 504-567-3249.

Massachusetts: The Southeastern Massachusetts Amateur Radio Assn. will hold its winter fleamarket on Saturday, Feb. 6, from 9 to 4, at the Congregational Church Hall of South Dartmouth, 17 Middle St., South Dartmouth. Admission is $1 at door, and tables are $8. Free parking, refreshments available. Talk-in on 147.60/00. For further information send s.a.s.e. to William Mercier, P.O. Box P-105, South Dartmouth, MA 02748.

†**Michigan:** The Oak Park Amateur Radio Club, Inc., swap and shop will be held at the Oak Park High School, Oak Park Blvd., Oak Park, on Sunday, Jan. 10, from 8 A.M. to 3 P.M. Admission is $2; 12 and under are free. League and nonham tables, prizes, food and refreshments, free parking. Talk-in on 146.04/64 and 52. For further information send s.a.s.e. to Rob Numerick, WB8ZPN, 23737 Couzens, Hazel Park, MI 48030, tel. 313-398-3189.

Michigan: The Southfield High School Amateur Radio Club is sponsoring their annual swap and shop on Jan. 17, at Southfield High School, 24675 Lahser, Southfield. Doors open at 6 A.M. for exhibitors; open to the public 8 A.M. to 3 P.M. Admission is $2; reserved tables are $8 (one 8-ft table, paid in advance). Tables will also be available at the door. Michigan's largest swap & shop. Lots of parking, food and prizes. For more information and/or reservations, write to Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034, tel. 313-354-8210.

Pennsylvania: The Lancaster hamfest, sponsored by SERCOM, Inc., will be held on Feb. 21 at the Guernsey Pavilion located on Rtes. 30 and 896, east of Lancaster. General admission $3, except children and wives. Doors open at 8 A.M. All inside spaces by *advance registration only*. $5 for each 8-ft. space with table. Limit 2 tables non commercial; six tables commercial. Registration deadline Feb. 10. All vendors must set up between 6 and 8 A.M. Sunday. Reservations will not be held past 9 A.M. without prior arrangement. Free tailgating in specified area outside if weather permits on a first-come, first-served basis. Food served. Talk-in on 146.01/61 or 52. Write: SERCOM, Inc., P.O. Box 6082, Rohrerstown, PA 17603.

Texas: The Texas VHF-FM Society winter meeting will be held in Brownsville, Jan. 29-31, at the Fort Brown Motel. Registration and hospitality room Friday evening, 7:30 P.M. and onward. Saturday will also have registration and program. Sunday will be official business meeting and prizes. Annual CHARRO swapfest will be held in conjunction with the winter meeting. Preregistration is $5, $6 at the door. Special room rates at Fort Brown Motel if reservation received prior to Dec. 31. For further information write to CHARRO, P.O. Box 3772, Brownsville, TX 78520.

*Hamfest/Travel Coordinator, ARRL
†ARRL Hamfest

Coming Conventions

February 6-7
Florida State, Miami

February 27-28
Ohio State, Cincinnati

March 20-21
Roanoke Division, Charlotte, North Carolina

March 27-28
Nebraska State, Kearney

April 3-4
Missouri State, Kansas City

April 17-18
Mississippi State, Jackson

May 14-15
Atlantic Division/New York State
Rochester

May 15-16
Alabama State, Birmingham

May 22-23
Delta Division, Knoxville, Tennessee

June 4-6
Southwestern Division, San Diego, California

June 5-6
Oregon State, Seaside

June 12-13
Southeastern Division, Atlanta, Georgia

June 19-20
Kansas State, Salina

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

FLORIDA STATE CONVENTION/ TROPICAL HAMBOREE
February 6-7, 1982, Miami

Amateur Radio operators from all continents will open the ARRL convention year in Sunny Miami. The Florida State Convention/ Tropical Hamboree is an international meeting with a full program of forums, technical presentations, exhibits and demonstrations covering all fields of Amateur Radio.

Group events include the DX Forum and Dinner, QCWA Hospitality Corner, Traffic Handlers' Breakfast, Wouff Hong Ceremony and an outstanding Special Edition ARRL Forum. *FCC examinations for Extra, Advance, General and Technician class licenses will be held on Saturday; send completed 610 form with notation under your signature "For Miami Hamboree" to FCC, Room 919 Federal Bldg., 51 S.W. 1 Ave., Miami, FL 33130. Forms must be in by Jan. 22.*

Topping the main awards list is an Apple II+ computer with disk drive and video display. Top hourly awards are 2-meter transceivers. Nonhams will be entertained with programs, demonstrations, exhibits and the diamond ring award.

Free overnight parking is available for self-contained RV units. Registration is $3 through Feb. 2, $4 after Feb. 2. Full details from Dade Radio Club, P.O. Box 350045, Riverside Station, Miami, FL 33135.

Club Corner

Conducted By Sally O'Dell,* KB1O

A CLUB CONTEST OR FUNTEST

Have a fun time and get ready for the big contests by planning a special club warm-up. Last May 17, operators across the country heard "QRZ the Crooked Stick and Rat's Nets QSO Party" on 15 meters. The Issaquah (Washington) ARC members operated their special contest as they competed against one another.

Jim Aguirre, WB7DHC, describes his club competition: "Members of the Issaquah ARC participated in a fun event we created to put a little 'gusto' in our club activities. We were looking for something that would interest our two-dozen-plus members, and came up with a contest format that was short, sweet and fair for everyone.

"Our idea was for club members to make as many contacts as possible on 15 meters during a three-hour period — any three hours out of a 12-hour contest period. We had a couple of other restrictions as well.

"Participants were limited to barefoot rigs; no big kW linears for this one! One other important rule predominated: Everyone had to use a homebrew wire antenna not more than 20 feet off the ground. That was the equalizer. With only 100 feet of wire allowed, imaginations ran wild. Some tried inverted Vs and longwires of course, but also Delta loops, a pair of phased dipoles and a 'Delta Z-match Quad.'

An entry in the June 1980 VHF Contest with (l-r) WA8NJR, WA8OGS, WA3OJX, W9OEH and K8VVV operating. How does your club station stack up?

"The results? Well, our club members logged more than a hundred contacts. (If you think that's low, try to explain a contest like this and keep your QSO rate up!) We received many compliments on both contest format and antenna performance. A few 'mini-pileups' occurred when operators wanted to know what a 'Crooked Stick and Rat's Nest' was — an obvious reference to the state of the antenna art being practiced. Several East Coast and Midwest hams refused to believe that 20-over-9 signals could radiate from a wire antenna only 20 feet off the ground. Transmitter power ranged from a modest 5 watts in, to a little over 100 watts out.

"Originally billed as the first annual club contest, it already looks like the 'maybe' will be dropped in favor of annual or possibly semi-annual renewals of this event."

These rules are simple and designed for all to understand; a few hours out of a longer period make a short-term contest reasonable. Other possibilities for a club contest are: slow speed on the Novice bands, cw — any speed — any band, antenna limitations (similar to the IARC's excellent approach) or battery power in the field. One final suggestion is operating a club contest as a multi-single by breaking into teams determined by ability. The better operators can assist those who are learning.

Who won the IARC contest? Who cares? Everyone had fun!

*Club Program Manager

In Training

Conducted By Steve Pink,* KF1Y

YET ANOTHER CHALLENGE FOR THE ARRL INSTRUCTOR

Grim statistics have arrived from the FCC. The number of hams taking license tests at FCC field offices has been dropping steadily for the last three years. This no doubt reflects a rather serious downward trend in the size of the amateur population.

A number of explanations suggest themselves. Beginning with the FCC itself, severe cutbacks are taking place that will make it more difficult for hams to get to an examination point. Plans are to close some FCC field offices, which will make the trip to the FCC, for many, a two-day affair. A lot of amateurs have taken the opportunity to upgrade at the many hamtests around the country at which FCC examiners have appeared. This opportunity has now completely disappeared, although it has been reported that some FCC examiners have traveled on their own time and money to hamfests to administer exams. (The ARRL is most appreciative of their selfless contributions.)

What will make matters worse, where FCC district examiners have been traveling regularly to the perimeters of their district to give exams, there are plans either to cancel or greatly reduce the frequency of these trips. And the number of service reductions is very likely to increase as the extent of federal cuts takes its toll on most government agencies in the next year or two. As these reductions continue, more hams will have to travel the many hundreds of miles to district offices, sometimes two states away. Could many amateurs be postponing upgrading or even giving up the idea because of this hardship? (Perhaps this explains the regular jumps in the number who take April tests — See Fig. 1. As the snow melts in the northern part of the country, one finds it easier to make that long trip.)

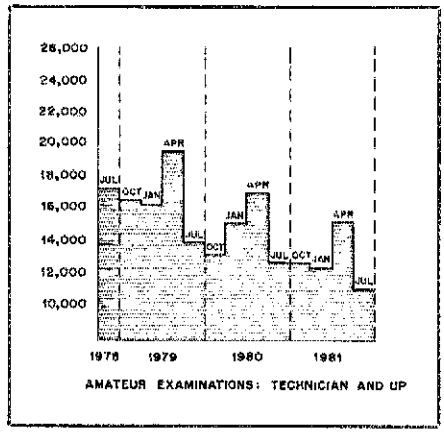


Fig. 1 — Amateur examinations (Technician and up) at FCC field offices.

These changes in FCC policy only partly explain the downward trend on the graph. On the amateur population side, a major change is occurring that most likely explains a large part of this downward trend. If one were to extend the graph to the left, a peak would appear a year or two back that coincides with the huge CB boom in this country. But the CB boom is now over: Each month during the last year 350,000 CB licenses expired unrenewed — a figure almost equal to the whole amateur population of the U.S. The number of hobbyists who have come to Amateur Radio from the CB ranks has diminished drastically, and a major resource for future recruitment continues to dwindle.

No individual ham can be blamed for any of these occurrences. But if we are not to lose the political clout that comes from numbers (albeit they are numbers of truly qualified amateurs), we must take positive steps to insure, at least, that those who want to become Amateur Radio operators can do so.

The League's registered instructors can be very important in this regard. In the old days, instructors were called "Elmers," and Elmers not only taught their students code and theory, they shepherded them from Novice through higher class licenses. An Elmer might even have accompanied his or her student to the FCC office to ease testing jitters. Nowadays, instructors often teach large classes and so the one-to-one relationship between Elmer and student can't be attained. But why couldn't instructors, even of very large classes, organize a carpool or ride-sharing system that will assure everyone in the class a convenient way to the FCC district office? Instructors need to take the initiative in this job, but of course they can find a volunteer to do the actual legwork. If the class is sponsored by a club, perhaps the club could form a committee to organize the carpools.

We would like to hear your suggestions toward solving this problem. Training new hams and helping them to upgrade has always been the lifeblood of Amateur Radio. The ARRL instructor network expanded and diversified to meet the needs of the growing numbers of new hams coming into our hobby a few years back. With the changes in FCC policy outlined above, a new challenge is taking shape. Let us know how you think the ARRL instructor should meet that challenge.

*ARRL Training Program Manager

License Renewal Information

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

2) Mail to FCC, Gettysburg, PA 17325.

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

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

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

The "Considerate Operator's Frequency Guide"

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

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

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

U.S. Amateur Frequency and Mode Allocations

Power Limits: All U.S. amateurs are limited to 250-watts dc input in the Novice segments. On all other segments, with certain exceptions in the 160-meter and 420-MHz bands, 1-kilowatt dc input is permitted. Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. (Revised as of December 6, 1981)

Bandwidth Limitations

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

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz, single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

DIGITAL TRANSMISSION:

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

(b) *American Standard Code for Information Interchange (ASCII).* F1 emission shall be utilized on those frequencies between 3.5 and 21.25 MHz where its use is permissible, and the sending speed shall not exceed 300 bauds. F1, F2 and A2 emissions may be utilized on those frequencies between 28 and 225 MHz where their use is permissible and the sending speed shall not exceed 1200 bauds. F1, F2 and A2 emissions may be utilized on those frequencies above 420 MHz where their use is permissible and the sending speed shall not exceed 19.6 kilobauds.

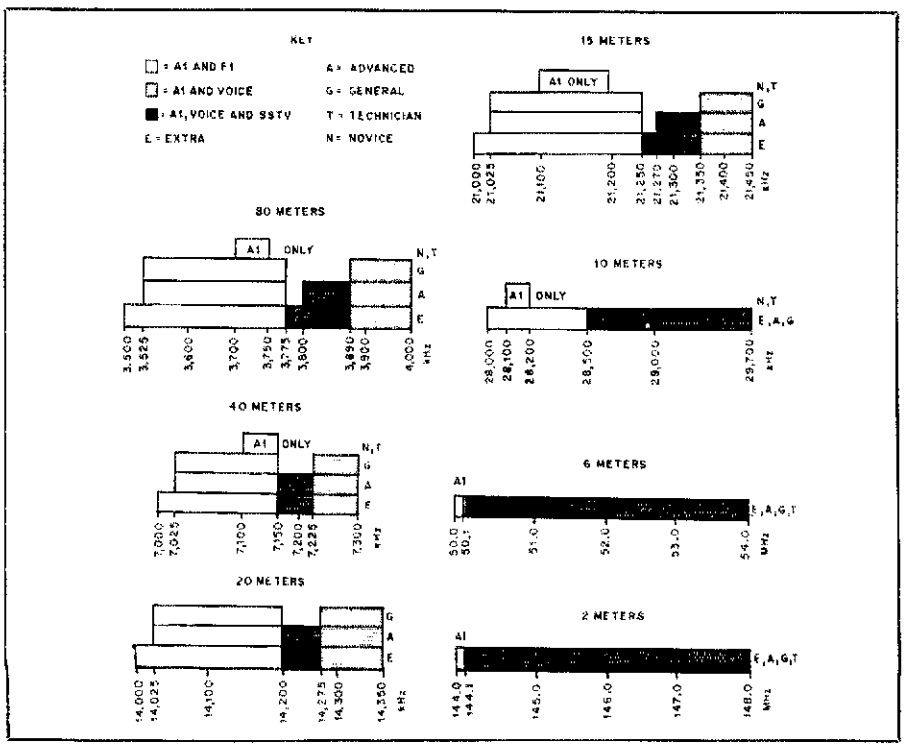
The code must conform to the American Standard Code for Information Interchange (ASCII) as defined in American National Standards Institute (ANSI) standard X3.4-1968. See §97.69 of the Amateur Rules.

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

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

160 METERS: Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see *License Manual* or request form MS/G-7 from ARRL hq.

Other — All modes, except as noted.



Extra, Advanced, General, Technician

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

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

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1982*

(Check *QST* monthly for updates)

JANUARY

1	Straight Key Night
2-3	CD Party, phone
7	West Coast Qualifying Run
9-10	CD Party, cw
10	*ARRL Hamfest (Oak Park, MI)*
12	W1AW Qualifying Run
16	*ARRL Hamfest (Hammond, LA)*
16-17	*ARRL Hamfest (Sarasota, FL)*
26	W1AW Qualifying Run
30-Feb. 7	Novice Roundup

FEBRUARY

3	West Coast Qualifying Run
6-7	*Florida State Convention (Miami)*
7	*ARRL Hamfest (Arlington Heights, IL)*
10	W1AW Qualifying Run
14	*ARRL Hamfest (Mansfield, OH)*
20-21	International DX Contest, cw
24	W1AW Qualifying Run
27	*ARRL Hamfest (Glasgow, KY)*
27	*ARRL Hamfest (Robbinsdale, MN)*
27-28	*Ohio State Convention (Cincinnati)*
28	*ARRL Hamfest (Akron, OH)*
28	*ARRL Hamfest (Vienna, VA)*
28	*ARRL Hamfest (Livonia, MI)*

MARCH

4	West Coast Qualifying Run
6-7	International DX Contest, phone
11	W1AW Qualifying Run
12-14	*ARRL Hamfest (Orlando, FL)*
14	*ARRL Hamfest (Sterling, IL)*
14	*ARRL Hamfest (Winchester, IN)*
19-20	*ARRL Hamfest (Sioux City, IA)*
20-21	*Roanoke Division Convention (Charlotte, NC)*
25	W1AW Qualifying Run
27-28	*ARRL Hamfest (Columbus, GA)*
27-28	*Nebraska State Convention (Kearney)*
28	*ARRL Hamfest (Timonium, MD)*

APRIL

1-4	SAROC (Las Vegas)†
3	*ARRL Hamfest (Elizabethtown, KY)*
3-4	*ARRL Hamfest (Little Rock, AR)*
3-4	CD Party (open), phone
3-4	*Missouri State Convention (Kansas City)*
7	West Coast Qualifying Run
16	W1AW Qualifying Run
17-18	CD Party (open), cw
17-18	EME Contest (part 1)
17-18	*Mississippi State Convention (Jackson)*
18	*ARRL Hamfest (Raleigh, NC)*
23-25	*Dayton Hamvention (Dayton, OH)†*
25	W1AW Qualifying Run

MAY

6	West Coast Qualifying Run
11	W1AW Qualifying Run
14-15	*Atlantic Division/New York State Convention (Rochester, NY)*
15-16	*Alabama State Convention (Birmingham)*
15-16	EME Contest (part 2)
22-23	*ARRL Hamfest (Columbia, MO)*
22-23	*Delta Division Convention (Knoxville, TN)*
27	W1AW Qualifying Run

JUNE

2	West Coast Qualifying Run
4-6	*Southwestern Division Convention (San Diego, CA)*
6	*ARRL Hamfest (Princeton, IL)*
9	W1AW Qualifying Run
12	*ARRL Hamfest (Midland, MI)*
12-13	*Southeastern Division Convention (Atlanta, GA)*
12-13	VHF Contest
13	*ARRL Hamfest (Willow Springs, IL)*
19-20	*Kansas State Convention (Salina, KS)*
22	W1AW Qualifying Run
26-27	Field Day

JULY

1	West Coast Qualifying Run
2-5	*ARRL/CRRL Midwest Convention (Saskatoon, Saskatchewan)*
3-4	*West Virginia State Convention (Jackson's Mill, WV)*
8	W1AW Qualifying Run
10-11	IARU Radiosport Championship
21	W1AW Qualifying Run
23-25	*ARRL National Convention (Cedar Rapids, IA)*

AUGUST

4	West Coast Qualifying Run
6-8	*Rocky Mountain Division/ Northwestern Division Convention (W. Yellowstone, MT)*
7-8	UHF Contest
8	*ARRL Hamfest (Willow Springs, IL)*
13	W1AW Qualifying Run
14-15	*ARRL Hamfest (Concordia, KS)*
22	*Illinois State Convention (St. Charles)*
22	W1AW Qualifying Run

SEPTEMBER

2	West Coast Qualifying Run
11-12	VHF Contest
14	W1AW Qualifying Run
19	*ARRL Hamfest (Scotch Plains, NJ)*
22	W1AW Qualifying Run

OCTOBER

2-3	*New England Division Convention (Boxboro, MA)*
6	West Coast Qualifying Run
8-10	*Pacific Division Convention (Santa Cruz, CA)*
9-10	*Virginia State Convention (Virginia Beach)*
9-10	CD Party, cw
10-11	CD Party, phone
13	W1AW Qualifying Run
16-17	Simulated Emergency Test
23-24	*Tennessee State Convention (Chattanooga)*
24	W1AW Qualifying Run
29-31	*Hudson Division Convention (McAffee, NJ)*

NOVEMBER

4	West Coast Qualifying Run
6-7	Sweepstakes, cw
11	W1AW Qualifying Run
20	W1AW Qualifying Run
20-21	Sweepstakes, phone

DECEMBER

1	West Coast Qualifying Run
4-5	160-Meter Contest
10	W1AW Qualifying Run
11-12	10-Meter Contest
28	W1AW Qualifying Run

*Hamfests/Conventions of record as of November 1, 1981

†Not an ARRL event

Results, 1981 ARRL September VHF QSO Party

By Bill Jennings,* K1WJ and Mark Wilson,** AA2Z

Uhf operation during the vhf contests is becoming an ever-increasingly important part of the serious vhf contester's operating strategy. Gone are the days when just a very few vhf contesters, those who were considered uhf experimenters — pioneers if you wish — would spend a good portion of a vhf contest weekend lovingly tuning a homebuilt converter, hoping to hear something more than that sterile "hiss" of a dead 220- or 432-MHz band.

Time was in a September VHF QSO Party when you could rely on those few extra multipliers found on 6 meters to nullify your crosstown rival's superior 2-meter QSO total in a heated competition for an ARRL Section contest award. Times *have* changed. Nowadays, a serious vhf contester has to have more ears than a Kansas cornfield and more arms than an octopus to make sure that he/she is on the "right" band to maximize the QSO rate *and* to work all possible multipliers on each band used.

Let's use the results of the 392 entries received for the 1981 September VHF QSO Party, held on the weekend of September 12-13, and the numbers from the 372 logs submitted for the 1980 September contest, to illustrate the increasing use of the uhf bands in the vhf contests. In 1980, 37% of the entrants indicated any type of activity on the 220-MHz band, while in 1981 that percentage crept up to 40%. The 432-MHz band was used by 45% of the 1980 entrants, and the numbers crossed the half-way barrier to better than 52% usage by those stations reporting their activity in 1981.

It was in part because of his use of the 220-MHz band that Bill, K5MAT, was to break the long-standing Rocky Mountain Division single-operator record for the September contest, one of 12 new division records set in 1981 (seven single operator and five multioperator). The old Rocky Mountain Division Record of 546 points, set by WØEVZ in 1964, was remarkable in that it stood for 17 years. Had K5MAT not included 220-MHz capabilities in his contest arsenal, his score would have fallen 47 points short of setting a new record.

If we compare multipliers and numbers of QSOs per band for the top scorers in both the 1980 and the 1981 September contests (see January 1981 *QST*, page 82, for the 1980 contest results), we find a noticeable increase in the numbers of QSOs and multipliers worked by stations in call areas where uhf participation in the past has been very light or nonexistent. In Nevada, where in contests past 10 or so QSOs would have been the limit on 432, we find WA7JUO with 19 70-cm contacts in the log. And KØTLM's two multipliers on 220 MHz are two more than the top WØ station had even one year ago. Well done.

WA4WZQ sums up the vhf contester's attitude toward the seemingly perpetual advancement in utilizing ever-higher frequency bands with this statement: "We want to thank all of our 'four-band' contacts. Please, let's make it 'five-band' QSOs with 1296 next time."

You've probably noticed that with the results of each successive recent vhf contest, a few more stations have those E, F, G, H and I designators indicating the use of the microwave bands at 1296 and above. It is probably safe to say that in studying the recent past history of the use of uhf bands in vhf contesting, we would be seeing a parallel to the near future use of the microwave frequencies by vhf contesters.

The VHF Sweepstakes is on for the weekend of January 12-13. See the December 1981 issue of *QST* for details. Good luck.

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

WA8ONQ (N8BPB in background), leader of the multiop group of the same call sign in Ohio that now holds the all-time multioperator division record for the September contest in the Great Lakes Division.

Top 10

Single Operator		*Multioperator*	
WA2DPU	64,504	W2SZ/1	205,530
WA2FGK/8	50,298	WA2SNA	95,504
WB3CDE	47,502	W4BFB	86,880
W8DJY	38,226	K1TR/1	86,031
K1PXE	31,533	WA8ONQ	77,952
KA1BRD	30,660	W8VP	72,770
K3SXA	29,877	W9IP	69,276
WB1CJT	26,688	K9HMB	68,684
K1FWF	23,973	K3YTL	68,580
WB2WIH	21,888	K3MTK	67,760

Division Leaders

Single-Operator	*Division*	*Multioperator*
WA2DPU*	Atlantic	K3YTL
K9RO	Central	W9IP
WØVB*	Dakota	WBØZAH
WA5FDF	Delta	W4BFB*
W8DJY*	Great Lakes	WA8ONQ*
WB2WIH	Hudson	WA2SNA
KØTLM	Midwest	WBØZKG
K1PXE	New England	W2SZ/1*
WB7UUP	Northwestern	WA7ECY
K6GSS	Pacific	W9DHK
WA2FGK/8*	Roanoke	K3LNZ/8
K5MAT*	Rocky Mountain	AAØP
WA4NJP*	Southeastern	WB4NMA
N6NB	Southwestern	N6MI*
KC5WX*	West Gulf	N5CG
VE3CRU	Canadian	VE3LNX
C6ADV	DX	XE2XW*

*Indicates new division record

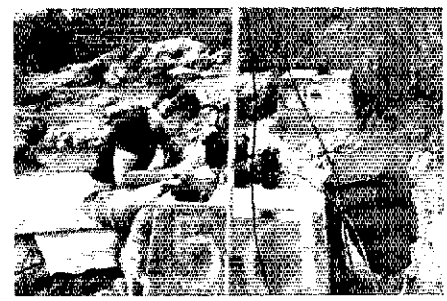
Call-Area Score Leaders QSOs/Multipliers per Band

	50 MHz	*144 MHz*	*220 MHz*	*432 MHz*	*1296 MHz*
K1PXE	20/8	132/20	49/15	75/19	19/7
W2SZ/1*	382/38	472/23	123/22	173/25	33/12
WA2DPU	133/27	251/21	104/12	188/19	19/9
WA2SNA*	198/22	356/23	105/19	96/22	20/8
WB3CDE	111/23	270/21	59/16	55/18	—
K3YTL*	234/30	290/23	64/20	55/17	—
WA4SBC	21/10	88/18	28/14	62/17	—
W4BFB*	281/33	599/22	46/10	57/15	—
KC5WX	30/5	140/6	15/1	51/7	3/1
N5CG*	121/27	182/16	—	15/5	—
N6NB	46/11	165/11	61/6	37/10	14/6
N6MF*	87/8	357/11	72/5	30/5	8/5
WA7JUO	14/5	67/6	—	19/6	—
WA7ECY*	7/1	3/1	2/1	2/1	—
WA2FGK/8	131/26	387/32	28/15	16/10	—
WA8ONQ*	204/37	343/30	62/11	48/11	7/4
K9RO	51/20	161/15	20/8	17/6	3/1
W9IP*	160/36	374/25	36/16	74/15	—
KØTLM	43/15	59/10	5/2	17/8	—
WØRT*	10/4	104/11	2/2	16/7	—
VE3CRU	51/10	114/20	30/10	41/9	9/5
VE3LNX*	73/12	109/17	30/11	31/10	—

*Multioperator stations

All-Time Division Records

		Single-Operator			Multioperator		
		Call	Score	Year	Call	Score	Year
Atlantic	Jan.	WA3AXV	80,770	81	W3KKN	52,272	81
	June	K3SXA	45,144	81	W3CCX	240,380	81
	Sept.	WA2DPU	64,504	81	K3MTK	74,046	80
Central	Jan.	K9RO	30,080	80	K9HMB	72,424	81
	June	W9IP	90,797	81	K9HMB	136,656	81
	Sept.	GW3NJY/W9	35,310	79	W9IP	84,739	79
Dakota	Jan.	WØRGU	16,000	81	KØVXM	7830	79
	June	KØVXM	29,127	80	WØSD	89,782	81
	Sept.	WØVB	3276	81	KØSE	10,492	79
Delta	Jan.	WB4JGG	16,884	80	WB4HEL/4	8880	73
	June	WB4JGG	36,936	80	W4BFB/4	74,404	78
	Sept.	WB4JGG	28,424	79	W4BFB	86,880	81
Great Lakes	Jan.	K8LEE	41,080	76	K8III	80,984	79
	June	WA8TTS	38,064	79	WA8ONQ	111,111	80
	Sept.	W8DJY	38,226	81	WA8ONQ	77,952	81
Hudson	Jan.	WB2WIK	63,070	80	K2XR	76,000	81
	June	WA2FGK/2	61,903	81	K2XR	203,218	81
	Sept.	WB2WIK	54,202	79	K2XR	142,006	80
Midwest	Jan.	WBØZKG	16,776	81	KØVUY	14,196	76
	June	WBØTEM	30,304	80	WØOHU	68,796	79
	Sept.	NØIS	24,119	79	KØTLM	7470	79
New England	Jan.	WA1MAO	55,130	81	WA1RWU	76,416	81
	June	N6NB/1	86,254	80	W1FC	315,582	81
	Sept.	N6NB/1	102,795	79	W2SZ/1	205,530	81
Northwestern	Jan.	WA7KYZ	10,296	79	WB7DTI	10,008	81
	June	KB7WW	26,649	81	N7DB	42,210	81
	Sept.	WA6JUD/7	4056	76	WA7NAN	8759	75
Pacific	Jan.	WA6JUD/6	23,868	76	WA6BMV	24,814	77
	June	N6NB	69,184	77	WA6JUD/6	81,213	76
	Sept.	WA6JUD/6	24,640	77	WB6KBZ/6	31,995	78
Roanoke	Jan.	K3ICH/4	23,744	80	W4BFB/4	27,392	80
	June	N6NB/8	84,780	81	W2CNS/8	152,934	81
	Sept.	WA2FGK/8	50,298	81	W4BFB	190,210	79
Rocky Mountain	Jan.	N6NB/7	6120	80	WAØPHZ/Ø	8062	68
	June	WAØTVZ	22,935	77	NØBRI	33,930	81
	Sept.	K5MAT	900	81	NØKV	2970	79
Southeastern	Jan.	W4GDS	26,400	73	W4VO	18,966	78
	June	WB4OSN	55,380	80	WA4OYH	85,500	80
	Sept.	WA4NJP	13,939	81	W4VO	24,426	79
Southwestern	Jan.	N6NB	25,880	79	N6NB	46,750	81
	June	K6YNB	60,342	76	W6AMT	105,080	76
	Sept.	K6YNB/6	34,013	76	N6MI	22,848	81
West Gulf	Jan.	K5CM	14,100	78	K5CM	14,910	81
	June	WA5HNK	34,151	77	K5LZO	92,106	80
	Sept.	KC5WX	6220	81	K5CM	18,630	78
Canadian	Jan.	VE1ASJ	21,156	79	VE1DXA	13,266	79
	June	VE2DFO	37,410	81	VE3ONT	82,188	74
	Sept.	VE3ASO	18,816	73	VE3ONT	43,413	74
DX	Jan.	C6ADV	120	81	—	—	—
	June	W2BN/C6	18,700	77	VP5AA	29,526	80
	Sept.	JA1RJU	8	79	XE2XW	114	81



AA2Z gave up the creature comforts of beautiful Connecticut to try his hand at mountaintopping from the wilds of western Massachusetts.

The WA2FGK mobile, ready to roll into West Virginia and to roll out again with the number two single-operator score in the contest.

SOAPBOX

Having worked the last four vhf contests exclusively on 2-meter cw and ssb running about 80 watts, I feel that the scoring system is not fair to the single operator. I think that awards should be made to those stations that score the most points on each band (VE3BZE). Worked three "new" states on 220 — TN, MA and KY (N4CD). A grid locator system would encourage vhf enthusiasts to aim their antennas this way! 90% of those stations that I worked were off the back or side of their antennas. Think what would have happened had there been an incentive to point those antennas into the "wilderness" (KA1SY). *No* Es or extended tropo — really the pits! (W5UWB). Since my station is weighted toward the uhf side, I was very happy to see 6 meters dead in this area and pleased to be on hand for a modest opening on 1296. Best DX — W2SZ/1 at 496 miles on the 23-cm band (WA8TXT). This contest can be summed up in three letters — UGH! Oh, the sections were there for the taking — I had 19 sections in less than four hours. I seem to be quite lucky in getting Maine (I even wound up with two Maine QSOs) (WB2CUT). I am still patiently waiting for 6 meters to open up — 9/23/81 (WD4PKZ). The enclosed log sheets for the recent September VHF QSO Party are just another piece of evidence to prove the "Black Hole" theory that exists between Lake Michigan and the Missouri River (AE9M). I believe that there should be no time limit on 220-MHz fm. There is not enough activity on 220 to justify this limitation (WA1PLS). Sure would be nice if more vhfers realized that there are Minnesota stations north of Mpls./St. Paul. We do have several multiband capable stations in Duluth and even farther north (WBØZAH). 220 ssb/cw proved worth the effort, netting us half of our 220 multipliers, some of which we wouldn't have worked on fm. Our 4 watts on 220 was more than enough to snag KY, OH and WV (WD4MBK/WB4NMA). Came out with both barrels blazing when we experienced "contestus interruptus" (K1CE). Unbelievable signal from WA7JUO. Strongest signal that I've ever heard from Nevada (N6BXP). Our 2-meter station was really flaming. An operator in Cleveland reported that we were as loud as his locals. And we can hear, thanks to our locally designed GaAs-FET preamp. Two additional "Boomers" lounging in the cellar should produce an awesome signal in '82 (there's even a 4CX1000A waiting in the wings) (W3GNR).

FEEDBACK

Please refer to page 82 of January 1981 *QST* for the following corrections. In the Washington Section, KB7G/7 should be listed as the multiop section winner (not single operator), with KB7B, N7AYI and WB7RTG assisting KB7G. In the Ohio listings, adjust the linescore of KD8Z to read 3243-141-23-AB.

Please refer to page 82 of September 1981 *QST* for the following correction. N7DB/7 (not K7AUO), with a score of 42,210, should be listed as the multiop leader and the new all-time division record score in the Northwestern Division. The All-Time Division Leader Box with this report reflects this change.

Scores are listed in order, single-operator stations first within each section. From left to right: call, score, number of QSOs, number of multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2.3 GHz, H-5.7 GHz, I-10 GHz, J-24 GHz).

U.S.A.

1

Connecticut

K1PXE 31,533-295-69-ABCDE
KA1BRD 30,660-352-70-ABCD
WA1UQC 18,198-255-54-ABCDE
K1FO (6,184-182-56-ABCDE
AK4L/1 6988-183-42-ABCDI
KA1BXB 8918-157-49-ABCDF
K1EM 6513-145-39-ABD
WJ1A/1 5280-120-32-ABCD
WA1ZNT 2668-116-23-AB
WB1EYI 2574-138-18-BC
WA1GTP 1242- 54-23-AB
WA1ZEK 684- 76- 9-B
W1GNC 510- 51-10-B
W1AW (AA2Z, op.) 304- 27- 6-BD
WA1POI 125- 21- 5-ABC
K1WJ 54- 9- 3-C
KA1GIY 25- 7- 5-A
W1VD (+K1JX, K1ZZ) 51,136-673-68-ABCDI
W1QK (+KA1TD, W1PV, WA1WXV, WB1SCW EZL) 34,221-480-61-ABCDF
K1MUJ (K1SGX UQF, KB1H, WA1S K2S 1QVF HYN, ops.) 10,592-331-32-AB
WB1BVR (+KA1SK) 6448-208-31-AB
K1CE (+KB2GG, N1X/, WA1VFI 736- 47-16-ABD

Eastern Massachusetts

K1FWF 23,973-315-61-ABCD
N1AIS 8525-242-31-BD
W1GXT 6897-153-43-BCDF
WB1FKF 6,146-113-38-BCDE
KA1DHO 4350-127-30-ABCD
K1GVM 3828-116-29-ABD
WA1JOF 3060-170-18-B
W1KM 2784- 95-29-ABD
KA1AMR 744- 62-12-B
WA1YKN 624- 52-12-B
W1XM (W1XG, N2ME, WA4TTG, ops.) 39,075-399-75-ABCDE
N1BLI (+N1BCG) 2070-138-15-B

Maine

K1TOL 5511-167-33-A
W1BJ 1540- 97-14-BD
K1HZ 126- 21- 6-B
KA1SY 114- 19- 6-B

New Hampshire

WB1CJT 26,688-322-64-ABCDE
W1EJ 18,966-241-58-ABCDE
AA1I 17,287-229-59-ABCDE
AC1J 3404-133-23-ABCD
KA1CDZ 2134- 97-22-AB
W1HNZ 350- 35-10-B
WA1GDR 350- 35-10-AB
N1CU 242- 22-11-B
KA1FTG 234- 26- 9-B
WA1YKM/1 6- 3- 2-A

Rhode Island

KH2M/1 14,664-246-52-ABCD
W1AJR 4674-105-38-ABCD
WB1BAT (K8BGZ, op.) 3740-187-20-B
K1OS 588- 42-14-AB
K1WJ/1 16- 4- 4-B
AJ1E/1 (+KA1CXC, WA1AYS, WA2IHR, WB4RVA) 21,420-307-60-ABCD

Vermont

K1LPS 5017-173-29-AB
W1AIM 4956- 99-42-ABCD
W1TKZ (KJ5 OGF TKUR, N1AGN, N2AWG, WA1S PQY ZLG, WB1BUM, ops.) 60,138-658-78-ABCDI

Western Massachusetts

AC1T 6882-152-47-ABCD
WA1PLS 4840-180-22-BC
AA2ZT 1968-107-41-ABCD
WA1VCU 2280-101-20-BD
W1JP 960- 60-16-AB
K1BE 884- 52-17-AB
WA1UOL 434- 31-14-AB
K1GXU 230- 23-10-B
AB2Z/1 (K1DH, WA1UGE, WB1CBH, AG2X, K2SMM UF WR, WA2SAAU SPL, WB2S CFP ILR PKO QCJ, KL7JT.

N8AFM, WA8USA, oprs.)
205,530-1197-130-ABCDEFIJ
K1TR/1 (+K1s BA EA, N1BEM, W1OOP, WA1s PBU QWF VFJ)
86,031-930-79-ABCDEF
KA1APR (+KA1AVJ, WA1RWU)
7546-343-22-B

2

Eastern New York

W2CRS	20,510-216-70-ABCDEFI
WA2TIF	12,996-322-36-BD
K2GSF	1854-103-18-B
WB2FHR	136- 17- 8-B
W2GKR (+KA1FVG)	5130-125-38-ABCD

New York City - Long Island

WA2YWP	12,460-288-40-ABC
K2OVS	11,100-185-60-ABD
N2BFJ	9072-209-42-ABC
WB2CMI	8200-205-40-AB
WA2SLY	4984-178-28-AB
KB2WS (+KC2GI)	3384-141-24-B

Northern New Jersey

WB2WIH	21,848-284-57-ABCD
KA2BTD	14,112-236-48-ABCD
N2BMN	9633-198-39-ABCD
N2CG	7680-149-40-ABCD
WA2CWA	6240-195-32-AB
W2VC	5684- 86-32-CDE
WB2CUT	4628-231-20-B
WB2ONA	4256- 73-38-ABCDE
WA2UDT	3689-119-31-AB
KQ2F	3150- 95-25-BD
WB2IKL	2760-138-20-B
W2TC	2546-134-19-B
WB2TMD	2150- 90-24-AB
WA2ALM	1904-119-16-B
KA2GQU	1008- 72-14-B
WA2SNA (K2BJG, N2s AA2 CIA CTI W2s FPY IHM LVT RS, WA2UPK, WB2RFB, WD2AAI, oprs)	95,504-775-94-ABCDE
N2BOW (+KA2s MKO NMS, N2s BMP CEJ)	27,633-382-61-ABCDI
K4BNC (+W4AVP)	1386- 63-22-AB

Southern New Jersey

WA2DPU	64,504-549-88-ABCDE
W2EIF	16,820-213-58-ABCDE
W3HRW	4170-139-30-AB
W3CXU/2	3538- 63-35-BCDE
WA2RYE	1672- 76-22-A
K2BWR (+K2ZRJ)	23,754-228-74-ABCDE
WB2RVX (+W2PJC)	12,201-196-49-ABCDE

Western New York

WB2BGI	17,582-254-59-ABCD
K2GK	9310-146-49-ABCDE
K2YCO	5434- 98-38-ABCDE
K2LZF	4095- 94-35-ABCDE
K2OS	3634-158-23-B
K2NV	2408-109-24-ABD
N2CLM	1620- 81-20-B
W2SFU	1340- 67-20-AB
W2WGL	1066- 66-16-B
K2JIQ	798- 57-14-B
KC2FY	660- 44-15-AB
W2DUC	660- 55-12-AB
WA2RXB	455- 35-13-AB
W4UCH/2	288- 32- 9-A
K2QN	2- 1- 1-D
K2TXB (+K2EY, N2CUW, W2DRZ, WA2RKO)	26,376-471-56-AB
N2HR (+N2s CGT CSG, N6IN, WA2s IVO YFB, WB3RKK)	23,232-323-64-ABCD

3

Delaware

K3SXA	29,817-319-69-ABCDE
K3CNH	9564- 53-18-AB
AC3I (+N3s AYJ BHS)	15,437-337-43-ABCD

Eastern Pennsylvania

WB3CDE	47,502-495-78-ABCD
K3IWR	7605-152-45-ABD
WA3UGP	5800-180-29-BCDE
W3ETB	4788-106-36-ABCD
WA3JUF	3978- 66-26-BCDI
AK3O	3629-191-19-B
WA2QMY/3	1860- 93-20-AB
KJ4YYG	1080- 68-15-AC
KA3FQU	885- 59-15-B
W3KM	825- 55-15-B
W3GJC	752- 47-16-B
WA3KFT	21- 7- 3-AB
K3YTL (KA3s EEO FUW, KB3JK, N3AVZ, W3UJH, WA3s JWP JWV VAZ YUN, WB3s BVF CAI DYE FAA FKQ FYT, oprs.)	68,580-643-90-ABCDE
K3MTK (KA3HHB, W3LUW, WA3s KPP LBI PUL TUL WAK ZFD WB2YEH, oprs.)	67,760-714-80-ABCDE
WB3CZG (+N2CMI, K3MKZ, KA3AJH, N3AVC, WB3s FFT KBI)	56,985-539-87-ABCDE
WB3JYO (KA3s EEX FOG HTT HJS, N3s BBY BHP BOO, W3ICC, WA3YUE, WB3ONI)	27,018-408-57-ABCD
W3AD (K3s HEC SZY, N3BCZ, W3CWE, WA3s HMK PHL, WB3s BNB CSY, oprs.)	24,360-393-56-ABD
K3HP (+KB3HE, WB3IIQ)	20,500-362-50-ABCD
W3LP (W3s GFN JUZ UH, WA3CUQ oprs.)	8473-229-37-AB
AI3Q (+K3s BS JSZ PQI TRM	
KA3CAP, WB3s FNZ KNJ)	6688-176-38-AB

Maryland - D.C.

KA1GD	11,840-279-40-ABD
K3HCE	10,125-199-45-ABD
W3ZZ	9688-322-28-BD
K3AKR	8722-139-49-ABCD
W3OZ	2760- 69-20-D
WB3CHS	2508-132-19-B
W3HQX	1008- 72-14-B
K3PNL	450- 25- 9-D
KB3QV	338- 26-13-B
KA3FJV	210- 21-10-B

Western Pennsylvania

WA3DJG	4488-176-24-ABD
W3CSA	2425- 96-25-ABD
W3GNR/3 KA3s AWL DEO DWR WA3s BUX FFC JBY UKE, oprs.)	33,361-385-73-ABCDE
K3HKK K3BIE, KA3s DBO DBT DGT GJC, LA4LN, N3s BAQ BBH BPY WS, WA3WNE, WB2LOU, WB3AEI, WN3VAW, oprs.)	22,701-286-69-ABCD

4

Alabama

WA4CQG/4	7872-151-48-ABCD
WA4VUG/4	3- 3- 1-B

Georgia

WA4NJP	13,939-236-53-ABCD
K4CKS	7920-188-40-ABC
NA4I	735- 49-15-AB
4K4T	48- 8- 6-A
WB4NMA (+WD4s JQV MBK)	15,912-264-52-ABCD

Kentucky

KC4EG	1584- 36-36-ABD
N4EPF	1022- 73-14-B
K4OZQ	672- 48-12-BD
W4SMU	273- 37- 7-BD
WD4EKA (+KD4EI, W4VBH, WA4s CBX CUS DHG KMG KYS OVG PYX, WB4IDK, WD4s AFZ GSM)	27,420-405-60-ABCD
WA8LXJ/4 (+WD8ISK)	14,575-224-55-ABCDI

North Carolina

K4WO	4536-104-36-ABD
W4ODS	408- 34-12-AB
KA4HKK/4	280- 35- 8-B
WA4WZQ/4 (+K4YBC, WA3SBT, WA4WZP, WD4s CXR GQU)	31,204-470-58-ABCD

Northern Florida

W5HUQ/4	4466-139-29-ABD
W4ODW	2775- 92-25-ABD

South Carolina

WA4LDU	3510-113-27-ABD
N4DT	2834- 96-26-ABCD
NB4S	832- 64-13-B
WD4PKZ	230- 23-10-AB
K4GL	144- 12- 6-CD
AJ4N (+KJ4X, WB4MJU)	6864-202-33-ABC

Southern Florida

K1FJM/4	513- 53- 9-ABD

Tennessee

WA4QYK	1357- 48-23-ABC
WA4PTZ	1085- 45-13-B
WA4DFS	261- 29- 9-B
W4BFB (AA4ZZ, AB4J, AK2F, K4s LVY PDY RVW TP, KA4NNC, KC4CD, KD4s IL PX, KK4L, KU4V N4FJE, W4FK1, WA4s OJU VCC, WB4s PCS TLX, WD4s ABZ AEI JWO, WN4GGH, oprs.)	86,880-983-80-ABCD
WD4DGF (+N4VC)	2398-109-22-AB

Virginia

WA4SBC	17,051-199-59-ABCD
N4CD	6956-123-47-ABCD
W4DO	3640-130-28-AB
W3IY/4	2415- 49-23-CDE
WD4AZG	1116- 62-18-AD
W4UG	686- 49-14-B
KA4SCA	672- 48-14-AB
KL7GLL/4	546- 42-13-AB
KC4YN	26- 13- 2-B
W4IY (K4HWG, KA4CKI, K4RI, N4KV, WB4RDV, WD4RGP, oprs.)	28,035-388-63-ABCD
KC4AO/4 (+KA4IKQ, KB4s NT XK, WD4BWL)	3680-176-20-ABC
W4UVA (KB3KJ, WD4EIS, oprs.)	1020- 68-15-B

5

Arkansas

WA5FDF	2884- 84-28-ABCD
WB5JAR	1260- 60-21-AB
N5DL (+K9DSJ, WD8s CAN CAP)	10,350-194-46-ABCD

Louisiana

W5EW/5	715- 65-11-B
WA5WPO	165- 11-11-ABD
WA5YOU (+WB5NIF, WD5CZN)	1034- 39-22-ABCD

Mississippi

W5RCI	1380- 56-20-BCD
W5UCV	928- 55-16-ABD
WD5IKD	533- 41-13-B
WA5WUX	435- 29-15-AB
WD5HLD	117- 13- 9-AB

New Mexico

K5MAT	900-125- 6-ABC
WD5GNW (+WØZYF)	287- 41- 7-AB

Northern Texas

KC5WX	6220-239-20-ABCDE
KC5IJ	357- 37- 7-ABD
KA9JJQ/5	201- 67- 3-B
WD5IBM (+KA5s FKH FLF)	2745-158-15-ABCD
AC5I (+WB5KTC)	2436-188-12-ABD

Oklahoma

K5SW	720- 49-12-BD
K5WF	580- 58-10-B
W5NZS	318- 35- 9-ABD
AA5V	135- 27- 5-B
N5CG (+K5CM, N5KW)	15,984-318-48-ABD

Southern Texas

KC5GB	2128-101-19-ABD
WD5ERG	378- 46- 7-BD
K5BZU	210- 42- 5-B
W5UWB (+WA5TBE)	1650- 85-15-ABDE

6

East Bay

N6AMG	6230-125-35-ABCDE
WB6ZEP	3480-152-20-ABD
WB6NAC	765- 85- 9-B
WA6LHD	561- 51-11-B
WB6DHK (+G4KAH, WA6LCN, WB6WML)	7176-222-26-ABCD

Los Angeles

N6BXP	7429-323-19-ABC
W6PFE	4029-193-17-ABCD
N6CA	252- 14- 6-E
WA6EKR	44- 11- 4-B
N6MI (+AD6C, AE6E)	22,848-554-34-ABCDE
K6BPC (WA6s HXD PZL, WB6YVP, oprs.)	7462-239-26-ABCD
KC6A (+AA6DD, K6LPF)	6422-155-26-BCDE

Orange

K6PVS	2655-156-15-BD
W6MFO	814- 74-11-B
N6ME (+K6KTS, KA6s ART DGD OXP, N6s DBF DNH, WA6PMX, WD6GSH)	17,503-633-23-ABCD

Sacramento Valley

W6SFH (+WA6KOD)	1278- 44-18-BDE

San Diego

WB6NMT	4482-106-27-ABCDE
K6LMN/6	3072-218-12-BC
KS6A	803- 54-11-BD
W6TIK	660- 39-12-ABC

San Francisco

WA6LLY/6	759- 69-11-AB
WA6KLK (+N6EEK, NA6T, WB6KFA, WD6FGX)	4563-149-27-ABCD
N1AL/6 (+KD6NT)	1536- 83-16-ABCD

San Joaquin Valley

W6YKM	10,127-180-41-ABCDE
K6JKQ	6303-124-33-ABCDE

Santa Barbara

N6NB	20,340-324-45-ABCDEI
KB6XG	11,640-313-30-ABCDE
K6ELQ	1652-102-14-ABD
K6MEP (KA6MMC, N6AFY, WA6s DJS FPX, oprs.)	11,622-348-26-ABCDEI

Santa Clara Valley

K6GSS	11,592-241-36-ABCDE
K1RZ/6	8550-257-30-ABCD
W6XN	3634- 89-23-BCDE
WB9AJZ/6	984- 68-12-BC
WB2SZK/6	100- 17- 5-ABC

7

Alaska

KL7WE	339-101- 3-ABD
WB4WXF/KL7	4- 2- 2-AB

Arizona

K1VOW	495- 41-11-ABD
K2ONR/7	318- 45- 6-BEI

Nevada

WA7JUO	2023-100-17-ABD
K7ZOK	637- 48-13-ABD
WAØYPL/7	75- 15- 5-AB

Oregon

W7TYR	1308- 79-12-ABCDE
K7HSJ	1034- 70-11-ABCDE
W7UDM	440- 45- 8-ABDE
WA7AWJ	102- 51- 2-AB
WA7ECY (+N7DB)	90- 14- 5-ABCD

Utah

WA7AQK	220- 21-10-ABD
N7BHC	116- 23- 4-ABCD

Washington

WB7UUP	1562-125-11-ABCD
K7ND	1526- 90-14-ABCDI
W7ERH	60- 20- 3-B
W7IDZ	54- 9- 6-AB
WB7ATP	4- 2- 2-B

Wyoming

WA7KYM	51- 17- 3-A

8

Michigan

WD8BRE	2808-117-24-AB
WA8RUJ	1680-112-15-B
W8KNH	1248-104-12-B
W8CAP	784- 56-14-B
WB8AAX	550- 55-10-B
WD8KLU	500- 38-10-ABD
K8LZF	294- 21- 7-D
KA8BCL	248- 31- 8-B
W8QOI	248- 31- 8-A
WB8TGY	224- 23- 8-ABC
KA8GMJ	105- 15- 7-AB
WA8ZCO	54- 9- 3-D
WD8MJQ (+WD8DSV)	5684-203-28-AB

Ohio

W8DJY	38,226-449-69-ABCDEI
WA8TXT	15,960-163-57-ABCDE
K8NXI	14,442-208-58-ABCD
K8DIO	6720-149-35-BD
WO8CTX	5022-141-31-ABCD
N8CSL	2960-185-16-B
KD8ZU	2484-119-18-BD
W8DWV	2162- 86-23-BCD
N8AXA	2142- 95-18-ABCD
W8SRW	1494- 83-18-B
WD8MSF	1156- 68-17-AB
WA8GMT	1050- 75-14-A
WA8SVV	855- 57-15-AB
K8WW	792- 24-11-E
W8LCY	300- 30-10-B
K8IP	180- 20- 9-B
W8HBG	144- 12-12-B
WA8ONQ (+WA3OJX, N4AMG, K8VVV, N8BPB, WA8s NJR OGS WB8IGY, KA9KIC, W9OEH)	77,952-672-96-ABCDEI
W8VP (K8AL, KA8s AMF DFX LBO N9BOB, W5UA, WBs PR ULC WA8FHF, WB3GPJ, WD8s DQE ERS NFJ TSI WB9YCZ, WD8IYL, oprs.)	72,770-649-95-ABCD

West Virginia

WA2FGK/8 (K2LNS, oprs)	50,298-562-83-ABCD
KJ8J	1216- 76-16-B
W8UT	1020- 51-68-BD
W8AEC	468- 21-12-BD
K3LNZ/8 (WA3s EOQ NZL OVW W4PSJ, oprs.)	32,777-380-73-ABCD
K8SA (+KB8YZ, KB8CY, KC8FI, WB8s NVX UBK, WD8MCR)	1190- 85-14-B

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Illinois

K9RO	14,750-252-50-ABCDE
WB9SNR	8540-144-35-BCDE
AE9M	5820-173-30-ABD
W9NLP	3002-141-19-BD
WB9WMM	2208- 96-23-AB
WD9COL	1080- 72-15-AB
AF9R	680- 34-10-D
WD9EMI	8- 2- 2-BI
W9IP (+K9s AKS VV, KA9KKP, W3EP, WA9YLB)	69,276-643-92-ABCD
K9HMB (+K9s GL PW RS, WB9s CAS TIY, WA7CIO, WD9DCL)	68,084-737-77-ABCDE
AA9U (+WB9s TQQ VDV)	11,711-205-49-ABCD
WB8HUC/9 (KB8UJ, KI8B, WB8s GUE GEX GEY GFA, oprs.)	8645-213-35-ABCD

Indiana

WB9NTL	8732-198-37-ABCDE
WD9EME	3696-114-28-ABCD
N9AZC	3125-125-25-AB
WA9PKL	720- 39-16-ABD
WB9KYE	105- 15- 7-A
W9YDP	28- 7- 4-B

Wisconsin

WA9KGQ	3540- 97-30-ABCD
KB9NM	2212-158-14-B
N9CIQ	560- 56-10-AB
WA9LZM	341- 31-11-AB
W9HR	322- 32- 7-BD
K9XY	182- 21- 7-ABC
W9NAW	126- 18- 7-A
K9GDF	2- 2- 1-B

Ø

Colorado

WDØDJU	148- 31- 4-ABC
WDØBZA	108- 22- 4-ABC
NØCQO	24- 12- 1-B
WB7VMQ	21- 21- 1-B
AAØP (+KAØJCN, KB6OY, NØCAR, WDØHHU)	620-119- 5-ABD
WØIA (W1XE, WA5FNW, WD6DRT KAØDXM, NØAWZ, NØMC, WØJF, oprs.)	120- 36- 3-ABC

Iowa

WØRAP	432- 27- 8-D
N9BD/Ø	420- 41-10-ABC
WBØZKG (+AKØP)	5890-154-31-ABCD

Kansas

WBØISW	1230- 67-15-ABCD
AEØG	405- 45- 9-B
NØLL	348- 29-12-AB
KØVUA	88- 22- 4-B
WØRT (+WØQOA)	3600-132-24-ABCD

Minnesota

WØVB	3276- 92-26-BCDE
WØXG	2184-104-21-AB
WØOHU	630- 35- 9-D
WBØGGM	324- 36- 9-AB
WBØZAH (+AF9T, KAØKWA, KBØLC, NØBNG)	1326-102-13-AB

Missouri

KØTLM	5110-124-35-ABCD
WØRWH	4800-173-24-BD
WØFY	2340- 73-26-ABD
KBØGR	1095- 72-15-ABD
WAØNOK (+WBØITA)	3475-122-25-ABCD

Nebraska

NØAJU	1050- 75-14-AB
KFØY	15- 5- 3-B
WBØIUT (+KAØs DWJ JLT, WAØWRI, WBØCGF)	1620- 79-18-ABD
WDØRQM/Ø (+KAØCRI, WØKAV)	78- 13- 6-AB

South Dakota

KØUDZ	84- 11- 7-ABD

VE

Maritimes - Newfoundland

VE1UT	168- 13- 8-BD

Quebec

VE2BBK	3737- 75-37-ABCD
VE2BXF	546- 39-14-AB
VE2CUA (VE2s DFH DUB, oprs.)	114- 19- 6-B

Ontario

VE3CRU	18,036-245-64-ABCDE
VE3FGU	6732-187-36-AB
VE3ASO	6620-163-40-AB
VE3BZE	1157- 89-13-B
VE3EMS	440- 20-11-C
VE3OSS/3	54- 5- 6-AC
VE3LNX (+VE3s ADJ LIZ, oprs.)	15,200-243-50-ABCD
VE3UOT (VE1BCZ, VE3HTT, oprs.)	1392-111-12-ABD

British Columbia

VE7BLF	648- 38-12-ABCD
VE7ASI	416- 39- 8-ABCD

DX

Bahamas

C6ADV	1- 1- 1-A

Mexico

XE2XW (KA5OTN, W5XW, WA5NAD, oprs.)	114- 67- 2-B

Check Logs

K1KA	
WA5VJB	
WB8KAY	

1982 Novice Roundup Announcement

Attention, Novices and Technicians! It's time to get ready to enter *your* contest, the Novice Roundup. There's no other contest like it. Only Novices and Technicians are eligible to compete for awards. A handsome achievement certificate is awarded to every Novice or Technician (single-operator station) who submits a valid entry of 200 or more QSOs in the 1982 Novice Roundup.

An important part of playing the contest game is complying with the rules and doing the associated paperwork. The Novice Roundup is a very good place to start and learn the fundamentals of contesting. Many top contesters have gotten their start in the Novice Roundup.

To ensure your success in the NR, you should: (1) Read and understand the rules for the contest. If any part of the rules is unclear, by all means contact us here at ARRL Hq. for a clarification. (2) Follow the rules to the letter during the contest. Be sure to copy all the contest QSO exchange information for every QSO. (3) Very carefully check your contest entry before sending it in. Make sure that all the pertinent information is included in your contest entry. (4) Last but not least, be sure to mail your entry by the deadline set forth in the rules (March 9, 1982, in this case). All your contest efforts will have been for naught if the logs do not arrive in time to make the listings.

How to Participate

The 1982 Novice Roundup starts at 0001 UTC on January 30 and ends at 2359 UTC on February 7. That means the NR starts on Friday evening, January 30, local time. You may operate 30 hours out of the nine days. Rule no. 2 further details the timekeeping. Entry forms are available from ARRL Headquarters: log sheets, summary sheets (one needed) and CD-77 forms ("dupe sheets" — one needed) to keep track of whom you have worked in matrix form. The log sheets have room for 100 contacts each. Send your self-addressed, stamped envelope to Headquarters now, and you'll have your forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

The idea in the contest is to work as many stations as possible, in as many different ARRL sections and foreign countries as possible. ARRL sections are listed on page 8 of every *QST*. If you are in one of the few states with more than one ARRL section and do not know which section you are in, write and ask for a free copy of *Operating an Amateur Radio Station*. You may work each station *only once*. Keep your contacts as short as possible; send your exchange (RST report and ARRL section) only once, and repeat it only if requested. Keep your CQs short, too! Here's a sample:

CQ NR CQ NR DE KA2YYY/N KA2YYY/N K
KA2YYY/N DE WA1XXX/T AR
WA1XXX/T DE KA2YYY/N 579 ENY K
KA2YYY DE WA1XXX R 569 NH K
WA1XXX R 73 DE KA2YYY/N K

Note that once you have established each other's license class you can drop the /N and /T for the duration of the QSO; brevity is the name of the game!

Scoring and Rules

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of multipliers (sections + countries) worked. And remember, KH6, KL7, KP4/KV4 and VE districts are sections and *cannot* be counted a second time as a foreign country. If you work 100 stations in 31 sections + 3 foreign countries and have an ARRL (not FCC) Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31 + 3) or 34, for a total of 3740 points. For details on the Code Proficiency program, see "Contest Corral" on page 98

Do not write above this line.

NOVICE ROUNDUP

License Class
☒ Novice
☐ Technician
☐ Other

CALL USED WB1AVA/N ARRL SECTION or COUNTRY Connecticut

CHECK ONE: Single Operator Station X Multioperator Station ____

If multioperator, show calls of all operators, loggers ____

(235 QSOs + CP credit 15) × (56 Sections + Countries* 2) =

14,500 Claimed score. Hours of operation 13

*Do not list U.S.A. or Canada here.

Transmitter TS-830S Power input 180 watts

Receiver TS-830S Antenna dipole, beam

"I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge. I agree to be bound by the decisions of the ARRL Awards Committee."

Date 2/9/82 Signature ____ Call WB1AVA

Please enclose log, photos, comments, ideas, etc. with your entry and mail promptly to: ARRL Communications Department, 225, Main Street, Newington, Conn. 06111.

MULTIPLIER CHECK-OFF LIST

(CROSS OFF EACH NEW MULTIPLIER AS WORKED.)	1	2	3	4	5	6	7	8	9	0	VE	DX (list)
	~~Conn~~	~~ENY~~	~~EPA~~	~~Ala~~	~~Ariz~~	~~Ebay~~	~~Ariz~~	~~Mich~~	~~IL~~	~~Colo~~	~~Mar-Nfld~~	HHa
	~~EMass~~	~~Nlsh~~	~~Del~~	~~Ga~~	~~Ark~~	~~Ida~~	~~Ebay~~	~~Ohio~~	~~Ind~~	~~Iowa~~	~~Que~~	DL
	~~Me~~	~~Nnj~~	~~MDC~~	~~Ky~~	~~Miss~~	~~Mnp~~	Mont	~~Wisc~~	~~Minn~~	~~Kans~~	~~Ont~~	
	~~NH~~	~~Nlf~~	~~WFT~~	~~NC~~	~~NMex~~	~~Nlas~~	Nev			~~Minn~~	Man	
	~~RI~~	~~WNY~~		~~NFla~~	~~NTex~~	SCV	~~Oreg~~			~~Mo~~	Sask	
	~~Vt~~			~~SC~~	Okla	SDgo	Utah			Nebr	~~Alta~~	
	~~WMass~~			~~GFla~~	~~Tenn~~	SF	~~Wash~~			NDak	BC	
				~~Tenn~~		~~Nnl~~	Wyo			~~SDak~~	VFS	
				~~Va~~		SV	KL7					
				W.I.		Pac.						

Print or type:

NAME: Ginny McGivern CALL: WB1AVA

ADDRESS: 1234 Main St.

Someburg, CT 01234

CD-49 (R9/77)
Printed in U.S.A.

Sample summary sheet

of this issue. You may work DX stations for contest credit; a multiplier of one is earned for each different foreign country worked.

Read the rules carefully. Keep a check sheet (also called "dupe sheet" or form CD-77) of stations worked so that you won't have duplicate QSOs. Log sheets, CD-77 and a summary sheet are available now from your ARRL Headquarters. To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed, stamped envelope containing your full name, call and mailing address complete with ZIP code.

BCNU in the NR!

Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to exchange QSO information with as many stations as possible on the 3.5-, 7-, 21- and 28-MHz Novice/Tech bands. Others work Novices and Technicians only.

2) **Contest Period:** First week of February, including both weekends. Begins 0000 UTC Saturday, January 30, 1982, and ends 2359 UTC Sunday, February 7, 1982. Operate no more than 30 hours. Off periods must be at least 15 minutes long; listening time counts as operating time. Times on and off must be indicated in your log.

3) **Categories:**

(A) Single Operator: One person performs all transmitting, receiving and logging functions.

(B) Multioperator: Single transmitters only. Those obtaining any form of assistance such as relief operators or logging.

4) **Exchange:** Signal report and ARRL section or country for DX stations. Novices should send /N and Technicians /T after their call sign so others will know their license class.

5) **Scoring:**

(A) QSO points: Count one point for each complete two-way QSO. Work each station once, regardless of the frequency band.

Novice Roundup

CALL USED WB1AVA/N SECTION Connecticut

50 QSOs per side
Number each new multiplier as worked

FREQ.	DATE/TIME GMT	STATION WORKED	EXCHANGE SENT	EXCHANGE RCVD*	POINTS
	Jan. 30,1981				
7	0103	K1WJ	599 CT	599 CT *#1	1
	0105	KA1DYZ/N	599 CT	599 CT	1
	0106	KAØ1QR/T	569 CT	579 MO *#2	1
	Feb. 2, 1981				
28	1448	KA6BPR/N	559 CT	599 EBay *#3	1
	1453	WØUA	599 CT	559 CO *#4	1
	1459	KH2GG	569 CT	569 CT	1
	1512	N6TR	599 CT	586 SBar *#5	1
	1522	KA1DYZ/N	569 CT	579 CT	duplicate Ø
	1526	WA1JLD	599 CT	599 CT	

Sample log sheet

(B) Multiplier: Each ARRL section (listed on page 8), plus VE8/VY1, plus each foreign country.

(C) Code proficiency: Additional points can be earned if you have qualified for an ARRL Code Proficiency certificate. FCC code credit *cannot* be used in lieu of the above. If an entrant does not already have an ARRL CP Award, apply for credit by attaching a copy of the qualifying run from W1AW or W6OWP for February to your Novice Roundup entry. CP credit equals the wpm speed indicated on the latest certificate or sticker held by the entrant.

(D) Final score: Add your Code Proficiency credit to your total number of QSO points. Multiply that by your ARRL section/country total for your final score.

6) **Miscellaneous:** Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL Hq. for an s.a.s.e. Official forms are recommended. Any entry making more than 200 QSOs must submit duplicate checking sheets (alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs. Logs should include dates, QSO times, on and off times, complete exchange sent and received, and band. Postmark your entry within 30 days after the contest (March 9, 1982).

8) **Awards:** Certificates to the top Novice and Technician in each ARRL section and each single-operator Novice or Technician who submits a valid entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards.

9) **Conditions of entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See this issue, page 92.

INDEX OF PRODUCT REVIEW ITEMS FOR 1981

☐ As explained in the "Feedback" item on page 47, there is no separate section for Product Reviews in the 1981 index that appears on pp. 226-231 of December 1981 *QST*. The list of Product Review items follows:

AEA KT-1 Keyer/Trainer: 40, Jan.
AEA Morse Memory Keyer Model CK-1: 40, Aug.
B&W Model 370-15 Antenna: 50, March
Benjamin Michael Industries Model 173B Station Clock: 48, Oct.
Bird Model 6736 Termaline Wattmeter: 39, Jan.
C-Probe II: 49, March
Cubic Astro 102BXA Transceiver: 49, Dec.
Curtis KB-4900 Keyboard Keyer: 47, Sept.
Cushcraft A3 Triband Antenna: 40, May
Cushcraft 20-4CD Skywalker 20-Meter Monoband Yagi Antenna: 51, Dec.
Daiwa CNA-1001 Automatic Antenna Tuner, The: 41, Nov.
Decibel Products DB 702 2-Meter Antenna: 48, Sept.
Gargler, Inc. Microphones: 49, April
GC Electronics Lift-It Transfer Sheets: 49, Sept.
HAL Message Storage Option: 41, Aug.
Heath HX-1681 CW Transmitter: 48, March
Feedback: 53, April
Heath VF-7401 2-Meter Transceiver: 43, Nov.
Heathkit EE-104 Phase-Locked-Loop Course and ET-3300 Breadboard: 50, March
ICOM IC-2A 2-Meter Hand-Held Transceiver: 38, Jan.
ICOM IC-551 6-Meter Transceiver: 43, June
Japan Radio Company Model NRD-515 All-Wave Receiver: 42, Nov.
J. W. Miller Automatic Antenna Tuner Auto-Trak Model AT2500: 42, July
Kenwood TR-2400 2-Meter FM Transceiver: 46, April
Feedback: 40, June
Kenwood TR-7800 2-Meter FM Transceiver: 46, Sept.
Kenwood TR-7850 2-Meter FM Transceiver: 48, Oct.
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Kenwood TS-130S HF SSB Transceiver: 40, July
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KLM 144-148-13 LB Antenna: 48, Oct.
K5SMG Code Practice Tapes: 41, Aug.
Macrotronics M8000 RTTY System: 49, Sept.
Mirage B-23 2-Meter, 30-Watt, All-Mode Amplifier: 41, May
Radio Shack DX-302, The: 39, Aug.
Feedback: 51, Sept.
Shure 444D Controlled-Magnetic Fixed-Station Microphone: 43, July
Telex/Hy-Gain HDR-300 Heavy Duty Rotator: 40, Jan.
Vocom Telescoping 5/8-λ Antenna for 2-Meter Portables: 49, Sept.
Yaesu FRG-7700 Communications Receiver: 38, Aug.
Yaesu FT-107M HF Transceiver: 45, April
Yaesu FT-480R 2-Meter Multimode Transceiver: 46, Oct.
Yaesu FT-707 Transceiver: 41, June

Club Competition Rules and Contest Disqualification Criteria

The 1982 contest season is upon us. Three of the ARRL-sponsored contests during 1982 include an ARRL-affiliated club competition — January VHF Sweepstakes, February/March International DX Contest and November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. The use of standard ARRL contest forms will help to ensure that your score is figured properly and speed up the publication of contest results in *QST*.

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings before being counted for a club.

For a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet, *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* is in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX Competition.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be an ARRL-affiliated club.

2) *Medium.* Any club submitting fewer than 50 entries falls in this class, except as noted in local club criteria, below. The same mileage and attendance requirements apply as the unlimited class club. The club must be an ARRL-affiliated club.

3) *Local.* Any club submitting 10 entries or less is in this classification. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be an ARRL-affiliate.

Single and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (i.e., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete.)

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later so that the 50-percent attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator cw score and the highest single-operator phone score in any club entry will be rewarded with a club certificate when at least three single-operator cw and/or three single-operated phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by two percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1981 phone SS prohibits submission of an entry for the 1982 phone SS, but 1982 cw SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by Hq., three additional contacts will be deleted as a penalty. The penalty will not be considered part of the two-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final

Strays

I would like to get in touch with . . .

☐ hams interested in the propagation forecasting techniques of J. H. Nelson. Mary MacKenzie, KA7FEF, 6125 S.E. 86th Ave., Portland, OR 97266.

☐ anyone who served with the 9th Armored Division, particularly in the 149th Armored Signal Company, in the U.S. and Europe from July 1942. Fred Linn, W9NZF, 2929 N. Shepard Ave., Milwaukee, WI 53211.

☐ anyone with a schematic or schematic information about the DuMont type 241 oscilloscope. Rick Newton, KA3AUX, 9 Emma Dr., Pittsburgh, PA 15223.

☐ amateurs who could give me operating tips and maintenance information about a Dalmo Victor Chart Recorder DPR-LC-MS. Jim Buckwalter, WA6FGM, 3212 W. Mill Creek, Visalia, CA 93277.

☐ other hams who have experienced marriage encounter, for the purpose of starting a net. Steve Mulford, WBØFKY, 1406 SW Peggy Circle, Lee's Summit, MO 64063.

Public Service

Conducted By Robert J. Halprin,* K1XA

The Health and Welfare Traffic Problem

The handling of welfare inquiries during times of emergency is the primary activity with which the public associates Amateur Radio, although it is secondary in importance to emergency and priority traffic leaving the disaster area. Moreover, welfare messages tie up valuable amateur resources that are better utilized in support of civil preparedness agencies, police, fire, Red Cross, Salvation Army and other official agencies whose communications needs are more critical to providing relief to the affected area.

Since we must be reconciled to the inevitability of welfare inquiries, we must be prepared to handle the messages after they are received in the disaster area. If local telephone service is out, which is often the case, the main alternative is to hand-deliver them, a process that, at worst, will require manpower that is simply not available. It seems unavoidable that much of this traffic will either be unserviced at all or serviced only after normal communications have been restored.

The American Red Cross is an agency that receives staggering numbers of these inquiries following a disaster. W5FJU, as director of the communications committee to the Greater Houston Area Red Cross Chapter, set out to find an answer to this problem, drawing upon years of experience in emergency communications. The Greater Houston Chapter is also headquarters for the 114-county Texas del Sur Division of the Red Cross, a division that is very vulnerable to that most awesome natural disaster known as a tropical hurricane.

With a grant from the Stauffer Chemical Company, the Greater Houston Chapter purchased five Microlog ATR-6800 microprocessor-based radioteletype terminals and additional Collins radio equipment to provide for one field-deployable RTTY station and one Houston-based station. Each station is equipped with two Micrologs with printers and cassette recorders, a KWM-2A, a 312B console with remote VFO for split-frequency operation, and ancillary equipment such as antennas and diesel generators. The field unit will be transported by land vehicle to the disaster area where possible; otherwise it will be airlifted.

As inquiries reach the Houston Chapter through the TWX network from other chapters, they will be entered into a Microlog terminal operating offline (not connected to the radio) by a high-speed typist and recorded on cassette tape. The tape will then be carried to the radio room for transmission to the field unit. The procedure both lessens the workload on amateur operators and speeds up the process.

Each inquiry message will consist of an inquiry number for later reference, name, address and telephone number of the person or family being inquiried about, and the identity of the person making the inquiry. During reception by the field unit, the inquiry will be recorded for playback by the offline field unit; it may also be printed at the online unit.

Once in the field, the message will be serviced by one of the following means: (1) local telephones, if operating; (2) checking the refugee list in shelters; (3) actual hand delivery. If actual delivery is necessary, Red Cross volunteer personnel may deliver it. Groups such as the Boy Scouts, Civil Air Patrol, off-road recreational vehicle clubs and citizens-band groups can provide additional manpower.

Reply messages will contain the original inquiry number and a message from the inquiree. Once back in Houston, the reply will be sent back to the originating chapter by TWX.

In addition to servicing inquiries, the field group will encourage people in the affected area to send out notification of their status to a member of their family. Doing this should forestall having to service multiple inquiries about the same family.

Use of this communications link is not restricted to welfare traffic; other traffic, such as relief supply and personnel requests, will be handled on behalf of relief and government agencies.

During the recovery from Hurricane Allen in 1980, W5FJU and W5DWI took Microlog and Collins equipment down to the Rio Grande Valley before the current Red Cross equipment was purchased. N3JL, president of Microlog, flew in with two ATR-6800s, which he generously lent to the Chapter for testing purposes. Results were spectacular, particularly considering the poor propagation during the test. All of the new equipment was further tested and demonstrated to the news media and Red Cross officials in April. Coverage by the press was very favorable.

The current system obviously has great potential. It provides a high-speed communications link with only a minor burden on amateurs, since the delivery of the welfare inquiries can be performed by non-amateurs. Possible further enhancements include a separate computer for cross-checking inquiries to avoid duplication. The use of error-detection/correction codes and sophisticated ARQ protocols,[1] both of which are relatively easy to implement on computer-based equipment, would eliminate manual retransmission of garbled messages.

The use of this type of system, I would like to stress, cannot and will not supercede the efforts of local amateurs to support disaster communications. On the contrary, it will relieve them of the burden of welfare traffic and allow them to assist local agencies in providing relief. The computer age has arrived in disaster communications, and it will enable us to fulfill our public service role better than ever before. — *Linden B. Sisk, AK5N, ARRL section emergency coordinator, Southern Texas*

[1]See "Amtor, an Improved Error-Free RTTY System," *QST*, June 1981, p. 25.

PUBLIC SERVICE DIARY

☐ Saskatoon, Saskatchewan — Aug. 26. A freight train derailment caused worry that some of the cars containing vinyl chloride would start leaking. EC VE5HG was notified, and emergency communications were initiated between EMO headquarters station VE5AA and the accident site. About 30 messages were sent over the next five hours to relay information until company officials arrived and confirmed that none of the rail cars containing the chemical were leaking. (VE5WM, SCM Saskatchewan)

☐ Lake Park, Iowa — Sept. 3-5. A young child wandered away from home, and a search was quickly started. Local hams were alerted, and the WBØWOE repeater, as well as 52 simplex, was used to communicate between the estimated 3500 searchers, and CD and rescue officials. Two days later, the lad was found, unhappy but unharmed. (WØFQ, EC Dickinson Co.)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Aroostook Co., Maine — Aug. 17. During extensive flooding, CEP officials called on local hams to provide communications. Nineteen amateurs responded, and five mobile units were dispatched around the area to report road conditions and evacuation situations. Not only was VE1KMT/R in New Brunswick required for use as a link when Caribou CEP radio facilities temporarily broke down, but hand-held-equipped amateurs also were needed to supplement lost communications caused by a loss of commercial power. (WA1YNZ, EC Aroostook Co.)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For October, 36 reports were received denoting a total ARES membership of 19,124. Sections reporting were: AL, AB, AZ, CO, ENY, IL, IN, KS, KY, LA, ME, MI, NE, NH, NLI, NTX, OH, ON, ORG, RI, SV, SDG, SJV, SB, SCV, SK, SFL, SNJ, UT, VA, WA, WV, WMA, WNY, WPA, WI.

COMMUNICATIONS SERVICE OF THE MONTH

☐ ". . . Situation . . . fire disaster in Lynn, Massachusetts . . . "

On November 28 at 0730 local time, this alert frequency message signaled Amateur Radio's involvement in a tragic blaze that devastated a four-block area of Lynn. The services of the National Guard, Red Cross, Civil Defense were required. Losses were estimated at over $35 million. Miraculously, no deaths were reported.

Amateurs were involved in many ways. Through them, Lynn and Greater Boston Red Cross chapters were linked on 145.23 MHz to facilitate communications. Amateurs were also stationed at the Salvation Army, which was visited by Massachusetts Governor Edward King, and at Red Cross shelters. King spoke briefly with amateurs while being filmed by WBZ television crews. The Edison Hotel served as the site of

*Assistant Communications Manager, ARRL

the Amateur Radio command post, linked to National Guard command posts by adjoining suites. The National Guard was initially reluctant to utilize amateurs because of a question of liability. This question was finally resolved after discussions with State Civil Defense in Framingham. At 1740 local November 28, Division Provost Marshal Colonel Walsh requested three shifts of Amateur Radio operators to be stationed at six onsite locations around the disaster area. The three shifts were later expanded at Walsh's request to six, lasting until 1800 local, November 29. In addition to relinquishing the use of their 146.28/88 repeater in Salem, the North Shore Repeater Association was instrumental in supplying large numbers of operators. A directed net on the Salem repeater linked the Edison command post with onsite stations, Lynn Armory, Lynn Police and Civil Defense agencies.

Criminals may have been foiled by amateurs. K1DFD observed a ladder hanging from a broken window of a bank at approximately 0100 local, November 29. He removed the ladder, and notified the Edison command post which, in turn, notified authorities. Police then placed the bank under observation. An accident involving two stolen vehicles was observed by WIFAO who was stationed at an onsite location. WIFAO copied a partial license number of the getaway vehicle, and radioed the information to the command post. A law enforcement officer (who is also an amateur) called for assistance on 146.52 simplex, using the only radio he had, his own 2-meter hand-held. The command post relayed his request for a police cruiser, lessening the risk of violence.

Nearly 100 amateurs were involved in the 36-hour operation. Amateurs from the North Shore Repeater Association will identify all those who participated after analyzing records and logs. The National Guard will send letters of recognition to all participants. — *Barbara Jackson, WD9ERI, and Phil Temples, K9HI, Roslindale, Massachusetts*

At the Monterey County (California) Marathon: KB6IT (l) and race physician Dr. Don King discuss participants while timing official Lance Almond (r) and spectators watch the runners. (*photo courtesy WD6EKR*)

The City of Columbia, Missouri, now has a fully operational amateur station at the local office of the National Weather Service. This permits members of the Central Missouri Radio Association and the Central Missouri ARES (under the direction of EC WBØKUW) to provide local weather information for the NWS during times of severe weather. CMRA member John Turner, NØBLB, is shown here at the 2-meter installation. (*KØPCK photo*)

❑ Thirty-eight hams provided communications July 3-5 for a gala holiday weekend festival on the St. Louis riverfront that attracted 750,000 persons. The three-day festival, held in the shadow of the 630-foot-high Gateway Arch on the west bank of the Mississippi River, was the first annual Veiled Prophet Fair, featuring air shows, parachutists, fireworks, a gigantic parade, music and song, and food. Although a sudden drenching downpour on July 4 forced the cancellation of some events, it did not dampen the spirits of the hams or the holiday revelers.

Operating simplex on the 2-meter band from a portable net control station in the St. Louis City communications trailer, the hams provided communications for seven American Red Cross first-aid stations, an on-site Army (MASH) hospital, parade marshals and fair officials. At least 15 points were linked by the ham network. In addition, special nets were set up as needed to coordinate the parade and nighttime fireworks display. A 220-MHz link was used for communications between the riverfront and Red Cross headquarters in midtown St. Louis.

Messages involved locating lost children, obtaining first aid for injured persons and sunstroke victims, and coordinating the arrival of uniformed marching units, horseback riders and colorful floats at the parade assembly point near Busch Memorial Stadium. An unusual message involved obtaining emergency medical help for a woman who was bitten by a monkey!

Although the Veiled Prophet Parade and a full-dress ball had been held in St. Louis since 1878 to mark the start of the city's fall social season, the 1981 Veiled Prophet Fair was the first attempt to combine the parade with other events. One event washed out by the rain was the illumination of historic Eads Bridge with floodlights. The hams were to coordinate the turning on of power at three different locations in Missouri and Illinois. The bridge was officially lighted the next day, July 5.

The St. Louis hams, however, were able to help out more than they had planned in coordinating the fireworks display. When the fair officials' commercial two-way radios went dead during the evening of July 4, the hams stepped in and provided primary communications, even to the point of stationing a ham (NØAP) on the fireworks barge anchored in the Mississippi River.

For their dedicated three days of communications efforts, the hams received congratulations and grateful thank-you notes from St. Louis city officials, plus a reassurance that they will be called upon to play a more important communications role in future Veiled Prophet Fairs and other civic events.

The ham operations were coordinated by KØDCQ and KBØEA, both of whom are members of St. Louis Repeater, Inc. — *John J. Waidmann, WØVDU*

AMATEUR RADIO AND THE DOUBLE EAGLE 5

On November 12, 1981, various amateurs were monitoring the 145.13 repeater in Mendocino County (Northern California). At 9:30 PST, the Double Eagle 5 Balloon reported to the chase plane that it was in sight of Port Arena, California, on the Pacific Coast.

Amateurs were notified on the 145.13 repeater that a landing might be attempted in Mendocino County. All stations were asked to monitor the aviation vhf frequencies, as well as 14.300 MHz and 21.300 MHz, for transmissions from the balloon. We weren't sure if Amateur Radio was on board or not, but the CAP liaison stations informed us of the two amateur frequencies.

The Mendocino County Sheriff's Office was notified that the Amateur Radio operators were available for search and rescue communications, through the ARES and RACES groups in the county, and that we were monitoring the balloon radio transmissions and could provide the sheriff's department with position reports as to any landing made within the county. They were glad to have the help and informed our liaison that they would like to refer any inquiries about the balloon from the news media to us. KA6IAR provided information that was up-to-date and timely to UPI, AP, the *Los Angeles Times*, and various local and out-of-state radio stations, about the progress of the balloon, and the later landing in rugged country. — *Robert Smith, NA6T, SCM San Francisco*

REPEATER LOG

According to reports received between October 21 and November 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
WR1ABO							1			1
N1ADE							1			1
N1AGV				1						1
WA1DGW				2	1			2		5
WC1RAC							1	4		5
W1UD							1			1
W1XJ							1	4		5
WA1YHL							1			1
KC2CY				3			2	7		12
WB2NQV			2	1		1	3	2		9
W2VL				13						13
WB2ZII				1			4			5
N3AIA		1		1						2
N3BFL				2			1	1		4
K3JSZ				1				15		16
W3UER				2	1		1	1	1	6
WR4AIQ								1		1
WR4AMJ		2		1				1		4
W4HBB							1			1
K4ITL							1			1
WB4QES			3	21	1			2	1	28
K4SCL							1			1
N5AAY							1			1
WB5FXA							1			1
W5RVT	3						2			5
WB5VFF				2						2
WA6ATY				1			2	4		7
N6AUB							1	1		2
WA6EUZ				9			9			18
KH6HHG								2		2
W6LIO				1	1			1		3
WA6WTT		1		8				1		10
WR7ACE				1						1
K7CC		2		6						8
KC7FA				3				5		8
W7WGW				3		1				4
WR8ADO								4		4
WR8AES				1			5	4		10
WR8AOV							1			1
WR8ARB				2				1		3
WD8IEL							2			2
WB8UIN							2			2
WA8ULB				2						2
K8VXH							2			2
K8WNJ							1			1
N9AHP				1			2	1		4
WN9PIQ	2			1			1			4
WØVQR								1		1
TOTAL	5	6	5	90	4	2	52	65	2	231

NATIONAL TRAFFIC SYSTEM

The "senior statesman of NTS," H. J. Hopkins, W4SHJ, concluded more than two decades of service to the National Traffic System on October 31, at which time AB4V ws designated to succeed him as manager of 4RN/c4. Congratulations, Hoppy, on your outstanding (and pecedent-setting) tenure as an NTS manager. RN5/c4 manager N4MD has issued certificates to the following: WA4JDH W4CKS WA4ZPZ W4UP WA4PIZ N6AEN K5BIL W4KIX WA4PFK W4JL KA4ASZ K4ZK N2WX W4NFK WD4AWN N4SS W5MI N5RB K5TL N5BFV WB5UVX W5VMY KC5SF W5LQ WA5PRI N4AZI K5OAF W5EDT N5AMK W5WZ KB5W WB5TRZ WB5FHA W5UYH W5RB WA5RKU K5CXP WA5JGU WB5NKD KA5KAV W5FW NG4J W4WXH K4JGW W4DDK W4VS K4WOP K4VM W42JY N5TC W5SBE N5BB N5BT N5CY AA5J WB5EFJ W9OYL K5PE K5GM W5CTZ W5TFB KB5TC W5HMR K5QEW. TWN/c4 certificates were issued by WA7GYQ to W5ENI KCØD WØOGH WA7JJL WØLQ WDØAIT KBØZ KJØG W5JOV. 8RN/c4 certificates went to WD8KFN and AF8V.

October Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	33	1311	39.7	.914	93.9	
CAN	33	857	25.9	.489	100.0	
PAN	58	797	13.7	.440	87.6	
Region Nets						
1RN	64	476	7.4	.358	83.3	96.7
2RN	62	403	6.5	.342	92.9	100.0
3RN	37	252	6.8	.356	97.0	81.8

4RN	66	911	13.8	.531	78.4	100.0
RN5	31	381	12.3	.350	94.4	100.0
RN6	94	550	5.8	.250	66.0	93.5
RN7	66	565	8.6	.469	98.7	90.3
8RN	58	373	6.4	.381	79.3	96.7
9RN	66	440	6.7	.305	100.0	100.0
TEN	36	408	11.3	.313	78.0	100.0
ECN						87.9
TWN	50	220	4.4	.306	36.2	79.0
TCC						
TCC Eastern	113[1]	928				
TCC Central	90[1]	461				
TCC Pacific	80[1]	248				
Cycle Four						
Area Nets						
EAN	33	2300	69.7	1.620	93.4	
CAN	33	1286	39.0	.927	99.0	
PAN	33	1347	40.8	1.133	97.5	
Region Nets						
1RN	55	744	13.5	.572	91.9	90.9
2RN	91	719	7.9	.510	96.9	93.9
3RN						97.0
4RN	64	806	12.6	.450	91.0	100.0
RN5	65	909	13.9	.536	94.0	100.0
RN6	62	751	12.1	.397	95.7	98.5
RN7	62	700	11.3	.936	94.5	95.5
8RN	59	467	7.9	.405	94.0	84.8
9RN	64	696	10.8	.562	98.0	98.5
TEN	66	476	7.2	.380	88.3	98.5
ECN	76	706	9.3	.643	94.3	93.9
TWN	64	566	8.8	.374	98.1	98.5
TCC						
TCC Eastern	106[1]	994				
TCC Central	96[1]	619				
TCC Pacific	126[1]	941				
Sections[2]	4847	41,897	8.6			
Summary	6428	66,257	10.3			
Record	8258	59,630	16.4			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (214): APSN ATN (AB), ABN ACN ASN SSN (AK), AENB AENI AENJ AENK AENR (AL), ATEN HARC (AZ), NCN NCTN (CA), CN CPN NVTN RTN WCN (CT), FAST FMSN FMTN FPON GN MEN NFPN PEN QFN QFNS SPARC SWFTN TPTN (FL), CVEN GCN GSN GSSBN GTN (GA), I75MN ICN INPMN ITEN TLCN (IA), ILN (IL), ICN IPN ITN QIN (IN), KPN KSBN QKS (KS), 3ARES 4ARES 5ARES 8ARES 11ARES BARES CARN CCEN KEN KNTN KPON KRN KSN KTN KYN MEN MKPN MRN PAEWTN PAWN TSTMN WARES (KY), LAN (LA), EMRI EMRIPN EMRISS EM2MN HHTN NEEPN NENN WMFN WMN (MA/RI), MEPN (MB), BEN MACS MITN MNN QMN UPN (MI), MTN (MS), NCSSBN (NC), MNARES NCHN NE40 NE75 NMPN NSN PARC2MN PVTN WNN (NE), GSFM GSPN NHN (NH), JSARS MCN NJSN NJVN NWNJVN OBTTN SJVN SOCTN UCETN (NJ), NSN (NV), CDN CNYTN EPN HVN NLIPN NYS OCTEN SDN STAR WDN (NY), BN BRTN COARES FRCN HCARES LCNWARES 06MN OSSBN OSSN OFON OLZ OPEN OWTN STN (OK), KTN LEN LN OLN OPN OSN (ON), AREST MPARES OSN PTTN WCN (OR), D3ARES EPA EPAEPTN EPN LCARESN MCARN MCESN PTTN SMRA WARCVTN WPA WPAPTN WPATMTN (PA), WQVUAN (PQ), BR2MN CN CNN GPD2MN LC2MN S2MN SCNTN SCSSBN WC2MN (SC), PWXN RARA S2MN SATN SPN (SK), TNCW TNPN TNVN (TN), DFW TJN TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), EWTN IETN NTN NWSSBN PSTS SCARES WARTS WSN (WA), WINC WINE WINS (WIN), BWN NWTN WIN WNN WSBN WSSN (WI), WVARES WVFN WVHN WVMN 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				
Eastern Area	124	91.1	1821	928
Central Area	99	90.9	782	461
Pacific Area				
Summary	223	91.0	2603	1389
Cycle Four				
TCC Eastern	133	86.8	1972	994
TCC Central	105	93.2	1234	619
TCC Pacific	144	87.5	1823	941
Summary	382	89.2	5029	2554

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (October) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, N2YL, K2PL, KO2H, W2XD, WA2SPL, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s GOL HTL QI. Central Area (W9JUJ, Director) — WD4HIF, K4VM, W4s OGG ZJY, KA4MZY, W5s CTZ KLV, KB5TG, N5AMK, WA5EQQ, WB5s NKG OXE YDD, K5s BNH KJN, W9s HOT JUJ NXG, WB9WGD. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE, WA7GYQ, WØs EJD HXB, WDØAIT, KØDJ. *Cycle Four* — Eastern Area (W2CS, Director) — K1EIR, N1BHH, W1s EFW NJM TM, WB1CPF, K2PL, KB2KW, N2YL, W2s CS FR GKZ XD, WA2SPL, W3s FAF PQ, WB3GZU, W4UQ, K4s KNP ZK, KB4N, WB4PNY, AF8V, W8PMJ, WB8s ITT WTS YDZ, N8XX, VE3s ATU CWA GOL. Central Area (W5GHP, Director) — W4s WXH ZJY, W5s LQ RB SBE, N5s BB BT RB TC, K5s GM TL, KB5W, KC5SF, W9s CXY DND, WB9UYU, AEØR, WØs AM HI, KØEZ. Pacific Area (KØDJ, Director) — K5MAT, W5KH, N6s GW PZ, W6s EOT OA VZT, KN6C, KT6A, K7s HLR KSA, KN7B, W7s AK DZX EP GHT LYA VSE, WA7GYQ, WB7NHR, KØs BN DJ, KCØD, NØIA,WØs HXB LQ OGH, WDØAIT, VE7ZK.

Independent Nets (October 1981)

1	2	3	4
Amateur Radio Teletype Society	31	1501	345
Central Gulf Coast Hurricane	31	262	2338
Clearing House	31	139	305
Early Bird	31	960	406
Empire Slow Speed	34	58	414
Hit and Bounce Traffic	31	431	576
IMRA	27	563	1125
Midwest RTTY	32	183	294
Mission Trail	31	290	1302
Piconet All Day Watch	166	241	2481
20-Meter ISSB	27	632	574
75-Meter ISSB	31	494	1043
7290 Traffic	53	765	3655

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll October 1981

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

124
WA1TBY WA4PFK
123
NJ4L WB5YDD
121
W2XD W1EOF WD4HIF
118
KA4BBA
113
N2APB W5DTR
112
K9BVE
111
AG2R W7IEU WD8IBY WB1HIH WA4JDH
110
KB5EK KB2HM WB7DZX WD4ALY KC9CJ
108
WA5RVT K3JSZ N8BJD W9YCV
107
WB1GXZ WB8YDZ WD4AWN
106
WA4STO AK1W KA1FE W5JOV
105
WA4SRD WD5JYI
104
WB6BZZ W1TN KB5NX
KB3DT KA7HHJ
103
K1OSM N4DZW W7VSE KT6A
102
WD4CNR VE3HTL N8AUH KF8J WB4WYG WB8MTD KA5CXW K8OZ
101
WA3WIY KC5NN N9AUG W7LNE
100
WA4UTC VE3GOL VE3LDU N1NH WØOTF W2ZOJ K3JL
99
KA4LNA WA4CCK N9BYK
98
W4ZJY W5VMY KA4AUR W1RWG WB8JGW
97
KA4MZY K2VX W6NTN
96
N1ARI W7GHT WD8RHU KA2CTU KA4GFU
KA1BJY KB5UL
95
W2YJR N2BNB WDØAIT W4ANK K7GXZ W4WXH WB8SYA KY4U
94
VE1WF K2GCE AG9G
93
W4BSP VE3HGJ WB2BNY AC3N AA4FG
92
N7AKX N8BQK NØBDG VE3DPO K4EV WD8KFN N2WX
91
KA5AZK N5BT W3VA N8AWH WA8DNT
90
KA2GSL W4CKS W7FJZ KB3UD VE3WM
89
NN4D N4BZH
88
WØKJZ VE3GT WB5MMI WA4PIZ N4EDH
87
WB2TXK K4IWW
86
KN6C WA1YNZ W5CTZ
85
KA2KVZ N4EVV KA2BHR WB2IDJ WØOGG W5KLV
84
W5VMP VE2GA WB7OEX WA4EYU
83
N7AFY K4VWK WA7IHS
82
N2XJ KA3GJT VE3JRT K1JHC WA2EIC
81
W2BIW N5TC WB4NVO KA4ASZ
80
N2CER W7EP WB3FKP K4KDJ KI4W N4EAM
79
W7BS K1BSO WA1VRL
KA1BTU
78
WD4BSC WA6LVO K3CR WB2OWO WA3WQP KA9HPQ
77
WB5LBR N5AMH
76
WD5AAH N7BGY KB8MX WA2KOJ WA6QCA N5RB KA3CWA N6GW KA9IKR
75
K5TL WB3CAI K3RZR K1NAN W6HUJ WB4NTW
74
WB6QBZ KA7JEX KB5TC
73
N2BDW N8DAD KY4L W9UMH
72
KB2KW KAØJQG WBØQAM WA8DHB WB4AID
71
N7AFZ
WA7DPK KA1EMQ KC5FX AA3B KA4IUM KØSI WA8GMT
70
KØDJ WB2KCT WB9YPY
69
KC5SF N3BFL N1BFD N3ADU W8VPW WA4LXP N4PL
68
N5DKW KD4PJ W6CPB W8GGX
67
WA2ARC WA8PIM W8YY W8EK WB8SIQ N9ATP
66
K2ZVI W3DP KA4ERP N2ARD K2RN KA2BHB KB6FC WDØDEX
65
KA2GOH K4ZN
64
K5QXC K8GXV WD8IXZ W4HON WA7LGN WD8KBW N4UF KG9B
63
WD5GKH WB3HTW N6BCY KA2JMH WA2MFU KØCY WB2NAO KA7ELI WA8HGH
61
WB2PKG KA5IWF KP4DJ WØRJW W9JN N2BLX W9IEM
60
WB8YPZ WØOUD W6IPL WBØZEN W5RB WB8NCD
57
KA8DGO/T
54
KA8DEZ/N
51
N2CSB/T KA4SAA/N
42
KA9GBG
41
KA8GGZ/T

Brass Pounders League October 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WB1CPF, W1YI, W3ATQ, WP4AOH, NP4F and WD4SIG.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	684	1046	1501	58	3289
KA9CPA	29	893	127	812	1861
W4IZ	737	25	640	0	1402
WA4JDH	1	728	852	5	1385
W9JUJ	2	609	563	48	1222
NØBQP	47	1637	15	1003	2835
WAØHJZ	27	567	10	367	980
WØBMA	23	454	389	88	954
VE3KK	260	213	374	45	892
K4TH	13	404	320	129	866
K4SCL	4	459	379	12	851
W4SIZ	12	410	403	19	844
AF8V	26	359	360	25	770
N4EAM	5	393	350	14	762
WD4HIF	3	351	353	25	732
WB4FVV	3	338	297	46	684
WB7TQF	47	288	303	32	670
NG4J	31	252	339	36	658
W9UMH	412	137	58	21	628
W3VR	232	101	276	14	623
WA2SPL	2	320	270	9	601
WB5YDD	100	235	205	60	597
VE3HTL	3	282	282	18	585
VE3HGJ	28	268	270	9	575
K8OZ	12	254	298	10	574
WD9ESZ	27	218	301	0	546
W1EOF	2	190	328	25	545
KT6A	1	256	264	14	535
K9BVE	11	247	244	33	535
W4WXH	39	224	249	6	518
WD4COL	57	212	188	49	506
N4PL	21	214	255	15	505
KA2KVZ	25	216	253	10	504
WØACH	26	228	252	0	504
W5TI	5	244	248	4	501

BPL for 100 or more originations plus deliveries:

W1YI	191
WP4BDS	152
KAØAID	152
KA8CPS	137
WØOYH	127

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

Confessions of a Contest Cripple

Remember back to those first few months on the air, before you discovered chasing DX on 15-meter phone, ragchewing on the local repeater or working your way into the top ten in a contest?

Remember what people told you about Amateur Radio? That it is a hobby enabling you to talk to people all over the world, making friends with a broad cross section of people from farmers to senators, from junior high school students to astronauts. You were also probably told of the many technical achievements of amateurs over the years. Do you also remember the rationale of why the Amateur Radio Service is provided for in the FCC regulations?

In addition to gaining firsthand knowledge of the multi-faceted communications field and to making friends all over the world, Amateur Radio's primary purpose is to provide a national resource of trained radio operators capable of providing disciplined communications during times of local, regional, national or even international disaster. You've probably tuned across the many traffic nets on 40 and 80 meters or the international nets on the high end of 20 and 15 meters. Perhaps you've overheard a phone patch to someone otherwise unable to get a message to a loved one. Or a local traffic net has broken the squelch on your 2-meter radio. All of these activities are in response to this public-service purpose of Amateur Radio.

Amateurs tend to develop one special interest, such as chasing countries to make the DX Century Club Honor Roll or designing control systems to link repeaters, and then go at it in a very determined way. As one specializes more and more, it's not difficult to lose the perspective of one of the primary reasons for our existence as amateurs — to be prepared to provide communications in a disaster. Of great value is knowledge of how to fabricate those discontinued parts for the RTTY machine, as is knowing how to work that weak JA on 80 meters. Also of value is your ability to work 150 stations per hour in a contest or to lead your club to a successful Field Day operation in the midst of a rainstorm. The one thing missing in all these diverse activities is the ingredient that ties it all together.

The unifying organized response to this basic public-service call is provided for by the ARRL-sponsored National Traffic System (NTS), designed for the efficient relaying of volumes of third-party written message traffic. Over the years NTS has become streamlined into a well-oiled machine. Put a message in at one end, and it comes out at the other with a minimum of delay. Your specialized knowledge in contests, DX chasing or whatever, can be used effectively where it can count the most. Your extensive efforts to optimize your station for competitive amateur activities can be well utilized by devoting a few minutes per week to public-service activities. What better station to conduct a Transcontinental Corps function on a weekly basis than the operator with a kilowatt and Yagis at 100 feet, and who can copy 40 words per minute? Why should the League always aim toward getting newcomers involved in traffic handling? Let's attract some of the more experienced operators, as well, who have the horsepower in both operating ability and station capability.

What basic information is required? You ought to find out the time and frequency of your section NTS net. If on cw the net control station (NCS) starts rattling off QNI, QNQ, QTC and QNX, have a ready reference so you know the language. A CD-218 (available for an s.a.s.e. from ARRL Hq.) at the operating position will do the trick. Familiarity with message format is also necessary. With experience gained in contest operation, it won't be long before you are volunteering for an NCS slot. Suggested reading is the *ARRL Operating Manual* (available at radio-store book counters) and *Operating an Amateur Radio Station* (free to ARRL members with two units of postage and a self-addressed envelope). After getting a few basics under your belt, you'll be able to make a valuable contribution to this aspect of Amateur Radio with only 15 or 20 minutes per week of operation. That's less time in a *year* than you may have operated in the Sweepstakes!

If you see yourself as a contest cripple in need of broadening your operating horizons, you'll find a little network operation time worth spending, both for increasing your own depth of knowledge and for lending your operating expertise that may be needed in time of disaster. As a former contest cripple just released from "intensive care," I find my modest efforts in public service activities truly rewarding. — *Tom Frenaye, K1KI*

OCTOBER CD PARTY

Here are the high-scoring stations from the October CD Party. Conditions favored the western stations this time around, with intense competition among stations from the fifth, sixth and seventh call areas. The listings read: Call-Score-QSOs-Sections-Hours-Section. — *Mark Wilson, AA2Z*

CW

K5TM (WN4KKN, op)	24,534-423-58-10-STX
N6TR	23,026-397-58-10-SB
K6LL/7	21,945-399-55-10-AZ
N1EE/5	21,594-366-59-10-NTX
K5CM	21,063-357-59-10-OK
N6OP	19,544-349-56-10-SJV
KQ8C	19,266-338-57-10-WV
W8LNO	18,126-318-57-8-OH
WB1HIH	18,032-322-56-10-WMA
N6NF	17,270-314-55-10-SCV
K1XA	16,848-312-54-8-CT
W6UQF	15,105-265-57-9-SDG
W4YE	13,520-260-52-6-VA
K9GDF	13,255-241-55-6-WI

Phone

N5KW	8575-175-49-9-OK
WB1HIH	7544-164-46-10-WMA
WB3ANV	4578-109-42-9-MDC
KF7R	4410-105-42-10-MT
WA8GMT	3900-100-39-8-OH
K2SCU/5	3627-93-39-5-NTX

*Communications Manager, ARRL

SCM ELECTION NOTICE

To all ARRL members in the Wisconsin, Illinois, Northern Florida, Manitoba, Santa Clara Valley, Indiana, Vermont, Maine and Oregon sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL Headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 5, 1982.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on April 1, 1982, returns counted May 18, 1982, and SCMs elected as a result of the above procedures will take office July 1, 1982.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1982.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.
John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATIONS

Since no petitions were received for the Santa Barbara and East Bay sections as a result of notices in the July and August *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning January 1, 1982:

Balloting Results: In the Alaska Section, Richard Henry, AL7O, received 224 votes, and Wilse G. Morgan, KL7CQ, received 128 votes. Mr. Henry is declared elected.

In the Alabama Section, Hubert H. Wheeler, W4IBU, received 360 votes, and Joseph E. Smith, Jr., WA4RNP, received 196 votes. Mr. Wheeler is declared elected.

In the Kansas Section, Robert M. Summers, KØBXF, received 423 votes, and William F. Boeckenhaupt, AKØA, received 141 votes. Mr. Summers is declared elected.

In the New Mexico Section, Joe T. Knight, W5PDY, received 279 votes, and Milt Jensen, N5IA, received 156 votes. Mr. Knight is declared elected.

In the Tennessee Section, John C. Brown, NO4Q, received 478 votes, and David Goggio, W4OGG, received 297 votes. Mr. Brown is declared elected.

OSCAR Operating Schedule

Date (UTC)	OSCAR 9 Orbit No.	OSCAR 9 Time (UTC) Hr Mn	OSCAR 9 EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	OSCAR 8 Mode	OSCAR 8 Time UTC Hr Mn	OSCAR 8 EQX W. Long. (Degrees)
1 Jan.	1306	0010	169.3	19,495	A + J	0008	68.8
2 Jan.	1322	0134	190.3	19,509	J	0013	69.9
3 Jan.	1337	0122	187.4	19,523	J	0017	71.1
4 Jan.	1352	0111	184.5	19,537	A	0022	72.3
5 Jan.	1367	0059	181.7	19,551	A + J	0027	73.5
6 Jan.	1382	0048	178.8	19,565	X	0031	74.6
7 Jan.	1397	0037	176.0	19,579	A	0036	75.8
8 Jan.	1412	0025	173.1	19,593	A + J	0040	77.0
9 Jan.	1427	0014	170.2	19,607	J	0045	78.1
10 Jan.	1442	0002	167.4	19,621	J	0049	79.3
11 Jan.	1458	0126	188.3	19,635	A	0054	80.5
12 Jan.	1473	0115	185.5	19,649	A + J	0058	81.7
13 Jan.	1488	0103	182.6	19,663	X	0103	82.8
14 Jan.	1503	0052	179.8	19,677	A	0108	84.0
15 Jan.	1518	0040	176.9	19,691	A + J	0112	85.2
16 Jan.	1533	0029	174.0	19,705	J	0117	86.3
17 Jan.	1548	0018	171.2	19,719	J	0121	87.5
18 Jan.	1563	0006	168.3	19,733	A	0126	88.7
19 Jan.	1579	0130	189.3	19,747	A + J	0130	89.9
20 Jan.	1594	0118	186.4	19,761	X	0135	91.0
21 Jan.	1609	0107	183.6	19,775	A	0139	92.2
22 Jan.	1624	0056	180.7	19,788	A + J	0001	67.6
23 Jan.	1639	0044	177.8	19,802	J	0005	68.7
24 Jan.	1654	0033	175.0	19,816	J	0010	69.9
25 Jan.	1669	0021	172.1	19,830	A	0015	71.1
26 Jan.	1684	0010	169.3	19,844	A + J	0019	72.3
27 Jan.	1700	0134	190.2	19,858	X	0024	73.4
28 Jan.	1715	0122	187.4	19,872	A	0028	74.6
29 Jan.	1730	0111	184.5	19,886	A + J	0033	75.8
30 Jan.	1745	0059	181.6	19,900	J	0037	76.9
31 Jan.	1760	0048	178.8	19,914	J	0042	78.1
1 Feb.	1775	0036	175.9	19,928	A	0046	79.3
2 Feb.	1790	0025	173.1	19,942	A + J	0051	80.5
3 Feb.	1805	0014	170.2	19,956	X	0056	81.6
4 Feb.	1820	0002	167.4	19,970	A	0100	82.8
5 Feb.	1836	0126	188.3	19,984	A + J	0105	84.0
6 Feb.	1851	0115	185.5	19,998	J	0109	85.1
7 Feb.	1866	0103	182.6	20,012	J	0114	86.4

Orbit predictions for OSCAR 8 by Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or to the AMSAT nets (East Coast and Mid States at 9 P.M. and West coast at 8 P.M. local time, on 3850 kHz — international at 2200 UTC Saturday on 28,878, at 1800 UTC Sunday on 14,282 and 1900 UTC Sunday on 21,280 kHz. OSCAR 9 *predictions are for reference only. Because of its low altitude, long-range predictions are not always accurate.* Use W1AW and AMSAT Bulletins for weekly updates. For printout of each orbit send an s.a.s.e. to Project OSCAR for a three-month calendar. Donations for this service are accepted by Project OSCAR at the above address.

O 9 progresses an average of 23.8095° W. per orbit in a period of 95.2377 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1851 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesdays and Fridays — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club: Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL: To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL Hq.

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

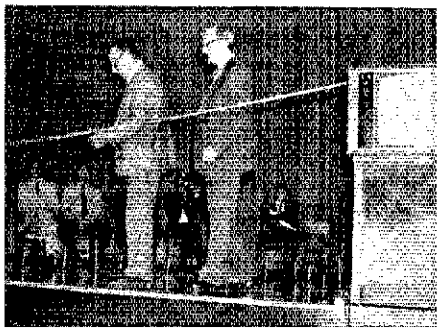
Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband. Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

OSCAR 9
Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry, interspersed with a carrier or continuous carrier.
Vhf Beacon — 145.825 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
Uhf Beacon — 435.025 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
S-Band Beacon — 2401.0-MHz nbfm ±10 kHz. ASCII, Baudot, voice, afsk and Morse.
X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use lhcp.
Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

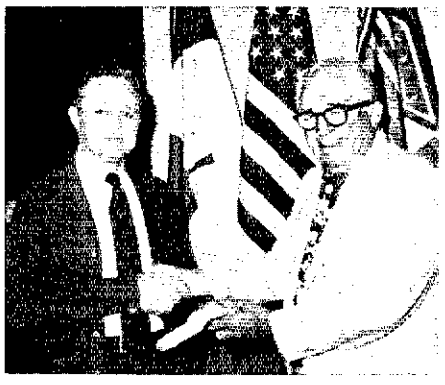
Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The all-new OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

Strays

Some members of the Naples (Florida) FM Assn., (l-r) WA4HWN, WA4YGP and N4CQT, take a short time-out from their Special Olympics communications efforts. The games, which had nearly 600 "special" participants, ran smoothly thanks in no small part to the reliability of the Naples group and their 147.07/67 repeater. *(photo courtesy WA4PXH)*



Ed Piller, W2KPQ (right) cuts the ribbon at dedication ceremonies in Eagle Bend, Minnesota, for the first experimentally licensed communicasting system for low-power TV. The system is an outgrowth of an FCC petition filed by Piller and Dr. Lee Cohen, WA2RPC. Using technology borrowed from amateur television repeaters, this system provides interactive audio-video communication among three school districts and the largely rural community, answering some of their educational needs. *(photo by Diane Silbernagel)*



Canadian Radio Relay League Counsel B. Robert Benson, Q.C., VE2VW (left), presents his donation in support of the ARRL Foundation Twentieth Anniversary Amateur Satellite Fund Drive to Foundation President Robert York Chapman, W1QV. For more information about the ARRL Foundation and the Amateur Satellite Program, see page 60 of this issue.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

JANUARY

Dec. 31-Jan. 1

ARRL Straight Key Night, Dec. *QST*, page 102.

2-3

ARRL CD Party, phone, for ARRL officials and CD appointees. Details in Winter *QCD*.

Zero District QSO Party, Dec. *QST*, page 102.

6

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z Jan. 7 (9 P.M. PST Jan. 6). Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

9-10

ARRL CD Party, cw.

Hunting Lions in the Air Contest, Dec. *QST*, page 102.

First Annual 40- and 80-Meter Phone Contest, Dec. *QST*, page 102.

11

W1AW Qualifying Run, 10-35 wpm at 0300Z Jan. 12 (10 P.M. EST Jan. 11). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See Jan. 6 listing for more details.

16-17

ARRL VHF Sweepstakes, Dec. *QST*, page 93.

3rd Annual International 160-Meter Phone Contest, Dec. *QST*, page 102.

Michigan QRP Club CW Contest, sponsored by the Michigan QRP Club, from 1500Z Jan. 16 until 1500Z Jan. 17. Three entry categories (single op): 1 watt or less output power; 5 watts or less; more than 5 watts. Exchange signal report, QSO number, power output and QTH (state, province or country). Count one point per QSO and multiply by the number of states, provinces and countries worked per band. Multiply total by 1.5 if using battery or natural power. Mail logs (include s.a.s.e. for results) by March 7 to: Contest Manager, 281 Crescent Dr., Portland, MI 48875.

23-24

ARRL Midnight Special, from 0400-0600Z Jan. 24 (11 P.M. EST Jan. 23 until 1 A.M. EST Jan. 24). First hour, 20 cw; second hour, 40 cw. Suggested frequencies: 7.040-7.075 and 14.060-14.085. Use exciters only — no external amplifiers! Exchange signal report (honest reports, please!) and the name of the ARRL section you lived in when you received your first amateur license. Score equals number of QSOs; no multiplier. Mail entries by Feb. 7 to ARRL Hq. Include s.a.s.e. for results; top scorers will be listed in *QST*.

North Dakota QSO Party, sponsored by Red River Amateurs, from 0000-0800Z and 1600-2400 Jan. 23 and 0800-1600Z Jan. 24. Work stations once per band and mode. Exchange signal report and QTH (county for ND stations; state, province or country for others). Suggested frequencies: phone — 3.905 7.280 14.280 21.380 28.580; cw — 1.810, 35 kHz up from lower band edge; Novice — 25 kHz from lower band edge. Count 10 points per phone contact, 20 points per cw contact and 50 points per RTTY contact. ND stations add 100 points for working 5 Novices. ND stations multiply by number of states/provinces/countries worked per band and mode; others multiply by total ND counties (max. 53) per band/mode. Mail logs by Feb. 28 (include large s.a.s.e. for results) to: Bill Snyder, WØLHS, Box 2784, Fargo, ND 58108-2784.

Texas QSO Party, sponsored by the West Texas ARC from 0000Z Jan. 23 until 1800Z Jan. 24. All bands and modes. Work stations again as they change county. Single operator only. Cw QSOs in cw sub-bands only. Exchange serial number and QTH (county for TX stations; state, province or country for others). Suggested frequencies: phone — 3.940 7.260 14.280 21.370 28.600; cw — 65 kHz up from lower band edge; Novice — 10 kHz up from lower band edge. TX stations count one point per phone QSO and two points per cw QSO; multiply by number of states, provinces and countries worked. Others count one point per phone QSO, two points per cw QSO with TX fixed stations; and 5 points per phone QSO, 7 points per cw QSO with TX mobile stations. Multiply by total number of TX counties worked (max. 254). Logs must be received by March 15. Mail to: WTARC, P.O. Box 9944, Odessa, TX 79762-0041.

26

W1AW Qualifying Run, 10-35 wpm at 2400Z (7 P.M. EST) Jan. 26. See Jan. 11 listing for more details.

30-31

CQ WW 160-Meter Contest, cw, sponsored by *CQ Magazine* from 2200Z Jan. 29 until 1600Z Jan. 31. Cw only (phone Feb. 26-28). W/VE stations count 2 points per W/VE QSO, 10 points per DX QSO. DX stations count 2 points per QSO with own country, 5 points other country and 10 points for W/VE. Multiply by sum of states, provinces and DXCC countries (incl. KH6/KL7). Exchange signal report and serial number; W/VE stations also send state/province. Avoid the 1825-1830 DX window. Mail entry by Feb. 28 (March 31 for phone) to: Don McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32901.

Classic Radio Exchange, sponsored by the Southeast ARC from 2100Z Jan. 21 until 0400Z Feb. 1. Object is to restore, operate and enjoy old equipment built since 1945 but at least 10 years old. Exchange name, signal report, state/province/country, receiver and transmitter type. The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone - 3.910 7.280 14.280 21.380 28.580; cw — 60 kHz up from lower band edge; Novice — 20 kHz up from lower band edge. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band. Multiply that number by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. Mail logs (include s.a.s.e. for results) to: Stu Stephens, K8SJ, 1407 Hollyrood Rd., Sandusky, OH 44870.

French Contest, cw, sponsored by Reseau Des Emetteurs Francais, from 0600Z Jan. 30 until 1800Z Jan. 31 (phone 0600Z Feb. 27 until 1800Z Feb. 28). Single and multioperator; single ops operate 26 hours max. with 3 off times. Work French stations, including overseas territories and DA1/2 French military stations. Exchange signal report and serial number. Count 3 points for QSOs with own continent, 10 points for other continents. Multiply by total of French departments (max. 96 — F6GGG/76 is in Dept. 76), French overseas countries (max. 39), Belgian provinces (max. 9) and DA1/2. Mail within 30 days to REF French Contest, Square Trudaine 2, 75009 Paris, France.

FEBRUARY

Jan. 30-Feb. 7

ARRL Novice Roundup, this issue, page 90.

2

West Coast Qualifying Run, 10-35 wpm at 0500Z Feb. 3 (9 P.M. PST Feb. 2). See Jan. 6 listing for more details.

6-7

Arizona QSO Party, sponsored by the Arizona ARC from 2000Z Feb. 6 until 0800Z Feb. 7. Work stations once per band. Exchange signal report and QTH (county for AZ stations; state, province or country for others). Suggested frequencies: phone — 3.895 7.230 14.280 21.365 28.560; cw — 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count one point per phone QSO, two points per cw or other mode QSO. AZ stations multiply by number of states/provinces/countries worked. Others multiply by number of AZ counties worked (max. 13). Club station W7IO counts as one multiplier. Stations working all counties and W7IO may double multiplier. Mail entries by March 6 (include large s.a.s.e. for results) to: AARC, 16647 N. 34th Ave., Phoenix, AZ 85023.

North American Sprint, sponsored by the National Contest Journal, from 0100-0500Z Feb. 7 (Sat. evening). Single operator, cw, 80-40-20 meters only. Suggested frequencies: 3.530-3.550, 7.030-7.050, 14.030-14.050. Stations outside North America work NA stations only. Work stations once per band. Exchange your call, his call, serial number, your name, state, province or country. Proper logging requires the time for each QSO. Serial numbers start with 001 and must be consecutive. An operator may use only one call sign during the contest. Multiply number of valid QSOs by sum of states, VE provinces and other North American countries for final score. U.S. and Canada don't count as countries; KH6 does not count as a state or country; non-NA countries don't count as multipliers. Special QSY rule: If any station solicits a call by sending CQ, QRZ? etc. he is permitted to work only one station in response to that solicitation. He must then move at least 1 kHz before working another station or at least 5 kHz before soliciting another QSO. Team competition: Each team has a maximum of 10 members. To qualify as a team, the name, call sign of each operator and call sign of the station operated (should the operator be a guest at a station other than his own) must be registered with W6OAT. The team information must be included in a letter received before the start of the Sprint or in a Western Union Mailgram dated at least 24 hours before the start of the Sprint. No distance/meeting requirements for team entry. Entries should be mailed in time to reach W6OAT no later than March 2. A complete entry consists of a summary sheet showing name, address, score computation, etc., and a log showing new multipliers as worked and duplicate contacts marked as such. Separate dupe sheets for each band. Send entries to: Rusty Epps, W6OAT, 948-H Kiely Blvd., Santa Clara, CA 95051.

South Carolina QSO Party, sponsored by the Colleton County Contesters, from 1800Z Feb. 6 until 2359Z Feb. 7. Work stations once per band and mode. SC mobiles that change counties count as new stations. Exchange signal report and QTH (county for SC stations; state/province/country for others). Suggested frequencies: phone — 3.895 7.230 14.280 21.365 28.560; cw — 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count 2 points per phone QSO, 3 points per cw QSO. SC stations multiply by total states, provinces and countries worked. Others multiply by total SC counties worked. Mail by March 5 (include large s.a.s.e. for results) to: WA4YUU, P.O. Box 994, Walterboro, SC 29488.

QRP-SSB Contest

RSGB 7 MHz Contest, phone

9

W1AW Qualifying Run, 10-40 wpm, at 0300Z Feb. 10 (10 P.M. EST Feb. 9). See Jan. 11 listing for more details.

13-14

PACC Contest

QCWA QSO Party, cw.

Oregon QSO Party

Two-Land QSO Party

YU-WW Contest, cw.

YL-OM Contest, phone.

WAS SSTV Contest

20-21

ARRL International DX Contest, cw, Dec. *QST*, page 94.

24

W1AW Qualifying Run

27-28

CQ WW 160-Meter Contest, phone (see Jan. 30-31 listing).

French Contest, phone (see Jan. 30-31 listing).

QRP Winter Sports Contest

7-MHz Contest, cw

*Assistant Communications Manager, ARRL

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ ORS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SCM/SEC: VE6XC. ASCM: VE6AMM. STM: VE6ABC. NM: (ATN) VE6ABC; ANM: (APSN) VE6ABC. The SET went well for the province test. The Alberta Disaster Services were involved and allowed us to set up a hqs in their emergency communications trailer. We received new media coverage and the ADS people were favorably impressed with our efforts and abilities. The Edmonton EC, VE6ABC, took over and ran the whole show successfully after yours truly was called to the hospital for major surgery. Traffic: VE6CHK 101, VE6ABC 44, VE6AMM 42, VE6QN 26, VE6VS 9, VE6YW 4, VE6SA 3, VE6AVZ 2, VE6BAZ 2, VE6CFE 1.

BRITISH COLUMBIA: SCM, H. Ernie Savage, VE7FB — British Columbia Public Service Corp Net 3755. NM VE7-QC reports total checkins 4543 up from the summer time. BCEN 3650 kHz reports increase in check-ins. SET was very slow and very little activity. Vancouver ARC code and theory class is progressing and several from last class received their VARC certificate for obtaining their call signs. VE7HQ is now active from Prince Rupert. VE7ZK's new TS-830S has worked WAE plus other DX plus RAEM. VE7FB is also doing good for DX-CC. Traffic: VE7HQ 144, VE7ZK 123, VE7FAZ 76, VE7FB 41, VE7COA 39, VE7EWI 16, VE7EDN 13, VE7BLO 2.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: VE4JP. SEC: HK. STM: RO. NMs: TE NM VJ ACX. There was lots of activity on SET, and most DEC's areas had a good turnout. As last year most of the activity was confined to local areas and not out of the section. The morning net has changed its time to 9 A.M. Killarney is celebrating its 100th birthday and VE4RO is handling the traffic. VE4IX is going for his BPL this month, and that should make the third one, and with it a medallion. All nets improved. MTN QNI 198, QTC 83, sess 31. MMN QNI 384, QTC 24, sess 31. WRIN QNI 235, QTC 150, (all SET), sess 9. MEPN QNI 856, QTC 21, sess 31. Traffic: VE4PG 227, VE4RO 120, VE4ACX 57, VE4AJE 33, VE4TE 30, VE4FK 26, VE4JA 17, VE4AAD 16, VE4NM 13, VE4LB 11, VE4QI 10, VE4AED 6, VE4ID 6, VE4CR 4, VE4AP 3, VE4HA 3, VE4NE 3, VE4TL 3.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. STM: VE3QI. Unfortunately the Welland Co. ARC were disqualified from FD because of the late arrival of logs at Hq as a result of the postal service interruption. Score was 2637, better than last year. Ottawa ARC annual homebrew nite entrants in order of merit were: VE3s JLG KMV DQM BNO MPG NR. Recent visitors to the Burlington ARC breakfast club were DK1RT and VE3HW/PW5. VE3JEG now VE8JG in Fort Simpson, NWT. VE2NW now VE3HNW in Simcoe. VE7DFN/3 now VE3NFN. VE3LGY now VE3XL. Peterboro ARC members VE3s MT MEW IQZ MCD MCC IRW FQR KXB assisted their Fire Dept. during the firemen test skills and demonstration. VE3EFX 226th DXCC country has been confirmed. Several ARES groups are becoming equipped with tone alert units to aid in call ups. VE3LDU is new EC for Oxford Co. VE3DSS has resumed his OVS activities on 50, 144, 220, and 432 MHz cw/ssb. DOC examination dates for 1982 are Feb 10, April 21, June 16, Oct 20. Application forms must be submitted to DOC four weeks before date of writing. Quinte ARC assisted with communications for the Belleville YMCA's annual run with VE3s HON HBR GSI GPJ BMC. OCWA National Capital Chapter No. 70 executive: VE3s BDO BYX ET BNO YE. VE3PK moving to Sarnia and will be inactive temporarily. VE3FYR, featured in an article in the CNR employee magazine "Keeping Track," is a member of the Canadian Amateur Radio Railroaders Assoc (CARRA). Hams in the 'Soo' will be assisting with the Friendship Games '82. SET activity much improved this year over last year with the Toronto area flooded with traffic. New calls in the section are: VE3s MWP MWR MWU MWV MVI MWQ NPG NFD. Congrats to the following who have obtained their Advanced: VE3s LWL LVK LWZ LVS MFO. My best wishes for a Happy New Year to all. Traffic: VE3KK 892, VE3HTL 585, VE3HGJ 575, VE3RCO 497, VE3CYR 451, VE3GOL 272, VE3GNW 192, VE3DPO 168, VE3EUI 166, VE3AWE 159, VE3IXB 156, VE3JRT 156, VE3WM 131, VE3GT 122, VE3LDU 99, VE3BZB 90, VE3DVE 90, VE3FGU 89, VE3AJN 72, VE3GFN 63, VE3LNN 42, VE3WG 42, VE3ISW 38, VE3EFX 26, VE3DZH 24, VE3LSJ 21, VE3DUK 17, VE3ANJ 12, VE3KCZ 12.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. New appointee: VE2GFH ORS. Congratulations to VE2AXO for high score in the 1981 BARTG RTTY contest. VE2s AQU FSA FFS FRZ DEA ATC and AAS provided communications for the "Terry Fox Run" on September 13. Bienvenue a VE2GMO de la Mauricie. Felicitations a VE2GFH pour son travail aupres des amateurs handicappes. Traffic: VE2PJ 151, VE2FKI 148, VE2EDO 96, VE2BP 38, VE2EC 36, VE2EKC 36, VE2GAG 20.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PO. STM: WA3WIY. PSHR: WA3WIY K3JL. Congrats to WA3QPX and XYL on their new son. Ten members of the Sussex ARA furnished comms for the Nanticoke Indian Bike Ride and Crop Walk in Oct. New Del. Repeater Assoc. officers: KA3ERO, pres.; AA1K, v.p.; WB3LGC, treas.; N3ADT, cor. sec.; WB3DZR, rec. sec. MDSN is now alternating with the DSSN on 3735 kHz at 1930 EST M-F and 1800 Sn. All Novices should take this opportunity to get into cw traffic handling at slow speeds. WB3FOC, KA3BXC, and WB3EOU participated in our Red Cross Mock Disaster Drill. DTN: QNI 339, QTC 50, DEPN: QNI 85, QTC 41. SEN: QNI 26, QTC 1. Traffic: W3QQ 106, WA3WIY 66, K3JL 54, W3DKX 50, WB3DUG 45, N3SJ 22, WA3PWT 10, K3ZXP 10, N3AXH 7, W3FEG 7, W3WD 6, N8NA 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ. DEC: KB3VM W3EEK W3YZW.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	575	272	39
EPA	3610	7/10 P.M. Dy	487	237	64
PFN	3958	5 P.M. Dy	305	251	27
PTTN	3610	6:30 P.M. Dy	199	76	28

Local and vhf nets reporting: D3ARES, LCARESN, MCESN, MTG CO AREC, SMRA WARCVTN with a total QNI 511 QTC 121 in 52 sess. OBS reports: K3EBZ KB3VM N3BFL W3VA WA3ENE WB3FVJ. OO reports: N3BFL W3FAF W3GOA W3GVR. OVS reports: N3BFL W3GOA. PSHR reports: AA3B K3EBZ K3JSZ K3QXC KA3GJT KB3UD KB3VM N2BFL W3DP W3GOA W3VA WA3TKU WA3WQP WB3CAI WB3FKP WB3FYT WB3HTW. New appointments: WA3OGM KA3GJT to ORS, congrats. N3CJP now KB3VM. WB3FKD now KB3VV. KB3UL now KF3J. WB3GZV now KF3N. Upgrades: W3ADE to Extra; K3NWM K3VRD and KA3CRP to "A"; KA3GAN to Gen; KA3CAU and KA3HMG to Tech. Congrats to all. EPAEPTN welcomes KA3DLY N3CFR K3SLH WA3JXW. PTTN welcomes KA3DLY N3CFR WA3NTJ. KB3VM advises D10ARES and RACES nets have moved to the 145.43 repeater. WA3WQP reports PFN Banquet much fun and that the PFN is now operating daily. W3ID still working on his antenna. Hi. New Gear Dept: KA3FJJ, Swan 100MXA; WA3TKU, TR9000 with 80 watt amp; WA3ZGJ, IC720A. WB3FKP reports W3KT was guest speaker at Murgas ARC and that the club provided communications for first Wilkes-Barre Tri-Athelon. WB3FPL reports Reading RC celebrating 50th anniversary. W3FAF sez operating QRP in PA QSO Party was lots of fun. WA3EHD moved 30 ft to new QTH. W3TWV and KA3FJJ report for first time, welcome aboard. Members of the Hazleton ARC were guests on the Dennis Burke Show broadcast over WAZL. K3BS/mobile operated from 18 PA counties during the PA QSO Party and drove 535 miles. The Pack Rats VHF Conference/Hamfest and the R.F. Hill ARC hamfest reports attendance very good. SET reports were received at this office by the following stations: AK3O KA3AVN KA3HIZ KA3GJT KB3UD N3CFE W3PTM WA3EHD WA3DNI WB3CAI WB3HTW. Stations using emergency power were: K3QXC K3SLJ KA3EAO KA3FQT KB3JW KB3VM N3AOG W3EEK W3VA W3ZAA WA3DFU WA3OFD WB3CRM WB3EDU WB3FJJ WB3INT WB3LUJ. I wish to thank all stations who participated in the SET and helped make the '81 SET an outstanding success. Traffic: K3JSZ 254, WA3WQP 248, W3IPX 239, WA3DFU 199, KB3UD 170, W3DP 168, N3BFL 134, W3VA 134, W3FAF 111, AA3B 103, KA3GJT 101, WA3OFD 78, W3ID 47, W3YZW 44, N3CD 42, WB3FKP 42, WA3OGM 41, WB3HTW 37, K3QXC 31, WB3CAI 30, W3ADE 18, W3CL 18, W3TWV 17, WB3FVJ 16, KB3LF 16, W3EEK 15, WA3VIL 13, K3EBZ 12, KB3VM 8, WA3TKU 6, WB3FYT 4, WA3CKA 3, KA3FJJ 3, AF3Z 3, W3HK 2, W3AVJ 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — WA3TAI is SEC. ARL seven his address. Big doings by MEPN in this year's SET. Many new candidates for NCS! Much learning with many emergency powered besides the mobilers. WB3KJT is ready for prime time liaison. KA3GWH enjoys MDSN, and KA3CDO is its hard working manager. 3735 kHz week nites with DSSN (Del.) alternating. Give it a try. W3FZV made it to SAS, VE and CD parties. WA3EOP's high power is 35 watts. WB3GEJ gets a big turnout in the WC2Mtr Net. W3UT makes a big count with all those volunteer liaison spots. KA3CDO notes MEPN voters no better than average. AK3X is finding a little time for late MDD. W3OYY has the bigger PON QNI total. WB3BFK watches TV while operating. W3DFW gets invited to free meals. WA3VPL sponsors the local HS radio club. KB3NL has new 2-meter rig. WB3GZU with some free time, was over 1000 in traffic. KA3CWA is another comer in Upper Marlboro. N4DR/3 has had KK2XGH on the 30-meter band for some time. W3LDD has new rig and sounds louder! KA3KHB is ready for action. W3IK is back from Europe. He and W3MR have 00 reports. KC3D dabbles in DX and RTTY. WA3FYZ/M had car troubles. W3ZNW welcomes standard time. W3CDQ was in the YLRL party, hosted ZS2AA and finally QSOed a JA YL. WB3LTA had WB3LHT and KA3CTK as NCS operate "SPOOK" with N3AJR KA3DXZ N4EOC W2CYO WB3HAE KB3OB KA3BDP WA3RRG KB3QO W3PIH W3EXP K3LYW KC3H WB3DPN WB3AAO K3PRM and KA3BAL on patrol. Net/Manager sessions/traffic/QNI avg. MEPN/WB3GZU 30/164/27.1. 100%: WB3BFK W3DKX W3LDD. Others N3AGM KA3CDQ W3FA WB3GZU K3ONU and KB3VP. WRPON/W3DFW 22/24/18.8. MDC PON/W3OYY 5/9/24.4 and WC2Mtr/WB3GEJ 4/4/24.5. Traffic: WB3GZU 1072, KA3CDQ 237, W3FA 169, W3UT 110, KA3CWA 73, WB3BFK 48, W3LDD 18, WB3KJT 13, WA3EOP 13, AK3X 11, W3ZNW 10, N4DR/3 10, WA3VPL 8, W3FZV 6, KC3D 4, WA3FYZ 3, WB3LTA 2, KB3NL 2. (Sept.) WA3IVO 202, W3FZV 38.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. October was SET time throughout the country with ARES and NTS groups from all over participating actively. In our section W2HOB decided that each county should plan its own operation rather than having a joint section-wide disaster as we have done several times in the past. It was felt that this would better enable each county EC an opportunity to define his own goals and objectives and have an activity that would help him meet them. The activities varied, from a major fire and tornado to an airplane crash and a toxic chemical waste problem. All involved felt that their activities were helpful to future planning, and that they would be able to plan even more useful exercises for future SETs based on the results of this year's event. Were you involved??? Our ARES and NTS still desparately need more people in ALL counties of our section. WE NEED YOU!!! Why not contact your EC today, or give me a call and I'll put you in touch. You'll be helping to further the cause of Amateur Radio in SNJ and helping to make SNJ a better place (if that's possible) to live and work!!! Traffic: WB2IQJ 742, N2CER 293, KA2GSL 135, KM2E 70, WA4JRP 61, WB2PKG 58, KA2BKF 47, W2ZO 46, WB2GFM 31, N2AEP 22, WB2LCC 20, K2UL 12, KA2CQX 4.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA3AIV-Western; W2BCH-Central; WA2DHZ-Southern; WB2NAO-Northern; WB3CUF-Mohawk Districts. ARES. NMs: N2APB K2KIR K2KQC WA2s ELD KOJ PUU ZJP KA2CTU KI2D W2s FR MTA KO2H. Appts: K2VV, ORS; K2NV, OVS. Silent Keys: WB2WAV K2YYM. PSHR: N2APB N2ARD KA2BHB KA2BHR N2BLX N2CSB KA2CTU W2GLH KA2GOH WB2IDS WA2KOJ WA2MFU W2MTA WB2NAO WB2OWO K2RN WB2TXK W2ZOJ. BPL to W2GLH. Reports: OO WB2MMB 13, N2NW 2; OBS W2GLH; OVS K2QR aurora and 432 MHz. Oct 27-28 alerted flood evacuations in nine counties ARES with Red Cross and agencies; W2BCH WB2JWD WA2VAM K2VTT.

Net	Freq.	Time/Day	QNI	QSP	QND
NYSCN	3677	1000/Sn	41	22	4
THIN	3913	1600/Sn	30	0	3
NYPON*	3913	1700/Dy			
NYSPTEN	3925	1800/Dy	858	153	36
ESS	3590	1800/Dy	414	58	34
OCTEN	34/94	1830/Dy	537	94	36
Q NET	31/91	1830/Dy	407	5	31
STAR/E*	99/39	1830/Dy	92	39	22
WDN/E*	04/64	1830/Dy	535	170	39
NYS/E*	3677	1900/Dy	467	378	34
JCARCN	10/70	2000/Dy	291	8	31
WNYECN	3955	2000/3rd Sn			
OARCN	25/85	2000/W	79	0	4
SLVARES	31/91	2100/Sn	57	15	8
CNYTN*	40/00	2115/Dy	634	184	38
NARASEN	22/82	2130/Sn	76	2	4
WDN/L*	04/64	2130/Dy	766	155	35
STAR/L*	325/925	2130/Dy	95	14	27
NYS/L*	3677	2200/Dy	391	261	34

*NTS nets. Blueline Svc Net 147.93/33. CNYTN adding 147.90/30. Western Catskill Net on 3540 kHz at 2230 local. W2TFL is manager. STAR covers Steuben Co. and East, support by Southern Tier stations requested. Send your net info to N2APB or W2GLH (North Country) for this column. PREPAREDNESS DUEL wins 1981 paper tiger award! W2BCH and W2MTA offer heartfelt thanks to participants. Congrats: Wyoming ARES and EC WB2TXK for WNY PD5 top honors, and to the Central District with top district score in WNY. Top score overall Orange Co. in ENY with 23218 out of a possible 81920 points. Regrets to ARES groups whose PD material got lost in mail! Traffic: W2MTA 470, KA2CTU 367, W2ZOJ 323, KO2H 309, K2GWN 303, WB2OWO 265, WA2HSB 256, WB2IDS 253, W2GLH 227, W2AET 223, N2APB 195, KA2GOH 161, WA2KOJ 148, KA2BHR 100, W2FR 95, N2BLX 84, KA2CLT 80, WB2TXK 72, KG2D 56, N2ABA 55, WB2NAO 49, KB2VS 48, WA2MFU 43, WA2PUU 43, K2RN 43, N2CSB 42, W2PZL 42, N2ARD 41, WA2RXO 39, KA2BHB 38, AF2K 38, WB2SGI 38, W2RQF 36, WB2QIX 32, K2QR 32, WB2LJK 29, WA2AIV 19, KA2DBD 12, N2NW 4, K2VR 4, WB3CUF 2. (Sept.) KA2BHB 41, WB2VSJ 1.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB —

Net	Sess.	QNI	QTC	kHz	T/D
WPAOW	33	399	192	3585	7:00 P/D
WPAPTN	39	639	315	3983	6:15 P/D/
WPA2MTN	32	601	105	146.28/88	8:00 P/D
NWPA2MTN	31	372	12	146.04/64	9:00 P/D

W3VRE is Silent Key; our sympathies are extended to his family. Upgrades: Novice — KA3HEC KA3HZD KA3HZR KA3HZS; Tech — KA3GWA; General — WB3FNT KA3DGT N3CPL (WB3DWS); Advanced — WA3INH KA3EGE K3OTS WB3GUK KB3VG (KA3EIM); Extra — WB3JGD KA3BRO. Congrats to all. New calls: KB3VE (ex-N3BRU), KB3VD (ex-N3BRP). New officers Skyview ARC: WB3IUV, pres.; W3GVI, v.p.; K3VRV, treas.; WB3APF, sec.; W3LPQ WB3LTL, directors. 9N1MM was guest of honor at dinner here in Pgh. He will go back to Nepal in January. WA3YAI (PY2ZEV) is home from Brazil for visit. Look for him on 21.070 at 7 to 10 P.M. EST. I want to thank all who participated in the WPA sec. SET. It was better than ever. Our ARES MEMBERS AND TFC HANDLERS did yeoman duty. The contacts between the Red Cross and the Weather Bureau were marvelous, and both services had high praise for our operations. ECs KB3OO WA3ZNP did preliminary ground work each in different area, and it all meshed fine. AC3N and N3ADU also had special net sessions to handle the tfc. N3ADU made BPL. Traffic: N3ADU 545, AC3N 236, KB3DT 198, K3CR 141, N3EE 109, N3FM 104, N3WS 90, W3IA 80, W3EGJ 75, K3SMB 61, WB3EFQ 55, KB3BG 52, W3RUL 43, W3MML 40, WA3QNT 37, WA3UNX 32, W3KMZ 29, KA3BGC 27, WB3GUK 21, N3BKV 16, W3KUN 16, WB3GXG 14, K3HCT 13, W3NGO 13, KA3CDV 12, W3KYN 12, K3VQV 10, N3BTY 8, W3EXC 8, WB3JGD 7, WB3KJH 5, W3AHH 4, AB3X 4, K3LTV 4, W3LOD 1. (Sept.) N3WS 29.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9QRP — SEC: W9QBH. STM: WB9JSR. ASCM: W9RYU.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0300 Dy	275	62
Il Phone	3915	2130 Dy		
NCPN	3915	1200/1700 Dy	133	52
IEN	3940	1400 Su	5	4

D9RN 100% stations W9HOT W9NXG K9EHP WB9WGD K9UZA K9BVE WB9ODN. DRN9 100% stations W9NXG WB9WGD W9JIJ W9HOT. W9VEY memorial station had QTC 11 in 4 sessions. On Dec. 5th the Illinois REACT, Illinois VOAD steering committee, and the ARES representatives met to draw up plans for statewide communications. WA9TEC and KD9D have new ZX81 computers and are looking for Amateur Radio software exchange with other users. K9BVE was the BPL recipient for the month. Cw traffic can be frightening to many people because of the speed and lack of experience. On January 1st 0100Z (7:00 PM local) on 3705 kHz in the Novice band, the ITN, Illinois Training Net, will begin its daily sessions. All those inexperienced in traffic handling should check in and get in on the ground floor and learn the proper procedures from the start. For further information, contact KB9X, 947 Oxford, Glen Ellyn, 60137. Platt Co ARES handled communications for the Freedom Marathon Race, 26 miles, on Oct 11th at Allerton Park. The Illinois SEC, W9QBH, is now ESDA 3-3 on

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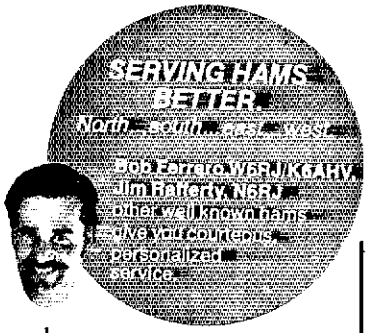

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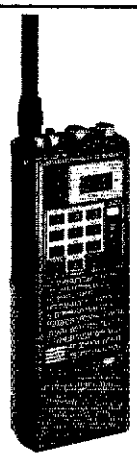
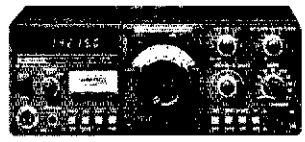
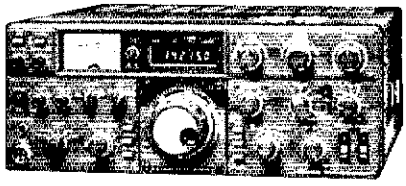
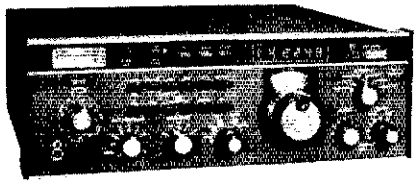

TR-2500


TS-130S


TR-7850


TS-830S

R.L. DRAKE TR-7/DR-7



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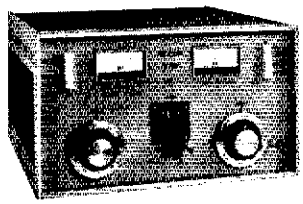

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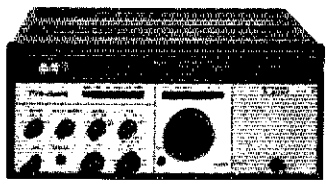

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the Illinois State ESDA Net. At the Chicago SKYWARN Council meeting on Oct 24th, it was decided to use WCRA 2200 for National Weather Service liaison. Twelve members of the Adams Co ARES group provided communications for the Quincy Auxiliary Police Pumpkin Patrol on Halloween. Members rode with six roving units to provide communications to the EOC from 6 to 12 PM. WB9EDP, 2133 N. Campbell Ave, Chicago 60647 is looking for amateurs interested in starting an Apple Computer Users net. The prime interest is applecation of computers in the ham shack: logging, SSTV, control of receiver frequency, and interfacing to station equipment. Traffic: K9BVE 535, KB9X 225, W9HOT 179, W9JJJ 173, WB9WGD 83, WØRJW 80, W9OK 67, KN9BAM 66, W9TLU 55, K9EHP 53, WD9HZF 50, W9LNQ 36, W9OBH 31, WB9QFO 26, WB9JSR 24, K9ORP 15, W9KR 14, K9SW 14, W9HBI 10, W9HLX 8, WD9EBQ 4, W9KSU 4, W9SSP 2

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN-W9QYY; QIN-WD9GXW; ICN-N9AEI; vhf-W9PMT; IWN-K9DCX; IPN-W9DLF.

Net	Freq.	Time UTC Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2300	2369	376	2122	62
QIN	3656	1430/0100/0400	922	473	2412	93
ICN	3708	0015	136	51	642	31
IPN	3910	2130	1125	144	870	31
IWN	3910	1310	1472		520	31

Hoosier vhf Nets: QNI 4719, QTC 311, QTR 7120, Bulletins 60 for 20 nets. 9RN QTC 696 in 1238 minutes. IN QNI: W9QLW W9JUJ W9EI K9WWJ WB9UYU W9XD WD9GXW N9HZ N9ACG KI9R N9PS WA9OCF N9AEI KJ9J. D9RN QTC 440 in 65 sessions. IN QNI: W9JUJ K9CGS WB9MIK W9URO W9DLF K9KTB. CAND QTC 857 in 33 sessions. IN QNI: W9OLF W9JUJ WB9WRC. Appointments: WD9IZA EC Grant County; N9ACG EC Madison County; W9JZV, OBS Marion County; W9PMT vhf nets manager; WA9KWH, EC Jay County. Silent Keys K9YZJ WA9DHQ W9QR W9ZSC. The new Indiana Navy-Marine Corps MARS director is WA9MPH. We wish him all the best. Congratulations to W9JUJ on her upgrade to Extra. Congratulations to the 21 Repeater Group handling comms for one tornado, 3 marathons, one bike tour, one parade and several weather nets. Especially to W9EFA WA9UGP WA9VKV WB9VLE N9BCQ N9BCP WB9AMK W9YEL KA9GPM KA9FLF for their help with INCERT. The new area Indiana State Police INCERT Coordinator is Trooper Terrence L. Sutton, Ft. Wayne. HAWKS, Hoosier Amateur Women's Club WA9HLW pres., W4OOE, v.p.; W9RTH, secy.; K9ILK K9RXK WA9EYL WA9EZP W9BJH K9ZLB WA9BWT W9JYO W7NJS WA9BGE K9FZX W51QK WA9YIF W9NBW K9RXK WB9LWZ WB9SJD WD9FIC WB9ZCH WB9UKD WB9UKC WD9HEE WB9NXW K9OOB WD9EZP WD9FIV W9JUJ WB9YXH KA9GWE KA9DGM KA9CDE. Congratulations and thanks to everyone who helped make this year's SET a success. Thanks to the Hoosier Hills Ham Club for a great hamfest. I enjoyed the Saturday night fish fry. Traffic: W9JUJ 1222, W9UMH 628, W9FC 221, WB9UYU 187, W9QLW 158, W9OYY 120, WB9WRC 111, W9EI 100, KJ9J 96, N9AEI 92, W9XD 91, W9PMT 87, W5NPM 84, N9ACG 84, WB9ADE 79, WA9OCF 71, W9URQ 71, K9DCX 64, K9WWJ 64, KG9K 62, WB9MIK 54, N9PS 52, W9DLF 39, W9DKP 30, W9IOH 30, WB9AWI 26, KI9R 23, WD9ART 22, WA9OHX 22, W9UEM 21, W9RTH 20, WD9DWD 19, K9FZX 19, W9WEI 19, WD9EXI 18, K9CGS 15, WB9DIX 15, WA9CKK 15, N9AST 14, WA9KWH 13, W9UPI 13, KB9WI 12, N9ELK 11, WA9JNC 11, K9DIY 10, WB9YAY 10, W9EUP 9, K9FHQ 9, K9FVN 9, WD9EPU 8, W9BDP 7, WD9CIV 7, W9POF 6, KC9CT 5, WB9AJY 4, W9ZGC 4, K9OUP 3, WA9PKL 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — BWN 3984 1215Z, QNI 1134, QTC 1306, WB9YPY, BEN 3985 1800Z, QNI 723, QTC 239, WB9ESM, WSBN 3985 2300Z, QNI 1067, QTC 382, WD9ESZ, WNN 3723 0000Z, QNI 193, QTC 65, KA9HPQ, WSSN 3645 M-F 0030Z, QNI 143, QTC 34, N9BYK, WIN-E 3662 0100Z, QNI 386, QTC 160 W9YCV, WIN-L 3662 0400Z, QNI 299, QTC 121, K9LGU, XPO 3925 1801Z, QNI 418, QTC 34, WA9NIX, NWTN 3494 0030Z, QNI 549, QTC 42, WB9YPY, Gr. Bay 7221.12 W 0030Z, QNI 18, QTC 4, WB9NRK, WCWTN 3791 0030Z, QNI 96, QTC 7, N9AUG. KA9BHM KA9BHN have Techs; their dad, N9BPM, has Advanced. KA9FIH has Extra; N9CPB N9BAF have Advanced. KA9HHZ has General. KA9HCJ has Tech. WD9CYT now KC9GW. WD9ESZ WD9CYL WD9JHT have Advanced. KE9C and others were very involved in the affair of the first kindergarten located in Watertown. Support your local club; they need *your* support. WD9HHM has General. WA9PPB is now KC9ES. WD9ESX has A-1 certificate. KA9LDX KA9LFH have Novice. KC9FW was WB9UMT/N9CDU. New Novices of YTARC KA9LUT KA9LUG KA9LVL. Regret to report W9GTJ a Silent Key. New Novices Shawano area KA9LWN KA9LWO KA9LWP. N9CLE has Advanced. BPL to KA9CPA WD9ESZ. New Novices New London area KA9LXV KA9LXW WB9LKC's sons WB9WDQ KA9KJW have Gens. WB9WDQ is in Rome. Traffic: KA9CPA 1661, WD9ESZ 546, W9CXY 396, W9YPY 324, W9YCV 218, W9DND 181, K9GDF 170, N9AUG 161, K9FHI 150, N9BYK 149, W9IEM 137, WD9DHF 111, W9UCL 107, K9AKG 98, KC9CJ 96, AG9G 89, WB9JSW 85, WD9FRI 68, WB9ESM 67, W9IHW 65, WA9WYS 65, WB9YPZ 64, KA9HPQ 63, N9ATP 60, K9LGU 54, WA9ZII 50, KG9B 46, W9LDO 45, N9BDL 44, WB9NRK 43, K9AQ 42, W9SO 42, K9UTQ 41, W9KTG 39, K9JPS 37, K9HDF 35, KC9GW 34, WB9ICH 34, WA9YVC 34, KA9GYD 33, KA9IKR 33, KB9NG 32, KE9C 29, KA9GBG 27, WA9DXW 25, WD9BKT 22, KA1EBA/9 21, W9UW 21, N9BCX 20, KA9EMF 18, WD9IMZ 18, K9UU 17, WA9GGH 15, KA9IHR 15, K9ANV 12, KB9FM 11, WA9UJK 11, WA9GYF 4.

DAKOTA DIVISION

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWN — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. Congratulations to NØDBP as a Tech and KAØKZX who upgraded to Tech. Callsign changes are KAØKZZ to NØDDS, and WBØYXA to KCØIW. Congratulations to WØCDO on receiving award from NWS for being their official observer for 35 yrs. Best wishes are extended to WBØAUM and XYL on their wedding with lots of hams attending. Congratulations to WBØNAD and XYL on their new harmonic. Extended a speedy recovery to WAØRWK on her mistortune of a broken arm, the key hand. We have been having good check-ins on the DTRN. I want to thank those who are active and hop more will get on during the cold winter days. Traffic: WAØRWM 39, KNØA 24, KAØFSM 10.

SOUTH DAKOTA: SCM, Erwin Heimbuck, KØOTZ — The antenna work for winter should be done by now. Thanks to the weather we had extra time this year. Work is completed on the new antennas for the Terry Peak (Lead) rpt. New ant are 200+ feet up on the top of Terry. This

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ALPHA 76CA Same as 76PA, but uses 2.4 KVA Hipersil™ extra-duty transformer for rugged, heavy duty use or tough environments; reduces weight by 10 lbs.

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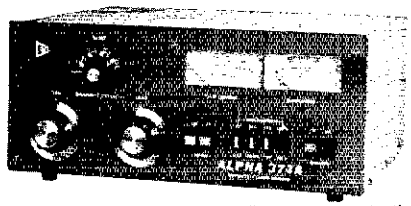

ALPHA 374A Adds "no-tune-up" convenience to the basic 76A chassis. Provides instant bandswitching among the popular amateur bands, plus full coverage manual tuning in the 1.8-2.0 & 3-22 MHz ranges.

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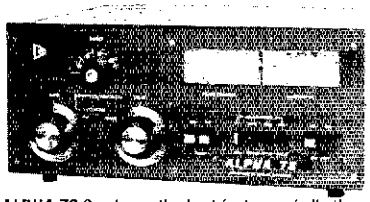

ALPHA 78 Combines the best features of all other ALPHA amplifiers. (3) 8874's, QSK, 2.4 KVA Hipersil™ transformer and a bandpass no-tune-up system that fully covers the 160-15m bands with no sacrifice in efficiency compared to manual mode. 7½"h × 17"w × 14½"d, 65 lb.

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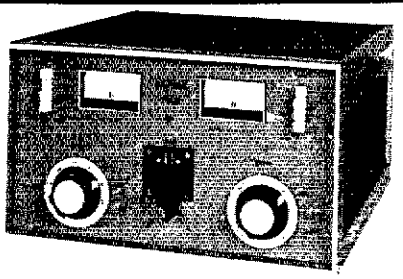

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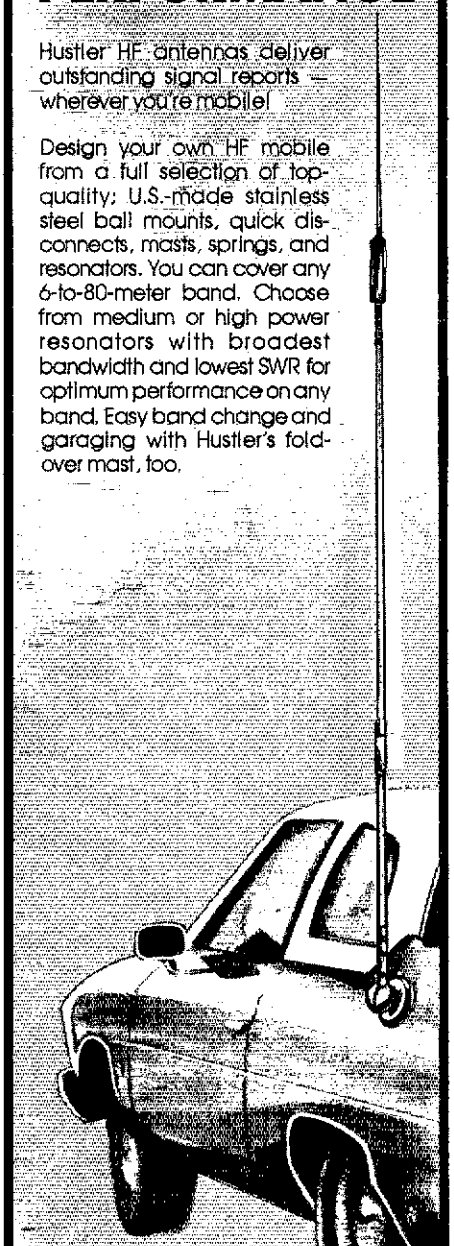

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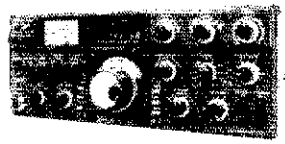

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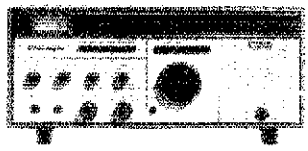

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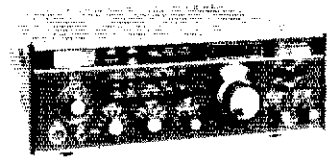

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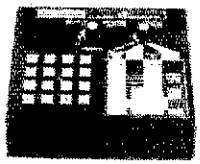

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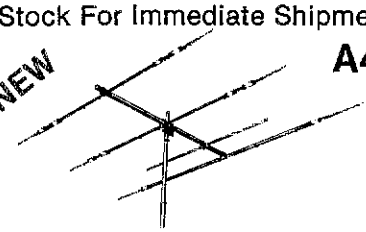

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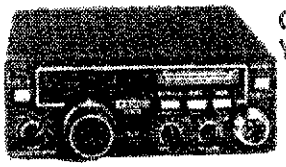

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Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

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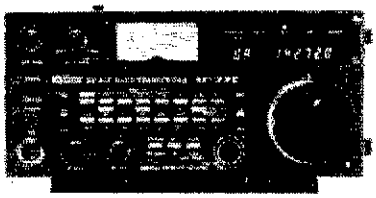

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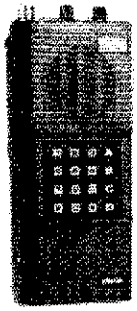

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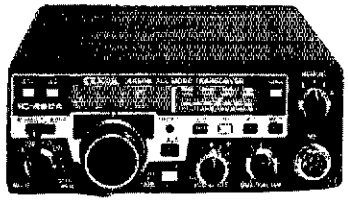

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with the new GE rpt will really help the coverage. Six meters has been good this fall with KØUDZ getting Africa for his last continent for WAC on 6. Congrats. WØPUF has some gear going on 1296 with good results so far. The SDSMT ham club just completed tests on 3.5 GHz and managed to work from Terry Peak to Kadoka. Congrats. If you are thinking of putting in for this job, get your petitions into the ARRL NOW. Traffic: WDØBMR 144, WØHOJ 118, KØAIE 109, WØKJZ 85, WBØOMF 33, WAØVRE 26, WØRWE 9.

DELTA DIVISION

ARKANSAS: SCM, Dale E. Temple W5RXU — SEC: WB5IGF. Mockingbird NM WA5ZWZ reports 22 sessions, 622 checkins, 17 traffic, 8 hours 45 min. Razorback NM KC5CE reports 1117 checkins, 42 traffic, 9 hours 55 min. Arkansas Phone NM W5UAU reports 631 checkins, 37 traffic, 1167 min. OZK NM W5MYZ reports 169 checkins, 25 traffic, 379 min, 31 sessions. Clinton Amateur Radio Club reports that club active in SET 1981. MARC 3rd in 5th call area in FD. Northwest ARK. ARC reports 16/76 repeater new Spectrum Solid State on emergency power and a reduction of repeater dues??? WB5IGF, SEC, has state emergency plan about ready for publiction. More later. Traffic: AE5L 91, W5QFU 50, W5UAU 28, WB5GQH 22, W5KL 6.

LOUISIANA: SCM, Jim Glammanco, N5IB — RN5 certificates were awarded to W5MI N5RB K5TL N5BFV WB5UVX W5VMY KC5SF W5LQ WA5PRI N4AZI/5. Congrats to all of them. Congrats to JARC on their 25th anniversary and on most enjoyable hamfest this past October. SELARC has new officers: WB5UTY, pres.; WD5HLE, v.p.; WD5FQG, sec.; K5CAV, treas. The SELARC Hamfest will be Jan 16 in the Twelve Oaks cafeteria on the SLU campus in Hammond. The Baton Rouge Sunday Advocate had a fine picture and article profiling WB5JEH and her work with the Eye Bank Net. She has been doing this work for several years, and the article was well-deserved recognition and showing Amateur Radio at its finest. WB5IYH reports that the slow net, LSN, is doing just fine, but that the LA stations are being outnumbered by the out-of-state ones. Be sure to pass the word about LSN to new hams and to your students in Novice classes. Speed is about 10 wpm. Time and freq are below. 73.

Net	Freq.	TIME	QNI	QTC	Mgr
LAN	3615 kHz	7 & 10 P.M., Dy	402	193	K5TL
LTN	3910 kHz	6:30 P.M., Dy			
LSN	3703 kHz	7:30 P.M., M-F	107	13	WB5IYH
LRN	3287.5 kHz	6:30 P.M. Su, 8 P.M. W	3	0	N5RB

Traffic: K5TL 213, W5LQ 109, W5VMY 91, KC5SF 77, WB5LBR 33, WD5CWK 29, AC5H 27, N5RB 26, K5DPG 15.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. STM: KB5W. Freq Coord: WD5DCI. With regrets report W5RIM as Silent Key. SET went well with good exercise on coast and in Pontotoc. Need more of this activity to keep our system working. JARC active in public service in Jackson with N5AGV directing services at ball games with communications for ARC. WD5DCI now has fine comprehensive vhf directory for the state. This is first in-state listing of vhf. Keep him posted on any changes. Congrats to upgrades: Tech — WD5DCF KA5LGG; Gen — N5DUZ KA5GTW KA5HPD KA5MLW WB5URU; Adv — WB5OYK WB5RZI N5DOK; Extra — KC5IG. KA5HQZ now KD5BM, KA5GYM now KD5AI KA5FXL now N5DYE. MTN (K5OAF) sess 31 QNI 158 QTC 69. MSBN (WD5EYM) sess 31 QNI 2161 QTC 67. MN (WB5RMW) sess 29 QNI 454 QTC 7. MSN (KA5GGG) sess 20 QNI 153 QTC 11. CAEN (KA5AGD) sess 4 QNI 91 QTC 7. GSEN (KB5W) SET sess QNI 17 QTC 36. RACES (K5GEI) sess 4 QNI 128 QTC 3. Traffic: K5OAF 117, KT5Z 83, WD5EYM 15, WB5SNB 15, KC5LK 11.

TENNESSEE: SCM, John C. Brown, NO4O — STM: K4YOL. SEC: W4NZW. W4SXH has been honored with the TN CW Century award. Congrats to well earned award. Those of you that missed out on the TSN SET activity really missed a very and I mean a very active net. They started with the first gong and went around the clock until the last bell. The station activity reports show that also. Bunch of real fine hams doing a fine job. The activity on upgrades has slowed a bit and is likely to get slower as most all examining stations are to be visited by FCC only one time each year because of budget cuts. You have got to be well prepared when you go as the year will pass before they come around again. Several made the grade but no new calls have been reported this time. One station reported an upgrade after 41 years as a General. You never get too old. TN CW Honor Roll — N4EAM NG4J KY4L NO4O W4WXH W4ZJY. TSN Honor Roll — KA4BSG WA4CMS NN4D N4DZW N4EAM N4EFB KA4HPW NG4J KY4L WA4LXP KA4OVE KA4OEO KA4PWU KA4RJC WB4YSN W4ZJY. The TSN set a record for that net: QNI 462, QTC 279, QND 30. Fine job. The SCM is still working on a suitable certificate for all the assistant NMs. Traffic for month — LF 90 sessions, 4498 QNI, 314 QTC; VHF — 99 sessions, QNI 2845, QTC 515 (still leading on QTC); CW — 60 sessions, QNI 786, QTC 461. Eight nets no reports. No. of station activity reports continue to climb. Is yours among those reported? Traffic: N4EAM 762, NG4J 658, W4WXH 518, W4ZJY 331, N4EFB 234, W4OGG 223, WD4SIG 146, WA4NIF 145, N4DZW 144, W4DDK 144, WB4BKF 139, K4VM 106, W4MRD 101, KA4OXO 87, KA4RJC 81, K4WOP 80, NN4D 70, KA4BSG 59, KY4L 59, WA4UCE 33, W4PFP 32, KA4IKT 25, K4YOL 24, W4TYV 21, NM4W 20, W4RUW 12, W4NZW 12, W4EWR 9, WA4GLS 7, W4PSN 7, K4ON 6, WB4YPO 5, K4AMC 5, W4DPO 3, WB4TDB 3, W4UIO 26.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: N4EEL. Net/sess./QNI/QTC: KRN/22/707/46, MKPN/31/1184/160, KTN/31/1237/228, KNTN/59/549/294, KSN/36/251/140, KEN/4/161/5, BARES/6/148/18, CCEN/4/64/6, CARN/19/116/10, 11ARES/7/18, 5ARES/5/103/32, 4ARES/8/74/41, KYPON/5/65/9, PAWN/4/49, PAEWTN/30/281/37, 6ARES/4/82/15, 3ARES/5/38/6, TSTMN/34/468/74, WARES/5/15, MEN/9/199/17, MRN/32/294/183, DCAN/D9RN 100%. New appointments: WA4MCF, NM PAWN; KE4CZ, EC. Upgrades: N4FTH KE4BX KE4CC N4ELO KA4OIL. New NM KTN is WD4BSC. W4TPB working up new call letter plate bill. Help him by contacting your representative. Paducah clubs unite into PARA. Murray ARC has completed fall Novice class. Traffic: KA4GFU 299, KC4VB 286, KA4MZY 282, KB4OZ 262, K4YZU 210, WA4SWF 206, WA4JTE 157, WD4BSC 143, KD4SN 131, WA4AGH 130, KC4XM 124, KS4V 116, WD4IYI 110, K4ZWB 108, KA4SAA 107, KZ4G 104, WA4EBN 101, KC4WN 93, WA4JAV 77, K4AXE 75, WA4JQS 56, K4HOE 45, KA4BCM 44, KA4MBF 38, WD4CJO 34, N4EEL 31, KD4IF 31, WA4AUN 29, WA4AVV 27, K4MHL 27, KD4TY 25,

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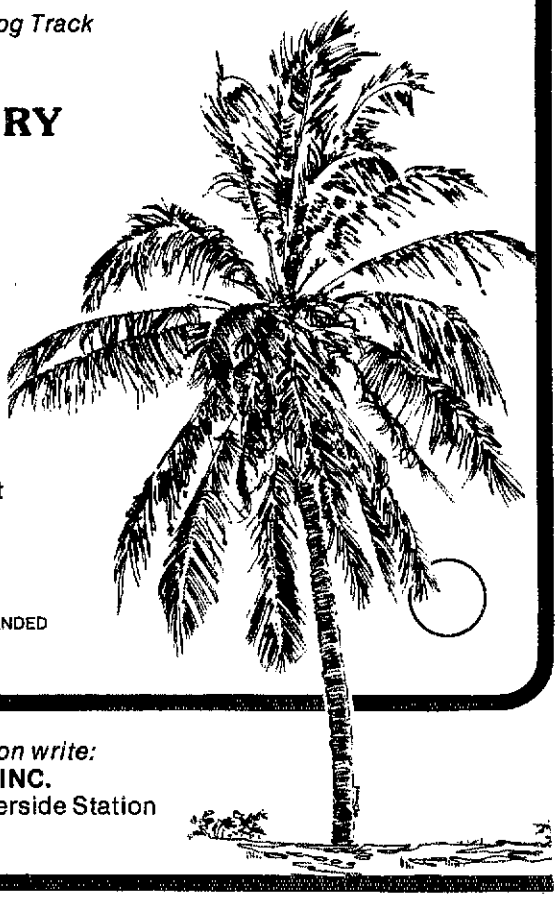

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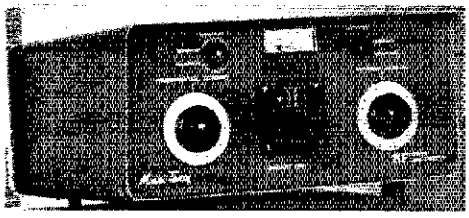

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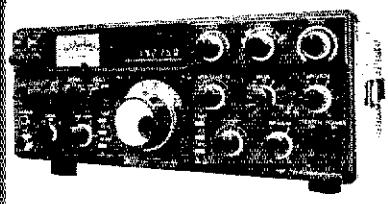
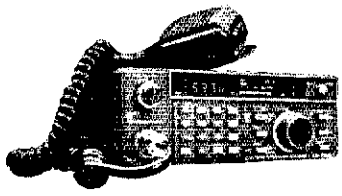


TS530S



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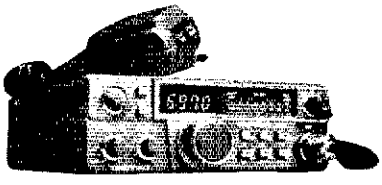

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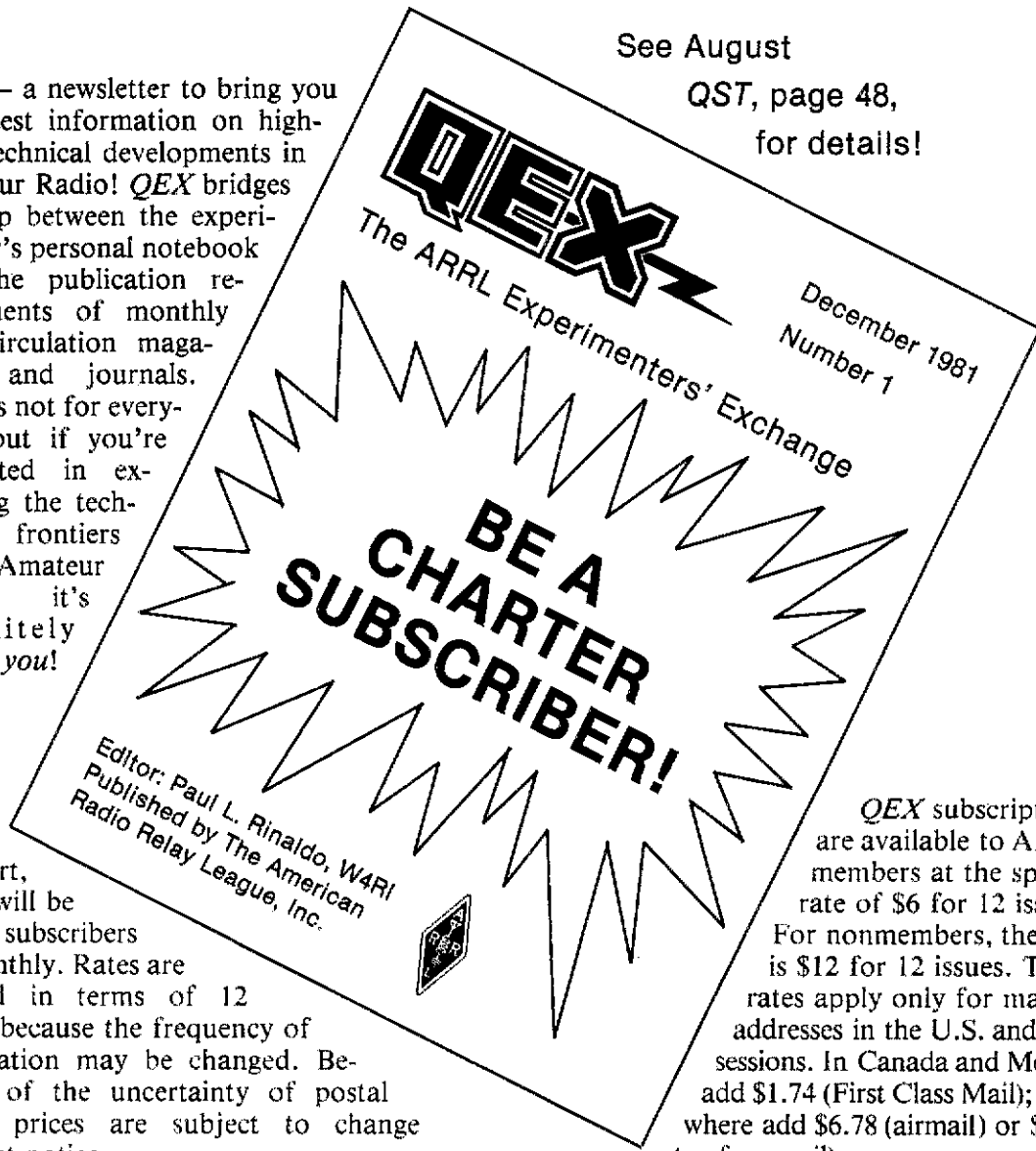

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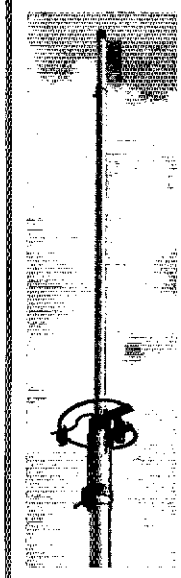

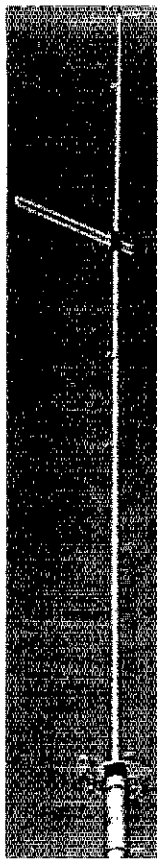

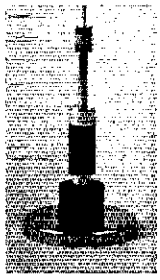

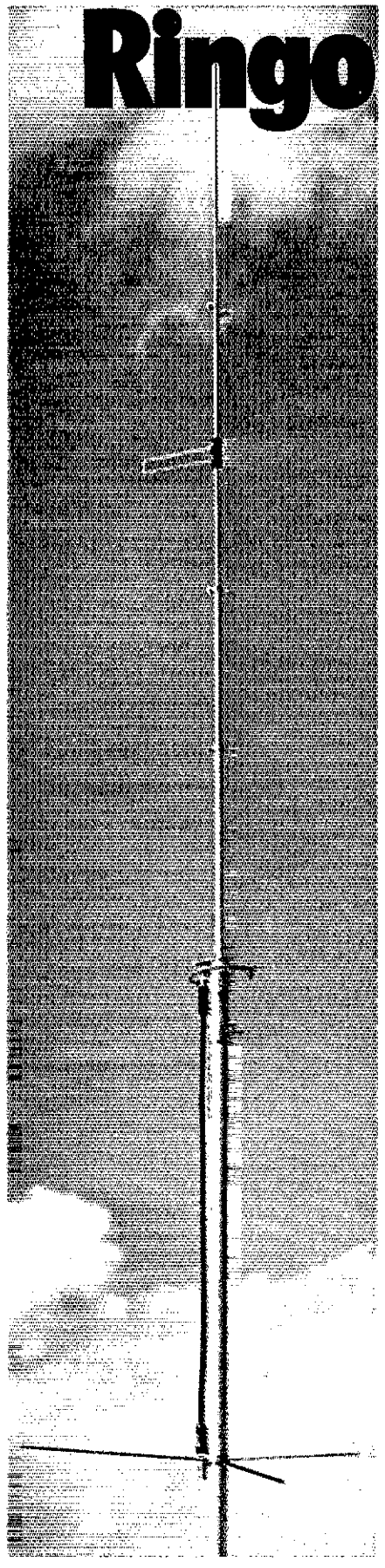

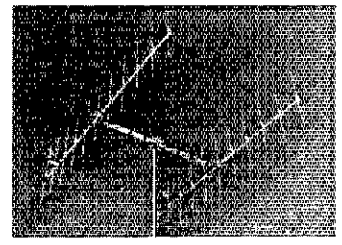

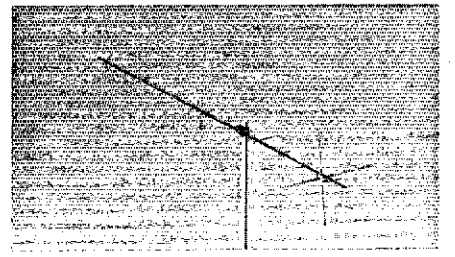

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TS-147	144-148 MHz	Trunk Lip Mount
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TS-220	220-225 MHz	Trunk Lip Mount

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

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WA4YPQ 24, W4PKX 21, WD4EKZ 20, NN4H 19, WD4COF 19, WB4ABF 18, WA4GAL 18, WB4NHO 18, KA4KSV 14, WA4UQA 14, KA4BGZ 12, WD4RWU 10, KA4MTX 9, KA4MAP 8, KA4ADF 6, WA4IGD 6, WA4UIV 6, WD4IYH 5.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KG8DN K8RGT W8VWY. NMs: KA8DEZ WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr.
MITN*	3953	1900 dy	851	550	31	WD8LRT
OMN*	3683	1800 dy**	1225	459	93	WA8PIM
UPN*	3922	1700 dy	618	368	35	WA8DHB
MACS*	3953	1100 dy	590	303	31	K8LNE
GLETN	3932	2100 dy	1169	166	31	WD8LSV
MNN*	3722	1730 dy**	438	155	66	KA8DEZ
WSSBN	3935	1900 dy	594	35	31	WB8SUR
BR	3930	1730 M/S	327	22	24	WB8ZGP
MEN	3930	0900 Su	137	6	4	WB8ZGP
TASYL	3922	1900 M	36	6	4	KM8E
VHF Nets		9 reports	606	209	46	WD8NKT

*NTS Nets. Times local. **OMN late net, 2200; MNN late net, 2000; MACS Su 1300. 3932 kHz is MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. UP ARES Thur 3922 kHz, 1800. OO reports: K8JH W8QG AC8Y. Silent Keys, with deep regret: K8RKM W8RLT (ex-DJ0ND). New officers for Hiawatha ARC: W8LSX, pres.; N4SP, v.p.; KA8KDN, sec.; W8IOC, treas.; WD8AKE, bd. mbr. For Marinette & Menominee RC: K8ICO, pres.; W8ZPU, v.p.; K8OCW, sec/treas.; WB8NCT, repeater treasurer. For U.P. Repeater Assn.: W8WK, pres.; W8LSX, v.p.; W8SKP, sec. Congrats to MCRC members W8FJK and W8FMO on fifty years in Amateur Radio, Oct 23 was a good day for 6M butts, with WD8ARH WB8BGY WD8DSV K8EFS WB8WXZ all reporting working ZS3E. This completes 6M WAC for BGY DSV and WXZ. W8CUP sent me his SET message from aboard his newly acquired 7.5-meter sloop, the "Sea Q." I received 65 SET messages this year, all indicating lots of good activity. I'd like to hear more folks taking advantage of the relaxed ID rules, especially in emergency and public service net operations. There has always been too much IDing, and now there's *much* too much! SPL: KA0AID KA8CPS AF8V. Traffic: AF8V 770, KA0AID 437, KA8CPS 435, WB8YDZ 383, WB8MTD 327, WD8IBY 297, WA8DHB 223, WA8PIM 190, W8YY 183, KB8MX 182, N8BNC 181, WD8IXZ 170, WD8LRT 145, K8GXV 140, K8UPE 132, WD8RHU 120, WB8YRY 113, WD8OEP 108, N8BJD 106, WB8SYA 101, WD8EIB 100, K8KMQ 99, WA8QAF 97, KC8DC 96, KA8DEZ 92, KF8M 91, WD8OSE 88, W8CUP 83, WD8NKT 77, W8YIQ 75, K8OCP 74, WD8MJB 73, WA0TAQ 67, W8IHX 65, W8VIZ 62, W8SCW 60, W8JXJ 59, WB8TTA 58, WD8RNQ 57, KB8GT 55, WD8JRT 50, KC8DN 47, KA8LHJ 47, KA8ECT 42, KA8IWW 42, WD8HWR 40, WB8ITT 35, K8LNE 34, W8ECK 33, K8RV 32, W8VPW 31, WA8YBP 31, W8CBH 26, WB8YWA 26, KG8Z 21, WD8LIP 18, K8ZJU 18, KI8O 17, WB8DJS 16, KB8TD 15, KR8L 10, WB8AXI 9, W8LDS 9, W8ZGP 9, K8CIP 8, W8TBP 8, K8DD 6, WB8IYA 6, W8LOU 6, N8AOM 5, WD8BEN 5, WB8HPZ 4, WB8HSN 4, W8JUP 4, KE8X 4, N8DGN 2.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW W8EK KF8J WB8JGW WD8KFN WB8YGW WB8YTD

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	363	266	62	6:45/10 P.M.	3.577
BNR	278	171	41	6 P.M.	3.605
ONN	163	44	26	6:30 P.M.	3.708
OSN	196	168	31	6:10 P.M.	3.577
OSSBN	2530	1223	101	10:30 A.M. 4:15 & 6:45 P.M.	3.9725
OSSN	160	51	31	6:45 A.M.	3.577
O6MN	516	40	31	9:00 P.M.	50.160

As I hope you've all noticed, we have a new Section net — the Ohio Sunrise Slow Net. This net was instituted to fill an early morning gap, and serve as a training net. Contact new NM WB8YTD if you'd like more information. I would appreciate all club officers announcing that the Ohio Novice Net is available for Section Novice, Technician, and higher licensees, who wish to learn cw traffic handling and enjoy working with beginners or slow-speed cw. Contact new NM WA8BUW for more specifics on this net. Congrats to W8KRF EC Lorain Co. and the LCARA for their work with The Bay Village International Soccer Tournament over the Labor Day weekend. Club elections: DARA: WA2KOO/8, pres.; N8ZM, v.p.; KG8Q, secy.; WD8CXH, treas.; Canton ARC: WA8ADA, pres.; WD8IKA, v.p.; KK8D, secy/treas.; Toledo ARA: KA8DLF, pres.; W8BHL, v.p.; W8CBA, secy.; KA8FKB, treas.; LEARA: AB8P, pres.; W8MW W8AZO, v.p.s; WA8MAA, secy.; W8GRG, treas.; WD8KIS, trustee. Appointment: WA8WOB, EC Adams County. Upgrades: WB8SOY to Extra; KA8NXV (8 years old!) to Novice. Please remember the Ohio ARRL Convention February 27 and 28.

Local Nets	QNI	QTC	Sess.
ALERT	70	6	1
BRTN	442	300	35
CCOMF	61	4	8
COARES	106	7	3
Firelands Red Cr.	69	65	5
IE NET	33	8	4
LCNWOARES	895	224	66
MASER	85	4	4
RARA	70	2	4
TSRAC	1050	325	42
VWCEN	40	4	4

Traffic: K8OZ 574, K8NCV 459, WD8KFN 341, WB8JGW 303, W8PMJ 302, K8AN 244, WB8SIO 232, AB8P 216, N8BQK 196, WB8DMF 196, W8EK 188, KF8J 155, WD8KBW 146, WD8DYW 145, N8AUH 141, W8WEG 133, KA8HCT 128, KA8IUK 128, WA8HGH 124, WB8MZZ 122, K8DL 120, N8JR 110, K8JDI 107, W8UPD 107, W8GGX 105, WD8ODV 104, WB8WTS 102, WA8GMT 95, WB8UBR 91, KA8KFW 88, N8AKS 84, W8QZK 84, WA8BUW 82, WD8OYO 80, WB8NCD 69, WB8YUS 69, WD8MIO 68, W8MOK 68, K8PYT 63, N8DAD 56, W8TP 54, WB8RSM 51, KA8GGZ 46, KA8DGO 45, K3RC 39, K8CKY 38, WA8SSI 37, WD8NEC 33, WD8QAC 33, W8OQL 32, WB8KKI 31, WB8YGW 31, WA8ZID 31, N8CW 29, K8GET 28, WD8JAJ 28, WA8QYJ 28, W8RG 28, WB8QXN 27, WB8SJE 27, WD8IKC 24, WD9HDZ 22, K8NJG 22, WD8AYH 19, W8BHL 19, WD8CHL 18, WB8CJU 17, N8BZC 15, WD8RGS 15, WB8HHL 14, K8KRG 14, WB8SRC 14, WB8MRL 13, W8RZN 13, KA8HGH 12, WB8YTD 11, N8AJU 10, W8LZE 9, W8MGA 9, WA1OAA 9, KA8GMF 8, WB8NHV 8, KA8LNA 7, WB8TRK 7, W8CAR 6, K8CMR 6, WD8EKI 5, WB8NTR 5, WD8OYK 5,

CT2100

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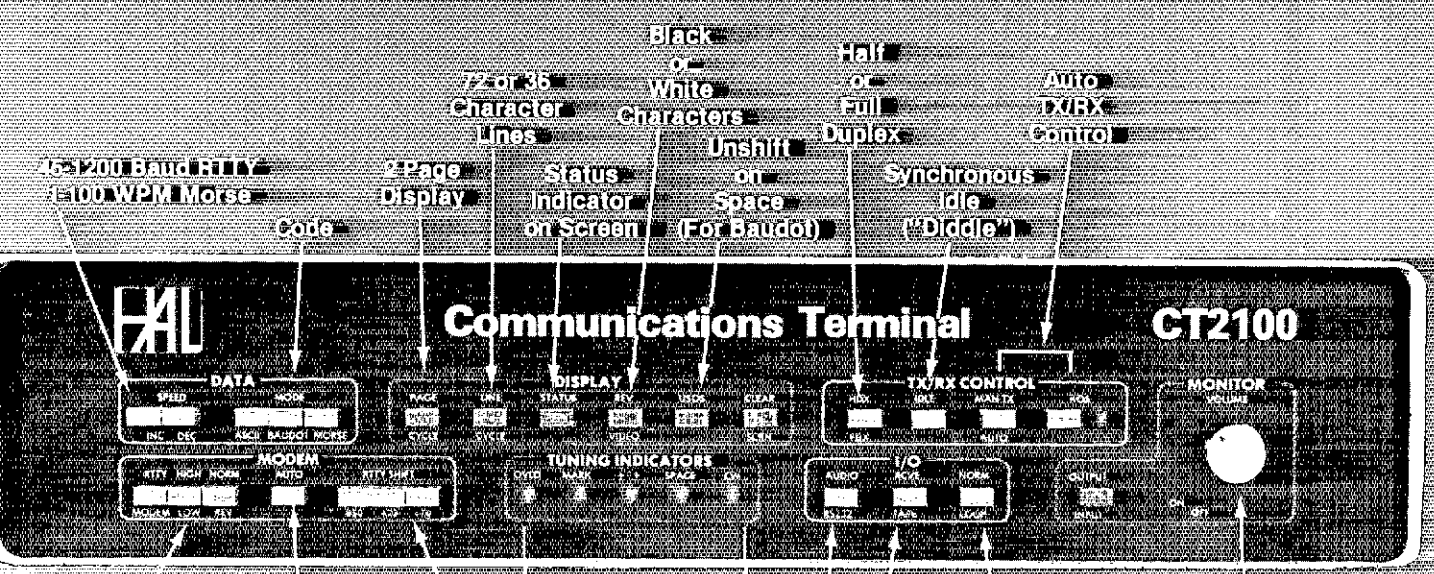

- 0 to 200 Baud RTTY
- 0 to 100 WPM Morse Code

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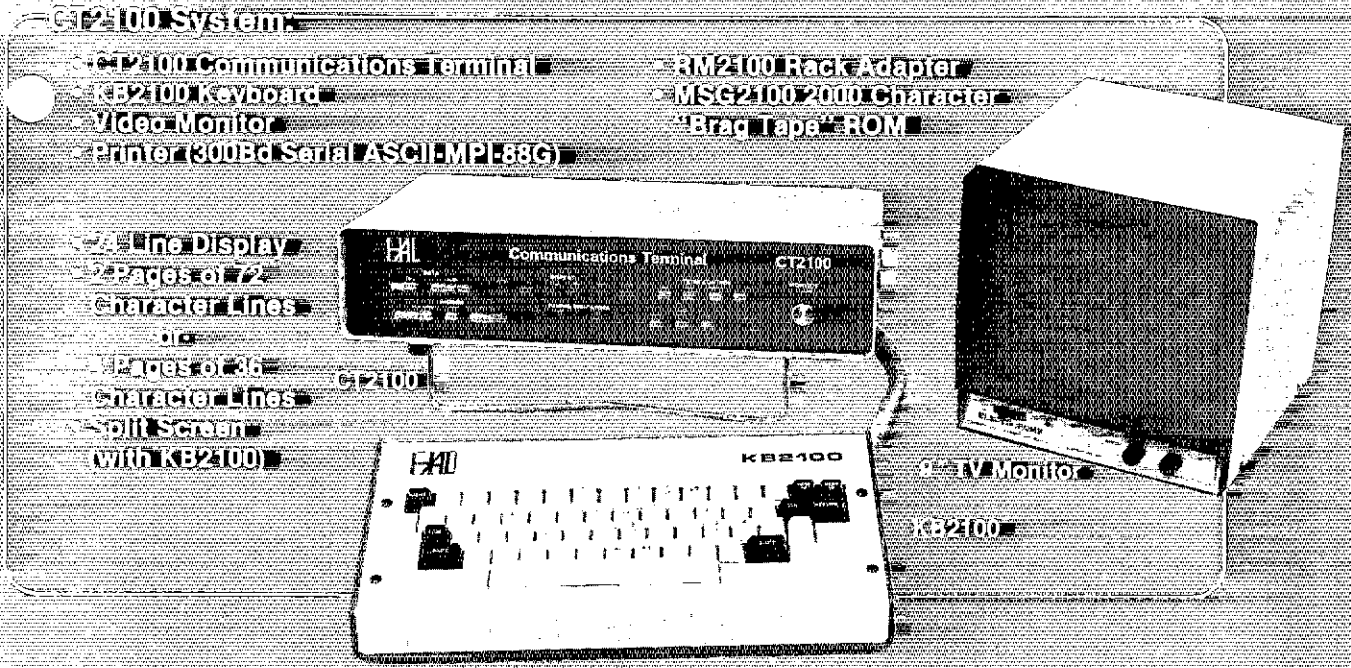
- KB2100 Keyboard
- Video Monitor
- Printer (300Bd Serial ASCII MPI 88G)
- RM2100 Rack Adapter
- MSG2100 2000 Character Bubble Tape ROM



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ALDA
PS-115 15A unreg ps $ 59 v
AMCOMM
S-225 2m FM Xcvr $199 f
ATLAS
350XL Xcvr $389 m
DMK-XL Mobile mt 29 w
215X/NB 160-15m xcvr 349 m
PS-110H 12v ps 69 mw
110L Xcvr (RX+TX) 189 m
CIR
BPS-200 Power supply $ 99 f
CLEGG/SQUIRES-SANDERS
Interceptor VHF Rcvr $ 99 m
CLIFFORD INDUSTRIES
XxRD 20A power supply $ 69 m
50RM 50A ps w/meters 199 w
COLLINS
75S-1 Ham Rcvr $275 mwf
75S-2 Ham Rcvr 299 m
75S-3 Ham Rcvr 375 mf
75S-3B Ham Rcvr 450 wtcv
F455FA08 800 Hz filter 99 w
F455FA31 3.1 KHz filter 79 w
51S-1 Rcvr (round) 1095 w
32S-1 Transmitter 275 f
32S-3 Transmitter 425 wtcv
32S-3 Xmtr (round) 469 m
516F-1 KWM-1 DC ps 69 f
KWM-2 Xcvr 499 v
351D-2 KWM-2 mount 45 mf
516F-2 AC supply 175 mfcv
MP-1 DC supply 49 m
DENTRON
160-10AI Tuner $ 89 e
MT-2000A Tuner 119 v
MT-3000A Tuner 249 cve
GLA-1000 Linear 249 v
AF-1A Rcv audio proc 69 w
DRAKE
SSR-1 SW Rcvr $179 m
2B Ham Rcvr 139 ce
2C Ham Rcvr 159 w
2BS Speaker 9 c
R-4 Ham Rcvr 229 mte
R-4A Ham Rcvr 239 mwfv
R-4B Ham Rcvr 275 wfcve
R-4C Ham Rcvr 375 mce
MS-4 Speaker 19 mv
FL-500 Filter 35 me
FL-1500 Filter 35 m
SC-2 2m rcv conv 69 w
CPS-1 Conv ps 19 w
T-4X Transmitter 239 mwfc
T-4XB Transmitter 275 ve
T-4XC Transmitter 375 fcve
TR-4 Xcvr 299 wfe
TR-4/NB Xcvr 349 me
TR-4C Xcvr 375 mfc
TR-4CW/NB Xcvr 499 f
34PNB Blanker 49 mw
TR-6/NB 6m Xcvr 499 me
AC-3 AC supply 59 mwfc
AC-4 AC supply 89 all
DC-3 DC supply 49 f
DRAKE - cont.
TR-7/DR-7 w/NB-7 1069 m
PS-7 Power supply 199 m
NB-7 Blanker 59 w
WH-7 Wattmeter 89 mc
MN-2000 Matcher 149 e
TR-22C 2m FM Xcvr 119 m
UV-3 (3-band) Xcvr 699 c
UMK-3 Remote tnk kit 39 w
ETO
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HT-44 Transmitter 149 v
PS-150-120 AC ps 69 v
HA-1 Keyer 49 m
HEATHKIT
SB-300 Ham Rcvr $149 c
SB-600 Speaker 9 e
ICOM
IC-701 Xcvr $599 mwf
IC-701PS Power supply 99 mw
PS-15 Power supply 99 e
IC-551D 6m Xcvr 449 w
IC-502 6m SSB port 149 m
IC-22S 2m FM Xcvr 149 m
IC-211 2m FM Xcvr 399 v
IC-230 2m FM Xcvr 149 f
IC-245 2m FM Xcvr 239 mv
IC-255A/TIP mic 2m 229 v
IC-280 2m FM Xcvr 239 w
IC-215 2m FM port 119 m
IC-202 2m SSB port 149 e
IC-260A 2m Xcvr 289 e
KDK
2015 2m FM/TTP mic $199 v
KLM
661 6m Xcvr $329 m
4-80BL 2m 4/80w amp 119 w
KENWOOD
R-599 Ham Rcvr $199 v
R-599D Ham Rcvr 249 m
T-599D Transmitter 299 m
DS-900 DC supply 69 f
VFO-120 Remote VFO 119 f
TS-520 Xcvr 449 me
VFO-520 Remote VFO 99 ce
DG-5 Digital display 129 e
TS-820S Digital Xcvr 599 mf
TS-820S/CW filter 629 c
R-300 SW Rcvr 169 wfc
R-1000 SW Rcvr 299 c
R-820 Ham Rcvr 699 v
MC-50 Desk mic 29 e
TS-700A 2m Xcvr 399 mv
TR-7400A 2m FM Xcvr 229 f
TR-7400A/CES scanner 249 m
TR-7625/TTP mic 2m 269 c
RM-76 Microprocessor 59 c
TR-2200A 2m FM port 119 mw
TR-2400 2m FM HT 239 m
TR-8300 440 FM Xcvr 189 v
MC-45 TTP mic 29 m
KPS-12 Power supply 69 m
MFJ
752 Dual filter $ 59 w
496/53 board/AC ps 259 v
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MICROLOG - cont.
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AVR-2 Demodulator 429 m
AVR-2 Demod/split screen 499 m
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PSU-5 Supply 129 mw
Astro 102BX Xcvr 599 m
PSU-6 AC supply 139 mf
PSU-6A AC supply 139 m
270 Cygnet Xcvr 269 f
300B Cygnet Xcvr 299 m
350 Xcvr 189 mv
350C Xcvr 269 m
500C Xcvr 269 w
500CX Xcvr 299 m
HF-700S Xcvr 329 mtc
750CW Xcvr 399 m
117XC AC ps/spkr 99 mv
230XC 110/220 ps 95 m
PSU-3A AC ps 119 tc
14-117 DC supply 89 f
14X DC module 49 m
14C DC module 49 m
512 DC supply 39 f
410 VFO 69 c
410C VFO 89 c
600T Transmitter 249 f
VX-1 VOX 19 m
250 6m Xcvr 169 m
250C 6m Xcvr 239 m
Mark 6B 6m linear 575 m
ST-2 Ant tuner 139 m
TPL
1202 2m 10/100w amp $ 89 m
TEMPO
2020 Xcvr $469 m
Tempo One Xcvr 289 v
AC One AC supply 89 v
S-I 2m FM HT 149 me
S-II 2m FM HT/TTP 179 w
TEN-TEC
200 Novice VFO $ 49 m
505 Argonaut Xcvr 189 mv
509 Argonaut Xcvr 269 c
515 Argonaut Xcvr 299 v
206A Calibrator 25 v
208 Ext CW filter 19 m
208A Ext CW filter 39 v
210 Power supply 19 f
570 Century/21 Xcvr 239 mc
276 Calibrator 19 c
277 Ant tuner 59 m
540 Xcvr 369 fe
540 w/CW filt/NB 399 m
544 w/CW filt/NB 469 f
262G PS/VOX/spkr 99 mwfe
262M AC supply 99 fe
240 160m conv 79 m
241 Xtal osc 19 m
247 Ant tuner 49 w
TEN-TEC - cont.
Omni-A convert series B 569 v
Omni-D series B Xcvr 689 f
Omni-D series C Xcvr 799 mc
580 Delta Xcvr 589 m
252M/O AC supply 99 mtv
255 Deluxe AC ps 139 m
234 Speech processor 99 m
214 Electret mic 25 m
243 Remote VFO 99 v
215PC Microphone 19 m
KR-1A Dual paddle 15 m
KR-50 Keyer 69 m
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FT-101B Xcvr 469 me
FT-101E Xcvr 569 mve
FT-101E w/CW filter 599 m
FT-101EE Xcvr 539 c
FT-101EX Xcvr 469 wf
FT-101EX w/CW filter 499 m
SP-101 Speaker 19 e
FT-101ZD Dig Xcvr 599 w
FT-301S 20w Xcvr 299 w
FT-301 Xcvr 369 w
FP-301 AC supply 99 m
FP-301D Deluxe AC ps 129 w
FT-7 20w Xcvr 299 cv
FT-901DM Xcvr 769 mv
FT-901DE Xcvr 629 f
FV-901DM Remote VFO 269 v
YR-901 RTTY/CW read 399 m
FC-902 Ant tuner 139 f
FV-107 Remote VFO 89 ve
FP-707 Power supply 109 e
FRB-707 Relay box 19 v
FRG-7 SW Rcvr 189 fc
Sears FRG-7 Rcvr 169 m
FRG-7000 SW Rcvr 329 w
FRG-7700/MU-7700 439 m
FTV-250 2m Xvtr 169 f
FT-625RD 6m Xcvr 469 m
FT-221 2m Xcvr 329 mwc
FT-720RVH 2m FM Xcvr 269 m
CPU-2500R 2m FM Xcvr 249 c
FT-207R 2m FM HT 179 mwe
NC-1 Desk charger 19 m
NC-2 Quick desk cgr 49 v

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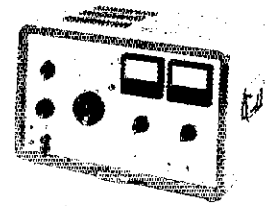

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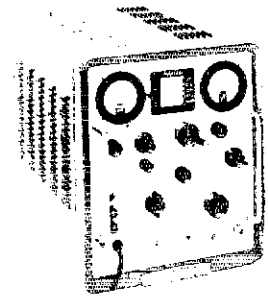

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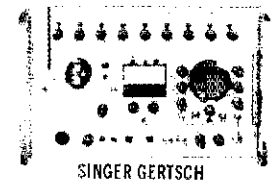

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(1) This list was prepared from an inventory taken on the date shown. The letters after the prices indicate in which store the equipment was located at that time. The quantities vary. In some cases there are several of an item; others, only one. Due to the lead and distribution time of this publication, some of the items may have already been sold by the time you see this ad. However, due to the number of trades we are involved in each day, some items are in stock that are not listed. (2) We reserve the right to sell certain power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) Sometimes used gear is serviced after we receive your order. Please allow for a few days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment special, Closeouts, etc.

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c = Clearwater, FL 33515; 1898 Drew Street	(813) 461-4267		
v = Las Vegas, NV 89106; 1072 N. Rancho Drive	(702) 647-3114	1-800-634-6227	
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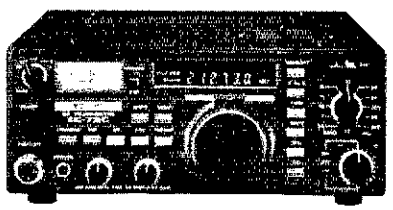

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HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: W2IT KB2TM. Here they are! ENY point scores for PD5: Orange 23,218; Saratoga/Warren/Washington 21,489; Sullivan 19,618; Rensselaer 19,188; Ulster 18,117; Dutchess 16,192; Putnam 15,543; Schenectady 13,950; Rockland 12,123; Westchester 11,622; Columbia/Greene 290; Albany 70. Those at the bottom were so low because mailings of messages were never received from the ECs. Congratulations to the groups in WNY for a very fine job, this being their first PD. Special credit goes to Orange and WB2SON for being first in the PD! WB2EAG reports new NYS cw net at 10 A.M. local on Mondays through Saturdays on 7.077 MHz. It covers all of state. Join in if you are available any morning. AARA reports good auction on Friday, 13 Nov. AARA also reports WA2UYY upgraded to Adv. and W2UU WB2CQK N2AVY and XYL on way to Fla. in sailboat. Rip Van Winkle ARC reports new officers: WB2UEB, pres.; WB2LKZ, v.p.; W2FSL, treas.; WA2GVC, sec. KA2KVZ and KA2AHW did demo of ham radio at Red Hook JHS. KA2KVZ reports new tri-bander. See all you ECs and staff at staff meeting. PSHR: WB2MCO WB2EAG W2YJR KA2KVZ W2BIW N2BDW KB2KW K2ZVI. BPL: WA2SPL KA2KVZ. Traffic: WA2SPL 801, KA2KVZ 504, WB3EAG 443, WB2HDU 255, WB2MCO 179, KB2KW 100, W2EFU 99, W2BIW 85, W2YJR 75, N2BDW 74, K2MI 69, WB2VVS 56, WB2ELA 46. K2ZVI 39, AA2Y 35. WB2SON 19, W2IQK 17. N2CSX 15, N2CPX 14, K2HNW 12. (Sept.) W2NRD 108, W2IQK 80.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY.

NLI CW	3630 kHz	1900/2200	K2GCE
NLIPN	3928 kHz	1815	WA2SEL
NLS	3710 kHz	1930	WB2EUF
NCVHF	146.04/64	2100 M W Sn	WA2SOE
BAVHF	147.915/315	2030 M-F	N2BMF
SCVHF	144.77/5.37	2030 M-F	WA2ARC
LIMARC	146.25/85	2045 F	WA2SOE
ESS	3590 kHz	1800	W2WSS

Note: All times are local; please try and help out by checking in whenever you can. Well here it is, 1982, your list of New Years resolutions should include: checking into a traffic net, joining your local ARES, volunteering to help out to provide communications as a public service for an event, making sure that you get your reservation in early for the Hudson Division convention being held Oct 29-31 at the Playboy Club at Great Gorge, NJ. Under "end of an era" dept., WA2UWA is now AH2M. Paul held his old call for about 20 yrs and, "uniquely, warm, adorable" was heard on all bands. Suffolk County ARC had W2IHA as a guest speaker at their Oct meeting. The Wantagh ARC net W2VA is on the air again at 2030 local, Thurs., 28.720 MHz. W2XS reports that he has worked 75 countries on cw, from his car while driving to and from work. That's something to think of next time you're stopped on the L.I.E. LIMARC started their technical network on Nov 11. The net meets on the second Wed. of the month at 2030 local. The output freq is 147.375 MHz, telephone call-in with questions will be handled by W2NL. His call-in number for patch directly to the net is 516-541-2450. Additional info can be obtained from W2KPO. WA2PMW now has 35 states worked on 2M ssb. WA2UWF is now EC for Brookhaven and N2AYB is EC for Islip. KA2KGH now KR2B. New Novices, thanks to the teaching efforts of KE2N, are KA2MHV KA2MHX KA2MJH. Section net certificates for BAVTN awarded to N2BQD, WB2DWP N2BSS WA2JJL. KA2KVP upgraded to General; KA2LHN upgraded to Tech. KB2EN KF2F both have Kenwood TR-7850. Radio Central had their Columbus Day show at Smithaven mall. N7CRS and KC7AC, formerly WA2TFI and WB2YOY, regards from Ariz. Traffic: W2GKZ 96, WB2KCT 95, N2AKZ 73, K2GCE 73, WA2ARC 71, WB2BNY 32. N2BSS 32, K2IZ 28, W2XS 24, WA2PMW 20, WA2SEL 13, KR2B 11, WB2JAY 6, K2HD 5. (Sept.) WA2ARC 63.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC N2BOP W2PSU KA2GQQ KA2HNQ N2XJ WB2IQJ N2BNB.

Net	Freq.	Time	Sess.	QNI	QSP
NJPN	3950	6 P.M. Dy 9 A.M. Su	42	588	305
NJN/E	3695	7 P.M. Dy	32	382	147
NJN/L	3695	10 P.M. Dy	32	291	166
NJSN	3735	6:30 P.M. Dy			
OBTTN	72/12	8 P.M. Dy	36	521	143
UCETN	085/885	7:30 P.M. Dy	37	404	90
NJVN	49/49	10:30 P.M. Dy	30	331	149
NWNJVN	90/30	8:30 P.M. Dy	8	74	44
NJRTTY	147.51	Autostart			

OBTTN net certificates issued KC2FB WA2HPD KA2IRQ and WB2PKG. N2BNB has new Tri-bander. W2RQ has stacked beams for 20, 15 and 10 (WOW!) KB2HM is new District Emergency Coordinator for Middlesex. Are you a member of the Amateur Radio Emergency Service? If not, sign up and also support your local and state net. Be trained when your help is needed. Congratulations to WB2KLF and KA2KYM (Geri is 13 years old!) on upgrading to Extra. WB2WLW and WB2YGT upgraded to Advanced and WA2YMK to General. KB2WI (now in warm and sunny Arizona) joined former SCMs W2ZI W2IIN and W2NKD at SOWP luncheon. N2SU reports Clifton Radio Club meets second Monday at 8 P.M. in School 3. The Cherryville Repeater Association has scheduled the next Flemington Hamfest for April 3. KB2HZ has started a DX information net on 147.375 at 7:30 P.M. each Wednesday. Official station appointments are available. Appointees should check your certificates to see if it needs endorsement. Remember to send reports and other information for this column to W5DTR/2, RD 3, Box 175, Califon NJ 07830 (201-832-2821) until KB2WI returns. Traffic: AG2R 216, KB2HM 207, N2XJ 175, W2XD 171, K2VX 156, N2BNB 138, WA7DPK 109, WB2KLF 88, N2BOP 74, KA2JMH 73, KA2GMH 62, W2RQ 62, KA2IRQ 50, KA2GSX 36, W5DTR 35, W2CC 29, WA8ZNH 19, W2NKD 12, N2SU 10, KA5DLV 10, KO2A 9, KP6BC 1. (Sept.) W2RQ 58, N2SU 15.

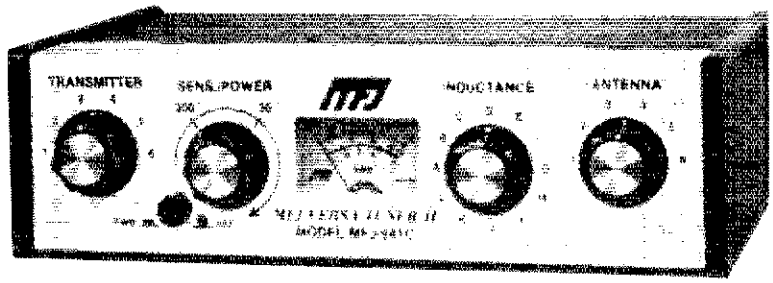
MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WAØAUX WBØAVW WDØHND WØYLS. New DEC District I, KBØZP. OO NØCXX now KCØJB. Congratulations to the DSM club for ARRL Satellite Fund $500 from hamfest receipts. NØBHA has DXCC/CW. After 14 years AIØK has qualified for WAS, on 75M. KFØF did return from Norway. KAØCLQ now KNØO. WDØBFV KAØKMF KAØKMG Techs. KAØIVZ now Extra. WBØQCD

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

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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.

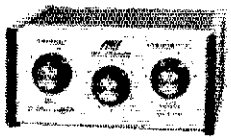
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

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 airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+ $4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel. 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$229.95 (+ $10)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V

MFJ-989

$329.95 (+ $10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf 6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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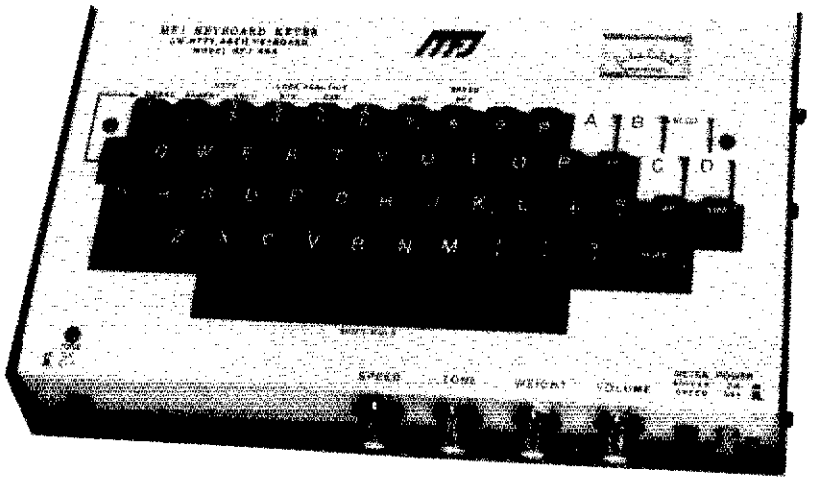
MFJ Super Keyboards



5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, +300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1¼"H (front) x3½"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+$3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+$3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+$3).

110 VAC ADAPTER. $7.95 (+$3).

BENCHER IAMBIC PADDLE. $42.95 (+$4).

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new publisher of A5 Mag. Remember Davenport Hamfest in Feb. CVARC participated with Sheriff in search and rescue. Advance convention 1982 registration available soon. KAØJQG WBØQAM made PSHR this month. New officers in Davenport WBØUZT WAØNDD WAØOEW WDØAMA. WØMME/R will have autopatch in Mt. Pleasant. KCØFH/R new 450 MHz repeater in Newton. District I aided the YMCA with annual Triathalon. DSM and CVARC have new Novice classes. ICN doing great job with new traffic handlers. Still have open EC spots, let me know. Have a "ham" for dinner during holidays. Send reports and newsletters to me, please!!! It has been a good traffic month due to SET, send some traffic.

Net	Freq.	UTC	Days	QNI	QTC	Sess.
75 M Phone	3970	(1830-2330)	M-S	1911	112	55
TLCN	3560	(0030-0400)	Dy	413	201	62
ICN	3713	(0100)	TThs	100	26	13

Traffic: WAØAUX 354, KØCY 200, WØSS 189, WBØQAM 179, WØYLS 158, AEØR 149, KAØJQG 146, KAØX 127, KØGP 80, WDØHND 56, WØBW 25, WBØAVW 20, KØEVC 16, WBØUPF 16, WAØNMA 10, KBØBZ 10, KNØO 2.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØFT WØOYH WAØLBB. It is again this month one of sorrow when we have heard of so much that has gone wrong the past month — Silent Keys: KØRSD WDØGWT and XYL of WØFT. On top of all this, WBØTOM fell off his tower and is in a Wichita hospital in not-too-good condition. Our sympathy is with the families of each. Kansas Nebr RC elected new officers for 1982 — WBØYGT, pres.; WBØSVM, v.p.; WDØCJV, sec.; WØWXY, treas.; WØTQ, hamfest chmn. KWN QNI 1041, QTC 618. CSTN QNI 1417, QTC 162. KPN QNI 503, QTC 270. KSBN QNI 1689, QTC 646. Ks SEC reporting 900 registered ARES members and 10 EC reporting the past month. Hiawatha ARC assisted again in the Halloween parade for the 14th year. OKS-SS now operating a Monday sked 3735 kHz at 7:30 P.M.; each and everyone invited to QNI. Oct report QNI 20 and 3 QTC, doubled the Sept report. Let's all help NØBDG get the net going with your QNI and with those you inform and get to QNI also. A very good SET exercise was held this year. Next one will see some changes I am sure. A surprise or two will be built in. Congratulations to our new net manager of the phone nets, KAØCUF. Bill will be in full swing by the time you read this. WØOYH had to throw in the towel for a while as his business grows. We'll all miss Orlan, 'Ole Faithful'. Traffic: WØOYH 487, KØBXF 232, WØKL 204, WØQMT 161, WØFIR 126, WØNYG 118, WBØZEN 103, WØHI 102, WØAM 75, WAØLBB 70, NØBDG 62, WBØYLP 58, KAØCUF 57, WØCHJ 54, WØASY 30, WØFT 26, WØRBO 26, WØPB 19, ACØE 16, WØMI 9, WØOAG 8, KØFPC 5, WØOUU 4, WØRT 3.

MISSOURI: SCM, L. G. Wilson, KØRWL — ASCM: WØOTF. SEC: NØAJI. STM: KMØL. The Heart of America Radio turned out in force for the Macy's Marathon. They provided emergency communications for the 26-mile race. New officers for the Southwest Missouri Ham Radio Club are: KAØGYE, pres.; KFØV, v.p.; KIØL, treas. New officers for the Callaway Amateur Radio League are: KJØU, pres.; KCØFD, v.p.; WBØWLX, secy/treas.

Net	QNI	QTC
MEOW	457	68
HBN	425	36
ACE	42	7
NEMOE	109	23
CMEN	113	0
MOSSBN	767	117

KBØLN and NØBNM speedy recovery from recent illnesses. Congratulations to WBØSYA and XYL WDØCGJ, on their new YL harmonic. This makes KMØL an uncle. Information was relayed back and forth via a 40 and 20 meter "Stork Net." KØRWL is sporting a new 18 HT Hy-Tower. Traffic: WØBMA 954, KCØAS 473, KØSI 152, WØOTF 143, KØBM 124, KIØK 110, KØPCK 94, WØOUD 79, KCØCL 33, KGØL 25, KMØL 10, KØRWL 8.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: NØAIH. STM: WDØBQG. Our sympathy to family and friends of KØMUF. Glad to see the good turnout from NE at Salina. Proud to have RC van and trailer there from Omaha. RC centennial traffic was from the following ECs: KØFJT KØJBL AJØA WDØBQM WBØPPF WAØQQX WØEXK representing 13 counties. Congrats for upgrading: Adv — KØJFO WBØHWR; Tech — KAØLDK KAØLDM. Officers elected for Pioneer ARC (Fremont): KCØDA, pres.; KAØAEW, v.p.; KØSW, sec/treas. WØRN was presented LIFETIME MEMBERSHIP in the Pioneer ARC for services beyond the call of duty. ECs reporting for Sept were WBØPPF KCØR AJØA KØGND KØJNB WBØBOK WDØBQM. Happy New Year to U all!!

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — STM: K1EIR. SEC: W1SY.

Net	Freq.	EST	QTC	QNI	NM
CN	3640	1900/2200	330	416	K1EIR
CPN	915/315	1800/1900 Su	84	253	WB2PJU
NVTN	28/88	2130			WA1ELA
RTN	13/73	2100			WB1CPF
WCN	78/18	3030	175	469	W1DPR

High QNI: CN-K1UQE WB1EKV WB1ESJ K1EIR WB2PJU; CPN- KA1KD K1EUW K1AQE. Upgrading: General -KA1BED; Adv — KA1AFN KA1EUO N1BFD N1BFS; Extra — K1WGO WB1GCN K1WNT; Tech — KA1GPI KA1GPV. Call changes: KA1KH now KF1J; KA1FKJ now N1BRV; KA1CAK now N1BST. AREA club provided communications for the Waterbury 6-mile run for the Am. Cancer Society. Congratulations to Fairfield ARA on their sixth anniversary. W1CUH has new tower and is looking for DX. Danbury area DXers are using 147.300 simplex for passing tips. KA1ENI is the new editor of CARA's Capers. The Amateur Radio Apple Bulletin Board System is now on line courtesy of K1VYQ. For the latest DX info, OSCAR coordinates, accurate time or gear trading call (203) 438-3117, after 1800 local and weekends. A BIG TNX are in order to all who participated in the SET. K1SYI has a swappers net on K1MUJ/R Wed. at 2000 EST. All clubs are encouraged to send a copy of their club newsletter to the SCM. In this way you can share info, with others in the section. FARA's club station in Fairfield's Town Hall is now on the air. Tri-City ARC is busy converting CBs to 10 meters. Meriden ARC members get it together on 147.48 simplex every Thur at 1900 (L). With the winter season upon us, hams should be busy preparing their mobiles and homes for any emergency. Remember, he who fails to prepare, prepares to fail. Traffic: W1EFW 357, WB1CRH 221, WB2PJU 218, WB1GXZ 211, K1GF 188, N1BFD 145, WB1EKV 126, K1EUW 97, WB1ESJ 95, K1AQE 80, W1XX 80, WA1LOU 67, KA1BHT 51, K1UQE 58, K1XA 49, KA1KD 30, W1DPR 21, W1HUE 10, W1CUH 4, W1ICF 3.

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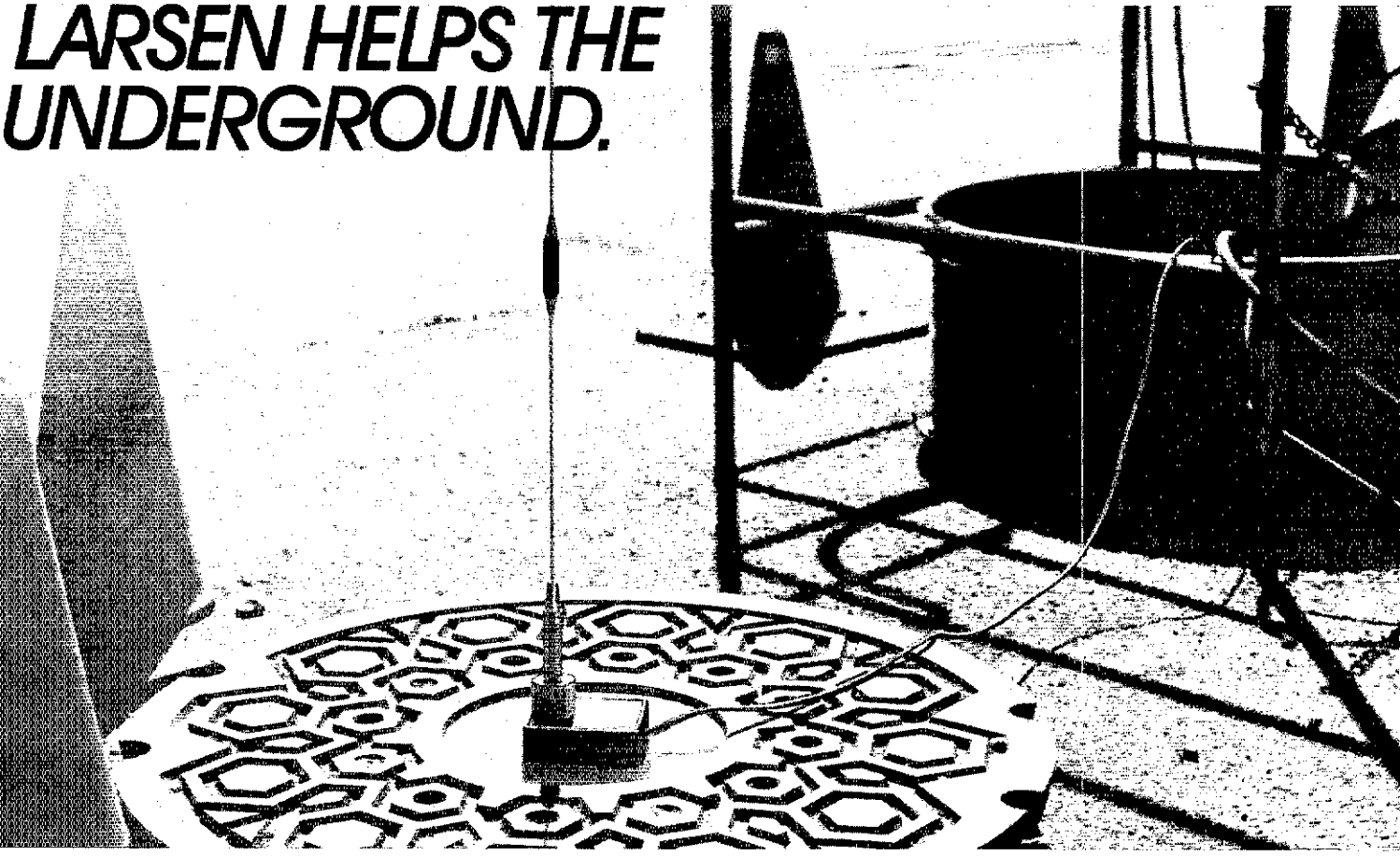

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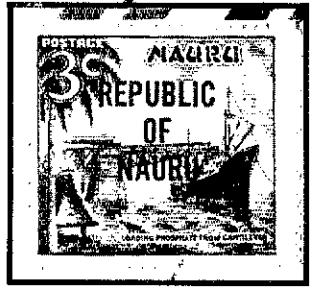

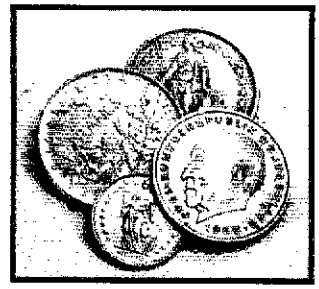

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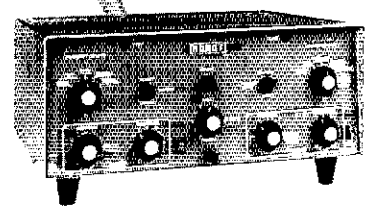

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EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr	Freq	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	411	363
EMRIPN	KA1BJY	3.898	1730/Dy	413	288
EM2MN	KA1CGP	90/30	2000/MWF	303	138
NEEPN	K1BZD	3.945	0830/Sn	66	44
HHTN	K1BSO	04/64	2230/Dy	592	310
EMRISS	N1BHH	3.715	2030/Dy	169	83
NENN	WB1GQO	3.720	1815/Dy	361	106
MFARAD	WA1DWS	3.924	1300/M-Sa	179	62

Two successful League Officials meetings were held recently with many East Mass Hams participating. Pres Dannals and Director Sullivan were in attendance and participated in vigorous discussions on: reorganization of the League Comm Dept, a stronger club affiliated program, NTS, ARES club insurance and more. It was good chance to see friends and talk about ham radio and its future. Whitman club newsletter tells the interesting tale of KA1DYG who has been in the Lakeville hosp for ten years. He just got licensed. Quannapowitt club had talk on lightning and how to protect your equipment from it. The Wellesley club is planning a tour of the ch-5 TV studio in Needham. W1QGN became a Silent Key. Algonquin club is limiting the business portion of its meetings to 1 hour to leave more time for lighter subjects. The Framingham club makes the business part small so as to maximize the beer and pizza part. Yankee Clipper Contest Club member K1DG has been denied a variance to put up two 90 foot towers but he's not quitting. Massasoit club members participated in March of Dimes "Superwalk". Norwood club had K1MEM give talk on Desecheo DXpedition. Greater Lawrence club is taking advantage of group bulk mailing of their outgoing QSLs through the League. The Federation for Amateur Radio in Washington DC has awarded WA1WFA a $500 scholarship. W1LE, DEC New Bedford, just out of hospital. Bellingham ARES provided communications for parade. WB7TPY willing to give talk on Red Cross Disaster Services to local clubs. W1HL now using tower that he had so much trouble getting up in Andover. KA1GEK coming on strong as a traffic handler on NENN. Traffic: WA1TBY 699, N1BHH 638, K1BZD 548, KA1BJY 173, KA1ON 158, K1BSO 118, WB1GQO 101, K1GN 101, KA1MI 82, WA1DXT 72, KA1EMQ 64, W1CE 59, K9HI 56, W8TM 54, W1ATX 49, WB7TPY 39, WA1FNM 31, WA1OEZ 24, N1AJJ 21, W1HL 17, WD9ERI 14, K1LCQ 6, KA1R 4, WA1YHV 2, KE1U 1.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. It is with sadness that we report that W1BJ became a Silent Key Nov 10. A former Pan American Airways cw traffic handler, he brought enthusiasm and expertise into carrying out his STM responsibilities. The shock is aggrandised by the fact he was active on the recent SET and was handling traffic on Nov. 9. He will be missed. Need more public service reports from the clubs. Net sessions/QNI/QTC: PTN 34/280/197; SPSN 13/147/17; AEN 7/101/47; HCEPN 2/2/0. PSHR: AK1W W1RWG WA1YNZ K1NAN. Traffic: AK1W 265, W1KX 164, WB1BYR 112, W1RWG 104, WA1YNZ 97, K1NAN 80, KL7IJG/1 79, W1BMX 79, N1BUN 74, W1GKJ 62, N5YX/1 54, W1JTH 46, W1ISO 42, W1AHM 40, KA1AVU 35, W1WCI 34, N1BJW 20, KA1TJ 18, KA1BZV 17, WA1ZJL 16, KA1EIW 13, KA1GNO 11, N1BCE 10, K1NIT 8, KA1CNG 5, KA1AIF.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH/W1SWX — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM W1VTP. Welcome to new hams: KA1s HPA HPC HPE HUW. It is sad to report W1ELH and W1MKA Silent Keys. New OBS KA1BBI. The GSPN get together at Concord was excellent turnout. The New England Novice Net meets on 3720 kHz at 6:15 P.M. loca. Join the other 15 NH stations that checkin. The NHARA meeting had 9 clubs represented plus MARS. From all reports the SET was better than ever. KA1FMQ now General. K1NOR has motorcycle. KA1JA active again after busy work schedule. I'd like to wish everyone a Happy New Year! Traffic: N1NH 245, KA1CXP 236, KA1BBI 227, W1TN 216, W1GUX 204, K1OSM 147, KB1A 114, K1ALM 96, KA1FWQ 94, KA1BJ 90, W1VTP 80, W1MHX 69, AK1E 63, W1ALE 50, KA1FMU 44, KA1CJI 42, KA1HUW 18, WA1PEL 13, N1BOF 13, W1NH 12.

RHODE ISLAND: SCM, Gordon Fox, W1YNE — SEC: KA1EHR. STM: KA1FE. NM WA1OSL reports RIEM2MTN sessions 24, QNI 200, QTC 24. Endorsements W1EOF ORS. KA1EAL now KF1L has gone to Binghamton for advanced studies. Div Director W1HHR called an LO meeting in Newport this month. Present was W2HD. The all-day meeting was well attended by members from RI, CT, and EMa. DSARG (10/70) provided communications for the Old Stone Bank Road Race. RI was well represented in SET and SEC. KA1EHR tried out the new ARES structure. First indications were very positive. Traffic: W1EOF 545, KA1FE 101, KA1BTU 63, KA1EHR 53, W1YNE 48, N1BEE 21, WA1CSO 18, WA1ESY 17, KF1L 16, AE1S 10, N1RI 9.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Gone or about to go south for the winter: W1KJG W1CBW W1GZH. With regret we report K1SLU, W1QVS and W1FRT as Silent Keys. N1ARI went to Boston and came back with an Extra Class license, having just recently upgraded to Adv. Net activity has been on the increase. I may be found on the GMN or VTN daily; this is for those who say they never hear me on! KA1POE upgrade to Gen. GMN/27/552/48; VSSB 31/541/78; Carrier 27/481/33; VPN 4/66/5; VTN not rcvd. Sometime ago I mentioned getting ideas or suggestions re tieing 2-mtr rptrs in VT together as to times & dates for ttc. To date — no comments! Traffic: N1ARI 120, K1BQB 111, W1RNA 41, AE1T 17, W1KJG 16.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. SEC: W1JP. STM: W1TM. NMs: W1UD WA1ITL W1UPH. KA1T doing yeoman duty NTS, filling in for vacationing W1TM, and WB1DBN likewise in ARES for WB1HIH. Orchids to WA1OPN on her special award/Intl. Yr. of Diabled Persons. Kudos also K1JVM for developing computer-based programs to help autistic children. Looks like our present SEC/next SCM will QNI W1JP/MM as soon as he and XYL WB1ABF conjure up an antenna on their 32 ft "Determined" to make it into WMA. EC W1DOY doing outstanding PR at Boy Scout Camporee/SET, and at Interfaith 10 mi. walk making use of W1UD/R autopatch. Traffic: WB1HIH 305, W1YI 284, W1UD 170, WA1ITL 149, KA1T 93, WB1CGK 91, K1JHC 74, W1KK 67, W1JP 41, KA1NE 31, WA1OPN 26, K1IJV 21, KA1LI 13, W1ZPB 12, WB1DBN 11, W1UPH 11, WB1HKN 4, W1TM 2.

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ALASKA: SCM, Fred Wegmer, KL7HFM — ASCMs:

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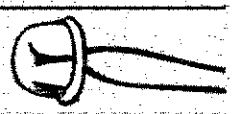

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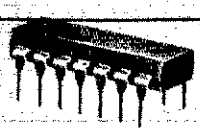

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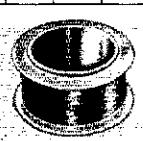
Ⓑ	20	60	278-1304
Ⓐ	22	90	278-1306
Ⓑ	22	75	278-1307



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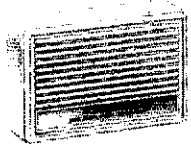

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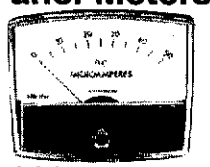

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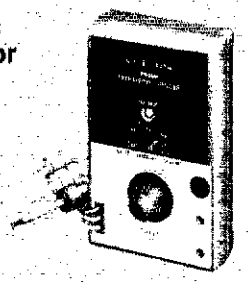

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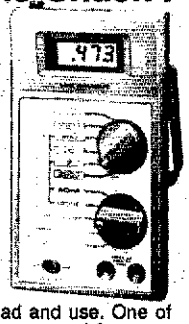

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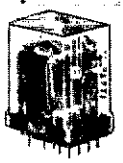

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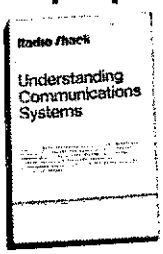

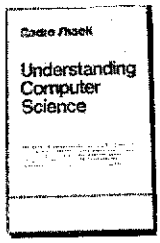

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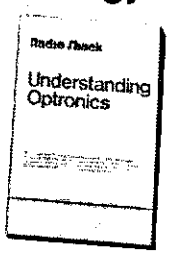

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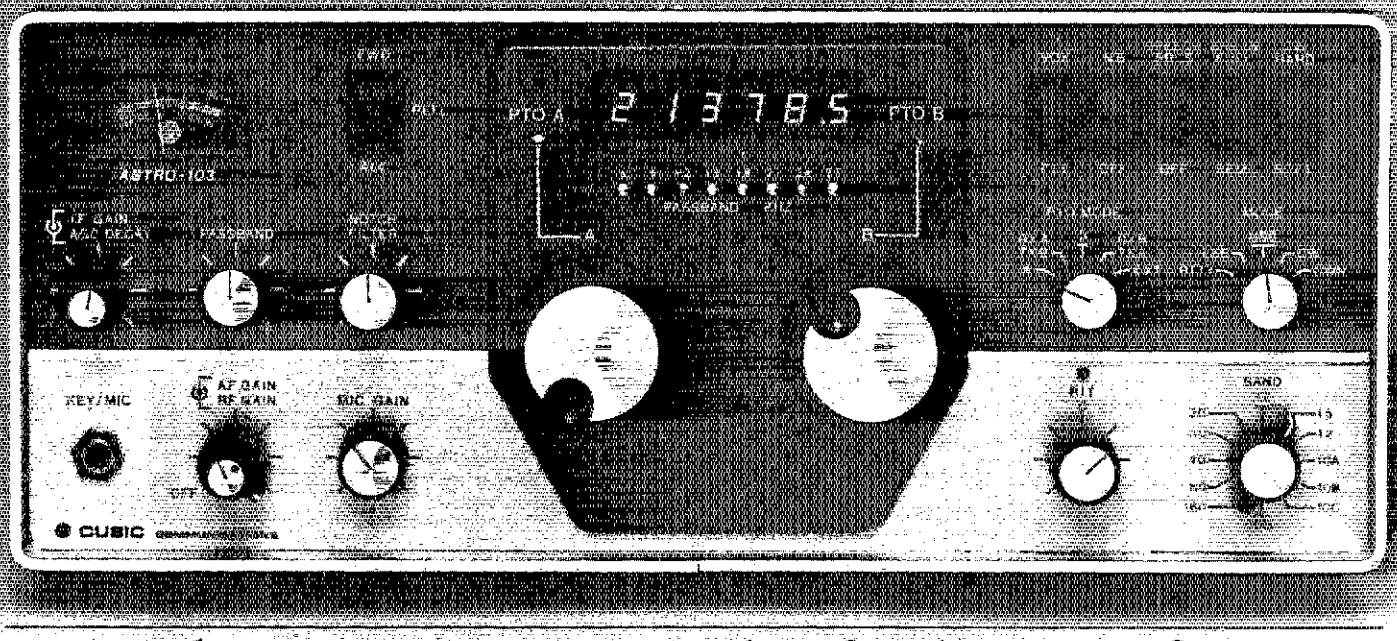

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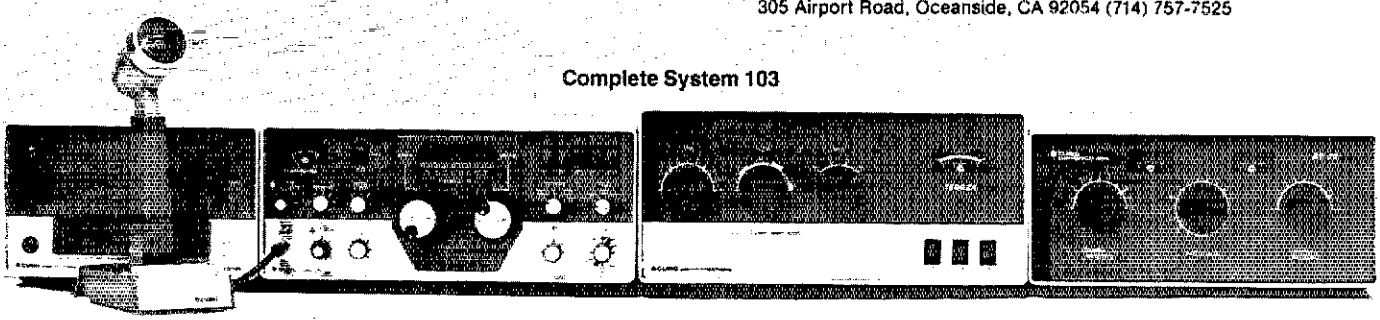

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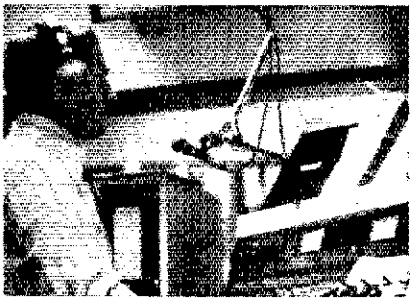

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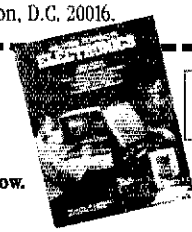

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AL7AC KL7IBG. STM: AL7O. SEC: AL7CM, AL7AW, EC Anch, reports that the SET went very well, state and CD officials were well pleased with the results. Gov. Hammaond extended a warm thanks to all who participated. KL7HEI, NM APN, requests that all who desire Saturday traffic to please listen a little more. 14,292 is becoming cluttered with too much calling and not enough listening. Congrats to KL7GLU upon being elected pres. of PARKAS, and KL7BJD as v.p. Congrats, to the Sitka Amateur Radio Club upon becoming affiliated. KL7BCS is pres. One of the "Big City" problems that Anchorage hams will have to face is the new CATV spectrum. Chief engineer of the local CATV company spoke at the Anch ARC meeting and promised all possible help. GREAT!! Now let's all help him and maybe we can prevent mutual RFI.

IDAHO: SCM, Lem Allen, W7JMH — Voice of Idaho ARC has 147.84/.24 rptr on Cinnabar linked with 146.02/.62 machine on Snow Bank. Is now possible to QSO from Burley to Whitebird. Payette club has new solid state rptr, and is donating their old machine to the Elmore Co. club to be put on 146.01/.61 at Mt. Home. KA7FAH has 3-band yagi.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935	7 P.M. Dy	31	1343	24
CD	3990	8:10 A.M. M-F	22	610	21
IMN	3635	8 P.M. M-F	30	235	158
Elmore Co.	146.52	7 P.M. W	4	36	0

Welcome to KNØI and NØCTX, in Idaho Falls, from MO. Thanks to everyone who worked the SET exercises. Several trouble areas were spotted and are being improved. Traffic: W7GHT 490, AC7P 79, W7JMH 34, N7AYL 4, WB7QYU 2.

MONTANA: SCM, Les Belyea, N7AIK — ASCM: KØPP. SEC: W7LR. STM: WB7DZX. We are looking for the 1982 HAM OF THR YEAR, request clubs or individuals submit your candidates' resumes to the SCM by June 15th, 1982. Upgrades reported: KA7FVP to Tech, KA7DSH KA7GXF to Adv. New ham in Glendive is KA7LQM, XYL of WB7QZD. Congrats. A mobile communications van equipped by the Beartooth ARC (BARK) is ready to provide an emergency radio link for Carbon County. New editor for the Butte ARC is WA7FOB. His very first issue had nine pages. Yellowstone ARC (Billings) had their annual dinner party on Dec 5th. The SCM was the guest speaker and a better than ever slide show was featured. W7OIG and WB7UTJ of Sidney spent some time in the hospital, but all is well. WB7OYP is a certified HPI, very FB. The 146.10/70 repeater in Havre, K7NM/R, has RTTY and SSTV. IMN QNI 235 QTC 158, BSN QNI 278 QTC 39, MTN QNI 965 QTC 76. Traffic: WB7DZX 249, W7TGU 153, N7AIK 94, W7IXD 67, W7NEG 4.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE.

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	0145Z Dy	3908	840	39	W7FQ
OSN	0230/0600 Dy	3587	365	353	KA7ELI
OARES	0115Z Dy	3993.5	494	120	W7HLF
OARES	0230Z Dy	3993.5	98	6	W7HLF
WCN	0300Z Dy	3702	362	156	K7ZIG
PTTN	0300Z Dy	147.78	387	14	W7LRB
MPARES	0300Z T Th	147.02	202	3	WA7ZAF
SOARES	0330Z M Th S	146.94	321	145	KA7DBS

Upgrades: Extra — KA7FAO KA7IHM KB7MO; Gen. — KA7CZN N7CTY; Tech — KA7JFQ KA7ILE KA7IJY; Novice — KA7LLS KA7LKA. WA7TEG was operating NN3SI at Smithsonian Inst. in Oct. W7CPV/W7CMR celebrated their 50th wedding anniversary with vows of 50 more, 25 at a time. KA7FAO spent two years going tron Nov-Tech-Gen-Adv-Extra without ever plugging a mike into his Kenwood; that's dedication. K-Bar-A in K. Falls held Halloween Patrol for public service. OTVARC beating bushes for new v.p. They have trouble keeping one. The club is up to 155 members now. Need OBS and OO stations in section. If interested contact SCM. Traffic: W7VSE 389, WA7LGN 170, W7LNE 158, K7NTS 143, WB7OEX 135, W7ZB 129, KA7ELI 110, WA7IHS 103, KA7DBS 80, KI7Y 68, N7BGY 59, W7QMU 37, K7VM 10, W7LT 9, W7TC 9, WB7DSK 5. (Sept.) WB7OEX 144, K7WWR 18, W7DAN 16, WB7TAZ 4.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Time (Z)	Freq.	QNI	QTC	Mgr
NTN	1930	3970	1075	61	W7VL
WARTS	0100	3970	3124	223	W7EQY
NWSSBN	0230	3945	612	33	W7ZPK
WSN	0245/0545	3590	740	313	W7GB
EWTN	0130/0530	146.64	77	84	WA7CBN
IETN	0130/0300	147.30	20	6	KA7CSP
PSTS	0130/0630	145.33	135	94	W7IEU
SCSRES	0330/W	147.18	82	4	W7ERH

W7EA narrates slide show at WWDX club of 1980 China trip which led to official trip in 1981 by W7EA KC7CF K7HO K7LAY to the Peoples Republic of China. WA7RVV responds to call on 146.94 and drives 100 mi RT at 10 P.M. to help N7CRJ with flat tire. BRAVO! From IEVHF Rptr News, new 220 rpt w/ap on Mica Pk E. WA, 222.34/223.94. New rptr Spokane area, 449.175 (down 5). WA7WDL discusses plans for NW Div Convn, Northwest 83, Spokane, July 8-9-10 hosted by Spokane AR Council, WA7WDL, pres. WA7YCP replaces W7HCF as tech eng maintaining 3 rptrs for IEVHF Club, helpers WB7CJH WB7AVD. Thanks, N Sea ARC. W7JIH teaches Novice class sponsored by Northwest YMCA. N7CY and XYL, WA7RVA, presented talk on "Using A Computer for Ham Radio." Eleven Cowlitz, Clark and Wahkiakum Co. ARES hams provided communications on Oct 3-4 for 125 searchers in the last extensive search in Cowlitz Co for victims of the May, 1980, Mt. St. Helens eruption. Fifty ARES hams from Pierce, King, Thurston, Mason Cos provided comms for Tour De Forest Road Rally. K7SSC coordntr. Pierce Co. ARES made big hit at Rainier Council BSA Jamboree handling traffic and demonstrations for 3000 Scouts. Radio Club of Tacoma's 10k gen. provided power for rigs and lights for Jamboree. Ten ARES hams assisted Skagit Co. Sheriff on two searches for lost hunters using 145.19 rptr. Congrats to KA7JPK and KA7JHG for upgrade to General. ARES/NWS is going greatly but needs more reporters in E. Wa. at certain locations also alternate stations. Now have 75 reporters. Net time: 10 A.M PST, 3900 kHz. Reports go to forcast office in Seattle. Check in after roll. Ask for WA7RWK W7RGD K7SRU. Evergreen AR Svc. provided comms for bike-a-thon, two cross-country runs and a high school district meet. Congrats to W7DZK and WB7TQF for making BPL. Sorry to report Silent Keys W7MKN W7OAN N7BX (former W7JGI) K7ZVA. Please send club news to SCM WA7RWK for this column. Traffic: W7DZX 749, WB7TQF 670, K7GXZ 190, N7AFZ 154, W7FJZ 144, K7CTP 131, W7IEU 130, N7AFY 119, WA7BDD 116, W7GB 77, W7BUN 38, WA7CFH 28, W7LG 25, W7APS 20, W7JFR 14, WA7RCR 12, W7ERH 10, KA7CSP 7, N7CT 4.

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PACIFIC DIVISION

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. Thanks to outgoing Northwestern Nevada EC KB7MV for a job well done, and we look forward to working with new EC K7WLY. Nevada will not be a rare section on the airways with KA7KNJ KA7BRE KA7BRF in Winnemucca, N6MY in Garderville, and W7QAQ in Reno. It gives us great pleasure to again congratulate N7AKX for BPL. It is his second. Hard work does pay off. Las Vegas club had CPR presentation for November program by W7KHD. Nevada Sagebrush Net weeknights 7:30 P.M. PST, 3905 kHz. NM is W7BS. Happy New Year to all. Please send station reports. Traffic: N7AKX 524, W7BS 129, W7SK 1.

PACIFIC: SCM, Pat Corrigan, KH6DD — Good showing by KH6 in the fall contests. Ex-KH6HDH is now W3HHG and getting up big 4-ele quad. The annual SET was very well conducted by the ECs on Guam, Maui, Kauai and Hawaii. Each EC mustered good ARES participation with imaginative scenarios. Maui EC KH6H also got good media coverage. Our appreciation to N6FEO and W6IPL for helping on PTN during W6RNL's indisposition. PTN is back on 0300 UTC sked on 14110. Others are most welcome. The Pacific section will end up with three ballots for the director election because of endless problems. KH6N will be returning to W6 to take up residence while AH6AC returns here from Guam. Traffic: KH6HIJ 64, KH6H 33, KH6DD 14.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. The second annual North Hills RC's Old Timers Night had a large turnout. N6DRB is the new EC for Sacramento County. Former EC, KA6IUE, has moved from the section. The SET was well attended with local media coverage in Sacramento. The Mount Vaca RC and the Yuba/Sutter ARC provided communications for the annual Heart Cyclethon. Congratulations to KE6HH KA6LIJ and KA6LWR on their Advanced tickets. W6RBT and WA6WAY have been acting as NCSs for the Northern Calif. Net. It took K6ZY two months to completely rebuild a HQ-120. K6GNX, who likes to ski on Donner Lake in the winter, had to get ants. up in a hurry when a snow storm knocked out all phone lines in the North Tahoe area. Traffic: N6AUB 6, W6RSP 3.

SAN FRANCISCO: SCM, Robert Smith, NA6T — STM: K6TP. SEC: KE6CD. October SET a big success with all countries reporting various activities on Oct 17-18. REDXA to have 7J1RL film on OKINO TORI-SHIMA in December. Multi-single effort on CQWW at K6ANP very productive. Congrats to Advanced upgrades: KA6JED WA6MJT; XYL of KA6IBO to Novice. W6RNL has been missed on all the nets. Get well quick. HARC-FWRA and SFRC provided communications for The March of Dimes Bike-A-Thons in their areas. VP2ML gave FB slide talk at Sonoma Co RA Inc. 67 at RACES are in training at SRJC. MARC clubhouse at Hamilton Field shaping up real fast; get on the bandwagon and help. Bothered by CATV? Let your SCM know your problems. Traffic: W6NL 239, W6ITL 205, K6TWJ 88, WB6RTE 20, WA6QXV 7.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Appointments renewed: WA6YAB SEC; N6OZ OBS; W6AJH EC; W6DPD ORS. New officers of the Central Valley RC are W6VMB, pres.; WB6VGZ, 1st v.p.; KA6CZS, 2nd v.p.; N6HB, s/t. W6FTA W6PIX and WA6HIN are Silent Keys. K8ZTT W6DPD W6XP KE6CS KB6DI attended the Northern Cal DX Club. K8ZTT W6DPD KE6CS AF6Y joined W6XP took care of his guests. N6BBO N6DTV N6ETM are Advanced. KA6LGJ KA6QVW are Techs. WA6YAK is NF6K. KA6DKY is N6EWS. N6DTV is KD7GT. KA6DKY is N6FIU. KE6DK has TS-820S. N6UR has Azden PCS-3000. KE6DK has TH6DXX. K6LKJ has TS-830S. KA6ITM has FT207R and Brimstone 144. WA6ZCL has TR 9000. Time is rapidly approaching for the big Fresno Hamfest May 21-23, 1982. Happy New Year to ALL. Traffic: N6AWH 196, WA6YAB 36, KB6CC 22, W6SX 18, W6DPD 16, WD6FRS 6, WA6JDB 6, K9YBM 6.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. The SCV ARES group had a very productive meeting at the Flying Lady II, in Morgan Hill, with 35 in attendance. Plans are to hold such meetings every six months. W6KZJ reports vacation cut into his traffic total. SEC WB6IZF now has home station powered by a solar panel. A large part of the affiliated clubs rpt elections of officers for the new year. West Valley ARA celebrating its 25th anniversary. W6ZRJ gave talks to WVARA, SCCARA and PAARA on emergency communications and NTS. He also is editor of NCN RELAY! The Northern California Net meets at 7 & 8:30 P.M. local time on 3630 kHz and 7:30 P.M. on 144.81/5.41 MHz thru WA6EUZ/R every day of the year. W6ASH and SPECS group very active in emergency communications. N6OM working portable from VP2V and 8P6. New ECs are KJ6N for Palo Alto, W8RPA for Stanford, WA6LIJ for Los Altos and WA6ROM for Mt. View area. New members of FARS are; WB6GFJ, W6FKF KD6VT and KA6PRU. WB6QHF and XYL have new Jr Op, Sarah. KA6RFZ new call in Santa Cruz. WA8HKP and N6DUI moving from S. Cruz to Mt View. WD6GIT and K6AYB busy with OO work. SCVRS welcomed new members N6EEZ N6EJG K6QMD. LERA ARC new members are WBØDAG WD6DRF KE6EZ WA6DFL WB6ADX W6VGP KA6KMG and WA6WPF. From W6TWU license class new tickets to KA6RGE KA6RGF KA6RGG. San Mateo RC had a variety program with W6MKM K6ITL W6KXG giving talks on different subjects. W6PLT spoke on ARES Tone Alert System to the Gabilan ARC. I want to wish every one a Merry Christmas and Happy New Year. I hope the new year brings to each one what they want out of ham radio!! Traffic: W6YBV 243, W6KZJ 81, WB6OTS 61, W6ASH 26, W6RFF 22, W6PRI 17, WB6IZF 2. (Sept.) W6OII 32, W6PRI 4. (Aug.) W6OII 12.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian Black, WD4CNR — STM: NJ4L. SEC: NB4L.

Net	Time	Freq.	Sess.	QTC	QNI	NM
CMN	1245Z	3927	31	376	596	W4EAT
CNN	2300Z	3715	31	67	188	KA4AUR
JFK	2330Z	3923	31	173	1303	WB4WII
THEN	0030Z	3923	31	132	1334	WA4OBR
CN/E	2400Z	3574	31	170	338	AB4S
CN/L	0300Z	3574	31	166	222	AB4S

Many thanks to AB4S for a job well done. Our section will miss his steady hand on the helm. Ed is too good a man to lose completely. Look for him on CN in the evenings. Three more changes in the section: our new SEC NB4L. His work on SET at short notice promises good things for North Carolina's emergency service. W4EAT and WA4OBR take over the CMN and THEN. The good news NJ4L is out of the hospital and back in harness as

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Sensitivity (S/N 10dB):	CW/SSB AM
1.8 to 30MHz	0.5μV 2μV
100 to 1600kHz	2μV 6μV
Selectivity:	6kHz/2.4kHz/0.6kHz/0.3kHz (*Option) * *
Stability:	Within 50Hz/one hour
Power requirements:	AC 100/117/220/240V,50/60Hz, 50VA
Dimensions and Weight:	340mm(W)×140mm(H)×300mm(D); Approx. 7.5kg
Preset memory (Option):	24ch
Frequency stability:	Less than 50Hz per hour after warming up.
Image rejection ratio:	70dB or more
IF rejection ratio:	70dB or more
Input impedance:	50 to 75 ohms, unbalanced
AF outputs;	
Speaker output:	1W or more (4 ohms)
Record/line output:	1mW or more (600 ohms)

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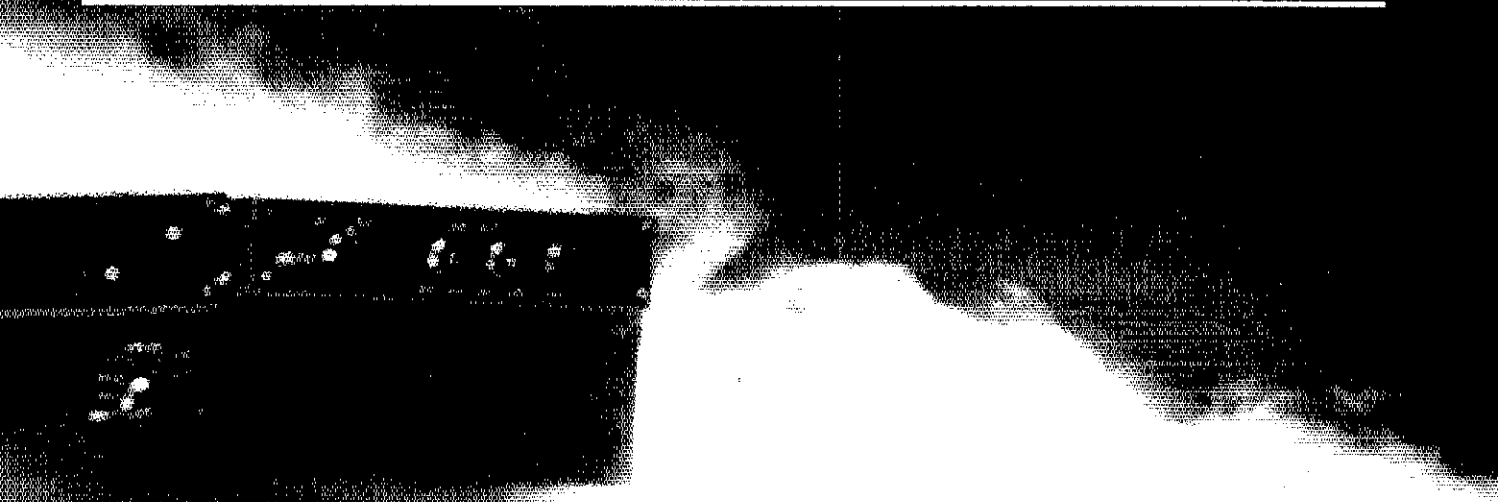

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Equipped with a 4 bit microprocessor and ingeniously designed logic, the IC-720A provides a combination of features found in no other transceiver. It has fingertip pushbutton control of all decision functions while maintaining the feel required of a truly great receiver by providing three tuning rates that give a choice of 100 KHz, 10 KHz or 1 KHz per revolution bandspread. A large tuning knob with adjustable tension and closely spaced RIT and passband tuning controls allow fine tuning of a signal with a minimum of effort.

Human engineering provides such features as illuminated annunciators for transmit, CW Narrow, RIT, tuning speed, and dial lock. Readout of mode in use and VFO along with frequency eliminates unnecessary eye movement. One large multi-function meter shows signal strength, relative power out, SWR, collector voltage, or collector current.

ICOM's dual VFO system is included as standard with the IC-720A and provides easily split frequency operation.

Other features standard with the IC-720A are variable power output, RF speech processor, receiver attenuator, noise blanker, and selectable AGC. All of this in a broadbanded transceiver requiring no tuning of transmitter or receiver.

Use of the IC-720A with the fully broadbanded IC-2KL linear amplifier and IC-AT500 fully automatic antenna tuner provides 500 watts of solid state power output. Controlled from the IC-720A, the linear amplifier and tuner change bands automatically with the transceiver and the tuner automatically adjusts to maximize the power output to the transmission line.

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Enjoy ICOM's new AT500 Antenna Tuner. The perfect companion for the ICOM HF series. Providing 160-10 meter coverage, including the new WARC bands, the IC-AT500 accepts up to 4 antennas and automatically selects the proper one for the band in use.
Silent automatic band switching with the IC-701, IC-720A or IC-730 — the IC-AT500 provides advanced features not found in ordinary antenna tuners. Preset capability allows a "lookahead" tuning to preset each band to a near matched condition without application of RF. This allows the receive function of the transceiver to perform at peak performance without application of RF power (causing RFI).
"Hands off" tuning requires no manual adjustment. Powerful motors quickly drive the capacitors in the "T" network to their optimum value. "Feedthru" control connectors allow channeling of both the IC-2KL linear as well as the AT500 for a complete no tuning 500 watt output system.
The IC-AT500 is designed to match coax fed antennas with 3:1 or less VSWR, allowing your solid state transceiver to run at maximum power into the transmission line.
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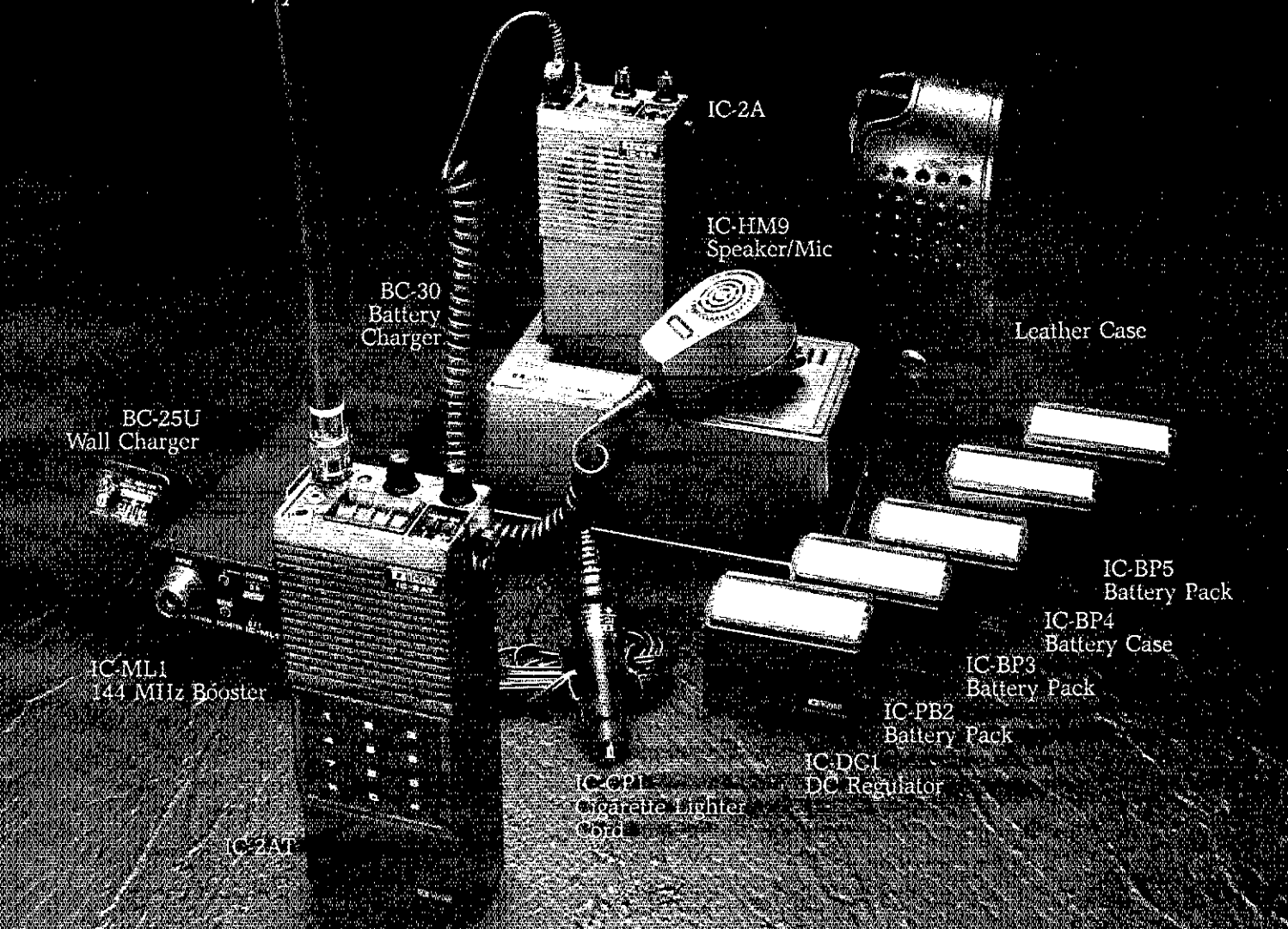
Each IC-2A and IC2AT comes complete with BP3 NiCd pak, AC wall charger, flexible antenna, earphone, wrist strap, and belt clip . . . all standard, at no extra cost.



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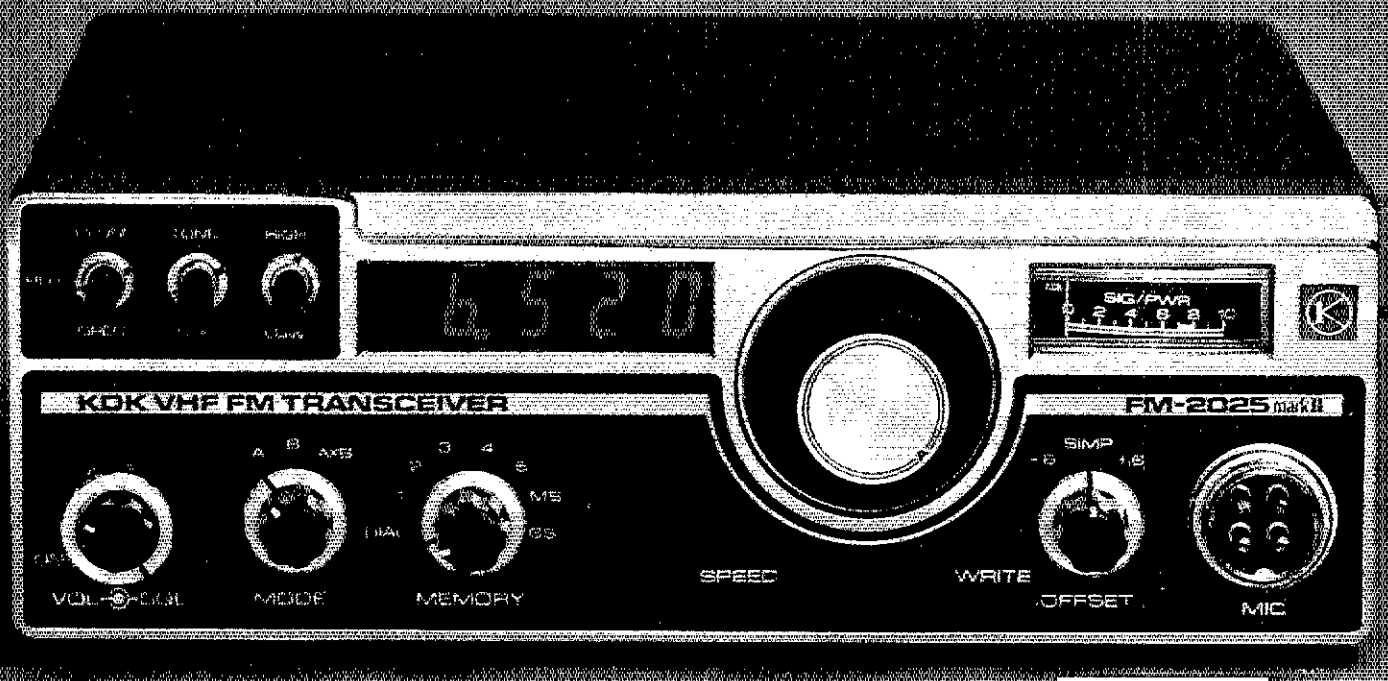

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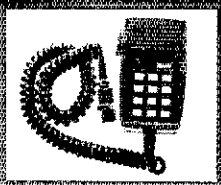

- Features such as ten channel memory in two banks of five each, a solid 25 watts of power, full MARS and CAP coverage from 143.000 Mhz to 148.995 Mhz, plus built in memory retention for up to one year . . . and much, much more makes this the radio of the year. If you have been waiting to move up to a new model, or have wished for a radio with "everything" . . . KDK has it!
- The ten channel memory is easily addressable and you have two banks of five channels each. You can even use both banks at once for odd splits.
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- KDK has also eliminated another trouble spot by completely hand wiring each radio. No internal plugs to become intermittant and no wire wraps either, just good solid wiring.
- KDK gives you one of the hottest receivers you can find. By using UHF (not VHF) dual gate MOS-FETs with electronic auto tuning for the RF amplifier and the first mixer, you have a combination of ultra sensitivity and maximum quietness.
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- The power output stage of the 2025A Mk II will not break down even with an infinite VSWR load, and uses heavy duty solid state antenna switching with a four stage low pass filter. All this gives you an exceptionally clean, spur free output.
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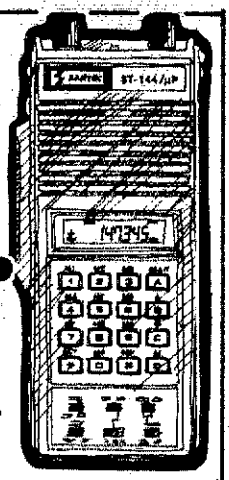

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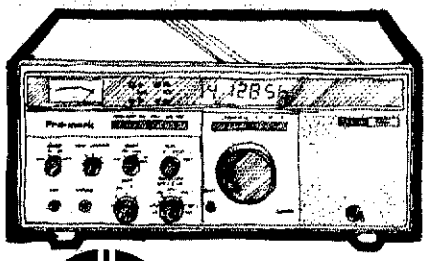

Pro-Mark KWM-380

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TB6EM	Call for price
TB4EC	Call for price
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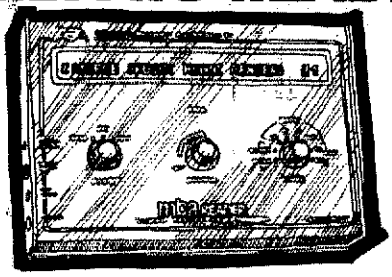
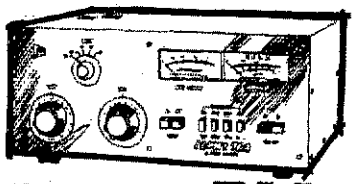
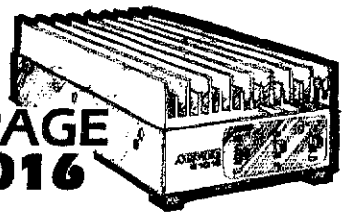




ALPHA 76A



MIRAGE B1016

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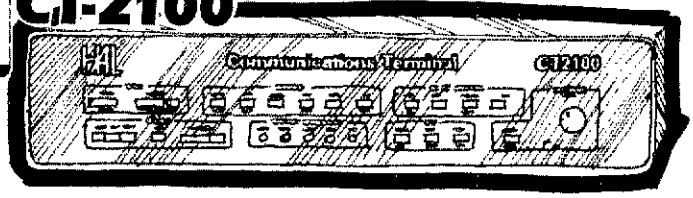
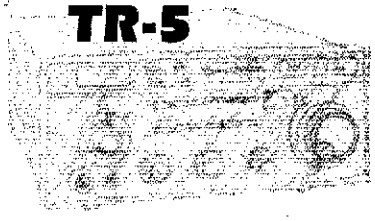
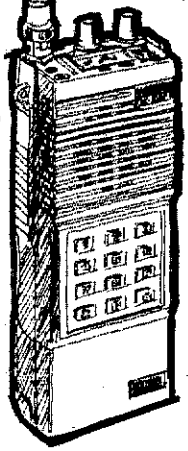


Coming:

R.L. Drake TR-5

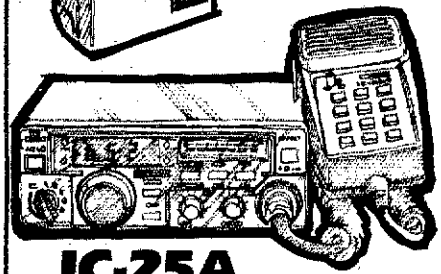




IC-2AT

ICOM

IC-720A



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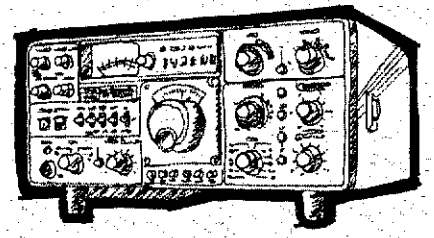

FT-902DM

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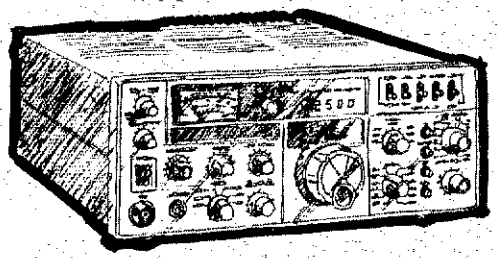
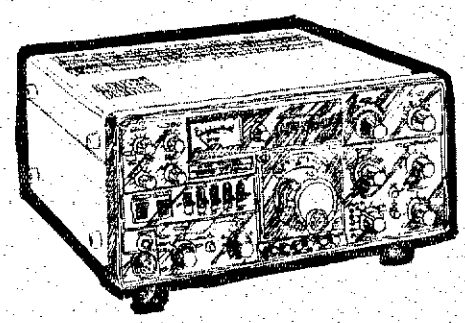
FT-707



FT-107M



FT-101ZD MARK III

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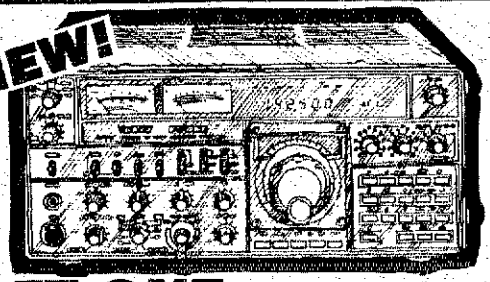

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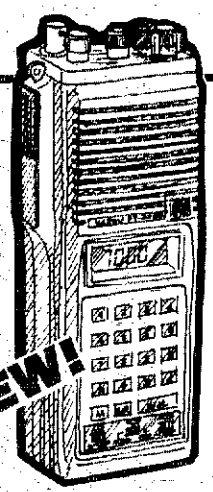

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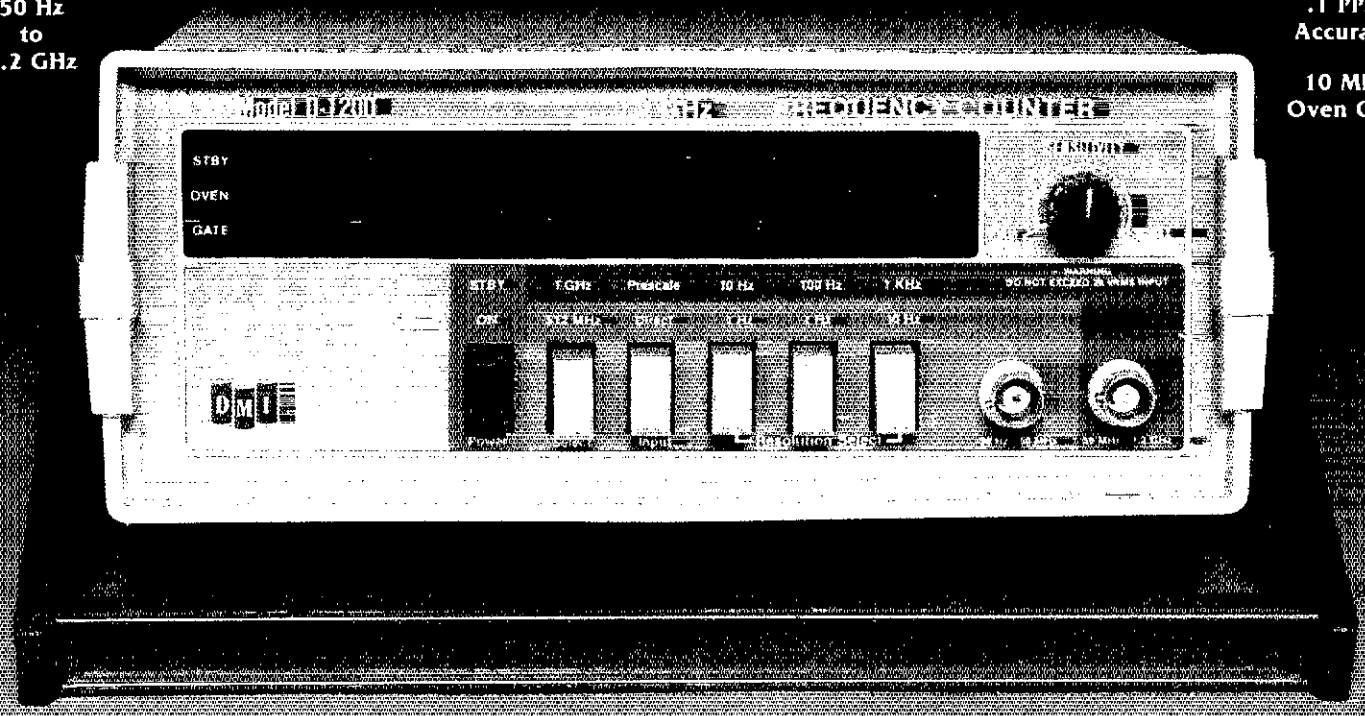

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Because we produce the most accurate frequency counter for the money — Because most models count to 1 GHz even 1.2 GHz (standard prescaler) — Because DigiMax model types have sold more than 25,000 units. — Because DigiMax has the best quality specifications to price ratio in the industry — INO! Because if you settle for any counter with lesser specifications than DigiMax offers, or pay $100, $200, or even $500 more — You have simply made a mistake. We feel confident that when you compare DigiMax specifications & prices, you will discover for yourself that DigiMax instruments provides the best features for the price of any frequency counter manufacturer. Your choice is clear — Buy quality — Buy Performance — Buy Effectiveness — Buy DigiMax.

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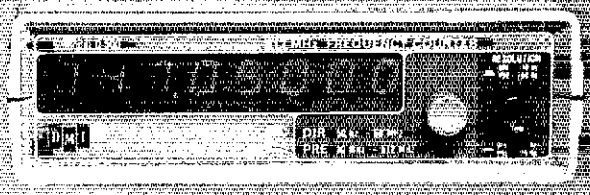
50 MHz TO 1 GHz — .1 PPM — PORTABLE — MOS — 50 OHM INPUTS

The D500 will count from 50 Hz to 512 MHz — the **D510** from 50 Hz to 1 GHz — the 500 series includes a 1 PPM (17° to 35°C) TCXO — combined with the compact size and portability when a BAC-5 rechargeable battery pack is added. The 500 series becomes the perfect addition for any tool box, car, boat, or ham shack — plus they can help you meet your QSO on the correct frequency, or check your transmitter frequency. The D500 will resolve 1 Hz to 50 MHz, 10 Hz to 500 MHz, and the D510 will resolve 10 Hz to 1 GHz. The excellent accuracy, high reliability, clearly makes the D500 or D510 the perfect choice for that bench, tool box, or ham shack. Plus DigiMax's low cost will fit most any budget.



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D500	$149.95	50 Hz-512 MHz	1 PPM 17°-35°C TCXO TIME BASE	8	15 to 50 MV	20 to 50 MV 50 to 100 MV @ 1 GHz	8-15 VDC 300 MA AC-12 REQ. FOR 110 VAC
D510	$179.95	50 Hz-1.0 GHz					
D612	$259.95	50 Hz-1.2 GHz	.1 PPM 20°-40°C PROPORTIONAL	8	15 to 50 MV	15 to 50 MV 50 to 75 MV @ 1 GHz	8-15 VDC 500 MA
D1200	$299.95	10 Hz-1.2 GHz	10 MHz OVEN		5 to 50 MV		

AC-12 AC ADAPTER $8.95 — 1200 BNC BASE 21" ANT. $8.95 — BAC12 $44.95 — BAC5 $29.95

The ultimate team...the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical/electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m/ssb detector, speaker ON/OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter/digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A/R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

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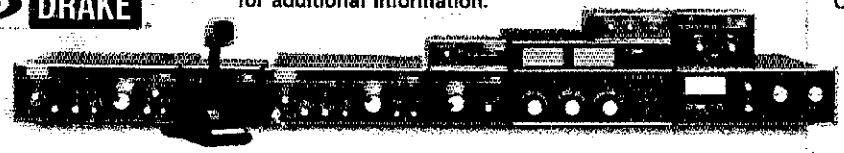

COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive operation** with main transceiver PTO or RV75

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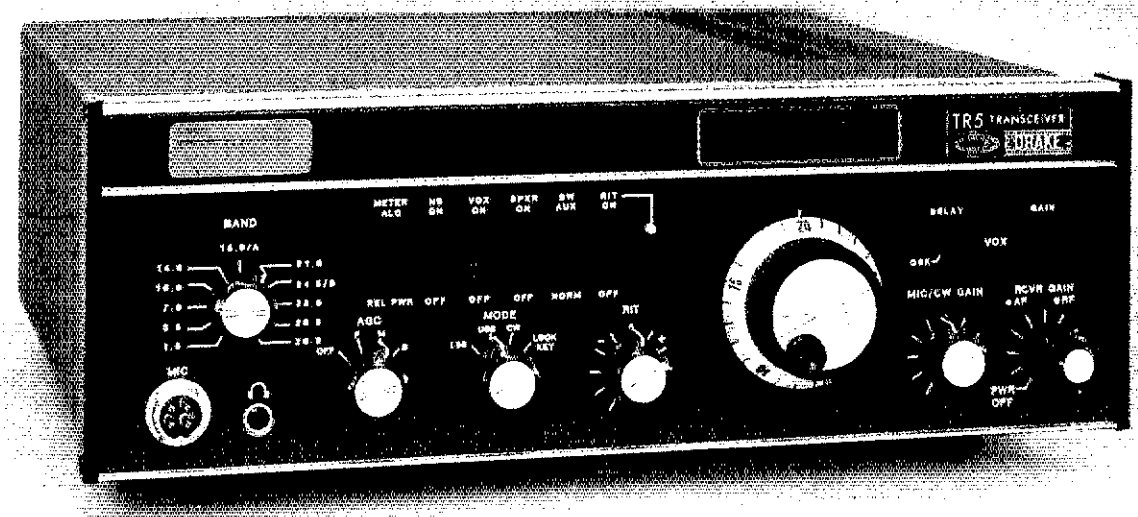
* Patent pending

New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO
featuring the Drake "VRTO"

• **Frequency Synthesized** for crystal-controlled stability • **VRTO (Variable Rate Tuning Oscillator*)** adjusts tuning rate as function of tuning speed. • **Resolution to 10 Hz** • **Three programmable fixed frequencies** for MARS, etc. • **Split or Transceive** operation with main transceiver PTO or RV75

* Patent pending

With the new TR5 versatility and value are spelled D-R-A-K-E . . .

DYNAMIC RANGE

The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

RELIABLE SERVICE

When you purchase a TR5, or any Drake product, you acquire a product of the latest production techniques, which provide reliable performance.

Yet with a product as sophisticated as one of today's transceivers, after-sales service is a must. Ask any Drake owner. Our Customer Service Department has a reputation second to none.

ACCESSORIES

Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

KILOWATT AMPLIFIER

Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier/power supply will put the TR5 on an even footing with the best of them.

ENGINEERING

The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superceded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

See your Drake dealer or write for additional information.

Features, availability and prices subject to change without notice or obligation.

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DRAKE

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our STM. WB4DAR WB4UJH and K4VHQ all home now and doing well as of this writing. The bad news — licenses issued by Fred & Sam at Maysville Hamfest are invalid. Shame on you guys. Speaking of Maysville first annual, good work WA4PID and WD4LVN. Encore. Also Ashville's hamfest well attended. Hart to beat combination of fall colours in the mountains and friendly folk in charge up there. Time to start planning for this year's hamfests, contests, SET and Field Day. Best wishes for a prosperous and fulfilled New Year. Traffic: WD4CNQ 361, AB4V 360, NJ4L 323, AB4S 308, WD4CNR 306, K4EVY 286, W4PCN 285, WB4WII 215, KD4PJ 195, W4EAT 180, WA4SRD 149, KF4R 129, NB4L 119, KU4W 117, WA4UTC 115, K4IWW 96, W4EHF 94, W4WXZ 94, WA4OBR 87, K4MC 54, N4CJJ 53, W8PJS 48, WB4YZF 48, KZ4A 46, WD4LOO 46, WB4CYN 39, WD4JJK 35, WB4HRR 33, KC4AM 30, WA4CUD 30, K4FTB 30, W4PRQ 25, KD4WP 24, N4CCK 22, WD4LRG 20, KA4KJI 19, N4UE 14, W2JDB 8, KA4KDD 6, N4ARY 5, N4AET 4, WB4SLF 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — ASCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC KC4LA KA4AUR. Congrats to our SEC, WD4HLZ for setting up a fine scenario for SET. Sptg. ARC furnished communications for festival of 30 high school bands, participated in simulated chemical spill with Civil Defense. I want to thank each of you who have donated a little something to Amateur Radio during the past year. It has made my job as SCM much easier, and, by your efforts, we have accomplished many things. QNI/QTC: SC SSBN 1381/129; Blue Ridge 2 Meter Net 2062/80; Anderson 2M Net 793/34; SC NTN 331/72; Lancaster County 2M Net 181/16; Western SC Emergency Net 407/34; Newberry County ARES Net 86/6; Carolina State Line Net 64/2; Greater Pee Dee 2M Net 419/38; Laurens County 2M Net 81/0; CNN 188/67; Trident ARC ARES Net 111/0; York County ARES Net 240/67; Sptg. ARC Net 248/12. Traffic: K4ZN 347, K4ZB 162, W4NTO 146, W4ANK 95, KA4AUR 83, W4FMZ 74, K4FRX 41, W4FVV 36, WA4MIY 29, W4MTK 29, NQ4N 15, KA4LRM 4, W4DRF 2, WB4NBK 1.

VIRGINIA: SCM, Luck Hurder, WA4STO — ASCM: K3RZR. STM: KY4K. SEC: KZ4K. Chief OO: W4HU. Chief OBS: K3RZR. Chief OVS: N4CD.

Net	Time	Freq.	QTC	QNI	NM
VNTN	Noon	7260	160	285	WD4FTK
VSBN	16:00	3947	518	726	W4NWM
VSN	6:30	3705	163	349	WB4KSG
VN(E)	7:00	3680	284	467	K4JST
VN(L)	10:00	3680	122	263	W3ATQ
VLN	10:15	3947	312	575	WD4ALY
SVEN	7:15	22/82	70	433	N4EVV
WARC	830A/Sn	3748	5	27	K4JST

Many clubs reporting Halloween "spook watch" activity, indicating increased public service awareness. WA4NYZ sez active in Northampton County when not flying for Air National Guard. A certain K3 in Va. was presented with an Oscar Meyer all meat microphone. Some say the new mike doesn't cut the mustard, while others swear they relish it more than the old. Williamsburg ARC justifiably proud of highest totals in 200 watt FD battery class. FB! K4JST sez he is available for club talks on emergency power operation. Contact him in advance for available dates. Changes in ID rules appear to be beneficial and welcomed by many! W4HU reports 29 OO reports sent by our active OOs in Va. WD4CXU NCSing 2M ssb net Thurs. eves on 144.250 at 9 P.M. All welcome! WB4VVI has KW on 2 from Pilot. Chief OVS N4CD reports F2 skip providing lots of DX on 6M. W4KXE active in Boy Scout on the Air Jamboree with troops in Luray. K4BAV looking for new repeater site in Alexandria for local ARES use. K4DHB finally up on 2M fm! W4NFA active in NOVA traffic effort, while many ARES types spent SET month showing Red Cross and emergency preparedness groups our stuff. Remember, if you hold an appointment, it only remains valid if you send in an appropriate report EVERY month. Traffic: WA4STO 774, W3ATQ 566, KY4K 523, WB4PNY 497, K4KDJ 439, K4JST 418, WA4CCK 285, WD4FTK 280, WA4LJI 222, KA4IUM 219, W4NWM 187, KA4ERP 175, WD4ALY 161, KZ4K 153, W4NFA 142, W3BBN 134, WB4FLT 129, K3RZR 121, W4UO 116, WB4FDT 115, K4JH 95, N4BJX 80, KA3DTE 78, K4VWK 77, KI4W 75, N4EVV 69, K4LMB 68, NN4I 56, K4DHB 54, KB4WT 53, K4JM 49, W3BBQ 48, WA4YIU 47, WA4QWC 43, WB4ODZ 39, WB4MAE 37, WB4UHC 36, N4BFI 33, K4MTX 31, N4YE 29, WB4LAB 26, NC4B 23, KD4FP 23, WB4ZTJ 22, WA1VRL 19, WD4OUU 19, W4LXB 19, W4YVG 18, N4YO 18, KB4PW 17, WB4KIT 14, W4CFV 14, WB4DQZ 13, WD4KOJ 10, N4ENU 9, WB4RWY 9, N4FNT 8, WA4TVS 7, WB4ZNB 7, W4PVA 6, N4LE 6, W4OKN 5, W4YE 4, W4KXE 4, W4TZC 3, WA4EQW 1, WB2OMZ 1. (Sept.) K4MTX 33, N4YE 24.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR KD8X W8FZP WD8LDY. QCWA dinner on 10-31 was well attended with 28 present. WD8IXM and K8ZPR are active on A1V in Wierton area, and looking for others to join them. New State Radio Council officers are: WA8GYU, pres.; K8LG, v.p.; K8YL, sec.; WA8FLF, treas. Next council mtg. will be at Jackson's Mill on Dec 5. WVFN 31 sess. 584 QNI, 127 QTC. WVN 29 sess. 183 QNI, 59 QTC. WVMD 31 sess. 401 QNI, 35 QTC. WVNN 25 sess. 91 QNI, 28 QTC. WV Hillbilly 4 sess. 148 QNI, 46 QTC. KFC 2 Mtr 4 sess. 56 QNI, 3 QTC. PARA 2 Mtr 5 sess. 56 QNI, 2 QTC. Kanawha Valley 2 Mtr 4 sess. 47 QNI, 2 QTC. WV 6 Mtr 26 sess. 105 QNI, 4 QTC. Traffic: WD8DHC 179, K8JQ 53, K8QEW 51, K8KT 41, W8HZA 37, W8FZP 34, K8MHR 34, KD8X 31, W8JWX 23, KC8CR 22, W8CKX 21, WB8UDY 12, N8CFX 10, KC8CS 10, W8CAL 6, WA8NDY 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NMs: WØHXB NØAXQ WDØAIT WØEJD WAØRYL KBØZ. The Rocky Mountain Division Director of ARRL, KØPGM, held a League Officers meeting in Denver on 7 Nov. It was well attended by elected and appointed officials of the Division. Guest speaker was 1st Vice President, WØBWJ. There were a lot of good ideas and suggestions passed between the section officials which should result in a close relationship throughout the Division. A special thanks to WAØLVM for arranging the meeting place and the special tour of the Region 8 FEMA Communications Center. With the increasing amount of electronic devices on the market and in use the old problem of interference becomes even more important to all radio amateurs. ARRL Hq. has published a handbook for Local Interference Committees and is available from the Communications Department. If your club has an Interference Committee this book will provide worthwhile guidance and ideas. Nets: HNN, sess 31, QNI 1724, QTC 158, Inf. 211, QNF, 1180; Colombine, sess 27, QNI 1155, QTC 59, Inf. 229, QNI 1086; CWN, sess 37, QNI 175, QTC

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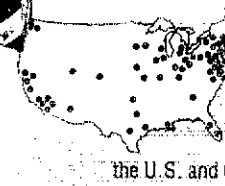

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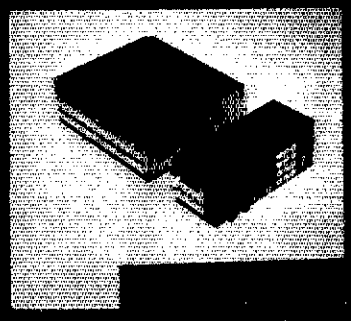

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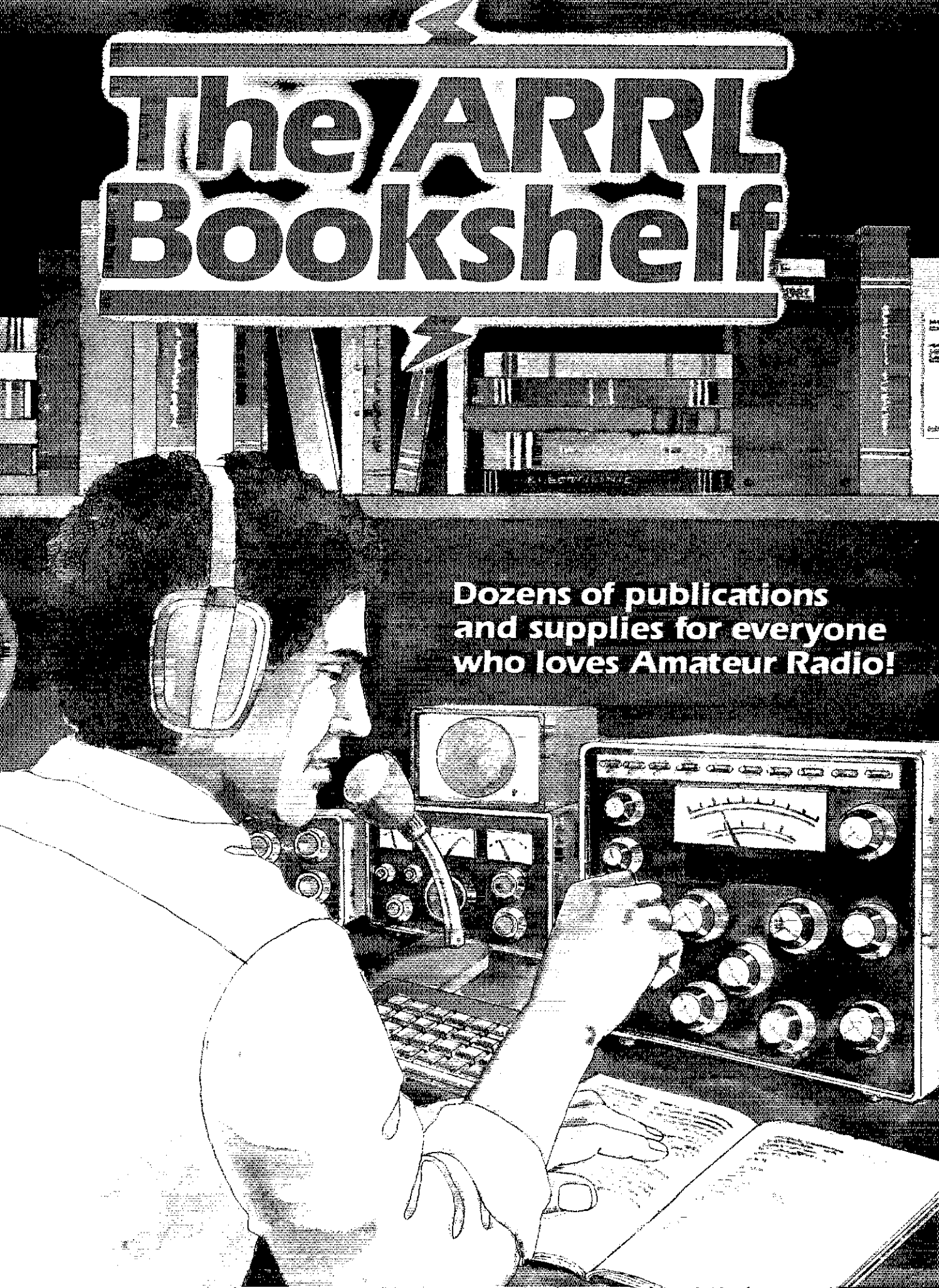
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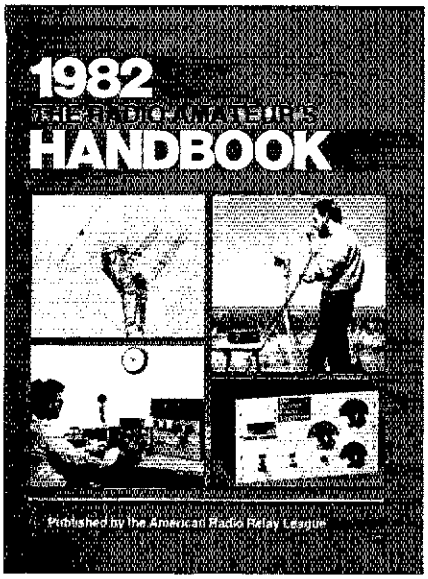

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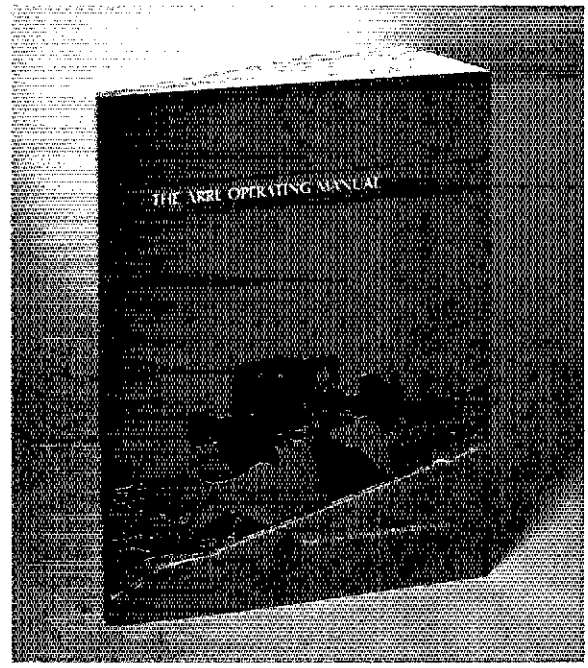

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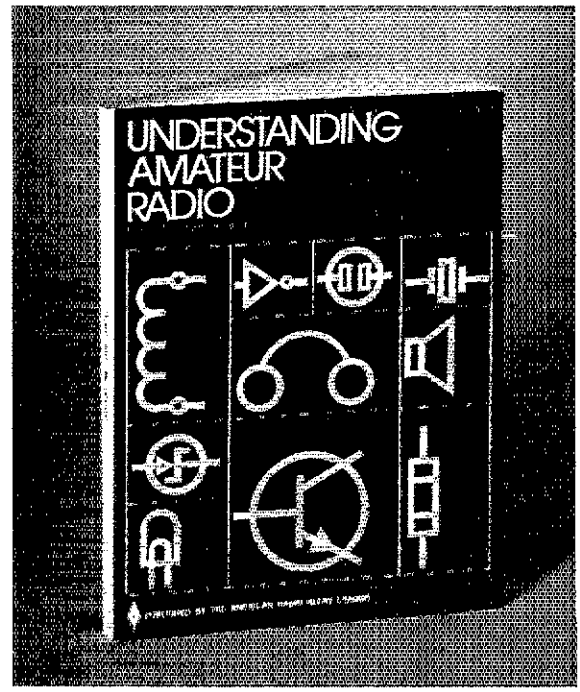

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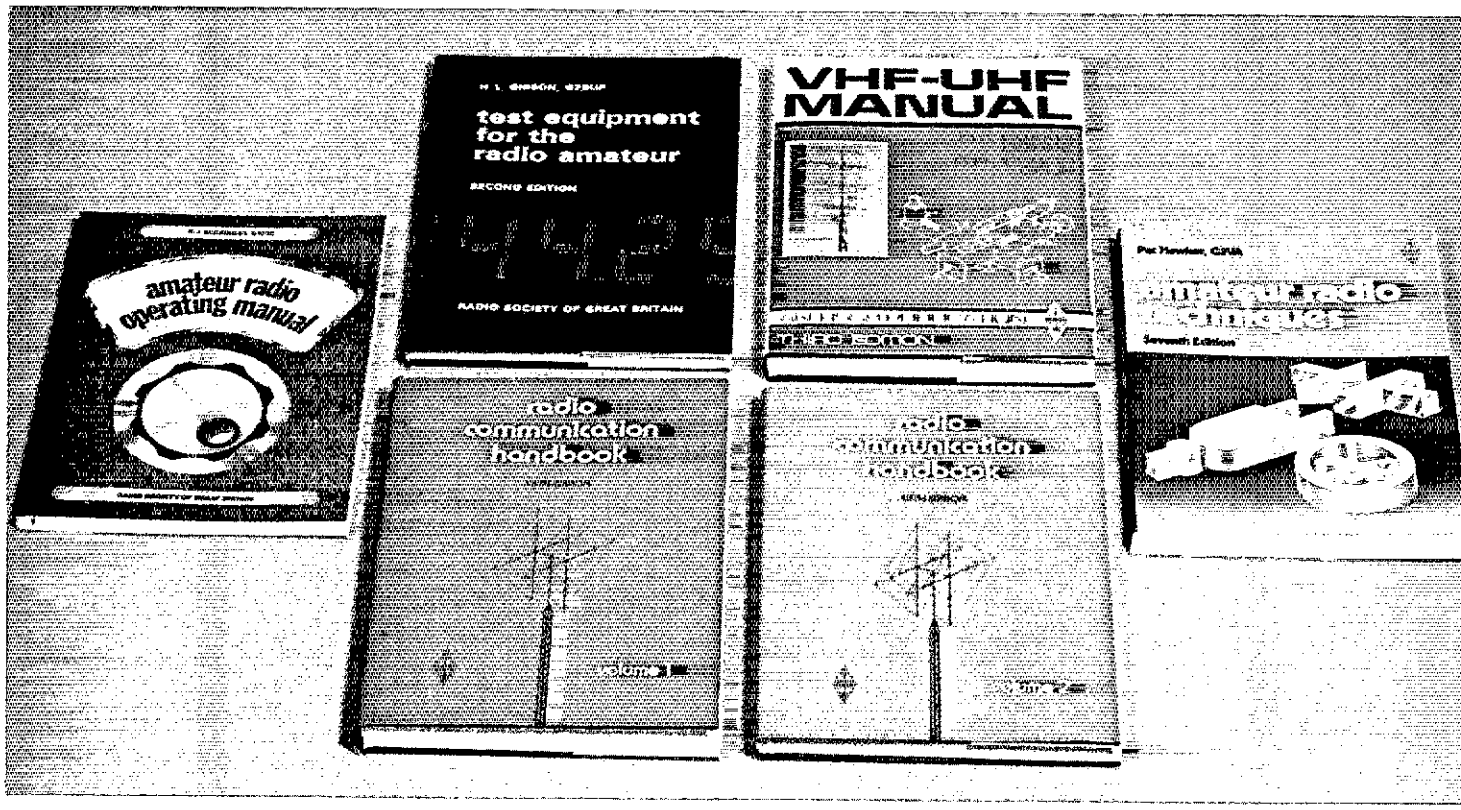


PUBLICATIONS FROM THE RADIO SOCIETY OF GREAT BRITAIN

VHF-UHF MANUAL by Dain Evans, G3RPE and G.R. Jessop, G6JP. You will find the *VHF-UHF Manual* jam-packed with practical theory and construction projects for the region above 30 MHz and extending into microwave regions. In fact there are 70 pages contained in the microwave chapter alone! Receivers and Transmitters for these bands are covered in 181 pages. The balance of this 349-page book contains chapters on Propagation, Tuned-circuits, Space Communications, Filters, Test Equipment, Antennas, and a handy Data section. (Since this is a British publication, there is little coverage of the 6-meter band, but many of the 4-meter band projects can be adapted by the experienced amateur for use on 6-meters.) 3rd Edition. Copyright 1976. Hardbound **$17.50.**

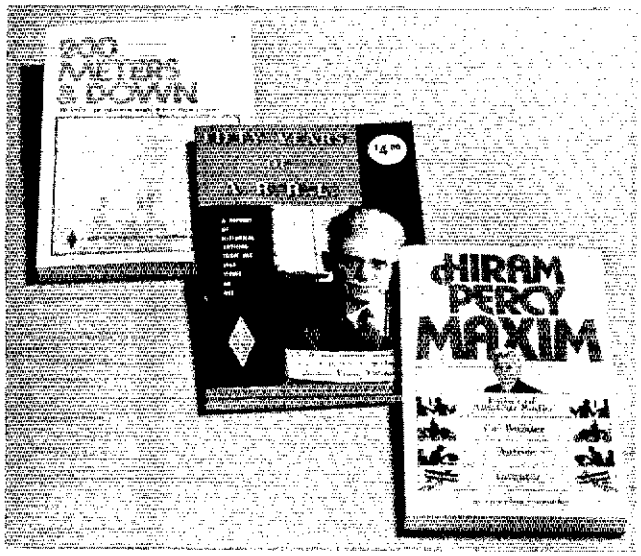
AMATEUR RADIO OPERATING MANUAL by R.J. Eckersley, G4FTJ. Get the British side of operating. Besides such chapters as Setting Up a Station, Operating Practices and Procedures, DX, Contests, RTTY and Mobile, Portable and Repeater Operation, the reader will find information in the Appendices most useful. There are continental and regional maps which show the prefixes assigned to each area and listing of countries showing ITU callsign allocations, callsign systems for each country, notes on foreign amateur operation, address of licensing administration and the name and address of the National Amateur Radio Society. 189 pages. Copyright 1979, 1st Edition. Softbound **$10.00.**

AMATEUR RADIO TECHNIQUES by Pat Hawker, G3VA. Contains 800 diagrams and 364 pages of circuit ideas and devices which the author has gathered during 22 years of writing the *Technical Topics* columns in *Radio Communication*. It is not a text or handbook, but an idea book — RSGB's version of ARRL's *Hints and Kinks*, but on a larger and more in-depth scale. Copyright 1980, 7th Edition. Soft cover **$12.50.**

RADIO COMMUNICATION HANDBOOK 5th Edition. You probably have the ARRL *Radio Amateur's Handbook* in your library. Now you can have a second source of authoritative radio frequency and electronics information at your fingertips. Volume 1 contains 10 chapters (460 pages); Principles, Electronic Tubes and Valves, Semiconductors, HF Receivers, VHF and UHF Receivers, HF Transmitters, VHF and UHF Transmitters, Keying and Break-in, Modulation Systems, and RTTY. Volume 2 contains 13 chapters (318 pages): Propagation, HF Aerials, VHF and UHF Aerials, Mobile and Portable Equipment, Noise, Power Supplies, Interference, Measurements, Operating Techniques and Station Layout, Amateur Satellite Communication, Image Communication, The RSGB and the Radio Amateur, and General Data. Both volumes are hardbound. Volume 1, Copyright 1978, **$20.00.** Volume 2, Copyright 1977, **$18.50.** Both volumes for **$35.00.**

TEST EQUIPMENT FOR THE RADIO AMATEUR by H.L. Gibson, G2BUP. A great addition to the library of the Radio Amateur who builds his own equipment. Beside covering measuring techniques, you will find a wealth of test equipment which you can build yourself. Construction projects range from simple dummy loads and attenuators to a 150 MHz digital frequency counter and timer. You will find simple signal sources for 1296 and 2304 MHz and 10 GHz. Chapter titles and number of pages devoted to each: Current and Measurement—23, Frequency Measurement—23, Wavemeters—19, RF Power Measurement—9, Aerial and Transmission Line Measurements—9, Noise Measurements—8, Components, Valves and Semiconductors—12, Signal Sources and Attenuators—12, Oscilloscopes and Modulation Monitors—8, Power Supplies—3, and Reference Data—8. Copyright 1978, 2nd Edition. Hardbound **$11.00.**

THE HISTORY OF ARRL AND AMATEUR RADIO



200 METERS & DOWN by Clinton B. DeSoto. Chronicles the exciting evolution of Amateur Radio from the pioneers who perfected the "wireless art" up through the technical advancements of the mid-1930's. Tells first-hand how the A.R.R.L. came about and how the League saved Amateur Radio from certain oblivion during the early years. Copyright 1936 (reprinted in 1981). 184 pages. **$4.00.**

FIFTY YEARS OF A.R.R.L. A reprint of the golden anniversary articles that appeared in the 1964 issues of *QST*. Packed with photographs of old gear. "Old Timers" can relive their own amateur experiences, and newcomers can learn the fascinating tale of Amateur Radio's early years up through the early 1960's. Copyright 1965. 151 pages. **$4.00.**

HIRAM PERCY MAXIM by Alice Clink Schumacher. A fascinating biography of the father of Amateur Radio, who was also a car builder, author, and inventor. Copyright 1970. 153 pages. **$4.50.**

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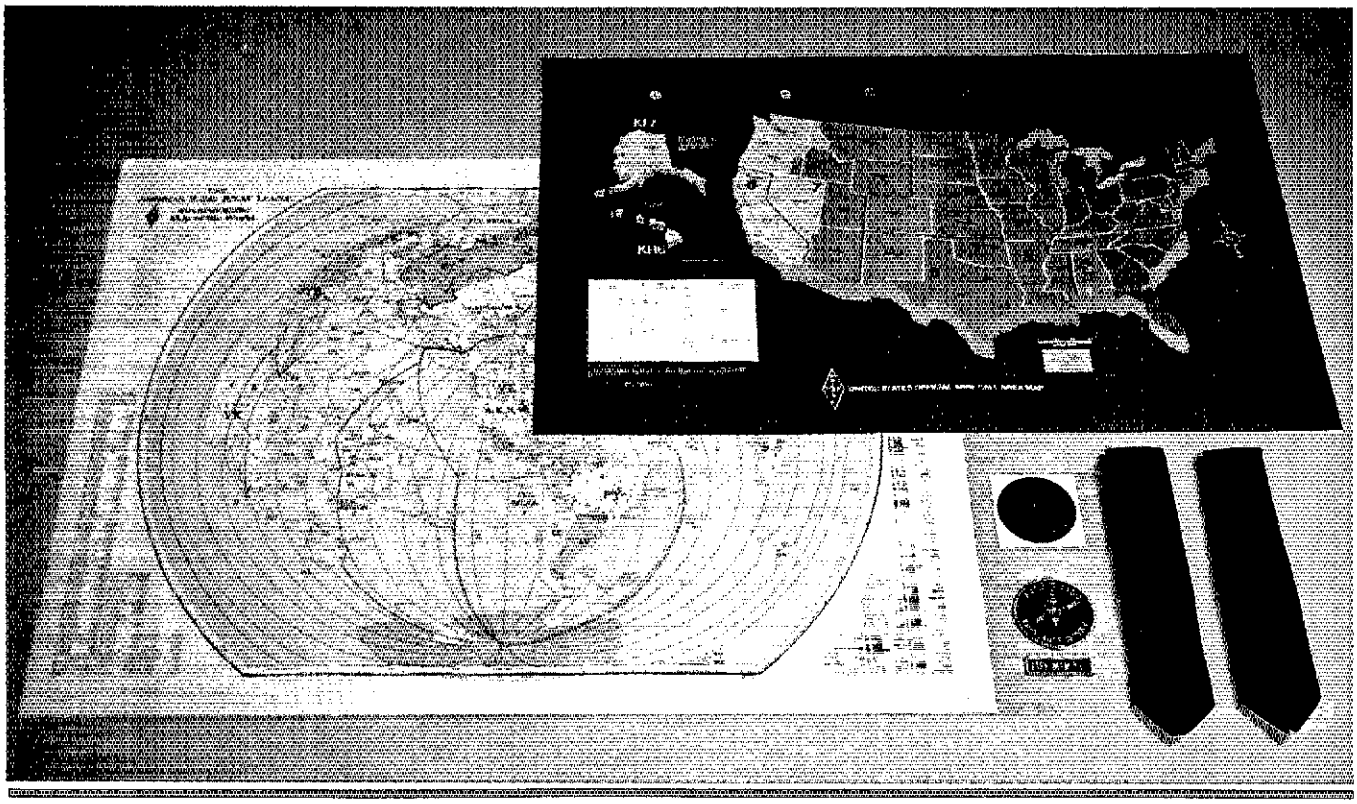

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ARRL WORLD MAP A great circle map centered on the U.S. which shows country boundaries, prefixes, radio districts, and ITU boundaries. Printed in 6 colors by Rand McNally. The countries listing is by prefix and shows country, continent and both ITU and *CQ* zones. Map size is 30 x 40 inches. Copyright 1980. $4.50.

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192, QNF 762. Traffic: NØBQP 2835, WAØHJZ 980, WØACH 504, KØDJ 424, WDØAIT 419, WØFPT 304, WØEJD 252, WØACD 193, KBØZ 156, WØLAE 87, WØNFW 75, WØRE 47.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMsWA5UNO. KG5L. W5VFO. Southwest Net (SWN) meets daily on 7.083 at 1930 local and handled 273 msgs with 305 stations. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100 Zulu and handled 120 msgs with 884 stations. New Mexico Breakfast Club meets daily on 3.940 kHz at 0700 local and handled 78 msgs with 816 checkins. Yucca 2 Mtr Net, 146.01/61, handled 14 msgs with 518 checkins. Caravan Club 2 Mtr. Net, 147.66/06, handled 5 msgs with 127 checkins. Tnx to KB5DA for Caracan Club rpt. KB5LI and SWN active in SET. Abq ARES active in SET with abt 50 participating in a citywide exercise with Red Cross, 1550th Air Rescue and many others. Traffic: W5JOV 253, KA5DDW 251, W5ENI 145, KB5LI 76, WA5MIY 14.

UTAH: SCM, L. M. Norman, W7PBV — Beehive Net meets daily on 7272 at 1230 MST. UCN meets daily on 3710 at 1930 MST. K7JH/R on 16/76 with autopatch. W7OCX did a FB job of running the SET. WA7HHE is off to school in 8-Land. KA7IMV now active on 2M with a handheld. WB7TUR has a hb QRP rig on 21.150 MHz, looking for WAS, one down 49 to go. N7BUO married one month, says "life couldn't be finer". WB7BZJ almost gave up ham radio but got a deer this season. N7KM gave a FB session on computers to the Rainbow Canyons ARC members. Traffic: K7HLR 204, WA7KHE 145, WA7TEH 103, WB4NVO/7 72, W7RO 38, W7OCX 24, W7PBV 9.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. STM: WØOGH/7. New Wyo. RACES/ARES Net meets Sun. morning at 9:00 A.M. local time on 7.260 MHz. Net control is KB7SX, the Wyoming State RACES Officer. All County ECs and RACES officers are urged to check in and all amateurs are welcome. Congratulations to K7TFW on his upgrade to Extra. WB7NHR reports the Wyoming Cowboy Net held 22 sessions with 582 QNI and 21 QTC. WAØPFJ reports the Wyoming Jackalope Net held 27 sessions with 570 QNI and 2 QTC. Traffic: WB7NHR 268, WØOGH 198, W7SQT 64, K7TFW 40, K7SLM 10.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. October was the month to test our abilities to operate under emergency conditions. All sections of the state participated. We had good coorperation with the Some of the stations participating WA4HRV KA4BNO K4CYY WA4IIH KC4IK WA4JPK WA4JOZ KA4JWD K4JXS WA4KDB WA4LDX K4OXU WB4ZVH and many more stations. There is a new net in Tuscaloosa, WARRS. It's AENU on 147.315/.915. This new net was very active in their first SET. If you can reach or you are thru there, you can catch the net Tues. 8:30 P.M. local. WD4HYF upgraded to Advanced and KA4DTN upped to General at Anniston Hamfest. New ham in Ft. Payne KA4UTY. DRN5 manager reports 100% from Ala with W4GKS W4NBU WA4JDH KD4KT K4LYY WA4PIV W4WJF. AENJ manager reports QNI 519 with 37 messages 32 sessions. AENM manager reports 2879 QNI 177 QTC in 35 sessions. The net held 6 special sessions to assist the SET and handled 17 SET messages. AENU QNI 31 in 3 sessions. The net relayed 24 messages during their SET exercise. AEND QNI 232, QTC 104 in 31 sessions. AENB QNI 253 QTC 99 in 34 sessions. The net had 3 SET sessions with one operating on emergency power. SCARES held a transmitter hunt on Nov 21 had a good time. All radio clubs report they will hold their annual Christmas parties. SCARES has started their Novice classes at Civil Defense building. They hope to have some new Novices. See N4DMA for details. AENR manager reports QNI 50, 1 QTC, 9 sessions. WA4JDH 1385, W4CKS 173, WA4LXP 159, W4IBU 100, K4AOZ 80, WD4DHI 72, WA4PIZ 49, K4UMD 31, WA4JPK 30, K4HJX 25, WB4EKJ 10, WB4TVY 8, W4RNX 6, N4CSX 4, W4WJF 3.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — SEC: K4VHC. STM: W4WXA. NVOAD: WA4PUP. Chief OBS: W4BIA. I want to thank all in the section for the FB performance during the SET on Oct 31. The state can depend on solid communication if there should be any emergencies. I hope that by now all reports have been sent in to the League. The deadline is Jan 31, so if you failed to mail yours you still have time. Congrats to W4GH on being "Georgia's Amateur of the Year". WA4IQU was presented with plaque by the GCN for his many years of dedicated service. New officers for the Georgia SSB Association are: WA4ZOT, pres.; W4GH, v.p.; N4BGH, sec/treas.; WB4ZVX W4HON, director. GCN elected W4HON, pres.; WA4IQU, sec/treas. SGARC presented demo on cw, ssb, RTTY & msg handling at "Wintersville Classic". Reports from the sponsors of Savannah Hamfest considered it a success although attendance was not what was expected. Warner Robins was well attended & according to chrmn, W4HON was a success. Please keep me informed if you are planning a hamfest during 1982. Ever since the Georgia SSB Assn. was formed, 3975 has been the gathering place for the hams in the section. During the daytime hours, it's hard to communicate from one end of the section to the other. This has been proven many times during emergencies, SET, etc. GTN meets at noon each day on 7243. Forty meters gives us excellent coverage during daytime hours. I have had many requests from hams throughout the state on wanting to keep some activity on 40 in case of daytime emergencies. Let's see if we can't get some activity going. I wish all of you a very Happy New Year. Traffic: K4EV 120, WB4NTW 100, K4JNL 72, W4PIM 85, WB4ZVX 58, K5TF 54, WA4PUP 46, W4HON 33, W4FIZ 32, KA4ATM 26, WB4LBM 26, N4UZ 25, AA4EI 16, W4BIA 12, WA4PUO 6, AK4T 4, K4BAI 3, K4NM 3.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: WD4HIF. NMs: KC4MM N4EC KF4U WN4IIV. ASCM: W4BSP WA4AXJ N4EDH WB4OBB. There is concern here about problems with cable TV channels leaking into 2 meter frequencies and vice-versa. Anyone experiencing these problems should write me immediately for an information packet. New officers for DBARA: WB2UKX, pres.; W4MGO, v.p., WD4LPK, sec.; N4ENL, treas.; directors are WB4FKL W4MB KB4T WB4WTJ. Jax RANGE officers: N4FAJ, pres.; N4ECO, v.p.; WD4OEX, sec.; KF4S, treas.; WD4BIW K4YLX N4UF KA4FGR WD4PIC, directors. The Panama City ARC: N4DXC, pres.; KA4VMZ, v.p.; KB4UL, sec. The Greater Jax Hamfest Assn: WD4ETG, chairman; WA4TUB, v. chairman; WB4EEK, sec.; W4KGI,

treas. The 1982 event will be held Aug. 7-8. W4MB is operating a beacon on the new 10 MHz WARC band under special authorization from FCC. Call is KK2XJM. Reports are welcome. KF4U back from vacation, was licensed as 2BZJ in 1921 and is still active 60 years later! Thanks to W7LIQ/4 N4EZZ WA4EYY K4HEU a St. Johns Co. height ordinance was modified to accommodate ham radio towers. KC4CB KY4F & W4OQP have a new 220 MHz rptr in Orlando. W4WKQ was auctioneer for the Playground ARC auction in Nov. Good SET results with comprehensive reports rcvd from KW4F, Alachua Co., and N4KF & W4WGR, Orange Co. W4IZ fair operation originated over 700 messages with much PR benefits. A special award for the message service was given by fair officials. Traffic: W4IZ 1402, W4SIZ 844, WD4HIF 732, N4PL 505, W4JL 390, N4EC 260, KA4MGO 257, WD4IIO 228, WA4EYU 224, N4EDH 178, N4BZH 144, WB4TZR 120, W4BSP 106, W4MGO 104, K4DHX 92, WB4PHT 89, WD4MLQ 87, WB4GHU 81, AA4FG 73, W4KIX 56, N4UF 44, WB4DTS 38, W4GUJ 37, KF4U 32, WA4STZ 30, WB4DTS 38, WA4ZTS 27, WB4EXA 26, W3IDO 19, WA4OXT 15, K4KUU 3.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — ASCM: W4KGJ. SEC: AA4WJ. STM: WA4PFK. Congrats to KY4U, new TPTN NM. KA4LNA continues as NM of QFNS. KA4CPS is new EC De Soto Co and WB2OUK is EC Lee Co. Traffic totals this month jumped to 11,149, thanks to SET, Jax and Tallahassee fairs. We SFla section folks get deeply involved with SFla fairs as Florida traffic handlers work closely together. N2WX reported originating 40 QTC in 6 hours at his school. On Oct. 10, Hardee Co ARES, led by EC KA4FHG, provided comms for the St. Jude Bikeathon in Wauchula. Congrats to KA4FHG on upgrading and new call, KE4DA. On Oct 16, St. Petersburg ARC members were called into action by Red Cross to establish comms with the Lake Maggiore area where firefighters were battling a brush fire and Red Cross was trying to provide refreshments. Several hams were soon on the scene including K4RBJ WA4WOU K4KE WA4IIT. Manning the club station at Red Cross were K5IHH WB8VLR KA4BPO. After about an hour, Red Cross had their own comms set up and released the amateurs. Brandon ARS, carrying out responsibilities of a First Class affiliated club (or is it to be called Blue Ribbon Club?) is conducting code and theory classes at Brandon HS under tutorage of K4TN and WD4OBG. AA4WJ reports that his daughter is having great success at getting Daddy's attention by hurling insults at him in morse code! We were rather pleased by a fairly high level of activity on the NTS nets during SET. Your SCM received about 200 reports of stations active in SET. But we continue to be bothered by the feeling that many amateurs are not getting the plaudits and credit deserved, mainly because the paperwork is neglected. For example, only 13 stations claimed PSHR in October. Of these 13, only 6 claimed the allowed 5 points for participating in a public service event (bikeathon, SET, weather watch, message service, etc.). How many forget to take credit, 5 points each for those emergency messages handled? The 1981 SET/LO Bulletin ranks our section 3rd. But we should be first because we handled 131,972 messages in 1980 — nearly twice as many as our nearest competitor. Why aren't we first? Because ranking is based not only on number of messages but also on number of reports. Only 452 were made in 1980. And this month I received only 41. Only 1 of each 317 stations sent me a traffic report. Of course you who do report are a very, very select group. But this is pitiful performance for our Amateur community. If I had received monthly reports from 1 in each 100, we could have been first place. Will more of you send me monthly traffic reports? You can use the CD-210 card, but I prefer a message and this wouldn't cost you any postage. Just say, for example: "SAR DEC ORIG 2 RCVD 3 SENT 3 DEL 1 TOTAL 9." If you don't know how to compose and send a message, look it up or ask someone. It doesn't make sense for a licensed amateur to remain ignorant of this forever. You can send a message anywhere you want (where allowed by rules) even if you only have a handi-talkie radio. There are plenty of nets and traffic handlers on the vhf bands as well as ht, and they will be glad to take your traffic. So let me have your traffic totals — even if this is the only message you send each month. Thanks & 73. Traffic: W3CUL 3289, K4TH 866, K4SCL 851, WB4FVV 684, W3VR 623, WD4COL 506, K4ZK 436, W4GPL 386, WA4PFK 318, N2WX 276, WD4AWN 259, KY4U 223, NC4H 211, WB4PIB 186, WB4AID 177, WB4WYG 166, KE4O 157, WA4EIC 156, K4EUK 138, W3TLV 115, WA4HXU 113, AA4WJ 109, KA4LNA 101, KA4ASZ 95, W4DVO 93, W4NFK 87, KA4FHG 55, W4WYR 49, KA4BBA 48, W4ESH 41, WB4GCK 39, WB4FVN 37, N4KB 35, W4IRA 28, K5IHH 28, NJ4O 27, W1DLP 12, N4FNY 10, W4SMK 10, WB8VLR 9, W4JM 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — WINS convenes daily now at 7 P.M. local time. WINC changed to 6:30 daily after Nov. 15. WP4AOH new NM for WINS. NM for WINC and is retransmitting ARRL bulletins twice weekly on WINC. WP4BDS was active in Sweepstakes with NP4D NP4C and WP4BDS as operators. Everything is being geared up for the Dec. 6 PRARC Pre-Christmas party. BPL: WP4BDS. PSHR: KP4DJ WP4BCV. Traffic: WP4BDS 364, KP4DJ 142, WP4BCV 73, WP4AOH 32.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. October turned out to be an active month. Hilite of the month was the SW Division Convention in Scottsdale. I enjoyed meeting many of the AZ hams along with the other 4 SCMs from the Division and the other League officials. FB SARC. The SET and CAP exercise seemed to generate activity. Thanks to all participants. WB7QOM reports that the Gila County RACES members provided communications for the Copper Valley 26-mile marathon and 10K race on Oct 27. SSARC members WB7QZB KA7IKW WB7FAJ KA7GSF WB7DBE and WB7FDF provided comms for model airplane competition on Oct 4. SSARC reports that WA7BJF became a Silent Key. TRA members AF7M N7CLC WA7RKI KA7FRY WA7DAO WB7TWM KA7DAC W7BM K7KYW N7CVG WA7WKE KA7DLX provided comms for the 1st annual Optimist Air Show held at Ryan Field on Oct 17 & 18. WA7NXL received DXCC 125 all cw, CQ DX cw and WPX cw awards. I attended an IEEE computer society mtng at which KD2S talked about amateur packet comms. KD2S and I would like to hear of any activity in this area. Thanks to W7MGF for providing a copy of the VVARA newsletter. Flagstaff Jr. HS WB7OWW is active with 1 operator and 9 students W7LUX reports interesting 6M activity. New appointee: KA7HHJ: ORS. PSHR: KA7HHJ W7EP. SWN: QNI 305, QTC 273. ATEN: QNI 903, QTC 220. Traffic: W7EP 242, KD7I 233, W4AMM 207, KA7HHJ 182, WA7KQE 58, W7OIF 58, K7UXB 48, W7LVB 48, KE7W 24,

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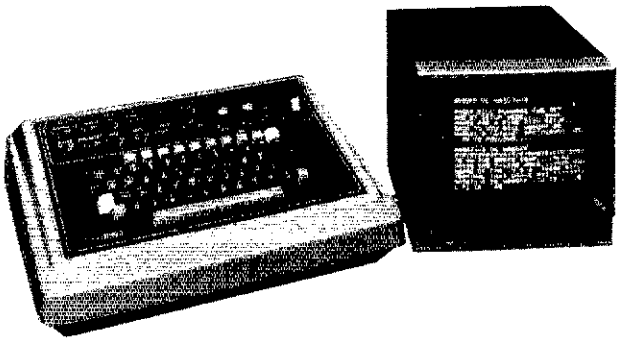

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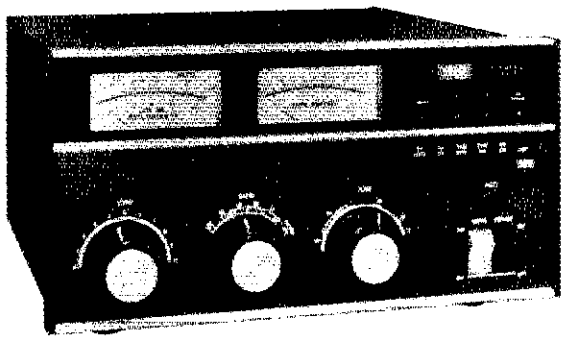

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6PM to 10PM CT.

WA7IYG 21, WØRIQ 19, N7EH 17, WA7NXL 14, K7NMQ 12, W7LBW 6, K7JKM 5, WB7QOM 3, WA7YUL 3.

LOS ANGELES: SCM, Stan Broki, N2YQ — SEC: N6UK. STM: K5DY. The Associated Radio Amateurs of Long Beach supported the first annual Recreational Park 5- and 10-K run to benefit the Lung Association. Participants were: N6BCY WA6OFD AK6Y KE6EF N6LB W6VDP WA6UBU KA6LDP KA6FTH. Two ARES groups organized a SET and relayed messages via the traffic system to me. They were the Associated Amateurs of Long Beach and the Devonshire ARES, headed by K6IYK. Participants at Devonshire ARES were: K6IYK W6TUQ WA6AQQ AA6K WB6BSA WA6LAU N6BEU W6RPS WB6UJG WD6GDB WB6YKD AI8A WA6MRY W6JWZ KA6LCY. N6VI reports doubling his country count this past month on 6 meters. Can you believe his 6 meter antenna is too high (105') and he wants to lower it? I received club bulletins this month from: Tri-County ARA, K6AGF, where they held an Oct. auction; Western Amateur Radio Assoc, N6ME/rpt; TRW ARC, W6TRW, where I attended their monthly flea market (fortunately I left my money and checkbook home), and met many local hams; United Radio Amateurs Club K6AA, where K1ZZ was featured speaker; Lockheed Employees RC, W6LS, where I was featured speaker; Associated Radio Amateurs of Long Beach, W6RO, on the Queen Mary; San Fernando Valley ARC, W6SD; San Gabrial Valley RC, W6OFK, where the big event was grand tour of Goldstone Deep Space Network and side trip to Solar One in Daggett; Northrop RC, W6VPZ; Pasadena RC, W6KA; JPL ARC, W6VIO; and the Southern Calif DX Assoc, where Dave, K6LPL, resigned from the board of directors. I enjoyed the Southwestern Division Convention. I mobiled out using N6UK's TS-180 with Swan Spider ant. on 40, 20, 15, and 10. Had QSO with W6RO on the way to Scottsdale. I also worked cw QSOing JAs, I Us, PYs, VEs and many stateside stations. I saw many local hams at the convention and a good time was had by all. Traffic: W6INH 140, K6OWA 123, WA6OCM 119, WA6LVO 84, KB6FC 73, N6PZ 61, W6NKE 57, N6BCY 49, N6DZQ 48, KT6D 42, KA6ALH 22, K6CL 10, N6HE 3.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. STM: KA6A. SEC: W6UBQ. DECs (by counties): K6GGS (San Bernardino), W6LKN (Riverside), WB6JBI (Orange), W6YZY (Inyo). New officers of Orange County Communications Club (RACES) are: WA6ARN, pres. (and Asst. Radio Officer); WB6KTO, operations and training officer; WB6IHZ, technical officer; N6BVU, public information officer. New appointments: OBS-WB6UUT WA6ACB; OES-WA6TLE WD6FBI N6DYR; OVS-N6ADV; EC-WA6WYP (for SBar RACES Dist #6). I would like to thank everyone for the best SET yet! The planning and execution by the ECs is particularly appreciated. At the same time, I would like to remind them of the January deadline for filing reports. Finally, a reminder that critiques help us benefit from our SET. Traffic: WB6EIG 530, KN6C 400, KS6T 281, WB6OBZ 211, W6NTN 171, WB6BZZ 164, WA6QCA 143, K6ZCE 85, WA6WZO 81, W6RE 70, W6TKV 65, K6XI 49, W6CPB 43, KA6HJK 33, WA6WZN 22, W6XD 10, KI6X 8, WD6FEM 4, N6ADV 2, WB6LGL 2, WB6NSX 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Over 50 hams turned out for Red Flag Patrols on Oct 25, 26 and 27 during a windy Santa Ana period to assist the Calif Dept of Forestry. WB6AFS is showing off a new linear and W5VGF/6 a new transceiver. During a trip to Vancouver, WA, WB6GMM gave out 500 contacts to county hunters. WA6DNT has a new IC-730, and two deep-cycle batteries for emerg power. North County Traffic Net held 30 sessions and handled 67 msgs. The net meets nightly at 2000 on 146.13/73 MHz and is sponsored by the Palomar ARC. N6IE and K6NS received 50-year certificates from OCWA. WB6HMY is coordinating rainfall reports for the San Diego National Weather Service. Reports run from 1000 to 1000 and are collected on the Palomar 13/73 repeater. Poway ARS is planning to put a repeater on nearby Mt. Woodson. Escondido ARS has weekly net on 146.28/88 MHz at 2000 each Sunday with N6CLO as Net Manager. Traffic: KT6A 535, W6HUJ 363, N6GW 239, KM6I 178, KB6AI 104, K6HAP 102, WA6DNT 100, WA6UFY 83, WB6GMM 70, KU6D 30, N6AT 14, K6QCW 10. (Sept.) WA6DNT 29.

SANTA BARBARA: Robert N. Dyruff, W6POU — Growing opposition to CATV leaking RF into ham bands. WB6GVO W6KPS launch revolt, mass-mailing. W6EJJ called meeting with SPAR's K6QYL W6POU and pres W2HD. Counsel W3PS, HQ staff. Need seen for concerned action on local ordinance and cable "ITV". OBSs W6POE W1UUQ W6ZRR report full scheds of vhf/hf/RTTY nets. FD results rank SBARC tops in Sctn followed by WB6OBQ K6FI N6GC K6KI Vent. Co. ARES mobilized 20 ops for 24 hr Oat Mtn 6500 acre burn. ARES supplied ARC shelter comms and 1st aid and damage assessment. Incident Command System (ICS) training given yielding county fire credentials. Lost-Child SAR exercise set by AVERT council teams. EC KQ6I reports improved SET. KA6Q led 60 SBAR No. Co. hams in 10 community SET using satellite. Lompoc, Righetti HS clubs — rcvg good publicity. WB6FMC/R now 146.205/805 in SLO Co. Traffic: WDØDEX 303, W6JGS 67.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — ASCM: WA5OFD. STM: W5VMP. SEC: W5GPO. NMs: AE5I WD5JYI AA5J KA5IWF. Well, if you had any doubts about whether you need emergency preparedness in your home town, 1981 should have removed all those doubts ten-fold! We have had just about all natural disasters known to man right here in this section. There's not one of the 80 plus ARES units here in NTX that has not been activated for one reason or another, and some got much more of their share of action. I cannot put into words how proud of each and every ARES and NTS member your SEC and I am! All bases were covered, all challenges were met with professionalism and efficiency second to none, and we have gained the respect of our served agencies and the general public. Another beautiful thing about public service communications is that no matter how long you have been involved, you always learn a valuable lesson each time you participate in an operation when the chips are down. If you have been thinking about getting involved in traffic handling or the Amateur Radio Emergency Service, make it a New Year's resolution to do it now! My address is on the bottom of page 8 in this issue; just write of your area of interest, and I will be most happy to put you in touch with the folks in your area who will help you get started. PSHR: N5DKW KC5FX KA5AZK N5BT KA5IWF KC5NN WD5JYI KB5UL. Traffic: W5TI 501, N5BT 290, K5BNH 240, KA5AZK 236, WD5JYI 226, KC5FX 138, KB5UL 127, WB5OXE 98, W9OYL 71,

KA5IWF 56, KC5NN 55, AJ5F 42, N5DKW 38, W5VMP 38, W5GPO 28, K5PC 24, K5SOR 21, W5ERT 16, KAØCSM 15, N5DYI 10, K5QKM 9, WA5QFD 9.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN. Beaver and Texoma Hamfests are now history. Both well attended in spite of inclement weather. K5CAY W5QMJ W5REC WA5UJF WD5HUT WD9BIT WB5NMZ WB5OQX W5LHU W5KWG KA5DTV WD5IFB all received Public Service Commendations recently for work during a flash flood in Enid last May. FB. W5ZWM operating 'sail boat mobile' on Kaw Lake. OOs report hearing a lot of out-of-band operation. Remember where the band edges are, especially in USB mode. Tahlequah getting new repeater ready to go. 25 ORS reports with a corresponding increase in traffic count. Lot of recent upgrades with changes in calls. Sure makes it hard to keep up with. League appointees should keep your SCM and Hq up to date on such changes, as well as address changes. I hope you all had a Happy Holiday and a prosperous New Year. Traffic: W5REC 285, W5RB 179, K5CXP 165, KB5EK 160, WB5ELG 145, KA5CXW 128, WB5NKC 126, W5AS 97, WA5OUV 68, WD5IFB 63, W5UYH 61, WA5FSN 58, WB5TFX 43, W5VXU 43, WA5JGU 42, K5CAY 39, WA5ZOO 33, W5VLW 30, W5VOR 26, W5SUG 24, WB5EAY 18, NØIN 8, KC5OU 7, WB5LSW 6, W5JJ 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — ASCM/TM: N5TC. SEC: WA5RVT. Vice: AK5N (resigned). OO reporting this month: K5DL. AD/OBS W5OVH reports El Paso amateurs quite busy: Aug 30, city-wide Civil Defense drill managed to keep 28/88 solar-powered repeater on Mt. Franklin with help of ARRL and Rep. Mary Polk. W5OVH herself elected vp, West Texas Rptr Assn, secy of K5WPH and re-elected treas of W5ES, also writes a column for W5ES bulletin. EC WB5RFQ helped Washington County Sheriff's Dept when oil rig fell from truck and blocked highway; Brenham ARC helped with county fair parking lot duty. ORS/OBS N5FN refurbished hf antennas, put new finals in amplifiers, installed TS-120 in new auto. ORS K5RVF and Beaumont amateurs furnished communication for American Red Cross during Cavalcade, Oct 24 and 25. AD W5BGE, WØAIG and others back from Lake Texoma Hamorama; WØAIG's spouse won IC-730 and is now negotiating a deal. ORS K5GM spent week in Washington, DC. OBS/ORS W5KLV made 210 readings of W1AW bulletins. DEC K5DG and 34 Amateur Radio ops provided communication for Confederate Air Force AIRSHO 80 October 8, 9, 10, 11. Traffic: WB5YDD 597, W5SHN 458, W5KLV 424, N5AMH 183, N5TC 168, W5CTZ 154, WB5MMI 121, KA5GYJ 87, N5DAA 84, K5GM 74, WB5EFJ 72, KB5NX 67, WA5RVT 61, KB5TC 53, WD5GKH 27, WD5AAH 45, W5BGE 34, K5HZR 33, N5CRU 30, W5KR 28, KA5KRI 24, N5FN 16, W5OVH 7, WB5RFQ 2. (Sept.) K5GM 74. (Aug.) W5OVH 17.

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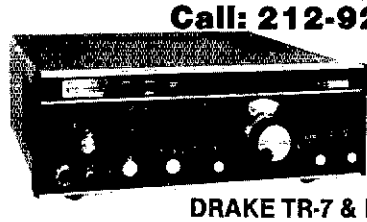

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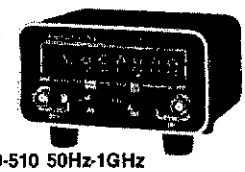

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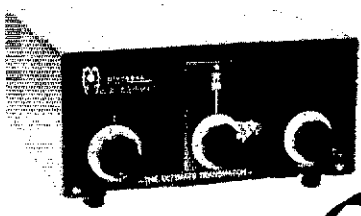
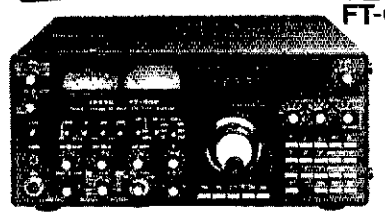
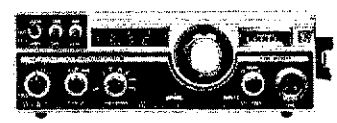


YAESU FT-ONE





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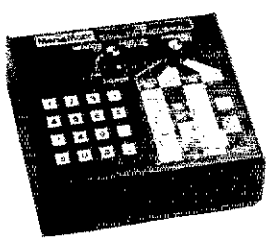
MIRAGE B1016



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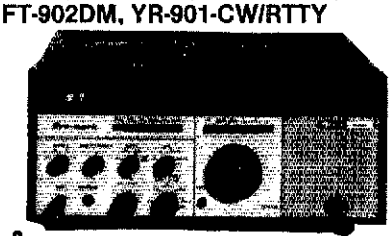
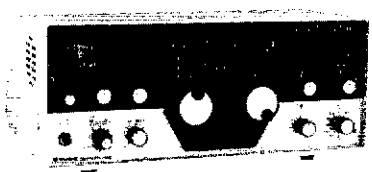
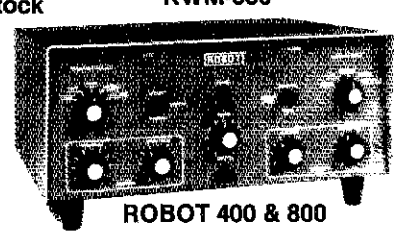


ROCKWELL/COLLINS KWM-380

ICOM IC-720A, IC-730
IC-25A, IC-251A, IC-2KL, IC-451A



ASTRO 103 150A & 100 MXA
DIPLOMAT 150



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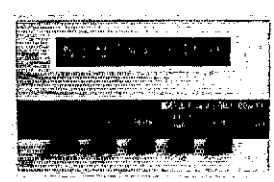

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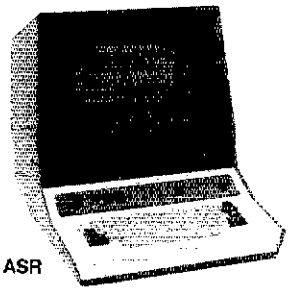
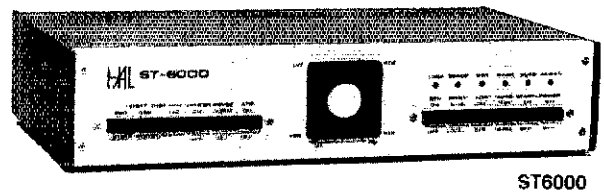


DS3100 ASR



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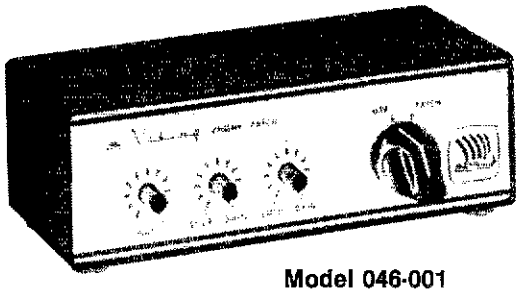

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(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

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IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

CINCINNATI ARRL '82 — Hamilton County ARPSC invites all hams to participate in the second annual Ohio State Convention. Two full days of amateur activities; forums, meetings, exhibits, flea market, and more! This ALL INDOORS activity will take place on Saturday and Sunday, February 27 & 28. For further information contact Cincinnati ARRL '82, Committee for Amateur Radio, P.O. Box 46311, Cincinnati, OH 45246. Dealer and exhibitor inquiries invited. Registration $4, Flea Market $3.

PLAYBOY Club — Plan ahead now to attend the ARRL Hudson Division Convention October 30-31, 1982, at the Playboy Club, Great Gorge, McAfee, NJ. For info send s.a.s.e. to HARC, Box 528, Englewood, NJ 07631.

INDIANA: South Bend Swap & Shop January 3, 1982 at Century Center downtown on U.S. 33 Oneway North between St. Joseph Bank Building and river. Half acre on carpeted floor. Industrial history museum in same building. Four land highways to door from all directions. Talk-in: 52-52 & area Repeaters.

1982 SAROC Annual Prestige Convention, April 1-2-3-4, Aladdin Hotel. If you did not Advance Register for 80-81 SAROC send QSL card with s.a.s.e. for details. POB 14217, Las Vegas, NV 89114.

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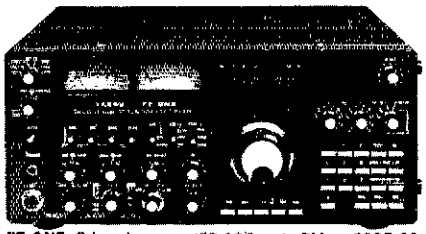

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FV-707DM Dig VFO w/12 memories 279.00
FC-707 8-band antenna tuner, 150w..... 129.00
FTV-707 Transverter w/no module 129.00
2m module only 154.00
6m module only 110.00
440 module only 255.00
FRB-707 Relay box 39.00
MMB-2 Mobile mounting bracket 20.00
MR-7 Mounting rack 20.00

Other accessories for FT-107M/707:

XF8.9HC 600 Hz CW filter 45.00
XF8.9HCN 350 Hz CW filter 45.00
XF8.9HCM 450 Hz CW filter 50.00
XF8.9HCN 350 Hz CW filter 50.00
YM-34 Desk microphone 31.00
YM-35 Scan noise canx mic 20.00
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YM-37 Mobile microphone 10.00
YM-38 Scan desk microphone 39.00

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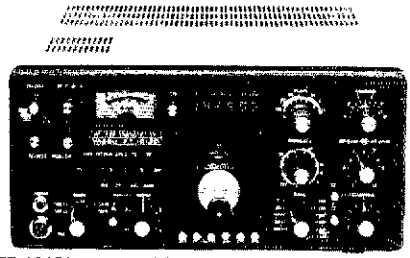

FT-101ZD MK-III 9-band dig. Xcvr 925.00
FV-101DM synth., scanning VFO 359.00
AM-101Z AM board 27.00
FM-101Z FM board 56.00
DC-101ZD DC converter 60.00
FA-9 Fan 22.00
YE-7A Hand microphone 17.00
FT-902DM 9-band digital Xcvr 1535.00
FT-901 Series service manual 25.00

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YK-901 ASCII Keyboard 175.00
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Misc. Accessories:

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YS-2000 1.8-60 MHz PEP watt/SWR 95.00
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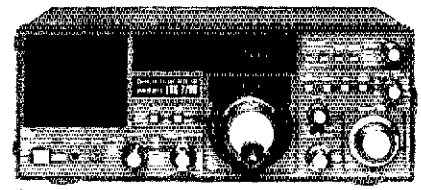
YM-21 Noise cancelling microphone 20.00
YM-22 TTP mic for 127RA 69.00
FF501dx Low pass filter 34.00
QTR-24D Deluxe 24 hour world clock 49.00



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MU-7700 Memory unit 149.00
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FRV-7700 118-150 MHz VHF converter... 149.00
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FRG-7 0.5-29.9 MHz Shortwave receiver..... 319.00

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FT-480R 2m SSB/FM/CW Xcvr 529.00
FT-780R 70 cm synth. All-Mode 785.00
FP-80A Power supply for FT-680R/480R .. 95.00
SC-1 Station console w/ps, clock, TTP 199.00
FT-627RA 6m FM xcvr w/4 memories 399.00
FT-127RA 220 FM synth Xcvr w/autoscan .. 479.00
FT-127 220 FM 12 ch. Xtal Xcvr 299.00
FP-4 4A power supply 50.00
FP-12 12A power supply/spkr 135.00
FSP-1 Remote speaker 21.00

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FL-2010 2m 10w amplifier 99.00
FT-708R .2/1w 440 FM HT/TTP 359.00
FL-7010 440 10w amplifier ..... TBA

Accessories for FT-208R/FT-708R

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NC-8 15-hr/4-hr desk charger/AC ps 99.00
LCC-8 Leather carrying case 35.00
FBA-2 Batt sleeve for FNB-2 in NC-7/NC-8.... 6.25
FBA-3 Sleeve; FT-208R/708R in NC-1A/3A .. 12.00
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FTS-32AE 32 tone encoder/decoder 75.00
MMB-10 Mobile bkt for HT & PA-2 ..... 15.00
PA-3 Mobile adapter & charger 39.00
YM-24A Speaker/microphone 39.00

VHF Portables:

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FT-290R 2m FM/SSB portable Xcvr 399.00
FL-2010 2m 10w amplifier for FT-290R.... 99.00
FP-80A 4.5A ps for FT-290R/FL-2010 .. 95.00
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MMB-11 Mobile mounting bracket 39.00
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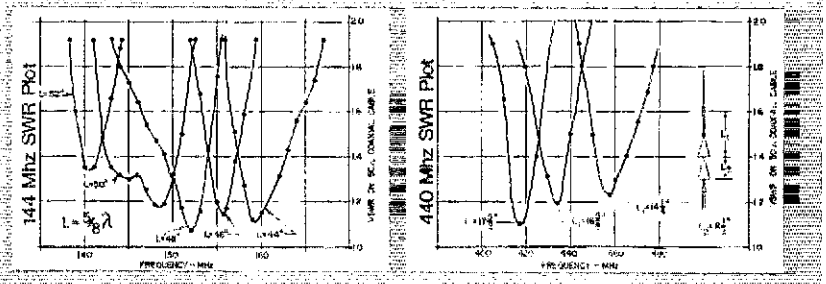

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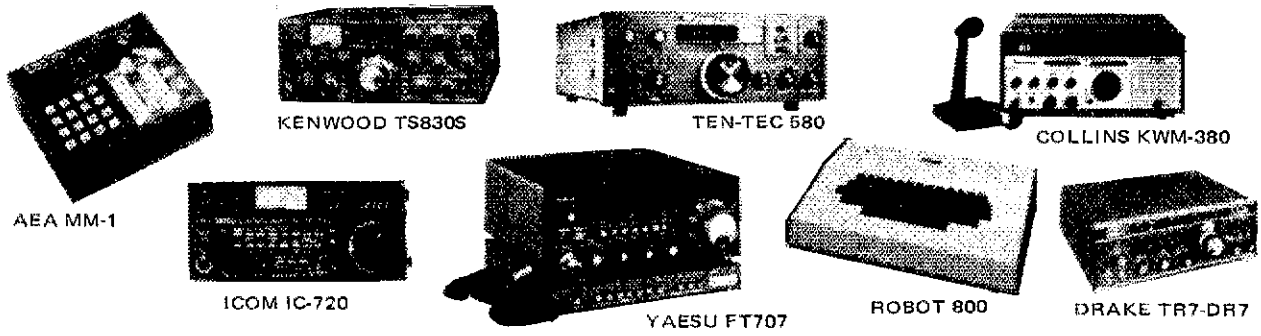

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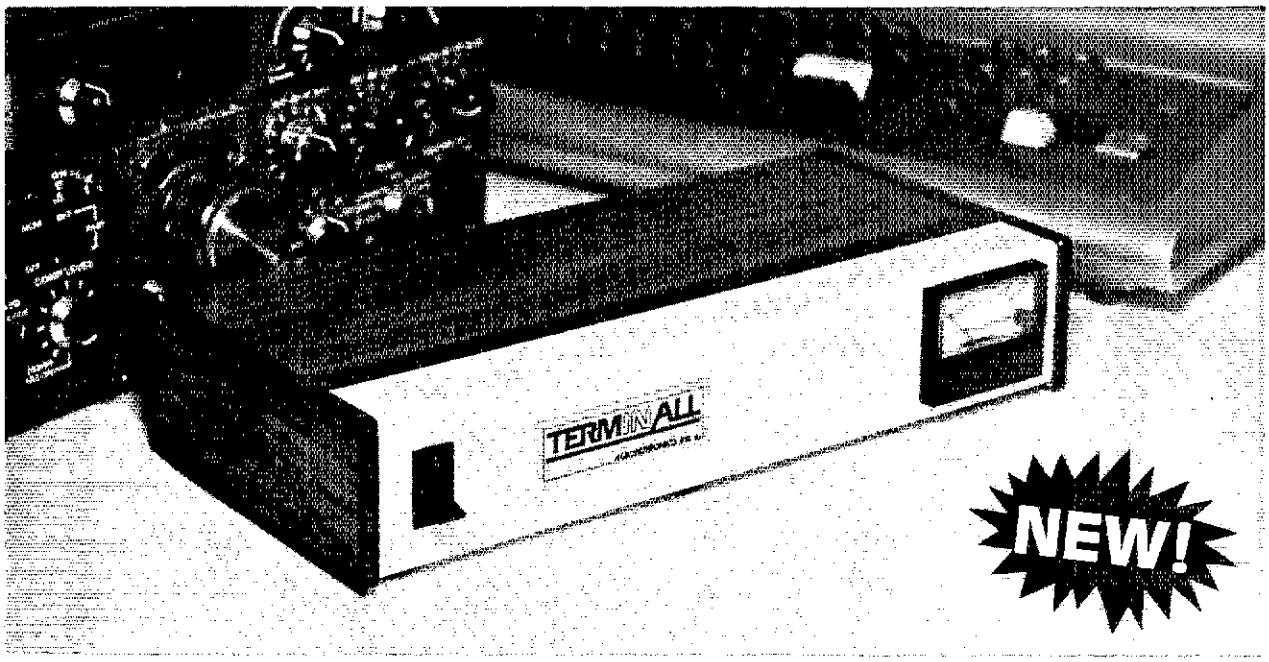

TERMINALL is a hardware and software system which converts your TRS-80* (Model I or Model III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL gives you more for your money. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

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 may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code - it's fully automatic - and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

More for your money

■ TERMINALL has the RTTY terminal unit - demod and AFSK - built in. This results in a lower total cost because separate terminal units usually cost at least $225 assembled, and most do not even have a crystal controlled AFSK. TERMINALL eliminates not only the higher cost of an external terminal unit, but also eliminates the hassle of interfacing to another piece of equipment.

■ **Outstanding documentation.** Professionally written, 90 page user manual - contains: step-by-step instructions - explicit examples - numerous photographs and illustrations - theory of operation - parts layouts - schematic diagrams - trouble shooting guide.

■ **Built in software backup** - set up the program parameters and messages the way you like to operate - then have the program save a new copy of itself -on either cassette or disk!

■ **Software** supplied on both cassette and auto-run diskette at no additional cost.

■ **Built in separate, mutli-stage active filter RTTY and CW demodulators.** No phase lock loops. RTTY demodulator has 170 and 850Hz 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 application. A must on many VHF RTTY repeaters.

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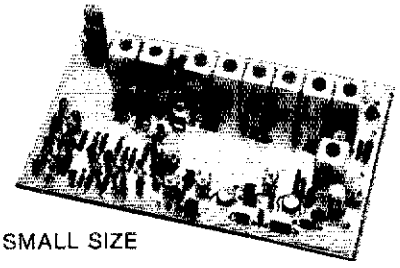

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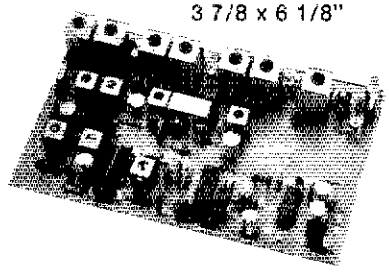

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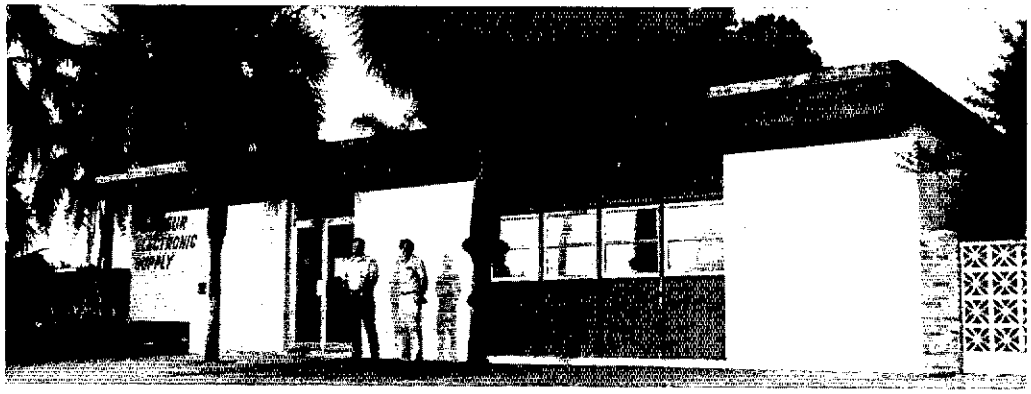

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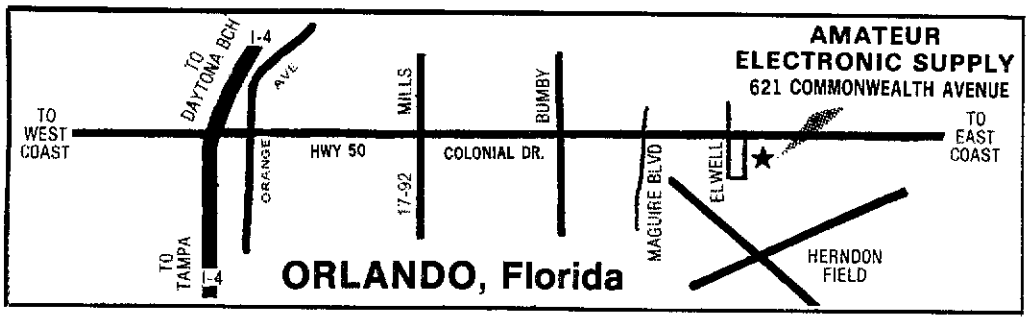

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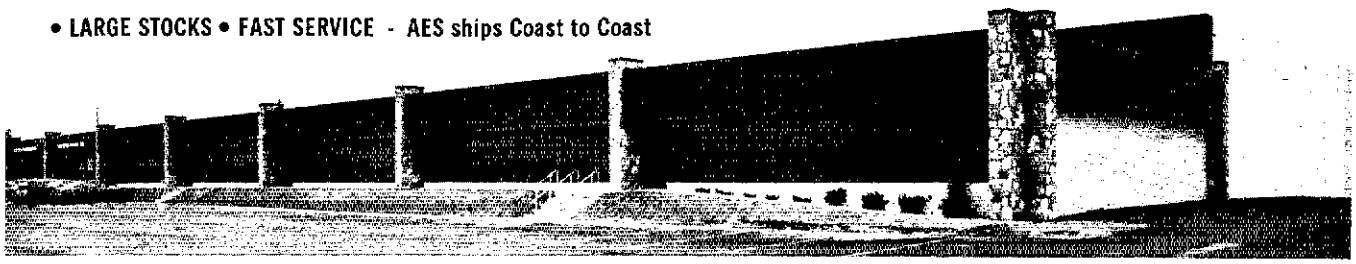

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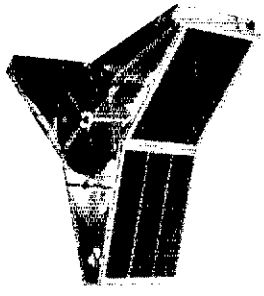

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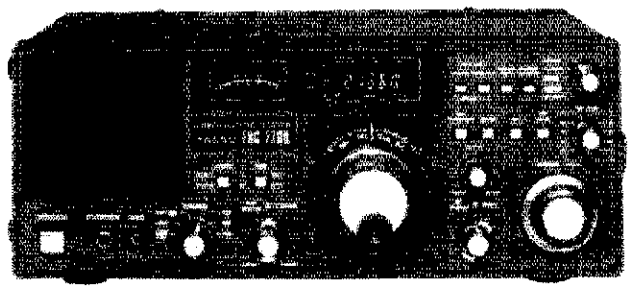

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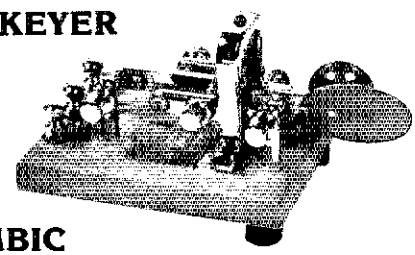

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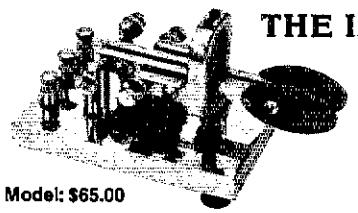

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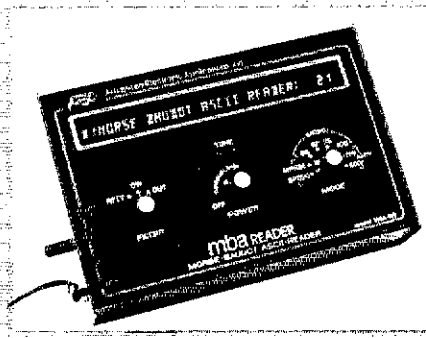
MBA READER™, A NAME YOU SHOULD KNOW



What does MBA mean? It stands for Morse-Baudot and ASCII. **What does the MBA Reader do?** The RO model (reader only) uses a 32 character alphanumeric vacuum fluorescent display and takes cw or tty audio from a receiver or tape recorder and visually presents it on the display.

The copy moves from right to left across the screen, much like the Times Square reader board. **Is the AEA model MBA Reader different from other readers?** It certainly is! It is the first to give the user 32 characters of copy (without a CRT), up to five words at one time. It can copy cw up to 99 wpm and Baudot at 60-67-75 and 100 wpm. Speeds in the ASCII mode are 110 and hand typed 300 baud. The expanded display allows easy copy even during high speed reception.

The AEA model MBA has an exclusive automatic speed tracking feature. If you are copying a signal at 3-5 wpm and tune to a new signal at 90 wpm, the MBA catches the increased speed without loss of copy.

The MBA Reader allows a visual display of your fist and improves your code proficiency. It is compact in size, and has an easily read vacuum fluorescent display.

The Reader operates from an external 12 VDC source. This allows for portable/mobile or fixed operation.

Check the AEA model MBA Reader at your favorite dealer and see all the features in this new equipment. If your dealer cannot supply you, contact

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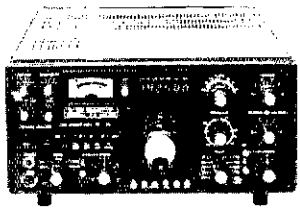
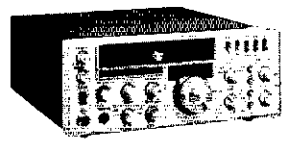
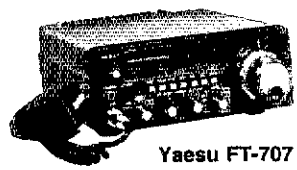


Yaesu FT-101ZD Mark III
now includes FM, APF & Notch Filter

Yaesu FT-207R



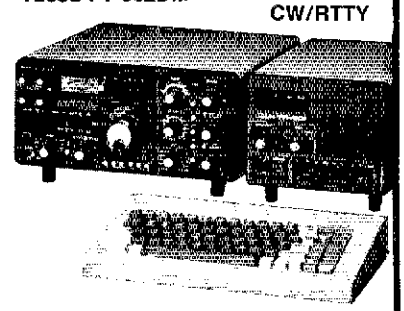
Yaesu FT-107M



Yaesu FT-707

Yaesu FT-902DM

Yaesu YR-901 CW/RTTY



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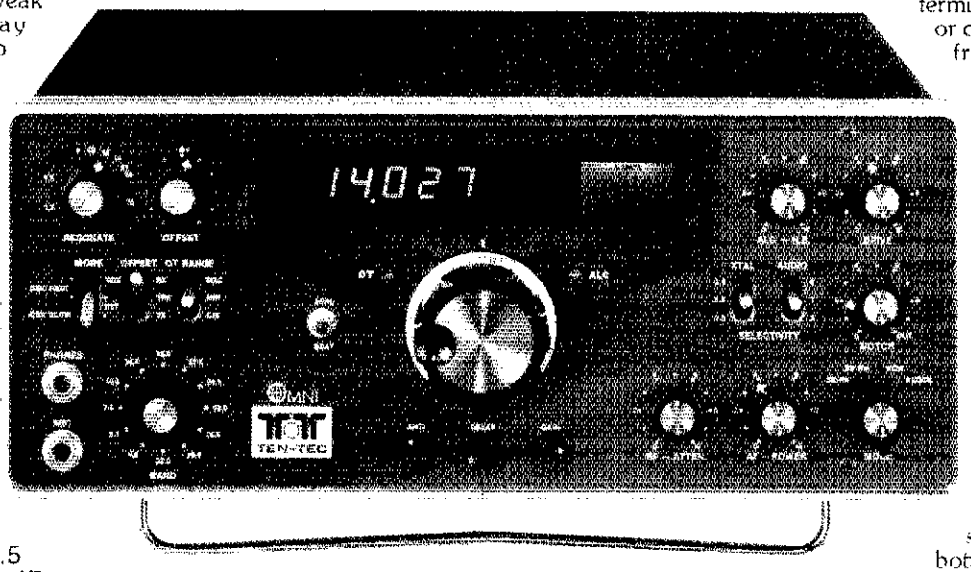
The Rig That Filters The Crowd



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OMNI-C has what it takes to filter the crowds. To narrow the Amateur Radio world right down to the particular signal you want. The selectivity, sensitivity, dynamic range and operational features you need to cut any crowd down to size.

Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

Standard filters include an excellent 8-pole 2.4 kHz crystal ladder filter and, in addition, a 150 Hz active audio cw filter with three ranges (450, 300, 150 Hz).

Optional filters include 1.8 kHz 8-pole crystal ladder ssb filter, 500 Hz 8-pole cw filter, and 250 Hz 6-pole cw filter.

Front panel switches put any optional filter in series with the standard filter for up to ***16 poles of filtering*** for near ultimate skirt selectivity.

Four i-f response curves for ssb and three for cw. That's response tailoring, that's crowd control.

Optimized sensitivity and dynamic range. The OMNI sensitivity range of 0.3 μV typical (slightly less on 160 & 80M) combines with a 90 dB dynamic range to provide an ideal balance that will handle any situation from copying a weak signal half way 'round the world to keeping the next-door kilowatt from muscling in. And a PIN diode switched 18 dB attenuator is included for extra insurance against overload.

More crowd-handling features—and all standard equipment.

Built-in notch filter. To drop out unwanted signals or carriers. Tunable from 200 Hz to 3.5 kHz, with a 50 dB notch depth.

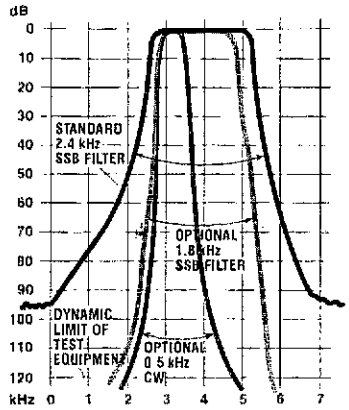
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, ±500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

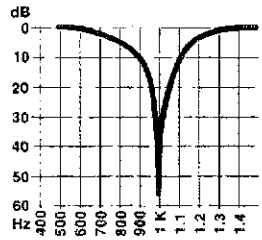
2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any crowd.

All solid-state—from the pioneer, Ten-Tec.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.



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All 9 hf bands—only crystals are needed for 18 and 24.5 MHz bands.

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"Hang" AGC for smoother action.

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Separate receiving antenna capability. Switch receiver to a common antenna for transceive or separate receive-only antenna; the system also acts as receiving antenna by-pass with an instant break-in linear amplifier or transverter.

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100% duty cycle on all bands up to 20 minutes. Full RTTY and SSTV power.

Built-in VOX and PTT with front panel controls.

Built-in phone patch jacks for easy interface.

Built-in zero-beat switch for spotting the exact frequency of a DX station.

Built-in adjustable sidetone volume and pitch.

Adjustable threshold ALC, optimum power for driving a linear. Provides means of working into a high SWR.

Front panel control of linear or antenna. The rear panel bandswitch terminals control relays or circuits in step with front panel bandswitch.

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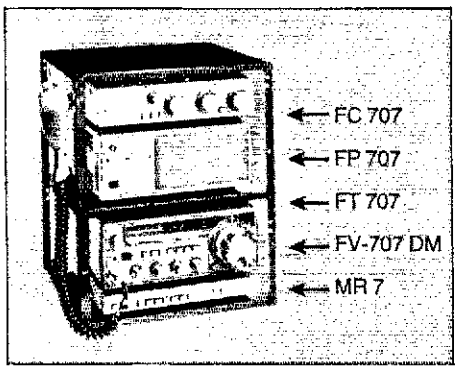

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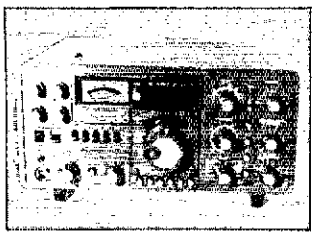

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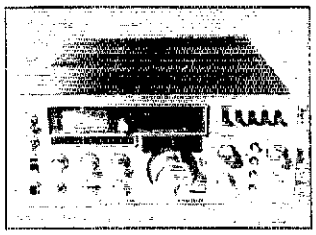

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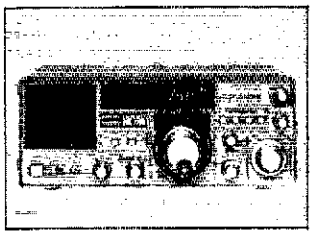

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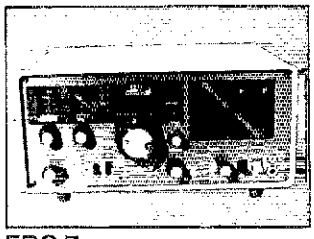

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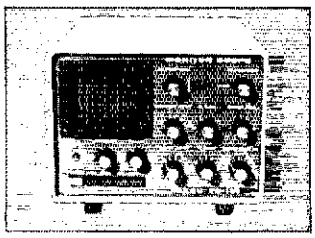

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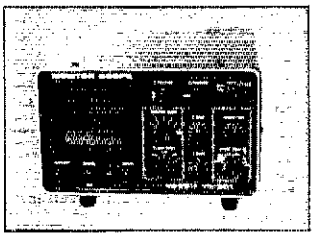

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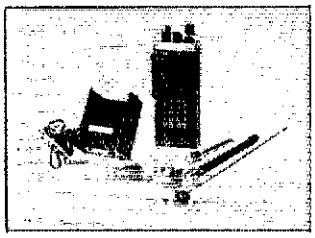

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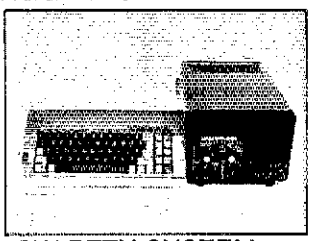

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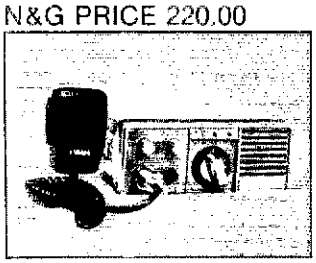

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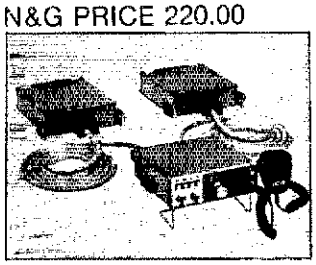

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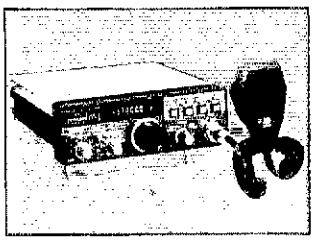

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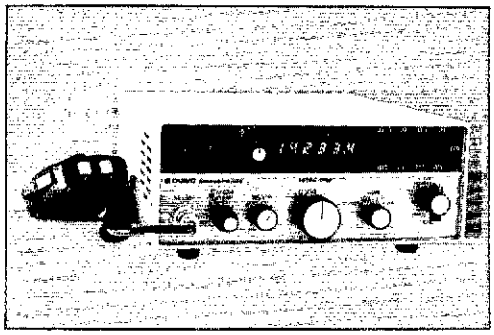

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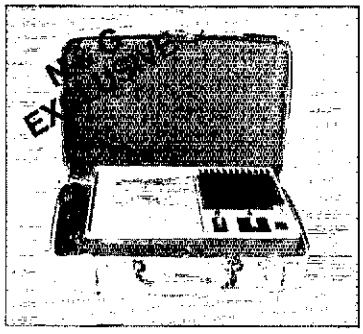

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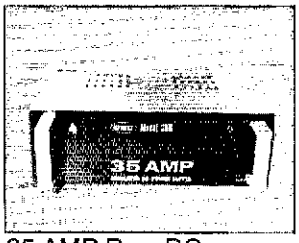

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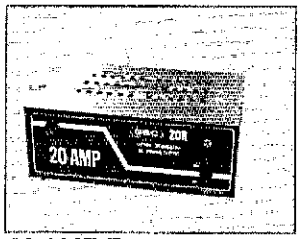

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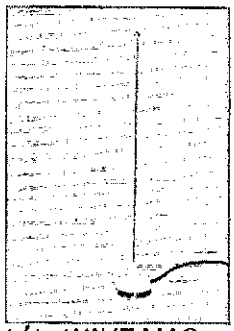

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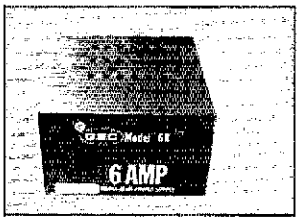

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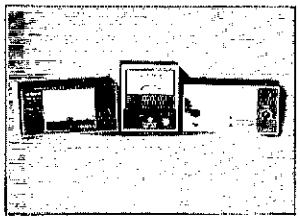

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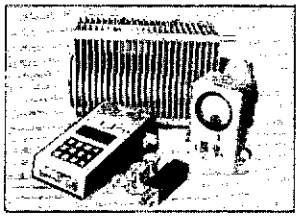

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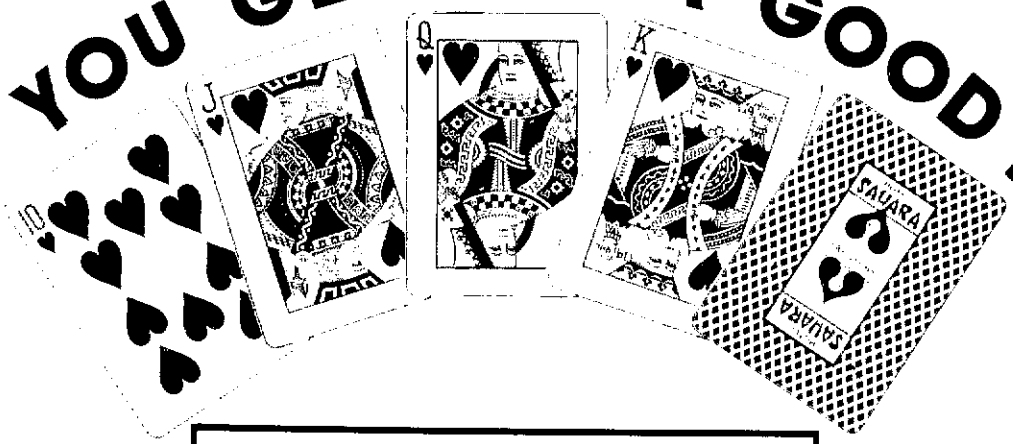

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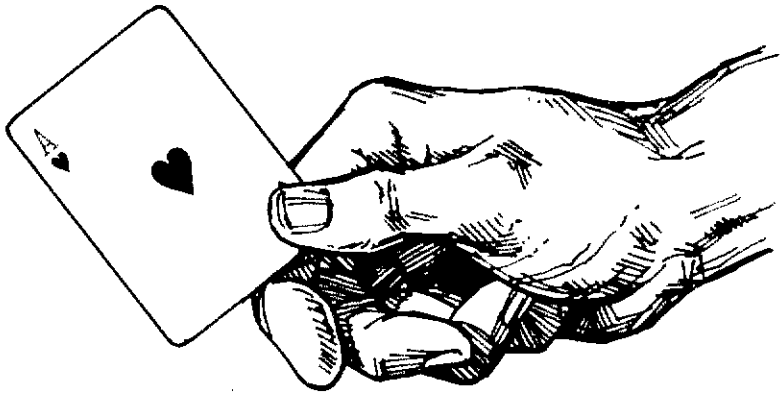

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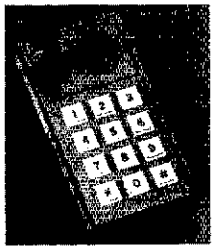

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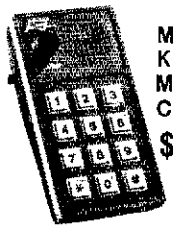

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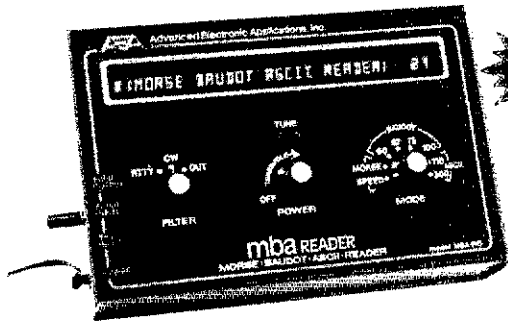

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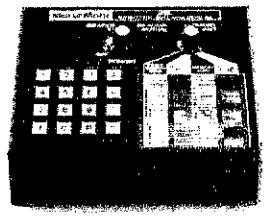

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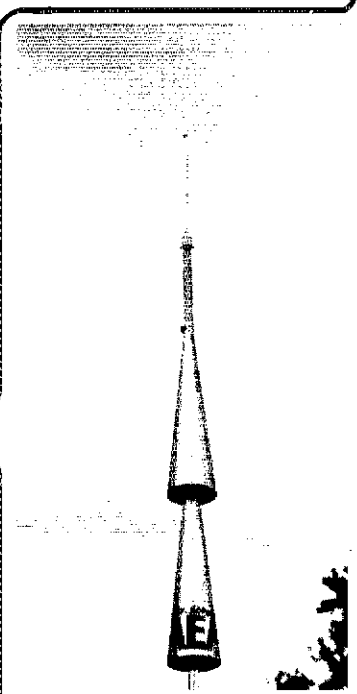

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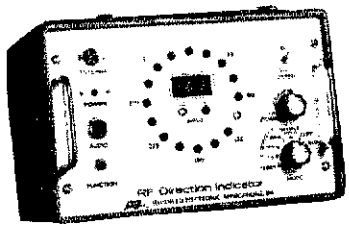

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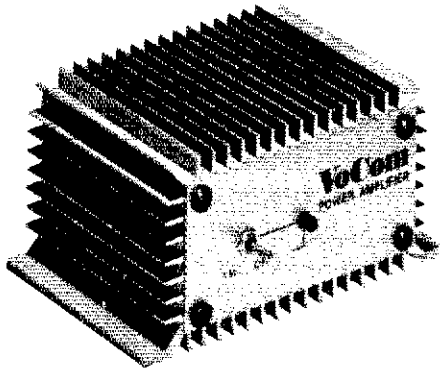

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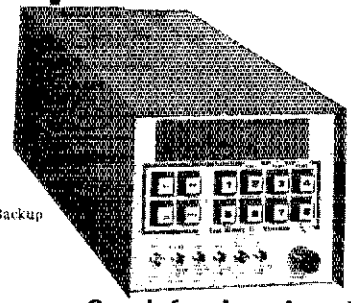

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SELL Kenwood TS-820S cw filter excellent, carton, and service manual $650 Art Rauch, W4VZ, 10950 SW105 Ave., Miami, FL 33176. Phone 305-274-9709.

FOR SALE: Kenwood '820 with digital display & cw filter. Like new with carton & manual $850 Ronald Breecher WA2EUN, 21 Rogers Rd., Great Neck, NY 516-466-2121.

WANTED: Drake TV-5200-LP low pass filter. N5DUB, 252-B Suburban, Enid, OK 73701.

ATTENTION Collins Collectors: Mint condition Collins accessories: 75A-4 manual, last series, $25. Mechanical filter adapters, with filters, never used: MFA-2, 353A-31, $45 each. Entire package $95 John Werner 313-759-4539.

HEATH HW101 HP23B p.s., c.w. filter, housed speaker, factory aligned, phone patch connection, perfect, demonstrateable $315 plus shipping. B. Frank, N4CWD, 8206 N.W. 93 Ave., Tamarac FL 33321 305-722-5949.

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PAIR of 3-500Z new, never been used. $150 firm, Cory Leland, RT 1, Kiester, MN, 56051 Phone 507-294-3745.

FOR SALE: Yaesu FT101B, excellent condition $500., W3IV, 301-460-9293.

DX-NEWS-PRESS no ads, no politics, no nonsense. DX information only. Money back guarantee. $18/yr U.S. $23/yr Frgn. Box 3301, Ontario, CA 91761.

NEED five fahnstock clips, K2VGV.

FOR SALE: SB301, SB401, SB600, SB610, SB620, excellent condition, $500. W3IV, 301-460-9293.

DGM MVD1000. Morse only with Sony monitor, $275. Joe Williamson KB5YA Killeen, TX 817-699-7697.

DRAKE TR-3, RV-3, AC-3, SWR, Turner 454X microphone. $375. Dennis Quinn, 1680 Washington Street, Verona, WI 53593 1-608-832-4459.

DRAKE Twins T4XB-R4B power supply and speaker excellent condition $700. KB4SN 615-688-1881 nites 688-2129 Knoxville, TN 37918.

ESTATE SALE: Complete Ten-Tec station 546 Omni-D, 252 M/O power supply, 645 Keyer, 215 PC mike, $800. KA8KAW, 616-652-6544.

TUBES 4CX250B $22. Sockets $4. Chimmeys $2 JAN 6816/RCA 26720 $35. 4X150A $15. Plus post $2. SB303 $210. KB4NH 956 E. Seminole Dr. FL 33595 813-493-6303.

ATLAS family jewels: 210XLE, nb, VOX, 200PS, $500; 215X, VOX, 200PS, $400; 110L xcvr, $200; UPS prepaid W8JWX 304-523-2754.

SEND S.a.s.e. for list with low prices of closeout of many fine quality radio, TV and laboratory test instruments. W5AMK, Box 3751, Temple, TX 76501.

DRAKE TR-7/DR-7, PS7 and accessories all mint cond. $1575. Vibroplex bug excellent cond. You ship. WA2LYZ 609-627-5683.

FIELD DAY: 5kW water cooled generator on trailer $150, 2-1/2 kW generator air cool — $150, cleaning shack of 25 years of stuff, older Collins, Harvey Wells, Heath, RTTY, Johnson, surplus, etc. s.a.s.e. for list. R. LaBrenz K8HES, 940 W. Hampton, Essexville, MI 48732.

YAESU FRG-7700 and MU-7700, mint, $550. 50-foot roll of new RG-17/U, $30. Want reasonably priced 75S-3/B/C. S.a.s.e. inquiries, please. N1FB Paul K. Pagel, 4 Roberts Rd., Enfield, CT 06082.

ICOM '720A, PS-15, SP3 mint, new warranty less than 6 mos. old, 1 hour use. $1125 I-ship Yaesu FT-227R Memorizor with AED scanner $225. WB4KSP, 904-269-5153.

HALLICRAFTERS SX-100 for sale. Works fine. $125. Dobbs 1746 Clarkson Rd. #G Richmond, VA 23224.

WANTED: Ten-Tec 405 amp. KBØWF/WBØPWE 316-421-8468 3164 Belmont Parsons, KS 67357.

WOW! Complete Heathkit station. HW-101 with ps, cw filter, matching speaker and mike. Less than 20 hours. Factory aligned by Heath. SB-200 linear amp (includes 10 meters) with new spare finals. Less than 2 hours operation. Never used HD-73 rotator with 150' 8-cond. cable. All with manuals. Over $1200 value for $875. Package deal only. You pay shipping. WD5IMA Jerry Reeves, Box 483, Carthage, TX 75633 214-693-7296.

WANTED, Yaesu FL-110 amp. KA6OOW, Box 723, Morro Bay, CA 93442.

FOR SALE: Model 15, Teletype, TD, power supply and steel table, operational, best offer. Cash and carry. Tel 203-435-9331, call after 6 PM WA1BAL.

HEATH SB-104 upgraded to SB-104A. SB-604 speaker and power supply, SB-644A remote VFO. Excellent condition. Package only $425. WA1GOO, 203-853-4716.

WANTED: Complete set of coils (with frame, index scale) for National HRO-7 receiver; freq. 480-960 kHz. Also, would like to buy an SOJ-2 Select-O-Ject (with cord) for above. Will purchase complete receiver, if necessary. Roy H. Wilkinson, 10041 Penn. Ave. S, Bloomington, MN 55431, Call collect after 12:00 noon CST 612-884-6875.

WANTED Collins: 30L1, 30S1, 75S3C, KWM2A. Also RCA uhf TacTec. W9QYH, 1605 Ridge Road, Green Bay, WI 54304.

DRAKE station T4XC-R4C-4NB-AC4-MS4, rare C4 console-Etek FR4 digital readout extra filter crystals all mint. $1200. KB4SN 615-688-1881 Nights 615-688-2129 Knoxville, TN 37918.

KENWOOD TS820S, VFO-820, SM220 W/BS8, SP820, MC50: $850 Henry 2K-3 w/spare 3-500Z finals: $600. Ken — K1KNM, P.O. Box 317, Carver, Mass, 02330 617-866-2622.

COLLINS 75S-1 w/cw filter, notch, manual, $225/offer. Heath HW-101, ac & dc ps, cw filter, manuals, $300/offer. Dave Wells, KD6TC, P.O. Box 27373, Oakland, CA 94602. 415-531-2800.

MUCH Wanted: Four channel control cable and head for RCA Series 700 VHF-FM xcvr, needs 6 crystal modules also. (conversion project) Chris Hazlitt KL7FB. Box 1476, Anchorage, AK 99510 907-274-9090.

NATIONAL: NCX-5 xcvr VX-501 VFO-XCV-27 xtl calib. Heath phonepatch manuals & schematic excellent $350 U-ship. Ken KC9AIJ ex-WB9MIP ph. after 5:00 608-935-5424.

MADISON January TS830S, TS130S call; TS530S plus filter, microphone $799.; Drake Theta 7000E/monitor $1095.; New Drake TR5 $995.; Icom IC25A $309.; IC720A/AC $1298.; IC730 $729.; IC22/U $250.; New Santec 2 meter transceiver — call; ST7 440FM $299.; Robot 800A $749.; 400 $675.; Hal CT2100 $699.; Yaesu FT101ZD/MK3 $799.; FT208R $299.; FT101ZD $699.; Kenwood service manuals — stock; antique tubes — call; New Hygain TH7DX $399.; Belden RG8 foam 8214 36c/ft; RG213 8267 43c/ft; 9405 heavy rotor cable 45c/ft; Amphenol silverplate PL259 $1.; complete service. All items guaranteed. Prices FOB Houston. Include sufficient postage. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268.

SELL Navy GO-9 for best offer, pickup only. LM-13 $30 plus shipping; 8MF 2kV oil-filled capacitors $6 plus shipping. Sandy, K6HE, 714-745-6940 after 0900 PST.

MOTOROLA gear: 2-VHF HT-220 Slimlines, UHF Slimline, 6 channel VHF omni, UHF MX320, MX360 case, MX speaker mic, misc. MX parts, Yaesu SP901, CDE rotor; make offer 212-268-2654 N2HA.

YAESU FRDX-400 receiver with two and six $195. Gonset Sidewinder six meter transceiver $50. Heath SB-401 transmitter $175. 8548 Georgetown Pike, McLean, VA 22102 703-893-8383 W4URL.

FOR SALE - complete only ARS w/manuals; Shure #444 mic; MFJ-cw filter; 10-80 m HyGain vertical ant.; 50' RG-8U coax; Radio Shack wattmeter/SWR/ant. switch; Hallicrafters FPM-300 MKII, ssb/cw trans. w/key 10-80; $465.; N8CJI, 419-782-5913 after 4:00 P.M. EST.

DRAKE MN-7 antenna tuner $120. Atlas RX-110 receiver $120. Icom IC-215 2 meter portable $100. UPS brown incl. W6HVN Box 833 Altaville, CA 95221.

MADISON Kenwood January: Factory direct rebate TS130S $30; with PS30 — $50.; TR9000 — $35.; R1000 — $30. rebate. Forms with purchase. Call price reduction TS530S, TR7800, TR7850. New low price TR7730 with MC46 — call. Prices FOB Houston. Madison Electronics 1508 McKinney, Houston, TX 77010. 1-713-658-0268.

SALE: Estate of Zachary Reynolds W4TXL Collins, Heathkit, Hallicrafter, Henry, Yaesu, Kenwood, Johnson, National, Signal-One, Drake xmtrs. rcvr's, transceivers, monitors, power supplies, amplifiers, transmatchs, ant. phaser, new replacement tubes for most units: Triplett, Eico, Sencore, B&W, Bird, Autek, Westinghouse, RCA, Heathkit test equip., scopes, Continental custom amp — too large to ship; 4 500-ft spools RG 17A/U coax, 2 200-ft spools RG 14A/U coax, Big Bertha rotator pole, multi-Yagi; misc. new ants. in original boxes. All freq. D. Reynolds, 300 Wellington Rd., Winston-Salem, NC 27106. 1-919-765-3053, 1-919-996-2019.

SALVAGED 250-foot AM broadcast tower, similar Rohn 55, $10./ft., will separate. Base and guy insulators available. Don Bishop, NØEA. 303-363-8070. Tim Cutforth, WAØMGJ, 303-935-1156.

FOR SALE: Heath SB-301, SB-401, SB-630 console, speaker & access — best offer Jim Taylor, K9JT, 6720 N. 75th St., Milwaukee, WI 53223 414-353-1977.

FT-101EE, fan, cw filter, $495. FR-101S, 3 filters, extra crystals, $275. FTV-250, two meter transverter, $175. FT-620B, six meter transceiver, $295. K2MRU, 201-391-2166.

EXCELLENT Drake station — T-4X, R4-A, AC-4 and MS-4 including manuals $575. WA7ACQ, 1401 S.W. Cloverdale St., Seattle, WA, 98106 206-767-3639.

FOR SALE: Atlas 210X/nb, digital display, dc cable, $430. Kantronics Mini-Reader, $230. Johnson 275W. Matchbox/SWR, $70. Daiwa RF670 processor, $70. Heathkit HD-1410 keyer, $35. Autek QF-1 filter, $35. Turner desk mike/AGC, $30. AEA CK-1 contest keyer, $90. Prefer sell to Bay Area amateur. Package deal available. H.I. Shieber, K7HI, P. O. Box 395, San Francisco, CA 94101.

KENWOOD TS-520S. Less than 30 hrs total. Mint condx. 160-10M & WWV. Must sell. $420. Call John Dunham, WA1MOW/6, 714-692-7180 bus. hrs., 714-756-4240 eves.

SWAN 350, ps/spkr $250.; EV-727 mike, $7; Autek filter QF-1A, $50 KB2PD 201-270-5395.

SELL: Tempo 2020 10-80m ssb am with cw filter ac/dc sup nb 100 kc cal $350 WA4ASF, 813-863-3358.

SELLING MMT 1296 mint, cover never off $350. Klitzing 2m 180W. puts out 220W. @ 36A. $250. MMT-432S Mint $275. Klitzing 70 cm 110W. mint $275. WA5THJ Box 409 Liverpool TX 77577. 713-581-2619.

FOR SALE: Mint, little used, TI 59 Calculator Outfit. *PC100A printer. Aviation, Marine Navigation*, Leisure, Math, Business Software Packages. Cigar plug cord. Many extra magnetic cards. Extra paper. All manuals plus additional TI publications. Users Group Newsletters. $395. Prefer sell in Bay Area. H.I. Shieber, K7HI, P.O. Box 395, San Francisco, CA 94101.

FOR SALE: Collectors item. Table model metal Atwater-Kent radio cabinet. Dates in 1920s-1930s. W3QJM, 2818 Oak Ave., Altoona, PA 16600.

1982 CALLBOOKS! Set $31. postpaid. K4CLA, 562A Oak, Lexington SC 29072.

H8 with 48K memory, H-17 dual floppy-$1000. KWM2 with q-mult, hbrew power supply, SB650 digital display $550 WB8GGM 419-468-1438.

WANTED: Ten Tec 405 amplifier — Mitch, K6VPN, 271 Madison Avenue, San Bruno, CA 94066.

COLLINS late model (RE) S-line. 75S-3C, 32S-3A, 516F-2, 312B-3, DX Engineering processor, 500 CPS filter, Cover Craft covers, factory boxes and manuals $1,600. Dave, WA6YOC, P.O. Box 126, Tiburon, CA 94920, tel 415-383-4545.

FOR SALE: Drake MN2700 matching network with balun, $200 WØMYE, 650 Daphne St., Broomfield, CO 80020.

SUPERBOARD II RTTY program. $65. Free details. Bob Pearson, 99-060 Lohea, Aiea, HI 96701.

IC-211 multimode 2-meter transceiver for sale. With low-noise preamplifier. $400. Stan Horzepa, WA1LOU, 72 Stiles St., Waterbury, CT 06706.

SELL: 6 Callbooks, oldest 1929; other electronics books. List s.a.s.e. K6WM, 850 Groff, Pomona, CA 91768.

THREE 4D32 transmitting tubes, unused, in original cartons, $75. each. Sam, W5TVG, 918-747-5542, Tulsa, OK.

(ROHN TOWERS) wholesale direct to users all products available — write or call for price list, also we are wholesale distributors for Antenna Specialists and Regency fm radios — Hill Radio P. O. Box 1405-2503 G E Rd., Bloomington, IL 61701 309-663-2141.

WANTED: Radio Amateur Handbook, catalogs (WRL, Allied, etc.) before 1961. Mint HR060 with coils. W7EDO, Mike 1-602-954-0586 evenings.

WANTED Swan 510X WØNIT 920 West Adams, Pueblo CO 81004 303-544-1654.

SELL: Clean FTDX570 $350, FL2000 $375, FT101ZD $550, FTV901R complete $550. Prices include U.S. shipping. Consider trades for late serial 75A4, mint HRO60, Johnson Invader. W7EDO, Mike 1-602-954-0586 evenings.

CRYSTALS: Build something! Good starter, QRP crystal oscillator, we'll supply the crystals and sockets. FT-243's General, Novice, any frequency .01%, 7000-8700 kilocycles $1.75, minimum five $1.50 each. 3500-4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50c, Airmail 25c per crystal. "Crystals since 1933. WØLPS. Stamp for 1700-60000 kilocycles listings-circuits. C-W Crystals. Marshfield, MO 65706.

DRAKE R4C, loaded with xtals and filters, T4XC with spare finals, AC-4 power supply. Mint. $795. WØFLG Rte. 1, Box 1361, Branson, MO 65616 417-338-2128.

3 KSR Teletype's excellent condition $175. ea my QTH. G. E. Kammerer K4HCD, 2676 Orchid Ave., Charleston Hgts, SC 29405 803-554-9664.

COLLINS: KWM 2/A noise blanker, new $75, 351R2 rack, new. $35. Both in sealed boxes. Schaaf, 807 Sunbeam Circle, Oneida, WI 54155. 1-414-434-2938.

ATTRACTIVE 8 x 10 certificate for mounting amateur radio license. Suitable for frame mounting, $2.50. AJØP, 8400 Eastwood Rd., Minneapolis, MN 55432.

HAMMARLUND SP400X receiver, with power supply, speaker, and manual, $125. Will deliver 100 mile radius. Call Mark WA2WOV 201-875-9279.

ALPHA 76 linear, with spares, $1000. Howard, WB8QHQ, 7649 Westover Ct; Fair Oaks, CA 95628 916-961-0320.

FOR SALE: R-390 & manual $225; 75S3B round 3 filters $450; SB-650 $100; 3BP1 tube $10; 3AP1 tube $10; IO-4555 Scope (new) $225; A-744 Cushcraft kit $40; Cushcraft A4 boom $20; Dual PS23 on rack panel $100. Russ Lawson K1MOU, Box 46, West Suffield, CT 06093, 203-668-2871.

HEATH SB104A/cw filter/n.b./HP 1144/SB604 — $500, SB644A — $75, SB614A — $125, Ten Tec Century-21 w/keyer $225. All mint, K4SUE D. Sowers 522, McGeorge Dr., Vinton VA 24179 703-890-2372.

FOR SALE: Mint Argonaut 509, PS, cw filter, calibrator $285. Amplifier 405 & ps $190. W6TZA, 4594 Las Lindas Way, Carmichael, CA 95608 916-967-3588.

KENWOOD TS700S with Janel PM-1 preamp, repeater sub band kit SP70 speaker and service manual $525. Mirage B1016 and 30 amp dc supply $310 All excellent, will ship KB5MR 918-299-9645.

COLLINS R-648/ARR-41 receiver, SBE-33 transceiver, W7ISJ, 602-885-6008.

NEED cash!! TS-520S w/cw filter, $475. K3JZH 717-876-0180.

LIKE NEW Tempo One. Power supply and speaker, digital frequency read out and new trans match. $450. Will ship COD certified check only. WD8DFQ 313-758-7806 Jerry Miller.

FOR SALE: R820 receiver. Joe, WB5YKD, 1409 S.W. 66th, Oklahoma City, OK 73159. 405-681-5884.

MN-2000. Flawless. Shipped postpaid, 1st $130 m.o. AE7M: 2544 N.E. Morlan, Gresham, OR 97030.

YAESU FT-101. 110 and 12 volt cords plus base microphone with 2000 W Heathkit linear amplifier. Both units $900. A-1 condition guaranteed. $500 each separate. 805-937-2493. P. Snow.

MINT Heath twins SB-301 SB401 $360, WB2LCV 609-646-0231.

DENTRON 3000A ant. tuner (new) $200. SBE cb rig converted to 10 meters $100. Heathkit HW32 40 meter rig $75, with spk & p/s KA9BEN S. Hart R. R. #2, Sterling, IL 61081. 815-626-0231.

DRAKE TR-22 2 meters fully crystalled excellent cond. w/touch tone mic., $99. 40 ft. Wooden tower $80. WB2EAZ, 203-742-7212.

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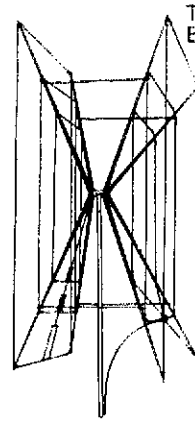

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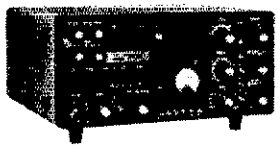

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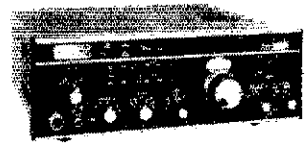

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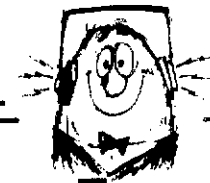

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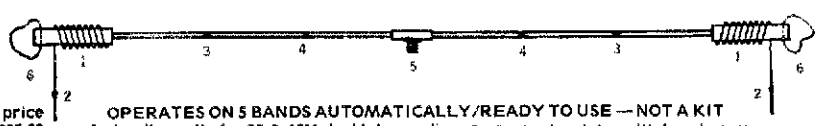

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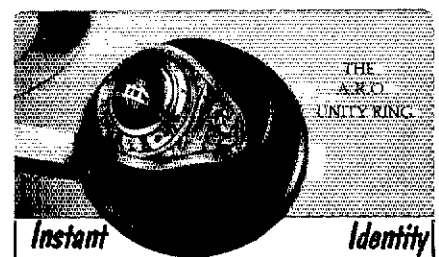

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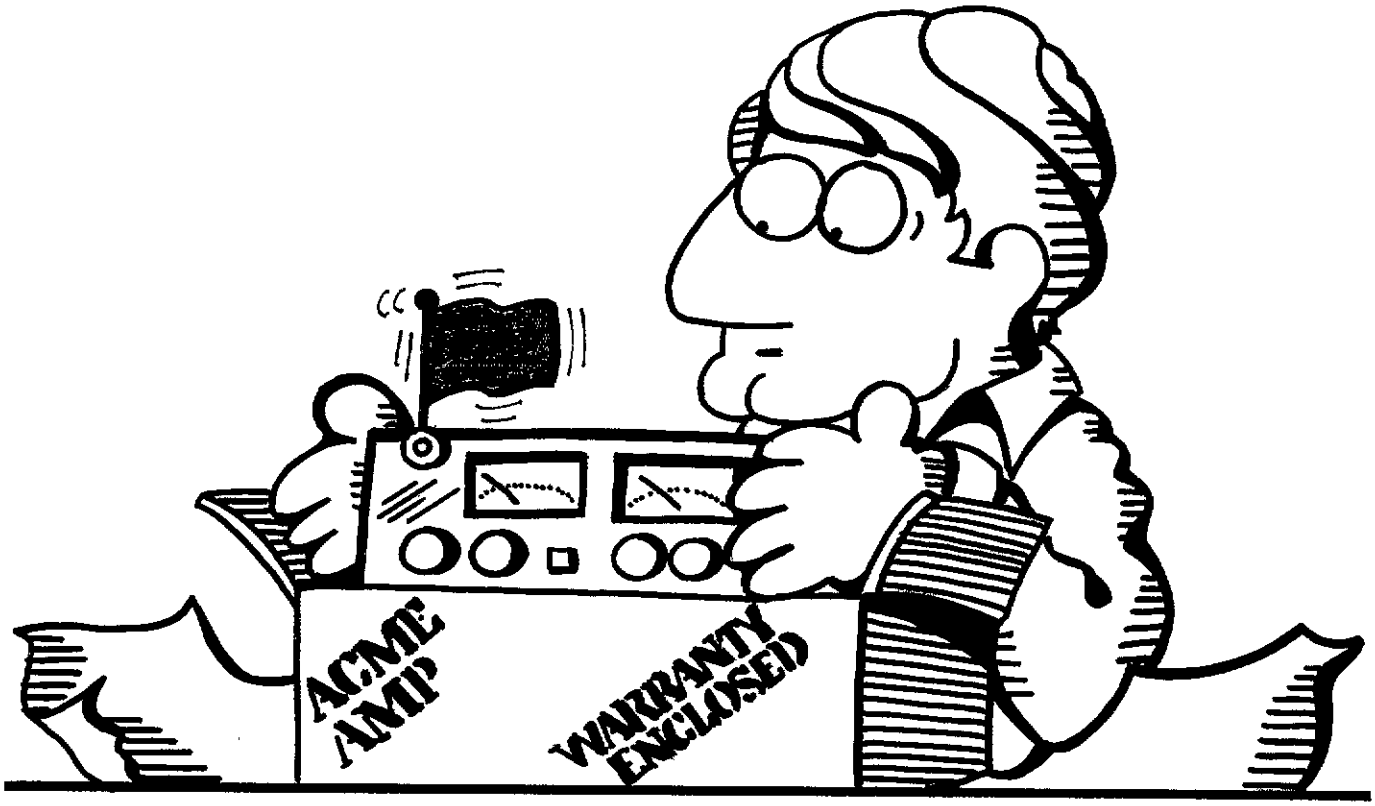

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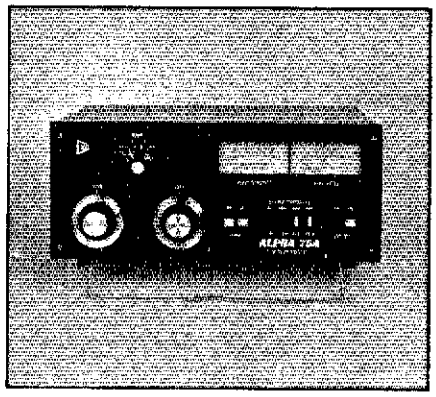

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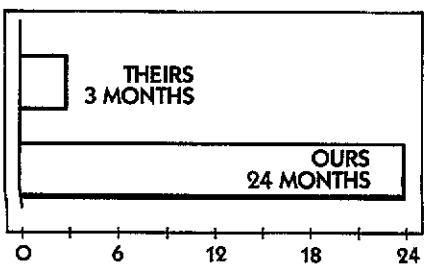

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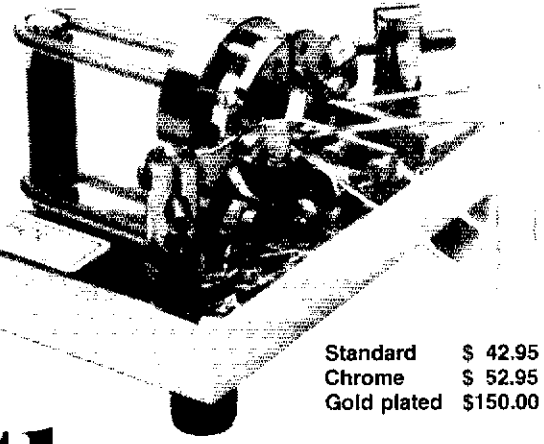

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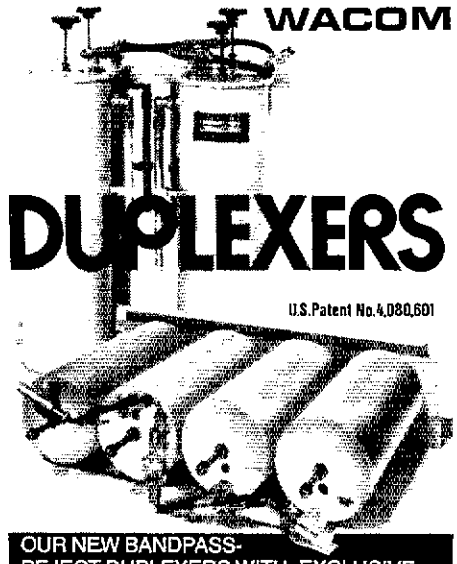

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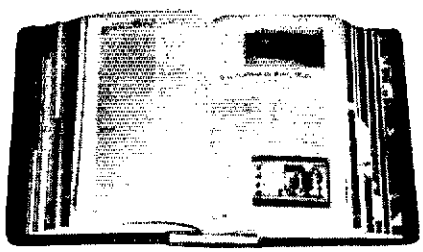

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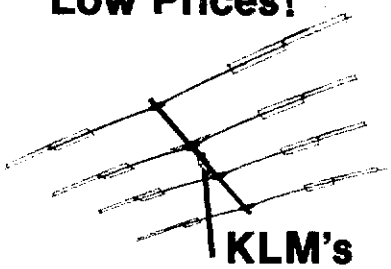

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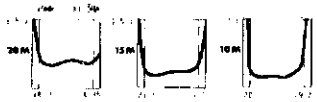

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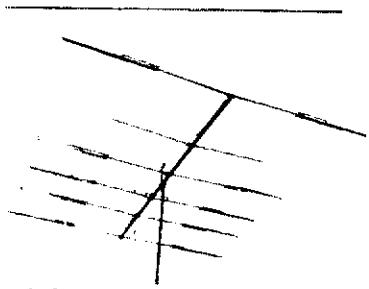

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432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

CALL FOR OUR LOW PRICES ON OTHER KLM PRODUCTS!

MINI-PRODUCTS

HQ-1 Mini-Quad Compact 20/15/10 mtr. Antenna $139

ROTORS & CABLES

Alliance HD73 (10.7 sq. ft. Rating).	$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	$ 45
CDE Ham 4 (15 sq. ft. Rating)	$169
CDE Tailtwister (30 sq. ft. rating)	$239
HYGAIN HDR-300 (Most H.D. Rotor for BIG Arrays)	$399
KENPRO KR 500 (Heavy Duty Elevation Rotor)	$179
8 COND (2-#22GA./6-#18GA.) Rotor Cable.	$0.19/ft.
H.D. 8 COND (2-#16GA./6-#18GA.) Rotor Cable	$0.36/ft.

COAXIAL CABLE & CONNECTORS

RG213/U (95% shield - non-contaminating jacket)	$0.29/ft.
RG8X (95% shield-non contaminating jacket).	$0.18/ft.
RG11/U (75 OHM - 95% shield)	$0.35/ft.
½" Aluminum Hardline w/poly jacket	$0.69/ft.
½" Copper Hardline w/poly jacket	$1.10/ft.
½" Alum. H.L. Conn (UHF or N - Male or Female).	$15.00
½" Copper H.L. Conn (UHF or N - Male or Female)	$22.00
Amphenol Silver Plate PL259	$ 1.25
Amphenol Nickel Plate PL259	$ 0.90
Amphenol N Type Male Conn For RG213/U	$ 2.95

HYGAIN CRANKUPS

HG37SS	37 ft. Self Supporting	$529
HG52SS	52 ft. Self Supporting	$839
HG54HD	Heavy Duty 54 Ft. Self Supporting.	$1629
HG70HD	Heavy Duty 70 Ft. Self Supporting.	$2299
HG50MT2	50 ft. Side Supported.	$699

MOTOR DRIVES AND OTHER TOWER ACCESSORIES IN STOCK – CALL!!

ROHN TOWERS

20G – $32.50 25G – $38.50 45G – $87.50

HBX32	32 ft. Free Standing (rated 10 sq. ft.)	$169
HDBX32	32 ft. Free Standing (rated 18 sq. ft.)	$189
HBX40	40 ft. Free Standing (rated 10 sq. ft.)	$229
HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	$259
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
FK2548	48 ft. 25G Foldover Tower	$719
FK2558	58 ft. 25G Foldover Tower	$799
FK2568	68 ft. 25G Foldover Tower	$879
FK4544	44 ft. 45G Foldover Tower	$1019
FK4554	54 ft. 45G Foldover Tower	$1119
FK4564	64 ft. 45G Foldover Tower	$1219

Foldover Towers Freight Paid-10% Higher West of Rockies.
ALL ROHN ACCESSORIES IN STOCK – CALL!

GALVANIZED STEEL TOWER HARDWARE

3/16" EHS Guywire (3990 lbs.).	$12/100 ft. $111/1000 ft.
1/4" EHS Guywire (6000 lbs.)	$15/100 ft. $139/1000 ft.
5/32" 7 x 7 Aircraft Cable (2700 lbs.)	$11/100 ft.
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$0.30
1/4" CCM Cable Clamp (1/4" Cable).	$0.40
1/4" TH Thimble (fits all sizes)	$0.25
3/8 EE (3/8" Eye & Eye Turnbuckle)	$5.50
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$6.50
1/2 EE (1/2" Eye & Eye Turnbuckle)	$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)	$9.50
3/16" Preformed Guy Grip	$1.65
1/4" Preformed Guy Grip	$1.85
6" Diam - 4 ft. Long Earth Screw Anchor	$12.50
2" Diam - 10 ft. Long Heavy Duty Steel Mast.	$39.00
500D Guy Insulator (5/32" or 3/16" Cable)	$0.95
502 Guy Insulator (1/4" Cable).	$1.95
5/8" Diam - 8 ft. Copper Clad Ground Rod w/clamp.	$11.00

ANTENNA WIRE & ACCESSORIES

12 Ga. Solid Copperweld (Multiples of 50 ft.).	$6/50 ft.
14 Ga. Solid Copperweld (Multiples of 50 ft.).	$5/50 ft.
14 Ga. Stranded Copper (Multiples of 50 ft.)	$5/50 ft.
14 Ga. Stranded Copper (70 ft. coil)	$ 7.00
14 Ga. Stranded Copper (140 ft. Coil)	$ 14.00
18 Ga. Copperweld (1/4 mile spool)	$30.00
18 Ga. Copperweld (1/2 mile spool)	$58.00
Heavy Duty B&W End Insulator	$4/Pair
HYGAIN Model 155 Center Insulator	$ 5.95
HYGAIN Model 157 Center Insulator w/SO239.	$11.95
450 OHM H.D. Low Loss Ladder Line.	$ .14/ft.

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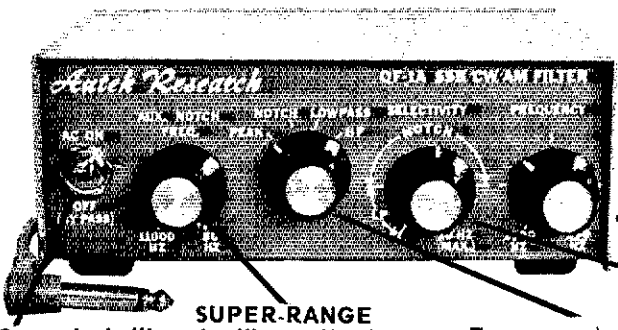

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QF-1A Active Filter

For SSB & CW

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Only $73 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

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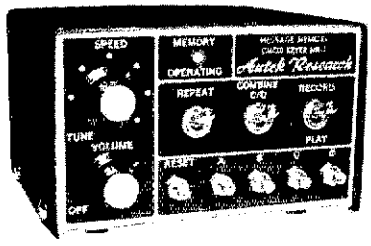
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST.**) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB,** and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3.000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $104.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very usetul for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF.** 5 to 50+ **WPM. LATEST CMOS FOR LOW CURRENT.** Built in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for IC's. Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

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Please Rush ppd. via Speedy UPS.

- ☐ QF-1A Filter at $73.00
- ☐ MK-1 Keyer at $104.50
- ☐ ME-1 Expander for MK-1 at $35 (factory installed)
- ☐ ME-1 Owner installed at $25 (save $10)

Add 4% tax in Fla. Add $3 each to Canada, Hawaii and Alaska. $3 for UPS air. Add $18 each elsewhere (shipped air).

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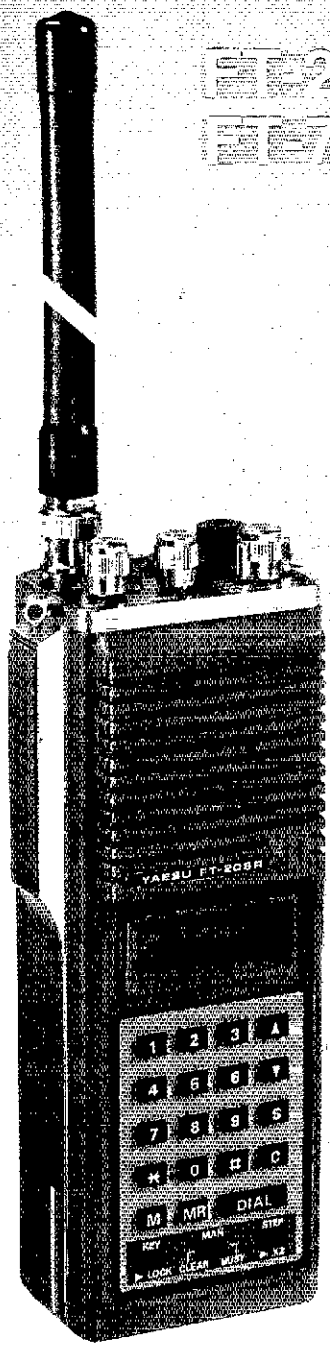
NO CUT CORNERS!

FT-208R — 2 Meters
FT-708R — 70 CM



LIQUID CRYSTAL DISPLAY
The LCD frequency readout provides high readability night and day, along with very low current drain.

KEYBOARD FREQUENCY ENTRY
All operating frequencies are entered from the front panel keyboard. Unusual repeater splits, scanning, and memory programming are all controlled via the keyboard.

UP/DOWN MANUAL SCAN
The FT-208R scans in either 5 kHz or 10 kHz steps, while the FT-708R steps are 25 kHz and 50 kHz. Automatic halting on a busy or clear channel is provided, with automatic pause and restart feature. Scan either the band or the memories.

LIMITED BAND SCAN
You can program upper and lower frequency limits, then command the transceiver to scan that segment or exclude that segment.

TEN MEMORY CHANNELS
The memories may be used for either simplex or repeater operation. No need to throw a "5 UP" switch for those 15 kHz channels, either!

LONG-LIFE MEMORY BACKUP
A Lithium cell provides the memory backup function. Now you won't dump memory when switching battery packs.

LOW CURRENT DRAIN
Typical standby current drain is 20 mA, for long battery life.

450 mAH BATTERY PACK
With more capacity than competing packs, the FNB-2 battery pack gives you those precious extra minutes of operating time that might prove critical in an emergency!

HI/LOW POWER SWITCH
In the high power position, the FT-208R packs a wallop at 2.5 watts output, while the Ft-708R output is 1 watt. Switch to low power for 1 watt output on the FT-208R, 200 mW on the FT-708R, for even greater battery life.

PRIORITY CHANNEL
A priority channel may be programmed from the keyboard, allowing you to check a favorite channel while operating on another.

AUTOMATIC BAND AND MEMORY SCAN WITH PAUSE/RESTART
Automatic scanning of the band or memories (or a segment of the band) with pause and restart feature.

16 BUTTON DTMF PAD
For autopatch operation, a 16 button dual tone pad is built into every FT-208R and FT-708R.

PROGRAMMABLE SPLITS
The popular ±600 kHz shift is standard (±5 MHz on the FT-708R) on the FT-208R. Odd splits of up to 4 MHz may easily be programmed from the keyboard. Additionally, a split memory/dial mode provides a third method of operating on unusual splits.

OPTIONAL 32 TONE CTCSS
Easy interface is provided to the synthesized SSY-32 CTCSS Encoder, providing all 32 common subaudible tones for repeater operation.

LOCK SWITCH
The keyboard lock switch allows you to disable entry from the keyboard, thus preventing inadvertent frequency change.

FULL LINE OF ACCESSORIES
A Yaesu tradition, a full line of accessories is available to maximize your enjoyment of the FT-208R and FT-708R.

For more than a quarter of a century, Yaesu has produced reliable, high-performance communications equipment for the Amateur and Land Mobile services. Contact us today for full information on our cost-effective line of HF, VHF and UHF transceivers — at Yaesu we want you to get your message across!

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282

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NEW

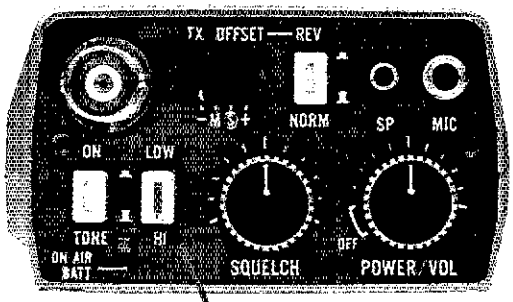
BIG performance... small size... smaller price!!!

TR-2500

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.

- **Extremely compact size and light weight**
  Measures 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches). Weighs 540 grams (1.2 lbs) with Ni-Cd pack. (Photo shown, actual size).
- **LCD digital frequency readout**
  Easy to read in direct sunlight or dark (with lamp switch). Low current drain. Shows frequencies and memory channels, plus four "Arrow" mode indicators.
- **Ten channel memory**
  Nine memories for simplex or ±600 KHz offset. "M0" memory for non-standard split frequency repeaters.
- **Lithium battery memory back-up**
  Built-in Lithium battery (estimated 5 year life) maintains memory when Ni-Cd pack is fully discharged or removed.

CONVENIENT TOP CONTROLS



- **HI/LO power output selection**
  Allows operation at 2.5 watts or 300 mw RF output.

Actual size

- **Programmable automatic band scan**
  Upper and lower frequency limits and scan steps of 5 KHz and larger (5, 10, 15, 20, 30 KHz, etc.) may be programmed. Scan locks on busy channel, resumes approximately 2 seconds after signal ceases.
- **UP/DOWN manual scan**
  Up/Down manual scan in 5 KHz steps.
- **Built-in tuneable sub-tone encoder**
  Sub-tone encoder, with activate switch, tuneable (variable resistor) to desired CTCSS tone. Optional TU-1 programmable (DIP-switch) encoder accessory available.
- **Built-in 16 key autopatch encoder**
  16 keys provide telephone dual tone modulation.
- **"SLIDE-LOC" battery pack**
  Slides into position, locks into place.
- **Reverse operation**
  Shifts receiver to transmit frequency, and transmitter to receive frequency.
- **Keyboard frequency selection**
  Sets operation frequency across full range.
- **Extended frequency coverage**
  Covers 143.900 to 148.995 MHz in 5 KHz steps.
- **Optional power source**
  Using optional MS-1 mobile or ST-2 AC charger/power supply, radio may be operated while charging. (Automatic drop-in connections.)
- **High impact plastic case**
  Provides extra strength to resist damage.
- **Battery status indicator**
  Flashes to indicate low battery charge level.
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.

Standard accessories included:

- Flexible rubberized antenna with BNC connector
- 400 mAH heavy-duty Ni-Cd battery pack
- AC charger
- Plugs for external microphone and speaker

More information on the TR-2500 is available from all authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Optional accessories:

- ST-2 Base station power supply and quick charger (approx. 1 hr)
- MS-1 Mobile stand/charger/supply
- TU-1 Programmable sub-tone (CTCSS) encoder
- SMC-25 Speaker microphone
- LH-2 Deluxe top grain cowhide leather case
- PB-25 Extra Ni-Cd battery pack, 400 mAH, heavy duty
- BT-1 Battery case for AA manganese or alkaline cells (Not Ni-Cd).
- VB-2530 RF power amplifier.
- BH-2 Belt hook
- WS-1 Wrist strap
- EP-1 Earphone

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